

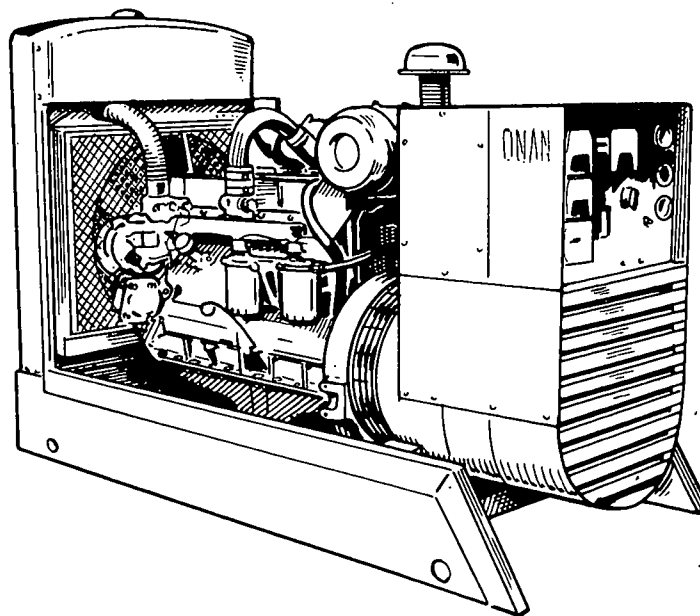
OPERATOR'S MANUAL AND PARTS CATALOG

FOR

DYA

SERIES

ELECTRIC GENERATING SETS



BEGIN SPEC. B

TABLE OF CONTENTS

TITLE	PAGE
Introduction	1
Safety Precautions	2
Specifications	4
Description	7
Installation	11
Operation	22
General Maintenance	27
Parts Catalog	29

The need for an international standard of measurement has been increased by today's improved communication and transportation between countries.

This has prompted formation of modernized metrics known as the International System of Units, officially abbreviated SI.

ONAN products appear on the world market, therefore both metric and the present American system of units (CU) will be found in this manual.

To assist in familiarization, refer to the following terms.

TERM	METRIC	ENGLISH
Length	millimetre (mm)	Inch (in)
Pressure	kilopascals (kPa)	pounds per square inch (PSI)
Mass (Weight)	kilogram (kg)	pound (lb)
Volume (Liquid)	litre	gallon (gal)
Power	kilowatt	horsepower (HP)
Frequency	hertz (Hz)	cycles per second (CPS)
Energy	Joules (J)	BTU
Battery Capacity	Coulomb (C)	Ampere Hour (AH)
Revolutions per Minute	r/m	rpm
Temperature	Celsius (°C)	Fahrenheit (°F)

The customary unit of Brake Horsepower (BHP) becomes kilowatts (kW) when converted to SI metric units. This kW rating should not be confused with the kW rating of the generator which will always be lower due to losses inherent with any electrical induction device.

WARNING

TO AVOID POSSIBLE PERSONAL INJURY OR EQUIPMENT DAMAGE, A QUALIFIED ELECTRICIAN OR AN AUTHORIZED SERVICE REPRESENTATIVE MUST PERFORM INSTALLATION AND ALL SERVICE.

INTRODUCTION

FOREWORD

This manual is applicable to the DYA Series electric generating set, consisting of an ONAN 60.0 kW, UR generator, driven by an ALLIS-CHALMERS 2900 Engine.

The manual is divided into two sections. Section 1 provides information on installation, operation and troubleshooting. Section 2 is a Parts Catalog for ONAN optional and standard equipment.

The manual should be used in conjunction with the engine manual, as your specific engine may have variations due to optional equipment available.

WARNING Onan uses this symbol throughout this manual to warn of possible personal injury.

CAUTION This symbol refers to possible equipment damage.

MODEL IDENTIFICATION

Identify your model by referring to the MODEL and SPECIFICATION NO. as shown on the Onan nameplate. Electrical characteristics are shown on the lower portion of the nameplate.

60.0	DYA	15R	/	1	F
1	2	3		4	5

1. Indicates Kilowatt rating (60 kW).
2. Factory code for SERIES identification.
3. 15 = 60 Hz. Reconnectible
515 = 50 Hz. Reconnectible
R—Indicates remote starting feature.
4. Factory code for designating optional equipment.
5. Specification letter. (Advances when factory makes production modifications.)

If it is necessary to contact a dealer or the factory regarding the set, always mention the complete Model, Spec No. and Serial No. as given on the Onan nameplate. This nameplate information is necessary to properly identify your unit among the many types manufactured. Refer to the engine nameplate when requesting information from its manufacturer. The Onan nameplate is located on the right side of the generator; the Allis-Chalmers nameplate is on the right side, on the engine block.

Left side and right side are considered when viewed from the engine or front end of the generating set.

SAFETY PRECAUTIONS

Throughout this manual you will find eye-catching flags containing Warnings and Cautions. These will alert you to conditions that could result in danger to you or the equipment, if the notice is ignored.

ONAN recommends that you read your manual and become thoroughly acquainted with it and your equipment before you start your unit. The accumulated experience of ONAN engineers is available to you, enabling you to operate your set in the most efficient and safest manner possible. These recommendations and the following safety precautions are for your protection. Study and know them!

REMEMBER. Most accidents are caused by failure to follow simple and fundamental safety rules or precautions.

Most accidents can be prevented!

KNOW YOUR MANUAL—KNOW YOUR EQUIPMENT

WARNING

Set forth below are a number of potential hazards which could result in some degree of personal injury. The suggested procedures should be adhered to.

General

- Keep your electric generating set and the surrounding area clean and free from obstructions. Remove all oil deposits; keep the floor clean and dry.
- Provide appropriate fire extinguishers and install them in convenient locations. Consult your local fire department for the correct type of extinguisher to use. Do not use foam on electrical fires. Use extinguisher rated ABC by NFPA.
- Make sure that all fasteners on the generating set are secure. Tighten supports and clamps, keep guards in position over fans, driving belts, etc.
- Do not wear loose clothing in the vicinity of moving parts, or jewelry while working on electrical equipment. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts; cause shock or burning.
- If necessary to make adjustments while the unit is running, use extreme caution when close to hot exhausts, moving parts, etc.

- Do not stand on a wet floor while working on electrical equipment. Use rubber insulative mats placed on dry wood platforms.

Fuel System

- DO NOT fill fuel tanks while engine is running, unless tanks are outside engine compartment. Fuel contact with hot engine or exhaust is a potential fire hazard.
- DO NOT SMOKE OR USE AN OPEN FLAME in the vicinity of the generator set or fuel tank. Internal combustion engine fuels are highly flammable.

REMEMBER—IF YOU CAN SMELL FUMES—A POSSIBLE EXPLOSION AND FIRE CONDITION EXISTS!

- Make sure that oily rags are not left on or near the engine. Oil soaked rags are combustible and present hazardous walking conditions.
- Fuel lines must be of steel piping, adequately secured, and free from leaks. Piping at the engine should be approved flexible line. Do not use copper piping on flexible lines as copper will work harden and become brittle.
- Your engine installation should be equipped with a means of positive fuel shutoff in applications when fuel is conducted from a remote source. Fuels under pressure (e.g. natural gas or liquefied petroleum gas) should be controlled by a positive shutoff valve, preferably automatic, in addition to any valve integral with the carburetor or gas regulator equipment.

Exhaust System

- Exhaust products of any internal combustion engine are toxic and can cause serious personal injury, if inhaled. All engine installations, especially those within a confine, should be equipped with an exhaust system to discharge gases to the atmosphere. Do not use exhaust gases to heat a compartment.
- Inspect exhaust system regularly to assure that system is free of leaks.

Coolant System

- Coolants under pressure have a higher boiling point than that of water. DO NOT open a radiator or heat exchanger pressure cap or break a system while the engine is running, and in no case until the system pressure has been bled off.
- Radiator fan belts are guarded for your protection. DO NOT remove covers or guards.
- Keep your hands away from moving parts.

Ventilation System

- Check remote radiators frequently. Remove any dirt, debris, bird nests, etc.
- Check ventilation louvres frequently. Make sure that free-fall louvres and motor operated louvres open and close properly and that there is no restriction in the free-air flow.

Electrical System

- The electrical installation exterior to your generator should have been performed by qualified licensed electricians. All local and state

codes should have been consulted and complied with. It is essential that all load circuit breakers adequately protect electrical functions, all circuits are properly grounded and wiring is correct capacity.

- Tag open switches.
- DON'T tamper with interlocks.
- Before starting work on the generating set, disconnect batteries. This will prevent inadvertent starting of the set.
- Use extreme caution when making adjustments on the electrical components in the control cabinet while the engine is running. High voltages are present and could cause serious personal injury.
- DO NOT SMOKE while servicing batteries. Verify correct polarity of battery cables before connecting. Lead acid batteries give off a highly explosive hydrogen gas which can be ignited by electrical arcing or by smoking. When connecting batteries, connect the ground lead last.

SPECIFICATIONS

ENGINE DETAILS

Engine Manufacturer	Allis-Chalmers
Engine Series	2900
Number of Cylinders.....	6
Displacement.....	301-cubic inch (4.9 litre)
BHP @ 1800 r/m	102 (76 kW)
Compression Ratio	16.25:1
Bore	3.875-inches (98.425 mm)
Stroke	4.250-inches (107.95 mm)
Fuel	ASTM No. 2 Diesel or 2D
Battery Voltage.....	12 VDC
Battery Group (Two 6-Volt, 135 A.H. [486 kC])	2H
Starting Method	Solenoid Shift
Governor Regulation.....	5% Maximum
Battery Charging Current	35-Amperes

GENERATOR DETAILS

Type.....	15R 60 Hz
	515R 50 Hz
Rating (Watts)	
60 Hertz Continuous Standby	60,000 (72.5 kVA)
50 Hertz Continuous Standby	50,000 (62.5 kVA)
AC Voltage Regulation.....	± 2%
60 Hertz r/m.....	1800
50 Hertz r/m.....	1500
Output Rating	0.8 PF
AC Frequency Regulation	5% No Load—Full Load

CAPACITIES AND REQUIREMENTS

Cooling System (Including Radiator)	27-quarts (25.5 litres)
Engine Oil Capacity (Filter, Lines, Crankcase).....	11-quarts (10.4 litres)
Exhaust Connection (inches pipe thread)	3

AIR REQUIREMENTS (1800 r/m)

Engine Combustion.....	216-cfm (0.102 m ³ /sec)
Radiator Cooled Engine.....	6050-cfm (2.86 m ³ /sec)
Total for Radiator Cooled Model	6266-cfm (2.96 m ³ /sec)
Alternator Cooling Air (1800 r/m).....	1000-cfm (0.5 m ³ /sec)
(1500 r/m).....	833-cfm (0.4 m ³ /sec)
Fuel Consumption at Rated Load ASTM No. 2 Diesel	4.8-g/h (18.2 lit/hr)

GENERAL

Height	52.5-inches (1.33 m)
Width	33.0-inches (0.838 m)
Length	78.313-inches (1.99 m)
Approximate Weight (Mass)	2,000-pounds (908 kg)

TABLE 1. UR GENERATOR VOLTAGE/CURRENT OPTIONS

VOLTS	FREQ.	PHASE	AMPERES	DOUBLE DELTA	SERIES DELTA	PARALLEL WYE	SERIES WYE	REF. VOLTAGE WIRE (W12) TAP
110/220	50 Hz	1	284 *	x				H6
115/230	50 Hz	1	272 *	x				H6
120/240	60 Hz	1	313 *	x				H5
110/190	50 Hz	3	190			x		H3
115/200	50 Hz	3	180			x		H4
120/208	60 Hz	3	208			x		H4
110/220	50 Hz	3	164		x			H6
127/220	60 Hz	3	197			x		H4
115/230	50 Hz	3	157		x			H6
120/240	60 Hz	3	180		x			H5
139/240	60 Hz	3	180			x		H5
220/380	50 Hz	3	95				x	H3
230/400	50 Hz	3	90				x	H4
240/416	60 Hz	3	104				x	H4
254/440	60 Hz	3	98				x	H5
277/480	60 Hz	3	90				x	H5
9X 347/600	60 Hz	3	72					H5—Not Reconnectible

60.0 kW 75.0 kVA 60 Hz
50.0 kW 62.5 kVA 50 Hz

* - These current values are available only from special long stack units. When standard 3-phase unit is reconnected into Double Delta configuration, maximum current is 2/3 that of valve given (i.e. 120/240 output would be 208 amperes, NOT 313).

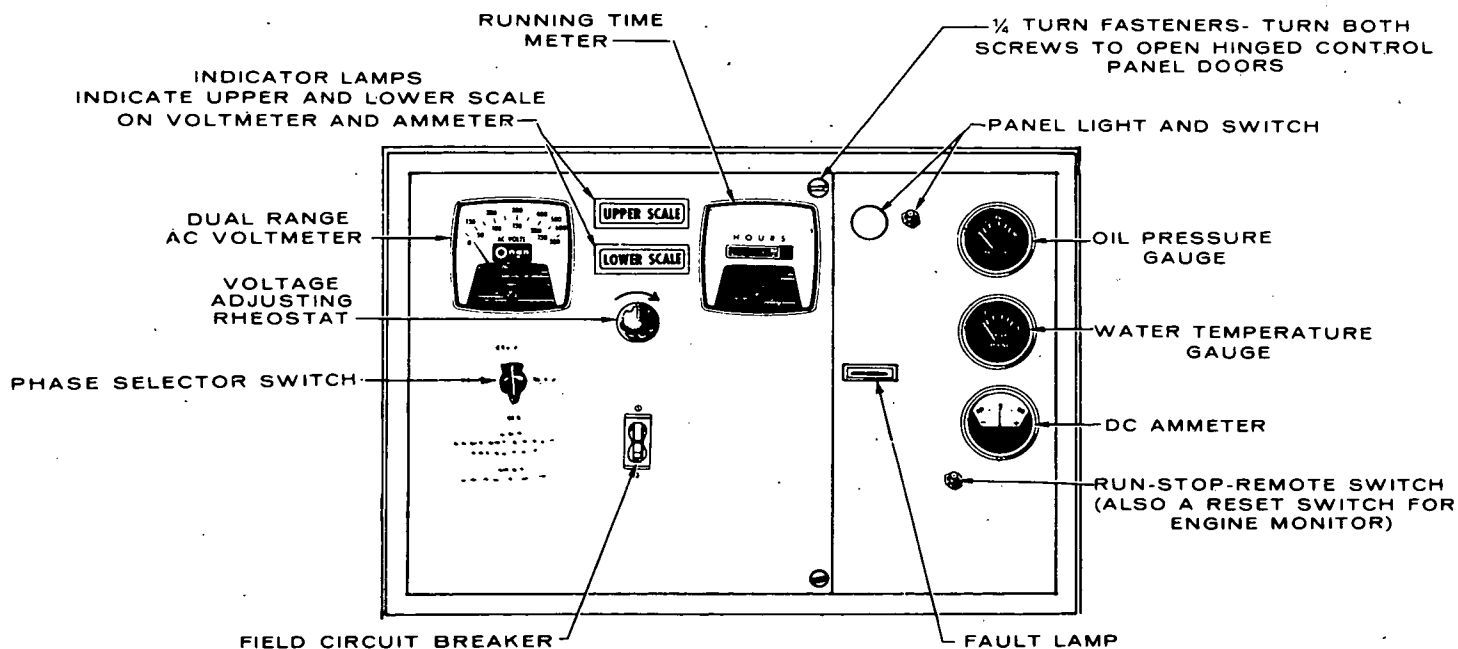


FIGURE 1. TYPICAL CONTROL PANEL (ONE FAULT LAMP)

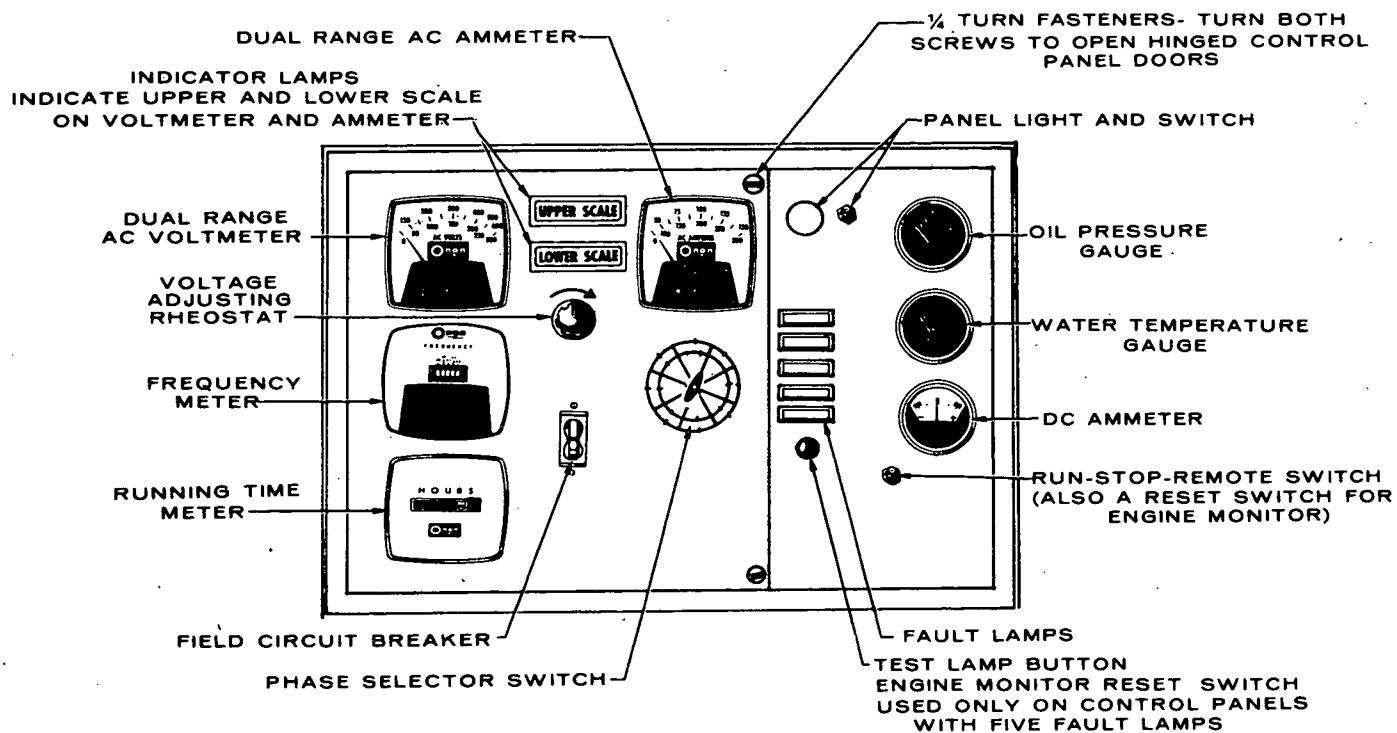


FIGURE 2. OPTIONAL CONTROL PANEL (FIVE FAULT LAMPS)

DESCRIPTION

GENERAL

An Onan DYA series electric generating set is a complete unit consisting of an engine driven AC generator, with standard and optional controls and accessories as ordered.

ENGINE

The engine on the DYA is an Allis-Chalmers, 2900, as described in the engine manual. Basic measurements and requirements will be found under *SPECIFICATIONS*. For operation, maintenance and service information, consult the Allis-Chalmers manual.

AC GENERATOR

The generator is an ONAN Type UR, 12 lead, 4-pole revolving field, reconnectible, brushless unit. The main rotor is attached directly to the engine flywheel, therefore engine speed determines generator output frequency. The 60 Hz set operates at 1800 r/m, the 50 Hz at 1500 r/m. Excitation is achieved as follows—

Residual alternating current from the stator winding is applied to the voltage regulator, where it is compared with a reference voltage, rectified and returned to the field winding of the exciter. Current then induced in the exciter rotor is rectified and fed into the generator rotor. This induces a current in generator stator which is applied to the load.

CONTROL PANEL

The following is a brief description of each of the standard controls and instruments located on the face of the panel. See Figure 1.

DC Panel

Panel Light and Switch: Illuminates control panel.

Oil Pressure Gauge: Indicates pressure of lubricating oil in engine (wired to a sensor unit located on the engine).

Water Temperature Gauge: Indicates temperature of circulating coolant in engine. (Wired to a sensor unit located on the engine.)

Battery Charge Rate DC Ammeter: Indicates battery charging current.

Run-Stop/Reset-Remote Switch: Starts and stops the unit locally or from a remote location. Resets engine monitor relay in Stop/Reset position.

Warning Light: Indicates "Fault" in engine operation.

AC Panel

AC Voltmeter: Indicates AC generator output voltage. Dual range instrument: measurement range in use shown on indicator light.

Voltage Regulator: Rheostat, provides approximately plus or minus 5% adjustment of the rated output voltage.

Exciter Circuit Breaker: Provides generator exciter and regulator protection from overheating, in the event of certain failure modes of the generator, exciter and voltage regulator.

Running Time Meter: Registers the total number of hours, to 1/10th, that the unit has run. Use it to keep a record for periodic servicing. Time is accumulative, meter cannot be reset.

Voltmeter Phase Selector Switch: Selects phases of generator output to be measured by the AC voltmeter.

OPTIONAL EQUIPMENT

DC Panel

Warning Lights: Eliminates the one "Fault" light and substitutes five indicator (see Figure 2) lights to give warning of—

- Overcrank
- Overspeed
- Low oil pressure
- High engine temperature
- Low engine temperature

Operation of these lights will be discussed in conjunction with engine monitor panel.

Reset Switch: Manual reset for engine monitor after shut-down.

Lamp Test: Press to test warning lamp bulbs (when engine is running only).

AC Panel

AC Ammeter: Indicates AC generator output current. Dual range in use shown on indicator lights.

Frequency Meter: Indicates the frequency of the generator output in hertz. It can be used to check engine speed. (Each hertz equals 30 r/m.)

CONTROL PANEL INTERIOR

The only equipments discussed in this section will be those which the operator may have reason to adjust or inspect for service.

Terminal Board (TB) 21: Connection of wire W12 to terminals H3, H4, H5, and H6 is made at this point, to change reference voltage when reconnecting generator for different voltages. Refer to Figure 3.

Voltage Regulator: Solid state unit, consisting of printed circuit board VR21. Prior to Spec F, a bridge rectifier and reactor assembly VR22 were mounted on the generator end-bell. Starting with Spec F, VR22 has been removed and an SCR bridge CR21, with a commutating reactor L21 have been relocated in the control panel as part of the voltage regulator system. AC output from generator is controlled at predetermined level regardless of load; regulation is plus or minus 2% from no load to full load, at 0.8 P.F.

Engine Monitor: Printed circuit plug-in modules provide the following functions:

1. A 75 second cranking period.
2. Approximately a 12.5-second time delay for oil pressure buildup.
3. An external alarm contact to light a fault lamp and shut down the set for alarm conditions such as:

- a. Overcrank (failed to start after cranking 75 seconds).
- b. Overspeed (engine speed reaches 2100 r/m).
- c. Low oil pressure 14 psi (96.5 kPa).
- d. High engine temperature 215°F (102°C).

On standard control panels, all four alarms are wired into one common fault lamp; on units with five fault lamps, four have shutdown alarms, the fifth (low engine temperature) lights a fault lamp only. Refer to Table 2.

Standard Cranking Module: Limits engine cranking time to 75 seconds. If engine fails to start after 75 seconds the engine monitor lights a fault lamp and opens the cranking circuit.

OPTIONAL MODULES

Cycle Cranker: Plug-in module replaces standard cranking circuit. Automatically provides a 15-second crank time and a 10-second rest time for three ON and two OFF cycles in 65 seconds. If engine fails to start, after 75 seconds the engine monitor lights a fault lamp and opens the cranking circuit. The ON and OFF cycle times are nominal and can be adjusted at potentiometers on the cranker module board.

Pre-Alarm: Gives advance warning for low oil pressure or high engine temperature. Requires two sensors each for engine temperature and oil pressure.

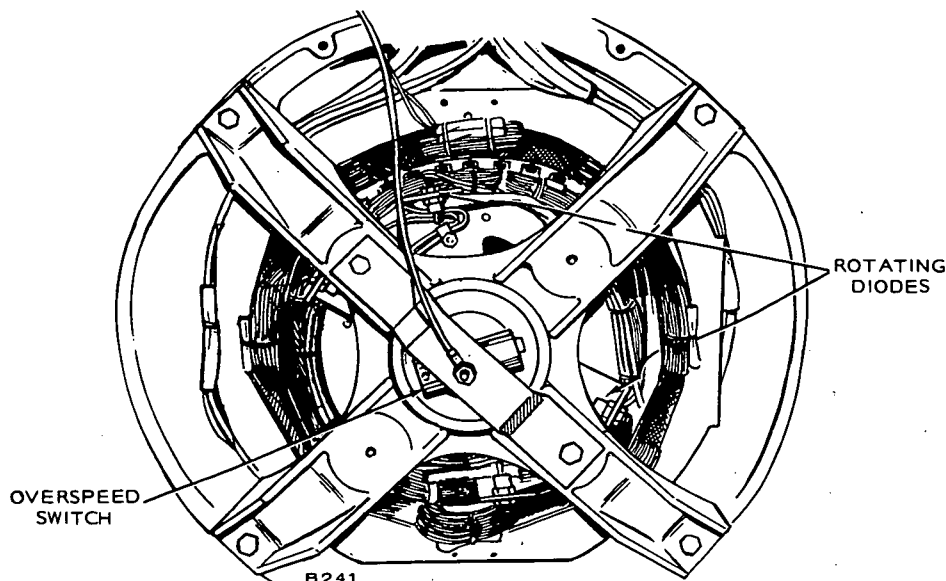


FIGURE 3. OVERSPEED SWITCH

TABLE 2. FAULT LAMP OPTIONS

SYSTEM	FAULT	FAULT LAMP	STOP ENGINE	EXTERNAL ALARM	PRE-ALARM
PENN STATE SINGLE LIGHT	Overcrank Overspeed Low Oil Pressure High Engine Temperature	x x x x	x x	x x x x	
STANDARD SINGLE LIGHT	Overcrank Overspeed Low Oil Pressure High Engine Temperature	x x x x	x x x x	x x x x	
5 LIGHT	Overcrank Overspeed Low Oil Pressure High Engine Temperature Low Engine Temperature	x x x x x	x x x x	x x x x	
5 LIGHT PRE-ALARM	Overcrank Overspeed Low Oil Pressure High Engine Temperature Low Engine Temperature	x x x x x	x x * * 	x x x x 	 x x

* - With additional optional sensors.

ENGINE SENSORS

Resistance units and switches in the engine temperature and oil pressure monitoring and shut-down systems are sealed units and are not repairable.

For location, refer to Figures 4 and 5. When replacing a sensor, do not substitute, use recommended items. Resistance units are matched to the gauge they supply, and cut-off switches are close-tolerance actuation parts, made for a specific application.

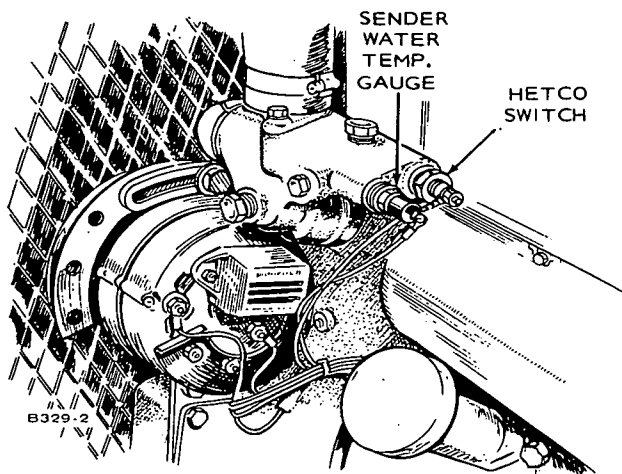


FIGURE 4. WATER TEMPERATURE MONITORS

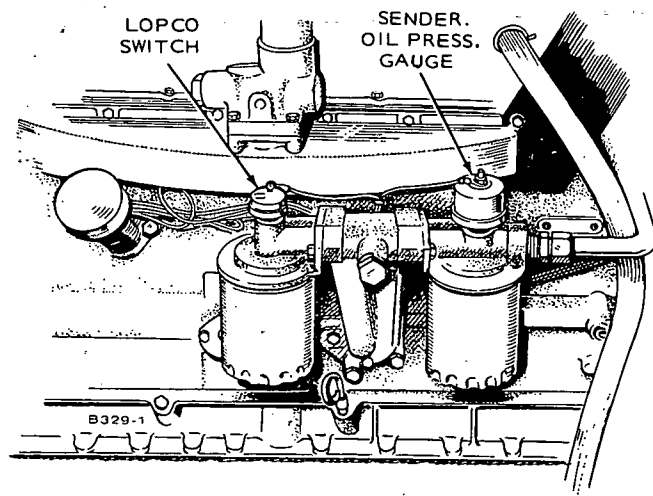


FIGURE 5. OIL PRESSURE MONITORS

INSTALLATION

GENERAL

Installations must be considered individually. Use these instructions as a general guide. All installations must meet regulations of state and local building codes, fire ordinances, etc., which may affect installation details. See Figure 6.

Requirements to be considered prior to installation:

1. Level mounting surface.
2. Adequate cooling air.
3. Adequate fresh induction air.
4. Discharge of circulated air.
5. Discharge of exhaust gases.
6. Electrical connections.
7. Fuel installation.
8. Water supply (city water cooling).
9. Accessibility for operation and servicing.
10. Vibration isolation.
11. Noise levels.

LOCATION

Provide a location that is protected from the weather and is dry, clean, dust free and well ventilated. If practical, install inside a heated building for protection from extreme weather conditions.

MOUNTING

Generator sets are mounted on a rigid skid base which provides proper support. The engine-generator assembly is isolated from the skid base by rubber mounts which provide adequate vibration isolation for normal installations. For installations where vibration control is critical, install additional spring-type isolators between skid base and foundation.

For convenience in general servicing and changing crankcase oil, mount set on raised pedestal at least 6-inches (150 mm) high. Refer to *ONAN Technical Bulletin T-030* for further installation information.

VENTILATION

Generator sets create considerable heat which must be removed by proper ventilation. Outdoor installations rely on natural air circulation but indoor installations need properly sized and positioned vents for the required air flow. See *SPECIFICATIONS* for the air required to operate with rated load under normal conditions at 1800 r/m.

Radiator set cooling air travels from the rear of the set and is removed by a pusher fan which blows out through the radiator. Locate the air inlet to the rear of the set. Make the inlet opening at least 1½-times larger than the radiator.

Locate the cooling air outlet directly in front of the radiator and as close as possible. The opening size should be at least as large as the radiator area. Length and shape of the air outlet duct should offer minimum restriction to air flow. Use a duct of canvas or sheet metal between the radiator and the air outlet opening. The duct prevents recirculation of heated air.

Provide a means of restricting the air flow in cold weather to keep the room or compartment temperature at a normal point.

For operation outside a building, a shelter housing with electrically operated louvres is available as an option. Transformers connected across the generator output supply current to the motors.

When the generator is operating, current in the transformers actuate the motors and open the louvres. The louvres are held open for the duration of the set operation, then are closed by return springs when the set is shut down.

City water cooled sets do not use the conventional radiator. A constantly changing water flow cools the engine. Ventilation is seldom a problem, but sufficient air movement and fresh air must be available to properly cool the generator, disperse heat convected off the engine and support combustion in the engine.

For small compartments, a duct of equal or larger area than generator outlet is recommended to remove the heated air from the generator air outlet to the outside atmosphere. Limit bends and use radius type elbows where needed. A larger, well ventilated compartment or room does not require a hot air duct.

Installations made in a small room may require installation of an auxiliary fan (connected to operate only when the unit is running) of sufficient size to assure proper air circulation and evacuation of fumes.

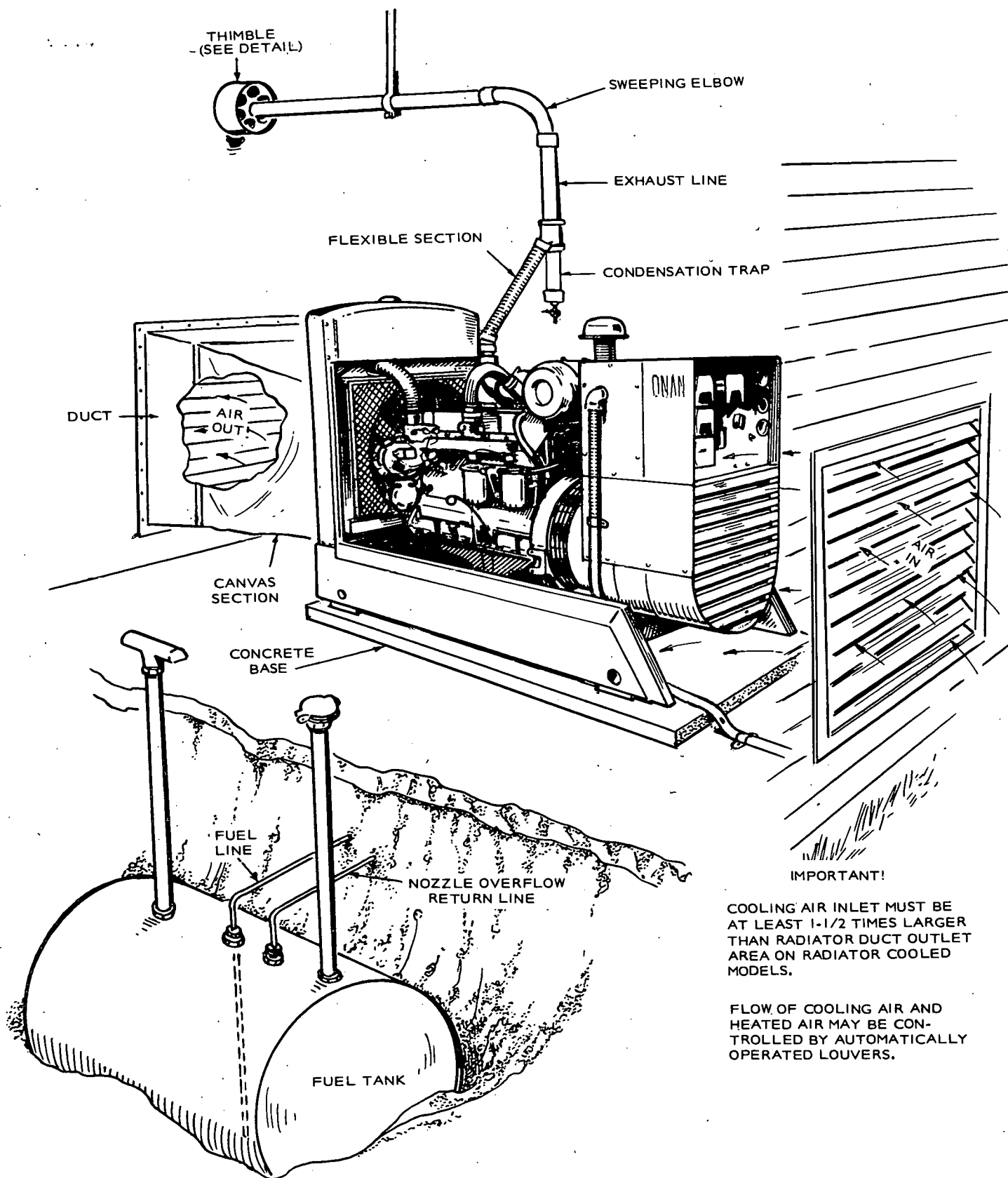


FIGURE 6. TYPICAL DYA INSTALLATION

COOLING SYSTEM

Standard Radiator Cooling, uses a set mounted radiator and engine driven pusher type fan to cool engine water jacket. Air travels from the generator end of the set, across the engine and out through the radiator. An integral discharge duct adapter flange surrounds the radiator grille.

Heat Exchanger Cooling (optional), uses a shell and tube type heat exchanger instead of the standard radiator and fan. Engine jacket coolant circulates through the shell side of the heat exchanger, while raw cooling water is pumped through the tubes. Engine coolant and raw water do not mix. This type of cooling separation is necessary when the raw water contains scale forming lime and other impurities.

This system reduces set enclosure airflow and noise levels. Proper operation depends upon a constant supply of raw water for heat removal. The engine coolant side of the system may be protected from freezing the raw water side cannot. See Figure 7 for typical installation.

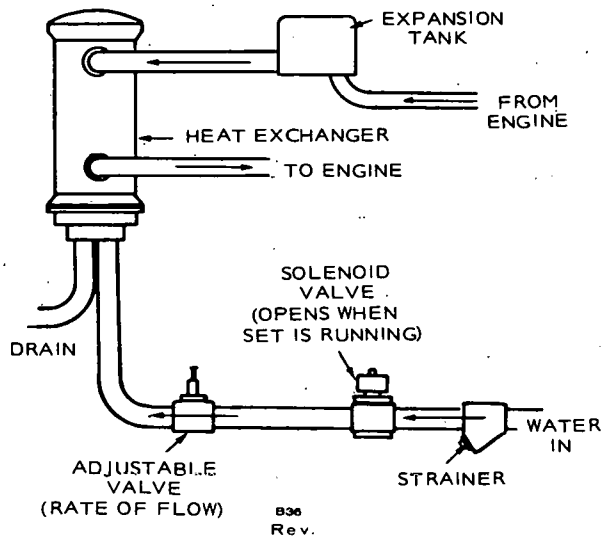


FIGURE 7. TYPICAL HEAT EXCHANGER SYSTEM

Standpipe Cooling (optional) substitutes a mixing (tempering) tank for the standard radiator and fan. Cooling water circulating through the engine jacket is mixed with raw water in the tank. Because raw water flows through the engine jacket, it must not contain scale forming impurities or fouling of the engine water will occur. Fouling results in engine overheating and costly repair bills.

This system reduces set enclosure airflow requirements and noise levels. Proper operation is dependent on a constant supply of cooling water. The system cannot be protected from freezing. See Figure 8.

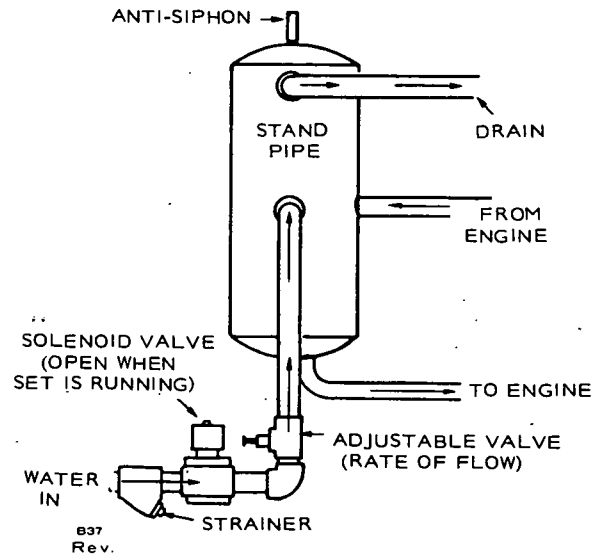


FIGURE 8. TYPICAL STANDPIPE SYSTEM

Remote Radiator Cooling (optional), substitutes a remote mounted radiator and an electrically driven fan, for the set mounted components. Removal of the radiator and fan from the set reduces set enclosure airflow requirements and noise levels without forcing dependence on a continuous cooling water supply. The remote radiator system can be completely protected against freezing.

This system must be designed to meet specific requirements of the application.

Water Jacket Heater (optional) may be installed to keep engine coolant warm while engine is shut down. It heats and circulates the coolant within the engine, which reduces start-up time and engine wear caused by cold starts. It is electrically operated and thermostatically controlled.

COOLING CONNECTIONS

The radiator cooled (standard) set does not require any external connections except as discussed under *Ventilation*. Allow clearance around the set for access to service the radiator and fan belts. See Figure 6.

Heat Exchanger and Standpipe cooled sets must be connected to a pressurized supply of cold water. Make connections to the set with flexible pipe to absorb vibration. On the cool water line install a solenoid valve to shut off the flow when the set is shut down and a rate of flow valve to control engine temperature. This valve can be either manual or automatic. Actual rate of flow will depend on inlet water temperature.

Adjust the flow to maintain water temperature between 165°F and 195°F (73.9°C and 90.6°C) while viewing the water temperature gauge.

Before filling cooling system check all hardware for security. This includes hose clamps, capscrews, fittings and connections. Use flexible coolant lines with heat exchanger, standpipe or remote mounting radiator.

Remote radiator plumbing will vary with installation. All systems must comply with the following conditions—

1. Make all connections to the set and to the radiator, with flexible pipe.
2. Install an auxiliary circulating pump if the horizontal distance between the engine and pump exceeds 15-feet (4.65 m).
3. Install a hot-well system to relieve excess engine water jacket pressure if the top of the radiator is more than 15-feet (4.65 m) above the center-line of the engine crankshaft.

GENERAL WATER FILTER

Electric generating sets can be equipped with an optional cooling system filter (corrosion resistor). This filter is a unit which directs coolant from the system through a filtering and treating device. It softens water, neutralizes acidity and protects against corrosion by the use of a replaceable chemically activated filtering element. In addition, the unit contains a sacrificial metal plate which arrests pitting of metals in the system by electro-chemical action.

Exact location of filter will vary because of other optional equipment which may also be installed.

Two types of elements are available from your Onan dealer or distributor.

1. Regular formula (chromate).
2. PAF formula (borate) year round type.

CAUTION Do not use anti-freeze with an anti-leak formula. The stop-leak element can prevent or retard the flow through the filter, thereby eliminating the filtering process completely.

The regular formula can be used with plain water and selected antifreezes. The best protection results will be gained by using the borate formula element with a permanent antifreeze.

ONAN recommends that shutoff valves be installed to the engine side of the inlet and outlet of the coolant filter, for ease in changing elements. Further, it is good practice to insert and clamp a thick-walled pyrex tube into the line at a convenient point to serve as a flow indicator. This flow indicator will act in the capacity of a sight gauge to observe general condition, possible air pockets and presence of contaminants in the coolant flow.

WATER JACKET HEATER (Optional)

This heater is installed to maintain an elevated engine temperature in lower ambient temperature applications. It heats and circulates engine coolant, and is thermostatically controlled.

EXHAUST

WARNING

Inhalation of exhaust gases can result in death.

Engine exhaust gas must be piped outside building or enclosure. Do not terminate exhaust pipe near inlet vents or combustible materials. An approved thimble (Figure 9) must be used where exhaust pipes pass through walls or partitions. Pitch exhaust pipes downward or install a condensation trap (Figure 10) at the point where a rise in the exhaust system begins. Avoid sharp bends; use sweeping long radius elbows. Provide adequate support for mufflers and exhaust pipes. Refer to Figure 6 for a typical exhaust installation. Shield or insulate exhaust lines if there is danger of personal contact. Allow at least 9-inches (230 mm) of clearance if the pipes run close to a combustible wall or partition. Use a pipe at least as large as the 3-inch (76 mm) pipe size outlet of the engine with a flexible portion between the engine and the muffler.

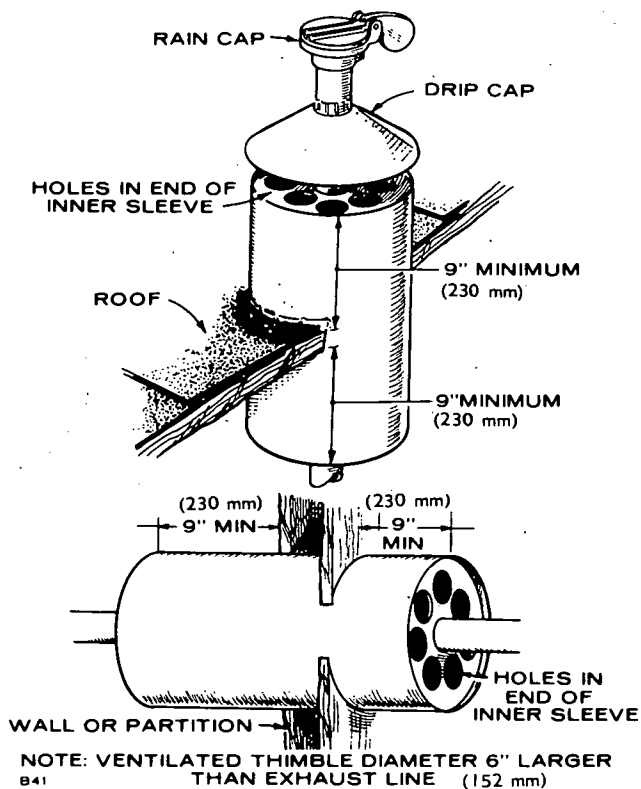


FIGURE 9. EXHAUST THIMBLE

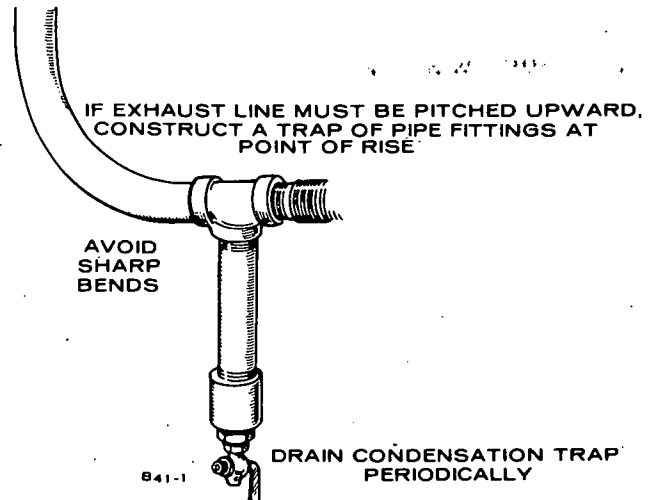


FIGURE 10. EXHAUST CONDENSATION TRAP

Do not connect a flexible line to the exhaust manifold. Minimum diameters and maximum lengths of pipe (with critical muffler[s]) are as follows:

Single Exhaust system:

3½-inch	95 feet (29 m)
4-inch	200 feet (61 m)
5-inch	550 feet (168 m)

Maximum permissible exhaust restriction (back pressure) is 27.2-inches H₂O (6.8 kPa).

FUEL SYSTEM

Allis-Chalmers engines used on the DYC sets are designed for use with ASTM No. 2 Diesel fuel. They will however, operate on diesel fuels within the specifications delineated in the Allis-Chalmers engine manual.

FUEL CONNECTIONS

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

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

A fuel lift in excess of 8-feet (2.44 m) is not recommended without a day tank installation, because of fuel drainage. Horizontal run, if the supply tank is level with the fuel pump, should not exceed 12.5-feet (3.8 m). However, a day tank is again recommended.

The fuel inlet is to the transfer pump and is threaded for 1/8-inch pipe. Injector pump return line is common with the injectors' return line, and requires a 1/8-inch low pressure hose connection. See Figure 11 for fuel system installation.

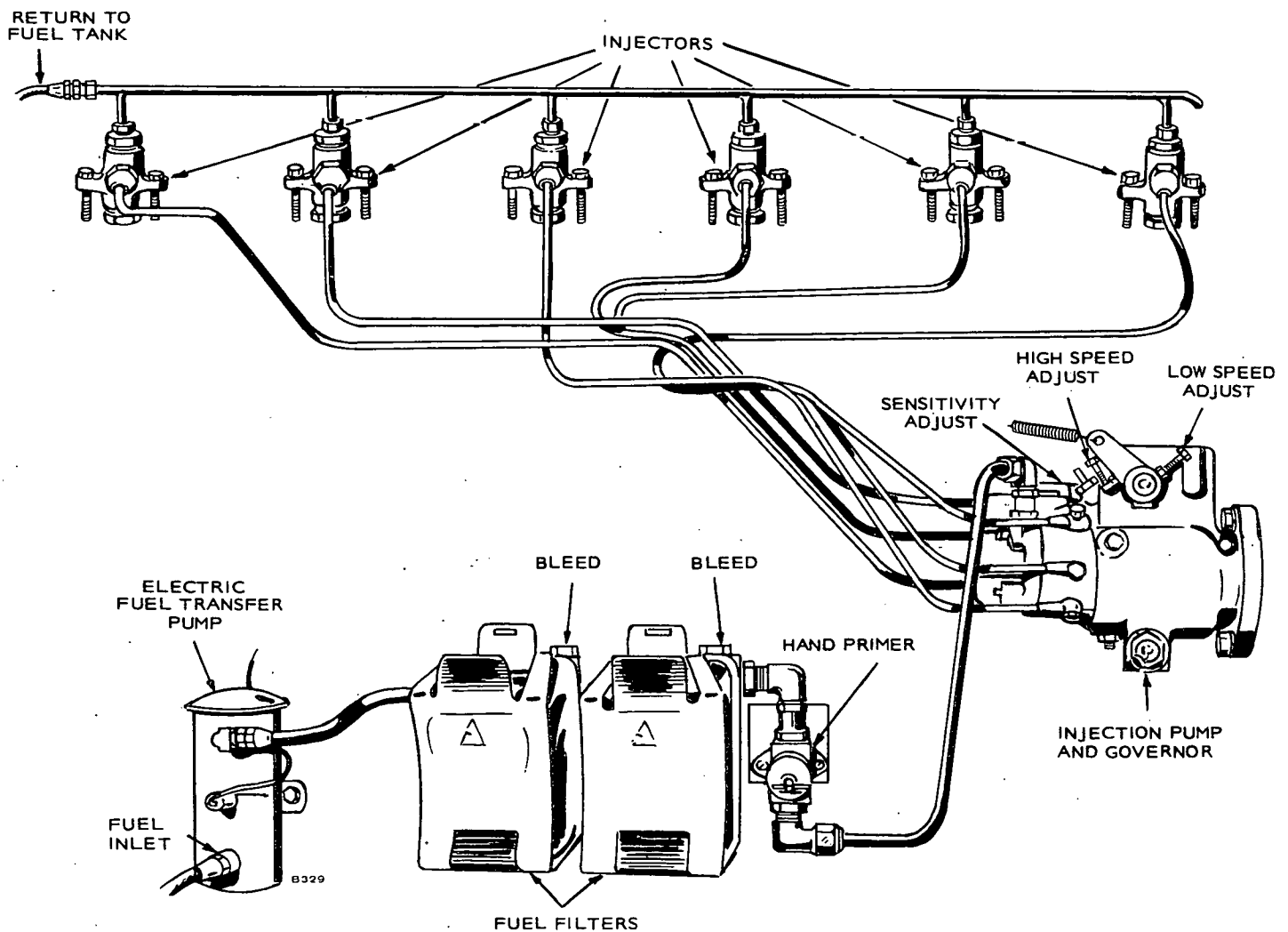


FIGURE 11. FUEL SYSTEM

DAY TANK

Generator set installations may be equipped with an optional separate fuel day tank. A float operated valve controls fuel flow into the fuel tank. The correct level is maintained to assure a constant source of fuel. It is necessary to install an overflow line between the day tank and the main fuel tank. Refer to the installations included with the tank. See Figure 12 for an example of a day tank installation. Tank and lines must be below level of injector pump return outlet.

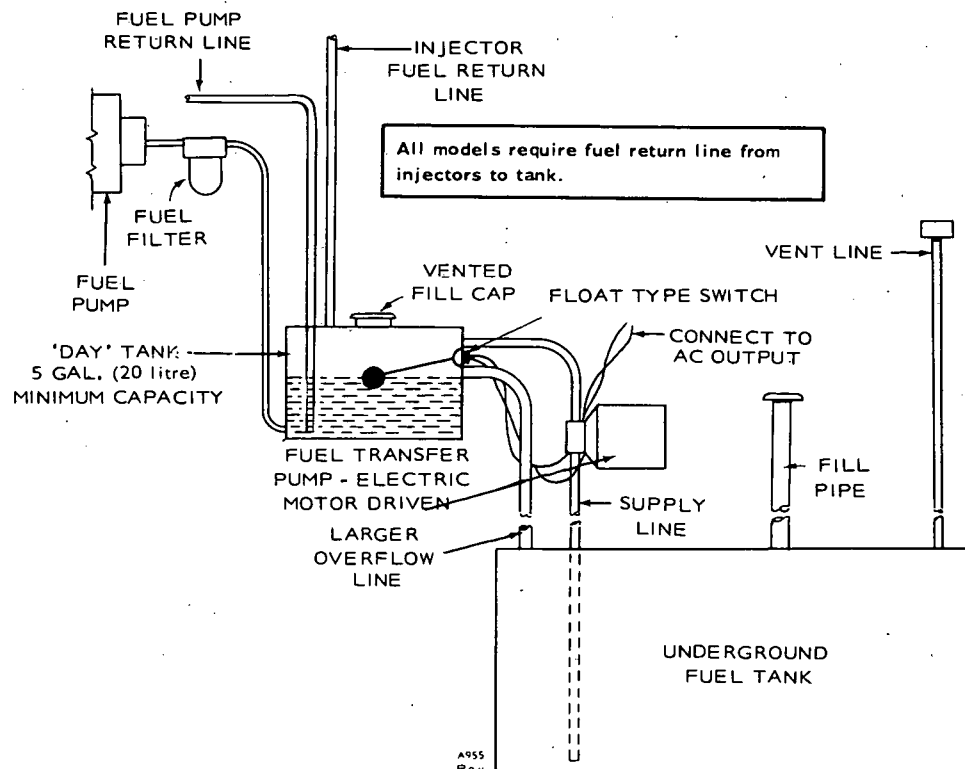


FIGURE 12. DAY TANK (TYPICAL)

BATTERY

Starting the unit requires 12-volt battery current. Use two 6-volt (see *SPECIFICATIONS*) batteries for a normal installation. Connect the batteries in series (negative post of first battery to positive post of second) as in Figure 13. Necessary battery cables are on unit. Service the batteries as necessary. Infrequent unit use (as in emergency standby service) may allow the batteries to self-discharge to the point where they cannot start the unit. If installing an automatic transfer switch that has no built-in charge circuit, connect a separate trickle charger. Onan automatic transfer switches include such a battery charging circuit.

WARNING

being charged.

Do not smoke while servicing batteries. Lead acid batteries give off explosive gases while

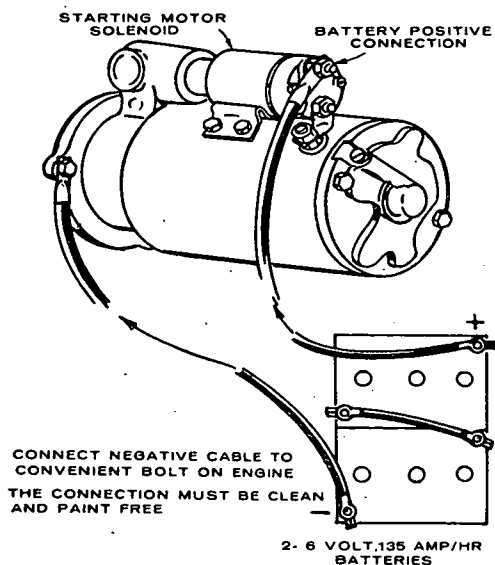


FIGURE 13. BATTERY CONNECTION

BATTERY, HOT LOCATION

Batteries will self discharge very quickly when installed where the ambient temperature is consistently above 90°F (32.2°C) such as in a boiler room. To lengthen battery life, dilute the electrolyte from its normal 1.275 specific gravity reading at full charge to a 1.225 reading. The cranking power is reduced slightly when the electrolyte is so diluted, but if the temperature is above 90°F (32.2°C), this should not be noticed. The lengthened battery life will be worth the effort.

1. Fully charge the battery.
2. With the battery still on charge, draw off the electrolyte above the plates in each cell. DO NOT ATTEMPT TO POUR OFF; use a hydrometer or filler bulb and dispose of it in a safe manner. Avoid skin or clothing contact with the electrolyte.
3. Refill each cell with distilled water, to normal level.
4. Continue charging for 1 hour at a 4 to 6 hour rate.
5. Test each cell. If the specific gravity is still above 1.255, repeat steps 2, 3, and 4 until the reading is reduced to 1.225. Usually, repeating steps twice is sufficient.

REMOTE CONTROL CONNECTIONS

Provision is made for addition of remote starting. This is accomplished on a 4 place terminal block situated within the control box. Connect one or more remote switches across remote terminal and B+ terminal as shown in Figure 14. If the distance between the set and remote station is less than 1000-feet (305 m), use No. 18 AWG wire; between 1000- and 2000-feet (305 m and 610 m), use No. 16 AWG wire.

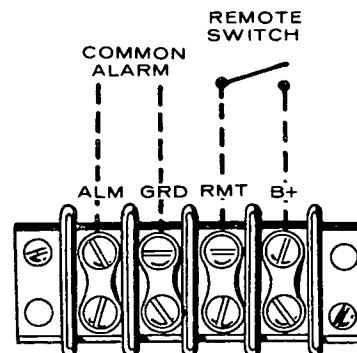
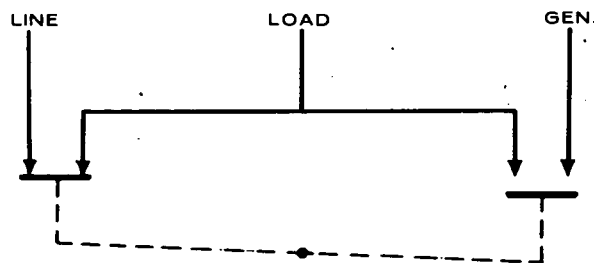


FIGURE 14. REMOTE START CONNECTION (TB12)

WIRING CONNECTIONS

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 sizes, etc. must conform to requirements of electrical codes in effect at the installation site.

If the installation is for standby service, a double throw transfer switch must always be used. Connect this switch (either automatic or manual) so that it is impossible for commercial power and generator current to be connected to the load at the same time. See Figure 15. Instructions for connecting an automatic load transfer control are included with such equipment.



NOTE: SHOWN WITH LINE CONNECTED TO LOAD.

FIGURE 15. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

Control Box Connections: The factory ships these 12 lead generators with load connection wires NOT connected together in the control box. These 12 wires are labeled T1 through T12 and must be brought together before making load connections. Proceed as follows:

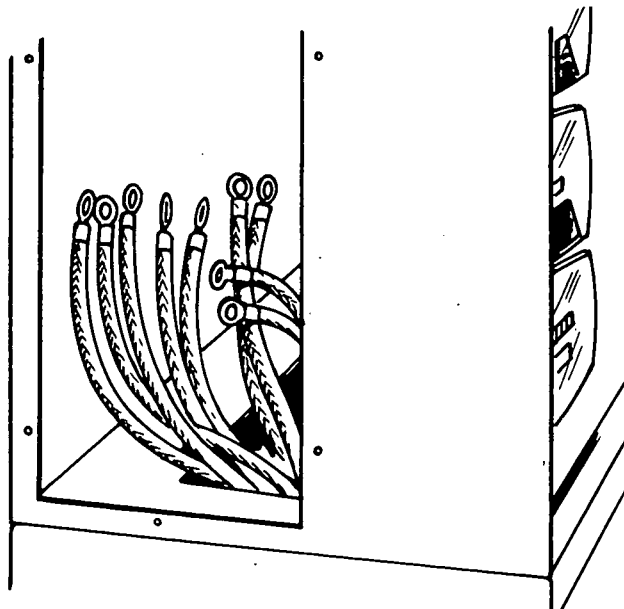


FIGURE 16. CONTROL BOX (SIDE PANEL REMOVED)

1. Remove either right, left or top panel from control box. See Figure 16.
2. Connect wires together as shown on panel drawing and in Figure 21 according to voltage desired.
3. Open hinged control panel doors. Connect lead from terminal 63 to correct terminal for voltage desired. These terminals are labeled H2, H3, H4, H5 and H6. See Figure 17.
4. Close front panel and secure with 1/4 turn fasteners.
5. Connect load wires to generator leads.

Preceding instructions do not apply to models designated Code 3 or 9X; this connection is made at the factory. The installer must only connect load wires.

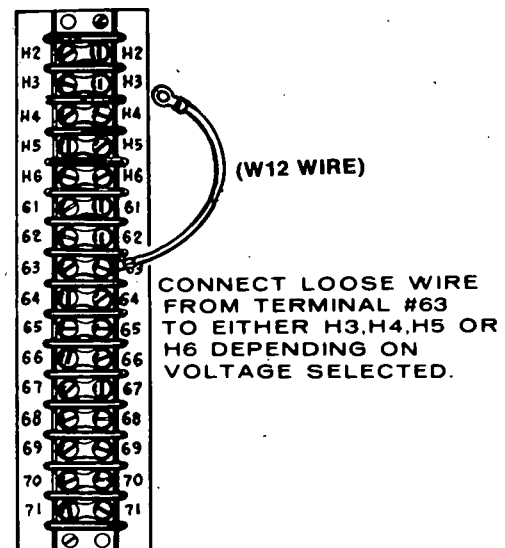


FIGURE 17. REFERENCE VOLTAGE CONNECTION (TB21)

120/240 Volt, Single Phase, 12 Lead: Terminal connection L0 can be grounded (neutral). For 120 volts, connect the hot load wires to either the L1 or L2 connection, Figure 18. Connect the neutral load wire to the grounded L0 connection. Two 120 volt circuits are thus available, with not more than 1/3 the rated capacity of the set available on either circuit. If using both circuits, be sure to balance the load between them.

For 240 volts, connect one load wire to the L1 connection and the second load wire to the L2 connection. Terminal connection L0 is not used for 240 volt service.

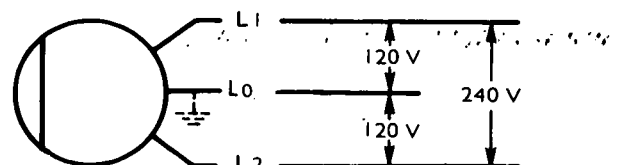


FIGURE 18. 120/240 V. 1-PHASE DOUBLE DELTA

120/240 Volt, 3 Phase, Delta Connected Set; 12 Lead:

The 3 phase Delta connected set is designed to supply 120 and 240 volt, 1 phase current and 240 volt, 3 phase current, Figure 19. For 3 phase operation, connect the three load wires to generator terminals L1, L2 and L3—one wire to each terminal. For 3 phase operation the L0 terminal is not used.

For 120/240 volt, 1 phase, 3 wire operation, terminals L1 and L2 are the "hot" terminals. The L0 terminal is the neutral, which can be grounded if required. For 120-volt service, connect the black load wire to either the L1 or L2 terminal. Connect the neutral (white) wire to the L0 terminal. Two 120 volt circuits are available. Connect between any two 3-phase terminals for 240 volt 1-phase loads.

Any combination of 1 phase and 3 phase loading can be used at the same time as long as total current does not exceed the NAMEPLATE rating of the generator. If no 3 phase output is used, usable 1 phase output is 2/3 of 3 phase kVA.

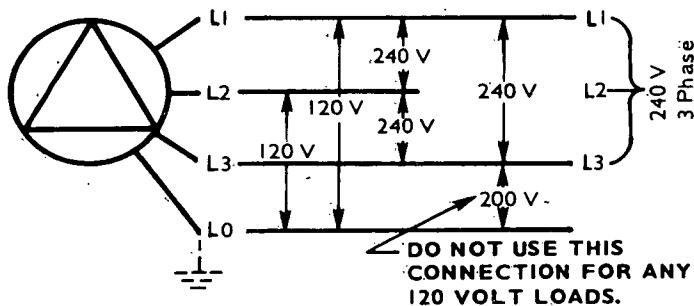


FIGURE 19. 120/240 V. 3-PHASE DELTA

3 Phase, Wye Connected Set: The 3 phase, 4 wire set produces line to neutral voltage and line to line voltage. The line to neutral voltage is the lower voltage as noted on the unit nameplate, and the line to line voltage is the higher nameplate voltage.

For 3 phase loads, connect separate load wires to each of the set terminals L1, L2 and L3. Single phase output of the higher nameplate voltage is obtained between any two 3 phase terminals as shown in Figure 20.

The terminal marked L0 can be grounded. For 1 phase loads, connect the neutral (white) load wire to the L0 terminal. Connect the black load wire to any one of the other three terminals—L1, L2 or L3. Three separate 1 phase circuits are available, with not more than 1/6 the rated capacity of the set from any one circuit.

If using 1 phase and 3 phase current at the same time, use care to properly balance the 1 phase load, and not to exceed rated line current.

Figure 22 shows load connections for 120/208 voltage. Other voltages are available from either parallel wye or series wye illustration.

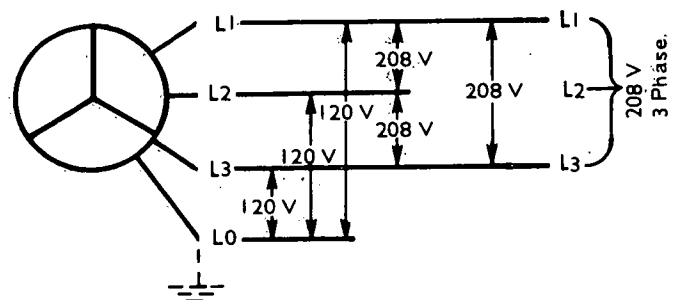




FIGURE 20. 120/208 V. 3-PHASE WYE

NAMEPLATE VOLTAGE CODE 3



**CONNECT LEAD FROM
TERMINAL 63 TO H5**

NAMEPLATE VOLTAGE CODE 9X



**CONNECT LEAD FROM
TERMINAL 63 TO H5**

NAMEPLATE VOLTAGE CODE		VOLTAGE	PHASES	HERTZ	CONNECT LEAD FROM TERMINAL #3 TO:	GENERATOR CONNECTION	GENERATOR CONNECTION SCHEMATIC DIAGRAM	GENERATOR CONNECTION WIRING DIAGRAM (WITH CURRENT TRANSFORMERS WHEN USED)
15	120/240	1	60	H5	DOUBLE DELTA			
515	115/230 110/220	1 1	50 50	H6 H6				
15	120/240	3	60	H5	SERIES DELTA			
515	115/230 110/220	3 3	50 50	H6 H6				
15	120/208 127/220 139/240	3 3 3	60 60 60	H3 H4 H5	PARALLEL WYE			
515	110/190 115/200 120/208 127/220	3 3 3 3	50 50 50 50	H3 H4 H4 H5				
15	240/416 254/440 277/480	3 3 3	60 60 60	H3 H4 H5	SERIES WYE			
515	220/380 230/400 240/416 254/440	3 3 3 3	50 50 50 50	H3 H4 H4 H5				

21

OPERATION

GENERAL

Onan DYA Series electric generating sets are given a complete running test under various load conditions and are thoroughly checked before leaving the factory. Inspect your unit closely for loose or missing parts and damage which may have occurred in transit. Tighten loose parts, replace missing parts and repair any damage before putting set into operation.

PRESTART SERVICING

Lubrication System: Engine oil was drained prior to shipment. Fill engine to capacities shown. After engine has been run, check dipstick, add oil to bring level to full mark. Record total capacity for future oil changes. For all operating conditions grade CD lubricating oil is recommended for turbocharged engines. Do not mix brands nor grades of lubricating oils.

Oil Viscosity should be as follows:

AMBIENT TEMPERATURE	USE SAE VISCOSITY
0° F (-17.8° C) and below	10W
0° F to 32° F (-17.8° C to 0° C)	20-20W
Above 32° F (0° C)	30W

Oil Capacities (nominal)

Oil Pan and Filter—11 quarts (10.4 litres)

Oil quantity dipsticks have dual marking with high and low-level marks: static oil level on one side and engine at low speed marks on opposite side. Be sure to use proper scale.

Cooling System: Cooling system was drained prior to shipment. Fill cooling system before starting. Nominal capacity is 27 quarts (25.5 litres). For units using either a radiator or heat exchanger (city water cooled), fill the system with clean soft water. Use a good rust and scale inhibitor additive. If a possibility exists of a radiator cooled set being exposed to freezing temperatures use anti-freeze with an ethylene glycol base. During initial engine run, check the coolant level several times and replenish if necessary to compensate for air pockets which may have formed during filling. Refer to Allis-Chalmers engine manual for additional information.

CAUTION

1. Verify that the electric solenoid valve used with city water cooled sets is open before initial starting of unit to allow coolant chambers to fill. Overheating and damage to the engine could result from noncompliance.

2. If engine is equipped with a cooling system filter, do not use antifreeze with an anti-leak formula. The stop leak element can prevent or retard the coolant flow through the filter, thereby eliminating the filtering process completely.

WARNING

Be careful when checking coolant under pressure. It is advisable to shut engine down and bleed off pressure before removing pressure cap. Severe burns could result from contact with hot coolant.

Fuel System: Refer to the Allis-Chalmers engine manual for fuel oil specifications. Check with fuel supplier and ensure that fuel supplied meets the specifications. Filter or strain fuel when filling tank. Fuel supply tanks should be kept as nearly full as possible by topping up each time engine is used. Warm fuel returning from the injector pump heats the fuel in the supply tank. If the fuel level is low in cold weather, the upper portion of the tank not heated by returning fuel tends to increase condensation. In warm weather both the supply tank and fuel are warm. Cool night air lowers the temperature of the tank more rapidly than the temperature of the fuel. Again this tends to increase condensation.

Condensate mixing with the sulphur in the fuel forms a sulphurous acid which will corrode and damage the engine. KEEP FUEL CLEAN.

WARNING

DO NOT SMOKE while handling fuel. Diesel fuel is flammable.

Priming Fuel System: Verify that all connections in fuel system are secure and no leaks exist. Proceed with priming as follows:

1. Loosen injection pump end of the fuel supply tube between hand primer pump and injection pump.
2. Open fuel shutoff valve. (Verify tank has fuel.)
3. Loosen locking screw on top of hand primer plunger and release clamp. See Figure 22.
4. Pump primer plunger to fill the filters with fuel and expel air.
5. Continue until fuel flow around loosened end of fuel supply line at injection pump is free of bubbles.
6. Secure line and hand pump plunger.

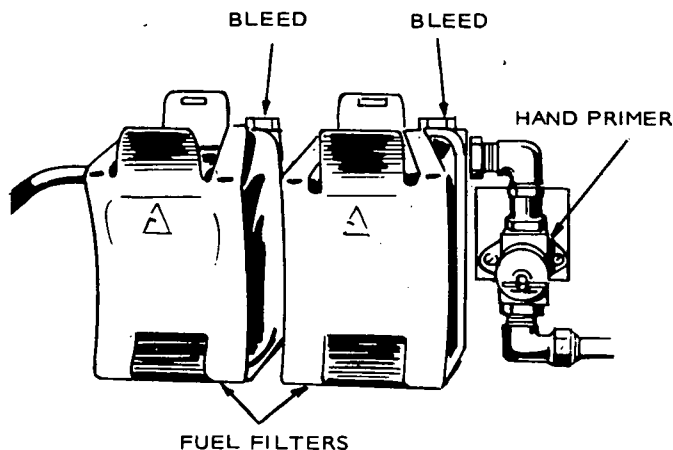


FIGURE 22. PRIMING FUEL SYSTEM

Ensure that hand primer pump is screwed in and secured before attempting to start engine.

Check all connections in fuel system for security to ensure that pressure will not bleed off when engine is not in use. Pressure should be maintained for immediate starting if unit is on standby service.

BATTERIES

Ensure that the cable connections to the batteries are secure. Coat connections with petroleum based or non-conductive grease to retard formation of corrosive deposits.

Check level of electrolyte to be at split ring mark. Measure specific gravity of electrolyte: SG 1.280 at 80°F (26.7°C). If distilled water has been added or specific gravity is less than 1.280, place batteries on charge until desired reading is reached. Do not over charge.

STARTING

When the preceding service functions have been performed, recheck to verify unit is ready to start.

1. Crankcase filled.
2. Cooling system filled—input solenoid valve open.
3. Batteries charged and connected.
4. Fuel solenoid valve open.

To start, move the "run-stop/reset-remote" switch to the "run" position. The engine should start after a few seconds of cranking. Immediately after start, observe the oil pressure gauge. Normal oil pressure is between 30- and 55 psi (207.0-379.5 kPa). Check the following gauges:

1. DC Ammeter—10 to 30 amperes.
2. AC Voltmeter—AC generator output voltage.
3. Frequency Meter—AC generator output frequency.

After running 10 minutes under load the water temperature gauge should have stabilized at 180°F to 195°F (82°C to 90.6°C). On city water cooled units an adjustable valve is connected in the water supply line. Adjust the hand wheel valve to provide a water flow that will keep the water temperature gauge reading within the range of 170°F to 200°F (76.7°C to 93.3°C).

STOPPING

To reduce and stabilize the engine temperatures and prevent turbocharger housing damage, run the engine at no load for three to five minutes before shutting down.

Move the run-stop/reset-remote switch to stop position to shut down the set.

Break-In Note: Run set at 50 percent rated load for the first half-hour of initial operation after reaching operating temperature.

Non-Start: If after a few seconds of cranking, engine fails to start, or starts and runs then stops and fault lamp lights, refer to appropriate troubleshooting chart, Table 3 or Table 4.

EXERCISE PERIOD

Generator sets on continuous standby service are required to be operative at essential loads from a cold start in a short period of time in the event of a power outage.

This imposes severe conditions on the engine. Friction of dry piston rings upon dry cylinder walls causes scuffing and rapid wearing. These can be relieved by exercising the set at least once a week for a minimum time of 30-minutes per exercise period. Preferably, run the set under at least 50 percent load to allow the engine to reach normal operating temperature. This will keep engine parts lubricated, maintain fuel prime, prevent electrical relay contacts from oxidizing and insure easy emergency starts. Onan automatic transfer switches contain an optional exercise switch which, by pre-selection, will start, determine run period and shut down a set on a weekly frequency. For example, the switch can be set for time of start, length of run, A.M. or P.M. and day of week.

After each exercise period, top off fuel tank, check engine for leaks and unit for general condition. Locate cause of leaks (if any) and correct.

NO LOAD OPERATION

Periods of no load operation should be held to a minimum. If it is necessary to keep the engine running for long periods of time when no electric output is required, best engine performance will be obtained by connecting a "dummy" electrical load. Such a load could consist of heater elements, etc.

TABLE 3.
TROUBLESHOOTING ENGINE SHUTDOWN SYSTEM
(Engines with only one fault lamp)

SYMPTOM	CORRECTIVE ACTION
1. Engine stops cranking and fault lamp lights, after cranking approximately 75 seconds.	<p>1. See engine service manual for troubleshooting fuel system.</p> <p>After correcting problem, reset engine monitor relay by placing Run-Stop/Reset-Remote switch to Stop/Reset, then back to the required running position.</p>
2. Fault lamp lights immediately after engine starts.	2. Check for: Overspeed condition as engine starts.
3. Fault lamp lights and engine shuts down after running for a period.	<p>3. Check the following:</p> <ul style="list-style-type: none"> a. Oil level. Engine will shut down if sensor is closed. b. Check engine manual for troubleshooting oil system. c. High engine temperature. Check coolant level; check water flow (city water cooled systems); check radiator for free air flow, and fan belts for tightness. See engine manual for troubleshooting cooling system. d. Check for faulty oil pressure sensor or faulty high engine temperature sensor.
4. Engine runs, shuts down and cranks for 75-seconds. Cranking cycle stops; fault lamp lights.	4. Check fuel supply.
5. Fault lamp lights, no fault exists.	5. To check a no-fault condition, disconnect leads from TB11 terminals 29, 30 and 31. If fault lamp lights with leads disconnected, replace engine monitor board. Reconnect leads.

TABLE 4.
TROUBLESHOOTING ENGINE SHUTDOWN SYSTEM
(Units with five fault lamps)

SYMPTOM	CORRECTIVE ACTION
1. Overcrank fault lamp lights and engine stops cranking after approximately 75-seconds.	1. See engine service manual for troubleshooting fuel system. After correcting fault, reset engine monitor relay by placing Run-Stop/Reset-Remote switch to Stop/Reset position, depressing Reset button, then to the required running position.
2. Engine runs, shuts down, cranks for 75-seconds, cranking cycle stops, overcrank light ON.	2. Check fuel supply.
3. *Low oil pressure shutdown.	3. Check— a. Oil level. Replenish if necessary. b. Sensor. Faulty sensor will shut down engine. c. Refer to engine service manual for troubleshooting guide for oil system.
4. *High engine temperature shutdown.	4. Check— a. Coolant level. Replenish if necessary. b. City water cooled sets. Check water flow, valves, etc. c. Check sensor; check thermostat. d. Radiator model, check fan belts, radiator for obstructions, etc.
5. Overspeed shutdown.	5. Check governor and throttle linkages for freedom of movement. Check overspeed switch.
6. Overspeed light on, no shutdown.	6. Disconnect wire at TB11-29. Light on after reset; replace engine monitor board.
7. *Low oil pressure light ON. No shutdown.	7. Disconnect wire at TB11-30. Light ON after relay reset. Replace engine monitor board.
8. *High engine temperature light ON. No shutdown.	8. Disconnect wire at TB11-31. Light ON after relay reset. Replace engine monitor board.

*NOTE: Not applicable on Pennsylvania State models.

OUT-OF-SERVICE PROTECTION

Generator sets removed from service for extended periods of time should be protected from rust and corrosion. The natural lubrication qualities of ASTM No. 2 Diesel fuel should protect a diesel engine for at least 30-days when unit is not in service. To protect a unit that will be out of service over 30 days, Onan recommends the following procedure:

1. Check coolant, top up if necessary using recommended anti-freeze.
2. Run set until thoroughly warm; generator under at least 50% load.
3. Shut down engine and drain oil base while still warm. Refill and attach a warning tag indicating viscosity of oil used.
4. Service air cleaner.
5. Clean throttle and governor linkage and protect by wrapping with a clean cloth.
6. Plug exhaust outlets to prevent entrance of moisture, bugs, dirt, etc.
7. Clean off dirt and dry entire unit. Coat parts likely to rust with a light coat of grease or oil.
8. Disconnect battery and follow standard battery storage procedure. Apply a film of non-conductive grease (e.g., vaseline) to battery cable lugs.
9. Fill fuel tank to prevent condensation contamination.
10. Provide a suitable cover for the entire unit.

RETURNING A UNIT TO SERVICE

1. Remove cover and all protective wrapping. Remove plug from exhaust outlet.
2. Check warning tag on oil base and verify that oil viscosity is still correct for existing ambient temperature.
3. Clean and check battery. Measure specific gravity (1.250 at 77° F [25° C]) and verify level to be at split ring. If specific gravity is low, charge until correct value is obtained. If level is low, add distilled water and charge until specific gravity is correct. **DO NOT OVERCHARGE.**

WARNING

Do not smoke while servicing batteries. Explosive gases are emitted from batteries in operation. Ignition of these gases can cause severe personal injury.

4. Check coolant level, adjust if necessary.
5. Connect batteries.
6. Verify that no loads are connected to generator.
7. Start engine.
8. After start, apply load to at least 50 percent of rated capacity.
9. Check all gauges to be reading correctly. Unit is ready for service.

HIGH ALTITUDE

Ratings apply to altitudes up to 1000-feet (305 m), standard cooling, normal ambients and with No. 2 Diesel fuel. Consult factory or nearest authorized Onan distributor for operating characteristics under other conditions.

Engine horsepower loss is approximately 3 percent for each 1000 feet (305 m) of altitude above sea level. Use lower power requirement at high altitudes to prevent smoke, over-fueling and high temperatures.

HIGH TEMPERATURES

1. See that nothing obstructs air flow to-and-from the set.
2. Keep cooling system clean.
3. Use correct SAE No. oil for temperature conditions.

LOW TEMPERATURES

1. Use correct SAE No. oil for temperature conditions. Change oil only when engine is warm.
2. Use fresh fuel. Protect against moisture condensation.
3. Keep fuel system clean and batteries in a well charged condition.
4. Partially restrict cool air flow but use care to avoid overheating.
5. Connect water jacket heater when set is not running.
6. Refer to Allis-Chalmers manual for further information.

Water Jacket Heater: The function of this optional heater is to keep the engine warm enough to assure starting under adverse weather conditions. Connect the heater to a source of power that will be on during the time the engine is not running. Be sure the voltage rating is correct for the heater element rating.

GENERAL MAINTENANCE

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 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 Allis-Chalmers engine manual for details of engine service and maintenance procedures.

A set on stand-by duty will need servicing at times other than those recommended by Onan and the engine manufacturer. These maintenance service periods will vary according to set site or location and

OPERATOR MAINTENANCE SCHEDULE

MAINTENANCE ITEMS	OPERATIONAL HOURS			
	8	50	100	200-250
Inspect Set	x			
Check Fuel	x			
Check Radiator Coolant Level	x			
Check Oil Level	x			
Drain Fuel Filter Sediment	x			
Check Air Cleaner (Clean if Required)		x1		
Clean Injector Pump Linkage		x1		
Clean and Inspect Crankcase Breather			x	
Inspect Fan Belt			x2	
Check Cooling System			x3	
Change Crankcase Oil			x1, 7	
Replace Oil Filter Element			x1, 7	
Clean and Inspect Battery Charging Alternator				x
Check Starter				x4
Check Injection Nozzles				x5
Replace Fuel Filter Elements				x1
Check Batteries				x

x1 Perform more often in extremely dusty conditions, or every 3 months.

x2 Adjust to 1/2 inch depression between pulleys, or every 3 months.

x3 Check for rust or scale formation. Flush if necessary.

x4 Oil front bearing sparingly, check brushes.

x5 Check for proper spray pattern, etc. Refer to the Allis-Chalmers manual.

x7 Perform every 3 months or 100 hours, whichever comes first.

NOTE: The above schedule is a minimum requirement for your engine. Refer to Allis-Chalmers service manual for recommended service periods.

application. Consult with your Onan distributor or dealer for a schedule of maintenance and service more suitable to the unique environment and application of your set.

WARNING

Before commencing any maintenance work on the engine, generator, control panel, automatic transfer switch or associated wiring, disconnect batteries. Failure to do so could result in damage to the unit or serious personal injury in the event of inadvertent starting.

AC GENERATOR

There are no brushes, brush springs or collector rings on these generators, therefore they require very little servicing. Periodic inspections, to coincide with engine oil changes, will ensure good performance.

Generator Bearing: Inspect the bearing every 1000 hours with the unit running.

If using the unit for "prime power," replace the bearing every 10,000 hours or two years. If using the set for "standby," replace the bearing every five years.

Check generator voltage. It may be necessary to make a slight readjustment of the voltage rheostat to obtain the preferred voltage at average load.

INSPECTION AND CLEANING

When inspecting the rotating rectifier assembly, make sure diodes are free of dust, dirt and grease. Excessive foreign matter on these diodes and heat sinks will cause the diodes to overheat and will result in their failure. Blow out the assembly periodically, with filtered, low pressure air. Also check to see that diodes and leadwires are properly torqued. The diodes should be torqued to 30 in. lb. or finger-tight plus a quarter turn. Blow dust out of control panel.

BATTERIES

Check the condition of the starting batteries at least every two weeks. See that connections are clean and tight. A light coating of non-conductive grease will retard corrosion at terminals. Keep electrolyte at the proper level above the plates by adding distilled water. Check specific gravity; recharge if below 1.280.

VOLTAGE REGULATOR ADJUSTMENT

CAUTION

Do not adjust the voltage regulator voltage potentiometer to a point where generator output exceeds that stamped on the rating plate. To do so will cause excessive field current to flow and burn out the exciter. All adjustments should be made by a qualified technician.

AIR RESTRICTION INDICATOR

Mounted on the air intake pipe between the air filter and the turbo-charger is an Air Restriction Indicator, the purpose of which is to signal condition of the air filter. When the RED signal indicator on the device is fully exposed it is locked in position. At this time the air filter should be serviced in accordance with the instructions in the Allis-Chalmers engine manual.

After servicing the filter reset the indicator by depressing the reset button on top of the unit. See Figure 23.

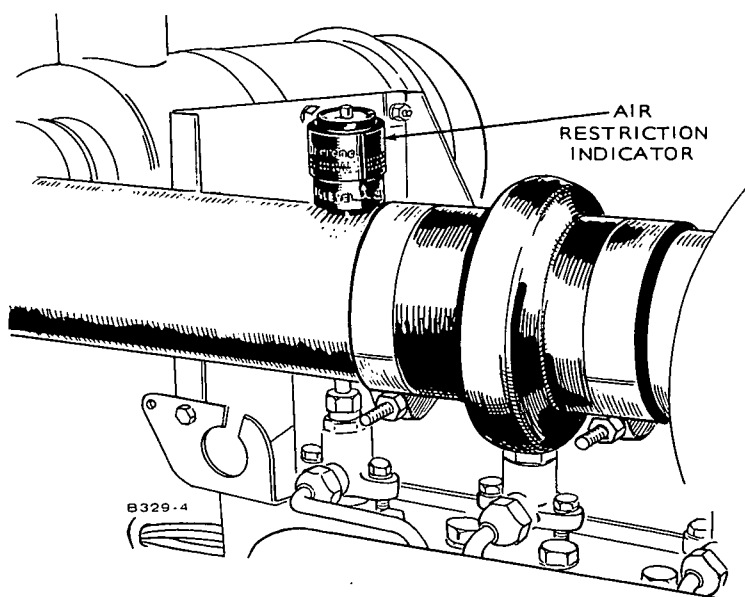


FIGURE 23. AIR RESTRICTION INDICATOR

CONNECTIONS (Fuel, Exhaust, etc.)

Operator should periodically make a complete visual inspection of the set while running at rated load. Some of the things to check for are as follows:

1. Check all fuel and oil lines for possible leakage.
2. Inspect exhaust lines and mufflers for possible leakage and cracks.
3. Periodically or daily, drain moisture from condensation traps.
4. Inspect water lines and connections for leaks and security.
5. Inspect electrical wires and connections for security and fray damage.

If generator requires major repair or servicing, contact an authorized Onan dealer or distributor.

ENGINE SPEED

Generator frequency is in direct ratio to engine speed, which is controlled by the governor.

A Roosa-Master governor is standard equipment on the DYA generator set. High speed and low speed limit stops are set at the Onan testing facility and normally do not require further adjustment, therefore if your set is used on continuous standby service, the governor may never need to be touched. If however the unit is used frequently, adjustment may be required due to wear of internal components. This adjustment is achieved by backing off the high speed stop screw. Screw in the low speed adjusting screw until the generator output frequency meter reads 60 hertz (generator on load). Turn in the high speed adjusting screw until it bottoms; secure the locknuts.

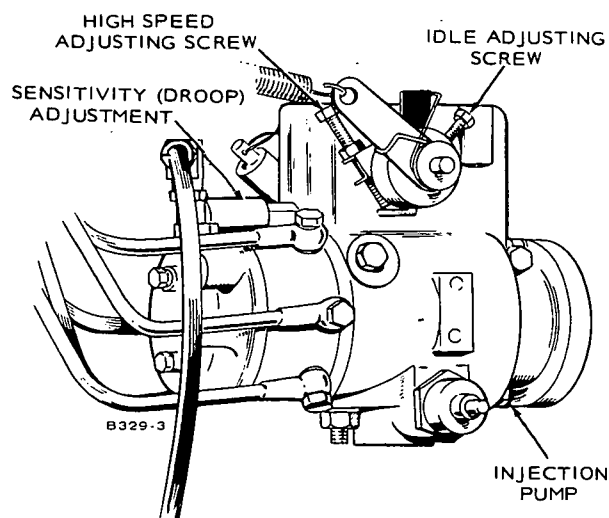


FIGURE 24. ROOSA-MASTER GOVERNOR

Governor sensitivity is adjusted by rotating an external knurled knob at the rear of the injector pump housing. Turning inward (clockwise) shortens governor control spring making it less sensitive, thereby increasing speed droop. Turning outward (counterclockwise) has opposite effect. Adjustment can be made with engine running. The speed droop is set at the Onan plant to give a regulation of 3 percent to 5 percent from no-load to full-load.

When using the generator frequency meter to determine engine speed, multiply frequency by 30 to calculate engine speed.

Example: 30×61 (hertz) = 1830 r/m.


Adjust engine speed to 1800 r/m for 60 hertz sets and 1500 r/m for 50 hertz sets, at full load.

PARTS CATALOG

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 and give the complete MODEL, SERIAL and SPECIFICATION NUMBER.

Onan®			
ELECTRIC GEN SET			
MODEL <input type="text"/>		SERIAL NO. <input type="text"/>	
IMPORTANT - ALWAYS GIVE ABOVE NOS. WHEN ORDERING PARTS			
CONTINUOUS <input type="text"/>		RATING <input type="text"/>	
HERTZ-60 RPM - 1800			
3 PHASE		1 PHASE	
KW <input type="text"/>	KVA <input type="text"/>	KW <input type="text"/>	KVA <input type="text"/>
VOLTS 120/208 127/220 139/240		120/240 240/416	
AMPS <input type="text"/>		<input type="text"/>	
VOLTS 254/440 277/480 347/600		120/240	
AMPS <input type="text"/>		<input type="text"/>	
BAT. <input type="text"/> VOLTS			
MANUFACTURED BY ONAN DIVISION OF ONAN CORPORATION MINNEAPOLIS, MINN. 55432, U.S.A. FOR ELECT. EQUIPMENT ONLY 			


ALLIS-CHALMERS PARTS

All Allis-Chalmers must be ordered from the Allis-Chalmers Company of Harvey, Illinois, or their nearest authorized distributor. Refer to the Engine nameplate located on left front side of the crankcase. When ordering parts, always supply Allis-Chalmers with the following nameplate information:

ENGINE MODEL

ENGINE CATALOG NUMBER

ENGINE SERIAL NUMBER

	
ALLIS-CHALMERS	
HARVEY, ILLINOIS • MADE IN U.S.A.	
<input type="text"/>	<input type="text"/>
ENGINE MODEL	ENG. CATALOG NO.
ENGINE SERIAL NO.	<input type="text"/>
HT-53188	

This catalog applies to the standard DYA generator sets as listed below. Powered by a Allis-Chalmers 2900 engine (see Allis-Chalmers 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 Allis-Chalmers 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 generator set sides are determined by facing the front end of the engine.

ELECTRIC GENERATOR SET DATA TABLE

MODEL AND SPEC NO. *	ELECTRICAL DATA			
	WATTS	HERTZ	PHASE	WIRE
50.0DYA-515R/ 50.0DYA-15R50 (Penn State)	50,000	50	†	12
	50,000	60	†	12
60.0DYA-9XR 60.0DYA-15R/	60,000	60	3	4
	60,000	60	†	12

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

† - These sets are reconnectible; refer to Specifications (Generator Details).

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

REPLACEMENT ENGINE

100-0868

1

Engine, Replacement (Allis Chalmers Model 2900)

General Description:

Includes: Complete Cylinder Block, Fuel Pump, Fuel Filter, Oil Filter, Governor, Fan Blades (Pusher Type), Flywheel, Water Pump, Oil Pan, Oil Fill, Exhaust Manifold, Air Cleaner, Flywheel Housing, Oil Cooler, Generator Mounting Brackets, Starter Adapter, Fan Belt.

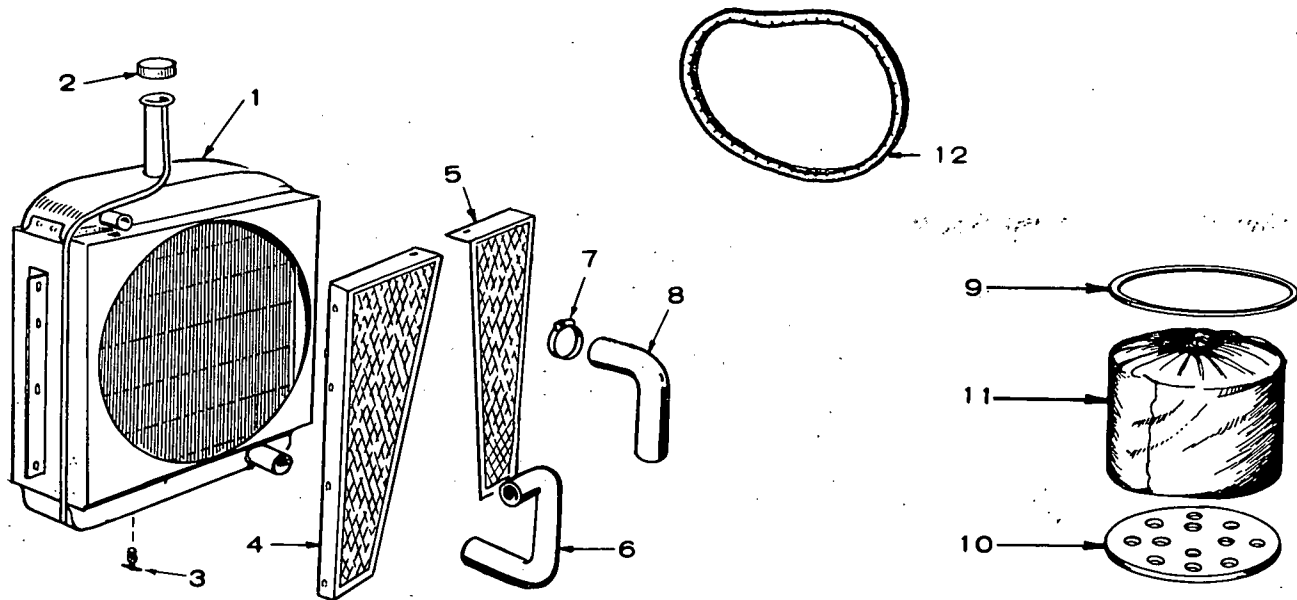
Excludes: Alternator, Temperature Sender, Oil Pressure Sender, Starter Motor, Radiator.

NOTE: Replacement engine is for standard Spec 1 generator sets. For all other Specs refer to factory.

NOTICE!

ITEMS REFERENCED AS **OPTIONAL** INDICATE PART IS FACTORY INSTALLED AND MAY NOT BE APPLICABLE TO ALL MODELS. FOR FIELD CONVERSIONS ADDITIONAL PARTS ARE USUALLY REQUIRED.

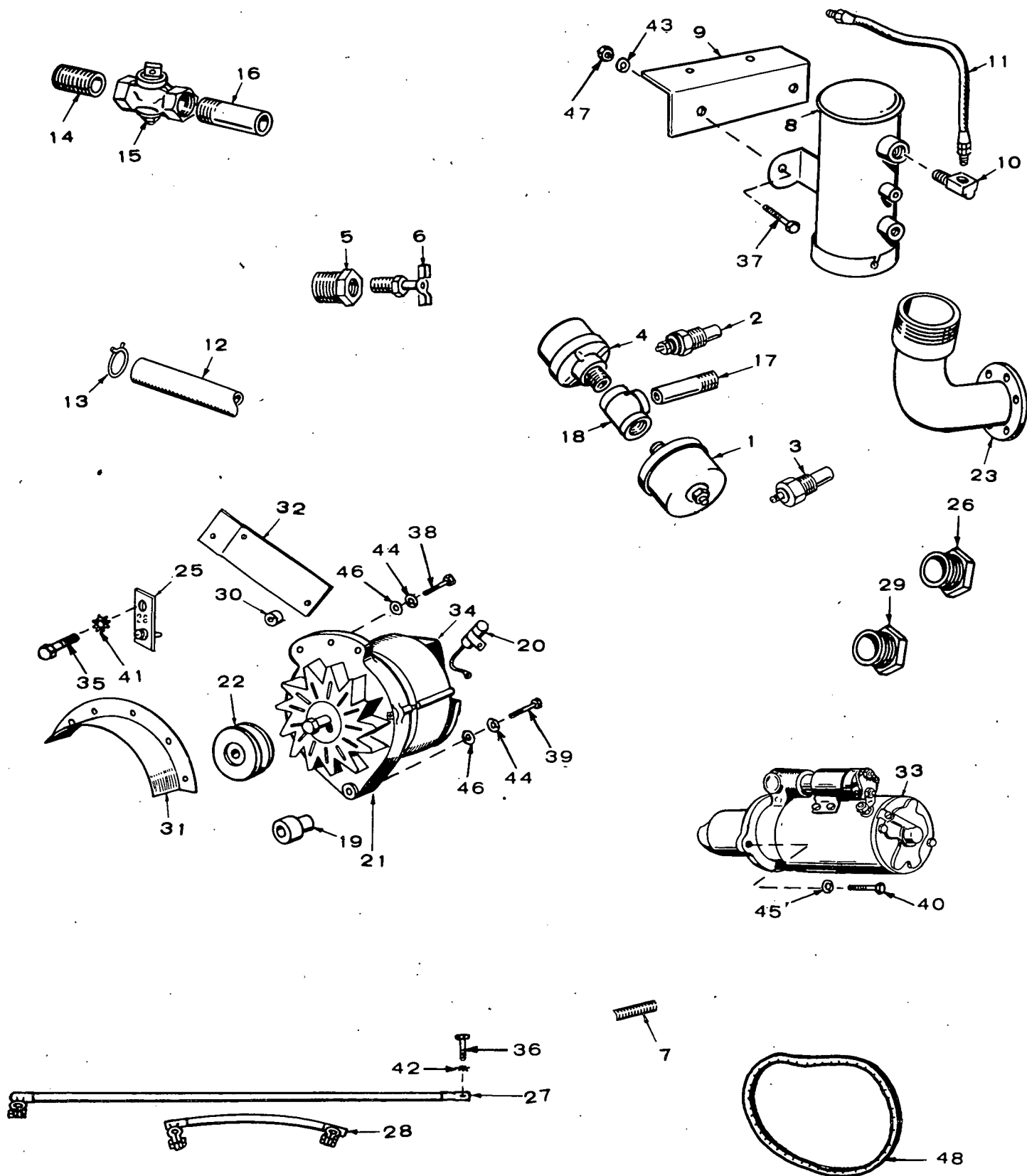
COOLING SYSTEM GROUP (Radiator Cooled Generator Sets)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	130-0809	1	Radiator
2	130-0449	1	Cap, Radiator
3	504-0028	1	Valve, Radiator Drain
4	130-0810	1	Guard, Fan (R.H.)
5	130-0811	1	Guard, Fan (L.H.)
6	503-0595	1	Hose, Radiator - Lower
7	503-0465	4	Clamp, Hose
8	503-0594	1	Hose, Radiator - Upper
9	130-0778	1	Gasket, Water Filter Cover - Optional
10	130-0780	1	Plate, Sacrificial - Water Filter - Optional
11	ELEMENT, WATER FILTER - OPTIONAL		
	130-0775	1	Chromate Formula
	130-0776	1	All Purpose (PAF) Formula
12	511-0095	1	*Belt, Fan (Begin Serial #427437)

* NOTE: Prior to Onan Serial #427437 the fan belt used was supplied by Allis-Chalmers.

MISCELLANEOUS ENGINE PARTS GROUP



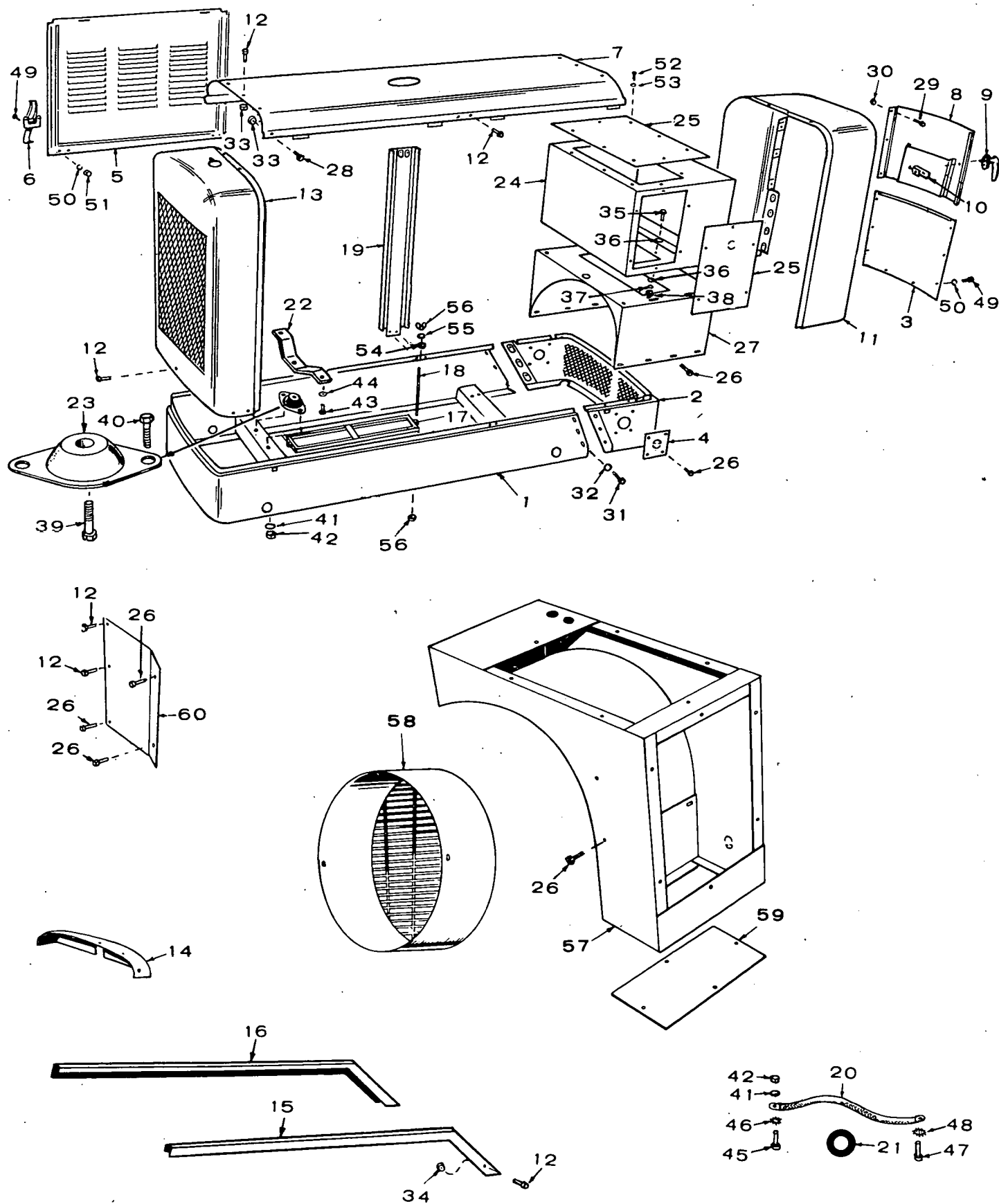
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	193-0108	1	Sender, Oil Pressure Gauge
2	193-0109	1	Sender, Water Temperature Gauge
3	309-0179	1	Switch, High Water Temperature
4	309-0169	1	Switch, Low Oil Pressure
5	505-0017	2	Bushing, Reducer (1/2 x 3/8")
6	504-0028	1	Valve, Drain (Block)
7	134-1437	1	Spring, Injection Pump Lever
8	149-0554	1	Pump, Fuel (Electric)
9	149-1162	1	Bracket, Fuel Pump Mounting
10	502-0002	1	Elbow, Fuel Pump Inlet
11	501-0002	1	Line, Fuel - Flexible (17")
12	503-0348	1	Hose, Oil Drain
13	503-0197	1	Clamp, Oil Drain
14	505-0100	1	Nipple, Close (1/2") Oil Drain
15	504-0011	1	Valve, Oil Drain
16	505-0185	1	Nipple, Half - Oil Drain
17	505-0098	1	Nipple, Oil Sender and Switch
18	505-0059	1	Tee, Oil Sender and Switch (1/8")
19	232-1813	1	Spacer, Alternator Mounting - Spec A Only
19	191-0873	1	Spacer, Alternator Mounting - Begin Spec B
20	312-0058	1	Condenser, Alternator
21	191-0665	1	† Alternator, Charge (Includes Fan)
22	191-0649	1	Pulley, Alternator
23	155-0996	1	Elbow, Exhaust
25	332-1292	1	Bracket, Terminal Mounting
26	505-0021	1	Bushing, Reducer - Oil Drain
27	CABLE, BATTERY		
	416-0618	1	Positive (42")
	416-0619	1	Negative (18")
28	416-0446	1	Cable, Battery Jumper
29	505-0007	1	Bushing (3/8 x 1/8") Fuel Sediment Filter
30	191-0791	1	Spacer, Alternator Adjusting - Spec A Only
31	191-0725	1	Guard, Alternator Belt
32	191-0872	1	Bracket, Alternator

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
33	191-0721	1	* Starter
34	191-0732	1	Regulator, Voltage (Part of Alternator)
35	800-0026	1	Screw, Hex Cap - Terminal Bracket Mounting (5/16-18 x 3/4")
36	800-0069	1	Screw, Hex Cap - Battery Cable to Ground (7/16-14 x 3/4")
37	800-0003	2	Screw, Hex Cap - Fuel Pump Mounting (1/4-20 x 1/2")
38	800-0013	1	Screw, Hex Cap - Alternator Mtg. (5/16-18 x 1-1/4")
39	800-0025	1	Screw, Hex Cap - Alternator Mtg. (5/16-18 x 5/8")
40	800-0055	3	Screw, Hex Cap - Starter Mtg. (3/8-16 x 2")
41	856-0008	1	Washer, Shakeproof - Terminal Bracket Mounting (5/16" External-Internal)
42	856-0012	1	Washer, Shakeproof - Battery Cable to Ground (7/16" External-Internal)
43	850-0040	2	Washer, Lock - Fuel Pump Mounting (1/4")
44	850-0045	2	Washer, Lock - Alternator Mounting (5/16")
45	850-0050	3	Washer, Lock - Starter Mounting (3/8")
46	526-0115	2	Washer, Flat - Alternator Mtg.
47	862-0001	2	Nut, Hex - Fuel Pump Mounting (1/4-20)
48	511-0095	1	Belt, Alternator Drive

* - For components, contact your nearest Delco Remy Dealer or Delco Remy Division of General Motors Corporation, Anderson, Indiana 46011.

† - For components, contact your nearest Motorola Dealer or Motorola Automotive Products, Inc., 9401 W. Grand Ave., Franklin Park, Illinois 60131.

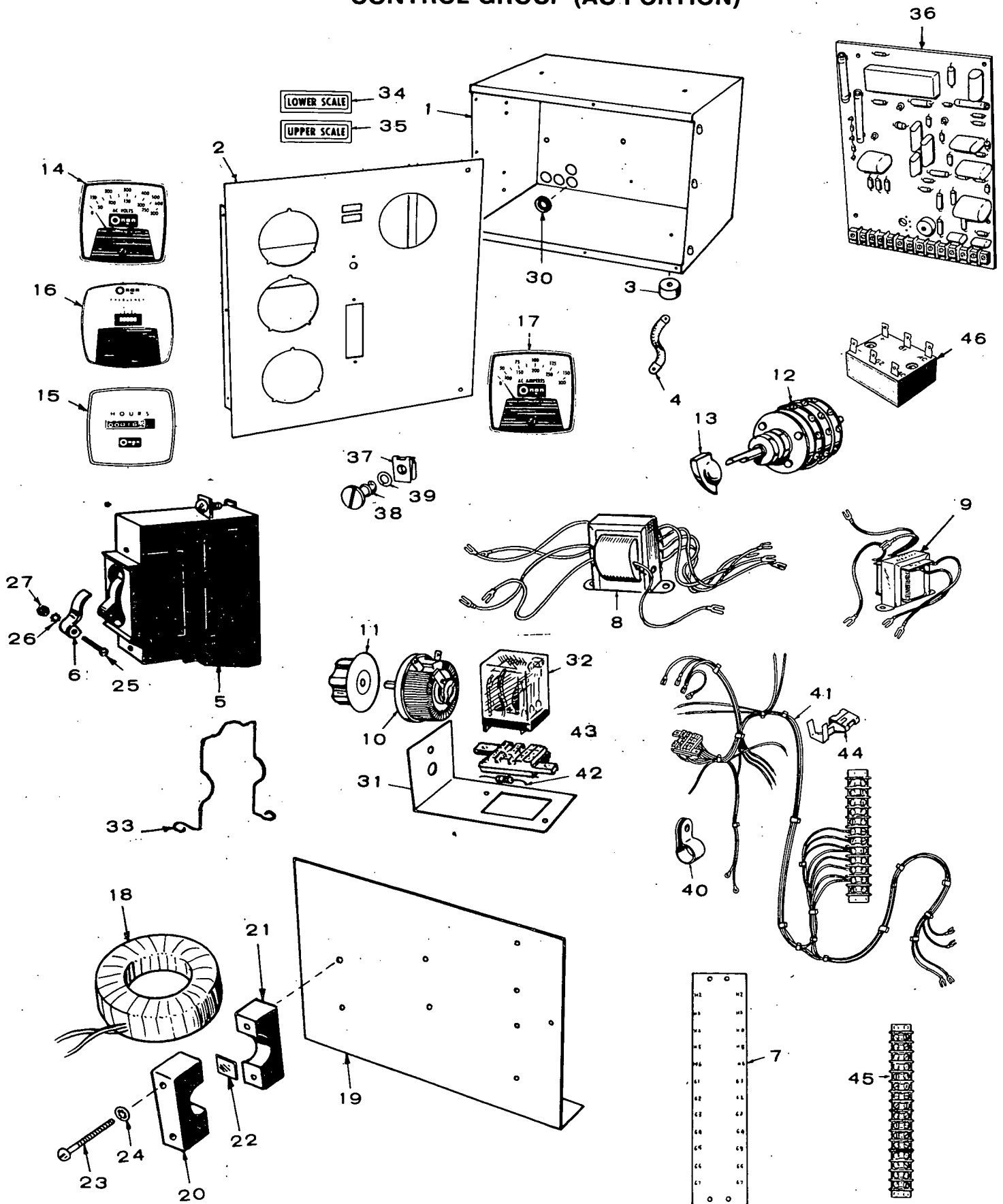
MOUNTING AND HOUSING GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	403-0900	1	Chassis, Front
2	403-0894	1	Chassis, Rear - Housed Sets
3	405-1780	1	Panel, Rear Housing Access - Housed Sets
4	403-0895	2	Cover, Conduit Opening - Housed Sets
5	405-1804	4	Panel (Side), Door - Housed Sets
6	406-0105	8	Clamp, Door - Housed Sets
7	405-2149	1	Panel, Top - Housed Sets
8	405-1777	1	Panel, Rear Door - Housed Sets
9	406-0157	1	Handle (Includes Keys), Door - Housed Sets
10	406-0089	1	Catch, Door - Housed Sets
11	405-1775	1	Panel, Rear - Housed Sets
12	821-0014	As Req.	Screw (5/16-18 x 1/2"), Self Locking
13	405-1153	1	Panel, Front - Radiator Cooled Sets
14	405-1165	1	Extension, Radiator Hood - Unhoused Radiator Cooled Sets
15	403-0896	1	Trim, Right Hand Chassis - Unhoused Sets
16	403-0897	1	Trim, Left Hand Chassis - Unhoused Sets
17	416-0480	1	Frame, Battery Hold-down
18	520-0663	2	Stud, Battery Hold-down
19	405-1776	2	Support, Housing Center - Housed Sets
20	337-0090	1	Strap, Ground
21	508-0001	1	Grommet, Rubber - Control Box Housing (2 used on Housed Models)
22	403-0908	1	Support, Engine Mount
23	402-0030	3	Mount, Vibration
24	301-3155	1	Housing, Control Box - Unhoused Sets
25	PANEL, CONTROL BOX HOUSING		
	301-3156	3	Unhoused Sets
	301-3156	2	Housed Sets, Also Unhoused Sets With Circuit Breaker
	301-3156	1	Housed Sets With Circuit Breaker
26	821-0010	As Req.	Screw (1/4-20 x 1/2"), Self Locking
27	301-3154	1	Saddle, Control Box Housing - Unhoused Sets
28	821-0016	4	Screw (5/16-18 x 3/4"), Self Locking - Housed Sets

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
29	809-0059	3	Screw (#14 x 1/2"), Self Locking - Housed Sets
30	870-0106	3	Nut (#14), Speed
31	800-0048	6	Screw (3/8-16 x 3/4") - Housed Sets
32	850-0050	6	Washer (3/8"), Lock - Housed Sets
33	870-0113	As Req.	Nut (5/16-18), Retainer
34	870-0020	6	Nut (5/16-18)
35	800-0003	4	Screw (1/4-20 x 1/2")
36	526-0018	8	Washer (1/4"), Flat
37	850-0040	4	Washer (1/4"), Lock
38	862-0001	4	Nut (1/4-20), Hex
39	800-0520	1	Screw (3/4-10 x 1") - Vibration Mount to Support
40	800-0090	2	Screw (1/2-13 x 1") - Vibration Mount
41	850-0060	3	Washer (1/2"), Lock
42	862-0016	3	Nut (1/2-13), Hex
43	800-0073	2	Screw (7/16-14 x 1-1/2") - Engine Support
44	850-0055	2	Washer (7/16"), Lock
45	800-0091	1	Screw (1/2-13 x 1-1/4") - Ground Strap
46	856-0013	1	Washer (1/2"), Shakeproof EIT
47	800-0071	1	Screw (7/16-14 x 1") - Ground Strap
48	856-0012	1	Washer (7/16"), Shakeproof EIT
49	813-0098	22	Screw (10-32 x 3/8") - Housed Sets
50	850-0030	22	Washer (#10), Lock - Housed Sets
51	870-0053	16	Nut (10-32) - Housed Sets
52	815-0026	18	Screw (10-32 x 3/8"), Truss Head - Control Box Panel Mounting
53	853-0018	18	Washer (#10), Shakeproof EIT
54	526-0115	2	Washer (5/16"), Flat
55	850-0045	2	Washer (5/16"), Lock
56	865-0007	2	Nut (5/16-18), Wing - Battery Hold-down Stud
57	301-3191	1	Box, Junction - Housed Sets
58	234-0369	1	Cover, End Bell - Housed Sets
59	301-3195	1	Plate, Junction Box Bottom - Housed Sets
60	301-3196	1	Bracket, Junction Box

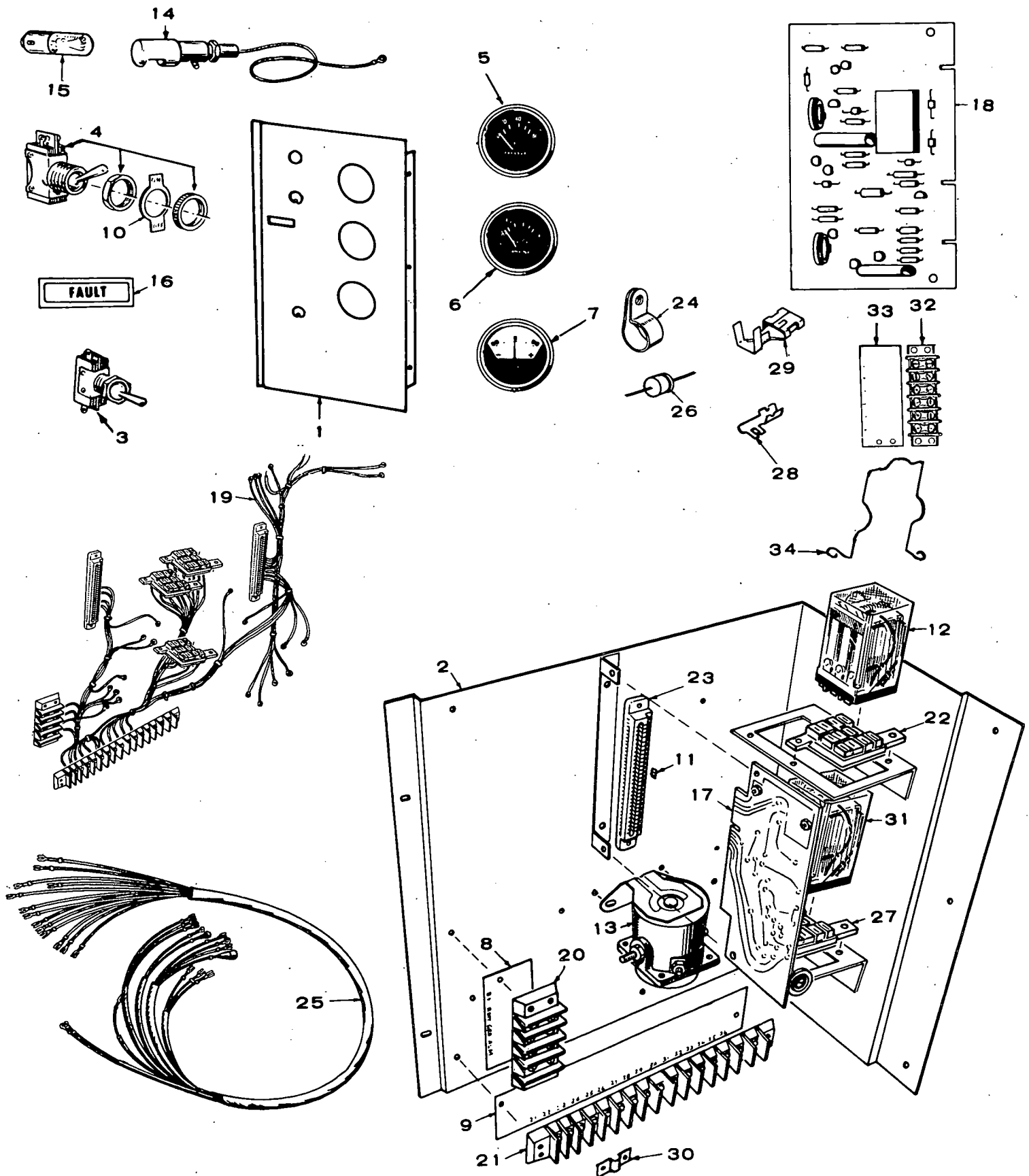
CONTROL GROUP (AC PORTION)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	301-3158	1	Box Only, Control				
2	PANEL ONLY, CONTROL						
			Sets Without Meter Panel	24	854-0010	6	Washer, Internal Lock - Transformer Mtg. (#10)
	301-3274	1	50.0DYA-515R and 60.0DYA-15R	25	815-0203	1	Screw, Roundhead (10-32 x 7/8")
	301-3821	1	60.0DYA-9XR	26	854-0010	2	Washer, Internal Lock (#10)
			Sets With Meter Panel	27	871-0010	1	Nut, Hex (10-32)
	301-3170	1	50.0DYA-515R and 60.0DYA-15R	30	508-0001	4	Grommet, Rubber
	301-3342	1	60.0DYA-9XR	31	301-3244	1	Bracket, Relay Mounting
3	402-0078	4	Rubber Mount, Control Box				50.0DYA-515R and 60.0DYA-15R
4	337-0049	1	Strap, Ground	32	307-1061	1	Relay, Voltage Selector - 50.0DYA-515R and 60.0DYA-15R
5	BREAKER, CIRCUIT			33	307-1157	1	Spring, Relay Holddown - 50.0DYA-515R & 60.0DYA-15R
	320-0018	1	Brush Type Generator	34	322-0130	1	Light, Lower Scale
	320-0431	1	Brushless Generator	35	322-0131	1	Light, Upper Scale
6	320-0307	1	Lock, Circuit Breaker Handle (Penn State)	36	BOARD ASSEMBLY, PRINTED CIRCUIT (See Separate Group for Components)		
7	STRIP, MARKER				332-1264	1	Brush Type Generator
	332-1248	1	Sets Without Meter Panel		332-1268	1	Brushless Generator
	332-1242	1	Sets With Meter Panel	37	406-0332	2	Fastener
8	315-0342	1	Transformer, Voltage	38	406-0333	2	Stud, Fastener
9	REACTOR, COMMUTATOR (Begin Spec F)			39	406-0334	2	Washer, Stud Fastener
	315-0384	1	With Leads and Terminals	40	332-0050	2	Clip, Tinnerman
	315-0343	1	Without Leads and Terminals	41	HARNES, WIRING - AC CONTROL (Includes Parts Marked *)		
10	303-0170	1	Rheostat				Sets Without Meter Panel (Spec A through E)
11	303-0032	1	Knob, Rheostat		338-0524	1	50.0DYA-515R and 60.0DYA-15R
12	SWITCH, SELECTOR				338-0570	1	60.0DYA-9XR
	308-0012	1	Sets Without Meter Panel		338-0525	1	Sets With Meter Panel 50.0DYA-515R and 60.0DYA-15R
	308-0284	1	Sets With Meter Panel		338-0571	1	60.0DYA-9XR
13	303-0076	1	Knob, Selector Switch				Sets Without Meter Panel (Begin Spec F)
14	VOLTMETER				338-0764	1	50.0DYA-515R, 60.0DYA-15R and Penn State
	302-0718	1	50.0DYA-515R and 60.0DYA-15R		338-0766	1	60.0DYA-9XR
	302-0779	1	60.0DYA-9XR				Sets With Meter Panel (Begin Spec F)
15	METER, RUNNING TIME				338-0730	1	50.0DYA-515R, 60.0DYA-15R and Penn State
			Sets With Meter Panel		338-0759	1	60.0DYA-9XR
	302-0469	1	50 Hertz Sets	42	350-0556	1	*Resistor (47,000-Ohm, 1/2 Watt)
	302-0466	1	60 Hertz Sets	43	323-0764	1	*Socket, Relay
16	METER, FREQUENCY			44	332-1280	As Req.	*Terminal, Crimp
			Sets With Meter Panel	45	*BLOCK, TERMINAL		
	302-0256	1	50 Hertz Sets		332-0607	1	Sets Without Meter Panel (12 Place)
	302-0221	1	60 Hertz Sets		332-0795	1	Sets With Meter Panel (16 Place)
17	AMMETER, AC			46	305-0524	1	Bridge, Rectifier (Begin Spec F)
			Sets With Meter Panel				
	302-0721	1	50.0DYA-515R and 60.0DYA-15R				
	302-0406	1	60.0DYA-9XR				
18	TRANSFORMER, CURRENT						
	302-0107	3	50.0DYA-515R and 60.0DYA-15R				
	302-0076	3	60.0DYA-9XR				
19	302-0729	1	Bracket, Transformer Mounting				
20	302-0235	3	Clamp, Transformer Mounting (Upper)				
21	302-0236	3	Clamp, Transformer Mounting (Lower)				
22	302-0253	As Req.	Shim, Transformer Mounting				
23	813-0110	6	Screw, Roundhead Machine - Transformer Mounting (10-32 x 2")				

* Included in Wiring Harness Assembly.

CONTROL GROUP (ENGINE INSTRUMENT PORTION)

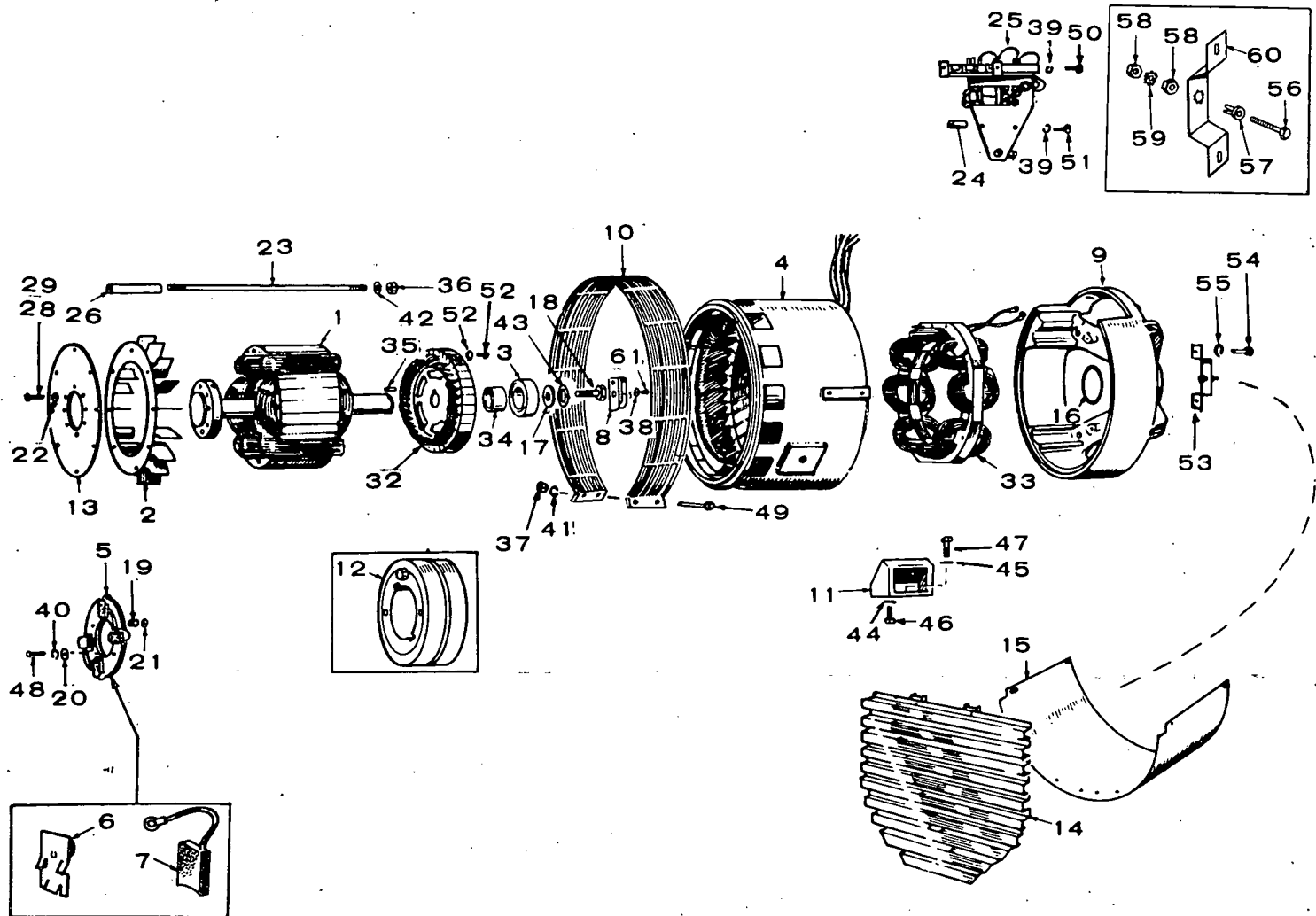


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	PANEL ONLY, ENGINE CONTROL		
	301-3165	1	Sets With One Fault Light (Standard)
	301-3267	1	Sets With Five Fault Lights (Optional)
2	301-3253	1	Bracket, Engine Control
3	SWITCH, SELECTOR		
	308-0138	1	Standard
	308-0327	1	Penn State
4	308-0002	1	Switch, Panel Light
5	193-0107	1	Gauge, Oil Pressure
6	193-0106	1	Gauge, Water Temperature
7	302-0061	1	Ammeter, Charge (30-0-30)
8	332-1239	1	Strip, Marker (B+, Remote and Ground Alarm)
9	332-1241	1	Strip, Marker (21 through 36)
10	308-0003	1	Plate, Switch (On/Off)
11	332-1276	2	Plug, Keying (Sets with Five Fault Lights use Qty. of 1)
12	307-1058	2	Relay (1 Start Disconnect, 1 Ignition)
13	307-1031	1	Relay, Start Solenoid
14	322-0073	1	Holder, Lamp
15	322-0074	1	Lamp, Panel
16	LAMP, FAULT		
	322-0128	1	Standard Sets
	332-0107	1	Overcrank (Optional)
	322-0111	1	Overspeed (Optional)
	322-0108	1	Low Oil Pressure (Optional)
	322-0109	1	High Engine Temperature (Optional)
	322-0110	1	Low Engine Temperature (Optional)
17	CONTROL, CRANKER		
	300-0733	1	Standard Cranker
	300-0714	1	Cycle Cranker (Optional) - See Separate Group for Components

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
18	MONITOR, ENGINE CONTROL (See Separate Group For Components)		
	300-0679	1	Sets With One Fault Light - Standard
	300-0681	1	Sets With Five Fault Lights - Optional
19	HARNESS ASSEMBLY, WIRING - CONTROL (Includes Parts Marked *)		
	338-0528	1	Sets With One Fault Light - Standard
	338-0534	1	Sets With Five Fault Lights - Optional
20	332-0537	1	*Block, Terminal - 4 Place
21	332-0795	1	*Block, Terminal - 16 Place
22	323-0765	2	*Socket, Relay - 11 Place
23	332-1271	2	*Housing, Printer Circuit Board Terminal
24	332-0051	1	Clip, Tinnerman
25	338-0533	1	Harness Assembly, Wiring - Engine to Control
26	357-0004	1	Rectifier, Diode (Part of Standard Cranker Control)
27	323-0764	1	*Socket, Relay - 8 Place
28	332-1269	As Req.	*Terminal, PC Board
29	332-1280	As Req.	*Terminal, Crimp
30	332-1043	1	*Jumper, Terminal - Sets With One Fault Light
31	307-1061	1	Relay, Starter Protection - Begin Spec C
32	332-0669	1	*Block, Terminal (6 Place) - Sets With Five Fault Lights
33	332-1240	1	*Strip, Marker (53 through 58) - Sets With Five Fault Lights
34	307-1157	3	Spring, Relay Hold-down

* Included in Wiring Harness Assembly.

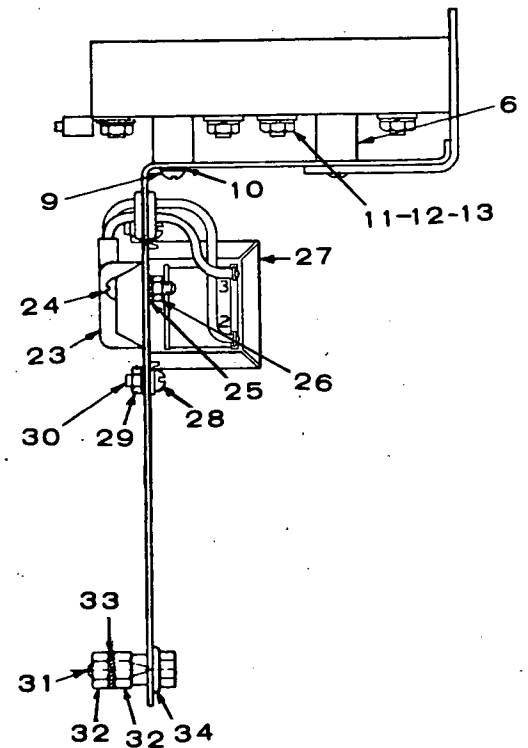
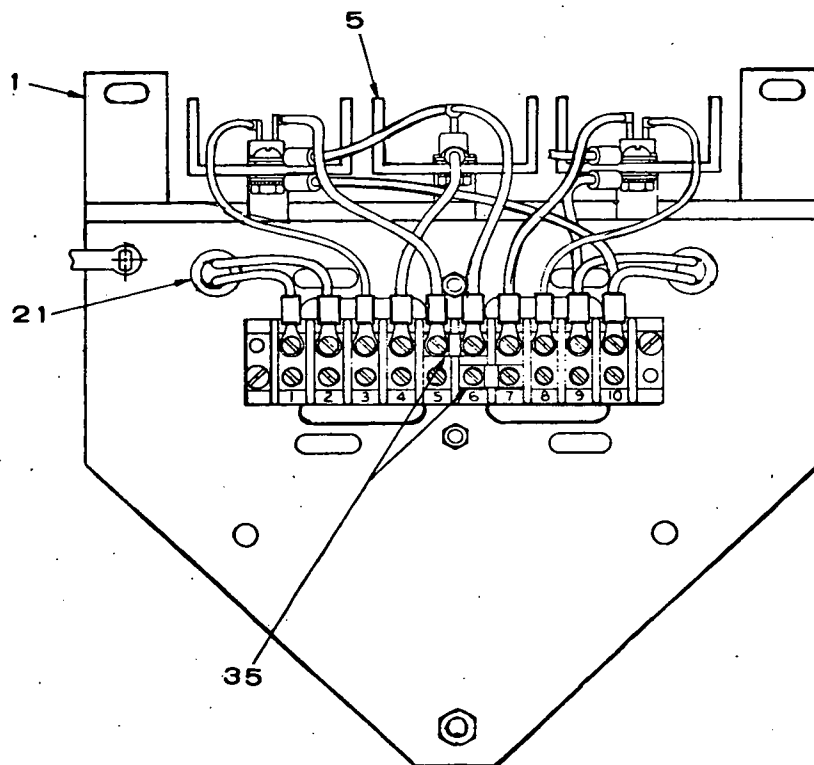
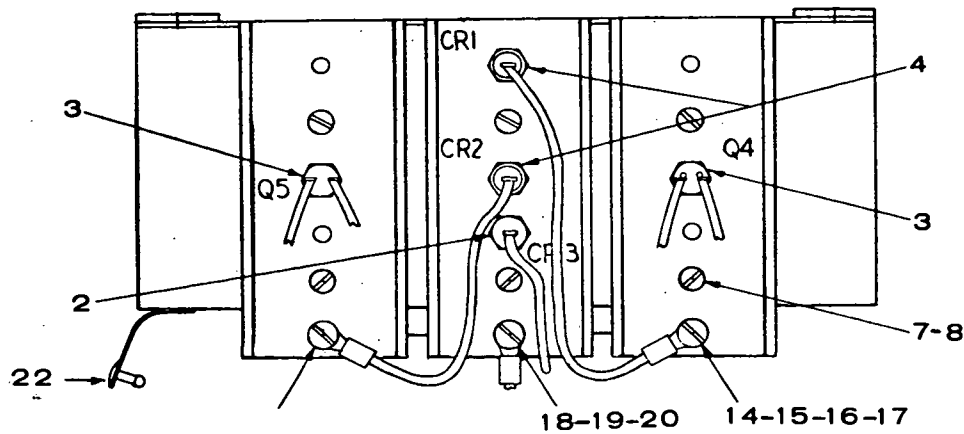
GENERATOR GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	*	1	Rotor Assembly, Wound (Includes Collector Ring on Brush Type Generators)	35	515-0145	1	Key, Exciter Rotr (Brushless Generator)
2	205-0089	1	Blower		NUT, HEX		
3	510-0101	1	Bearing	36	862-0011	4	Generator through Stud (3/8-16)
4	*	1	Stator Assembly, Wound	37	862-0001	2	Generator Screen (1/4-20)
5	212-0342	1	Rig Assembly, Brush - Includes Brushes and Springs (Brush Type Generator Only)		WASHER, SHAKEPROOF LOCK		
6	212-1105	4	Spring, Brush (Brush Type Generator Only)	38	856-0010	1	Overspeed Switch Mounting (3/8" External-Internal)
7	214-0046	4	Brush (Brush Type Generator Only)	39	853-0013	4	Chassis Mounting (1/4")
8	150-0717	1	Switch Assembly, Overspeed		WASHER, SPRING LOCK		
9	BELL, END			40	850-0040	4	Brush Rig Mounting - Brush Type Generator (1/4")
	211-0215	1	Spec A and B	41	850-0040	2	Generator Screen (1/4")
	211-0185	1	Begin Spec C	42	850-0050	4	Generator Through Stud (3/8")
10	234-0368	1	Screen, Generator	43	850-0079	1	Rotor Through Stud (3/4")
11	232-2106	2	Bracket, Generator Mounting	44	850-0060	4	Generator Support to Chassis (1/2")
12	204-0083	1	Ring, Collector - Brush Type Generator Only	45	850-0055	4	Generator Support to Vibration Mount (7/16")
13	232-2078	1	Disc, Generator Drive		SCREW, HEX CAP		
14	234-0370	1	Grille, Generator Air Inlet	46	800-0091	4	Generator Support to Chassis (1/2-13 x 1-1/4")
15	234-0361	1	Wrapper, Generator End Bell	47	800-0071	4	Generator Support to Vibration Mount (7/16-14 x 1")
16	509-0125	1	Seal, "O" Ring - Bearing	48	114-0023	4	Brush Rig Mounting - Brush Type Generator (1/4-20 x 1-1/4")
17	526-0238	1	Washer, Bearing Retainer	49	114-0023	2	Generator Screen (1/4-20 x 1-1/4")
18	800-0513	1	Screw, Bearing Retainer	50	800-0009	2	Chassis Mounting (1/4-20 x 1-1/2")
19	212-1225	4	Spacer, Brush Rig Mounting - Brush Type Generator Only)	51	800-0003	2	Chassis Mtg. (1/4-20 x 1-1/2")
	WASHER, FLAT			52	800-0009	4	Exciter Rotor Mounting (1/4-20 x 1-1/2")
20	526-0018	4	Brush Rig Mounting (Brush Type Generator Only)	53	150-1456	1	Bracket and Point Assembly, Overspeed Switch
21	526-0108	4	Brush Rig Mounting (Brush Type Generator Only)	54	800-0003	2	Screw, Hex Cap (1/4-20 x 1-1/4") - Overspeed Switch Mounting
22	526-0259	8	Drive, Disc to Hub Mounting	55	850-0040	2	Washer, Lock (1")4" Overspeed Switch Mounting
23	520-0723	4	Stud, Generator Through	56	150-0723	1	*Point, Overspeed Switch (Begin Spec F)
24	305-0481	2	Spacer, Voltage Regulator Mtg. (Spec A through E)	57	870-0250	1	*Nut, Insulation - Overspeed Switch (Begin Spec F)
25	CHASSIS ASSEMBLY (See Separate Group for Components Breakdown (Spec A through E)			58	862-0001	2	*Nut, Hex - Overspeed Switch (1/4-20) (Begin Spec F)
	305-0483	1	Brush Type Generator	59	853-0013	1	*Washer, Lock - Overspeed Switch (1/4") (Begin Spec F)
	305-0491	1	Brushless Generator	60	150-1356	1	*Bracket, Overspeed Switch (Begin Spec F)
26	503-0611	4	Hose, Insulator	61	812-0189	1	Screw, Round Head - Overspeed Switch Mtg. (3/8-16 x 3/4")
28	805-0033	8	Bolt, Place - Drive Disc to Hub				
29	805-0018	8	Bolt, Place - Drive Disc to Engine				
32	201-1739	1	Rotor Assembly, Wound - Exciter (Brushless Generator - Includes Diodes) - See Separate Group for Components				
33	STATOR ASSEMBLY, WOUND - EXCITER (Brushless Generator)						
	220-1528	1	Spec A Through E				
	220-2353	1	Begin Spec F				
34	232-2102	1	Spacer, Bearing (Brushless Generator)				

* - Parts included in 150-1546 Bracket and Point Assembly.

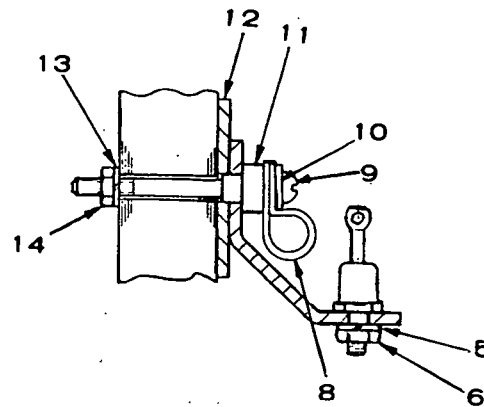
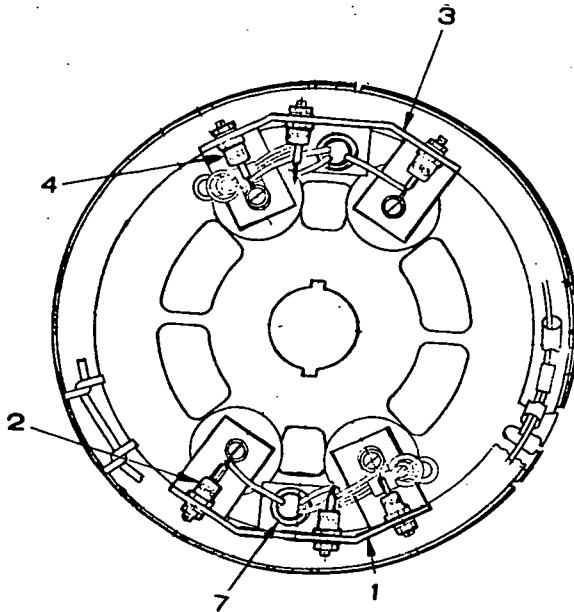
VOLTAGE REGULATOR GROUP - SPEC A THROUGH E



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	CHASSIS ASSEMBLY, VOLTAGE REGULATOR (Includes Parts Marked *)		
	305-0491		Brushless Generator
	305-0483	1	Brush Type Generator
1	305-0482	1	*Chassis, Voltage Regulator
2	358-0029	1	*Rectifier, Silicon (CR3)
3	RECTIFIER, SILICON CONTROLLED		
	364-0014	2	*Brushless Generator (Q4 & Q5)
	364-0012	2	*Brush Type Generator (Q4 & Q5)
4	RECTIFIER, SILICON		
	358-0035	2	*Brushless Generator (CR1 & CR2)
	358-0031	2	*Brush Type Generator (CR1 — CR2)
5	363-0048	3	*Heat Sink, Rectifier
6	332-1265	6	*Insulator, Stand off
7	812-0077	6	*Screw, Roundhead - Heat Sink Mtg. (8-32 x 3/8")
8	853-0005	6	*Washer, Shakeproof Lock - Heat Sink Mtg. (#8 External)
9	812-0077	6	*Screw, Roundhead - Stand off Insulator Mtg. (8-32 x 3/8")
10	853-0005	6	*Washer, Shakeproof Lock - Stand off Insulator Mtg. (#8 External)
11	871-0010	3	*Nut, Hex - Rectifier Mounting (CR1, CR2 & CR3) - 10-32
12	526-0009	3	*Washer, Flat - Rectifier Mounting (CR1, CR2 & CR3) #10
13	850-0030	3	*Washer, Lock - Rectifier Mounting (CR1, CR2 & CR3) #10
14	812-0079	2	*Screw, Roundhead - Rectifier Lead to Heat Sink (8-32 x 1/2")
15	526-0048	2	*Washer, Flat (Brass) - Rectifier Lead to Heatsink (#8)
16	853-0005	2	*Washer, Shakeproof Lock - Rectifier Lead to Heat Sink (#8 External)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
17	871-0007	2	*Nut, Hex - Rectifier Lead to Heat Sink (8-32)
18	812-0079	1	*Screw, Roundhead - Terminal Block Lead to Heatsink (8-32 x 1/2")
19	853-0005	1	*Washer, Shakeproof Lock - Terminal Block Lead to Heat Sink (#8)
20	871-0007	1	*Nut, Hex - Terminal Block Lead to Heat Sink (8-32)
21	508-0002	2	*Grommet, Rubber
22	332-1415	1	*Clamp, Cable
23	332-1266	1	*Block, Terminal
24	812-0081	2	*Screw, Roundhead - Terminal Block Mounting (8-32 x 5/8")
25	853-0005	2	*Washer, Shakeproof Lock - Terminal Block Mounting (#8 External)
26	860-0008	2	*Nut, Hex - Terminal Block Mounting (8-32)
27	REACTOR ASSEMBLY, COMMUTATOR		
	315-0343	1	*Brushless Generator
	315-0339	1	*Brush Type Generator
28	812-0077	2	*Screw, Roundhead - Reactor Mtg. (8-32 x 3/8")
29	853-0005	2	*Washer, Shakeproof Lock - Reactor Mounting (#8 External)
30	860-0008	2	*Nut, Hex - Reactor Mtg. (8-32)
31	150-0723	1	*Point, Contact - Overspeed Switch
32	862-0001	2	*Nut, Hex - Contact Point (1/4-20)
33	853-0013	1	*Washer, Shakeproof Lock Contact Point (1/4 External)
34	870-0250	2	*Nut, Insulator - Contact Point (1/4)
35	332-1043	2	*Jumper - Terminal Block

EXCITER ROTOR GROUP

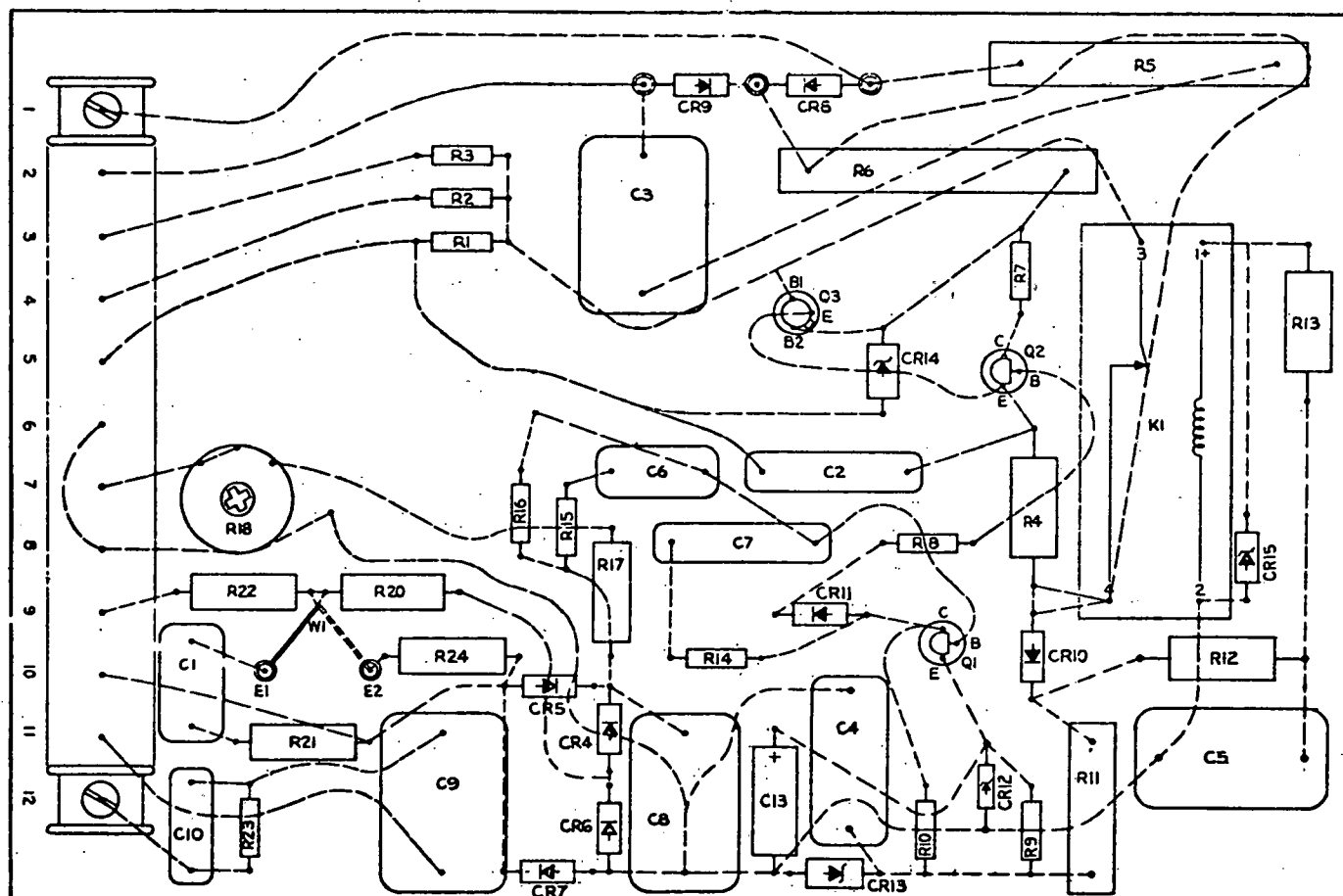


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	201-1739	1	Rotor Assembly, Wound - Exciter (Includes Parts Marked *)
1	363-0055	1	*Heat Sink, Rectifier - Negative
2	358-0015	3	*Rectifier, Diode - Negative (CR4, CR5 & CR6)
3	363-0054	1	*Heat Sink, Rectifier - Positive
4	358-0016	3	*Rectifier, Diode - Positive (CR1, CR2 & CR3)
5	850-0030	6	*Washer, Lock Spring (#10) Diode Mounting
6	870-0053	6	*Nut, Hex - Diode Mounting (10-32)
7	508-0093	2	*Grommet, Rubber
8	332-0050	2	*Clip, Wire
9	813-0110	4	*Screw, Roundhead - Heat Sink Mounting (10-32 x 2")
10	526-0009	4	*Washer, Flat - Heat Sink Mounting (#10)
11	508-0124	4	*Bushings, Insulating - Heat Sink Mounting
12	508-0156	4	*Washer, Insulating - Heat Sink Mounting
13	850-0030	4	*Washer, Lock Spring - Heat Sink Mounting (#10)
14	870-0053	4	*Nut, Hex - Heat Sink Mtg. (10-32)

PRINTED CIRCUIT BOARD ASSEMBLY GROUP (AC)

332-1264 - Printed Circuit Board, Complete

BRUSH TYPE GENERATOR

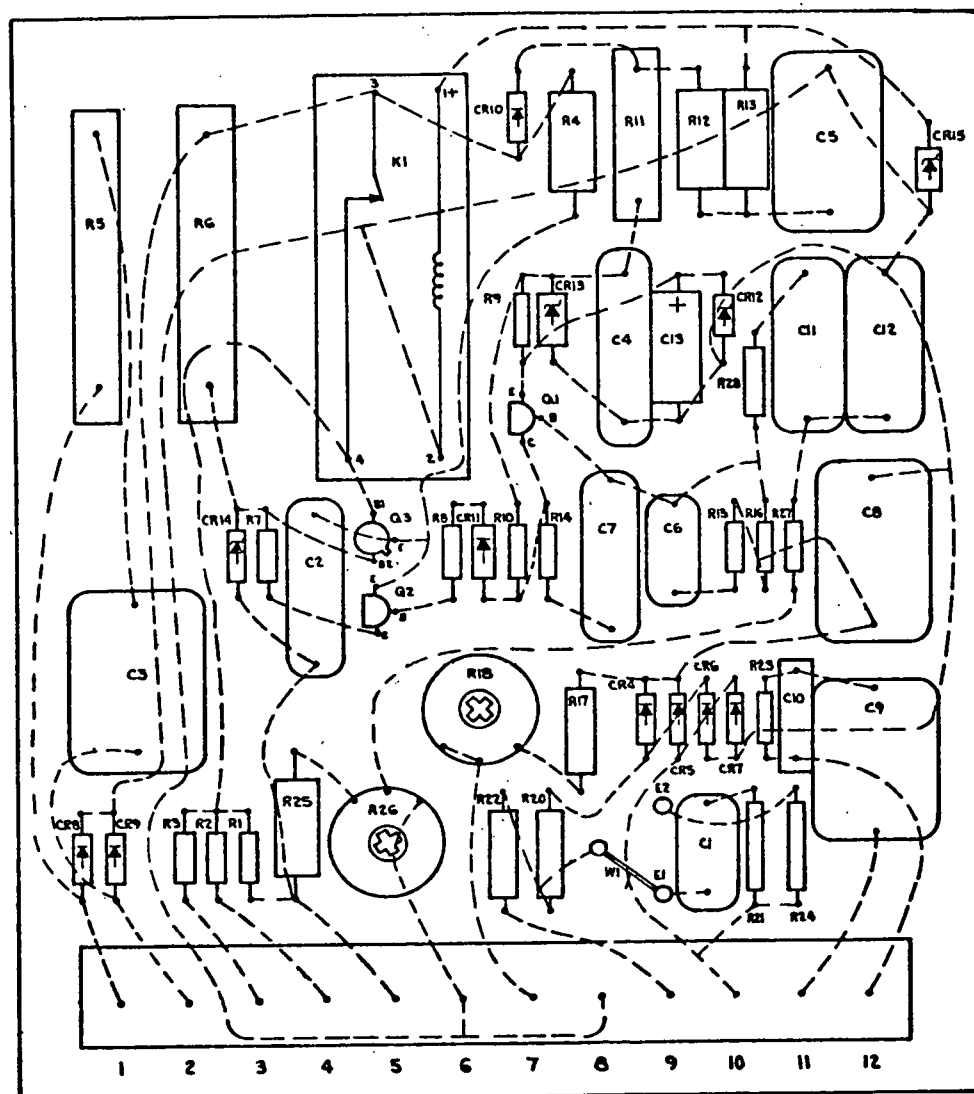


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
TB1	332-1252	1	Terminal Block	R6	353-0039	1	Resistor, Fixed (5,000-Ohm, 15 Watt)
C1	355-0018	1	Capacitor (.47 Mfd., 100 Volt)	R7	350-0398	1	Resistor (3,000-Ohm, 1/2 Watt)
C2, C7	355-0005	2	Capacitor (.22 Mfd., 200 Volt)	R8, R16	350-0447	2	Resistor (330,000-Ohm, 1/2 Watt)
C3, C9	355-0017	2	Capacitor (.47 Mfd., 400 Volt)	R9, R10	350-0423	2	Resistor (33,000-Ohm, 1/2 Watt)
C4	355-0006	1	Capacitor (.47 Mfd., 200 Volt)	R11	352-0151	1	Resistor, Fixed (15,000-Ohm, 5 Watt)
C5, C8	355-0016	2	Capacitor (1 Mfd., 100 Volt)	R12	350-1014	1	Resistor (13,000-Ohm, 2 Watt)
C6	355-0015	1	Capacitor (.1 Mfd., 200 Volt)	R13	350-1007	1	Resistor (6,800-Ohm, 2 Watt)
C10	355-0014	1	Capacitor (.047 Mfd., 200 Volt)	R14	350-0443	1	Resistor (220,000-Ohm, 2 Watt)
C13	356-0039	1	Capacitor (100 Mfd., 10 Volt)	R15	350-0435	1	Resistor (100,000-Ohm, 1/2 Watt)
CR4 thru 11	357-0014	8	Rectifier, Silicon	R17	351-0524	1	Resistor, Metal Film (13,000-Ohm, 1/4 Watt)
CR12	359-0035	1	Diode, Zener (6.8 Volt)	R18	303-0168	1	Potentiometer
CR13	359-0025	1	Diode, Zener (20 Volt)	R20, R22	351-0520	2	Resistor, Metal Film (28,000-Ohm, 1/4 Watt)
CR14	359-0026	1	Diode, Zener (18 Volt)	R21	351-0522	1	Resistor, Metal Film (5,110-Ohm, 1/4 Watt)
CR15	359-0015	1	Diode, Zener (24 Volt)	R24	351-0523	1	Resistor, Metal Film (8,870-Ohm, 1/4 Watt)
K1	307-1063	1	Relay, Magnetic Reed				
Q1, Q2	362-0017	2	Transistor, Silicon (NPN)				
Q3	361-0004	1	Transistor, Unijunction				
R1, R23	350-0355	2	Resistor (47-Ohm, 1/2 Watt)				
R2, R3	350-0351	2	Resistor (33-Ohm, 1/2 Watt)				
R4	350-1075	1	Resistor (4.7-Megohm, 2 Watt)				
R5	353-0040	1	Resistor, Fixed (270-Ohm, 10 Watt)				

PRINTED CIRCUIT BOARD ASSEMBLY GROUP (AC,

332-1268 - Printed Circuit Board, Complete

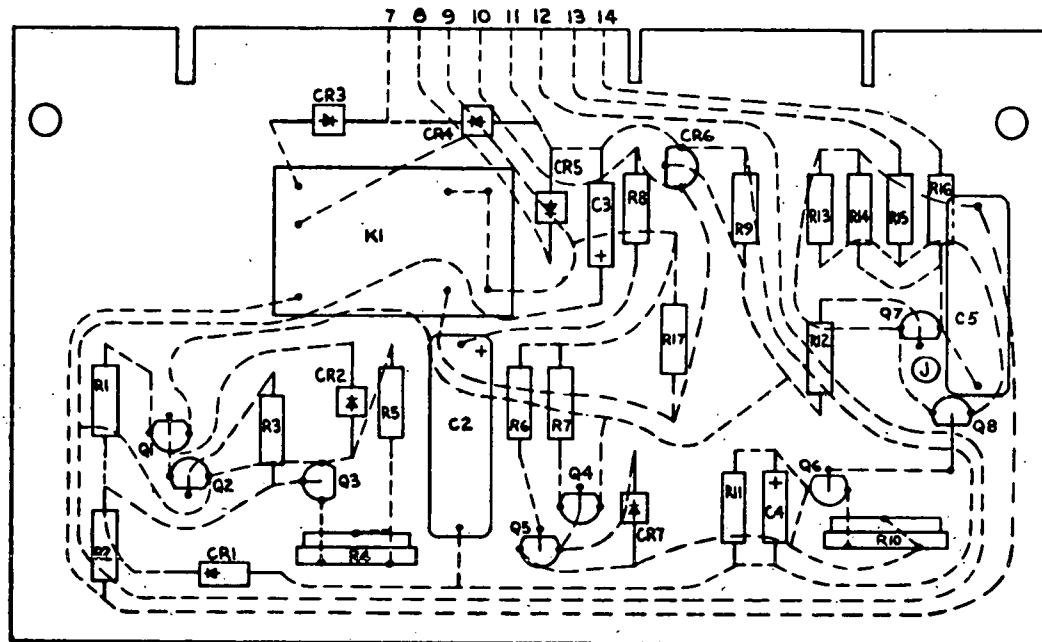
BRUSHLESS TYPE GENERATOR



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
TB1	332-1252	1	Terminal Block	R6	353-0039	1	Resistor, Fixed (5,000-Ohm, 15 Watt)
C1	355-0018	1	Capacitor (.47 Mfd., 100 Volt)	R7	350-0398	1	Resistor (3,000-Ohm, 1/2 Watt)
C2, C7	355-0005	2	Capacitor (.22 Mfd., 200 Volt)	R8, R16	350-0447	2	Resistor (330,000-Ohm, 1/2 Watt)
C3, C9	355-0017	2	Capacitor (.47 Mfd., 400 Volt)	R9, R10	350-0423	2	Resistor (33,000-Ohm, 1/2 Watt)
C4, C12	355-0006	2	Capacitor (.47 Mfd., 200 Volt)	R11	352-0151	1	Resistor, Fixed (15,000-Ohm, 5 Watt)
C5, C8	355-0016	2	Capacitor (1 Mfd., 100 Volt)	R12	350-1014	1	Resistor (13,000-Ohm, 2 Watt)
C6	355-0015	1	Capacitor (.1 Mfd., 200 Volt)	R13	350-1007	1	Resistor (6,800-Ohm, 2 Watt)
C10	355-0014	1	Capacitor (.047 Mfd., 200 Volt)	R14	350-0443	1	Resistor (220,000-Ohm, 2 Watt)
C11	355-0020	1	Capacitor (.1 Mfd., 400 Volt)	R15, R27	350-0435	2	Resistor (100,000-Ohm, 1/2 Watt)
C13	356-0039	1	Capacitor (100 Mfd., 10 Volt)	R17	351-0524	1	Resistor, Metal Film (13,000-Ohm, 1/4 Watt)
CR4 thru 11	357-0014	8	Rectifier, Silicon	R18	303-0168	1	Potentiometer
CR12	359-0035	1	Diode, Zener (6.8 Volt)	R20, R22	351-0520	2	Resistor, Metal Film (28,000-Ohm, 1/4 Watt)
CR13	359-0025	1	Diode, Zener (20 Volt)	R21	351-0522	1	Resistor, Metal Film (5,110-Ohm, 1/4 Watt)
CR14	359-0026	1	Diode, Zener (18 Volt)	R24	351-0523	1	Resistor, Metal Film (8,870-Ohm, 1/4 Watt)
CR15	359-0015	1	Diode, Zener (24 Volt)	R25	350-1011	1	Resistor (10,000-Ohm, 2 Watt)
K1	307-1063	1	Relay, Magnetic Reed	R26	303-0164	1	Potentiometer
Q1, Q2	362-0017	2	Transistor, Silicon (NPN)	R28	350-0459	1	Resistor (1.0 Megohm, 1 Watt)
Q3	361-0004	1	Transistor, Unijunction				
R1, R23	350-0355	2	Resistor (47-Ohm, 1/2 Watt)				
R2, R3	350-0351	2	Resistor (33-Ohm, 1/2 Watt)				
R4	350-1075	1	Resistor (4.7 Megohm, 2 Watt)				
R5	353-0040	1	Resistor, Fixed (270-Ohm, 10 Watt)				

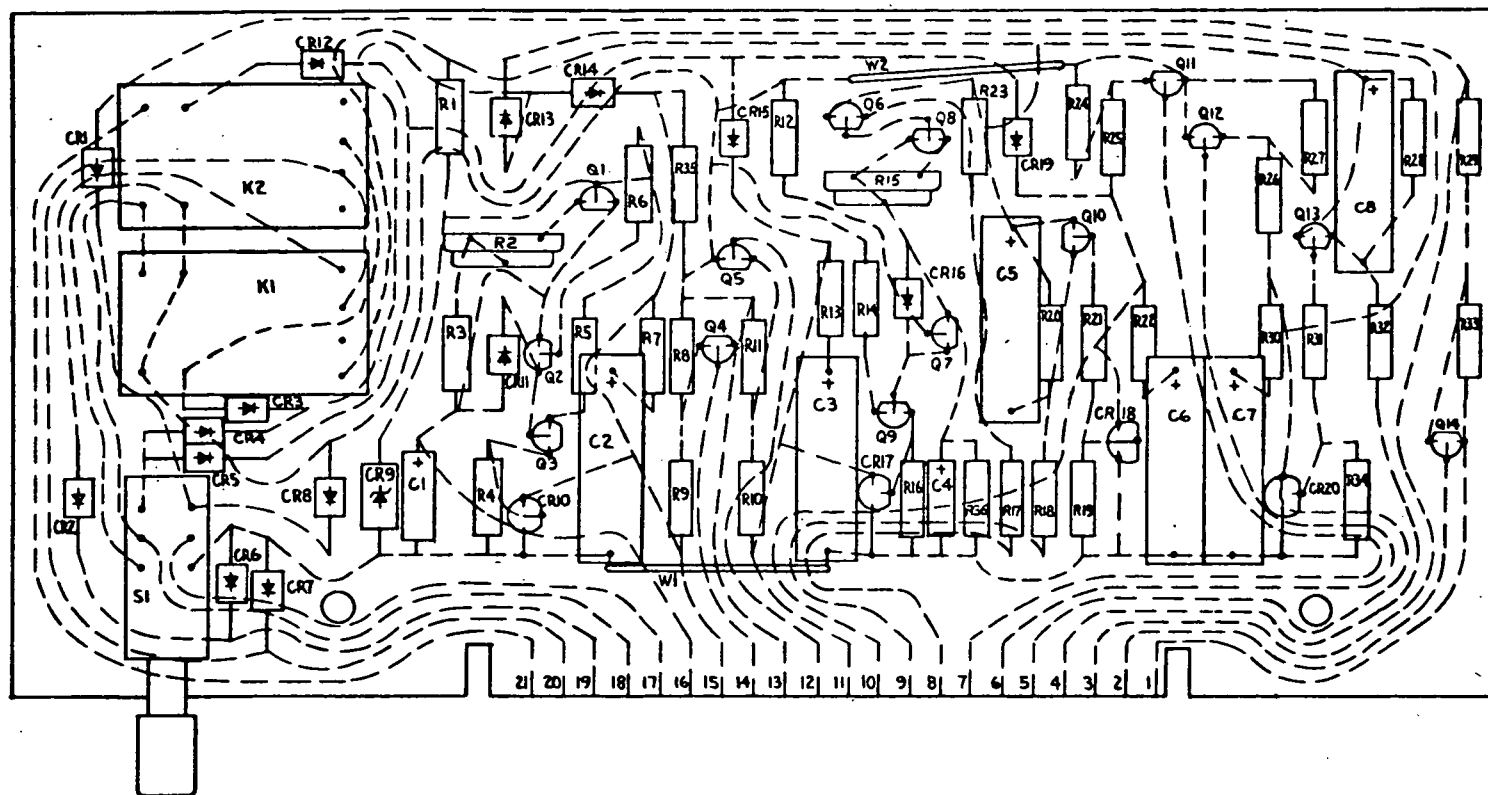
ENGINE CONTROL MONITOR GROUP (STANDARD SETS WITH ONE FAULT LIGHT)

12 VOLT



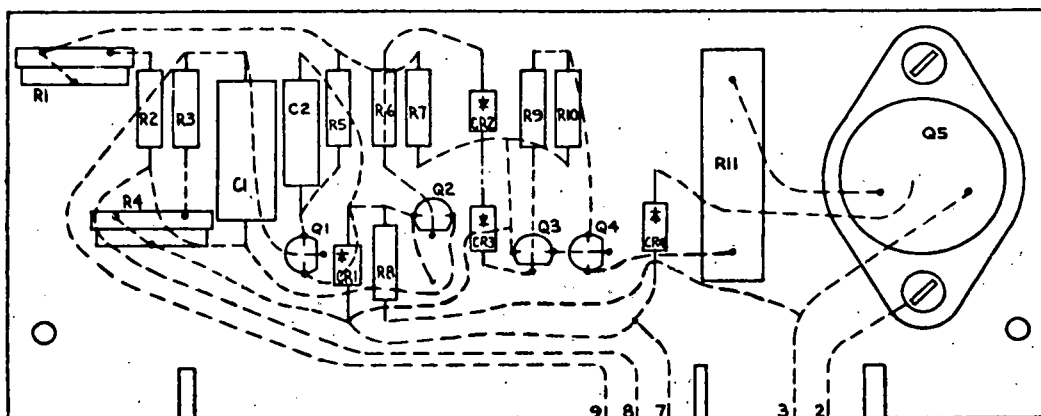
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0679	1	Monitor Assembly, Complete - Engine Control
K1	307-1039	1	Relay
R3	350-0548	1	Capacitor (10,000-Ohm)
C2,5	355-0005	2	Capacitor (22 Mfd.)
C3	356-0040	1	Capacitor (10 Mfd.)
C4	356-0030	1	Capacitor (1 Mfd.)
CR1	359-0027	1	Diode, Zener
CR2,3,4,5,7	357-0004	5	Rectifier, Diode
CR6	364-0017	1	Rectifier, Gate Control
Q1, Q4	361-0003	2	Transistor
Q2,3,5,6	362-0025	4	Transistor, Field Effect
Q7, Q8	362-0008	2	Transistor, Silicon
R1, R7	350-0536	2	Resistor (1000-Ohm)
R2	350-0526	1	Resistor (150-Ohm)
R6	350-0552	1	Resistor (22,000-Ohm)
R4, R10	303-0169	2	Potentiometer
R5	350-0572	1	Resistor (1 Megohm)
R8	350-0505	1	Resistor (2.7-Ohm)
R9	350-0517	1	Resistor (27-Ohm)
R11	350-0584	1	Resistor (10 Megohm)
R12,13,14	350-0529	3	Resistor (270-Ohm)
R15, R16	350-0540	2	Resistor (2.2-Ohm)
R17	350-1128	1	Resistor (220-Ohm)

ENGINE CONTROL MONITOR GROUP **(SETS WITH FIVE FAULT LIGHTS) OPTIONAL**



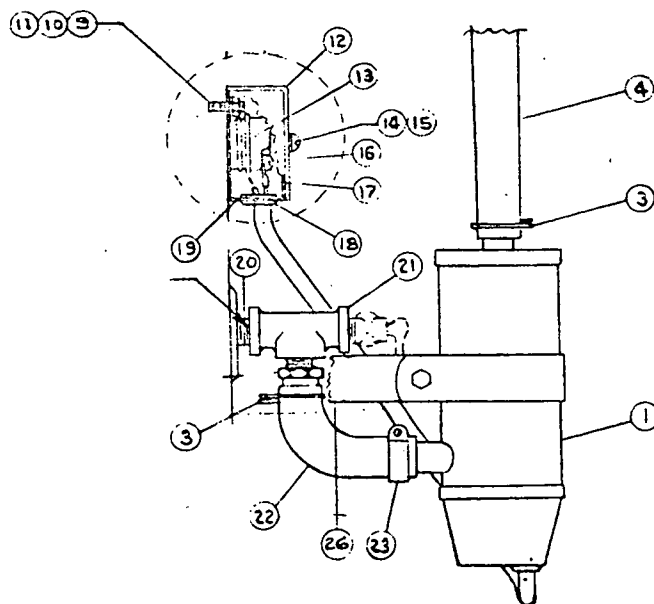
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0681	1	Monitor Assembly, Complete - Engine Control
K1, K2	307-1039	2	Relay
R6	350-0548	1	Resistor (10,000-Ohm)
C2,3,5,6,7,8	355-0005	6	Capacitor (22 Mfd.)
C1	356-0040	1	Capacitor (10 Mfd.)
C4	356-0030	1	Capacitor (1 Mfd.)
CR9	359-0027	1	Diode, Zener
CR1 thru 8, 11 thru 16,19 CR10,17,18, 20	357-0004	15	Rectifier, Diode
Q3,9	362-0003	2	Transistor
Q1,2,7,8	362-0025	4	Transistor, Field Effect
Q4,5,6, 11 thru 14	362-0008	8	Transistor, Silicon
R5,14	350-0536	2	Resistor (1000-Ohm)
R1	350-0526	1	Resistor (150-Ohm)
R12	350-0552	1	Resistor (22,000-Ohm)
R2,15	303-0169	2	Potentiometer
R3	350-0572	1	Resistor (1-Megohm)
R7,13,22,30	350-0505	4	Resistor (2.7-Ohm)
R4,16,19,34	350-0517	4	Resistor (27-Ohm)
R36	350-0584	1	Resistor (10 Megohm)
R8,11,20,21, 23,24,27,28, 31,33	350-0529	10	Resistor (270-Ohm)
R9,10,17,18, 25,26,29,32	350-0540	8	Resistor (2,200-Ohm)
R35	350-1128	1	Resistor (220-Ohm)
S1	308-0280	1	Switch, Push Button

CONTROL, CYCLE CRANKER GROUP **(Optional Equipment)**



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0714	1	Control, Cycle Cranker - Complete
C1	356-0039	1	Capacitor, Electrolytic (100 Mfd.)
CR1	359-0027	1	Diode, Zener (7.5 Volts)
CR2,3,4	357-0004	3	Rectifier, Diode
Q1,2	362-0008	2	Transistor, Signal
Q3	362-0017	1	Transistor
Q4	362-0026	1	Transistor, Signal
Q5	362-0019	1	Transistor, Power
R1, R4	303-0171	2	Potentiometer (5,000-Ohm)
R2	350-0560	1	Resistor, Fixed (1 Megohm)
R3, R9	350-0548	2	Resistor, Fixed (10,000-Ohm)
R5	350-0558	1	Resistor, Fixed (68,000-Ohm)
R6	350-0420	1	Resistor, Fixed (24,000-Ohm)
R7	350-0546	1	Resistor, Fixed (6,800-Ohm)
R8	350-0526	1	Resistor, Fixed (150-Ohm)
R10	350-0500	1	Resistor, Fixed (1.0-Ohm)
R11	352-0152	1	Resistor, Fixed (5 Watt, 2.5-Ohm)
C2	355-0010	1	Capacitor, Dielectric (.0022 Mfd., 100 Volt)

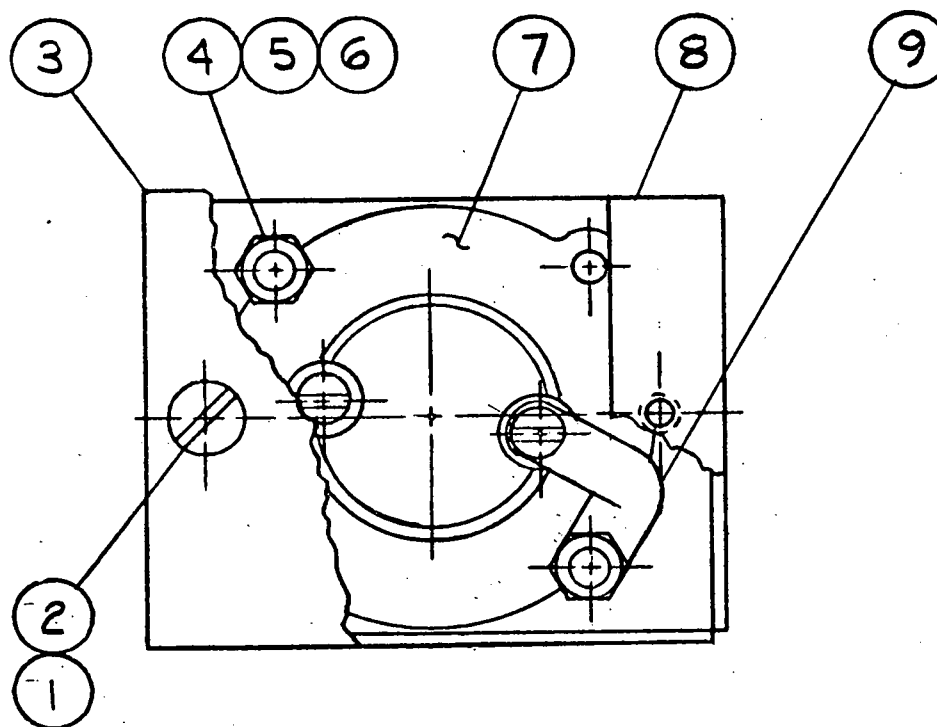
WATER JACKET HEATER INSTALLATION



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	333-0052	1	Heater (1500 Watt, 120 Volt) - Includes Clamp and Adapter
3	503-0197	3	Clamp, Hose
4		1	Hose (Order 20" of Bulk Hose Number 503-0386)
9	520-0446	2	Stud
10	850-0030	2	Lockwasher (#10)
11	870-0053	2	Nut, Hex (#10-32)
12	333-0013	1	Cover, Thermostat Mounting Box
13	309-0106	1	Thermostat (Includes Screws
14	850-0025	2	Lockwasher (#8)
15	812-0076	2	Screw, Round Head (#8-32 x 5/16")
17	332-0149	1	Terminal
18	508-0008	1	Grommet
19	333-0012	1	Box, Thermostat Mounting
20	505-0071	1	Nipple, Pipe (1/4 x 2")
21	505-0184	1	Tee, Pipe (1/4")
22		1	Hose (Order 16" of Bulk Hose Number 503-0386)
23	503-0183	1	Clamp, Hose
25	505-0135	1	Nipple, Half (3/8 x 1-1/2")
26	130-0755	1	Bracket, Heater Mounting

179-0317

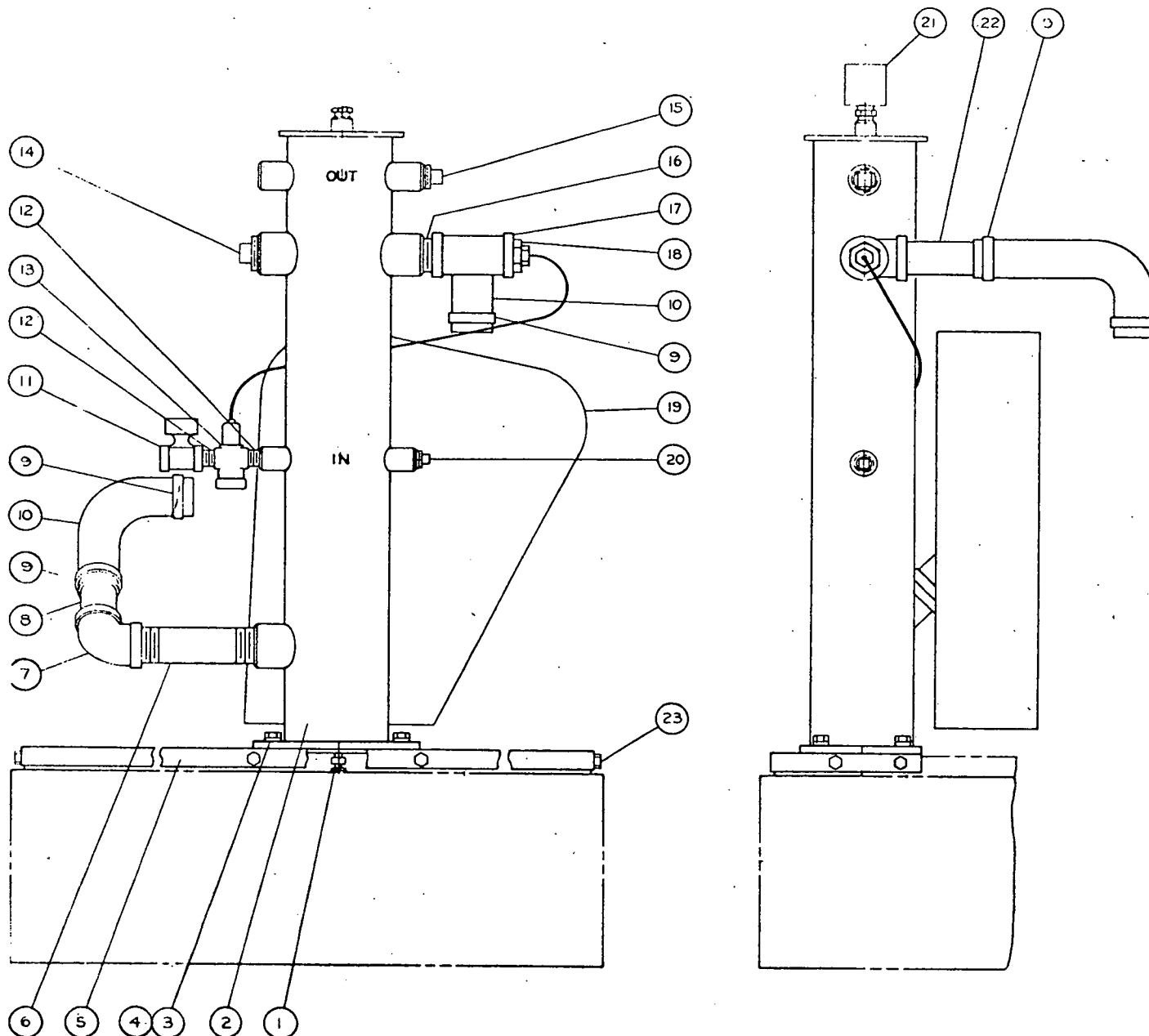
LOW WATER TEMPERATURE SWITCH INSTALLATION



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	812-0075	2	Screw, Round Head (#8-32 x 1/4")
2	850-0025	2	Washer, Lock (#8)
3	333-0013	1	Cover, Thermostat Box
4	520-0446	2	Stud (#10-32 x 3/4")
5	850-0030	2	Washer, Lock (#10)
6	870-0053	2	Nut, Hex Head (#10-32)
7	309-0029	1	Switch, Temperature
8	333-0012	1	Box, Thermostat Mounting
9	160-0428	1	Strap

179-0357

STANDPIPE COOLING INSTALLATION

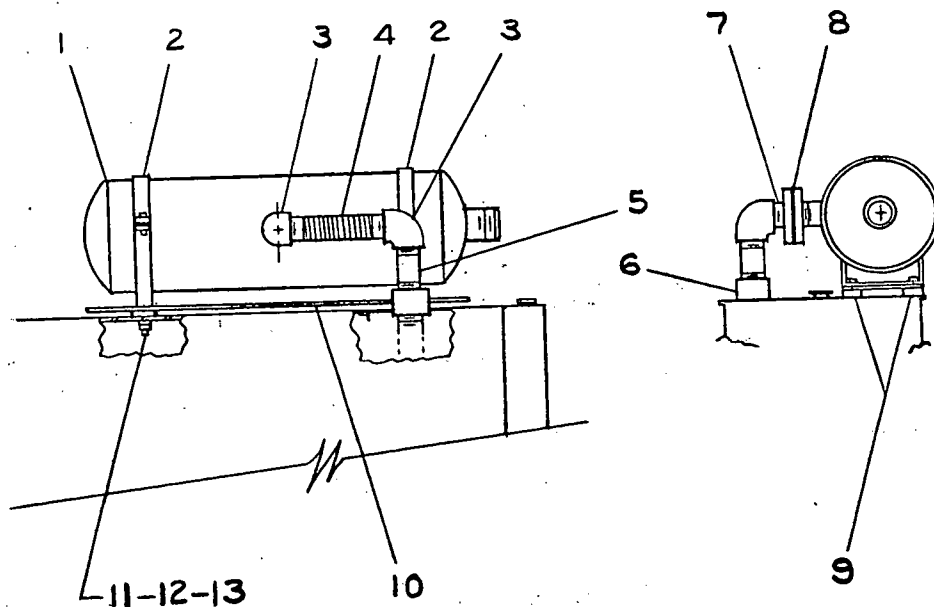


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	504-0028	1	Valve, Drain
2	130-0635	1	Standpipe
3	800-0050	4	Screw, Hex Cap (3/8-16 x 1")
4	850-0050	4	Washer, Lock (3/8")
5	130-0636	1	Bracket, Standpipe
6	505-0641	1	Nipple, Pipe (1-1/2 x 6")
7	505-0043	1	Elbow, Pipe (1-1/2" x 90°)
8	505-0272	1	Nipple, Half (1-1/2 x 4")
9	503-0465	4	Clamp, Hose
10	503-0576	2	Hose, Exhaust
11	307-0835	1	Valve, Solenoid
12	505-0102	2	Nipple, Close (3/4 x 1-3/8")

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
13	309-0241	1	Valve, Water Temperature Control
14	505-0402	1	Plug, Pipe (1-1/2")
15	505-0140	1	Plug, Pipe (1")
16	505-0220	1	Nipple, Close (1-1/2 x 1-3/4")
17	505-0317	1	Tee, Pipe (1-1/2")
18	505-0289	1	Bushing, Reducer (1-1/2 x 1")
19	130-0946	1	Guard, Belt
20	505-0130	1	Plug, Pipe (3/4")
21	504-0062	1	Valve, Vacuum Relief
22	505-0474	1	Nipple, Half (1-1/2 x 5")
23	821-0014	6	Screw, Self Locking (5/16-18 x 1/2")
24	800-0052	2	Screw, Hex Head (3/8-16 x 1-1/2")

179-0307

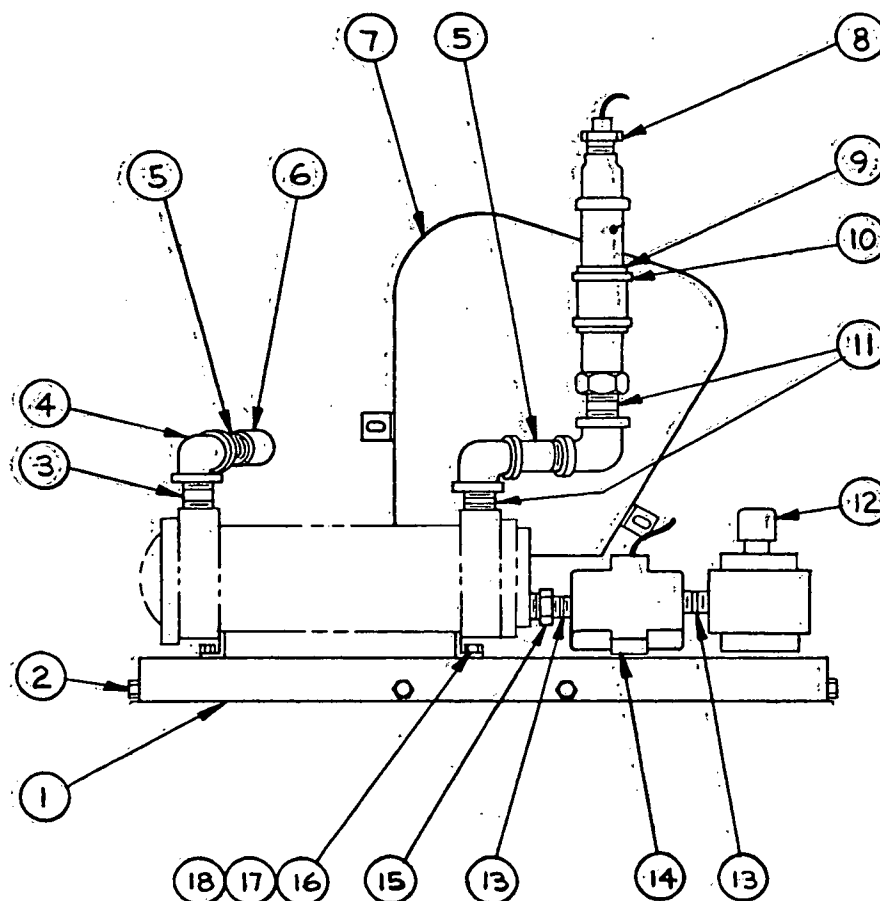
MUFFLER INSTALLATION



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	155-0989	1	Muffler, Exhaust
2	140-0757	2	Band, Muffler Mounting
3	505-0453	2	Elbow, Pipe (2" x 90°)
4	505-0679	1	Nipple, Pipe (3 x 12")
5	155-1131	1	Tube, Flexible
6	505-0327	1	Coupling, Pipe (3")
7	505-0382	1	Nipple, Close (3 x 2-5/8")
8	154-0570	1	Flange, Union (3")
9	526-0172	4	Spacer, Muffler Mounting
10	155-1060	1	Shield, Heat
11	800-0028	4	Screw, Hex Cap (5/16-18 x 1")
12	850-0045	4	Lockwasher (5/16")
13	862-0002	4	Nut, Hex (5/16-18)
14	155-0789	2	Support, Hood

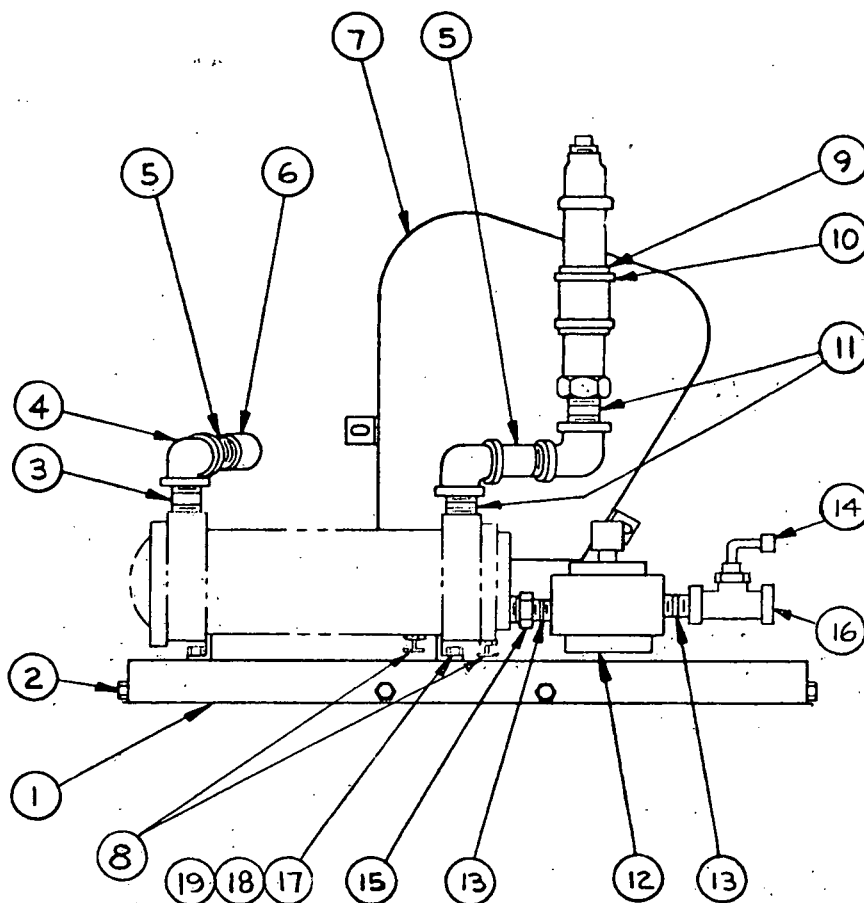
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SOLENOID VALVE AND REGULATOR INSTALLATION (HEAT EXCHANGER COOLED WITH MARSH REGULATOR)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	130-0863	1	Bracket, Heat Exchanger Mtg.
2	821-0014	6	Screw, Self Locking (5/16-18 x 1/2")
3	505-0109	1	Nipple, Short (1-1/2 x 2-1/2")
4	505-0043	3	Elbow, Pipe (1-1/2" x 90°)
5	505-0642	2	Nipple, Pipe (1-1/2" x 4")
6	505-0032	1	Coupling, Pipe (1-1/2")
7	130-0946	1	Guard, Belt
8	505-0129	1	Bushing, Reducer (3/4 x 1")
9		1	Hose (Order 3" of Bulk Hose Number 503-0250)
10	503-0465	2	Clamp, Hose
11	505-0220	2	Nipple, Close (1-1/2 x 1-3/4")
12	307-1139	1	Valve, Solenoid (12 Volt)
13	505-0004	2	Nipple, Close (1 x 1-1/2")
14	309-0242	1	Valve, Water Temp Control (12 Volt)
15	505-0024	1	Bushing, Reducer (1-1/2 x 1")
16	800-0049	4	Screw, Hex Cap (3/8-16 x 7/8")
17	850-0050	4	Washer, Lock (3/8")
18	862-0003	4	Nut, Hex (3/8-16)
19	800-0052	2	Screw, Hex Head (3/8-16 x 1-1/2")

SOLENOID VALVE AND REGULATOR INSTALLATION (HEAT EXCHANGER COOLED)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	130-0863	1	Bracket, Heat Exchanger Mounting
2	821-0014	6	Screw, Self Locking (5/16-18 x 1/2")
3	505-0109	1	Nipple, Short (1-1/2" x 2-1/2")
4	505-0043	3	Elbow, Pipe (1-1/2" x 90°)
5	505-0642	2	Nipple, Pipe (1-1/2 x 4")
6	505-0032	1	Coupling, Pipe (1-1/2")
7	130-0964	1	Guard, Belt
8	504-0003	2	Valve, Drain
9		1	Hose (Order 3" of Bulk Hose Number 503-0250)
10	503-0465	2	Clamp, Hose
11	505-0220	2	Nipple, Close (1-1/2 x 1-3/4")
12	307-1139	1	Valve, Solenoid (12 Volt)
13	505-0004	2	Nipple, Close (1 x 1-1/2")
14	800-0052	2	Screw, Hex Head (3/8-16 x 1-1/2")
15	505-0024	1	Bushing, Reducer (1-1/2 x 1")
16	504-0090	1	Valve
17	800-0049	4	Screw, Hex Cap (3/8-16 x 7/8")
18	850-0050	4	Washer, Lock (3/8")
19	862-0003	4	Nut, Hex (3/8-16)



**MANUFACTURER'S
LIMITED
WARRANTY**

Onan extends to the original purchaser of goods for use, the following warranty covering goods manufactured or supplied by Onan, subject to the qualifications indicated.

- (1) Onan warrants to original purchaser for the periods set forth below that goods manufactured or supplied by it will be free from defects in workmanship and material, provided such goods are installed, operated, and maintained in accordance with Onan's written instructions, and further provided, that installation inspection and initial start-up on commercial-industrial generator set or power system installations are conducted by an Onan Authorized Distributor or its designated service representative.

PRODUCT APPLICATION	PERIOD OF WARRANTY
<input type="checkbox"/> Goods used in personal, family and household applications.	One (1) year from date of purchase.
<input type="checkbox"/> Goods used in commercial-industrial applications.	One (1) year from date of purchase.
<input type="checkbox"/> Commercial-industrial stationary generator sets.	One (1) year from date of initial start-up.
<input type="checkbox"/> Commercial-industrial, standby power systems with nominal operating speeds of 1800 rpms or less which are installed in the U.S. or Canada (must include Onan supplied generator sets, automatic transfer switch, exerciser and running time meter).	* Five (5) years or 1500 hours, whichever occurs first from the date of initial start-up. Labor allowance for the first two (2) years or 1500 hours, whichever occurs first from the date of initial start-up.
<input type="checkbox"/> Commercial-industrial, standby power systems with nominal operating speeds of 1800 rpms or less which are installed outside the U.S. or Canada (must include Onan supplied generator set, automatic transfer switch, exerciser and running time meter).	* Two (2) years or 1500 hours, whichever occurs first from the date of initial start-up.
<input type="checkbox"/> Repair or replacement parts.	Ninety (90) days from date of purchase, excludes labor.

* Must be registered on Form No. 23C065, to be provided and completed by seller.

- (2) Onan's sole liability and Purchaser's sole remedy for a failure of goods to perform as warranted shall be limited to the repair or replacement of goods returned to Onan's factory at 1400 73rd Avenue N.E., Minneapolis, Minnesota 55432, or to an Onan Authorized Distributor or its designated service representative, transportation prepaid.

Except as indicated below, this warranty does not include travel time and mileage labor for removal of Onan product from its application and reinstallation.

a) Removal and Reinstallation

- Garden Tractor Engines*—Onan will pay up to a maximum of two (2) hours labor for warranty work requiring removal and reinstallation of Onan industrial engines in garden tractor applications performed by an Onan Authorized Distributor or its designated service representative.
- Vehicles*—Onan will pay one (1) hour labor for warranty work requiring removal and reinstallation performed by an Onan Authorized Distributor or its designated service representative on vehicle applications utilizing a POWER DRAWER® and Onan supplied sliding tray generator set installations.

b) Travel Time and Mileage

- Marine Generator Set Installations*—Onan will, for six (6) months after date of purchase, pay travel time up to four (4) hours and mileage costs up to one hundred fifty (150) miles related to warranty repairs, provided, such travel and repairs are performed by an Onan Authorized Distributor or its designated service representative.
- Commercial-Industrial Standby Generator Set and System Installations*—Provided the generator set or system is permanently wired in a stationary installation, Onan will, for six (6) months after initial start-up, pay travel time up to four (4) hours and mileage costs up to one hundred fifty (150) miles for warranty repairs performed by an Onan Authorized Distributor or its designated service representative.

(3) THERE IS NO OTHER EXPRESS WARRANTY.

IMPLIED WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO PERIODS OF WARRANTY SET FORTH ABOVE AND TO THE EXTENT PERMITTED BY LAW, ANY AND ALL IMPLIED WARRANTIES ARE EXCLUDED.

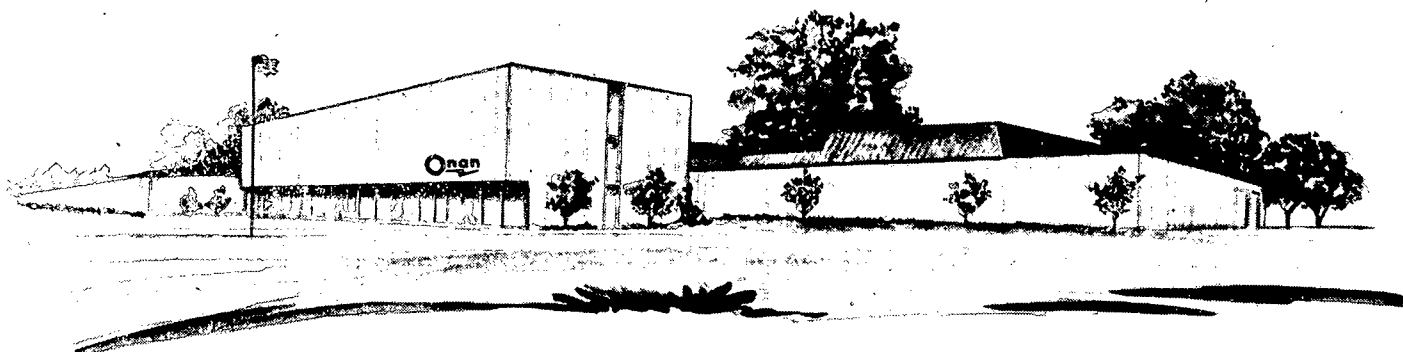
IN NO EVENT IS ONAN LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

(4) All claims must be brought to the attention of Onan or an Onan Authorized Distributor or its designated service representative within thirty (30) days after discovery that goods or parts fail to perform as warranted.

(5) THIS WARRANTY SHALL NOT APPLY TO:

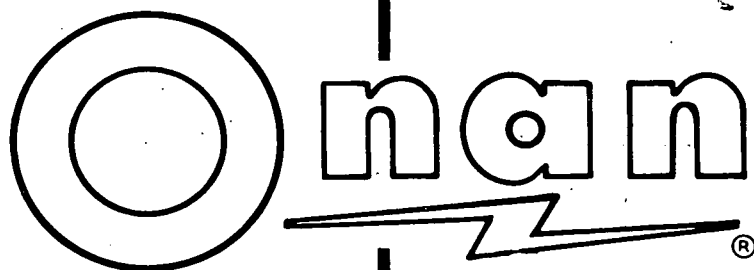
- a) Cost of maintenance, adjustments, installation and start-up.
- b) Failures due to normal wear, accident, misuse, abuse, negligence or improper installation.
- c) Products which are altered or modified in manner not authorized by manufacturer in writing.
- d) Failure of goods caused by defects in the system or application in which the goods are installed.
- e) Telephone, telegraph, teletype or other communication expenses.
- f) Living and travel expenses of persons performing service, except as specifically included in Section 2.
- g) Rental equipment used while warranty repairs are being performed.
- h) Overtime labor requested by purchaser.
- i) Starting batteries.

(6) No person is authorized to give any other warranties or to assume any other liabilities on Onan's behalf, unless made or assumed in writing by an officer of Onan, and no person is authorized to give any warranties or assume any other liability on behalf of Seller unless made or assumed in writing by Seller.



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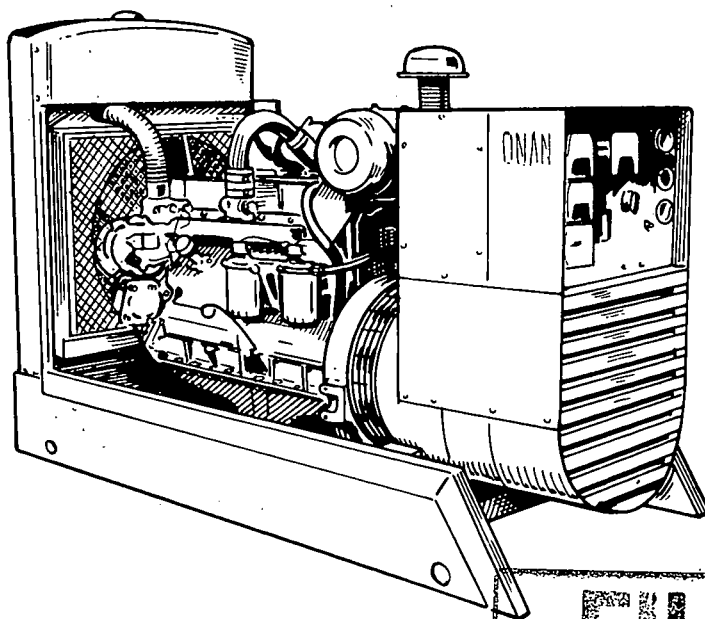


OPERATOR'S MANUAL AND PARTS CATALOG

FOR

DYA SERIES

ELECTRIC GENERATING SETS



BEGIN SPEC. B

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DYA SECTION
**RETURN TO FILE
ENGINEERING DEPT.**

TABLE OF CONTENTS

TITLE	PAGE
Introduction	1
Safety Precautions	2
Specifications	4
Description	7
Installation	11
Operation	22
General Maintenance	27
Parts Catalog	29

The need for an international standard of measurement has been increased by today's improved communication and transportation between countries.

This has prompted formation of modernized metrics known as the International System of Units, officially abbreviated SI.

ONAN products appear on the world market, therefore both metric and the present American system of units (CU) will be found in this manual.

To assist in familiarization, refer to the following terms.

TERM	METRIC	ENGLISH
Length	millimetre (mm)	Inch (in)
Pressure	kilopascals (kPa)	pounds per square inch (PSI)
Mass (Weight)	kilogram (kg)	pound (lb)
Volume (Liquid)	litre	gallon (gal)
Power	kilowatt	horsepower (HP)
Frequency	hertz (Hz)	cycles per second (CPS)
Energy	Joules (J)	BTU
Battery Capacity	Coulomb (C)	Ampere Hour (AH)
Revolutions per Minute	r/m	rpm
Temperature	Celsius (°C)	Fahrenheit (°F)

The customary unit of Brake Horsepower (BHP) becomes kilowatts (kW) when converted to SI metric units. This kW rating should not be confused with the kW rating of the generator which will always be lower due to losses inherent with any electrical induction device.

WARNING

TO AVOID POSSIBLE PERSONAL INJURY OR EQUIPMENT DAMAGE, A QUALIFIED ELECTRICIAN OR AN AUTHORIZED SERVICE REPRESENTATIVE MUST PERFORM INSTALLATION AND ALL SERVICE.

INTRODUCTION

FOREWORD

This manual is applicable to the DYA Series electric generating set, consisting of an ONAN 60.0 kW, UR generator, driven by an ALLIS-CHALMERS 2900 Engine.

The manual is divided into two sections. Section 1 provides information on installation, operation and troubleshooting. Section 2 is a Parts Catalog for ONAN optional and standard equipment.

The manual should be used in conjunction with the engine manual, as your specific engine may have variations due to optional equipment available.

WARNING Onan uses this symbol throughout this manual to warn of possible personal injury.

CAUTION This symbol refers to possible equipment damage.

MODEL IDENTIFICATION

Identify your model by referring to the MODEL and SPECIFICATION NO. as shown on the Onan nameplate. Electrical characteristics are shown on the lower portion of the nameplate.

60.0	DYA	15R	/	1	F
1	2	3		4	5

1. Indicates Kilowatt rating (60 kW).
2. Factory code for SERIES identification.
3. 15 = 60 Hz. Reconnectible
515 = 50 Hz. Reconnectible
R—Indicates remote starting feature.
4. Factory code for designating optional equipment.
5. Specification letter. (Advances when factory makes production modifications.)

If it is necessary to contact a dealer or the factory regarding the set, always mention the complete Model, Spec No. and Serial No. as given on the Onan nameplate. This nameplate information is necessary to properly identify your unit among the many types manufactured. Refer to the engine nameplate when requesting information from its manufacturer. The Onan nameplate is located on the right side of the generator; the Allis-Chalmers nameplate is on the right side, on the engine block.

Left side and right side are considered when viewed from the engine or front end of the generating set.

SAFETY PRECAUTIONS

Throughout this manual you will find eye-catching flags containing Warnings and Cautions. These will alert you to conditions that could result in danger to you or the equipment, if the notice is ignored.

ONAN recommends that you read your manual and become thoroughly acquainted with it and your equipment before you start your unit. The accumulated experience of ONAN engineers is available to you, enabling you to operate your set in the most efficient and safest manner possible. These recommendations and the following safety precautions are for your protection. Study and know them!

REMEMBER. Most accidents are caused by failure to follow simple and fundamental safety rules or precautions.

Most accidents can be prevented!

KNOW YOUR MANUAL—KNOW YOUR EQUIPMENT

WARNING

Set forth below are a number of potential hazards which could result in some degree of personal injury. The suggested procedures should be adhered to.

General

- Keep your electric generating set and the surrounding area clean and free from obstructions. Remove all oil deposits; keep the floor clean and dry.
- Provide appropriate fire extinguishers and install them in convenient locations. Consult your local fire department for the correct type of extinguisher to use. Do not use foam on electrical fires. Use extinguisher rated ABC by NFPA.
- Make sure that all fasteners on the generating set are secure. Tighten supports and clamps, keep guards in position over fans, driving belts, etc.
- Do not wear loose clothing in the vicinity of moving parts, or jewelry while working on electrical equipment. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts; cause shock or burning.
- If necessary to make adjustments while the unit is running, use extreme caution when close to hot exhausts, moving parts, etc.

- Do not stand on a wet floor while working on electrical equipment. Use rubber insulative mats placed on dry wood platforms.

Fuel System

- DO NOT fill fuel tanks while engine is running, unless tanks are outside engine compartment. Fuel contact with hot engine or exhaust is a potential fire hazard.
- DO NOT SMOKE OR USE AN OPEN FLAME in the vicinity of the generator set or fuel tank. Internal combustion engine fuels are highly flammable.

REMEMBER—IF YOU CAN SMELL FUMES—A POSSIBLE EXPLOSION AND FIRE CONDITION EXISTS!

- Make sure that oily rags are not left on or near the engine. Oil soaked rags are combustible and present hazardous walking conditions.
- Fuel lines must be of steel piping, adequately secured, and free from leaks. Piping at the engine should be approved flexible line. Do not use copper piping on flexible lines as copper will work harden and become brittle.
- Your engine installation should be equipped with a means of positive fuel shutoff in applications when fuel is conducted from a remote source. Fuels under pressure (e.g. natural gas or liquefied petroleum gas) should be controlled by a positive shutoff valve, preferably automatic, in addition to any valve integral with the carburetor or gas regulator equipment.

Exhaust System

- Exhaust products of any internal combustion engine are toxic and can cause serious personal injury, if inhaled. All engine installations, especially those within a confine, should be equipped with an exhaust system to discharge gases to the atmosphere. Do not use exhaust gases to heat a compartment.
- Inspect exhaust system regularly to assure that system is free of leaks.

Coolant System

- Coolants under pressure have a higher boiling point than that of water. DO NOT open a radiator or heat exchanger pressure cap or break a system while the engine is running, and in no case until the system pressure has been bled off.
- Radiator fan belts are guarded for your protection. DO NOT remove covers or guards.
- Keep your hands away from moving parts.

Ventilation System

- Check remote radiators frequently. Remove any dirt, debris, bird nests, etc.
- Check ventilation louvres frequently. Make sure that free-fall louvres and motor operated louvres open and close properly and that there is no restriction in the free-air flow.

Electrical System

- The electrical installation exterior to your generator should have been performed by qualified licensed electricians. All local and state

codes should have been consulted and complied with. It is essential that all load circuit breakers adequately protect electrical functions, all circuits are properly grounded and wiring is correct capacity.

- Tag open switches.
- DON'T tamper with interlocks.
- Before starting work on the generating set, disconnect batteries. This will prevent inadvertent starting of the set.
- Use extreme caution when making adjustments on the electrical components in the control cabinet while the engine is running. High voltages are present and could cause serious personal injury.
- DO NOT SMOKE while servicing batteries. Verify correct polarity of battery cables before connecting. Lead acid batteries give off a highly explosive hydrogen gas which can be ignited by electrical arcing or by smoking. When connecting batteries, connect the ground lead last.

SPECIFICATIONS

ENGINE DETAILS

Engine Manufacturer	Allis-Chalmers
Engine Series	2900
Number of Cylinders.....	6
Displacement.....	301-cubic inch (4.9 litre)
BHP @ 1800 r/m	102 (76 kW)
Compression Ratio	16.25:1
Bore	3.875-inches (98.425 mm)
Stroke	4.250-inches (107.95 mm)
Fuel	ASTM No. 2 Diesel or 2D
Battery Voltage.....	12 VDC
Battery Group (Two 6-Volt, 135 A.H. [486 kC])	2H
Starting Method	Solenoid Shift
Governor Regulation.....	5% Maximum
Battery Charging Current	35-Amperes

GENERATOR DETAILS

Type.....	15R 60 Hz
	515R 50 Hz
Rating (Watts)	
60 Hertz Continuous Standby	60,000 (72.5 kVA)
50 Hertz Continuous Standby	50,000 (62.5 kVA)
AC Voltage Regulation.....	± 2%
60 Hertz r/m.....	1800
50 Hertz r/m.....	1500
Output Rating	0.8 PF
AC Frequency Regulation	5% No Load—Full Load

CAPACITIES AND REQUIREMENTS

Cooling System (Including Radiator)	27-quarts (25.5 litres)
Engine Oil Capacity (Filter, Lines, Crankcase).....	11-quarts (10.4 litres)
Exhaust Connection (inches pipe thread)	3

AIR REQUIREMENTS (1800 r/m)

Engine Combustion.....	216-cfm (0.102 m ³ /sec)
Radiator Cooled Engine.....	6050-cfm (2.86 m ³ /sec)
Total for Radiator Cooled Model	6266-cfm (2.96 m ³ /sec)
Alternator Cooling Air (1800 r/m).....	1000-cfm (0.5 m ³ /sec)
(1500 r/m)	833-cfm (0.4 m ³ /sec)
Fuel Consumption at Rated Load ASTM No. 2 Diesel	4.8-g/h (18.2 lit/hr)

GENERAL

Height	52.5-inches (1.33 m)
Width	33.0-inches (0.838 m)
Length	78.313-inches (1.99 m)
Approximate Weight (Mass)	2,000-pounds (908 kg)

TABLE 1. UR GENERATOR VOLTAGE/CURRENT OPTIONS

VOLTS	FREQ.	PHASE	AMPERES	DOUBLE DELTA	SERIES DELTA	PARALLEL WYE	SERIES WYE	REF. VOLTAGE WIRE (W12) TAP
110/220	50 Hz	1	284 *	x				H6
115/230	50 Hz	1	272 *	x				H6
120/240	60 Hz	1	313 *	x				H5
110/190	50 Hz	3	190			x		H3
115/200	50 Hz	3	180			x		H4
120/208	60 Hz	3	208			x		H4
110/220	50 Hz	3	164		x			H6
127/220	60 Hz	3	197			x		H4
115/230	50 Hz	3	157		x			H6
120/240	60 Hz	3	180		x			H5
139/240	60 Hz	3	180			x		H5
220/380	50 Hz	3	95				x	H3
230/400	50 Hz	3	90				x	H4
240/416	60 Hz	3	104				x	H4
254/440	60 Hz	3	98				x	H5
277/480	60 Hz	3	90				x	H5
9X 347/600	60 Hz	3	72					H5—Not Reconnectible

60.0 kW 75.0 kVA 60 Hz
50.0 kW 62.5 kVA 50 Hz

* - These current values are available only from special long stack units. When standard 3-phase unit is reconnected into Double Delta configuration, maximum current is 2/3 that of valve given (i.e. 120/240 output would be 208 amperes, NOT 313).

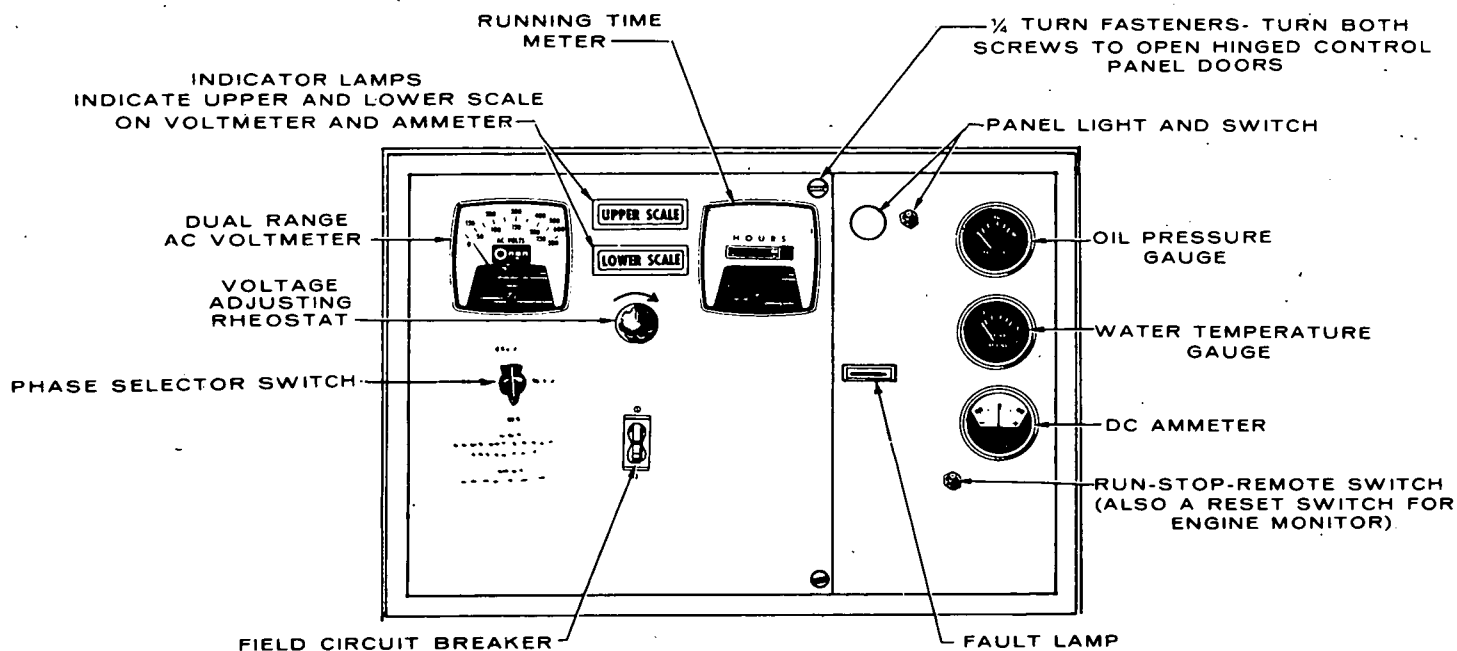


FIGURE 1. TYPICAL CONTROL PANEL (ONE FAULT LAMP)

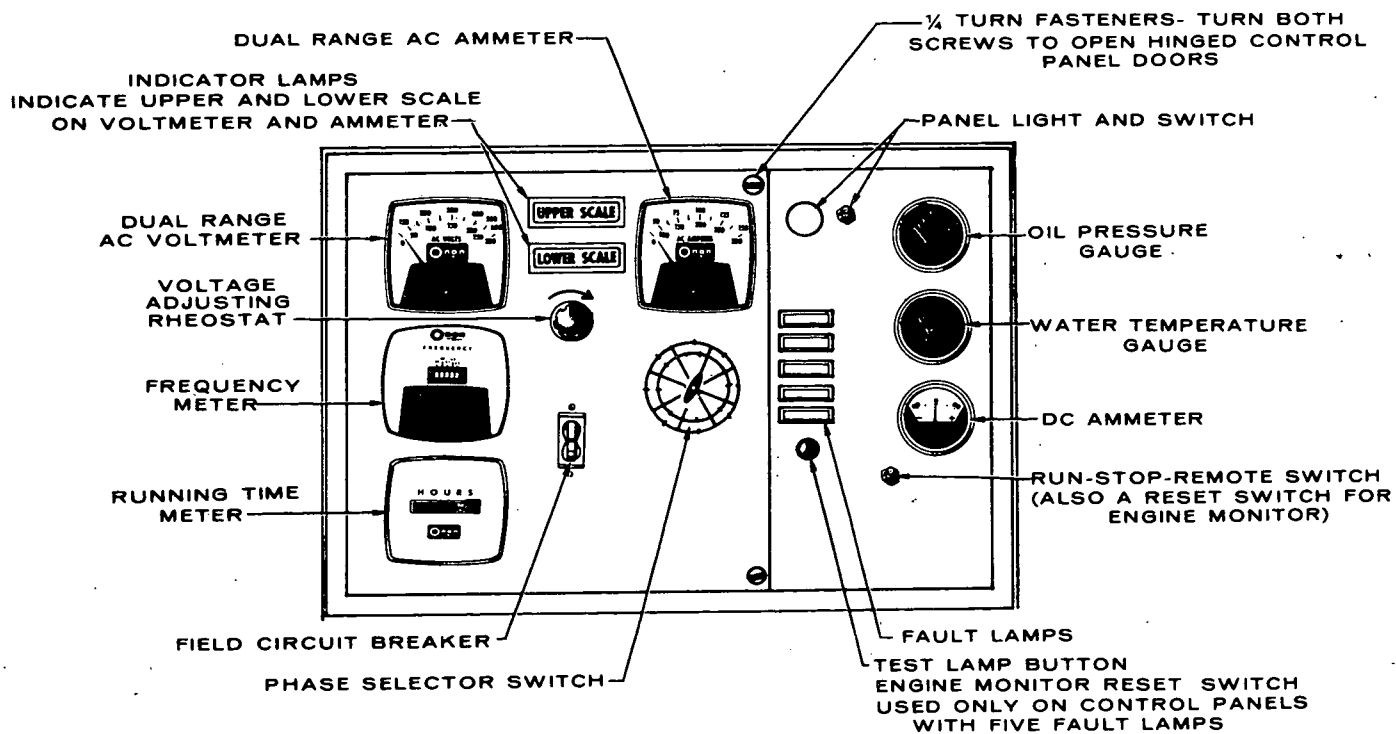


FIGURE 2. OPTIONAL CONTROL PANEL (FIVE FAULT LAMPS)

DESCRIPTION

GENERAL

An Onan DYA series electric generating set is a complete unit consisting of an engine driven AC generator, with standard and optional controls and accessories as ordered.

ENGINE

The engine on the DYA is an Allis-Chalmers, 2900, as described in the engine manual. Basic measurements and requirements will be found under *SPECIFICATIONS*. For operation, maintenance and service information, consult the Allis-Chalmers manual.

AC GENERATOR

The generator is an ONAN Type UR, 12 lead, 4-pole revolving field, reconnectible, brushless unit. The main rotor is attached directly to the engine flywheel, therefore engine speed determines generator output frequency. The 60 Hz set operates at 1800 r/m, the 50 Hz at 1500 r/m. Excitation is achieved as follows—

Residual alternating current from the stator winding is applied to the voltage regulator, where it is compared with a reference voltage, rectified and returned to the field winding of the exciter. Current then induced in the exciter rotor is rectified and fed into the generator rotor. This induces a current in generator stator which is applied to the load.

CONTROL PANEL

The following is a brief description of each of the standard controls and instruments located on the face of the panel. See Figure 1.

DC Panel

Panel Light and Switch: Illuminates control panel.

Oil Pressure Gauge: Indicates pressure of lubricating oil in engine (wired to a sensor unit located on the engine).

Water Temperature Gauge: Indicates temperature of circulating coolant in engine. (Wired to a sensor unit located on the engine.)

Battery Charge Rate DC Ammeter: Indicates battery charging current.

Run-Stop/Reset-Remote Switch: Starts and stops the unit locally or from a remote location. Resets engine monitor relay in Stop/Reset position.

Warning Light: Indicates "Fault" in engine operation.

AC Panel

AC Voltmeter: Indicates AC generator output voltage. Dual range instrument: measurement range in use shown on indicator light.

Voltage Regulator: Rheostat, provides approximately plus or minus 5% adjustment of the rated output voltage.

Exciter Circuit Breaker: Provides generator exciter and regulator protection from overheating, in the event of certain failure modes of the generator, exciter and voltage regulator.

Running Time Meter: Registers the total number of hours, to 1/10th, that the unit has run. Use it to keep a record for periodic servicing. Time is accumulative, meter cannot be reset.

Voltmeter Phase Selector Switch: Selects phases of generator output to be measured by the AC voltmeter.

OPTIONAL EQUIPMENT

DC Panel

Warning Lights: Eliminates the one "Fault" light and substitutes five indicator (see Figure 2) lights to give warning of—

- a. Overcrank
- b. Overspeed
- c. Low oil pressure
- d. High engine temperature
- e. Low engine temperature

Operation of these lights will be discussed in conjunction with engine monitor panel.

Reset Switch: Manual reset for engine monitor after shut-down.

Lamp Test: Press to test warning lamp bulbs (when engine is running only).

AC Panel

AC Ammeter: Indicates AC generator output current. Dual range in use shown on indicator lights.

Frequency Meter: Indicates the frequency of the generator output in hertz. It can be used to check engine speed. (Each hertz equals 30 r/m.)

CONTROL PANEL INTERIOR

The only equipments discussed in this section will be those which the operator may have reason to adjust or inspect for service.

Terminal Board (TB) 21: Connection of wire W12 to terminals H3, H4, H5, and H6 is made at this point, to change reference voltage when reconnecting generator for different voltages. Refer to Figure 3.

Voltage Regulator: Solid state unit, consisting of printed circuit board VR21. Prior to Spec F, a bridge rectifier and reactor assembly VR22 were mounted on the generator end-bell. Starting with Spec F, VR22 has been removed and an SCR bridge CR21, with a commutating reactor L21 have been relocated in the control panel as part of the voltage regulator system. AC output from generator is controlled at predetermined level regardless of load; regulation is plus or minus 2% from no load to full load, at 0.8 P.F.

Engine Monitor: Printed circuit plug-in modules provide the following functions:

1. A 75 second cranking period.
2. Approximately a 12.5-second time delay for oil pressure buildup.
3. An external alarm contact to light a fault lamp and shut down the set for alarm conditions such as:

- a. Overcrank (failed to start after cranking 75 seconds).
- b. Overspeed (engine speed reaches 2100 r/m).
- c. Low oil pressure 14 psi (96.5 kPa).
- d. High engine temperature 215°F (102°C).

On standard control panels, all four alarms are wired into one common fault lamp; on units with five fault lamps, four have shutdown alarms, the fifth (low engine temperature) lights a fault lamp only. Refer to Table 2.

Standard Cranking Module: Limits engine cranking time to 75 seconds. If engine fails to start after 75 seconds the engine monitor lights a fault lamp and opens the cranking circuit.

OPTIONAL MODULES

Cycle Cranker: Plug-in module replaces standard cranking circuit. Automatically provides a 15-second crank time and a 10-second rest time for three ON and two OFF cycles in 65 seconds. If engine fails to start, after 75 seconds the engine monitor lights a fault lamp and opens the cranking circuit. The ON and OFF cycle times are nominal and can be adjusted at potentiometers on the cranker module board.

Pre-Alarm: Gives advance warning for low oil pressure or high engine temperature. Requires two sensors each for engine temperature and oil pressure.

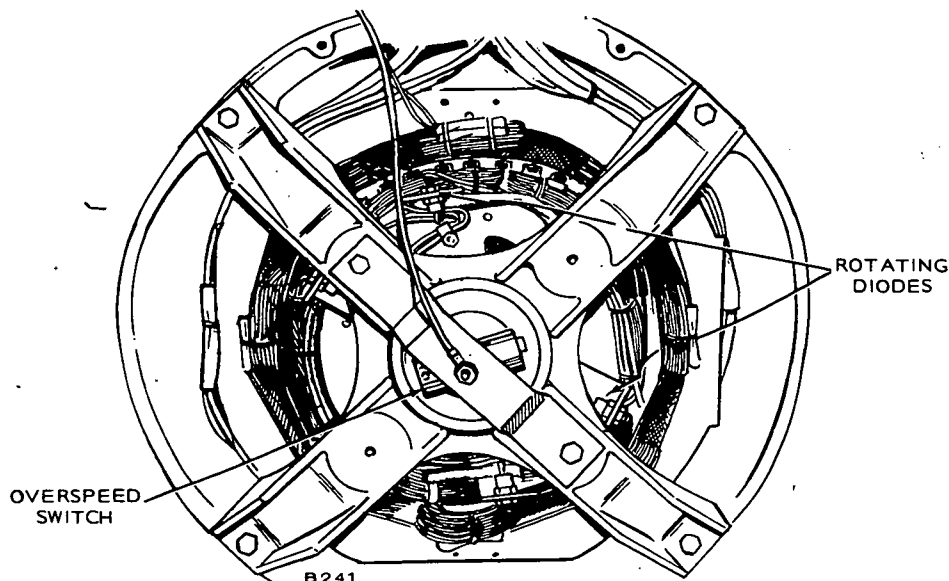


FIGURE 3. OVERSPEED SWITCH

TABLE 2. FAULT LAMP OPTIONS

SYSTEM	FAULT	FAULT LAMP	STOP ENGINE	EXTERNAL ALARM	PRE-ALARM
PENN STATE SINGLE LIGHT	Overcrank Overspeed Low Oil Pressure High Engine Temperature	x x x x	x x	x x x x	
STANDARD SINGLE LIGHT	Overcrank Overspeed Low Oil Pressure High Engine Temperature	x x x x	x x x x	x x x x	
5 LIGHT	Overcrank Overspeed Low Oil Pressure High Engine Temperature Low Engine Temperature	x x x x x	x x x x	x x x x	
5 LIGHT PRE-ALARM	Overcrank Overspeed Low Oil Pressure High Engine Temperature Low Engine Temperature	x x x x x	x x * * 	x x x x	 x x

* - With additional optional sensors.

ENGINE SENSORS

Resistance units and switches in the engine temperature and oil pressure monitoring and shut-down systems are sealed units and are not repairable.

For location, refer to Figures 4 and 5. When replacing a sensor, do not substitute, use recommended items. Resistance units are matched to the gauge they supply, and cut-off switches are close-tolerance actuation parts, made for a specific application.

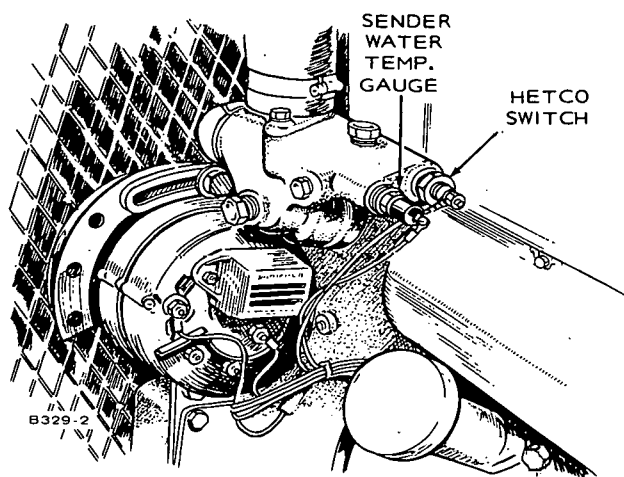


FIGURE 4. WATER TEMPERATURE MONITORS

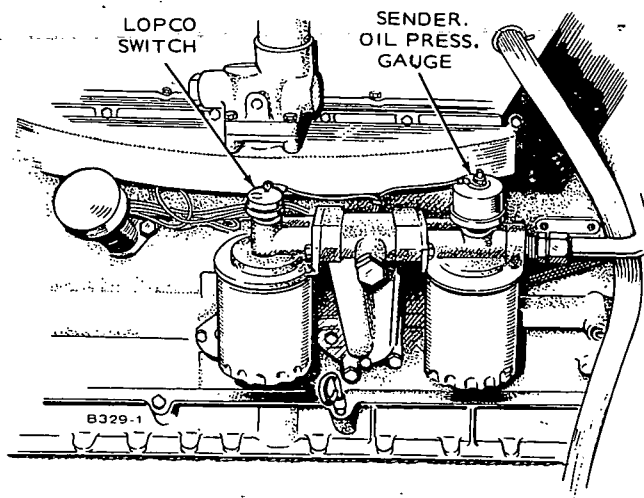


FIGURE 5. OIL PRESSURE MONITORS

INSTALLATION

GENERAL

Installations must be considered individually. Use these instructions as a general guide. All installations must meet regulations of state and local building codes, fire ordinances, etc., which may affect installation details. See Figure 6.

Requirements to be considered prior to installation:

1. Level mounting surface.
2. Adequate cooling air.
3. Adequate fresh induction air.
4. Discharge of circulated air.
5. Discharge of exhaust gases.
6. Electrical connections.
7. Fuel installation.
8. Water supply (city water cooling).
9. Accessibility for operation and servicing.
10. Vibration isolation.
11. Noise levels.

LOCATION

Provide a location that is protected from the weather and is dry, clean, dust free and well ventilated. If practical, install inside a heated building for protection from extreme weather conditions.

MOUNTING

Generator sets are mounted on a rigid skid base which provides proper support. The engine-generator assembly is isolated from the skid base by rubber mounts which provide adequate vibration isolation for normal installations. For installations where vibration control is critical, install additional spring-type isolators between skid base and foundation.

For convenience in general servicing and changing crankcase oil, mount set on raised pedestal at least 6-inches (150 mm) high. Refer to *ONAN Technical Bulletin T-030* for further installation information.

VENTILATION

Generator sets create considerable heat which must be removed by proper ventilation. Outdoor installations rely on natural air circulation but indoor installations need properly sized and positioned vents for the required air flow. See *SPECIFICATIONS* for the air required to operate with rated load under normal conditions at 1800 r/m.

Radiator set cooling air travels from the rear of the set and is removed by a pusher fan which blows out through the radiator. Locate the air inlet to the rear of the set. Make the inlet opening at least 1½-times larger than the radiator.

Locate the cooling air outlet directly in front of the radiator and as close as possible. The opening size should be at least as large as the radiator area. Length and shape of the air outlet duct should offer minimum restriction to air flow. Use a duct of canvas or sheet metal between the radiator and the air outlet opening. The duct prevents recirculation of heated air.

Provide a means of restricting the air flow in cold weather to keep the room or compartment temperature at a normal point.

For operation outside a building, a shelter housing with electrically operated louvres is available as an option. Transformers connected across the generator output supply current to the motors.

When the generator is operating, current in the transformers actuate the motors and open the louvres. The louvres are held open for the duration of the set operation, then are closed by return springs when the set is shut down.

City water cooled sets do not use the conventional radiator. A constantly changing water flow cools the engine. Ventilation is seldom a problem, but sufficient air movement and fresh air must be available to properly cool the generator, disperse heat convected off the engine and support combustion in the engine.

For small compartments, a duct of equal or larger area than generator outlet is recommended to remove the heated air from the generator air outlet to the outside atmosphere. Limit bends and use radius type elbows where needed. A larger, well ventilated compartment or room does not require a hot air duct.

Installations made in a small room may require installation of an auxiliary fan (connected to operate only when the unit is running) of sufficient size to assure proper air circulation and evacuation of fumes.

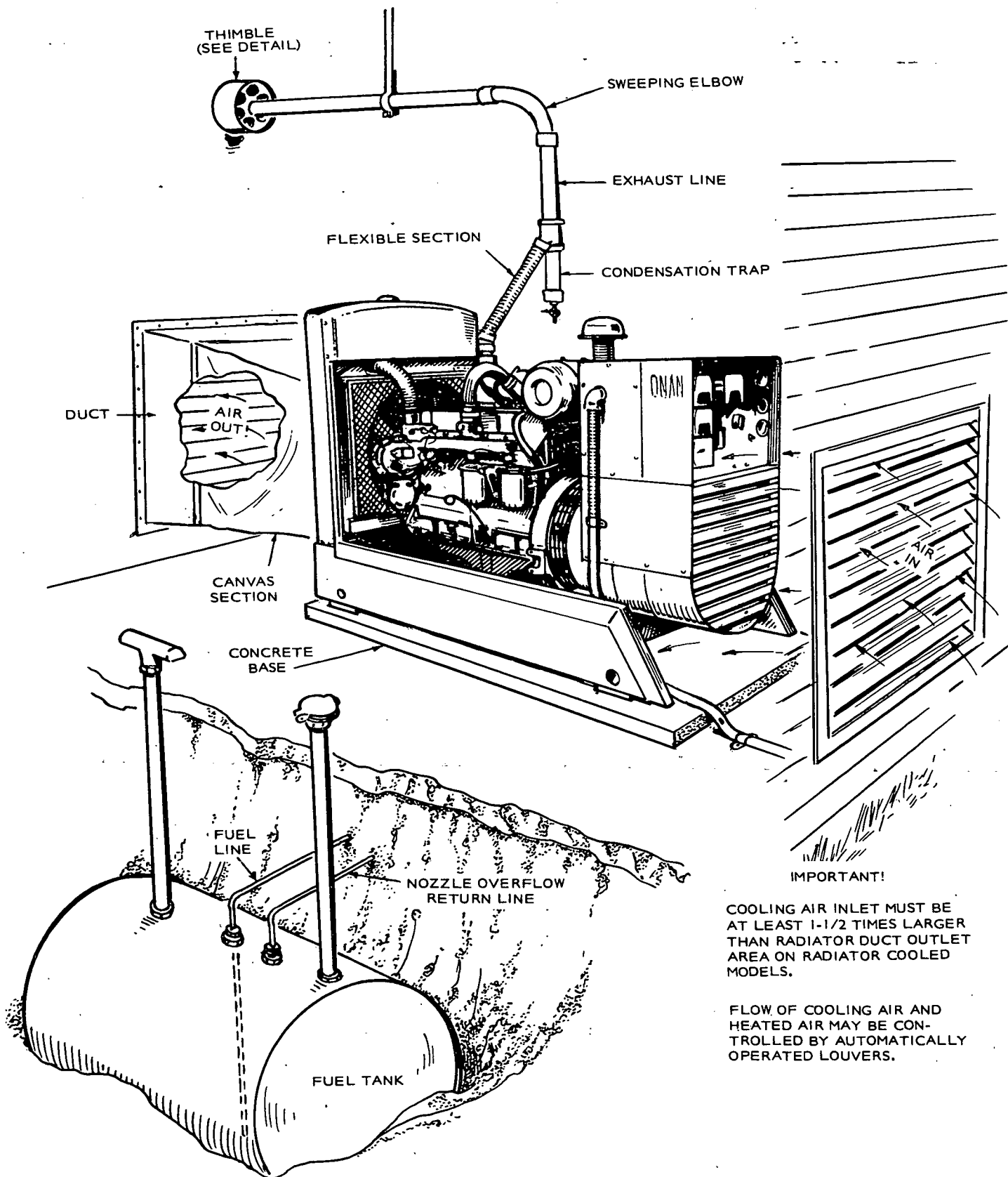


FIGURE 6. TYPICAL DYA INSTALLATION

COOLING SYSTEM

Standard Radiator Cooling, uses a set mounted radiator and engine driven pusher type fan to cool engine water jacket. Air travels from the generator end of the set, across the engine and out through the radiator. An integral discharge duct adapter flange surrounds the radiator grille.

Heat Exchanger Cooling (optional), uses a shell and tube type heat exchanger instead of the standard radiator and fan. Engine jacket coolant circulates through the shell side of the heat exchanger, while raw cooling water is pumped through the tubes. Engine coolant and raw water do not mix. This type of cooling separation is necessary when the raw water contains scale forming lime and other impurities.

This system reduces set enclosure airflow and noise levels. Proper operation depends upon a constant supply of raw water for heat removal. The engine coolant side of the system may be protected from freezing the raw water side cannot. See Figure 7 for typical installation.

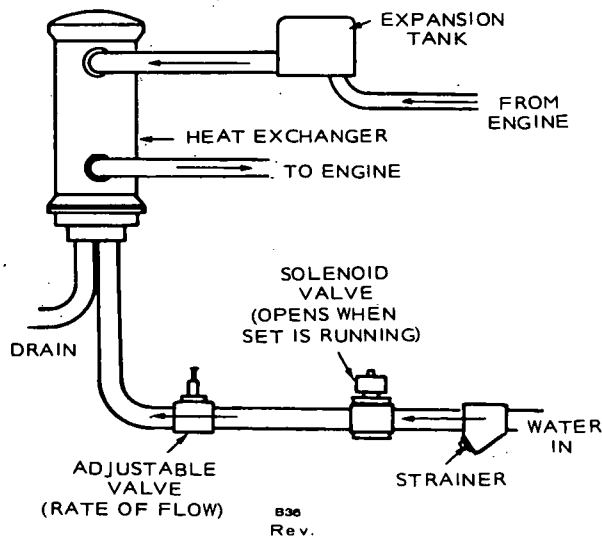


FIGURE 7. TYPICAL HEAT EXCHANGER SYSTEM

Standpipe Cooling (optional) substitutes a mixing (tempering) tank for the standard radiator and fan. Cooling water circulating through the engine jacket is mixed with raw water in the tank. Because raw water flows through the engine jacket, it must not contain scale forming impurities or fouling of the engine water will occur. Fouling results in engine overheating and costly repair bills.

This system reduces set enclosure airflow requirements and noise levels. Proper operation is dependent on a constant supply of cooling water. The system cannot be protected from freezing. See Figure 8.

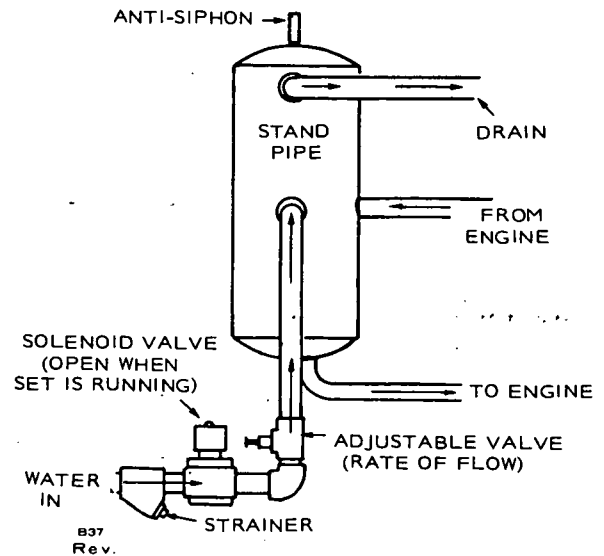


FIGURE 8. TYPICAL STANDPIPE SYSTEM

Remote Radiator Cooling (optional), substitutes a remote mounted radiator and an electrically driven fan, for the set mounted components. Removal of the radiator and fan from the set reduces set enclosure airflow requirements and noise levels without forcing dependence on a continuous cooling water supply. The remote radiator system can be completely protected against freezing.

This system must be designed to meet specific requirements of the application.

Water Jacket Heater (optional) may be installed to keep engine coolant warm while engine is shut down. It heats and circulates the coolant within the engine, which reduces start-up time and engine wear caused by cold starts. It is electrically operated and thermostatically controlled.

COOLING CONNECTIONS

The radiator cooled (standard) set does not require any external connections except as discussed under *Ventilation*. Allow clearance around the set for access to service the radiator and fan belts. See Figure 6.

Heat Exchanger and Standpipe cooled sets must be connected to a pressurized supply of cold water. Make connections to the set with flexible pipe to absorb vibration. On the cool water line install a solenoid valve to shut off the flow when the set is shut down and a rate of flow valve to control engine temperature. This valve can be either manual or automatic. Actual rate of flow will depend on inlet water temperature.

Adjust the flow to maintain water temperature between 165°F and 195°F (73.9°C and 90.6°C) while viewing the water temperature gauge.

Before filling cooling system check all hardware for security. This includes hose clamps, capscrews, fittings and connections. Use flexible coolant lines with heat exchanger, standpipe or remote mounting radiator.

Remote radiator plumbing will vary with installation. All systems must comply with the following conditions—

1. Make all connections to the set and to the radiator, with flexible pipe.
2. Install an auxiliary circulating pump if the horizontal distance between the engine and pump exceeds 15-feet (4.65 m).
3. Install a hot-well system to relieve excess engine water jacket pressure if the top of the radiator is more than 15-feet (4.65 m) above the center-line of the engine crankshaft.

GENERAL WATER FILTER

Electric generating sets can be equipped with an optional cooling system filter (corrosion resistor). This filter is a unit which directs coolant from the system through a filtering and treating device. It softens water, neutralizes acidity and protects against corrosion by the use of a replaceable chemically activated filtering element. In addition, the unit contains a sacrificial metal plate which arrests pitting of metals in the system by electro-chemical action.

Exact location of filter will vary because of other optional equipment which may also be installed.

Two types of elements are available from your Onan dealer or distributor.

1. Regular formula (chromate).
2. PAF formula (borate) year round type.

CAUTION Do not use anti-freeze with an anti-leak formula. The stop-leak element can prevent or retard the flow through the filter, thereby eliminating the filtering process completely.

The regular formula can be used with plain water and selected antifreezes. The best protection results will be gained by using the borate formula element with a permanent antifreeze.

ONAN recommends that shutoff valves be installed to the engine side of the inlet and outlet of the coolant filter, for ease in changing elements. Further, it is good practice to insert and clamp a thick-walled pyrex tube into the line at a convenient point to serve as a flow indicator. This flow indicator will act in the capacity of a sight gauge to observe general condition, possible air pockets and presence of contaminants in the coolant flow.

WATER JACKET HEATER (Optional)

This heater is installed to maintain an elevated engine temperature in lower ambient temperature applications. It heats and circulates engine coolant, and is thermostatically controlled.

EXHAUST

WARNING

Inhalation of exhaust gases can result in death.

Engine exhaust gas must be piped outside building or enclosure. Do not terminate exhaust pipe near inlet vents or combustible materials. An approved thimble (Figure 9) must be used where exhaust pipes pass through walls or partitions. Pitch exhaust pipes downward or install a condensation trap (Figure 10) at the point where a rise in the exhaust system begins. Avoid sharp bends; use sweeping long radius elbows. Provide adequate support for mufflers and exhaust pipes. Refer to Figure 6 for a typical exhaust installation. Shield or insulate exhaust lines if there is danger of personal contact. Allow at least 9-inches (230 mm) of clearance if the pipes run close to a combustible wall or partition. Use a pipe at least as large as the 3-inch (76 mm) pipe size outlet of the engine with a flexible portion between the engine and the muffler.

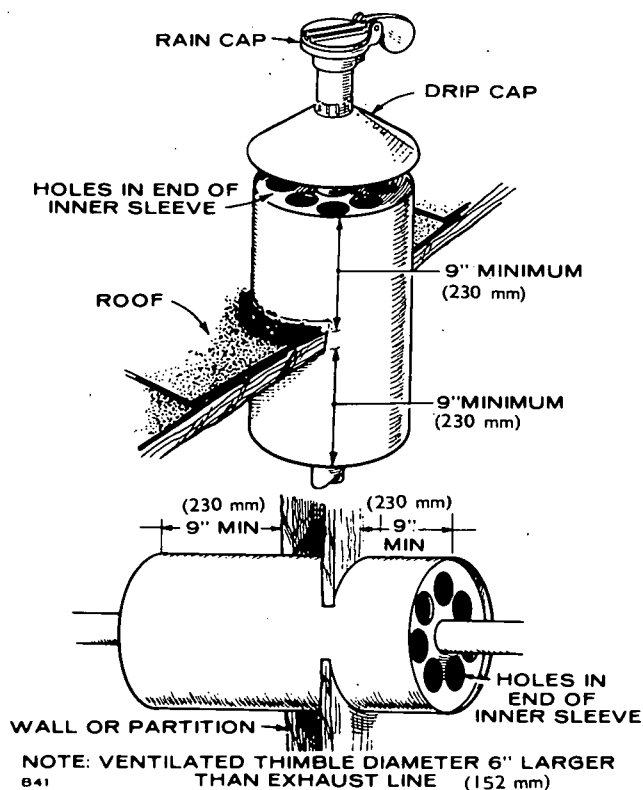


FIGURE 9. EXHAUST THIMBLE

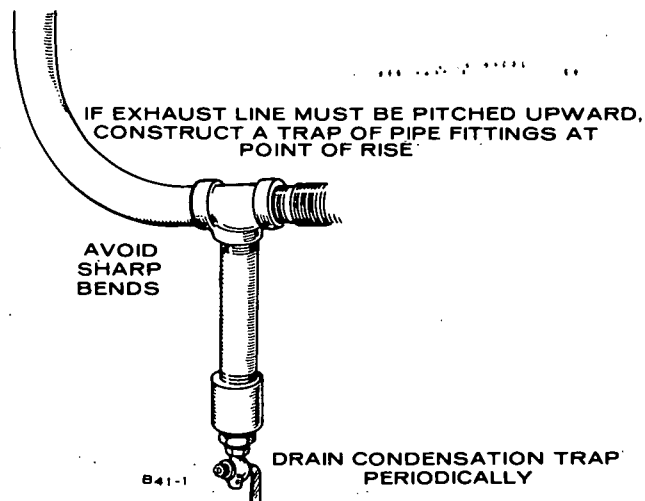


FIGURE 10. EXHAUST CONDENSATION TRAP

Do not connect a flexible line to the exhaust manifold. Minimum diameters and maximum lengths of pipe (with critical muffler[s]) are as follows:

Single Exhaust system:

3½-inch	95 feet (29 m)
4-inch	200 feet (61 m)
5-inch	550 feet (168 m)

Maximum permissible exhaust restriction (back pressure) is 27.2-inches H₂O (6.8 kPa).

FUEL SYSTEM

Allis-Chalmers engines used on the DYC sets are designed for use with ASTM No. 2 Diesel fuel. They will however, operate on diesel fuels within the specifications delineated in the Allis-Chalmers engine manual.

FUEL CONNECTIONS

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

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

A fuel lift in excess of 8-feet (2.44 m) is not recommended without a day tank installation, because of fuel drainage. Horizontal run, if the supply tank is level with the fuel pump, should not exceed 12.5-feet (3.8 m). However, a day tank is again recommended.

The fuel inlet is to the transfer pump and is threaded for 1/8-inch pipe. Injector pump return line is common with the injectors' return line, and requires a 1/8-inch low pressure hose connection. See Figure 11 for fuel system installation.

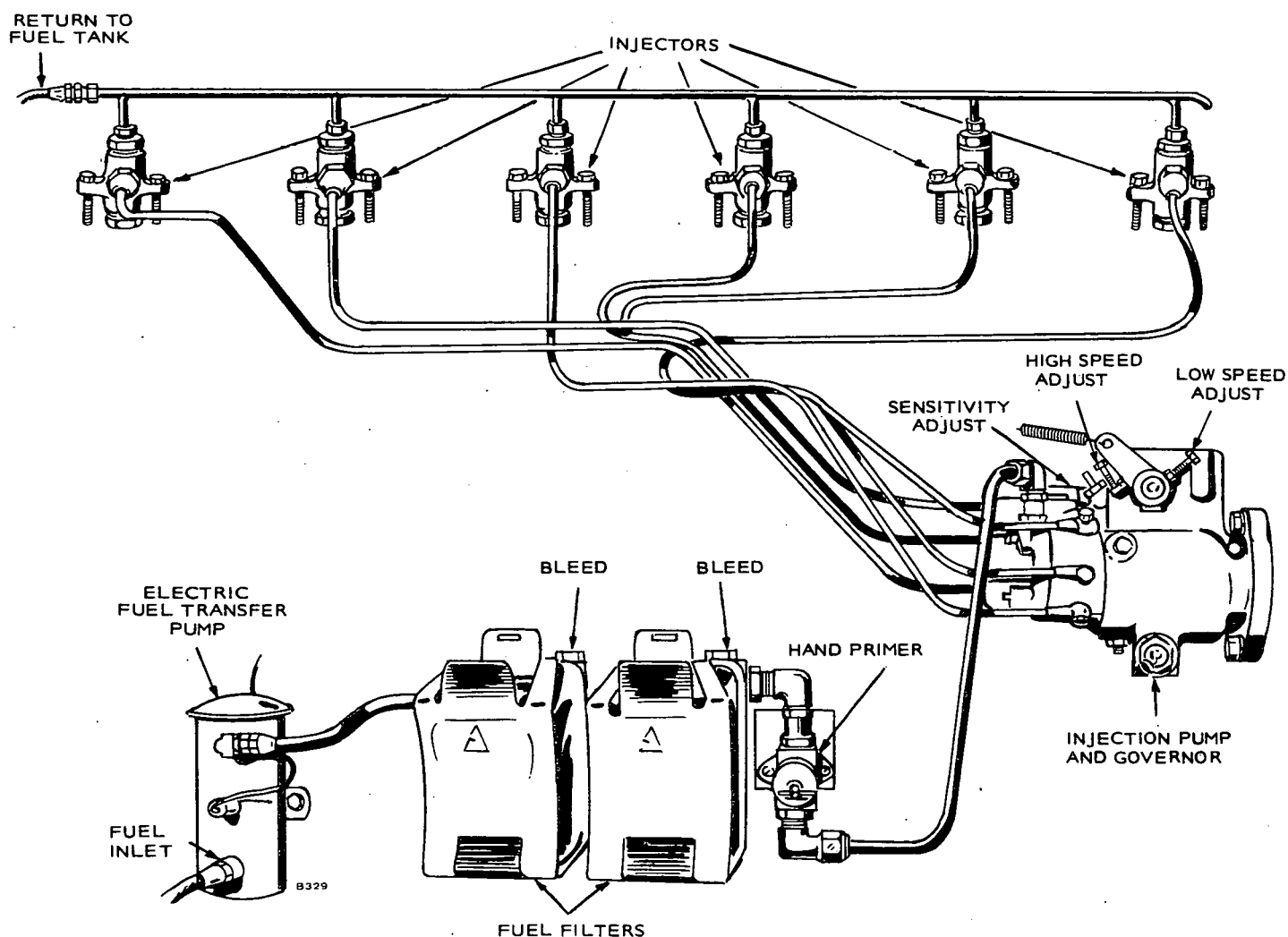


FIGURE 11. FUEL SYSTEM

DAY TANK

Generator set installations may be equipped with an optional separate fuel day tank. A float operated valve controls fuel flow into the fuel tank. The correct level is maintained to assure a constant source of fuel. It is necessary to install an overflow line between the day tank and the main fuel tank. Refer to the installations included with the tank. See Figure 12 for an example of a day tank installation. Tank and lines must be below level of injector pump return outlet.

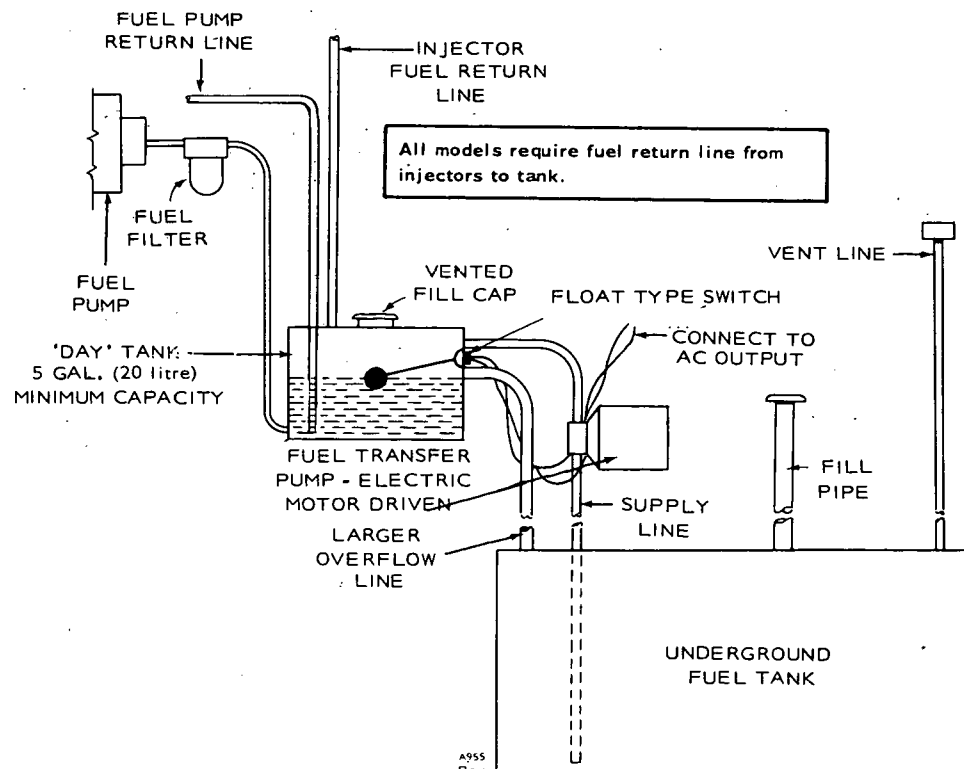


FIGURE 12. DAY TANK (TYPICAL)

BATTERY

Starting the unit requires 12-volt battery current. Use two 6-volt (see *SPECIFICATIONS*) batteries for a normal installation. Connect the batteries in series (negative post of first battery to positive post of second) as in Figure 13. Necessary battery cables are on unit. Service the batteries as necessary. Infrequent unit use (as in emergency standby service) may allow the batteries to self-discharge to the point where they cannot start the unit. If installing an automatic transfer switch that has no built-in charge circuit, connect a separate trickle charger. Onan automatic transfer switches include such a battery charging circuit.

WARNING

Do not smoke while servicing batteries. Lead acid batteries give off explosive gases while being charged.

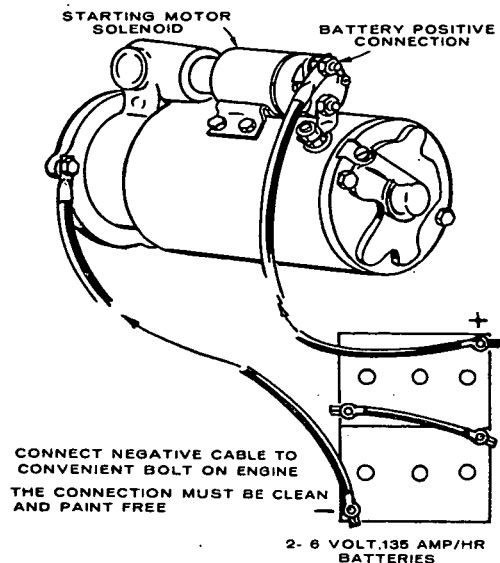


FIGURE 13. BATTERY CONNECTION

BATTERY, HOT LOCATION

Batteries will self discharge very quickly when installed where the ambient temperature is consistently above 90°F (32.2°C) such as in a boiler room. To lengthen battery life, dilute the electrolyte from its normal 1.275 specific gravity reading at full charge to a 1.225 reading. The cranking power is reduced slightly when the electrolyte is so diluted, but if the temperature is above 90°F (32.2°C), this should not be noticed. The lengthened battery life will be worth the effort.

1. Fully charge the battery.
2. With the battery still on charge, draw off the electrolyte above the plates in each cell. **DO NOT ATTEMPT TO POUR OFF**; use a hydrometer or filler bulb and dispose of it in a safe manner. Avoid skin or clothing contact with the electrolyte.
3. Refill each cell with distilled water, to normal level.
4. Continue charging for 1 hour at a 4 to 6 hour rate.
5. Test each cell. If the specific gravity is still above 1.255, repeat steps 2, 3, and 4 until the reading is reduced to 1.225. Usually, repeating steps twice is sufficient.

REMOTE CONTROL CONNECTIONS

Provision is made for addition of remote starting. This is accomplished on a 4 place terminal block situated within the control box. Connect one or more remote switches across remote terminal and B+ terminal as shown in Figure 14. If the distance between the set and remote station is less than 1000-feet (305 m), use No. 18 AWG wire; between 1000- and 2000-feet (305 m and 610 m), use No. 16 AWG wire.

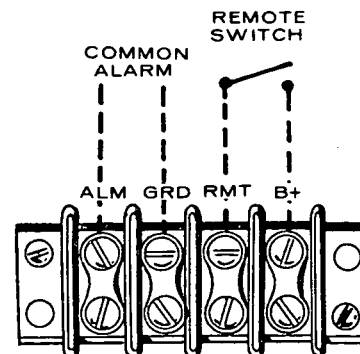
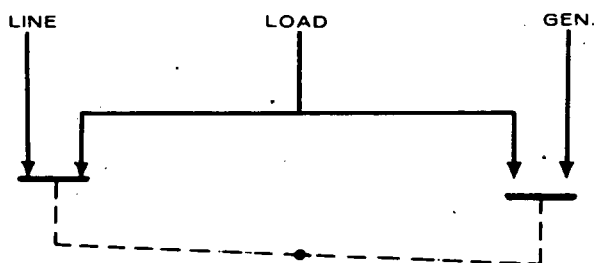


FIGURE 14. REMOTE START CONNECTION (TB12)

WIRING CONNECTIONS

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 sizes, etc. must conform to requirements of electrical codes in effect at the installation site.

If the installation is for standby service, a double throw transfer switch must always be used. Connect this switch (either automatic or manual) so that it is impossible for commercial power and generator current to be connected to the load at the same time. See Figure 15. Instructions for connecting an automatic load transfer control are included with such equipment.



NOTE: SHOWN WITH LINE CONNECTED TO LOAD.

FIGURE 15. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

Control Box Connections: The factory ships these 12 lead generators with load connection wires NOT connected together in the control box. These 12 wires are labeled T1 through T12 and must be brought together before making load connections. Proceed as follows:

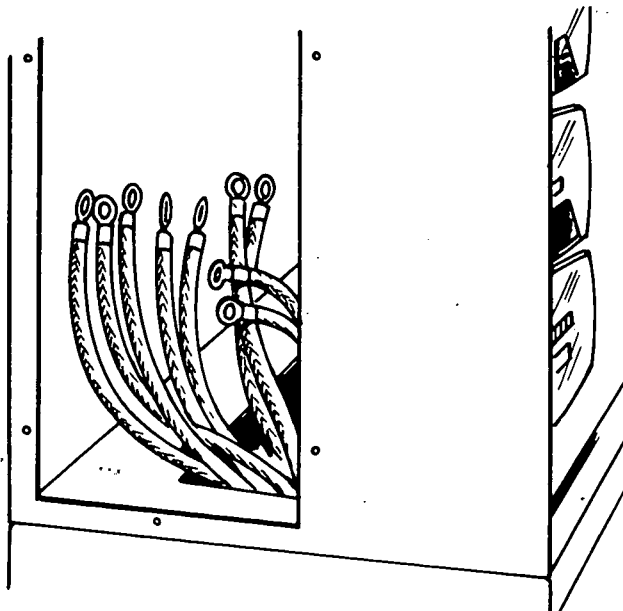


FIGURE 16. CONTROL BOX (SIDE PANEL REMOVED)

1. Remove either right, left or top panel from control box. See Figure 16.
2. Connect wires together as shown on panel drawing and in Figure 21 according to voltage desired.
3. Open hinged control panel doors. Connect lead from terminal 63 to correct terminal for voltage desired. These terminals are labeled H2, H3, H4, H5 and H6. See Figure 17.
4. Close front panel and secure with 1/4 turn fasteners.
5. Connect load wires to generator leads.

Preceding instructions do not apply to models designated Code 3 or 9X; this connection is made at the factory. The installer must only connect load wires.

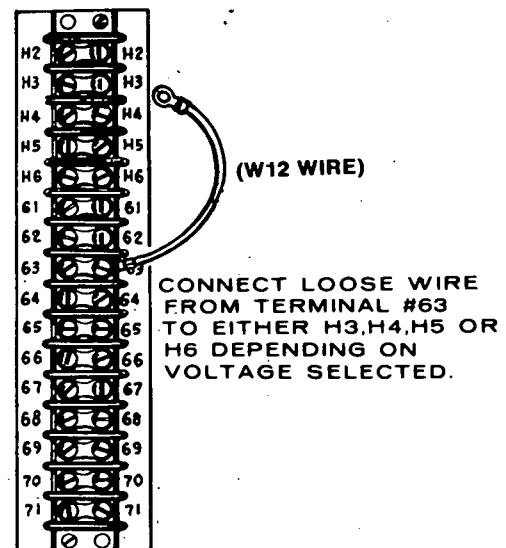


FIGURE 17. REFERENCE VOLTAGE CONNECTION (TB21)

120/240 Volt, Single Phase, 12 Lead: Terminal connection L0 can be grounded (neutral). For 120 volts, connect the hot load wires to either the L1 or L2 connection, Figure 18. Connect the neutral load wire to the grounded L0 connection. Two 120 volt circuits are thus available, with not more than 1/3 the rated capacity of the set available on either circuit. If using both circuits, be sure to balance the load between them.

For 240 volts, connect one load wire to the L1 connection and the second load wire to the L2 connection. Terminal connection L0 is not used for 240 volt service.

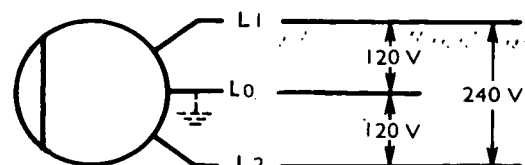


FIGURE 18. 120/240 V. 1-PHASE DOUBLE DELTA

120/240 Volt, 3 Phase, Delta Connected Set; 12 Lead:

The 3 phase Delta connected set is designed to supply 120 and 240 volt, 1 phase current and 240 volt, 3 phase current, Figure 19. For 3 phase operation, connect the three load wires to generator terminals L1, L2 and L3—one wire to each terminal. For 3 phase operation the L0 terminal is not used.

For 120/240 volt, 1 phase, 3 wire operation, terminals L1 and L2 are the "hot" terminals. The L0 terminal is the neutral, which can be grounded if required. For 120 volt service, connect the black load wire to either the L1 or L2 terminal. Connect the neutral (white) wire to the L0 terminal. Two 120 volt circuits are available. Connect between any two 3-phase terminals for 240 volt 1-phase loads.

Any combination of 1 phase and 3 phase loading can be used at the same time as long as total current does not exceed the NAMEPLATE rating of the generator. If no 3 phase output is used, usable 1 phase output is 2/3 of 3 phase kVA.

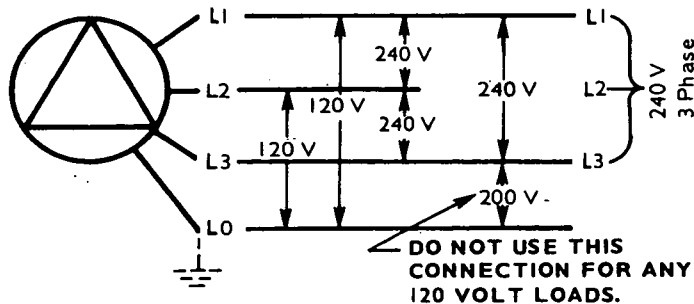


FIGURE 19. 120/240 V. 3-PHASE DELTA

3 Phase, Wye Connected Set: The 3 phase, 4 wire set produces line to neutral voltage and line to line voltage. The line to neutral voltage is the lower voltage as noted on the unit nameplate, and the line to line voltage is the higher nameplate voltage.

For 3 phase loads, connect separate load wires to each of the set terminals L1, L2 and L3. Single phase output of the higher nameplate voltage is obtained between any two 3 phase terminals as shown in Figure 20.

The terminal marked L0 can be grounded. For 1 phase loads, connect the neutral (white) load wire to the L0 terminal. Connect the black load wire to any one of the other three terminals—L1, L2 or L3. Three separate 1 phase circuits are available, with not more than 1/6 the rated capacity of the set from any one circuit.

If using 1 phase and 3 phase current at the same time, use care to properly balance the 1 phase load, and not to exceed rated line current.

Figure 22 shows load connections for 120/208 voltage. Other voltages are available from either parallel wye or series wye illustration.

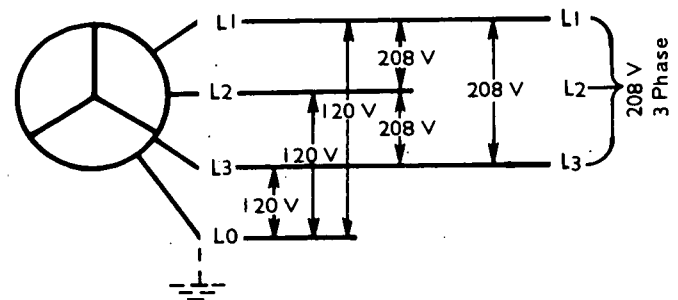
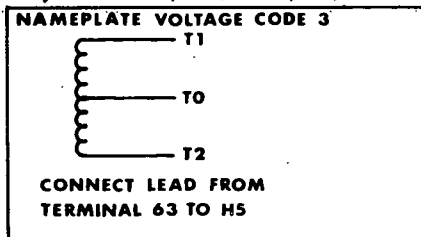
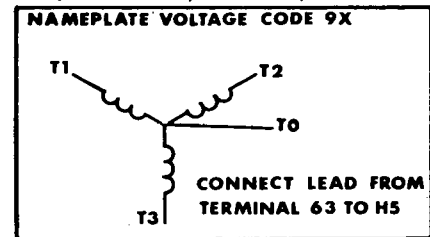


FIGURE 20. 120/208 V. 3-PHASE WYE

120/240 VOLT, 1 PHASE, 60 HERTZ



347/600 VOLT, 3 PHASE, 60 HERTZ



+

THIS DIAGRAM APPLIES TO 12 LEAD GENERATORS ONLY

NAMEPLATE VOLTAGE CODE					GENERATOR CONNECTION SCHEMATIC DIAGRAM	GENERATOR CONNECTION WIRING DIAGRAM (WITH CURRENT TRANSFORMERS WHEN USED)
VOLTAGE	PHASES	HERTZ	CONNECT LEAD FROM TERMINAL 63 TO:	GENERATOR CONNECTION		
15	120/240	1	60	H5		
515	115/230	1	50	H6		
	110/220	1	50	H6		
15	120/240	3	60	H5		
515	115/230	3	50	H6		
	110/220	3	50	H6		
15	120/208	3	60	H3		
515	127/220	3	60	H4		
	139/240	3	60	H5		
	110/190	3	50	H3		
515	115/200	3	50	H4		
	120/208	3	50	H4		
	127/220	3	50	H5		
	15	240/416	3	60	H3	
515	254/440	3	60	H4		
	277/480	3	60	H5		
	220/380	3	50	H3		
	230/400	3	50	H4		
	240/416	3	50	H4		
	254/440	3	50	H5		

98C2193

FIGURE 21. OPTIONAL VOLTAGE CONNECTIONS

OPERATION

GENERAL

Onan DYA Series electric generating sets are given a complete running test under various load conditions and are thoroughly checked before leaving the factory. Inspect your unit closely for loose or missing parts and damage which may have occurred in transit. Tighten loose parts, replace missing parts and repair any damage before putting set into operation.

PRESTART SERVICING

Lubrication System: Engine oil was drained prior to shipment. Fill engine to capacities shown. After engine has been run, check dipstick, add oil to bring level to full mark. Record total capacity for future oil changes. For all operating conditions grade CD lubricating oil is recommended for turbocharged engines. Do not mix brands nor grades of lubricating oils.

Oil Viscosity should be as follows:

AMBIENT TEMPERATURE	USE SAE VISCOSITY
0° F (-17.8° C) and below	10W
0° F to 32° F (-17.8° C to 0° C)	20-20W
Above 32° F (0° C)	30W

Oil Capacities (nominal)

Oil Pan and Filter—11 quarts (10.4 litres)

Oil quantity dipsticks have dual marking with high and low-level marks: static oil level on one side and engine at low speed marks on opposite side. Be sure to use proper scale.

Cooling System: Cooling system was drained prior to shipment. Fill cooling system before starting. Nominal capacity is 27 quarts (25.5 litres). For units using either a radiator or heat exchanger (city water cooled), fill the system with clean soft water. Use a good rust and scale inhibitor additive. If a possibility exists of a radiator cooled set being exposed to freezing temperatures use anti-freeze with an ethylene glycol base. During initial engine run, check the coolant level several times and replenish if necessary to compensate for air pockets which may have formed during filling. Refer to Allis-Chalmers engine manual for additional information.

CAUTION

1. Verify that the electric solenoid valve used with city water cooled sets is open before initial starting of unit to allow coolant chambers to fill. Overheating and damage to the engine could result from noncompliance.

2. If engine is equipped with a cooling system filter, do not use antifreeze with an anti-leak formula. The stop leak element can prevent or retard the coolant flow through the filter, thereby eliminating the filtering process completely.

WARNING

Be careful when checking coolant under pressure. It is advisable to shut engine down and bleed off pressure before removing pressure cap. Severe burns could result from contact with hot coolant.

Fuel System: Refer to the Allis-Chalmers engine manual for fuel oil specifications. Check with fuel supplier and ensure that fuel supplied meets the specifications. Filter or strain fuel when filling tank. Fuel supply tanks should be kept as nearly full as possible by topping up each time engine is used. Warm fuel returning from the injector pump heats the fuel in the supply tank. If the fuel level is low in cold weather, the upper portion of the tank not heated by returning fuel tends to increase condensation. In warm weather both the supply tank and fuel are warm. Cool night air lowers the temperature of the tank more rapidly than the temperature of the fuel. Again this tends to increase condensation.

Condensate mixing with the sulphur in the fuel forms a sulphurous acid which will corrode and damage the engine. KEEP FUEL CLEAN.

WARNING

DO NOT SMOKE while handling fuel. Diesel fuel is flammable.

Priming Fuel System: Verify that all connections in fuel system are secure and no leaks exist. Proceed with priming as follows:

1. Loosen injection pump end of the fuel supply tube between hand primer pump and injection pump.
2. Open fuel shutoff valve. (Verify tank has fuel.)
3. Loosen locking screw on top of hand primer plunger and release clamp. See Figure 22.
4. Pump primer plunger to fill the filters with fuel and expel air.
5. Continue until fuel flow around loosened end of fuel supply line at injection pump is free of bubbles.
6. Secure line and hand pump plunger.

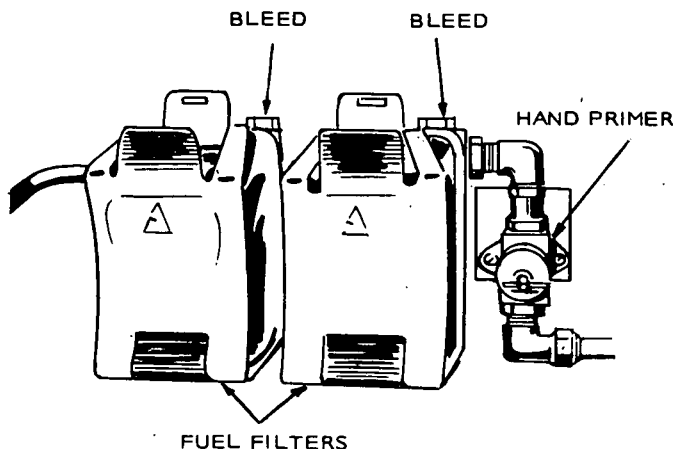


FIGURE 22. PRIMING FUEL SYSTEM

Ensure that hand primer pump is screwed in and secured before attempting to start engine.

Check all connections in fuel system for security to ensure that pressure will not bleed off when engine is not in use. Pressure should be maintained for immediate starting if unit is on standby service.

BATTERIES

Ensure that the cable connections to the batteries are secure. Coat connections with petroleum based or non-conductive grease to retard formation of corrosive deposits.

Check level of electrolyte to be at split ring mark. Measure specific gravity of electrolyte: SG 1.280 at 80°F (26.7°C). If distilled water has been added or specific gravity is less than 1.280, place batteries on charge until desired reading is reached. Do not over charge.

STARTING

When the preceding service functions have been performed, recheck to verify unit is ready to start.

1. Crankcase filled.
2. Cooling system filled—input solenoid valve open.
3. Batteries charged and connected.
4. Fuel solenoid valve open.

To start, move the "run-stop/reset-remote" switch to the "run" position. The engine should start after a few seconds of cranking. Immediately after start, observe the oil pressure gauge. Normal oil pressure is between 30- and 55 psi (207.0-379.5 kPa). Check the following gauges:

1. DC Ammeter—10 to 30 amperes.
2. AC Voltmeter—AC generator output voltage.
3. Frequency Meter—AC generator output frequency.

After running 10 minutes under load the water temperature gauge should have stabilized at 180°F to 195°F (82°C to 90.6°C). On city water cooled units an adjustable valve is connected in the water supply line. Adjust the hand wheel valve to provide a water flow that will keep the water temperature gauge reading within the range of 170°F to 200°F (76.7°C to 93.3°C).

STOPPING

To reduce and stabilize the engine temperatures and prevent turbocharger housing damage, run the engine at no load for three to five minutes before shutting down.

Move the run-stop/reset-remote switch to stop position to shut down the set.

Break-In Note: Run set at 50 percent rated load for the first half-hour of initial operation after reaching operating temperature.

Non-Start: If after a few seconds of cranking, engine fails to start, or starts and runs then stops and fault lamp lights, refer to appropriate troubleshooting chart, Table 3 or Table 4.

EXERCISE PERIOD

Generator sets on continuous standby service are required to be operative at essential loads from a cold start in a short period of time in the event of a power outage.

This imposes severe conditions on the engine. Friction of dry piston rings upon dry cylinder walls causes scuffing and rapid wearing. These can be relieved by exercising the set at least once a week for a minimum time of 30-minutes per exercise period. Preferably, run the set under at least 50 percent load to allow the engine to reach normal operating temperature. This will keep engine parts lubricated, maintain fuel prime, prevent electrical relay contacts from oxidizing and insure easy emergency starts. Onan automatic transfer switches contain an optional exercise switch which, by pre-selection, will start, determine run period and shut down a set on a weekly frequency. For example, the switch can be set for time of start, length of run, A.M. or P.M. and day of week.

After each exercise period, top off fuel tank, check engine for leaks and unit for general condition. Locate cause of leaks (if any) and correct.

NO LOAD OPERATION

Periods of no load operation should be held to a minimum. If it is necessary to keep the engine running for long periods of time when no electric output is required, best engine performance will be obtained by connecting a "dummy" electrical load. Such a load could consist of heater elements, etc.

TABLE 3.
TROUBLESHOOTING ENGINE SHUTDOWN SYSTEM
(Engines with only one fault lamp)

SYMPTOM	CORRECTIVE ACTION
1. Engine stops cranking and fault lamp lights, after cranking approximately 75 seconds.	<p>1. See engine service manual for troubleshooting fuel system.</p> <p>After correcting problem, reset engine monitor relay by placing Run-Stop/Reset-Remote switch to Stop/Reset, then back to the required running position.</p>
2. Fault lamp lights immediately after engine starts.	2. Check for: Overspeed condition as engine starts.
3. Fault lamp lights and engine shuts down after running for a period.	<p>3. Check the following:</p> <ul style="list-style-type: none"> a. Oil level. Engine will shut down if sensor is closed. b. Check engine manual for troubleshooting oil system. c. High engine temperature. Check coolant level; check water flow (city water cooled systems); check radiator for free air flow, and fan belts for tightness. See engine manual for troubleshooting cooling system. d. Check for faulty oil pressure sensor or faulty high engine temperature sensor.
4. Engine runs, shuts down and cranks for 75-seconds. Cranking cycle stops; fault lamp lights.	4. Check fuel supply.
5. Fault lamp lights, no fault exists.	5. To check a no-fault condition, disconnect leads from TB11 terminals 29, 30 and 31. If fault lamp lights with leads disconnected, replace engine monitor board. Reconnect leads.

TABLE 4.
TROUBLESHOOTING ENGINE SHUTDOWN SYSTEM
(Units with five fault lamps)

SYMPTOM	CORRECTIVE ACTION
1. Overcrank fault lamp lights and engine stops cranking after approximately 75-seconds.	1. See engine service manual for troubleshooting fuel system. After correcting fault, reset engine monitor relay by placing Run-Stop/Reset-Remote switch to Stop/Reset position, depressing Reset button, then to the required running position.
2. Engine runs, shuts down, cranks for 75-seconds, cranking cycle stops, overcrank light ON.	2. Check fuel supply.
3. *Low oil pressure shutdown.	3. Check— a. Oil level. Replenish if necessary. b. Sensor. Faulty sensor will shut down engine. c. Refer to engine service manual for troubleshooting guide for oil system.
4. *High engine temperature shutdown.	4. Check— a. Coolant level. Replenish if necessary. b. City water cooled sets. Check water flow, valves, etc. c. Check sensor; check thermostat. d. Radiator model, check fan belts, radiator for obstructions, etc.
5. Overspeed shutdown.	5. Check governor and throttle linkages for freedom of movement. Check overspeed switch.
6. Overspeed light on, no shutdown.	6. Disconnect wire at TB11-29. Light on after reset; replace engine monitor board.
7. *Low oil pressure light ON. No shutdown.	7. Disconnect wire at TB11-30. Light ON after relay reset. Replace engine monitor board.
8. *High engine temperature light ON. No shutdown.	8. Disconnect wire at TB11-31. Light ON after relay reset. Replace engine monitor board.

*NOTE: Not applicable on Pennsylvania State models.

OUT-OF-SERVICE PROTECTION

Generator sets removed from service for extended periods of time should be protected from rust and corrosion. The natural lubrication qualities of ASTM No. 2 Diesel fuel should protect a diesel engine for at least 30-days when unit is not in service. To protect a unit that will be out of service over 30 days, Onan recommends the following procedure:

1. Check coolant, top up if necessary using recommended anti-freeze.
2. Run set until thoroughly warm; generator under at least 50% load.
3. Shut down engine and drain oil base while still warm. Refill and attach a warning tag indicating viscosity of oil used.
4. Service air cleaner.
5. Clean throttle and governor linkage and protect by wrapping with a clean cloth.
6. Plug exhaust outlets to prevent entrance of moisture, bugs, dirt, etc.
7. Clean off dirt and dry entire unit. Coat parts likely to rust with a light coat of grease or oil.
8. Disconnect battery and follow standard battery storage procedure. Apply a film of non-conductive grease (e.g., vaseline) to battery cable lugs.
9. Fill fuel tank to prevent condensation contamination.
10. Provide a suitable cover for the entire unit.

RETURNING A UNIT TO SERVICE

1. Remove cover and all protective wrapping. Remove plug from exhaust outlet.
2. Check warning tag on oil base and verify that oil viscosity is still correct for existing ambient temperature.
3. Clean and check battery. Measure specific gravity (1.250 at 77° F [25° C]) and verify level to be at split ring. If specific gravity is low, charge until correct value is obtained. If level is low, add distilled water and charge until specific gravity is correct. **DO NOT OVERCHARGE.**

WARNING

Do not smoke while servicing batteries. Explosive gases are emitted from batteries in operation. Ignition of these gases can cause severe personal injury.

4. Check coolant level, adjust if necessary.
5. Connect batteries.
6. Verify that no loads are connected to generator.
7. Start engine.
8. After start, apply load to at least 50 percent of rated capacity.
9. Check all gauges to be reading correctly. Unit is ready for service.

HIGH ALTITUDE

Ratings apply to altitudes up to 1000-feet (305 m), standard cooling, normal ambients and with No. 2 Diesel fuel. Consult factory or nearest authorized Onan distributor for operating characteristics under other conditions.

Engine horsepower loss is approximately 3 percent for each 1000 feet (305 m) of altitude above sea level. Use lower power requirement at high altitudes to prevent smoke, over-fueling and high temperatures.

HIGH TEMPERATURES

1. See that nothing obstructs air flow to-and-from the set.
2. Keep cooling system clean.
3. Use correct SAE No. oil for temperature conditions.

LOW TEMPERATURES

1. Use correct SAE No. oil for temperature conditions. Change oil only when engine is warm.
2. Use fresh fuel. Protect against moisture condensation.
3. Keep fuel system clean and batteries in a well charged condition.
4. Partially restrict cool air flow but use care to avoid overheating.
5. Connect water jacket heater when set is not running.
6. Refer to Allis-Chalmers manual for further information.

Water Jacket Heater: The function of this optional heater is to keep the engine warm enough to assure starting under adverse weather conditions. Connect the heater to a source of power that will be on during the time the engine is not running. Be sure the voltage rating is correct for the heater element rating.

GENERAL MAINTENANCE

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 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 Allis-Chalmers engine manual for details of engine service and maintenance procedures.

A set on stand-by duty will need servicing at times other than those recommended by Onan and the engine manufacturer. These maintenance service periods will vary according to set site or location and

OPERATOR MAINTENANCE SCHEDULE

MAINTENANCE ITEMS	OPERATIONAL HOURS			
	8	50	100	200-250
Inspect Set	x			
Check Fuel	x			
Check Radiator Coolant Level	x			
Check Oil Level	x			
Drain Fuel Filter Sediment	x			
Check Air Cleaner (Clean if Required)		x1		
Clean Injector Pump Linkage		x1		
Clean and Inspect Crankcase Breather			x	
Inspect Fan Belt			x2	
Check Cooling System			x3	
Change Crankcase Oil			x1, 7	
Replace Oil Filter Element			x1, 7	
Clean and Inspect Battery Charging Alternator				x
Check Starter				x4
Check Injection Nozzles				x5
Replace Fuel Filter Elements				x1
Check Batteries				x

x1 Perform more often in extremely dusty conditions, or every 3 months.

x2 Adjust to 1/2 inch depression between pulleys, or every 3 months.

x3 Check for rust or scale formation. Flush if necessary.

x4 Oil front bearing sparingly, check brushes.

x5 Check for proper spray pattern, etc. Refer to the Allis-Chalmers manual.

x7 Perform every 3 months or 100 hours, whichever comes first.

NOTE: The above schedule is a minimum requirement for your engine. Refer to Allis-Chalmers service manual for recommended service periods.

application. Consult with your Onan distributor or dealer for a schedule of maintenance and service more suitable to the unique environment and application of your set.

WARNING

Before commencing any maintenance work on the engine, generator, control panel, automatic transfer switch or associated wiring, disconnect batteries. Failure to do so could result in damage to the unit or serious personal injury in the event of inadvertent starting.

AC GENERATOR

There are no brushes, brush springs or collector rings on these generators, therefore they require very little servicing. Periodic inspections, to coincide with engine oil changes, will ensure good performance.

Generator Bearing: Inspect the bearing every 1000 hours with the unit running.

If using the unit for "prime power," replace the bearing every 10,000 hours or two years. If using the set for "standby," replace the bearing every five years.

Check generator voltage. It may be necessary to make a slight readjustment of the voltage rheostat to obtain the preferred voltage at average load.

INSPECTION AND CLEANING

When inspecting the rotating rectifier assembly, make sure diodes are free of dust, dirt and grease. Excessive foreign matter on these diodes and heat sinks will cause the diodes to overheat and will result in their failure. Blow out the assembly periodically, with filtered, low pressure air. Also check to see that diodes and leadwires are properly torqued. The diodes should be torqued to 30 in. lb. or finger-tight plus a quarter turn. Blow dust out of control panel.

BATTERIES

Check the condition of the starting batteries at least every two weeks. See that connections are clean and tight. A light coating of non-conductive grease will retard corrosion at terminals. Keep electrolyte at the proper level above the plates by adding distilled water. Check specific gravity; recharge if below 1.280.

VOLTAGE REGULATOR ADJUSTMENT

CAUTION

Do not adjust the voltage regulator voltage potentiometer to a point where generator output exceeds that stamped on the rating plate. To do so will cause excessive field current to flow and burn out the exciter. All adjustments should be made by a qualified technician.

AIR RESTRICTION INDICATOR

Mounted on the air intake pipe between the air filter and the turbo-charger is an Air Restriction Indicator, the purpose of which is to signal condition of the air filter. When the RED signal indicator on the device is fully exposed it is locked in position. At this time the air filter should be serviced in accordance with the instructions in the Allis-Chalmers engine manual.

After servicing the filter reset the indicator by depressing the reset button on top of the unit. See Figure 23.

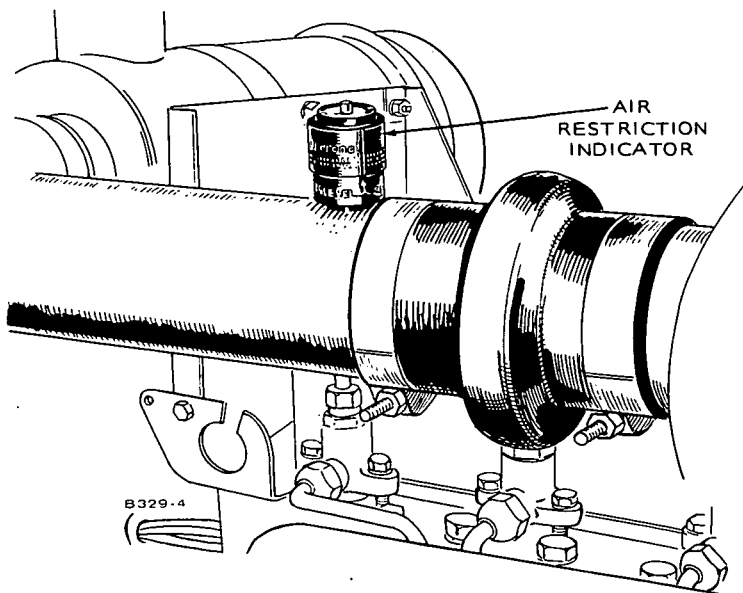


FIGURE 23. AIR RESTRICTION INDICATOR

CONNECTIONS (Fuel, Exhaust, etc.)

Operator should periodically make a complete visual inspection of the set while running at rated load. Some of the things to check for are as follows:

1. Check all fuel and oil lines for possible leakage.
2. Inspect exhaust lines and mufflers for possible leakage and cracks.
3. Periodically or daily, drain moisture from condensation traps.
4. Inspect water lines and connections for leaks and security.
5. Inspect electrical wires and connections for security and fray damage.

If generator requires major repair or servicing, contact an authorized Onan dealer or distributor.

ENGINE SPEED

Generator frequency is in direct ratio to engine speed, which is controlled by the governor.

A Roosa-Master governor is standard equipment on the DYA generator set. High speed and low speed limit stops are set at the Onan testing facility and normally do not require further adjustment, therefore if your set is used on continuous standby service, the governor may never need to be touched. If however the unit is used frequently, adjustment may be required due to wear of internal components. This adjustment is achieved by backing off the high speed stop screw. Screw in the low speed adjusting screw until the generator output frequency meter reads 60 hertz (generator on load). Turn in the high speed adjusting screw until it bottoms; secure the locknuts.

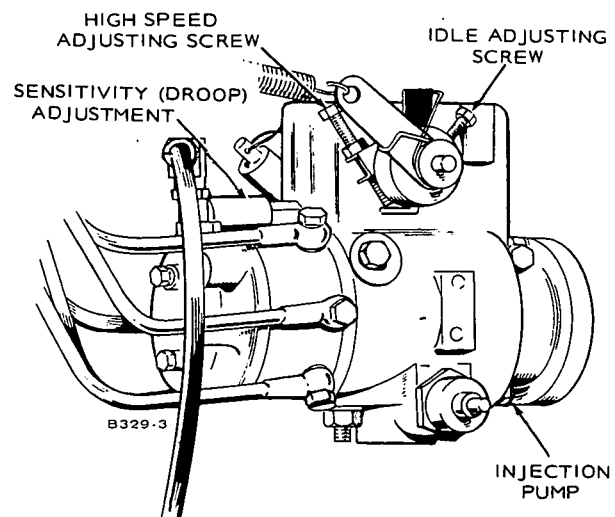


FIGURE 24. ROOSA-MASTER GOVERNOR

Governor sensitivity is adjusted by rotating an external knurled knob at the rear of the injector pump housing. Turning inward (clockwise) shortens governor control spring making it less sensitive, thereby increasing speed droop. Turning outward (counterclockwise) has opposite effect. Adjustment can be made with engine running. The speed droop is set at the Onan plant to give a regulation of 3 percent to 5 percent from no-load to full-load.

When using the generator frequency meter to determine engine speed, multiply frequency by 30 to calculate engine speed.

Example: 30×61 (hertz) = 1830 r/m.

Adjust engine speed to 1800 r/m for 60 hertz sets and 1500 r/m for 50 hertz sets, at full load.

PARTS CATALOG

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 and give the complete MODEL, SERIAL and SPECIFICATION NUMBER.

Onan ELECTRIC GEN SET			
MODEL <input type="text"/>			
SERIAL NO. <input type="text"/>			
IMPORTANT - ALWAYS GIVE ABOVE NOS. WHEN ORDERING PARTS			
CONTINUOUS		RATING	
HERTZ-60 RPM - 1800			
3 PHASE		1 PHASE	
KW <input type="text"/>	KVA <input type="text"/>	KW <input type="text"/>	KVA <input type="text"/>
VOLTS 120/208 127/220 139/240		120/240 240/416	
AMPS <input type="text"/>		<input type="text"/>	
VOLTS 254/440 277/480 347/600		120/240	
AMPS <input type="text"/>		10 <input type="text"/>	
BAT. <input type="text"/> VOLTS			
MANUFACTURED BY ONAN DIVISION OF ONAN CORPORATION MINNEAPOLIS, MINN. 55432, U.S.A. FOR ELECT. EQUIPMENT ONLY			

ALLIS-CHALMERS PARTS

All Allis-Chalmers must be ordered from the Allis-Chalmers Company of Harvey, Illinois, or their nearest authorized distributor. Refer to the Engine nameplate located on left front side of the crankcase. When ordering parts, always supply Allis-Chalmers with the following nameplate information:

ENGINE MODEL

ENGINE CATALOG NUMBER

ENGINE SERIAL NUMBER

ALLIS-CHALMERS HARVEY, ILLINOIS • MADE IN U.S.A.	
ENGINE MODEL	ENG. CATALOG NO.
ENGINE SERIAL NO.	<input type="text"/>
HT-53188	

This catalog applies to the standard DYA generator sets as listed below. Powered by a Allis-Chalmers 2900 engine (see Allis-Chalmers 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 Allis-Chalmers 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 generator set sides are determined by facing the front end of the engine.

ELECTRIC GENERATOR SET DATA TABLE

MODEL AND SPEC NO. *	ELECTRICAL DATA			
	WATTS	HERTZ	PHASE	WIRE
50.0DYA-515R/ 50.0DYA-15R50 (Penn State)	50,000	50	†	12
	50,000	60	†	12
60.0DYA-9XR 60.0DYA-15R/	60,000	60	3	4
	60,000	60	†	12

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

† - These sets are reconnectible; refer to Specifications (Generator Details).

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

REPLACEMENT ENGINE

100-0868

1

Engine, Replacement (Allis Chalmers Model 2900)

General Description:

Includes: Complete Cylinder Block, Fuel Pump, Fuel Filter, Oil Filter, Governor, Fan Blades (Pusher Type), Flywheel, Water Pump, Oil Pan, Oil Fill, Exhaust Manifold, Air Cleaner, Flywheel Housing, Oil Cooler, Generator Mounting Brackets, Starter Adapter, Fan Belt.

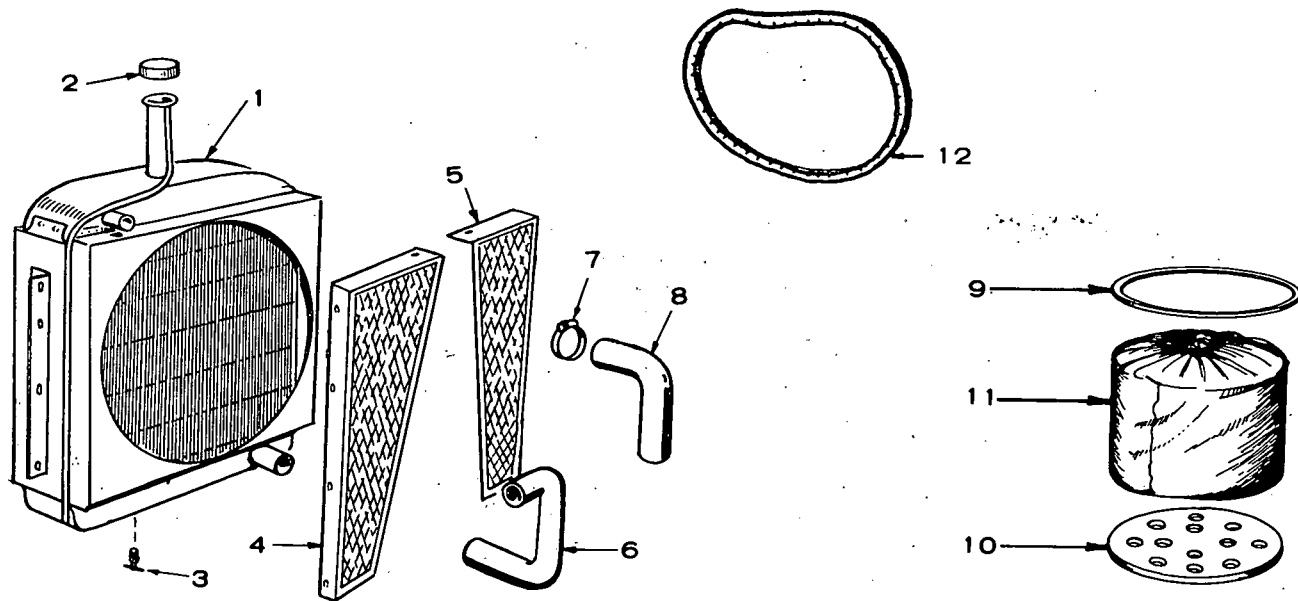
Excludes: Alternator, Temperature Sender, Oil Pressure Sender, Starter Motor, Radiator.

NOTE: Replacement engine is for standard Spec 1 generator sets. For all other Specs refer to factory.

NOTICE!

ITEMS REFERENCED AS **OPTIONAL** INDICATE PART IS FACTORY INSTALLED AND MAY NOT BE APPLICABLE TO ALL MODELS. FOR FIELD CONVERSIONS ADDITIONAL PARTS ARE USUALLY REQUIRED.

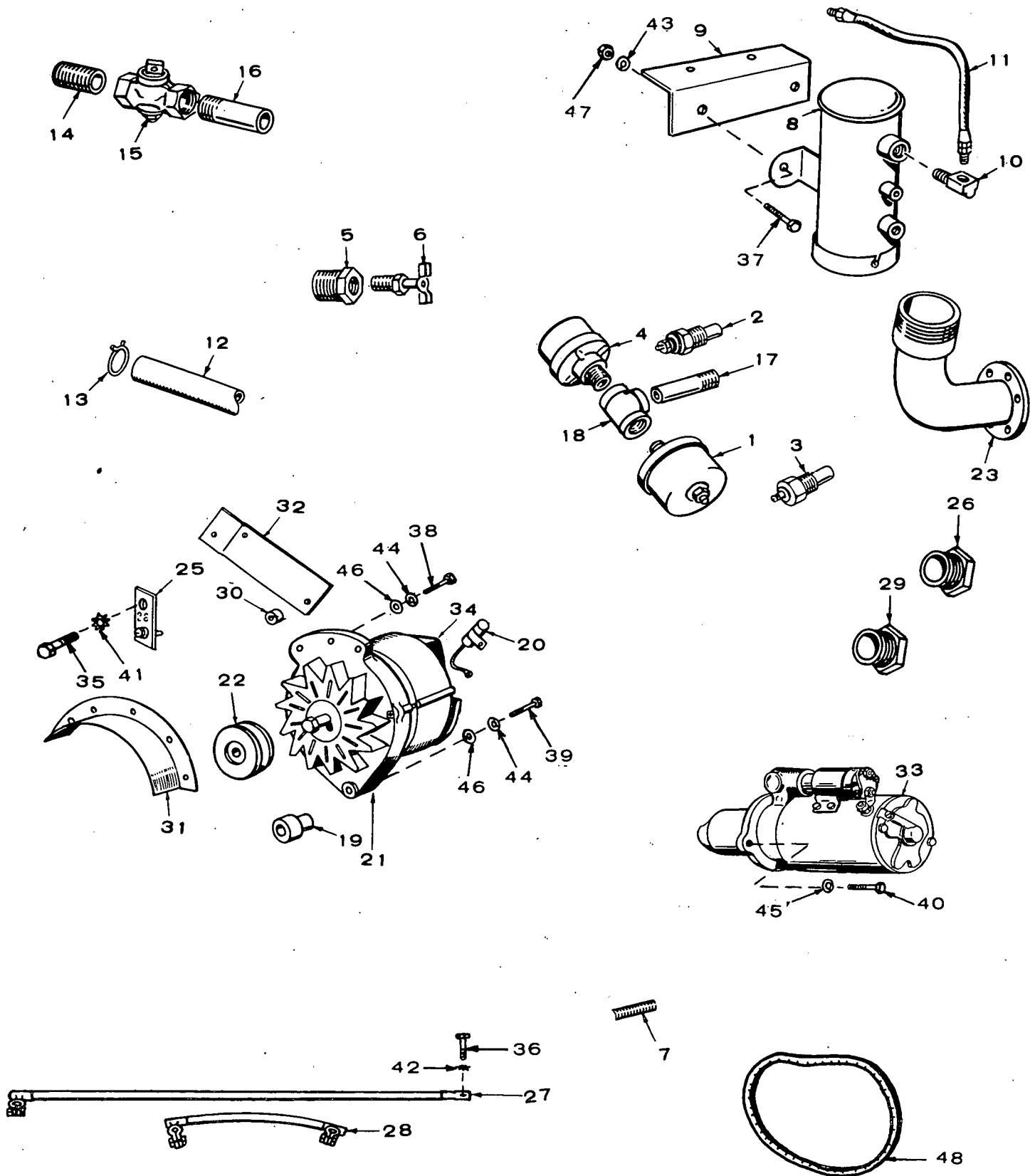
COOLING SYSTEM GROUP (Radiator Cooled Generator Sets)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	130-0809	1	Radiator
2	130-0449	1	Cap, Radiator
3	504-0028	1	Valve, Radiator Drain
4	130-0810	1	Guard, Fan (R.H.)
5	130-0811	1	Guard, Fan (L.H.)
6	503-0595	1	Hose, Radiator - Lower
7	503-0465	4	Clamp, Hose
8	503-0594	1	Hose, Radiator - Upper
9	130-0778	1	Gasket, Water Filter Cover - Optional
10	130-0780	1	Plate, Sacrificial - Water Filter - Optional
11	ELEMENT, WATER FILTER - OPTIONAL		
	130-0775	1	Chromate Formula
	130-0776	1	All Purpose (PAF) Formula
12	511-0095	1	*Belt, Fan (Begin Serial #427437)

* NOTE: Prior to Onan Serial #427437 the fan belt used was supplied by Allis-Chalmers.

MISCELLANEOUS ENGINE PARTS GROUP



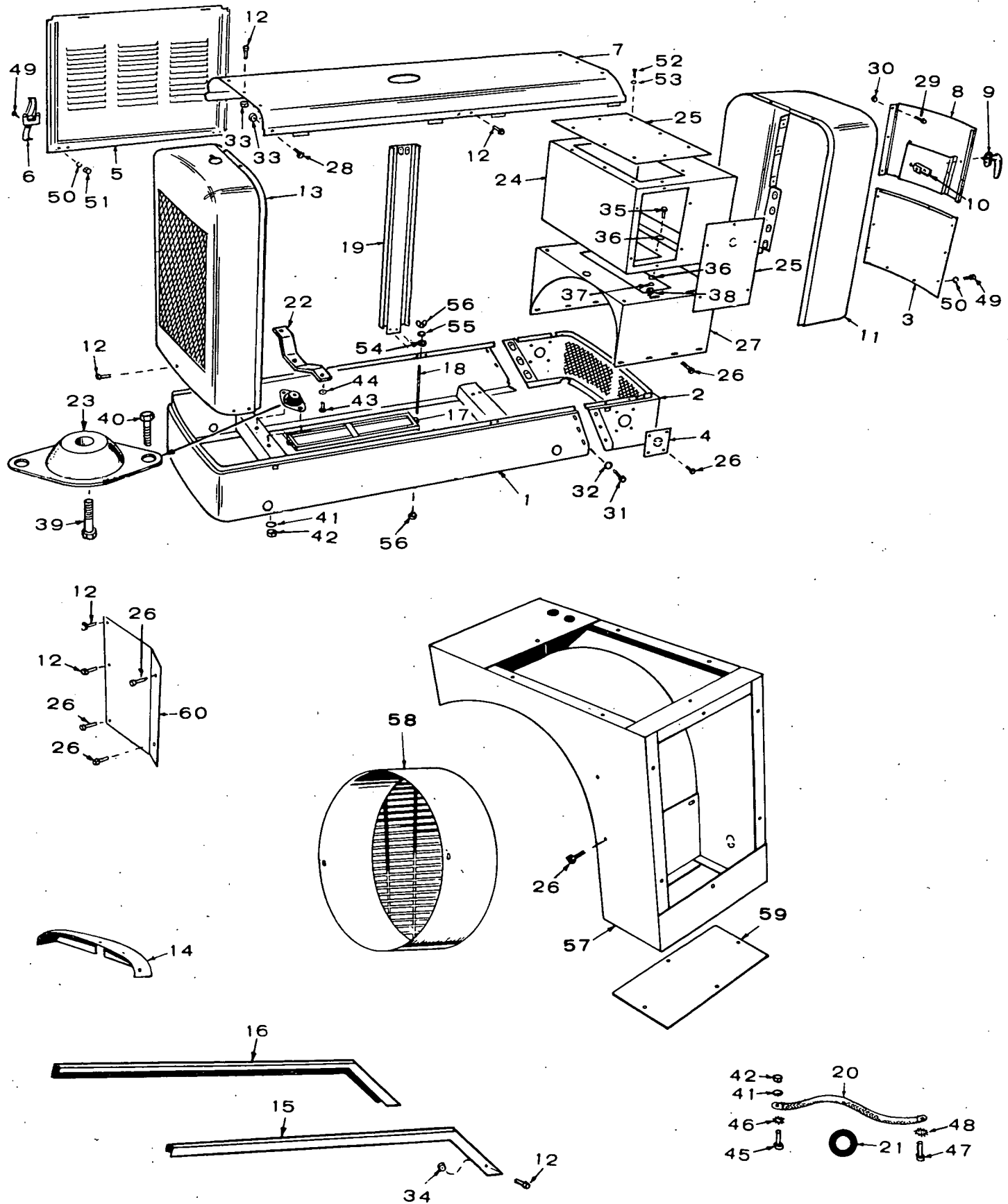
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	193-0108	1	Sender, Oil Pressure Gauge
2	193-0109	1	Sender, Water Temperature Gauge
3	309-0179	1	Switch, High Water Temperature
4	309-0169	1	Switch, Low Oil Pressure
5	505-0017	2	Bushing, Reducer (1/2 x 3/8")
6	504-0028	1	Valve, Drain (Block)
7	134-1437	1	Spring, Injection Pump Lever
8	149-0554	1	Pump, Fuel (Electric)
9	149-1162	1	Bracket, Fuel Pump Mounting
10	502-0002	1	Elbow, Fuel Pump Inlet
11	501-0002	1	Line, Fuel - Flexible (17")
12	503-0348	1	Hose, Oil Drain
13	503-0197	1	Clamp, Oil Drain
14	505-0100	1	Nipple, Close (1/2") Oil Drain
15	504-0011	1	Valve, Oil Drain
16	505-0185	1	Nipple, Half - Oil Drain
17	505-0098	1	Nipple, Oil Sender and Switch
18	505-0059	1	Tee, Oil Sender and Switch (1/8")
19	232-1813	1	Spacer, Alternator Mounting - Spec A Only
19	191-0873	1	Spacer, Alternator Mounting - Begin Spec B
20	312-0058	1	Condenser, Alternator
21	191-0665	1	† Alternator, Charge (Includes Fan)
22	191-0649	1	Pulley, Alternator
23	155-0996	1	Elbow, Exhaust
25	332-1292	1	Bracket, Terminal Mounting
26	505-0021	1	Bushing, Reducer - Oil Drain
27	CABLE, BATTERY		
	416-0618	1	Positive (42")
	416-0619	1	Negative (18")
28	416-0446	1	Cable, Battery Jumper
29	505-0007	1	Bushing (3/8 x 1/8") Fuel Sediment Filter
30	191-0791	1	Spacer, Alternator Adjusting - Spec A Only
31	191-0725	1	Guard, Alternator Belt
32	191-0872	1	Bracket, Alternator

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
33	191-0721	1	* Starter
34	191-0732	1	Regulator, Voltage (Part of Alternator)
35	800-0026	1	Screw, Hex Cap - Terminal Bracket Mounting (5/16-18 x 3/4")
36	800-0069	1	Screw, Hex Cap - Battery Cable to Ground (7/16-14 x 3/4")
37	800-0003	2	Screw, Hex Cap - Fuel Pump Mounting (1/4-20 x 1/2")
38	800-0013	1	Screw, Hex Cap - Alternator Mtg. (5/16-18 x 1-1/4")
39	800-0025	1	Screw, Hex Cap - Alternator Mtg. (5/16-18 x 5/8")
40	800-0055	3	Screw, Hex Cap - Starter Mtg. (3/8-16 x 2")
41	856-0008	1	Washer, Shakeproof - Terminal Bracket Mounting (5/16" External-Internal)
42	856-0012	1	Washer, Shakeproof - Battery Cable to Ground (7/16" External-Internal)
43	850-0040	2	Washer, Lock - Fuel Pump Mounting (1/4")
44	850-0045	2	Washer, Lock - Alternator Mounting (5/16")
45	850-0050	3	Washer, Lock - Starter Mounting (3/8")
46	526-0115	2	Washer, Flat - Alternator Mtg.
47	862-0001	2	Nut, Hex - Fuel Pump Mounting (1/4-20)
48	511-0095	1	Belt, Alternator Drive

* - For components, contact your nearest Delco Remy Dealer or Delco Remy Division of General Motors Corporation, Anderson, Indiana 46011.

† - For components, contact your nearest Motorola Dealer or Motorola Automotive Products, Inc., 9401 W. Grand Ave., Franklin Park, Illinois 60131.

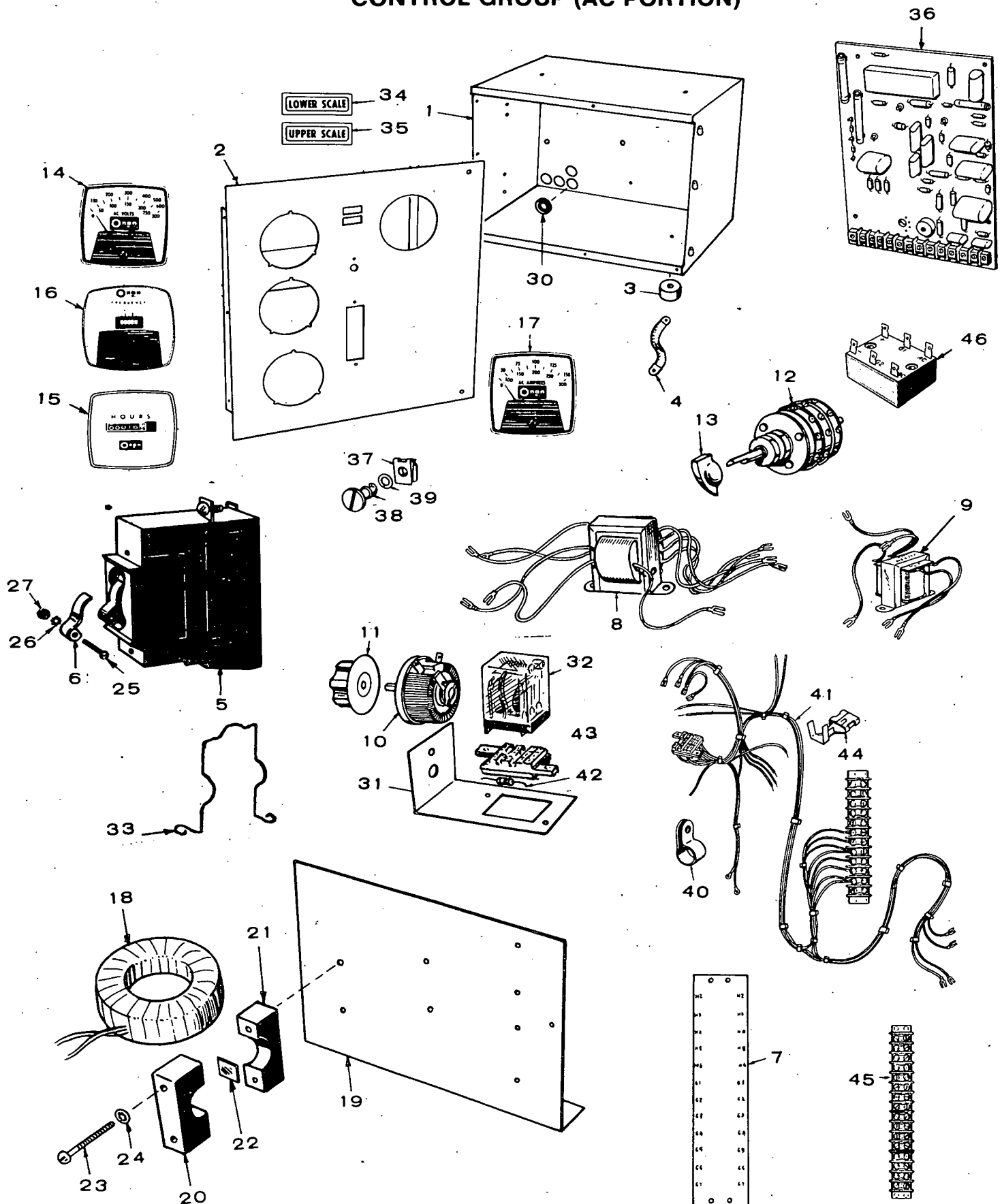
MOUNTING AND HOUSING GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	403-0900	1	Chassis, Front
2	403-0894	1	Chassis, Rear - Housed Sets
3	405-1780	1	Panel, Rear Housing Access - Housed Sets
4	403-0895	2	Cover, Conduit Opening - Housed Sets
5	405-1804	4	Panel (Side), Door - Housed Sets
6	406-0105	8	Clamp, Door - Housed Sets
7	405-2149	1	Panel, Top - Housed Sets
8	405-1777	1	Panel, Rear Door - Housed Sets
9	406-0157	1	Handle (Includes Keys), Door - Housed Sets
10	406-0089	1	Catch, Door - Housed Sets
11	405-1775	1	Panel, Rear - Housed Sets
12	821-0014	As Req.	Screw (5/16-18 x 1/2"), Self Locking
13	405-1153	1	Panel, Front - Radiator Cooled Sets
14	405-1165	1	Extension, Radiator Hood - Unhoused Radiator Cooled Sets
15	403-0896	1	Trim, Right Hand Chassis - Unhoused Sets
16	403-0897	1	Trim, Left Hand Chassis - Unhoused Sets
17	416-0480	1	Frame, Battery Hold-down
18	520-0663	2	Stud, Battery Hold-down
19	405-1776	2	Support, Housing Center - Housed Sets
20	337-0090	1	Strap, Ground
21	508-0001	1	Grommet, Rubber - Control Box Housing (2 used on Housed Models)
22	403-0908	1	Support, Engine Mount
23	402-0030	3	Mount, Vibration
24	301-3155	1	Housing, Control Box - Unhoused Sets
25	PANEL, CONTROL BOX HOUSING		
	301-3156	3	Unhoused Sets
	301-3156	2	Housed Sets, Also Unhoused Sets With Circuit Breaker
	301-3156	1	Housed Sets With Circuit Breaker
26	821-0010	As Req.	Screw (1/4-20 x 1/2"), Self Locking
27	301-3154	1	Saddle, Control Box Housing - Unhoused Sets
28	821-0016	4	Screw (5/16-18 x 3/4"), Self Locking - Housed Sets

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
29	809-0059	3	Screw (#14 x 1/2"), Self Locking - Housed Sets
30	870-0106	3	Nut (#14), Speed
31	800-0048	6	Screw (3/8-16 x 3/4") - Housed Sets
32	850-0050	6	Washer (3/8"), Lock - Housed Sets
33	870-0113	As Req.	Nut (5/16-18), Retainer
34	870-0020	6	Nut (5/16-18)
35	800-0003	4	Screw (1/4-20 x 1/2")
36	526-0018	8	Washer (1/4"), Flat
37	850-0040	4	Washer (1/4"), Lock
38	862-0001	4	Nut (1/4-20), Hex
39	800-0520	1	Screw (3/4-10 x 1") - Vibration Mount to Support
40	800-0090	2	Screw (1/2-13 x 1") - Vibration Mount
41	850-0060	3	Washer (1/2"), Lock
42	862-0016	3	Nut (1/2-13), Hex
43	800-0073	2	Screw (7/16-14 x 1-1/2") - Engine Support
44	850-0055	2	Washer (7/16"), Lock
45	800-0091	1	Screw (1/2-13 x 1-1/4") - Ground Strap
46	856-0013	1	Washer (1/2"), Shakeproof EIT
47	800-0071	1	Screw (7/16-14 x 1") - Ground Strap
48	856-0012	1	Washer (7/16"), Shake- proof EIT
49	813-0098	22	Screw (10-32 x 3/8") - Housed Sets
50	850-0030	22	Washer (#10), Lock - Housed Sets
51	870-0053	16	Nut (10-32) - Housed Sets
52	815-0026	18	Screw (10-32 x 3/8"), Truss Head - Control Box Panel Mounting
53	853-0018	18	Washer (#10), Shakeproof E T
54	526-0115	2	Washer (5/16"), Flat
55	850-0045	2	Washer (5/16"), Lock
56	865-0007	2	Nut (5/16-18), Wing - Battery Hold-down Stud
57	301-3191	1	Box, Junction - Housed Sets
58	234-0369	1	Cover, End Bell - Housed Sets
59	301-3195	1	Plate, Junction Box Bottom - Housed Sets
60	301-3196	1	Bracket, Junction Box

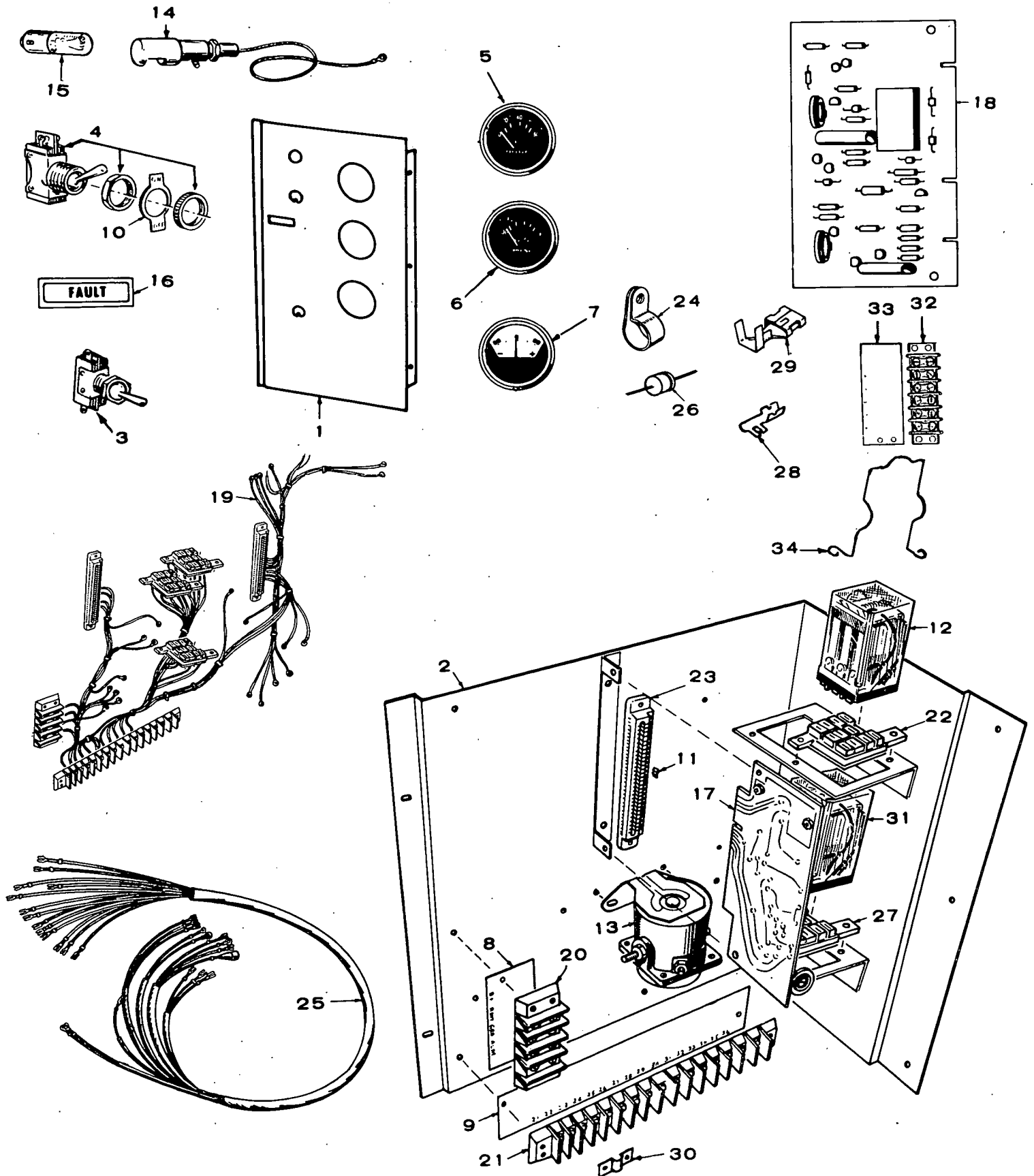
CONTROL GROUP (AC PORTION)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	301-3158	1	Box Only, Control				
2	PANEL ONLY, CONTROL						
	301-3274	1	Sets Without Meter Panel	24	854-0010	6	Washer, Internal Lock - Transformer Mtg. (#10)
	301-3821	1	50.0DYA-515R and 60.0DYA-15R 60.0DYA-9XR	25	815-0203	1	Screw, Roundhead (10-32 x 7/8")
	301-3170	1	Sets With Meter Panel	26	854-0010	2	Washer, Internal Lock (#10)
	301-3342	1	50.0DYA-515R and 60.0DYA-15R 60.0DYA-9XR	27	871-0010	1	Nut, Hex (10-32)
3	402-0078	4	Rubber Mount, Control Box	30	508-0001	4	Grommet, Rubber
4	337-0049	1	Strap, Ground	31	301-3244	1	Bracket, Relay Mounting 50.0DYA-515R and 60.0DYA-15R
5	BREAKER, CIRCUIT			32	307-1061	1	Relay, Voltage Selector - 50.0DYA-515R and 60.0DYA-15R
	320-0018	1	Brush Type Generator	33	307-1157	1	Spring, Relay Holddown - 50.0DYA-515R & 60.0DYA-15R
	320-0431	1	Brushless Generator	34	322-0130	1	Light, Lower Scale
6	320-0307	1	Lock, Circuit Breaker Handle (Penn State)	35	322-0131	1	Light, Upper Scale
7	STRIP, MARKER			36	BOARD ASSEMBLY, PRINTED CIRCUIT (See Separate Group for Components)		
	332-1248	1	Sets Without Meter Panel		332-1264	1	Brush Type Generator
	332-1242	1	Sets With Meter Panel		332-1268	1	Brushless Generator
8	315-0342	1	Transformer, Voltage	37	406-0332	2	Fastener
9	REACTOR, COMMUTATOR (Begin Spec F)			38	406-0333	2	Stud, Fastener
	315-0384	1	With Leads and Terminals	39	406-0334	2	Washer, Stud Fastener
	315-0343	1	Without Leads and Terminals	40	332-0050	2	Clip, Tinnerman
10	303-0170	1	Rheostat	41	HARNES, WIRING - AC CONTROL (Includes Parts Marked *)		
11	303-0032	1	Knob, Rheostat				Sets Without Meter Panel (Spec A through E)
12	SWITCH, SELECTOR				338-0524	1	50.0DYA-515R and 60.0DYA-15R
	308-0012	1	Sets Without Meter Panel		338-0570	1	60.0DYA-9XR
	308-0284	1	Sets With Meter Panel		338-0525	1	Sets With Meter Panel 50.0DYA-515R and 60.0DYA-15R
13	303-0076	1	Knob, Selector Switch		338-0571	1	60.0DYA-9XR
14	VOLTMETER						Sets Without Meter Panel (Begin Spec F)
	302-0718	1	50.0DYA-515R and 60.0DYA-15R		338-0764	1	50.0DYA-515R, 60.0DYA-15R and Penn State
	302-0779	1	60.0DYA-9XR		338-0766	1	60.0DYA-9XR
15	METER, RUNNING TIME				338-0730	1	Sets With Meter Panel (Begin Spec F) 50.0DYA-515R, 60.0DYA-15R and Penn State
			Sets With Meter Panel		338-0759	1	60.0DYA-9XR
	302-0469	1	50 Hertz Sets	42	350-0556	1	*Resistor (47,000-Ohm, 1/2 Watt)
	302-0466	1	60 Hertz Sets	43	323-0764	1	*Socket, Relay
16	METER, FREQUENCY			44	332-1280	As Req.	*Terminal, Crimp
	302-0256	1	50 Hertz Sets	45	BLOCK, TERMINAL		
	302-0221	1	60 Hertz Sets		332-0607	1	Sets Without Meter Panel (12 Place)
17	AMMETER, AC				332-0795	1	Sets With Meter Panel (16 Place)
			Sets With Meter Panel	46	305-0524	1	Bridge, Rectifier (Begin Spec F)
	302-0721	1	50.0DYA-515R and 60.0DYA-15R				
	302-0406	1	60.0DYA-9XR				
18	TRANSFORMER, CURRENT						
	302-0107	3	50.0DYA-515R and 60.0DYA-15R				
	302-0076	3	60.0DYA-9XR				
19	302-0729	1	Bracket, Transformer Mounting				
20	302-0235	3	Clamp, Transformer Mounting (Upper)				
21	302-0236	3	Clamp, Transformer Mounting (Lower)				
22	302-0253	As Req.	Shim, Transformer Mounting				
23	813-0110	6	Screw, Roundhead Machine - Transformer Mounting (10-32 x 2")				

* Included in Wiring Harness Assembly.

CONTROL GROUP (ENGINE INSTRUMENT PORTION)

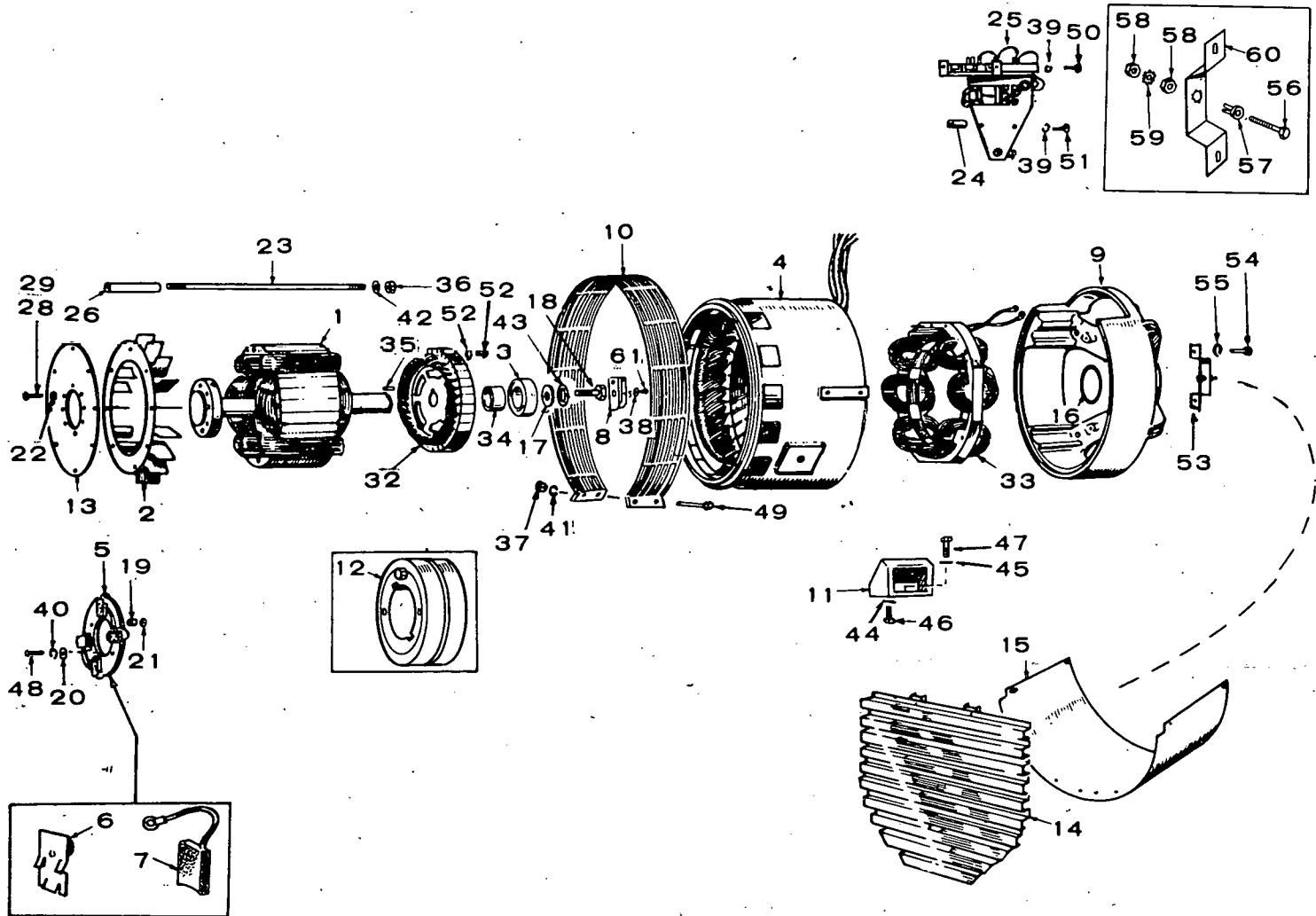


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	PANEL ONLY, ENGINE CONTROL		
	301-3165	1	Sets With One Fault Light (Standard)
	301-3267	1	Sets With Five Fault Lights (Optional)
2	301-3253	1	Bracket, Engine Control
3	SWITCH, SELECTOR		
	308-0138	1	Standard
	308-0327	1	Penn State
4	308-0002	1	Switch, Panel Light
5	193-0107	1	Gauge, Oil Pressure
6	193-0106	1	Gauge, Water Temperature
7	302-0061	1	Ammeter, Charge (30-0-30)
8	332-1239	1	Strip, Marker (B+, Remote and Ground Alarm)
9	332-1241	1	Strip, Marker (21 through 36)
10	308-0003	1	Plate, Switch (On/Off)
11	332-1276	2	Plug, Keying (Sets with Five Fault Lights use Qty. of 1)
12	307-1058	2	Relay (1 Start Disconnect, 1 Ignition)
13	307-1031	1	Relay, Start Solenoid
14	322-0073	1	Holder, Lamp
15	322-0074	1	Lamp, Panel
16	LAMP, FAULT		
	322-0128	1	Standard Sets
	332-0107	1	Overcrank (Optional)
	322-0111	1	Overspeed (Optional)
	322-0108	1	Low Oil Pressure (Optional)
	322-0109	1	High Engine Temperature (Optional)
	322-0110	1	Low Engine Temperature (Optional)
17	CONTROL, CRANKER		
	300-0733	1	Standard Cranker
	300-0714	1	Cycle Cranker (Optional) - See Separate Group for Components.

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
18	MONITOR, ENGINE CONTROL (See Separate Group For Components)		
	300-0679	1	Sets With One Fault Light - Standard
	300-0681	1	Sets With Five Fault Lights - Optional
19	HARNESS ASSEMBLY, WIRING - CONTROL (Includes Parts Marked *)		
	338-0528	1	Sets With One Fault Light - Standard
	338-0534	1	Sets With Five Fault Lights - Optional
20	332-0537	1	*Block, Terminal - 4 Place
21	332-0795	1	*Block, Terminal - 16 Place
22	323-0765	2	*Socket, Relay - 11 Place
23	332-1271	2	*Housing, Printer Circuit Board Terminal
24	332-0051	1	Clip, Tinnerman
25	338-0533	1	Harness Assembly, Wiring - Engine to Control
26	357-0004	1	Rectifier, Diode (Part of Standard Cranker Control)
27	323-0764	1	*Socket, Relay - 8 Place
28	332-1269	As Req.	*Terminal, PC Board
29	332-1280	As Req.	*Terminal, Crimp
30	332-1043	1	*Jumper, Terminal - Sets With One Fault Light
31	307-1061	1	Relay, Starter Protection - Begin Spec C
32	332-0669	1	*Block, Terminal (6 Place) - Sets With Five Fault Lights
33	332-1240	1	*Strip, Marker (53 through 58) - Sets With Five Fault Lights
34	307-1157	3	Spring, Relay Hold-down

* Included in Wiring Harness Assembly.

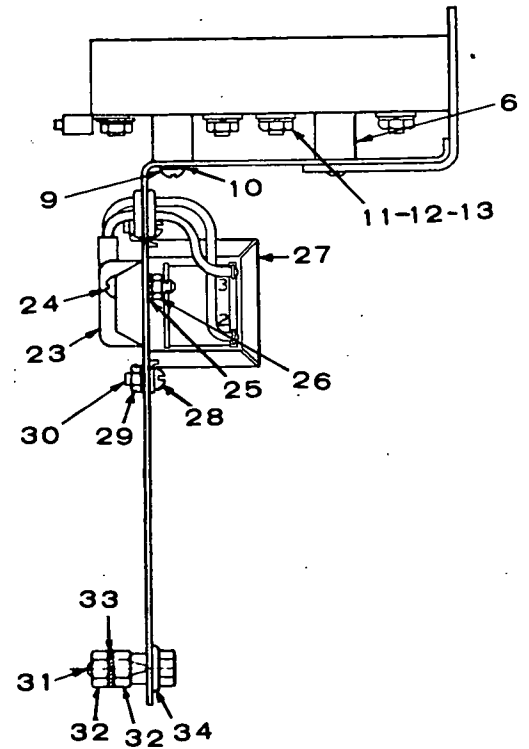
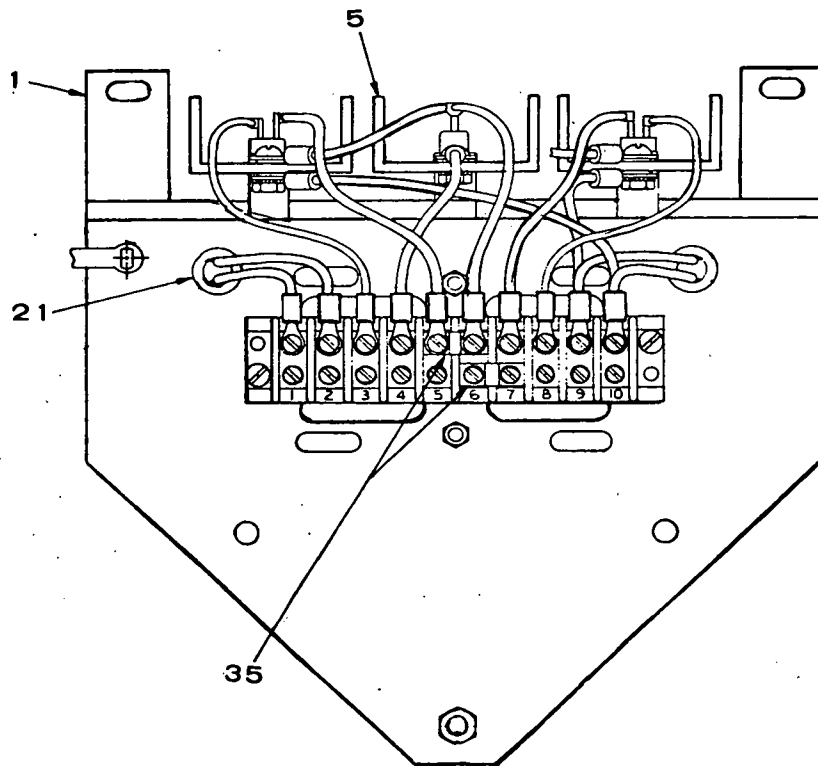
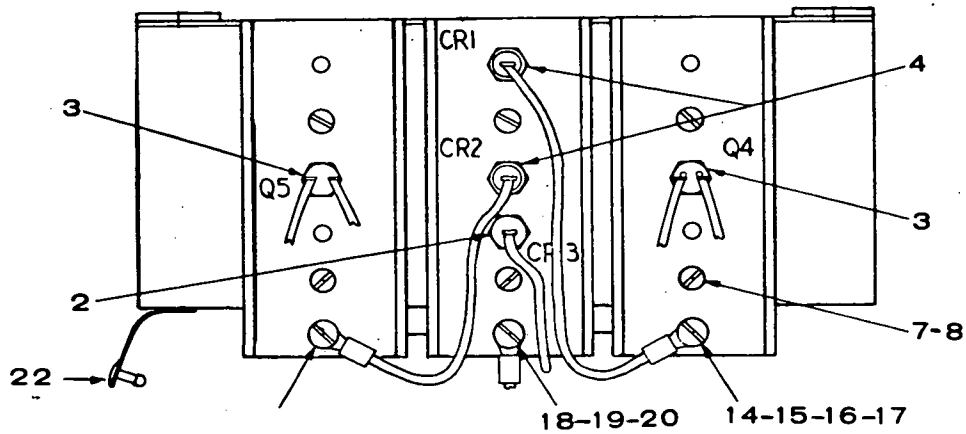
GENERATOR GROUP



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1		1	Rotor Assembly, Wound (Includes Collector Ring on Brush Type Generators)	35	515-0145	1	Key, Exciter Rotor (Brushless Generator)
2	205-0089	1	Blower		NUT, HEX		
3	510-0101	1	Bearing	36	862-0011	4	Generator through Stud (3/8-16)
4		1	Stator Assembly, Wound	37	862-0001	2	Generator Screen (1/4-20)
5	212-0342	1	Rig Assembly, Brush - Includes Brushes and Springs (Brush Type Generator Only)		WASHER, SHAKEPROOF LOCK		
6	212-1105	4	Spring, Brush (Brush Type Generator Only)	38	856-0010	1	Overspeed Switch Mounting (3/8" External-Internal)
7	214-0046	4	Brush (Brush Type Generator Only)	39	853-0013	4	Chassis Mounting (1/4")
8	150-0717	1	Switch Assembly, Overspeed		WASHER, SPRING LOCK		
9	BELL, END			40	850-0040	4	Brush Rig Mounting - Brush Type Generator (1/4")
	211-0215	1	Spec A and B	41	850-0040	2	Generator Screen (1/4")
	211-0185	1	Begin Spec C	42	850-0050	4	Generator Through Stud (3/8")
10	234-0368	1	Screen, Generator	43	850-0079	1	Rotor Through Stud (3/4")
11	232-2106	2	Bracket, Generator Mounting	44	850-0060	4	Generator Support to Chassis (1/2")
12	204-0083	1	Ring, Collector - Brush Type Generator Only	45	850-0055	4	Generator Support to Vibration Mount (7/16")
13	232-2078	1	Disc, Generator Drive		SCREW, HEX CAP		
14	234-0370	1	Grille, Generator Air Inlet	46	800-0091	4	Generator Support to Chassis (1/2-13 x 1-1/4")
15	234-0361	1	Wrapper, Generator End Bell	47	800-0071	4	Generator Support to Vibration Mount (7/16-14 x 1")
16	509-0125	1	Seal, "O" Ring - Bearing	48	114-0023	4	Brush Rig Mounting - Brush Type Generator (1/4-20 x 1-1/4")
17	526-0238	1	Washer, Bearing Retainer				
18	800-0513	1	Screw, Bearing Retainer	49	114-0023	2	Generator Screen (1/4-20 x 1-1/4")
19	212-1225	4	Spacer, Brush Rig Mounting - Brush Type Generator Only)	50	800-0009	2	Chassis Mounting (1/4-20 x 1-1/2")
	WASHER, FLAT			51	800-0003	2	Chassis Mtg. (1/4-20 x 1-1/2")
20	526-0018	4	Brush Rig Mounting (Brush Type Generator Only)	52	800-0009	4	Exciter Rotor Mounting (1/4-20 x 1-1/2")
21	526-0108	4	Brush Rig Mounting (Brush Type Generator Only)	53	150-1456	1	Bracket and Point Assembly, Overspeed Switch
22	526-0259	8	Drive, Disc to Hub Mounting	54	800-0003	2	Screw, Hex Cap (1/4-20 x 1-1/4") - Overspeed Switch Mounting
23	520-0723	4	Stud, Generator Through	55	850-0040	2	Washer, Lock (1/4") Overspeed Switch Mounting
24	305-0481	2	Spacer, Voltage Regulator Mtg. (Spec A through E)	56	150-0723	1	*Point, Overspeed Switch (Begin Spec F)
25	CHASSIS ASSEMBLY (See Separate Group for Components Breakdown (Spec A through E)			57	870-0250	1	*Nut, Insulation - Overspeed Switch (Begin Spec F)
	305-0483	1	Brush Type Generator	58	862-0001	2	*Nut, Hex - Overspeed Switch (1/4-20) (Begin Spec F)
	305-0491	1	Brushless Generator	59	853-0013	1	*Washer, Lock - Overspeed Switch (1/4") (Begin Spec F)
26	503-0611	4	Hose, Insulator	60	150-1356	1	*Bracket, Overspeed Switch (Begin Spec F)
28	805-0033	8	Bolt, Place - Drive Disc to Hub	61	812-0189	1	Screw, Round Head - Overspeed Switch Mtg. (3/8-16 x 3/4")
29	805-0018	8	Bolt, Place - Drive Disc to Engine				
32	201-1739	1	Rotor Assembly, Wound - Exciter (Brushless Generator - Includes Diodes) - See Separate Group for Components				
33	STATOR ASSEMBLY, WOUND - EXCITER (Brushless Generator)						
	220-1528	1	Spec A Through E				
	220-2353	1	Begin Spec F				
34	232-2102	1	Spacer, Bearing (Brushless Generator)				

* - Parts included in 150-1546 Bracket and Point Assembly.

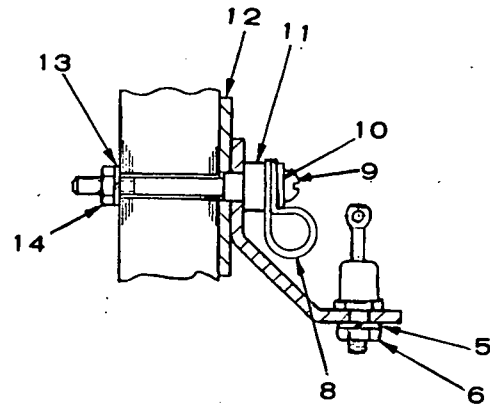
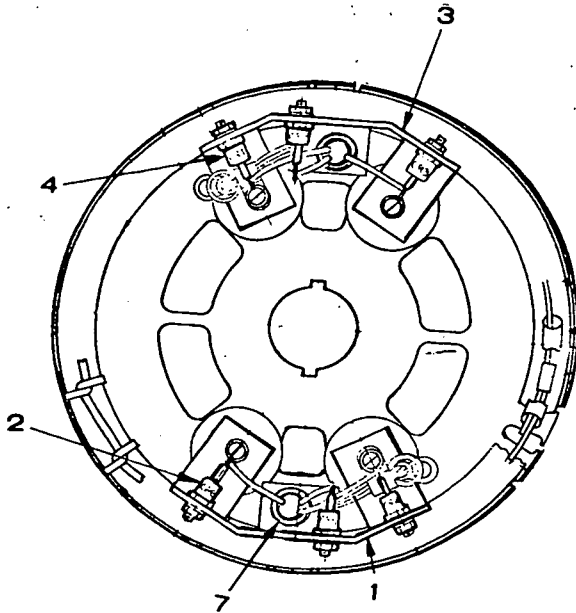
VOLTAGE REGULATOR GROUP - SPEC A THROUGH E



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	CHASSIS ASSEMBLY, VOLTAGE REGULATOR (Includes Parts Marked *)		
	305-0491		Brushless Generator
	305-0483	1	Brush Type Generator
1	305-0482	1	*Chassis, Voltage Regulator
2	358-0029	1	*Rectifier, Silicon (CR3)
3	RECTIFIER, SILICON CONTROLLED		
	364-0014	2	*Brushless Generator (Q4 & Q5)
	364-0012	2	*Brush Type Generator (Q4 & Q5)
4	RECTIFIER, SILICON		
	358-0035	2	*Brushless Generator (CR1 & CR2)
	358-0031	2	*Brush Type Generator (CR1 — CR2)
5	363-0048	3	*Heat Sink, Rectifier
6	332-1265	6	*Insulator, Stand off
7	812-0077	6	*Screw, Roundhead - Heat Sink Mtg. (8-32 x 3/8")
8	853-0005	6	*Washer, Shakeproof Lock - Heat Sink Mtg. (#8 External)
9	812-0077	6	*Screw, Roundhead - Stand off Insulator Mtg. (8-32 x 3/8")
10	853-0005	6	*Washer, Shakeproof Lock - Stand off Insulator Mtg. (#8 External)
11	871-0010	3	*Nut, Hex - Rectifier Mounting (CR1, CR2 & CR3) - 10-32
12	526-0009	3	*Washer, Flat - Rectifier Mounting (CR1, CR2 & CR3) #10
13	850-0030	3	*Washer, Lock - Rectifier Mounting (CR1, CR2 & CR3) #10
14	812-0079	2	*Screw, Roundhead - Rectifier Lead to Heat Sink (8-32 x 1/2")
15	526-0048	2	*Washer, Flat (Brass) - Rectifier Lead to Heatsink (#8)
16	853-0005	2	*Washer, Shakeproof Lock - Rectifier Lead to Heat Sink (#8 External)

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
17	871-0007	2	*Nut, Hex - Rectifier Lead to Heat Sink (8-32)
18	812-0079	1	*Screw, Roundhead - Terminal Block Lead to Heatsink (8-32 x 1/2")
19	853-0005	1	*Washer, Shakeproof Lock - Terminal Block Lead to Heat Sink (#8)
20	871-0007	1	*Nut, Hex - Terminal Block Lead to Heat Sink (8-32)
21	508-0002	2	*Grommet, Rubber
22	332-1415	1	*Clamp, Cable
23	332-1266	1	*Block, Terminal
24	812-0081	2	*Screw, Roundhead - Terminal Block Mounting (8-32 x 5/8")
25	853-0005	2	*Washer, Shakeproof Lock - Terminal Block Mounting (#8 External)
26	860-0008	2	*Nut, Hex - Terminal Block Mounting (8-32)
27	REACTOR ASSEMBLY, COMMUTATOR		
	315-0343	1	*Brushless Generator
	315-0339	1	*Brush Type Generator
28	812-0077	2	*Screw, Roundhead - Reactor Mtg. (8-32 x 3/8")
29	853-0005	2	*Washer, Shakeproof Lock - Reactor Mounting (#8 External)
30	860-0008	2	*Nut, Hex - Reactor Mtg. (8-32)
31	150-0723	1	*Point, Contact - Overspeed Switch
32	862-0001	2	*Nut, Hex - Contact Point (1/4-20)
33	853-0013	1	*Washer, Shakeproof Lock Contact Point (1/4 External)
34	870-0250	2	*Nut, Insulator - Contact Point (1/4)
35	332-1043	2	*Jumper - Terminal Block

EXCITER ROTOR GROUP

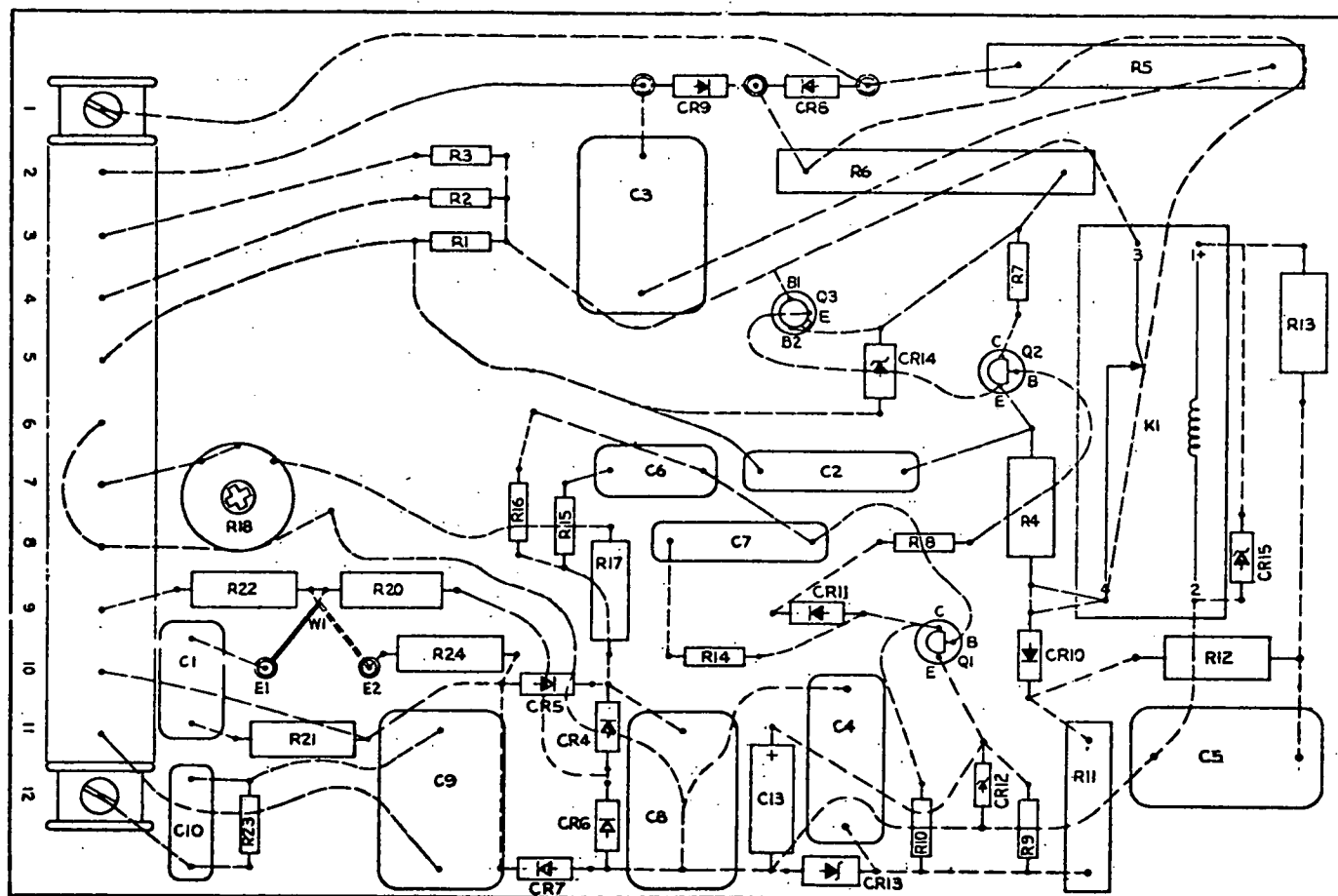


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	201-1739	1	Rotor Assembly, Wound - Exciter (Includes Parts Marked *)
1	363-0055	1	*Heat Sink, Rectifier - Negative
2	358-0015	3	*Rectifier, Diode - Negative (CR4, CR5 & CR6)
3	363-0054	1	*Heat Sink, Rectifier - Positive
4	358-0016	3	*Rectifier, Diode - Positive (CR1, CR2 & CR3)
5	850-0030	6	*Washer, Lock Spring (#10) Diode Mounting
6	870-0053	6	*Nut, Hex - Diode Mounting (10-32)
7	508-0093	2	*Grommet, Rubber
8	332-0050	2	*Clip, Wire
9	813-0110	4	*Screw, Roundhead - Heat Sink Mounting (10-32 x 2")
10	526-0009	4	*Washer, Flat - Heat Sink Mounting (#10)
11	508-0124	4	*Bushings, Insulating - Heat Sink Mounting
12	508-0156	4	*Washer, Insulating - Heat Sink Mounting
13	850-0030	4	*Washer, Lock Spring - Heat Sink Mounting (#10)
14	870-0053	4	*Nut, Hex - Heat Sink Mtg. (10-32)

PRINTED CIRCUIT BOARD ASSEMBLY GROUP (AC)

332-1264 - Printed Circuit Board, Complete

BRUSH TYPE GENERATOR

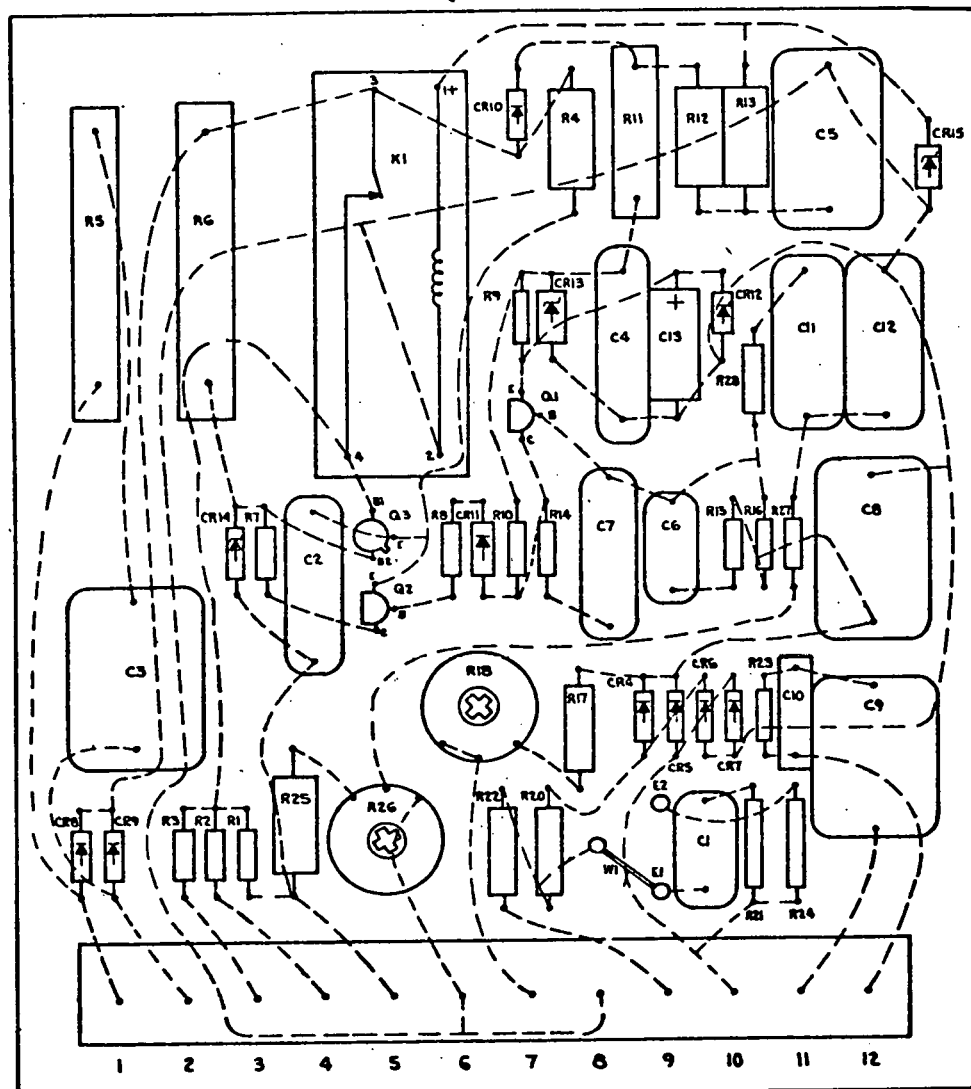


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
TB1	332-1252	1	Terminal Block	R6	353-0039	1	Resistor, Fixed (5,000-Ohm, 15 Watt)
C1	355-0018	1	Capacitor (.47 Mfd., 100 Volt)	R7	350-0398	1	Resistor (3,000-Ohm, 1/2 Watt)
C2, C7	355-0005	2	Capacitor (.22 Mfd., 200 Volt)	R8, R16	350-0447	2	Resistor (330,000-Ohm, 1/2 Watt)
C3, C9	355-0017	2	Capacitor (.47 Mfd., 400 Volt)	R9, R10	350-0423	2	Resistor (33,000-Ohm, 1/2 Watt)
C4	355-0006	1	Capacitor (.47 Mfd., 200 Volt)	R11	352-0151	1	Resistor, Fixed (15,000-Ohm, 5 Watt)
C5, C8	355-0016	2	Capacitor (1 Mfd., 100 Volt)	R12	350-1014	1	Resistor (13,000-Ohm, 2 Watt)
C6	355-0015	1	Capacitor (.1 Mfd., 200 Volt)	R13	350-1007	1	Resistor (6,800-Ohm, 2 Watt)
C10	355-0014	1	Capacitor (.047 Mfd., 200 Volt)	R14	350-0443	1	Resistor (220,000-Ohm, 2 Watt)
C13	356-0039	1	Capacitor (100 Mfd., 10 Volt)	R15	350-0435	1	Resistor (100,000-Ohm, 1/2 Watt)
CR4 thru 11	357-0014	8	Rectifier, Silicon	R17	351-0524	1	Resistor, Metal Film (13,000-Ohm, 1/4 Watt)
CR12	359-0035	1	Diode, Zener (6.8 Volt)	R18	303-0168	1	Potentiometer
CR13	359-0025	1	Diode, Zener (20 Volt)	R20, R22	351-0520	2	Resistor, Metal Film (28,000-Ohm, 1/4 Watt)
CR14	359-0026	1	Diode, Zener (18 Volt)	R21	351-0522	1	Resistor, Metal Film (5,110-Ohm, 1/4 Watt)
CR15	359-0015	1	Diode, Zener (24 Volt)	R24	351-0523	1	Resistor, Metal Film (8,870-Ohm, 1/4 Watt)
K1	307-1063	1	Relay, Magnetic Reed				
Q1, Q2	362-0017	2	Transistor, Silicon (NPN)				
Q3	361-0004	1	Transistor, Unijunction				
R1, R23	350-0355	2	Resistor (47-Ohm, 1/2 Watt)				
R2, R3	350-0351	2	Resistor (33-Ohm, 1/2 Watt)				
R4	350-1075	1	Resistor (4.7-Megohm, 2 Watt)				
R5	353-0040	1	Resistor, Fixed (270-Ohm, 10 Watt)				

PRINTED CIRCUIT BOARD ASSEMBLY GROUP (AC,

332-1268 - Printed Circuit Board, Complete

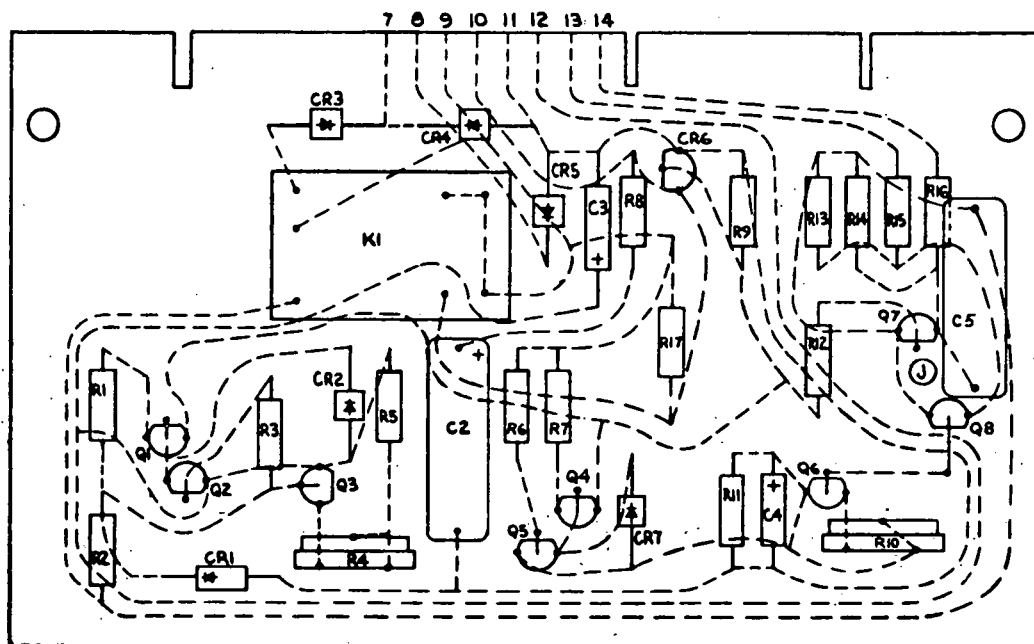
BRUSHLESS TYPE GENERATOR



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION	REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
TB1	332-1252	1	Terminal Block	R6	353-0039	1	Resistor, Fixed (5,000-Ohm, 15 Watt)
C1	355-0018	1	Capacitor (.47 Mfd., 100 Volt)	R7	350-0398	1	Resistor (3,000-Ohm, 1/2 Watt)
C2, C7	355-0005	2	Capacitor (.22 Mfd., 200 Volt)	R8, R16	350-0447	2	Resistor (330,000-Ohm, 1/2 Watt)
C3, C9	355-0017	2	Capacitor (.47 Mfd., 400 Volt)	R9, R10	350-0423	2	Resistor (33,000-Ohm, 1/2 Watt)
C4, C12	355-0006	2	Capacitor (.47 Mfd., 200 Volt)	R11	352-0151	1	Resistor, Fixed (15,000-Ohm, 5 Watt)
C5, C8	355-0016	2	Capacitor (1 Mfd., 100 Volt)	R12	350-1014	1	Resistor (13,000-Ohm, 2 Watt)
C6	355-0015	1	Capacitor (.1 Mfd., 200 Volt)	R13	350-1007	1	Resistor (6,800-Ohm, 2 Watt)
C10	355-0014	1	Capacitor (.047 Mfd., 200 Volt)	R14	350-0443	1	Resistor (220,000-Ohm, 2 Watt)
C11	355-0020	1	Capacitor (.1 Mfd., 400 Volt)	R15, R27	350-0435	2	Resistor (100,000-Ohm, 1/2 Watt)
C13	356-0039	1	Capacitor (100 Mfd., 10 Volt)	R17	351-0524	1	Resistor, Metal Film (13,000-Ohm, 1/4 Watt)
CR4 thru 11	357-0014	8	Rectifier, Silicon	R18	303-0168	1	Potentiometer
CR12	359-0035	1	Diode, Zener (6.8 Volt)	R20, R22	351-0520	2	Resistor, Metal Film (28,000-Ohm, 1/4 Watt)
CR13	359-0025	1	Diode, Zener (20 Volt)	R21	351-0522	1	Resistor, Metal Film (5,110-Ohm, 1/4 Watt)
CR14	359-0026	1	Diode, Zener (18 Volt)	R24	351-0523	1	Resistor, Metal Film (8,870-Ohm, 1/4 Watt)
CR15	359-0015	1	Diode, Zener (24 Volt)	R25	350-1011	1	Resistor (10,000-Ohm, 2 Watt)
K1	307-1063	1	Relay, Magnetic Reed	R26	303-0164	1	Potentiometer
Q1, Q2	362-0017	2	Transistor, Silicon (NPN)	R28	350-0459	1	Resistor (1.0 Megohm, 1 Watt)
Q3	361-0004	1	Transistor, Unijunction				
R1, R23	350-0355	2	Resistor (47-Ohm, 1/2 Watt)				
R2, R3	350-0351	2	Resistor (33-Ohm, 1/2 Watt)				
R4	350-1075	1	Resistor (4.7 Megohm, 2 Watt)				
R5	353-0040	1	Resistor, Fixed (270-Ohm, 10 Watt)				

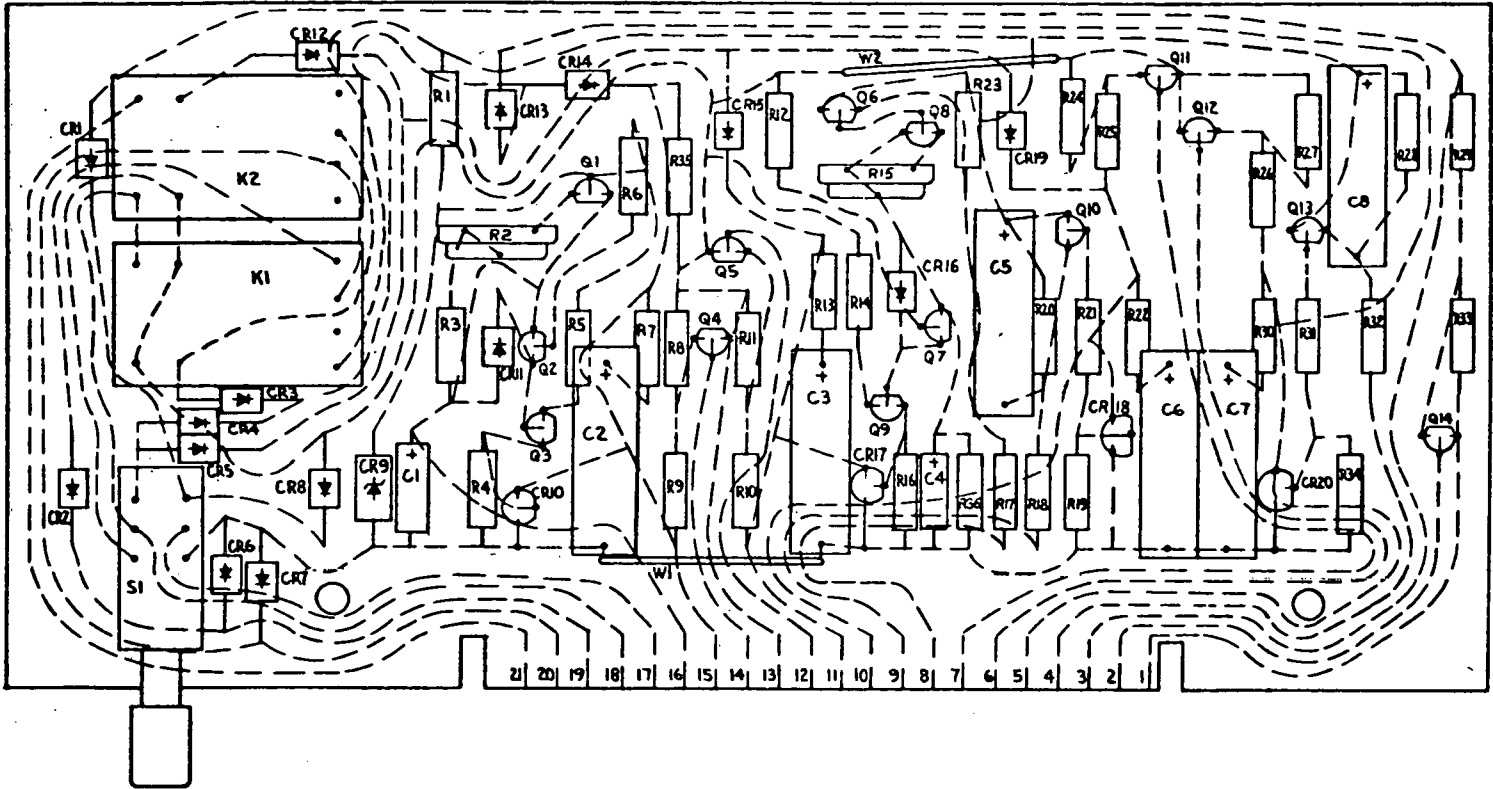
ENGINE CONTROL MONITOR GROUP (STANDARD SETS WITH ONE FAULT LIGHT)

12 VOLT



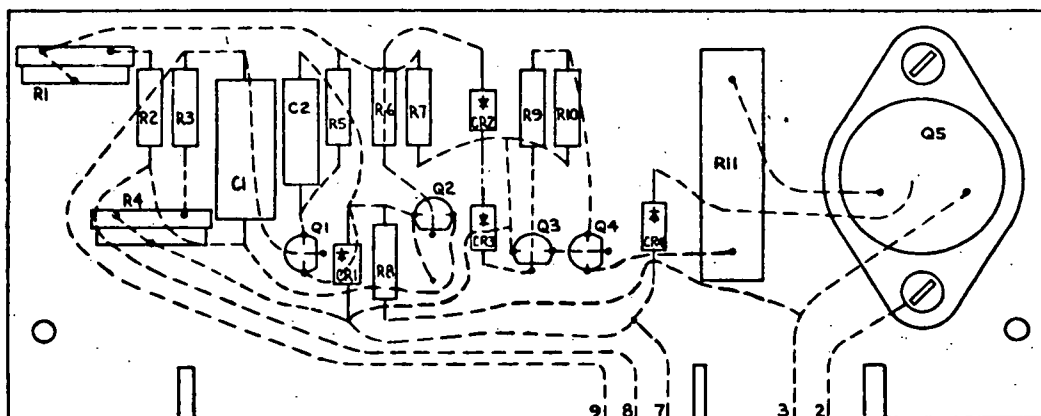
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0679	1	Monitor Assembly, Complete - Engine Control
K1	307-1039	1	Relay
R3	350-0548	1	Capacitor (10,000-Ohm)
C2,5	355-0005	2	Capacitor (22 Mfd.)
C3	356-0040	1	Capacitor (10 Mfd.)
C4	356-0030	1	Capacitor (1 Mfd.)
CR1	359-0027	1	Diode, Zener
CR2,3,4,5,7	357-0004	5	Rectifier, Diode
CR6	364-0017	1	Rectifier, Gate Control
Q1, Q4	361-0003	2	Transistor
Q2,3,5,6	362-0025	4	Transistor, Field Effect
Q7, Q8	362-0008	2	Transistor, Silicon
R1, R7	350-0536	2	Resistor (1000-Ohm)
R2	350-0526	1	Resistor (150-Ohm)
R6	350-0552	1	Resistor (22,000-Ohm)
R4, R10	303-0169	2	Potentiometer
R5	350-0572	1	Resistor (1 Megohm)
R8	350-0505	1	Resistor (2.7-Ohm)
R9	350-0517	1	Resistor (27-Ohm)
R11	350-0584	1	Resistor (10 Megohm)
R12,13,14	350-0529	3	Resistor (270-Ohm)
R15, R16	350-0540	2	Resistor (2.2-Ohm)
R17	350-1128	1	Resistor (220-Ohm)

ENGINE CONTROL MONITOR GROUP (SETS WITH FIVE FAULT LIGHTS) OPTIONAL



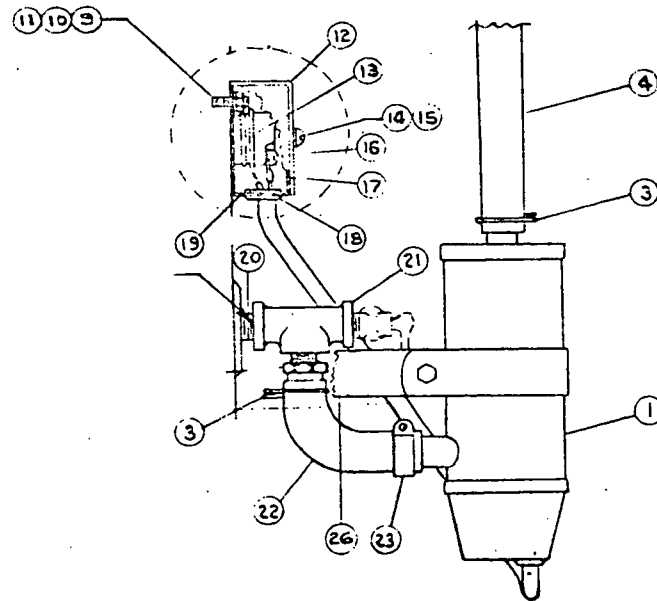
REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0681	1	Monitor Assembly, Complete - Engine Control
K1, K2	307-1039	2	Relay
R6	350-0548	1	Resistor (10,000-Ohm)
C2,3,5,6,7,8	355-0005	6	Capacitor (22 Mfd.)
C1	356-0040	1	Capacitor (10 Mfd.)
C4	356-0030	1	Capacitor (1 Mfd.)
CR9	359-0027	1	Diode, Zener
CR1 thru 8, 11 thru 16,19 CR10,17,18, 20	357-0004	15	Rectifier, Diode
Q3,9	362-0003	2	Transistor
Q1,2,7,8	362-0025	4	Transistor, Field Effect
Q4,5,6, 11 thru 14	362-0008	8	Transistor, Silicon
R5,14	350-0536	2	Resistor (1000-Ohm)
R1	350-0526	1	Resistor (150-Ohm)
R12	350-0552	1	Resistor (22,000-Ohm)
R2,15	303-0169	2	Potentiometer
R3	350-0572	1	Resistor (1-Megohm)
R7,13,22,30	350-0505	4	Resistor (2.7-Ohm)
R4,16,19,34	350-0517	4	Resistor (27-Ohm)
R36	350-0584	1	Resistor (10 Megohm)
R8,11,20,21, 23,24,27,28, 31,33	350-0529	10	Resistor (270-Ohm)
R9,10,17,18, 25,26,29,32	350-0540	8	Resistor (2,200-Ohm)
R35	350-1128	1	Resistor (220-Ohm)
S1	308-0280	1	Switch, Push Button

CONTROL, CYCLE CRANKER GROUP **(Optional Equipment)**



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
	300-0714	1	Control, Cycle Cranker - Complete
C1	356-0039	1	Capacitor, Electrolytic (100 Mfd.)
CR1	359-0027	1	Diode, Zener (7.5 Volts)
CR2,3,4	357-0004	3	Rectifier, Diode
Q1,2	362-0008	2	Transistor, Signal
Q3	362-0017	1	Transistor
Q4	362-0026	1	Transistor, Signal
Q5	362-0019	1	Transistor, Power
R1, R4	303-0171	2	Potentiometer (5,000-Ohm)
R2	350-0560	1	Resistor, Fixed (1 Megohm)
R3, R9	350-0548	2	Resistor, Fixed (10,000-Ohm)
R5	350-0558	1	Resistor, Fixed (68,000-Ohm)
R6	350-0420	1	Resistor, Fixed (24,000-Ohm)
R7	350-0546	1	Resistor, Fixed (6,800-Ohm)
R8	350-0526	1	Resistor, Fixed (150-Ohm)
R10	350-0500	1	Resistor, Fixed (1.0-Ohm)
R11	352-0152	1	Resistor, Fixed (5 Watt, 2.5-Ohm)
C2	355-0010	1	Capacitor, Dielectric (.0022 Mfd., 100 Volt)

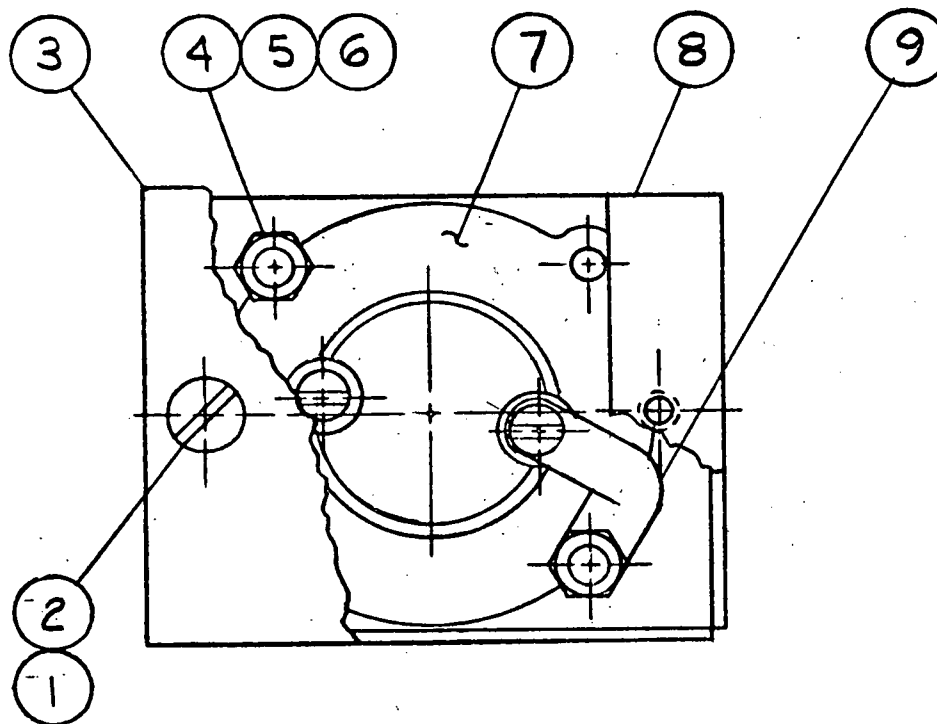
WATER JACKET HEATER INSTALLATION



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	333-0052	1	Heater (1500 Watt, 120 Volt) - Includes Clamp and Adapter
3	503-0197	3	Clamp, Hose
4		1	Hose (Order 20" of Bulk Hose Number 503-0386)
9	520-0446	2	Stud
10	850-0030	2	Lockwasher (#10)
11	870-0053	2	Nut, Hex (#10-32)
12	333-0013	1	Cover, Thermostat Mounting Box
13	309-0106	1	Thermostat (Includes Screws
14	850-0025	2	Lockwasher (#8)
15	812-0076	2	Screw, Round Head (#8-32 x 5/16")
17	332-0149	1	Terminal
18	508-0008	1	Grommet
19	333-0012	1	Box, Thermostat Mounting
20	505-0071	1	Nipple, Pipe (1/4 x 2")
21	505-0184	1	Tee, Pipe (1/4")
22		1	Hose (Order 16" of Bulk Hose Number 503-0386)
23	503-0183	1	Clamp, Hose
25	505-0135	1	Nipple, Half (3/8 x 1-1/2")
26	130-0755	1	Bracket, Heater Mounting

179-0317

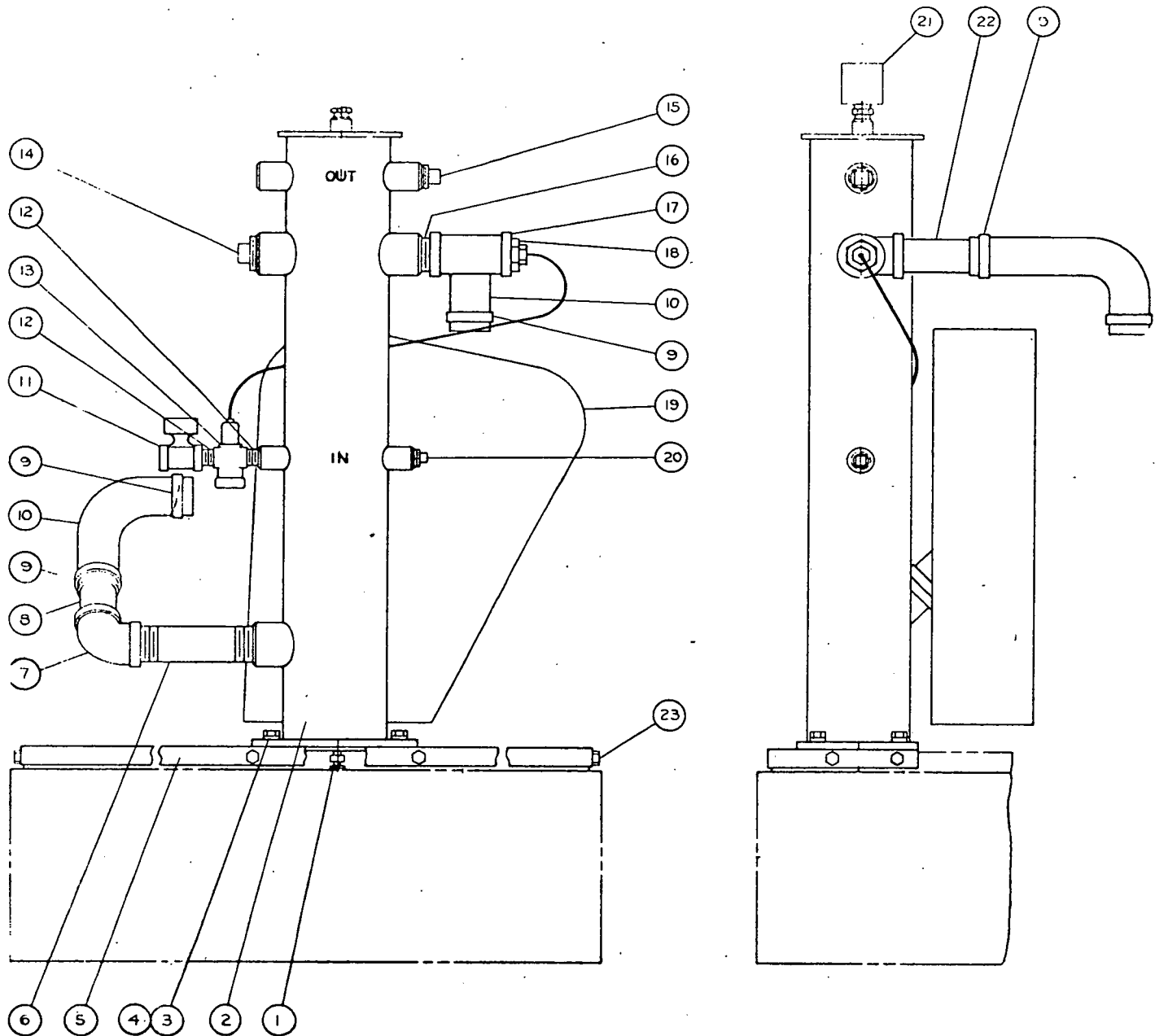
LOW WATER TEMPERATURE SWITCH INSTALLATION



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	812-0075	2	Screw, Round Head (#8-32 x 1/4")
2	850-0025	2	Washer, Lock (#8)
3	333-0013	1	Cover, Thermostat Box
4	520-0446	2	Stud (#10-32 x 3/4")
5	850-0030	2	Washer, Lock (#10)
6	870-0053	2	Nut, Hex Head (#10-32)
7	309-0029	1	Switch, Temperature
8	333-0012	1	Box, Thermostat Mounting
9	160-0428	1	Strap

179-0357

STANDPIPE COOLING INSTALLATION

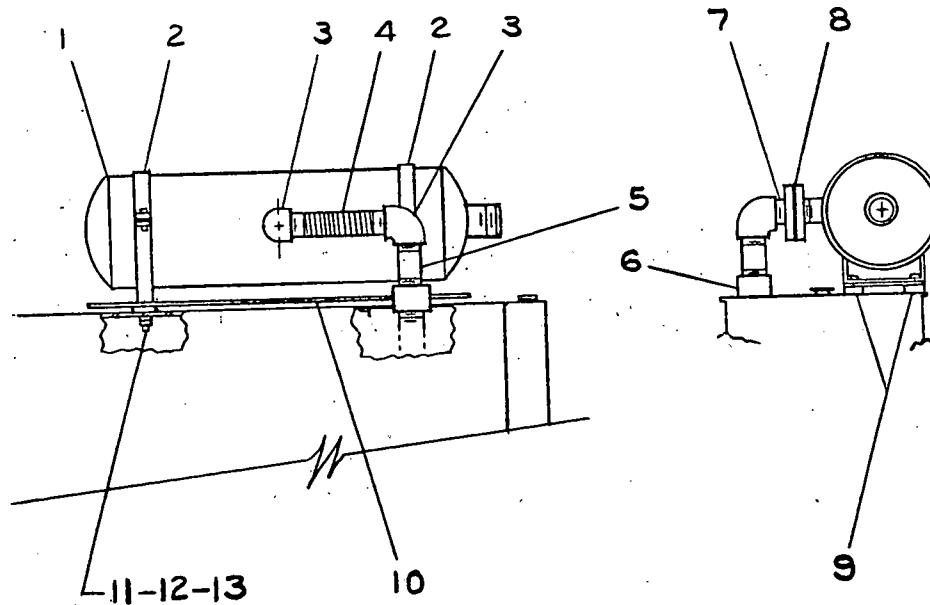


REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	504-0028	1	Valve, Drain
2	130-0635	1	Standpipe
3	800-0050	4	Screw, Hex Cap (3/8-16 x 1")
4	850-0050	4	Washer, Lock (3/8")
5	130-0636	1	Bracket, Standpipe
6	505-0641	1	Nipple, Pipe (1-1/2 x 6")
7	505-0043	1	Elbow, Pipe (1-1/2" x 90°)
8	505-0272	1	Nipple, Half (1-1/2 x 4")
9	503-0465	4	Clamp, Hose
10	503-0576	2	Hose, Exhaust
11	307-0835	1	Valve, Solenoid
12	505-0102	2	Nipple, Close (3/4 x 1-3/8")

REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
13	309-0241	1	Valve, Water Temperature Control
14	505-0402	1	Plug, Pipe (1-1/2")
15	505-0140	1	Plug, Pipe (1")
16	505-0220	1	Nipple, Close (1-1/2 x 1-3/4")
17	505-0317	1	Tee, Pipe (1-1/2")
18	505-0289	1	Bushing, Reducer (1-1/2 x 1")
19	130-0946	1	Guard, Belt
20	505-0130	1	Plug, Pipe (3/4")
21	504-0062	1	Valve, Vacuum Relief
22	505-0474	1	Nipple, Half (1-1/2 x 5")
23	821-0014	6	Screw, Self Locking (5/16-18 x 1/2")
24	800-0052	2	Screw, Hex Head (3/8-16 x 1-1/2")

179-0307

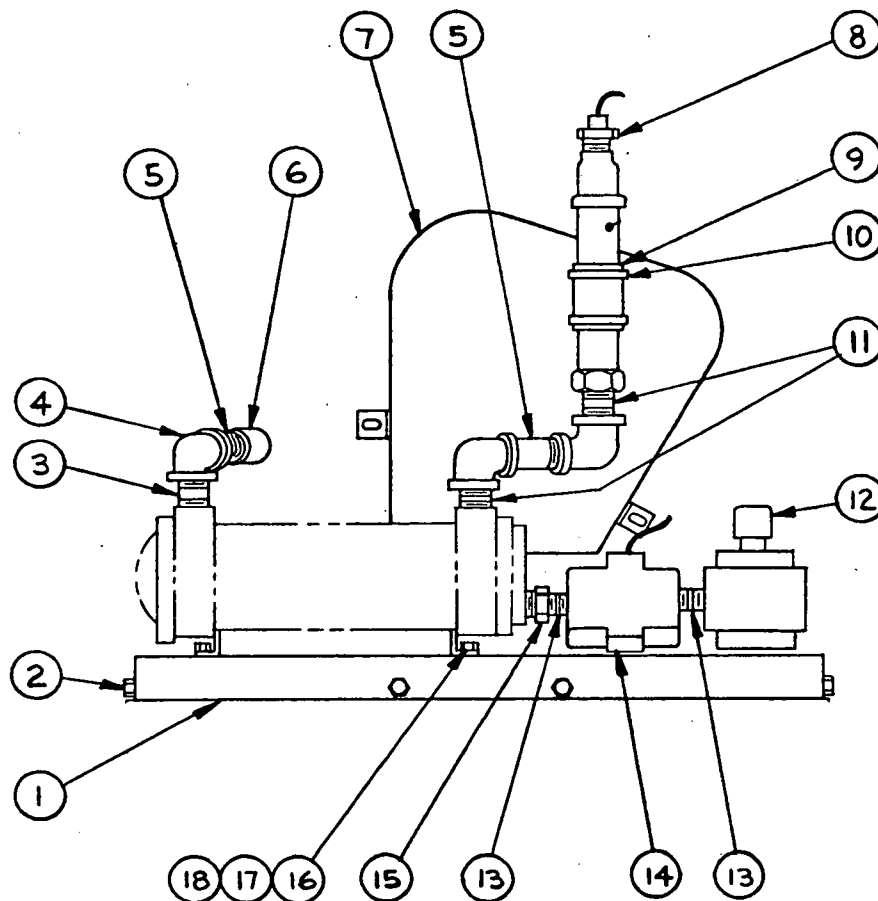
MUFFLER INSTALLATION



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	155-0989	1	Muffler, Exhaust
2	140-0757	2	Band, Muffler Mounting
3	505-0453	2	Elbow, Pipe (2" x 90°)
4	505-0679	1	Nipple, Pipe (3 x 12")
5	155-1131	1	Tube, Flexible
6	505-0327	1	Coupling, Pipe (3")
7	505-0382	1	Nipple, Close (3 x 2-5/8")
8	154-0570	1	Flange, Union (3")
9	526-0172	4	Spacer, Muffler Mounting
10	155-1060	1	Shield, Heat
11	800-0028	4	Screw, Hex Cap (5/16-18 x 1")
12	850-0045	4	Lockwasher (5/16")
13	862-0002	4	Nut, Hex (5/16-18)
14	155-0789	2	Support, Hood

179-0409

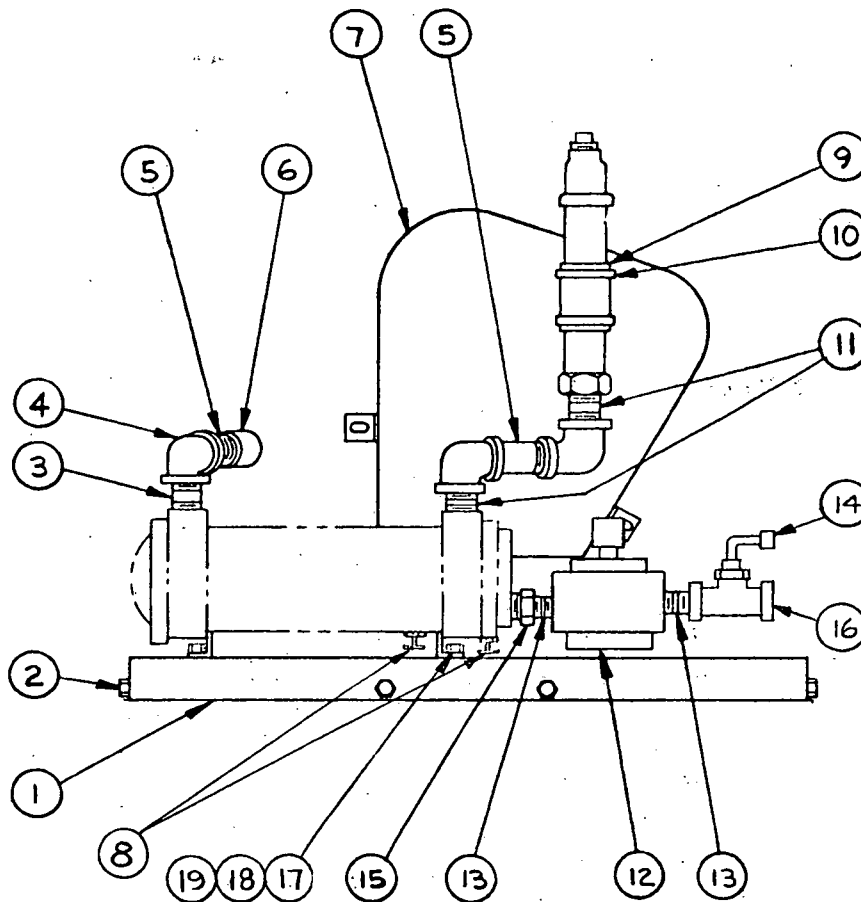
SOLENOID VALVE AND REGULATOR INSTALLATION (HEAT EXCHANGER COOLED WITH MARSH REGULATOR)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	130-0863	1	Bracket, Heat Exchanger Mtg.
2	821-0014	6	Screw, Self Locking (5/16-18 x 1/2")
3	505-0109	1	Nipple, Short (1-1/2 x 2-1/2")
4	505-0043	3	Elbow, Pipe (1-1/2" x 90°)
5	505-0642	2	Nipple, Pipe (1-1/2" x 4")
6	505-0032	1	Coupling, Pipe (1-1/2")
7	130-0946	1	Guard, Belt
8	505-0129	1	Bushing, Reducer (3/4 x 1")
9		1	Hose (Order 3" of Bulk Hose Number 503-0250)
10	503-0465	2	Clamp, Hose
11	505-0220	2	Nipple, Close (1-1/2 x 1-3/4")
12	307-1139	1	Valve, Solenoid (12 Volt)
13	505-0004	2	Nipple, Close (1 x 1-1/2")
14	309-0242	1	Valve, Water Temp Control (12 Volt)
15	505-0024	1	Bushing, Reducer (1-1/2 x 1")
16	800-0049	4	Screw, Hex Cap (3/8-16 x 7/8")
17	850-0050	4	Washer, Lock (3/8")
18	862-0003	4	Nut, Hex (3/8-16)
19	800-0052	2	Screw, Hex Head (3/8-16 x 1-1/2")

179-0410

SOLENOID VALVE AND REGULATOR INSTALLATION (HEAT EXCHANGER COOLED)



REF. NO.	PART NO.	QTY. USED	PART DESCRIPTION
1	130-0863	1	Bracket, Heat Exchanger Mounting
2	821-0014	6	Screw, Self Locking (5/16-18 x 1/2")
3	505-0109	1	Nipple, Short (1-1/2" x 2-1/2")
4	505-0043	3	Elbow, Pipe (1-1/2" x 90°)
5	505-0642	2	Nipple, Pipe (1-1/2" x 4")
6	505-0032	1	Coupling, Pipe (1-1/2")
7	130-0964	1	Guard, Belt
8	504-0003	2	Valve, Drain
9		1	Hose (Order 3" of Bulk Hose Number 503-0250)
10	503-0465	2	Clamp, Hose
11	505-0220	2	Nipple, Close (1-1/2 x 1-3/4")
12	307-1139	1	Valve, Solenoid (12 Volt)
13	505-0004	2	Nipple, Close (1 x 1-1/2")
14	800-0052	2	Screw, Hex Head (3/8-16 x 1-1/2")
15	505-0024	1	Bushing, Reducer (1-1/2 x 1")
16	504-0090	1	Valve
17	800-0049	4	Screw, Hex Cap (3/8-16 x 7/8")
18	850-0050	4	Washer, Lock (3/8")
19	862-0003	4	Nut, Hex (3/8-16)



**MANUFACTURER'S
LIMITED
WARRANTY**

Onan extends to the original purchaser of goods for use, the following warranty covering goods manufactured or supplied by Onan, subject to the qualifications indicated.

- (1) Onan warrants to original purchaser for the periods set forth below that goods manufactured or supplied by it will be free from defects in workmanship and material, provided such goods are installed, operated, and maintained in accordance with Onan's written instructions, and further provided, that installation inspection and initial start-up on commercial-industrial generator set or power system installations are conducted by an Onan Authorized Distributor or its designated service representative.

PRODUCT APPLICATION	PERIOD OF WARRANTY
<input type="checkbox"/> Goods used in personal, family and household applications.	One (1) year from date of purchase.
<input type="checkbox"/> Goods used in commercial-industrial applications.	One (1) year from date of purchase.
<input type="checkbox"/> Commercial-industrial stationary generator sets.	One (1) year from date of initial start-up.
<input type="checkbox"/> Commercial-industrial, standby power systems with nominal operating speeds of 1800 rpms or less which are installed in the U.S. or Canada (must include Onan supplied generator sets, automatic transfer switch, exerciser and running time meter).	* Five (5) years or 1500 hours, whichever occurs first from the date of initial start-up. Labor allowance for the first two (2) years or 1500 hours, whichever occurs first from the date of initial start-up.
<input type="checkbox"/> Commercial-industrial, standby power systems with nominal operating speeds of 1800 rpms or less which are installed outside the U.S. or Canada (must include Onan supplied generator set, automatic transfer switch, exerciser and running time meter).	* Two (2) years or 1500 hours, whichever occurs first from the date of initial start-up.
<input type="checkbox"/> Repair or replacement parts.	Ninety (90) days from date of purchase, excludes labor.

* Must be registered on Form No. 23C065, to be provided and completed by seller.

- (2) Onan's sole liability and Purchaser's sole remedy for a failure of goods to perform as warranted shall be limited to the repair or replacement of goods returned to Onan's factory at 1400 73rd Avenue N.E., Minneapolis, Minnesota 55432, or to an Onan Authorized Distributor or its designated service representative, transportation prepaid.

Except as indicated below, this warranty does not include travel time and mileage labor for removal of Onan product from its application and reinstallation.

a) Removal and Reinstallation

- Garden Tractor Engines*—Onan will pay up to a maximum of two (2) hours labor for warranty work requiring removal and reinstallation of Onan industrial engines in garden tractor applications performed by an Onan Authorized Distributor or its designated service representative.
- Vehicles*—Onan will pay one (1) hour labor for warranty work requiring removal and reinstallation performed by an Onan Authorized Distributor or its designated service representative on vehicle applications utilizing a POWER DRAWER® and Onan supplied sliding tray generator set installations.

b) Travel Time and Mileage

- Marine Generator Set Installations*—Onan will, for six (6) months after date of purchase, pay travel time up to four (4) hours and mileage costs up to one hundred fifty (150) miles related to warranty repairs, provided, such travel and repairs are performed by an Onan Authorized Distributor or its designated service representative.
- Commercial-Industrial Standby Generator Set and System Installations*—Provided the generator set or system is permanently wired in a stationary installation, Onan will, for six (6) months after initial start-up, pay travel time up to four (4) hours and mileage costs up to one hundred fifty (150) miles for warranty repairs performed by an Onan Authorized Distributor or its designated service representative.

(3) THERE IS NO OTHER EXPRESS WARRANTY.

IMPLIED WARRANTIES INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO PERIODS OF WARRANTY SET FORTH ABOVE AND TO THE EXTENT PERMITTED BY LAW, ANY AND ALL IMPLIED WARRANTIES ARE EXCLUDED.

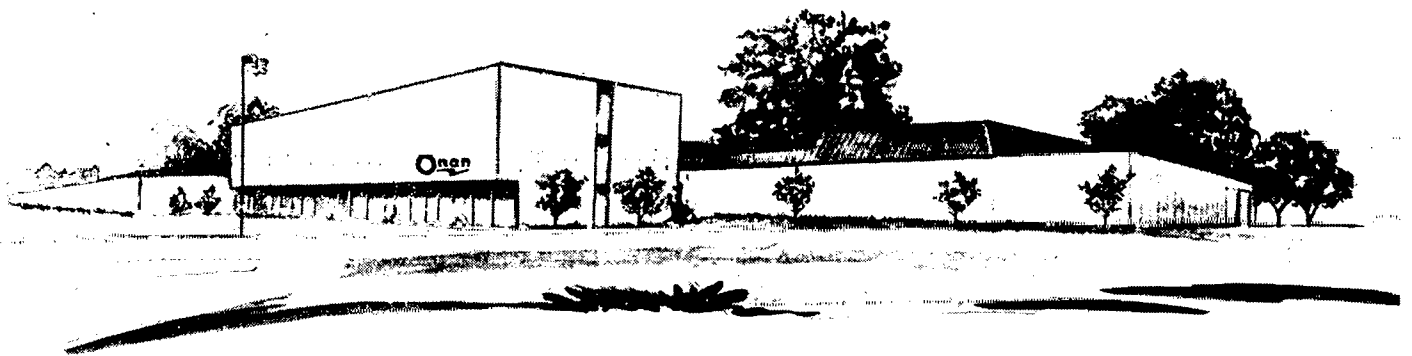
IN NO EVENT IS ONAN LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

(4) All claims must be brought to the attention of Onan or an Onan Authorized Distributor or its designated service representative within thirty (30) days after discovery that goods or parts fail to perform as warranted.

(5) THIS WARRANTY SHALL NOT APPLY TO:

- a) Cost of maintenance, adjustments, installation and start-up.
- b) Failures due to normal wear, accident, misuse, abuse, negligence or improper installation.
- c) Products which are altered or modified in manner not authorized by manufacturer in writing.
- d) Failure of goods caused by defects in the system or application in which the goods are installed.
- e) Telephone, telegraph, teletype or other communication expenses.
- f) Living and travel expenses of persons performing service, except as specifically included in Section 2.
- g) Rental equipment used while warranty repairs are being performed.
- h) Overtime labor requested by purchaser.
- i) Starting batteries.

(6) No person is authorized to give any other warranties or to assume any other liabilities on Onan's behalf, unless made or assumed in writing by an officer of Onan, and no person is authorized to give any warranties or assume any other liability on behalf of Seller unless made or assumed in writing by Seller.



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