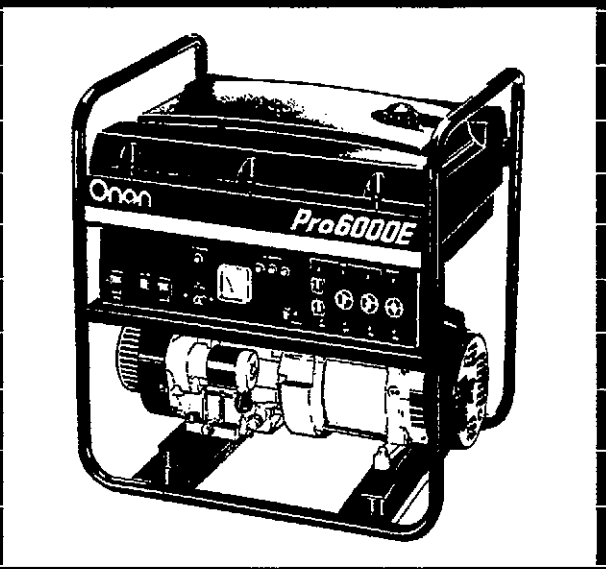
Onan Portable GenSets

Operator's Manual

EGH, EGS



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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.

Table of Contents

Section 1. Introduction

ABOUT THIS MANUAL

This manual provides information for operating and maintaining the Onan 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 an Onan Authorized Service Center for assistance. Factory trained Onan parts and service representatives are ready to handle 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).

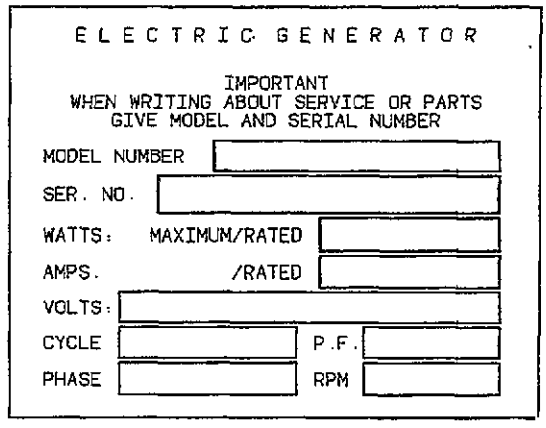
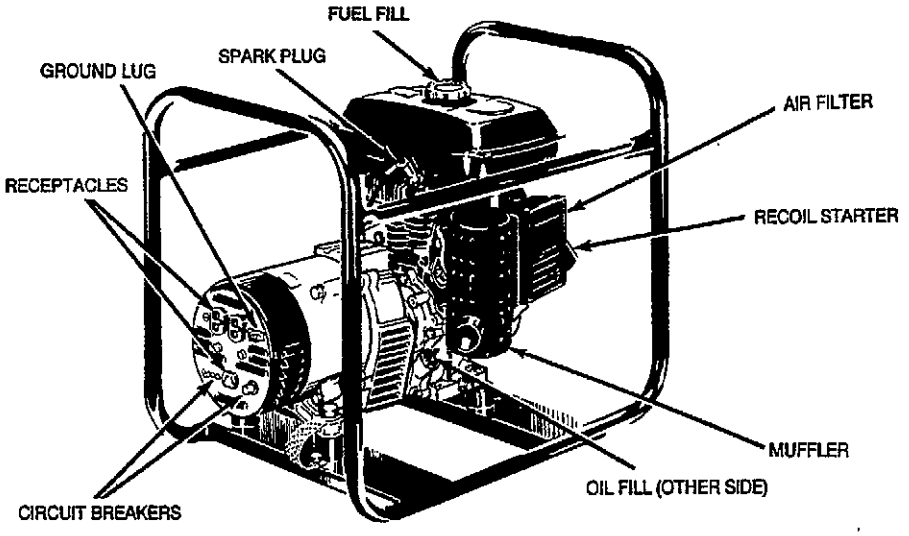


FIGURE 1-1. NAMEPLATE

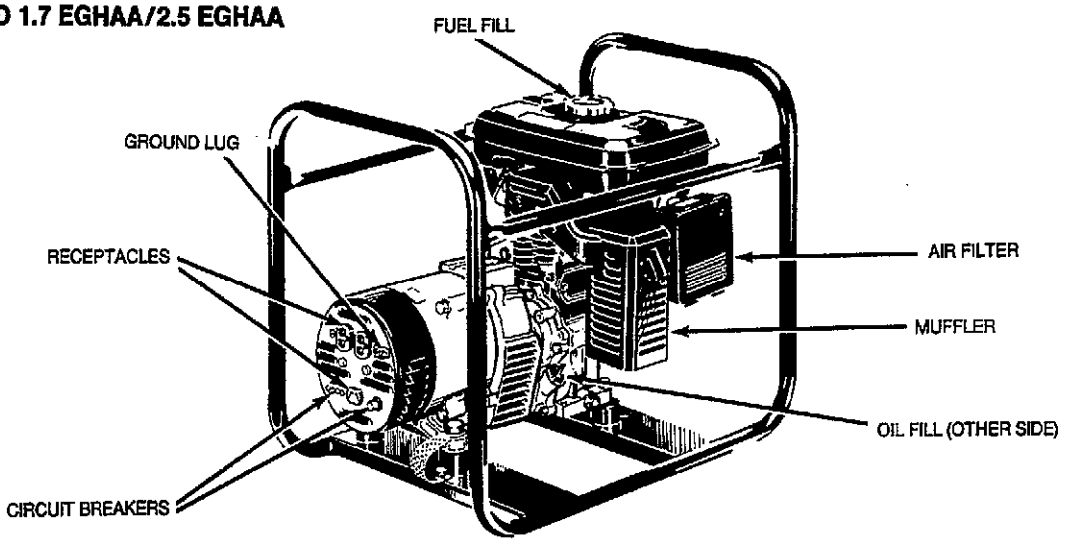
⚠WARNING

INCORRECT 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.

STANDARD 1.4EGSAA



STANDARD 1.7 EGHAA/2.5 EGHAA



STANDARD 4.0 EGHAB

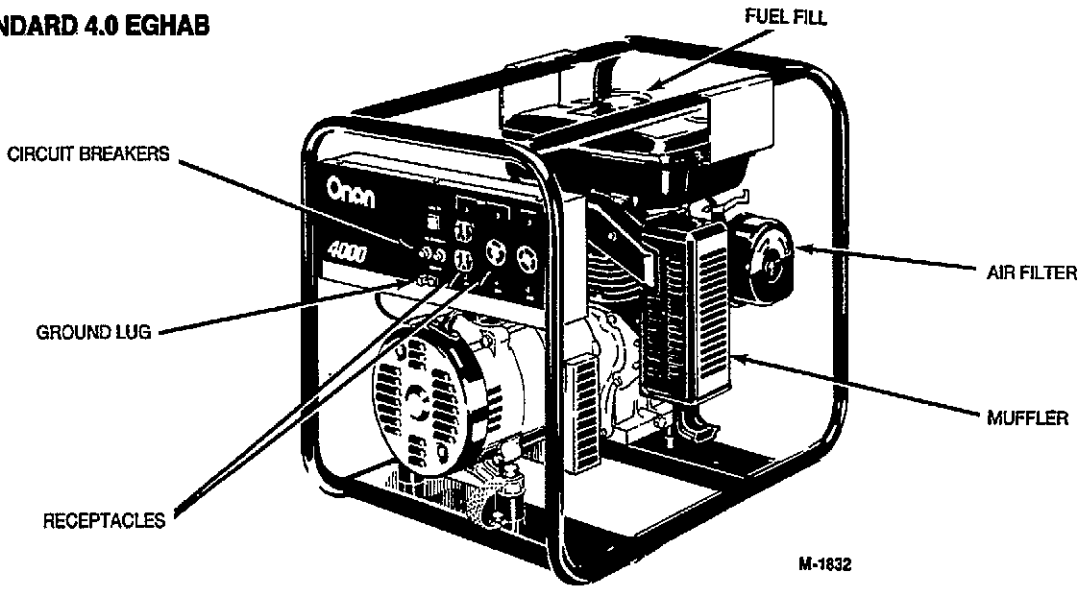
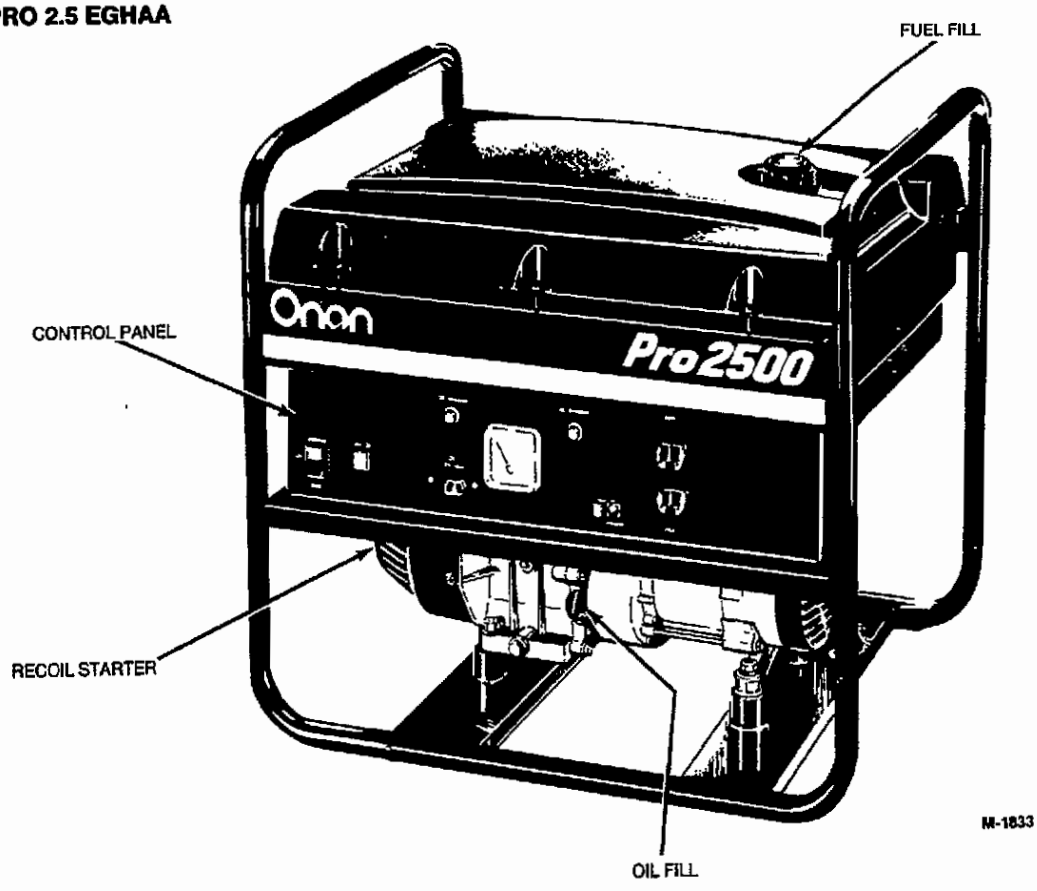


FIGURE 1-2. PORTABLE GENERATOR SETS

PRO 2.5 EGHAA



PRO 4.0 EGHAB

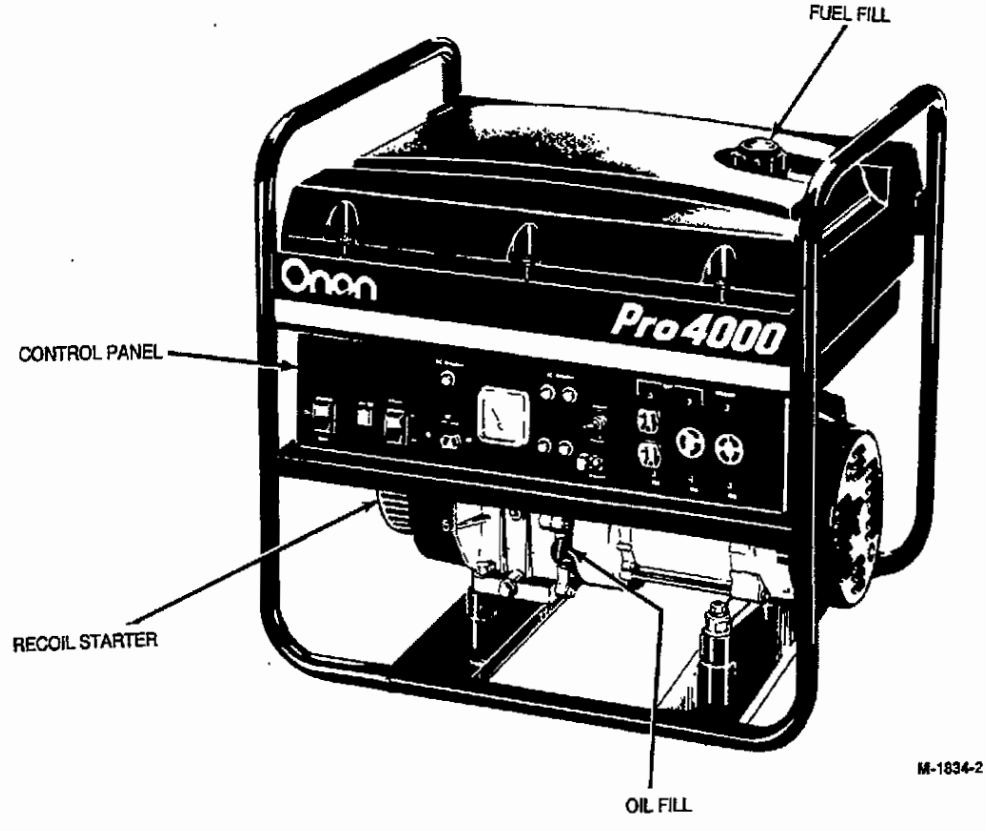
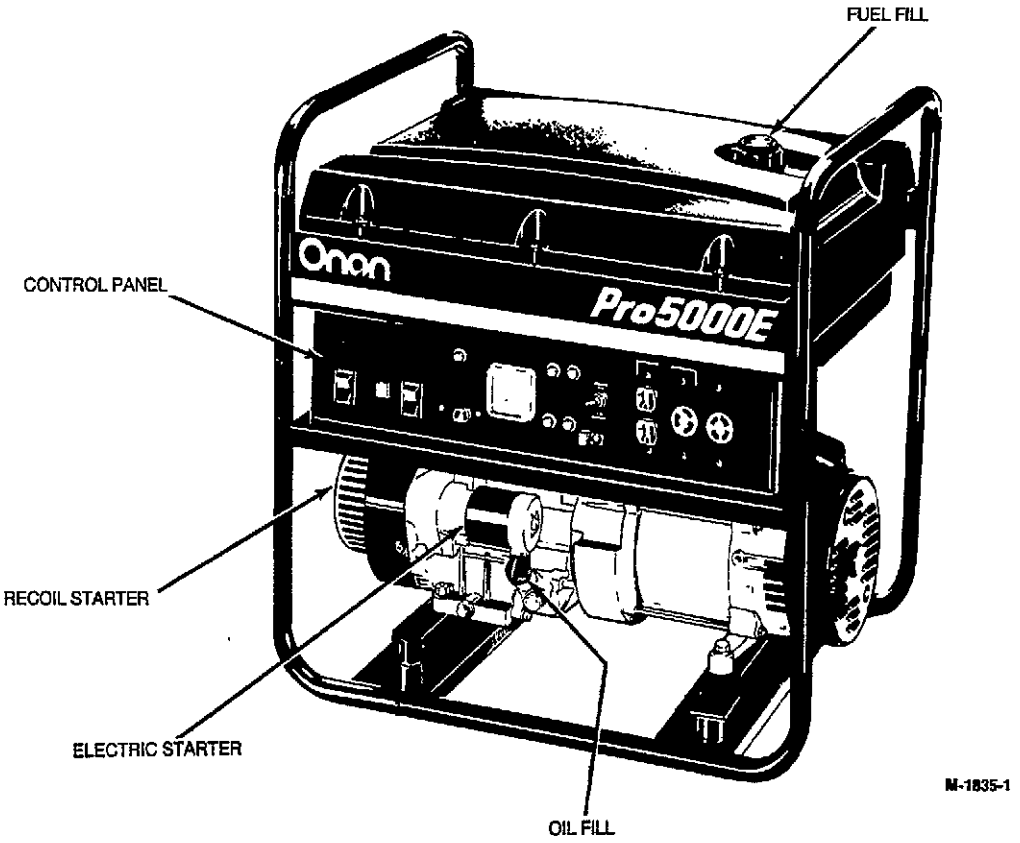


FIGURE 1-3. PORTABLE GENERATOR SETS

PRO 5.0 EGHEB



PRO 6.0 EGHEB

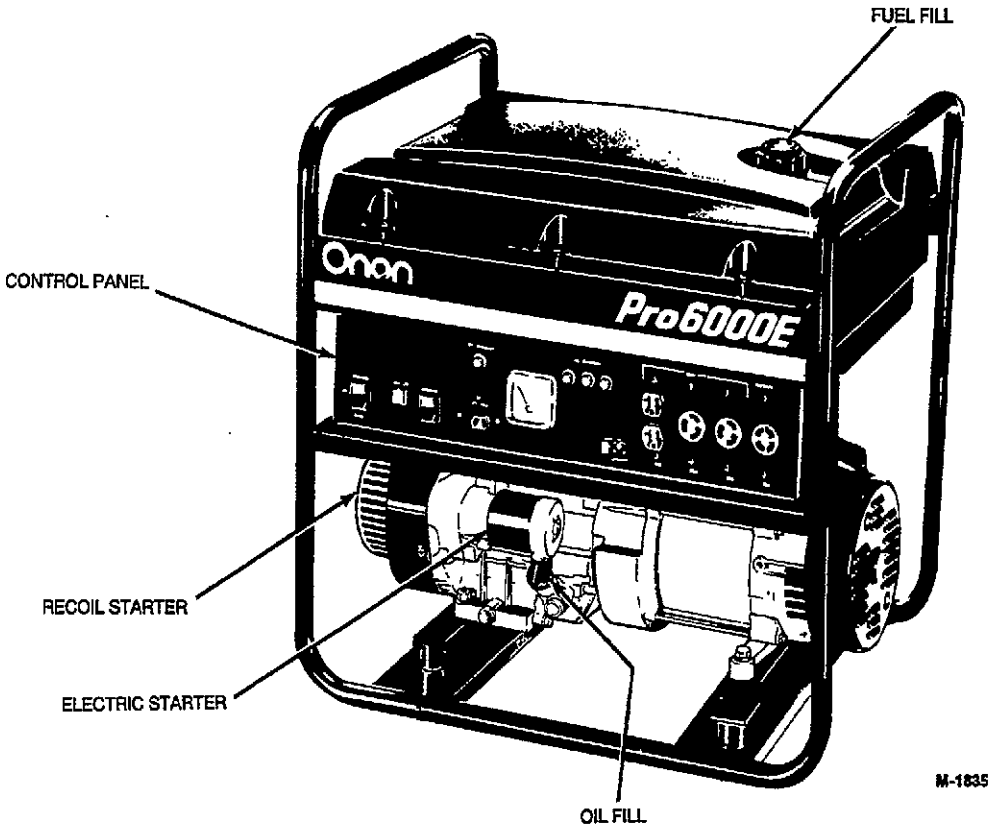


FIGURE 1-4. PORTABLE GENERATOR SETS

Section 2. Specifications

TABLE 2-1. STANDARD SERIES SPECIFICATIONS

MODEL	1.4 EGSAA	1.7 EGHAA	2.5 EGHAA	4.0 EGHAB	5.0 EGHAB
GENERATOR DETAILS					
AC OUTPUT - 60 HERTZ					
Voltage	120	120	120	120/240	120/240
Wattage (Max. Power)	1400	1700	2500	4000	5000
Wattage (Rated Power)	1200	1400	2000	3500	5000
Current (Rated Amperes)	10.0	12.5	16.7	29.2/14.6	41.6/20.8
DC OUTPUT					
Watts	60	60	120	—	—
Volts X Amperes	12 x 5	12 x 5	12 x 10	—	—
ENGINE DETAILS					
Engine Speed (RPM)	3600	3600	3600	3600	3600
Engine Oil Capacity					
Quarts (Litres)	0.58 (0.55)	0.63 (0.6)	0.63 (0.6)	0.95 (0.9)	1.16 (1.1)
Spark Plug Gap					
Inches (Millimeters)	0.039 (1.0)	0.028 (0.7)	0.028 (0.7)	0.028 (0.7)	0.039 (1.0)
Starting System	Recoil	Recoil	Recoil	Recoil	Recoil
GENERATOR SET DETAILS					
Dry Weight					
Pounds (Kilograms)	70 (32)	75 (34)	85 (39)	130 (59)	170 (77)
Dimensions - Inches (mm)					
Length	23.5 (597)	23.5 (597)	23.5 (597)	26.8 (681)	28 (711)
Width	16 (406)	16 (406)	16 (406)	19 (483)	21.25 (540)
Height	18.3 (465)	18.3 (465)	18.3 (465)	21.3 (541)	24.75 (629)
Fuel Tank Capacity					
Gallons (Litres)	0.8 (3)	0.95 (3.6)	0.95 (3.6)	1.58 (6)	2.1 (8)
Operating Hours					
At Continuous Power	2.2	2.5	2.3	3.3	4.4

Specifications Subject to Change Without Notice. 11-89.

TABLE 2-2. PRO SERIES SPECIFICATIONS

MODEL	2.5 EGHAA	4.0 EGHAB	4.0 EGHEB	5.0 EGHAB	5.0 EGHEB	6.0 EGHEB
GENERATOR DETAILS						
AC OUTPUT -60 HERTZ						
Voltage	120	120/240	120/240	120/240	120/240	120/240
Wattage (Max. Power)	2500	4000	4000	5000	5000	6000
Wattage (Rated Power)	2000	3500	3500	5000	5000	5500
Current (Rated Amperes)	16.7	29.2/14.6	29.2/14.6	41.6/20.8	41.6/20.8	45.8/22.9
DC OUTPUT						
Watts	120	120	120	120	120	120
Volts X Amperes	12 x 10	12 x 10	12 x 10	12 x 10	12 x 10	12 x 10
ENGINE DETAILS						
Engine Speed (RPM)	3600	3600	3600	3600	3600	3600
Engine Oil Capacity						
Quarts (Litres)	0.63 (0.6)	0.95 (0.9)	0.95 (0.9)	1.16 (1.1)	1.16 (1.1)	1.16 (1.1)
Spark Plug Gap						
Inches (Millimeters)	0.028 (0.7)	0.028 (0.7)	0.028 (0.7)	0.039 (1.0)	0.039 (1.0)	0.039 (1.0)
Starting System	Recoil	Recoil	Electric/Recoil	Recoil	Electric/Recoil	Electric/Recoil
GENERATOR SET DETAILS						
Weight						
Pounds (Kilograms)	110 (50)	145 (66)	155 (70)	175 (79)	185 (84)	205 (94)
Dimensions - Inches (mm)						
Length	26.8 (681)	26.8 (681)	26.8 (681)	29.2 (742)	29.2 (742)	29.2 (742)
Width	22 (559)	22 (559)	22 (559)	22.5 (572)	22.5 (572)	22.5 (572)
Height	24.6 (625)	24.6 (625)	24.6 (625)	28.3 (719)	28.3 (719)	28.3 (719)
Fuel Tank Capacity						
Gallons (Litres)	6.5 (24.6)	6.5 (24.6)	6.5 (24.6)	8 (30.3)	8 (30.3)	8 (30.3)
Operating Hours						
At Continuous Power	20	13	13	11	11	11
Battery Requirements:						
Battery (Group U1)	—	—	12-Volt	—	12-Volt	12-Volt
Cold Cranking Amps						
(at 32°F [0°C])	—	—	235	—	235	235

Specifications subject to change without notice. 7-90.

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 installation and regular, frequent visual and audible inspections of the complete exhaust system.

1-P/EM

GENERAL

This section covers starting and operating the generator set. It is recommended that the operator read through this entire section before starting the set. It is essential that the operator become completely familiar with the set for safe operation.

PRE-START CHECKS

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

Engine Oil

Check the engine oil level frequently. 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 or running. See Recommended Fuel section for fuel type. Fill fuel tank slowly to a point no higher than one inch below the top of the filler neck or to red fill line inside tank (if equipped). 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.***

Inspection

Give the generator set a visual inspection for loose bolts and nuts, oil leaks, fuel leaks, and exhaust leaks. Repair any problems before starting the generator set.

RECOMMENDED FUELS

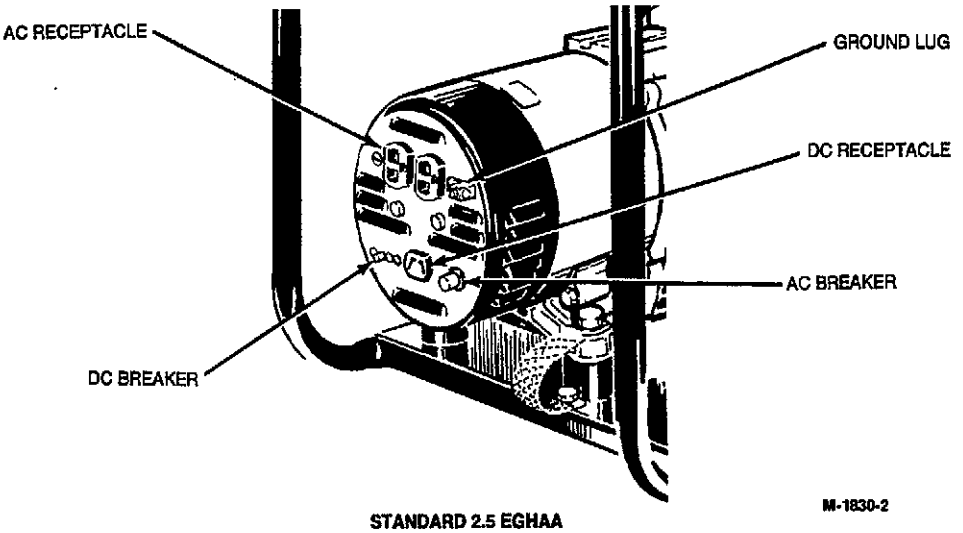
Use clean, fresh, unleaded or regular grade gasoline. Using unleaded gasoline results in extended periods between service, longer spark plug life, and reduced carbon build-up inside the engine.

GROUNDING REQUIREMENTS

Local code enforcement might require that the generator set be electrically connected to a grounding electrode (water pipe, earth-driven grounding rod, etc.) during operation. A grounding lug is provided for connecting the generator set to a grounding 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.



M-1830-2

STANDARD 2.5 EGHAA

PRO 2.5 EGHAA

M-1833-1

PRO 5.0 EGHEB

M-1834-3

FIGURE 3-1. TYPICAL PORTABLE GENERATOR SET CONTROL PANELS

CONTROL PANEL

This 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 held 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.

Make sure that the Start/Stop switch is left in the Stop position. If the switch is left in the center On position, the starting battery will slowly discharge.

⚠CAUTION ***The Start/Stop switch must be left in the Stop position when the genset is not in use or the battery will discharge. Do not leave the Start/Stop switch in the center On position when the set is not in operation.***

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 voltage. The meter will read 120 VAC circuit voltage.

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

Full Power Switch: Allows operator to select full power operation from the 120 VAC receptacles or shared power between the 120 VAC and 240 VAC receptacles. Switch setting also affects voltmeter readings; refer to voltmeter description.

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

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.

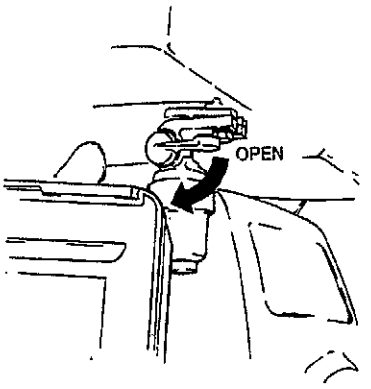
⚠WARNING ***Inhalation of exhaust gas can result in severe personal injury or death. Do not operate the generator set in poorly ventilated areas such as indoors, inside tanks, confined areas, depressions, or any area where exhaust gases might accumulate. Locate the exhaust outlet so that exhaust gases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



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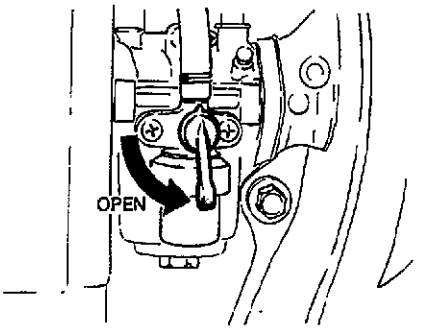
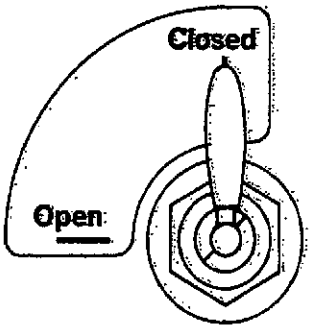
1.4 EGS/AA



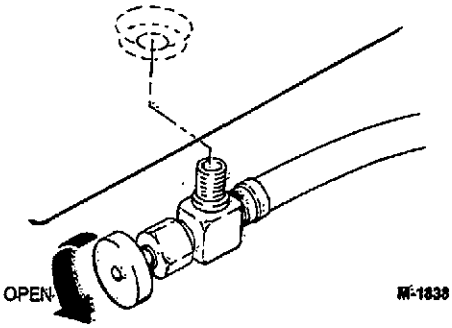
M-1837

1.7 - 4.0 EGH



FS-1841

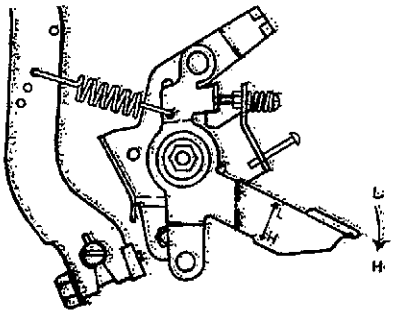
5.0 EGH STANDARD



M-1838

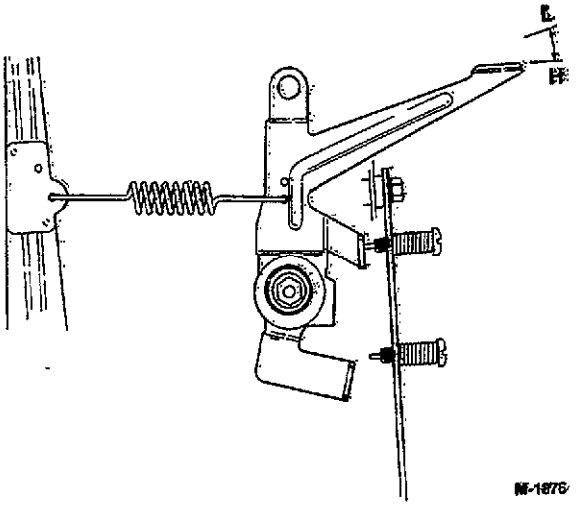
PRO MODELS - BELOW FUEL TANK (IF EQUIPPED)

FIGURE 3-2. FUEL VALVE



FS-1828

1.4 EGS/AA



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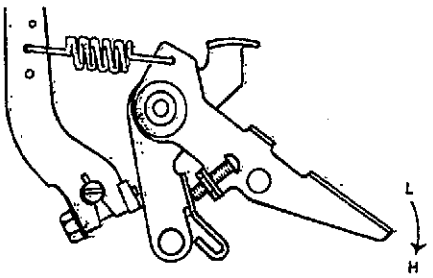
5.0 EGH STANDARD



FS-1828-1

1.7 - 4.0 EGH

FIGURE 3-3. SPEED CONTROL LEVER

Electric 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. 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. 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.

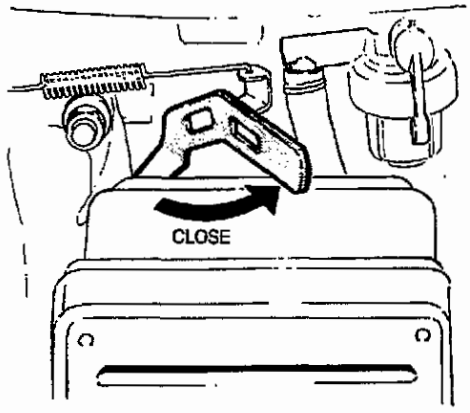
5. Proceed to Adding Loads in this section.

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. Make sure the engine switch is in 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, open the choke lever as the engine warms up. Allow the engine to warm up for three to five minutes before applying a load.

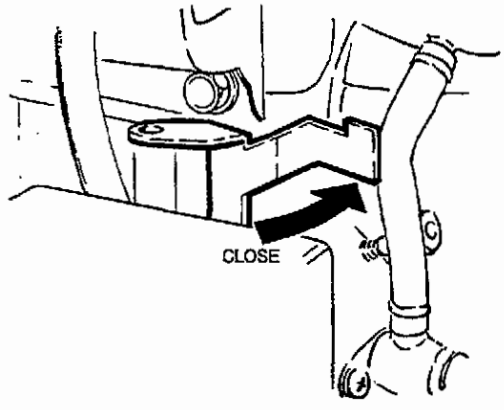
   If the oil watch lamp flashes during cranking or running, stop the engine and check the oil level. Add oil as recommended in the *Maintenance* section.

6. Proceed to Adding Loads in this section.



M-1840

1.4 EGSAA



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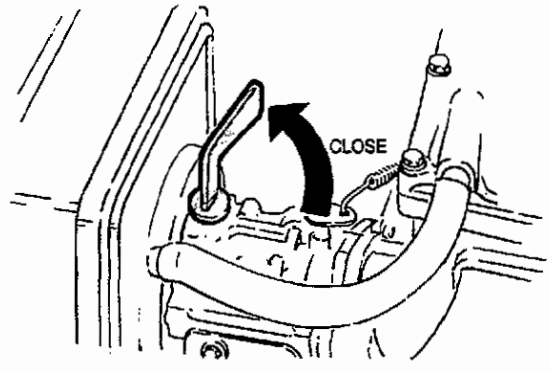
1.7 - 4.0 EGH



M-1842

5.0 - 6.0 EGH

FIGURE 3-4. CHOKE LEVER

ADDING LOADS

Follow the appropriate procedure for adding either AC loads 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: For model 2.5 EGHAA with a maximum power output of 2500 watts and a rated output of 2000 watts, it would be possible to operate a portable heater rated at 1500 watts, a drill rated at 400 watts, and a 100 watt light. If you also wished to operate a circle saw rated at 900 watts it would be necessary to disconnect the heater while you are using the circle saw.

   If a motor load and another load total very 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).

High Altitudes

Maximum power decreases roughly four percent for each 1000 feet (310 m) above sea level (after the first 1000 feet). If operation is degraded by altitude above 2000 feet (620 m), calculate altitude derating to determine maximum AC load capacity.

Models with Full Power Switch: Set the full power switch to the position that corresponds to the electrical requirements of your equipment (Figure 3-5). Set the switch to the 120V Only setting to use the 120-volt duplex receptacle or the 120-volt twist-lock receptacle only or to the 120/240V setting to use these receptacles and the 120/240V twist-lock receptacle.

TABLE 3-1. TYPICAL WATTAGE REQUIREMENTS

Electrical Equipment	Typical Running Watts*
Bench Grinder (8 in.)	1400
Circle Saw (7-1/4 in.)	900
Coffee Maker (drip)	850
Coffee Percolator	850
Drill (3/8 in.)	400
Electric Water Pump	550
Portable Heater	1500
Range (small burner)	1275
Range (large burner)	2400
Refrigerator	600
Sump Pump	350
Trimmer (12 in. heavy duty)	500
TV (B & W)	60
TV (Color)	200

*See text for typical starting watts of motor loads.

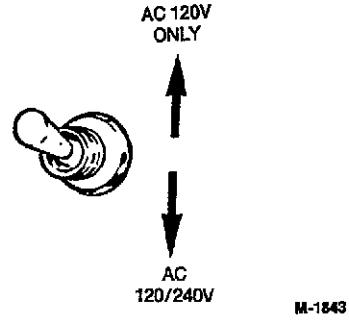


FIGURE 3-5. FULL POWER SWITCH

Models with Idlematic: Move the Idlematic switch to On if you want the idlematic feature to operate (Figure 3-6). This feature automatically controls engine speed so it 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.

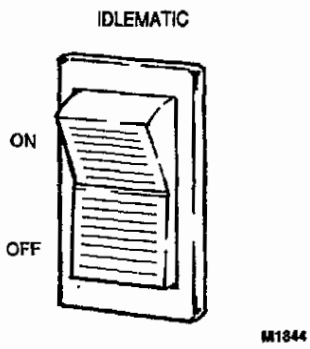


FIGURE 3-6. IDLEMATIC SWITCH

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.***

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 use AC receptacles while using DC power on the following models: 1.4 EGSAA, 1.7 EGHAA, 2.5 EGHAA,

CIRCUIT BREAKERS

If either a DC or AC 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).

Ground-Fault Circuit-Interrupter

Some models are equipped with a 120-volt GFCI outlet. These outlets are intended for user protection. The GFCI deenergizes the circuit it is connected to when a current to ground exceeds a predetermined value. If the GFCI RESET button trips during operation, disconnect the load, stop the generator set, and inspect the equipment for defects.

Test the GFCI monthly by starting the generator set and pressing the TEST button. If the RESET button pops out, push the RESET button back in to return the outlet to normal operation. If the RESET does not pop out, the GFCI must be replaced.

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 3-7 for typical Oil Watch illustration. Add oil as recommended in the *Maintenance* section before attempting to restart.

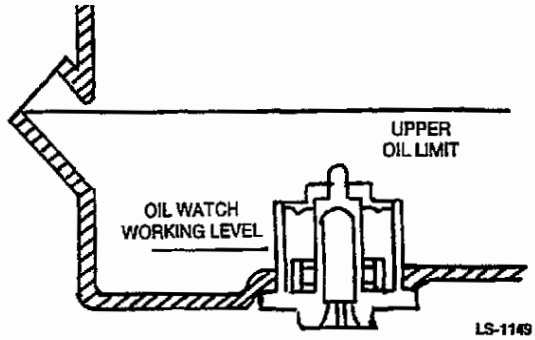


FIGURE 3-7. TYPICAL OIL WATCH

STOPPING

1. Remove all loads from the generator set.
2. Let the generator set run for three to five minutes without a load 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 the Start/On/Stop or On/Stop switch to Stop or by turning the Engine On/Off switch to Off, depending on the model.

   Make sure that the Start/On/Stop switch is left in the Stop position. If the switch is left in the center On position, the starting battery will slowly discharge.

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 that 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)	1. Low Battery 2. Bad battery connection.	1. Check battery electrolyte level and charge. 2. Clean and tighten all battery and cable connections.
CRANKS SLOWLY (ELECTRIC START MODELS)	1. Low battery. 2. Bad battery connection. 3. Oil is too heavy. 4. Load is connected.	1. Check battery electrolyte level and charge. 2. Clean and tighten all battery and cable connections. 3. Replace with lighter oil. 4. Always disconnect load while starting.
ENGINE WON'T START	1. Out of fuel. 2. Fuel supply valve closed. 3. Carbon deposits on spark plug. 4. Low oil level.	1. Add fuel. 2. Fully open fuel supply valve. 3. Remove and clean or replace spark plug. 4. Add oil as necessary.
EXHAUSTING BLACK SMOKE	1. Choke closed. 2. Dirty air filter. 3. Rich fuel mixture.	1. Open choke. 2. Clean or replace air filter. 3. Contact an Onan service center.
UNIT RUNS THEN STOPS	1. Out of fuel. 2. Low oil level. 3. Excess oil.	1. Add fuel. 2. Add oil. 3. Reduce oil level.
UNIT RUNS BUT SURGES	1. Loose or worn spark plug lead. 2. Faulty spark plug. 3. Dirty fuel filter or generator set at too steep of an angle. 4. Governor out of adjustment or lean fuel mix.	1. Check spark plug lead connection. 2. Remove and clean or replace spark plug. 3. Check fuel filter and generator set angle. 4. Contact an Onan service center.
NO AC OUTPUT VOLTAGE	1. Open AC circuit breaker due to an overload.	1. Remove all loads, reset circuit breaker, check tools or appliances being used for defects. Do not exceed generator set rated load specifications.
NO DC OUTPUT VOLTAGE	1. Open DC circuit breaker due to an overload.	1. Remove all loads, reset circuit breaker, check for an overload or shorted battery. Do not exceed generator set rated load specifications.

Section 4. Maintenance

GENERAL

Establish and adhere to a definite schedule for maintenance and service. If the generator set will be subjected to extreme 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 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[1]				
Check Oil Level	X				
Change Crankcase Oil		X[2,3]			
Clean Air Filter		X[3]			
Clean Spark Plug			X[4]		
Clean and Inspect Muffler			X		
Check/Adjust Engine Speed			X[5]		
Clean Fuel Filter				X	
Check Spark Plug Gap				X	
Clean Carburetor and Fuel Tank					X[6]
Check Valve Lash Clearance					X[6]
Clean Cylinder Head					X[6]

1 - Check for loose parts and for oil and fuel leaks. Check exhaust system audibly and visually with generator set runing and 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 - Perform every 50 hours on 1.4 kW model.
5 - Perform on 4-, 5-, and 6-kW Pro and Standard models only.
6 - Have your 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 generator set until gas and fumes are purged from the area.***

LUBRICATION SYSTEM

The engine oil was drained from the crankcase prior to shipment. 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 and 6.0 kW model 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 and 6.0 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. 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.

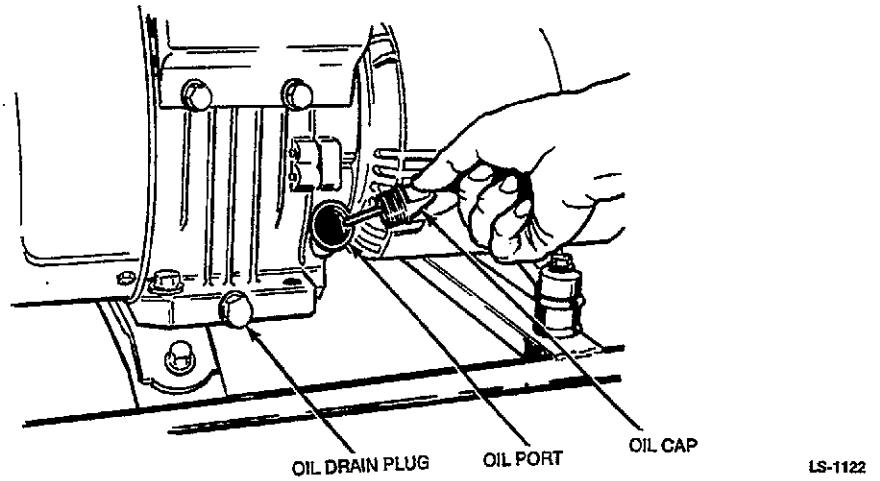


FIGURE 4-1. OIL LEVEL CHECK

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.

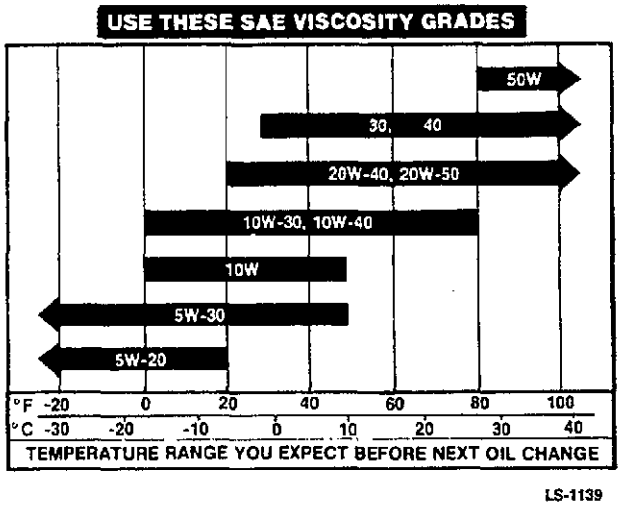


FIGURE 4-2. SAE VISCOSITY GRADES

AIR FILTER

Service the air filter at the intervals recommended in the Maintenance Schedule. In dusty conditions, service the air filter more often. Replace the air filter only with an Onan-approved filter. There are three types of air filter assemblies used on these models: foam filter only, foam wrapper on paper element, and paper element only. Follow the filter service procedures that apply to the filter system on the generator set.

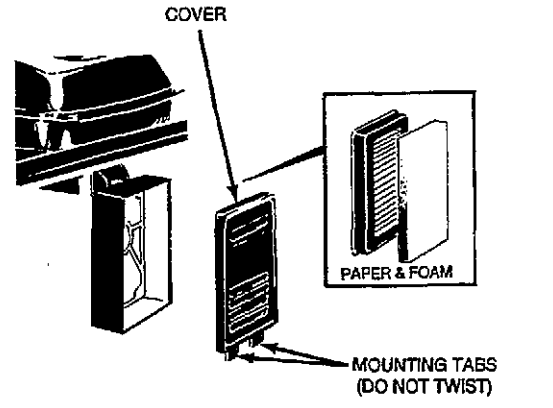
1. Carefully remove the air cleaner cover and remove the air cleaner element.

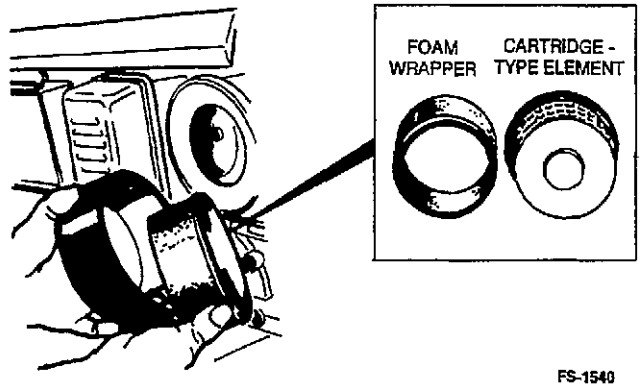
2. Follow the service procedures listed by the type of filter used.

   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.





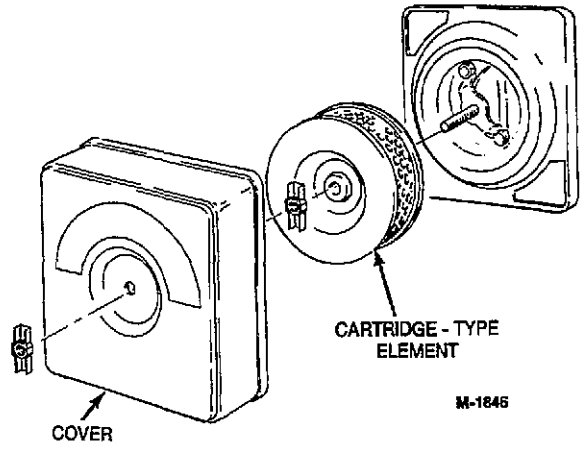


FIGURE 4-3. AIR CLEANER SERVICE

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 5.0 to 6.0 kW Pro Models. If necessary, the fuel tank can be raised for easier service access as follows:

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.

⚠CAUTION ***Do not clean spark plug by sandblasting. Deposits remaining on the plug can cause premature engine wear.***

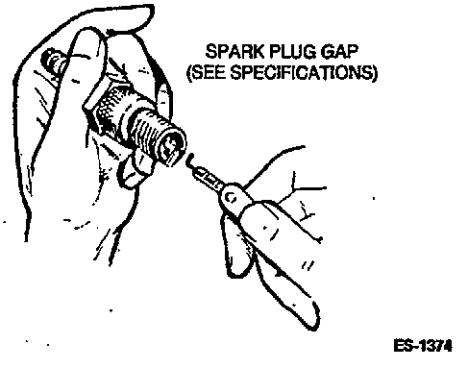


FIGURE 4-4. MEASURING SPARK PLUG GAP

MUFFLER SERVICE

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 operating the generator set.

Models With Spark Arrester: 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.***

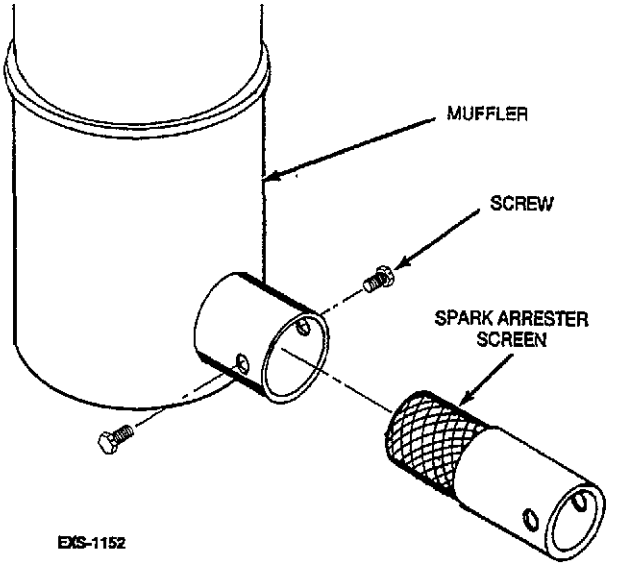


FIGURE 4-5. CLEANING A TYPICAL SPARK ARRESTER

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 bowl, as follows:

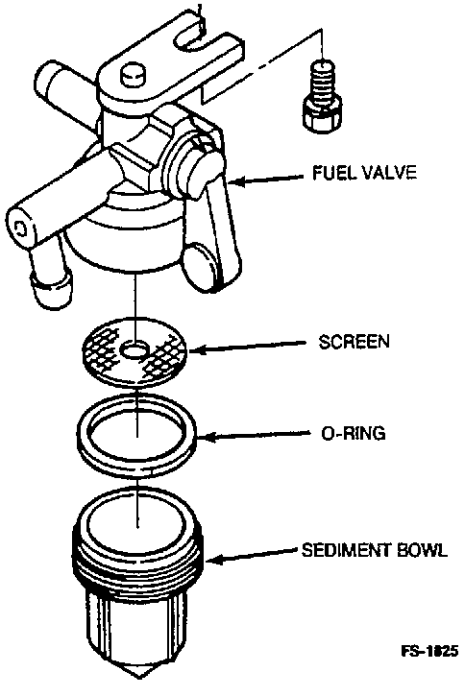
1. Turn the fuel supply valve to the closed position and allow the set to operate until it runs out of fuel. Let the generator set cool down before proceeding.
2. Unscrew the sediment bowl from the fuel supply valve and clean it.
3. Remove the screen and clean any dirt and particulate off the screen.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

Service in-line fuel filter 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.

   Models with fuel shutoff located below the fuel tank have a filter screen mounted inside the fuel shutoff elbow. The screen should be cleaned when performance problems occur or bad fuel is suspected.



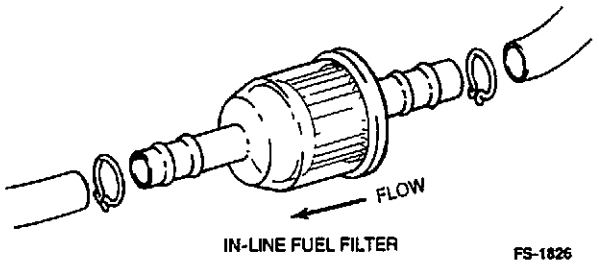


FIGURE 4-6. FUEL FILTER

BATTERY CARE

Electric start models use a 12-volt starting battery that should be maintained as follows:

⚠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. Always remove the negative (-) cable first to reduce the risk of arcing.

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.

ENGINE SPEED

The engine governor maintains a constant engine speed under various load conditions to limit variations in generator output voltage and frequency. Engine speed variations directly affect the frequency and to a lesser extent the output voltage of the generator. An increase in engine speed will cause a corresponding increase in generator frequency and a decrease in engine speed will cause a corresponding decrease in frequency. Voltage is held fairly constant by the voltage regulator when small variations in engine speed occur.

⚠WARNING ***Contact with moving parts can cause severe personal injury. Keep clothing, jewelry, hands, and fingers clear when working on the generator set.***

⚠WARNING ***A hot muffler and other generator set components can cause severe burns. Always allow the generator set to cool before touching any components.***

Engine Speed Check and Adjustment

Disconnect all loads from the generator set. An accurate frequency meter should be connected to the generator output receptacle. Check and adjust the engine speed as follows:

1. Start the engine. Make sure the speed control lever is in the high speed position on Standard models and that the Idlematic is Off on Pro models. Operate the generator set with no-load until it is warm. Refer to Figure 4-7.
2. Check the no-load frequency for a normal reading of 63.5 Hz + or - 0.5 Hz (3780 to 3840 RPM).
3. If an abnormal reading is measured, adjust the speed as follows:

Standard Models - Move the speed control lever to a position between the high and low speed settings. Adjust the high speed screw by turning it counterclockwise to increase engine speed or clockwise to decrease engine speed.

4.0 kW Standard Models: One full turn of the adjustment screw will change the frequency approximately 1-1/4 Hertz. Do not turn the adjustment screw more than 2 turns.

5.0 kW Standard Models: One full turn of the adjustment screw will change the frequency approximately 4 Hertz. Do not turn the adjustment screw more than 1/2 turn.

After making an initial adjustment, move the speed control lever to the high speed setting and recheck frequency. Repeat this process until a normal no-load speed (63.5 Hz + or - 0.5 Hz) is obtained.

Pro Models - Set the idlematic control to On. Adjust the high speed screw by turning it clockwise to increase engine speed or counterclockwise to decrease engine speed. One full turn of the adjustment screw will change the frequency approximately 3.7 Hertz. Do not turn the adjustment screw more than 3/4 turns. After making an initial adjustment, set the Idlematic control to Off and recheck frequency. Repeat this process until a normal no-load speed (63.5 Hz + or - 0.5 Hz) is obtained.

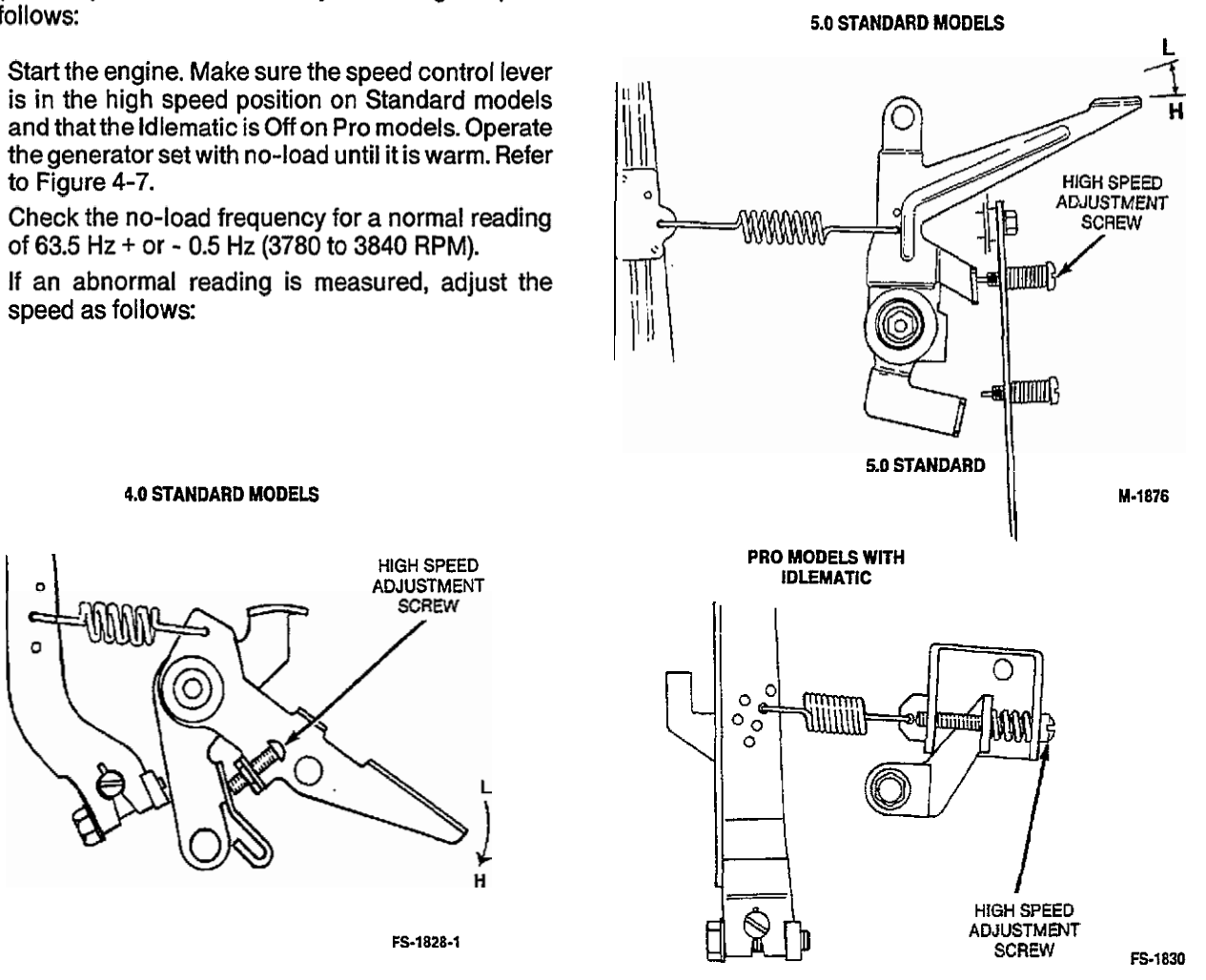


FIGURE 4-7. ENGINE SPEED ADJUSTMENT

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 30 days, the following procedure is recommended.

Preparing Generator Set For Storage

1. Run the engine in a dust free location until it reaches normal operating temperature.
2. Turn the fuel supply valve off and remove the air filter. As the generator set runs out of fuel, squirt fogger into the carburetor intake, then reassemble the air filter.
3. When 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.
5. Check the engine oil level.
6. Open the fuel supply valve.
7. 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.
8. Apply 50 percent load to the generator set until it runs smoothly. Run the generator set for an hour.
9. 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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