GENERAC®

Owner's Manual

For

Stationary Industrial Generators

Gas or Diesel

⚠DANGER

Asphyxiation. Running engines produce carbon monoxide, a colorless, odorless, poisonous gas. Carbon monoxide, if not avoided, will result in death or serious injury.

(000103)

⚠WARNING

Equipment damage. Only qualified service personnel may install, operate, and maintain this equipment. Failure to follow proper installation requirements could result in death, serious injury, and equipment or property damage.

(000182a)

⚠WARNING

Loss of life. This product is not intended to be used in a critical life support application. Failure to adhere to this warning could result in death or serious injury.

(000209b)

SAVE THIS MANUAL FOR FUTURE REFERENCE

Use this page to record important information about this generator.

Gen Model:	
Model:	
Serial:	
Alternate No:	
Production Date:	
Country of Origin:	
KW / KVA:	
Volts:	
Amps:	
Hz:	
Phase:	
Controller P/N:	

Record the information found on the unit data label on this page. See ***Safety Information*** for the location of the unit data label. The unit has a label plate affixed to the inside partition, to the left of the control panel console.

Always supply the complete model and serial numbers of the unit when contacting an Independent Authorized Service Dealer (IASD) about parts and service.

Operation and Maintenance: Correct maintenance and care of the unit ensures a minimum number of problems, and keeps operating expenses at a minimum. It is the operator's responsibility to perform all safety inspections, to verify all maintenance for safe operation is performed promptly, and to have the equipment inspected periodically by an IASD. Normal maintenance, service, and replacement of parts are the responsibility of the owner/operator and are not considered defects in materials or workmanship within the terms of the warranty. Individual operating habits and usage may contribute to the need for additional maintenance or service.

When the generator requires servicing or repairs, Generac recommends contacting an IASD for assistance. Authorized service technicians are factory-trained and are capable of handling all service needs. To locate the nearest IASD, please visit the dealer locator at: ***www.generac.com/Dealer-Locator.***

IMPORTANT NOTE: For stationary, non-emergency use in the United States, consult applicable state/district regulations and permits.

IMPORTANT NOTE: For equipment used outside the United States, consult applicable country/region regulations and permits.

⚠WARNING

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65Warnings.ca.gov/diesel. (000394)

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Section 1: Safety Information

Introduction

Thank you for purchasing a Generac Power Systems, Inc. product. This unit has been designed to provide high-performance, efficient operation, and years of use when maintained correctly.

The information in this manual is accurate based on products produced at the time of publication. The manufacturer reserves the right to make technical updates, corrections, and product revisions at any time without notice.

Read This Manual Thoroughly

⚠WARNING

Consult Manual. Read and understand manual completely before using product. Failure to completely understand manual and product could result in death or serious injury. (000100a)

If any section of this manual is not understood, contact the nearest Independent Authorized Service Dealer (IASD) or Generac Customer Service at 1-888-436-3722 (1-888-GENERAC), or visit ***www.generac.com*** for starting, operating, and servicing procedures. The owner is responsible for correct maintenance and safe use of the unit.

This manual must be used in conjunction with all other supporting product documentation supplied with the product.

SAVE THESE INSTRUCTIONS for future reference. This manual contains important instructions that must be followed during placement, operation, and maintenance of the unit and its components. Always supply this manual to any individual that will use this unit, and instruct them on how to correctly start, operate, and stop the unit in case of emergency.

Installation, Operation, and Maintenance

This generator set must be installed by an IASD or other competent, qualified contractor. Initial startup must be performed and documented by an IASD. An IASD can also provide the necessary training for authorized operators. It is the operator's responsibility to perform all safety inspections, to verify all maintenance for safe operation is performed promptly, and to have the equipment inspected periodically by an IASD.

Access to the generator shall be through the use of a special tool, or lock and key, or other means of security and shall be controlled by the authority responsible for the location.

Normal maintenance service and replacement of parts are the responsibility of the owner 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.

Correct maintenance and care of the generator will ensure a minimum number of problems and keep operating expenses at a minimum. See an IASD for service aids and accessories.

Safety Rules

The manufacturer cannot anticipate every possible circumstance that might involve a hazard. The alerts in this manual, and on tags and decals affixed to the unit, are not all inclusive. If using a procedure, work method, or operating technique that the manufacturer does not specifically recommend, verify that it is safe for others and does not render the equipment unsafe.

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

⚠DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

(000001)

⚠WARNING

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

(000002)

⚠CAUTION

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

(000003)

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

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

How to Obtain Service

NOTE: Use this page to record important information about the generator set. This label is typically located on the side of the control panel.

Each generator set has a data label containing important information about the unit.

Always supply complete model number and serial number of the unit as given on the data label when contacting an IASD about parts or service. For quick and easy reference, copy the information printed on the data label located on the generator onto the sample label printed here. See ***Figure 1-1***.

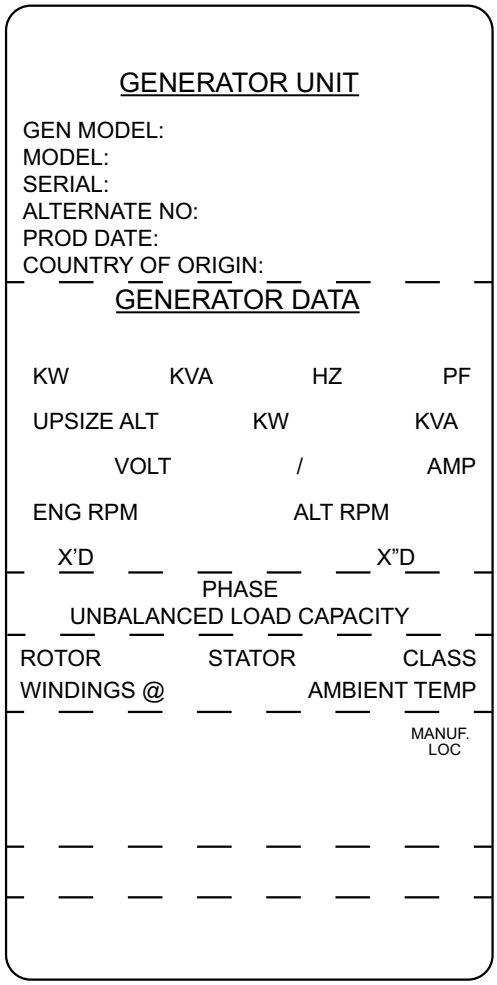


Figure 1-1. Data Label (Sample)

General Hazards

⚠DANGER

Loss of life. Property damage. Installation must always comply with applicable codes, standards, laws and regulations. Failure to do so will result in death or serious injury. (000190)

⚠DANGER

Automatic start-up. Disconnect utility power and render unit inoperable before working on unit. Failure to do so will result in death or serious injury. (000191)

⚠WARNING

Accidental Start-up. Disconnect the negative battery cable, then the positive battery cable when working on unit. Failure to do so could result in death or serious injury. (000130)

⚠WARNING

Equipment damage. Only qualified service personnel may install, operate, and maintain this equipment. Failure to follow proper installation requirements could result in death, serious injury, and equipment or property damage. (000182a)

⚠WARNING

Personal Injury. Fuel lines are pressurized. Servicing the fuel lines may release high pressure fuel and could result in death or serious injury. (000501)

⚠WARNING

Moving Parts. Do not wear jewelry when starting or operating this product. Wearing jewelry while starting or operating this product could result in death or serious injury. (000115)

⚠WARNING

Moving Parts. Keep clothing, hair, and appendages away from moving parts. Failure to do so could result in death or serious injury. (000111)

⚠WARNING

Equipment and property damage. Do not alter construction of, installation, or block ventilation for unit. Doing so could result in unsafe operation or damage to the unit. (000146a)

⚠WARNING

Risk of injury. Do not operate or service this machine if not fully alert. Fatigue can impair the ability to operate or service this equipment and could result in death or serious injury. (000215a)

⚠WARNING

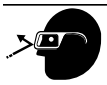
Injury and equipment damage. Do not use generator as a step. Doing so could result in falling, damaged parts, unsafe equipment operation, and could result in death or serious injury. (000216)

⚠WARNING

Sudden start-up. Always set the safety disconnect switch to MANUAL before working on equipment. Failure to do so could result in death or serious injury. (000194)

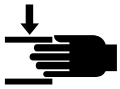
⚠WARNING

Personal injury. Do not insert any object through the air cooling slots. Generator can start at any time and could result in death, serious injury, and unit damage. (000142a)



⚠WARNING

Vision Loss. Eye goggles are required to be worn when using this machine. Failure to wear eye goggles could result in permanent vision loss. (000101)



⚠WARNING

Pinch point. Keep hands clear of pinch points when installing or removing parts, or opening and closing doors. Failure to do so could result in serious injury. (000803)

⚠WARNING

Loss of life. This product is not intended to be used in a critical life support application. Failure to adhere to this warning could result in death or serious injury. (000209b)

⚠WARNING

Hearing Loss. Hearing protection is recommended when using this machine. Failure to wear hearing protection could result in permanant hearing loss. (000107)

In the design and construction, all edges or cutting profiles have been eliminated. Any burring due to adjustment and assembly operations has also been eliminated during the assembly phases.

The use of gloves shall be utilized when handling parts which may have edges or angles.

Exhaust Hazards

⚠DANGER

Asphyxiation. Running engines produce carbon monoxide, a colorless, odorless, poisonous gas. Carbon monoxide, if not avoided, will result in death or serious injury. (000103)

⚠WARNING

Equipment and property damage. Do not alter construction of, installation, or block ventilation for unit. Doing so could result in unsafe operation or damage to the unit. (000146a)

⚠WARNING

Asphyxiation. Always use a battery operated carbon monoxide alarm indoors and installed according to the manufacturer's instructions. Failure to do so could result in death or serious injury. (000178a)

Electrical Hazards

⚠DANGER

Electrocution. Contact with bare wires, terminals, and connections while generator is running will result in death or serious injury. (000144)

⚠DANGER

Electrocution. Never connect this unit to the electrical system of any building unless a licensed electrician has installed an approved transfer switch. Failure to do so will result in death or serious injury. (000150)

⚠DANGER

Electrical backfeed. Use only approved switchgear to isolate generator from the normal power source. Failure to do so will result in death, serious injury, and equipment damage. (000237)

⚠DANGER

Electrocution. Verify electrical system is properly grounded before applying power. Failure to do so will result in death or serious injury. (000152)

⚠DANGER

Electrocution. Do not wear jewelry while working on this equipment. Doing so will result in death or serious injury.

(000188)

⚠DANGER

Electrocution. Water contact with a power source, if not avoided, will result in death or serious injury.

(000104)

⚠DANGER

Electrocution. Turn utility supply OFF before working on utility connections of the transfer switch. Failure to do so will result in death or serious injury. (000123)

⚠DANGER

Electrocution. In the event of electrical accident, immediately shut power OFF. Use non-conductive implements to free victim from live conductor. Apply first aid and get medical help. Failure to do so will result in death or serious injury. (000145)

⚠WARNING

Electrocution. Potentially lethal voltages are generated by this equipment. Render the equipment safe before attempting repairs or maintenance. Failure to do so could result in death or serious injury.

(000187)

⚠WARNING

Electric shock. Only a trained and licensed electrician should perform wiring and connections to unit. Failure to follow proper installation requirements could result in death, serious injury, and equipment or property damage.

(000155a)

⚠WARNING

Electrocution. Refer to local codes and standards for safety equipment required when working with a live electrical system. Failure to use required safety equipment could result in death or serious injury.

(000257)

Lifting Hazards

⚠WARNING

Personal injury. Failure to properly connect lifting cables, chains, or straps could result in death, serious injury, or property damage.

(000346)

⚠WARNING

Personal Injury. Do not use lifting hook if there are signs of damage or corrosion. Doing so could result in death, serious injury, or property damage.

(000349)

⚠WARNING

Personal Injury. Do not use lifting hook other than as directed. Failure to do so could result in death, serious injury, or property damage.

(000350)

⚠WARNING

Personal Injury. Verify all fasteners are properly tightened prior to lifting unit. Failure to do so could result in death, serious injury, or property damage.

(000351)

⚠WARNING

Personal injury. Excessive weight. Use only appropriate lifting eyes and lifting equipment to lift unit. Improper lifting techniques could result in equipment damage, death or serious injury. (000224)

⚠WARNING

Personal Injury. When using a ladder, verify ladder is on level ground and clear of debris that could result in slipping, tripping, or falling. Do not climb past top rung of ladder. Failure to adhere to these guidelines could result in death or serious injury. (000804)

⚠WARNING

Equipment damage. Only qualified service personnel may install, operate, and maintain this equipment. Failure to follow proper installation requirements could result in death, serious injury, and equipment or property damage.

(000182a)

Fire Hazards

⚠DANGER

Explosion and Fire. Fuel and vapors are extremely flammable and explosive. Add fuel in a well ventilated area. Keep fire and spark away. Failure to do so will result in death or serious injury. (000105)

⚠WARNING

Fire risk. Fuel and vapors are extremely flammable. Do not operate indoors. Doing so could result in death, serious injury, or property or equipment damage. (000281)

⚠WARNING

Fire hazard. Do not obstruct cooling and ventilating airflow around the generator. Inadequate ventilation could result in fire hazard, possible equipment damage, death or serious injury. (000217)

⚠WARNING

Fire and explosion. Installation must comply with all local, state, and national electrical building codes. Noncompliance could result in unsafe operation, equipment damage, death, or serious injury. (000218)

⚠WARNING

Fire hazard. Use only fully-charged fire extinguishers rated “ABC” by the NFPA. Discharged or improperly rated fire extinguishers will not extinguish electrical fires in automatic standby generators. (000219)

⚠WARNING

Electrocution. Refer to local codes and standards for safety equipment required when working with a live electrical system. Failure to use required safety equipment could result in death or serious injury. (000257)

⚠WARNING

Risk of Fire. Unit must be positioned in a manner that prevents combustible material accumulation underneath. Failure to do so could result in death or serious injury. (000147)

⚠WARNING

Hot Surfaces. When operating machine, do not touch hot surfaces. Keep machine away from combustibles during use. Hot surfaces could result in severe burns or fire. (000108)

Comply with regulations the Occupational Safety and Health Administration (OSHA) has established, or with equivalent standards. Also, verify that the unit is applied, used, and maintained in accordance with the manufacturer's instructions and recommendations. Do nothing that might alter safe application/usage and render the unit in noncompliance with the aforementioned codes, standards, laws, and regulations.

Explosion Hazards

⚠DANGER

Explosion and fire. Fuel and vapors are extremely flammable and explosive. No leakage of fuel is permitted. Keep fire and spark away. Failure to do so will result in death or serious injury. (000192)

⚠DANGER

Explosion and fire. Connection of fuel source must be completed by a qualified professional technician or contractor. Incorrect installation of this unit will result in death, serious injury, and property and equipment damage. (000151a)

⚠DANGER

Risk of fire. Allow fuel spills to completely dry before starting engine. Failure to do so will result in death or serious injury. (000174)

⚠WARNING

Explosion and fire risk. Do not smoke near unit. Keep fire and spark away. Failure to do so could result in death, serious injury, or property or equipment damage. (000282)

⚠WARNING

Risk of Fire. Hot surfaces could ignite combustibles, resulting in fire. Fire could result in death or serious injury. (000110)

Battery Hazards

⚠DANGER

Electrocution. Do not wear jewelry while working on this equipment. Doing so will result in death or serious injury. (000188)

⚠WARNING

Explosion. Do not dispose of batteries in a fire. Batteries are explosive. Electrolyte solution can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

(000162)

⚠WARNING

Explosion. Batteries emit explosive gases while charging. Keep fire and spark away. Wear protective gear when working with batteries. Failure to do so could result in death or serious injury.

(000137a)

⚠WARNING

Explosion. Batteries emit explosive gases. Always disconnect negative battery cable first to avoid spark. Failure to do so could result in death or serious injury.

(000238)

⚠WARNING

Electrical shock. Disconnect battery ground terminal before working on battery or battery wires. Failure to do so could result in death or serious injury.

(000164)

⚠WARNING

Risk of burns. Batteries contain sulfuric acid and can cause severe chemical burns. Wear protective gear when working with batteries. Failure to do so could result in death or serious injury.

(000138a)

⚠WARNING

Risk of burn. Do not open or mutilate batteries. Batteries contain electrolyte solution which can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

(000163a)

⚠WARNING

Environmental Hazard. Always recycle batteries at an official recycling center in accordance with all local laws and regulations. Failure to do so could result in environmental damage, death, or serious injury.

(000228)

Always recycle batteries in accordance with local laws and regulations. Contact your local solid waste collection site or recycling facility to obtain information on local recycling processes. For more information on battery recycling, visit the Battery Council International website at: ***http://batterycouncil.org***.

Standards Index

The generator owner must strictly comply with all applicable national, state, or local laws, codes, and regulations pertaining to the installation of engine-generator power systems. Always use the current acceptable version or edition of the applicable code or standard which applies to the local jurisdiction. In the absence of pertinent local laws and standards, the following published booklets may be used as a guide:

National Fire Protection Association (NFPA) 70: The National Electric Code (NEC)*

1. NFPA10: Standard for Portable Fire Extinguishers*
2. NFPA 30: Flammable and Combustible Liquids Code*
3. NFPA 37: Standard for Stationary Combustion Engines and Gas Turbines*
4. NFPA 54: National Fuel Gas Code*
5. NFPA 58: Standard for Storage and Handling of Liquefied Petroleum Gases*
6. NFPA 68: Standard on Explosion Protection by Deflagration Venting*
7. NFPA 70E: Standard for Electrical Safety in the Workplace*
8. NFPA 99: Health Care Facilities Code*
9. NFPA 101: Life Safety Code*
10. NFPA 110: Standard for non-emergency and Standby Power Systems*
11. NFPA 211: Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances*
12. NFPA 220: Standard on Types of Building Construction*
13. NFPA 5000: Building Code*
14. International Building Code**
15. Agricultural Wiring Handbook***
16. ASAE EP-364.2 Installation and Maintenance of Farm Standby Electric Power****

This list is not all inclusive. Check with the Authority Having Local Jurisdiction (AHJ) for any local codes or standards which may be applicable to the jurisdiction where the generator is installed. The above listed standards are available from the following Internet sources:

* *www.nfpa.org*

** *www.iccsafe.org*

*** *www.rerc.org* Rural Electricity Resource Council; P.O. Box 309; Wilmington, OH 45177-0309

**** *www.asabe.org* American Society of Agricultural & Biological Engineers; 2950 Niles Road; St. Joseph, MI 49085

Section 2: General Information

Unit Identification

Data Label

Each generator set has a data label containing important information about the generator. The data label lists unit serial number, rated voltage, amps, wattage capacity, etc.

NOTE: The figure below is a generic representation only. See data label(s) affixed to unit for actual information on a particular model.

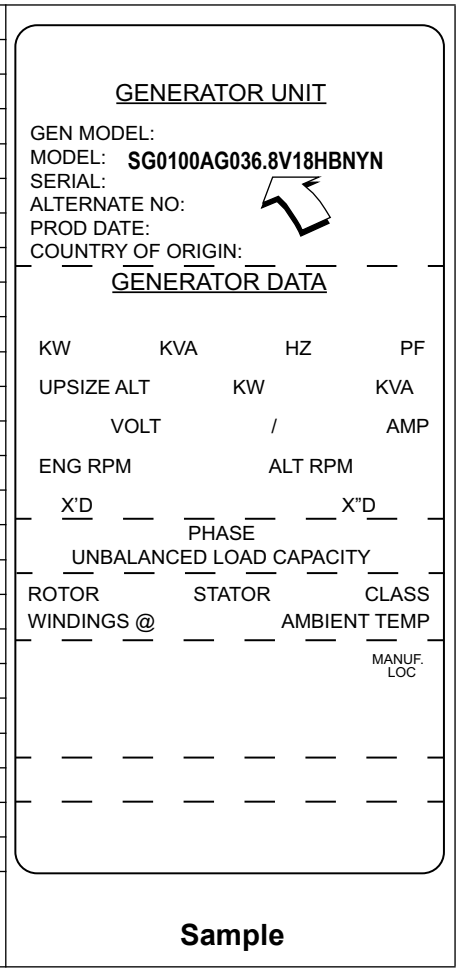
Model Identification Code

The model identification code gives important information about the generator set. For example, if the code is:

SG 0100 A G03 6.8 V 18 H B N Y N

then the generator set would have the attributes shown in bold below:

S	Standby	
	M	Modular
	P	Prime
	W	Prime Modular (MPS)
	C	Continuous
	Z	Protector Series
G	Gaseous engine	
	D	Diesel engine
	B	Bi-Fuel
0100	kW rating (0100 = 100kW)	
A	Voltage code (see ***Voltage Code***)	
G03	Engine designation (for internal use)	
6.8	Engine size (6.8 = 6.8L, 14.2 = 14.2L)	
V	Fuel type (see ***Fuel Type***)	
18	Engine RPM (see ***Engine RPM***)	
H	Control Panel (see ***Controller Type***)	
B	Brushless excitation	
	P	Permanent magnet (external) excitation
	D	Direct excitation
	A	AREP
K	Compact L2 sound attenuated	
Y	Exhaust muffler mounted	
	N	Exhaust muffler not provided
	L	Exhaust muffler shipped loose with unit
N	Emission designation (for internal use)	



Sample

Voltage Code

Voltages	Code	Description
60 Hz	**A**	120/240 VAC, single-phase, three-lead
	D	120/240 VAC, single- or three-phase, 12-lead (Full capacity single- or three-phase; cannot be reconnected for 277/480 VAC)
	G	120/208 VAC, three-phase, 12-lead
	H	231/400 VAC, three-phase, 12-lead (Adjustable from 380 VAC to 416 VAC)
	J	120/240 VAC, three-phase, 12-lead
	K	277/480 VAC, three-phase, 12-lead
	L	346/600 VAC, three-phase, three-lead
50 Hz	**M**	110/220 VAC, single-phase, three-lead (Adjustable to 120/240 VAC)
	N	115/200 VAC, single-phase, 12-lead
	P	100/200 VAC, three-phase, 12-lead (Adjustable to 240 VAC)
	R	231/400 VAC, three-phase, 12-lead (Adjustable from 380 VAC to 416 VAC)
	S	480 VAC, three-phase, three-lead

Fuel Type

Code	Description
B	Bi-Fuel Diesel and Natural Gas
D	Diesel
G	Gasoline
N**	Natural Gas (NG) (Normal)
S*	Natural Gas (Low Pressure)
V	Liquid Propane Vapor Withdraw (LPV)
L	Liquid Propane Withdraw (LPL)
P**	Dual Fuel NG (Normal) / LPL Secondary
R**	Dual Fuel NG (Normal) / LPV Secondary
Q*	Dual Fuel NG (Low Pressure) / LPL Secondary
T*	Dual Fuel NG (Low Pressure) / LPV Secondary

*Low Pressure Range = 7–11 in H_2O (1.7–2.7 kPa)

**Normal Pressure Range = 11–14 in H_2O (2.7–3.5 kPa)

Engine RPM

Example	Description
15	1,500 rpm
18	1,800 rpm
23	2,300 rpm
30	3,000 rpm
36	3,600 rpm

NOTE: Engines operating above 1,500 or 1,800 rpm use a gearbox to reduce the engine rpm to the desired alternator rotor rpm of 1,500 rpm (50 Hz operation) or 1,800 rpm (60 Hz operation).

Controller Type

Code	Description
A	ComAp
B	Deep Sea (DSE) G8610
C	Deep Sea (DSE) G8601
D	Power Zone 410
E	Power Zone 410 (Turbo)
G	G-Panel
H	H-Panel
P	Power Zone Pro Sync
S	Power Zone Pro
T	Power Zone Pro (Turbo)

Equipment Description

This equipment is a revolving field, alternating current type generator set. The generator set is designed to supply electrical power for the operation of compatible electrical loads when 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 or a gearbox. Generators with a 4-pole rotor are driven at a rated speed of 1,800 rpm to supply a frequency of 60 Hertz. 4-Pole rotors operating at 50 Hertz are driven at 1,500 rpm.

See data label affixed to the unit for rated AC voltage, wattage, amperage, number of phases, etc. See ***Model Identification Code*** for an explanation of how to identify the unit's features.

Standard Generator Features

The generator incorporates the following features:

- 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.
- Generator is self-ventilated and drip-proof constructed.
- 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.

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 the generator set has been correctly selected, installed, and interconnected by a competent, qualified electrician or installation contractor. Once installation is complete, do nothing which may result in non-compatibility between the generator and connected electrical loads.

Single-Phase "A" or "M" Code Units

The following statement applies to single-phase units with an "A" or "M" code alternator:

The generator is suitable for supplying typical residential loads, such as induction motors (sump pumps, refrigerators, air conditioners, furnaces, etc.), electronic components (TV, computer, monitor, etc.), lighting loads, and microwaves.

Three-Phase Load Imbalance Limits

For three-phase units, the maximum load imbalance between phases can not exceed 25% of rated load (current).

Ambient Condition Derate

The maximum ambient temperature for the generator is indicated on the unit data label. Derate values for ambient temperature in excess of that indicated on the data label, as well as altitude, may apply depending on the engine and kW rating of the unit. Contact an IASD for any derate values applicable to this specific generator at its installed location.

Engine and Generator Protective Devices (If Equipped)

The generator set may be required to operate for long periods of time without an operator to monitor conditions such as coolant temperature, oil pressure, voltage, frequency, etc. For this reason, the generator set has numerous sensors to provide the control panel with the information it needs to protect both the engine and generator. The control panel is designed to shut down the engine if potentially damaging conditions occur. These conditions can include low oil pressure, high coolant temperature, low coolant level, engine overspeed, over or under voltage, over or under frequency, etc. These settings are configured at the factory and can be adjusted by an IASD if required.

NOTE: Engine and generator protective devices are only mentioned here for the owner's general information. For details, consult the applicable control panel technical manual. The list below is not all inclusive.

Coolant Temperature Sensor

The control panel 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 low coolant temperature sensor, 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 control panel will shut the engine down.

Oil Pressure Sensor

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

Oil Temperature Sensor (If Equipped)

The control panel automatically shuts down the engine if the oil temperature rises above a safe level.

Overspeed Shutdown

A speed circuit controls engine cranking, startup, operation, and shutdown. Engine speed signals are delivered to the control panel whenever the unit is running. Should the engine overspeed above a safe, preset value, the control panel 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. The default settings are:

- The unit will attempt to start (crank) three times.
- Each crank cycle lasts either 10 or 15 seconds, followed by a five second rest (to cool the starter).
- After three starting attempts the unit will shutdown.

RPM Sensor Loss Shutdown

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

Low Fuel Pressure Warning

- Some gaseous units are equipped with a low fuel pressure warning switch which will trigger a Warning alarm if the fuel pressure drops below a minimum setting.

- Diesel units with fuel tanks are equipped with High and Low fuel level warning alarms, as well as a low fuel level shutdown alarm.

DC Fuses

Located inside the front panel, the fuses protect the control panel wiring and components from damaging overload. See corresponding control panel manual for fuse location and identification.

Fuel System

This generator set is equipped with one of the following fuel systems:

- Diesel fuel system
- Natural Gas (NG) fuel system
- Bi-Fuel Diesel and Natural Gas
- LP gas vapor withdrawal fuel system (LPV)
- LP liquid withdrawal fuel system (LPL)
- Dual fuel system: Natural Gas (primary fuel source), LP gas vapor (secondary fuel source)
- Dual fuel system: Natural Gas (primary fuel source, LP liquid (secondary fuel source)

Diesel Fuel System

The manufacturer recommends the use of No. 2 diesel fuel when temperatures are above freezing, and No. 1 diesel fuel when temperatures drop below freezing. Diesel fuel must meet the following requirements:

Beginning October 1, 2010, owners and operators that use diesel fuel must use diesel fuel that meets:

- Sulfur content of 15 parts per million (ppm) maximum.
- Cetane index or aromatic content as follows: A minimum cetane index of 40, or a maximum aromatic content of 35 volume percent.

NG Fuel System

NG is supplied by a local utility in its vapor state through in ground piping.

Bi-fuel Fuel System

Combines diesel fuel and natural gas fuel systems.

LP Fuel System

LP is supplied as a liquid in pressurized tanks. It is usually made up of propane, butane, or a mixture of both gases.

LP Vapor Withdrawal Fuel System

Utilizes the vapors formed above the liquid fuel in the supply tank. Approximately 10–20 percent of the tank capacity is needed for fuel expansion from the liquid to the vapor state.

LP Liquid Withdrawal Fuel System

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 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: Units with LP gas liquid withdrawal systems incorporate a block heater as standard equipment. The heater is powered by the utility power source during non-operating periods to provide heated coolant to aid in the fuel vaporization process.

Dual Fuel: NG/LP Fuel System

Some applications consist of a dual-fuel system. This type of fuel system allows the generator to run on either NG (primary) or LP vapor or liquid (secondary). The unit automatically switches to the secondary source the primary source (utility supplied) becomes unavailable. It can do so while in operation or while not operating.

NOTE: Engines using propane as an alternative fuel are limited to a maximum of 100 hours per year solely during emergency operations and must keep records of such use. Further operation requires a performance test to confirm compliance with the emissions standards of §60.4233.

Specifications

Generator

See data plate on the generator for rated watts, amperes, frequency, voltage, phase, and other important information.

Engine Oil Recommendations

The engine has been filled with factory engine oil of a grade recommended by the engine supplier. See the applicable engine service manual for engine oil recommendations.

The manufacturer recommends an initial oil and filter change after the first 50 hours (or first three months) of service operation. Use a high quality detergent oil with an appropriate classification and viscosity for the engine type and ambient temperature conditions. Contact your IASD for oil recommendations. Synthetic oils meeting the same service category and viscosity requirements for the application may be used.

- Recommended API Service Category for gaseous engines: SJ, SL, SM, or SN.

- Recommended API Service Category for diesel engines: CH-4, CI-4, or CJ-4

Coolant

⚠DANGER

Risk of poisoning. Do not use mouth to siphon coolant. Doing so will result in death or serious injury.

(000149)

⚠WARNING

Risk of burns. Do not open coolant system until engine has completely cooled. Doing so could result in serious injury.

(000154)

⚠CAUTION

Risk of overheating. Do not use any chromate base rust inhibitor with propylene glycol base antifreeze, boosters, or additives. Doing so will cause overheating and possible equipment damage. (000165a)

Use only deionized or distilled water and Ethylene glycol antifreeze (Propylene glycol can also be used, but do not mix with Ethylene glycol). When adding coolant, always add the recommended 50-50 mixture.

Gearbox Lubrication (If Equipped)

Use only SAE 90 gear oil with the correct proportion of Lucas Heavy Duty Oil Stabilizer. See ***Maintenance*** section for more information.

Starting Aids (If Equipped)

One or more of the following starting aids may be provided to ensure quicker, easier starts under varying climactic conditions.

- Engine coolant heater
- Engine oil heater
- Battery warmer
- Glow plugs

These aids are powered by a normal (utility) power source during non-operating periods.

Engine Coolant Heater

Heats engine coolant when the unit is not operating. This action keeps the engine warm even in cold weather, helping to ensure quicker starts. Powered by a circuit normally fed by the utility power supply.

Engine Oil Sump Heater

Keeps the oil in the sump heated to allow easier starting and faster engine warm-up. Powered by a circuit normally fed by the utility power supply.

Battery Warmer

Keeps battery warm so it can provide full cranking current when starting in cold conditions. Powered by a circuit normally fed by the utility power supply.

Glow Plugs / Intake Air Heater

Internally heat the cylinders of a diesel engine. This assists in achieving a chamber temperature high enough for combustion. Powered by a circuit normally fed by battery power.

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Section 3: Operation

Generator Control and Operation

⚠WARNING

Equipment damage. Only qualified service personnel may install, operate, and maintain this equipment. Failure to follow proper installation requirements could result in death, serious injury, and equipment or property damage.

(000182a)

Operation of this generator set should only be performed by an authorized operator, which is, someone who has been properly trained by an IASD. Contact a local IASD for assistance in training Authorized Operators.

The following instructions assume the generator has been correctly installed, serviced, tested, adjusted, and otherwise prepared for use by a competent, qualified installation contractor and IASD. Carefully read the Safety Rules and any other safety information before attempting to operate this (and related) equipment.

Grounding the Generator

⚠DANGER

Explosion and Fire. Do not connect ground wire to any pipe that carries a flammable or explosive substance. Doing so will result in death or serious injury.

(000211)

See ***Figure 3-1***. Ground the generator set in accordance with all codes and regulatory requirements.

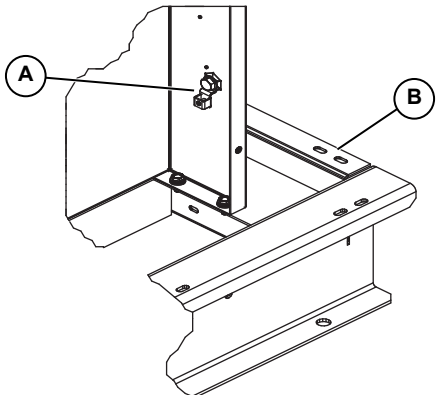


Figure 3-1. Grounding Electrode Terminal (Typical)

A	Grounding Electrode Terminal
B	Base Frame

Generator AC Neutral Connections

Grounding is recommended only at one point in the system. Consult local building codes for correct neutral grounding requirements.

Initial Startup

The initial startup of the generator set must be performed and documented by an IASD.

Control Panel Interface

See ***Figure 3-2***, ***Figure 3-3***, ***Figure 3-4***, ***Figure 3-5***, ***Figure 3-6***, and ***Figure 3-7***. The control panel interface mounted on the generator allows the operator to monitor, and if necessary, manually start the generator. See ***Table 3-1*** for callout definitions for the figures which follow.

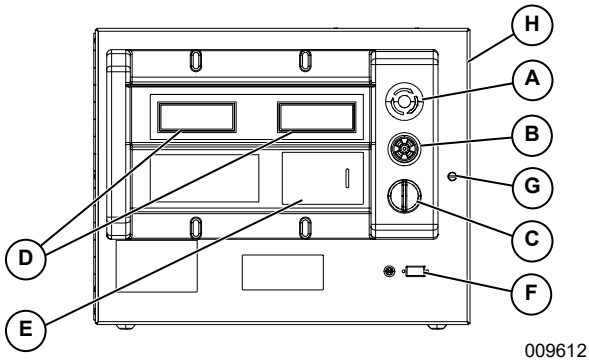


Figure 3-2. H-Panel

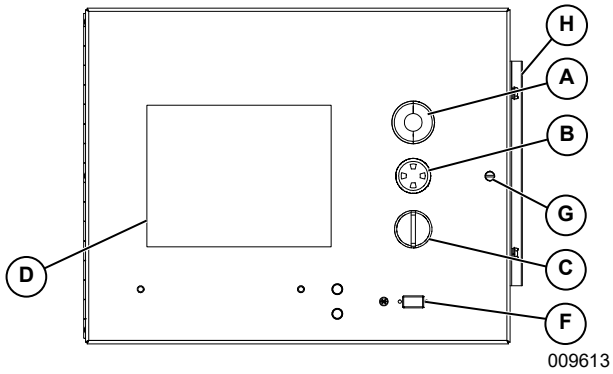


Figure 3-3. G-Panel

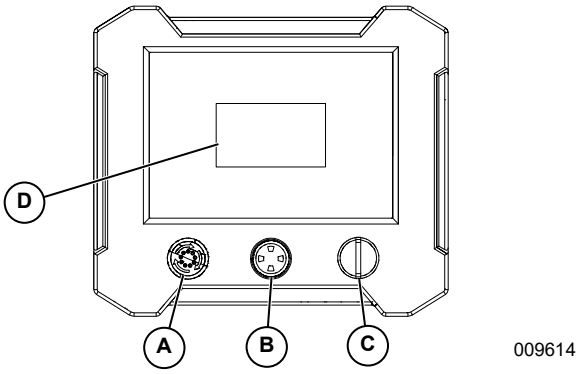


Figure 3-4. Power Zone® Pro

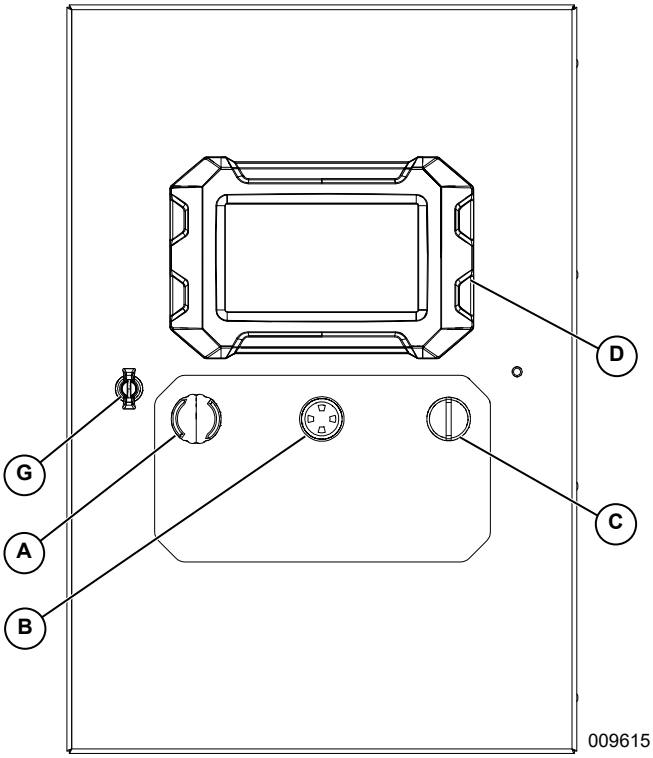


Figure 3-5. Power Zone Pro Sync

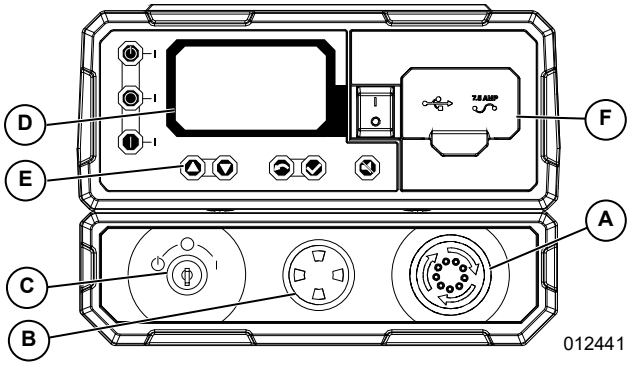


Figure 3-6. Power Zone 410

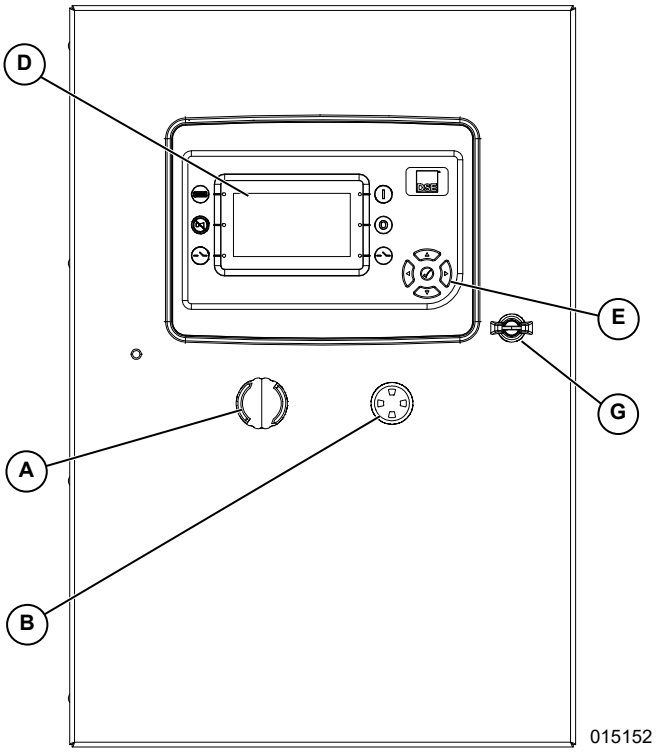


Figure 3-7. DSE G8601

Table 3-1. Control Panel Interface Definitions

A	Emergency stop button
B	Common alarm
C	Key switch
D	Display window
E	Arrow key pad
F	Communication port
G	Panel access
H	Battery charger

NOTE: See accompanying control panel manual for more information.

Emergency Stop Button

⚠CAUTION

Equipment Damage. The emergency stop switch is not to be used to power down the unit under normal operating circumstances. Doing so could result in equipment damage. (000246b)

Pressing the emergency stop button while the unit is running will immediately shut down the generator. To start the unit, the emergency stop button must be manually reset, the alarm acknowledged, the key switch

turned to OFF, and then turned to either the AUTO or MAN position, depending on the desired mode of operation.

Common Alarm Horn

The common alarm and corresponding output are activated whenever a fault condition is set for alarm and if the fault is active. The common alarm will not activate on warnings or DTC fault conditions. Pressing the ENTER button on the key pad will acknowledge the alarm and silence the horn. The manufacturer recommends the local IASD be notified of any alarm condition in order for qualified service personnel to assess and correct the situation.

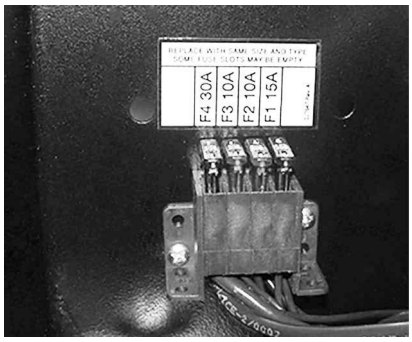
Key Switch (If Equipped)

The key switch positions are:

- **AUTO:** Generator automatically starts when a correctly connected automatic transfer switch senses a loss or reduction of available utility power.
- **OFF:** Immediately shuts down generator and prevents it from starting automatically.
- **MAN:** Immediately starts generator.

Fuse Block

The fuse block is located inside the control panel at the back lower left corner, and provides electrical protection for the DC power, wiring and other electrical components.



001066

Figure 3-8. Panel Fuse Block (Reference Only)

NOTE: Some units will NOT have a fuse in the F4 slot.

Additional Components

Generator Main Line Circuit Breaker (MLCB) (Generator Disconnect)

A generator MLCB (generator disconnect) is located in the high voltage customer connections panel, typically located to the right of the control panel. The generator MLCB (generator disconnect) serves as protection for the AC wiring and alternator, while also providing a means of disconnecting the generator.

Automatic Transfer Switch

⚠DANGER

Electrocution, equipment and property damage. Handle transfer switches carefully when installing. Never install a damaged transfer switch. Doing so could result in death or serious injury, equipment and property damage. (000195)

A typical automatic transfer switch monitors utility voltage and when voltage falls outside of specific parameters, it will initiate the generator start command. As long as the generator control is in the AUTO position, it responds to the automatic transfer switch start command.

For information about any connected automatic transfer switch, see the applicable transfer switch owner's manual.

Automatic Battery Charger

One of the following types of battery chargers may be provided:

- 2.5 amp
- 10 amp
- 20 amp

The 2.5 amp charger is 12 VDC only. The 10 amp charger is available either as a 12 VDC or 24 VDC. The 20 amp charger operates as both 12 VDC or 24 VDC. The appropriate battery charger is installed per the engine's battery system.

All chargers are fully automatic float types and are fully fuse protected (input and output). They have automatic current limiting to reduce risk of overcharging, and have automatic maintenance of charge voltage. Therefore, they can be connected to the batteries continuously.

The chargers require the connection of a charged battery in order to turn on. The battery provides boost voltage for the charger, so a completely dead battery will not allow the charger to operate. The boost required is approximately 9 to 11 volts for a 12 VDC system, and 18 to 22 volts for a 24 VDC system. Replace the battery if it is below the boost voltage.

Alarm Response Procedures

The generator is protected by factory set alarms and warnings. The alarms and warnings alert the owner of a fault condition that requires attention and action to keep the generator operating in an efficient and safe running order.

When any alarm is triggered, the common alarm horn sounds and the corresponding fault will be displaed.

NOTE: Not all faults can be corrected and cleared by the owner/operator. Some warnings, and most alarm conditions, must be safely cleared by a qualified dealer or trained technician.

Warnings

Warnings are the lowest level alarm, and are generated to alert the operator an operating condition has changed and may require action or inspection. Warnings clear once they are no longer active.

Non-Shutdown Alarms

Non-shutdown alarms are more urgent than warnings, and indicate a system parameter which is approaching or has exceeded a safe operating limit. Non-shutdown alarms require some form of action, such as inspection, close monitoring, etc. These types of alarms clear when they are no longer active and have been acknowledged.

Shutdown Alarms

Shutdown alarms protect the generator from damage and indicate a system fault which, if continued without immediate inspection or correction, would result in damage to the unit. Shutdown alarms are cleared only after key switch has been placed in OFF and they are no longer active.

Alarm Display Window

For information regarding alarm codes and troubleshooting procedures, see the applicable control panel manual.

General Fault Response Procedure

NOTE: See corresponding control panel manual for detailed alarm descriptions and specific procedures.

1. Use keypad or touch screen to navigate to the alarm display.
2. Carefully read each line of the alarm warning page to determine which fault condition is present. If there is more than one fault, the most recent is listed first.
3. Depending on the fault condition, toggle to the corresponding area.
4. Observe the information displayed for the affected area.
5. Determine corrective action necessary.
6. When the fault condition is cleared, the alarm display will turn off.

Operating the Unit with an 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: See applicable manual for any transfer switch being used and note the dangers during operation.

Normal operation is the generator in AUTOMATIC working with an automatic transfer switch. When the transfer switch senses a utility failure or loss it will provide a start command to the generator, the generator will automatically start and the transfer switch will transfer power to the load from utility to generator (emergency). It is important both the generator and any connected automatic transfer switch(es) be correctly connected and in AUTOMATIC mode for normal operation.

Operating Unit with a Manual Transfer Switch

⚠ DANGER

Electrocution. Do not manually transfer under load. Disconnect transfer switch from all power sources prior to manual transfer. Failure to do so will result in death or serious injury, and equipment damage. (000132)

⚠ DANGER

Electrocution. Only authorized personnel should access transfer switch interior. Transfer switch doors should be kept closed and locked. Failure to do so will result in death or serious injury. (000213)

If the generator was installed in conjunction with a transfer switch capable of manual operation only, or when an automatic transfer switch has failed and can only be transferred manually, the following procedure applies. A manually operated transfer switch is one which will not provide automatic startup.

Manual Engine Startup and Transfer

See applicable documentation for the control panel. For additional and specific information about any transfer switch connected to the generator, see applicable transfer switch manual as well.

Proceed as follows to manually transfer load from the utility source to the generator (emergency source):

1. With generator OFF, and the generator MLCB (generator disconnect) set to OFF (OPEN), turn OFF or disconnect utility power circuit to the transfer switch, using the means provided (such as the utility MLCB or other means of disconnect).
2. Manually set automatic transfer switch (ATS) to EMERGENCY (STANDBY/GENERATOR) with load circuits connected to the emergency (generator) power supply.
3. Set generator's MLCB (generator disconnect) to OFF (OPEN).
4. Start generator.
5. Allow engine to stabilize and warm up.
6. Verify all applicable instrument and gauge readings. When all readings are correct, set generator's MLCB (generator disconnect) to ON (CLOSED).

Load circuits are now powered by the stationary emergency generator.

Transfer Load and Shutdown

Proceed as follows to manually transfer load back to utility power source and shut down generator:

1. Set generator's MLCB (generator disconnect) to OFF (OPEN).
2. Verify utility power to the transfer switch is OFF (open the utility disconnect).
3. Manually set automatic transfer switch to UTILITY (NORMAL), i.e., load circuits connected to the utility.
4. Turn ON utility power supply to the transfer switch using the means provided (such as the utility MLCB).
5. Allow generator to run at no-load for five to ten minutes to stabilize internal temperatures.
6. Shut down generator.

Shutting Generator Down While Under Load

IMPORTANT NOTE: To turn generator OFF during utility outages to perform maintenance, or conserve fuel, follow these steps:

To turn generator OFF (while running in AUTO and ONLINE):

1. Turn main utility disconnect OFF.
2. Set generator MLCB (generator disconnect) to OFF (OPEN).
3. Allow generator to run for five minutes to cool down.
4. Turn generator OFF.

To turn generator back ON:

1. Put generator back into AUTO and allow to start and warm-up for a few minutes.
2. Set generator MLCB (generator disconnect) to ON (CLOSED).

The system will now be operating in AUTOMATIC mode. The generator MLCB (generator disconnect) can be turned ON (CLOSED). To shut unit OFF, this complete process must be repeated.

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Section 4: Maintenance

Maintenance

Regular maintenance will improve performance and extend engine/equipment life. Generac Power Systems, Inc. recommends that all maintenance work be performed by an Independent Authorized Service Dealer (IASD). Regular maintenance, replacement, or repair of the emissions control devices and systems may be performed by any repair shop or person of the owner's choosing. To obtain emissions control warranty service free of charge, the work must be performed by an IASD. See the emissions warranty.

Periodic inspection, service, and maintenance of this unit is critical in ensuring its reliable operation. The following is the manufacturer's recommended maintenance schedule. The established intervals are the maximum required when the unit is used in typical standby service applications (approximately 250 hours per year). Maintenance items need to be performed more frequently if the unit is used in severe applications (such as long duration outages, very high or very low ambient conditions, or extremely dirty or dusty environments). Use calendar time or hours of operation, whichever occurs first, from the previous maintenance interval to determine the next required maintenance interval. Note some inspections are based only on hours of operation.

There may be times when the generator must operate continuously for long periods of time (for example, extended utility outages). During such extended operational periods some items will require more frequent checking (based on hours). Use the "Extended Run-Time Maintenance Inspections" recommendation for such periods of operation.

Follow all applicable safety and caution statements found in the unit operating manual or engine service/maintenance manual before performing any maintenance checks or service.

NOTE: Only remove safety guards necessary to access service area. Do not remove guards where not required. After service, verify all guards are correctly installed and secured.

Service Maintenance Intervals

Extended Run-Time Maintenance Inspections: Daily inspections which must be performed when the unit is operated continuously for extended periods of time. These inspections and routine monthly inspections can be performed by an Authorized Operator.

NOTE: For units equipped with a gearbox, the gearbox oil should be inspected monthly or every 100 hours of operation.

1A. A **<u>one-time</u>** post installation, initial operation, service inspection of the generator set to verify it is ready to operate, transfer to, and carry load when required, and to identify any potential problem areas. *Performed ONLY ONCE following the first three months or first 50 hours of operation after installation and startup of the unit.*

The various service maintenance intervals are designated by interval numbers:

1. A frequent, periodic inspection of the generator set to verify it is ready to operate when required and to identify any potential problem areas. *Performed monthly, or every 24 hours (interrupted) of operation of the unit.*
2. An operational service inspection of the generator set to verify it is ready to operate and carry load when required, and to identify any potential problem areas. *Performed semi-annually (6 months) or every 125 hours of operation of the unit.*
3. A mid-level service inspection of the generator set to verify it is ready to operate and carry load when required, and to identify any potential problem areas. *Performed annually or every 250 hours of operation of the unit.*
4. A comprehensive service inspection of the generator set to verify it is correctly serviced and ready to operate and carry load when required, and to identify any potential problem areas. *Performed biannually (every 24 months or 500 hours).*

NOTE: Maintenance levels 2, 3, and 4 require the use of the applicable engine service manual and must be performed by a qualified service technician.

Maintenance Schedule

The following pages contain the maintenance schedule describing the inspections/tasks which need to be accomplished at each designated maintenance interval. Some maintenance level tasks are combined. For example, if the six month tasks are due, both the monthly and the six month task should be completed at the same time. Similarly, when the annual tasks are due, the monthly and semi-annual tasks should also be completed. There is space on the sheets for recording the date and signature of the person completing the task, as well as recording the engine hours and other pertinent information. At the bottom of each sheet, space is also provided to record any fluids added, parts replaced or corrective action taken. All of this recorded information provides a detailed maintenance history of the unit. This maintenance history may be required for warranty validation purposes, and is a good idea to maintain throughout the lifetime of the unit.

The manufacturer recommends service procedures beyond the normal monthly checks be performed by an IASD.

Notes and Maintenance Item Explanations

Maintenance Item	Description
Oil and oil filter	Change oil and filter shortly after start up or commissioning of the unit. The recommendation is that this be done after the first 50 hours of operation or after the first three months of service. Perform oil and filter changes every 250 hours (or yearly) thereafter. If an oil analysis program is used (annually), the acceptable oil change interval can be extended to 500 hours or every two years, based on the results of the analysis.
Gearbox oil (if equipped)	Change gearbox oil every two years or 600 hours of operation. Check gearbox oil level monthly or every 100 hours of operation.
Coolant quality	Check coolant annually for proper thermal protection levels. Drain, flush, and refill the cooling system with fresh coolant every two years regardless of operating hours.
Flexible hoses	Change coolant, fuel (gaseous supply hoses from regulator to mixer), oil, charge air cooling, and block heater hoses, flexible joints, etc.) every two years regardless of operating hours.
Accessory drive belts	Replace accessory drive belts every two years regardless of operating hours. If necessary, check and replace automatic tensioner (if used).
Magnetic pickup(s) mounted on flywheel housing	Remove, clean, inspect, and reset magnetic pickups to the correct operational output voltage every two years.
Crank and/or cam pickup for ignition system	Visually inspect (outside) for cleanliness and tightness.
Fuel and fuel filters (if equipped)	Fuel filters should be replaced per engine manufacturer's recommendations, or as needed for correct engine operation. Primary fuel/water separator is equipped with a drain to drain any condensation that accumulates.
Diesel exhaust fluid (DEF) (if equipped)	DEF quality can be measured by using a refractometer. DEF must comply with ISO standard 22241-1 with an urea solution of 32.5%. DEF has a shelf life of up to 18 months, depending on storage conditions.

NOTE: Certain applications may require more frequent maintenance inspections and more frequent operation under load.

NOTE: This schedule does not reflect all of the possible requirements of an individual engine manufacturer service schedule, particularly if the unit is used in other than a standby power application.

NOTE: For more information about service schedules and support for your application, contact a local IASD.

Disabling a Generator for Maintenance

There are two conditions when maintenance inspections may have to be performed on the unit:

1. When unit is in standby mode (AUTOMATIC) and NOT running. To disable unit from starting in this condition, in order to perform maintenance inspections or service, follow the steps in ***Disabling Generator From Starting***.
2. When unit is running and providing power to the load. To shut down unit safely, without damaging loads or generator, follow the steps for shutting down a unit while in operation. See ***Shutting Down and Starting an Operating Generator***. Before shutting down an operating unit for maintenance, always warn personnel that power will be shut down temporarily, so equipment which may be damaged can be correctly turned OFF or placed in standby.

Disabling Generator From Starting

To prevent injury, BEFORE performing any maintenance, proceed as follows to disable the generator set from starting and/or connecting to load:

1. Set control panel AUTO/OFF/MANUAL switch to OFF.
2. Remove control panel fuse (see wiring diagram).
3. Turn off power to the battery charger by removing battery charger ATC style fuse or opening the battery charger circuit breaker located in the load control panel.
4. Disconnect negative (-) battery cable.

NOTE: Battery charger must be turned off before disconnecting negative (-) battery cable to prevent an over-current condition from burning out sensitive control panel components and circuits.

NOTE: Following any maintenance, reverse these steps so unit is returned to standby setup for normal operation.

Shutting Down and Starting an Operating Generator

Proceed as follows if the unit is operating and required inspections must be performed:

1. Verify power to load can be interrupted (warn any equipment users that there will be a temporary power disruption). There may be other procedures which must be done before shutting a unit down, depending on application.
2. Set utility MLCB to OPEN.
3. Set generator MLCB (generator disconnect) to OPEN.
4. Allow unit to cool down (running at no-load) for approximately five minutes to prevent damage to critical engine components.
5. Set control panel AUTO/OFF/MANUAL switch to OFF. There may be safety tag-outs or lockouts required at this point, depending on application.
6. Perform necessary maintenance inspections or tasks (based on hourly requirements).
7. When all inspections have been completed and any discrepancies corrected, set the control panel AUTO/OFF/MANUAL switch to AUTO.
8. When generator is running, and all engine/generator parameters (voltage, frequency, coolant temp, oil pressure, etc.) have been verified as correct, set generator MLCB (generator disconnect) to CLOSED. The unit will accept and carry the load.
9. Visually inspect the generator set to verify it is operating correctly.
10. Set utility MLCB to CLOSED.

Maintenance Tasks

Visually Inspecting Unit

Visually inspect unit periodically. If problems are found contact an IASD. Look for the following:

- Any debris, trash, grass or weed growth, which would obstruct the flow of cooling air into and out of the unit ventilation louvers.
- Visually inspect hoses and hose connections for signs of leakage. This includes all coolant hoses, fuel hoses, exhaust system connections, intake system connections, etc. Also look at the engine block and gearbox (if equipped) for signs of fluid leakage.
- Visually inspect the engine accessory drive belts for evidence of obvious wear, fraying or deterioration, and obvious looseness. A “squealing” sound heard during starting and running could indicate a loose belt.

Checking Engine Fluids

The following inspections can be performed by a trained Authorized Operator. Observe all safety precautions outlined in ***Safety Information***.

Checking Engine Oil Level

⚠WARNING

Skin irritation. Avoid prolonged or repeated contact with used motor oil. Used motor oil has been shown to cause skin cancer in laboratory animals. Thoroughly wash exposed areas with soap and water. (000210)

An Authorized Operator should inspection the levels of engine oil and engine coolant monthly (or every 24 hours of operation). The oil level should be maintained between the FULL and ADD marks on the engine dipstick. Recommended fluids are listed in ***Engine Oil Recommendations***.

Proceed as follows to inspect the engine oil:

1. Locate the engine oil dipstick.
2. The most accurate oil level readings are measured when the engine is cold. If the engine was running, wait at least ten minutes before proceeding.
3. Remove oil dipstick and wipe it dry with a clean, lint free cloth.
4. Slowly insert the clean oil dipstick into the oil dipstick tube. Visually verify oil dipstick is fully seated in the oil dipstick tube. A visual inspection is required because some oil dipsticks require more effort than others to fully seat.
5. Remove the dipstick after 10 seconds.
6. Inspect oil level on both sides of the oil dipstick. The lower of the two readings will be the correct oil level measurement.
7. Add oil (if necessary) to adjust the level. After adding or changing the oil, the engine should run for one minute before checking the oil level. Remember to wait ten minutes to allow the engine to cool and oil to fully drain into the oil pan.

Typical causes of inaccurate oil level readings:

- Reading the high level of the oil dipstick.
- Reading the oil dipstick before the oil fully drains into the oil pan.
- Inserting and removing the oil dipstick too quickly.
- The oil dipstick is not fully seated in the oil dipstick tube.

Checking Coolant Level

⚠DANGER

Risk of poisoning. Do not use mouth to siphon coolant. Doing so will result in death or serious injury.

(000149)

⚠DANGER

Risk of Poisoning. Do not allow coolant to contact skin or eyes. If coolant is consumed, seek medical attention immediately. Failure to do so will result in death or serious injury.

(000559)

⚠DANGER

Risk of poisoning. Ethylene glycol base antifreeze is poisonous. Wash hands thoroughly after handling. Do not store in an open container. Keep away from children and animals. Failure to do so could result in death or serious injury.

(000321)

⚠WARNING

Risk of burns. Do not open coolant system until engine has completely cooled. Doing so could result in serious injury.

(000154)

⚠CAUTION

Risk of overheating. Do not use any chromate base rust inhibitor with propylene glycol base antifreeze, boosters, or additives. Doing so will cause overheating and possible equipment damage.

(000165a)

Visually inspect coolant expansion tank and verify the coolant level is between the “Cold” and “Hot” level markings. To add coolant to the system, add it to the expansion tank when the engine is cool (not at operating temperature, not running). Add only a 50/50 mixture of the correct antifreeze and distilled or deionized water to the coolant system.

Inspecting and Changing Gearbox Oil (If Equipped)

Inspect monthly, or every 100 hours of operation. Biannually (or every 600 hours), an authorized service technician should completely drain and refill the gearbox.

Gear oil used is 80W-90. Lucas Heavy Duty Oil Stabilizer should be added as follows by fluid volume:

- 390 Gearbox - Approximately 32 oz total. 26 oz gear oil and 6 oz Lucas Heavy Duty Oil Stabilizer.
- 520 Gearbox - Approximately 55 oz total. 44 oz gear oil and 11 oz Lucas Heavy Duty Oil Stabilizer.

Proceed as follows to inspect gearbox oil level:

1. Disable generator from starting.
2. See ***Figure 4-1***. Remove oil level check plug (B).

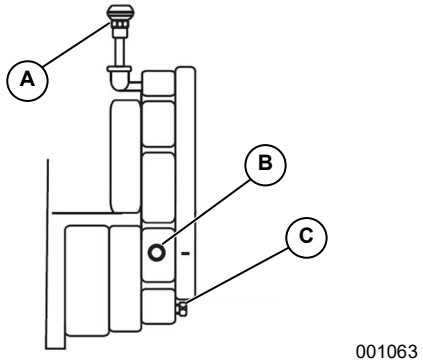

Figure 4-1. Gearbox Oil Servicing Points

3. The oil level should be at the bottom edge of the oil level check plug hole.

NOTE: Do NOT overfill gearbox. If too much fluid is added, allow the excess oil to drain from the level check plug hole and collect it in a suitable container or with rags.

4. To add oil, remove oil filler/vent cap (A), and fill through the vent line.
5. Replace the vent cap and oil level check plug and tighten.

Proceed as follows to change gearbox oil:

1. Disable generator from starting.
2. Remove oil drain plug (C) and drain oil into an appropriate container. Dispose of or recycle the oil according to local or national laws.
3. Install oil drain plug.
4. To add oil to gearbox, remove oil level check plug and oil filler/vent cap.
5. Add recommended oil/stabilizer mix until it just starts to flow from oil level check plug opening.
6. Install and tighten oil filler/vent cap and oil level check plug.

Return generator to operating condition. Start unit and inspect for leaks.

Maintaining the Battery

⚠DANGER

Electrocution. Do not wear jewelry while working on this equipment. Doing so will result in death or serious injury.

(000188)

⚠WARNING

Sudden start-up. Always set the safety disconnect switch to MANUAL before working on equipment. Failure to do so could result in death or serious injury. (000194)

⚠WARNING

Explosion. Batteries emit explosive gases. Always disconnect negative battery cable first to avoid spark. Failure to do so could result in death or serious injury. (000238)

⚠WARNING

Explosion. Do not dispose of batteries in a fire. Batteries are explosive. Electrolyte solution can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention. (000162)

⚠WARNING

Equipment damage. Only qualified service personnel may install, operate, and maintain this equipment. Failure to follow proper installation requirements could result in death, serious injury, and equipment or property damage. (000182a)

⚠WARNING

Electrical shock. Disconnect battery ground terminal before working on battery or battery wires. Failure to do so could result in death or serious injury. (000164)

⚠WARNING

Risk of burns. Batteries contain sulfuric acid and can cause severe chemical burns. Wear protective gear when working with batteries. Failure to do so could result in death or serious injury. (000138a)

⚠WARNING

Risk of burn. Do not open or mutilate batteries. Batteries contain electrolyte solution which can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention. (000163a)

⚠WARNING

Explosion. Batteries emit explosive gases while charging. Keep fire and spark away. Wear protective gear when working with batteries. Failure to do so could result in death or serious injury. (000137a)

⚠WARNING

Environmental Hazard. Always recycle batteries at an official recycling center in accordance with all local laws and regulations. Failure to do so could result in environmental damage, death, or serious injury. (000228)

Always recycle batteries in accordance with local laws and regulations. Contact your local solid waste collection site or recycling facility to obtain information on local recycling processes. For more information on battery recycling, visit the Battery Council International website at: ***http://batterycouncil.org***.

Per UL 2200 Edition 3, Clause 96.5.e:

"CAUTION - A battery presents a risk of high short circuit current. The following precautions are to be observed when working on batteries:

- Remove watches, rings, or other metal objects;
- Use tools with insulated handles;"

Per UL 2200 Edition 3, Clause 97.2.a:

"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 500 grams (one pound) bicarbonate of soda to 4 liters (one gallon) 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."

Per UL 2200 Edition 3, Clause 97.2.b:

"CAUTION - Lead-acid batteries present a risk of fire because they generate hydrogen gas. The following procedures 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."

IMPORTANT NOTE: 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 automatic startup and possible injury to personnel, do not connect battery

cables until NORMAL source voltage at the transfer switch is correct and the system is ready to be placed into operation.

IMPORTANT NOTE: Verify the AUTO/OFF/MANUAL switch is set to OFF 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.

IMPORTANT NOTE: Verify utility power supply to the battery charger is turned OFF and the 10A and 15A fuses are removed from the generator control panel and the ATC style fuse removed from the battery charger, or sparking may occur at the battery posts as the cables are attached and cause an explosion.

An Authorized Operator should inspect the engine battery system monthly. 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, 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 recharged or replaced as required.

IMPORTANT NOTE: A negative ground system is used. Battery connections are shown on the wiring diagrams. Verify the battery is correctly connected and terminals are tight. Observe battery polarity when connecting the battery to the generator set.

Additional considerations:

- Wear rubber gloves and boots.
- Do not place tools or metallic objects on top of battery.
- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Servicing of batteries is to be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.
- Determine if battery is inadvertently grounded. Remove source of ground when inadvertently grounded. Contact with any part of a grounded battery is capable of resulting in electrical shock. The risk of such shock is reduced when such grounds are removed during installation and maintenance (applicable to a generator not having a grounded supply circuit).

Installing and Replacing Battery

When required, the battery must be replaced with one of equivalent size, voltage, and CCA (cold crank amp capacity). See unit specification sheet or contact an IASD for correct battery sizing.

A new battery must be filled with the correct electrolyte and be fully charged before installing.

Preliminary Instructions

1. Set AUTO/OFF/MANUAL switch on the generator control panel to OFF.
2. Turn off utility power supply to battery charger circuit.
3. Remove 10A fuse from generator control panel.
4. Remove ATC style fuse from battery charger.

Battery cables are connected to the generator connection points at the factory. Connect the cables to the battery posts as shown in ***Figure 4-2*** and ***Figure 4-3***.

12 VDC System

Proceed as follows to install battery in 12 VDC system:

1. See ***Figure 4-2***. Connect red positive (+) battery cable (E) from the starter contactor to the positive (POS or +) battery post (F).

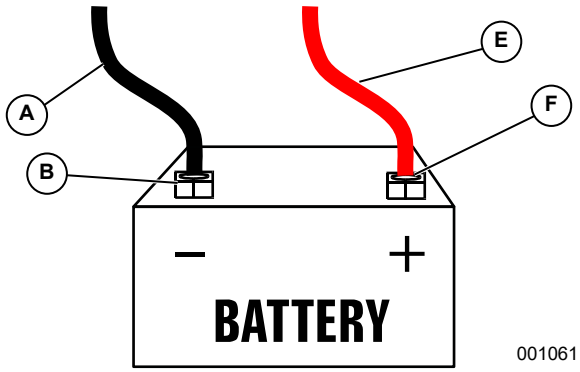

Figure 4-2. 12 VDC System

2. Connect black negative (-) battery cable (A) to the frame ground to the negative (NEG or -) battery post (B).

24 VDC System

Proceed as follows to install battery in 24 VDC system:

1. See ***Figure 4-3***. Connect red positive (+) battery cable (E) from the starter contactor to positive (POS or +) post of battery A (F).

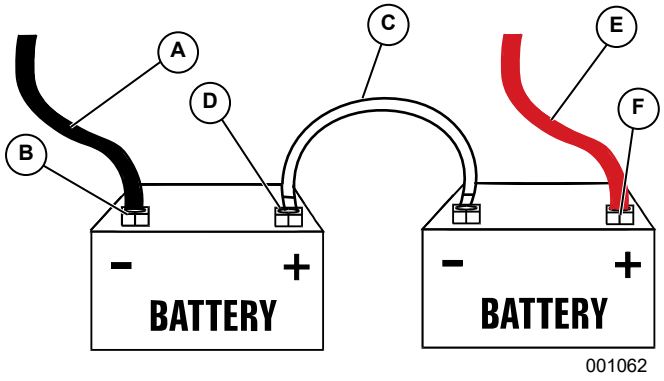

Figure 4-3. 24 VDC System

2. Connect black negative (-) battery cable (A) to frame ground to negative (NEG or -) post of battery B (B).

NOTE: On 24V gaseous units, center tap wire number 13 (D) between the batteries.

3. Connect either a black or red jumper cable (C) from negative (NEG or -) post of battery A to positive (POS or +) post of battery B.

Final Instructions

⚠CAUTION

Equipment damage. Do not make battery connections in reverse. Doing so will result in equipment damage.

(000167a)

Always recycle batteries in accordance with local laws and regulations. Contact your local solid waste collection site or recycling facility to obtain information on local recycling processes. For more information on battery recycling, visit the Battery Council International website at: ***http://batterycouncil.org***.

1. Install ATC style fuse in battery charger.
2. Install 10A fuse in the generator control panel.
3. Turn on utility power supply to the battery charger circuit.
4. If unit was previously operational, turn AUTO/OFF/MANUAL switch on the generator control panel to AUTO.

Other Maintenance Checks

The following inspections should be performed by an IASD, or an Authorized Operator. These maintenance items require a high level of experience and skill to evaluate and correct.

- Inspect engine accessory drive belts
- Inspect hoses and connections
- Inspect fuel supply system
- Inspect exhaust system

Maintenance and Repair Parts

All non-emissions related service maintenance or repairs should be completed by an authorized service technician to maintain the warranty status of a unit. Emissions related maintenance and repairs may be performed by a person or repair shop of the owner's choosing.

Extended Run-Time Maintenance Checks

These maintenance tasks can be performed by an IASD or an Authorized Operator. Comply with all safety notices contained in the owner's manual.

IASD/Authorized Operator Maintenance Tasks. Perform steps 1 through 8 and 11 every 24 continuous operating hours.	Task Completed Date/Initials
1. Before shutting down unit, perform a thorough visual inspection for leaks, loose components or connections, excessive apparent wear or damage. Any discrepancies noted should be further inspected and corrected while the unit is shut down. Inspect decal condition and location. Contact an IASD if any decals are damaged, illegible, or missing.	
2. Shut down unit per the procedure in the owner's manual.	
3. Check engine oil level. Oil level should be between the low and full markings on oil dipstick. Adjust as necessary.	
4. Check engine coolant level. Verify coolant level in the coolant catch tank is between the cold and hot level markings. Adjust as necessary. Use only a 50/50 mixture of appropriate coolant.	
5. Visually inspect engine accessory drive belts and fan coupling device (if equipped) for correct tension and any signs of abrasion, wear, deterioration or damage. Correct as necessary.	
6. Visually inspect all hoses and connections (exhaust, intake, coolant, block heater, fuel lines and filters, oil filters, etc) for leaks, tightness, signs of deterioration, wear, or damage. Correct as necessary.	
7. Inspect air inlets and outlets (enclosure or building vents) for debris or blockage. Correct as necessary.	
8. Visually inspect fuel supply system for signs of leaks or damage. Correct as necessary.	
9. **Gearbox Equipped Only:** Check gearbox oil level every 100 operating hours. Adjust as necessary.	
10. **Weekly When Operating:** Check battery electrolyte level (if accessible). Adjust as necessary (add only distilled or deionized water to replenish battery cells).	
11. Return unit to operational condition and restart. Check unit voltage and frequency. Visually inspect the unit for leaks, loose connections, components, and any abnormal operating conditions. Verify safety guards are in place. Place the unit back in service.	

Date inspection Completed:	Unit Hour-Meter Reading:
IASD/Authorized Operator signature signifying inspection complete:	
Record any oil or coolant added and notes about any discrepancies found and corrective action taken.	

Maintenance Level 1A

One Time at 50 Hours / 3 Months. These maintenance tasks must be performed by an IASD. Comply with all safety notices contained in the owner's manual. Some of these tasks require the use of the applicable engine service manual.

IASD Tasks. Perform these tasks in addition to the regularly scheduled Monthly maintenance tasks	Task Completed Date/Initials
1. Disable unit from operating per the procedure found in the owner's manual.	
2. Inspect decal condition and location. Contact an IASD if any decals are damaged, illegible, or missing.	
3. Inspect engine valve clearance (valve lash) as specified in the engine service manual. **NOTE:** This is NOT required for engines with hydraulic lifters. See engine service manual.	
4. Change engine oil.	
5. Change oil filter(s).	
6. Check engine accessory drive belts and fan coupling device (if equipped) for correct tension, wear or abrasion, deterioration, or damage. Correct as necessary.	
7. Inspect all hoses, piping, and connections (intake, exhaust, coolant, block heater, fuel and filters, oil lines and filters) for tightness, leaks, deterioration or damage. Correct as necessary.	
8. Inspect wiring connections (at generator MLCB, customer connections, control terminal strips, battery, etc) for loose connections, corrosion or damage. Correct as necessary.	
9. Return unit to operational condition and test. Place unit in automatic and open service disconnect to force unit to start and transfer to load. Exercise unit against load for 15 minutes, visually inspecting for leaks, loose connections, components, and any abnormal operating conditions. Verify safety guards are in place. Record the unit voltage, frequency, kW and kVA while running. Restore utility power and monitor transfer to utility, cool-down and shutdown. Correct any discrepancies. Voltage: Frequency: kW: kVA:	
10. If control has alarm and/or event or run logs, record the alarm and event logs to a history file for the unit.	
11. Return the unit to operational condition.	

Date inspection Completed: Unit hour Meter Reading:
IASD signature signifying inspection complete:
Record any oil or coolant added and notes about any discrepancies found and corrective action taken.

Maintenance Level 1 - Monthly or Every 24 Hours

These maintenance tasks can be performed by an IASD or an Authorized Operator. Comply with all safety notices contained in the owner's manual.

IASD/Authorized Operator Maintenance Tasks	Task Completed Date/Initials
1. Disable unit from operating per the instructions in the owner's manual.	
2. Inspect decal condition and location. Contact an IASD if any decals are damaged, illegible, or missing.	
3. Check engine oil level. Oil level should be between the low and full markings on the dipstick. Adjust as necessary.	
4. **Gearbox Equipped Only:** Check gearbox oil level. Adjust as necessary.	
5. Check engine coolant level. Verify level in the coolant catch tank is between the cold and hot level markings. Adjust as necessary. Use only a 50/50 mixture of appropriate coolant.	
6. Check battery electrolyte level (if accessible). Adjust as necessary (add only distilled or deionized water to replenish battery cells).	
7. Inspect battery terminal posts, connections, cables and charger connections, and battery hold-downs for signs of corrosion, looseness, etc. Remove, clean, and tighten connections as necessary.	
8. Inspect operation and condition of the battery charger. Inspect operation and condition of optional block heater, oil sump heater, and battery warmer (if equipped). Correct discrepancies as necessary.	
9. Inspect air inlets and outlets (enclosure or building vents) for debris or blockage. Correct as necessary.	
10. Visually inspect fuel supply system for signs of leaks or damage. Correct as necessary.	
11. Perform a 5 minute, no-load operational test of the unit. Check unit voltage and frequency. Visually inspect unit for leaks, wear, damage, loose connections or components, and corrosion. Correct as necessary. Verify safety guards are in place. Voltage: Frequency:	
12. If control has alarm and/or event or run logs, record the alarm and event logs to a history file for the unit.	
13. Return unit to operational condition.	

Date inspection Completed:	Unit hour Meter Reading:
IASD/Authorized Operator signature signifying inspection complete:	
Record any oil or coolant added and notes about any discrepancies found and corrective action taken.	

Maintenance Level 2 - Semi-Annual or Every 125 Hours

These maintenance tasks must be performed by an IASD. Perform these tasks every six months or every 125 hours of operation. Perform these tasks in addition to the regularly scheduled Monthly maintenance tasks. Comply with all safety notices contained in the owner's manual. Some of the tasks will require the use of the applicable engine service manual.

IASD Tasks	Task Completed Date/Initials
1. Disable unit from operating per the procedure found in the owner's manual.	
2. Inspect decal condition and location. Contact an IASD if any decals are damaged, illegible, or missing.	
3. Inspect engine accessory drive belts and fan coupling device (if equipped) for correct tension, wear, abrasion, deterioration, or damage. Correct as necessary.	
4. Inspect all hoses, piping, and connections (intake, exhaust, coolant, block heater, fuel and filters, oil lines and filters) for tightness, leaks, deterioration or damage. Correct as necessary.	
5. Load test the battery or test electrolyte levels (specific gravity) with a hydrometer.	
6. Return unit to operational condition and test. Place unit in AUTOMATIC and open the service disconnect to force the unit to start and transfer to the load. Exercise unit against the load for 15 minutes, visually inspecting for leaks, loose connections, components, and any abnormal operating conditions. Verify safety guards are in place. Record the unit voltage and frequency while running. Restore utility power and monitor transfer to utility, cool-down and shutdown. Correct any discrepancies. Voltage: Frequency: kW: kVA:	
7. If control has alarm and/or event or run logs, record the alarm and event logs to a history file for the unit.	
8. Return unit to operational condition.	

Date inspection Completed:	Unit hour Meter Reading:
IASD signature signifying inspection complete:	
Record any oil or coolant added and notes about any discrepancies found and corrective action taken.	

Maintenance Level 3 - Annual or Every 250 Hours

These maintenance tasks must be performed by an IASD. Perform these tasks every 12 months or every 250 hours of operation. Perform these tasks in addition to the regularly scheduled Monthly and Semi-Annual maintenance tasks. Comply with all safety notices contained in the owner's manual. Some of the tasks will require the use of the applicable engine service manual.

IASD Tasks	Task Completed Date/Initials
1. Disable unit from operating per procedure found in the owner's manual. Some of the following tasks will require the use of the applicable engine service manual.	
2. Inspect decal condition and location. Contact an IASD if any decals are damaged, illegible, or missing.	
3. Change engine oil (or change engine oil at the interval defined in the engine service manual).	
4. Change engine oil filter(s) (or change engine oil filter at the interval defined in the engine service manual).	
5. Inspect air filter. Replace as necessary (or inspect and replace air filter at the interval defined in the engine service manual).	
6. **Gaseous Units Only:** Inspect, clean, and gap spark plugs. Replace as necessary.	
7. **Gaseous Units Only:** Inspect ignition wires for damage, deterioration and tightness. Replace as necessary.	
8. **Diesel Units Only:** Test fuel quality. If required, strip any water/sediment from the tank. Filter or polish fuel and add any additional additives required to maintain fuel quality.	
9. **Diesel Units Only:** Change primary and secondary fuel filters (if equipped). Clean any water separator or mechanical strainer (if equipped). Prime and bleed fuel system per engine service manual procedures.	
10. Inspect engine accessory drive belts and fan coupling device (if equipped) for correct tension, wear or abrasion, deterioration, or damage. Correct as necessary.	
11. Inspect all hoses, piping, and connections (intake, exhaust, coolant, block heater, fuel and filters, oil lines and filters) for tightness, leaks, deterioration or damage. Correct as necessary.	
12. Visually inspect radiator and charge air core (if equipped), unit enclosure drains for any build up of dirt, debris, or oil contamination (external). Clean, correct as necessary.	
13. Check coolant thermal protection level. Correct as necessary.	
14. Inspect all wiring connections in the high voltage and low voltage connection panels. Check for loose connections, corrosion, arcing or damage. Verify torque on all main load lugs at generator connections (generator MLCB) and transfer switch connections (see applicable transfer switch manual). Correct as necessary.	
15. Return unit to operational condition and test. Place unit in automatic and open service disconnect to force unit to start and transfer to load. Exercise unit against the load for 1 hour (60 minutes). Visually inspect for leaks, loose connections, components, and any abnormal operating conditions. Verify safety guards are in place. Record unit voltage, frequency and kW while running. Restore utility power and monitor transfer to utility, cool-down and shutdown. Correct any discrepancies. Voltage: Frequency: kW: kVA:	
16. If control has alarm and/or event or run logs, record the alarm and event logs to a history file.	
17. Return unit to operational condition and place back in automatic operation.	

Date inspection Completed:	Unit hour Meter Reading:
IASD signature signifying inspection complete:	
Record any oil or coolant added and notes about any discrepancies found and corrective action taken.	

Maintenance Level 4 - Bi-Annual or Every 500 Hours

These maintenance tasks must be performed by an IASD. Perform these tasks every 24 months or every 500 hours of operation. Perform these tasks in addition to the regularly scheduled Monthly, Semi-Annual and Annual maintenance tasks. Comply with all safety notices contained in the owner's manual. Some of the tasks will require the use of the applicable engine service manual.

IASD Tasks	Task Completed Date/Initials
1. Disable unit from operating per procedure found in the owner's manual. Some of the following tasks will require the use of the applicable engine service manual.	
2. Inspect decal condition and location. Contact an IASD if any decals are damaged, illegible, or missing.	
3. Inspect engine valve clearance (valve lash) as specified in the engine service manual. **NOTE:** This is NOT required for engines with hydraulic lifters. See engine service manual.	
4. **Gearbox Equipped Only:** Change gearbox oil. Can be extended to 600 hours.	
5. Replace engine air filter(s).	
6. **Gaseous Units Only:** Replace spark plugs. Gap per engine specifications.	
7. Replace engine accessory drive belts. Inspect and lubricate (if required) the belt tensioning device (if equipped) and replace if necessary.	
8. Drain and flush cooling system. Fill with fresh coolant of appropriate type (50/50 mixture).	
9. Replace all flexible hoses: Coolant hoses including block heater hoses and vaporizer hoses (if equipped); charge air system connection hoses/joints/couplings, and any flexible fuel or oil lines.	
10. Replace fuel filter. Verify fuel system is purged and primed before running unit (diesel only).	
11. Remove, clean, inspect, reinstall and reset to correct voltage level the flywheel magnetic pickup(s) (if equipped).	
12. Return unit to operational condition and test. Place unit in automatic and open the service disconnect to force unit to start and transfer to load. Use an appropriate load bank to supplement load to full rated load (100% kW at rated kVA) if possible. Exercise unit against the load for 2 hours (120 minutes). Visually inspect for leaks, loose connections, components, and any abnormal operating conditions. Verify safety guards are in place. Record the unit voltage, frequency, kW and kVA while running. Remove load bank load, restore utility power and monitor transfer to utility, cool-down and shutdown. Correct any discrepancies. Voltage: Frequency: kW: kVA:	
13. If control has alarm and/or event or run logs, record alarm and event logs to a history file.	
14. Return the unit to operational condition and place back in automatic operation.	

Date inspection Completed:	Unit hour Meter Reading:
IASD signature signifying inspection complete:	
Record any oil or coolant added and notes about any discrepancies found and corrective action taken.	

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Section 5: Warranty Information

For Stationary Emergency Compression-Ignition Generators

To receive information about how to make an emissions-related warranty claim and how to make arrangements for authorized repairs, call 1-800-333-1322 or go to ***www.generac.com***.

For Stationary Emergency Spark-Ignited Generators (Where Applicable)

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 and/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, email emissions@generac.com, or visit 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

Part No. 10000012792 Revision F (3/17)

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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