CENTURION

Owner's Manual

Liquid-cooled, Prepackaged Standby Generators

Models: 004912-0, 004912-1
(15 kW LP/15 kW Natural Gas)
120/240V Single-phase w/ 100 Amp Transfer Switch

004913-0, 004913-1, 004913-2
(25 kW LP/25 kW Natural Gas)
120/240V Single-phase w/ 200 Amp Transfer Switch

***This manual should remain with the unit.**

⚠ DANGER ⚠

⚠ ONLY QUALIFIED ELECTRICIANS OR CONTRACTORS ⚠
SHOULD ATTEMPT INSTALLATION!

DEADLY EXHAUST FUMES. OUTDOOR INSTALLATION ONLY!

INTRODUCTION

Thank you for purchasing this model of the standby generator product line by Generac Power Systems.

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

◆ READ THIS MANUAL THOROUGHLY

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

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

⚠ DANGER ⚠

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

⚠ WARNING ⚠

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

⚠ CAUTION ⚠

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

NOTE:

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

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

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

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

This symbol points out potential explosion hazard.

This symbol points out potential fire hazard.

This symbol points out potential electrical shock hazard.

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

◆ OPERATION AND MAINTENANCE

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

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

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

◆ HOW TO OBTAIN SERVICE

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

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

Model No. _____ Serial No._____

AUTHORIZED SERVICE DEALER LOCATION

To locate the nearest AUTHORIZED SERVICE DEALER, please call this number:

1-800-333-1322

OR

Locate us on the web at:

www.generac.com

Introduction ..... Inside Front Cover
Read This Manual Thoroughly ..... IFC
Operation and Maintenance ..... IFC
How to Obtain Service ..... IFC
Authorized Dealer Locator Number ..... IFC
Safety Rules 2
Section 1 – General Information 4
1.1 Generator 4
1.2 Transfer Switch 4
1.3 Automatic System Operation 4
1.4 Generator AC Connection Systems 4
1.5 Main Circuit Breaker 5
1.6 Generator Fuel System 5
1.7 Engine Protective Devices 5
1.8 Unpacking 6
1.9 Lifting the Generator 6
1.10 Specifications 7
1.11 Fuel Consumption 7
1.12 Reconfiguring the Fuel System 7
1.13 Torque Specifications 8
1.14 Engine Oil Recommendations 8
1.15 Coolant Recommendations 8
1.16 Before Installation 8
Section 2 — INSTALLATION 8
2.1 Generator Installation 8
2.2 Generator Location 9
2.3 Generator Mounting and Support 9
2.4 Basic Standby Electric System 9
2.5 Emergency Circuit Isolation Method 10
2.6 Total Circuit Isolation Method 10
2.7 Grounding the Generator 10
2.8 Generator AC Neutral Connections 11
2.9 Transfer Switch Start Signal Connections 11
2.10 Battery Installation 11
2.11 Preparation Before Start-Up 12
Section 3 — OPERATION 13
3.1 Using a Standard “GTS” Transfer Switch 13
3.2 Control Console Components 13
3.3 Manual Transfer and Start-up 14
3.4 Automatic Operation 14
3.5 Weekly Exercise Cycle 14
3.6 Engine Block Heater 14
Section 4 — MAINTENANCE 15
4.1 Maintenance Performed by Authorized Service Facilities 15
4.2 Cooling System 15
4.3 Overload Protection for Engine DC Electrical System 15
4.4 Checking Fluid Levels 15
4.5 Maintenance Owner/Operator Can Perform 16
4.6 Miscellaneous Maintenance 17
4.7 Out of Service Procedure 19
4.8 Fuel Pipe Sizing 19
4.9 Scheduled Maintenance 20
Section 5 — TROUBLESHOOTING 23
5.1 Troubleshooting Points 23
Section 6 — NOTES 24
Section 7 — INSTALLATION DIAGRAM 25
Section 8 — ELECTRICAL DATA 26
Section 9 — EXPLODED VIEWS AND PARTS LISTS 30
Section 10 — WARRANTY 48

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

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

WARNING:

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

WARNING:

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

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

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

DANGER

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

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

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

GENERAL HAZARDS

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

- Before performing any maintenance on the generator, disconnect its battery cables to prevent accidental start-up. Disconnect the cable from the battery post indicated by a NEGATIVE, NEG or (–) first. Reconnect that cable last.
- Never use the generator or any of its parts as a step. Stepping on the unit can stress and break parts, and may result in dangerous operating conditions from leaking exhaust gases, fuel leakage, oil leakage, etc.

⚠ ELECTRICAL HAZARDS ⚠

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

⚠ FIRE HAZARDS ⚠

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

⚠ EXPLOSION HAZARDS ⚠

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

1.1 GENERATOR

This equipment is a liquid-cooled, engine-driven generator set. The generator is designed to supply electrical power that operates critical electrical loads during utility power failure. The unit has been factory-installed in a weather resistant, all metal enclosure and is intended for outdoor installation only. Use this generator as a source of electrical power for the operation of 120 and/or 240VAC, single-phase loads.

These models are available. They are rated as follows:

Model 004912 : Provides 15,000 watts (15 kW) of single-phase power.

Model 004913: Provides 25,000 watts (25 kW) of single-phase power.

⚠ WARNING ⚠

⚠ **If this generator is used to power electrical load circuits normally powered by a utility power source, it is required by code to install a transfer switch. The transfer switch must effectively isolate the electric system from the utility distribution system when the generator is operating (NEC 701). Failure to isolate an electrical system by such means results in damage to the generator and may also result in injury or even death to utility power workers due to backfeed of electrical energy.**

1.2 TRANSFER SWITCH

This generator system includes a matched automatic transfer switch which is intended to be used in conjunction with the generator. It is supplied in a NEMA 3R enclosure. The NEMA 3R enclosure is weather resistant and can be used indoors or outdoors. Follow these rules:

- Install the transfer switch on a firm, sturdy supporting structure.
- To prevent switch distortion, level the switch if necessary. This can be done by placing washers between the switch enclosure and the mounting surface.
- Never install the switch where water or any corrosive substance might drip onto the enclosure.
- Protect the switch at all times against excessive moisture, dust, dirt, lint, construction grit and corrosive vapors.
- It is highly recommended to utilize the manufacturer's transfer switch with this generator or it may void the warranty.

1.3 AUTOMATIC SYSTEM OPERATION

When this generator, along with its transfer switch, has been installed and interconnected, a circuit board in the generator panel constantly monitors utility power source voltage. Should that voltage drop below a preset value, and remain at such a low state for a preset amount of time, the generator cranks and starts. After the generator starts, the transfer switch transfers load circuits so the generator can power them.

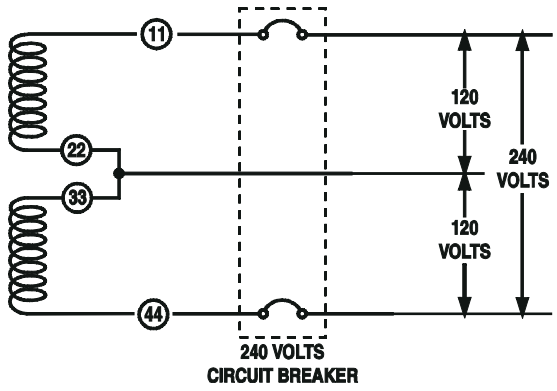
When utility source voltage has been restored, the switch re-transfers back to the utility source voltage and the generator then shuts down.

Please reference the transfer switch manual for specific information.

1.4 GENERATOR AC CONNECTION SYSTEMS

The generator was shipped from the factory with its stator AC output leads connected in a single-phase, three-wire generator AC connection system (Figure 1.1). The stator assembly in this system consists of a pair of stationary windings, with two leads brought out of each winding. Each single winding can supply 120VAC, 60 Hertz. When the two windings are connected in series, a 240VAC, 60 Hertz output results. Typically the two “hot” leads in the circuit are Wires No. 11 and 44. The “Neutral” leads are the junction of Wires 22 and 33.

Figure 1.1 - Generator AC Connection System



NOTE:

Rated power of generator is subject to and limited by such factors as ambient temperature, altitude, engine condition, and other factors. Engine power will decrease about 3% for each 1000 feet above 3000 feet and will decrease an additional 1.5% for each 10°F above 77°F. Maximum output power of the generator is limited by maximum engine power.

Figure 1.2 - Main Circuit Breaker

Model	Rating	Phase	Actual Current	C/B Rating*	Circuit Breaker
04912	15,000	1	62.5	70	70A BQ2
04913	25,000	1	104.2	125	125A BQ2

*** Amp Rating of CB structured under model.**

1.5 MAIN CIRCUIT BREAKER

The generator's main circuit breaker is included with the unit. The breaker for each unit is described in Figure 1.2.

1.6 GENERATOR FUEL SYSTEM

The generator has been factory tested and adjusted using a natural gas fuel system. If propane (LP requirements) gas is preferred, contact an authorized service dealer. Refer to Secion 1.12.

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

Fuel pressure for a natural gas set up should be **five inches to 14 inches of water column (0.18 to 0.5 psi)** at all load ranges.

Fuel pressure for an LP vapor set up should be **11 inches to 14 inches of water column (0.4 to 0.5 psi)** at all load ranges.

NOTE:

A seperate gas line and regulator may be needed to assure proper gas pressure to the generator. Improper gas pressure can cause hard starting and affect engine durability.

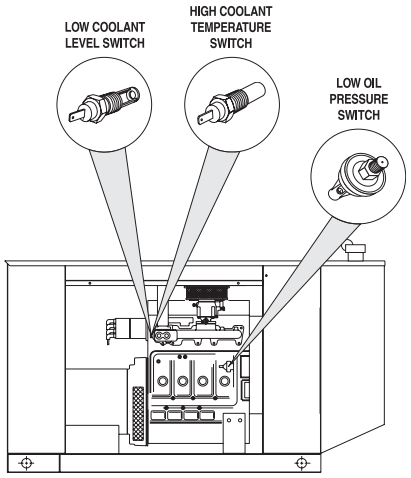
⚠ WARNING ⚠

⚠ **Gaseous fuels such as natural and LP (propane) gas are highly explosive. Even the slightest spark can ignite such fuels and cause an explosion. No leakage of fuel is permitted. Natural gas, which is lighter than air, tends to collect in high areas. LP gas is heavier than air and tends to settle in low areas.**

1.7 ENGINE PROTECTIVE DEVICES

The engine has several safety switches which cause the engine to automatically shut down under the following conditions: low oil pressure, high coolant temperature, engine overspeed, low coolant level or overcrank (Figure 1.3).

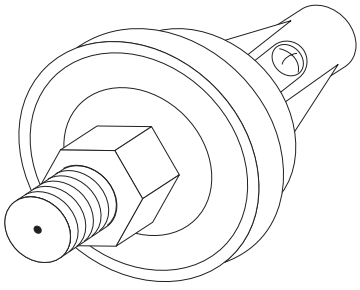
Figure 1.3 - Engine Protective Devices



◆ 1.7.1 LOW OIL PRESSURE SWITCH

This switch is normally-closed (N.C.) but is held open by engine oil pressure during engine running. Should operating oil pressure drop below about 10 psi (68 kPa), the switch contacts close and the engine shuts down automatically (Figure 1.4).

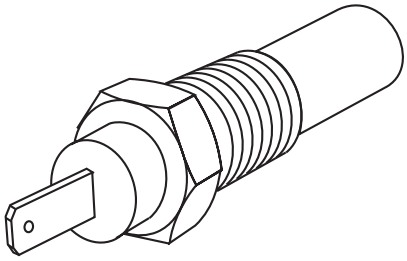
Figure 1.4 - Low Oil Pressure Switch



◆ 1.7.2 HIGH COOLANT TEMPERATURE SWITCH

This normally open (N.O.), thermostatic switch has sensing tip which is immersed in captive coolant. Should coolant temperature exceed about 250°F (121°C), the switch contacts close, which causes the engine to shut down automatically (Figure 1.5).

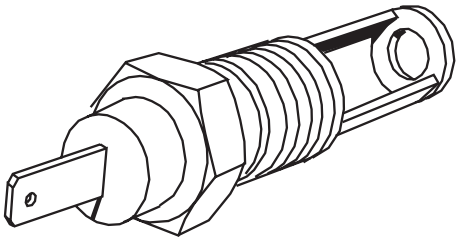
Figure 1.5- High Coolant Temperature Switch



◆ 1.7.3 LOW COOLANT LEVEL SWITCH

Should engine coolant level drop below the level of the high coolant temperature switch, it is possible for the engine to overheat without automatic shutdown. To prevent such overheating without automatic shut down, the engine has a low coolant level sensor. If the engine coolant drops too low, the engine automatically shuts down (Figure 1.6).

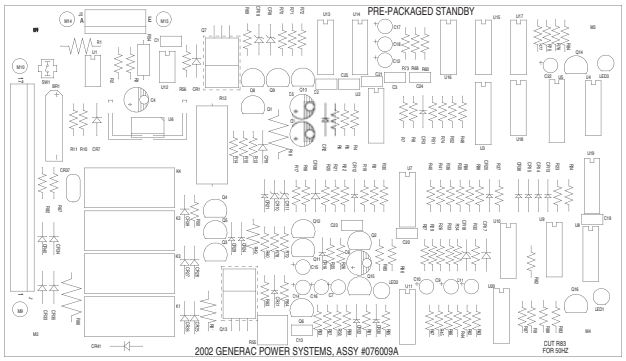
Figure 1.6 - Low Coolant Level Sensor



◆ 1.7.4 OVERSPEED SHUTDOWN

The Pre-pack circuit board on liquid cooled units receives AC frequency (rpm) signals directly from the stator AC power windings, via sensing leads S15 and S16. Should AC frequency exceed about 72 Hz, circuit board action will automatically shutdown the engine (Figure 1.7).

Figure 1.7 - Control Module Assembly Circuit Board



◆ 1.7.5 PCB OPERATION LED'S

- LED 1 is RED. The LED will be on when utility sensing is NOT available to the circuit board. This LED will function only when the AUTO/OFF/ MANUAL switch is set in the Auto position.
- LED 2 is YELLOW. This LED will be on when the circuit board battery charger is on. This LED will cycle on and off with the battery charger, 4.85 hours on the 4.85 hours off.
- LED 3 is GREEN. This LED will flash when the circuit board has load voltage available to it. This LED will function when voltage is available across T1 and T2.

◆ 1.7.6 OVERCRANK SHUTDOWN

After 90 seconds of crank-rest cycles, this function ends cranking if the engine fails to start in that 90 second span.

◆ 1.7.7 DC FUSE

This clearly labeled fuse is located on the front panel of the control system. It protects the panel wiring and components from damaging overload. **Always remove this fuse before commencing work on the generator.** The unit will not start or crank if the fuse is blown. Replace the fuse with one of the same size, type, and rating. The manufacturer normally uses an AGC fuse rated at 15 amps (part number 022676).

1.8 UNPACKING

◆ 1.8.1 UNPACKING PRECAUTIONS

Handle shipping cartons and crates with care. Use care to avoid damage from dropping, bumping, collision, etc. Store and unpack cartons with the proper side up, as noted on the shipping carton.

◆ 1.8.2 INSPECTION

After unpacking, carefully inspect the generator for any damage that may have occurred during shipment. If loss or damage is noted at the time of delivery, have the person(s) making delivery note all damage on the freight bill or affix their signature under the consignor's memo of loss or damage.

1.9 LIFTING THE GENERATOR

⚠ WARNING ⚠

⚠ When lifting or hoisting equipment is used, be careful not to touch overhead power lines. The generators weight of more than 900 pounds requires proper tools, equipment, and qualified personnel to be used in all phases of handling and unpacking.

1.10 SPECIFICATIONS

◆ 1.10.1 GENERATOR

	Single-Phase		
Model	004913		004912
Rated Max. Cont. AC Power Output (kW)	25		15
Rated voltage (volts)		120/240	
No. of Rotor Poles	2		4
Driven Speed of Rotor	3600		1800
Rotor Excitation System	Direct excited brush type		
Type of Stator	4 Wire		
Rotor/Stator Insulation	Class F/H		

◆ 1.10.2 ENGINE

Make ..... Mitsubishi
Displacement .....92 inches^3 (1.5 liters)
Cylinder Arrangement .....4, in-line
Valve Arrangement .....Overhead Cam
Firing Order 1-3-4-2
Number of Main Bearings 5
Compression Ratio.....9 to 1
No. of Teeth on Flywheel 104
Ignition Timing
at 1800 rpm..... 35 degrees BTDC
at 3600 rpm..... 43 degrees BTDC
Spark Plug Gap.....0.020-0.025 inch
Recommended Spark Plugs
Champion RN11YC4
Oil Pressure .....30-50 psi
Crankcase Oil Capacity .....4.0 U.S. quarts (3.8 liters)
Recommended Engine Oil .....SAE 15W-40
Type of Cooling System ..... Pressurized, closed recovery
Cooling Fan ..... Pusher Type
Cooling System Capacity .....2 U.S. gallons (7.6 liters)
Recommended Coolant .....Use a 50-50 mixture of ethylene glycol base and deionized water.

1.11 FUEL CONSUMPTION

25 kW Models
Using Natural Gas.....441 cu. ft. per hour
Using LP Gas ..... 175 cubic ft.(4.8 gal.) per hour
15 kW Models
Using Natural Gas.....277 cu. ft. per hour
Using LP Gas ..... 110 cubic ft.(3.1 gal.) per hour

NOTE:

Fuel consumption is given at rated maximum continuous power output when using natural gas rated at 1000 Btu per cubic foot; or LP gas rated 2520 Btu per cubic foot. Actual fuel consumption obtained may vary depending on such variables as applied load, ambient temperature, engine conditions and other environmental factors.

Fuel pressure for a natural gas set up should be **five inches to 14 inches of water column (0.18 to 0.5 psi)** at all load ranges.

Fuel pressure for an LP vapor set up should be **11 inches to 14 inches of water column (0.4 to 0.5 psi)** at all load ranges.

NOTE:

A seperate gas line and regulator may be needed to assure proper gas pressure to the generator. Improper gas pressure can cause hard starting and could affect engine durability.

1.12 RECONFIGURING THE FUEL SYSTEM

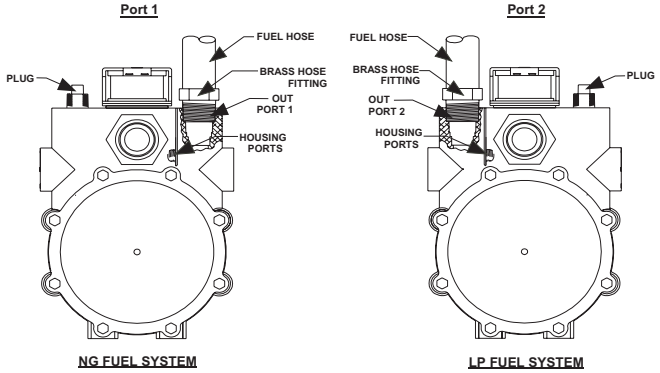
NOTE:

All models are configured for natural gas from the factory.

To reconfigure the fuel system from NG to LP, follow these steps:

1. Turn the main gas supply off.
2. Remove the carburetor fuel hose from the outlet port (Port 1) of the demand regulator (Figure 1.8).
3. Remove the brass hose fitting from the outlet port (Port 1) of the demand regulator.
4. Remove pipe plug from Port 2.
5. Install brass hose fitting into Port 2.
6. Install pipe plug into Port 1.
7. Connect carburetor gas hose to brass fitting.
8. Tighten all clamps and plugs.
9. Make sure fuel supply is of the proper pressure and type for configuration.
10. Reverse the procedure to convert back to natural gas.

Figure 1.8 — Reconfigure the Fuel System



NOTE:

Port 1 is for NG only and Port 2 is for LP vapor only. No provision for simultaneous fuels has been made.

DANGER

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

1.13 TORQUE SPECIFICATIONS

Cylinder Head ..... 15 (+ 90° + 90°) ft.lb.
Intake Manifold ..... 13 ft.lb.
Exhaust Manifold ..... 13 ft.lb.

1.14 ENGINE OIL RECOMMENDATIONS

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

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

CAUTION

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

1.15 COOLANT RECOMMENDATIONS

Use a mixture of half low silicate ethylene glycol base anti-freeze and deionized water. Cooling system capacity is about 8 U.S. quarts (7.6 liters). Use only deionized water and only low silicate anti-freeze. If desired, add a high quality rust inhibitor to the recommended coolant mixture. When adding coolant, always add the recommended 50-50 mixture.

CAUTION

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

1.16 BEFORE INSTALLATION

Before installing this equipment, check the ratings of both the generator and the transfer switch. Read "Emergency Isolation Method" and "Total Circuit Isolation Method" in the installation manual (Part No. 079699).

The generator's rated wattage/amperage capacity must be adequate to handle all electrical loads that the unit will power. You may have to group the critical (essential) loads together and wire them into a separate "emergency" distribution panel.

This generator can be installed in conjunction with a "GTS" type engineered transfer switch, if desired.

The standard transfer switch included has no adjustable sensing or controlling circuit boards. Instead, the generator control console houses a "Printed Circuit Board Assembly", which controls all phases of operation, including engine start up and load transfer.

2.1 GENERATOR INSTALLATION

DANGER

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

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

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

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

CAUTION

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

NOTE:

For more information about the installation of a standby system, you can order *Engine-Generator Standby Electric Power Systems Installer's Guide and Reference Manual* (part #046622) from an Authorized Service Dealer.

◆ 2.1.1 NFPA STANDARDS

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

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

◆ 2.1.2 OTHER PUBLISHED STANDARDS

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

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

2.2 GENERATOR LOCATION

Install the generator set, in its protective enclosure outdoors, where adequate cooling and ventilating air is always is available. Consider these factors:

- Install the unit where air inlet and outlet openings will not become obstructed by leaves, grass, snow, etc. If prevailing winds will cause blowing or drifting, consider a windbreak to protect the unit.
- Install the generator on high ground where water levels will not rise and endanger it.
- Allow sufficient room on all sides of the generator for maintenance and servicing. Allow three feet of space on all sides. NOTE: LOCAL LAWS OR CODES MAY REQUIRE DIFFERENT OFFSET DISTANCES.
- Where strong prevailing winds blow from one direction, face the generator air inlet openings into the prevailing winds.
- Install the generator as close as possible to the transfer switch. This reduces the length of wiring and conduit.
- Install the generator as close as possible to the fuel supply, to reduce the length of piping. HOWEVER, REMEMBER THAT LAWS OR CODES MAY REGULATE THE DISTANCE.

2.3 GENERATOR MOUNTING AND SUPPORT

Retain the generator compartment to a steel mesh or rebar reinforced concrete slab with 1/4-inch masonry type anchor bolts. Be sure the bolts are long enough to retain the compartment. The slab should be at least five inches thick and should extend beyond the enclosure to a distance of at least three inches on all sides. See page 25 for generator major dimensions.

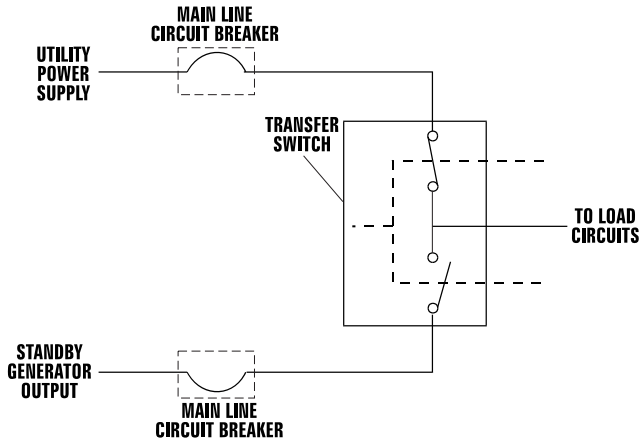
2.4 BASIC STANDBY ELECTRIC SYSTEM

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

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

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

Figure 2.1 – Basic Standby Electric System



2.5 EMERGENCY CIRCUIT ISOLATION METHOD

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

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

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

2.6 TOTAL CIRCUIT ISOLATION METHOD

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

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

2.7 GROUNDING THE GENERATOR

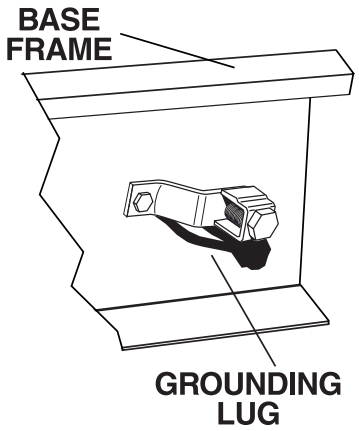
The National Electrical Code requires the frame and external electrically conductive parts of this equipment to be properly connected to an approved earth ground and/or grounding rods. For that purpose, a GROUND LUG (Figure 2.2) is provided on the generator mounting base. Consult a qualified electrician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

⚠ DANGER ⚠

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

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

Figure 2.2 – Generator Grounding Lug (typical)



2.8 GENERATOR AC NEUTRAL CONNECTIONS

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

2.9 TRANSFER SWITCH START SIGNAL CONNECTIONS

If the generator is to be installed with an automatic transfer switch, such as a GTS-type switch, it will be necessary to connect the two-wire start control system.

Connect the two-wire start signal from the automatic transfer switch to the automatic start connection, which is located in the right hand corner inside the control panel. Match wires 178 and 183 in the transfer switch to 178 and 183 on the terminal strip in the control panel. The conductors for the two-wire start circuit must be in their own conduit.

2.10 BATTERY INSTALLATION

⚠ DANGER ⚠

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

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

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

⚠ WARNING ⚠

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

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

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

◆ 2.10.1 VENTED BATTERIES

⚠ CAUTION ⚠

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

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

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

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

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

Recommended batter is Group 26, 12VDC, 550 CCA/75 AH minimum. All batteries must be at 100 percent state-of-charge before they are installed on the generator.

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

NOTE:

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

2.11 PREPARATION BEFORE START-UP

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

◆ 2.11.1 PRIOR TO INITIAL START-UP

⚠ CAUTION ⚠

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

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

◆ 2.11.2 TRANSFER SWITCH

If this generator is used to supply power to any electrical system normally powered by an electric utility, the National Electrical Code requires that a transfer switch be installed. The transfer switch prevents electrical backfeed between two different electrical systems. (For additional information, see the applicable transfer switch manual for this unit.)

The transfer switch, as well as the generator and other standby components, must be properly located and mounted in strict compliance with applicable codes, standards and regulations.

◆ 2.11.3 FUEL SYSTEM

Make sure the fuel supply system to the generator (a) delivers the correct fuel at the correct pressure and (b) is properly purged and leak tested according to code. No fuel leakage is permitted. See Section 1.10, "Specifications" for more information.

◆ 2.11.4 GENERATOR SET LUBRICATION

Check the engine crankcase oil level before operating and, if necessary, add oil to the proper level – the dipstick "FULL" mark. Never operate the engine with the oil level below the dipstick "ADD" mark. See Section 1.10, "Specifications" and Section 1.14, "Engine Oil Recommendations".

NOTE:

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

◆ 2.11.5 ENGINE COOLANT

Have the engine cooling system properly filled with the recommended coolant mixture. Check the system for leaks and other problems. See Section 1.10, "Specifications" and "Recommended Coolant".

◆ 2.11.6 BELT TENSION

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

◆ 2.11.7 ELECTRICAL SYSTEM

Make sure the generator is properly connected to an approved earth ground and/or ground rod.

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

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

3.1 USING A STANDARD "GTS" TRANSFER SWITCH

When required, the pre-packaged standby generator can be installed with an engineered "GTS" type engineered automatic transfer switch.

When a GTS type transfer switch is used, it controls automatic operation and automatic transfer as follows:

- Solid state circuits in the transfer switch monitor utility power source voltage.
- When utility source voltage drops below a pre-set level, transfer switch action closes the circuit. The engine then cranks and starts as controlled by the pre-packaged generator's Control Module circuit board.
- After the engine starts and when the generator AC output voltage and frequency have reached a pre-set value, transfer switch circuits signal the transfer switch main contacts to actuate to the "Standby" power source side. Generator AC output then powers load circuits.
- When the utility power source voltage is restored above a pre-set level, transfer switch solid state circuits signal the switch main contacts to move back to their utility power source side.
- Following re-transfer back to the utility power source side, transfer switch circuit board action opens the circuit. Engine then shuts down.

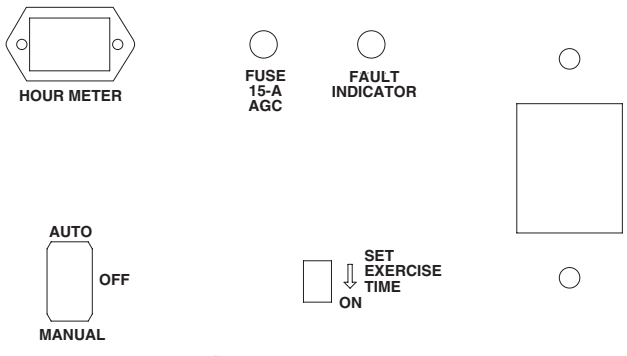
NOTE:

If the generator is installed in conjunction with an engineered GTS type engineered transfer switch, refer to the applicable transfer switch manual for exact operating parameters and timing sequences.

3.2 CONTROL CONSOLE COMPONENTS

The components of a liquid-cooled generator control console (Figure 3.1) are as follows:

Figure 3.1 - Liquid-Cooled Generator Panel



◆ 3.2.1 HOURMETER

Indicates time the generator has operated, in hours and tenths of hours. Use the hourmeter along with the periodic maintenance schedule for the generator set.

◆ 3.2.2 AUTO/OFF/MANUAL SWITCH

Use this three-position switch as follows:

- Set the switch to AUTO for fully automatic operation. See Section 3.4, "Automatic Operation".
- Set switch to MANUAL position to crank and start the generator engine.
- Set switch to OFF position to shut down an operating engine. With OFF selected, operation will not be possible.

⚠ DANGER ⚠

⚠ With switch set to AUTO, engine can crank and start suddenly without warning. Such automatic start up normally occurs when utility source voltage drops below a pre-set level. To prevent possible injury that might be caused by such sudden starts, set the AUTO/OFF/MANUAL switch to OFF before working on or around the unit. Then, place a "DO NOT OPERATE" tag on control console.

◆ 3.2.3 FAULT INDICATOR LAMP

The lamp goes ON when one or more of the following engine faults occurs and when engine shuts down.

- Low oil pressure
- High coolant temperature
- Low coolant level
- Overcrank
- Overspeed

◆ 3.2.4 15 AMP FUSE

The fuse protects the control console's DC control circuit against electrical overload. If the fuse has melted open due to an overload, or is removed, engine cranking and startup may still occur when the AUTO/OFF/MANUAL switch is placed in the AUTO or MANUAL positions.

NOTE:

To disable the control board and thus prevent potential crank and run, the 15 amp fuse AND the 7.5 amp in-line fuse must both be removed or the battery cables should be disconnected.

Should you need to replace the fuse, use only an identical AGC 15-amp replacement fuse.

◆ 3.2.5 7.5 AMP IN-LINE FUSE

This in-line fuse is connected in wire 15A which runs between the AUTO/OFF/MANUAL switch and position 10 of the 076009A PCB. This fuse protects the start, fuel, field boost, and transfer outputs from the PCB and will open if there is excessive current draw on any one of these outputs. If this fuse has melted open or is removed, the control board will be disabled and the unit will not be able to crank and run when the AUTO/OFF/MANUAL switch is placed in the AUTO or MANUAL positions. Replace the fuse with an identical AGC 7.5 amp fuse.

NOTE:

This fuse will not remove the positive (+) battery input power from the PCB when it opens. This means the exercise timer will not be reset. If this fuse does open, carefully check the wiring to the start, fuel, field boost and transfer outputs before replacing the fuse.

◆ 3.2.6 SET EXERCISE TIME SWITCH

This switch allows for programming the generator to start and exercise automatically. See Section 3.5, "Weekly Exercise Cycle."

3.3 MANUAL TRANSFER AND START-UP

To transfer electrical loads to the STANDBY (GENERATOR) power source side and start the engine manually, refer to the Owner's Manual of the particular transfer switch.

3.4 AUTOMATIC OPERATION

To set the system for fully automatic operation, proceed as follows:

- Check that load circuits are connected to the utility power supply.
- Set the AUTO/OFF/MANUAL switch to its AUTO position.
- Set the generator main circuit breaker to its ON or CLOSED position.

3.5 WEEKLY EXERCISE CYCLE

The generator will start and exercise once every seven days. During this weekly exercise, the unit runs for about 20 minutes and shuts down. Transfer of loads to generator output does not occur during the exercise period.

To select day and time for exercising, proceed as follows:

- Set-the-AUTO/OFF/MANUAL switch to OFF.
- Set generator main circuit breaker to OFF or OPEN.
- Locate the rocker switch on the control panel identified with the words "Set Exercise Time" (Figure 3.2).
- Push "Set Exercise Time" switch to ON position for 20 to 30 seconds and then release. Switch will spring back into its original position when released.
- Wait 30 seconds before setting the AUTO/OFF/MANUAL switch to AUTO position.

CAUTION

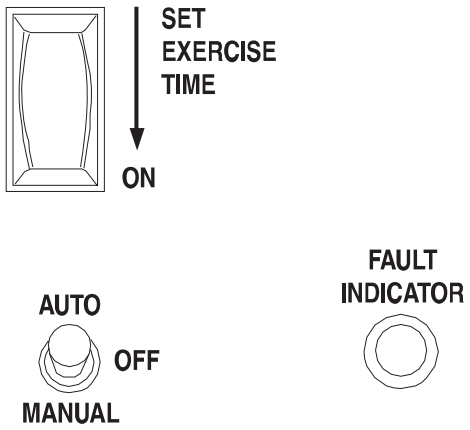
⚠ **If the AUTO/OFF/MANUAL switch is switched too soon, the engine may start. If engine does start, it will shut down automatically in about two (2) minutes.**

- Set the generator main circuit breaker to its ON or CLOSED position.
- Generator is now programmed to start and exercise every seven days thereafter, on day and time of day the switch was actuated.
- Place a sign on the generator control panel and the transfer switch, indicating the day and time the generator will be exercising.

NOTE:

If battery terminals are disconnected, the exercise timer needs to be reset for correct automatic exercise operation.

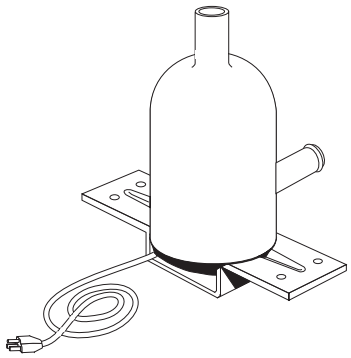
Figure 3.2 - "Set Exercise" Switch



3.6 ENGINE BLOCK HEATER

This standby generator comes equipped with a block heater (Figure 3.3), similar to the block heaters used in automotive applications. The block heater is wired to a grounded plug.

Figure 3.3 - Engine Block Heater



Refer to applicable wiring diagram(s) and electrical schematic(s) at back of manual for wiring connections. Customer supplies a 120V 15A Utility fed circuit for the block heater.

4.1 MAINTENANCE PERFORMED BY AUTHORIZED SERVICE FACILITIES

◆ EVERY THREE MONTHS

1. Check battery state of charge and condition.
2. Inspect and test fuel system.
3. Check transfer switch.
4. Inspect exhaust system.
5. Check engine ignition system.
6. Check fan belts.

◆ ONCE EVERY SIX MONTHS

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

◆ ONCE ANNUALLY

1. Test engine governor; adjust or repair, if needed.
2. Clean, inspect generator.
3. Flush cooling system.

◆ FIRST 100 OPERATING HOURS

1. Change engine oil and oil filter. (After initial change, service engine oil and filter at 150 operating hours or six months, whichever comes first.)
2. Retorque cylinder head. (See Section 1.13, “Torque Specs”.)
3. Retorque intake and exhaust manifold. (See Section 1.13, “Torque Specs”.)

◆ EVERY 500 OPERATING HOURS

1. Service air cleaner.
2. Check starter.
3. Check engine DC alternator.

◆ EVERY 800 OPERATING HOURS

1. Retorque cylinder head. (See Section 1.13, “Torque Specs”.)
2. Retorque intake and exhaust manifold. (See Section 1.13, “Torque Specs”.)
3. Check engine compression.
4. Check valve clearance.

4.2 COOLING SYSTEM

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

Without sufficient cooling and ventilating air flow, the engine/generator quickly overheats, which causes it to shut down. (See Section 7 for installation diagram and vent locations.)

⚠ WARNING ⚠

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

4.3 OVERLOAD PROTECTION FOR ENGINE DC ELECTRICAL SYSTEM

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

⚠ CAUTION ⚠

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

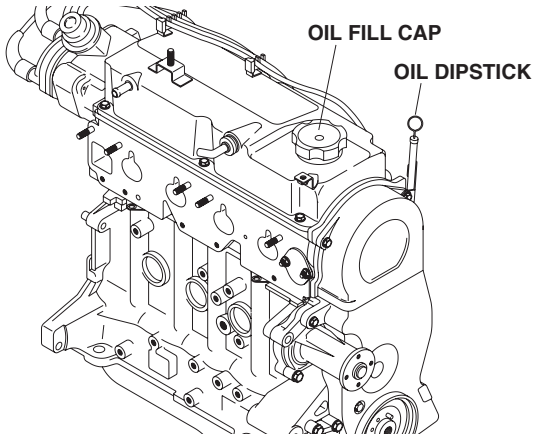
4.4 CHECKING FLUID LEVELS

◆ 4.4.1 CHECK ENGINE OIL

Check engine crankcase oil level (Figure 4.1) at least every 20 hours of operation, or prior to use.

- Remove oil dipstick and wipe dry with a clean, lint-free cloth.
- Install oil dipstick, then remove again.
- Oil should be between FULL and ADD marks.
- If oil level is below the dipstick ADD mark, remove oil fill cap. Add the recommended oil to bring oil level up to the FULL mark. DO NOT FILL ABOVE THE “FULL” MARK. See Section 1.14 for recommended oils.

Figure 4.1 - Oil Dipstick and Oil Fill Cap



◆ 4.4.2 BATTERY FLUID

Check battery electrolyte fluid at least once weekly. Fluid should cover separators in all battery cells. If fluid level is low, add distilled water to cover tops of separators. DO NOT USE TAP WATER IN BATTERY.

◆ 4.4.3 ENGINE COOLANT

Check coolant level in coolant recovery bottle. See Section 1.10, Specifications.

- Add recommended coolant mixture as necessary.
- Periodically remove radiator pressure cap to make sure the coolant recovery system is functioning properly. Coolant should be at bottom of radiator filler neck. If coolant level is low, inspect gasket in radiator pressure cap. Replace cap, if necessary. To have pressure cap tested, contact an Authorized Service Dealer. Inspect cooling system and coolant recovery system for leaks.

4.5 MAINTENANCE OWNER/ OPERATOR CAN PERFORM

◆ 4.5.1 CHECK ENGINE OIL LEVEL

Refer to “Checking Fluid Levels”, Section 4.4.

◆ 4.5.2 CHECK BATTERY

- Check battery fluid level each week as outlined under “Checking Fluid Levels”, Section 4.4.
- Check battery cables for condition, tightness, corrosion or damage. Clean, tighten or replace as necessary.

◆ 4.5.3 EXERCISE SYSTEM

Start the generator engine at least once every seven days and let it run at least 20 minutes. See Section 3.5, “Weekly Exercise Cycle”.

◆ 4.5.4 INSPECT COOLING SYSTEM

- Inspect engine cooling system at least once each month.
- Check hoses for damage, deterioration, leaks, etc. Correct any discrepancies found.
- Check hose clamps for tightness.
- Check fluid levels as outlined above.

◆ 4.5.5 PERFORM VISUAL INSPECTION

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

◆ 4.5.6 INSPECT EXHAUST SYSTEM

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

◆ 4.5.7 CHECK FAN BELT

- Inspect fan belts every three months. Replace any damaged, deteriorated, worn or otherwise defective belt.
- Check fan belt tension. Thumb pressure, exerted midway between pulleys, should deflect about 3/8 to 3/4 inch. Adjust belt tension as required.

◆ 4.5.8 INSPECT ENGINE GOVERNOR

Visually inspect electronic governor.

⚠ DANGER ⚠

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

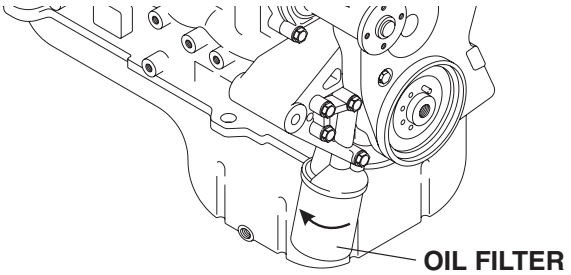
◆ 4.5.9 CHANGING ENGINE OIL

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

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

1. Remove OIL DRAIN HOSE from its retaining clip.
2. Loosen and remove OIL DRAIN HOSE CAP. Drain oil completely into suitable container.
3. When all oil has drained, install and tighten OIL DRAIN HOSE CAP, and re-install into its retaining clip.
4. Turn OIL FILTER (Figure 4.2) counterclockwise and remove. Dispose of old filter.
5. Apply light coating of new engine oil to seal of new oil filter.-Install FILTER and tighten by hand only. DO NOT OVERTIGHTEN.
6. Remove OIL FILL CAP. Add recommended oil (see SPECIFICATIONS). DO NOT FILL ABOVE THE DIPSTICK "FULL' MARK. Crankcase oil capacity is 4.0 U.S. quarts (3.8 liters).
7. Start engine and check for oil leaks.

Figure 4.2 - Oil Filter



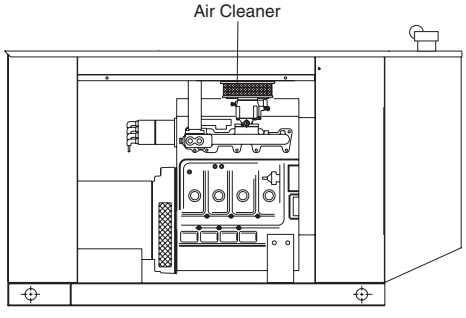
⚠ CAUTION ⚠

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

◆ 4.5.10 CHANGING THE ENGINE AIR CLEANER

To replace the engine air cleaner, (part number 059402), remove the air cleaner cover and remove air cleaner. Clean bottom plate and install the air filter making sure it is positioned properly before reattaching the cover (Figure 4.3).

Figure 4.3 – Engine Air Cleaner



(Doors Removed for Clarity)

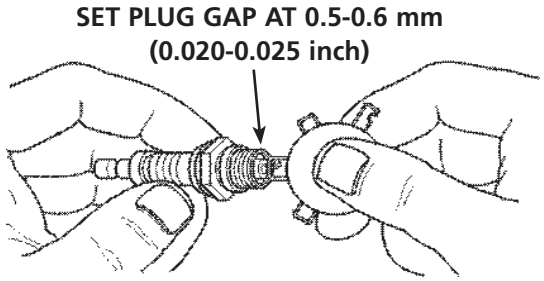
See "Scheduled Maintenance", Section 4.7, for air cleaner maintenance.

◆ 4.5.11 SPARK PLUGS

Reset the spark plug gap or replace the spark plugs as necessary. See Section 4.7.

1. Clean the area around the base of the spark plugs to keep dirt and debris out of the engine. Clean by scraping or washing using a wire brush and commercial solvent. Do not blast the spark plugs to clean.
2. Remove the spark plugs and check the condition. Replace the spark plugs if worn or if reuse is questionable. See "Scheduled Maintenance", Section 4.7, for recommended inspection.
3. Check the spark plug gap using a wire feeler gauge. Adjust the gap to 0.5-0.6 mm (0.020-0.025 inch) by carefully bending the ground electrode (Figure 4.4).

Figure 4.4 – Setting the Spark Plug Gap



◆ 4.5.12 COOLANT CHANGE

Every year, have Authorized Service Facility drain, flush and refill the cooling system. See Section 1.10, SPECIFICATIONS, for cooling system recommendations.

4.6 MISCELLANEOUS MAINTENANCE

◆ 4.6.1 CLEANING THE GENERATOR

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

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

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

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

◆ 4.6.2 BATTERY

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

- DO NOT use jumper cables and a booster battery to crank or start the generator engine.
- DO NOT recharge a weak battery while it is installed in the generator. Remove battery from generator and recharge in a well-ventilated area, away from fuel vapors, sparks, heat or flames.
- Battery electrolyte fluid is an extremely caustic sulfuric solution that can cause severe burns. DO NOT permit fluid to contact eyes, skin, clothing, painted surfaces, wiring insulation, etc. If any battery fluid is spilled, flush the affected area with clear water immediately.
- Always wear safety glasses, rubber apron and gloves when handling a battery.
- Batteries give off explosive hydrogen gas while charging. The gas can form an explosive mixture around the battery for several hours after charging. Any spark, heat or flames can ignite the gas and cause an explosion which can shatter the battery, causing blindness or other serious injury.

◆ 4.6.3 BATTERY MAINTENANCE

The battery should be inspected per the "Service Schedule," Section 6. The following procedure should be followed for inspection:

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

⚠ DANGER ⚠

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

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

Do not use any jumper cables or booster battery to crank and start the generator engine. If the battery has completely discharged, remove it from the generator for recharging.

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

Be sure the utility power supply is turned off, or sparking may occur at the battery posts as you attach the cables and cause an explosion.

◆ 4.6.4 BATTERY REPLACEMENT

When replacing batteries, use the same number and the type of battery - BCI Group No. 26/26R with 525 CCA @ 0 degrees F.

BCI Group No.	CCA
26/26R	525 @ 0 deg. F

NOTE:

The BCI number should be located directly on the battery.

◆ 4.6.5 RODENT PROTECTION

The intrusion of rodents into the generator set can cause a wide range of problems, from failure of the unit to start, to personal injury and, in extreme circumstances, short circuit or fire. Although the unit was designed to limit this problem, further precautions can be taken by the owner to help minimize both the chance of rodent entry and the extent of any damage. The following inspection should be performed.

1. The base frame of the unit contains an optional fuel inlet location that is capped at the factory. Check that it is secured in place. The same applies for any access ports in the roof of the enclosure. If any of these caps are missing, contact an Authorized Dealer.
2. Inside the generator set, the chance of rodent entry into the control panel is greatly reduced by the inclusion of adjustable wire connectors. Check that the wire connector screws are tight, thus closing off any gap between the access holes and the wires.

4.7 OUT OF SERVICE PROCEDURE

◆ 4.7.1 REMOVAL FROM SERVICE

If the generator cannot exercise every seven days, and it is to be out of service longer than 90 days, prepare the generator for storage as follows:

1. Start the engine and let it warm up.
2. Close the fuel shutoff valve in the fuel supply line and allow the unit to shut down.
3. Once the unit has shut down, it will signal a fault on the control panel.
4. Set the Auto/Off/Manual switch to OFF and turn off the utility power to the transfer switch.
5. While the engine is still warm from running, drain the oil completely. Refill the crankcase with SAE 15W-40 oil having API Service Class SD, SE or SF. (See "Engine Oil Recommendations" in Section 1.14)
6. Attach a tag to the engine indicating the viscosity and classification of the oil in the crankcase.
7. Remove the spark plug(s) and spray fogging agent into the spark plug(s) threaded openings. Reinstall and tighten the spark plug(s).
8. Remove the battery and store it in a cool, dry room on a wooden board. Never store the battery on any concrete or earthen floor.
9. Clean and wipe the entire generator.

◆ 4.7.2 RETURN TO SERVICE

To return the unit to service after storage, proceed as follows:

1. Verify that utility power is turned off to the transfer switch and that the Auto/Off/Manual switch is set to OFF.
2. Check the tag on the engine for oil viscosity and classification. Verify that the correct recommended oil is used in engine. See Section 1.14. If necessary, drain and refill with the proper oil.
3. Check the battery. Fill all cells to the proper level with deionized water. DO NOT USE TAP WATER IN THE BATTERY. Remove the battery before charging. Recharge the battery to 100 percent state of charge, or, if defective, replace the battery with a 12-volt DC Group 26/26R battery rated for 75 amp hours 525 CCA minimum @ 0° F.
4. Clean and wipe the entire generator.
5. Reconnect the battery. Observe battery polarity. Damage may occur if the battery is connected incorrectly.
6. Open the fuel shutoff valve.
7. Start the unit by moving the Auto/Off/Manual switch to MANUAL. Allow the unit to warm up thoroughly.
8. Stop the unit and set the Auto/Off/Manual switch to AUTO.
9. Turn on the utility power to the transfer switch.
10. The generator is now ready for service.

4.8 FUEL PIPE SIZING

Refer to chart for proper sizing of fuel supply piping. Insufficient fuel pipe size can cause hard starting, poor engine performance and inability to carry load.

NG and LP Vapor Pipe Sizing Chart:

Length of Pipe	Iron Pipe Size (IPS Inches)					
in Feet	½"	¾"	1"	1 ¼"	1 ½"	2"
15	76	172	345	750	1,220	2,480
30	52	120	241	535	850	1,780
45	43	99	199	435	700	1,475
60	38	86	173	380	610	1,290
75		77	155	345	545	1,120
90		70	141	310	490	1,000
105		65	131	285	450	920
120			120	270	420	860
150			109	242	380	780
180			100	225	350	720
210			92	205	320	660
240				190	300	620
270				178	285	580
300				170	270	545
450				140	226	450
600				119	192	390

* Consumption in Cubic Feet Per Hour.

◆ PERIODIC REPLACEMENT PARTS	
Part Name	Part Number
Oil Filter	# 0A45310244
Radiator Cap	# 046627
Air Cleaner	# 059402
Spark Plug	# 0A45310275

4.9 SCHEDULED MAINTENANCE

The following is a recommended maintenance schedule for small standby and residential generator sets. The established intervals in the schedule are the *maximum* recommended when the unit is used in an average service application. They will need to be decreased (performed more frequently) if the unit is used in a severe application. Use the unit hour meter or calendar time, whichever occurs first, from the previous maintenance interval to determine the next required maintenance interval.

Service Maintenance Interval Information:

The various service maintenance intervals are designated by interval numbers as follows:

1 An early inspection of the generator set to insure it is ready to operate when required and to identify any potential problem areas.

Performed monthly or following each 10 hours of operation of the unit and requires approximately ***.5 man-hours*** *per unit to complete.*

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

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

- **Disable the generator set from starting and/or connecting to the load by setting the control panel AUTO/ OFF/MANUAL switch to the "OFF" position.**
- **Remove the control panel fuse.**
- **Turn off utility supply to engine water heater.**
- **Turn off the battery charger by turning off utility supply to the transfer switch.**
- **Remove the negative battery cable.**

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

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

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

Performed ***ONLY ONCE*** *following the first three months or the first 30 hours of operation after purchase of the unit and requires approximately* ***2.5 man-hours*** *per unit to complete.*

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

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

Performed semi-annually or following each 50 hours of operation of the unit and requires approximately ***1.5 man-hours*** *per unit to complete.*

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

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

Performed annually or following each 100 hours of operation of the unit and requires approximately ***4.0 man-hours*** *per unit to complete.*

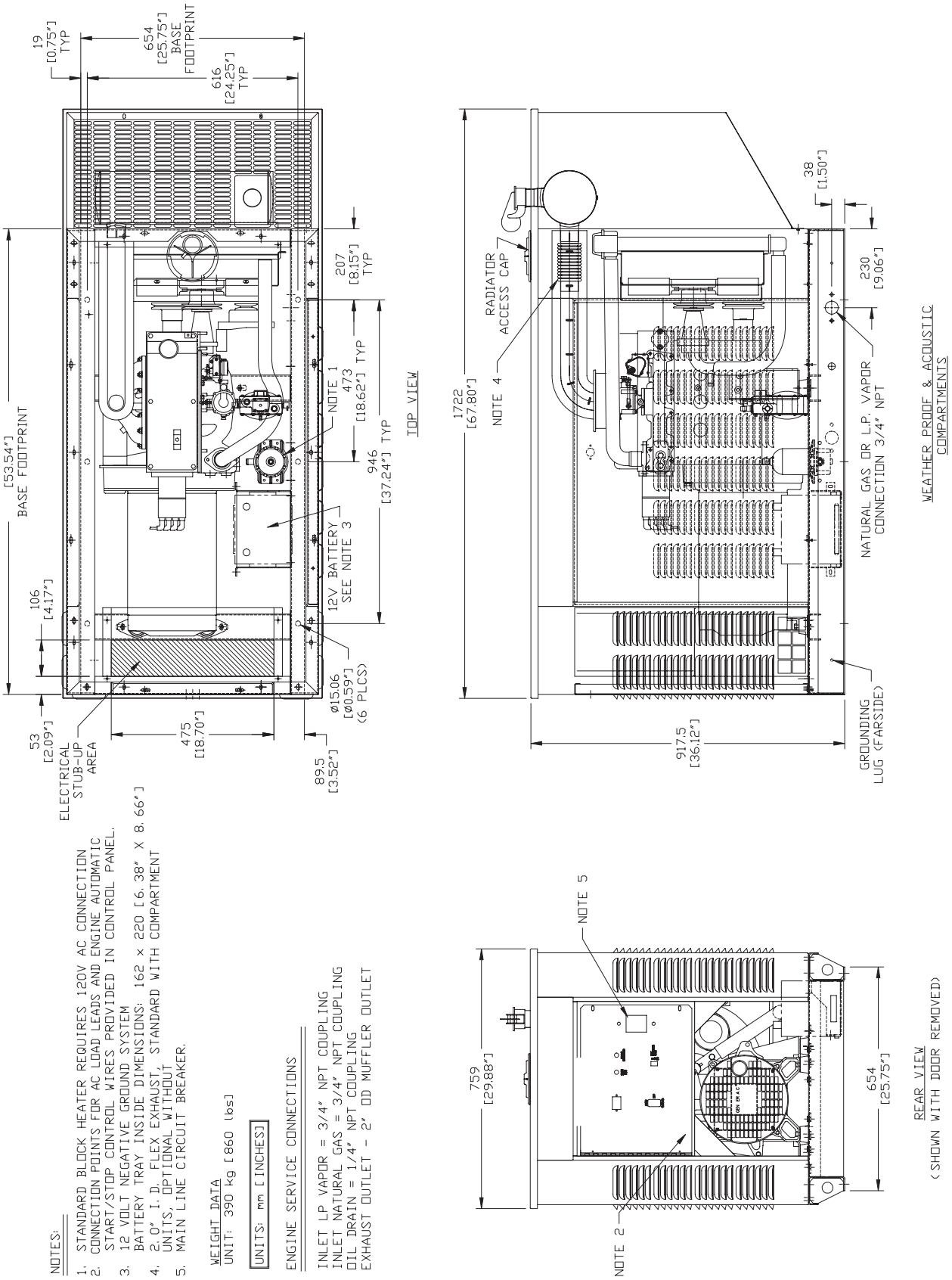
This inspection contains some maintenance tasks which require special tools, equipment, and/or knowledge to accomplish and should be performed only by an Authorized Service Dealer.

Maintenance Tasks	Level 1 Recommended to be done monthly/ 10 hrs.	Task Comp. (Date-Initials)	Level 2 Required to be done 3 months/ Break-in 30 hrs.	Task Comp. (Date-Initials)	Level 3 Required to be done Semi-annually/ 50 hrs.	Task Comp. (Date-Initials)	Level 4 Required to be done Annually/ 100 hrs.	Task Comp. (Date-Initials)
1. Disable the unit from operating per the first page warning.	⬭		⬭		⬭		⬭	
2. Check the engine oil level. Adjust as necessary.	⬭		⬭		⬭		⬭	
3. Check the engine coolant level. Adjust as necessary.	⬭		⬭		⬭		⬭	
4. Check the engine coolant thermal protection level. Correct as necessary.							⬭	
5. Check the fuel delivery system on gas engine driven units. Tighten Tighten connections as necessary.			⬭		⬭		⬭	
6. Check the air inlets and outlets for debris. Clean as necessary.	⬭		⬭		⬭		⬭	
7. Check the battery electrolyte level if accessible. Adjust as necessary.	⬭		⬭		⬭		⬭	
8. Check the battery posts, cables, and charger for loose connections, corrosion, and proper operation. Correct as necessary.	⬭		⬭		⬭		⬭	
9. Check the unit wiring for loose connections, corrosion, and damage. Correct as necessary.							⬭	
10. Check the engine accessory drive belts for wear, weather cracking, and damage. Replace as necessary.							⬭	
11. Visually inspect the unit looking for leaks, wear or damage, loose connections or components, and corrosion. Correct as necessary.	⬭		⬭		⬭		⬭	
12. Test the engine and transfer switch safety devices. Correct and/or adjust as necessary.							⬭	

Maintenance Tasks	Level 1 Recommended to be done monthly/ 10 hrs.	Task Comp. (Date-Initials)	Level 2 Required to be done 3 months/ Break-in 30 hrs.	Task Comp. (Date-Initials)	Level 3 Required to be done Semi-annually/ 50 hrs.	Task Comp. (Date-Initials)	Level 4 Required to be done Annually/ 100 hrs.	Task Comp. (Date-Initials)
13. Initiate an automatic start and transfer of the unit to site load and exercise it for at least one hour looking for leaks, loose connections or components, and abnormal operating conditions. Correct as necessary.			⬭		⬭			
14. Start and exercise the unit at full rated load (use a load bank if the site load is not enough) for at least two hours looking for leaks, loose connections components, and abnormal operating conditions. Correct as necessary.							⬭	
15. Change the engine oil.			⬭				⬭	
16. Replace the engine oil filter(s).			⬭				⬭	
17. Replace the engine air filter(s).							⬭	
18. Check the engine spark plugs on gas engine driven units. Clean and re-gap or replace as necessary.			⬭				⬭	
19. Perform a five minute no-load operational run of the unit looking for any post service problems.			⬭				⬭	
20. Return the unit to standby setup for operation when required.	⬭		⬭		⬭		⬭	

5.1 TROUBLESHOOTING POINTS

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



NOTES:

1. STANDARD BLOCK HEATER REQUIRES 120V AC CONNECTION
2. CONNECTION POINTS FOR AC LOAD LEADS AND ENGINE AUTOMATIC START/STOP CONTROL WIRES PROVIDED IN CONTROL PANEL.
3. 12 VOLT NEGATIVE GROUND SYSTEM
   BATTERY TRAY INSIDE DIMENSIONS: 162 x 220 [6.38" X 8.66"]
4. 2.0" I.D. FLEX EXHAUST, STANDARD WITH COMPARTMENT UNITS, OPTIONAL WITHOUT
5. MAIN LINE CIRCUIT BREAKER.

WEIGHT DATA
UNIT: 390 kg [860 lbs]

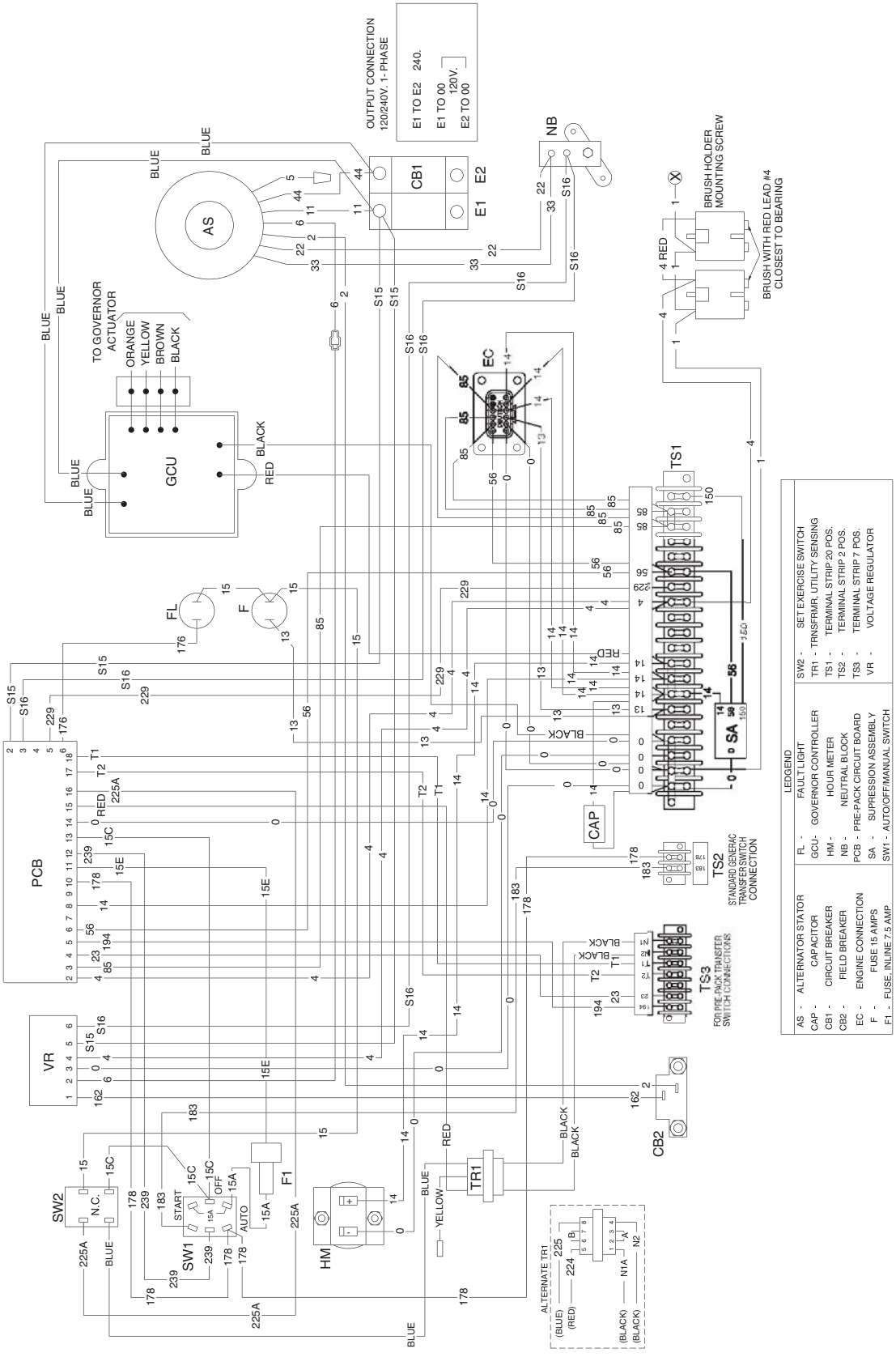
UNITS: mm [INCHES]

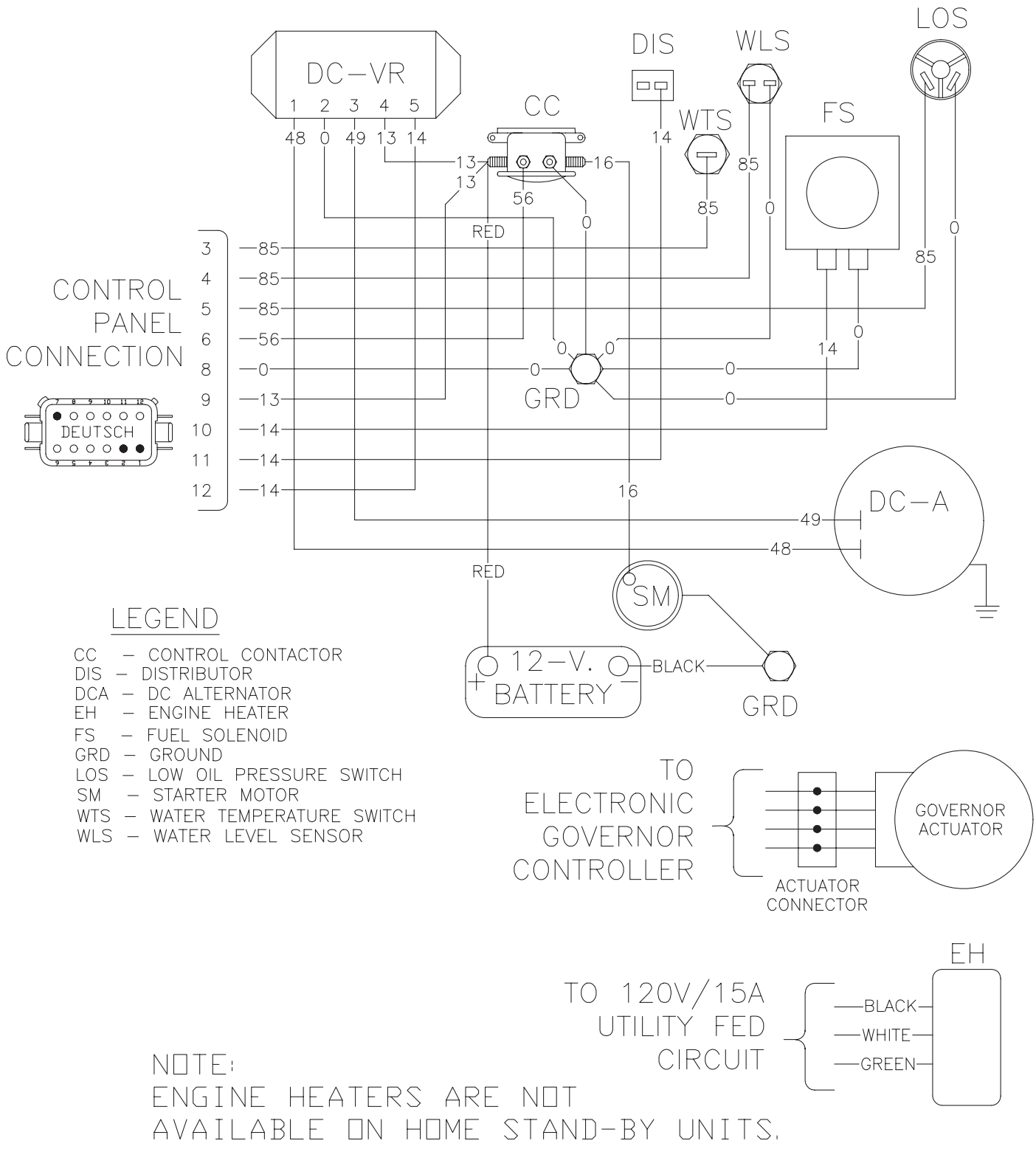
ENGINE SERVICE CONNECTIONS

INLET LP VAPOR = 3/4" NPT COUPLING
INLET NATURAL GAS = 3/4" NPT COUPLING
OIL DRAIN = 1/4" NPT COUPLING
EXHAUST OUTLET - 2" OD MUFFLER OUTLET

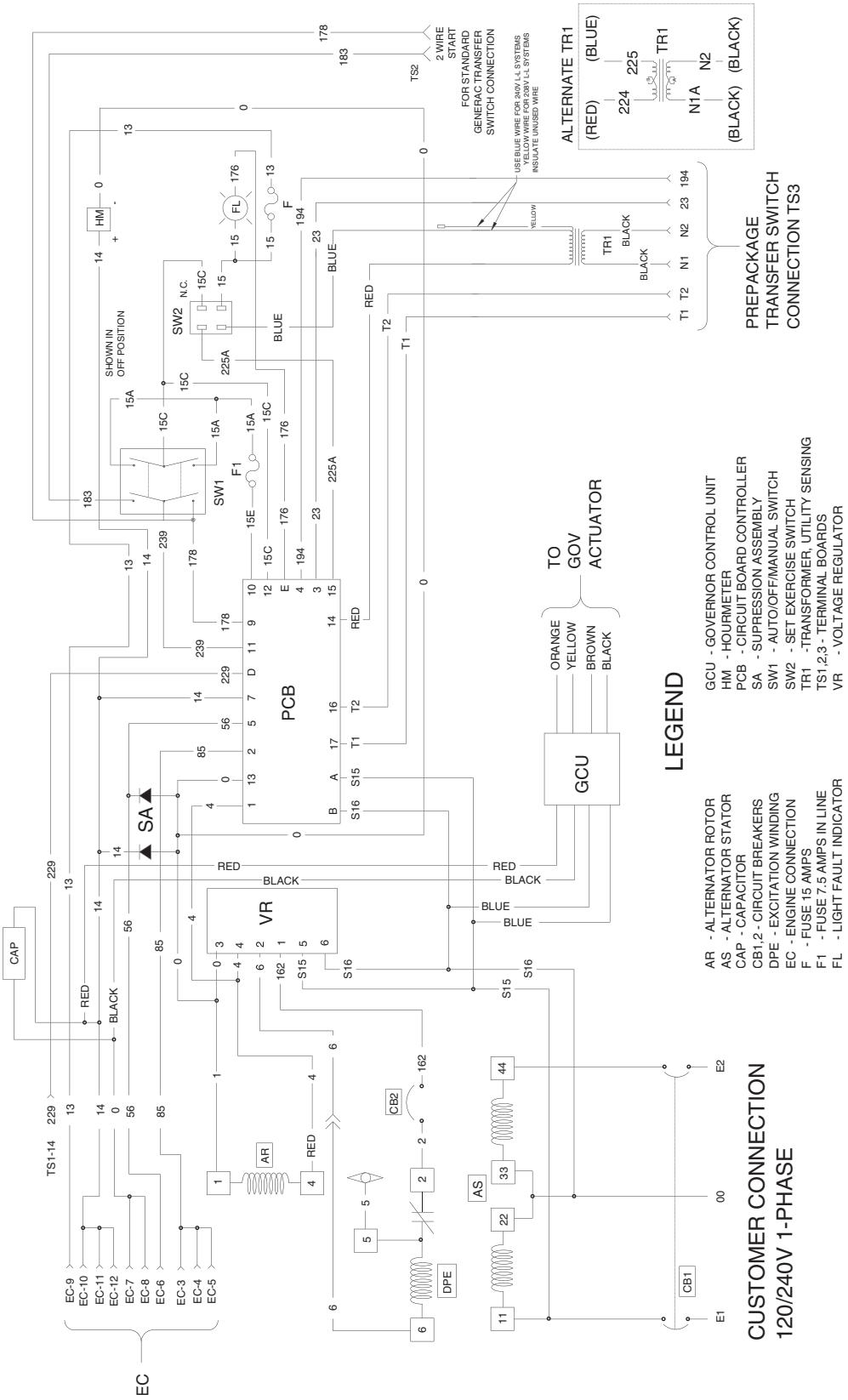
Section 8 - Electrical Data

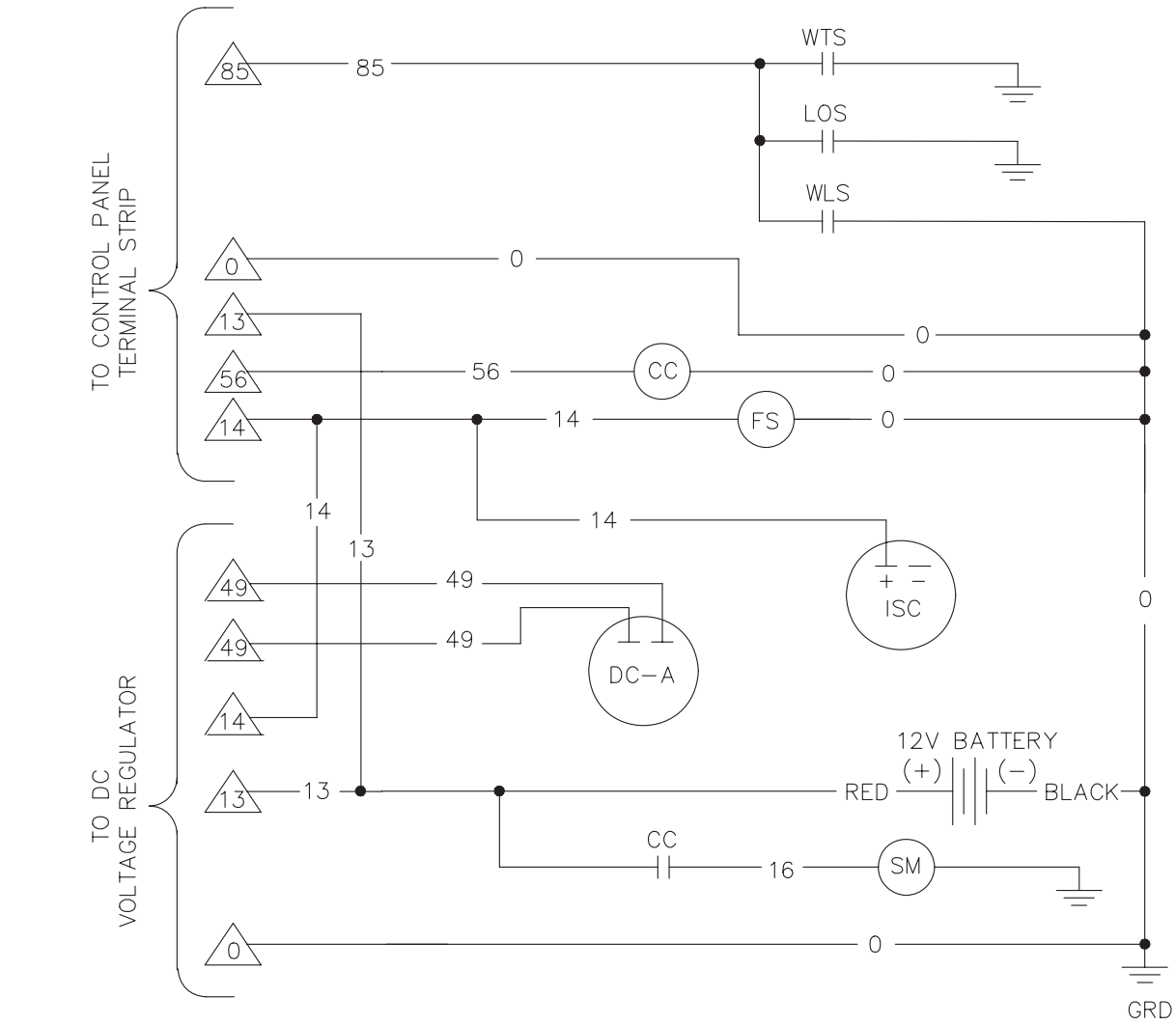
Liquid-cooled 15 kW and 25 kW Generators
Wiring Diagram — Control Panel —Drawing No. 0E0345

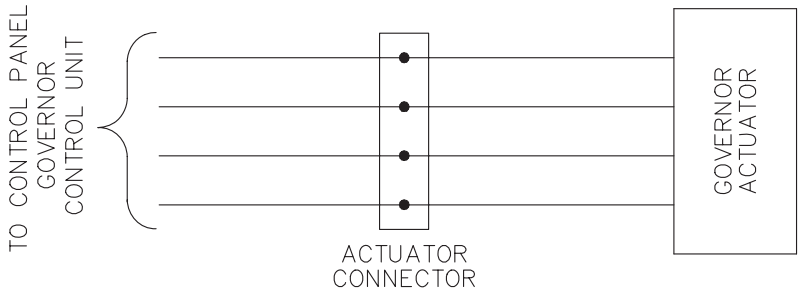


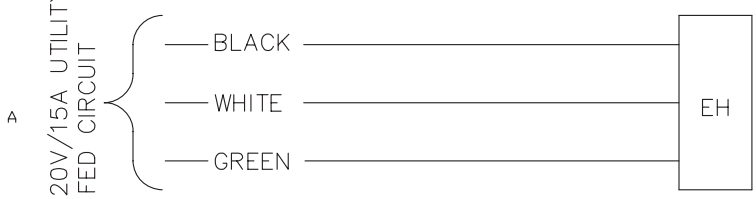

DC—VR
1 2 3 4 5
48 0 49 13 14
CC
DIS
WLS
LOS
WTS
FS
CONTROL PANEL CONNECTION
DEUTSCH
3 4 5 6 8 9 10 11 12
—85 —85 —85 —56 —0 —13 —14 —14 —14
RED
GRD
16
DC—A
49
48
SM
12—V. BATTERY
BLACK
GRD
LEGEND
CC — CONTROL CONTACTOR
DIS — DISTRIBUTOR
DCA — DC ALTERNATOR
EH — ENGINE HEATER
FS — FUEL SOLENOID
GRD — GROUND
LOS — LOW OIL PRESSURE SWITCH
SM — STARTER MOTOR
WTS — WATER TEMPERATURE SWITCH
WLS — WATER LEVEL SENSOR
TO ELECTRONIC GOVERNOR CONTROLLER
GOVERNOR ACTUATOR
ACTUATOR CONNECTOR
EH
TO 120V/15A UTILITY FED CIRCUIT
BLACK
WHITE
GREEN
NOTE:
ENGINE HEATERS ARE NOT AVAILABLE ON HOME STAND-BY UNITS.

Liquid-cooled 15 kW and 25 kW Generators
Wiring Diagram — 1.5L Guardian — Drawing No. 0E1525







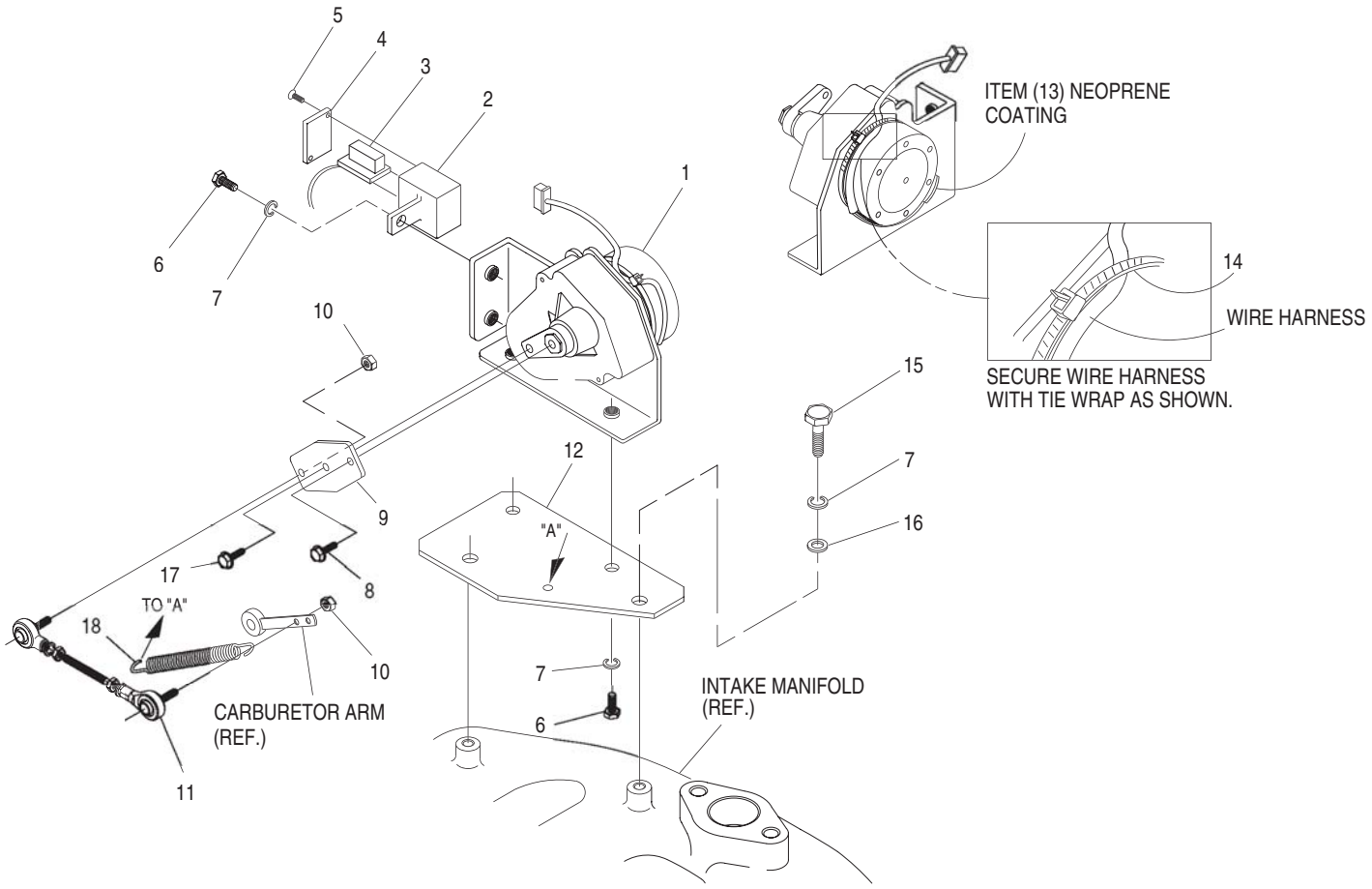


NOTE: ENGINE HEATERS ARE NOT AVAILABLE ON HOME STAND-BY UNITS.

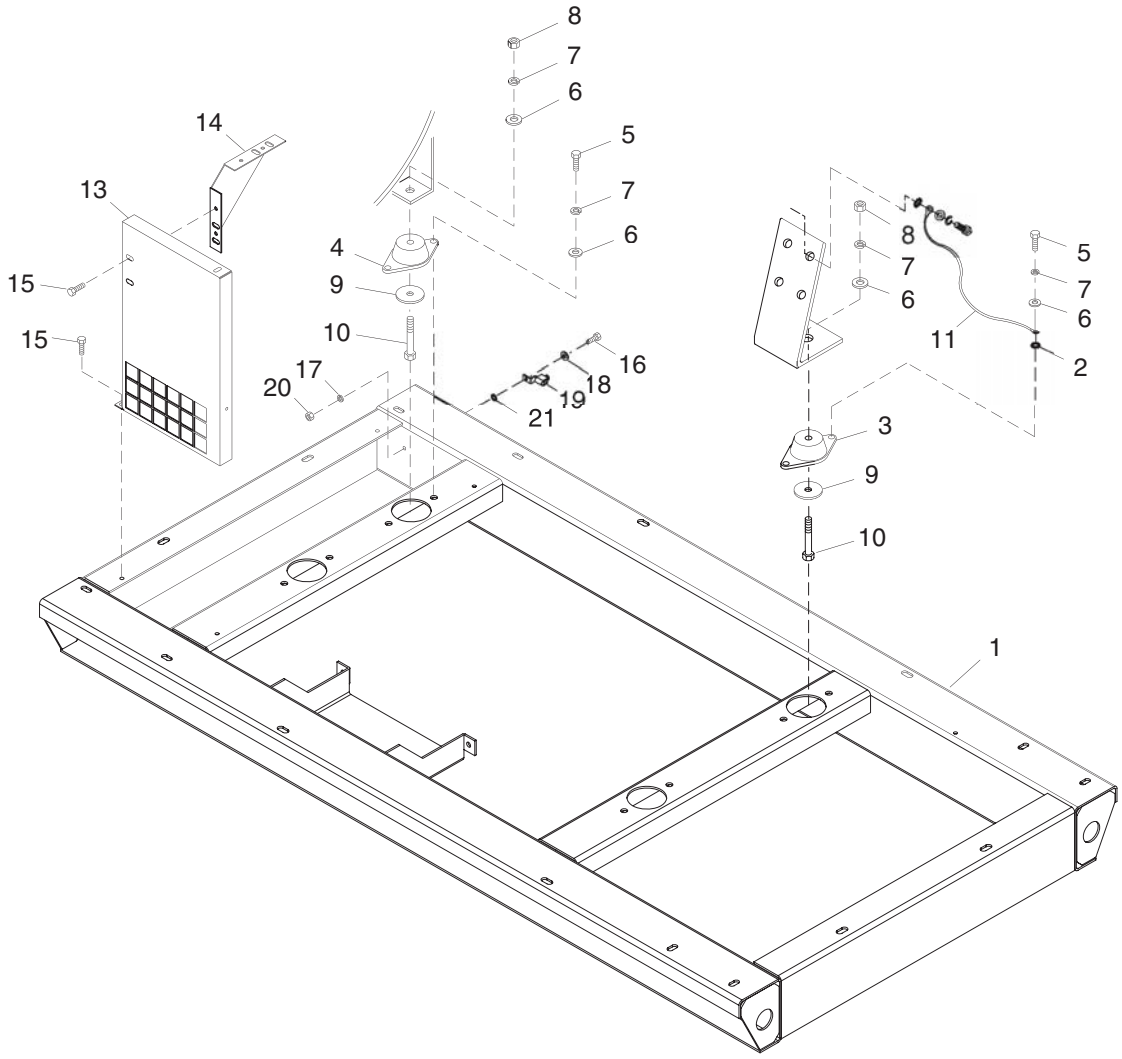
LEGEND

CC – CONTROL CONTACTOR
DCA – DC ALTERNATOR
EH – ENGINE HEATER
FS – FUEL SOLENOID
GRD – GROUND
ISC – IGNITION SYSTEM CONTACT
LOS – LOW OIL SWITCH
SM – STARTER MOTOR
WTS – WATER TEMPERATURE SWITCH
WLS – WATER LEVEL SWITCH

Liquid-cooled 15 kW and 25 kW Generators
Governor Assembly — Drawing No. 0E1331-B

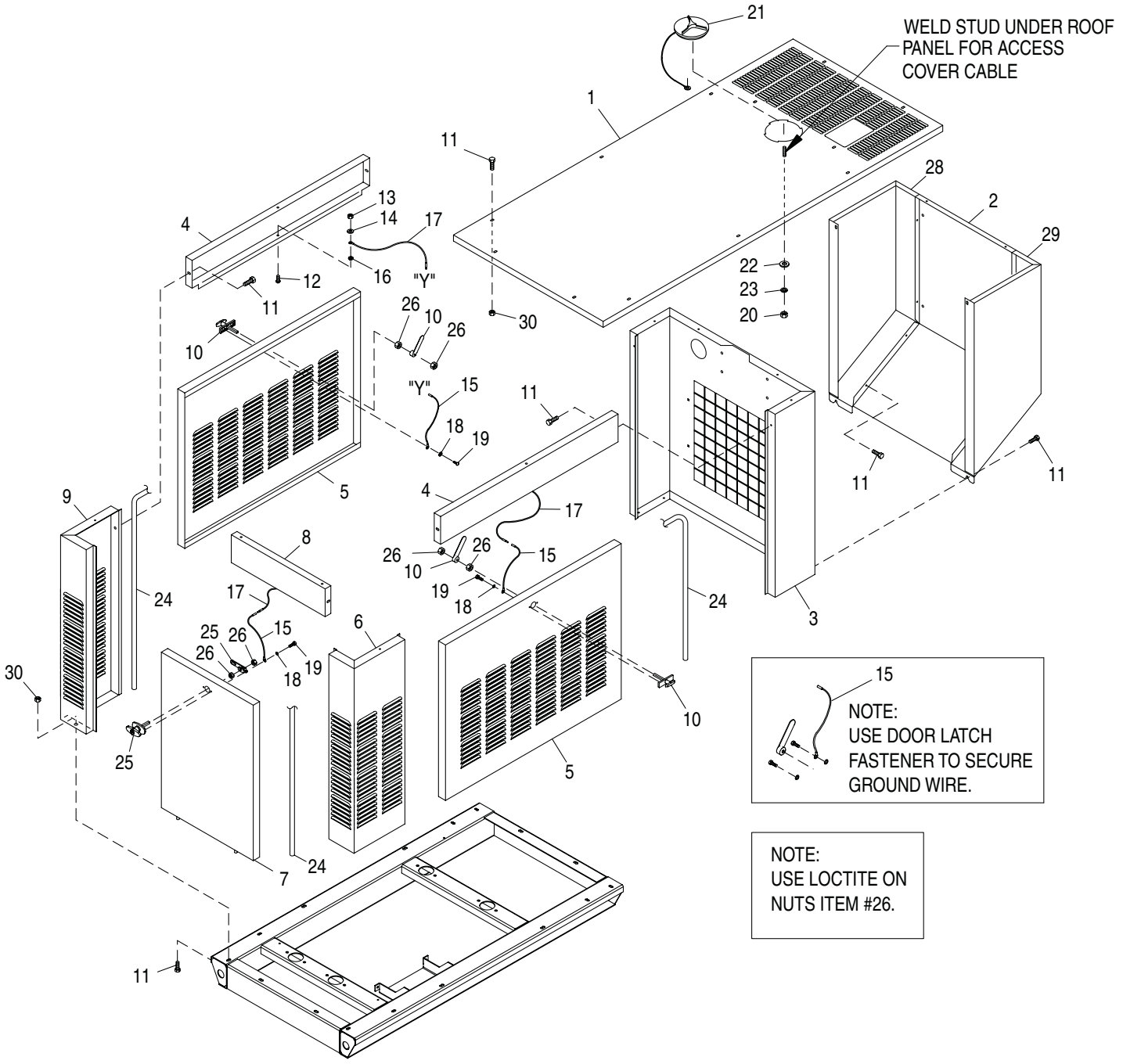


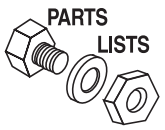
ITEM	PART NO.	QTY.	DESCRIPTION
1	098290	1	ASM MOTOR STEPPER
2	098941A	1	HOUSING GOVERNOR CONNECTOR
3	098958A	REF	CONNECTOR INTERFACE ASSEMBLY
4	098942A	1	COVER CONNECTOR HOUSING
5	098225	2	SCREW FHM #2 X 5/8 SELF TAP
6	043146	3	SCREW HHC M6-1.0 X 10 G8.8
7	022097	5	WASHER LOCK M6-1/4
8	084543A	1	SCREW PHM M3-0.5 X 12MM
9	098783	1	LEVER STEPPER MOTOR
10	037398	2	NUT LOCK HEX #10-32 NYL INS
11	0E1326	1	ASSY. CARBURETOR LINKAGE ROD
12	0A7106	1	BRACKET STEPPER MOTOR
13	074031	AR	LIQUID NEOPRENE
14	029333A	10	TIE WRAP 7.4"X.19" BLK UL
15	022507	2	SCREW HHC 1/4-20 X 1/2 G5
16	022473	2	WASHER FLAT 1/4 ZINC
17	064526	1	SCREW TAP HWH #6-25 X 3/8 ZINC
18	0E1694	1	SPRING,ANTI LASH



ITEM	PART NO.	QTY.	DESCRIPTION
1	0D8656	1	BASE,MOUNTING 1.5L STNRD&ACSTC
2	027482	2	WASHER SHAKEPROOF EXT 5/16 STL
3	070936	2	DAMPENER VIBRATION
4	070936C	2	VIB. ISO. 70-75 DURO
5	039253	8	SCREW HHC M8-1.25 X 20 G8.8
6	022145	12	WASHER FLAT 5/16 ZINC
7	022129	16	WASHER LOCK M8-5/16
8	045771	4	NUT HEX M8-1.25 G8 YEL CHR
9	071956	4	WASHER FLAT M8
10	051730	4	SCREW HHC M8-1.25 X 60 G8.8
11	021991	1	EARTH STRAP
13	0D9335	2	PANEL, SUPPORT
14	0D9336	2	PANEL, BRACKET
15	0C2454	12	SCREW TH-FRM M6-1X16 N WA Z/JS
16	047411	1	SCREW HHC M6-1.0 X 16 G8.8
17	022097	1	WASHER LOCK M6-1/4
18	022473	1	WASHER FLAT 1/4-M6 ZINC
19	055414	1	LUG SLDLSS #2-#8 X 17/64 CU
20	049813	1	NUT HEX M6 X 1.0 G8 YEL CHR
21	026850	1	WASHER SHAKEPROOF EXT 1/4 STL

Liquid-cooled 15 kW Generator
Standard Compartment — Drawing No. 0E0771-H





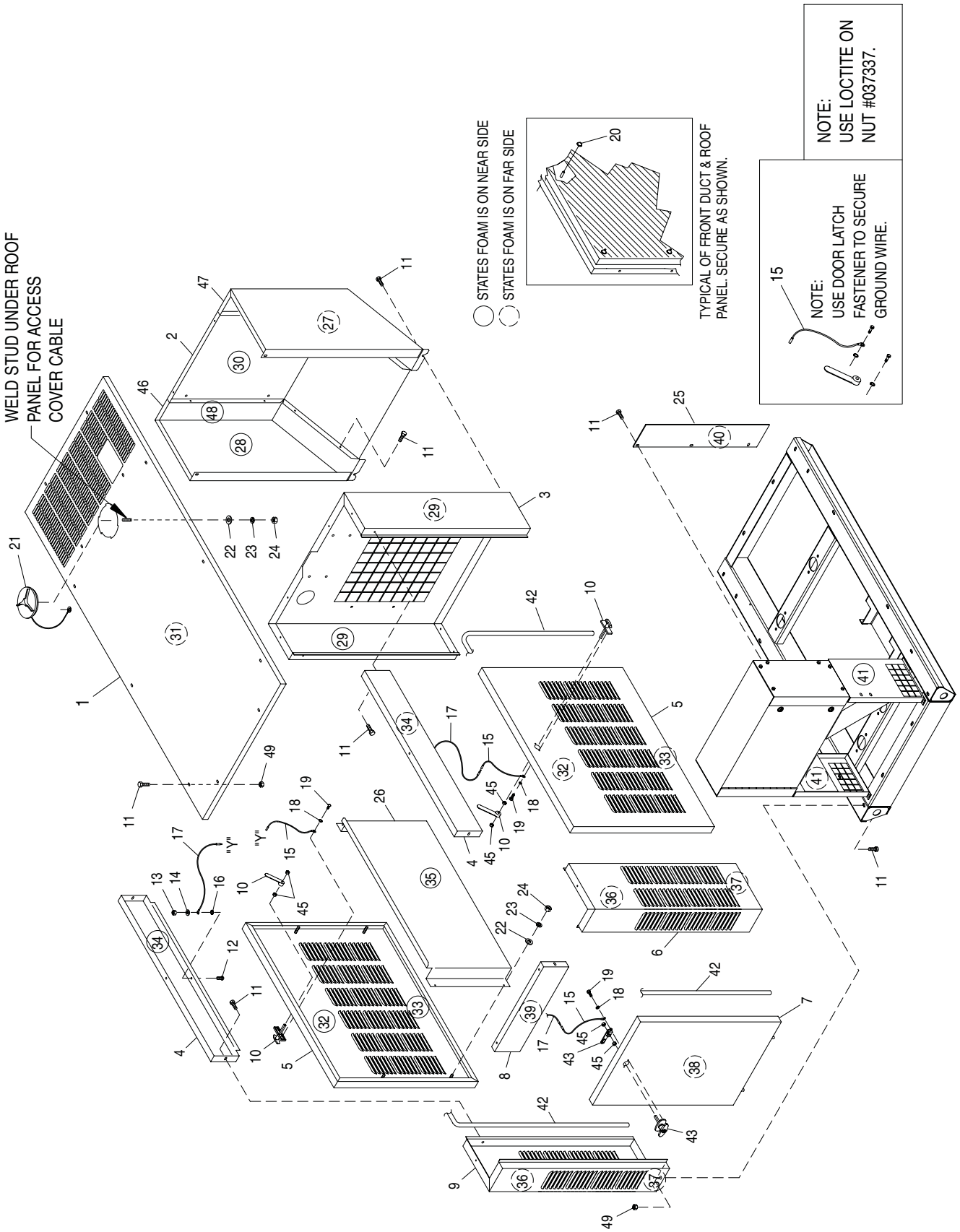
ITEM	PART NO.	QTY.	DESCRIPTION
1	0D8666 (A)	1	ROOF ACSTC&STND CMPRTMNT 1.5L
2	0D8664C (G)	1	DUCT CENTER 1.5L
3	0D8657 (A)	1	SUPPORT RADIATOR 1.5L MITSU
4	0D8660 (A)	2	BRACE SIDE 1.5L MITSU
5	0A7568 (A)	2	DOORWELDMENT 1.5EPS
6	0D8659 (A)	1	CORNER POST REAR RH SIDE 1.5L
7	0D8662 (A)	1	DOOR REAR COMPARTMENT 1.5L
8	0D8661 (A)	1	BRACE REAR 1.5L MITSU
9	0D8658 (A)	1	CORNER POST REAR LH SIDE 1.5L
10 *	067042	2	LATCH & CAM
11	0C2454	40	SCREW TH-FRM M6-1 X 16 N WA Z/JS
12	033530	3	SCREW PHM #10-32 X 5/8 ZINC
13	051716	3	NUT HEX M5-0.8 G8 YEL CHR
14	022152	3	WASHER LOCK #10
15	0912970064	3	ASSEMBLY BASE-DOOR GROUND WIRE
16	023762	3	WASHER SHAKEPROOF EXT #10 STL
17	0912970063	3	GRD WIRE ASS'Y 99HSB
18	022264	6	WASHER LOCK #8-M4
19	067035	6	SCREW PPHM #8-32 X 5/16
20	022127	1	NUT HEX 1/4-20 STEEL
21	0C2634A	1	ASSEMBLY COVER ACCESS
22	022473	1	WASHER FLAT 1/4 ZINC
23	022097	1	WASHER LOCK M6-1/4
24	0D2023	3	GASKET CLIP-ON SELF GRIPPING
25 **	0F3390	1	LATCH AND CAM
26	037337	6	NUT HEX JAM 3/8-24 SS
27	0D2023	21	GASKET CLIP-ON SELF GRIPPING
28	0D8664A (E)	1	DUCT LH SIDE 1.5L
29	0D8664B (F)	1	DUCT RH SIDE 1.5L
30	077992	20	NUT HEX LOCK M6-1.0 SS NY INS

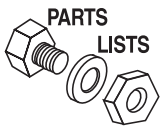
* NOTE: THE KEY FOR THIS LOCK IS P/N 067042A
** NOTE: THE KEY FOR THIS LOCK IS P/N 0C2164K

OPTIONAL COMPARTMENT MATERIALS:
ALL P/N'S WITH A ( ) SUFFIX INDICATE ALUMINUM MATERIAL OPTION.

ALUMINUM ENCLOSURE NOTE: ALL ENCLOSURE PANELS THAT FASTEN TO THE BASE FRAME MUST BE SECURED USING ITEM 11 THREAD FORMING FASTENER AND ITEM 30 LOCK NUT. LOCK NUT IS TO BE INSTALLED AFTER THREAD FORMING FASTENER HAS PENETRATED THROUGH EXTRUSIONS IN ENCLOSURE PANELS. ALL ROOF PANELS ARE TO BE SECURED IN THE SAME MANNER.

Liquid-cooled 25 kW Generator
Acoustic Compartment — Drawing No. 0E0772-L





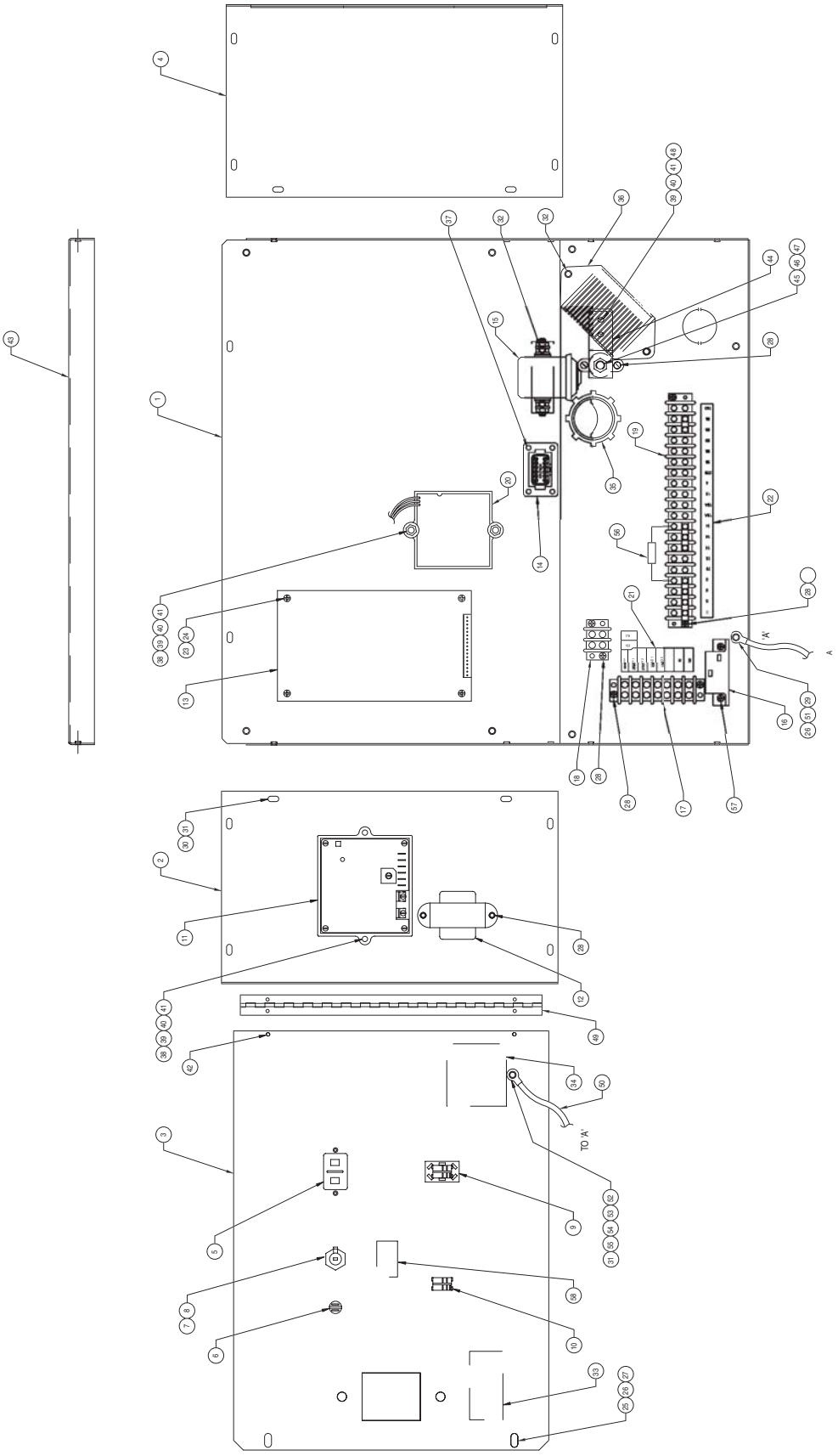
ITEM	PART NO.	QTY.	DESCRIPTION
1	0D8666 (A)	1	ROOF ACSTC & STND CMPRTMNT 1.5L
2	0D8664C (G)	1	DUCT CENTER 1.5L
3	0D8657 (A)	1	SUPPORT RADIATOR 1.5L MITSU
4	0D8660 (A)	2	BRACE SIDE 1.5L MITSU
5	0A7568 (A)	2	DOOR WELDMENT 1.5 EPS
6	0D8659 (A)	1	CORNER POST REAR RH SIDE 1.5L
7	0D8662 (A)	1	DOOR REAR COMPARTMENT 1.5L
8	0D8661 (A)	1	BRACE REAR 1.5L MITSU
9	0D8658 (A)	1	CORNER POST REAR LH SIDE 1.5L
10 *	067042	2	LATCH & CAM
11	0C2454	40	SCREW TH-FRM M6-1 X 16 N WA Z/JS
12	033530	3	SCREW PHM #10-32 X 5/8 ZINC
13	051716	3	NUT HEX M5-0.8 G8 YEL CHR
14	022152	3	WASHER LOCK #10
15	0912970063	3	ASSY WIRE 14AWG 7.5 #0 GRN/YEL
16	023762	3	WASHER SHAKEPROOF EXT #10 STL
17	0912970064	3	ASSY WIRE 14AWG 7.5 #0 GRN/YEL
18	022264	6	WASHER LOCK #8-M4
19	067035	6	SCREW PPHM #8-32 X 5/16
20	078115	13	WASHER SELF LOCKING DOME
21	0C2634A	1	ASSEMBLY COVER ACCESS
22	022473	9	WASHER FLAT 1/4 ZINC
23	022097	9	WASHER LOCK M6-1/4
24	022127	9	NUT HEX 1/4-20 STEEL
25	0D8663	2	BAFFLE CNTRL PNL 1.5L ACOUSTIC
26	0D8665	2	BAFFLE DOOR 1.5L ACOUSTIC UNIT
27	0E0072D	1	ACSTC INSLTN 1.5L DUCT RH PNL
28	0E0072B	1	ACSTC INSLTN 1.5L DUCT LH PNL
29	0E0072Q	2	ACSTC INSLTN 1.5L RAD SUPPORT
30	0E0072C	1	ACSTC INSLTN 1.5L DUCT FNT PNL
31	0E0072A	1	ACSTC INSLTN 1.5L ROOF PANEL
32	0E0072M	2	ACSTC INSLTN 1.5L SIDE DR PNL
33	0E0072P	2	ACSTC INSLTN 1.5L SIDE DR PNL
34	0E0072L	2	ACSTC INSLTN 1.5L SIDE BRC PNL
35	0E0072N	2	ACSTC INSLTN 1.5L DR BAFFLE PL
36	0E0072G	2	ACSTC INSLTN 1.5L RR CRNR TOP
37	0E0072J	2	ACSTC INSLTN 1.5L RR CRNR BOTT
38	0E0072F	1	ACSTC INSLTN 1.5L REAR DR PNL
39	0E0072E	1	ACSTC INSLTN 1.5L REAR BRC PNL
40	0E0072K	2	ACSTC INSLTN 1.5L BAFFLE PANEL
41	0E0072H	2	ACSTC INSLTN 1.5L CNTRL SUPPT
42	0D2023	3	GASKET CLIP-ON SELF GRIPPING
43 **	0F3390	1	LATCH AND CAM
45	037337	6	NUT HEX JAM 3/8-24 SS
46	0D8664A (E)	1	DUCT LH SIDE 1.5L
47	0D8664B (F)	1	DUCT RH SIDE 1.5L
48	0E0072R	2	INSUL ACO 1.5L DUCT FRNT PNL
49	077992	20	NUT HEX LOCK M6-1.0 SS NY INS

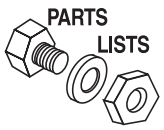
* NOTE: THE KEY FOR THIS LOCK IS P/N 067042A
** NOTE: THE KEY FOR THIS LOCK IS P/N 0C2164K

OPTIONAL COMPARTMENT MATERIALS:
ALL P/N'S WITH A ( ) SUFFIX INDICATE ALUMINUM MATERIAL OPTION.

ALUMINUM ENCLOSURE NOTE: ALL ENCLOSURE PANELS THAT FASTEN TO THE BASE FRAME MUST BE SECURED USING ITEM 11 THREAD FORMING FASTENER AND ITEM 49 LOCK NUT. LOCK NUT IS TO BE INSTALLED AFTER THREAD FORMING FASTENER HAS PENETRATED THROUGH EXTRUSIONS IN ENCLOSURE PANELS. ALL ROOF PANELS ARE TO BE SECURED IN THE SAME MANNER.

Liquid-cooled 15 kW and 25 kW Generators
Control Panel — Drawing No. 0E0778-G

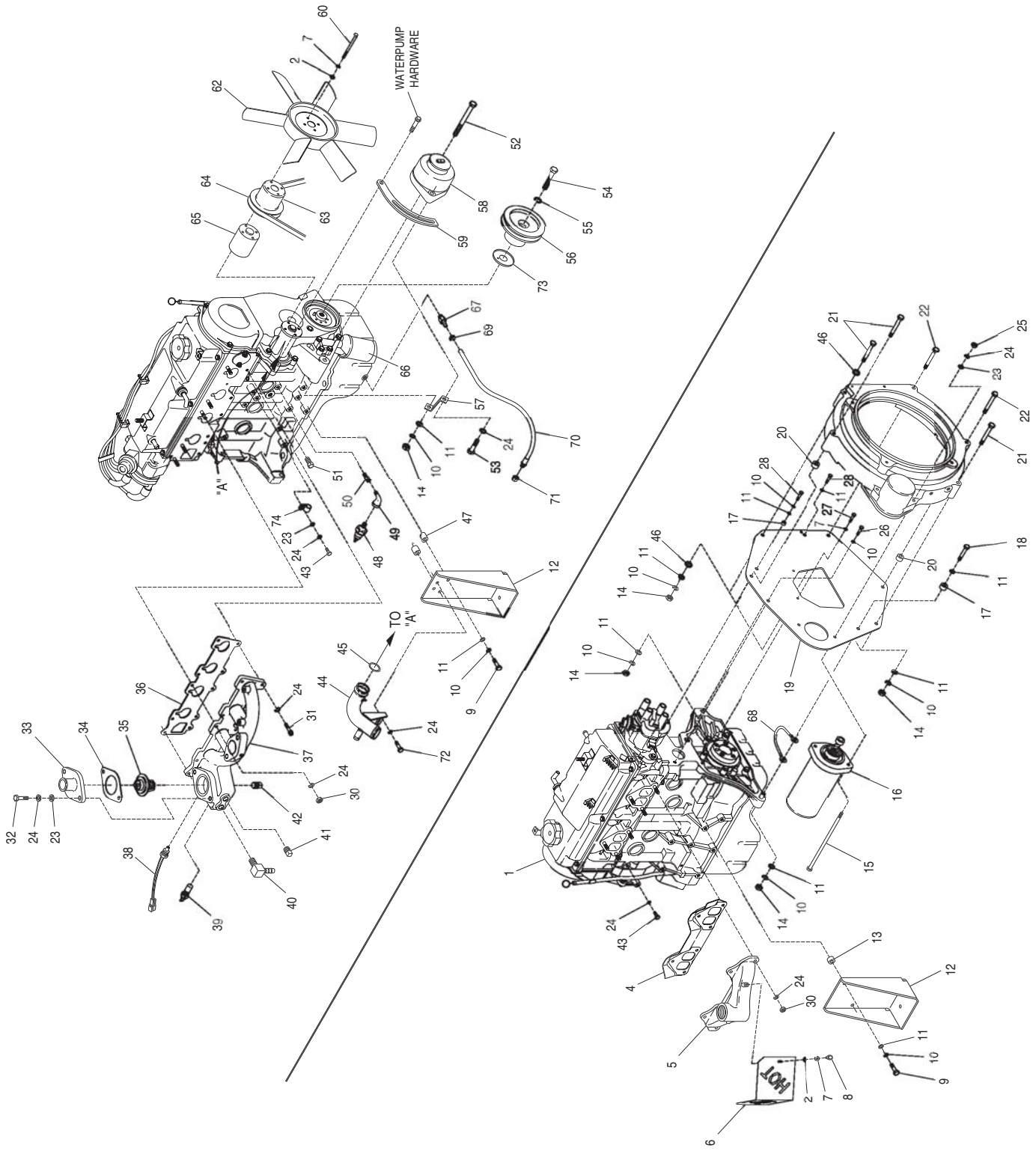


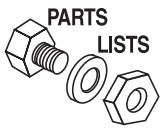


ITEM	PART NO.	QTY.	DESCRIPTION
1	0D9322	1	PANEL BACK & BOTTOM GUARDIAN
2	0D9332	1	PANEL LH SIDE GUARDIAN & SPRN
3	0D9325A	1	PANEL FRONT CONTROL GUARDIAN W/ SILKSC
4	0D9330	1	PANEL RH SIDE C-PANEL SML BRK
5	0C1457	1	HOURMETER
6	064009	1	LIGHT 12VDC .02A LED RED PILOT
7	032300	1	HOLDER FUSE
8	022676	1	FUSE 15A X AGC15
9	0E4494	1	SWITCH ROC DPDT ON-OFF-ON
10	082573	1	SWITCH ROCKER DPST 125V SPD
11	083048	1	ASSEMBLY REGULATOR POTTED
12	083264	1	TFMR ASM CMA 240/12V
13	076009A	1	PP LOGIC ASM 50/60HZ
14 *	0E0331	1	HARNESS CONTROL PANEL PP GUARDIAN
15	056739	1	RELAY SOLENOID 12VDC PNL MNT
16	049350	1	CIRCT BRK 4 X 1 ETA 46-500-P
17	047822	1	BLOCK TERM 20A 7 X 6 X 1100V
18	048766	1	BLOCK TERM 20A 2 X 6 X 1100V
19	057335	1	BLOCK TERM 20A 20 X 6 X 1100V
20	098647	1	ASSY L.C. ELECT GOV
21	0E1454	1	DECAL CUST. CONNT. PRE-PACK1.5L
22	0E1459	1	DECAL TERMINAL STRIP PRE-PACK
23	072566	4	NUT SPACER.250 PCB
24	080882	4	SCREW PPH TAPPING #6 X 5/8 SS
25	0A8955	2	SCREW PHM M6-1.0 X 20MM
26	022097	3	WASHER LOCK M6-1/4
27	022473	2	WASHER FLAT 1/4-M6 ZINC
28	0C2212	10	SCREW PHTT M4-0.7 X 16 ZYC
29	023762	2	WASHER SHAKEPROOF EXT #10 STL
30	0C2267	14	SCREW HHTT M5-0.8 X 12 BP
31	023897	15	WASHER FLAT #10 ZINC
32	0C2454	4	SCREW TH-FRM M6-1X16 N WA Z/JS
33	054199	1	DECAL HIGH VOLTAGE
34	081988	1	DECAL EXERCISE INFO
35	0E2514	1	STRAIGHT WIRE CONNECTOR 1 1/2"
36	0A1354A	1	REGULATOR - DC ALT
37	074908	4	SCREW HHTT M5-0.8 X 10 BP
38	020911	4	SCREW PPHM M5-0.8 X 30 ZINC
39	051713	5	WASHER FLAT M5
40	049226	5	WASHER LOCK M5
41	051716	5	NUT HEX M5-0.8 G8 YEL CHR
42	036261	4	RIVET POP .125 X .129-.133/#30
43	0D9334	1	PANEL, TOP
44	061979	1	BUS BAR
45	022237	1	WASHER LOCK 3/8
46	022241	1	NUT HEX 3/8-16 STEEL
47	057073	1	JUNCTION BLOCK 3/8-16
48	055440	1	SCREW HHC M5-0.8 X 25 G8.8
49	0D8671	1	HINGE CONTINUOUS 1.5L CNTL PNL
50	0912970080	1	WIRE ASSEMBLY
51	049813	1	NUT HEX M6 X 1.0 G8 YEL CHR
52	033121	1	SCREW HHC #10-32 X 1/2
53	026850	1	WASHER SHAKEPROOF EXT 1/4 STL
54	022158	1	NUT HEX #10-32 STEEL
55	022152	1	WASHER LOCK #10
56	0A3968	1	CAPACITOR FILTER ASY
57	0C2323	2	SCREW PHTT #6-32 X 5/8 ZYC
58	0E3783	1	DECAL WARNING REMOVE FUSE

* NOT SHOWN

Liquid-cooled 15 kW and 25 kW Generators
Engine — Drawing No. 0E1228-H

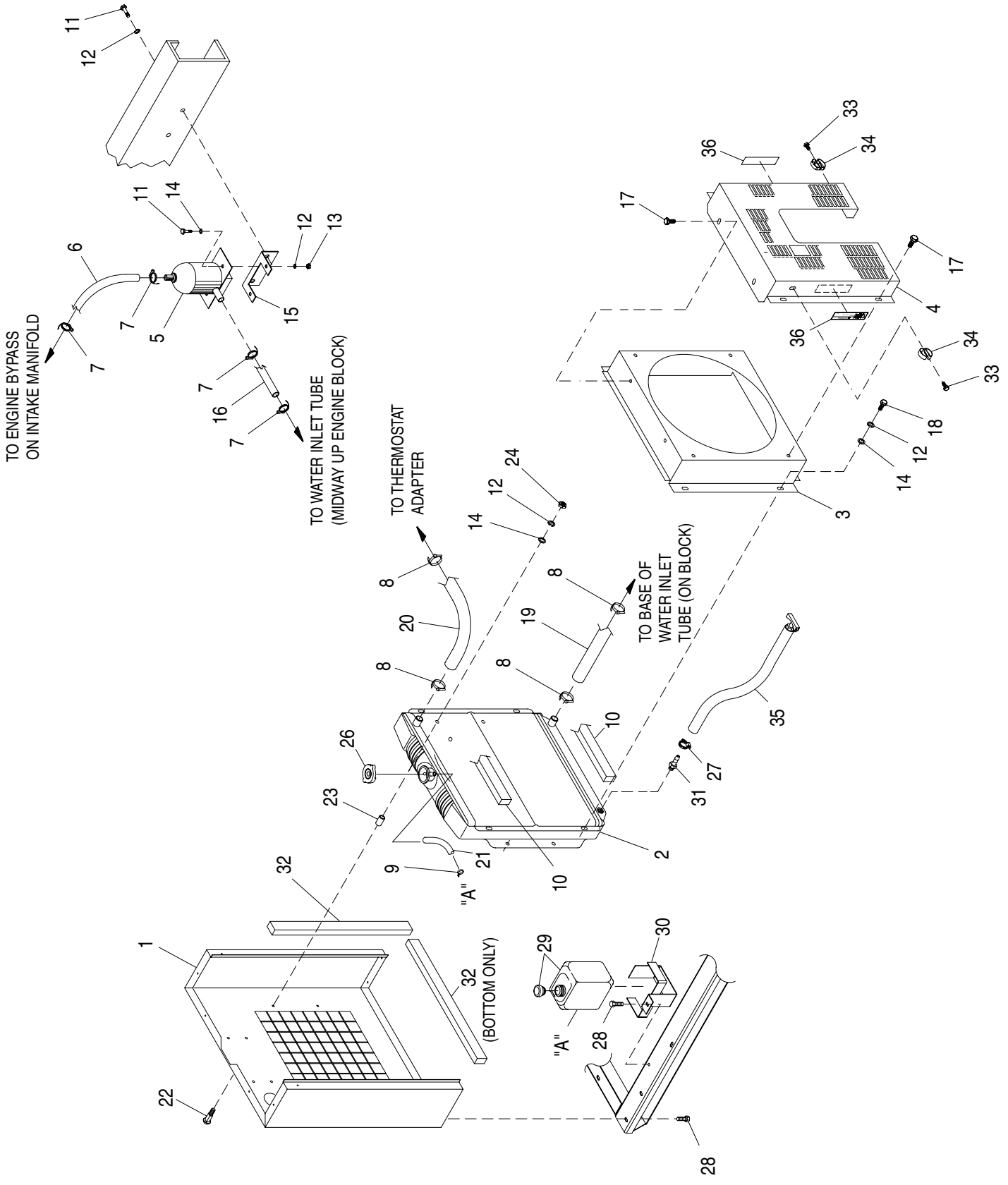


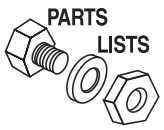


ITEM	PART NO.	QTY.	DESCRIPTION
1	0A4531	1	ENGINE-1.5L
2	022473	6	WASHER FLAT 1/4 ZINC
4	0A45310258	1	GASKET-EXHAUST MANIFOLD
5	0A4355	1	MANIFOLD-EXHAUST
6	0E2632	1	HEAT SHIELD EXH 1.5L
7	022097	8	WASHER LOCK M6-1/4
8	022507	2	SCREW HHC 1/4-20 X 1/2 G5
9	052212	2	SCREW HHC M10-1.25 X 25 G8.8
10	046526	4	WASHER-LOCK-M10
11	022131	20	WASHER FLAT 3/8 ZINC
12	0C2499	2	STAMPING ENG FOOT
13	055993	1	SPACER .41 X .75 X .12 STL/ZNC
14	045772	1	NUT HEX M10-1.5 G8 YEL CHR
15	023586	2	SCREW SHC 5/16-18 X 2 G8.8 NZ
16	020692	1	STARTER-12V
17	0A7005	2	SPACER .56 X 1 X .37 ST/ZNC
18	052243	1	SCREW HHC M10-1.5 X 60 G8.8
19	0A4772	1	ENGINE PLATE
20	070901	2	SLEEVE DOWEL BLHSG
21	051735	3	SCREW HHC M10-1.5 X 70 G8.8
22	056768	3	SCREW HHC M10-1.5 X 90 G8.8
23	022145	12	WASHER FLAT 5/16 ZINC
24	022129	19	WASHER LOCK M8-5/16
25	022259	2	NUT HEX 5/16-18 STEEL
26	052213	11	SCREW HHC M10-1.25 X 20 G8.8
27	047411	2	SCREW HHC M6-1.0 X 16 G8.8
28	052830	1	SCREW HHC M10-1.25 X 45 G8.8
30	045771	12	NUT HEX M8-1.25 G8 YEL CHR
31	058306	5	SCREW SHC M8-1.25 X 25 G12.9
32	030795	2	SCREW HHC 5/16-18 X 1 G5
33	0A2711A	1	ADAPTER-THERMOSTAT
34	048665	1	GASKET THERMOSTAT
35	075885	1	THERMOSTAT 195 DEG
36	0A45310257	1	GASKET INLET MANIFOLD
37	0E1100	1	MANIFOLD INTAKE MACHINED
38	0E0561	1	ASSY WATER LEVEL SENSOR C/E PL
39	0A6751	1	SW-TMP 245 DEG 3/8 NPT
40	034339	1	BARBED EL 90 3/8 NPT X 5/8
41	026925	1	PLUG STD PIPE 3/8 STEEL SQ HD
42	061012	1	PLUG STD PIPE 1/8 SCKT HD
43	039253	5	SCREW HHC M8-1.25 X 20 G8.8
44	0A5110	1	PIPE WATER-INLET
45	0A7006	1	O-RING 1-1/16 X 1-5/16 X 1/8
46	025507	2	WASHER SHAKEPROOF EXT 7/16 STL
47	022500B	2	SPACER .41 X .75 X .25 ST/ZNC
48	0A8584	1	SWITCH OIL PRESSURE
49	036277	1	ELBOW 90D STREET 1/8
50	042574	1	ADAPTOR 1/8 NPTF TO 1/8-28
51	026073A	1	PLUG STD PIPE 1/4 STEEL SQ HD
52	0A6701	1	SCREW HHC M10-1.5 X 110 G8.8
53	039414	1	SCREW HHC M8-1.25 X 35 G8.8
54	0A5568	1	SCREW HHC M12-1.25 X 55 G8.8
55	051769	1	WASHER LOCK M12
56	0A4804	1	PULLEY-CRANKSHAFT (1800 RPM) BUILT PRIOR TO 11/20/02
	0A4804A	1	PULLEY-CRANKSHAFT (1800 RPM) BUILT AFTER 11/20/02
	0A4800	1	PULLEY-CRANKSHAFT (3600 RPM) BUILT PRIOR TO 11/20/02
	0A4800A	1	PULLEY-CRANKSHAFT (3600 RPM) BUILT AFTER 11/20/02
57	0A5839	1	BRACKET - ALT SUPPRT
58	0A1354B	1	DC ALTERNATOR-12V
59	0A4839	1	ARM ADJUST ALTERNATOR
60	055816	4	SCREW HHC M6-1.0 X 70 G8.8
62	0E1936	1	FAN COOLING 15”
63	0A2628	1	PULLEY - FAN 95 DIA
64	0A5275	1	V-BELT 3/8 X 32-1/8 1.5L
	0A5586	1	V-BELT 3/8 X 28.9 1.5L
65	0A4814	1	SPACER PULLEY
66	0A45310244	1	FILTER OIL
67	0C1852	1	ADAPTER DRAIN OIL
68	0912970066	1	GROUND WIRE (STARTER)
69	070928	1	CLAMP HOSE - OIL DRAIN
70	069860C	1	HOSE ASM.-OIL DRAIN
71	069811	1	CAP HEX 1/4NPT BRASS
72	058443	2	SCREW CRIMPTITE 1/4-20 X 5/8
73	0F3856	1	GUARD CRANKSHAFT 1.5L
74 *	055934C	1	CLAMP VINYL .5 X .406 Z

* CLAMP FOR WIRING HARNESS (NOT SHOWN)

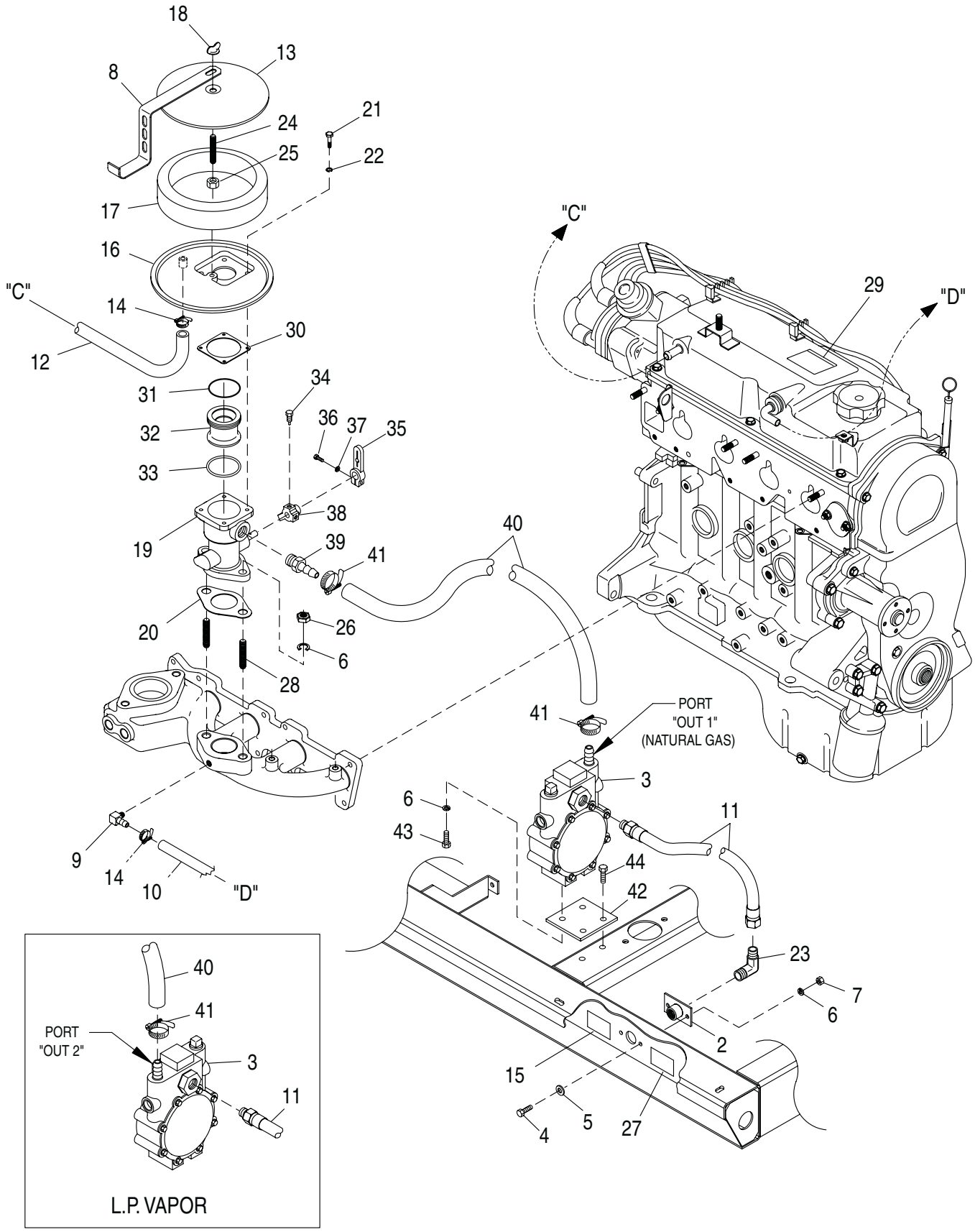
Liquid-cooled 15 kW and 25 kW Generators
Radiator — Drawing No. 0E0769-L





ITEM	PART NO.	QTY.	DESCRIPTION
1	0D8657	1	SUPPORT RADIATOR 1.5L MITSU
2	0A5734	1	RADIATOR 1.5L
3	0A6237	1	VENTURI 1.5L MODINE
4 *	0A6238	1	GUARD FAN 1.5L MODINE
5	084918	1	HEATER ENGINE 0500W 120V
	084918A	1	HEATER BLOCK 1000W 120V
6	051520N	1	TUBING 5/8 ID X 12
7	048031C	4	CLAMP HOSE BAND 1/4
8	099502	4	CLAMP HOSE #24 B1.06 - 2.00
9	083709	1	CLAMP WIRE HOSE .573 - .551
10	052250	2	TAPE FOAM 1 X 1 (12" LG)
11	047411	4	SCREW HHC M6-1.0 X 16 G8.8
12	022097	8	WASHER LOCK M6-1/4
13	049813	2	NUT HEX M6 X 1.0 G8 YEL CHR
14	022473	9	WASHER FLAT 1/4 ZINC
15	084427	1	BRACKET HEATER
16	051520Z	1	TUBING 5/8 ID X 18" LG
17 *	058443	6	SCREW CRIMPTITE 1/4-20 X 5/8
18	056892	4	SCREW CRIMPTITE 10-24 X 3/8
19	0A6284	1	HOSE - LOWER RADIATR
20	0A6258	1	HOSE - UPPER RADIATR
21	029032	1	HOSE 9/32 ID (36" LG)
22	031669	4	BOLT CARR 1/4-20 X 1-3/4 JS500
23	060035	4	SPACER .41 X .75 X .87 ST/ZNC
24	022127	4	NUT HEX 1/4-20 STEEL
26	046627	1	CAP RADIATOR
27	0C7649	1	CLAMP HOSE .38-.87
28	0C2454	4	SCREW TH-FRM M6-1 X 16 N WA Z/JS
29	076749	1	TANK COOLANT RECOVERY
30	0E0726	1	BRACKET WATER BOTTLE 1.5L MIT
31	035461	1	BARBED STR 1/4 NPT X 3/8
32	0A7275	3	FOAM 1.5 X 1 ADH BAK
33	0A2111	2	SCREW SWAGE 10-32 X 5/16 Z/YC
34	065852	2	SPRING CLIP HOLDER .37-.62
35	047290A	1	ASSY. RAD. DRAIN HOSE
36	050275	2	DECAL WARNING-FAN

* FAN GUARD KIT 0E3596 (NOT USED WITH LEVEL ONE GUARDING)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"C"
29
"D"
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PORT
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(NATURAL GAS)
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"D"
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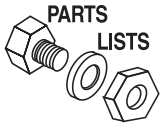
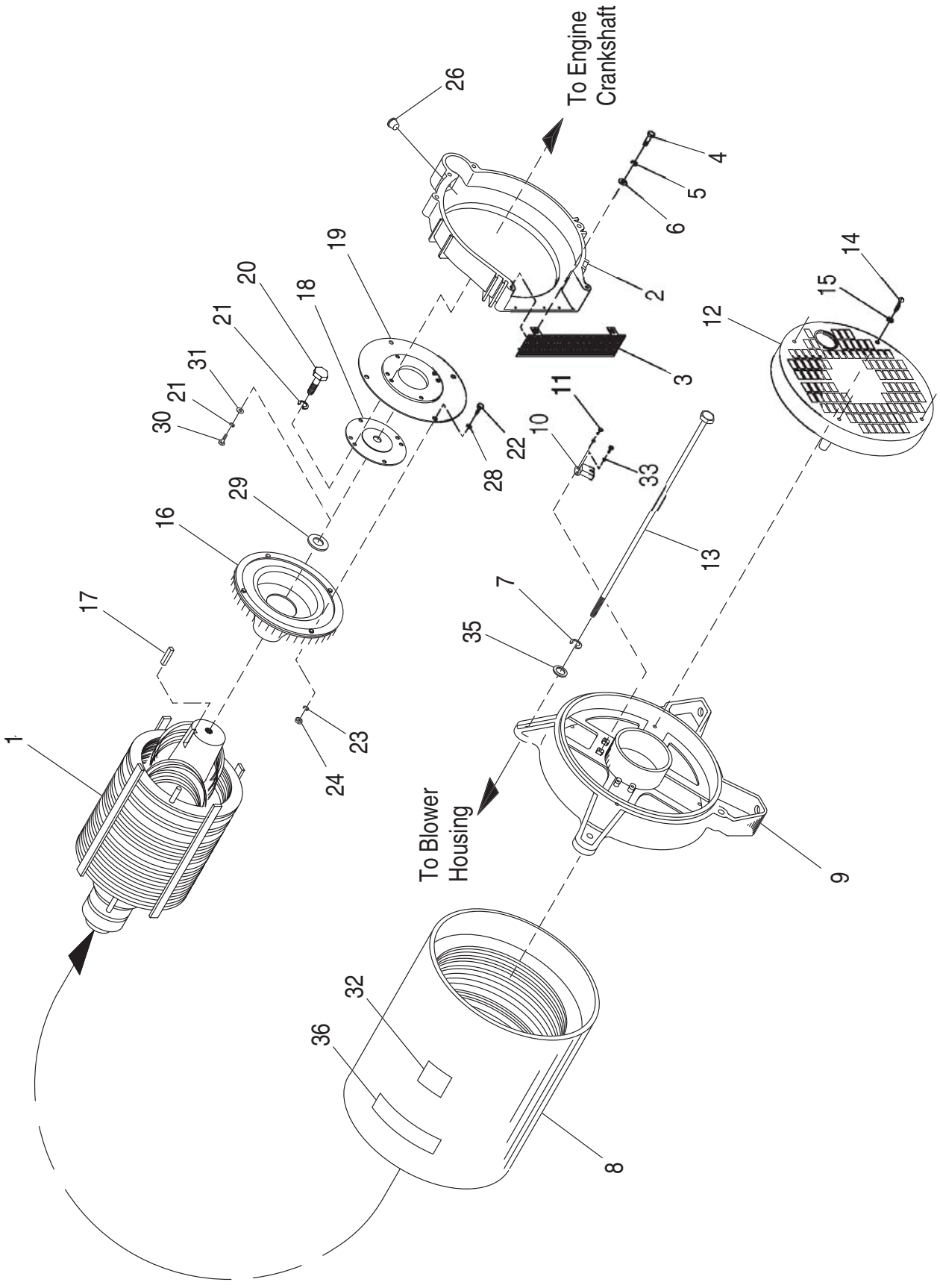
41
PORT
"OUT 2"
3
11
L.P. VAPOR

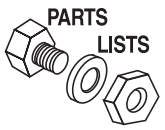


ITEM	PART NO.	QTY.	DESCRIPTION
1 *	---------	1	WELDMENT MOUNTING BASE
2	075580	1	FLANGE FUEL INLET
3	0E1006	1	ASSY REGULATOR 1.5L N.G.OR LPV
4	039253	2	SCREW HHC M8-1.25 X 20 G8.8
5	022145	2	WASHER FLAT 5/16 ZINC
6	022129	6	WASHER LOCK M8-5/16
7	045771	2	NUT HEX M8-1.25 G8 YEL CHR
8	0A7040	1	BRACKET-RAD HOSE
9	032552	1	BARBED EL 90 5/16 X 1/8 NPT
10	029032	1	HOSE 9/32 ID 11"
11	0E1056	1	FUEL HOSE ASSM. NAT.GAS/L.P.V.
12	029032	1	HOSE 9/32 ID 7.5"
13	0A5547	1	COVER AIR CLEANER
14	048031C	4	CLAMP HOSE BAND 1/4
15	0D1509	1	DECAL INLET PRESSURE
16 **	0E0591	1	ADAPTER,CARB.TO AIR CLNR
17	059402	1	FILTER ELEMENT
18	037561	1	NUT WING 1/4-20 NYLK
19	0E1028	1	CARBURETOR ASSY. 1.5L
20	059401	1	CARBURETOR GASKET
21 **	091526	4	SCREW PPHM M5-0.8 X 12 ZNC
22 **	049226	4	WASHER LOCK M5
23	026307	1	ELBOW 90D STREET 3/4
24	062522	1	STUD TH 1/4-20 X 3 G2 ZNC FULL
25	022127	1	NUT HEX 1/4-20 STEEL
26	022259	2	NUT HEX 5/16-18 STEEL
27	050279	1	DECAL FUEL INLET NG
28	0A6125	2	STUD 5/16-18 X 1.25 F THR
29	0D8492T	1	DECAL EMISSION CTRL 1.5 NG 2005 (10-15KW NATURAL GAS)
30 **	0E1104	1	GASKET AIR CLEANER ADAPTER
31 **	0E0668	1	O-RING 2-028 1.38 X 1.50 X .06
32 **	0E0590	1	VENTURI 18MM
33 **	0C5133	1	O-RING 29.82 X 2.62
34 **	0E0665	1	SCREW THROTTLE PIN STOP
35 **	0E1108	1	THROTTLE ARM REWORK
36 **	033138	1	SCREW HHM #10-32 X 5/8
37 **	022152	1	WASHER LOCK #10
38 **	0E0645	1	LEVER THROTTLE STOP
39 **	063463A	1	BARBED STR 3/8NPT X 1/2 W/VS
40	0E1558	1	HOSE LPG & NAT GAS 1/2 ID (23"LG)
41	057823	2	CLAMP HOSE #10 .56 - 1.06
42	0E1111	1	PLATE, GAS REGULATOR MOUNTING
43	042907	2	SCREW HHC M8-1.25 X 16 G8.8
44	0C2454	2	SCREW TH-FRM M6-1 X 16 N WA Z/JS

* SHOWN IN OTHER VIEW
** INCLUDED IN ITEM 19 (CARBURETOR ASY.)

Liquid-cooled 15 kW and 25 kW Generators
Alternator — Drawing No. 0A9348-G

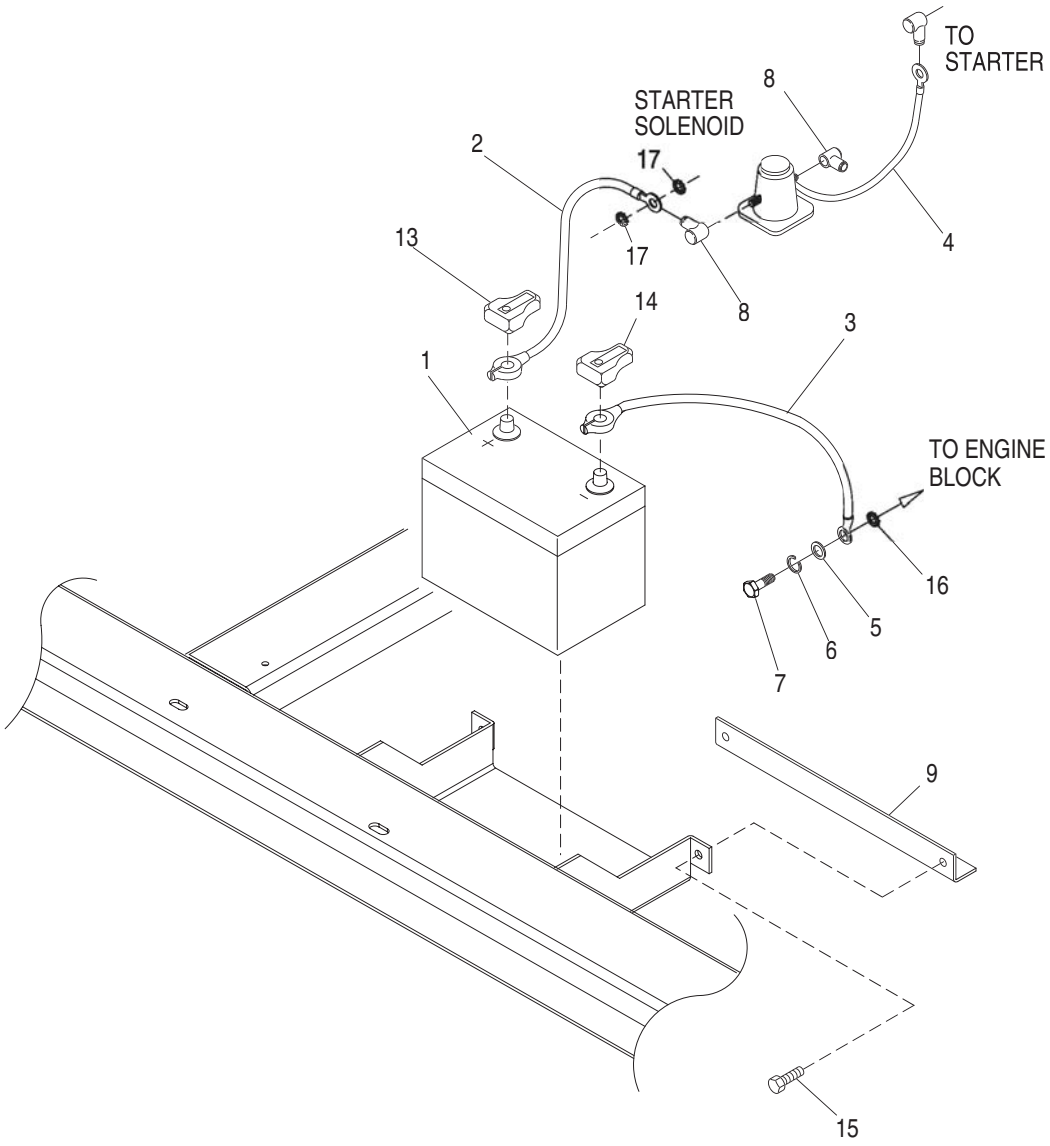




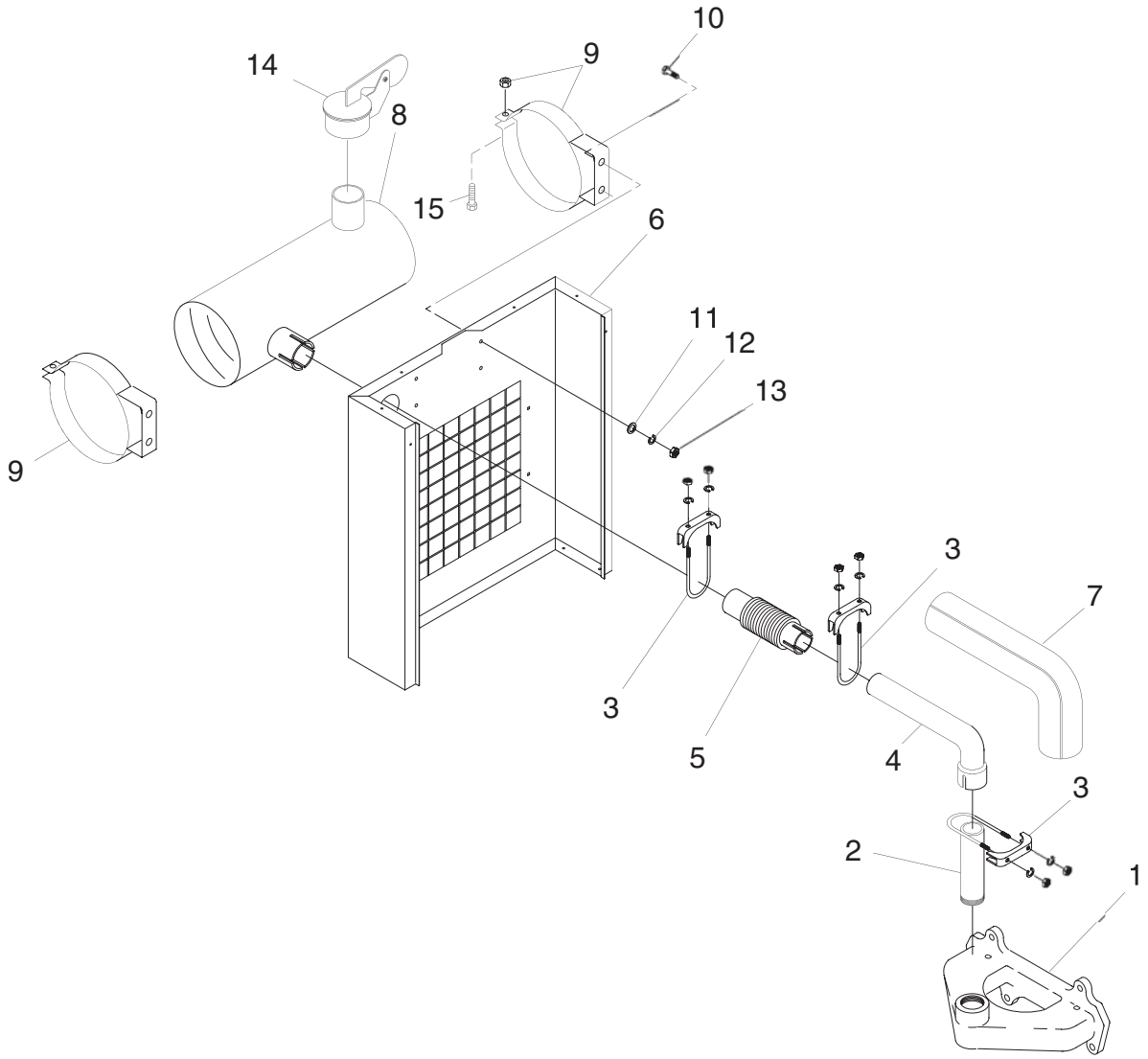
ITEM	PART NO.	QTY.	DESCRIPTION
1	098671	1	ASSY ROTOR 10KW
	098681	1	ASSY ROTOR 15KW
	098675	1	ASSY ROTOR 20KW
	098936	1	ASSY ROTOR 25KW
2	0A5336A	1	HOUSING BLOWER
3	0A1659	1	SCREEN AIR OUTLET
4	071912	4	SCREW PPHM M5-0.8 X 8 SS
5	049226	4	WASHER LOCK M5
6	051713	4	WASHER FLAT M5
7	022129	4	WASHER LOCK M8-5/16
8	098672	1	ASSY STATOR 10KW A
	098673	1	ASSY STATOR 10KW D
	098674	1	ASSY STATOR 10KW GJK
	098682	1	ASSY STATOR 15KW 1PH A
	098683	1	ASSY STATOR 15KW 3PH D
	098684	1	ASSY STATOR 15KW 1PH GJK
	098676	1	ASSY STATOR 20KW 1PH A
	098677	1	ASSY STATOR 20KW 1PH D
	098678	1	ASSY STATOR 20KW 1PH GJK
	097620	1	ASSY STATOR 25KW 1PH A
	098937	1	ASSY STATOR 25KW 1PH D
	097621	1	ASSY STATOR 25KW 3PH D
9	0A5382	1	BEARING CARRIER REAR
10	075591	1	ASSY HOLDER BRUSH
11	075476	4	SCREW PPHM M4-0.7 X 16
12	0A5601A	1	COVER REAR BEARING
13	075554B	4	BOLT STATOR X 16" LG
14	0A9375	4	SCREW RHM #10-24 X 2
15	022152	4	WASHER LOCK #10
16	097146	1	FAN & RING GEAR ASSEM.
17	042558	1	KEY SQ 3/8 X 1 STEEL
18	0A5061	1	SPACER-FLEX PLATE
19	0A4989	1	PLATE FLEX
20	053557	1	SCREW HHC M12-1.75 X 40 G8.8
21	051769	6	WASHER LOCK M12
22	049541	4	SCREW HHC M10-1.5 X 35 G8.8
23	046526	4	WASHER LOCK M10
24	045772	4	NUT HEX M10-1.5 G8 YEL CHR
26 *	087599	1	PLUG PLASTIC 3/8 NPT
27	077043E	1	FLEX CONDUIT 1" BLACK (NOT SHOWN)
28	022131	4	WASHER FLAT 3/8-M10 ZINC
29	072578	1	SPACER ROTOR SHAFT
30	0A7043	5	SCREW HHC M12-1.25 X 25 G8.8
31	049808	5	WASHER FLAT M12
32	058589	1	DECAL WARN ENG START
33	023365	4	WASHER SHAKEPROOF INT #8
35	0A8830	4	WASHER FLAT .34 ID X .75 OD
36	072080	1	DECAL DANGER STANBY UNITS

* USED ON PRE-PACKAGED UNITS ONLY

Liquid-cooled 15 kW and 25 kW Generators
Battery — Drawing No. 0E0770-B



ITEM	PART NO.	QTY.	DESCRIPTION
1	077483	REF	BATT 12VDC 75-AH 26 (NOT INCLUDED)
2	038804D	1	CABLE BATT RED #4 X 20.00
3	038805B	1	CABLE BATT BLK #4 X 23.00
4	0742600131	1	ASSY,WIRE#16 RED 1.6
5	022131	1	WASHER FLAT 3/8 ZINC
6	046526	1	WASHER LOCK M10
7	052213	1	SCREW HHC M10-1.25 X 20 G8.8
8	075763	3	BOOT, BATTERY CABLE
9	0D8668	1	BRACKET, BATTERY HOLD DOWN 1.5
13	050331A	1	BATTERY POST COVER (RED+)
14	050331	1	BATTERY POSTCOVER (BLACK-)
15	0C2454	2	SCREW TH-FRM M6-1X16 N WA Z/JS
16	025507	1	WASHER SHAKEPROOF EXT 7/16 STL
17	027482	2	WASHER SHAKEPROOF EXT 5/16 STL



ITEM	PART NO.	QTY.	DESCRIPTION
1	0A4355	1	MANIFOLD EXHAUST 1.5L
2	0E2844	1	NIPPLE TOE 1.5NPTX5.5 BLK IRON
3	036434	3	BOLT U 5/16-18 X 2.09
	036449	3	SADDLE 2 INCH
4	0E0109	1	PIPE,EXHAUST 1.5L STNDRD&ACSTC
5	0C1318	1	FLEX PIPE EXHAUST
6	0D8657	1	SUPPORT, RADIATOR 1.5L MITSU
7	0E0170	1	BLANKET, EXHAUST 1.5L MITSU
8	0D9437	1	MUFFLER,1.5L ACOUSTIC&STANDARD
9	060366	2	STRAP MUFFLER 6" DIA
10	039253	4	SCREW HHC M8-1.25 X 20 G8.8
11	022145	4	WASHER FLAT 5/16 ZINC
12	022129	4	WASHER LOCK M8-5/16
13	045771	4	NUT HEX M8-1.25 G8 YEL CHR
14	0A8974	1	CAP RAIN 2"
15	027837	2	SCREW RHM 1/4-20 X 2-1/4

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT

YOUR WARRANTY RIGHTS AND OBLIGATIONS

The California Air Resources Board (CARB) and Generac Power Systems, Inc. (Generac) are pleased to explain the Emission Control System Warranty on your new engine.* In California, new utility, and lawn and garden equipment engines must be designed, built and equipped to meet the state's stringent anti-smog standards. Generac will warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect, unapproved modification or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor, ignition system and exhaust system. Generac will repair your engine at no cost to you for diagnosis, replacement parts and labor, should a warrantable condition occur.

MANUFACTURER'S EMISSION CONTROL SYSTEM WARRANTY COVERAGE:

Emissions control systems on 1995 and later model year engines are warranted for two years as hereinafter noted. If, during such warranty period, any emission-related component or system on your engine is found to be defective in materials or workmanship, repairs or replacement will be performed by a Generac Authorized Warranty Service Facility.

PURCHASER'S/OWNER'S WARRANTY RESPONSIBILITIES:

As the engine purchaser/owner, you are responsible for the completion of all required maintenance as listed in your factory supplied *Owner's Manual*. For warranty purposes, Generac recommends that you retain all receipts covering maintenance on your engine. However, Generac cannot deny warranty solely due to the lack of receipts or for your failure to ensure the completion of all scheduled maintenance.

As the engine purchaser/owner, you should, however, be aware that Generac may deny any and/or all warranty coverage or responsibility if your engine, or a part/component thereof, has failed due to abuse, neglect , improper maintenance or unapproved modifications, or the use of counterfeit and/or "grey market" parts not made, supplied or approved by Generac.

You are responsible for presenting your engine to a Generac Authorized Warranty Service Facility as soon as a problem occurs. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

Warranty service can be arranged by contacting either your selling dealer or a Generac Authorized Warranty Service Facility. To locate the Generac Authorized Warranty Service Facility nearest you, call our toll-free number:

1-800-333-1322

IMPORTANT NOTE: This warranty statement explains your rights and obligations under the Emission Control System Warranty (ECS Warranty), which is provided to you by Generac pursuant to California law. See also the "Generac Limited Warranties for Generac Power Systems, Inc.," which is enclosed herewith on a separate sheet, also provided to you by Generac. The ECS Warranty applies **only** to the emission control system of your new engine. If there is any conflict in terms between the ECS Warranty and the Generac Warranty, the ECS Warranty shall apply except in circumstances where the Generac Warranty may provide a longer warranty period. Both the ECS Warranty and the Generac Warranty describe important rights and obligations with respect to your new engine.

Warranty service can be performed only by a Generac Authorized Warranty Service Facility. When requesting warranty service, evidence must be presented showing the date of the sale to the original purchaser/owner.

If you have any questions regarding your warranty rights and responsibilities, you should contact Generac at the following address:

ATTENTION WARRANTY DEPARTMENT
GENERAC POWER SYSTEMS, INC.
P.O. BOX 297
WHITEWATER, WI 53190

Part 1

EMISSION CONTROL SYSTEM WARRANTY

Emission Control System Warranty (ECS Warranty) for 1995 and later model year engines:

(a) Applicability: This warranty shall apply to 1995 and later model year engines. The ECS Warranty Period shall begin on the date the new engine or equipment is purchased by/delivered to its original, end-use purchaser/owner and shall continue for 24 consecutive months thereafter.

(b) General Emissions Warranty Coverage: Generac warrants to the original, end-use purchaser/owner of the new engine or equipment and to each subsequent purchaser/owner that each of its engines is ...

(1) Designed, built and equipped so as to conform with all applicable regulations adopted by the CARB pursuant to its authority, and

(2) Free from defects in materials and workmanship which, at any time during the ECS Warranty Period, may cause a warranted emissions-related part to fail to be identical in all material respects to the part as described in the engine manufacturer's application for certification.

(c) The ECS Warranty only pertains to emissions-related parts on your engine, as follows:

(1) Any warranted, emissions-related parts that are not scheduled for replacement as required maintenance in the *Owner's Manual* shall be warranted for the ECS Warranty Period. If any such part fails during the ECS Warranty Period, it shall be repaired or replaced by Generac according to Subsection (4) below. Any such part repaired or replaced under the ECS Warranty shall be warranted for the remainder of the ECS Warranty Period.

(2) Any warranted, emissions-related part that is scheduled only for regular inspection as specified in the *Owner's Manual* shall be warranted for the ECS Warranty Period. A statement in such written instructions to the effect of "repair or replace as necessary" shall not reduce the ECS Warranty Period. Any such part repaired or replaced under the ECS Warranty shall be warranted for the remainder of the ECS Warranty Period.

(3) Any warranted, emissions-related part that is scheduled for replacement as required maintenance in the *Owner's Manual* shall be warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part shall be repaired or replaced by Generac according to Subsection (4) below. Any such emissions-related part repaired or replaced under the ECS Warranty shall be warranted for the remainder of the ECS Warranty Period prior to the first scheduled replacement point for such emissions-related part.

(4) Repair or replacement of any warranted, emissions-related part under this ECS Warranty shall be performed at no charge to the owner at a Generac Authorized Warranty Service Facility.

(5) When the engine is inspected by a Generac Authorized Warranty Service Facility, the owner shall not be held responsible for diagnostic costs if the repair is deemed warrantable.

(6) Generac shall be liable for damages to other original engine components or approved modifications proximately caused by a failure under warranty of any emission-related part covered by the ECS Warranty.

(7) Throughout the ECS Warranty Period, Generac shall maintain a supply of warranted emission-related parts sufficient to meet the expected demand for such emission-related parts.

(8) Any Generac authorized and approved emission-related replacement part may be used in the performance of any ECS Warranty maintenance or repairs and will be provided without charge to the owner. Such use shall not reduce Generac ECS Warranty obligations.

(9) Unapproved, add-on, modified, counterfeit and/or "grey market" parts may not be used to modify or repair a Generac engine. Such use voids this ECS Warranty and shall be sufficient grounds for disallowing an ECS Warranty claim. Generac shall not be held liable hereunder for failures of any warranted parts of a Generac engine caused by the use of such an unapproved, add-on, modified, counterfeit and/or "grey market" part.

EMISSION RELATED PARTS INCLUDE THE FOLLOWING:

1) Fuel Metering System:

1.2) LPG/Natural Gas carburetion assembly and its internal components.
- a) Fuel controller (if so equipped)
- b) Mixer and its gaskets (if so equipped)
- c) Carburetor and its gaskets (if so equipped)
- d) Primary gas regulator (if so equipped)
- e) LP liquid vaporizer (if so equipped)

2) Air Induction System including:
- a) Intake pipe/manifold
- b) Air cleaner

3) Ignition System including:
- a) Spark plug
- b) Ignition module

4) Catalytic Muffler Assembly (if so equipped) including:
- a) Muffler gasket
- b) Exhaust manifold

5) Crankcase Breather Assembly including:
- a) Breather connection tube

*Generac engine types covered by this warranty statement include the following:

1) Prepackaged Standby Generator
2) Auxiliary Power Unit (APU) Generator
3) Standby Generator

Part 2

GENERAC POWER SYSTEMS "TWO YEAR" LIMITED WARRANTY FOR CENTURION "PREPACKAGED EMERGENCY AUTOMATIC STANDBY GENERATORS"

For a period of two years from the date of original sale, Generac Power Systems, Inc. (Generac) will, at its option, repair or replace any part which, upon examination, inspection and testing by Generac or a Generac Authorized Warranty Service Dealer, is found to be defective under normal use and service, in accordance with the warranty schedule set forth below. Any equipment that the purchaser/owner claims to be defective must be examined by the nearest Generac Authorized Warranty Service Dealer. All transportation costs under the warranty, including return to the factory, are to be borne and prepaid by the purchaser/owner. This warranty applies only to Generac Centurion prepackaged emergency automatic standby generators sold and rated for use in "Standby" applications.

WARRANTY SCHEDULE

YEARS ONE and TWO - 100% (one hundred percent) transferable coverage on Labor and Part(s) listed (proof of purchase and maintenance is required):

- Engine - All Components
- Alternator - All Components
- Transfer System - All Components

Steel enclosures are warranted against rusting for the first year of ownership only. Damage caused after receipt of generator is the responsibility of the owner and is not covered by this warranty. Nicks, srapes, dents or scratches to the painted enclosure should be repaired promptly by the owner.

All warranty expense allowances are subject to the conditions defined in Generac's Warranty Policies, Procedures and Flat Rate Manual.

THIS WARRANTY SHALL NOT APPLY TO THE FOLLOWING:

- Generac Centurion generators that utilize non-Generac replacement parts.
- Generac Centurion generators utilizing non-Generac transfer switches.
- Repairs or diagnostics performed by individuals other than Centurion/Generac authorized dealers not authorized in writing by Generac Power Systems.
- Any Generac Centurion generators used as rental or trailer mounted applications.
- Units used for prime power in place of existing utility power where utility power is present or in place of utility power where utility power service does not normally exist.
- Steel enclosures that are rusting due to the improper installation, location in a harsh or saltwater environment or scratched where integrity of paint applied is compromised.
- Costs of normal maintenance, adjustments, installation and start-up.
- Failures caused by any contaminated fuels, oils, coolants or lack of proper fluid amounts.
- Failures due, but not limited, to normal wear and tear, accident, misuse, abuse, negligence or improper installation. As with all mechanical devices, the Generac engines need periodic part(s) service and replacement to perform well. This warranty will not cover repair when normal use has exhausted the life of a part(s) or engine.
- Failures caused by any external cause or act of God, such as collision, theft, vandalism, riot or wars, nuclear holocaust, fire, freezing, lightning, earthquake, windstorm, hail, volcanic eruption, water or flood, tornado or hurricane.
- Damage related to rodent and/or insect infestation.
- Products that are modified or altered in a manner not authorized by Generac in writing.
- 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).
- Failure due to misapplication.
- Telephone, cellular phone, facsimile, internet access or other communication expenses.
- Living or travel expenses of person(s) performing service, except as specifically included within the terms of a specific unit warranty period.
- Expenses related to "customer instruction" or troubleshooting where no manufacturing defect is found.
- Rental equipment used while warranty repairs are being performed.
- Costs incurred for equipment used for removal and/or reinstallation of generator, (i.e., cranes, hoists, lifts, etc,)
- Overnight freight costs for replacement part(s).
- Overtime labor.
- Starting batteries, fuses, light bulbs and engine fluids.

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. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

GENERAC'S ONLY LIABILITY SHALL BE THE REPAIR OR REPLACEMENT OF PART(S) AS STATED ABOVE. IN NO EVENT SHALL GENERAC BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EVEN IF SUCH DAMAGES ARE A DIRECT RESULT OF GENERAC'S NEGLIGENCE. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you.

This warranty gives you specific legal rights. You also have other rights from state to state.

GENERAC® POWER SYSTEMS, INC.
P.O. BOX 297 · WHITEWATER, WI 53190

Revision 2/21/05