

# Onan

## **Operator's Manual 1400 - 5000 Watts EGH GenSets**

**Portable Generators**

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# Safety Precautions

Before operating the generator set, read the Operator's Manual and become familiar with it and your equipment. Safe and efficient operation can be achieved only if the equipment 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.

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

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

- DO NOT fill fuel tanks with the engine running. Fuel contact with hot engine or exhaust is a potential fire hazard.
- DO NOT SMOKE OR ALLOW AN OPEN FLAME near the generator set or fuel tank.
- DO NOT store or transport the generator set without first removing the fuel from the fuel tank.
- 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

- Engine exhaust contains CARBON MONOXIDE, a dangerous gas that is potentially lethal. Avoid carbon monoxide inhalation by operating the generator set outdoors where exhaust gases can be discharged directly into the open air.
- Do not operate the generator set in any type of enclosure that could allow exhaust gases to accumulate. Direct exhaust gas away from areas where people are gathered and away from buildings or enclosures.

## MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Before performing any maintenance on the generator set, disconnect the spark plug wire (and the starting battery negative [-] cable on electric start sets) to prevent accidental starting.
- Keep hands away from moving parts.
- Do not wear loose clothing or jewelry while servicing any part of the generator set. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts and cause shock or burning.

- Make sure that fasteners on the generator set are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- If adjustments must be made while the generator set is running, use extreme caution around hot manifolds and 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 surface to be damp when handling electrical equipment.
- Use extreme caution when working on electrical components. High voltages can cause injury or death. DO NOT tamper with interlocks.
- Follow all applicable 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.
- 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 over heating and engine damage, and present a potential fire hazard.
- DO NOT store anything on the generator set such as oil cans, oily rags, chains, wooden blocks, etc. A fire could result or operation could be adversely affected. Keep the generator set clean and dry at all times.
- 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 Standard and Pro Series portable generator sets. 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 generator set life, better performance, and safer operation.

## HOW TO OBTAIN SERVICE

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

A copy of the warranty form is in the literature package included with each unit. A service manual is available on special order through an Onan dealer or distributor.

When contacting an authorized service center for parts or service, supply the complete model number and serial number listed on the nameplate (Figure 1-1).

ELECTRIC GENERATOR	
IMPORTANT WHEN WRITING ABOUT SERVICE OR PARTS GIVE MODEL AND SERIAL NUMBER	
MODEL NUMBER	<input type="text"/>
SER. NO.	<input type="text"/>
WATTS: MAXIMUM/RATED	<input type="text"/>
AMPS: /RATED	<input type="text"/>
VOLTS:	<input type="text"/>
CYCLE	<input type="text"/>
PHASE	<input type="text"/>
P.F.	<input type="text"/>
RPM	<input type="text"/>

FIGURE 1-1. 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.**

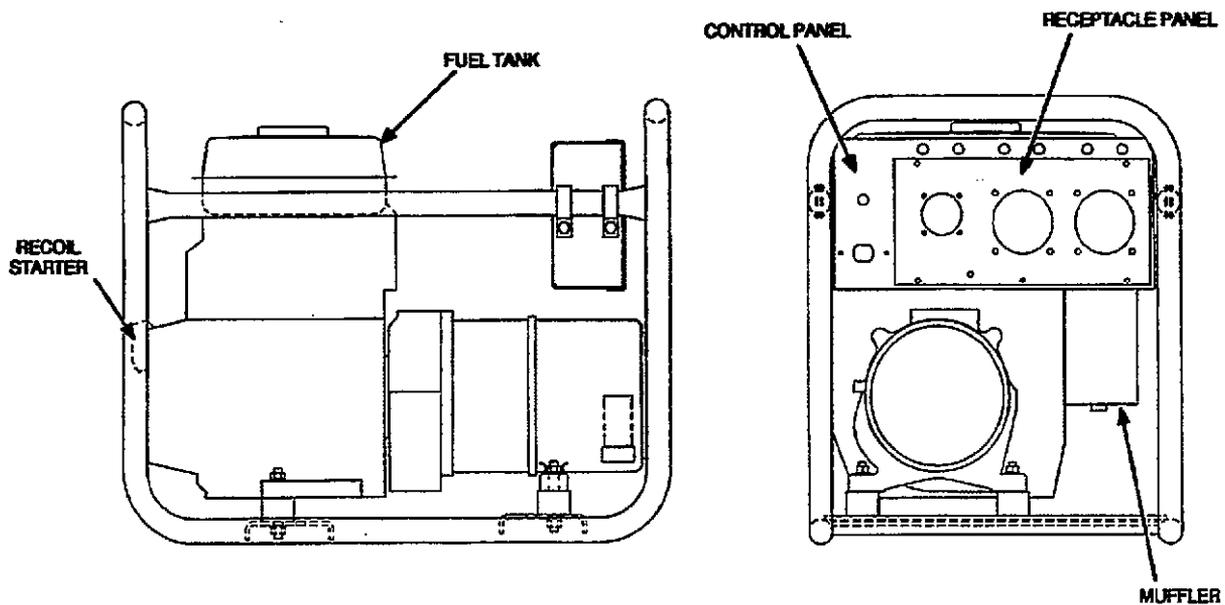


FIGURE 1-2. 1.4 AND 2.0 STANDARD MODEL PORTABLE GENERATOR SETS

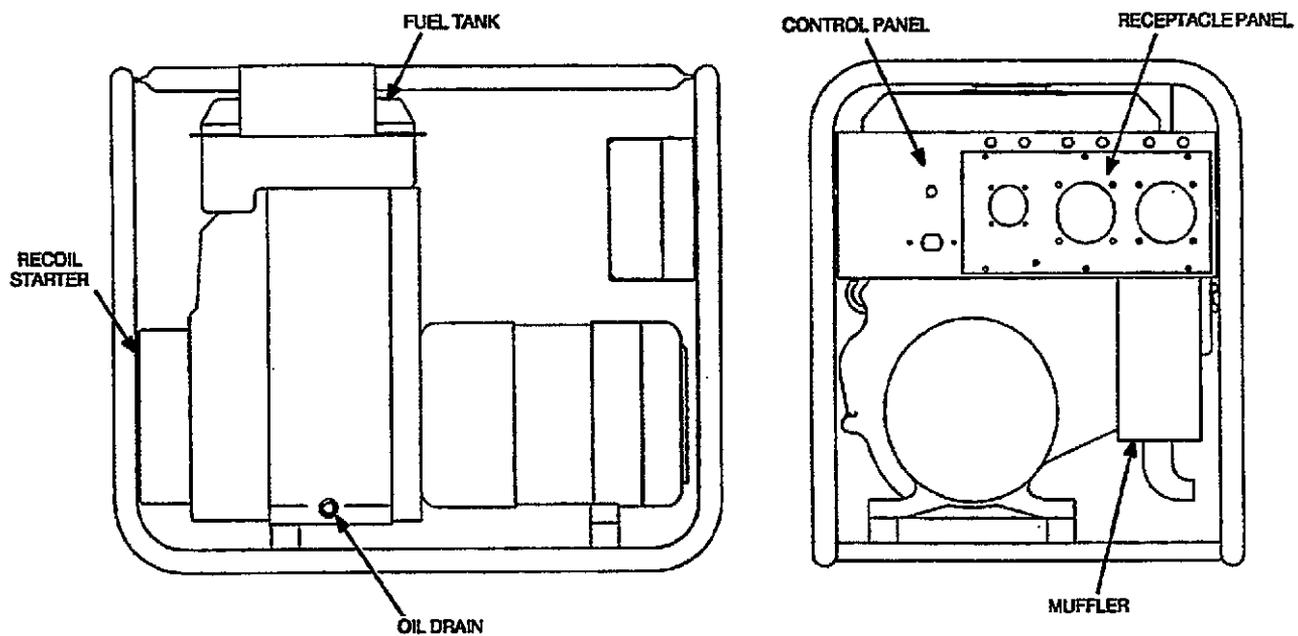


FIGURE 1-3. 3.5 STANDARD MODEL PORTABLE GENERATOR SET

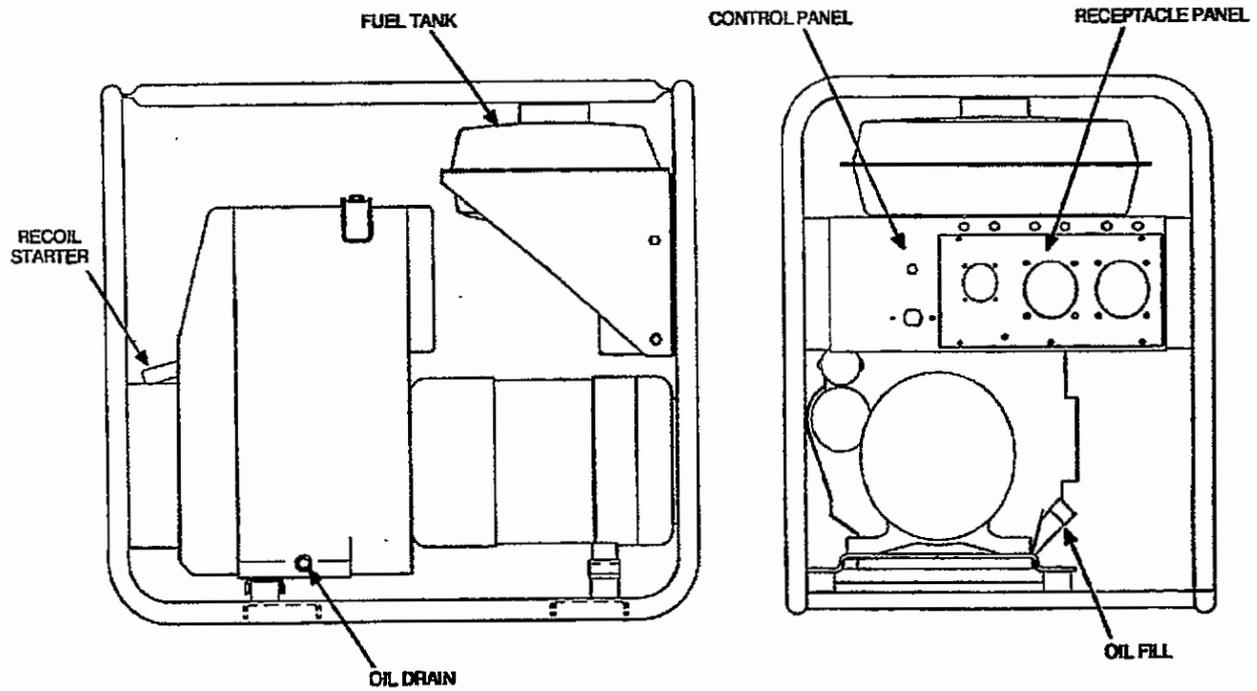


FIGURE 1-4. 5.0 STANDARD MODEL PORTABLE GENERATOR SET

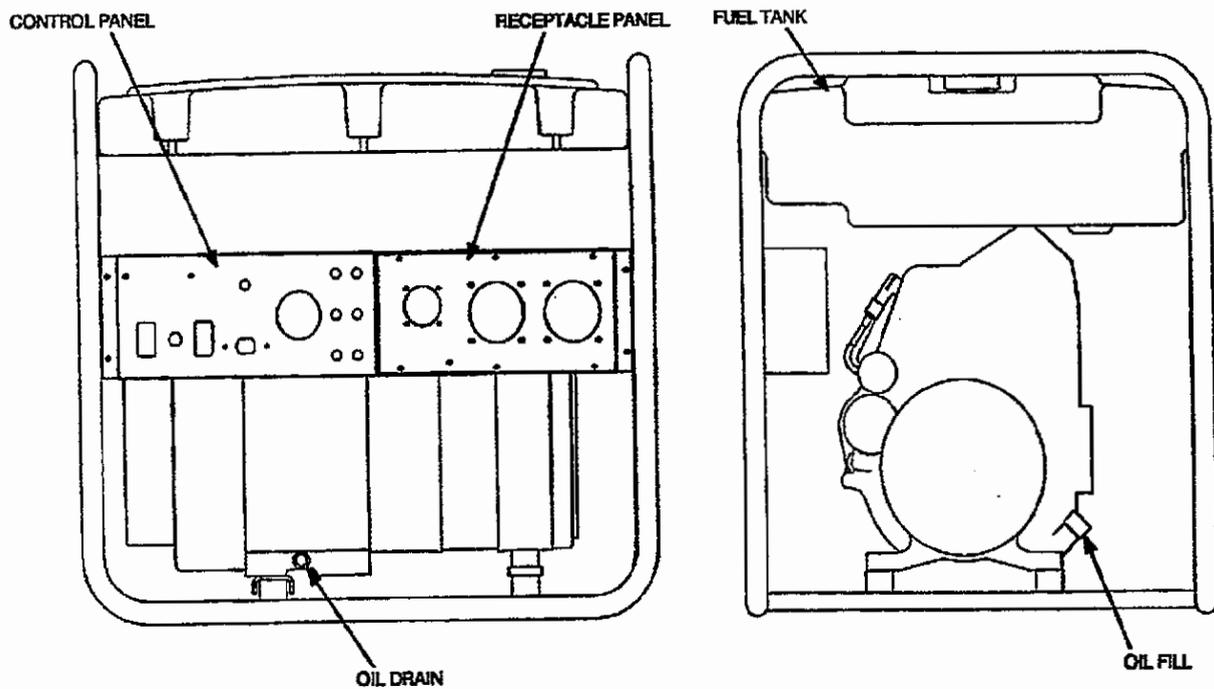


FIGURE 1-5. 2.0 PRO MODEL PORTABLE GENERATOR SET

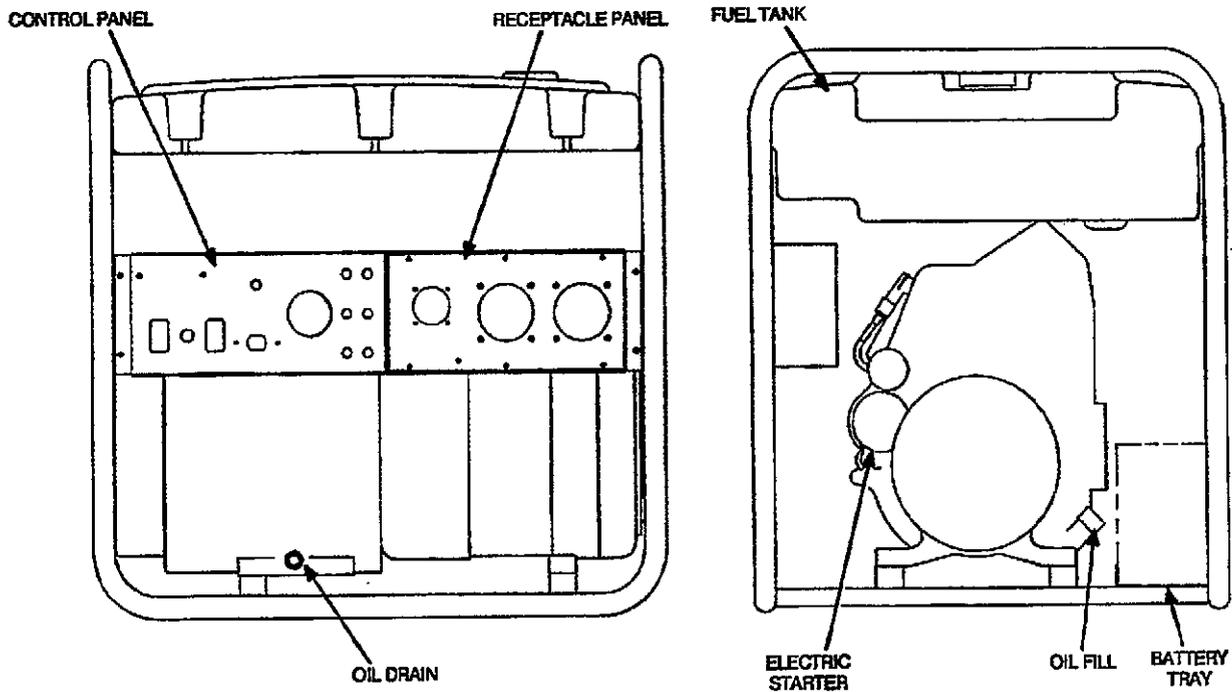


FIGURE 1-6. 3.5 PRO MODEL PORTABLE GENERATOR SET

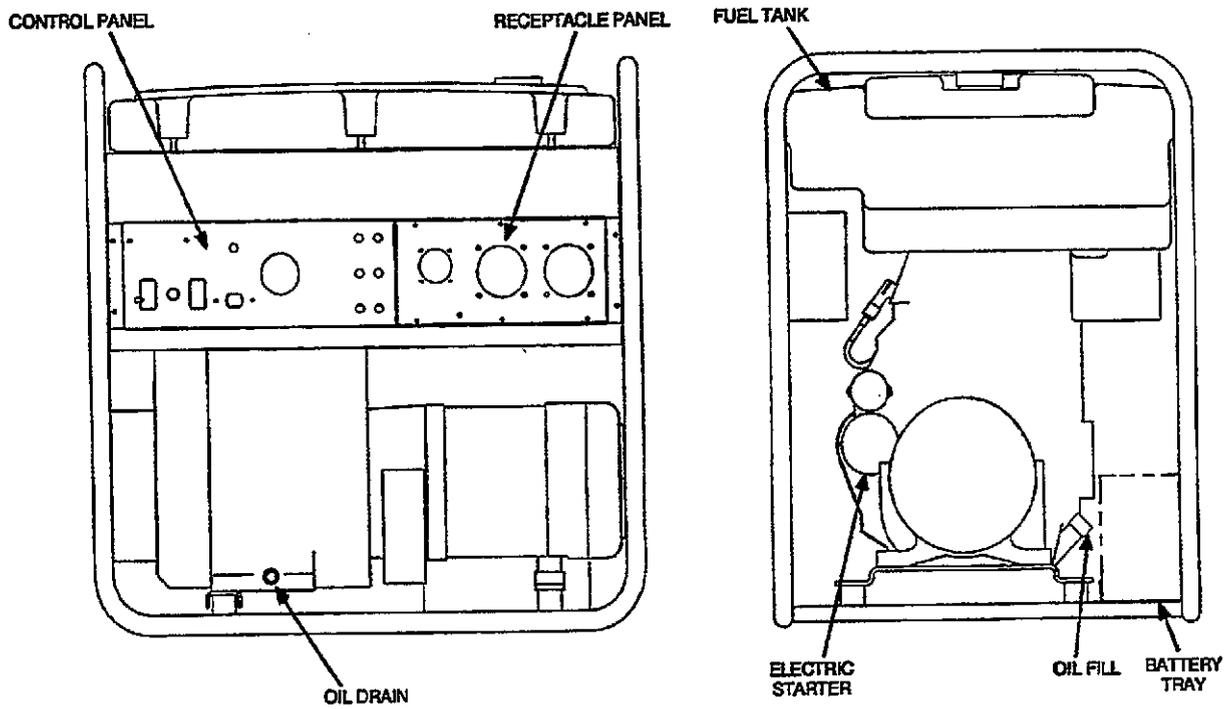


FIGURE 1-7. 5.0 PRO MODEL PORTABLE GENERATOR SET

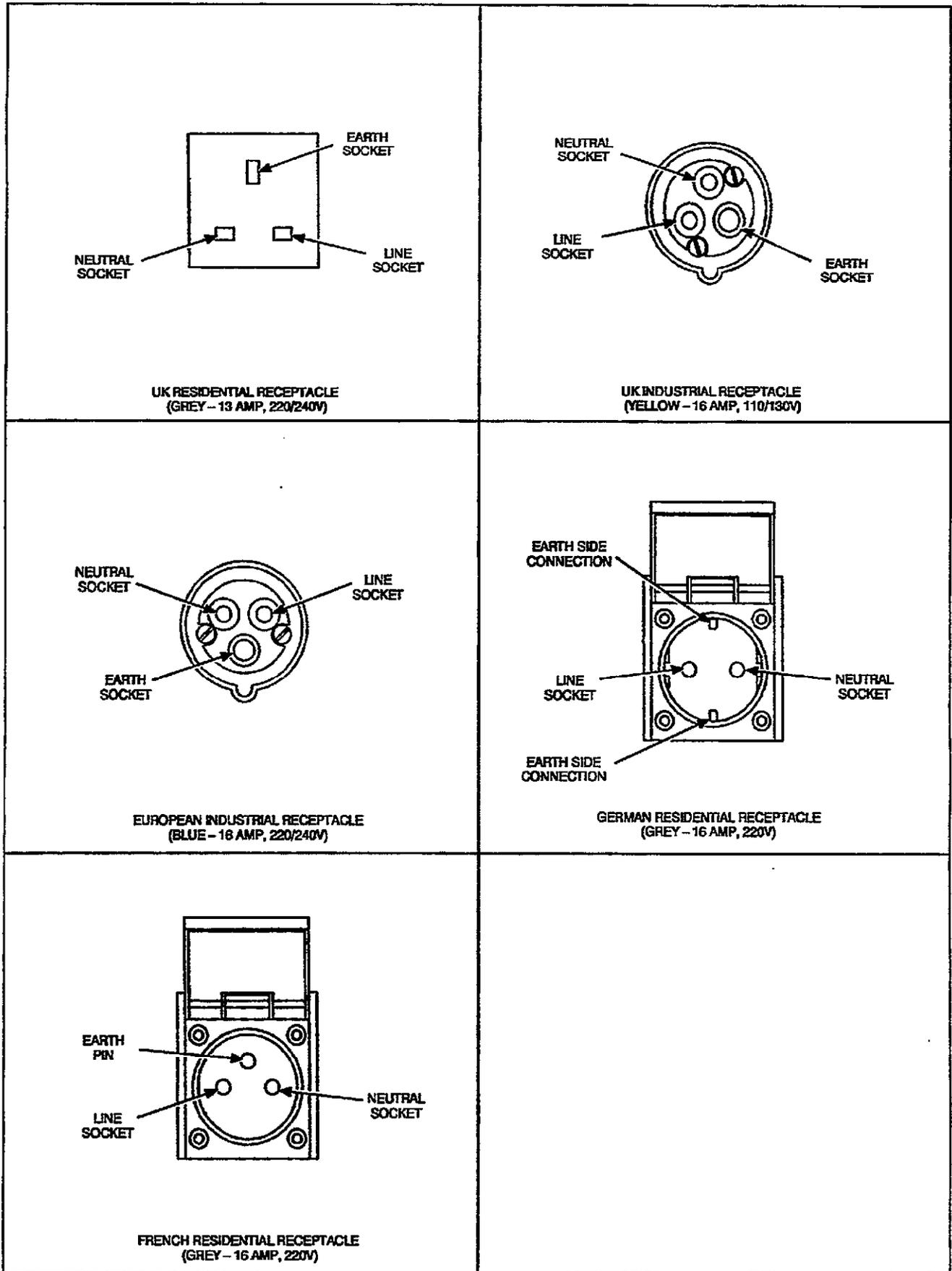


FIGURE 1-8. RECEPTACLES



# Section 2. Specifications

TABLE 2-1. STANDARD SERIES SPECIFICATIONS

STANDARD MODELS	1.4 EGHAM	2.0 EGHAM	3.5 EGHAM	5.0 EGHAM
<b>GENERATOR DETAILS</b>				
AC Output:				
Frequency (Hertz)	50	50	50	50
Voltage	110/220	110/220	110/220	110/220
Wattage (Max. Power)	1400	2000	3500	5000
Wattage (Rated Power)	1400	1800	3000	4500
Current (Rated Amperes)	12.7/6.4	16.4/8.2	27.2/13.6	40.9/20.4
DC Output:				
Watts	100	100	-	-
Volts x Amperes	12 x 8.3	12 x 8.3	-	-
<b>ENGINE DETAILS</b>				
Engine Speed (RPM)	3000	3000	3000	3000
Fuel	Gasoline	Gasoline	Gasoline	Gasoline
Engine Oil Capacity	0.63 qt (0.6 L)	0.63 qt (0.6 L)	0.95 qt (0.9 L)	1.16 qt (1.1 L)
Spark Plug Gap	0.028 in. (0.7 mm)	0.028 in. (0.7 mm)	0.028 in. (0.7 mm)	0.039 in. (1 mm)
Starting System	Recoil	Recoil	Recoil	Recoil
<b>GENERATOR SET DETAILS</b>				
Dry Weight	93 lbs (42 kg)	93 lbs (42 kg)	140 lbs (63.5 kg)	170 lbs (77 kg)
Dimensions:				
Length - Inches (mm)	23.5 (597)	23.5 (597)	26.8 (681)	29 (736.6)
Width - Inches (mm)	16 (406.4)	16 (406.4)	19 (482.6)	21.2 (538.5)
Height - Inches (mm)	18.3 (464.8)	18.3 (464.8)	21.3 (541)	24.8 (630)
Fuel Tank Capacity	0.9 gal (3.4 L)	0.9 gal (3.4 L)	1.58 gal (6.0 L)	2.1 gal (7.95 L)
Operating Hours at Rated Power:	3	2.6	3.1	2.6

**TABLE 2-2. PRO SERIES SPECIFICATIONS**

<b>PRO MODELS</b>	<b>2.0 EGHAM</b>	<b>3.5 EGHEM</b>	<b>5.0 EGHEM</b>
<b>GENERATOR DETAILS</b>			
AC Output:			
Frequency (Hertz)	50	50	50
Voltage	110/220	110/220	110/220
Wattage (Max. Power)	2000	3500	5000
Wattage (Rated Power)	1800	3000	4500
Current (Rated Amperes)	16.4/8.2	27.2/13.6	40.9/20.4
DC Output:			
Watts	100	100	100
Volts x Amperes	12 x 8.3	12 x 8.3	12 x 8.3
<b>ENGINE DETAILS</b>			
Engine Speed (RPM)	3000	3000	3000
Fuel	Gasoline	Gasoline	Gasoline
Engine Oil Capacity	0.63 qt (0.6 L)	0.95 qt (0.9 L)	1.16 qt (1.1 L)
Spark Plug Gap	0.028 in. (0.7 mm)	0.028 in. (0.7 mm)	0.039 in. (1 mm)
Starting System	Recoil	Recoil/Electric	Recoil/Electric
<b>GENERATOR SET DETAILS</b>			
Dry Weight	119 lbs (54 kg)	165 lbs (75 kg)	207 lbs (94 kg)
Dimensions:			
Length - Inches (mm)	26.8 (681)	26.8 (681)	29.2 (741.7)
Width - Inches (mm)	22 (559)	22 (559)	22.5 (571.5)
Height - Inches (mm)	24.6 (624.8)	24.6 (624.8)	28.3 (718.8)
Fuel Tank Capacity	6.5 gal (24.6 L)	6.5 gal (24.6 L)	8 gal (30.3 L)
Operating Hours at Rated Power:	20.5	13.5	11.5
Battery Requirements:			
Battery (Group U1)	—	12-Volt	12-Volt
Cold Cranking Amps (at 32°F [0°C])	—	235	235

# 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.**

**Protection against carbon monoxide inhalation includes proper exhaust system installation and regular, frequent visual and audible inspection of the complete exhaust system.**

## **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 safely.

### **PRE-START CHECKS**

Before starting the generator set, make sure it has sufficient oil and gasoline and that it is generally ready for operation.

#### **Engine Oil**

Check the engine oil level before each start. Keep the level full, but do not overfill. See the *Maintenance* section for oil specifications and oil checking and changing procedures.

#### **Fuel**

Select a well ventilated location for filling fuel tank. Do not fill fuel tank when engine is hot. See Recommended Fuel section for fuel type. Fill fuel tank slowly to a point no higher than two inches below the top of the filler neck. If operating the generator set on a slight grade, reduce the amount of gas used when filling so gas does not reach filler neck. Do not store or transport the generator set without first removing the fuel from the fuel tank.

**⚠WARNING** Gasoline presents the hazard of fire or explosion that can result in severe personal injury or death. Do not overfill fuel tank or fuel overflow can result. After filling fuel tank, securely tighten fuel cap. Do not transport the generator set without first removing the fuel from the fuel tank.

**⚠WARNING** Gasoline presents the hazard of fire or explosion that can result in severe personal injury or death. Never fill the fuel tank when the engine is hot or running. Do not permit any flame, spark, pilot light, cigarette, or other ignition source near the fuel system. Keep a type ABC fire extinguisher nearby.

### **RECOMMENDED FUEL**

Use clean, fresh, unleaded or regular grade gasoline. Using unleaded gasoline results in extended periods between service, longer spark plug life, and reduced carbon build-up inside the engine.

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.

## EARTHING REQUIREMENTS

Local code enforcement might require that the generator set be electrically connected to an earthing electrode (water pipe, earth-driven earthing rod, etc.) during operation. An earthing lug is provided for connecting the generator set to an earthing electrode conductor. See Figure 3-1.

**⚠WARNING** *1. If faulty electrical equipment is connected to the generator set, an electrical shock hazard exists that can result in severe personal injury or death. Check all electrical equipment for frayed cords or breaks in the insulation before using.*

*2. Properly applied and maintained ground fault circuit interrupters, often required by local codes, can afford additional protection against the hazard of electrical shock.*

## CONTROL PANEL

The following section describes the function and operation of the generator set controls for all of the models. Some control features are not available on certain models. Review each of the control descriptions that apply to the model being used. Refer to Figure 3-1 for typical control panel configurations. Procedures for using the controls for starting and operating the set are provided in the following sections.

### Control Components

**Engine On/Off Switch (Standard Series):** Mounted on the engine, allows engine starting when the On/Off switch is set to the On position. When the switch is set to the Off position, it stops engine operation.

**On/Stop Switch (Pro Series):** Allows the engine to be started any time that the switch is in the On position. Stops engine operation when placed in the Stop position.

**Start/On/Stop Switch (Electric Start Models):** Pushing switch into the Start position begins engine cranking. When engine starts, release the switch and it will return to the On position. To stop the engine, hold the switch in the Stop position until the engine stops running. The engine can be recoil started when the switch is placed in the On position.

**Low Oil Light:** Indicates low engine oil level. Low Oil Light will flash during cranking or will flash during operation and the generator set will stop if the engine oil level is below the low working level.

**Fuel Gauge:** Indicates the present fuel level in the generator set fuel tank.

**Voltmeter:** Indicates generator AC output line voltage.

**AC and DC Circuit Breakers:** Provide protection for the generator from short circuits or overloads.

**Idlematic Switch:** Automatic engine speed control. In the On position, the engine operates at idle speed until a load is applied. The Idlematic automatically increases the engine to full speed when a load is applied. This feature reduces engine wear and conserves energy. In the Off position the engine operates at full speed.

### Additional Controls

**Fuel Valve:** Controls fuel flow to engine. Setting fuel valve to Open position allows fuel to flow to engine. Set fuel valve to Closed position when generator set is not in use. See Figure 3-2.

**Choke Lever:** Restricts air flow to the carburetor for starting a cold engine. See Figure 3-4.

**Speed Control Lever:** Sets engine speed (Figure 3-3). This lever should be maintained in the high speed ("H") position at all times. Periodically check setting to make sure it is in the proper position.

## STARTING PROCEDURE

After checking the generator set as described in the Pre-Start Checks and disconnecting all loads from the generator set, follow each of the steps in sequence.

**⚠WARNING** *Inhalation of exhaust gas can result in severe personal injury or death. Do not operate the generator set in poorly ventilated areas such as indoors, inside tanks, confined areas, depressions, or any area where exhaust gases might accumulate. Locate the exhaust outlet so that exhaust gases will not accumulate during operation.*

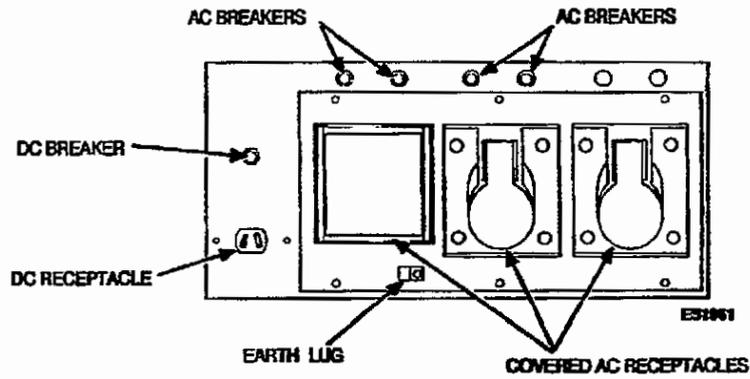
**⚠WARNING** *Due to the danger of severe personal injury or death, do not operate the generator set in hazardous areas where it might ignite gases, combustibles, or explosive materials.*

**⚠WARNING** *Generator sets present the hazard of electrical shock that can result in severe personal injury or death. Never expose the generator set to rain, snow, or similar wet conditions when operating.*

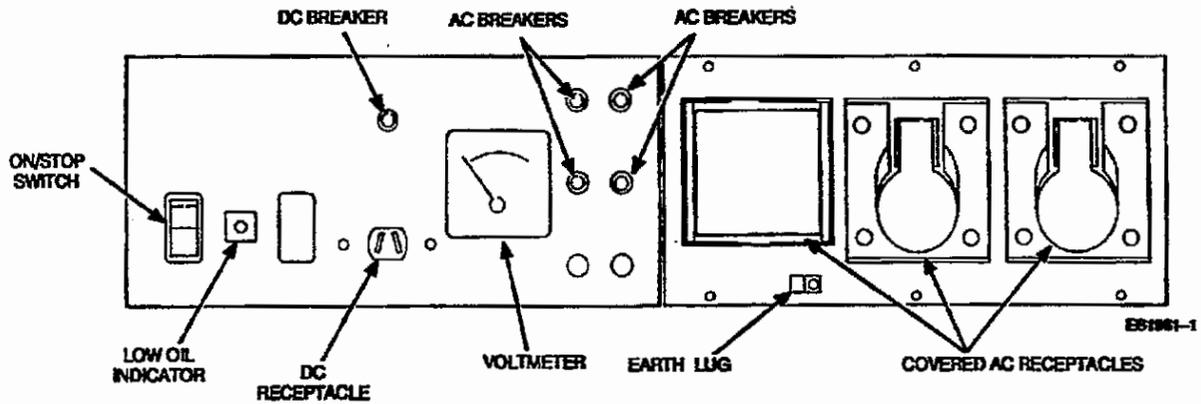
**⚠WARNING** *The muffler becomes very hot during and after generator set operation and can cause severe burns. Do not touch hot muffler.*

**⚠CAUTION** *The voltage surge at start-up can damage appliances (TV sets, microwave ovens, computers, etc.). Always disconnect all loads before starting the generator set.*

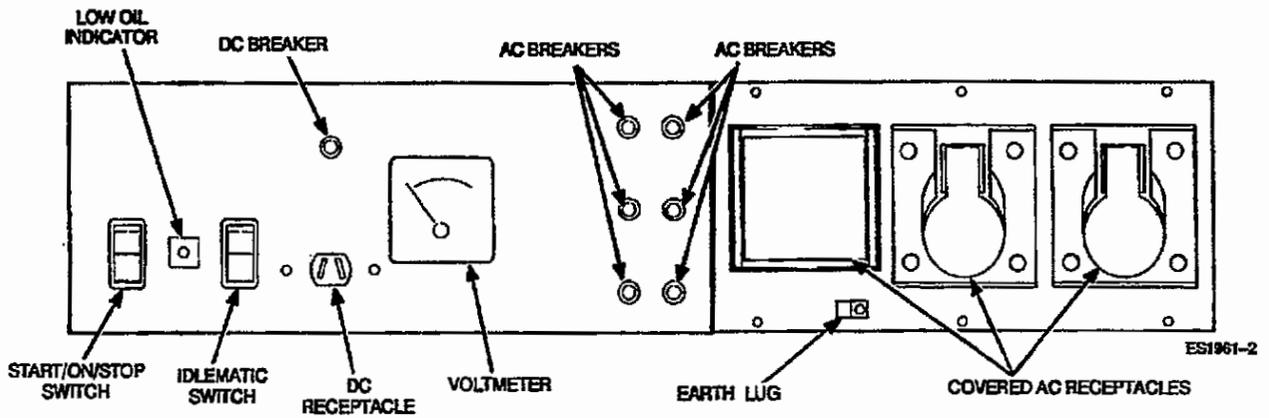
**2.0 STANDARD**



**2.0 PRO**



**5.0 PRO**



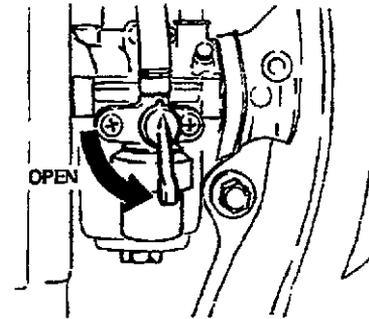
**FIGURE 3-1. TYPICAL PORTABLE GENERATOR SET CONTROL PANELS**

## Electric Start Models

1. Open the fuel valve (Figure 3-2).
2. Set the choke lever to the CLOSE position (Figure 3-4). If engine is warm from previous operation, do not close the choke.
3. Start the engine by pressing the Start/On/Stop switch to the START position. Release switch when engine starts and it will return to the On position. Gradually open the choke lever as the engine warms up. Allow the engine to warm up for three to five minutes before applying a load. The voltmeter on the control panel will indicate generator output voltage.

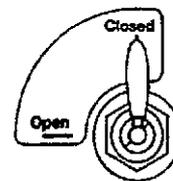
If the oil watch lamp flashes during cranking or running, stop the engine and check the oil level. Add oil as recommended in the Maintenance section.

4. Proceed to Adding Loads in this section.



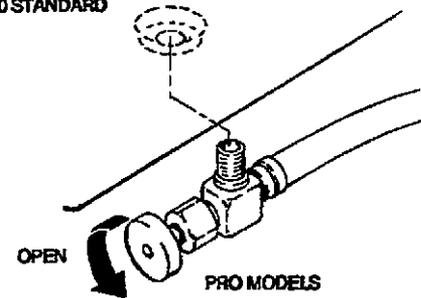
1.4, 2.0, AND 3.5 STANDARD

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5.0 STANDARD



PRO MODELS

M1838

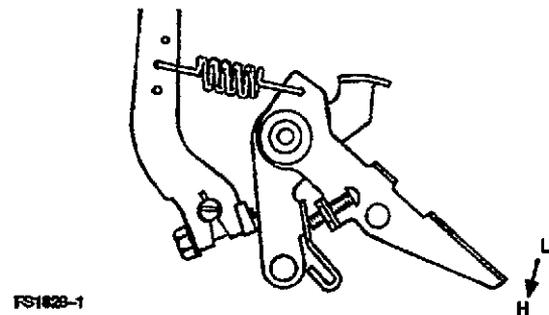
FIGURE 3-2. FUEL VALVE

## Manual Start Models

1. Open the fuel valve (Figure 3-2).
2. Check to be sure that the speed control lever is in the high speed ("H") position (Figure 3-3).
3. Set the choke lever to the CLOSE position (Figure 3-4). If engine is warm from previous operation, do not close the choke.
4. Move the engine switch to the On position.
5. With one hand on the generator set to steady it, grip the recoil handle and pull out smoothly and quickly. Repeat as necessary. When the engine starts, gradually open the choke lever as the engine warms up. Allow the engine to warm up for three to five minutes before applying a load.

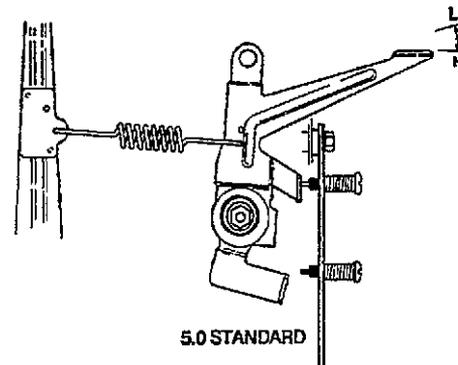
If the oil watch lamp flashes during cranking or running, stop the engine and check the oil level. Add oil as recommended in the Maintenance section.

6. Proceed to Adding Loads in this section.



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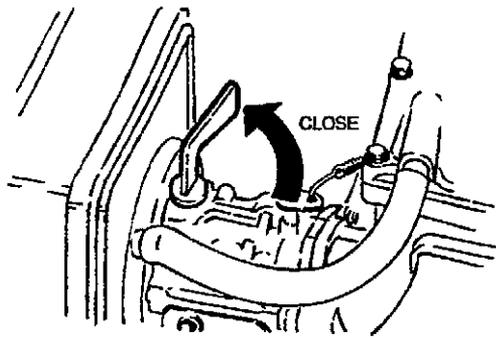
1.4, 2.0, AND 3.5 MODELS



5.0 STANDARD

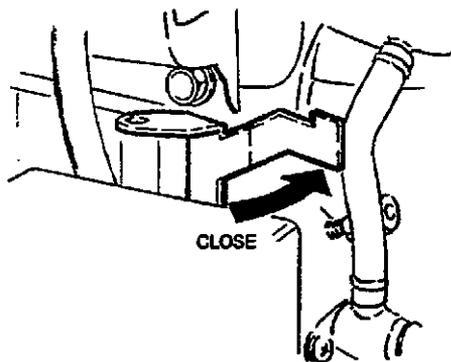
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FIGURE 3-3. SPEED CONTROL LEVER



1.4-3.5 EGH

M1842



5.0 EGH

M1841-1

FIGURE 3-4. CHOKE LEVER

## ADDING LOADS

Follow the appropriate procedure for adding either AC or DC loads.

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

### Adding AC Loads

1. Note the rated output of the generator set (from the generator set nameplate or the *Specification* section).
2. Check the load rating of each of the items that you plan to connect to the generator set. Table 3-1 lists typical wattages for common appliances and tools.
3. Add the wattages of the items you want to operate and make sure that the total wattage is not more than the generator set rated output. Note the following example.

**Example:** The 3.5 kW models have a maximum power output of 3500 watts and a rated output of 3000 watts. A 1500 watt heater, 900 watt circle saw, 500 watt drill and a 100 watt light could all be operated at the same time. If you wanted to operate a second circle saw rated at 900 watts, it would be necessary to disconnect the 1500 watt heater while you are using the second saw.

If a motor load and another load have a combined wattage close to the rated output of the generator set, start the motor load first and allow it to operate at normal speed before connecting the other load. Motor loads consume much more power during start up than they do when they are running (some motors draw up to three times their running load).

4. Connect the AC loads to the receptacle(s) on the control panel. Make sure the cord and plug connector have ground terminals.

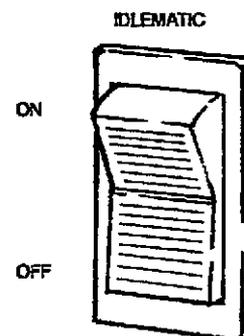
**WARNING** Electrical shock can cause severe personal injury or death. Cord and plug equipment must have a ground terminal to provide additional protection.

### High Altitudes

Maximum power decreases roughly four percent for each 1000 feet (310 m) above sea level (after the first 1000 feet). When operating the generator set at an altitude above 1000 feet, calculate the altitude derating to determine maximum AC load capacity.

**Models with Idlematic:** Move the Idlematic switch to ON if you want the idlematic feature to operate (Figure 3-5). This feature automatically controls engine speed so the set will operate at idle speed with no-load and full speed when a load is connected. If you do not want to use this feature, keep the switch in the OFF position.

Keep the Idlematic Switch at OFF if there will be a lot of small interrupted loads or loads under 0.8 amperes.



M1844

FIGURE 3-5. IDLEMATIC SWITCH

**TABLE 3-1. APPROXIMATE POWER USAGE OF COMMON APPLIANCES**

Appliance or Tool	Approximate Running Wattage
Battery Charger .....	Up to 800
Bench Grinder (8 in.) .....	1400
Circle Saw (7-1/4 in.) .....	900
Coffee Maker .....	850
Drill (3/8 in.) .....	400
Electric Water Pump .....	550
Electric Broom .....	200-500
Electric Drill .....	250-750
Electric Stove (Per Element) .....	350-1000
Electric Water Heater .....	1000-1500
Portable Heater .....	1500
Refrigerator .....	600-1000
Space Heater .....	1000-1500
Sump Pump .....	350
Television .....	200-600
Trimmer (12-in. heavy duty) .....	500

See text for starting watts of motor loads.

### Adding DC Loads

Connect the DC loads to the DC receptacle on the control panel. Make sure load wires positive (+) and negative (-) match with the polarities at the receptacle on the control panel. Refer to the Specification section for maximum DC output current at 12 volts.

**⚠WARNING** Batteries emit a highly explosive gas that can be ignited by electrical arcing, smoking, or other ignition source. When charging batteries, connect cables to the battery before connecting cables to the generator set. This will reduce the risk of arcing at the battery that could cause an explosion. When battery charging is complete, remove the cable at the generator set before removing cables from the battery.

Do not connect AC loads while using DC power on the 1.4 and 2.0 kW models.

### CIRCUIT BREAKERS

If an AC or DC circuit breaker opens, check to see if the generator set is overloaded. If so, remove some of the

load from the generator set. Reset the circuit breaker by pushing in the indicator (reset after waiting a minimum of 10 seconds after tripping).

### OIL WATCH INDICATOR

The Oil Watch flashes during cranking if the oil level is low. It also flashes and stops the generator set if the set is running and the oil level reaches the low working level of the Oil Watch. See Figure 3-6 for a typical Oil Watch illustration. Add oil as recommended in the Maintenance section before attempting to restart.

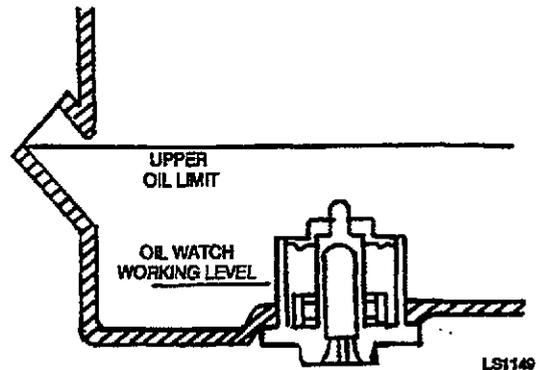


FIGURE 3-6. TYPICAL OIL WATCH

### STOPPING

1. Remove all loads from the generator set.
2. Let the generator set run for three to five minutes to allow the engine to cool down.
3. Close the fuel valve.

**⚠WARNING** Gasoline presents the hazard of fire or explosion that can result in severe personal injury or death. Always close the fuel valve when the engine is not in use to reduce the risk of fuel leakage.

4. Stop the generator set by pressing and holding the Start/On/Stop or On/Stop switch, or by turning the Engine On/Off switch to Off, depending on the model.

## OPERATING RECOMMENDATIONS

### High/Low Operating Temperatures

The generator set will operate satisfactorily in both high and low temperatures. Use the oil recommended in the Maintenance section for the expected temperature conditions.

#### **High Operating Temperatures:**

1. See that nothing obstructs the airflow to and from the generator set.
2. Keep the engine cooling fins clean. Air housings should be properly installed and maintained.

#### **Low Operating Temperatures:**

1. Use fresh gasoline and keep the tank filled to avoid condensation.
2. Keep the spark plug clean and correctly gapped.

### Extremely Dusty or Dirty Conditions

Observe the following procedures when operating the generator set in extremely dusty or dirty conditions.

1. Keep the generator set clean and do not allow dust and dirt to accumulate.
2. Clean the air cleaner more often than shown in the maintenance schedule.
3. Keep oil and gas in dust-tight containers suitable for storage of fuels.

### Generator Set Exercise

Infrequent operation of the generator set can result in moisture condensation in the engine and difficult starting. Moisture accumulates because the engine does not run often enough to reach normal operating temperature. This moisture can cause damage to the engine.

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 more effective than several short periods.

**TABLE 3-2. TROUBLESHOOTING GUIDE**

The following troubleshooting guide can be used for basic problem diagnosis. If these recommendations do not 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 (ELECTRIC START MODELS)	<ol style="list-style-type: none"> <li>1. Low battery.</li> <li>2. Bad battery connection.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check battery electrolyte level.</li> <li>2. Clean and tighten all battery and cable connections.</li> </ol>
CRANKS SLOWLY (ELECTRIC START MODELS)	<ol style="list-style-type: none"> <li>1. Low battery.</li> <li>2. Bad battery connection.</li> <li>3. Oil is too heavy.</li> <li>4. Load is connected.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check battery electrolyte level.</li> <li>2. Clean and tighten all battery and cable connections.</li> <li>3. Replace with recommended oil.</li> <li>4. Disconnect load while starting.</li> </ol>
ENGINE WON'T START	<ol style="list-style-type: none"> <li>1. Fuel below genset pickup level in tank.</li> <li>2. Fuel supply shutoff valve closed.</li> <li>3. Carbon deposits on spark plug.</li> <li>4. Low oil level.</li> </ol>	<ol style="list-style-type: none"> <li>1. Add fuel.</li> <li>2. Fully open fuel supply valve.</li> <li>3. Remove spark plug and clean.</li> <li>4. Add oil if necessary.</li> </ol>
EXHAUSTING BLACK SMOKE	<ol style="list-style-type: none"> <li>1. Choke stuck.</li> <li>2. Dirty air filter.</li> <li>3. Rich fuel mixture.</li> </ol>	<ol style="list-style-type: none"> <li>1. Open Choke</li> <li>2. Clean or replace air filter.</li> <li>3. Contact an Onan service center.</li> </ol>
UNIT RUNS THEN STOPS	<ol style="list-style-type: none"> <li>1. Out of fuel.</li> <li>2. Low oil level.</li> <li>3. Excess oil.</li> </ol>	<ol style="list-style-type: none"> <li>1. Add fuel.</li> <li>2. Add oil.</li> <li>3. Reduce engine oil level.</li> </ol>
UNIT RUNS THEN SURGES	<ol style="list-style-type: none"> <li>1. Loose or worn spark plug lead</li> <li>2. Faulty spark plug.</li> <li>3. Dirty fuel filter or generator set at too steep of an angle.</li> <li>4. Governor out of adjustment or lean fuel mixture.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check spark plug lead connection.</li> <li>2. Remove and clean or replace.</li> <li>3. Check fuel filter and angle of generator set.</li> <li>4. Contact an Onan service center.</li> </ol>
NO AC OUTPUT VOLTAGE	<ol style="list-style-type: none"> <li>1. Open AC circuit breaker due to an overload.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove all loads, reset breaker, check loads for defects. Do not exceed rated load specifications.</li> </ol>
NO DC OUTPUT VOLTAGE	<ol style="list-style-type: none"> <li>1. Open DC circuit breaker due to an overload.</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove all loads, reset breaker, check for shorted battery or load defects. Do not exceed rated load specifications.</li> </ol>

**⚠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 adhere to a definite schedule for maintenance and service. If the generator set will be subjected to extremely hot or dusty operating conditions, consult an Onan Authorized Service Center and determine an appropriate maintenance schedule. Keep an accurate log of all service and maintenance for warranty support.

Perform all the maintenance at the number of operating hours indicated. Use the schedule to determine the maintenance required, then refer to the following sections for the maintenance procedures.

**⚠WARNING** *Accidental starting of the generator set during maintenance can cause severe personal injury or death. Before performing maintenance, disconnect the spark plug wire from the spark plug. Electric start models: disconnect both generator set starting battery cables. Remove the negative (-) cable first to reduce the risk of arcing.*

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

**TABLE 4-1. PERIODIC MAINTENANCE SCHEDULE**

SERVICE THESE ITEMS	SERVICE INTERVAL				
	EVERY 8 HOURS	EVERY 50 HOURS	EVERY 100 HOURS	EVERY 200 HOURS	EVERY 500 HOURS
General Inspection	x <sup>1</sup>				
Check Oil Level	x				
Change Crankcase Oil		x <sup>2,3</sup>			
Clean Air Filter		x <sup>3</sup>			
Clean Spark Plug			x		
Clean and Inspect Muffler			x		
Clean Fuel Filter				x	
Check Spark Plug Gap				x	
Clean Carburetor and Fuel Tank					x <sup>4</sup>
Check Valve Lash Clearance					x <sup>4</sup>
Clean Cylinder Head					x <sup>4</sup>

- 1 – Check for loose parts and for oil and fuel leaks. Check exhaust system audibly and visually with the generator set running. 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 – Perform more often in extremely dusty conditions.
- 4 – Have the Onan service center perform.

## GENERAL INSPECTION

Clean the generator set and perform a general inspection before using the set each day or at least every eight operating hours. Check for loose parts or any signs of mechanical damage. Start the generator set, and check for visible and audible irregularities. Examine the exhaust system for leaks and inspect the fuel supply line, filter, tank, and fittings for leaks. If any problems are found, have them corrected immediately. Replace worn or damaged parts 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. Do not start the generator set until gas and fumes are purged from the area.*

## 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.

### Checking Engine Oil Level

Be sure the engine crankcase is filled with oil. Make sure that the generator set is resting on a level surface when checking oil level. If adding oil between changes, use the same brand and viscosity; different brands might not be compatible when mixed. See Recommended Engine Oil in this section.

Add oil very slowly until the full level is reached, but do not overfill. Too much oil can cause foaming and engine shutdown. Always replace the oil cap securely to prevent leakage. Refer to Figure 4-1.

**⚠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.*

*Check the oil level on all models except 5.0 kW models as follows:*

1. Remove oil cap and observe oil level.
2. Oil level should appear at the top of the oil port.
3. Add oil until oil level reaches the top of the oil port.

*Check the oil level on 5.0 kW models as follows:*

1. Remove oil level indicator and wipe with clean rag.
2. Insert oil level indicator into oil fill and push down until seated.
3. Remove oil level indicator and check oil level on indicator stem.
4. Add oil until oil level reaches upper mark on indicator stem.

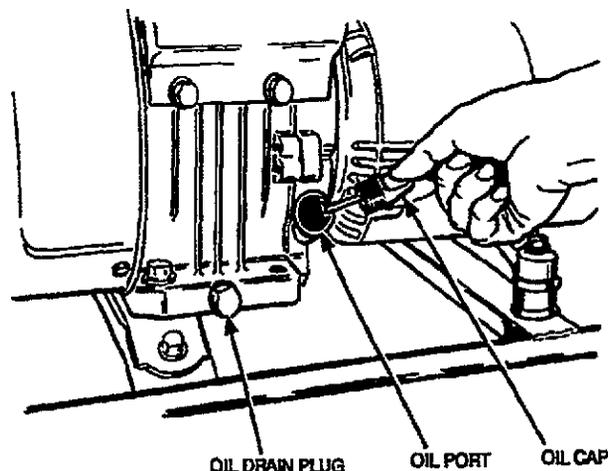
### Changing Engine Oil

Figure 4-1 shows the location of the oil drain. In dusty or dirty conditions, change the oil more frequently than specified in the Maintenance Schedule.

Run the engine until warm before draining the oil.

**⚠WARNING** *Hot oil can cause severe burns if spilled or splashed on skin. Do not check the oil level while the generator set is running: oil may blow out of the oil fill tube. Keep fingers and hands clear when removing oil drain plug, and wear protective clothing.*

To drain oil, place a pan under the oil drain plug. Remove oil plug and allow oil to drain from engine. Replace oil plug securely to prevent leakage.



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FIGURE 4-1. OIL LEVEL CHECK

## 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.

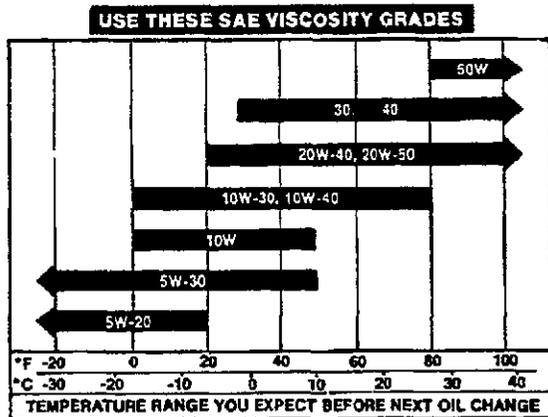


FIGURE 4-2. SAE VISCOSITY GRADES

## AIR FILTER

In dusty conditions, change the air filter often. Replace the air filter only with an Onan-approved filter. There are two types of air filter assemblies used on these models: a foam wrapper on paper element, and a paper element only. Follow the filter service procedures that apply to the filter system on the generator set.

1. Carefully remove the air cleaner cover and the air cleaner element.
2. Follow the service procedures listed by the type of filter used.

**Foam Wrapper On Paper Filter:** Remove foam wrapper and wash in detergent and water. Dry foam wrapper thoroughly. Use low pressure air on the inside of the paper element to remove dust and dirt. Replace paper element at every sixth cleaning or sooner if dusty conditions exist.

**Paper Filter Only:** Use low pressure air on the inside of the paper element to remove dust and dirt. Replace paper element at every sixth cleaning or sooner if dusty conditions exist.

3. Reassemble filter into the housing and carefully install the air cleaner cover.

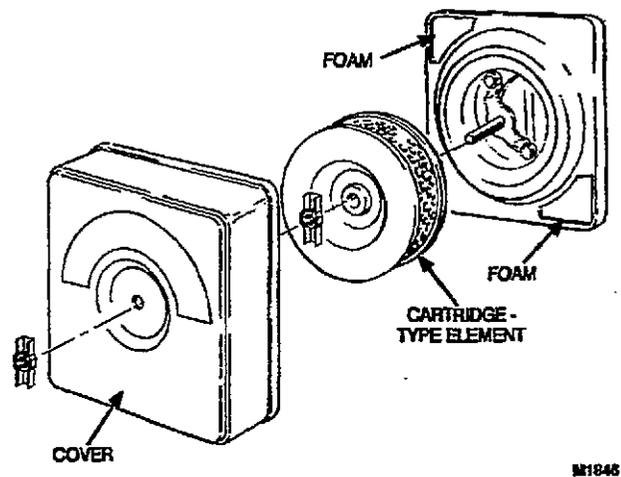
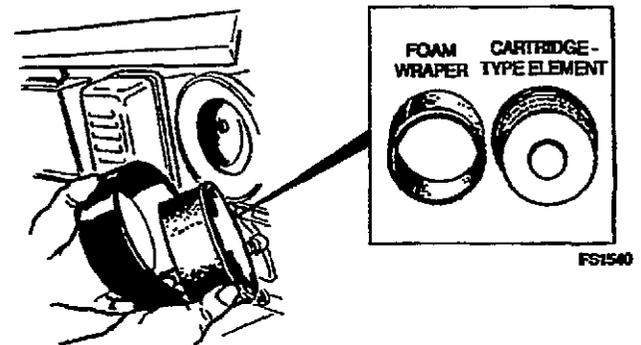
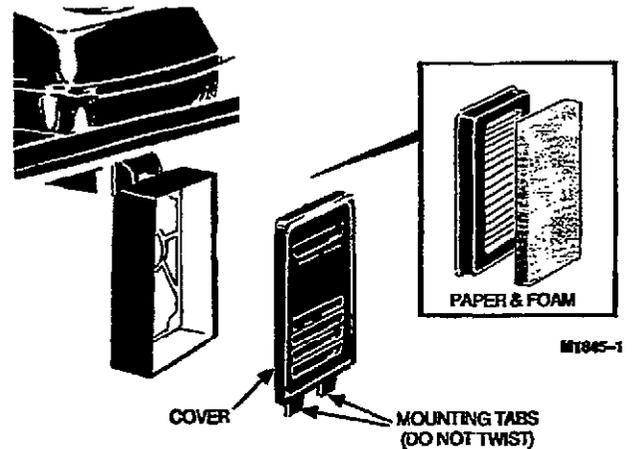


FIGURE 4-3. AIR FILTER SERVICE

## SPARK PLUG

A spark plug with heavy combustion deposits can cause the generator set to misfire, operate erratically, or stop running when a load is applied. Remove the spark plug and clean carbon and other deposits off with a wire brush, then inspect and measure plug gap (Figure 4-4). Plug gap measurements are listed in the *Specifications* section. If a plug is discolored or badly fouled, replace it.

The spark plug is located behind the control panel on the 5.0 kW Pro model. If necessary, the fuel tank can be raised for easier service access as follows:

**⚠WARNING** *Fuel presents the hazard of fire or explosion that can cause severe personal injury or death. Shut fuel valve and handle fuel tank carefully to prevent fuel leakage. Reduce fuel level in fuel tank to reduce the risk of spilling fuel. Do not permit any flame, spark, pilot light, cigarette, or other ignition source near the fuel system. Keep an ABC type fire extinguisher nearby.*

1. Let the generator set cool down before servicing. Check fuel level in the fuel tank and reduce the level if tank is full to avoid spilling. Use a pump designed for use with fuels to lower fuel tank level and store fuel in a clean container designed for fuel storage.
  2. Close the fuel shutoff valve on the bottom of the fuel tank (Figure 3-2).
  3. Remove the fuel tank mounting nuts and raise the control panel side of the fuel tank high enough to access the spark plug. Support the fuel tank to prevent tilting or dropping.
- Black deposits indicate a rich mixture.
  - A Wet plug indicates misfiring.
  - Badly or frequently fouled plug indicates the need for a major tune-up.

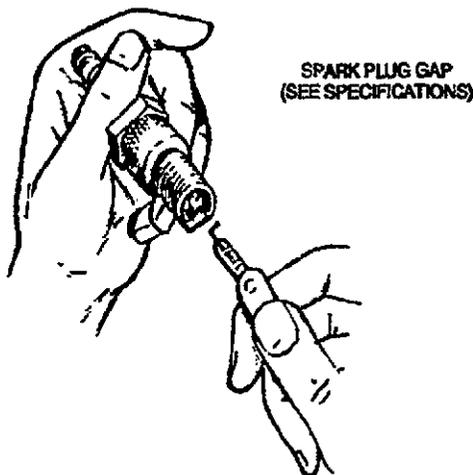


FIGURE 4-4. MEASURING SPARK PLUG GAP

## MUFFLER SERVICE

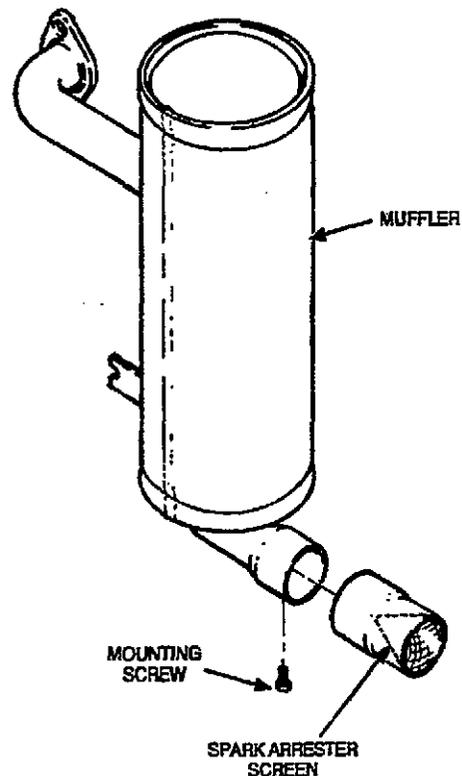
**⚠WARNING** *A hot muffler can cause severe burns. Allow the generator set to cool before servicing the muffler.*

Inspect the muffler for corrosion and physical defects. Operate and generator set and check for exhaust leaks and noisy operation. Replace a noisy or defective muffler before using the generator set.

The exhaust Spark Arrester requires periodic cleaning for safe operation and to maintain maximum efficiency. Consult the maintenance schedule for recommended cleaning intervals. Allow the generator set to cool down before servicing the muffler.

Remove the spark arrester screen (Figure 4-5), inspect for damage, and replace if defective. To clean, lightly tap the screen and clean any deposits with a wire brush. Also use a commercial solvent if necessary. Allow screen to dry, then reassemble and attach securely.

**⚠WARNING** *Most part cleaning solvents are flammable and misuse can result in severe personal injury or death. Follow the manufacturer's recommendations. Work in a well ventilated area and do not allow any spark, flame, pilot light, cigarette, or other ignition source near the generator set. Keep a fire extinguisher rated ABC near work area.*



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FIGURE 4-5. CLEANING A TYPICAL SPARK ARRESTER

## FUEL FILTER

**⚠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, cigarette, or other ignition source near the fuel system. Inspect for fuel leaks any time service is performed on the fuel system. Keep a fire extinguisher rated ABC near work area.

Clean or replace the fuel filter at the interval recommended in the Maintenance Schedule or if performance problems occur and bad fuel is suspected. Refer to Figure 4-6.

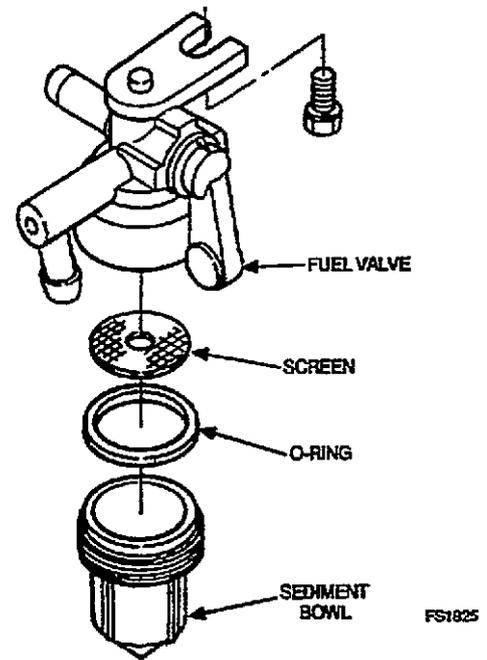
**Service fuel filter on models with sediment bowls as follows:**

1. Turn the fuel supply valve to the closed position and allow the set to operate until it runs out of fuel. Let the generator set cool down before proceeding.
2. Remove the fuel line from the fuel shutoff valve and collect the fuel in a suitable container.
3. Unscrew the sediment bowl from the fuel supply valve and clean it.
4. Remove the screen and clean any dirt and particulate off the screen.
5. Reinstall the screen and sediment bowl. Attach the fuel line securely to the fuel shutoff valve.

**Service In-line fuel filters as follows:**

1. Turn the fuel supply valve to the closed position and allow the set to operate until it runs out of fuel. Let the generator set cool down before proceeding.
2. Remove in-line fuel filter and collect fuel in a suitable container. Discard used fuel filter and install new fuel filter. Attach fuel lines securely to the fuel filter to prevent fuel leakage.

Pro models have a fuel filter screen mounted inside the fuel shutoff elbow. The screen should be cleaned when performance problems occur or bad fuel is suspected.



1.4, 2.0, AND 3.5 STANDARD MODELS

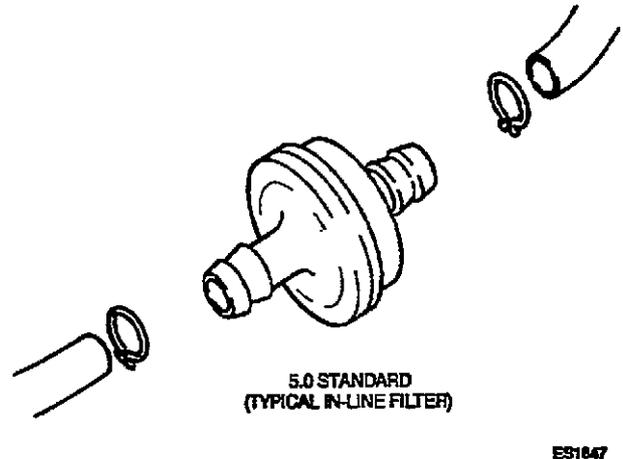


FIGURE 4-6. FUEL FILTER SERVICE

## BATTERY CARE

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

**⚠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.*

**⚠WARNING** *Ignition of explosive battery gases can cause severe personal injury. Do not smoke or allow any flame, spark, pilot light, arc-producing equipment or other ignition sources near the battery.*

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

1. Keep the battery case clean and dry. Wipe battery case with a damp cloth whenever dirt accumulates.
2. Make certain that the battery cable connections are clean and tight. To remove the battery cables, use a battery 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. Apply a light coating of petroleum jelly or non-conductive grease to battery connections to retard corrosion.
4. 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, only add water to a low battery.
5. Use a battery hydrometer to check the specific gravity of the electrolyte in each cell. A battery should be charged if the specific gravity measures less than 1.215. When charging the battery, avoid overcharging. Stop charging battery when the electrolyte specific gravity reaches 1.260, at approximately 80°F (27°C).

## CLEANING THE GENERATOR SET

Remove spilled oil and fuel from the generator set immediately with a dry rag. Dispose of cleaning rag properly. Do not allow dirt to accumulate on the engine cooling fins or on the control components and electrical connections. A damp cloth can be used to clean dust and dirt from the generator set. Cleaning solvents can damage electrical connectors and components and should not be used.

## OUT-OF-SERVICE PROTECTION

If you are unable to exercise the generator set regularly, and the set 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.

### Preparing Generator Set For Storage

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. Turn the fuel supply valve off and remove the air filter. As the generator set runs out of fuel, squirt fogger, such as OnaGard™, into the carburetor intake, then reassemble the air filter.

*OnaGard is a trademark of Onan Corporation.*

3. When the generator set runs out of fuel and stops running, remove the spark plug. Squirt one tablespoon (about 30 ml) of clean engine oil into the spark plug hole. Turn the engine over for several revolutions. Replace the spark plug. Pull the recoil starter handle out slowly until compression is felt.
4. Drain the oil base while still warm. 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.*

5. **Electric start models only:** Disconnect the cables from the starting battery negative (-) cable first to reduce the risk of arcing. Store battery in a cool dry place and connect to a charger every 30 days to maintain full charge.

**⚠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, which 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.*

6. Cover the generator set and store in a dry protected area.

## Returning the Generator Set to Operation

1. Perform an inspection of the generator set.
2. Check tag on set to verify that oil viscosity is still correct for existing ambient temperature.
3. **Electric start models only:** Clean and check battery. Measure specific gravity (1.260 at 80°F [27°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** *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, which 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 condition of the air filter and check the engine oil level.
5. Open the fuel supply valve.
6. Start the generator set. Initial start-up may be slow due to oil in the cylinder. Smoke and rough operation will occur until the oil in the cylinder is exhausted. If the engine does not start, check 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. The generator set is now ready for operation.





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Generation**

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