



Operator's Manual

TRACKERmarine Genset Series 4000 KY

Safety Precautions

Before operating the generator set, read this 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.*

Read and observe each of the following safety precautions.

FUEL AND FUMES ARE FLAMMABLE

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

- Do not smoke or allow an open flame or spark-producing equipment near the generator set or fuel tank.
- Inspect the fuel lines and connections daily for leaks per the maintenance schedule.

EXHAUST GASES ARE DEADLY

- Never sleep in the boat with the generator set running unless the boat is equipped with an operating carbon monoxide detector.
- Inspect the exhaust system daily for leaks per the maintenance schedule. Do not use engine cooling air to heat a compartment.
- Never operate the generator set inside a building or in an area where exhaust gases could accumulate, such as in a boat house.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Disconnect the negative (–) cable at the starting battery before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms on the ground or 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.
- Tag remote or open switches to avoid accidental closure or starting.
- **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.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Before starting work on the generator set, disconnect negative (–) cable at the battery. This will prevent accidental arcing or starting.
- 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, etc.
- Do not wear loose clothing or jewelry while working on generator sets, because they 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.

GENERAL SAFETY PRECAUTIONS

- Wear safety glasses and protective clothing when servicing batteries. **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.
- Have a fire extinguisher rated ABC nearby. Maintain extinguisher properly and become familiar with its use.
- 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 set 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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⚠ WARNING: ⚠
The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Introduction

ABOUT THIS MANUAL

This manual covers the operation and maintenance of the Series 4000 KY *Trackermarine*™ generator set (genset) provided by Onan®. Study this manual carefully and observe all of its instructions and precautions.

⚠ WARNING *This genset must not be used on any boat other than a "Tracker Marine" pontoon boat and must be installed strictly as set out in the Installation Manual.*

Component Locations, Starting and Stopping, Powering Equipment and Varying Operating Conditions cover basic operation of the genset. *Periodic Maintenance and Troubleshooting* cover the maintenance and care necessary for top performance. The owner is responsible for maintaining the genset according to the maintenance schedule (Table 4 on page 10).

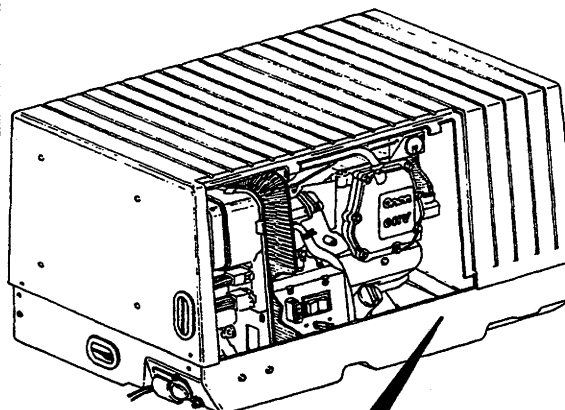
This manual also covers genset break-in, exercise and storage, how to obtain service, genset specifications and important information for California genset users.

Each operator of the genset should become thoroughly familiar with the information in this manual. Keep this manual and the genset Installation Manual with the other pontoon boat manuals.

MODEL IDENTIFICATION

When contacting an Onan® dealer or distributor for parts, service or product information, be ready to provide the model and serial numbers on the genset nameplate (Figure 1). Every character in these numbers is significant. (The last character of the model number is the specification letter, which is important for obtaining the right parts.)

To make the model and serial numbers easy to find when you need them, record them in the boxes provided in Figure 1.



NAMEPLATE WITH TYPICAL MODEL AND SERIAL NUMBER DATA

IMPORTANT ENGINE INFORMATION			
Onan		ONAN CORPORATION	
Model No.: 4KYFA26100C		1400 73rd Ave. NE	
S/N: A953123456		Minneapolis, MN 55432	
AC Volts:		Ph:	kW:
Amps:	Pf:	RPM:	
Fuel:	Hz:	Bat:	12V
Insulation - NEMA Class		Ambient: 40°C	IMI 3461 URC
REFER TO OPERATOR'S MANUAL FOR MAINTENANCE SPECIFICATIONS AND ADJUSTMENTS.			
THIS ENGINE MEETS 1995-1998 CALIFORNIA EMISSIONS REGULATIONS FOR ULGE ENGINES. EM			
SN5304U1G2RA		304 cc	

RECORD NUMBERS HERE

MODEL NUMBER:

SERIAL NUMBER:

FIGURE 1. TYPICAL NAMEPLATE

FUEL RECOMMENDATIONS

Use clean, fresh unleaded gasoline having a minimum octane rating (Anti-Knock Index) of 87.

During some times of the year only mandated "oxygenated" gasolines may be available. These are acceptable for use, but not preferable. Leaded gasoline may be used but will result in the extra maintenance required for removing combustion chamber and spark plug deposits. Do not use gasoline or gasoline additives (de-icers) containing methanol because methanol can be corrosive to fuel system components.

⚠ CAUTION *Do not use gasoline or gasoline additives containing methanol because methanol can be corrosive to fuel system components.*

Avoid using highly leaded gasolines and lead additives because of the extra engine maintenance that will be required.

⚠ WARNING *Gasoline is highly flammable and can cause severe personal injury or death. Do not smoke if you smell gasoline or are near fuel tanks or gasoline-burning equipment or are in an area sharing ventilation with such equipment. Keep flames, sparks, pilot lights, electrical arcs and arc-producing equipment and all other sources of ignition well away. Keep a type ABC fire extinguisher in the boat.*

ENGINE OIL RECOMMENDATIONS

Use premium quality motor oil. Look for the API (American Petroleum Institute) classification and use Class SG or SH oil (also SG/CD, SG/CE, SH/CD or SH/CE). Also look for the SAE (Society of Automotive Engineers) viscosity grade. Referring to Table 1, choose the viscosity grade appropriate for

the ambient temperatures expected during the period of time until the next scheduled oil change.

Single-grade SAE 30 oil is preferable when temperatures are consistently above freezing. Multigrade oils are better when wide temperature variations are expected.

TABLE 1. OIL VISCOSITY VS. TEMPERATURE

EXPECTED AMBIENT TEMPERATURES	SAE VISCOSITY GRADE
32° F (0° C) and higher	30
10° F to 100° F (-12° C to 38° C)	15W-40 (OnaMax)
0° F to 80° F (-18° C to 27° C)	10W-30 10W-40
-20° F to 50° F (-28° C to 10° C)	5W-30

STARTING BATTERIES

These gensets have a 12 volt, direct current (DC) starting and control system. Usually, the 12 volt battery used for boat lighting and other 12 volt DC boat loads is used for genset cranking and startup. See *Specifications* for minimum battery requirements for genset cranking.

Regular, monthly maintenance of batteries may be required. See *Periodic Maintenance* and any instructions available from the boat manufacturer or battery manufacturer. Battery recharging depends upon the boat's DC converter/battery charger, which is powered either by the genset AC output or the utility when it is connected.

Reliable genset starting and starter service life depend upon an adequate battery system capacity and proper maintenance.

Component Locations

COMPONENTS REQUIRING PERIODIC ATTENTION OR MAINTENANCE

The control panel and the components requiring attention during periodic maintenance (see *Periodic Maintenance*) are located behind a removable access cover. See Figure 2.

Removing the access cover: Turn the two cover latches counterclockwise to OPEN and pull the top of the cover outward.

Securing the access cover: Position the bottom of the cover so that its lip catches the top edge of the

base tray, rotate the top of the cover towards the genset and turn the two cover latches clockwise to CLOSED, making sure the latches catch.

⚠ WARNING *Operating the genset 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 genset cooling air does not circulate properly. Do not operate the genset with the access cover removed.*

The genset itself is located in a dedicated compartment on the deck of the pontoon boat.

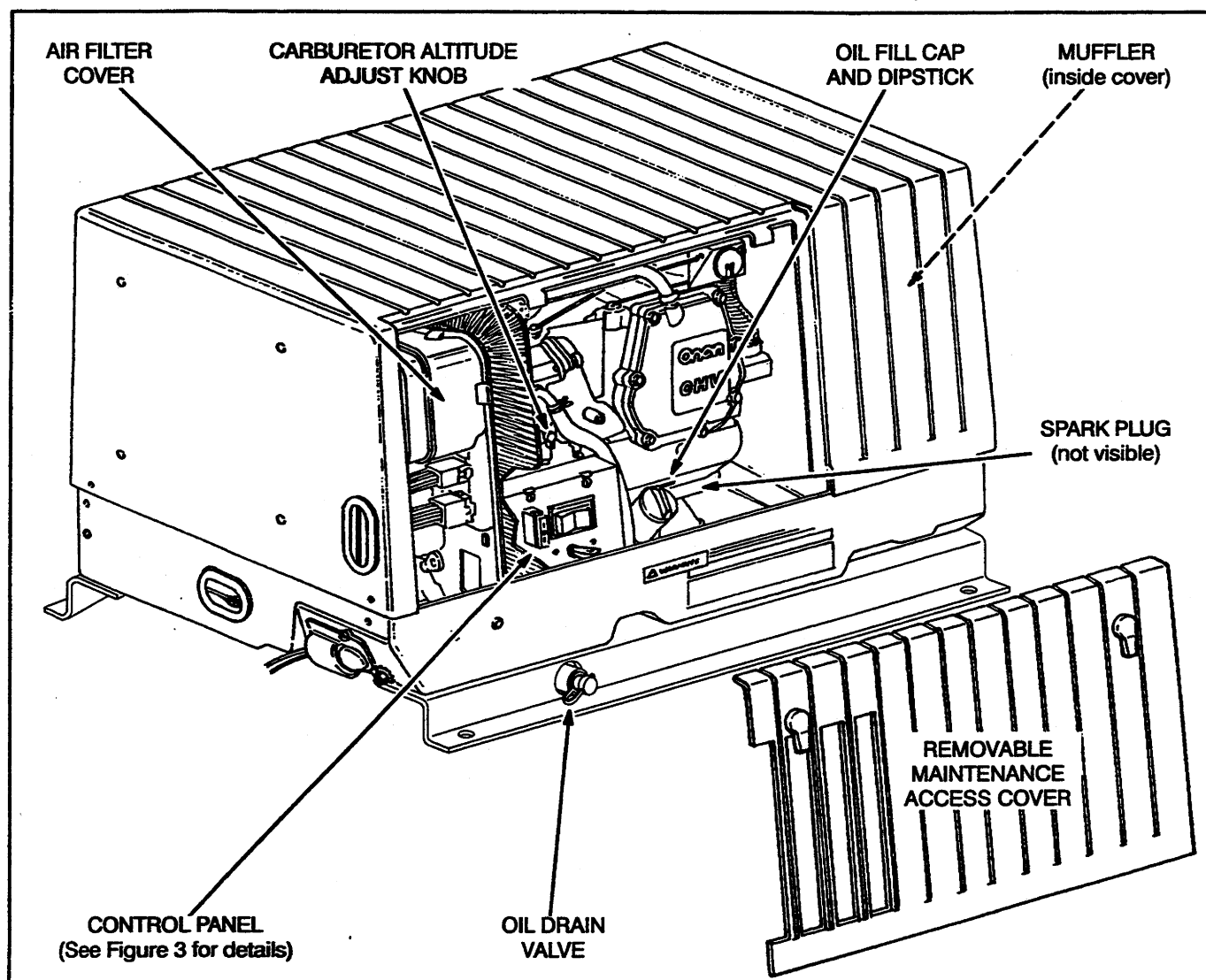


FIGURE 2. COMPONENT LOCATIONS

GENSET CONTROL PANEL

The genset control panel (Figure 3) is located behind the access cover on the genset (Figure 2). It has the following features:

START-STOP Switch – This is a rocker switch which returns to its neutral position when you let go. Hold it in the START position to crank and start the genset and push it momentarily to the STOP position to stop the genset.

Control Fuse – This fuse provides short circuit protection for the control and remote control circuits.

Line Circuit Breaker – The line circuit breaker protects the AC power leads connected to the genset from overloads and equipment short circuits.

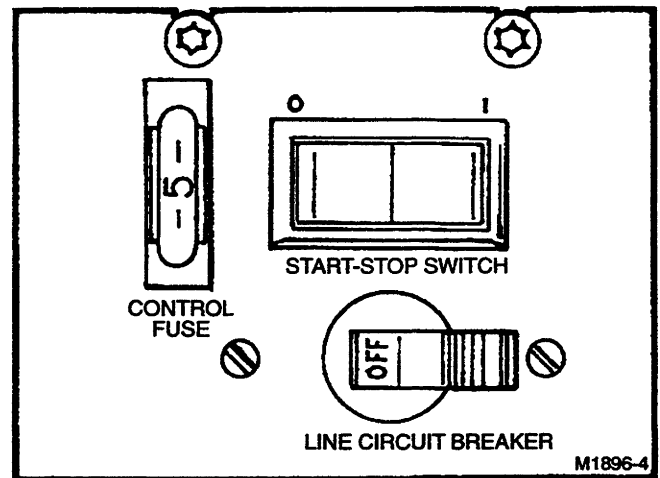


FIGURE 3. GENSET CONTROL PANEL

REMOTE CONTROL

The pontoon boat has a control panel inside the cabin for controlling genset operation.

Two remote control panel styles are available from Onan: the Standard Remote Control and the Deluxe Remote Control (Figure 4). They have the following features:

Standard Remote Control – This model has a START-STOP switch with a lamp that lights to indicate when the genset is running (which may not otherwise be obvious, especially when the boat is moving).

Deluxe Remote Control – Besides the features of the Standard Remote Control, this model has an hour meter and a battery condition meter.

The hour meter records genset operating time in hours. Use it for periodic maintenance as a record of operating time.

The battery condition meter indicates whether voltage across the 12 VDC control system and battery is normal. If the indicator consistently stays above or below the normal zone, see BATTERY CARE under *Periodic Maintenance*.

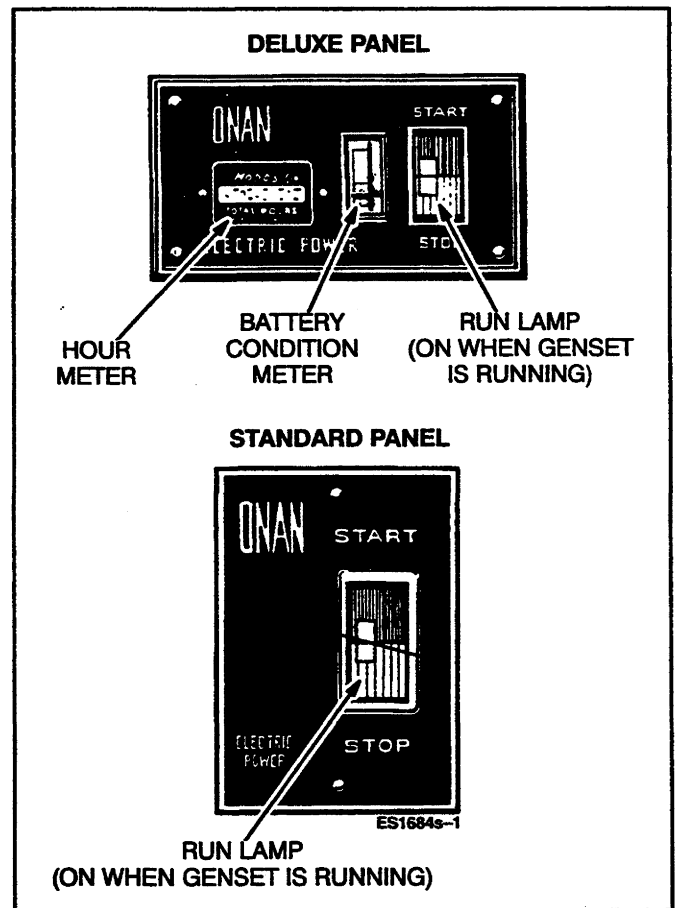


FIGURE 4. REMOTE CONTROL PANELS

Starting and Stopping

⚠ 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 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 genset and do not operate it until it has been inspected and repaired.

Never sleep in the boat with the genset running unless the boat is equipped with a working carbon monoxide detector. Primary protection against inhaling carbon monoxide, however, is the proper installation of the exhaust system and the daily (every eight hour) inspection for visible and audible exhaust system leaks.

PRE-START CHECKS

Before the first start of the day and after every eight hours of operation perform the maintenance instructed in OIL LEVEL CHECK AND GENERAL INSPECTION (Page 11) under *Periodic Maintenance*. Keep a log of maintenance and the hours run and perform any maintenance that may be due. Also, see *Genset Break-In, Exercise and Storage* to return the genset to service if the boat has been in storage.

STARTING

The genset can be started and stopped from the genset control panel or from a remote control panel inside the boat cabin.

⚠ WARNING *An operating genset can ignite flammable vapors causing severe personal injury or death. NEVER start the genset when the boat is docked for fueling. ALWAYS operate the genset compartment evacuator blower for at least 4 minutes just before starting the genset.*

1. Perform the PRE-START CHECKS and turn off the air conditioner and other large electrical loads.
2. Push and hold the genset or remote START switch (Figures 3 and 4) until the genset starts. (The remote START switch inside boat should have a lamp which lights to indicate that the genset has started and is running.)

⚠ CAUTION *Cranking the starter for longer than 10 seconds at a time can overheat and*

damage the starter. Do not crank for more than 10 seconds at a time and wait at least 30 seconds before trying again.

Secure the access cover as soon as the engine starts up when starting the genset at the genset control panel.

⚠ CAUTION *Proper engine cooling requires that the access cover be secured during operation. Also, hot engine parts can cause severe burns. Always secure the access cover as soon as the engine starts up.*

3. For top performance and engine life, especially in colder weather, let the engine warm up for at least two minutes before connecting the genset to the vehicle electrical loads (appliances). See *Powering Equipment*.
4. Check for fuel and exhaust leaks. Stop the genset immediately if there is a fuel or exhaust leak and have it repaired before continuing operation.
5. See *Troubleshooting* if the engine does not crank or start after several tries or stops running.

STOPPING

1. Turn off the air conditioner and other large electrical loads and let the genset run two minutes before stopping it. This allows the engine to cool down, reducing the incidence of backfiring and engine run-on.
2. Push the STOP switch momentarily.

Powering Equipment

GENSET LOADING

The AC output of the genset powers the boat air conditioner, the DC converter/battery charger and the appliances that may be plugged into the electrical outlets of the boat. How much electrical equipment (power consuming appliances) can be operated at one time depends upon how much power is available from the genset. If the genset is "overloaded", either the genset will stall or its circuit breaker(s) will trip.

To get an idea of how much equipment can be operated at one time add up the watt ratings of the individual appliances that are likely to be used at the same time and compare the sum to the kW (kilowatt) rating of the genset. Use Table 2 or the ratings on the appliances themselves (if so marked) to obtain the appliance watt values. Note that 1 kW = 1000 watts. If power consumption, as totaled up, exceeds genset power output, you may have to consider operating some appliances in sequence, one after another, rather than all at the same time.

Note that when the genset is loaded nearly to full power it is possible that it may stall when the air conditioner (or other large motor load) "cycles on". The reason for this is that for a brief moment at startup a motor draws up to three times the power stated on its nameplate. You may, therefore, have to consider operating some appliances at times when the air conditioner or other large motor load is not "On".

Note also that as altitude increases air density decreases, causing genset engine power to decrease (even when the altitude adjust knob is set correctly—see *Varying Operating Conditions*). Power decreases approximately 3.5 percent of rated power each 1000 feet (305 m) of increase in elevation above sea level. See Table 3 for the results of calculations for a typical genset. Therefore, at higher altitudes consider operating fewer appliances at the same time.

Electrical equipment and tools must be properly grounded and in good working condition.

⚠ WARNING *Electrical shock can cause severe personal injury or death. Read and follow the equipment and tool manufacturer's instructions and warnings.*

TABLE 2. TYPICAL APPLIANCE POWER CONSUMPTION

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

TABLE 3. POWER VS. ALTITUDE—4.0 KW GENSET

Elevation above Sea Level	Maximum Genset Power Output*
at 500 feet (152 m) and below	4000 watts (rated)
at 2500 feet (762 m)	3720 watts
at 5500 feet (1676 m)	3300 watts
above 5500 feet (1676 m)	3300 watts minus 140 watts for each additional 1000 feet (305 m)
* This table does not take into account the effect circuit breakers may have in limiting maximum continuous power output.	

RESTARTING A STALLED GENSET

If the genset stalls, disconnect or turn off as many appliances as possible and try restarting the genset as instructed under *Starting and Stopping*. Reconnect the loads (appliances) one by one up to a total load that does not overload the genset or cause the circuit breaker to trip.

RESETTING CIRCUIT BREAKERS

If a circuit breaker in the main power distribution panel of the boat or on the genset (Figure 5) trips, there is either a short circuit or too many appliances being operated at the same time. Note that the genset will continue to run after a circuit breaker trips.

If a circuit breaker trips, disconnect or turn off as many appliances as possible and reset the circuit breaker (typically, push the circuit breaker to Off to reset it and then to On to reconnect the circuit). If the circuit breaker trips right away, either the boat electrical distribution system has a short or the circuit breaker is faulty. Call a qualified electrician.

If the circuit breaker does not trip, reconnect the appliances, one by one, up to a total load that does not overload the genset or cause the circuit breaker to trip. If a circuit breaker trips right away when an appliance is connected, the appliance probably has a short.

CONNECTING THE PONTOON BOAT TO UTILITY POWER

When the boat has provisions for connecting to utility power, such as a cord for plugging into a power outlet receptacle, it must also have an approved device to keep the genset and utility from being interconnected. See the genset Installation Manual for more information.

⚠ WARNING *Interconnecting the genset and the public utility (or any other power source) can lead to the electrocution of personnel working on the utility lines, damage to equipment and fire. An approved switching device must be used to prevent interconnections.*

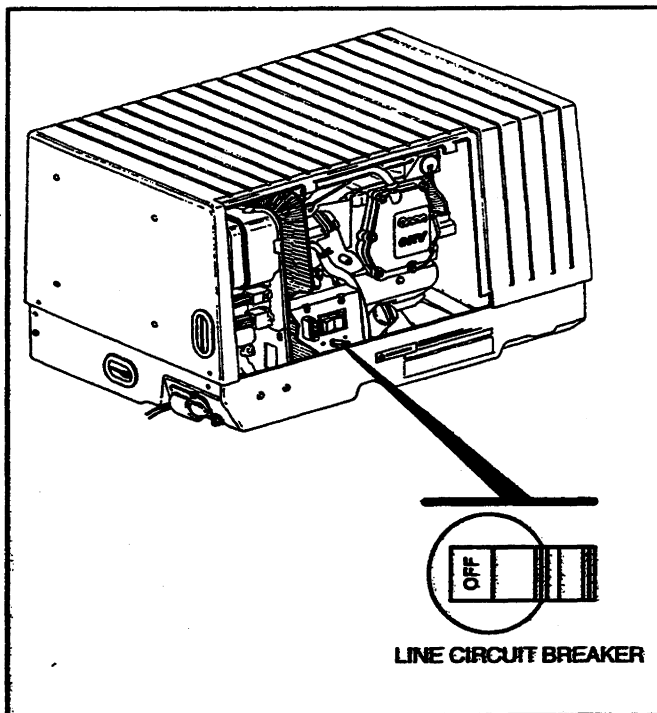


FIGURE 5. SET MOUNTED CIRCUIT BREAKER

Varying Operating Conditions

COLD WEATHER

Pay particular attention to the following items when operating the genset in cold weather:

1. Make sure the engine oil viscosity is appropriate for the cold weather temperatures. See Table 1. Be sure to change the oil if a sudden drop in temperature occurs.
2. Set the altitude adjust knob (Figure 6) for your altitude.

HOT WEATHER

Pay particular attention to the following items when operating the genset in hot weather:

1. Make sure nothing blocks the airflow to and from the genset.
2. Make sure the engine oil viscosity is appropriate for the hot weather temperatures. See Table 1.
3. Keep the genset clean.
4. Perform maintenance due. See *Periodic Maintenance*.
5. Set the altitude adjust knob (Figure 6) for your altitude.

HIGH ALTITUDE

For best fuel economy and genset operation set the carburetor altitude adjust knob (Figure 6) for the altitude of the lake or river. (See *Powering Equipment* for information on how altitude affects the maximum power output of the genset.)

⚠ CAUTION *Operating the genset at low altitude with a high altitude setting can cause power loss, overheating and engine damage.*

DUSTY CONDITIONS

Pay particular attention to the following items when operating the genset in dusty conditions:

1. Do not let dirt and debris accumulate inside the genset compartment. Keep the genset clean.
2. Perform air cleaner maintenance more often than usual. See *Periodic Maintenance*.
3. Change engine oil every 50 hours.
4. Keep opened containers of engine oil tightly closed to keep out dust.

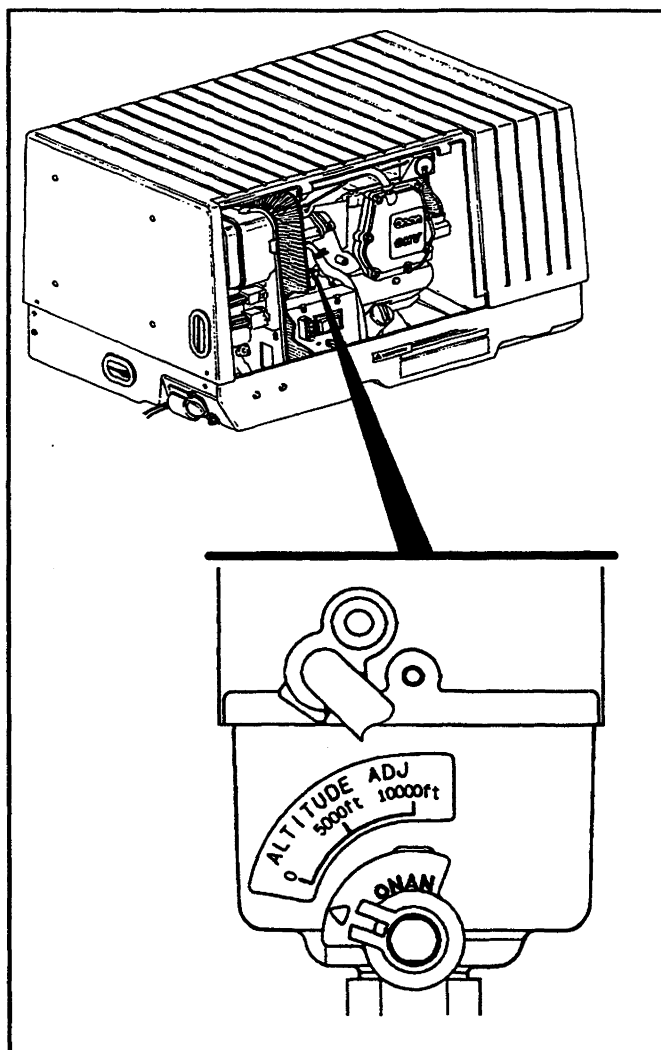


FIGURE 6. ALTITUDE ADJUST KNOB

Periodic Maintenance

Periodic maintenance is essential for top performance and long genset life. Use Table 4 as a guide for normal periodic maintenance. Under hot or dusty operating conditions some maintenance operations should be performed more frequently, as indicated

by the footnotes in the table. Keep a log of maintenance performed and the hours run. See *Maintenance Record*. Recording maintenance will help you keep it regular and provide a basis for supporting warranty claims.

TABLE 4. PERIODIC MAINTENANCE SCHEDULE

MAINTENANCE OPERATION	MAINTENANCE FREQUENCY						
	Every Day or Every 8 Hours	Every Month	Every 50 Hours	Every 150 Hours	Every 250 Hours	Every 500 Hours	P a g e
General Inspection	X						11
Check Engine Oil Level	X						12
Clean and Check Starting Battery		X ³					14
Clean the Spark Arrestor			X				16
Change Engine Oil				X ^{1, 2, 3, 4}			13
Replace Engine Air Filter					X ²		15
Clean Engine Cooling Fins					X ²		—
Replace Spark Plug						X ⁵	16
Replace Fuel Filter						X ^{5, 6}	—
Adjust Engine Valve Clearance						X ⁶	—

1 – As a part of engine break-in, change the engine oil after the first 20 hours of operation.

2 – Perform more often when operating in dusty conditions.

3 – Perform more often when operating in hot weather.

4 – Perform at least once a year.

5 – Perform sooner if engine performance deteriorates.

6 – Must be performed by a qualified mechanic (authorized Onan dealer).

OIL LEVEL CHECK AND GENERAL INSPECTION

Inspect the genset before the first start of the day and after every eight hours of operation.

Oil Level

Check the engine oil level as explained under CHECKING ENGINE OIL LEVEL in this section.

Exhaust System

Look and listen for exhaust system leaks while the genset is running. Shut down the genset if a leak is found and have it repaired before operating the genset.

Look for openings or holes between the genset compartment and boat cabin or living space if the genset engine sounds louder than usual. Have all such openings or holes closed off or sealed to prevent exhaust gases from entering the boat.

Replace dented, bent or severely rusted sections of the tailpipe and make sure the tailpipe extends at least 1 inch (25.4 mm) beyond the perimeter of the boat.

Do not operate cabin (bathroom, kitchen, etc.) power ventilators or exhaust fans while the boat is docked or anchored and the genset is running. The ventilator or fan can draw exhaust gases into the boat cabin.

Do not operate the genset when the pontoon boat is docked inside a boat house. When the boat is docked at an open dock, make sure barriers such as walls cannot cause the exhaust gases to accumulate in and around the boat.

⚠ WARNING ***EXHAUST GAS IS DEADLY! Do not operate the genset if there is an exhaust leak or any danger of exhaust gases entering or being drawn into the pontoon boat or accumulating inside an enclosed space such as a boat house.***

Fuel System

Check for leaks at the hose, tube and pipe fittings in the fuel supply system while the genset is running and while it is stopped. Check flexible fuel hose sec-

tions for cuts, cracks, and abrasions. Make sure the fuel line is not rubbing against other parts. Replace worn or damaged fuel line parts before leaks occur.

⚠ WARNING ***Gasoline is highly flammable and can cause severe personal injury or death. Repair leaks right away.***

Battery Connections

Check the battery terminals for clean, tight connections. Loose or corroded connections have high electrical resistance which makes starting harder. Shut the genset off and disconnect corroded or loose battery cables (negative [-] cable first) and clean and reconnect them as instructed under BATTERY CARE in this section.

⚠ WARNING ***Batteries give off explosive gases that can cause severe personal injury. Do not smoke near batteries. Keep flames, sparks, pilot lights, electrical arcs and arc-producing equipment and all other ignition sources well away.***

Do not disconnect the battery cables while the genset is cranking or running: the arcing can ignite the explosive battery gases.

Mechanical

Look for mechanical damage. Start the genset and look, listen and feel for any unusual noises and vibrations.

Check the genset mounting bolts to make sure they are secure.

Check to see that the genset air inlet and outlet openings are not clogged with debris or blocked.

Clean accumulated dust and dirt from the genset. Do not clean the genset while it is running or still hot. Protect the generator, air cleaner, control panel, and electrical connections from water, soap and cleaning solvents. Always wear safety glasses when using compressed air, a pressure washer or a steam cleaner.

⚠ WARNING ***Always wear safety glasses when using compressed air, a pressure washer or a steam cleaner to avoid severe eye damage.***

CHECKING ENGINE OIL LEVEL

Shut off the genset before checking the engine oil level.

1. Remove the oil fill cap/dipstick (Figure 7) and wipe it clean.

⚠ WARNING *Crankcase pressure can blow hot engine oil out the fill opening causing severe burns. Always stop the genset before removing the oil fill cap.*

2. Screw the oil fill cap back on and remove it to check the oil level on the dipstick.
3. Add oil as necessary until the full mark is reached. Use API Class SG or SH oil (also SG/CD, SG/CE, SH/CD or SH/CE) having an SAE viscosity grade appropriate for the expected temperatures, as indicated in Table 1.

DO NOT FILL TO A LEVEL ABOVE THE FULL MARK ON THE DIPSTICK. Drain the excess oil if too much has been added.

⚠ CAUTION *Too much oil can cause high oil consumption, high operating temperatures and oil foaming. Too little oil can cause severe engine damage. Keep the oil level between the Full and Add marks on the dipstick.*

4. Screw the oil fill cap on securely to prevent oil leakage.

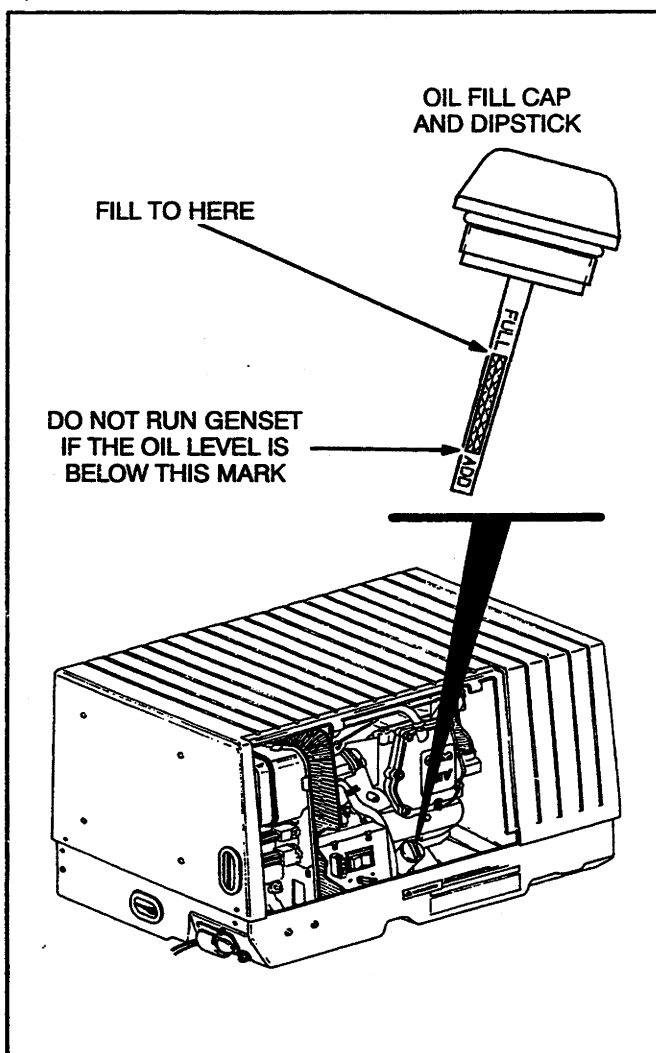


FIGURE 7. OIL LEVEL CHECK

CHANGING ENGINE OIL

Refer to Table 4 for scheduled engine oil change. In hot weather and dusty conditions the oil should be changed more often.

⚠ WARNING *State and federal agencies have determined that contact with used engine oil can cause cancer or reproductive toxicity. Take care to limit skin contact and breathing of vapors as much as possible. Use rubber gloves and wash exposed skin.*

1. Remove the cap and attach a 1/2 inch plastic or rubber hose to the nozzle on the end of the oil drain valve (Figure 8) and direct the other end of the hose into a container, such as a one gallon plastic milk carton, in which the oil can be transported for disposal.
2. Remove the oil fill cap (Figure 7).

⚠ WARNING *Crankcase pressure can blow hot engine oil out the fill opening causing severe burns. Always stop the genset before removing the oil fill cap.*

3. Open the oil drain valve by *pushing* it in, *twisting* it counterclockwise and then *pulling* it out as far as it will go. Let all of the oil drain from the engine and then close the drain valve by *pushing* it in and *twisting* it clockwise as far as it will go. It should latch so that you cannot twist it either way without first pushing it in.
4. Refill with API Class SG or SH oil (also SG/CD, SG/CE, SH/CD or SH/CE) having an SAE viscosity grade appropriate for the expected temperatures, as indicated in Table 1. See *Specifications* for oil capacity.
5. Check the oil level and add oil until the full mark is reached.

DO NOT FILL TO A LEVEL ABOVE THE FULL MARK ON THE DIPSTICK. Drain the excess oil if too much has been added.

⚠ CAUTION *Too much oil can cause high oil consumption, high operating temperatures and oil foaming. Too little oil can cause se-*

vere engine damage. Keep the oil level between the Full and Add marks on the dipstick.

6. Screw the oil fill cap on securely to prevent oil leakage.
7. Used oil is harmful to the environment if it is not disposed of properly. Take the container of used oil to the nearest recycling center or automotive service station for disposal.

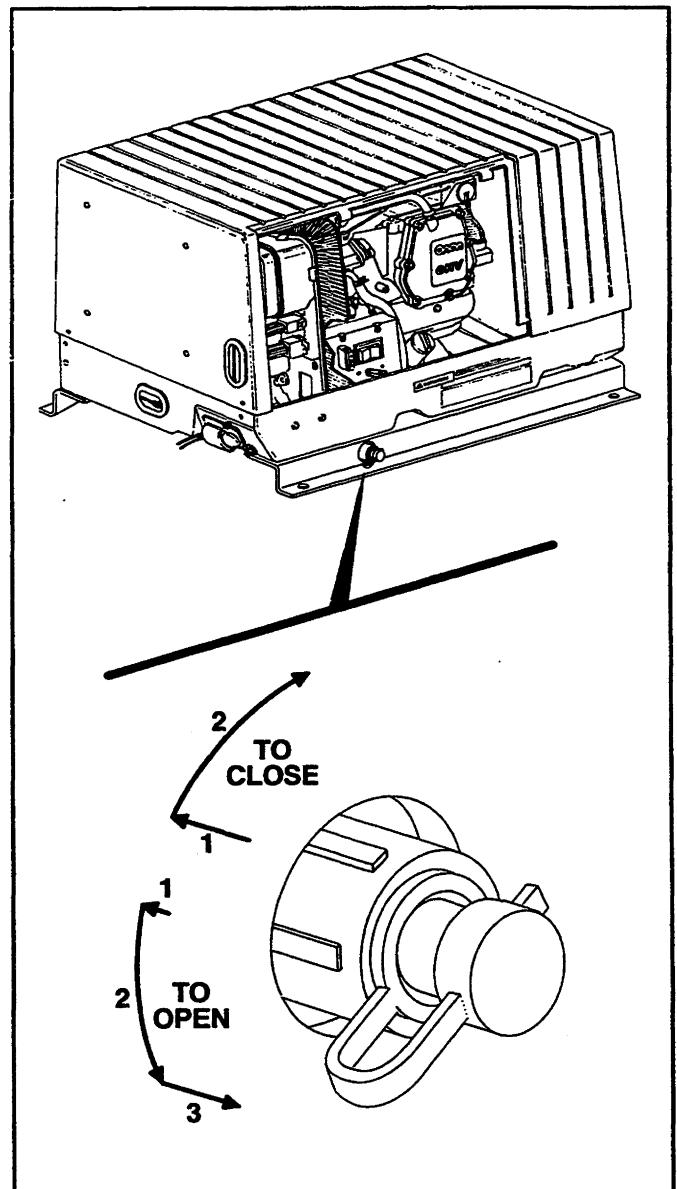


FIGURE 8. OIL DRAIN VALVE

BATTERY CARE

Refer to Table 4 for scheduled battery maintenance and to the battery manufacturer's recommendations and instructions for battery care. Check the electrolyte level more frequently during hot weather on batteries which are not of the "maintenance-free" type.

⚠WARNING *Batteries give off explosive gases that can cause severe personal injury. Do not smoke near batteries. Keep flames, sparks, pilot lights, electrical arcs and arc-producing equipment and all other ignition sources well away.*

Do not disconnect the battery cables while the genset is cranking or running: the arcing can ignite the explosive battery gases.

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

Maintain the battery as follows unless the battery manufacturer has other instructions and recommendations:

1. Keep the battery case clean and dry.
2. Make certain that the battery cable connections are clean and tight. Use a terminal puller tool to remove the battery cables.
3. Identify the cable as positive (+) or negative (-) before making the battery connections. Always remove the negative (-) cable first and connect it last, to reduce the risk of arcing.
4. To remove corrosion from the battery terminals, 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. If the battery is not of the "maintenance-free" type, maintain the electrolyte level by adding distilled water. Fill each cell to 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 (Figure 9). Charge the battery if the specific gravity measures less than 1.215. Do not overcharge the battery. Stop charging the battery when the electrolyte specific gravity reaches 1.260, at approximately 80° F (27° C).
7. If the remote battery condition meter (Figure 4) continues to indicate that battery voltage is abnormally low or high after battery maintenance has been performed, the boat battery charging system may need to be serviced by a qualified mechanic.

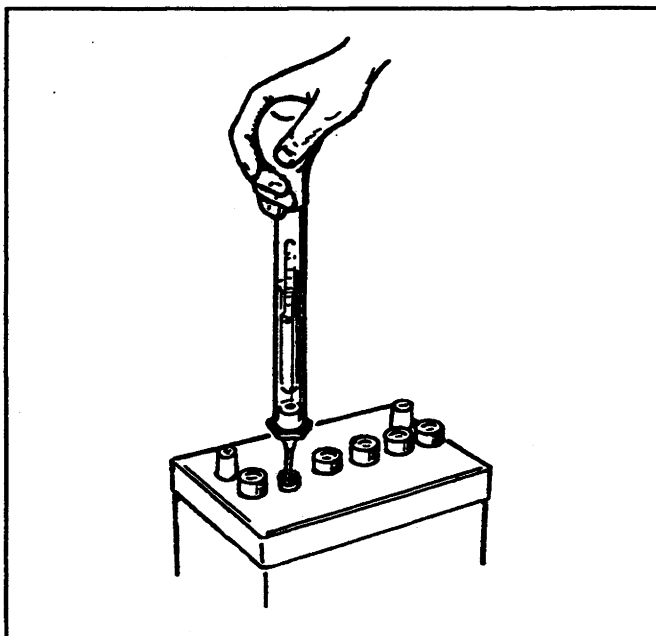


FIGURE 9. BATTERY CHECK WITH HYDROMETER

AIR FILTER

Refer to Table 4 for scheduled air filter replacement. In dusty conditions the air filter should be inspected and changed more frequently for best operation.

Change the air filter element (Figure 10) as follows:

1. Remove the foam block at the left side of the filter housing (60 Hertz models only).
2. Remove the air filter housing cover and filter element cover plate, which are secured by separate wing nuts, and remove the old air filter element.
3. Reassemble the air filter with a new air filter element. Make sure the air filter is centered around the carburetor air inlet. Do not over-tighten the wing nuts as that can distort the filter element or cover and lead to air leaks around the air filter element.

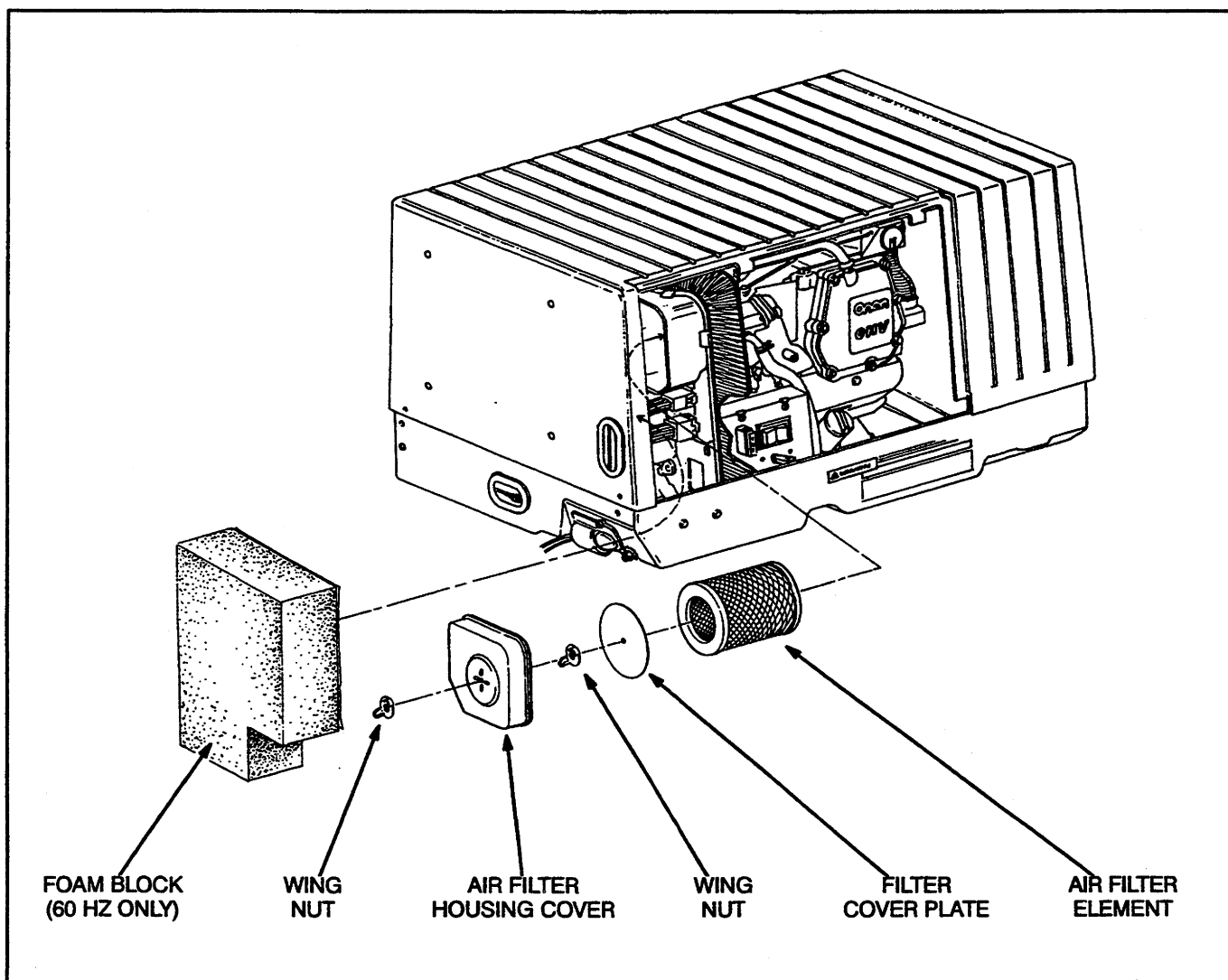


FIGURE 10. REPLACING THE AIR FILTER ELEMENT

SPARK PLUG

Refer to Table 4 for scheduled spark plug replacement. (The genset has one spark plug, Figure 11.) The spark plug must be in good condition for proper engine starting and performance. A spark plug that fouls frequently or has heavy soot deposits indicates the need for engine service. See *Troubleshooting*. See *Specifications* for spark plug gap.

To prevent crossthreading the spark plug, always thread it in by hand until it seats. If the spark plug is being reused, turn it with a wrench an additional 1/4 turn. If the spark plug is new, turn it an additional 3/8 to 1/2 turn. If you have a torque wrench, tighten the spark plug to 13 lbs-ft (17 N-m).

SPARK ARRESTOR

Refer to Table 4 for scheduled cleaning of the spark arrestor muffler (which meets U.S. Forest Service requirements). Cleaning is required for maximum genset performance.

⚠ WARNING A hot muffler can cause severe burns. Let the muffler cool down before removing or installing the cleanout plugs.

The muffler is mounted inside the genset housing. The cleanout plugs are located on the bottom side of the muffler, accessible through the air outlet opening in the bottom of the genset. Clean out the spark arrestor muffler as follows:

1. Remove the cleanout plugs from the bottom of the muffler (Figure 12).
2. Restart the genset and load it nearly to full power (see *Powering Equipment*). Let the genset run for about five minutes to expel the soot in the muffler.
3. Stop the genset, allow the muffler to cool down and then reinstall the plugs.

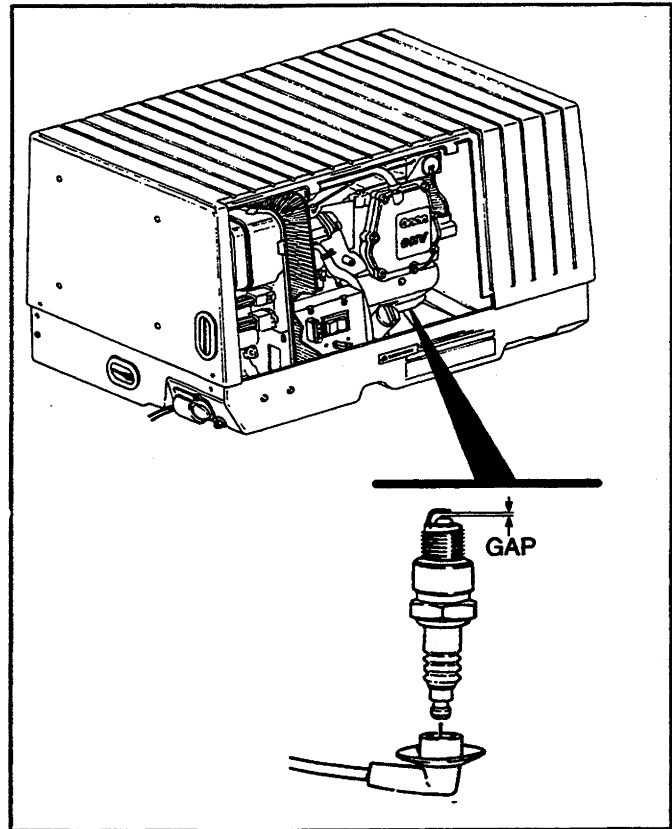


FIGURE 11. SETTING SPARK PLUG GAP

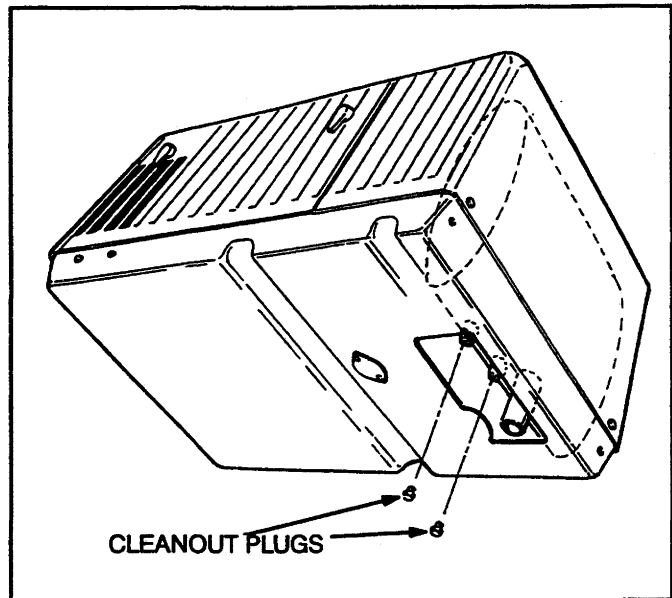


FIGURE 12. SPARK ARRESTOR CLEANOUT PLUGS

Genset Break-In, Exercise and Storage

BREAK-IN

Proper engine break-in on a new genset or on one with a rebuilt engine is essential for top engine performance and acceptable oil consumption.

For proper break-in, run the genset at approximately 1/2 rated power for the first 2 hours and then at 3/4 rated power for 2 more hours. See *Powering Equipment*.

Proper engine oil and oil level are especially critical during break-in because of the higher engine temperatures that can be expected. See RECOMMENDED ENGINE OIL in *Introduction*. Change the oil if its viscosity (Table 1) is not appropriate for the ambient temperatures during break-in. Check the oil level twice a day or every 4 hours during the

first 20 hours of operation and change the oil after the first 20 hours of operation.

EXERCISE

If use is infrequent the genset should be exercised at least 2 hours each month at approximately 1/2 rated power. See *Powering Equipment*. Exercising the genset drives off moisture, re-lubricates the engine, replaces the stale fuel in the fuel lines and carburetor with fresh fuel and removes oxide from electrical contacts and generator slip rings, thereby promoting better starting, more reliable operation and longer engine life.

A single two hour exercise period is better than several shorter periods. See STORAGE as an alternative if it is impractical to have someone exercise the genset on a regular basis.

STORAGE

Proper storage is essential for preserving top genset performance and reliability when the genset cannot be exercised regularly and will be idle for more than 120 days.

Storing the Genset

1. Fill the fuel tank with fresh fuel and add a fuel preservative (OnaFresh™), following the instructions on the container label. Unless a preservative (stabilizer) is added, the gasoline will deteriorate causing fuel system corrosion, gum formation and varnish-like deposits which can lead to hard starting and rough operation.

⚠ WARNING Gasoline preservatives (stabilizers) are toxic. Follow the instructions on the container label. Avoid skin contact. Wash your hands with soap and water after dispensing the fluid.

2. Run the genset for about 10 minutes at approximately 1/2 rated power (see *Powering Equipment*) to fill the fuel lines and carburetor with the fresh fuel and preservative and to bring the genset up to operating temperatures. Then turn off the air conditioner and other large loads, push the genset line circuit breaker to OFF (Figure 5) and stop the genset.
3. Remove the air filter and restart the genset. While the genset is running, spray an engine fogger (OnaGard™) into the carburetor, following the instructions on the container label, and then stop the genset. (A fogger coats the intake, cylinder and exhaust systems with a protective coat of oil.)
4. Change the air filter element if it is dirty.

5. Change the engine oil and attach a tag indicating its oil viscosity (Table 1).
6. Disconnect the battery cables (negative [-] cable first) from the starting battery and store the battery according to the battery manufacturer's recommendations.
7. Plug the exhaust tail pipe to keep out dirt, moisture, bugs, etc.
8. Shut off the fuel supply valve (if so equipped).

Returning The Genset To Service

1. Check the oil tag on the genset and change the oil if the viscosity indicated is not appropriate for the temperatures expected (Table 1).
2. Reconnect the starting battery (negative [-] cable last). See BATTERY CARE under *Periodic Maintenance*.
3. Remove the plug from the exhaust tailpipe.
4. Open the fuel supply valve (if so equipped).
5. Inspect the genset. See OIL LEVEL CHECK AND GENERAL INSPECTION under *Periodic Maintenance*.
6. Start the genset at the genset control panel. The initial startup may be slow and there may be smoke and rough operation for a few minutes until the oil in the cylinder from the fogger burns off. If the engine does not start, clean or replace the spark plug as it may have been fouled by the fogger.
7. Push the genset line circuit breaker ON (Figure 5) when the genset is ready to power appliances.

Troubleshooting

Table 5 provides basic troubleshooting guidance. If you fail to resolve the problem after taking the corrective actions suggested, contact an authorized Onan dealer. See *How to Obtain Service*.

sonnel with knowledge of fuels, electricity, and machinery hazards should perform service procedures. Review the safety precautions on the inside cover page.

⚠ WARNING Many troubleshooting procedures present hazards that can result in severe personal injury or death. Only qualified service per-

⚠ WARNING Hot engine parts can cause severe burns. Always allow the engine time to cool before performing any maintenance or service.

TABLE 5. TROUBLESHOOTING

Problem	Corrective Action
1. The engine fails to crank.	a. Try starting at the genset rather than at the remote control. b. Replace the fuse on the control panel if it has blown. c. Clean and tighten the positive (+) and negative (–) battery cable connections at the battery and the genset. d. Recharge the battery. Refer to the battery manufacturer's recommendations.
2. The engine cranks slowly.	a. Disconnect the air conditioner and other large loads. b. Clean and tighten the positive (+) and negative (–) battery cable connections at the battery and the genset. c. Recharge the battery. Refer to the battery manufacturer's recommendations. d. Change the engine oil to oil having the proper viscosity for the ambient temperature. See Table 1.
3. The engine cranks but fails to start.	a. Check the fuel tank and fill if necessary. b. Open any closed fuel shut off valve. c. Check engine oil level and add oil as necessary. d. Service the air cleaner. e. Secure the spark plug lead on the spark plug. f. Replace the spark plug.
4. The engine runs and then stops or surges.	a. Check the fuel tank and fill if necessary. b. Check the engine oil level and add oil as necessary. Drain excess oil if the level is above the dipstick Full mark. c. Check and reset the carburetor altitude adjust knob. See <i>Varying Operating Conditions</i>. (Gasoline models only.) d. Secure the spark plug lead on the spark plug. e. Replace the spark plug.
5. The genset keeps stalling or the circuit breaker keeps tripping.	Try running with fewer appliances connected. See <i>Powering Equipment</i> .
6. There is no electrical power even though the genset runs.	a. Reset tripped circuit breakers. See <i>Powering Equipment</i>. b. Unless there is an automatic power transfer switch, plug the boat power cord into the genset power output receptacle (if so equipped) or turn the boat power selector switch to its genset position (if so equipped).
7. The remote battery condition meter (Fig. 4) indicates low voltage.	a. Clean and tighten the positive (+) and negative (–) battery cable connections at the battery and the genset. b. Recharge the battery. Refer to the battery manufacturer's recommendations.
8. Black smoke exits the tailpipe.	Service the air cleaner.

Specifications

GENERATOR: 2-Pole Revolving Field, Self-Excited, Electronically Regulated, 1-Phase	
Power	4000 watts
Frequency	60 Hertz
Voltage	120 volts
Current	33.3 amperes
Speed	3600 rpm
FUEL CONSUMPTION:	
No load	0.29 gph (1.1 l/h)
Half load	0.48 gph (1.8 l/h)
Full load	0.71 gph (2.7 l/h)
ENGINE: 1-Cylinder, 4-Stroke Cycle, Spark-Ignited, OHV, Air Cooled	
Bore	3.11 inch (79 mm)
Stroke	2.44 inch (62 mm)
Displacement	18.5 inch ³ (304 cc)
Compression Ratio	8.5 : 1
Oil Capacity*	1.6 quart (1.5 l)
Intake Valve Clearance (Cold)	0.002 inch (0.05 mm)
Exhaust Valve Clearance (Cold)	0.002 inch (0.05 mm)
Spark Plug Gap	0.025 inch (0.64 mm)
Spark Plug Tightening Torque	13 lbs-ft (17 N-m)
Ignition Timing (magneto type ignition)	25° BTDC, non-adjustable
DC SYSTEM:	
Nominal Battery Voltage	12 volts
Minimum Battery Cold Cranking Capacity: Above/Below Freezing	360/450 amperes
Control Fuse	5 amperes
* –See <i>Periodic Maintenance</i> for oil filling instructions.	

Information for California Genset Users

These gensets meet the requirements of California's Exhaust Emissions Standards for 1995 and later for Utility and Lawn and Garden Equipment Engines.

As a California user of these gensets, please be aware that unauthorized modifications or replacement of fuel, exhaust, air intake, or speed control system components that affect engine emissions are prohibited. Unauthorized modification, removal or replacement of the genset label is prohibited.

You should carefully review Operator (Owner), Installation and other manuals and information you receive with your genset. If you are unsure that the installation, use, maintenance or service of your genset is authorized, you should seek assistance from an approved Onan engine or genset dealer.

California genset users may use Table 6 as an aid in locating information related to the California Air Resources Board requirements for emissions control.

TABLE 6. EMISSIONS CONTROL INFORMATION

Genset Warranty Information	The California emissions control warranty statement is located in the same packet of information as this manual when the engine is shipped from the factory.
Engine Valve Clearance	See <i>Specifications</i> .
Engine Ignition Timing	See <i>Specifications</i> .
Engine Fuel Requirements	The engine is certified to operate on unleaded gasoline. See Fuel Recommendations in <i>Introduction</i> .
Engine Lubricating Oil Requirements	See ENGINE OIL RECOMMENDATIONS in <i>Introduction</i> .
Engine Fuel Mixture Settings	These genset engines have precision-manufactured carburetors which are not adjustable.
Engine Adjustments	See Figure 6.
Engine Emission Control System	The engine emission control system consists of internal engine modifications.

How to Obtain Service

When you need parts or service for your genset contact the nearest authorized dealer or distributor. Onan has factory-trained representatives to handle your needs for genset parts and service. To locate the nearest authorized distributor:

1. Check the North American Sales and Service Directory (F-118) and the International Sales and Service Directory (IN-1013) supplied with your Onan genset. These directories list authorized distributors who will assist you in locating the nearest authorized dealer.

2. Consult the Yellow Pages. Typically, our distributors are listed under:

GENERATORS – ELECTRIC,
ENGINES – GASOLINE OR DIESEL, or
RECREATIONAL boats – EQUIPMENT,
PARTS AND SERVICE.

3. Call 1-800-888-ONAN for the name and telephone number of the nearest Cummins/Onan or Onan-only distributor in the United States or Canada. (This automated service utilizes touch-tone phones only). By calling this number you can also request a directory of autho-

rized RV servicing dealers: RV Sales and Service Directory F-919.

To get service, contact the authorized dealer or distributor nearest you, explain the problem and make an appointment. If you have difficulty in arranging for service or resolving a problem, please contact the dealer coordinator or service manager at the nearest Cummins/Onan distributor for assistance.

Before calling for service, have the following information available:

1. *The complete genset model number and serial number (see Model Identification on page 4)*
2. *The date of purchase*
3. *The nature of the problem (See Troubleshooting)*

⚠ WARNING *Improper service or replacement of parts can result in severe personal injury, death, and/or equipment damage. Service personnel must be qualified to perform electrical and/or mechanical service.*

Use the following table to keep a record of all periodic and unscheduled maintenance and service. See *Periodic Maintenance*.

Record the name, address, and phone number of your authorized Onan service center.



Onan Corporation
1400 73rd Avenue N.E.
Minneapolis, MN 55432
1-800-888-ONAN
612-574-5000 International Use
Telex: 275477
Fax: 612-574-8087

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