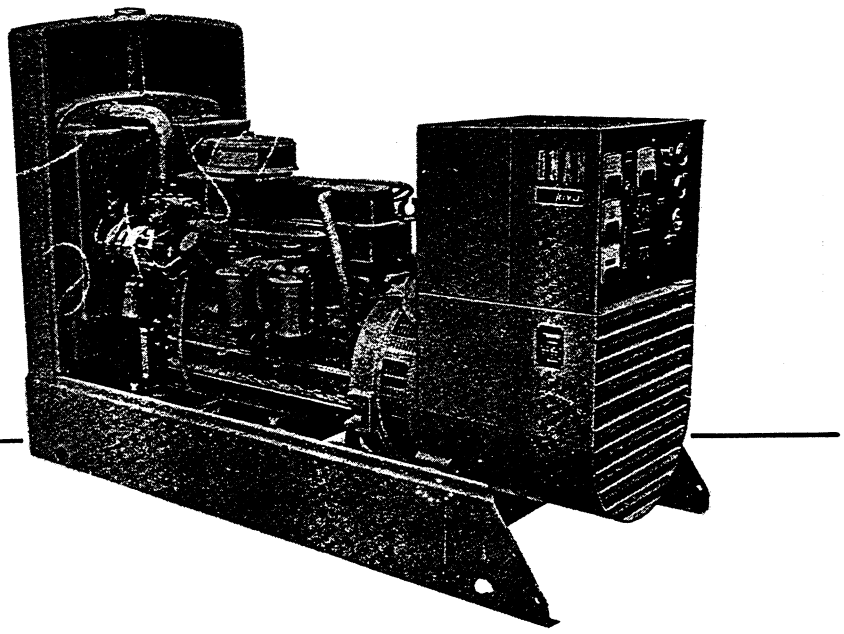
McGRAW-EDISON

Onan

Operators Manual

DYJ
GenSet



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Contents

WARNING

ONAN RECOMMENDS THAT ALL SERVICE INCLUDING INSTALLATION OF REPLACEMENT PARTS ONLY BE DONE BY PERSONS QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE. FROM THE STANDPOINT OF POSSIBLE INJURY AND/OR EQUIPMENT DAMAGE IT IS IMPERATIVE THAT THE SERVICE PERSON BE QUALIFIED.

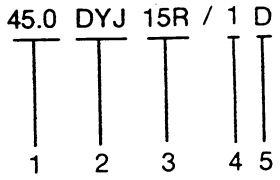
Introduction

FOREWORD

This manual is applicable to the DYJ Series electric generating set, consisting of an Onan UR Series 45.0 kW AC generator, driven by an Allis-Chalmers engine. Information is provided on installation, operation and troubleshooting for the DYJ set. The manual should be used in conjunction with the Allis-Chalmers engine manual and the Onan parts catalog, as your specific engine may have variations due to optional equipment available.

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.



1. Indicates Kilowatt rating.
2. Factory code for SERIES identification.
3. Indicates voltage code.
   15 indicates 60 Hz reconnectible.
   R indicates remote electric start.
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.

WARNING

ENGINE EXHAUST GAS (CARBON MONOXIDE) IS DEADLY!

Carbon monoxide is an odorless, colorless gas formed by incomplete combustion of hydrocarbon fuels. Carbon monoxide is a dangerous gas that can cause unconsciousness and is potentially lethal. Some of the symptoms or signs of carbon monoxide inhalation are:

- ***Dizziness***
- ***Intense Headache***
- ***Weakness and Sleepiness***
- ***Vomiting***
- ***Muscular Twitching***
- ***Throbbing in Temples***

If you experience any of the above symptoms, get out into fresh air immediately.

The best protection against carbon monoxide inhalation is proper installation and regular, frequent inspections of the complete exhaust system. If you notice a change in the sound or appearance of exhaust system, shut the unit down immediately and have it inspected and repaired by a competent mechanic.

Specifications

ENGINE DETAILS

Engine Manufacturer	Allis-Chalmers
Engine Series	649 - 2800
Number of Cylinders	6
Displacement	301 in³ (4933 cm³)
Power @ 1800 RPM	73 BHP (54.5 kW)
Compression Ratio	16.25:1
Bore	3.875 inches (98.4 mm)
Stroke	4.25 inches (108 mm)
Fuel	ASTM No. 2 Diesel
Battery Voltage (2 required in series)	6 Volt
Battery Rating-Cranking Performance Amps @ 0°F (-18°C)	565
Starting Method	Solenoid Shift
Governor Regulation	5% maximum
Exhaust Connection (inches pipe tap)	2

GENERATOR DETAILS

Type	Onan UR
Rating (kW)	
60 Hertz Continuous Standby	45.0
50 Hertz Continuous Standby	37.5
AC Voltage Regulation	±2%
60 Hertz RPM	1800
50 Hertz RPM	1500
Output Rating	0.8 PF
AC Frequency Regulation	3 Hertz, no load to full load
Battery Charging Current	35 Amperes

CAPACITIES

Cooling System (Includes Radiator)	27 quarts (25.6 litre)
Engine Oil Capacity (Filter, Lines, Crankcase)	17 quarts (16 litre)
Without Filters	15 quarts (14 litre)

AIR REQUIREMENTS (1800 RPM)

Engine Combustion	157 CFM (4.5 m³/min)
Radiator Cooled Engine	4500 CFM (127.4 m³/min)
Total for Radiator Cooled Model	4657 CFM (132.4 m³/min)
Alternator Cooling Air	
(1800 RPM)	1000 CFM (28.3 m³/min)
(1500 RPM)	835 CFM (26.3 m³/min)
Fuel Consumption at Rated Load (ASTM No. 2 Diesel fuel)	4.1 gph (15.5 L/h)

GENERAL

Height	52.5 inches (1334 mm)
Width	33.0 inches (838 mm)
Length	1-ph 78.4 inches (1992 mm)
	3-ph 76.7 inches (1948 mm)
Weight (Approx.)	2085 lb. (946 kg)

Description

GENERAL

An ONAN DYJ Series electric generating set is a complete unit consisting of an engine driven AC generator, with controls and accessories as ordered.

ENGINE

The engine on the DYJ is an Allis-Chalmers 2800 or 649 as described in engine manual. Basic measurements and requirements will be found under *SPECIFICATIONS*. However, the engine used for your unit may have variations due to optional equipment available, therefore the Allis-Chalmers manual should be consulted.

AC GENERATOR

The generator is an Onan Type UR, 4 pole revolving field, brushless unit. The alternating current is generated in the stator winding. The alternator rotor, attached directly to the engine flywheel, turns at engine speed. Therefore, the speed at which the rotor turns, determines generator output frequency. The 60 hertz set operates at 1800 rpm and the 50 hertz at 1500 rpm. Excitation is achieved by feeding AC output to a voltage regulator, where it is compared with a reference voltage in the regulator, rectified and returned to the field of the exciter, then to the exciter armature, rectified and fed to the generator field. The UR generator is available in 3Ø and 1Ø output. Excitation and control are the same.

CONTROL PANEL

The following is a brief description 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 the battery charging current.

Run-Stop/Reset-Remote Switch Starts and stops the unit locally or allows operation from a remote location.

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.

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

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

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.

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

Refer to the nameplate data for current ratings and voltage options.

Optional Equipment

Warning Lights Eliminates the one *"Fault"* light and substitutes five indicator 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. See Figure 2.

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

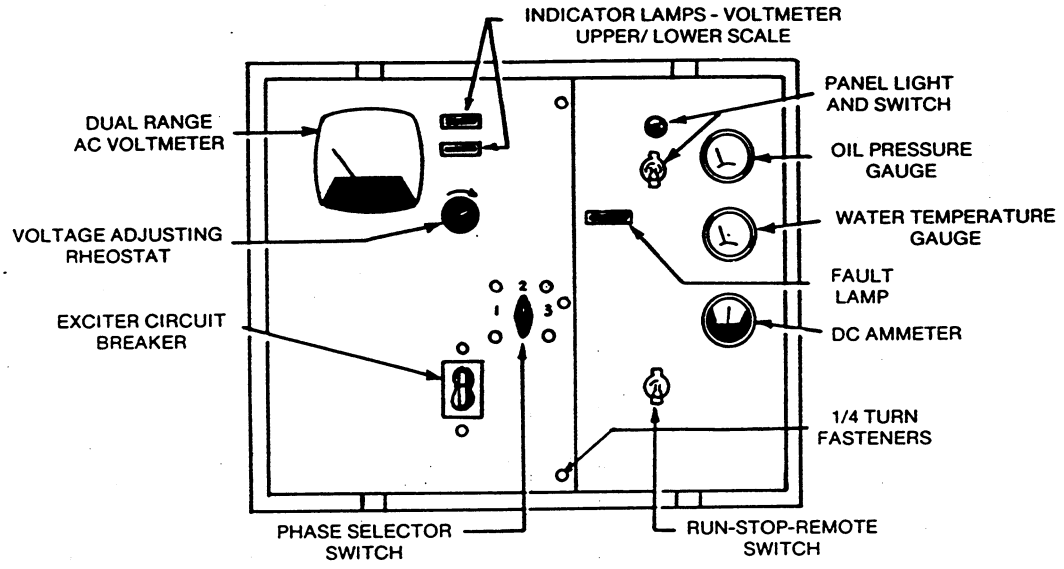


FIGURE 1. TYPICAL CONTROL PANEL (ONE FAULT LAMP)

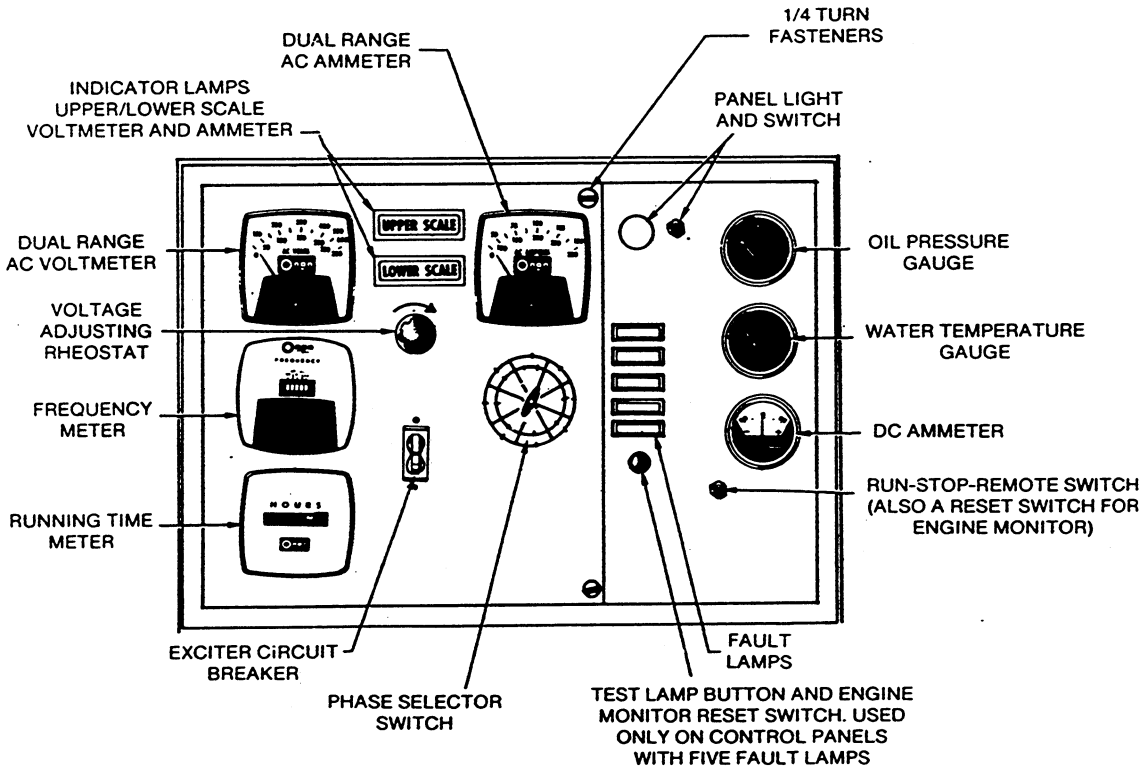


FIGURE 2. OPTIONAL CONTROL PANEL (FIVE FAULT LAMPS)

Control Panel Interior

The only equipment 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 19.

Voltage Regulator Solid state unit, consisting of VR21, CR21 and L21. Controls AC output from generator at predetermined level regardless of load. Regulation plus or minus 2% from no load to full load, 0.8 P.F.

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

1. A 75 second cranking period.
2. Approximately a 12-1/2 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 rpm).
   c. Low oil pressure (14 psi [96.5 kPa]).
   d. High engine temperature (215°F [102°C]).

Overspeed Shutdown Shutdown occurs if engine speed exceeds 2100 r/min. A sensor mounted on the generator shaft signals an overspeed condition which shuts down the engine through a control module.

Start-Disconnect Plug-in module. Operates at approximately 100 r/min above maximum cranking speed to prevent the starter from being energized while engine is running.

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 1.

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.

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

ENGINE SENSORS

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

For location, refer to Figures 3 and 4. When replacing a sensor, do not subtitute, 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.

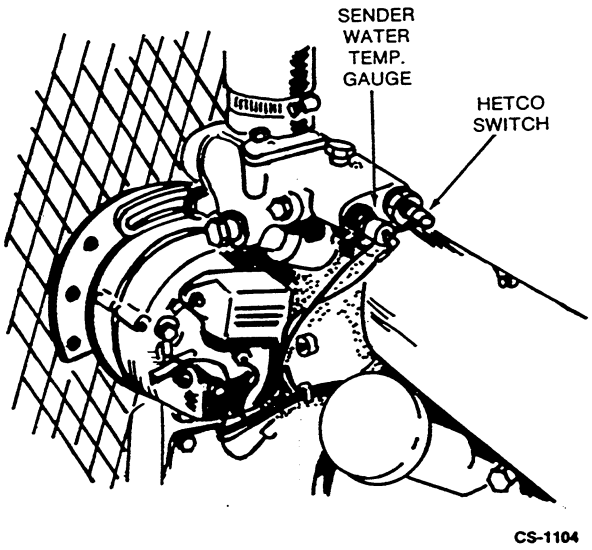


FIGURE 3. WATER TEMPERATURE MONITORS

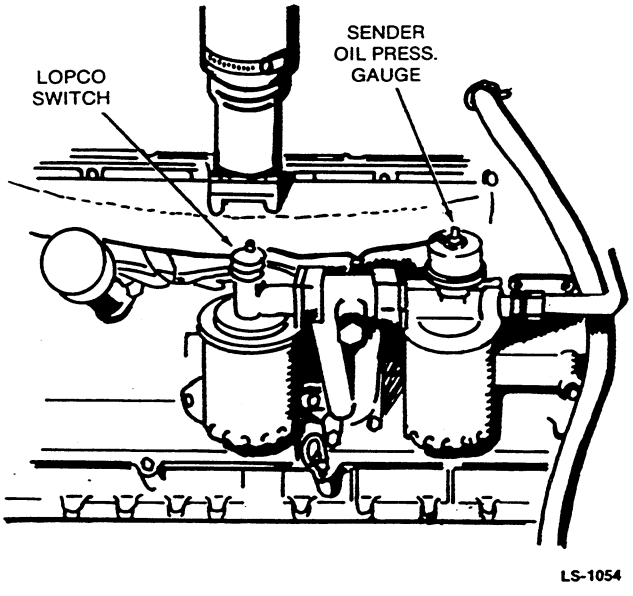


FIGURE 4. OIL PRESSURE MONITORS

TABLE 1. FAULT LAMP OPTIONS

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

Installation

GENERAL

Installations must be considered individually. Use these instructions as a general guide. Meet regulations of local building codes, fire ordinances, etc., which may affect installation details. See Figure 5.

Installation points to consider include:

- Level mounting surface.
- Adequate cooling air.
- Adequate fresh induction air.
- Discharge of circulated air.
- Discharge of exhaust gases.
- Discharge of exhaust gases.
- Electrical connections.
- Fuel connections.
- Water connections.
- Accessibility for operation and servicing.
- Vibration isolation.
- 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 extremes in weather conditions.

MOUNTING

Generating sets are mounted on a rigid skid base which provides proper support. Install vibration isolators between skid base and foundation. For convenience in draining crankcase oil and general servicing, mount set on raised pedestals (at least 6 inches high). If mounting in a trailer, or for other mobile applications, bolt securely in place. Extra support for the vehicle flooring may be necessary. Bolting down is recommended for stationary installations.

VENTILATION

General

Generating sets create considerable heat which must be removed by proper ventilation. Outdoor installations rely on natural air circulation but mobile and 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 rpm.

Radiator set cooling air travels from the rear of the set to the front end. Locate the room or compartment air inlet where most convenient, preferably to the rear of the set. Make the inlet opening at least as large as the radiator area (preferably 1-1/2 times larger).

Engine heat is removed by a pusher fan which blows cooling air out through the front of the radiator. Locate the cooling air outlet directly in front of the radiator and as close as practical. 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.

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 set is running) of sufficient size to assure proper air circulation.

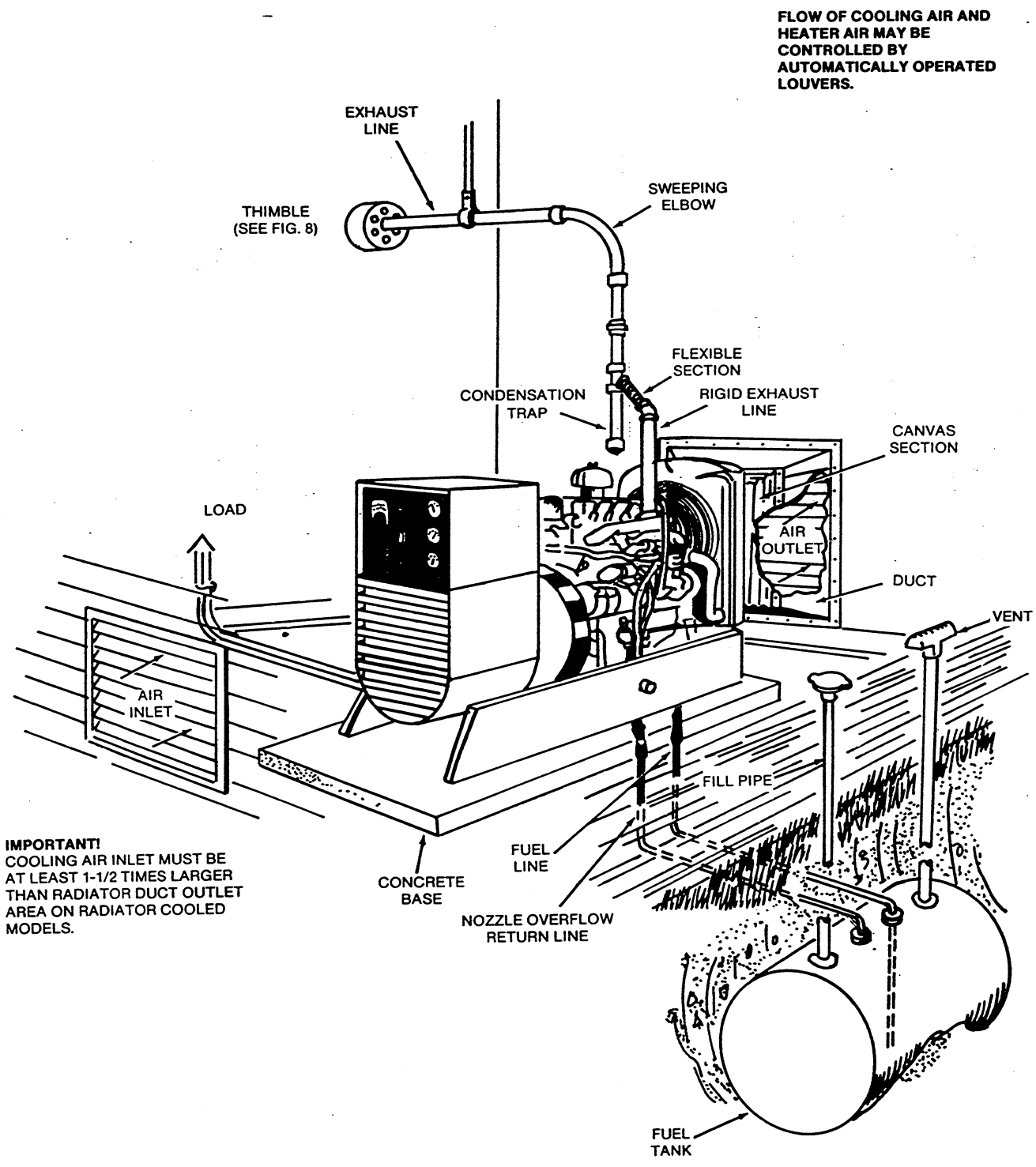


FIGURE 5. TYPICAL INSTALLATION

COOLING SYSTEM

General

The following text explains the various types of cooling systems that may be used with this gen set. A brief description of operation principles is given for each type.

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 be protected from freezing. See Figure 6 for typical installation.

Adequate airflow for heat rejected by the engine and generator to the air must still be supplied.

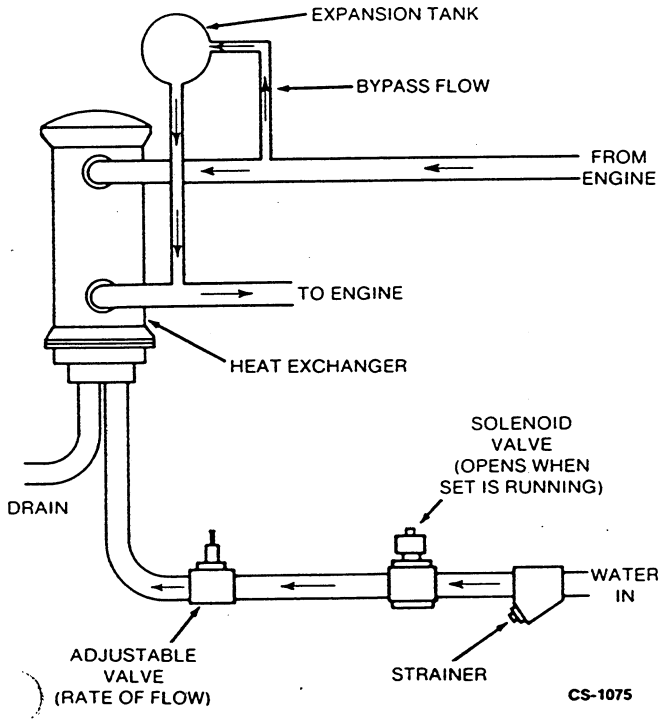


FIGURE 6. TYPICAL HEAT EXCHANGER SYSTEM

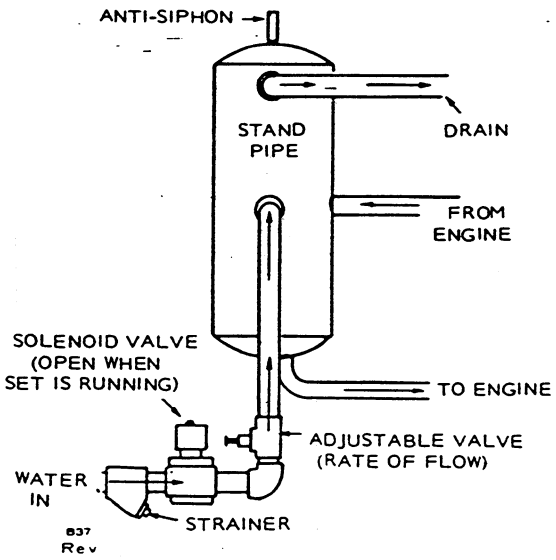


FIGURE 7. TYPICAL STANDPIPE SYSTEM

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 7.

Adequate airflow for heat rejected by the engine and generator to the air must still be supplied.

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.

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 5.

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.

EXHAUST SYSTEM

WARNING ***Pipe POISONOUS exhaust gas outside enclosure. Inhalation of exhaust gases can result in serious injury or 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 8) must be used where exhaust pipes pass through walls or partitions. Build the thimble according to codes (see National Fire Protection Association bulletin, Volume 4, section on *"Standards for Chimneys, Fireplaces and Vents"*). Pitch exhaust pipes downward or install a condensation trap (Figure 9) 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 5 for a typical exhaust installation. Shield or insulate exhaust lines if there is danger of personal contact. Allow at least 9 inches (229 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.

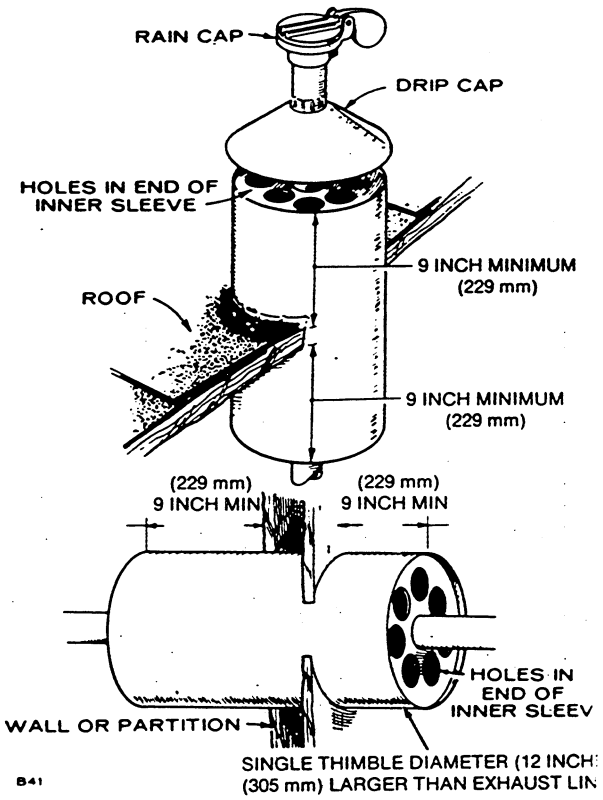


FIGURE 8. EXHAUST THIMBLE

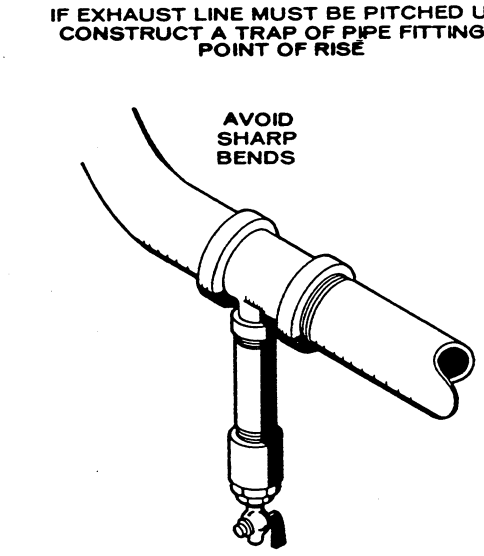


FIGURE 9. EXHAUST CONDENSATION TRAP

Do not connect a flexible line to the exhaust manifold. See Figure 5. Minimum diameters and maximum lengths of pipe (with critical muffler) are listed in Table 2.

Table 2 shows the maximum equivalent exhaust pipe length for exhaust systems using 3-inch through 4-inch pipe. Also shown are the equivalent lengths of various pipe fittings. The TOTAL exhaust system equivalent length (including all fittings and muffler) must NOT exceed the length shown in Table 2 for the size of pipe used. Exceeding the maximum length will create excessive back pressure in the system. The maximum allowable back pressure (measured at exhaust manifold) for the exhaust system is 5.4 inches (1.37 mm) H_2O.

TABLE 2. EXHAUST LENGTH

MAXIMUM EQUIVALENT EXHAUST PIPE LENGTH—ONE CRITICAL MUFFLER INCLUDED

PIPE SIZE (INCHES)	3	3.5	4
MAXIMUM PIPE Length in Feet (Metres)	136 (41)	302 (92)	598 (182)

Max. Allowable Back Pressure is 27.2 inches (691 mm) H_2O.

EQUIVALENT LENGTHS OF PIPE FITTINGS

TYPE OF FITTING (INCHES)	3	3.5	4
STANDARD ELBOW Feet (Metres)	8.1 (2.47)	9.6 (2.93)	11 (3.35)
LONG RADIUS ELBOW Feet (Metres)	5.2 (1.58)	6 (1.83)	7 (2.13)
MED. RADIUS ELBOW Feet (Metres)	6.8 (2.07)	8 (2.44)	9 (2.74)
STANDARD TEE Feet (Metres)	17 (5.18)	19 (5.79)	22 (6.70)

FUEL SYSTEM

Allis-Chalmers engines used on the DYJ sets are designed for use with ASTM No. 2 Diesel fuel. They will however, operate on diesel fuels within the specifications shown 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 mm) is not recommended without a day tank installation. 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 connected 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 10 for 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 11 for an example of a day tank installation. Tank and lines must be below level of injector pump return outlet.

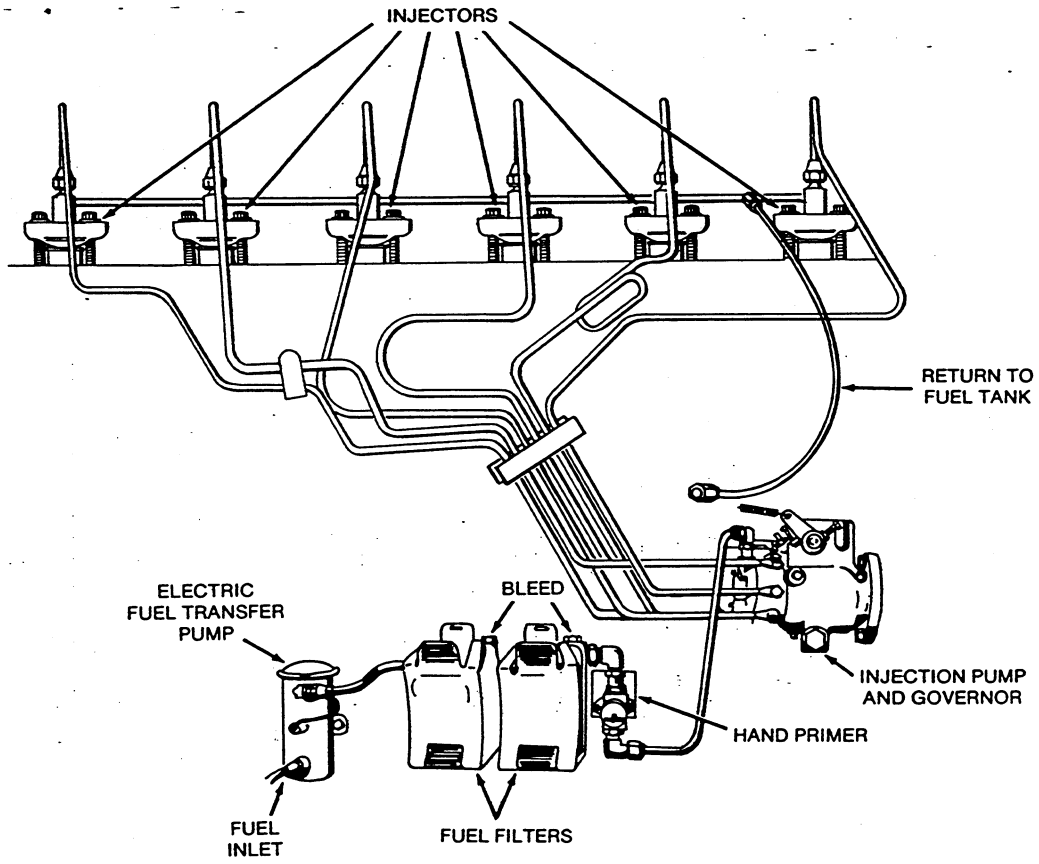


FIGURE 10. FUEL SYSTEM

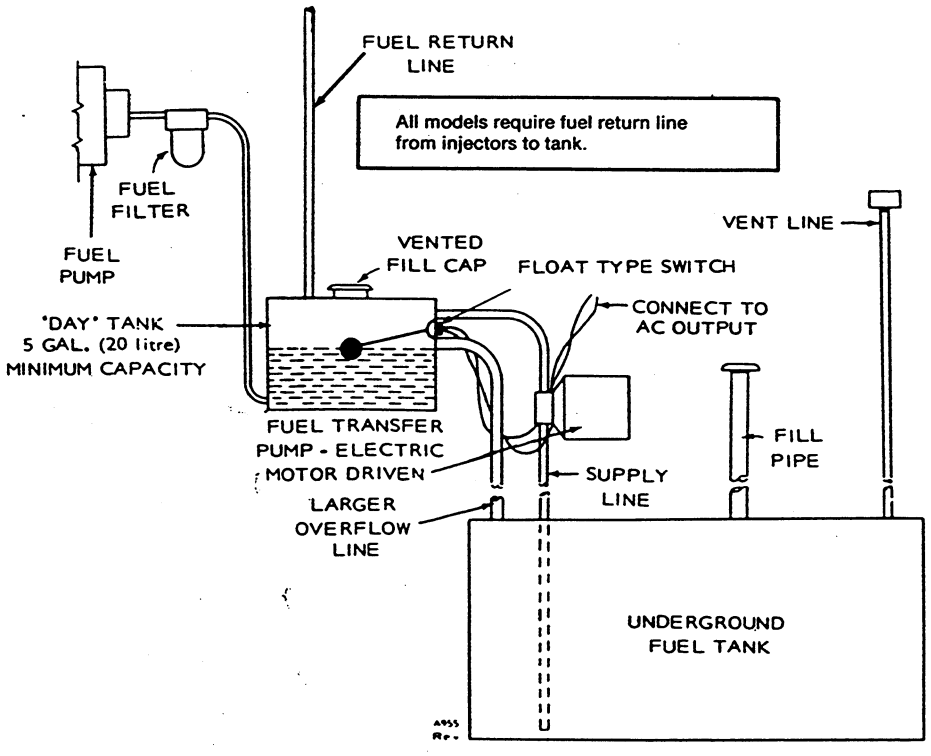


FIGURE 11. DAY TANK (TYPICAL)

ELECTRICAL CONNECTIONS

Battery Connections

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 12. 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.

WARNING ***Do not smoke while servicing batteries. Lead acid batteries give off explosive gases while being charged. Ignition of these gases can cause severe personal injury or death.***

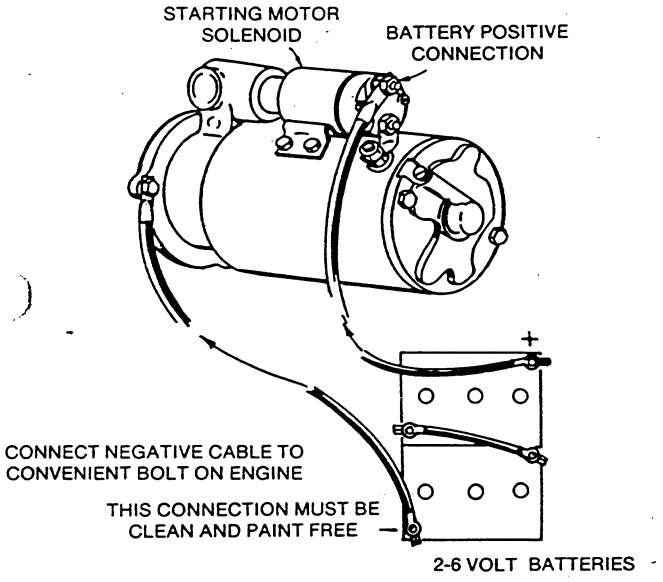


FIGURE 12. BATTERY CONNECTION

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 1.260 specific gravity reading at full charge to a 1.225 reading. The cranking power is reduced when the electrolyte is diluted, but this should not be noticed if the temperature is above 90° F (32.2° C). 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 the electrolyte in a safe manner.

WARNING ***Avoid skin or clothing contact with electrolyte or serious personal injury may result.***

3. Refill each cell to the normal level with distilled water.
4. Continue charging for one hour at 4 to 6 amperes.
5. Test each cell. If the specific gravity is still above 1.225, 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 13. If the distance between the set and remote station is less than 1000 feet (305 m), use No. 18 AWG wire; between 1000 feet (305 m) and 2000 feet (610 m), use No. 16 AWG wire.

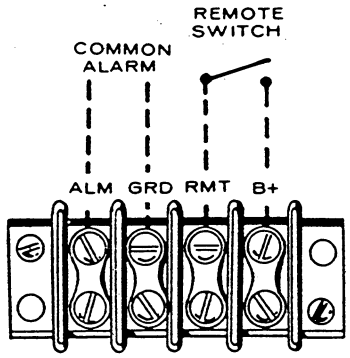


FIGURE 13. REMOTE CONTROL CONNECTION

Water Jacket Heater

The optional water jacket heater wiring diagram is shown in Figure 14. The heater requires a 115 VAC source that is on when the gen set is at rest.

CAUTION ***Do not connect heater to power line unless heating element is immersed in coolant. Energizing a heater element that is not immersed will cause it to burn out.***

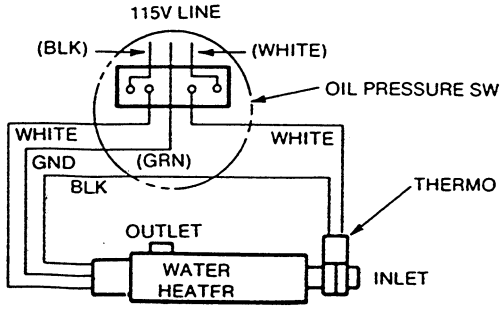
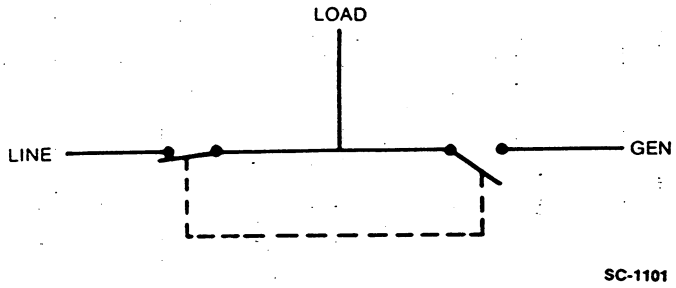


FIGURE 14. WATER JACKET HEATER WIRING DIAGRAM

Load 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:

1. Remove either right, left or top panel from control box. See Figure 16.

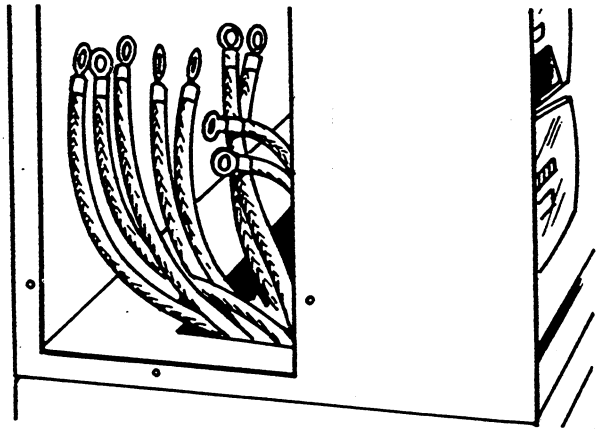


FIGURE 16. CONTROL BOX (SIDE PANEL REMOVED)

2. Connect wires together as shown on panel and in Figure 17 according to voltage desired.

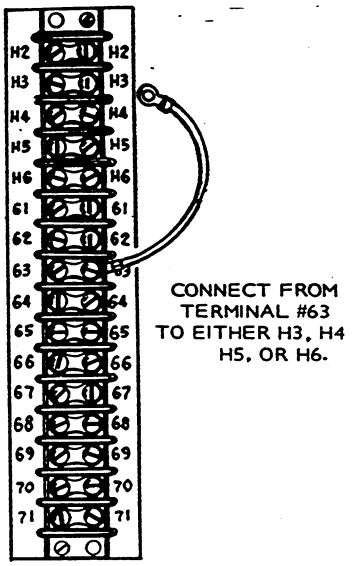


FIGURE 17. REFERENCE VOLTAGE CONNECTION

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 with a 347/600 voltage (designated 9X) or a 120/240 voltage (designated 3R); these connections are made at the factory. The installer must only connect load wires.

Single Phase, 12 Lead Terminal connection L0 (neutral) can be grounded if required. 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 shows load connections for 120/240 voltage. Other voltages are available from double delta illustration in Figure 19.

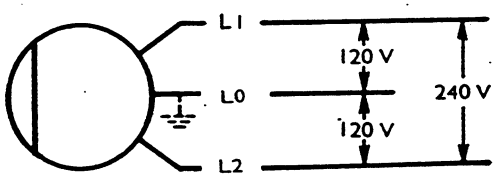
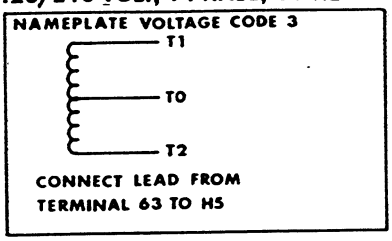
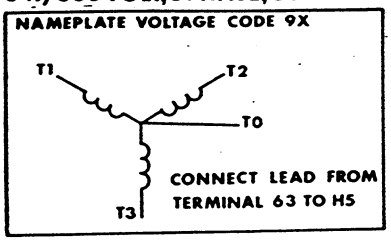


FIGURE 18. 120/240 V. 1-PHASE

120/240 VOLT, 1 PHASE, 60 HERTZ



347/600 VOLT, 3 PHASE, 60 HERTZ



THIS DIAGRAM APPLIES TO 12 LEAD GENERATORS ONLY

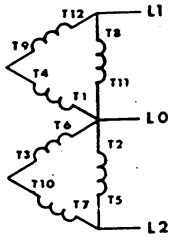
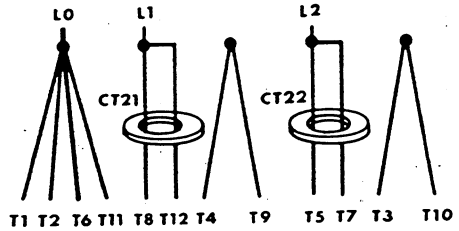
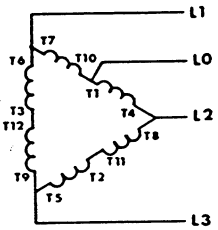
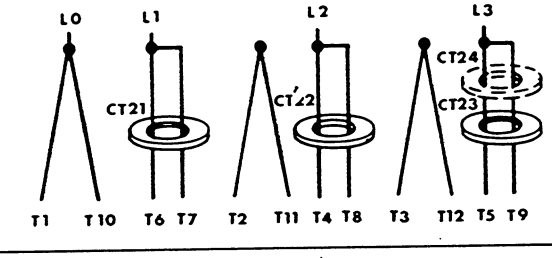
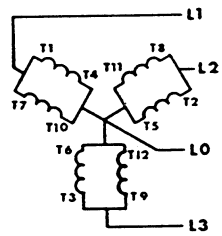
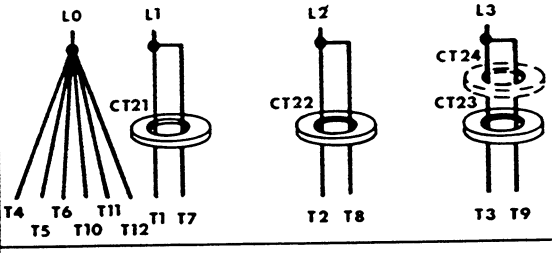
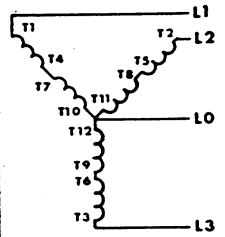
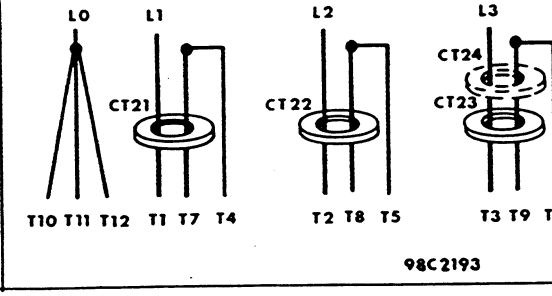
NAMEPLATE VOLTAGE CODE	VOLTAGE	PHASES	HERTZ	CONNECT LEAD FROM TERMINAL 63 TO:	GENERATOR CONNECTION	GENERATOR CONNECTION SCHEMATIC DIAGRAM	GENERATOR CONNECTION WIRING DIAGRAM (WITH CURRENT TRANSFORMERS WHEN USED)
15	120/240	1	60	H5	DOUBLE DELTA		
515	115/230	1	50	H6			
	110/220	1	50	H6			
	7 WIRE ONLY						
6D	240/480	3	60	H5	SERIES DELTA		
15	120/240	3	60	H5			
515	115/230	3	50	H6			
	110/220	3	50	H6			
15	120/208	3	60	H3	PARALLEL WYE		
	127/220	3	60	H4			
	139/240	3	60	H5			
515	110/190	3	50	H3			
	115/200	3	50	H4			
	120/208	3	50	H4			
	127/220	3	50	H5			
15	240/416	3	60	H3	SERIES WYE		
	254/440	3	60	H4			
	277/480	3	60	H5			
515	220/380	3	50	H3			
	230/400	3	50	H4			
	240/416	3	50	H4			
	254/440	3	50	H5			
7	220/380	3	60	H3			

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FIGURE 19. OPTIONAL VOLTAGE CONNECTIONS

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 20. 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 (neutral) 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 20 shows load connections for 120/240 voltage. Other voltages are available from series delta illustration in Figure 19.

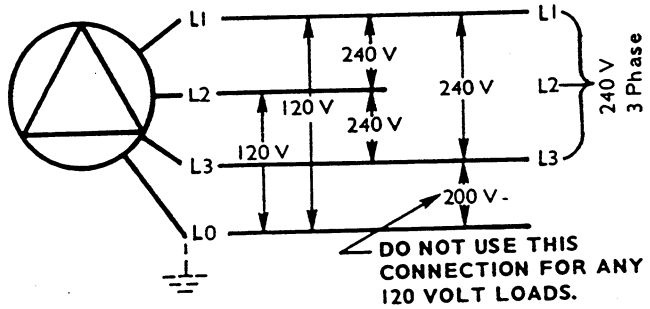

FIGURE 20. 120/240 V. 3-PHASE DELTA

3 Phase, Wye Connected Set The 3 phase, 4 wire set produces line to neutral voltge 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 21.

The terminal marked L0 can be grounded, if required. 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 terminals—L1, L2, or L3. Three separate 1 phase circuits are available, with not more than 1/3 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 21 shows load connections for 120/208 voltage. Other voltages are available from either parallel wye or series wye illustration in Figure 19.

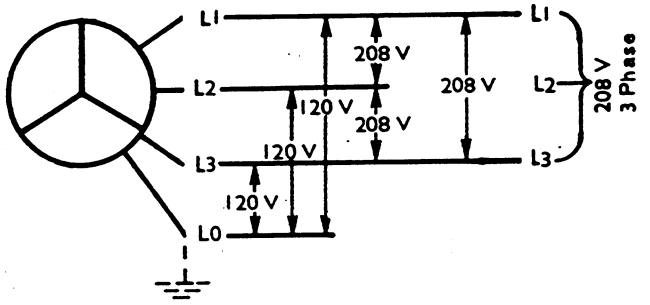

FIGURE 21. 120/208 V. 3-PHASE WYE

ONAN recommends that all connections from the generator to the bus-bars and from the bus-bars to the load be made by a qualified electrician. All applicable local and state laws should be complied with.

Grounding

Typical requirements for bonding and grounding are given in the National Electric Code. 1981. Article 250.

Periodic inspection is recommended. especially after service work has been performed on any equipment in the electrical system.

Generator Set Bonding and Equipment Grounding Bonding is defined as: (reference National Electrical Code, 1981, Article 100). The permanent joining of metallic parts to form an electically conductive path which will assure electrical continuity and capacity to conduct safely any current likely to be imposed.

WARNING ***For personal safety, it is essential that bonding and equipment grounding be done properly. All metallic parts which could become energized under abnormal conditions must be properly grounded.***

Circuit and System Grounding This refers to the intentional grounding of a circuit conductor or conductors. The design and installation of grounding systems encompasses many considerations, such as multiple transformers, standby generators, ground fault protection, physical locations of equipment and conductors, just to mention a few.

Although the consulting engineer and installer are responsible for the design and wiring of each particular grounding application, the basic grounding requirements must conform to national and local codes.

Operation

GENERAL

ONAN DYJ 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. Do not mix brands nor grades of lubricating oils.

Oil viscosity should be as follows:

AMBIENT TEMPERATURE	USE SAE VISCOSITY
0°F (-18°C) and below	10W or 10W30
0°F to 32°F (-18° to 0°C)	20/20W or 15W40
32°F to 95°F (0° to 35°C)	30 or 15W40
Above 95°F (35°C)	40 or 15W40

Oil Capacities (nominal)

Oil Pan and Filter — 17 quarts (16 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 (25.6 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 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 the fuel system are secure and no leaks exist. Proceed with priming as follows:

1. Loosen filter vent screw (Figure 22).
2. Using hand pump (Figure 22), prime system until fuel flow around filter vent screw is free of bubbles.
3. Secure vent screw and hand pump.

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

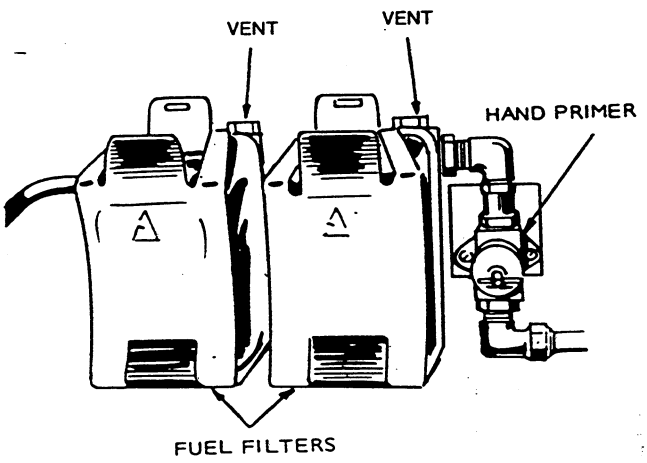

FIGURE 22. PRIMING FUEL SYSTEM

non-conductive grease to retard formation of corrosive deposits.

Check electrolyte level to be at the split ring mark. Measure the specific gravity of electrolyte: 1.260 at 80° F (26.7° C). If distilled water has been added or the specific gravity is less than 1.260, place the batteries on charge until desired reading is obtained. 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.***

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 and 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 have as an option an exerciser which, by pre-selection, will start, determine run period and shut down a set on a weekly frequency. For example, the exerciser 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.

OUT OF SERVICE PROTECTION

For storage of all durations, refer to the Allis-Chalmers engine manual.

HIGH ALTITUDE

Ratings apply to altitudes up to 500 feet (152 m); standard cooling, 85°F (29°C) ambient 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 500 feet (152 m) for a naturally aspirated engine. 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.
4. Derate 1% for each 10°F (5.5°C) above 85°F (29°C) ambient.

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.

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

SYMPTOM	CORRECTIVE ACTION
1. Fault lamp lights and engine stops cranking after approximately 75 seconds.	1. See engine service manual for troubleshooting fuel system, etc. After correcting problem, reset the engine monitor by moving run-stop/reset remote switch to reset position. Release and return to run position.
2. Fault lamp lights immediately after engine starts.	2. Check for: a. overspeed condition as engine starts. b. high temperature condition. c. faulty high engine temperature sensor or overspeed switch. d. faulty starter disconnect.
3. Fault lamp lights after engine is running.	3. Check the following: a. Oil level-engine will shut down after approximately 12-1/2 seconds if low oil pressure sensor does not open. b. Oil pressure sensor may be defective. c. High engine temperature - caused by low coolant level, faulty thermostat, etc. d. Faulty high engine temperature sensor. e. Faulty starter disconnect.
4. Fault lamp lights - no fault condition exists.	4. Be certain that no fault condition exists. Contact an authorized Onan dealer or distributor.

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, etc. After correcting fault, reset monitor by moving run-stop/ reset-remote switch to reset position, then to either run or remote to restart engine.
2. Overcrank fault lamp lights after engine has run for approximately 75 seconds.	*2. Replace engine monitor board.
3. High engine temperature lamp lights as soon as engine starts.	3. Check for defective sensor or actual high temperature condition.
4. Low oil pressure lamp lights after engine is running.	4. Check: a. Oil level - engine will shut down after approximately 12-1/2 seconds if oil pressure is low.
5. High engine temperature lamp lights after engine is running.	5. Check for: a. Defective thermostat/thermostats. b. Low coolant level. c. Defective high engine temperature sensor.
6. Overspeed lamp lights - no fault condition exists.	*6. Replace engine monitor board.
7. Low oil pressure fault lamp lights - no fault condition exists.	*7. Be certain that no fault condition exists.
8. High engine temperature fault lamp lights - no fault condition exists.	*8. Be certain that no fault condition exists.
9. When pressing test lamp button - one or more fault lamps do not light.	*9. Fault lamp/lamps may be burned out.

*Contact an authorized Onan dealer or distributor.

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.

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.***

TABLE 5. OPERATOR MAINTENANCE SCHEDULE

MAINTENANCE ITEMS	OPERATIONAL HOURS			
	8	50	100	200-250
Inspect Set	x6			
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.

x6 Perform general inspection of unit. Then with generator set running, visually and audibly check the exhaust system for leaks.

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

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

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 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.

CRANKCASE OIL

Engine oil should be drained when warm at recommended time interval shown in Table 5. Oil is removed by turning the sump valve 90 degrees and collecting oil in a container. Close valve after removing oil.

For most operating conditions, fill crankcase to the dipstick FULL mark with a good quality oil that meets service classification CD or CD/SE. Do not mix brands nor grades because they may not be compatible. The engine oil capacity with filter is 17 quarts (16 L); without filters, 15 quarts (14 L).

See the *Operation* section of this manual for recommended viscosity according to temperature.

CONNECTIONS (Fuel, Exhaust, etc.)

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

- Check all fuel and oil lines for possible leakage.
- Inspect exhaust lines and mufflers visually and audibly for possible leakage and cracks.
- Periodically or daily, drain moisture from condensation traps.
- Inspect water lines and connections for leaks and security.
- Inspect electrical wires and connections for security and fray damage.

COOLING SYSTEM

Draining Cooling System

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.***

The following steps should be followed when changing coolant at recommended maintenance intervals:

1. Remove AC power source of optional engine water jacket heater. Failure to do so will result in burn-out of heater.
2. If radiator cooled, remove radiator cap. Open radiator and cylinder block drain cocks.
3. If heat exchanger cooled, remove (shut off) raw water source and open heat exchanger drain cock. Remove expansion tank cap, open vent cocks and cylinder block drain cocks.

Filling Cooling System

1. Close all drain cocks opened for draining system.
2. If system inspection reveals rust or scale, cleaning should be done before filling with new coolant. Use a commercial solvent following the manufacturer's instructions. Never mix solvents with anti-freeze or inhibitors.
3. Fill system with clean, soft water and anti-freeze or inhibitor to about 1.5 inch (38 mm) below filler neck.
4. Replace filler cap. If heat exchanger system, close vent cocks when coolant appears.
5. Apply AC power to water jacket heater.
6. Operate engine until normal temperature is reached to vent air from system.
7. Check level of coolant and add as necessary. Check for leaks.

WARNING ***After running unit 10 minutes, the closed cooling system is pressurized and hot. Open the pressure cap slowly to vent pressure. Failure to do so may result in serious burns from sprayed hot coolant.***

Drive Belt

Improper belt tension will result in a slipping or broken belt. This in turn will result in overheating and shutdown of the engine caused by reduced coolant flow.

A force of 15 pounds (67 N) applied between the pump pulley and the engine pulley should deflect the belt about 1/2 inch (13 mm). If the belt is frayed, cracked or glazed, it should be replaced.

To adjust the belt tension, loosen the alternator mounting bolts and pivot alternator along the bolt slot. Be sure to tighten all mounting bolts when tension is correct.

Thermostat

The temperature of the cooling system is thermostatically controlled. The thermostat is in the housing between the radiator and the top engine block. To replace or examine the thermostat, remove the two bolts securing the housing.

Replace the thermostat if corroded, damaged or opening improperly. Check opening by immersing in a bath of water and heating the water. The thermostat should start opening at 180°F (82°C), and be fully open at 200°F (93°C). Ensure the mating surfaces of the housing are clean, and install a new gasket before reassembly.

Pressure Cap

Closed cooling systems make use of a pressurized cap to increase the boiling point of the coolant and allow higher operating temperatures. Pressure caps should be replaced every two years or sooner if they malfunction.

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.***

Water Jacket Heater

The water jacket heater is optional equipment on the generator set, Figure 23. When in use, the thermostat controlled system maintains engine temperature between 80°F and 100°F in a 50°F ambient (27°C and 38°C in a 10°C ambient). For efficient operation and maximum product life, perform the following procedure at least once a year:

WARNING ***Remove pressure from cooling system before loosening tank heater lines. Failure to do so may result in serious burns from hot spraying coolant.***

1. Remove head and valve assembly.
2. Clean foreign matter out of tank.
3. Remove element and scrape off scale accumulated on the sheathing.

CAUTION ***When assembling threaded aluminum parts, be sure to use anti-seize compound.***

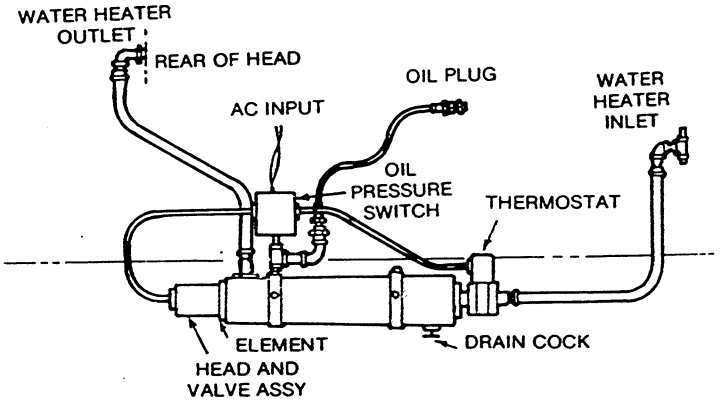

FIGURE 23. ENGINE HEATER

BATTERIES

Check 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 1.260.

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

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.

Inspection

Inspect generator and control box for loose or broken wires and parts. Check diodes for excessive dust, grease or moisture. Blow out the assembly periodically, with filtered, low pressure air (max. 30 psi (207 kPa). Check to see that diodes and leadwires are properly torqued. Diodes should be torqued to 15 in. lb. (1.7 N•m).

CAUTION ***Excessive foreign matter on diodes and heat sinks will cause overheating and possible failure.***

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

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.***

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 DYJ 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. See Figure 24. Screw in the low speed adjusting screw until the generator output frequency meter reads 60 hertz (generator on load). Turn in the high speed stop screw until it bottoms; secure the locknuts.

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 x 61 (hertz) = 1830 rpm.

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

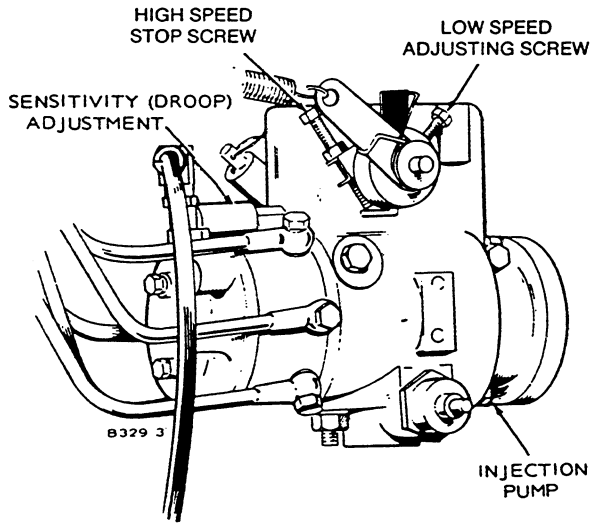

FIGURE 24. ROOSA-MASTER GOVERNOR

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