

13.3L Stationary Emergency Generator **OWNER'S MANUAL**

This manual should remain with the unit.

**IMPORTANT SAFETY INSTRUCTIONS
SAVE THESE INSTRUCTIONS**

INTRODUCTION

Thank you for purchasing this model of the Stationary Emergency Generator set product line by Olympian Power Systems, Inc..

Every effort was expended to make sure that the information and instructions in this manual were both accurate and current at the time the manual was written. However, the manufacturer reserves the right to change, alter or otherwise improve this product(s) at any time without prior notice.

◆ READ THIS MANUAL THOROUGHLY

If any portion of this manual is not understood, contact the nearest Authorized Service Dealer for starting, operating and servicing procedures.

Throughout this publication, and on tags and decals affixed to the generator, DANGER, WARNING, CAUTION and NOTE blocks are used to alert personnel to special instructions about a particular service or operation that may be hazardous if performed incorrectly or carelessly. Observe them carefully. Their definitions are as follows:



After this heading, read instructions that, if not strictly complied with, will result in personal injury, including death, and property damage.



After this heading, read instructions that, if not strictly complied with, may result in personal injury or property damage.



After this heading, read instructions that, if not strictly complied with, could result in damage to equipment and/or property.

NOTE:

After this heading, read explanatory statements that require special emphasis.

These safety warnings cannot eliminate the hazards that they indicate. Common sense and strict compliance with the special instructions while performing the service are essential to preventing accidents.

Four commonly used safety symbols accompany the DANGER, WARNING and CAUTION blocks. The type of information each indicates is as follows:

 **This symbol points out important safety information that, if not followed, could endanger personal safety and/or property of others.**

 **This symbol points out potential explosion hazard.**

 **This symbol points out potential fire hazard.**

 **This symbol points out potential electrical shock hazard.**

The operator is responsible for proper and safe use of the equipment. The manufacturer strongly recommends that the operator read this Owner's Manual and thoroughly understand all instructions before using this equipment. The manufacturer also strongly recommends instructing other users to properly start and operate the unit. This prepares them if they need to operate the equipment in an emergency.

◆ OPERATION AND MAINTENANCE

It is the operator's responsibility to perform all safety checks, to make sure that all maintenance for safe operation is performed promptly, and to have the equipment checked periodically by an Authorized Service Dealer. Normal maintenance service and replacement of parts are the responsibility of the owner/operator and, as such, are not considered defects in materials or workmanship within the terms of the warranty. Individual operating habits and usage contribute to the need for maintenance service.

Proper maintenance and care of the generator ensure a minimum number of problems and keep operating expenses at a minimum. See an Authorized Service Dealer for service aids and accessories.

Operating instructions presented in this manual assume that the standby electric system has been installed by an Authorized Service Dealer or other competent, qualified contractor. Installation of this equipment is not a "do-it-yourself" project.

◆ HOW TO OBTAIN SERVICE

When the generator requires servicing or repairs, contact an Authorized Service Dealer for assistance. Service technicians are factory-trained and are capable of handling all service needs.

When contacting an Authorized Service Dealer about parts and service, always supply the complete model number of the unit as given on the front cover of this manual or on the DATA LABEL affixed to the unit.

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Stationary Emergency Generator

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Important Safety Instructions

Stationary Emergency Generator



SAVE THESE INSTRUCTIONS – The manufacturer suggests that these rules for safe operation be copied and posted in potential hazard areas. Safety should be stressed to all operators, potential operators, and service and repair technicians for this equipment.



SAVE THESE INSTRUCTIONS – This manual contains important instructions that should be followed during installation and maintenance of the generator and batteries.



WARNING:



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



WARNING:



This product contains or emits chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

Study these SAFETY RULES carefully before installing, operating or servicing this equipment. Become familiar with this *Owner's Manual* and with the unit. The generator can operate safely, efficiently and reliably only if it is properly installed, operated and maintained. Many accidents are caused by failing to follow simple and fundamental rules or precautions.

The manufacturer cannot anticipate every possible circumstance that might involve a hazard. The warnings in this manual, and on tags and decals affixed to the unit are, therefore, not all-inclusive. If using a procedure, work method or operating technique that the manufacturer does not specifically recommend, ensure that it is safe for others. Also make sure the procedure, work method or operating technique utilized does not render the generator unsafe.

— DANGER —



Despite the safe design of this generator, operating this equipment imprudently, neglecting its maintenance or being careless can cause possible injury or death. Permit only responsible and capable persons to install, operate or maintain this equipment.



Potentially lethal voltages are generated by these machines. Ensure all steps are taken to render the machine safe before attempting to work on the generator.



Parts of the generator are rotating and/or hot during operation. Exercise care near running generators.



Generator exhaust gases contain DEADLY carbon monoxide gas. This dangerous gas, if breathed in sufficient concentrations, can cause unconsciousness or even death.



GENERAL HAZARDS



- For safety reasons, the manufacturer recommends that this equipment be installed, serviced and repaired by an Authorized Service Dealer or other competent, qualified electrician or installation technician who is familiar with applicable codes, standards and regulations. The operator also must comply with all such codes, standards and regulations.
- Installation, operation, servicing and repair of this (and related) equipment must always comply with applicable codes, standards, laws and regulations. Adhere strictly to local, state and national electrical and building codes. Comply with regulations the Occupational Safety and Health Administration (OSHA) has established. Also, ensure that the generator is installed, operated and serviced in accordance with the manufacturer's instructions and recommendations. Following installation, do nothing that might render the unit unsafe or in noncompliance with the aforementioned codes, standards, laws and regulations.
- The engine exhaust fumes contain carbon monoxide gas, which can be DEADLY. This dangerous gas, if breathed in sufficient concentrations, can cause unconsciousness or even death. For that reason, adequate ventilation must be provided. Exhaust gases must be piped safely away from any building or enclosure that houses the generator to an area where people, animals, etc., will not be harmed. This exhaust system must be installed properly, in strict compliance with applicable codes and standards.
- Keep hands, feet, clothing, etc., away from drive belts, fans, and other moving or hot parts. Never remove any drive belt or fan guard while the unit is operating.
- Adequate, unobstructed flow of cooling and ventilating air is critical in any room or building housing the generator to prevent buildup of explosive gases and to ensure correct generator operation. Do not alter the installation or permit even partial blockage of ventilation provisions, as this can seriously affect safe operation of the generator.
- Keep the area around the generator clean and uncluttered. Remove any materials that could become hazardous.
- When working on this equipment, remain alert at all times. Never work on the equipment when physically or mentally fatigued.
- Inspect the generator regularly, and promptly repair or replace all worn, damaged or defective parts using only factory-approved parts.
- Before performing any maintenance on the generator, disconnect its battery cables to prevent accidental start-up. Disconnect the cable from the battery post indicated by a NEGATIVE, NEG or (–) first. Reconnect that cable last.



- Never use the generator or any of its parts as a step. Stepping on the unit can stress and break parts, and may result in dangerous operating conditions from leaking exhaust gases, fuel leakage, oil leakage, etc.

ELECTRICAL HAZARDS

- All generators covered by this manual produce dangerous electrical voltages and can cause fatal electrical shock. Utility power delivers extremely high and dangerous voltages to the transfer switch as well as the Stationary Emergency Generator. Avoid contact with bare wires, terminals, connections, etc., on the generator as well as the transfer switch, if applicable. Ensure all appropriate covers, guards and barriers are in place before operating the generator. If work must be done around an operating unit, stand on an insulated, dry surface to reduce shock hazard.
- Do not handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. **DANGEROUS ELECTRICAL SHOCK MAY RESULT.**
- If people must stand on metal or concrete while installing, operating, servicing, adjusting or repairing this equipment, place insulative mats over a dry wooden platform. Work on the equipment only while standing on such insulative mats.
- The National Electrical Code (NEC), Article 250 requires the frame and external electrically conductive parts of the generator to be connected to an approved earth ground and/or grounding rods. This grounding will help prevent dangerous electrical shock that might be caused by a ground fault condition in the generator set or by static electricity. Never disconnect the ground wire.
- Wire gauge sizes of electrical wiring, cables and cord sets must be adequate to handle the maximum electrical current (ampacity) to which they will be subjected.
- Before installing or servicing this (and related) equipment, make sure that all power voltage supplies are positively turned off at their source. Failure to do so will result in hazardous and possibly fatal electrical shock.
- Connecting this unit to an electrical system normally supplied by an electric utility shall be by means of a transfer switch so as to isolate the generator electric system from the electric utility distribution system when the generator is operating. Failure to isolate the two electric system power sources from each other by such means will result in damage to the generator and may also result in injury or death to utility power workers due to backfeed of electrical energy.
- Generators installed with an automatic transfer switch will crank and start automatically when NORMAL (UTILITY) source voltage is removed or is below an acceptable preset level. To prevent such automatic start-up and possible injury to personnel, disable the generator's automatic start circuit (battery cables, etc.) before working on or around the unit. Then, place a "Do Not Operate" tag on the generator control panel and on the transfer switch.

- In case of accident caused by electric shock, immediately shut down the source of electrical power. If this is not possible, attempt to free the victim from the live conductor. **AVOID DIRECT CONTACT WITH THE VICTIM.** Use a nonconducting implement, such as a dry rope or board, to free the victim from the live conductor. If the victim is unconscious, apply first aid and get immediate medical help.
- Never wear jewelry when working on this equipment. Jewelry can conduct electricity resulting in electric shock, or may get caught in moving components causing injury.

FIRE HAZARDS

- Keep a fire extinguisher near the generator at all times. Do NOT use any carbon tetra-chloride type extinguisher. Its fumes are toxic, and the liquid can deteriorate wiring insulation. Keep the extinguisher properly charged and be familiar with its use. If there are any questions pertaining to fire extinguishers, consult the local fire department.

EXPLOSION HAZARDS

- Properly ventilate any room or building housing the generator to prevent build-up of explosive gas.
- Do not smoke around the generator. Wipe up any fuel or oil spills immediately. Ensure that no combustible materials are left in the generator compartment, or on or near the generator, as FIRE or EXPLOSION may result. Keep the area surrounding the generator clean and free from debris.
- These generator sets may operate using one of several types of fuels. All fuel types are potentially FLAMMABLE and/or EXPLOSIVE and should be handled with care. Comply with all laws regulating the storage and handling of fuels. Inspect the unit's fuel system frequently and correct any leaks immediately. Fuel supply lines must be properly installed, purged and leak tested according to applicable fuel-gas codes before placing this equipment into service.
- Diesel fuels are highly FLAMMABLE. Gaseous fluids such as natural gas and liquid propane (LP) gas are extremely EXPLOSIVE. Natural gas is lighter than air, and LP gas is heavier than air; install leak detectors accordingly.

IDENTIFICATION RECORD

◆ DATA LABEL

Every generator set has a DATA LABEL that contains important information pertinent to the generator (Figure 1.1). The data label, which can be found attached to the generator's lower connection box, lists the unit's serial number and its rated voltage, amps, wattage capacity, phase, frequency, rpm, power factor, etc.

Figure 1.1 — Data Label

MODEL	
PROD DATE	SERIAL
KW	KVA
PHASE	HERTZ
VOLT	AMP
PWR FACT	ALT RPM
ENG RPM	TYPE CODE
ALT SUBTRANS REACTANCE	ALT TRANS REACTANCE
CLASS ☐ ROTOR ☐ STATOR WINDING INS AT 25°C AMB	
MODEL NO (CAT/CUST NO)	SERIAL NO
0G2110 REV C	

NOTE:

The above is a generic representation of a data label. For actual information related to this particular model, please refer to the "construction document" located at the end of this manual, or to the data labels affixed to the unit.

★ Stationary Emergency Generator Model Number

This number is the key to numerous engineering and manufacturing details pertaining to the unit. Always supply this number when requesting service, ordering parts or seeking information.

★ Identification Code

Use this code to obtain important information about the generator. For example, if the code is ...

LG 175-- A 1 6 5.0 D 18 HB Y N C

– Identify the generator as follows:

- LG – Standby gaseous fuel generator.
- 175 – Rated output is 175,000 watts (175 kW).
- A – Voltage code (see "Voltage Codes" on this page).
- 1 – Indicates single-phase unit (3 – indicates three-phase unit).
- 6 – Indicates unit rated 60 Hertz (Hz).
- 5.0 – Engine is 5.0 liter (304 cubic inches).
- D – Unit has diesel fuel system ("N" indicates natural gas; "L" indicates LP Liquid Withdrawal; "V" indicates LP Vapor Withdrawal).
- 18 – Alternator rpm rating (1,800 rpm); "36" indicates 3,600 rpm.
- H – Unit has an option "H" control panel ("R", "E" and "G" panels are also available on some units).
- B – Indicates a brushless unit ("D" indicates a direct excited unit with brushes and slip rings; "P" indicates a permanent magnet excitation).
- Y – Unit is equipped with a standard enclosure ("N" indicates no enclosure; "S" indicates unit has an acoustic enclosure).
- N – Unit does not have an exhaust muffler ("Y" indicates a muffler has been mounted; "L" indicates a muffler has been shipped loose with the unit).
- Y – Unit has a main line circuit breaker ("C" indicates unit has a UL-listed circuit breaker; "N" indicates no circuit breaker has been mounted).

★ Voltage Codes

The identification code letter following the unit's kilowatt rating is the generator's "voltage code." Any one of the following voltage codes may be listed.

- A – 120/240 volts, single-phase, four-lead, 60 Hz
- D – 120/240 volts, single- and three-phase, 12-lead, 60 Hz
- G – 120/208 volts, three-phase, 12-lead, 60 Hz Broad Range
- J – 120/240 volts, three-phase, 12-lead, 60 Hz Broad Range
- K – 277/480 volts, three-phase, 12-lead, 60 Hz Broad Range
- L – 346/600 volts, three-phase, six-lead, 60 Hz
- M – 110/220 volts, single-phase, four-lead, 50 Hz
- N – 115/200 volts, three-phase, 12-lead, 50 Hz Broad Range
- P – 100/200 volts, three-phase, 12-lead, 50 Hz Broad Range
- R – 231/400 volts, three-phase, 12-lead, 50 Hz Broad Range
- S – 277/480 volts, three-phase, six-lead, 50 Hz

EQUIPMENT DESCRIPTION

This equipment is a revolving field, alternating current generator set. The generator was designed to supply electrical power for the operation of compatible electrical loads-when the UTILITY power supply is not available or has dropped to an unacceptable level.

The generator's revolving field is directly connected to and driven by an engine by means of flexible discs. Generators with a four-pole rotor are driven at rated speeds of 1,800 rpm to supply a frequency of 60 Hertz.

Refer to the data label on this specific generator or to the data label affixed to the unit for rated AC voltage, wattage, amperage, number of phases, etc. See "Identification Code" for an explanation of the way to identify the unit's features.

◆ STANDARD GENERATOR FEATURES

This generator incorporates the following generator features:

- The rotor insulation system is Class "H" rated, and the stator insulation is Class "H" rated as defined by NEMA MG1-22.4 and NEMA MG1-1.65.
- The generator is self-ventilated and drip-proof constructed.
- The voltage waveform deviation, total harmonic content of the AC waveform and "telephone influence factor" have been evaluated and are acceptable according to NEMA MG1-22.
- All prototype tested models have passed three-phase symmetrical short circuit test to ensure system protection and reliability.

ENGINE PROTECTIVE DEVICES

The Stationary Emergency Generator may be required to operate for long periods of time without an operator on hand to monitor such engine conditions as coolant temperature, oil pressure or rpm.-For that reason, the engine has several devices designed to protect it against potentially damaging conditions by automatically shutting down the unit when the oil pressure is too low, the coolant temperature is too high, the coolant level is too low, or the engine is running too fast.

NOTE:

Engine protective switches and sensors are mentioned here for the reader's convenience. Also refer to the applicable control panel manual for additional automatic engine shutdown information.

◆ COOLANT TEMPERATURE SENDER

This sender automatically shuts down the engine if the engine coolant temperature rises above a safe level.

◆ LOW COOLANT LEVEL SENSOR

Should the engine coolant level drop below the level of the high coolant temperature switch, it is possible for the engine to overheat without automatic shutdown. To prevent such overheating, the engine has a low coolant level sensor. If the level of engine coolant drops below the level of the low coolant level sensor, the engine automatically shuts down.

◆ OIL PRESSURE SENDER

This sender monitors oil pressure in the engine. If oil pressure drops below a safe level, the control system automatically shuts down the engine.

◆ LOW FUEL PRESSURE SWITCH (GAS UNITS ONLY)

This normally closed (N.C.) switch is held open by fuel pressure during operation. If fuel pressure drops below a safe level, the switch contacts close, automatically shutting down the engine.

◆ OVERSPEED SHUTDOWN

A speed circuit controls engine cranking, start-up, operation and shutdown. Engine speed signals are delivered to the circuit board whenever the unit is running. Should the engine overspeed above a safe, preset value, the circuit board initiates an automatic engine shutdown.

◆ OVERCRANK SHUTDOWN

After a pre-specified duration of cranking, this function ends the cranking if the engine has failed to start.

◆ RPM SENSOR LOSS SHUTDOWN

If the speed signal to the control panel is lost, engine shutdown will occur.

DC FUSES

These fuses are located inside the front panel of the control system. They protect the panel wiring and components from damaging overload. Replace fuse with same type and rating (both current and voltage).

FUEL SYSTEM

◆ FUEL REQUIREMENTS

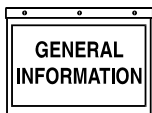
The Stationary Emergency Generator may be equipped with one of the following fuel systems:

- Liquid propane (LP) fuel system
- Propane vapor (PV) fuel system
- Natural gas fuel system

The data card that is affixed to the unit includes the "Identification Code," which may be used to identify the type of fuel system installed on the unit.

NOTE:

It is the responsibility of the installer to make sure that only the correct recommended fuel is supplied to the generator fuel system. Thereafter, the owner/operator must make certain that only the proper fuel is supplied.



◆ LP FUEL SYSTEM

LP is supplied as a liquid in pressure tanks. It is usually made up of propane, butane, or a mixture of the two gases. Propane tends to vaporize readily even at temperatures as low as -20° F (-29° C). However, butane reverts to its liquid state when temperatures drop below 32° F (0° C).

LP in a liquid withdrawal system must be converted to its gaseous state before it is introduced into the engine carburetor. A vaporizer-converter is generally used to accomplish this. In such a converter, heated engine coolant is ported through the converter to provide the necessary heat for conversion of the fuel from a liquid to a gaseous state.

NOTE:

On units with LP gas liquid withdrawal fuel systems, a block heater is included as standard equipment. The heater is powered by the UTILITY power source during non-operating periods. Thus, heated coolant is always available to aid the fuel vaporization process.

◆ NATURAL GAS FUEL SYSTEM

Natural gas is supplied in its vapor state. In most cases, the gas distribution company provides piping from the main gas distribution line to the standby generator site. The following information applies to natural gas fuel systems.

- Gas pressure in a building is usually regulated by national, state and local codes.
- To reduce gas pressure to a safe level before the gas enters a building, a primary regulator is needed. The natural gas supplier may or may not supply such a regulator.
- It is the responsibility of the gas supplier to make sure sufficient gas pressure is available to operate the primary regulator.
- Gas pressure at the inlet to the fuel shutoff solenoid should not exceed approximately 14 inches water column (0.6 psi). Optimum pressure at the fuel shutoff solenoid is 11 inches water column (0.4 psi).

◆ COMBINATION LP/NATURAL GAS FUEL SYSTEM

In some areas, the cost of natural gas may be reduced considerably by procuring the gas on “interrupted service” rates. Such rates may be obtained by using LP gas as an emergency fuel when natural gas is not available. Automatic changeover is accomplished by using two regulators, (for example, a line pressure regulator for natural gas, and a vacuum-operated regulator for LP gas). The difference in pressure compensates for the greater Btu value of LP gas.

During operation on natural gas, a positive pressure exists in the common line to the carburetor. This pressure closes the LP gas regulator and stops the flow of LP gas. Loss of natural gas pressure causes a partial vacuum in the line, and the LP gas regulator then opens to admit LP gas into the system. Adjusting a separate power mixture in the LP gas line permits precise setting of air-to-fuel ratios on each of the fuels. Changeover is automatic with the engine operating.

◆ PROPANE VAPOR WITHDRAWAL FUEL SYSTEM

This type of system utilizes the vapors formed above the liquid fuel in the supply tank. Approximately 10 to 20 percent of the tank capacity is needed for fuel expansion from the liquid to the vapor state. The vapor withdrawal system is generally best suited for smaller engines that require less fuel. The installer should be aware of the following:

- The natural gas and LP gas systems are similar. However, the natural gas system delivers gas at a pressure of approximately five inches water column to the carburetor. The LP gas system delivers gas at a slightly negative pressure (about negative one inch) to the engine carburetor.
- When ambient temperatures are low and engine fuel consumption is high, the vapor withdrawal system may not function efficiently.
- Ambient temperatures around the supply tank must be high enough to sustain adequate vaporization, or the system will not deliver the needed fuel volume.
- In addition to the cooling effects of ambient air, the vaporization process itself provides an additional cooling effect.

SPECIFICATIONS

◆ STATIONARY EMERGENCY GENERATOR

Refer to the data plate on the generator for rated watts, amperes, frequency, voltage, phase and other pertinent information.

◆ ENGINE

General:

Cylinders and Arrangement	6 in-line
Displacement	13.3 L (811 in ³)
Bore	137 mm (5.39 in.)
Stroke	150 mm (5.91 in.)
Compression Ratio	10.5-to-1 (NG) / 8.5-to-1 (LP)
Number of Main Bearings	7
Type of Main Bearing Caps	2 Bolt
Aspiration	
LG150/175	TAC
LG200	TAC
LG230 - 300	TAC
Rated Ambient Temp	40° C
Governed Engine Speed	See DATA LABEL
Type of Valve Lifters	Solid
Cylinder Head	Cast Iron with Overhead Valve
Pistons	Heat Resistant Alloy
Crankshaft	Induction-hardened, Die-forged Carbon Steel
Number of Flywheel Teeth	134

Engine Lubrication System:

Type of Oil Pump	Gear Driven
Oil Filter	Full Flow, Cartridge
Crankcase Oil Capacity	27 L (7.13 U.S. gal.)

Section 1 – General Information

Stationary Emergency Generator

GENERAL
INFORMATION

Fuel System:

Type of Fuel Natural Gas
Consumption:

Type	25% Load	50% Load	75% Load	100% Load
LG175	920	1311	1840	2300
LG200	1080	1539	2160	2700
LG230	1449	2048	2606	3252
LG250	1495	2145	2751	3446
LG275	1557	2253	3000	3792
LG300	1671	2376	3189	4100
Values in Cu. Ft/Hr. NG = Natural Gas Inlet Size = 1-1/2" NPT				

Cooling System:

Type Pressurized, Closed Recovery
Coolant Capacity
System 29 L (7.7 U.S. gals.)
Coolant Flow Per Minute (1,500 rpm / 1,800 rpm)
LG175/200 45 U.S. gals.
LG230/300 65 U.S. gals.
Heat Rejection to Coolant (50 Hz and 60 Hz)
LG175 550,000 Btu/h
LG200 703,000 Btu/h
LG300 1,140,000 Btu/h
Cooling Fan
LG175/200/230/250/275/300 Pusher Type
Diameter of Fan
LG175/200/300 762 mm (30 in.)
Cooling Airflow Required (50 Hz and 60 Hz)
LG175/200 17,400 cfm/19,200 cfm
Recommended Coolant See "Coolant"
Combustion Airflow Required (50 Hz / 60 Hz)
LG175-300 360-1200 cfm

Exhaust System:

Exhaust Flow at Rated Output at 50 Hz / 60 Hz
LG175-300 1,000-4,000 cfm
Exhaust Outlet Size 4 in. I.D. (flange)
Exhaust Temperature at Rated Output
LG175 (833° C) 1,533° F
LG200 (851° C) 1,565° F
LG300 (810° C) 1,490° F

Engine Electrical System:

DC Alternator Output 20 amps at 24 volts
Starter Motor 24-volt DC
Recommended Battery (2) 12-volt, 135 Ah, 40
Ground Polarity Negative (-)

Electrical Output Ratings Table:

Type Code	Output Rating	Output Voltage Code	Phase	Output Current	Circuit Breaker Rating
LG175	175 kw	"A"-120/240 Vac	1	729 A	800A
		"G"-120/208 Vac	3	607	700
		"J"-120/240 Vac	3	526	600
		"K"-277/480 Vac	3	263	300
		"L"-346/600 Vac	3	210	250
LG200	200 kw	"A"-120/240 Vac	1	833 A	900A
		"G"-120/208 Vac	3	694	800
		"J"-120/240 Vac	3	601	700
		"K"-277/480 Vac	3	301	350
		"L"-346/600 Vac	3	241	300
LG230	230 kw	"G"-120/208 Vac	3	798A	900A
		"J"-120/240 Vac	3	692	800
		"K"-277/480 Vac	3	346	400
		"L"-346/600 Vac	3	277	300
LG250	250 kw	"G"-120/208 Vac	3	687A	1,000A
		"J"-120/240 Vac	3	752	900
		"K"-277/480 Vac	3	376	450
		"L"-346/600 Vac	3	301	350
LG275	275 kw	"G"-120/208 Vac	3	954A	1,000A
		"J"-120/240 Vac	3	827	1000
		"K"-277/480 Vac	3	413	500
		"L"-346/600 Vac	3	331	400
LG300	300 kw	"G"-120/208 Vac	3	1,041A	1,200A
		"J"-120/240 Vac	3	902	1000
		"K"-277/480 Vac	3	451	500
		"L"-346/600 Vac	3	361	450

ENGINE OIL RECOMMENDATIONS

The unit has been filled with 15W-40 engine oil at the factory. Use a high-quality detergent oil classified "For Service CG, SJ or SH." Detergent oils keep the engine cleaner and reduce carbon deposits. Use oil having the following SAE viscosity rating, based on the ambient temperature range anticipated before the next oil change:

Temperature	Oil Grade (Recommended)
Above 80° F (27° C)	SAE 30W or 15W-40
32° to 80° F (-1° to 27° C)	SAE 20W-20 or 15W-40
Below 32° F (0° C)	SAE 10W or 5W-40

COOLANT

Use a mixture of half Ethylene glycol base antifreeze and half de-ionized water. Use only de-ionized water and Ethylene glycol antifreeze. When adding coolant, always add the recommended 50-50 mixture.

⚠ DANGER ⚠

⚠ Do not remove the radiator pressure cap while the engine is hot or serious burns from boiling liquid or steam could result.

⚠ Propylene glycol base antifreeze is poisonous. Do not use mouth to siphon coolant from the radiator, recovery bottle or any container. Wash hands thoroughly after handling. Never store used antifreeze in an open container because animals are attracted to the smell and taste of antifreeze even though it is poisonous to them.

⚠ CAUTION ⚠

⚠ Do not use any chromate base rust inhibitor with propylene glycol base antifreeze. Using any high silicate antifreeze boosters or additives also will cause overheating. We also recommend that any soluble oil inhibitor is NOT USED for this equipment.

◆ FUEL SYSTEM REQUIREMENTS AND RECOMMENDATIONS

- **Gaseous Fuel System:** See Chapter 8 of Engine-Generator Standby Electric Power Systems Installer's Guide and Reference Manual (part no. 046622).

ALTERNATOR AC LEAD CONNECTIONS

The connection to the AC output of the engine generator is made in the unit's connection box located at the back of the alternator. The ungrounded conductor connections are made on the bottom (load side) of the main line circuit breaker. The grounded conductor (neutral) connection is made on the neutral block.

Refer to the main line circuit breaker markings for the connector wire ranges, number of conductors and terminal tightening torques. The customer installed wiring is to be sized based on the 75 degrees Celsius ampacity. Refer to the appropriate table of the NEC (NFPA 70) Section 310 for further information on the sizing of conductors.

Refer to the wiring diagrams detail of the connections to be made at the time of installation.

◆ FOUR-LEAD, SINGLE-PHASE STATOR

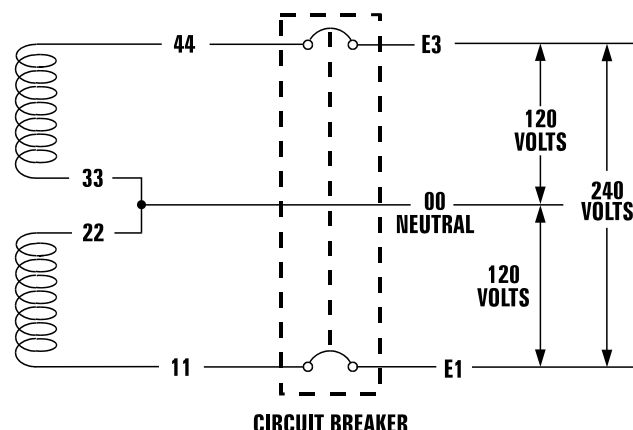
Four-lead generators are dual voltage coils or windings (Figure 1.2). Units may be assigned the following voltage code:

- "A" units are rated 120/240 VAC, single-phase, 60 Hertz.

Each stator winding in this case delivers a 120 VAC output, and connecting the two windings series results in a 240 VAC output.

The neutral line is formed by a junction of stator leads 22 and 33. Therefore, connection of 120 VAC (60 Hertz) or 110 VAC (50 Hertz) loads across leads 11 and neutral, or across leads 44 and neutral can be made.

Figure 1.2 – Four-lead, Single-phase Stator



◆ 12-LEAD, BROAD RANGE STATORS

This type of stator winding forms a 12-lead configuration and has six coils or windings.

✦ High Wye Stator Connection

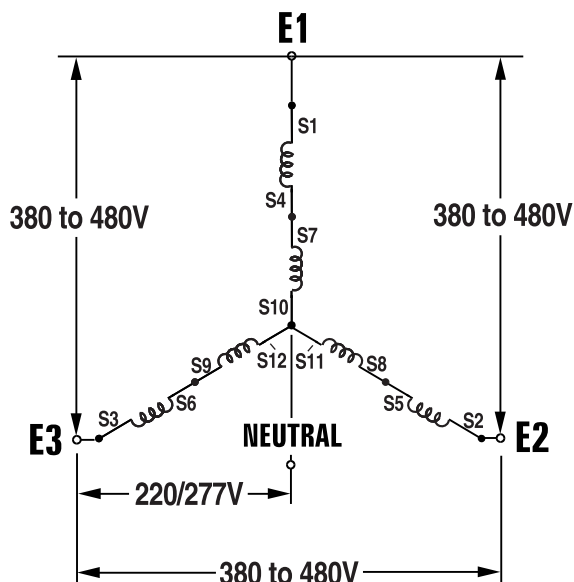
Units with this broad range stator connection may be assigned any of the following voltage codes (Figure 1.2):

- "K" units are rated 277/480 VAC, three-phase, 60 Hertz.
- "R" units are rated 231/400 VAC, three-phase, 50 Hertz.

NOTE:

Different voltage ratings are available from the same stator connection by adjusting the voltage regulator.

Figure 1.2 – High Wye Stator Connection



★ Low Wye Stator Connection

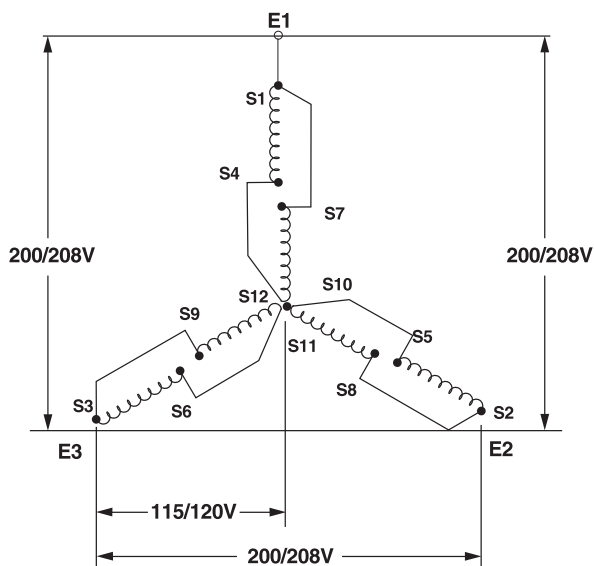
Units with this broad range stator connection may be assigned any of the following voltage codes (Figure 1.3):

- “G” units are rated 120/208 VAC, three-phase, 60 Hertz.
- “N” units are rated 115/200 VAC, three-phase, 50 Hertz.

NOTE:

Different voltage ratings are available from the same stator connection by adjusting the voltage regulator.

Figure 1.3 – Low Wye Stator Connection

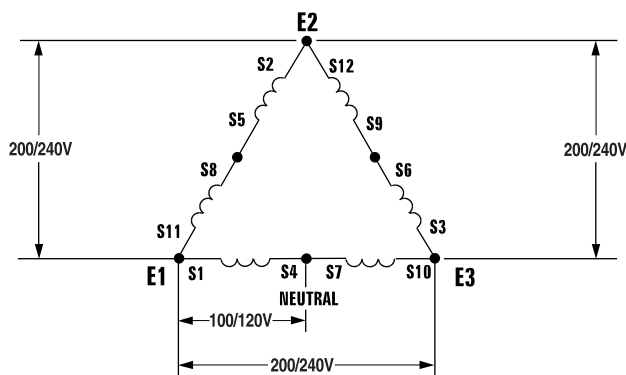


★ Three-phase Delta Stator Connection

This type of stator has six coils and 12 leads (Figure 1.4). Units may be assigned any of the following voltage codes:

- “J” units are rated 120/240 VAC, three-phase, 60 Hertz.
- “P” units are rated 100/200 VAC, three-phase, 50 Hertz.

Figure 1.4 – Three-phase Delta Stator Connection

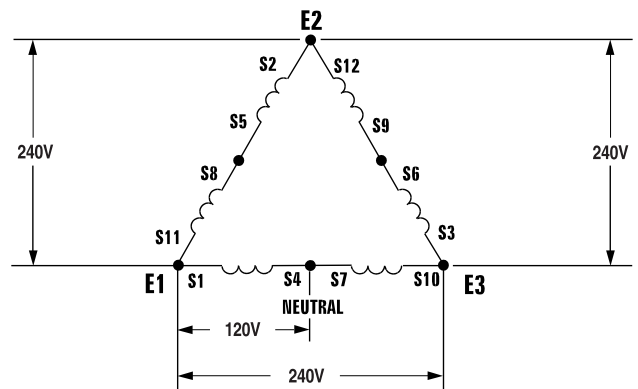


★ Single-/Three-phase Delta Stator Connection

This type of stator has six coils and 12 leads (Figure 1.5). Two coils/windings are wound with additional copper to allow for operation at full rated kW, single-phase. Units may be assigned any of the following voltage codes:

- “D” units are rated 120/240 VAC, three-phase, 60 Hertz.

Figure 1.5 – Single-/Three-phase Delta Stator Connection



NOTE:

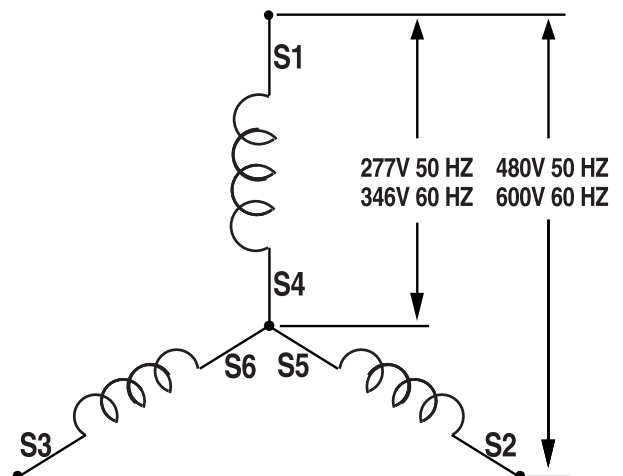
Single-phase loads should be connected to E1, E3 and Neutral. Cannot be reconfigured to 277/480 VAC.

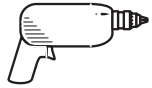
◆ SIX-LEAD, 600 VAC, THREE-PHASE STATOR

This type of stator has three coils and six leads (Figure 1.6). Units may be assigned any of the following voltage codes:

- “L” units are rated 346/600 VAC, three-phase, 60 Hertz.
- “S” units are rated 277/480 VAC, three-phase, 50 Hertz.

Figure 1.6 – Six-lead Stator Connection





STATIONARY EMERGENCY GENERATOR AND LOAD COMPATIBILITY

The generator must be fully compatible with the rated voltage, phase and frequency of the connected electrical loads. The generator, connected electrical devices, or both, can be damaged if voltage, phase and frequency are not compatible.

NOTE:

This manual assumes that the Stationary Emergency Generator has been properly selected, installed and interconnected by a competent, qualified electrician or installation contractor. Once the installation is complete, do nothing that may result in non-compatibility between the generator and connected electrical loads.

STARTING AIDS

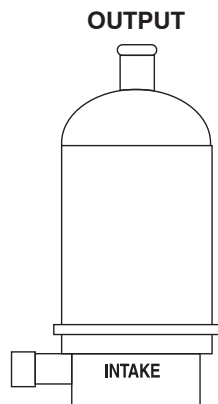
This Stationary Emergency Generator is equipped with the following starting aids that serve to provide quicker, easier starts under varying climactic conditions.

This generator has been mounted with an engine coolant heater and a battery charger. These aids are powered by a NORMAL (UTILITY) power source during non-operating periods.

◆ ENGINE COOLANT HEATERS

This unit is equipped with an engine coolant (block) heater (Figure 1.3), it is powered by a circuit normally fed by the utility power supply. The heater acts to heat the engine coolant when the unit is not operating. This action keeps the engine warm even in cold weather, thus helping ensure quicker starts. Heated coolant in the engine rises continuously drawing cold coolant into the heater, thus making certain of a constant flow of warm coolant through the engine.

Figure 1.3 – Typical Engine Coolant Heater



◆ BATTERY CHARGERS

All generators may be ordered with either a 2A or 10A battery charger installed in the control panel.

STATIONARY EMERGENCY GENERATOR INSTALLATION

— ⚠ DANGER ⚠ —

⚠ Connecting this generator to an electrical system normally supplied by an electric utility shall be by means of a transfer switch (such as the “GTS” type transfer switch), so as to isolate the electric system from the utility distribution system when the generator is operating. Failure to isolate the electric system by these means will result in damage to the generator and may also result in injury or death to utility workers due to backfeed of electrical energy.

— ⚠ CAUTION ⚠ —

⚠ If an open bottom is used, the engine-generator is to be installed over non-combustible materials and should be located such that combustible materials are not capable of accumulating under the generator set.

Only qualified, competent installation contractors or electricians thoroughly familiar with applicable codes, standards and regulations should install this stationary emergency electric power system. The installation must comply strictly with all codes, standards and regulations pertaining to the installation.

This genset must be installed on a level surface. The base frame must be level within two (2) inches all around.

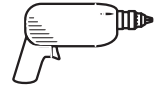
— ⚠ CAUTION ⚠ —

⚠ After the system has been installed, do nothing that might render the installation in noncompliance with codes, standards and regulations.

◆ NFPA STANDARDS

The following published standards booklets pertaining to stationary emergency electric systems are available from the National Fire Protection Association (NFPA), Batterymarch Park, Quincy, MA 02269:

- NFPA No. 37, STATIONARY COMBUSTION ENGINES AND GAS TURBINES.
- NFPA No. 76A, ESSENTIAL ELECTRICAL SYSTEMS FOR HEALTH CARE FACILITIES.
- NFPA No. 220, STANDARD TYPES OF BUILDING CONSTRUCTION
- NFPA No. 68, GUIDE FOR EXPLOSION VENTING
- NFPA No. 70, NATIONAL ELECTRICAL CODE.
- NFPA No. 30, FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE.
- NFPA No. 10, INSTALLATION, MAINTENANCE AND USE OF PORTABLE FIRE EXTINGUISHERS.



◆ OTHER PUBLISHED STANDARDS

In addition to NFPA standards, the following information pertaining to the installation and use of Stationary Emergency Generator electric systems is available:

- Article X, NATIONAL BUILDING CODE, available from the American Insurance Association, 85 John Street, New York, N.Y. 10038.
- AGRICULTURAL WIRING HANDBOOK, obtainable from the Food and Energy Council, 909 University Avenue, Columbia, MO, 65201.
- ASAE EP-364.2, INSTALLATION AND MAINTENANCE OF FARM STANDBY ELECTRIC POWER, available from the American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MI 49085.
- A52.1, AMERICAN NATIONAL STANDARD FOR CHIMNEYS, FIREPLACES AND VENTING SYSTEMS, available from the American National Standard Institute, 1430 Broadway, New York, N.Y. 10018.

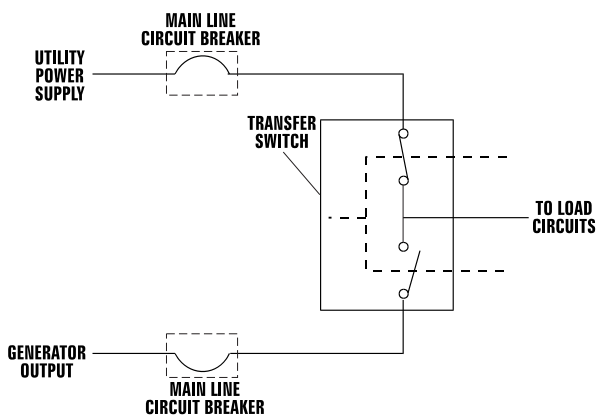
BASIC STATIONARY EMERGENCY GENERATOR ELECTRIC SYSTEM

Figure 2.1 shows a schematic diagram of a basic Stationary Emergency Generator electric system. Both the UTILITY power supply and the GENERATOR output are connected to an approved transfer switch. The transfer switch is required by electrical code and serves the following functions:

- Permits the LOAD circuits to be connected to only one power supply at a time.
- Prevents electrical backfeed between the generator and the UTILITY power circuits.

Notice that both the STATIONARY EMERGENCY GENERATOR and the UTILITY power supplies to the transfer switch are protected against overload by a main line circuit breaker.

Figure 2.1 – Basic Stationary Emergency Generator Electric System



EMERGENCY CIRCUIT ISOLATION METHOD

This prevents overloading the generator by keeping electrical loads below the wattage/amperage capacity of the generator. If the generator is powering only critical loads, within the wattage/amperage capacity, during utility power outages, consider using the emergency circuit isolation method.

Critical electrical loads are grouped together and wired into a separate “Emergency Distribution Panel.” Load circuits powered by that panel are within the wattage/amperage capacity of the generator set. When this method is used, it is difficult to overload the generator. The transfer switch must meet the following requirements:

- It must have an ampere rating equal to the total amperage rating of the emergency distribution panel circuit.
- Have it installed between the building’s main distribution panel and the emergency distribution panel.

TOTAL CIRCUIT ISOLATION METHOD

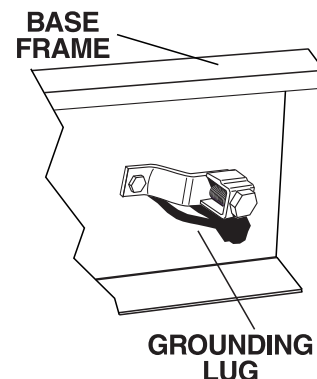
When a generator capable of powering all electrical loads in the circuit is to be installed, use the “Total Circuit Isolation Method.” It is possible for the generator to be overloaded when this isolation method is employed. The following apply to the transfer switch in this type of system.

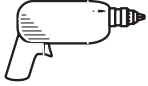
- Ampere rating of the transfer switch must equal the ampere rating of the normal incoming utility service.
- The transfer switch is installed between the utility service entrance and the building distribution panel.

GROUNDING THE STATIONARY EMERGENCY GENERATOR

The National Electrical Code requires the frame and external electrically conductive parts of this equipment to be properly connected to an approved earth ground and/or grounding rods. For that purpose, a GROUND LUG (Figure 2.2) is provided on the generator mounting base. Consult a qualified electrician for grounding requirements in the area. Grounding procedures must meet local regulations.

Figure 2.2 – Stationary Emergency Generator Grounding Lug (typical)





— **DANGER** —

-  **Do not connect the ground wire to any pipe that carries a flammable or explosive substance – FIRE or an EXPLOSION may result.**

Proper grounding helps protect personnel against electrical shock in the event of a ground fault condition in the generator or in connected electrical devices. In addition, grounding helps dissipate static electricity that often builds up in ungrounded devices.

STATIONARY EMERGENCY GENERATOR AC NEUTRAL CONNECTIONS

The manufacturer uses an UNGROUNDED AC neutral. Grounding is recommended only at the main service entrance. If the neutral wire is grounded and one of the phase loads becomes grounded, the excessive current opens the load circuit breaker or collapses the generator field. The actual result depends on the electrical characteristics of the particular installed generator.

BATTERY INSTALLATION

— **DANGER** —

-  **Stationary Emergency Generators installed with automatic transfer switches will crank and start automatically when NORMAL (UTILITY) source voltage is removed or is below an acceptable preset level. To prevent such automatic start-up and possible injury to personnel, do not connect battery cables until certain that normal source voltage at the transfer switch is correct and the system is ready to be placed into operation.**

-  **Storage batteries give off explosive hydrogen gas. This gas can form an explosive mixture around the battery for several hours after charging. The slightest spark can ignite the gas and cause an explosion. Such an explosion can shatter the battery and cause blindness or other injury. Any area that houses a storage battery must be properly ventilated. Do not allow smoking, open flame, sparks or any spark producing tools or equipment near the battery.**

-  **Battery electrolyte fluid is an extremely caustic sulfuric acid solution that can cause severe burns. Do not permit fluid to contact eyes, skin, clothing, painted surfaces, etc. Wear protective goggles, protective clothing and gloves when handling a battery. If fluid is spilled, flush the affected area immediately with clear water.**

— **WARNING** —

-  **Do not dispose of the battery in a fire. The battery is capable of exploding.**

-  **Do not open or mutilate the battery. Released electrolyte can be toxic and harmful to the skin and eyes.**

-  **The battery represents a risk of high short circuit current. When working on the battery, always remove watches, rings or other metal objects, and only use tools that have insulated handles.**

◆ VENTED BATTERIES

— **CAUTION** —

-  **The electrolyte is a dilute sulfuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive. The following procedures are to be observed:**

- **Wear full eye protection and protective clothing,**
- **Where electrolyte contacts the skin, wash it off immediately with water,**
- **Where electrolyte contacts the eyes, flush thoroughly and immediately with water and seek medical attention, and**
- **Spilled electrolyte is to be washed down with an acid-neutralizing agent. A common practice is to use a solution of one pound (500 grams) bicarbonate of soda to one gallon (4 liters) of water. The bicarbonate of soda solution is to be added until the evidence of reaction (foaming) has ceased. The resulting liquid is to be flushed with water and the area dried.**

-  **Lead acid batteries present a risk of fire because they generate hydrogen gas. The following procedure are to be followed:**

- **DO NOT SMOKE when near batteries,**
- **DO NOT cause flame or spark in battery area, and**
- **Discharge static electricity from body before touching batteries by first touching a grounded metal surface.**

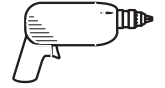
Servicing of batteries is to be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

For recommended batteries, see “Specifications.” All batteries must be at 100 percent state-of-charge before they are installed on the generator.

When using maintenance-free batteries, it is not necessary to check the specific gravity or electrolyte level. Have these procedures performed at the intervals specified in Section 4, “Maintenance.” A negative ground system is used. Battery connections are shown on the wiring diagrams. Make sure all batteries are correctly connected and terminals are tight. Observe battery polarity when connecting batteries to the generator set.

NOTE:

Damage will result if the battery connections are made in reverse.



PREPARATION BEFORE START-UP

The instructions in this section assume that the Stationary Emergency Generator has been properly installed, serviced, tested, adjusted and otherwise prepared for use by a competent, qualified installation contractor. Be sure to read the “Safety Rules” on Pages 2 and 3, as well as all other safety information in this manual, before attempting to operate this (and related) equipment.

◆ PRIOR TO INITIAL START-UP



⚠ Prior to initially starting the generator, it must be properly prepared for use. Any attempt to crank or start the engine before it has been properly serviced with the recommended types and quantities of engine fluids (oil, coolant, fuel, etc.) may result in an engine failure.

Before starting the generator for the first time, the installer must complete the following procedures. For follow-up maintenance information and/or service intervals, please refer to Section 4, “Maintenance,” and the “Service Schedule”.

✦ *Transfer Switch*

If this generator is used to supply power to any electrical system normally powered by an electric utility, the National Electrical Code requires that a transfer switch be installed. The transfer switch prevents electrical backfeed between two different electrical systems. (For additional information, see the applicable transfer switch manual for this unit.) The transfer switch, as well as the generator and other electrical components, must be properly located and mounted in strict compliance with applicable codes, standards and regulations.

✦ *Fuel System*

Make sure the fuel supply system to the generator (a) delivers the correct fuel at the correct pressure and (b) is properly purged and leak tested according to code. No fuel leakage is permitted. See “Specifications” for more information.

If the unit has been idle for a long period of time, or if the fuel lines or system components have been removed and reinstalled, the fuel system may require bleeding to remove air from the system. Air in the fuel system causes hard starting and rough operation. All fuel system lines must be installed and must be tight. A loose line may show no sign of leakage, but may draw air into the system.



⚠ Use a suitable container to catch the fuel that will spill during system bleeding process. Clean up all spilled fuel after bleeding.

✦ *Stationary Emergency Generator Set Lubrication*

Check the engine crankcase oil level before operating and add oil to the proper level – the dipstick “FULL” mark. Never operate the engine with the oil level below the dipstick “ADD” mark. See “Specifications” and “Engine Oil Recommendations”.

NOTE:

This engine is shipped from the manufacturer with 15W-40 oil. This oil should be changed after 30 hours of operation.

The engine is equipped with a mechanical governor. Make sure the governor is properly lubricated with clean engine oil.

✦ *Engine Coolant*

Have the engine cooling system properly filled with the recommended coolant mixture. Check the system for leaks and other problems. See “Specifications” and “Coolant”.

✦ *Belt Tension*

Check the engine-fan belt tension and condition prior to placing the unit into service and at recommended intervals. Belt tension is correct when a force of approximately 22 pounds (10 kg), applied midway between pulleys, deflects the belt about 3/8- to 5/8-inch (10 to 16 mm).

✦ *Electrical System*

Make sure the generator is properly connected to an approved earth ground.

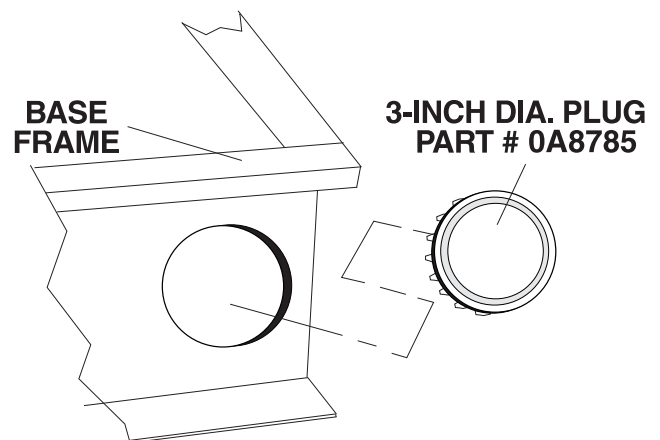
Make sure the generator battery is fully charged, properly installed and interconnected, and ready for use.

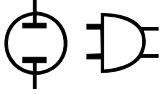
Check to ensure that there are no loose electrical connections. Restrain any loose wires to keep them clear of any moving generator set components.

✦ *Rodent Protection*

Make sure the four, 3-inch diameter cap plugs (part no. 0A8785) are properly installed in the tie-down holes in the side rails of the unit’s base frame (Figure 2.3). The cap plugs are shipped in a plastic bag located in the lower connection box. These plugs are needed to prevent rodents from accessing the interior of the generator set. On acoustic units, cap plugs also are needed to stay within noise specification limits.

Figure 2.3 – Base Frame Cap Plugs





STATIONARY EMERGENCY GENERATOR CONTROL AND OPERATION

Refer to the appropriate control panel operator's manual for this unit.

OPERATING UNIT WITH MANUAL TRANSFER SWITCH

If the generator was installed in conjunction with a transfer switch capable of manual operation only, the following procedure applies. A manually operated transfer switch is one that will not provide automatic start-up and does not include an intelligence circuit.

◆ ENGINE START-UP AND TRANSFER

For additional information, refer to the applicable control panel manual for this unit, as well as any literature pertaining to the transfer switch.



⚠ **The Maintenance Disconnect Switch and the AUTO/OFF/MANUAL switches (if so equipped) must be set properly, or the generator will crank and start as soon as the UTILITY power to the transfer switch is turned off. Refer to applicable control panel and transfer switch manuals for more information.**

⚠ **Do not proceed until certain that utility source voltage is available to the transfer switch and the transfer switch main contacts are set to UTILITY.**

⚠ **Do not attempt manual operation until all power supplies to the transfer switch have been positively turned off, or extremely dangerous — possibly lethal — electrical shock will result.**

⚠ **Transfer switch enclosure doors should be kept closed and locked. Only authorized personnel should be allowed access to the transfer switch interior. Extremely high and dangerous voltages are present in the transfer switch.**

In order to transfer load from the utility source to the generator, follow these directions:

- Turn OFF or disconnect the utility power circuit to the transfer switch, using the means provided (such as the utility source main line circuit breaker).
- Set the transfer handle to its UTILITY (NORMAL) position with load circuits connected to the utility power supply.
- Set the Stationary Emergency Generator's main line circuit breaker to its OFF (or OPEN) position.
- Start the generator.



⚠ **Do not crank the engine continuously for longer than 30 seconds, or the heat may damage the starter motor.**

- Let engine stabilize and warm up.
- Check all applicable instrument and gauge readings. When certain that all readings are correct, move the transfer switch manual handle to its STANDBY position, i.e., load circuits supplied by the generator.
- Set the Stationary Emergency Generator's main line circuit breaker to its ON (or CLOSED) position.
- Load circuits are now powered by the standby generator.

◆ RE-TRANSFER AND SHUTDOWN

For additional information, refer to the applicable control panel manual for this unit, as well as any literature pertaining to the transfer switch.

To transfer the load back to the utility power source and shut down the generator, follow these directions:

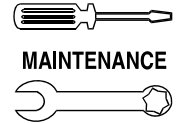
- Set the Stationary Emergency Generator's main line circuit breaker to its OFF (or OPEN) position.
- Manually move the transfer switch handle to its UTILITY (NORMAL) position, i.e., load circuits connected to the utility.
- Turn ON the utility power supply to the transfer switch, using the means provided (such as the utility power source main line circuit breaker).
- Let the generator run at no-load for a few minutes to stabilize internal temperatures.
- Shut down the generator.

OPERATING UNIT WITH AUTOMATIC TRANSFER SWITCH

If the generator has been installed along with an automatic transfer switch, the engine may be started and stopped automatically or manually.

NOTE:

Refer to the applicable manual for the transfer switch and to "Transfer Switch Start Signal Connections". In addition, please note the dangers under "Engine Start-up and Transfer."



SERVICE SCHEDULE

◆ OPERATOR MAINTENANCE FUNCTIONS

✦ **Every Month or 100 Hours** (*whichever comes first*)

- Test Stationary Emergency Generator system.
- Inspect battery (batteries) and cables.
- Check engine oil level.
- Check gearbox oil level (if so equipped).
- Check engine coolant level.
- Check generator ground connections.
- Test/inspect starting aids.

◆ AUTHORIZED SERVICE TECHNICIAN MAINTENANCE FUNCTIONS

✦ **Every Three Months or Every 120 Hours** (*whichever comes first*)

- Inspect and test fuel system and connections.
- Inspect exhaust system.
- Inspect/test fuel supply system.

✦ **After First 30 Hours of Operation**

- Inspect wiring.
- Change engine crankcase oil and oil filter.
- Inspect engine fan belts.
- Inspect battery (batteries) and cables.

✦ **Every Six Months or Every 200 Hours** (*whichever comes first*)

- Change engine oil and filter.
- Lubricate engine controls.
- Service engine air cleaner.
- Service engine fuel filter.
- Inspect AC generator.
- Test engine safety controls.
- Inspect fan belts.
- Check engine coolant level.
- Inspect engine cooling system hoses.
- Check optional starting aids.
- Check battery (batteries).
- Check engine compression.
- Check electrical connections.
- Check/test annunciator panel.
- Perform operational test.

✦ **Annually or Every 600 Hours** (*whichever comes first*)

- Check engine valve clearance.
- Inspect all wiring.
- Test engine starter operation.
- Retorque fan bolts.
- Drain and refill gearbox (If so equipped, contact sales for availability.)
- Inspect spark plugs

✦ **Every Two Years**

- Replace all rubber hoses.
- Replace engine fan belts.
- Inspect the Stationary Emergency Generator System.
- Drain, flush, refill cooling system.

✦ **Every 1,000 Operating Hours**

- Inspect engine DC alternator.
- Inspect engine starter.
- Retorque engine mounting brackets.
- Remove/test cooling system thermostat.

✦ **As Required**

- Bleed engine fuel system.

PERIODIC MAINTENANCE

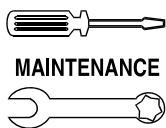
A rigorous program of scheduled periodic maintenance should be established and maintained. Such a program, if adhered to diligently, will provide added assurance that the power system functions properly when it is needed.

Keeping a “Maintenance Log” is highly recommended. Such a log should be a continuous record of repairs, parts replacements, gauge and instrument readings during operational tests, etc.

The manufacturer recommends that a “Customer Maintenance Inspection Agreement” be established between the user of this equipment and the installing Authorized Service Dealer. Under this agreement, an Authorized Service Technician performs pre-start and engine running tests and checks at six-month and one-year intervals. Ask an Authorized Service Dealer about this agreement.

The tasks listed in the “Service Schedule” cover the minimum recommended maintenance requirements for this equipment.

Note that many of the tests and checks listed in the schedule are to be performed only by an Authorized Service Technician. Fluid capacities and recommendations, as well as other applicable specifications, are listed in “Specifications”.



◆ TEST STATIONARY EMERGENCY GENERATOR SYSTEM OPERATION AND COMPONENTS

An authorized operator should test the operation of the Stationary Emergency Generator system and inspect its components monthly (or 100 hours). This should include inspecting the transfer switch for evidence of arcing, and pitted or burned contacts; inspecting wiring and grounding connections (see “Grounding the Generator”); and ensuring that starting devices are operational. During this operational test, all instrument and gauge readings should be recorded in a “Maintenance Log.” The transfer system also should be tested at this time; the engine should be run at least 30 minutes and any discrepancies corrected immediately.

Every six months (or 200 hours), an Authorized Service Technician should perform a system operational test.

◆ INSPECT BATTERY



⚠ **Stationary Emergency Generators installed with automatic transfer switches will crank and start automatically when NORMAL (UTILITY) source voltage is removed or is below an acceptable preset level. To prevent such automatic start-up and possible injury to personnel, do not connect battery cables until certain that normal source voltage at the transfer switch is correct and the system is ready to be placed into operation.**

⚠ **Storage batteries give off explosive hydrogen gas. This gas can form an explosive mixture around the battery for several hours after charging. The slightest spark can ignite the gas and cause an explosion. Such an explosion can shatter the battery and cause blindness or other injury. Any area that houses a storage battery must be properly ventilated. Do not allow smoking, open flame, sparks or any spark producing tools or equipment near the battery.**



⚠ **Battery electrolyte fluid is an extremely caustic sulfuric acid solution that can cause severe burns. Do not permit fluid to contact eyes, skin, clothing, painted surfaces, etc. Wear protective goggles, protective clothing and gloves when handling a battery. If fluid is spilled, flush the affected area immediately with clear water.**

⚠ **Do not dispose of the battery in a fire. The battery is capable of exploding.**

⚠ **Do not open or mutilate the battery. Released electrolyte can be toxic and harmful to the skin and eyes.**

⚠ **The battery represents a risk of high short circuit current. When working on the battery, always remove watches, rings or other metal objects, and only use tools that have insulated handles.**

An authorized operator should inspect the engine battery system monthly (or 100 hours). At this time, the battery fluid level should be checked and distilled water added if needed. Battery cables and connections also should be inspected for cleanliness and corrosion.

Once every six months (or 200 hours), an Authorized Service Technician should inspect the battery system. At this time the battery condition and state of charge should be checked using a battery hydrometer. The battery should be recharge or replaced as required.

◆ BATTERY REPLACEMENT

When replacing batteries, use the same number and the following type batteries.

BCI Group No.	CCA
GRP 31	925 @ 0 deg. F

NOTE:

The BCI number should be located directly on the battery. For more information, see “Specifications.”

◆ CHECK FLUIDS

An authorized operator should check the levels of engine oil, and engine coolant monthly (or 100 hours). The oil level should be maintained between the “FULL” and “ADD” marks on the engine dipstick. Recommended fluids are listed in the “Specifications” section.

◆ INSPECT EXHAUST SYSTEM

Every three months (or 120 hours), an authorized operator should inspect the entire exhaust system. Abnormal noise levels heard during each operational test may indicate a defective exhaust pipe or muffler. Any defective or leaking component should be repaired or replaced immediately by an Authorized Service Technician.

◆ INSPECT/TEST FUEL SUPPLY SYSTEM

Every three months (or 120 hours), an authorized operator should inspect and test the fuel supply system, as well as all fuel system connections. All connections must be tight and in good condition. A loose fuel system line may show no signs of leakage, but may draw air into the system causing rough operation and starting difficulties. Any defective or leaking component should be repaired or replaced immediately by an Authorized Service Technician.



United States Environmental Protection Agency Warranty Statement Warranty Rights, Obligations and Coverage

The United States Environmental Protection Agency (EPA) and Generac Power Systems, Inc. (Generac), are pleased to explain the Emission Control System Warranty on your new stationary emergency engine. If during the warranty period, any emission control system or component on your engine is found defective in materials or workmanship the manufacturer will repair your engine at no cost to you for diagnosis, replacement parts and labor provided it be done by an Authorized Warranty Service Facility. Your emission control system may include parts such as the fuel metering, ignition, and exhaust systems and other related emission related components listed below. Generac will warrant the emissions control systems on your 2009 and later model year engines provided there has been no abuse, neglect, unapproved modification or improper maintenance of your engine. For engines less than 130 HP the warranty period is two years from the date of sale to the ultimate purchaser. For engines greater than or equal to 130 HP the warranty period is three year from the date of the engine being placed into service.

Purchaser's/Owner's Warranty Responsibilities

As the engine purchaser/owner you are responsible for the following. 1.) The engine must be installed and configured in accordance to the installation specifications. 2.) The completion of all maintenance requirements listed in your Owner's Manual. 3.) Any engine setting adjustment must be done in accordance and consistent with the instructions in the Owner's Manual. 4.) Any emission control system or component must be maintained and operated appropriately in order to ensure proper operation of the engine and control system to minimize emissions at all times.

Generac may deny any, or all Emission Control System Warranty coverage or responsibility of the engine, or an emission control system or component on your engine thereof, if it has failed due to abuse, neglect, unapproved modification or improper maintenance, or the use of counterfeit and/or 'gray market' parts not made, supplied or approved by Generac. Warranty service/scheduled maintenance can be arranged by contacting your selling dealer or an Authorized Warranty Service dealer. The purchaser/owner shall be responsible for any expenses or other charges incurred for service calls and/or transportation of the product to/from the inspection or repair facilities. The purchaser/owner shall be responsible for any and/or all damages or losses incurred while the engine is being transported/shipped for inspection or warranty repairs.

Emission Related Parts Include the Following (if so equipped)

- | | |
|---|--|
| 1) Fuel Metering System | 3) Ignition System including |
| 1.1) Gasoline Carburetor assembly and internal components | a) Spark plug, b) Ignition module, |
| a) Fuel filter, b) Carburetor, c) Fuel Pump | c) ignition coil, d) Spark plug wirers |
| 1.2) Carburetion assembly and its components | 4) Exhaust system |
| a) Fuel controller, b) Carburetor and its gaskets, | a) Catalyst assembly, b) Exhaust manifold, |
| c) Mixer and it gaskets, d) Primary gas regulator | c) Muffler, d) Exhaust pipe, e) Muffler gasket |
| e) Liquid vaporizer | 5) Crankcase Breather Assembly including |
| 1.3) Fuel Regulator | a) Breather connection tube, b) PCV valve |
| 2) Air Induction System including | 6) Oxygen Sensor |
| a) Intake pipe/manifold, b) Air cleaner | 7) Diagnostic Emission-Control System |



United States Environmental Protection Agency Compliance Requirements

Purchaser's/Owner's Recordkeeping Responsibilities

The United States Environmental Protection Agency (EPA) and Generac Power Systems, Inc. (Generac), are pleased to explain your recordkeeping requirements for compliance with Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines as listed in the Electronic Code of Federal Regulations Title 40 Part 60. As the engine purchaser/owner who operates and maintains their certified emergency stationary engine and emission control system according to applicable emission related guidelines as specified in this Owner's Manual you are required to meet the following notification and recordkeeping requirements to demonstrate compliance. 1.) Maintain documentation that the engine is certified to meet emission standards. 2.) Recordkeeping of maintenance conducted. 3.) Recordkeeping of the provision allowing natural gas engines to operate using propane for a maximum of 100 hours per year as an alternate fuel solely during emergency operations provided the engine is not certified to operate on propane. 4.) Meet all compliance notifications submitted to the purchaser/owner and maintain all supporting documentation. 5.) Recordkeeping of hours of operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. For emergency engines greater than or equal to 130 HP, recordkeeping of hours of operation begins January 1, 2011. For emergency engines less than 130 HP, recordkeeping of hours of operation begins January 1, 2009; Engines are equipped with non-resettable hour meters to facilitate recordkeeping.

Specific Air Quality Management or Air Pollution Control Districts may have different and additional record keeping/ reporting requirements. Your permit to construct and/or operate the engine may be contingent upon compliance with those requirements. Check with your local Air Quality Management or Air Pollution Control District for specific requirements.

Emergency stationary internal combustion engines (ICE) may be operated for the purpose of maintenance checks and readiness testing, provided that the tests are recommended by Federal, State or local government, Generac, or the insurance company associated with the engine. Maintenance checks and readiness testing of such units is limited to 100 hours per year. There is no time limit on the use of emergency stationary ICE in emergency situations. The purchaser/owner may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year. Emergency stationary ICE may operate up to 50 hours per year in non-emergency situations, but those 50 hours are counted towards the 100 hours per year provided for maintenance and testing. The 50 hours per year for non-emergency situations cannot be used for peak shaving or to generate income for a facility to supply power to an electric grid or otherwise supply power as part of a financial arrangement with another entity. For purchaser/ owner of emergency engines, any operation other than emergency operation, maintenance and testing, and operation in non-emergency situations for 50 hours per year, as permitted in this section is prohibited.

If you operate and maintain your certified emergency stationary SI internal combustion engine and emissions control systems in accordance with the specifications and guidelines in the Owner's Manual, EPA will not require engine performance testing. If not, your engine will be considered non-certified and you must demonstrate compliance according to Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines as listed in the Electronic Code of Federal Regulations Title 40 Part 60.

Emission-Related Installation Instructions

Your certified emergency stationary engine has pre-set emission control systems or components that require no adjustment. Inspection and replacement of an emissions related component is required to be done in accordance with the requirements cited in the United States Environmental Protection Agency Warranty Statement or can be arranged by contacting your selling dealer or an Authorized Warranty Service dealer. Failing to follow these instructions when installing a certified engine in a piece of nonroad equipment violates federal law 40 CFR 1068.105 (b), subject to fines or penalties as described in the Clean Air Act.