

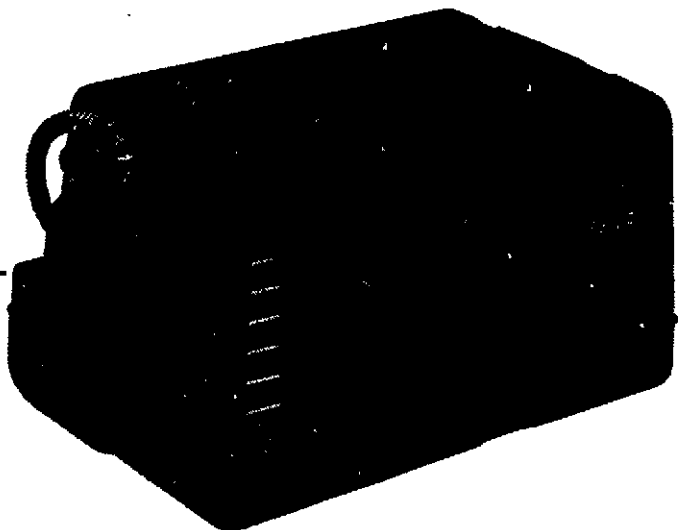
Onan

Operator's Manual

KV

GenSet

RV Electric Generator Set



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Safety Precautions

Before operating the generator set, read the Operator's Manual and become familiar with it and the equipment. Safe and efficient operation can be achieved only if the unit is properly operated and maintained. Many accidents are caused by failure to follow fundamental rules and precautions.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or the equipment.

⚠ DANGER This symbol warns of immediate hazards which will result in severe personal injury or death.

⚠ WARNING This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.

⚠ CAUTION This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

FUEL AND FUMES ARE FLAMMABLE. Fire, explosion, and personal injury can result from improper practices.

- DO NOT fill fuel tanks while engine is running. Fuel contact with hot engine or exhaust is a potential fire hazard.
- DO NOT SMOKE OR USE AN OPEN FLAME near the generator set or fuel tank.
- Fuel lines must be adequately secured and free of leaks. Fuel connection at the engine should be made with an approved flexible, non-conductive 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.

GASOLINE AND LPG FUEL MAY BE ACCIDENTALLY IGNITED BY ELECTRICAL SPARKS, presenting the hazard of fire or explosion, which can result in severe personal injury or death. When installing the generator set:

- Do not tie electrical wiring to fuel lines.
- Do not run electrical lines and fuel lines through the same compartment openings.
- Keep electrical and fuel lines as far apart as possible.
- Place a physical barrier between fuel lines and electrical lines wherever possible.
- If electrical and fuel lines must pass through the same compartment opening, make certain that they are physically separated by running them through individual channels, or by passing each line through a separate piece of tubing.
- 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 DEADLY

- Never sleep in the vehicle with the generator set running unless vehicle is equipped with an operating carbon monoxide detector.
- Provide an adequate exhaust system to properly expel discharged gases. Inspect exhaust system daily for leaks per the maintenance schedule. 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.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Before starting work on the generator set, disconnect batteries. This will prevent accidental arcing.

- Keep your hands away from moving parts.
- Make sure that fasteners on the generator set are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- Do not wear loose clothing or jewelry while working on generator sets. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts and cause shock or burning.
- If adjustment must be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Disconnect starting battery 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 can cause injury or death.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches to avoid accidental closure.
- DO NOT CONNECT GENERATOR SET DIRECTLY TO ANY BUILDING ELECTRICAL SYSTEM. Hazardous voltages can flow from the generator set into the utility line. This creates a potential for electrocution or property damage. Connect only through an approved device and after building main switch is open. Consult an electrician in regard to emergency power use.

GENERAL SAFETY PRECAUTIONS

- Have a fire extinguisher nearby. Maintain extinguisher properly and become familiar with its use. Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications.
- Hot coolants under pressure can cause severe personal injury. DO NOT open a radiator pressure cap while the engine is running. Stop the engine and carefully bleed the system pressure.
- Benzene and lead, found in some gasoline, have been identified by some state and federal agencies as causing cancer or reproductive toxicity. When checking, draining or adding gasoline, take care not to ingest, breathe the fumes, or contact gasoline.
- Used engine oils have been identified by some state or federal agencies as causing cancer or reproductive toxicity. When checking or changing engine oil, take care not to ingest, breathe the fumes, or contact used oil.
- Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and engine damage, which presents a potential fire hazard.
- DO NOT store anything in the generator compartment such as oil or gas cans, oily rags, chains, wooden blocks, portable propane cylinders, etc. A fire could result or the generator set operation (cooling, noise and vibration) may be adversely affected. Keep the compartment floor clean and dry.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.

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Section 1. Introduction

ABOUT THIS MANUAL

This manual provides information for operating and maintaining the MicroLite™ (KV) generator set. Study this manual carefully and comply with all warnings and cautions. Using the generator set properly and following a regular maintenance schedule will result in longer unit life, better performance, and safer operation.

MicroLite is a trademark of the Onan Corporation

HOW TO OBTAIN SERVICE

When the generator set requires service, contact your nearest authorized dealer or distributor. Factory-trained Parts and Service representatives are ready to handle all your service needs.

If unable to locate a dealer or distributor, consult the Yellow Pages. Typically, our distributors are listed under:

**GENERATORS-ELECTRIC,
ENGINES-GASOLINE OR DIESEL, OR
RECREATIONAL VEHICLES-EQUIPMENT,
PARTS AND SERVICE.**

For the name of your local Cummins/Onan or Onan-only distributor in the United States or Canada, call 1-800-888-ONAN (this automated service utilizes touch-tone phones only). By entering your area code and the first three digits of your local telephone number, you will receive the name and telephone number of the distributor nearest you.

For the name of your local Cummins-only distributor, or if you need more assistance, please call Onan Corporation, 1-612-574-5000, 7:30 AM to 4:00 PM, Central Standard Time, Monday through Friday.

When contacting your distributor, always supply the complete Model Number and Serial Number as shown on the generator set nameplate.

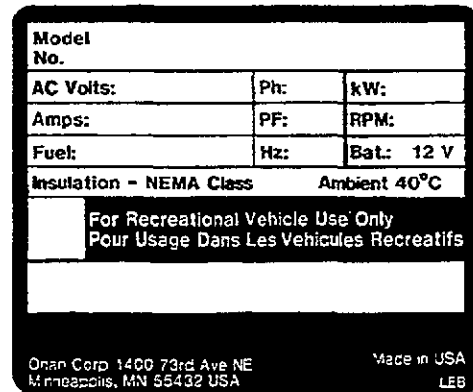
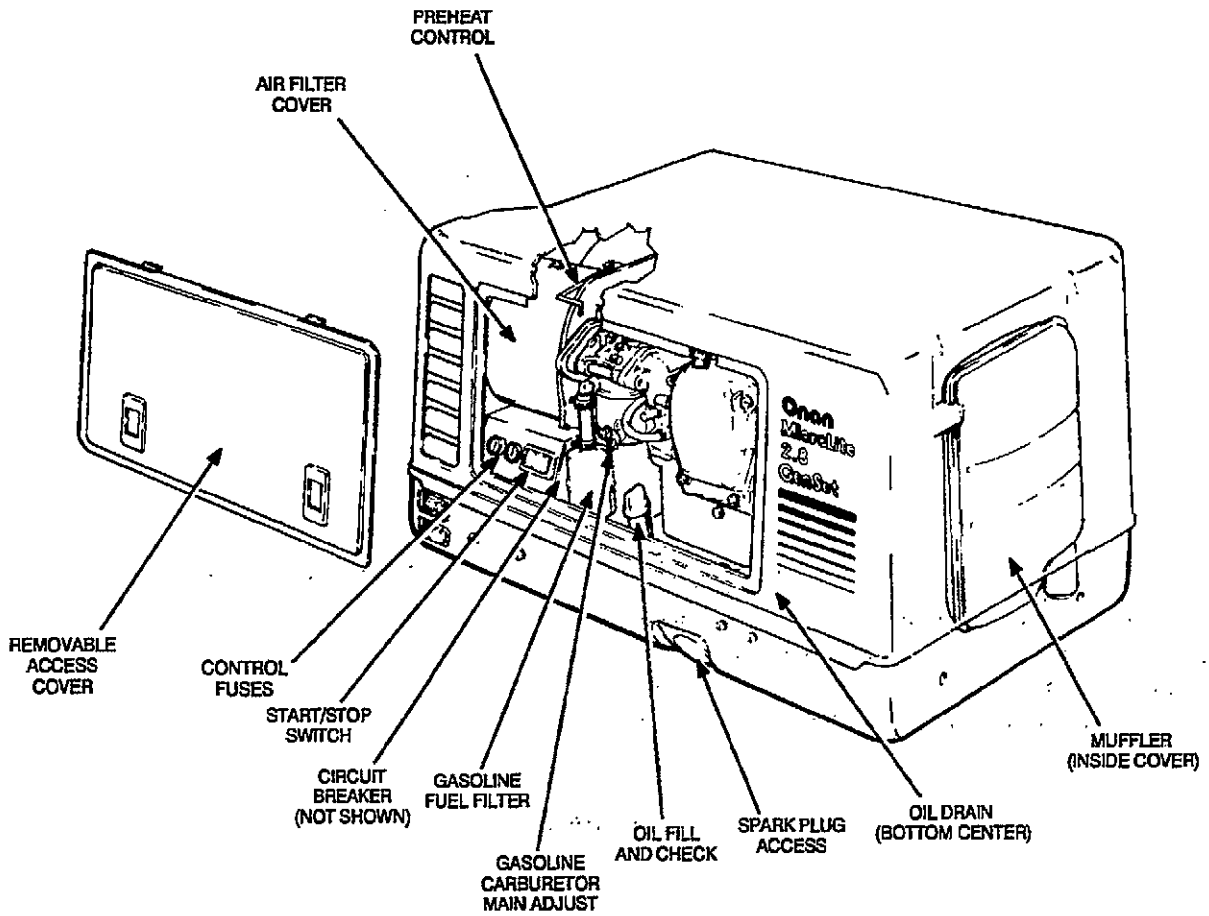


FIGURE 1-1. ONAN NAMEPLATE

⚠WARNING

INCORRECT SERVICE OR PARTS REPLACEMENT CAN RESULT IN SEVERE PERSONAL INJURY, DEATH, AND/OR EQUIPMENT DAMAGE. SERVICE PERSONNEL MUST BE QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE.

WARNING Operation of the generator set with the access cover removed can result in severe personal injury or equipment damage. Hot components are exposed when the access cover is removed and generator set cooling air does not circulate properly. Do not operate the generator set with the access cover removed.



G1207-3

FIGURE 1-2. MICROLITE™ (KV) GENERATOR SET

Section 2. Specifications

GASOLINE MODELS	1.7 KV	2.0 KV	2.2 KV	2.8 KV
GENERATOR DETAILS				
Type	Onan, Revolving Field, 2-Pole		Onan, Revolving Field, 2-Pole	
Frequency (Hertz)	50	50	60	60
Power (Watts)	1700	2000	2200	2800
Voltage	240	220	120	120
Current (Amperes)	7.1	9.1	18.3	23.3
ENGINE DETAILS				
Engine	Onan GH-200		Onan GH-200	
Fuel	Gasoline		Gasoline	
Engine Oil Capacity	1 qt (0.95 L)		1 qt (0.95 L)	
Battery Requirements:				
Battery Size	12-Volt		12-Volt	
Cold Cranking Amps	360		360	
Spark Plug Gap	0.025 in. (0.64 mm)		0.025 in. (0.64 mm)	
Average Fuel Consumption:				
No Load	0.2 gph (0.8 L/h)	0.2 gph (0.8 L/h)	0.2 gph (0.8 L/h)	0.2 gph (0.8 L/h)
Half Load	0.21 gph (0.8 L/h)	0.23 gph (0.9 L/h)	0.28 gph (1.0 L/h)	0.3 gph (1.1 L/h)
Full Load	0.33 gph (1.3 L/h)	0.4 gph (1.5 L/h)	0.35 gph (1.3 L/h)	0.43 gph (1.6 L/h)

LPG MODELS	2.0 KV	2.5 KV
GENERATOR DETAILS		
Type	Onan, Revolving Field, 2-Pole	
Frequency (Hertz)	50	60
Power (Watts)	2000	2500
Voltage	220	120
Current (Amperes)	9.1	20.8
ENGINE DETAILS		
Engine	Onan GH-200	
Fuel	LPG Vapor (11 inches W.C.)	
Engine Oil Capacity	1 qt (0.95 L)	
Battery Requirements:		
Battery Size	12-Volt	
Cold Cranking Amps	360	
Spark Plug Gap	0.025 in. (0.64 mm)	
Average Fuel Consumption:		
No Load	0.2 gph (0.8 L/h)	0.2 gph (0.8 L/h)
Half Load	0.3 gph (1.14 L/h)	0.34 gph (1.29 L/h)
Full Load	0.45 gph (1.7 L/h)	0.55 gph (2.08 L/h)

The 60 Hertz models are listed by C.S.A. and the U.S. Testing Company.

Section 3. Operation

⚠WARNING

EXHAUST GAS IS DEADLY!

Exhaust gases contain carbon monoxide, an odorless and colorless gas. Carbon monoxide is poisonous and can cause unconsciousness and death. Symptoms of carbon monoxide poisoning can include:

- *Dizziness*
- *Nausea*
- *Headache*
- *Weakness and Sleepiness*
- *Throbbing In Temples*
- *Muscular Twitching*
- *Vomiting*
- *Inability to Think Coherently*

IF YOU OR ANYONE ELSE EXPERIENCE ANY OF THESE SYMPTOMS, GET OUT INTO THE FRESH AIR IMMEDIATELY. If symptoms persist, seek medical attention. Shut down the unit and do not operate until it has been inspected and repaired.

Never sleep in the vehicle with the generator set running unless the vehicle interior is equipped with an operating carbon monoxide detector. Protection against carbon monoxide inhalation also includes proper exhaust system installation and visual and audible inspection of the complete exhaust system at the start of each generator set operation.

GENERAL

This section describes starting and operating the generator set. Read through this entire section before starting the set. Become completely familiar with the set to operate it correctly.

PRE-START CHECKS

General Inspection

Open the access cover and inspect the set and the entire exhaust system. Look for loose or damaged components and fasteners. Correct all problem areas before operating the set.

⚠WARNING *Exhaust gas presents the hazard of severe personal injury or death. Make certain that all exhaust components are operational and secure and there is no leakage.*

Do not start the generator set while a load is connected. Make certain that the output switching device on the vehicle (if present) is in the "Utility" position, and that the vehicle AC distribution panel breakers are off (open).

Do not start the set if exhaust gases will not effectively expel away from the vehicle. Be aware that any vent, window or opening that can be opened and that is not permanently sealed from the vehicle living space can be an avenue for carbon monoxide.

⚠WARNING *Exhaust gases can cause severe personal injury or death. Never operate the generator set unless the exhaust outlet is clear of walls, snow banks, or any obstructions that can prevent exhaust gases from dissipating. Never operate any exhaust fan in the vehicle when the generator set is running: an exhaust fan can draw exhaust gas into the vehicle.*

Make sure that the vehicle is not parked in high grass or brush.

⚠WARNING *Fire can cause severe personal injury or death. Do not operate the generator set when the vehicle is parked in high grass or brush.*

Lubrication

Check the engine oil level before each start. Make sure the generator set is level and keep oil level filled close to the dipstick FULL mark. Do not overfill. See the *Maintenance* section for lubrication recommendations and oil change procedures.

⚠WARNING *Hot oil can cause severe burns if spilled or splashed on skin. Keep fingers and hands clear when removing oil drain plug, and wear protective clothing.*

Fuel

Make sure the fuel tanks are full. See the Recommended Fuels section.

⚠WARNING Gasoline presents the hazard of fire or explosion that can result in severe personal injury or death. Do not smoke or allow any flame, spark, pilot light, arc-producing equipment or other ignition sources around fuel or fuel components. Keep a type ABC fire extinguisher nearby.

RECOMMENDED FUEL

Gasoline Models: Use clean, fresh unleaded gasoline. (Regular leaded may be used if necessary.) Unleaded gasoline promotes extended service intervals, longer spark plug life, and less engine carbon clean-out maintenance.

Gasoline fuels deteriorate over time causing fuel system corrosion and the formation of gum and varnish-like deposits. These deposits cause hard starting and rough engine operation. If the generator set will not be operated for more than 120 days, a fuel preservative and stabilizer, like OnaFresh™, should be used to protect the fuel system and reduce contaminant formation (refer to Out-Of-Service Protection in the *Maintenance* section).

OnaFresh is a trademark of the Onan Corporation.

LPG Models: Use clean, fresh commercial propane or HD-5 grade liquid propane gas in a mixture of at least 90 percent propane. Propane fuels other than HD-5 can contain more than 2.5 percent butane which can result in fuel vaporization and poor engine starting in low ambient temperatures (below 32°F or 0°C).

A manual shutoff valve must be mounted on the propane fuel supply tank. This supply tank valve must be opened fully when operating the generator set so the flow valve will close with a broken propane fuel line.

CONTROL PANEL

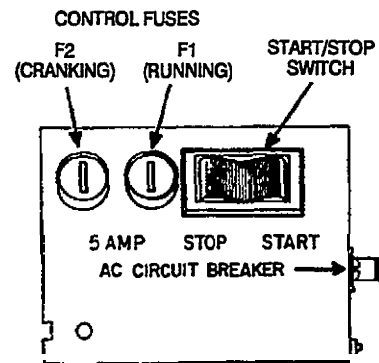
The following section describes the function and operation of the generator set controls. The generator set control panel and optional remote control panels are shown in Figures 3-1 and 3-2.

Control Components

Start/Stop Switch: Starts and stops the set locally. The set can also be operated from an optional remote control wired to the set control panel.

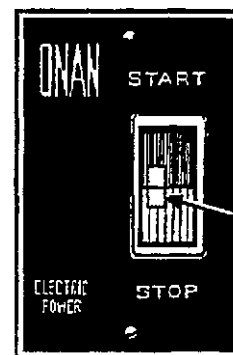
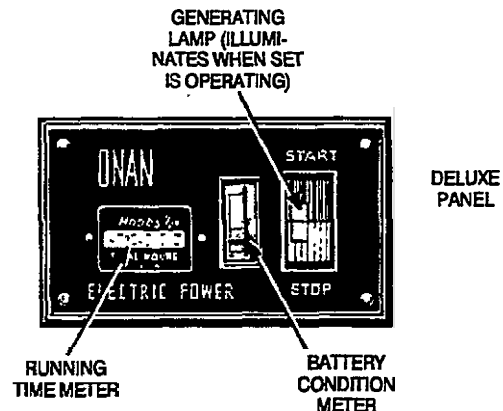
Control Fuses: Provide protection for the control box wiring and remote wiring from short circuit or other overload. The cranking fuse provides protection during start-up and the running fuse provides protection while the generator set is operating.

Line Circuit Breaker: Protects the generator from a short or overloaded circuit.



SC1609-2

FIGURE 3-1. GENERATOR SET CONTROL PANEL



ES1684a-1

FIGURE 3-2. REMOTE CONTROL PANELS

REMOTE CONTROL PANEL (OPTIONAL)

The optional remote control enables the generator set to be run from inside the RV living quarters or driver's area.

Standard Remote Control: This has a Start/Stop switch and an indicator lamp that lights when the set is running.

Deluxe Remote Control: Has the same features as the standard remote control plus a running time meter and a battery condition meter. See Figure 3-2.

Running Time Meter: Indicates cumulative total hours of generator set use. Use the meter to keep a record for periodic maintenance.

Battery Condition Meter: Indicates the condition of the battery and the battery charging circuit. The indicator should remain in the normal zone. If it reads consistently high or low, contact an Onan service center for assistance.

STARTING PROCEDURE

For initial start-up of a new generator set, refer to the Break-in Procedure section of this manual.

1. Inspect the generator set. Follow the Pre-start Checks listed at the beginning of this section. (Open the fuel supply valve on LPG fueled models).
2. Remove the access cover. Push the Start/Stop switch to START. Release the switch when the generator set starts and replace the access panel.

CAUTION Contact with hot engine parts can cause severe burns. Use caution when access cover is removed to avoid contacting hot engine parts.

CAUTION Operation of the generator set with the access cover removed can cause equipment damage. Generator set cooling air does not circulate properly with the access cover removed. Do not operate the generator set with the access cover removed.

3. Let the set warm up before connecting a load. Make sure that the set is running smoothly and that there are no fuel or exhaust leaks. Correct any problems immediately.
4. Apply load. See the Specifications section for generator set output power ratings. Refer to Table 3-1 to determine approximate power usage for various appliances and tools.

CAUTION Continuous generator set overloading can cause high operating temperatures that could damage the generator windings. Keep the load within the nameplate rating.

Remote Starting

Hold the Start/Stop switch on the remote control in the START position until the lamp on the switch lights, indicating the generator set is running.

If the switch is held at START for ten seconds and the lamp does not light, release the switch, wait two minutes and try again. If the second try does not start the generator set, start the set using the Start/Stop switch on the set. If the lamp still does not light, there may be an open in the remote wiring. Contact an Onan service center for assistance.

TABLE 3-1. APPROXIMATE POWER USAGE OF COMMON APPLIANCES

Appliance or Tool	Approximate Running Wattage
Air Conditioner	1400-2000
Battery Charger	Up to 800
Coffee Percolator	550-750
Converter	300-500
Electric Blanket	50-200
Electric Broom	200-500
Electric Drill	250-750
Electric Frying Pan or Wok	1000-1500
Electric Iron	500-1200
Electric Stove (Per Element)	350-1000
Electric Water Heater	1000-1500
Hair Dryer	800-1500
Microwave Oven	1000-1500
Radio	50-200
Refrigerator	600-1000
Space Heater	1000-1500
Television	200-600

STOPPING

1. Disconnect all loads from the generator set.
2. Let the set run three to five minutes to cool down. Failure to let the generator set cool down can cause engine run-on or backfire.
3. Push the Start/Stop switch to the STOP position at the genset control or at the remote control. (Close the fuel supply valve on LPG fueled models.)

OPERATING RECOMMENDATIONS

Break-In Procedure

To prevent high oil consumption or glazing of the engine cylinders, perform the break-in procedure described below:

1. After starting, apply a load to the generator set of half its capacity and run the set for two hours. See the *Specifications* section for the set capacity. Table 3-1 lists the wattage requirement of common appliances and tools.
2. Increase the load to three-quarters capacity and run the set for another two hours.
3. Change the engine crankcase oil after the first 20 hours of operation, and every 100 hours after that. See the *Maintenance* section of this manual for more information.

Connecting A Load

Allow the set to warm up before applying a heavy load. Overloading can cause high operating temperatures and damage the set. Keep the load within the nameplate rating. Keep periods of operation at no load to a minimum.

Hot Weather

Keep the cooling fins clean at all times, especially in weather hotter than 90°F (33°C). Make certain that nothing blocks the airflow to and from the generator set. Make certain that the set is well-maintained (see the Periodic Maintenance Schedule in Section 4 of this manual). Do not overload the set.

Cold Weather

Use the right oil type and weight for cold weather conditions. See the *Maintenance* section of this manual for oil recommendations. Change the oil only after the engine is warmed up. If a sudden temperature change occurs and the oil is not the correct viscosity, replace the oil as required.

At temperatures below 40°F (4°C), move the carburetor air preheater lever to the WINTER position. The lever is located on the outside of the air cleaner housing (see Figure 4-3). At temperatures above 70°F (21°C), move the preheater lever to the SUMMER position. At temperatures between 40°F (4°C) and 70°F (21°C), the preheater may be left in either position.

CAUTION *Operation of the preheater when temperatures are above 70°F (21°C) may cause erratic operation, and may result in reduced engine power and reduced engine life. For this reason, leave the preheater in the SUMMER position at high ambient temperatures.*

Extremely Dusty or Dirty Conditions

1. Keep the generator set and its cooling surfaces as clean as possible.
2. Service the air cleaner frequently.
3. Change the engine crankcase oil every 50 operating hours.
4. Keep oil in a dust-tight container.
5. Keep the governor linkage clean. See the *Maintenance* section for this procedure.

Generator Set Exercise

Infrequent operation of the generator set can encourage moisture to condense in the engine, making starting difficult. Moisture accumulates because the engine does not run often enough to reach normal operating temperature. This moisture can damage the engine. Also fuel evaporates and leaves deposits that can cause hard starting and unstable running.

To prevent moisture damage, run the generator set at 50 percent capacity (see *Specifications* section) two hours every four weeks. A long exercise period is preferable to several short periods.

TABLE 3-2. TROUBLESHOOTING GUIDE

The following is a simplified troubleshooting guide. If these recommendations fail to resolve the problem, contact an authorized Onan service center.

⚠WARNING

Many troubleshooting procedures present hazards which can result in severe personal injury or death. Only qualified service personnel with knowledge of fuels, electricity, and machinery hazards should perform service procedures. Review safety precautions on Inside cover page.

Problem	Probable Cause	Solution
FAILS TO CRANK	<ol style="list-style-type: none"> 1. Low battery. 2. Bad battery connection. 3. Blown fuse. 	<ol style="list-style-type: none"> 1. Check battery electrolyte level. 2. Clean and tighten all battery and cable connections. 3. Replace fuse on control box.
CRANKS SLOWLY	<ol style="list-style-type: none"> 1. Low battery. 2. Bad battery connection. 3. Oil is too heavy. 4. Load connected. 	<ol style="list-style-type: none"> 1. Check battery electrolyte level. 2. Clean and tighten all battery and cable connections. 3. Replace with lighter oil. 4. Disconnect load while starting.
CRANKS BUT WON'T START	<ol style="list-style-type: none"> 1. Fuel below genset pickup level in tank. 2. Fuel supply shutoff valve closed. 3. Carbon deposits on spark plug. 4. Low oil level. 	<ol style="list-style-type: none"> 1. Add fuel. 2. Fully open fuel supply valve. 3. Remove spark plug and clean. 4. Add oil if necessary.
EXHAUSTING BLACK SMOKE	<ol style="list-style-type: none"> 1. Rich fuel mixture. 2. Dirty air filter. 3. Choke stuck. 	<ol style="list-style-type: none"> 1. Turn main fuel adjustment in 1/8 turn (location of adjustment is shown in Figure 1-2). 2. Replace air filter. 3. Contact an Onan service center.
UNIT RUNS THEN STOPS	<ol style="list-style-type: none"> 1. Out of fuel. 2. Low oil level. 3. Excess oil. 	<ol style="list-style-type: none"> 1. Refill fuel tank. 2. Add oil if necessary. 3. Reduce engine oil level.
UNIT RUNS THEN SURGES	<ol style="list-style-type: none"> 1. Loose or worn spark plug lead. 2. Ignition coil, wiring, or control components defective. 3. Faulty spark plug. 4. Governor out of adjustment. 	<ol style="list-style-type: none"> 1. Check security of spark plug lead at spark plug and ignition coil. 2. Contact an Onan service center. 3. Remove and clean or replace 4. Contact an Onan service center.

⚠WARNING A hot generator set can cause severe burns. Always allow the generator set to cool before performing any maintenance or service.

Section 4. Maintenance

GENERAL

Establish and use a maintenance and service schedule. In extremely hot or dusty operating conditions, reduce maintenance intervals accordingly.

Consult an authorized Onan service center if the generator set is subject to extremely hot or dusty conditions, to draw up a more frequent maintenance schedule. Log all service and maintenance for warranty support.

Perform all maintenance at the time period indicated or after the number of operating hours indicated. Use the schedule to determine the maintenance required, and then refer to the sections that follow for the correct procedures.

⚠WARNING *Accidental starting of the generator set during maintenance can cause severe personal injury or death. Disconnect both generator set starting battery cables, before performing maintenance. Remove the negative (-) cable first to reduce the risk of arcing.*

TABLE 4-1. PERIODIC MAINTENANCE SCHEDULE

SERVICE THESE ITEMS	SERVICE TIME				P A G E
	Daily or after 8 hours	Monthly or after 100 hours	After 200 Hours	After 500 Hours	
Inspect Set	x ¹				4-2
Check Oil Level	x				4-2
Change Crankcase Oil		x ²			4-3
Check Battery Specific Gravity		x			4-4
Clean and Adjust Governor Linkage		x ⁵			4-4
Replace Air Filter			x ³		4-3
Clean Spark Plug			x ⁴		4-4
Clean Cooling Fins			x ⁵		-
Check Valve Lash Clearance			x ⁵		-
Change Fuel Filter (Gasoline)				x	4-3
Clean and Adjust Carburetor				x ⁵	-
Clean Cylinder Head				x ⁵	4-5
Inspect and Pressure Test the LPG System				x ⁶	-

- 1 – Check for oil, fuel and exhaust system leaks. Check exhaust system audibly and visually with genset running. Temporarily remove access cover to check muffler. Repair any leaks immediately. Replace corroded exhaust and fuel line components before leaks occur.
- 2 – Perform after first 20 hours of operation on new sets.
- 3 – Replace every 150 hours, perform more often in extremely dusty conditions.
- 4 – Replace annually or prior to storage.
- 5 – Have the Onan service center perform.
- 6 – Perform more frequently if there are extended periods of nonuse.

GENERAL INSPECTION

Perform a general inspection of the generator set every eight operating hours. Start the set and check for visible and audible irregularities.

Exhaust System

Examine the exhaust system for leaks. Inspect the set compartment for holes that might allow exhaust gas to enter the vehicle. If the generator set runs louder than usual, if the compartment has holes to the interior, or if the exhaust system leaks, do not operate the set. Consult an Onan service center as soon as possible, and do not run the set until the problem is corrected.

Replace worn, damaged, or corroded exhaust components before leaks occur.

⚠WARNING *Exhaust gas presents the hazard of severe personal injury or death. If there are any exhaust leaks, do not operate the generator set, and have the exhaust system repaired before using the generator set.*

Fuel System

With the generator set running, check the fuel supply line, filter, and fittings for leaks. Check all flexible sections for cuts, cracks, and abrasions, and make sure they do not rub against anything that could damage them. Replace worn or hardened fuel line components before leaks occur.

⚠WARNING *Fuel presents the hazard of fire or explosion that can result in severe personal injury or death. If any leaks are detected, have them corrected immediately.*

DC Electrical System

With the genset off, check the battery terminals for clean and tight connections. Loose or corroded connections create resistance that can impede starting. Clean and reconnect loose battery cables. Remove the negative (-) battery cable first and install it last to reduce the risk of arcing.

Mechanical

With the genset stopped, check for any signs of mechanical damage and investigate anything that indicates possible mechanical problems. With the set running, listen for any unusual noises that may indicate mechanical problems. If any problems are found, have them corrected immediately.

LUBRICATION SYSTEM

Before the initial start, the engine must be filled with oil of the recommended classification and viscosity. Refer to the *Specifications* section for the lubricating oil capacity.

Be sure the engine crankcase is filled with oil to the FULL mark on the oil level indicator (Figure 4-1). If adding oil between changes, use the same brand; different brands might not be compatible when mixed. See Recommended Engine Oil in this section.

Add oil very slowly until it reaches the FULL mark on the oil level indicator (see Checking Engine Oil Level). Make certain not to overfill; excess oil may foam in the crankcase and stop the engine. Always replace the oil level indicator tightly, to avoid leakage.

⚠WARNING *Hot oil can cause severe personal injury. Do not check the oil level while the generator set is running; oil may blow out of the oil fill tube.*

Checking Engine Oil Level

1. Remove the oil level indicator and wipe it with a clean rag.
2. Place oil level indicator in oil fill. Do NOT screw oil cap down.
3. Remove oil level indicator again, and check the oil level on the indicator stem.
4. Add oil very slowly as described above.

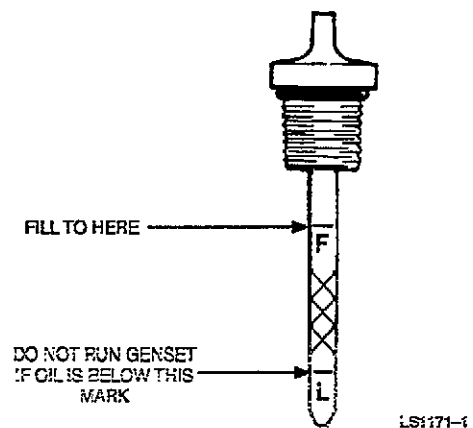


FIGURE 4-1. OIL LEVEL INDICATOR

Changing Engine Oil

Figure 1-2 shows the location of the oil drain and oil level indicator. In dusty or dirty conditions, change the oil more frequently than is specified in the maintenance schedule.

⚠WARNING *Hot oil can cause severe burns if spilled or splashed on skin. Keep fingers and hands clear when removing oil drain plug, and wear protective clothing.*

1. Place a pan under the oil drain plug. Run the engine until warm and then shut it off.
2. Unscrew the oil plug and allow oil to drain from the engine.
3. Install oil plug and tighten securely to avoid oil leak.
4. Dispose of the old oil properly.
5. Refer to the *Specifications* section for the engine oil capacity. See Recommended Engine Oil to select the proper grade of oil.
6. Remove oil level indicator and replenish oil through oil fill port. Add oil very slowly and do not over fill.

Recommended Engine Oil

Use oil with the API (American Petroleum Institute) designation SG. Oil should be labeled as having passed MS Sequence Tests (also known as ASTMG-1V Sequence Tests). Refer to Figure 4-2 for recommended viscosity and temperatures.

Oil consumption may be higher with a multigrade oil than with a single-grade oil if both oils have similar viscosities at 210° F (99° C). For this reason, single-grade oils are preferable unless wide temperature variations are anticipated.

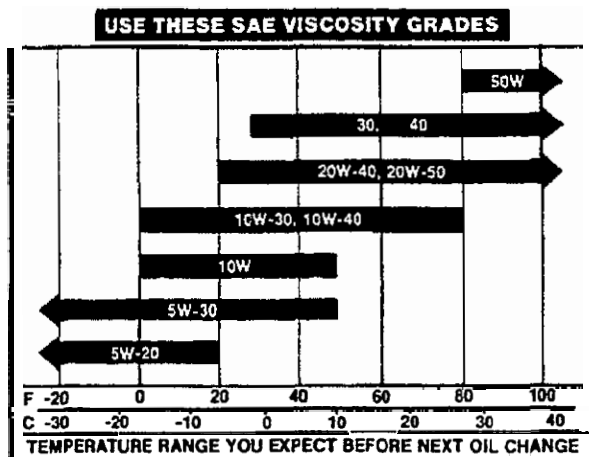


FIGURE 4-2. SAE VISCOSITY GRADES

LS1139

AIR FILTER

In dusty conditions, change the air filter often. Replace the air filter only with an Onan-approved filter.

To change the filter, remove the access cover, lift the filter cover out of the scroll housing and pull out the filter retainer. See Figure 4-3.

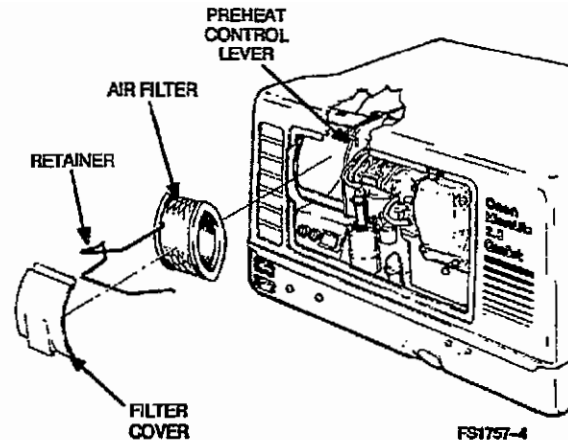


FIGURE 4-3. REPLACING THE AIR FILTER

GASOLINE FUEL FILTER

Change the fuel filter at the interval recommended in the Maintenance Schedule or if performance problems occur and bad fuel is suspected. Switch AC breaker OFF (Figure 3-1). Shut off the fuel supply valve and let the set run until it is out of fuel. Allow the generator set to cool down before replacing the fuel filter. Refer to Figure 4-4.

⚠WARNING *Fuel presents the hazard of fire or explosion that can cause severe personal injury or death. Do not permit any flame, spark, pilot light, lit cigarette, or other ignition source near the fuel system. Keep a type ABC fire extinguisher nearby.*

⚠CAUTION *Incorrect replacement of service parts can result in damage to equipment. Use genuine Onan replacement fuel filters only.*

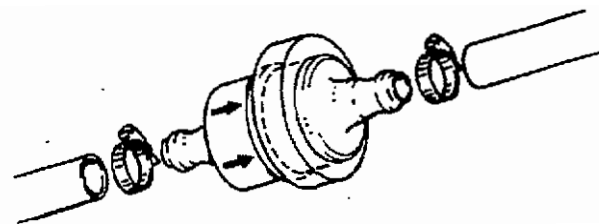


FIGURE 4-4. FUEL FILTER

FS1756-2

BATTERY CARE

To increase battery life, perform these routine checks and preventive measures.

⚠WARNING Batteries present the hazard of explosion, which can result in severe personal injury. Do not smoke or allow any fire, flame, spark, pilot light, arc-producing equipment or other ignition sources around the battery area. Do not disconnect battery cables while the generator set is cranking or running: batteries give off explosive gases.

⚠WARNING Battery electrolyte can cause severe eye damage and burns to the skin. Wear goggles, rubber gloves and a protective apron when working with batteries.

1. Keep the battery case clean and dry.
2. Make certain that the battery cable connections are clean and tight. To remove the battery cables, use a terminal puller tool.
3. Identify the cable as positive (+) or negative (-) before making the connection. Always connect the negative (-) cable last, to reduce the risk of arcing.
4. To remove corrosion around the terminal connections, wash the terminals with an ammonia solution or a solution consisting of 1/4 pound (about 100 grams) of baking soda in 1 quart (about 1 liter) of water. Be sure the vent plugs are tight to prevent cleaning solution from entering the cells. After cleaning, flush the outside of the battery and the surrounding areas with clean water.
5. Maintain the electrolyte level by adding distilled water as needed to reach the split-level marker in the battery. The water component of the electrolyte evaporates, but the sulfuric acid component remains. For this reason, add water, not electrolyte to the battery.
6. Use a battery hydrometer to check the specific gravity of the electrolyte in each battery cell. Charge the battery only if the specific gravity measures less than 1.215. Avoid overcharging the battery. Stop the boost charge when the electrolyte specific gravity reaches 1.260, at approximately 80° F (27° C).

GOVERNOR LINKAGE

The governor linkage must be free to move through its entire range of travel. Have the governor linkage cleaned and adjusted by an Onan service center as specified in the Periodic Maintenance Schedule. Inspect

the linkage for binding, excessive slack and wear during each general inspection. Figure 4-5 shows the governor linkage on a gasoline fueled generator set.

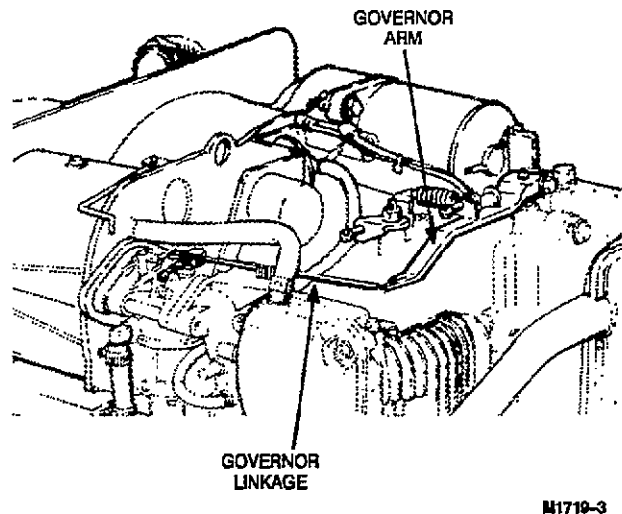


FIGURE 4-5. GOVERNOR LINKAGE

SPARK PLUG

A spark plug with heavy combustion deposits can cause the generator set to misfire, operate erratically, or stop when a load is applied. When the spark plug is removed, inspect and regap it (Figure 4-6). If the plug is discolored or fouled, replace it.

- Black deposits indicate a rich mixture.
- Wet plugs indicate misfiring.
- Badly or frequently fouled plugs indicate the need for a major tune-up.

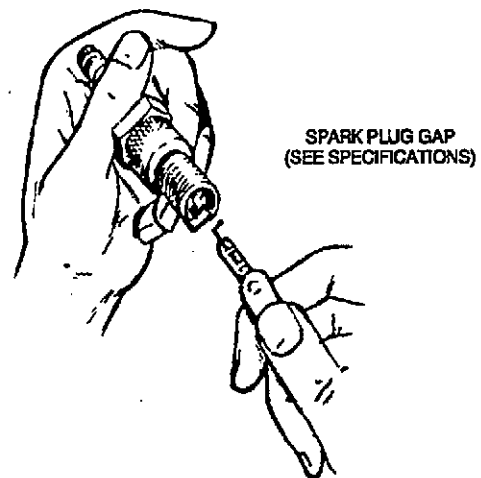


FIGURE 4-6. SETTING SPARK PLUG GAP

INSPECT AND CLEAN ENGINE (INTERNAL)

Running the generator set under widely varying operating conditions, running the engine at less than 50 percent load, and using fuel with additives and impurities can impede engine performance and shorten engine life.

Have the engine combustion chamber inspected internally by an Onan service representative for component wear and carbon buildup after approximately 500 hours of use. Because this procedure requires removing the cylinder head, it must only be performed by an Onan service representative, trained in generator set maintenance and repair.

OUT-OF-SERVICE PROTECTION

If the generator set cannot be exercised regularly and it will not be in use for more than 120 days, the following procedure is recommended. Failure to provide out-of-service protection can result in difficult starting, rough engine operation and reduced engine life.

Generator Set Storage Procedure

1. Add a fuel preservative and stabilizer, such as OnaFresh™, to the fuel supply. Follow manufacturer's instructions for using the fuel additive. Run the generator at 50 percent load (see *Specifications* section) for 30 minutes.

⚠WARNING *Fuel additives can cause a risk of personal injury. Read and follow manufacturer's instructions.*

2. Disconnect the load, switch AC breaker OFF (Figure 3-1) and stop the generator set at the set control.
3. Close the fuel supply valve and remove the air filter. Restart the generator set at the set control. As the generator set starts to run out of fuel (noticeable stumble or surge), spray fogger, such as OnaGard™, into the carburetor intake and reassemble the air filter. Follow manufacturer's instructions for using the fogger.
4. Replace the air cleaner after the engine stops. Remove the spark plug and ground the spark plug lead to prevent arcing. Spray OnaGard™ or engine oil up into the spark plug hole while cranking the engine for 3 seconds. Clean up excess oil and install the spark plug and plug wire.

OnaFresh and OnaGard are trademarks of Onan Corporation.

5. Drain the crankcase oil when the exhaust system has cooled. Refill the crankcase and attach a tag indicating viscosity of oil used.

⚠WARNING *Hot oil can cause severe burns if spilled or splashed on skin. Keep fingers and hands clear when removing oil drain plug, and wear protective clothing.*

6. Disconnect the cables from the starting battery, negative (-) cable first to reduce the risk of arcing.

Returning the Generator Set to Operation

1. Inspect the generator set.
2. Check the engine oil level. Check tag on set to verify that oil viscosity is still correct for existing ambient temperature.
3. Clean and check battery. Measure specific gravity and verify electrolyte level is at split ring. Check the battery electrolyte level. Reconnect the cables, negative (-) cable last, to reduce the risk of arcing.

⚠WARNING *Battery electrolyte can cause severe eye damage and burns to the skin. Wear goggles, rubber gloves, and a protective apron when working with batteries.*

⚠WARNING *Batteries present the hazard of explosion that can result in severe personal injury. Do not smoke or allow any spark, flame, pilot light, arc-producing equipment or other ignition sources around the battery area.*

4. Check the air filter and replace if dirty.
5. Turn on the fuel supply.
6. Start the generator set at the set control. Initial startup may be slow, due to oil in the cylinder. Smoke and rough operation will occur until the oil in the cylinder is burned. If the engine does not start, clean or replace the spark plug.
7. Apply 50 percent load to the generator set until it runs smoothly. Run the generator set for an hour.
8. Remove the load and let the generator set run for three to five minutes to cool down. Then move the Start/Stop switch to the STOP position. The generator set is now ready for operation.

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**Power
Generation**

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