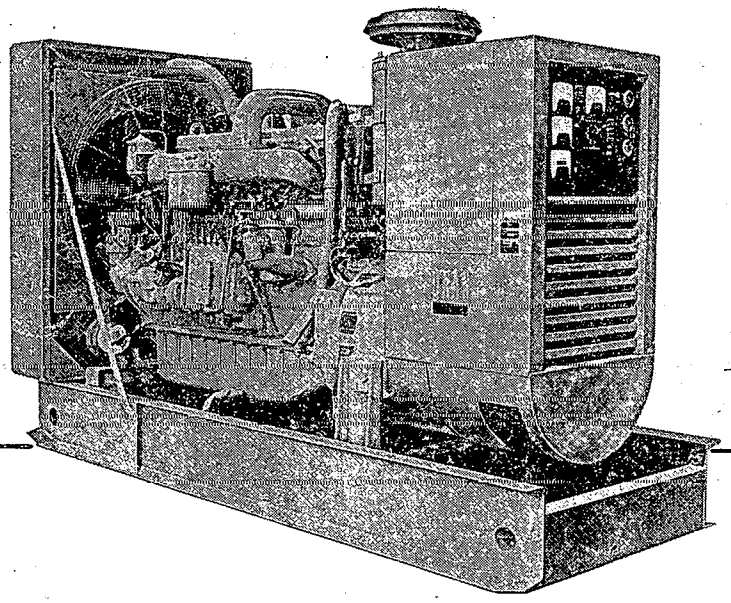
McGRAW DISON

Onan

Operator's Manual

DYH
GenSet



973-0125
8-81
(SPEC D)
Printed in U.S.A.

Safety Precautions

The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

ONAN recommends that you read your manual and become thoroughly acquainted with it and your equipment before you start your unit. These recommendations and the following safety precautions are for your protection.

Fuels, electrical equipment, batteries, exhaust gases and moving parts present potential hazards that could result in serious, personal injury. Take care in following these recommended procedures.

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

CAUTION **This symbol refers to possible equipment damage.**

General

- Keep your electric generating set and the surrounding area clean and free from obstructions. Remove any debris from set and 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 adjustment *must* be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.
- Do not work on this equipment when mentally or physically fatigued.
- Coolants under pressure have a higher boiling point than water. DO NOT open a radiator or heat exchanger pressure cap while the engine is running. Bleed the system pressure first.

Protect Against Moving Parts

- Keep your hands away from moving parts.
- Before starting work on the generating set, disconnect batteries. This will prevent starting the set accidentally.

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.
- 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.
- Be sure all fuel supplies have a positive shutoff valve.

Guard Against Electric Shock

- Remove electric power before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling electrical equipment.
- Use extreme caution when working on electrical components. High voltages cause injury or death. DON'T tamper with interlocks.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches.
- DO NOT SMOKE while servicing batteries. Lead acid batteries emit a highly explosive hydrogen gas that can be ignited by electrical arcing or by smoking.

Exhaust Gases Are Toxic

- Provide an adequate exhaust system to properly expel discharged gases. Check exhaust system regularly for leaks. Ensure that exhaust manifolds are secure and not warped. Do not use exhaust gases to heat a compartment.
- Be sure the unit is well ventilated.

Keep the Unit and Surrounding Area Clean

- Make sure that oily rags are not left on or near the engine.
- Remove all oil deposits. Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and subsequent engine damage and may present a potential fire hazard.

Table Of Contents

TITLE	PAGE
Safety Precautions	INSIDE COVER
Introduction	2
Specifications	3
Description	5
Installation	9
Operation	17
Troubleshooting	19,20
General Maintenance	23
Operator's Maintenance Schedule	24

WARNING

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

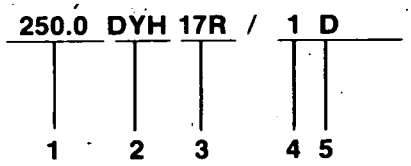
Introduction

FOREWORD

This manual is applicable to the DYH 250 kW Series electric generating set, consisting of an Onan YB17 Series AC generator, driven by an Allis-Chalmers 6138T engine. Information is provided on installation, operation, troubleshooting and parts ordering for the DYH set. The manual should be used in conjunction with the Allis-Chalmers engine manual, as your specific engine may have variations due to operation 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.

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

	250 kW
ENGINE DETAILS	
Engine Manufacturer	Allis-Chalmers
Engine Series	6138T
Number of Cylinders	6
Displacement	844-cu. inch (13.8 litres)
BHP @ 1800 RPM	390
Compression Ratio	15.4:1
Bore	5.25-inches (133.3 mm)
Stroke	6.5-inches (165.1 mm)
Fuel	ASTM No. 2 Diesel
Battery Voltage	24
Battery Group (Two 12-Volt, 225 A.h)	8D - over 25°F (-4.C) Operating Temp.
Starting Method	Solenoid Shift
Governor Regulation	5% Maximum
GENERATOR DETAILS	
Type	YB 17, Brushless (60 Hz) YB 517, (50 Hz)
Rating (kW)	
60 Hertz Continuous Standby	250 kW
50 Hertz Continuous Standby	208 kW
AC Voltage Regulation	±2%
60 Hertz RPM	1800
50 Hertz RPM	1500
Output Rating	0.8 PF
AC Frequency Regulation	3.0 Hz No Load—Full Load
Battery Charging Current	35 Amps Max
CAPACITIES AND REQUIREMENTS	
Cooling System (including Radiator and Intercooler)	16.5 Gallons (62.5 litres)
Engine Oil Capacity (Filter, Lines, Crankcase	15 Gallons (56.8 litres)
Exhaust Connection (inches pipe thread)	6
AIR REQUIREMENTS (1800 RPM)	
Engine Combustion	700 CFM (18.78 CFM (18.78 m^3/min)
Radiator Cooled Engine	18,400 CFM (521.08 m^3/min)
Alternator Cooling Air (1800 RPM)	1,200 CFM (33.96 m^3/min)
(1500 RPM)	1,000 CFM (28.32 m^3/min)
Fuel Consumption at Rated Load (No. 2 Diesel)	19.0-gph (68.22 lit/hr)
GENERAL	
Height	70.00 inches (1778 mm)
Width	44.00-inches (1117 mm)
Length	109.00-inches (2768 mm)
Weight (Approx.)	6,500-lbs (2951 kg)

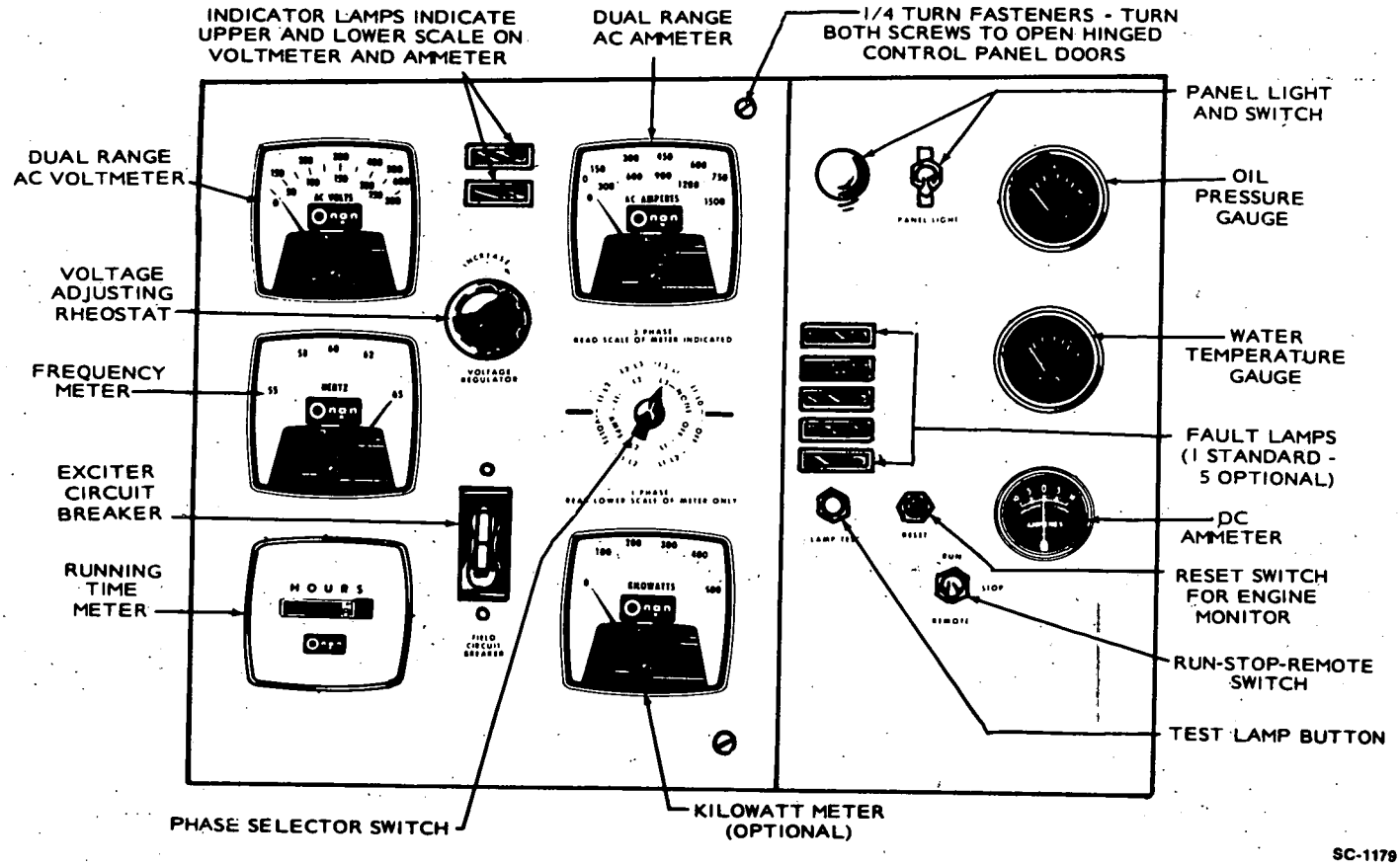


FIGURE 1. CONTROL PANEL

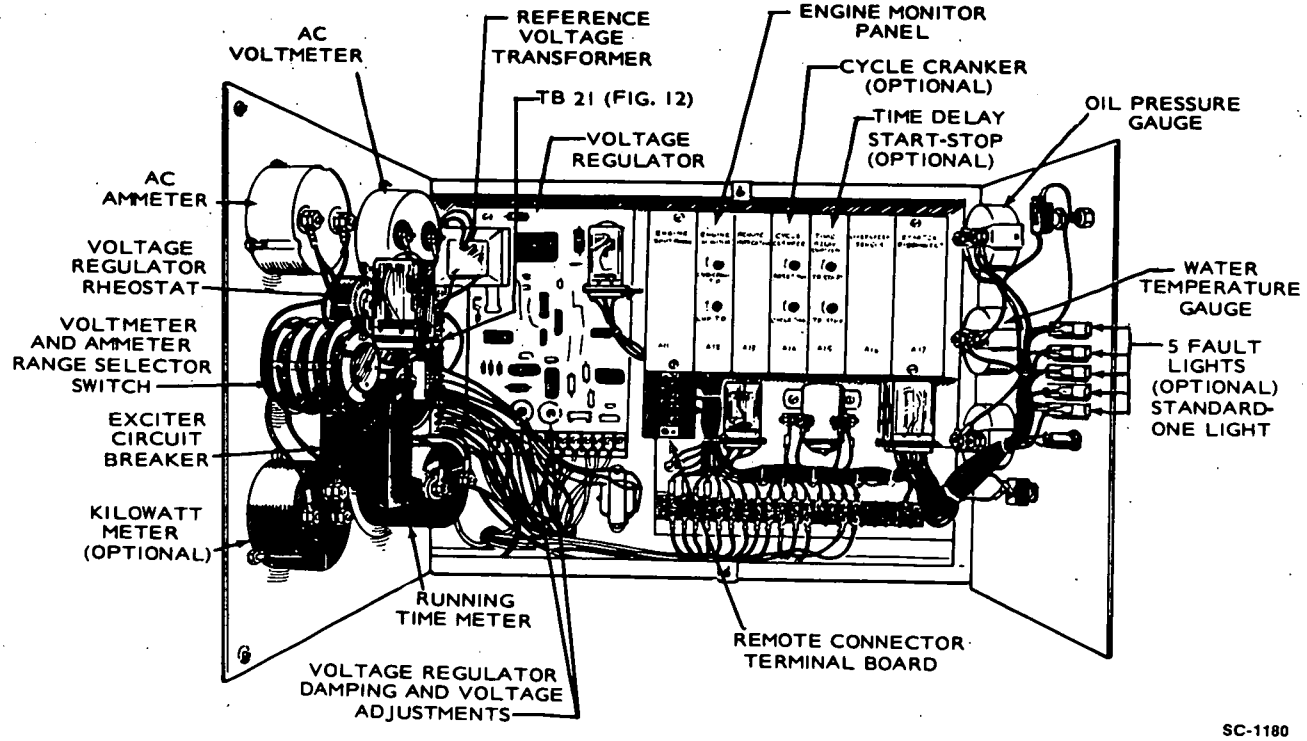


FIGURE 2. CONTROL PANEL INTERIOR

Description

GENERAL

An ONAN DYH 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 DYH is an Allis Chalmers 6138T 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 250 kW set uses an Onan Type YB17, 12 lead, 4 pole revolving field, reconnectible bus-bar 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.

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

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-Remote Switch: Starts and stops the unit locally or from a remote location.

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

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

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.

Voltmeter-Ammeter 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).

OPTIONAL EQUIPMENT

DC Panel

Warning Lights: Eliminates the one *"Fault"* light and substitutes five indicator 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.

AC Panel

Kilowatt Meter: Indicates output of the AC generator in kilowatts. Connected into a transducer mounted in the control box housing.

CONTROL PANEL INTERIOR

Discussed below is equipment which the operator may have reason to adjust or inspect for service.

Terminal Board (TB) 21: Connection of wandering lead (W12) to terminals H3, H4, H5 is made at this point, to change voltage regulator tap when reconnecting generator for different voltages. Refer to Figure 15.

Voltage Regulator: Solid state unit 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-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/min).
   c. Low oil pressure - 14 psi (97 kPa).
   d. High engine temperature - 215° F (102° C).

CAUTION **High Engine Temperature Cutoff will shut down engine in an overheat condition only if coolant level is sufficiently high to physically contact shutdown switch. Loss of coolant will allow engine to overheat without protection of shutdown device, thereby causing severe damage to the engine. Adequate engine coolant levels must be maintained to ensure operational shutdown protection capability of engine cooling system.**

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.

Start-Disconnect and Overspeed: Plug-in module. Operates at approximately 100 rpm above maximum cranking speed to prevent the starter from being energized while engine is running. Overspeed operates at 2000-2200 rpm. See Figure 3.

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.

TABLE 1. FAULT LAMP OPTIONS

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

Time Delay Start/Stop: Operative from remote location only. Provides 1-10 seconds time delay on starting and 30 seconds to 5-minutes delay on stopping. Delay period adjustable on engine monitor panel.

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

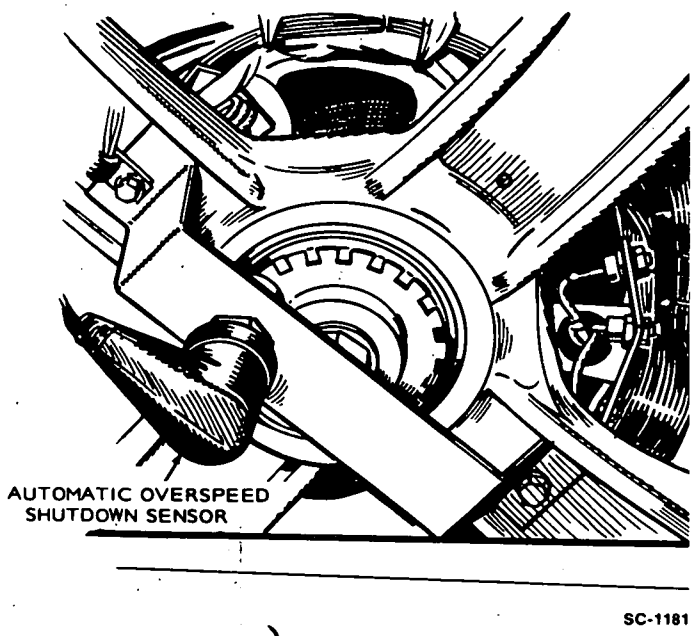


FIGURE 3. OVERSPEED SENSOR

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

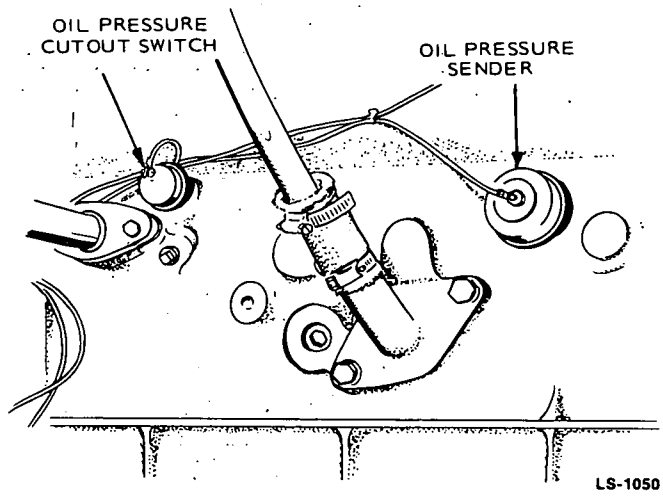


FIGURE 4. OIL PRESSURE MONITORS

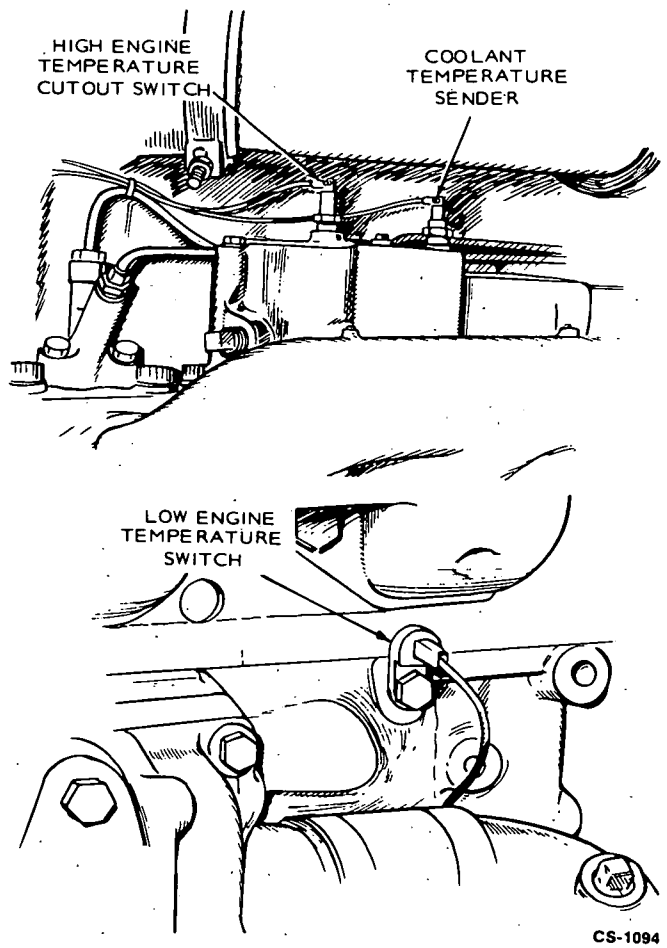


FIGURE 5. COOLANT TEMPERATURE MONITORS

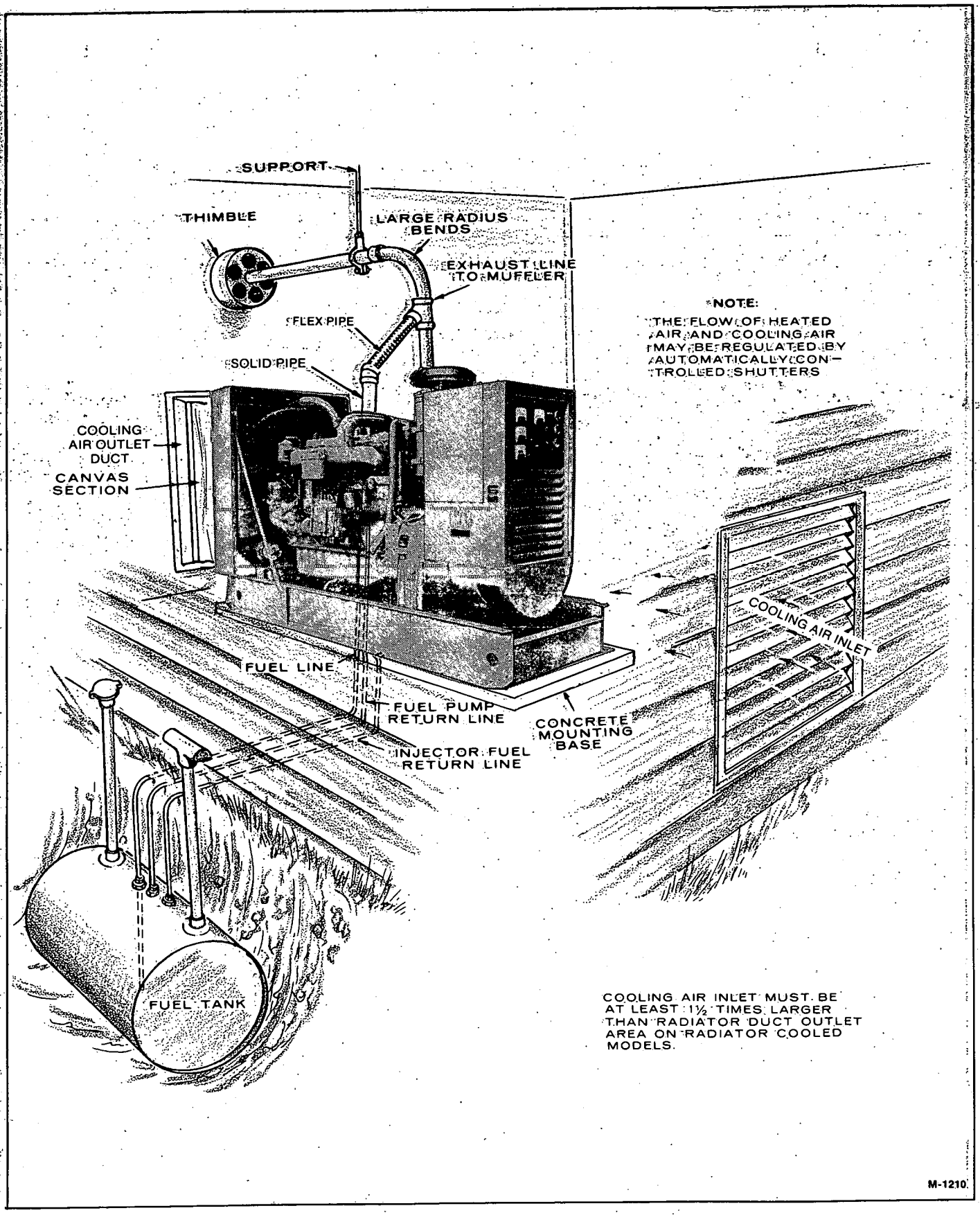


FIGURE 6. A TYPICAL STANDBY INSTALLATION

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. Refer to *ONAN Technical Bulletin T-030* for further installation information.

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. Accessiblity 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 extremes in 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.

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/min.

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.

Locate the cooling air outlet directly in front of the radiator and as close as possible. The opening free area must 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.

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. 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.

Installations require an auxiliary fan (connected to operate only when the unit is running) of sufficient size to assure proper air circulation and evacuation of fumes.

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 be protected from freezing. See Figure 7 for typical installation.

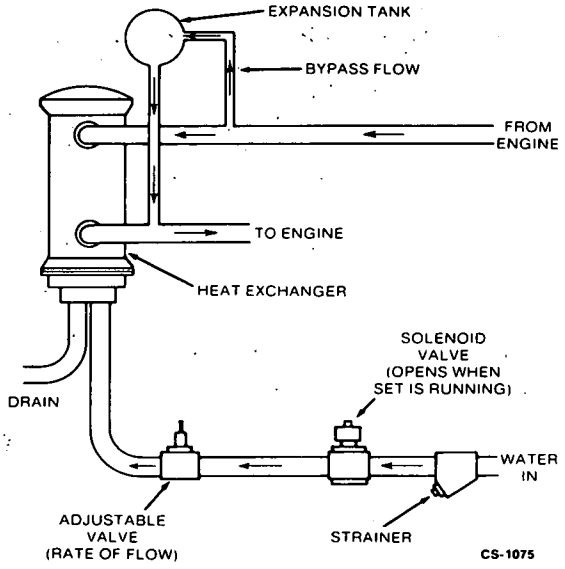


FIGURE 7. HEAT EXCHANGER (TYPICAL)

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 the 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.

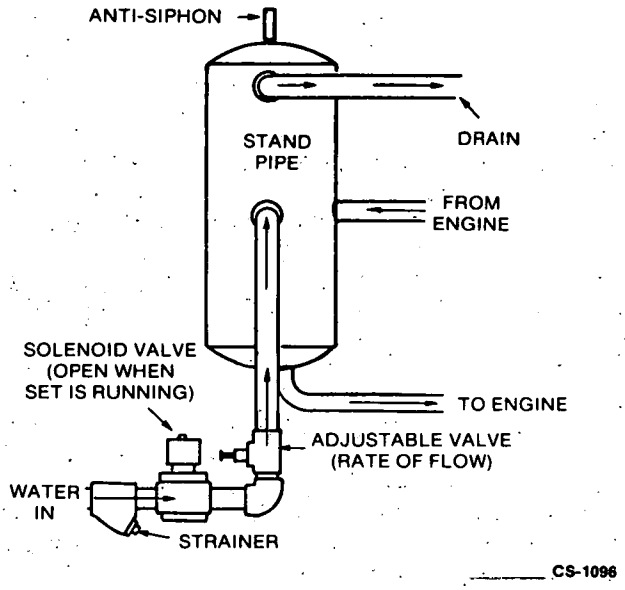


FIGURE 8. STANDPIPE (TYPICAL)

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 (74°C and 91°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 (4.7 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 (4.7 m) above the center-line of the engine crankshaft.

EXHAUST

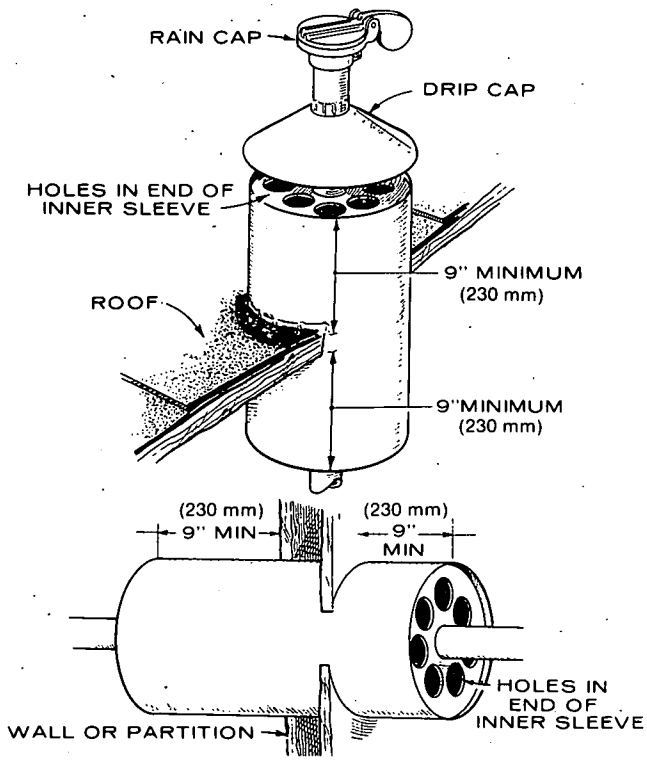
WARNING ***Pipe POISONOUS exhaust gas outside enclosure. Inhalation of exhaust gases can result in serious injury or death.***

Observe all local, state, and national fire codes when installing your unit. All installation work must be done by qualified personnel.

Engine exhaust gas must be piped outside building or enclosure. Do not terminate exhaust pipe near inlet vents, windows or other locations where exhaust can re-enter the building or by combustible materials. An approved thimble (Figure 9) 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 211 on "Standard For Chimineys, Fireplaces and Vents"). 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 12 inches (300 mm) of clearance if the pipes run close to a combustible wall or partition. Use a pipe at least as large as the 2 inch (50 mm) pipe size outlet of the engine.

Suspend the pipe from the enclosure structure and attach to engine with a flexible section. Place muffler as close to engine as possible to reduce condensation damage and carbon fouling.

Use flexible stainless steel tubing to connect between the engine and the exhaust line. Do not connect the flexible exhaust line directly to the exhaust manifold (see Figure 6). Table 2 and 3 give exhaust line sizes and maximum lengths.



NOTE: VENTILATED THIMBLE DIAMETER 6" (152 mm) LARGER THAN EXHAUST LINE.

FIGURE 9. TYPICAL EXHAUST THIMBLE

WARNING ***Do not use exhaust manifold heat to warm a room or compartment occupied by people due to possible leaking of harmful exhaust gases. Inhalation of exhaust gases can be fatal.***

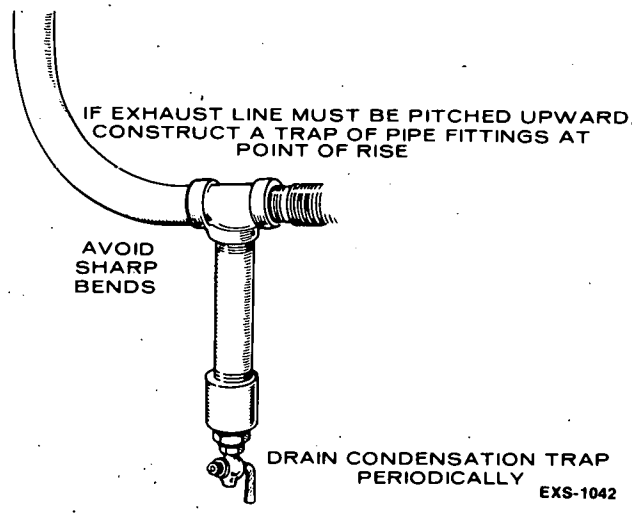


FIGURE 10. EXHAUST CONDENSATION TRAP

TABLE 2. EXHAUST PIPE SIZING AND LENGTH

PIPE SIZE (Inches)	6 Inches	8 Inches
MAXIMUM PIPE LENGTH IN FEET/M	80 (24 m)	300 (91 m)

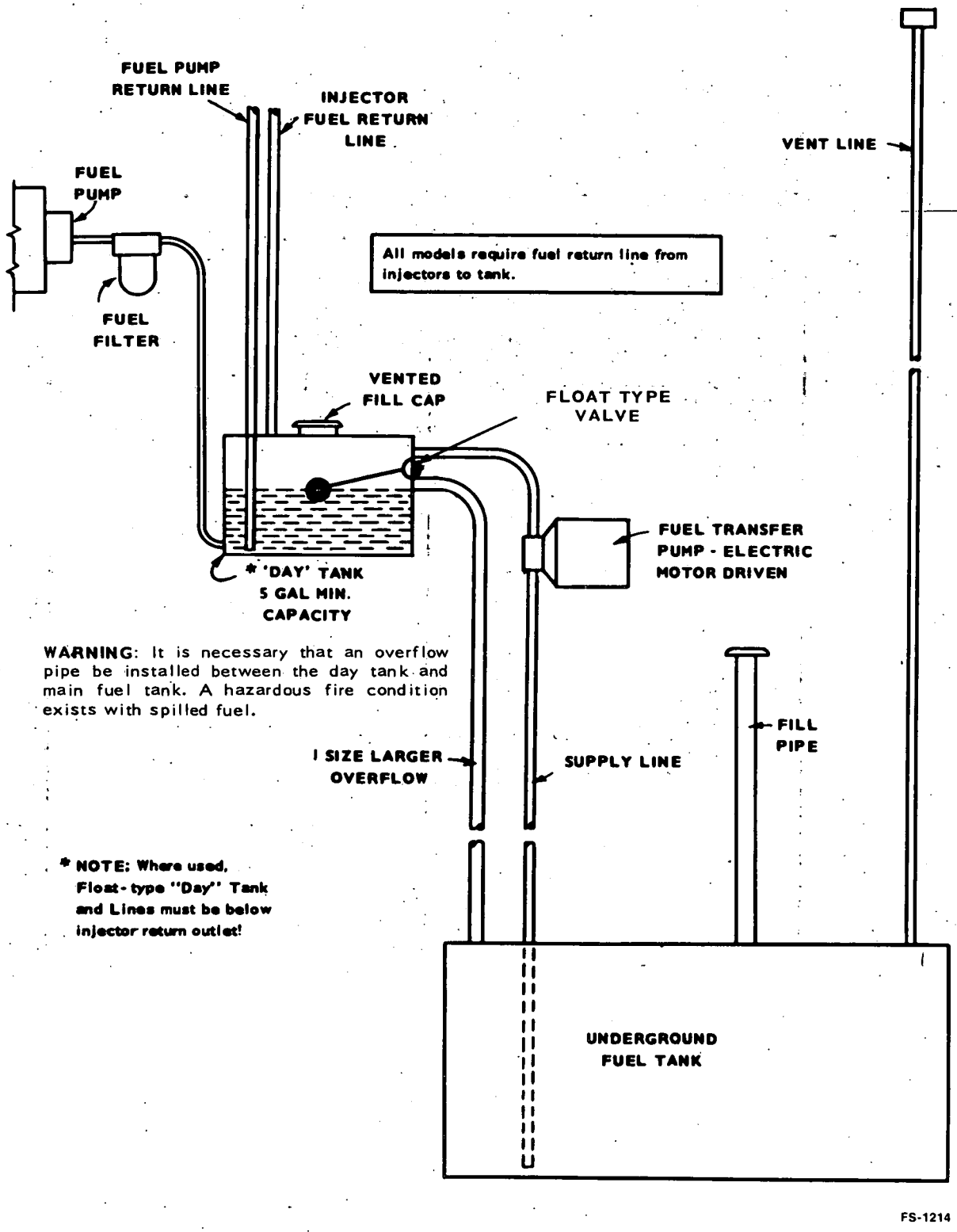


FIGURE 11. DAY TANK INSTALLATION

TABLE 3. PIPE FITTING EQUIVALENT LENGTH

TYPE OF FITTING Inches	6 Inches	8 Inches
STANDARD ELBOW Feet (Metres)	16 (4.88)	21 (6.40)
LONG RAD. ELBOW Feet (Metres)	14 (3.35)	(4.27)
MED. RAD. ELBOW Feet (Metres)	14 (4.27)	18 (5.49)
STANDARD TEE Feet (Metres)	34 (10.36)	44 (13.41)

Maximum permissible exhaust restriction (back pressure) is 3 inches Hg (10.13 kPa).

FUEL SYSTEM

Allis-Chalmers engines used on the DYH 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 (2.4 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 25-feet (7.6 m). However a day tank is again recommended.

The fuel inlet is to the transfer pump and is threaded for 3/8-inch pipe. Injectors' return line requires a 1/4-inch low pressure hose connection.

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.

BATTERY

Starting the unit requires 24-volt battery current. Use two 12-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. 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.**

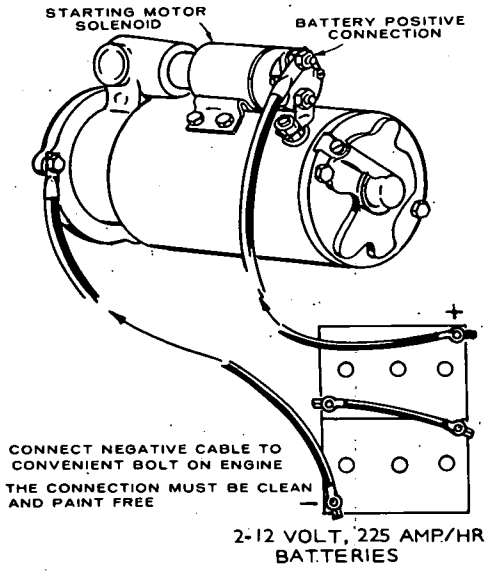


FIGURE 12. BATTERY CONNECTION

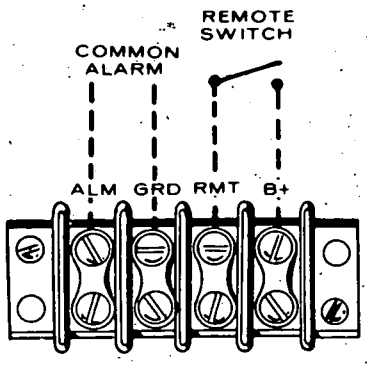
BATTERY, HOT LOCATION

Batteries will self discharge very quickly when installed where the ambient temperature is consistently above 90° F (32° 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 1.260 reading. The cranking power is reduced slightly when the electrolyte is so diluted, but if the temperature is above 90° F (32° 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 contract 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 1.225, 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. 18AWG wire; between 1000 feet (305 m) and 2000 feet (610 m), use No. 16AWG wire.



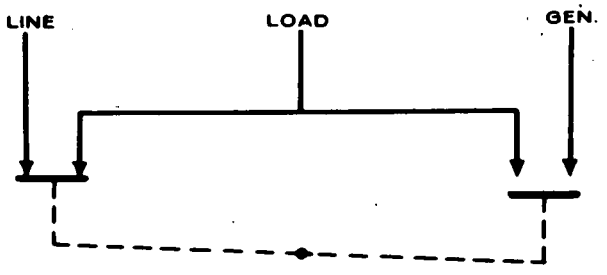
ES-1135

FIGURE 13. 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 (Figure 14) must always be used. Connect this switch (either automatic or manual) so that it is impossible for commercial power and generator power to be connected to the load at the same time. Instructions for connecting an automatic transfer switch are included with such equipment.



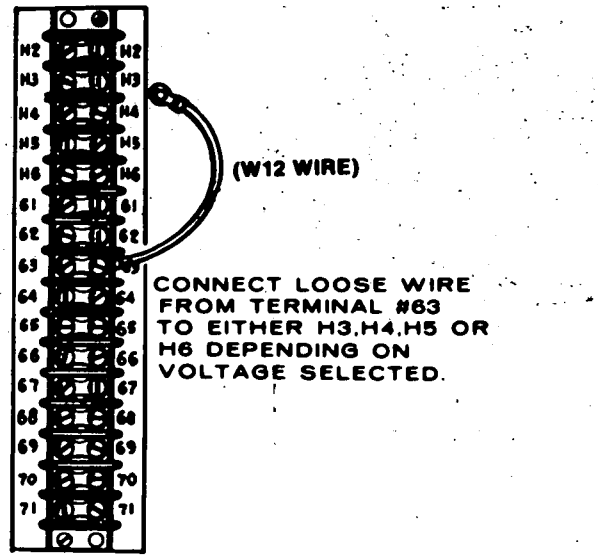
NOTE: SHOWN WITH LINE CONNECTED TO LOAD.

SC-1182

FIGURE 14. LOAD TRANSFER SWITCH

CONTROL BOX CONNECTION

Reconnection lead W12 on TB21 is a jumper which connects a single phase output from the generator to the appropriate tap on the voltage reference transformer (Figure 15). This lead is connected at one end to terminal 63 on the terminal board. The other end will be connected to a terminal marked H3, H4 or H5 depending upon the voltage option required. Refer to Figure 17 for voltages available and correct hookup.

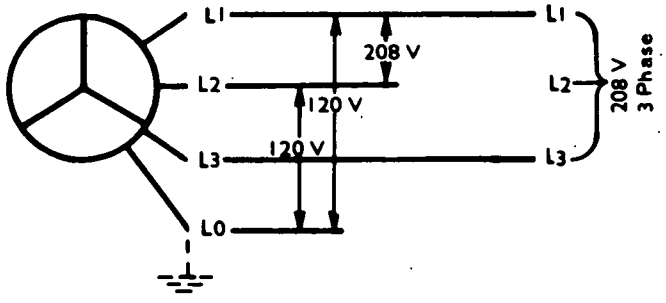


SC-1183

FIGURE 15. CONTROL BOX CONNECTION

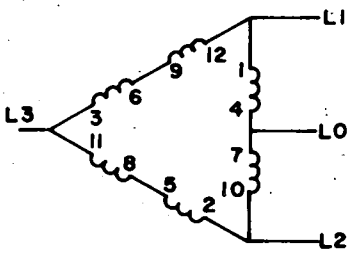
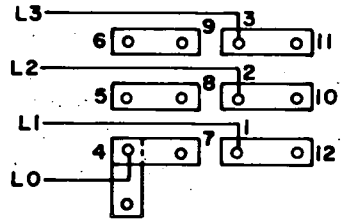
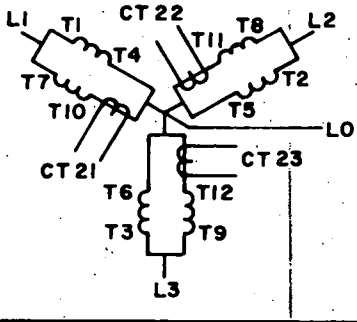
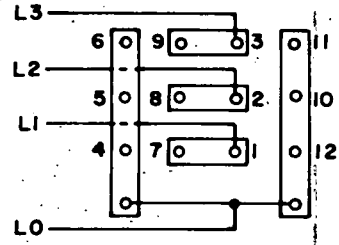
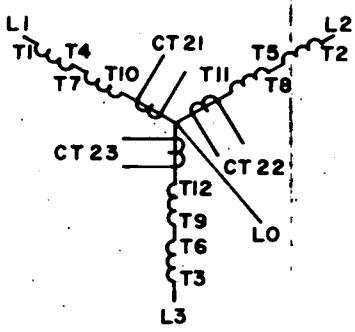
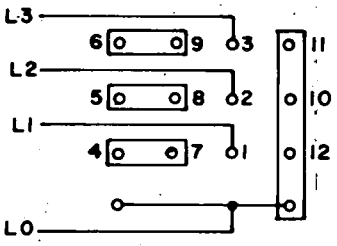
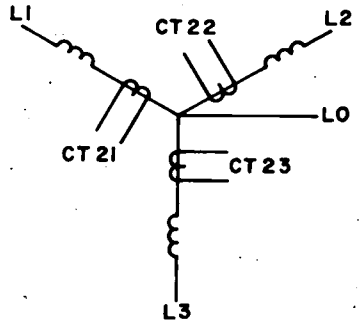
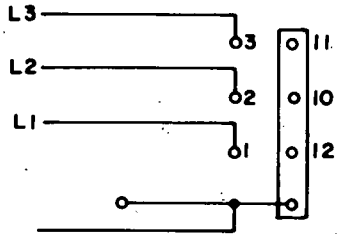
GENERATOR CONNECTIONS (Figure 17)

The YB generator is a 3-phase unit which can be connected in either series wye or parallel wye configuration to give the line to neutral and line to line voltage options referred to in Figure 17. The line to neutral voltage is the lower voltage noted on the unit nameplate, while the line to line voltage is the higher nameplate rating.



SC-1184

FIGURE 16. PHASE WYE CONNECTION

NAMEPLATE VOLTAGE CODE	VOLTAGE	PHASE	FREQUENCY	CONNECT LEADS FROM TERMINAL 63 TO: GENERATOR CONNECTION	GENERATOR CONNECTION SCHEMATIC DIAGRAM	GENERATOR CONNECTION WIRING DIAGRAM
5D	120/240	3	60	H5	SERIES DELTA		
6D	240/480	3	60	H5			
17	120/208	3	60	H3	PARALLEL WYE		
	127/220	3	60	H4			
	139/240	3	60	H5			
517	110/190	3	50	H3			
	115/200	3	50	H4			
	120/208	3	50	H4			
	127/220	3	50	H5			
7	220/380	3	60	H3	SERIES WYE		
17	240/416	3	60	H3			
	254/440	3	60	H4			
	277/480	3	60	H5			
517	220/380	3	50	H3			
	230/400	3	50	H4			
	240/416	3	50	H4			
	254/440	3	50	H5			
9X	347/600	3	60	H5	SERIES WYE		

SINGLE PHASE NOTE NOT AVAILABLE

YB SERIES GENERATORS 98-2579(C)

FIGURE 17. VOLTAGE CONNECTIONS

For 3-phase loads connect separate load wires to each of the set terminals L1, L2 and L3 (Figure 16). For a large single phase load only, connect between terminals L1 and L2. Available capacity is 2/3 maximum output.

The terminal L0 can be grounded. For 1-phase loads connect the neutral wire to the L0 terminal. Connect the load wire to either terminal — L1, L2. Two separate single phase circuits are available with a total capacity of up to 2/3 of the generator rated 3-phase output.

If using 1-phase and 3-phase current at the same time, ensure the 1-phase load is properly balanced. Do not exceed rated line current.

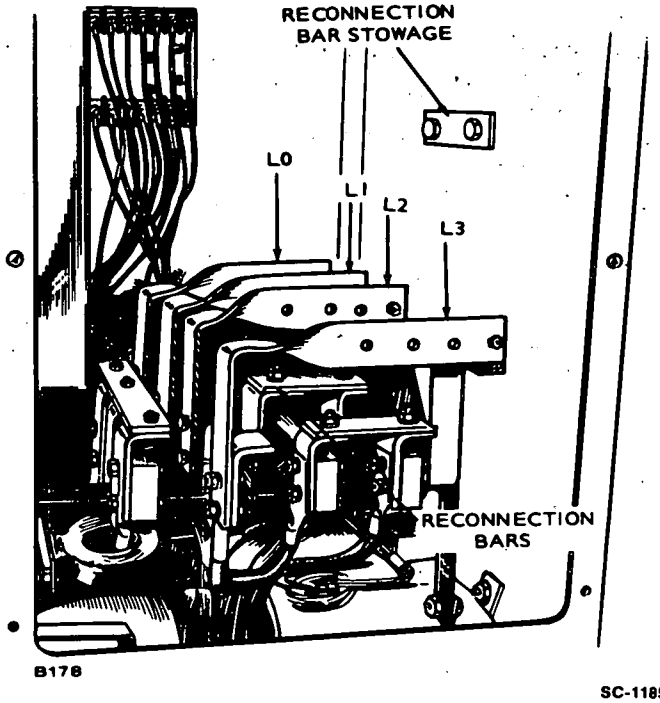


FIGURE 18. LOAD WIRE CONNECTIONS

Bus bars and reconnection bars (Figure 18) are aluminum, plated with tin to retard electrolytic corrosion. Select connecting cables and terminal lugs with care, to keep dissimilar metals apart. Do not overtorque bolts.

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 Electrical Code, 1981 Article 250.

Periodic inspection is recommended, especially after service work has been performed on equipment anywhere 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 electrically conductive path which will assure electrical continuity and capacity to conduct safely any current likely to be imposed.

Circuit and System Grounding
This refers to the intentional grounding of a circuit conductor or conductors. The design and installation of grounding system incompasses many considerations, such as multiple transformers, standby generators, ground 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.

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

Operation

GENERAL

Onan DYH 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*	SAE VISCOSITY GRADE
0° F (-18° C) and below	10W or 10W30
0° F to 32° F (-18° C to 0° C)	20-20W or 15W40
Above 32° F (0° C)	30W or 15W40
Above 95° F (35° C)	40W or 15W40

Oil Capacities (nominal
Oil Pan and Filter — 60 Quarts (57 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.

Turbocharger: Remove oil inlet of center housing and pour 85- to 120-cc of engine lubricating oil into the turbocharger housing. Fill oil inlet line with engine lubricating oil before reconnecting. Do this prior to initial start, and before starting if the engine has not been run for 30 days or more.

Cooling System: Cooling system was drained prior to shipment. Fill cooling system before starting. Nominal capacity is 16.5-gallons (62.5 lit). 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.**

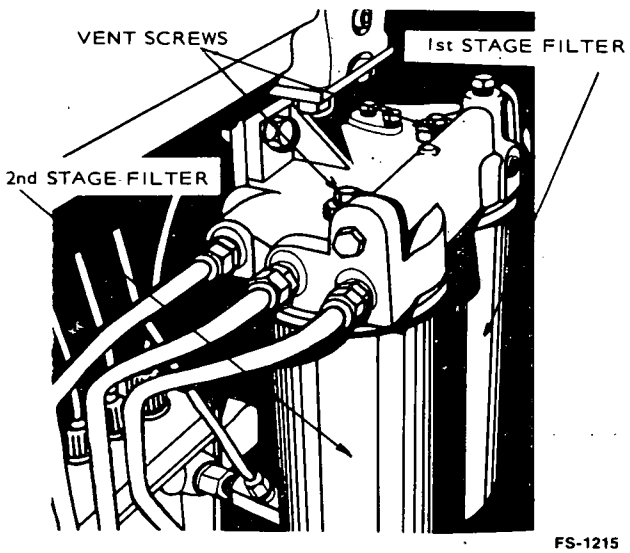


FIGURE 19. FUEL FILTERS

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

1. Loosen 2nd stage filter vent screw (Figure 19).
2. Using hand pump (Figure 20), prime system until fuel flow around filter vent screw is free of bubbles.
3. Secure vent screw and hand pump.

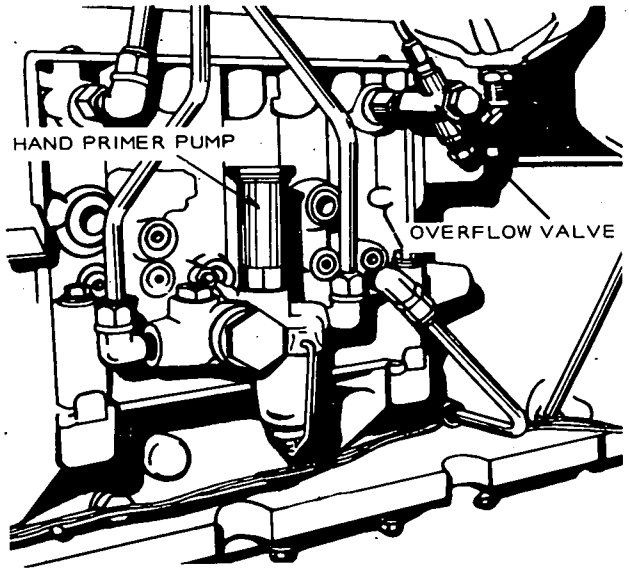


FIGURE 20. FUEL INJECTION SYSTEM

To bleed fuel injection pump refer to Figure 20. Disconnect fuel line from overflow valve and actuate hand primer. Continue pumping until fuel flow from valve is free of bubbles. Reconnect fuel line to overflow valve.

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 1.260 at 80° F (26° C). If distilled water has been added or specific gravity is less than 1.260, 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- and 379. 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° to 195° F (82° - 91° 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 180° F to 200° F (82° - to 93° C).

STOPPING

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

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 4 or Table 5.

TABLE 4.
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.	1. See engine service manual for troubleshooting fuel system. After correcting problem, reset engine monitor relay by placing Run-Stop/ Reset-Remote switch to Stop/Reset, then back to the required running position.
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.	3. Check the following: 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 5.
TROUBLESHOOTING ENGINE SHUTDOWN
(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.

EXERCISE PERIOD

Generating sets on continuous standby service are required to be operative at full load from a cold start in less than 10-seconds 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 can have 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.

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

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. Liquid cooled units. 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 (1.260 at 80°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% 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 (Figure 21): 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.

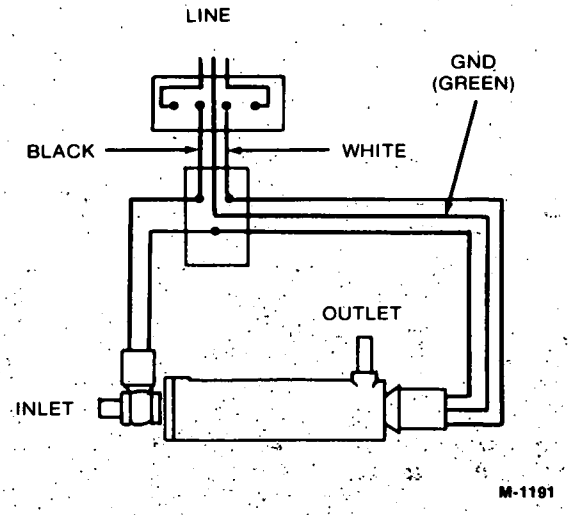


FIGURE 21. ENGINE HEATER

General Maintenance

GENERAL

Follow a definite schedule of inspection and servicing, based on operating hours (Table 6). Keep an accurate logbook of maintenance, servicing, and operating time. Use the running time meter (optional equipment) to keep a record of operation and servicing. Service periods outlined below are recommended 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 Allis-Chalmers engine manual for details of engine service and maintenance procedures.

WARNING **Before performing 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.**

WARNING **Regularly check entire exhaust system for leaks.**

ENGINE SPEED

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

A Woodward SG governor is standard equipment on the DYH generator set. High speed and low speed limits 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 Hz (generator on load). Turn in the high speed adjusting screw until it bottoms; secure the locknuts. Refer to Figure 22.

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

Example: 30 x 61 (Hz) = 1830 rpm.

Adjust engine speed to 1800 rpm for 60 Hz sets and 1500 rpm for 50 Hz sets.

Engine crankcase oil flows through the governor. Dirty oil can degrade governor operation.

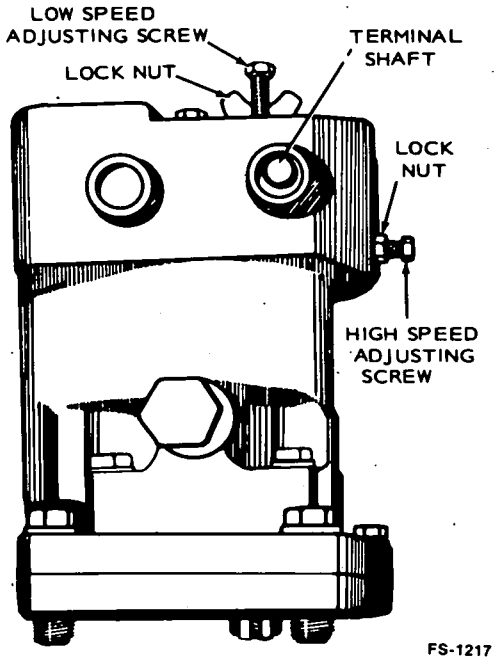


FIGURE 22. WOODWARD GOVERNOR

DUST AND DIRT

1. Keep set clean. Keep cooling system free of dirt, etc.
2. Service air cleaners frequently.
3. Store oil and fuel in dust-tight containers.
4. See engine operation and maintenance manual.

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. (3.4 N•m) 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 the electrolyte at the proper level above the plates by adding distilled water. Check specific gravity, recharge if below 1.260.

TABLE 6. OPERATOR MAINTENANCE SCHEDULE

MAINTENANCE	OPERATIONAL HOURS			
	8	50	100	200-250
Inspect Set	x8			
Check Fuel	x			
Check Radiator Coolant Level	x			
Check Oil Level	x			
Drain Fuel Filter Sediment	x			
Check Air Cleaner (Replace if Required)		x1		
Clean Injector Pump Linkage		x1		
Check Batteries		x4		
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	
Check all Hardware, Fittings, Clamps, Fasteners, etc.			x6	
Clean and Inspect Battery Charging Alternator				x
Check Starter				x
Check Injection Nozzles				x5
Replace Fuel Filter Element				x1

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

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

x3 Or every 3 months. Check for rust or scale formation. Flush if necessary.

x4 Or every 2 weeks.

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

x6 Or every 3 months.

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

x8 Give unit general inspection. Then with generator set running visually and audibly check the exhaust system for leaks.

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

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.

TANK HEATERS (Optional)

A Kim Tank Heater is optional equipment on the generator set. For efficient operation and optimum product life, perform the following procedure at least once a year (Figure 23).

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

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

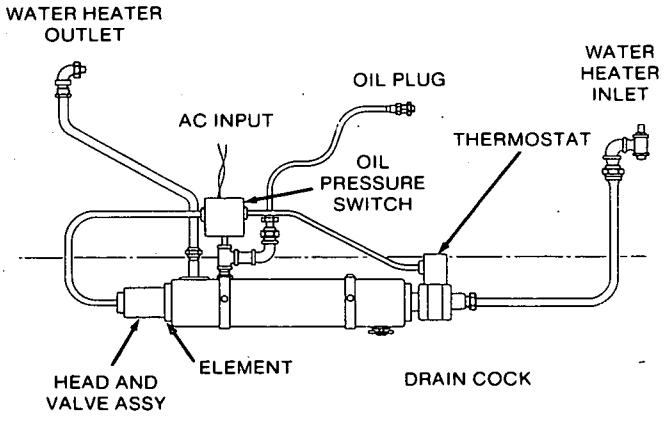


FIGURE 23. TANK HEATER MAINTENANCE

FILTERS

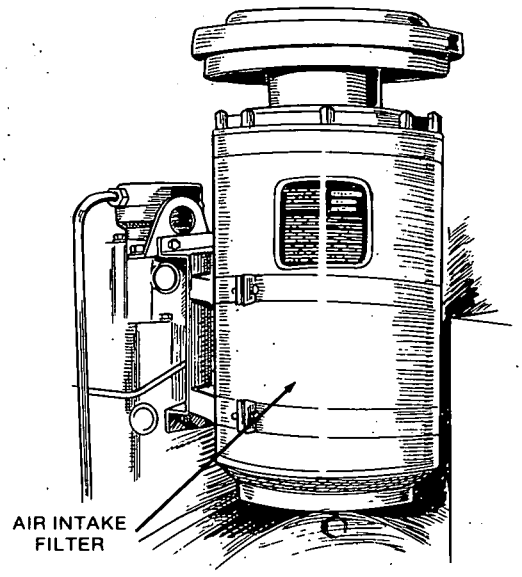
A planned program of filter cleaning or replacement will pay dividends in engine life, operation and reliability.

Air Filter: Replace or clean when plugged, or in accordance with service maintenance instructions. To remove filter element loosen eight nuts holding head, lift off head and remove filter element (see Figure 24).

Recommended clean method for element:

1. Blow dry compressed air (30 psi [207 kPa] maximum) through element from clean side. Hold air nozzle at least 1 inch (25 mm) away.
2. Soak for at least 15 minutes in water and Donaldsons D1400 solvent to remove soot and carbon as well as dirt. Rinse until water is clear (use low pressure water) and air dry. Do not use compressed air.

CAUTION **Filters should be handled with care to prevent damage. If the filter does become damaged, install recommended replacement part.**



M-1190

FIGURE 24. AIR FILTER

Onan Corporation
A subsidiary of
McGraw-Edison Company
1400 73rd Avenue N.E.
Minneapolis, Minnesota 55432

612 574 5000
Telex 29 0476
TWX 910 576/2833