

Cummins **Onan**



Operator Manual

RV Generator Set

KY (Spec J–N)

California

Proposition 65 Warning

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

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SAFETY PRECAUTIONS

Thoroughly read the OPERATOR'S MANUAL before operating the genset. Safe operation and top performance can be obtained only when equipment is operated and maintained properly.

Only trained and experienced service personnel with knowledge of fuels, electricity, and machinery hazards shall remove, dismantle and dispose of the generator set. See service manual.

Some generator set installation procedures present hazards that can result in severe personal injury or death. Only trained and experienced personnel with knowledge of fuels, electricity, and machinery hazards should perform generator set installation procedures.

The following symbols in this manual alert you to potential hazards to the operator, service person and equipment.

▲ DANGER alerts you to an immediate hazard which will result in severe personal injury or death.

▲ WARNING alerts you to a hazard or unsafe practice which can result in severe personal injury or death.

▲ CAUTION alerts you to a hazard or unsafe practice which can result in personal injury or equipment damage.

When equipped with an integral or add-on Automatic Generator Starting System (AGS) control, exhaust carbon monoxide (CO), electric shock, and moving parts hazards are possible due to unexpected starting. Turn off AGS whenever performing maintenance or service, when the vehicle is stored between uses, is awaiting service, or is parked in a garage or other confined area.

Electricity, fuel, exhaust, moving parts and batteries present hazards which can result in severe personal injury or death.

GENERAL PRECAUTIONS

- Keep children away from the genset.
- Do not use evaporative starting fluids. They are highly explosive.

- To prevent accidental or remote starting while working on the genset, disconnect the negative (-) battery cable at the battery.
- Keep the genset and its compartment clean. Excess oil and oily rags can catch fire. Dirt and gear stowed in the compartment can restrict cooling air.
- Make sure all fasteners are secure and torqued properly.
- Do not work on the genset when mentally or physically fatigued or after consuming alcohol or drugs.
- Used engine oil has been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale, or contact used oil or its vapors.
- Benzene and lead in some gasolines have been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale or contact gasoline or its vapors.
- Keep multi-class ABC fire extinguishers handy. Class A fires involve ordinary combustible materials such as wood and cloth; Class B fires, combustible and flammable liquid fuels and gaseous fuels; Class C fires, live electrical equipment. (ref. NFPA No. 10)
- Genset installation and operation must comply with all applicable local, state and federal codes and regulations.
- Use personal protective equipment when performing periodic maintenance operations such as gloves, safety glasses, etc.
- Use caution when working on live electrical equipment. Remove jewelry, make sure clothing and shoes are dry, stand on a dry wooden platform or rubber insulating mat and use tools with insulated handles.

GENERATOR VOLTAGE IS DEADLY!

- Disable the automatic genset starting feature (AGS) of an inverter-charger or other automatic starting device before servicing the genset to avoid electric shock from an unexpected start.

⚠️WARNING *The genset must not be connected to shore power or to any other source of electrical power. Back-feed to shore power can cause electric shock resulting in severe personal injury or death and damage to equipment. An approved switching device must be used to prevent interconnections.*

- Generator electrical output connections must be made by a trained and experienced electrician in accordance with applicable codes.

BATTERY GAS IS EXPLOSIVE

- Wear safety glasses.
- Do not smoke.
- To reduce arcing when disconnecting or reconnecting battery cables, always disconnect the negative (-) battery cable first and reconnect it last.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Disable the automatic genset starting feature (AGS) of an inverter-charger or other automatic starting device before servicing the genset to avoid unexpected starting.
- Do not wear loose clothing or jewelry near moving parts such as PTO shafts, fans, belts and pulleys.
- Keep hands away from moving parts.
- Keep guards in place over fans, belts, pulleys, and other moving parts.

ENGINE EXHAUST IS DEADLY!

- Inspect for exhaust leaks at every startup and after every eight hours of running.
- Prior to every startup and after every eight hours of running, all carbon monoxide detectors must be tested and confirmed to be working in accordance with the manufacturer's instructions or owners manual.
- Learn the symptoms of carbon monoxide poisoning in this manual.
- Never occupy the vehicle while the genset is running unless the vehicle is equipped with a working carbon monoxide detector.
- Make sure there is ample fresh air when operating the genset in a confined area.

- Disable the automatic genset starting feature of an inverter-charger or other automatic starting device before storing the vehicle or parking it in a garage or other confined space.
- The exhaust system must be installed in accordance with the genset Installation Manual.
- Engine cooling air must not be used for heating the working or living space or compartment.

THE HAZARDS OF CARBON MONOXIDE

⚠️WARNING *Engine-driven generators can produce harmful level of carbon monoxide that can injure or kill you.*

ONLY YOU CAN PROTECT YOURSELF FROM CO POISONING!

- Watch constantly for people near the exhaust of the generator set while it is running.
- Make sure exhaust cannot enter the living quarters through a window, vent or door.
- Make sure all CO detectors or audible alarms are working properly.
- Pay attention to the signs of CO poisoning.
- Check the exhaust system for corrosion, obstruction and leaks each time you start the generator set and every eight hours if you run it continuously.

SUBSTANCE HAZARDOUS TO HEALTH

Generator sets use substances, and emit and create wastes that can cause health risks. Generator set operators must use appropriate personal protective equipment (such as clothing, gloves, protective glasses/goggles, and respiration equipment) when exposed to fuel, oil, coolant, wet batteries, grease, cleaning agents, or other substances exposed to lungs, eyes, or skin. Use appropriate containers for transport, storage, and disposal of waste substances. Follow local regulations for disposal and recycling.

FUEL IS FLAMMABLE AND EXPLOSIVE

- Do not smoke or turn electrical switches ON or OFF where fuel fumes are present or in areas sharing ventilation with fuel tanks or equipment. Keep flame, sparks, pilot lights, arc-producing equipment and switches and all other sources of ignition well away.
- Fuel lines must be secured, free of leaks and separated or shielded from electrical wiring.

- Leaks can lead to explosive accumulations of gas. Natural gas rises when released and can accumulate under hoods and inside housings and buildings. LPG sinks when released and can accumulate inside housings and basements and other below-grade spaces. Prevent leaks and the accumulation of gas.

PROPANE

This product is also known as C₃H₈ or liquified propane gas. It consists of predominantly C₃ Hydrocarbons (propane and prepane) with typically < 50 ppm of ethyl mercaptan or other odorizing agent added to assist leak detection. Contains <0.1% 1, 3 butadiene. Hazardous components include c3-4 rich, petroleum distillate.

The substance has an initial boiling point of -42.1° C flash point of -104° C (PMCC), and a vapor pressure of 7.5 bar at 15° C.

Keep the container below 50°C. The substance should not be used for any other purpose without contacting the manufacture or supplier. Installers, operators and maintainers are likely to encounter this substance. When doubt exists as to correct handling procedure, contact supplier.

HAZARDOUS REACTIONS

This liquid is extremely flammable (F+). Readily forms an explosive air-vapor mixture at ambient temps. Avoid smoking, heat sources, such as welding and naked flames, sparks and static electricity build-up. Thermal decomposition products are hazardous, containing CO_x compounds.

The vapor is explosive. High vapor concentrations can cause respiratory irritation, dizziness, nausea, and loss of consciousness. Excessive and prolonged exposure to the mist can cause chronic inflammatory reaction of the lungs and form of pulmonary fibrosis.

Vapor is heavier than air and may travel to remote sources of ignition. Liquid leaks generate large volumes of flammable vapor (approx 250:1).

Avoid strong oxidizing agents, e.g. chlorates which may be used in agriculture

Cold burns (frost bite) will result from skin/eye contact with liquid. Toxicity following single exposure to high level of propane is of low order.

PROTECTIVE MEASURES

Ensure good ventilation and avoid heat sources. Observance of good housekeeping rules will ensure general safety. Do not smoke.

When working on, or testing, injection equipment, special care is required. Use eye protection at all times.

Adopt a high standard of personal hygiene. In the case of skin contact, flush with water to normalize temperature. Use gloves and overalls, and eye protection goggles. Use oil impervious gloves and avoid contamination inside the gloves. If overalls become contaminated, discontinue use and clean thoroughly. Contaminated clothing should be removed, soaked with water, and laundered before re-use.

No special respiratory precautions are necessary in normal use.

STORAGE/TRANSPORT

Store and transport only in correctly marked containers. Keep containers closed when not in use. Keep cool, out of sunlight and away from naked flames. Electrical continuity is required between the transport and storage vessels during product transfer.

In case of leak clear people away from area to a safe place. DO NOT operate electrical equipment unless flame proof. Summon emergency services and treat or refer casualties as necessary.

Extinguish all naked lights – AVOID MAKING SPARKS! Try to stop flow of product. Cover drains and dispense vapor with water spray. Note: Vapor may collect in confined spaces.

EMERGENCY ACTION

- Fire
 - Extinguishing media:
 - Large fire – None. Product flow must be stopped and container cooled by water spray. Water fog should be used to assist approach to source of the fire.
 - Small fire – foam/dry powder, CO₂
 - Avoid making sparks. Fire fighters to sue self-contained breathing apparatus. Keep fire exposed containers cool, using water fog/spray. Prevent run-off from entering waterway, drains and drinking water supplies. Every precaution must be taken to keep containers cool to avoid

the possibility of a boiling liquid expanding vapor explosion (BLEVE).

- Ingestion: Not applicable
- Inhalation (of vapor)
Remove from further exposure. Obtain medical assistance immediately.
- Eyes
Cold burns should be flushed with water to normalize temperature. Cover burns with sterile dressings. Do not use ointments or powders. Obtain medical assistance as necessary.
- Skin
Cold burns should be flushed with water to normalize temperature. Cover burns with sterile dressings. Do not use ointments or powders. Obtain medical assistance as necessary.
- Spillage: See Storage/Transport (Section 5, 7, 3)

PETROL (UK) / GASOLINE

This product is also known as Petrol (UK) or Gasoline. It can be clear liquid with slight tan or yellow color with a characteristic mild odor. It is a complex combination of hydrocarbons consisting primarily of paraffins, naphthenes, aromatic and olefinic hydrocarbons having carbon numbers predominantly between C4 and C12.

The substance has an initial boiling point of 25–220°C, a flash point greater than $<-40^{\circ}\text{C}$, and a vapor pressure between 0.5 – 1 bars and has negligible solubility in water.

It is used as a fuel for off-road Petrol powered vehicles and stationary engines, and can be found in fuel tanks, pipes and injection systems. The substance should not be used for any other purpose without contacting the manufacture or supplier. Installers, operators and maintainers are likely to encounter this substance.

HAZARDOUS REACTIONS

This liquid is extremely flammable. Avoid smoking, heat sources, such as welding and naked flames, sparks and static electricity build-up. Thermal decomposition products are hazardous, containing CO_x , NO_x and SO_x compounds.

The vapor is explosive. High vapor concentrations can result in central nervous system and respiratory depression with subsequent loss of consciousness.

Where ventilation is poor or temperatures high, vapor production may be a hazard. Excessive and prolonged exposure to the mist can cause chronic inflammatory reaction of the lungs and form of pulmonary fibrosis.

Avoid strong oxidizing agents, e.g. chlorates which may be use in agriculture.

Petrol is slightly irritating to the skin and has a defatting action. Toxicity following single exposure to high level of Petrol is of low order. Prolonged, repeated skin contact may de-fat the skin resulting in possible skin irritation and dermatitis. In some cases warty, cancerous growths have occurred. This product contains benzene ($<1\%$) which is classified as a carcinogen. Exposure to Benzene may result in blood disorders such as anaemia and leukemia. Toxic to aquatic organisms, may cause long-term adverse effects in aquatic environment.

PROTECTIVE MEASURES

Ensure good ventilation and avoid heat sources. Observance of good housekeeping rules will ensure general safety. Do not smoke. Avoid breathing mist.

When working on, or testing, injection equipment, special care is required to avoid perforation of skin by high pressure fuel. Use eye protection in the event of suspected high pressure leak.

Adopt a high standard of personal hygiene. In the case of skin contact, wash well with soap and water.

Use glove and overalls, and eye protection goggles if there is a risk of splashing. Use oil impervious gloves and avoid contamination inside the gloves. If overalls become contaminated, discontinue use and clean thoroughly. Contaminated clothing should be removed, soaked with water, and laundered before use.

No special respiratory precautions are necessary in normal use.

DO NOT use as a solvent for removing dirt/grease etc, from skin.

STORAGE/TRANSPORT

Store and transport only in correctly marked containers. Keep containers closed when not in use. Keep cool, out of sunlight and away from naked flames. Electrical continuity is required between the transport and storage vessels during product transfer.

Contain leak/spill with sand, earth or other suitable material, and prevent entry of substance into drainage/sewerage system, water-courses and land. Dispose of unwanted or absorbed substance through an authorized contractor to a licensed site.

Inform local and fire authorities should the product reach waterways, drains etc.

EMERGENCY ACTION

- Fire
Extinguishing media:
Large fire – Foam/water fog. Never use water jet.
Small fire – foam/dry powder, AAAF, CO₂, sand, earth.
Avoid making sparks. Fire fighters to use self-contained breathing apparatus. Keep fire exposed containers cool, using water fog/spray. Prevent run-off from entering waterway, drains and drinking water supplies.
- Ingestion
Do not induce vomiting. Wash the mouth out with water, and send to hospital immediately.
- Inhalation (of vapor)
Remove from further exposure. Obtain medical assistance immediately.
- Aspiration (inhalation of liquid)
If, following ingestion of gas oil, vomiting occurs, there is danger of aspiration into the lungs. This would cause intense local irritation and chemical pneumonitis that can be fatal. Obtain immediate medical assistance.
- Eyes
Irrigate copiously with water or preferably eye-wash solution for at least five minutes. If irritation persists seek medical advice.
- Skin
Wash thoroughly with soap and water. Change clothing if necessary.
If high pressure injection has occurred prompt surgical attention is required.
- Spillage
Absorb using sand, earth or other suitable material. Dispose of unwanted or absorbed flammable material as directed under Storage/Transport (Section 5.7.3). In the event of a major spillage, only trained personnel wearing self contained breathing apparatus should handle the spill. Any spillage or leak should be treated

as a major fire/explosion hazard. If vehicles present, switch off engines.

LUBRICATION OIL – PREMIUM BLUE E

15W40

Also known as oil, lube oil, sump oil, new oil is dark, viscous liquid with a slight, characteristic odor. The base oil contains: distillates (petroleum), solvent-dewaxed heavy paraffinic. It is not classified as dangerous according to Directive 1999/45/EC and its amendments, and is not classified according to the EU regulations.

It has a boiling point greater than 150°C, a flash point Open Cup of 220°C (Cleveland), and is insoluble in cold water.

It is used in engine lubricant oil systems, sump pan and filters, make-up tanks and piping systems as a lubrication oil for use in wide range of diesel engines operating under severe conditions. Installers, operators and maintainers are likely to encounter this product.

HAZARDOUS REACTIONS

This product is stable although slightly re-active with oxidizing agents. Results of decomposition are carbon oxides (CO, CO₂) and water.

Although harmful if swallowed or aspirated (breathed in), repeated or prolonged exposure is not known to aggravate medical conditions.

Used oil may contain harmful combustion by-products and unburnt fuel that will cause skin reactions as detailed for fuel. Particular care must be taken if oil from a severely overheated engine is handled – use impervious gloves, lab coat and safety glasses.

Do not breathe vapor/spray.

PROTECTIVE MEASURES

Ensure good ventilation and avoid heat sources.

Adopt a high standard of personal hygiene. In case of skin contact, wash thoroughly with soap and water.

Use safety glasses, impervious gloves and lab coat. Avoid contamination inside the gloves. If overalls become contaminated, discontinue use and clean thoroughly.

No special respiratory precautions are necessary in normal use. Do not breath vapor/spray when handling hot materials.

STORAGE/TRANSPORT








Store and transport only in correctly marked containers. Keep containers tightly sealed when not in use. Keep in cool, well ventilated area, out of sun-

Generator Set Warning Labels

Warning signs are provided on the generator set at or near the point of risk. To avoid injury, always take the necessary precautions – as indicated on the sample signs shown below:

light and away from naked flames. Store well away from food – stuffs and drinking water.

Wear splash goggles, full suit, boots and gloves. Absorb leak/spill with inert material and dispose of unwanted or absorbed substance through an authorized contractor to a licensed site. Finish cleaning by spreading water on the contaminate surface and allow to evacuate through the sanitary system.

	<p>Caution / Warning. Indicates a risk of personal injury.</p>
	<p>Caution / Warning of Temperature Hazard. Indicates a risk of personal injury from high temperature.</p>
	<p>Caution / Warning of High Voltage Hazard. Indicates a risk of personal injury from electric shock/electrocution.</p>
	<p>Caution / Warning. Indicates a risk of personal injury from equipment that may be subject to automatic starting or remote starting.</p>
	<p>Caution / Warning. Indicates to read Operator manual for additional information.</p>
	<p>Caution / Warning of Belt and Rotating Part Hazard. Indicates a risk of personal injury from entanglement in moving parts.</p>
	<p>Caution / Warning of Pressure Hazard. Indicates a risk of personal injury from pressurized fluids.</p>

1. Introduction

ABOUT THIS MANUAL

⚠WARNING *This genset is not a life support system. It can stop without warning. Children, persons with physical or mental limitations, and pets could suffer personal injury or death. A personal attendant, redundant power or an alarm system must be used if genset operation is critical.*

⚠WARNING *This generator set is not “ignition protected” and shall not be used in a flammable vapor environment.*

⚠WARNING *Improper installation can result in serious injury, death or equipment damage. The installer must be qualified to perform the installation of electrical and mechanical equipment.*

This manual covers operation and maintenance of the KY Series of generator sets (gensets). Each operator should study this manual carefully and observe all of its instructions and safety precautions. Keep this manual and the Installation Manual with the other vehicle manuals.

Operation, Periodic Maintenance and Troubleshooting provide the instructions necessary for operating the genset and maintaining top performance. The owner is responsible for maintenance in accordance with the PERIODIC MAINTENANCE SCHEDULE (Page 3-1). This manual also includes genset specifications, information on how to obtain service, and information for California users.

⚠WARNING *This genset is not a life support system. It can stop without warning. Children, persons with physical or mental limitations, and pets could suffer severe personal injury or death. A personal attendant, redundant power or an alarm system must be used if genset operation is critical.*

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

⚠WARNING *This generator set is not “ignition protected” and shall not be used in a flammable vapor environment.*

MODEL IDENTIFICATION

Model and Serial Numbers: Refer to Figure 1-1 for the location of the genset nameplate. Record the model and serial numbers in the designated boxes in Figure 1-1 so that they are handy when calling for parts, service or product information. Each character, including the last letter in the model number, is important for obtaining the right parts.

Genuine Onan replacement parts are recommended for best performance and safety.

Federal Emissions Compliance Period: The Federal Emissions Compliance Period referred to on the nameplate indicates the number of operating hours for which the engine has been shown to meet Federal emissions requirements. Category C = 250 hrs, B = 500 hrs, A = 1000 hrs.

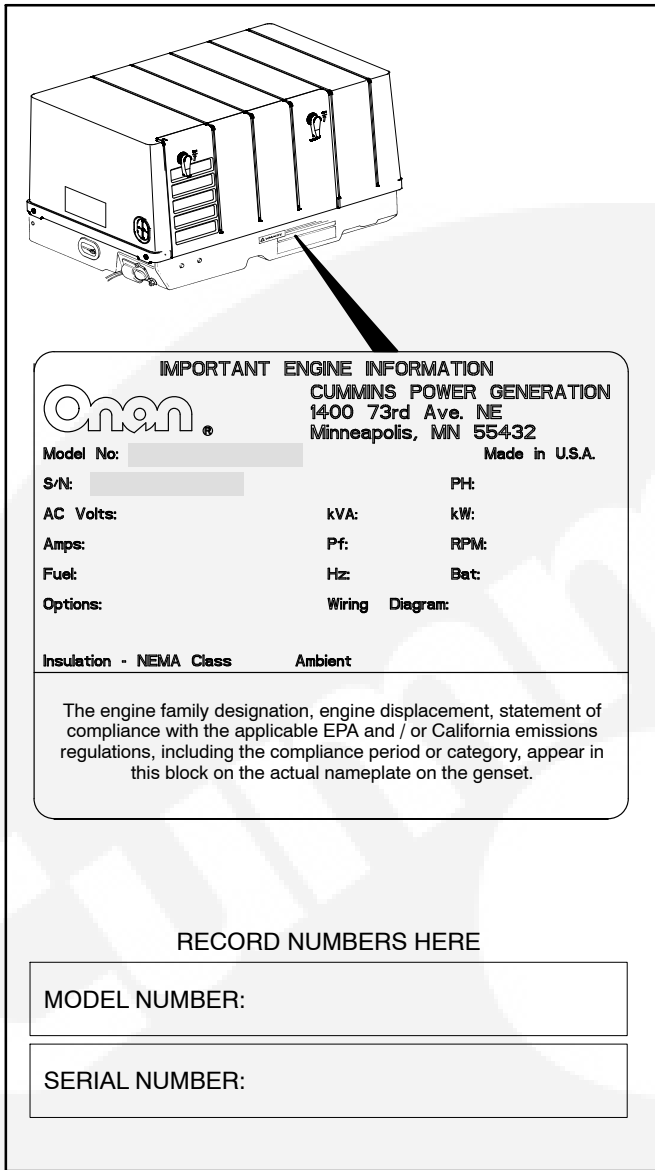


FIGURE 1-1. TYPICAL NAMEPLATE

NOISE

Generator sets emit noise. As noise level and timing of exposure increase, risk of hearing damage increases. The Specifications page in the Operator manual states noise level for this generator set. Select and use personal hearing protection appropriate for your exposure to generator set noise.

Note for use in countries where compliance to the EU Noise directive is required: This generator set has not been evaluated and is not marked for use in open air. Install the generator set in accordance with the Installation manual. Obey local noise restrictions when you operate the generator set.

ELECTROMAGNETIC COMPATIBILITY

Generator sets emit and receive electromagnetic (radio frequency) energy. If the generator set affects operation of nearby devices, or nearby devices affect generator set operation, increase the distance between them.

Note for use in countries where compliance to the EMC directive is required: This generator set has been evaluated for use in residential, commercial, and light industrial environments.

TYPICAL GENSET

Figure 1-2 illustrates a typical genset and the features requiring attention during operation and periodic maintenance.

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

Securing the access cover: Position the bottom of the cover so that its lip catches the top edge of the base tray, rotate the top of the cover towards the genset and turn the two cover latches clockwise to CLOSED, making sure the latches catch.

⚠️WARNING *Operating the genset with the access cover off can lead to severe burns and engine damage due to overheating. Always secure the cover after starting the genset.*



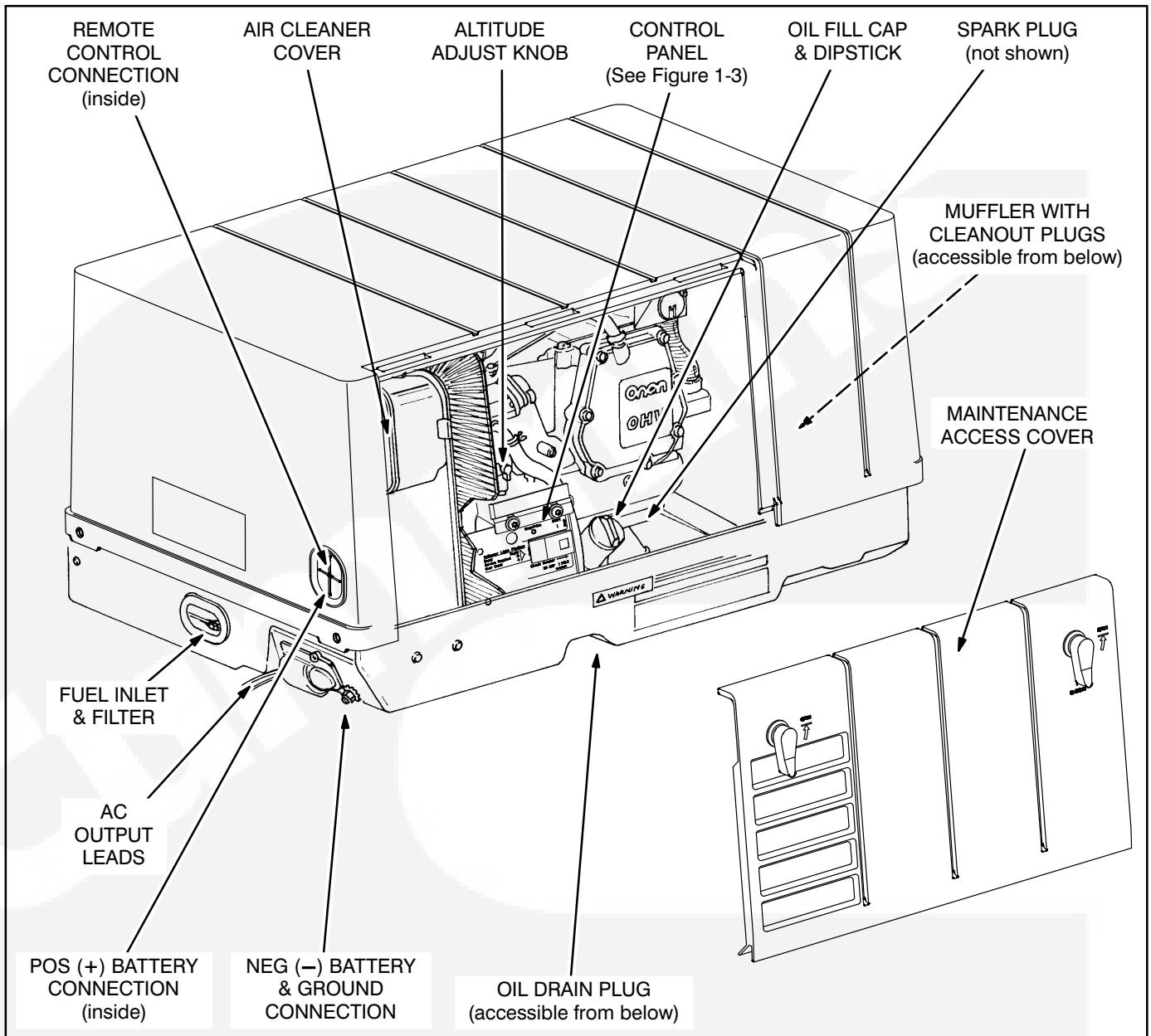


FIGURE 1-2. TYPICAL GENSET

FUEL RECOMMENDATIONS

⚠️WARNING Gasoline and LPG are highly flammable and explosive and can cause severe personal injury or death. Do not smoke or turn electrical switches ON or OFF where fuel fumes, tanks or equipment are present or in areas sharing ventilation. Keep flames, sparks, pilot lights, arc-producing equipment, switches and all other sources of ignition well away. Keep a type ABC fire extinguisher in the vehicle.

Gasoline Models

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

Leaded gasoline may be used but will result in the extra maintenance required for removing combustion chamber and spark plug deposits. Do not use gasoline or gasoline additives (de-icers) containing methanol because methanol can be corrosive to fuel system components.

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

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

LPG Models

Use clean, fresh HD-5 grade liquified petroleum gas (LPG) or equivalent product consisting of at least 90 percent propane. Commercial liquified petroleum gas fuels may contain more than 2.5 percent butane, which can result in poor fuel vaporization and poor engine starting in ambient temperatures below 32° F (0° C).

Satisfactory performance requires that the LPG vapor be supplied at a pressure within the range indicated in *Specifications* (Page 5-1).

⚠ WARNING *High LPG supply pressure can cause gas leaks which can lead to fire and severe personal injury or death. LPG supply pressure must be adjusted to Specifications by qualified personnel.*

ENGINE OIL RECOMMENDATIONS

Use API (American Petroleum Institute) performance Class **SJ** engine oil or better. Also look for

the SAE (Society of Automotive Engineers) viscosity grade. Referring to Table 1-1, choose the viscosity grade appropriate for the ambient temperatures expected until the next scheduled oil change.

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

TABLE 1-1. OIL VISCOSITY VS. TEMPERATURE

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

STARTING BATTERIES

See *Specifications* (Page 5-1) regarding minimum battery ratings for reliable genset cranking, especially in cold weather. Also see PERIODIC MAINTENANCE SCHEDULE (Page 3-1) and the battery manufacturer's instructions regarding battery maintenance. Reliable genset starting and starter service life depend upon adequate battery capacity and proper maintenance.



GENSET CONTROL PANEL

The genset control panel (Figure 1-3) is located behind the maintenance access cover (Figure 2) and has the following features:

Control Switch – This switch is used to prime the fuel system, start and stop the genset and display the fault code. Hold the switch in its **START** position to crank and start the genset. Press the switch to its **STOP** position to stop the genset. Hold the switch in its **STOP/PRIME** position to prime the fuel system (gasoline models only). See *Troubleshooting* (Page 4-1) about displaying fault codes.

Status Indicator Light – This light is an LED (light emitting diode) in the control switch that blinks rapidly during cranking and stays on continuously when the genset is running. If the genset shuts down abnormally, the light will blink a numerical code to indicate the cause of the shutdown. See *Troubleshooting* (Page 4-1).

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

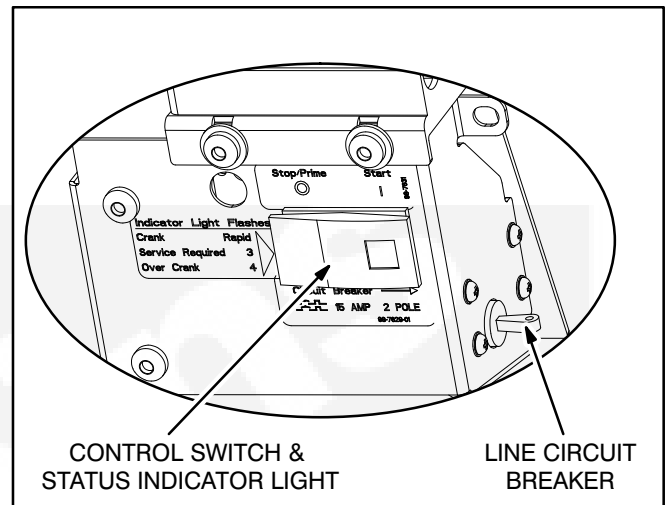


FIGURE 1-3. GENSET CONTROL PANEL

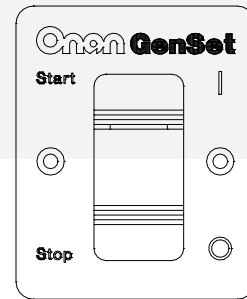


FIGURE 1-4. REMOTE SWITCH

REMOTE CONTROL PANEL

The vehicle probably has a control panel inside the vehicle for remote control of the genset. Onan offers three remote control kits:

- Remote switch with status indicator light only (Figure 1-4).
- Remote switch with status indicator light and hour meter (Figure 1-5).
- Remote switch with status indicator light and DC voltmeter (Figure 1-6).

The hour meter records genset operating time in hours. It cannot be reset. See the PERIODIC MAINTENANCE SCHEDULE (Page 3-1).

The DC voltmeter indicates whether voltage across the 12 VDC control system and battery is normal. If the indicator consistently stays above or below the normal zone, see MAINTAINING THE BATTERY AND BATTERY CONNECTIONS (Page 3-5).

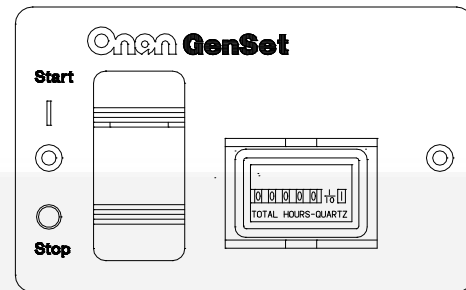


FIGURE 1-5. REMOTE SWITCH / HOUR METER

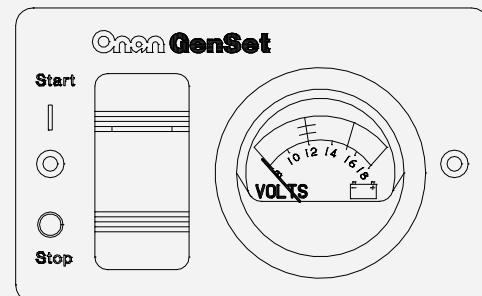


FIGURE 1-6. REMOTE SWITCH / DC VOLTMETER

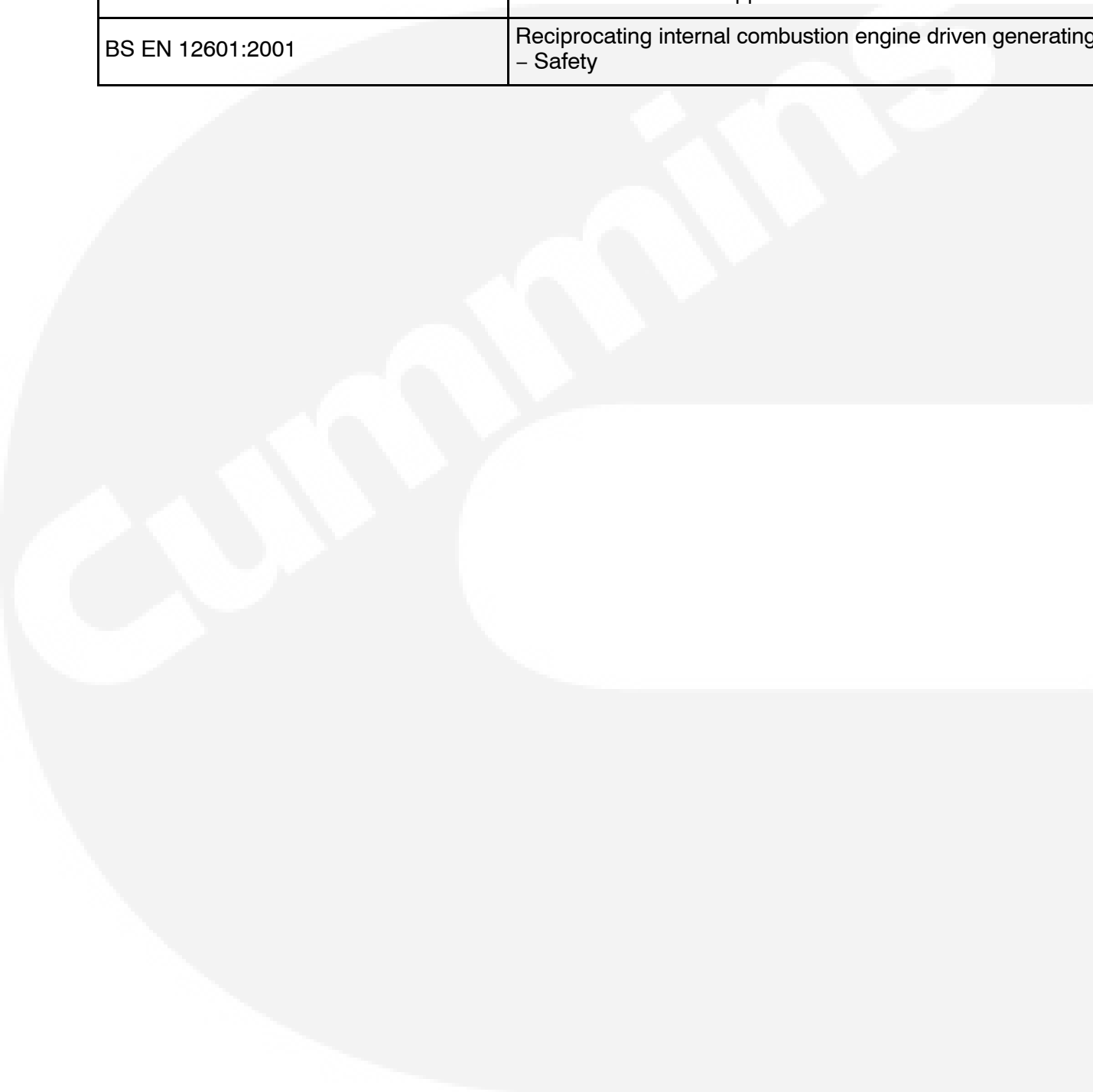
BUILD STANDARDS

The generator set and its control system have been designed, constructed and tested generally in accordance with the following Standards where applicable refer to Table 1.

TABLE 1. BUILD STANDARDS

BS EN 1037:1995+A1:2008	Safety of machinery – Prevent of unexpected start up.
BS EN ISO 14121–1:2007	Safety of machinery. Risk assessment. Principles
BS EN ISO 13857:2008	Safety of machinery. Safety distance to prevent hazard zones being reached by upper and lower limbs.
BS EN 349:1993+a1:2008	Safety of machinery – Minimum gaps to avoid crushing parts on the human body.
BS EN 547–1: 1996+A1:2008	Safety of machinery – Human body dimensions – Part 1: Principles of determining the dimensions required for openings for whole body access into machinery.
BS EN 547–2:1996+A1:2008	Safety of machinery – Human body dimensions – Part 2: Principles for determining the dimensions required for access openings.
BS EN 547–3:1996+A1:2008	Safety of machinery – Human body dimensions – Part 3: Anthropomorphic data.
BS EN 60204–1:2006+A1:2009	Safety of machinery. Electrical equipment of machines. General requirements
BS EN 614–1:2006+A1:2009	Safety of machinery. Ergonomic design principles. Terminology and general principles
BS EN 953:1997+A1:2009	Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards.
BS EN ISO 12100–1:2003+A1:2009	Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology
BS EN ISO 12100–2:2003+A1:2009	Safety of machinery. Basic concepts, general principles for design. Technical principles
BS EN ISO 13732–1:2008	Ergonomics of the thermal environment. Methods for the assessment of human responses to contact with surfaces. Hot surfaces
BS EN ISO 13849–1:2008	Safety of machinery – Safety related parts of control systems
BS EN ISO 13850:2006	Safety of machinery – Emergency stop. Principles for design.
BS EN 61310–1:2008	Safety of machinery – Indication, marking and actuation – Part 1: Requirements for visual, auditory and tactile signals.
BS EN 61310–2:2008	Safety of machinery – Indication, marking and actuation – Part 2: Requirements for marking.
BS EN 61000–6–1:2007	Electromagnetic compatibility (EMC). Generic standards. Immunity standard for residential, commercial and light–industrial environments

BS EN 61000-6-3:2007	Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments
BS EN 1299:1997+A1:2008	Mechanical vibration and shock – Vibration isolation of machines – Information for the application of source isolation
BS EN 12601:2001	Reciprocating internal combustion engine driven generating sets – Safety



2. Operation

⚠ WARNING EXHAUST GAS IS DEADLY!

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

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

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

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

CONDUCTING THE PRE-START CHECKS

Before the first start of the day and after every eight hours of operation, inspect the genset as instructed under CONDUCTING GENERAL INSPECTIONS (Page 3-2). Keep a log of maintenance and the hours run and perform any maintenance that may be due. See RETURNING THE GENSET TO SERVICE (Page 2-6) if the vehicle has been in storage.

Before each start:

1. Make sure all vehicle CO detectors are working.
2. Check for signs of fuel and exhaust leaks and for damage to the exhaust system.
3. Turn off the air conditioner and other large appliances.

PRIMING THE FUEL SYSTEM

If the genset ran out of fuel (gasoline models only) prime the fuel system by holding the control switch at **STOP/PRIME** for 30 seconds. (The status indicator light will stay on while the pump is on.)

STARTING THE GENSET

Start the genset from the genset control panel or remote control panel inside the vehicle (Page 1-6).

1. Visually inspect for fuel and exhaust leaks. Do not start the genset if there is a fuel or exhaust leak and have it repaired.
2. Push and hold the switch at **START** until the genset starts. The status indicator light on the switch flashes while cranking. It will stay on continuously when the genset is running.
3. The genset will shut down in 15 to 20 seconds if it does not start and the status indicator light will blink Fault Code No. 4. See *Troubleshooting* (Page 4-1). Wait 5 seconds for the control to reset before trying again. After five tries let the starter motor cool down for 30 seconds before trying again.

⚠ CAUTION *The starter motor can be damaged by overheating if not allowed to cool down for at least 30 seconds after every fifth crank.*

4. See *Troubleshooting* (Page 4-1) if the engine shuts down and the status indicator light blinks.
5. For top performance and engine life, especially in colder weather, let the engine warm up for two minutes before connecting appliances.
6. Always secure the access cover after starting the genset at the genset control panel.

⚠WARNING *Operating the genset with the access cover off can lead to severe burns and engine damage due to overheating. Always secure the cover after starting the genset.*

STOPPING THE GENSET

Turn off the air conditioner and other large appliances and let the genset run for two minutes to cool down. This reduces backfiring and run-on. Then press the switch to **STOP** to stop the genset.

RESTARTING THE GENSET

See *Troubleshooting* (Page 4-1) if the genset shuts down abnormally.

LOADING THE GENSET

The genset can power AC motors, air conditioners, AC/DC converters and other appliances. How much appliance load* can be powered depends upon the genset power rating. The genset will shut down or its circuit breakers will trip if the sum of the loads exceeds genset power.

To avoid overloading the genset and causing shut-downs, compare the sum of the loads of the appliances that are likely to be used at the same time to the power rating of the genset. Use Table 2-1 or the ratings on the appliances themselves (if so marked) to obtain the individual appliance loads. ***It may be necessary to run fewer appliances at the same time—the sum of the loads must not be greater than genset rating.***

Note that the genset may shut down due to overload—even though the sum of the loads is less than genset rating—when a large motor or air conditioner is started last or cycles off and then on again. The reason for this is that a motor’s startup load is much larger than its running load. ***It may be necessary to***

run fewer appliances when large motors and air conditioners are cycling on and off.

TABLE 2-1. TYPICAL APPLIANCE LOADS

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

Note also that air density decreases as altitude increases, causing genset engine power to decrease.** Power decreases approximately 3.5 percent of rated power each 1000 feet (305 m) of increase in elevation. See Table 2-2 for typical calculations. ***It may be necessary to run fewer appliances at higher altitudes.***

TABLE 2-2. POWER VS. ALTITUDE

Elevation above Mean Sea Level	Maximum Genset Power*
up to 500 ft (152 m)	4000 watts (rated)
2500 ft (762 m)	3720 watts
5500 ft (1676 m)	3300 watts
above 5500 ft (1676 m)	3300 watts minus 140 watts each 1000 ft (305 m)
* This table does not take into account the effect circuit breakers may have in limiting maximum power.	

* Appliance load and genset power are measured in terms of watts (W) or kilowatts (kW), where 1 kilowatt (kW) = 1000 watts (W).

** Power decreases even though the altitude adjust knob is set correctly (Page 2-4).

RESETTING CIRCUIT BREAKERS

If a circuit breaker in the main power distribution panel of the vehicle or on the genset (Figure 2-1) trips, either a circuit shorted or too many appliances were running. Note that the genset will continue to run after a circuit breaker trips.

If a circuit breaker trips, disconnect or turn off as many loads as possible and reset the circuit breaker. (It may be necessary to push the circuit breaker **OFF** to reset it and then **ON** to reconnect the circuit.) If the circuit breaker trips right away, either the electrical distribution system has a short or the circuit breaker is faulty. Call a qualified electrician.

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

Electrical appliances and tools must be used and maintained properly and be properly grounded to cause the line circuit breakers to trip when short circuits occur.

⚠WARNING *Short circuits in electrical appliances and tools can cause fire and electrical shock leading to severe personal injury or death. Read and follow the equipment and tool manufacturer's instructions and warnings regarding use, maintenance and proper grounding.*

CONNECTING TO UTILITY POWER

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

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

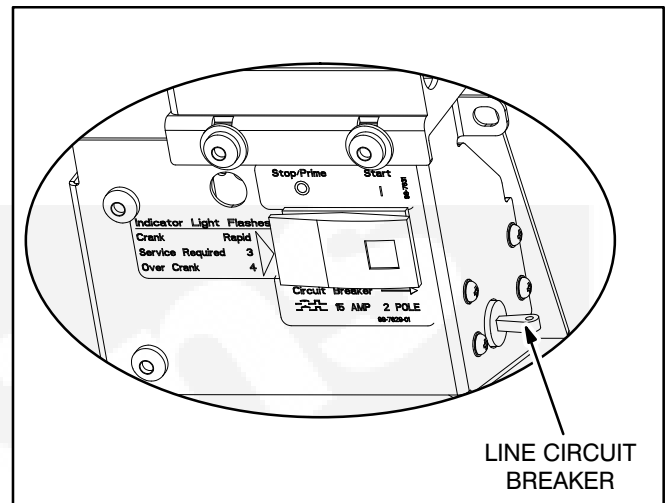


FIGURE 2-1. LINE CIRCUIT BREAKER

OPERATING IN COLD WEATHER

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

1. Make sure engine oil viscosity is appropriate for the ambient temperatures. Change oil if there is a sudden drop in temperature. See ENGINE OIL RECOMMENDATIONS (Page 1-5).
2. Check the altitude setting (Figure 2-2).
3. Perform spark plug maintenance (Page 3-7).
4. Perform battery maintenance (Page 3-5).

OPERATING IN HOT WEATHER

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

1. Make sure nothing blocks airflow to and from the genset.
2. Make sure engine oil viscosity is appropriate for the ambient temperatures. See ENGINE OIL RECOMMENDATIONS (Page 1-5).
3. Keep the genset clean.
4. Perform maintenance due. See PERIODIC MAINTENANCE SCHEDULE (Page 3-1).
5. Check the altitude setting (Figure 2-2).

ALTITUDE ADJUSTMENT

Gasoline Models – For best fuel economy and genset operation reset the carburetor for the current altitude (Figure 2-2). Look at road maps and road signs. For the effect of altitude on maximum power, see LOADING THE GENSET (Page 2-2).

⚠ CAUTION *Operating the genset at low altitude with a high altitude setting can cause power loss, overheating and engine damage. Always reset when returning to lower altitudes.*

OPERATING IN DUSTY ENVIRONMENTS

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

1. Do not let dirt and debris accumulate inside the genset compartment. Keep the genset clean.
2. Perform air cleaner maintenance more often (Page 3-5).
3. Change engine oil every 50 hours.
4. Keep containers of engine oil that have been opened tightly closed to keep out dust.

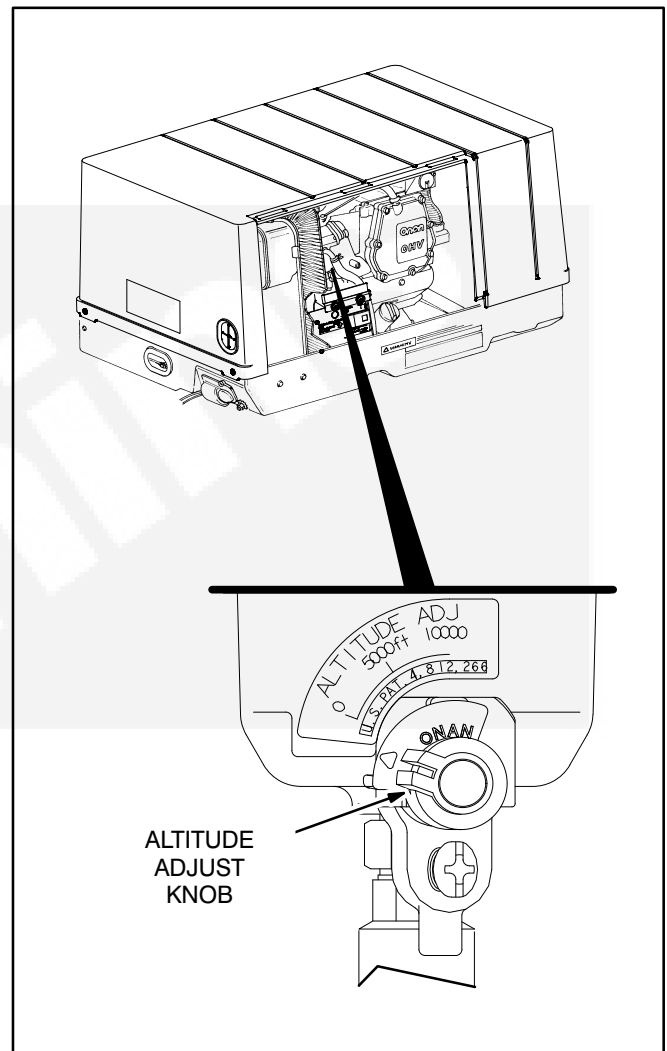


FIGURE 2-2. ALTITUDE ADJUST KNOB (GASOLINE MODELS ONLY)

BREAKING IN A NEW ENGINE

Proper engine break-in on a new genset or on one with a rebuilt engine is essential for top engine performance and acceptable oil consumption. Run the genset at approximately 1/2 rated power for the first 2 hours and then at 3/4 rated power for 2 more hours. See LOADING THE GENSET (Page 2-2).

Proper engine oil and oil level are especially critical during break-in because of the higher engine temperatures that can be expected. Change the oil if not appropriate for the ambient temperatures during break-in. See ENGINE OIL RECOMMENDATIONS (Page 1-5). Check oil level twice a day or every 4 hours during the first 20 hours of operation and change the oil after the first 20 hours of operation.

EXERCISING THE GENSET

Exercise the genset at least 2 hours each month if use is infrequent. Run the genset at approximately 1/2 rated power. See LOADING THE GENSET (Page 2-2). A single two hour exercise period is better than several shorter periods.

Exercising a genset drives off moisture, re-lubricates the engine, replaces stale fuel in fuel lines and carburetor and removes oxides from electrical contacts and generator slip rings. The result is better starting, more reliable operation and longer engine life.

STORING THE GENSET

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

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

run the genset for about 10 minutes at approximately 1/2 rated power to fill the fuel lines with the fresh fuel and preservative.

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

2. Change the engine oil and attach a tag indicating oil viscosity. See ENGINE OIL RECOMMENDATIONS (Page 1-5).
3. Remove the air filter and restart the genset. While the genset is running, spray an engine fogger (OnaGard™) into the carburetor, following the instructions on the container label, and then stop the genset. The fogger leaves a protective coat of oil on the internal surfaces of the engine.
4. Disconnect all appliances, push the genset line circuit breaker to OFF (Page 2-3) and stop the genset.
5. Disconnect the battery cables (negative [-] cable first) from the starting battery and store the battery according to the battery manufacturer's recommendations. See MAINTAINING THE BATTERY AND BATTERY CONNECTIONS (Page 3-5).
6. Plug the exhaust tail pipe to keep out dirt, moisture, bugs, etc.
7. Close the fuel supply valve (if so equipped).
8. **LPG Models** – Check the local ordinances if the vehicle is to be garaged. Generally, ordinances require that the LPG system be leak-free, that the LPG container not be filled beyond specified limits, that the container shutoff valve be closed and that the vehicle not be parked near sources of heat or ignition.

⚠WARNING *LPG leaks can lead to explosive accumulations in pits, sumps or other below-grade locations. Comply with all local ordinances regarding the garaging of vehicles with LPG engine fuel systems.*

9. **Gasoline Models** – Drain the carburetor float bowl to prevent deposits of gum from clogging the tiny passages in the carburetor as the gasoline in the bowl evaporates during storage (Figure 2-3). Drain it as follows:

- A. Let the engine cool down thoroughly.
- B. Place paper towels under the drain to absorb all of the drainage (less than 1/2 cup).
- C. Open the drain valve by turning it counter-clockwise with a screwdriver.
- D. Close the drain valve after draining the carburetor by turning it clockwise with a screwdriver *until just snug*.

⚠WARNING *Do not open the carburetor drain when the engine is hot. Close the drain immediately after draining. Failure to heed this warning can lead to fire resulting in severe personal injury or death.*

RETURNING THE GENSET TO SERVICE

1. Check the oil tag on the genset and change the oil if the viscosity indicated is not appropriate for the temperatures expected. See ENGINE OIL RECOMMENDATIONS (Page 1-5).
2. Reconnect the starting battery (negative [-] cable last). See MAINTAINING THE BATTERY AND BATTERY CONNECTIONS (Page 3-5).
3. Remove the plug from the exhaust tailpipe.
4. Change the air filter element if it is dirty (Page 3-5).
5. Open the fuel supply valve (if so equipped).
6. Inspect the genset. See CONDUCTING GENERAL INSPECTIONS (Page 3-2).
7. Start the genset. There may be smoke and rough operation for a few minutes until the oil from the fogger burns off. If the engine does not start, clean or replace the spark plug, which may have been fouled by the fogger.
8. Push the genset line circuit breaker ON (Page 2-3) when the genset is ready to power appliances.

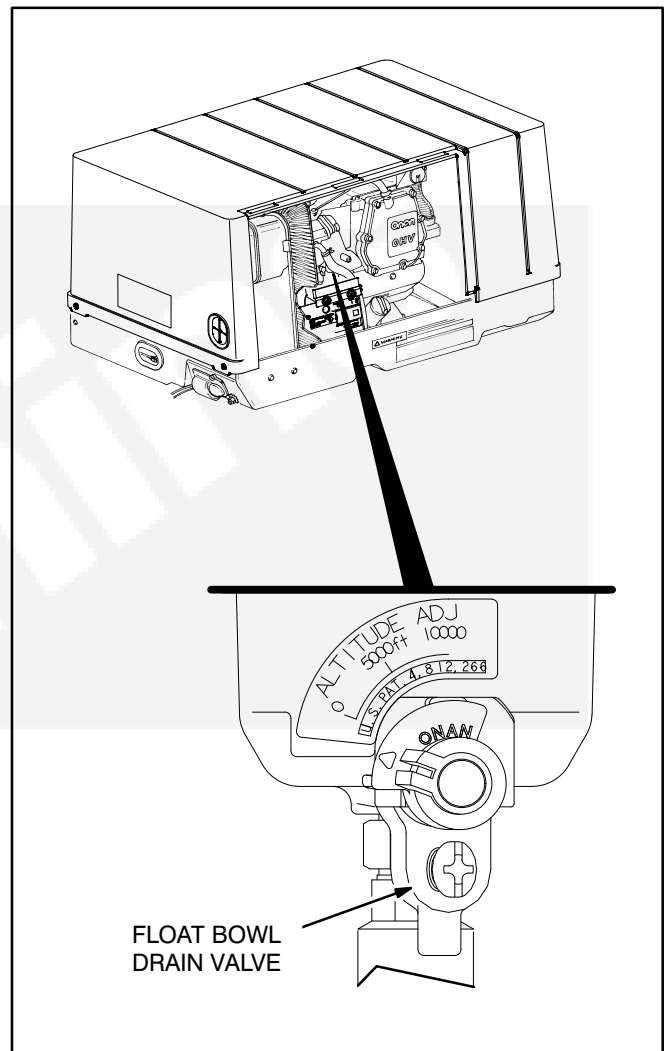


FIGURE 2-3. CARBURETOR DRAIN VALVE (GASOLINE MODELS ONLY)

3. Periodic Maintenance

Periodic maintenance is essential for top performance and long genset life. Use Table 3-1 as a guide for normal periodic maintenance. In hot and dusty environments some maintenance procedures should be performed more frequently, as indicated by the footnotes in the table. Keeping a log of maintenance performed and hours run will help you keep

genset maintenance regular and provide a basis for supporting warranty claims (Page 8-1).

Maintenance, replacement or repair of emission control devices and systems may be performed by any engine repair establishment or individual. However, warranty work must be completed by an authorized Onan dealer.

TABLE 3-1. PERIODIC MAINTENANCE SCHEDULE

MAINTENANCE PROCEDURE	MAINTENANCE FREQUENCY							Page
	Every Day or Every 8 Hours	After First 20 Hours	Every Month	Every 50 Hours	Every 150 Hours	Every 250 Hours	Every 450 Hours	
General Inspections	X							3-2
Check Engine Oil Level	X							3-3
Clean and Check Battery			X ³					3-5
Clean Spark Arrestor				X				3-7
Change Engine Oil		X ¹			X ^{2, 3, 4}			3-4
Replace Air Filter Element					X ²			3-5
Replace Spark Plug							X ⁵	3-7
Replace Fuel Filter							X ^{5, 6}	-
Adjust Valve Lash							X ⁶	-
Clean/Replace Cylinder Head							X ⁶	-

1 – As a part of engine break-in, change the engine oil after the first 20 hours of operation.
 2 – Perform more often when operating in dusty environments.
 3 – Perform more often when operating in hot weather.
 4 – Perform at least once a year.
 5 – Perform sooner if engine performance deteriorates.
 6 – Must be performed by a qualified mechanic (authorized Onan dealer).

CONDUCTING GENERAL INSPECTIONS

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

Oil Level

Check engine oil level (Figure 3-1).

Exhaust System

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

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

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

Park the vehicle so that the genset exhaust gases can disperse away from the vehicle. Barriers such as walls, snow banks, high grass and brush and other vehicles can cause exhaust gases to accumulate in and around the vehicle.

Do not operate power ventilators or exhaust fans while the vehicle is standing with the genset running. The ventilator or fan can draw exhaust gases into the vehicle.

⚠️WARNING **EXHAUST GAS IS DEADLY! Do not operate the genset if there is an exhaust leak or any danger of exhaust gases entering or being drawn into the vehicle.**

⚠️WARNING **Do not park the vehicle in high grass or brush. Contact with the exhaust system can cause a fire.**

Fuel System

Check for leaks at the hose, tube and pipe fittings in the fuel supply system while the genset is running

and while it is stopped. *Do not use a flame to check for LPG leaks.* Check flexible fuel hose sections for cuts, cracks, and abrasions. Make sure the fuel line is not rubbing against other parts. Replace worn or damaged fuel line parts before leaks occur.

If you smell gas, close the LPG container shutoff valve and have the genset serviced before using it again.

⚠️WARNING **Gasoline and LPG are highly flammable and explosive and can cause severe personal injury or death. Shut down the genset and repair leaks immediately.**

Battery Connections

Check the battery terminals for clean, tight connections. Loose or corroded connections have high electrical resistance which makes starting harder. See MAINTAINING THE BATTERY AND BATTERY CONNECTIONS (Page 3-5).

Mechanical

Visually inspect genset for mechanical damage. For generators with a sound shield, install service doors before running the generator set to listen for unusual noises. Check the genset mounting bolts. Check to see that the generator set air inlet and outlet openings are not clogged with debris or blocked. Keep generator set compartment clean.

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

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

Clean accumulated dust and dirt from the genset. Do not clean the genset while it is running or still hot. Protect the generator, air cleaner, control panel, and electrical connections from water, soap and cleaning solvents.

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

CHECKING ENGINE OIL LEVEL

Park the vehicle on level ground and shut off the genset before checking the engine oil level.

⚠️WARNING *State and federal agencies have determined that contact with engine oil can cause cancer or reproduce toxicity. Avoid skin contact and breathing of vapours. Use rubber gloves and wash exposed skin.*

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

1. Unscrew the oil fill cap and wipe oil off the dipstick (Figure 3-1). Screw the cap back on, remove it again and check the oil level on the dipstick.
2. Add or drain oil as necessary. See ENGINE OIL RECOMMENDATIONS (Page 1-5). Keep the oil level between the FULL and ADD marks.

⚠️CAUTION *Too much oil can cause high oil consumption. Too little oil can cause severe engine damage. Keep the oil level between the FULL and ADD marks.*

3. Screw the oil fill cap back on securely.

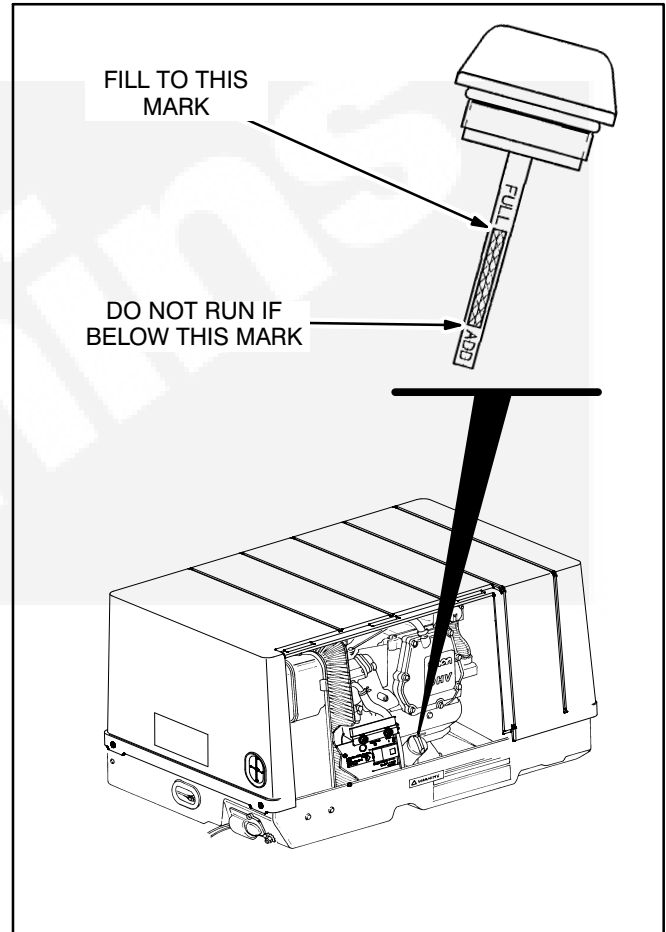


FIGURE 3-1. CHECKING ENGINE OIL LEVEL

CHANGING ENGINE OIL

⚠WARNING State and federal agencies have determined that contact with used engine oil can cause cancer or reproductive toxicity. Try to avoid skin contact and breathing of vapors. Use rubber gloves and wash exposed skin.

⚠WARNING Engine components (drains, filters, hoses, etc.) will be hot and can cause severe burns. The use of protective gloves is recommended.

⚠WARNING To prevent accidental or remote starting while working on the genset, disconnect the negative (-) battery cable at the battery.

Refer to Table 3-1 for scheduled engine oil change. Change oil more often in hot and dusty environments.

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

1. Run the engine until warm, stop it and remove the oil fill cap (Figure 3-1).
2. Remove the oil drain hole cover in the base, place a pan underneath and unscrew the drain plug (Figure 3-2). Let all oil drain from the engine and then secure the drain plug. Torque the plug to 21 lbs-ft (27 N-m) and secure the cover.
3. Refill with 1.6 quarts (1.5 liters) of oil. See ENGINE OIL RECOMMENDATIONS (Page 1-5). Check the oil level and add or drain oil as necessary.
4. Screw the oil fill cap back on securely.
5. Dispose of the used oil in accordance with local environmental regulations.

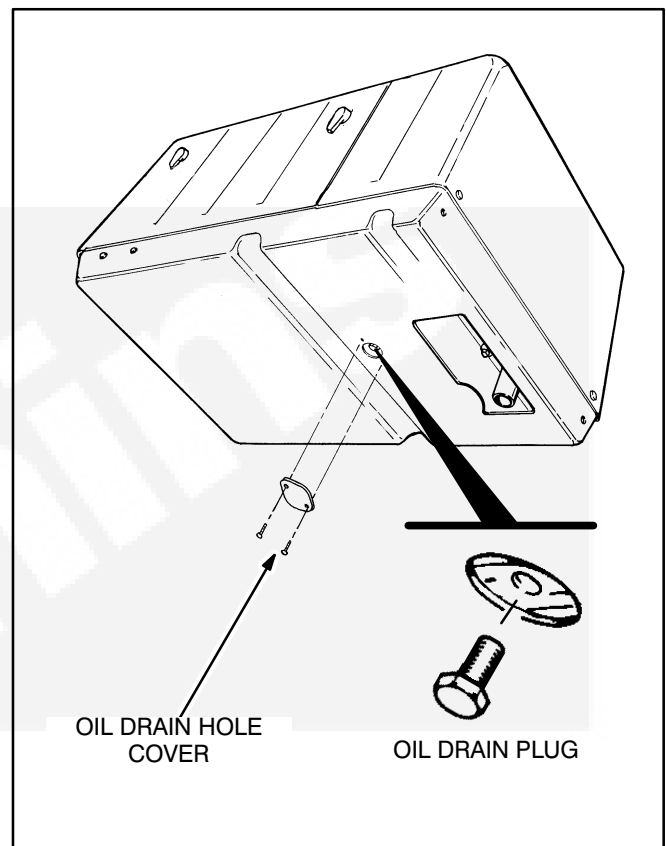


FIGURE 3-2. OIL DRAIN PLUG

MAINTAINING THE BATTERY AND BATTERY CONNECTIONS

⚠WARNING *Arcing at battery terminals or light switch or other equipment or flames and sparks can ignite battery gas causing severe personal injury—Ventilate battery area before working on or near battery—Wear safety glasses—Do not smoke—Switch trouble light ON / OFF away from battery—Do not disconnect battery cables while genset is running or vehicle battery charging system is on—Always disconnect negative (-) cable first and reconnect it last.*

Refer to Table 3-1 for scheduled battery maintenance, and follow the battery manufacturer's instructions. Have the battery charging system serviced if DC system voltage is consistently low or high. Always:

1. Keep the battery case and terminals clean and dry and the terminals tight.
2. Remove battery cables with a battery terminal puller.
3. Make sure which terminal is positive (+) and which is negative (-) before making battery connections, always removing the negative (-)

cable first and reconnecting it last to reduce arcing.

REPLACING THE AIR FILTER ELEMENT

⚠WARNING *To prevent accidental or remote starting while working on the genset, disconnect the negative (-) battery cable at the battery.*

⚠WARNING *Do not run the genset with the maintenance access covers off. Contact with hazardous moving parts and hot exhaust manifolds can cause severe personal injury.*

Refer to Table 3-1 for scheduled air filter element replacement. In dusty environments the filter element should be inspected and changed more frequently. To change the filter element (Figure 3-3):

1. Remove the air filter housing cover and filter element cover plate, which are secured by separate wing nuts, and remove the filter element.
2. Reassemble the air filter with a new filter element. Make sure the filter element is centered over the carburetor air inlet. Do not tighten the wing nuts too tightly. Excessive tightening can distort the filter element and cause air leaks around the element.



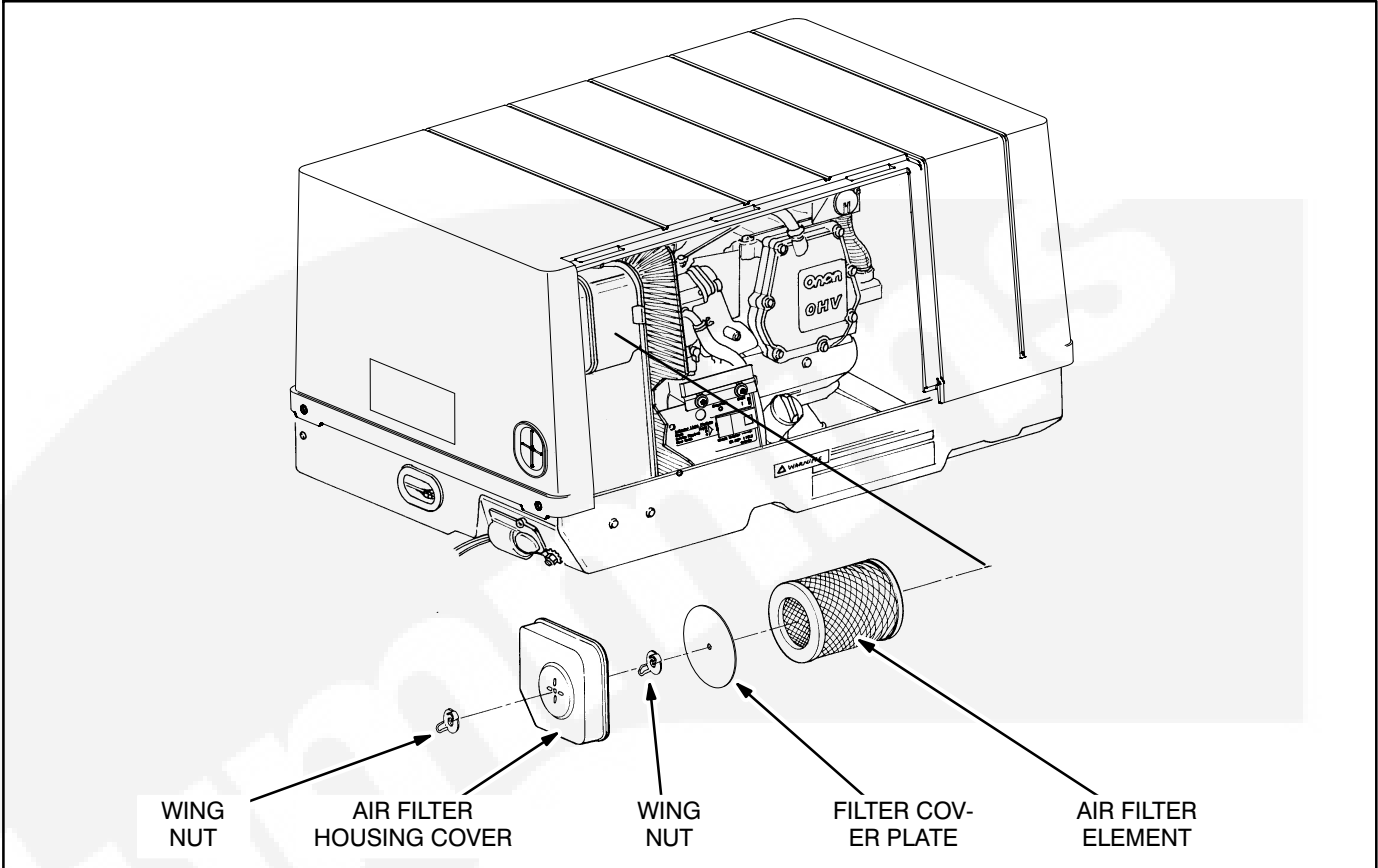


FIGURE 3-3. REPLACING THE AIR FILTER ELEMENT



REPLACING THE SPARK PLUG

Refer to Table 3-1 for scheduled spark plug replacement. (The genset has one spark plug, Figure 3-4.) The spark plug must be in good condition for proper engine starting and performance. A spark plug that fouls frequently or has heavy soot deposits indicates the need for engine service. See *Troubleshooting* (Page 4-1).

Always thread the spark plug in by hand until it seats, to prevent cross threading, and torque to 13 lbs-ft (17 N-m). If you don't have a torque wrench, turn the spark plug an additional 1/4 turn, if being reused, or 3/8 to 1/2 turns if new.

CLEANING THE SPARK ARRESTOR

Refer to Table 3-1 for scheduled cleaning of the spark arrestor muffler (which meets U.S. Forest Service requirements). Cleaning is required for maximum genset performance.

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

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

1. Remove the cleanout plugs from the bottom of the muffler (Figure 3-5).
2. Restart the genset and load it nearly to full power. Let the genset run for about five minutes to expel the soot in the muffler.
3. Stop the genset, allow the muffler to cool down and then reinstall the plugs.

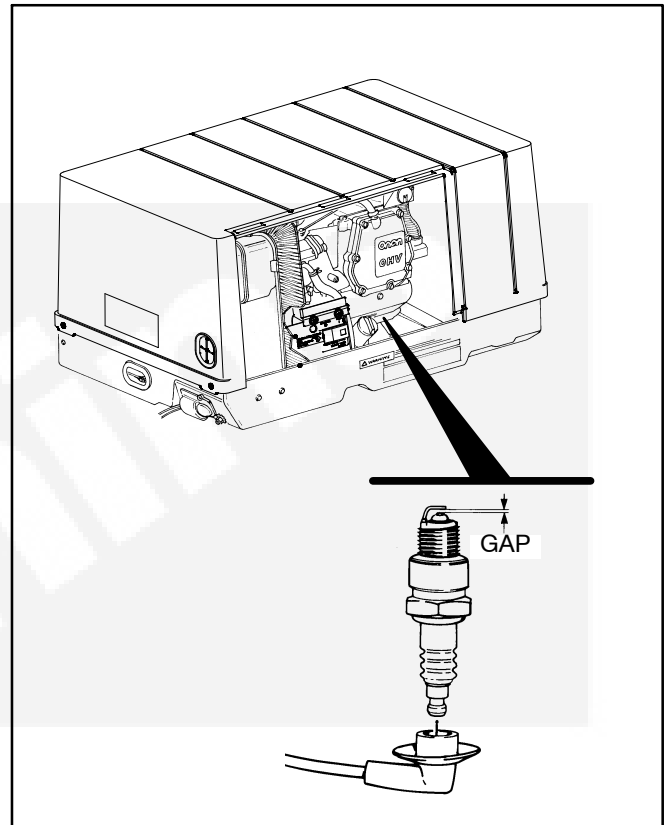


FIGURE 3-4. SPARK PLUG

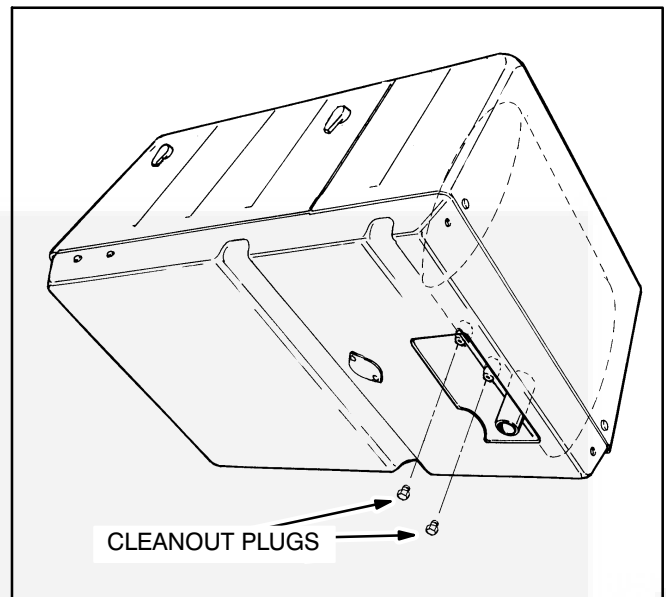


FIGURE 3-5. SPARK ARRESTOR CLEANOUT PLUGS

4. Troubleshooting

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

TABLE 2. TROUBLESHOOTING lists the Fault Codes in numerical order along with step-by-step instructions for corrective action. If you fail to resolve the problem after taking the corrective actions suggested, contact an authorized Onan dealer. See *How to Obtain Service* (Page 7-1).

First note the following:

- Maintaining engine oil level, keeping battery connections clean and tight, watching the fuel gauge, not overloading the genset, etc. will prevent most shutdowns.
- When the genset and vehicle engine share a common fuel tank the fuel dip tubes are usually arranged so that the genset will run out of fuel first. Marking the genset empty point on the fuel gauge will make it easier to tell when to stop the genset before running it out of fuel.

FAULT CODES

The genset controller provides extensive diagnostics by causing the status indicator light on the Control Switch to blink a numeric code. Following a fault

shutdown, the indicator light will repeatedly blink 3 blinks or 4 blinks at a time.

- **Three blinks** indicates a service fault. Press **Stop** once to cause the two-digit, second-level fault code to blink. (Pressing **Stop** again will stop the blinking.) The two-digit code consists of 1, 2, 3 or 4 blinks, a brief pause, and then 1 to 9 blinks. The first set of blinks represents the tens digit and the second set of blinks the units digit of the fault code number. For example, **Fault Code No. 36** appears as:
 blink-blink-blink—*pause*—blink-blink-blink-blink-blink-blink...
- **Four blinks** indicates that cranking exceeded 15 to 20 seconds without the engine starting.
- **Note: Fault Code Nos. 3 and 4 are first level faults. Avoid interpreting them as second-level Fault Code Nos. 33 and 44, which have not been assigned as fault codes.**

Restoring Fault Code Blinking – The fault code stops blinking after five minutes. Press **Stop** three times within five seconds to restore blinking. **Note that the last fault logged will blink, even after the condition that caused the shutdown has been corrected.**

TABLE 2. TROUBLESHOOTING

<p>⚠WARNING <i>Some genset service procedures present hazards that can result in severe personal injury or death. Only trained and experienced service personnel with knowledge of fuels, electricity, and machinery hazards should perform genset service. See Safety Precautions.</i></p>
<p>STATUS INDICATOR LIGHT DEAD (Faulty connections, no battery voltage)</p>
<p>Corrective Action:</p> <ol style="list-style-type: none"> 1. Try the genset Start Switch if the remote Start Switch does not work, and vice versa. 2. Clean and tighten the positive (+) and negative (-) battery cable connections at the battery, vehicle frame and genset. 3. Recharge or replace the battery. Refer to the battery manufacturer's recommendations.

TABLE 2. TROUBLESHOOTING (CONT.)

⚠WARNING *Some genset service procedures present hazards that can result in severe personal injury or death. Only trained and experienced service personnel with knowledge of fuels, electricity, and machinery hazards should perform genset service. See Safety Precautions.*

STARTING BATTERIES RUN DOWN

(Marginal batteries, connections, or charging system or, parasitic loads)

Corrective Action:

1. Clean and tighten the positive (+) and negative (-) battery cable connections at the battery, vehicle frame and genset.
2. Recharge or replace the battery. Refer to the battery manufacturer's recommendations.
3. Have a battery charging system installed or serviced in the vehicle.

STARTER ENGAGES-DISENGAGES

(Cranking voltage dips below 6 volts—low battery charge, poor connections, long cables)

Corrective Action:

1. Have the vehicle propulsion engine running while trying to start the genset—the battery charging alternator may be able to maintain starting voltage high enough to get the genset started.
2. Clean and tighten the positive (+) and negative (-) battery cable connections at the battery, vehicle frame and genset.
3. Recharge or replace the battery. Refer to the battery manufacturer's recommendations.
4. Increase battery cable size or run parallel cables.

STATUS INDICATOR LIGHT GOES OUT WHILE CRANKING—NO START

(Internal short circuit caused automatic-reset circuit protective device to trip)

Corrective Action: Try starting again. See an authorized Onan dealer if the status indicator light flashes and then goes out again without the engine starting.

NO POWER—GENSET RUNNING, STATUS LIGHT ON

(Line circuit breaker OFF, or tripped due to short circuit or overload)

Corrective Action:

1. Turn on or reset the line circuit breaker on the genset (Page 2-3).
2. Turn on or reset the line circuit breakers on the main distribution panel in the vehicle.

SERVICE CHECK FAULT—CODE NO. 3

(First-level fault code—Indicates fault with second-level fault code)

Corrective Action: Check the second-level fault code by pressing **STOP** once. The second-level fault code will have two-digits. The faults are listed in numerical order in this table.

TABLE 2. TROUBLESHOOTING (CONT.)

⚠WARNING *Some genset service procedures present hazards that can result in severe personal injury or death. Only trained and experienced service personnel with knowledge of fuels, electricity, and machinery hazards should perform genset service. See Safety Precautions.*

OVERCRANK FAULT—CODE NO. 4

(First-level fault code—Cranking exceeded 20 seconds without engine starting)

Corrective Action:

1. **Gasoline Models** – Check and fill the fuel tank, as necessary. (Note: The genset fuel pickup tube is probably higher up in the fuel tank than the vehicle engine pickup.)
2. Prime the engine fuel system by holding the control switch at **Stop/Prime** for 30 seconds.
3. **LPG Models** – Check and fill the LPG container, as necessary. *On cold days the LPG container may have to be kept at least half full to provide the rate of vaporization necessary to keep up with the genset fuel demand.*
4. Open any closed fuel valves.
5. Secure the spark plug lead on the spark plug (Page 3-7).
6. Replace the spark plug (Page 3-7).
7. Service the air cleaner (Page 3-5).

OVERVOLTAGE FAULT—CODE NO. 12

(Controller unable to maintain rated voltage)

Corrective Action: See an authorized Onan dealer.

UNDERVOLTAGE FAULT—CODE NO. 13

(Controller unable to maintain rated voltage)

Corrective Action: Reduce the number of connected appliances, especially when air conditioners and battery chargers are running.

OVERFREQUENCY FAULT—CODE NO. 14

(Engine governor unable to maintain rated frequency)

Corrective Action: See an authorized Onan dealer.

UNDERFREQUENCY FAULT—CODE NO. 15

(Engine governor unable to maintain rated frequency)

Corrective Action: Reduce the number of connected appliances, especially when air conditioners and battery chargers are running.

VOLTAGE SENSE FAULT—CODE NO. 27

(Controller unable to sense output voltage)

Corrective Action: See an authorized Onan dealer.

TABLE 2. TROUBLESHOOTING (CONT.)

⚠WARNING *Some genset service procedures present hazards that can result in severe personal injury or death. Only trained and experienced service personnel with knowledge of fuels, electricity, and machinery hazards should perform genset service. See Safety Precautions.*

HIGH BATTERY VOLTAGE FAULT—CODE NO. 29

(Voltage across battery system greater than 19 volts)

Corrective Action:

1. Check battery bank connections and reconnect if necessary so that the 12 volt batteries serving the genset are connected in parallel (12 volt) rather than in series (24 volt).
2. Select a lower battery boost charge rate.

LOW CRANKING SPEED FAULT—CODE NO. 32

(Cranking speed less than 180 rpm for more than 2 seconds)

Corrective Action:

1. Clean and tighten the positive (+) and negative (-) battery cable connections at the battery and at the genset.
2. Recharge or replace the battery. Refer to the battery manufacturer's recommendations.
3. Replace engine oil with oil of proper viscosity for ambient temperatures (Page 1-5). (High oil viscosity can slow down cranking speed.)

CONTROL CARD FAILURE FAULT—CODE NO. 35

(Microprocessor EEPROM error during self-test)

Corrective Action: See an authorized Onan dealer.

ENGINE STOPPED FAULT—CODE NO. 36

(Engine stopped without command by controller)

Corrective Action:

1. **Gasoline Models** – Check and fill the fuel tank, as necessary. (Note: The genset fuel pickup tube is probably higher up in the fuel tank than the vehicle engine pickup.)
2. **LPG Models** – Check and fill the LPG container, as necessary. *On cold days the LPG container may have to be kept at least half full to provide the rate of vaporization necessary to keep up with the genset fuel demand.*
3. Secure the spark plug lead on the spark plug (Page 3-7).
4. Replace the spark plug (Page 3-7).
5. Service the air cleaner (Page 3-5).
6. Check for mechanical damage.

INVALID GENSET CONFIGURATION FAULT—CODE NO. 37

(Genset configuration is preprogrammed at the factory)

Corrective Action: See an authorized Onan dealer.

TABLE 2. TROUBLESHOOTING (CONT.)

⚠WARNING *Some genset service procedures present hazards that can result in severe personal injury or death. Only trained and experienced service personnel with knowledge of fuels, electricity, and machinery hazards should perform genset service. See Safety Precautions.*

OVERCURRENT FAULT—CODE NO. 38

(Low power factor loads)

Corrective Action:

1. Reduce the number of appliances running at the same time, especially those with high motor starting loads such as air conditioners.
2. Have air conditioners and other appliances checked for proper operation. (A locked compressor rotor can cause very low power factor.)

GENERATOR ROTOR FAULT—CODE NO. 41

(Controller unable to sense field or output voltage)

Corrective Action: See an authorized Onan dealer.

PROCESSOR FAULT—CODE NO. 42

(Microprocessor ROM error during self-test)

Corrective Action: See an authorized Onan dealer.

PROCESSOR FAULT—CODE NO. 43

(Microprocessor RAM error during self-test)

Corrective Action: See an authorized Onan dealer.

SPEED SENSE FAULT—CODE NO. 45

(Controller unable to sense quadrature frequency)

Corrective Action: See an authorized Onan dealer.

IGNITION FAULT—CODE NO. 47

(Controller unable to sense ignition)

Corrective Action: See an authorized Onan dealer.

GENERATOR FIELD SENSE FAULT—CODE NO. 48

(Controller unable to sense field voltage)

Corrective Action: See an authorized Onan dealer.

5. Specifications

	GASOLINE MODELS		LPG MODELS	
	4KY	3.6KY	3.6KY	3.3KY
GENERATOR: 2-Pole Revolving Field, Self-Excited, 1-Phase, Microprocessor Regulated				
Power	4000 watts	3600 watts	3600 watts	3300 watts
Frequency	60 Hertz	50 Hertz	60 Hertz	50 Hertz
Voltage	120 volts ¹	230 volts ^{1, 2}	120 volts	230 volts ²
Current	33.3 amperes	15.7 amperes	30 amperes	14.3 amperes
Speed	3600 rpm	3000 rpm	3600 rpm	3000 rpm
FUEL CONSUMPTION:				
No load	0.29 gph (1.1 l/h)	0.21 gph (0.79l/h)	1.5 lbs/h (0.7 kg/h)	1.1 lbs/h (0.5 kg/h)
Half load	0.48 gph (1.8 l/h)	0.37 gph (1.4 l/h)	2.2 lbs/h (1.0 kg/h)	2.0 lbs/h (0.9 kg/h)
Full load	0.71 gph (2.7 l/h)	0.58 gph (2.2 l/h)	3.3 lbs/h (1.5 kg/h)	2.9 lbs/h (1.3 kg/h)
ENGINE: 1-Cylinder, 4-Stroke Cycle, Spark-Ignited, OHV, Air Cooled, Mechanically Governed				
Bore	3.11 inch (79 mm)		3.11 inch (79 mm)	
Stroke	2.44 inch (62 mm)		2.44 inch (62 mm)	
Displacement	18.5 inch ³ (304 cc)		18.5 inch ³ (304 cc)	
Compression Ratio	8.5 : 1		8.5 : 1	
Oil Capacity	1.6 quart (1.5 l)		1.6 quart (1.5 l)	
Intake Valve Lash (Cold)	0.002 inch (0.05 mm)		0.002 inch (0.05 mm)	
Exhaust Valve Lash (Cold)	0.002 inch (0.05 mm)		0.002 inch (0.05 mm)	
Spark Plug Tightening Torque	13 lbs-ft (17 N-m)		13 lbs-ft (17 N-m)	
Ignition Timing (magneto)	25° BTDC, non-adjustable		25° BTDC, non-adjustable	
Magneto Air Gap	0.009-0.015 inch (0.23-0.38 mm)		0.009-0.015 inch (0.23-0.38 mm)	
Spark Plug Gap	0.025 inch (0.64 mm)		0.020 inch (0.51 mm)	
DC SYSTEM:				
Nominal Battery Voltage	12 volts		12 volts	
Min. Battery Rating: Cold Cranking Amps (CCA) @ 0° F (-18° C)	450		450	
Battery Charging Current	-	10 amp (regulated)	-	10 amp (regulated)
INSTALLATION:				
Weight (with engine oil)	174 pounds (79 Kg)	184 pounds (84 Kg)	174 pounds (79 Kg)	184 pounds (84 Kg)
Minimum Compartment Size (H x D x W) ³	14.4 inch x 20 inch x 30.5 inch (366 mm x 508 mm x 775 mm)		14.4 inch x 20 inch x 30.5 inch (366 mm x 508 mm x 775 mm)	
Minimum Free Air Inlet Area	40 inch ² (258 cm ²)		40 inch ² (258 cm ²)	
Muffler Outlet Collar O. D.	1.13 inch		1.13 inch	
Fuel Connection	1/4 inch barb fitting for gasoline hose		5/8-18UNC, SAE 45° Flare Fitting	
LPG Vapor Supply Pressure	-		9-13 inch (228-330 mm) Water Column (WC)	
1. Also available for 100 volts, with grounded or isolated neutral. 2. Reconnectable. See the Installation Manual. 3. See the Installation Manual for additional considerations when sizing the genset compartment.				

6. Information for California Genset Users

This genset meets the requirements of California's Exhaust Emissions Standards as stated on the nameplate. Figure 1-1 illustrates where this information appears on the nameplate.

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

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

California genset users may use Table 3 as an aid in locating information related to the California Air Resources Board requirements for emissions control.

TABLE 3. EMISSIONS CONTROL INFORMATION

Genset Warranty Information	The California emissions control warranty statement is located in the same packet of information as this manual when the genset is shipped from the factory.
Engine Valve Lash	See <i>Specifications</i> (Page 5-1).
Engine Ignition Timing	See <i>Specifications</i> (Page 5-1).
Engine Fuel Requirements	Gasoline Models: The engine is certified to operate on unleaded gasoline. See Fuel Recommendations (Page 1-4). LPG Models: The engine is certified to operate on LPG vapor. See Fuel Recommendations (Page 1-4).
Engine Lubricating Oil Requirements	See ENGINE OIL RECOMMENDATIONS (Page 1-5).
Engine Fuel Mixture Settings	These genset engines have precision-manufactured carburetors which are not adjustable.
Engine Adjustments	Gasoline Models: See Altitude Adjustment on Page 2-4. LPG Models: Not applicable.
Engine Emission Control System	The engine emission control system consists of internal engine design.

7. How to Obtain Service

When you need service, parts, or product literature (such as the Service Manual) for your genset, contact the nearest authorized distributor. Onan has factory-trained representatives to handle your needs for genset parts and service. You may go to Internet site www.onan.com for information for contacting our distributors worldwide.

Call 1-800-888-ONAN to contact the nearest Cummins/Onan or Onan-only distributor in the United States or Canada. (This automated service utilizes touch-tone phones only). Select OPTION 1 (press 1) to be automatically connected to the distributor nearest to you.

If you are unable to contact a distributor using the automated service, consult the Yellow Pages. Typically, our distributors are listed under:

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

If you are outside North America, call Onan Corporation at 1-763-574-5000 from 7:30 AM to 4:00 PM, Central Standard Time, Monday through Friday, or fax 1-763-528-7229.

Before calling for service, have the following information available:

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

If you have difficulty in arranging service or resolving a problem, please contact the Service Manager at the nearest Cummins/Onan distributor for assistance.

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



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