Not intended for use in critical life support applications. △

— CAUTION —

ONLY QUALIFIED ELECTRICIANS OR CONTRACTORS SHOULD ATTEMPT INSTALLATION!
DEADLY EXHAUST FUMES. OUTDOOR INSTALLATION ONLY!

This manual should remain with the unit.
INTRODUCTION
Thank you for purchasing this model of the stationary emergency generator product line.

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 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:

⚠️ DANGER!
INDICATES A HAZARDOUS SITUATION OR ACTION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.

⚠️ WARNING!
Indicates a hazardous situation or action which, if not avoided, could result in death or serious injury.

⚠️ CAUTION!
Indicates a hazardous situation or action which, if not avoided, could result in minor or moderate injury.

NOTE:
Notes contain additional information important to a procedure and will be found within the regular text body of this manual.

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 potential explosion 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.

For safety reasons, the manufacturer recommends that this equipment be installed, serviced and repaired by a 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.

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 a 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 a Service Dealer for service aids and accessories.

Operating instructions presented in this manual assume that the generator electric system has been installed by a 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, simply contact a Service Dealer for assistance. Service technicians are factory-trained and are capable of handling all service needs.

When contacting a dealer about parts and service, always supply the complete Model Number, Serial Number and Type Code (where applicable) from the DATA LABEL that is affixed to the unit.
SAFETY RULES

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 a procedure, work method or operating technique is used 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.

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.

GENERAL HAZARDS

For safety reasons, the manufacturer recommends that this equipment be installed, serviced and repaired by a 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. This should be considered prior to installing the generator. The unit should be positioned to direct exhaust gasses safely away from any building where people, animals, etc., will not be harmed. Any exhaust stacks that ship loose with the unit must be installed properly per the manufacturer’s instruction, and 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 stationary emergency 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 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 personnel 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) requires the frame and external electrically conductive parts of the generator to be connected to an approved earth ground. This grounding will help prevent dangerous electrical shock that might be caused by a ground fault condition in the generator 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 injury or death to utility power workers due to backfeed of electrical energy.

Stationary emergency 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 generators 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.

**CALIFORNIA PROPOSITION 65 WARNING**

Engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

**CALIFORNIA PROPOSITION 65 WARNING**

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

DATA LABEL

Every generator set includes DATA LABEL that contains important information pertinent to the generator. The data label is attached to the lower connection box on the generator and lists the unit serial number, rated voltage, amps, wattage capacity, phase, frequency, rpm, power factor, and production date.

NOTE:
For actual information related to this particular model, please refer to the Manual Drawing Listing located at the end of this manual, or to the data label affixed to the unit.

Stationary Emergency Generator Model and Serial Number

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

This equipment is a revolving field, alternating current Stationary Emergency Generator set. It is powered by a gaseous fueled engine operating at 1800 rpm for 4-pole direct drive units, 3600 rpm for 2-pole direct drive units and 2300 - 3000 rpm for quiet drive gear units. See the Specifications section for exact numbers. The unit comes complete with a sound attenuated enclosure, internally mounted muffler, control console, mainline circuit breaker, battery charger, and protective alarms as explained in the following paragraph.

All AC connections, including the power leads from the alternator, 120 volt battery charger input and control connections to the transfer switch are available in the main connection box.

The Stationary Emergency Generator incorporates the following generator features:

- Rotor and Stator insulation is Class H rated as defined by NEMA MG1-32.6, MG1-1.66. 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 MG1-32.

**ENGINE OIL RECOMMENDATIONS**

The unit has been filled with 5W-20 engine oil at the factory. Use a high-quality detergent oil classified “For Service SJ or SH.” Detergent oils keep the engine cleaner and reduce carbon deposits. When changing the engine oil, be sure to use 5W-30 engine oil (synthetic oil is recommended).

⚠️ **CAUTION!**

Any attempt to crank or start the engine before it has been properly serviced with the recommended oil may result in an engine failure.

**NOTE:**

For temperatures below 32° F, it is strongly recommended to use the optional Cold Weather Start Kit. The oil grade for temperatures below 32° F is 5W-30 synthetic oil.

**COOLANT RECOMMENDATIONS**

Use a mixture of half low silicate ethylene glycol base anti-freeze and deionized water. Cooling system capacity is listed in the specifications. Use only deionized water and only low silicate anti-freeze. If desired, add a high quality rust inhibitor to the recommended coolant mixture. When adding coolant, always add the recommended 50-50 mixture.

⚠️ **CAUTION!**

Do not use any chromate base rust inhibitor with ethylene glycol base anti-freeze or chromium hydroxide (“green slime”) forms and will cause overheating. Engines that have been operated with a chromate base rust inhibitor must be chemically cleaned before adding ethylene glycol base anti-freeze. Using any high silicate anti-freeze boosters or additives will also cause overheating. The manufacturer also recommends that any soluble oil inhibitor is NOT used for this equipment.

⚠️ **DANGER!**

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

♦ HIGH COOLANT TEMPERATURE SWITCH

The switch will close if the temperature should exceed approximately 140° C (284° F), initiating an engine shutdown. The generator will automatically restart and the LED will reset once the temperature has returned to a safe operating level.

♦ LOW COOLANT LEVEL SENSOR

To prevent 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.

♦ LOW OIL PRESSURE SWITCH

This switch has normally closed contacts that are held open by engine oil pressure during cranking and operating. Should oil pressure drop below the 8 psi range, switch contacts close, and the engine shuts down. The unit should not be restarted until oil is added, and the AUTO/OFF/MANUAL switch must be turned to OFF and then back to AUTO.

♦ OVERCRANK SHUTDOWN

After a prespecified duration of cranking, this function ends the cranking if the engine has failed to start. The overcrank LED will turn ON. Turn OFF the AUTO/OFF/MANUAL switch, then turn switch back to AUTO to reset the generator control board.

NOTE:
If the fault is not corrected, the overcrank feature will continue to activate.

Approximate Crank Cycle Times
- 15 seconds ON
- 7 seconds OFF
- 7 seconds ON
- 7 seconds OFF
- Repeat for 45 seconds
  Approximately 90 seconds total.

♦ 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. Contact the nearest Authorized Dealer if this failure occurs.

♦ RPM SENSOR LOSS SHUTDOWN

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

♦ DC FUSES

Fuse F1 (15 amp) is located inside of the control panel. It protects the panel wiring and components from damaging overload. **Always remove this fuse before commencing work on the generator.** The unit will not start or crank if the fuse is blown.

Fuse F2 (25 amp) is located in the engine wire harness adjacent to the DC alternator. It is used to prevent circuit failure due to DC alternator failure. If this fuse is blown, battery charging will not occur while the engine is running. Replace these fuses with the same size, type, and rating. (See the exploded views and parts lists at the end of this manual for replacement part number.)
FUEL SYSTEM

FUEL REQUIREMENTS

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

- Natural gas fuel system
- Propane vapor (LPV) fuel system

Recommended fuels should have a Btu content of at least 1,000 Btu's per cubic foot for natural gas; or at least 2,520 Btu's per cubic foot for LP gas. Ask the fuel supplier for the Btu content of the fuel.

NOTE:
The fuel consumption requirements are identified in the Specifications section of the Owner's Manual. Refer to the Installation Manual if assistance is required for the sizing of the pipe diameter for the generator. Any piping used to connect the generator to the fuel supply should be of adequate size to achieve the 100% load fuel consumption requirements identified in the Specifications section regardless of actual load.

NOTE:
The recommended fuel pressure is identified in the Specifications section this manual.

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.

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 must never exceed approximately 14 inches water column (0.5 psi).

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:

- 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

Type........................................Synchronous
Rotor Insulation..........................Class H
Stator Insulation..........................Class H
Total Harmonic Distortion..............< 5%
Telephone Interference Factor (TIF) ......< 50
Alternator Output Leads 3-phase........4-wire
Bearings......................................Sealed Ball
Coupling......................................Flexible Disc
Load Capacity (Standby Rating)........22/27kW

* NOTE: Generator rating and performance in accordance with ISO8528-5, BS5514, SAE J1349, ISO3046 and DIN 6271 Standards. KW rating is based on LPG fuel and may derate with natural gas and generator specific settings.

Excitation System........................Direct
Generator Output Voltage/kW - 60 Hz kW Amp CB Size
120/240V, 1-phase, 1.0 pf 22/27 92/113 100/125
120/208V, 3-phase, 0.8 pf 22/27 77/94 80/100
120/240V, 3-phase, 0.8 pf 22/27 66/81 80/90
Generator Locked Rotor KVA Available @ Voltage Dip of 35%

22kW 27kW
38 KVA 42 KVA

◆ ENGINE

Make......................................Generac
Model........................................In Line
Cylinders and Arrangement...............4
Displacement..................................2.4 Liter
Bore........................................86.5 mm (3.41 in.)
Stroke.........................................100 mm (3.94 in.)
Compression Ratio.........................9.5-to-1
Air Intake System.........................Naturally Aspirated
Valve Seats..................................Hardened
Lifter Type..................................Hydraulic

Engine Parameters
Rated Synchronous RPM ..................60 Hz, 1800
HP at rated kW (22/27kW).................60 Hz, 32-36/38-43

Exhaust System
Exhaust Flow at Rated Output 60 Hz (22/27kW) ....165/180 cfm
Exhaust Temp. at Rated Output (22/27kW) ....900°F/1000°F

Combustion Air Requirements (Natural Gas)
Flow at rated power, 60 Hz.....................68 cfm

Governor
Type........................................Electronic
Frequency Regulation......................Isochronous
Steady State Regulation ......................± 0.25%

Engine Lubrication System
Type of Oil Pump............................Gear
Oil Filter.....................................Full Flow Spin-on, Cartridge
Crankcase Oil Capacity .................5.25 U.S. qts.
(including oil filter capacity)

◆ COOLING SYSTEM

Type.........................................Pressurized Closed Recovery
Water Pump...................................Belt Driven
Fan Speed....................................3,190 rpm
Fan Diameter................................18.1 inches
Fan Mode....................................Pusher
Air Flow (inlet air including alternator and combustion air)..................2400 ft³/min.
Coolant Capacity............................(3.0 U.S. gal.)
Heat Rejection to Coolant (22/27kW) ......99,000/105,000 Btu/h
Maximum Operating Air Temp. on Radiator .......60°C (150°F)
Maximum Ambient Temperature...............50°C (140°F)

◆ FUEL SYSTEM

Type of Fuel..................Natural Gas, Propane Vapor
Carburetor.................................Down Draft
Secondary Fuel Regulator...............Standard
Fuel Shut-off Solenoid......................Standard
Operating Fuel Pressure ...............5 in. - 14 in. Water Column

Fuel Consumption - ft³/hr (Natural Gas/LPV)

<table>
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<th>kW</th>
<th>Exercise</th>
<th>25%</th>
<th>50%</th>
<th>75%</th>
<th>100%</th>
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<td>42/16</td>
<td>100/40</td>
<td>190/75</td>
<td>255/101</td>
<td>316/125</td>
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<td>27kW</td>
<td>42/16</td>
<td>108/43</td>
<td>197/78</td>
<td>287/114</td>
<td>359/143</td>
</tr>
</tbody>
</table>

◆ ELECTRICAL SYSTEM

Battery Charge Alternator.................12V, 30 Amp
Static Battery Charger....................2.5 Amp
Recommended Battery.........................Group 26, 525CCA
System Voltage................................12 Volts

Voltage Regulator
Type........................................Electronic
Sensing......................................Single-phase
Regulation.................................± 1%
Features.................................V/F Adjustable, Adjustable Voltage and Gain LED Indicators

Power Adjustment for Ambient Conditions
Temperature Deration
3% for every 10°C above °C (22/27kW)........25
1.65% for every 10°F above °F (22/27kW).......104/77
Altitude Deration
1% for every 100 m above m (22/27kW)........183
3% for every 1000 ft. above ft. (22/27kW).....2500/600

Controller........................................R-200C
COLD WEATHER KIT
For cold climates, optional cold weather kit (part number 0F6148) is recommended. The kit includes:
- Battery Warmer
- 4” Junction Box with hardware
- 6 qt. pack 5W-30 synthetic oil (engine)

COOLANT HEATER KIT
The optional Coolant Heater Kit (part number 0G3065) is available to be used in conjunction with the Optional Cold Weather Kit. This kit includes:
- 1500 watt, 120 volt Engine Block Heater
- Heater Mounting Bracket
- All fittings, hoses and hardware to mount and plumb heater

RECONFIGURING THE FUEL SYSTEM

NOTE:
All models are configured to run on natural gas from the factory.
Before the generator can be operated using a LP fuel source, the fuel system and control panel (refer to the installation drawing for location) must be reconfigured. The steps to reconfigure the generator from a natural gas (NG) to a liquidified petroleum (LP) fuel source are as follows:

FUEL SYSTEM
1. Turn the main gas supply off and disconnect the battery.
2. Remove the carburetor fuel hose from the outlet port of the demand regulator (see Figure 6.1).
3. Disconnect the power wires from the fuel solenoid located on top of the regulator assembly by removing the screw on the front of the connector and pulling the connector forward, away from the solenoid body.
4. Loosen the spring clamp on the small fuel enrichment line and remove the hose from the hose barb.
5. Remove the black pipe assembly from the outlet port of the demand regulator. The solenoid assembly may need to be removed before performing this operation (Figure 6.1).
6. Remove the NG fuel jet (loosen counter clockwise) from the outlet port.
7. Remove the LP fuel jet (loosen counter clockwise) from the jet keeper port on the side of the regulator housing. Install this jet into the outlet port in the regulator casting.

NOTE:
The jet sizes are stamped on the individual jets. The larger jet size is used for running on NG.
8. Install the previously removed NG jet into the jet keeper port on the side of the regulator housing.
9. Install the previously removed black pipe onto the outlet port of the demand regulator. Use pipe sealant on the pipe threads.
10. Reverse steps 1-4 in this procedure to reactivate the demand regulator.
11. Follow the instructions in the Control Panel section.

DANGER
Serious injury or damage may occur if not configured properly. Please consult an Authorized Dealer with any questions.

CONTROL PANEL
The fuel select dipswitch is located in the control panel on the circuit board. Engine timing for Natural Gas (NG) Fuel is selected when dipswitch position 4 is set to “ON”. Engine timing for LP Fuel is selected when this switch is set to “OFF”. See the R-200C Control Panel manual for details.

CAUTION
Whenever the Generator’s Fuel Regulator is converted from one Fuel type to the other, make sure to configure the Fuel Select Connector for the correct Fuel type.
ALTERNATOR AC LEAD CONNECTIONS

See “Voltage Codes”. This Stationary Emergency Generator may be rated at any one of three voltages, either single-phase or three-phase. The electrical wires in the unit’s AC connection (lower) panel should be installed according to the number of leads and the voltage/phase required for the application. If there are any questions regarding lead connection, refer to the wiring diagrams at the back of this manual.

Voltage codes apply to the type of stator assembly installed on a particular generator.

FOUR-LEAD, SINGLE-PHASE STATOR

Four-lead alternators (see Figure 7.1) are designed to supply electrical loads with voltage code “A” (240V, 1-phase, 60 Hz). Electrical power is produced in the stator power windings. These windings were connected at the factory to the main circuit breaker as shown in Figure 7.1.

The rated voltage between each circuit breaker terminal is 240V. The rated voltage between each circuit breaker terminal and the neutral point 00 is 120V.

Figure 7.1 — Four-lead, Single-phase Stator

ALTERNATOR POWER WINDING CONNECTIONS

3-PHASE ALTERNATORS

The Stationary Emergency Generator is designed to supply 3-phase electrical loads. Electric power is produced in the alternator power windings. These windings were connected at the factory to the main circuit breaker with a “Y” configuration as shown in Figures 7.2 and 7.3.

The rated voltage between circuit breaker terminals E1-E2, E1-E3 and E2-E3 is either 480V or 208V depending on the model.

The rated voltage between each circuit breaker terminal and the neutral point 00 is either 277V or 120V depending on the model.

Figure 7.2 — Stator Power Winding Connections - 3-phase, 277/480V (6 Lead)

Figure 7.3 — Stator Power Winding Connections - 3-phase, 120/208V (6 Lead)
INSTALLATION
Refer to the separate “Installation Guide” supplied with the unit.
For safety reasons, the manufacturer recommends that this equipment be installed, serviced and repaired by a 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.

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”, as well as all other safety information in this manual, before attempting to operate this (and related) equipment.

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 the “Maintenance” section 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.

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”.

Check the oil level in the generator gearbox (if so equipped) prior to initial use and at the intervals indicated by the “Service Schedule.” The recommended oil is SAE 90 gear lubricant.

NOTE:
This engine is shipped from the manufacturer with “break-in” oil. This oil should be changed after 30 hours of operation.

PRIOR TO INITIAL START-UP

CAUTION

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.

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” sections.

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.

NOTE:
Battery charger must be connected to 120 VAC, 15 amp circuit to operate.

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

INITIAL INSPECTION FOR GENSET STARTUP
Inspect for the following.
• Freight Damage.
• Manuals present.
• Fluid Levels (Oil, coolant, battery, Gear Drive).
• Correct fuel piping.
• Correct muffler installation for external applications (open units only).
• Adequate air flow, clearances and ventilation per installation drawings and applicable codes.
• Correct AC and DC wire size, connections and grounding. Control and communication wiring to/from the transfer switch must be run in a separate conduit from the AC power leads.

• Battery charger connection to 120 VAC.
• Unit secured to pad.
START-UP CHECKLIST

⚠️ WARNING ⚠️

⚠️ Before working on the Stationary Emergency Generator, ensure the following:
• The AUTO/OFF/MANUAL switch is in the OFF position.
• The 120VAC supply to the battery charger is switched OFF.

◆ PREPARATION FOR START-UP

• Ensure that the 120VAC circuit breaker to the battery charger is open.
• Remove the fuse from the control panel. Open the front door of the control box and remove the 15 Amp ATO fuse in the lower left-hand corner of the control box.
• Connect the battery cables to the battery. Attach negative battery cable last.
• Close the 120VAC circuit breaker to the battery charger.
• Measure the voltage at the battery before and after the charger is turned on.
• Verify all AC electrical connections are tight at the circuit breaker and transfer switch.
• Visually inspect entire area looking for loose paper, plastic wrappings, leaves, etc.
• Check all hoses clamps fittings for leaks or damage.
• Check all electrical plugs throughout the generator. Ensure each plug is seated correctly and fully inserted into its receptacle.
• Verify the AUTO/OFF/MANUAL switch is in OFF position.
• Open the valve to the engine fuel line.
• Bleed the fuel system of air. (necessary for long fuel lines).
• Open the generator main line circuit breaker.
• Connect a manometer to the gas line and record the static pressure. It must be as listed in the Specifications.
• Insert the fuse into the control panel.
• Move the AUTO/OFF/MANUAL switch to the manual position. The engine should now crank and start.
• Check voltage at the generator terminals.
• For 3-phase units, check phase rotation at the transfer switch terminals. The generator phase rotation must match the utility phase rotation.
• Check for coolant, fuel, oil, and exhaust leaks.
• Close the generators main line circuit breaker.
• Turn the generator set off.
• Connect the UTILITY supply to the transfer switch.
• Set the AUTO/OFF/MANUAL switch to AUTO.
• Disconnect utility power before the transfer switch. Engine should start, transfer to load. Run at least 15 minutes on generator power. Make certain all 3-phase loads are functioning correctly (correct phase rotation).
• Reconnect Utility power. Transfer switch will transfer back to Utility and engine will shut down within the given time parameters set up for the specific transfer switch and controller.
• Install all covers, access plates and door panels.
• Put the Owners Manual in a safe and accessible place.
• Make certain the AUTO/OFF/MANUAL switch is in the AUTO position.
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 Stationary Emergency 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 specific transfer switch.

⚠️ DANGER!

⚠️ 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 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 the STANDBY (or EMERGENCY STANDBY) position, i.e., load circuits supplied by the generator.
• Set the generator’s main line circuit breaker to its ON (or CLOSED) position.
• Load circuits are now powered by the generator.

RETRANSFER AND SHUTDOWN

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

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

• Set the 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 Stationary Emergency Generator has been installed with an automatic transfer switch, the engine may be started and stopped automatically or manually.

NOTE:

Refer to the applicable manual for your transfer switch and to “Transfer Switch Start Signal Connections”. In addition, please note the dangers under “Engine Start-up and Transfer.”
MAINTENANCE PERFORMED BY SERVICE DEALERS/CONTRACTORS

⚠️ WARNING!

⚠️ Before working on the Stationary Emergency Generator, ensure the following:
- The AUTO/OFF/MANUAL switch is in the OFF position.
- The 15A fuse has been removed from the control box.
- The 120VAC supply to the battery charger is switched OFF.
- The negative battery cable has been removed.

EVERY THREE MONTHS
1. Check battery condition.
2. Inspect and test fuel system.
3. Check transfer switch.
4. Inspect exhaust system.
5. Check engine ignition system.
6. Check fan belts.

ONCE EVERY SIX MONTHS
1. Test Engine Safety Devices (low oil pressure, low coolant level, high coolant temperature).

ONCE ANNUALLY
1. Test engine governor; adjust or repair, if needed.
2. Clean, inspect generator.
3. Flush cooling system.
4. Clean/re-gap spark plugs or replace as necessary.

FIRST 30 OPERATING HOURS

FIRST 100 OPERATING HOURS
1. Change engine oil and oil filter. After initial change, service engine oil and filter at 100 operating hours or six months, whichever comes first.
2. Retorque intake and exhaust manifold.

EVERY 500 OPERATING HOURS
1. Service air filter.
2. Check starter.
3. Check engine DC alternator.

COOLING SYSTEM
Air intake and outlet openings in the generator compartment must be open and unobstructed for continued proper operation. This includes such obstructions as high grass, weeds, brush, leaves and snow.

Without sufficient cooling and ventilating air flow, the engine/generator quickly overheats, which causes it to shut down. (See the installation diagram.)

⚠️ WARNING!

⚠️ The exhaust system parts from this product get extremely hot and remains hot after shutdown. High grass, weeds, brush, leaves, etc. must remain clear of the exhaust. Such materials may ignite and burn from the heat of the exhaust system.

OVERLOAD PROTECTION FOR ENGINE DC ELECTRICAL SYSTEM
Engine cranking, start up and running are controlled by a solid state Engine Controller circuit board. Battery voltage is delivered to that circuit board via a 15 amp fuse. These overcurrent protection devices will open if the circuit is overloaded.

⚠️ CAUTION!

⚠️ If a circuit breaker opens or a fuse element melts, find the cause of the overload before resetting the circuit breaker or replacing the fuse.

CHECKING FLUID LEVELS

CHECK ENGINE OIL
Check engine crankcase oil level (Figure 10.1) at least every 20 hours of operation, or prior to use.

Figure 10.1 - Oil Dipstick and Oil Fill Cap
• Remove oil dipstick and wipe dry with a clean, lint-free cloth.
• Install oil dipstick, then remove again.
• Oil should be between FULL and ADD marks.
• If oil level is below the dipstick ADD mark, remove oil fill cap. Add the recommended oil to bring oil level up to the FULL mark. DO NOT FILL ABOVE THE “FULL” MARK. See “Engine Oil Recommendations” for recommended oils.

**BATTERY FLUID**

Check battery electrolyte fluid based on the Maintenance Schedule. Fluid should cover separators in all battery cells. If fluid level is low, add distilled water to cover tops of separators. DO NOT USE TAP WATER IN BATTERY.

**ENGINE COOLANT**

Check coolant level in coolant recovery bottle. See the Specifications section.

- Add recommended coolant mixture as necessary.
- Periodically remove radiator pressure cap (only when engine has cooled down) to make sure the coolant recovery system is functioning properly. Coolant should be at bottom of radiator filler neck. If coolant level is low, inspect gasket in radiator pressure cap. Replace cap, if necessary. To have pressure cap tested, contact a Service Facility. Inspect cooling system and coolant recovery system for leaks.

**MAINTENANCE OWNER/OPERATOR CAN PERFORM**

⚠️ **WARNING!**

⚠️ Before working on the generator, ensure the following:

- The AUTO/OFF/MANUAL switch is in the OFF position.
- The 15A fuse has been removed from the control box.
- The 120VAC supply to the battery charger is switched OFF.
- The negative battery cable has been removed.

**CHECK ENGINE OIL LEVEL**

Refer to “Checking Fluid Levels”.

**CHECK BATTERY**

- See “Checking Fluid Levels”.
- Check battery cables for condition, tightness, corrosion or damage. Clean, tighten or replace as necessary.

**EXERCISE SYSTEM**

Start the Stationary Emergency Generator engine at least once every seven days and let it run at least 20 minutes. For more detailed exercise information, see the respective sections in the Control Panel Technical Manual that is supplied with the unit.

**INSPECT COOLING SYSTEM**

- Inspect engine cooling system. See “Maintenance Schedule”.
- Check hoses for damage, deterioration, leaks, etc. Correct any discrepancies found.
- Check hose clamps for tightness.

**CHECK ENGINE COOLANT LEVEL**

See the “Checking Fluid Levels” section.

**PERFORM VISUAL INSPECTION**

Complete a thorough visual inspection of the entire engine-generator monthly. Look for obvious damage, loose, missing or corroded nuts, bolts and other fasteners. Look for fuel, oil or coolant leaks.

**INSPECT EXHAUST SYSTEM**

Inspect the exhaust system at least once every three months. Check all exhaust system pipes, mufflers, clamps, etc. for condition, tightness, leaks, security, damage.

**CHECK FAN BELT**

- Inspect fan belts every three months. Replace any damaged, deteriorated, worn or otherwise defective belt.
- Check fan belt tension. Thumb pressure, exerted midway between pulleys, should deflect about 3/8 to 5/8 of an inch. Adjust belt tension as required.
- Check fan belt alignment (see Figure 10.2).

![Figure 10.2 – Fan Belt](image-url)
INSPECT ENGINE GOVERNOR

Visually inspect electronic governor.

⚠️ DANGER!

Do not attempt to adjust the governor. Only qualified service facilities should adjust the governor. Excessively high operating speeds are dangerous and increase the risk of personal injury. Low speeds impose a heavy load on the engine when adequate engine power is not available and may shorten engine life. Correct rated frequency and voltage are supplied only at the proper governed speed. Some connected electrical load devices may be damaged by incorrect frequency and/or voltage. Only qualified service technicians should adjust the governed speed.

CHANGING ENGINE OIL

⚠️ CAUTION!

Hot oil may cause burns. Allow engine to cool before draining oil. Avoid prolonged or repeated skin exposure with used oil. Thoroughly wash exposed areas with soap.

Refer to maintenance performed by service facilities for engine oil and filter change frequencies.

Drain the oil while the engine is still warm from running. This means warm up the engine, shut it down and drain immediately as follows:

1. Remove the drain hose from its retaining clip or cut the zip-tie securing the oil drain hose.
2. Loosen and remove OIL DRAIN HOSE CAP. Drain oil completely into suitable container.
3. When all oil has drained, install and tighten OIL DRAIN HOSE CAP and secure drain hose with a new zip-tie, or place the hose in its retaining clip.
4. Turn OIL FILTER (Figure 10.3) counterclockwise and remove. Properly dispose of old filter.

5. Apply light coating of new engine oil to seal of new oil filter. Install FILTER and tighten by hand only. DO NOT OVER TIGHTEN.
6. Remove OIL FILL CAP and add recommended oil. Crankcase oil capacity is listed in the “Specifications” section.

⚠️ CAUTION!

After refilling the crankcase with oil, always check oil level on dipstick. NEVER OPERATE ENGINE WITH OIL BELOW THE DIPSTICK “ADD” MARK.

7. Start engine and check for oil leaks.
8. Shut OFF engine and wait 10 minutes for the oil to settle down into the oil pan. Recheck oil level on dipstick. DO NOT fill above the dipstick “FULL” mark.
9. Dispose of used oil at a proper collection center.

CHANGING THE ENGINE AIR FILTER

To replace the engine air filter, remove the air filter cover and replace the air filter making sure it is positioned properly before reattaching the cover (Figure 10.4).

See the “Service Schedule,” for air filter maintenance.

Figure 10.4 – Engine Air Filter

Air Filter

SPARK PLUGS

Reset the spark plug gap or replace the spark plugs as necessary (Figure 10.5).

1. Clean the area around the base of the spark plugs to keep dirt and debris out of the engine. Clean by scraping or washing using a wire brush and commercial solvent. Do not blast the spark plugs to clean.
2. Remove the spark plugs and check the condition. Replace the spark plugs if worn or if reuse is questionable. See the “Service Schedule” section for recommended inspection.
3. Check the spark plug gap using a wire feeler gauge. Adjust the gap to 1.07-1.17 mm (0.042-0.046 inch) by carefully bending the ground electrode (Figure 10.5).
COOLANT CHANGE

Every year, have a service facility drain, flush and refill the cooling system. See "Specifications" for cooling system recommendations.

MISCELLANEOUS MAINTENANCE

CLEANING THE STATIONARY EMERGENCY GENERATOR

Keep the generator as clean and as dry as possible. Dirt and moisture that accumulates on internal generator windings have an adverse effect on insulation resistance.

Periodically clean generator exterior surfaces. A soft brush may be used to loosen caked on dirt. Use a vacuum system or dry, low pressure air to remove any accumulations of dirt. The generator is housed inside an all-weather enclosure, clean the enclosure with a soft, damp cloth or sponge and water.

Once each year have the generator cleaned and inspected by a Service Dealer. That dealer will use dry, low pressure air to clean internal windings. Parts inside the control console should be cleaned and inspected at this time as well.

Finally, have the insulation resistance of stator and rotor windings checked. If insulation resistances are excessively low, the generator may require drying.

BATTERY

All lead-acid storage batteries discharge when not in use. Refer to specific instructions and warnings that accompany the battery. If such information is not available, observe the following precautions when handling a battery:

• DO NOT use jumper cables and a booster battery to crank or start the generator engine.
• DO NOT recharge a weak battery while it is installed in the generator. Remove battery from generator and recharge in a well-ventilated area, away from fuel vapors, sparks, heat or flames.
• Battery electrolyte fluid is an extremely caustic sulfuric solution that can cause severe burns. DO NOT permit fluid to contact eyes, skin, clothing, painted surfaces, etc. If any battery fluid is spilled, flush the affected area with clear water immediately.
• Always wear safety glasses, rubber apron and gloves when handling a battery.

• Batteries give off explosive hydrogen gas while charging. The gas can form an explosive mixture around the battery for several hours after charging. Any spark, heat or flames can ignite the gas and cause an explosion which can shatter the battery, causing blindness or other serious injury.

BATTERY MAINTENANCE

The battery should be inspected per the "Scheduled Maintenance" section. The following procedure should be followed for inspection:

1. Inspect the battery posts and cables for tightness and corrosion. Tighten and clean as necessary.
2. Check the battery fluid level of unsealed batteries and, if necessary, fill with DISTILLED WATER ONLY. DO NOT USE TAP WATER IN BATTERIES.
3. Have the state of charge and condition checked. This should be done with an automotive-type battery hydrometer.

WARNING!

Be sure the AUTO/OFF/MANUAL switch is set to the OFF position, before connecting the battery cables. If the switch is set to AUTO or MANUAL, the generator can crank and start as soon as the battery cables are connected.

Be sure the 120VAC power supply to the battery is turned OFF, or sparking may occur at the battery posts as the cables are attached and cause an explosion.
**BATTERY REPLACEMENT**

**NOTE:**

Unit DOES NOT include battery.

When supplying or replacing the battery, the recommended number and type of battery is listed in the Specifications Section.

**NOTE:**

The BCI number should be located directly on the battery.

---

**REPAIR PARTS**

The later portion of this manual consists of exploded views, parts lists and electrical data pertaining to this generator set. The parts list consists of: (a) an Item Number, (b) a Part Number, (c) Quantity required, and (d) a Description of the part. The Item Number corresponds to an identical number on the exploded view drawing.
SERVICE SCHEDULE

22 KW - 150 KW GASEOUS STATIONARY EMERGENCY GENERATOR

The following is a recommended maintenance schedule for Gaseous Stationary Emergency Generator sets from 22kW to 150 kW in size. The established intervals in the schedule are the maximum recommended when the unit is used in an average service application. They will need to be decreased (performed more frequently) if the unit is used in a severe application. Use calendar time, from the previous maintenance interval to determine the next required maintenance interval.

Service Maintenance Interval Information:
The various service maintenance intervals are designated by interval numbers as follows:
1. An early inspection of the generator set to insure it is ready to operate when required and to identify any potential problem areas.

   ![CAUTION]
   This inspection may be performed by the end user providing the following safety steps are taken to prevent the engine from starting automatically without warning:

   To prevent injury, perform the following steps in the order indicated before starting any maintenance:

   • Disable the generator set from starting and/or connecting to the load by setting the control panel Auto/Off/Manual switch to the “OFF” position.
   • Remove the 15 amp control panel fuse.
   • Turn off the battery charger.*
   • Remove the negative battery cable.

   ![CAUTION]
   * The battery charger must be turned off BEFORE removing the battery cable to prevent an over current condition from burning out sensitive control panel components and circuits.

   Following all maintenance, reverse these steps to insure the unit is returned to standby setup for normal operation when required.

2. A wear-in service inspection of the generator set to insure it is ready to operate and carry the load when required, and to identify any potential problem areas.

   Performed ONLY ONCE following the first three months or the first 30 hours of operation after purchase of the unit.

   This inspection contains some maintenance tasks which require special tools, equipment, and/or knowledge to accomplish and should be performed only by a Service Dealer.

3. An operational inspection of the generator set to insure it is ready to operate and carry the load when required, and to identify any potential problem areas.

   Performed semi-annually or following each 50 hours of operation of the unit.

   This inspection contains some maintenance tasks which require special tools, equipment, and/or knowledge to accomplish and should be performed only by a Service Dealer.

4. A mid-level inspection of the generator set to insure it is ready to operate and carry the load when required, and to identify any potential problem areas.

   Performed annually or following each 100 hours of operation of the unit.

   This inspection contains some maintenance tasks which require special tools, equipment, and/or knowledge to accomplish and should be performed only by a Service Dealer.

5. A comprehensive inspection of the generator set to insure it is properly serviced and ready to operate and carry the load when required, and to identify any potential problem areas.

   Performed annually or following each 250 hours of operation of the unit.

   This inspection contains some maintenance tasks which require special tools, equipment, and/or knowledge to accomplish and should be performed only by a Service Dealer.
## Stationary Emergency Generator Service Schedule

<table>
<thead>
<tr>
<th>Maintenance Tasks</th>
<th>Level 1</th>
<th>Level 2</th>
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1. Disable the unit from operating per the first page warning.
2. Check the engine oil level. Adjust as necessary.
3. Check the engine coolant level. Adjust as necessary.
4. Check the engine coolant thermal protection level. Correct as necessary.
5. Check the natural gas delivery system for leaks and correct pressure on gas engine driven units. Tighten connections as necessary.
6. Check the air inlets and outlets of the enclosure and radiator for debris. Clean as necessary.
7. Check the battery electrolyte level and specific gravity if accessible. Adjust as necessary.
8. Check the battery posts, cables, and charger for loose connections, corrosion, and proper operation. Correct as necessary.
9. Check the unit wiring for loose connections, corrosion, and damage. Correct as necessary.
<table>
<thead>
<tr>
<th>Maintenance Tasks</th>
<th>Level 1</th>
<th>Level 2</th>
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<td>10. Check the engine accessory drive belts and fan coupling device if equipped for correct tension, wear, weather cracking, and damage. Replace as necessary.</td>
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<td>11. Check the engine valve clearance/lash. Adjust as necessary.**</td>
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<td>12. Visually inspect the unit looking for leaks, wear or damage, loose connections or components, and corrosion. Correct as necessary.</td>
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<td>13. Test the engine and transfer switch safety devices. Correct and/or adjust as necessary.</td>
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<tr>
<td>14. Initiate an automatic start and transfer of the unit to site load and exercise it for at least 1 hour looking for leaks, loose connections or components, and abnormal operating conditions. Correct as necessary.</td>
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<td>15. Replace the engine accessory drive belts.</td>
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<td>16. Check gearbox oil level (if equipped).</td>
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<td>17. Change gearbox oil (if equipped).</td>
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** Not required for engines equipped with hydraulic lifters. See the "Specification" section for lifter type.
<table>
<thead>
<tr>
<th>Maintenance Tasks</th>
<th>Level 1 Required to be done monthly/</th>
<th>Task Comp. (Date-Initials)</th>
<th>Level 2 Required to be done 3 months/</th>
<th>Task Comp. (Date-Initials)</th>
<th>Level 3 Required to be done Semi-annually/</th>
<th>Task Comp. (Date-Initials)</th>
<th>Level 4 Required to be done Annually/</th>
<th>Task Comp. (Date-Initials)</th>
<th>Level 5 Required to be done Bi-annually/</th>
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<tr>
<td>18. Start and exercise the unit at full rated load (use a load bank if the site load is not enough) for at least 2 hours looking for leaks, loose connections or components, and abnormal operating conditions. Correct as necessary.</td>
<td>10 hrs.</td>
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<tr>
<td>19. Perform an engine oil analysis (send a sample to a lab for results). Change the engine oil and filters if the analysis results indicate this is required.</td>
<td>30 hrs.</td>
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<tr>
<td>20. Change the engine oil.</td>
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<tr>
<td>21. Replace the engine oil filter(s).</td>
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<tr>
<td>22. Replace engine spark plugs. Clean and re-gap or replace as necessary.</td>
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<tr>
<td>23. Replace the engine air filter(s).</td>
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<tr>
<td>24. Perform a 5 minute no-load operational run of the unit looking for any post service problems.</td>
<td>100 hrs.</td>
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<tr>
<td>25. Return the unit to standby setup for operation when required.</td>
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# TROUBLESHOOTING GUIDE

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<tr>
<th>PROBLEM</th>
<th>CAUSE</th>
<th>CORRECTION</th>
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<tr>
<td>Engine won't crank.</td>
<td>1. 15 amp fuse blown.</td>
<td>1. Replace fuse.</td>
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<tr>
<td></td>
<td>2. Loose or corroded or defective battery cables.</td>
<td>2. Tighten, clean or replace battery cables as necessary.</td>
</tr>
<tr>
<td></td>
<td>3. Defective starter contactor.</td>
<td>3. Replace contactor.*</td>
</tr>
<tr>
<td></td>
<td>4. Defective starter motor.</td>
<td>4. Replace starter motor.*</td>
</tr>
<tr>
<td></td>
<td>5. Dead or Defective Battery.</td>
<td>5. Remove, change or replace battery.</td>
</tr>
<tr>
<td></td>
<td>6. 5 amp fuse blown.</td>
<td>6. Replace fuse.*</td>
</tr>
<tr>
<td>Engine cranks but won't start</td>
<td>1. Out of fuel.</td>
<td>1. Replenish fuel.</td>
</tr>
<tr>
<td></td>
<td>2. Fuel solenoid (FS) is defective</td>
<td>2. Replace solenoid.*</td>
</tr>
<tr>
<td></td>
<td>3. Open Wire #14A from Engine Control circuit board.</td>
<td>3. Reconnect wire.</td>
</tr>
<tr>
<td></td>
<td>4. Spark plugs defective.</td>
<td>4. Clean, regap or replace plugs.</td>
</tr>
<tr>
<td></td>
<td>5. Door on tank not closed.</td>
<td>5. Close door on tank.</td>
</tr>
<tr>
<td>Engine starts hard, runs rough.</td>
<td>1. Flame arrestor (air cleaner) plugged or damaged.</td>
<td>1. Clean or replace as needed.</td>
</tr>
<tr>
<td></td>
<td>2. Plugged fuel line.</td>
<td>2. Unclog fuel line.</td>
</tr>
<tr>
<td></td>
<td>3. Defective spark plugs.</td>
<td>3. Clean, regap or replace plugs.</td>
</tr>
<tr>
<td></td>
<td>4. Fuel pressure incorrect.</td>
<td>4. Confirm fuel pressure to regulator is as recommended in SPECIFICATIONS.</td>
</tr>
<tr>
<td>Engine starts then shuts down.</td>
<td>1. Engine oil level is low.</td>
<td>1. Check oil and add oil as needed.</td>
</tr>
<tr>
<td></td>
<td>2. Engine is overheated.</td>
<td>2. Check cooling system for leaks.</td>
</tr>
<tr>
<td></td>
<td>3. Defective Low Oil Pressure Switch</td>
<td>3. Replace switch.*</td>
</tr>
<tr>
<td></td>
<td>5. Defective Control Module circuit board.</td>
<td>5. Replace board.*</td>
</tr>
<tr>
<td></td>
<td>6. Coolant Level is Low.</td>
<td>6. Repair leak - Add coolant.</td>
</tr>
<tr>
<td></td>
<td>7. Defective Low Coolant Level Switch</td>
<td>7. Replace Switch.*</td>
</tr>
<tr>
<td>AUTO/OFF/MANUAL Switch at OFF, engine continues to run</td>
<td>1. Defective AUTO/OFF/MANUAL switch</td>
<td>1. Replace switch.*</td>
</tr>
<tr>
<td></td>
<td>2. Open/disconnected wire #15A between AUTO/OFF/MANUAL switch and Control Module circuit board.</td>
<td>2. Reconnect/close wire.</td>
</tr>
<tr>
<td></td>
<td>3. Defective Control Module circuit board</td>
<td>3. Replace board.*</td>
</tr>
<tr>
<td>No AC output from generator.</td>
<td>1. Check main line circuit breaker.</td>
<td>1. Reset to ON or CLOSED.</td>
</tr>
<tr>
<td></td>
<td>2. Check circuit breaker &amp; fuses.</td>
<td>2. Reset and replace, if necessary.</td>
</tr>
<tr>
<td></td>
<td>3. Transfer switch set to NORMAL position</td>
<td>3. Set to GENERATOR position.</td>
</tr>
<tr>
<td></td>
<td>4. Generator internal failure.</td>
<td>4. *</td>
</tr>
<tr>
<td></td>
<td>5. Thermal circuit breaker open.</td>
<td>5. Auto-reset - Wait 5 min. and attempt restart.</td>
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</table>

*Contact the nearest Dealer for assistance.*
United States Environmental Protection Agency Warranty Statement
(Stationary Emergency Spark-Ignited Generators)

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, Generac will repair your engine at no cost to you for diagnosis, replacement parts and labor provided it be done by a Generac 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 years or 2500 hours of operation, whichever comes first, from the date of the engine being placed into service. For high-cost warranted components, the Emission Control System warranty is valid for 5 years or 3500 hours of operation, whichever comes first.

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 Generac's 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 can be arranged by contacting either your selling dealer or a Generac Authorized Warranty Service dealer, 1-800-333-1322 for the dealer nearest you. 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. Contact Generac Power Systems Inc. for additional Emission Control System Warranty related information, Generac Power Systems, Inc., PO. Box 8, Waukesha, WI 53187, or call 1-800-333-1322 or www.generac.com.

Important Note
This warranty statement explains your rights and obligations under the Emission Control System Warranty, which is provided to you by Generac pursuant to federal law. Note that this warranty shall not apply to any incidental, consequential, or indirect damages caused by defects in materials or workmanship or any delay in repair or replacement of the defective part(s). This warranty is in place of all other warranties, expressed or implied. Specifically, Generac makes no other warranties as to the merchantability or fitness for a particular purpose. Any implied warranties which are allowed by law, shall be limited in duration to the terms of the express warranty provided herein. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Emission Related Parts Include the Following (if so equipped)

1) Fuel Metering System
   1.1) Gasoline Carburetor Assembly and Internal Components
        A) Fuel Filter, B) Carburetor, C) Fuel Pump
   1.2) Carburetion Assembly and Its Components
        A) Fuel Controller, B) Carburetor and Its Gaskets,
        C) Mixer and Its Gaskets, D) Primary Gas Regulator,
        E) Liquid Vaporizer
   1.3) Fuel Regulator

2) Air Induction System Including A) Intake Pipe/Manifold,
   B) Air Cleaner

3) Ignition System Including A) Spark Plug, B) Ignition Module,
   C) Ignition Coil, D) Spark Plug Wires

4) Exhaust System
   A) Catalyst Assembly*, B) Exhaust Manifold, C) Muffler,
   D) Exhaust Pipe, E) Muffler Gasket

5) Crankcase Breather Assembly Including
   A) Breather Connection Tube, B) PCV Valve

6) Oxygen Sensor

7) Diagnostic Emission-Control System

*High-Cost Warranted Component
United States Environmental Protection Agency Compliance Requirements
(Stationary Emergency Spark-Ignited Generators)

Purchaser’s/Owner’s Record Keeping Responsibilities
The United States Environmental Protection Agency (EPA) and Generac Power Systems, Inc. (Generac) are pleased to explain your record keeping 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 record keeping requirements to demonstrate compliance: 1) Maintain documentation that the engine is certified to meet emission standards. 2) Record keeping of maintenance conducted. 3) Record keeping 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) Record keeping 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, record keeping of hours of operation begins January 1, 2011. For emergency engines less than 130 HP, record keeping of hours of operation begins January 1, 2009; engines are equipped with non-resettable hour meters to facilitate record keeping.

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 to the specifications and guidelines in this 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 so in accordance with the requirements cited in the United States Environmental Protection Agency Warranty Statement or can be arranged by contacting either your selling dealer or a Generac Authorized Warranty Service dealer, 1-800-333-1322 for the dealer nearest you. Failing to follow these instructions when installing a certified engine in a piece of non-road equipment violates federal law 40 CFR 1068.105 (b), subject to fines or penalties as described in the Clean Air Act.
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(1) APPLY MEDIUM STRENGTH BLUE THREADED LOCKING FLUID TO THREADS.
(2) ALTERNATE CONFIGURATION REQUIRES ALL NOTED PARTS.
<table>
<thead>
<tr>
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<th>PART #</th>
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(2) QTY. REQ. FOR 2-POLE BREAKERS / QTY. REQ. FOR 3-POLE BREAKERS.
## EXPLODED VIEW: MOUNTING BASE 2.4L

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**APPLICABLE TO:**  
**GROUP C**

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**DATE: 2/4/10**
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(1) APPLY MEDIUM STRENGTH BLUE THREAD LOCKING FLUID TO THREADS.

(2) INCLUDED WITH I/N 25.

(3) USE WITH R-200 CONTROL PANEL ONLY.
# EXPLODED VIEW: FUEL SYSTEM 2.4L G2 22&27KW

## DRAWING #: 0G8814

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(1) INCLUDED IN I/N 23 (REGULATOR ASY)
(2) FOR LP VAPOR APPLICATION SUBSTITUTE LPG FUEL INLET DECAL P/N 050280 FOR NG FUEL INLET DECAL P/N 050279 (ITEM 31).

**NOTES:**
1. REGULATOR (IN 35) AS SHOWN IN ILLUSTRATION IS SET UP FOR NATURAL GAS APPLICATION.
2. TO CONFIGURE REGULATOR FOR LP VAPOR, REFER TO THE "RECONFIGURING THE FUEL SYSTEM" SECTION OF THIS MANUAL.
## EXPLODED VIEW: EV ENCLOSURE C1 CPL

**DRAWING #: 0G3534**

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**ENCLOSURE NOTE:** All panels that fasten to the roof must be secured using IN 10 (thread forming fastener) and IN 3 (lock nut) and to include at least one connection point using IN 19 (thread forming fastener) with IN 3 (lock nut) to each panel. Lock nut is to be installed after thread forming fastener has penetrated through extrusion in enclosure panels. All panel to baseframe connections to include at least one connection point using IN 29 (washer special).

**MANUFACTURING:** When ordering replacement parts enter base number (first 6 digits only) in the system for correct material and color (for reference see Guideline 0H7169).

**CUSTOMER:** When ordering replacement parts enter base number (first 6 digits only) in the system for correct material and color (for reference see Guideline 0H7169).

**USED ON 1.5L / 1.6L UNITS ONLY.**
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OPTION 1 - SINGLE PHASE, R-SERIES CONTROL PANEL, 240V

LEGEND
AR = ALTERNATOR ROTOR
AS = ALTERNATOR STATOR
MLCB = MAIN CIRCUIT BREAKER
NB = NEUTRAL BLOCK

DIRECT DRIVE

GENERATOR OUTPUT
CUSTOMER CONNECTION
E1 - E3 = 240VAC
E1 - NB = 120VAC
E3 - NB = 120VAC
OPTION 2 - THREE PHASE, R-SERIES CONTROL PANEL, 6-WIRE 120/208V

LEGEND
AR = ALTERNATOR ROTOR
AS = ALTERNATOR STATOR
MLCB = MAIN CIRCUIT BREAKER
NB = NEUTRAL BLOCK

GENERATOR OUTPUT
CUSTOMER CONNECTION
E1 TO E2
E2 TO E3*208VAC
E1 TO E3

E1, E2, OR E3 TO NB = *120VAC

*NOTE: THE 8TH DIGIT OF THE MODEL NUMBER SPECIFIES OUTPUT VOLTAGE
'G' = 120/208VAC
OPTION 3 - THREE PHASE, R-SERIES CONTROL PANEL, 6-WIRE 277/480V

LEGEND
AR = ALTERNATOR ROTOR
AS = ALTERNATOR STATOR
MLCB = MAIN CIRCUIT BREAKER
NB = NEUTRAL BLOCK

GENERATOR OUTPUT
CUSTOMER CONNECTION

E1 TO E2
E2 TO E3 \* 480VAC
E1 TO E3

E1, E2, OR E3 TO NB = \* 277VAC

\* NOTE: THE 8th DIGIT OF THE MODEL NUMBER SPECIFIES OUTPUT VOLTAGE
"K" = 227/480VAC
OPTION 4 - THREE PHASE, R-SERIES CONTROL PANEL, 12-WIRE 120/208

**LEGEND**
- AR = ALTERNATOR ROTOR
- AS = ALTERNATOR StATOR
- MLCB = MAIN CIRCUIT BREAKER
- NB = NEUTRAL BLOCK

---

**WIRING DIAGRAM**
- Generator Output Customer Connection:
  - E1 TO E2
  - E2 TO E3 *208VAC
  - E1 TO E3
- E1, E2, OR E3 TO NB = *120VAC

**Note:** The 8th digit of the model number specifies output voltage.
- 'G' = 120/208VAC
NOTES:
1) MINIMUM RECOMMENDED CONCRETE PAD SIZE: 1041 (41.0') WIDE X 1892
(74 1/2') LONG. REFERENCE INSTALLATION GUIDE SUPPLIED WITH UNIT
FOR CONCRETE PAD GUIDELINES.
2) ALLOW SUFFICIENT ROOM ON ALL SIDES OF THE GENERATOR FOR MAINTENANCE
AND SERVICING. THIS UNIT MUST BE INSTALLED IN ACCORDANCE WITH CURRENT
APPLICABLE NFPA 37 AND NFPA 70 STANDARDS AS WELL AS ANY OTHER FEDERAL,
STATE AND LOCAL CODES FOR MINIMUM DISTANCES FROM OTHER STRUCTURES.
3) CIRCUIT BREAKER INFORMATION:
SEE SPECIFICATION SHEET WITHIN OWNERS MANUAL.
4) INSIDE STUB-UP AREA FOR AC LOAD LEAD CONDUIT CONNECTION, NEUTRAL
CONNECTION, BATTERY CHARGER 120 VOLT AC (0.5 AMP MAX.) CONNECTION,
ACCESS TO TRANSFER SWITCH CONTROL WIRES, AND TRANSFER SWITCH
CONNECTION (IF SO EQUIPPED). REMOVE FRONT COVER FOR ACCESS.
4A) ONE 1-1/2" NEMA ELECTRICAL KNOCKOUT AND TWO 1/2" NEMA ELECTRICAL
KNOCKOUTS PROVIDED FOR OUTSIDE AC LOAD CONDUIT CONNECTION, NEUTRAL
CONNECTION, BATTERY CHARGER 120 VOLT AC (0.5 AMP MAX.) CONNECTION,
ACCESS TO TRANSFER SWITCH CONTROL WIRES, AND TRANSFER SWITCH
CONNECTION (IF SO EQUIPPED). REMOVE FRONT COVER FOR ACCESS.
5) REFERENCE OWNERS MANUAL FOR LIFTING WARNINGS.
6) REMOVE LIFT-OFF ENCLOSURE TO ACCESS EXHAUST MUFFLER.

WEIGHT DATA

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<tr>
<th>ENGINE/KW</th>
<th>ENCLOSURE MATERIAL</th>
<th>WEIGHT (GENSET ONLY) KG (LBS)</th>
<th>WEIGHT (SHIPPING CARTON/SKID) KG (LBS)</th>
<th>SHIPPING WEIGHT (GENSET, SKID, &amp; CARTON) KG (LBS)</th>
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<td>383 (843)</td>
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<td>ALUMINUM</td>
<td>405 (893)</td>
<td>434 (957)</td>
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AIR INLET LOUVERS

13.5 (17/32") DIA. MOUNTING HOLE (4) PLACES, 12.7 (1/2") DIA. MASONRY ANCHOR BOLTS RECOMMENDED

CONCRETE MOUNTING PAD
SEE NOTE 1

REAR VIEW
GROUP G

CONTROL PANEL LEGEND:
AVR - AUTOMATIC VOLTAGE REGULATOR
BCH - BATTERY CHARGER
BR1 - DIODE (FIELD BOOST)
CB2 - CIRCUIT BREAKER (EXCITATION)
F1 - FUSE BAT POWER (15A ATO TYPE)
HM - HOUR METER
J2 - CONNECTOR 2 (ON PCB)
R4 - FIELD BOOST RESISTOR 15 OHM
RL1 - RELAY 1 (START RELAY)
RL2 - RELAY 2 (ENGINE RUN)
SW1 - AUTO/OFF/MANUAL SWITCH
SW2 - SET EXCERSISER SWITCH
TR1 - TRANSFORMER (6VA UTIL/16 VAC)

NOTE 1: WIRING SHOWN FOR CB1, NB, BA AND STATOR IS TYPICAL FOR SINGLE PHASE. FOR 3-PHASE, SEE DWG #0F6839.
### COMPONENTS INCLUDED IN 0H1433E

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<td>REF.</td>
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<td>0F1264</td>
<td>REF.</td>
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### COMPONENTS INSTALLED PER THIS DRAWING

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**NOTE:** ITEMS MARKED BY * ARE PART OF WIRE HARNESS.