# *Installation Guidelines*

## *For*

## *Automatic Standby Generator*

***20 kW Synergy™***

**⚠ DANGER!**

⚠ **NOT INTENDED FOR USE IN CRITICAL LIFE SUPPORT APPLICATIONS.**

⚠ **ONLY QUALIFIED ELECTRICIANS OR CONTRACTORS SHOULD ATTEMPT INSTALLATION!**

⚠ **DEADLY EXHAUST FUMES! OUTDOOR INSTALLATION ONLY!**

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

**This manual must be used in conjunction with the appropriate owner's manual.**

**Para español , visita: http://www.generac.com/service-support/product-support-lookup**

**Pour le français, visiter : http://www.generac.com/service-support/product-support-lookup**

## WARNING!

**California Proposition 65**

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

## WARNING!

**California Proposition 65**

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

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# Section 1 Safety and General Information

## 1.1 — Introduction

Thank you for purchasing this compact, high performance, variable speed, air-cooled, engine-driven generator. It is designed to automatically supply electrical power to operate critical loads during a utility power failure.

This unit is factory installed in an all-weather, metal enclosure that is intended exclusively for outdoor installation. This generator will operate using either vapor withdrawn liquid propane (LP) or natural gas (NG).

**NOTE: When sized properly, this generator is suitable for supplying typical residential loads such as Induction Motors (sump pumps, refrigerators, air conditioners, furnaces, etc.), Electronic Components (computer, monitor, TV, etc.), Lighting Loads and Microwaves.**

### 1.1.1— Read This Manual Thoroughly

If any portion of this manual is not understood, contact the nearest independent 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 operation that may be hazardous if performed incorrectly or carelessly. Observe them carefully. Their definitions are as follows:

**⚠DANGER**

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

(000001)

**⚠WARNING**

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

(000002)

**⚠CAUTION**

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

(000003)

**NOTE: Notes provide additional information important to a procedure or component.**

These safety warnings cannot eliminate the hazards they indicate. Observing safety precautions and strict compliance with the special instructions while performing the action or service are essential to preventing accidents.

Four commonly used safety symbols accompany DANGER, WARNING, and CAUTION boxes and the type of information each indicates:

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

**This symbol represents the potential for an Explosion Hazard.**

**This symbol represents the potential for a Fire Hazard.**

**This symbol represents the potential for an Electrical Shock Hazard.**

The operator is responsible for proper and safe use of the equipment. The manufacturer strongly recommends that if the operator is also the owner, to read their 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.

### 1.1.2— How to Obtain Service

When the generator requires servicing or repairs, contact a Dealer for assistance. Service technicians are factory-trained and are capable of handling all service needs. For assistance locating a dealer, call our dealer locater at 800-333-1322 or visit us at www.generac.com/dealer-locator.

When contacting a Dealer about parts and service, always supply the complete model number and serial number of the unit as given on its data decal, which is located on the generator. See section "The Generator" for decal location.

**Model No.** _____ **Serial No.** _____

## 1.2 — Safety Rules

**⚠ WARNING!**

**Save These Instructions – The manufacturer suggests that these rules for safe operation be copied and posted near the unit's installation site. Safety should be stressed to all operators and potential operators of this equipment.**

Study these SAFETY RULES carefully before installing, operating or servicing this equipment. Become familiar with this Installation 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 the manufacturer does not specifically recommend, ensure that it is safe for others. Also, make sure the procedure, work method or operating technique utilized does not render the generator unsafe.

**⚠ DANGER!**

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

**Installation must always comply with applicable codes, standards, laws and regulations.**

**A running generator gives off carbon monoxide, an odorless, colorless poison gas. Breathing in carbon monoxide can cause headaches, fatigue, dizziness, nausea, vomitting, confusion, fainting, siezures or death.**

### 1.2.1— General Hazards

- For safety reasons, the manufacturer recommends that this equipment be installed by an independent Sales or 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. Only an Independent Authorized Service Dealer is allowed to perform warranty service on this unit.
- The engine exhaust fumes contain carbon monoxide, which can be DEADLY. This dangerous gas, if breathed in sufficient concentrations, can cause unconsciousness or even death. Do NOT alter or add to the exhaust system or do anything that might render the system unsafe or in noncompliance with applicable codes and standards.
- Install a battery-operated carbon monoxide alarm indoors, according to manufacturer's instructions/recommendations.
- Adequate, unobstructed flow of cooling and ventilating air is critical to 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. **The generator MUST be installed and operated outdoors only.**
- 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.
- 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 contact the nearest Dealer for parts needing repair or replacement.
- 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, then remove the POSITIVE, POS or (+) cable. When reconnecting the cables, connect the POSITIVE cable first, the NEGATIVE 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.

### 1.2.2— 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 does the standby generator when it is in operation. Avoid contact with bare wires, terminals, connections, etc., while the unit is running. Ensure all appropriate covers, guards and barriers are in place, secured and/or locked 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.
- The National Electrical Code (NEC) requires the frame and external electrically conductive parts of the generator to be connected to an approved earth ground. Local electrical codes also may require proper grounding of the generator electrical system.
- After installing this home standby electrical system, the generator may crank and start at any time without warning. When this occurs, load circuits are transferred to the STANDBY (generator) power source. To prevent possible injury if such a start and transfer occur, always set the generator to the OFF mode, remove the 7.5A fuse adjacent to the generator control pad, and disconnect the battery before working on equipment.
- 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.

### 1.2.3— Fire Hazards

- For fire safety, the generator must be installed and maintained properly. Installation 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 in accordance with the manufacturer's instructions and recommendations. Following proper installation, do nothing that might alter a safe installation and render the unit in noncompliance with the aforementioned codes, standards, laws and regulations.
- Keep a fire extinguisher near the generator at all times. Extinguishers rated "ABC" by the National Fire Protection Association are appropriate for use on the standby electric system. Keep the extinguisher properly charged and be familiar with its use. Consult the local fire department with any questions pertaining to fire extinguishers.

### 1.2.4— Explosion Hazards

- 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.
- Gaseous fluids such as natural gas and liquid propane (LP) gas are extremely EXPLOSIVE. Install the fuel supply system according to applicable fuel-gas codes. Before placing the home standby electric system into service, fuel system lines must be properly purged and leak tested according to applicable code. After installation, inspect the fuel system periodically for leaks. No leakage is permitted.

## 1.3 — General Rules

- Follow all safety precautions in the Owner's Manual, Installation Guidelines manual and other documents included with your equipment.
- Refer to NFPA 70E for safety equipment required when working with a live system.
- Never energize a new system without opening all disconnects and breakers.
- Always consult your local code for additional requirements for the area in which the unit is being installed.

**⚠ WARNING!**

⚠ **Improper installation can result in personal injury and damage to the generator. It may also result in the warranty being suspended or voided. All the instructions listed below must be followed including location clearances and pipe sizes.**

### 1.3.1— Before You Begin

- Contact the local inspector or City Hall to be aware of all federal, state and local codes that could impact the installation. Secure all required permits before starting the job.
- Carefully read and follow all of the procedures and safety precautions detailed in the installation guide. If any portion of the installation manual, technical manual or other factory-supplied documents is not completely understood, contact a dealer for assistance.
- Fully comply with all relevant NEC, NFPA and OSHA standards as well as all federal, state and local building and electric codes. As with any generator, this unit must be installed in accordance with current NFPA 37 and NFPA 70 standards as well as any other federal, state, and local codes for minimum distances from other structures.
- Verify the capacity of the natural gas meter or the LP tank in regards to providing sufficient fuel for both the generator and other household and operating appliances.

### 1.3.2— Standards Index

Applicable national, state or local laws, codes and regulations pertaining to the installation of engine-generator power systems must be strictly complied with. Always use the current acceptable version or edition of the applicable code or standard which applies to your jurisdiction. In the absence of pertinent local laws and standards, the following published booklets may be used as a guide (these apply to localities which recognize NFPA and IBC):

1. National Fire Protection Association (NFPA) 70: The NATIONAL ELECTRIC CODE (NEC) *

2. NFPA 10: Standard for Portable Fire Extinguishers *
3. NFPA 30: Flammable And Combustible Liquids Code *
4. NFPA 37: Standard for Stationary Combustion Engines And Gas Turbines *
5. NFPA 54: National Fuel Gas Code *
6. NFPA 58: Standard for Storage And Handling Of Liquefied Petroleum Gases *
7. NFPA 68: Standard On Explosion Protection By Deflagration Venting *
8. NFPA 70E: Standard For Electrical Safety In The Workplace *
9. NFPA 211: Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances *
10. NFPA 220: Standard on Types of Building Construction *
11. NFPA 5000: Building Code *
12. International Building Code **
13. Agricultural Wiring Handbook ***
14. Article X, NATIONAL BUILDING CODE, available from the American Insurance Association, 85 John Street, New York, N.Y. 10038.
15. ASAE EP-364.2 Installation and Maintenance of Farm Standby Electric Power ****

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

* www.nfpa.org

** www.iccsafe.org

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

**** www.asabe.org American Society of Agricultural & Biological Engineers 2950 Niles Road, St. Joseph, MI 9085

**⚠ DANGER!**

⚠ **The installation of this product must comply strictly with applicable codes, standards and regulations. This product can be installed by the homeowner. However, if you are uncomfortable with the skills or tools required, have a qualified electrician or contractor perform the installation.**

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# Section 2 Unpacking and Inspection

## 2.1 — General

**NOTE: After unpacking, carefully inspect the contents for damage. Thoroughly inspect the unit immediately upon delivery to determine if any damage occurred in transit. Any claims for shipping damage need to be filed with the freight carrier as soon as possible. This is especially important if the generator is not be installed for a period of time. Any shipping damage, whether obvious or not readily apparent, is not covered by the warranty.**

- The standby generator set is ready for installation with a factory supplied and pre-mounted base pad and has a weather protective enclosure that is **intended for outdoor installation only.**
- The UL listed, 2-pole switch is rated at 200 amps, Service Rated at 250 volts maximum. The 200 Amp transfer switch is for indoor/outdoor use (if equipped).
- If any loss or damage is noted at time of delivery, have the person making the delivery note all damage on the freight bill or affix their signature under the consignor's memo of loss or damage.
- If a loss or damage is noted after delivery, separate the damaged materials and contact the carrier for claim procedures.
- "Concealed damage" is understood to mean damage to the contents of a package that is not evident at the time of delivery, but is discovered later.

## 2.2 — Required Tools

- General SAE and Metric hand tools
  - Wrenches
  - Sockets
  - Screwdrivers
- Standard electrician's hand tools
  - Drill and bits for mounting and routing conduits
- 4mm Allen wrench (for access to customer connections)
- 3/16 Allen wrench (test port on fuel regulator)
- Manometer (for fuel pressure checks)
- Meter capable of measuring AC Voltage and Frequency
- Meter capable of measuring AC Current

## 2.3 — Unpacking

1. Remove shipping carton. See Figure 2-1.
2. Inspect top of generator to determine if optional automatic transfer switch is included.
3. If present, carefully disassemble wooden frame and remove automatic transfer switch.


***Figure 2-1. Unpack Generator***

4. Remove **four** bolts with crating clamps. Carefully lift the generator off the wooden pallet. Do **NOT** drag the generator off the pallet or damage to the base will occur. See Figure 2-2.

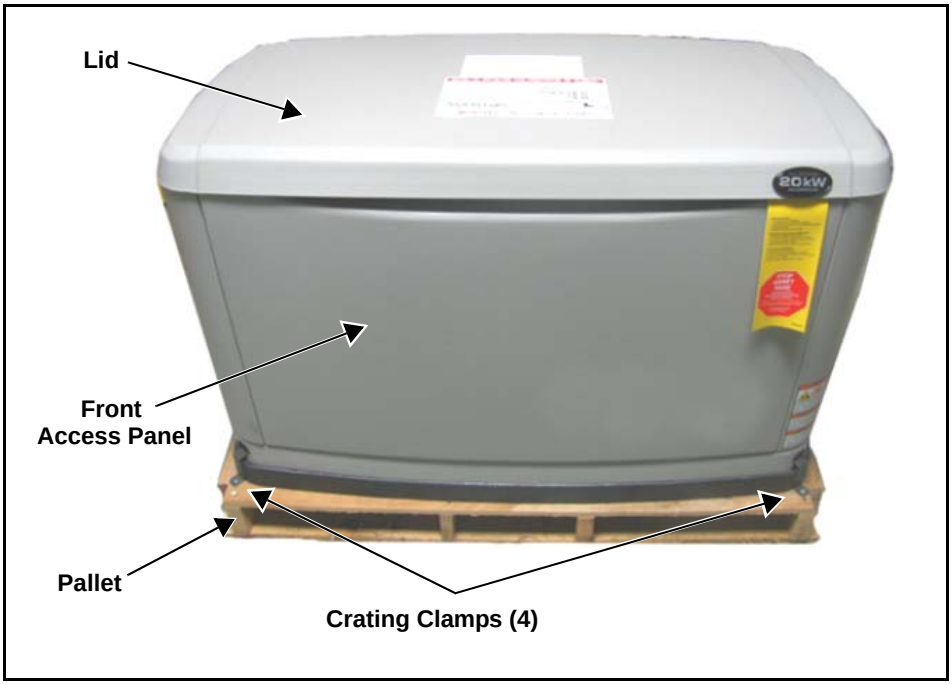


***Figure 2-2. Remove Crating Clamps***

5. The lid of the generator enclosure is locked. Open the side door compartment and carefully cut the cable strap to release the keys from the circuit breaker switch. See Figure 2-3.


***Figure 2-3. Open Side Door Compartment to Obtain Keys***

6. The lid is secured by two locks, one on each side of the enclosure. For best results, press down on the lid directly above the side lock, and while holding the lid down, use key to unlock the latch. Repeat step on opposite side of enclosure.

**NOTE: The lid may appear stuck if pressure is not applied as described. Always verify that the side locks are unlocked before pulling up on lid.**

7. Raise lid.
8. Lift front access panel straight up to disengage side hooks, and then outward away from unit.
9. Perform a thorough visual inspection for any hidden damage. Contact the freight carrier if any damage is evident.
10. Remove and inventory loose parts. See Subsection 2.4 —Parts Shipped Loose.

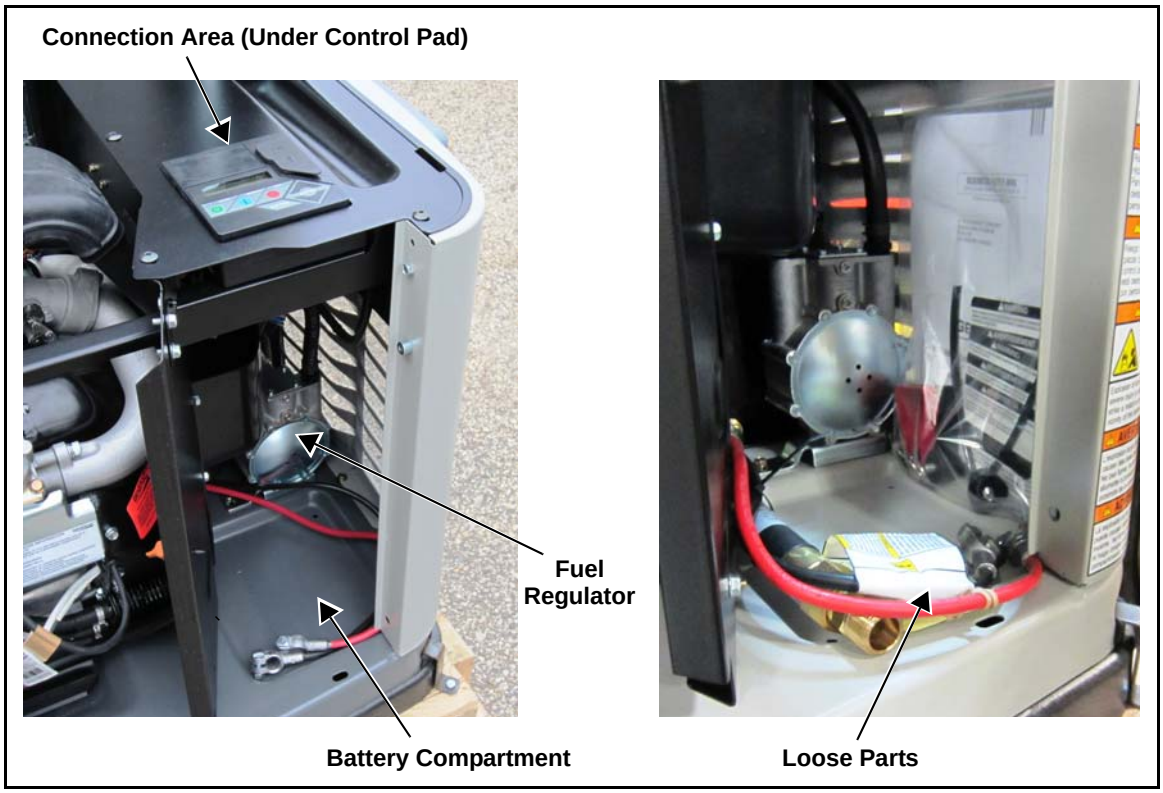


***Figure 2-4. Customer Connection Area/Loose Parts Location***

11. Figure 2-4 illustrates the following:
    - Customer connection area (beneath and behind the control pad)
    - Fuel regulator
    - Battery compartment
    - Location of Loose Parts shipped

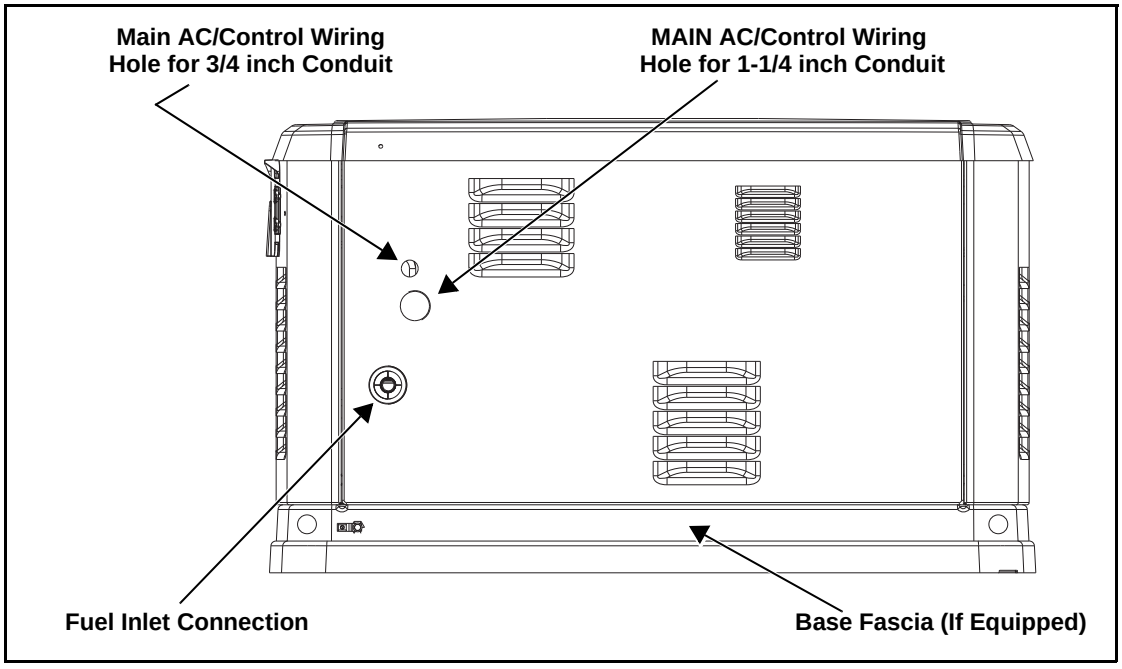


***Figure 2-5. Generator Back View***

## 2.4 — Parts Shipped Loose

The generator is shipped with the following loose parts:

- Rubber Mounts (units that include fascia)
- Battery Terminal Cap
- Main Line Circuit Breaker (MLCB) Terminal Caps
- Main Line Circuit Breaker (MLCB) Locking Mechanism
- Keys
- Flexible Fuel Line
- Wire Shielding to separate AC from DC control wires
- Rear Mounting Brackets (2)
- Installation/Owner's Manuals (CD if applicable)

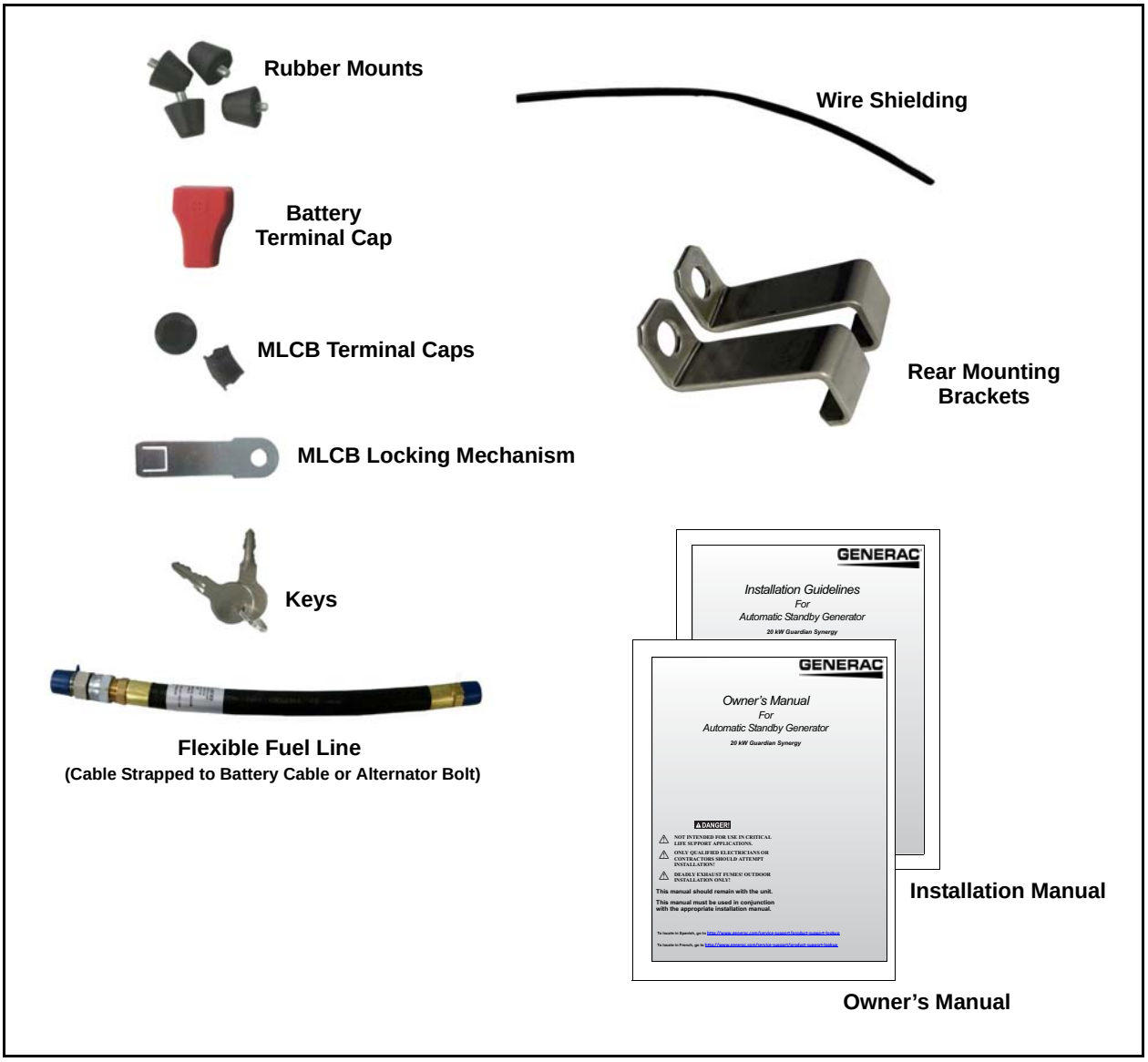


***Figure 2-6. Loose Parts***

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## 3.1 — Site Selection

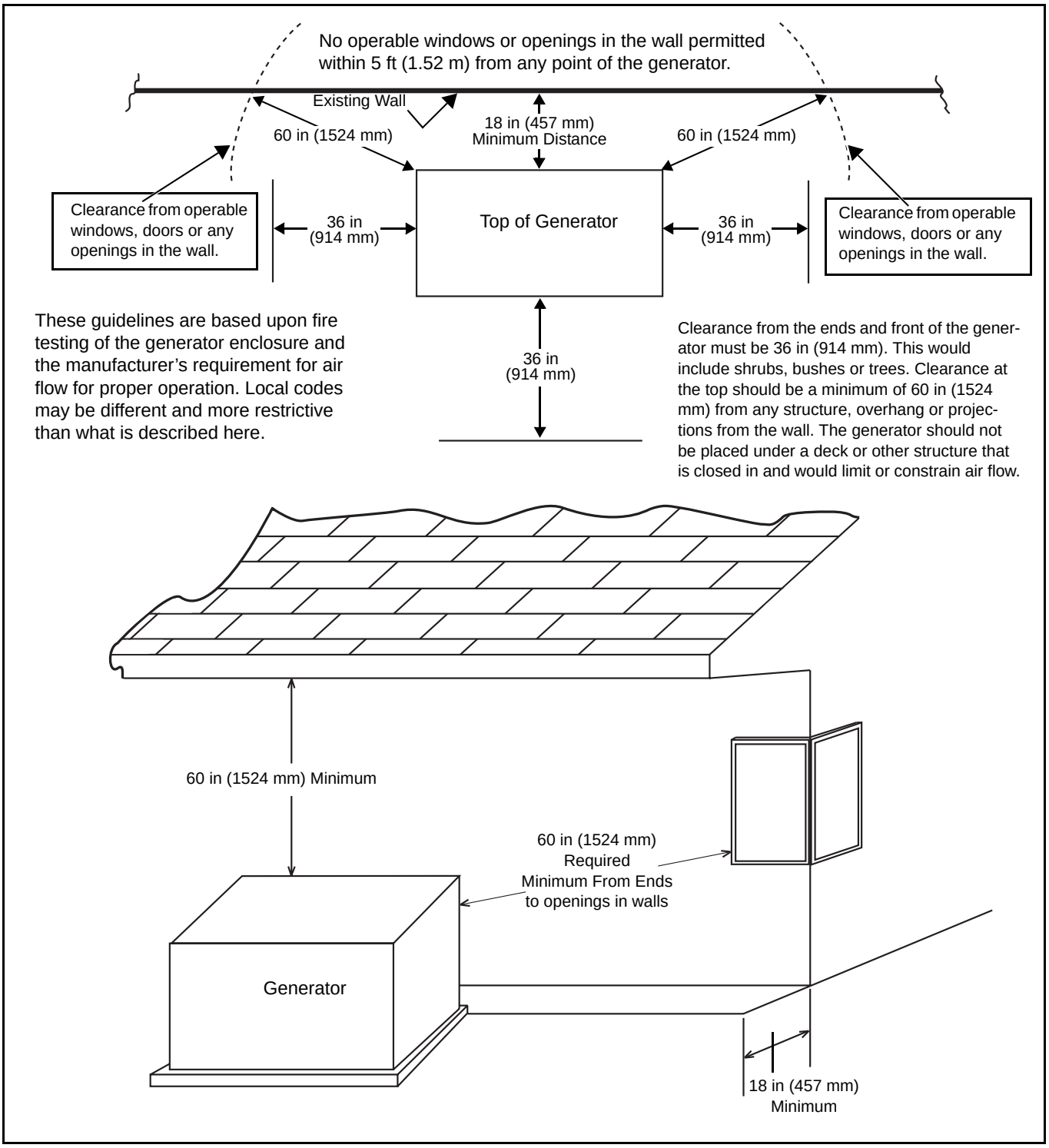


***Figure 3-1. Installation Guidelines***

Install the generator outdoors in its protective enclosure where adequate cooling and ventilating air is always available. Also consider these other factors:

- Installation must strictly comply with NFPA 37, NFPA 54, NFPA 58, and NFPA 70 standards.
- Install the generator where air inlet and outlet openings will not be obstructed by leaves, grass, snow, etc. If prevailing winds can cause blowing or drifting, use a windbreak for protection.
- Install the generator on high ground where rising water levels will not endanger it. The generator must not operate in or be subjected to standing water.
- Allow sufficient room on all sides of the generator for maintenance and servicing. Install the unit in accordance with current applicable NFPA 37 and NFPA 70 standards, as well as any other federal, state and local codes for minimum distances from other structures. DO NOT install under wooden decks or structures unless there is at least 5 feet (1.52 m) of clearance above the generator, 3 feet (0.91 m) of clearance at sides and front, and a minimum of 18 inches (457 mm) of clearance at the back of the unit.
- Install where rain gutter down spouts, roof run-off, landscape irrigation, water sprinklers or sump pump discharge does not flood, spray, or splash the enclosure, particularly air inlet or outlet openings.
- Install where services will not be affected or obstructed, including concealed, underground or covered services such as electrical, fuel, phone, air conditioning or irrigation. This could affect Warranty Coverage.
- Where strong prevailing winds blow from one direction, face the generator air inlet openings to the prevailing winds.
- Install the generator as close as possible to the fuel supply source to reduce the length of piping required. REMEMBER THAT LAWS OR CODES MAY REGULATE THE DISTANCE AND LOCATION.
- Install the generator as close as possible to the transfer switch. REMEMBER THAT LAWS OR CODES MAY REGULATE THE DISTANCE AND LOCATION.
- Install the generator on a level surface. The generator must be level within a 0.5 inches (13mm) all around.
- The generator is typically placed on a concrete pad, compacted pea gravel, or crushed stone. Check local codes to see what type is required. If a concrete pad is required, follow all federal, state and local codes.

### 3.1.1— Installation Guidelines

The National Fire Protection Association has a standard for the installation and use of stationary combustion engines. That standard is NFPA 37, its requirements limit the spacing of an enclosed generator set from a structure or wall (Figure 1.10).

NFPA 37, Section 4.1.4, Engines Located Outdoors: Engines, and their weatherproof housings if provided, that are installed outdoors shall be located at least 5 ft (1.52 m) from openings in walls and at least 5 ft (1.52 m) from structures having combustible walls. A minimum separation shall not be required where either of the following conditions exist:

1. The adjacent wall of the structure has a fire resistance rating of at least 1 hour.
2. The weatherproof enclosure is constructed of noncombustible materials and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure.

Annex A — Explanatory Material

A4.1.4 (2) Means of demonstrating compliance are by means of full scale fire test or by calculation procedures.

Because of the limited spaces that are frequently available for installation, it has become apparent that exception (2) would be beneficial for many residential and commercial installations. With that in mind, the manufacturer contracted with an independent testing laboratory to run full scale fire tests to assure that the enclosure will not ignite combustible materials outside the enclosure.

**NOTE: Southwest Research Institute testing approves 18 inches (457 mm) installation minimum from structure. Southwest Research is a nationally recognized third party testing and listing agency.**

The criteria was to determine the worst case fire scenario within the generator and to determine the ignitability of items outside the engine enclosure at various distances. The enclosure is constructed of non-combustible materials, and the results and conclusions from the independent testing lab indicated that any fire within the generator enclosure would not pose any ignition risk to nearby combustibles or structures, with or without fire service personnel response.

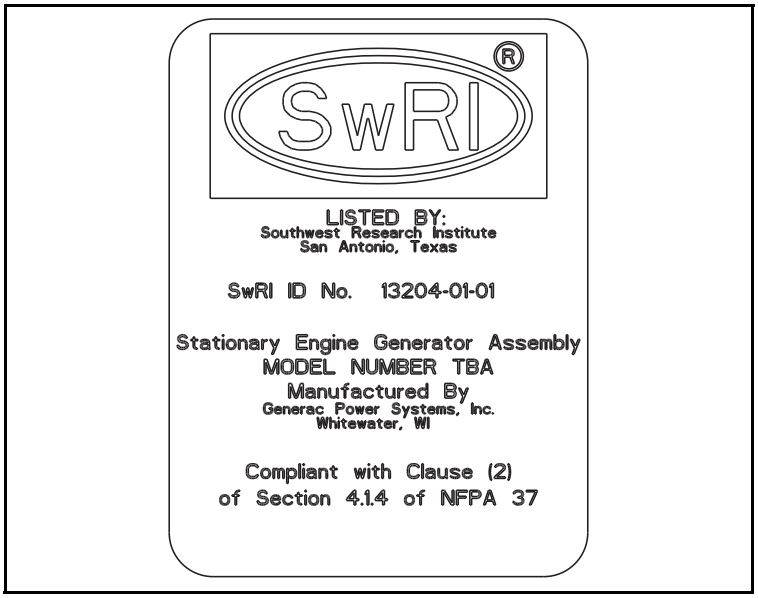


***Figure 3-2. Southwest Research Institute Decal***

Southwest Research Institute Decal (located inside the generator, next to the generator's data decal)

http://www.swri.org/4org/d01/fire/listlab/listprod/director.htm

**Based on this testing and the requirements of NFPA 37, Sec 4.1.4, the guidelines for installation of the generators listed above are changed to 18 inches (457 mm) from any point of the generator enclosure to a stationary wall, building or structure.** The required distance for maintenance and airflow clearance, the area above the generator should be at least 5 feet (1.52 m) with a minimum of 3 feet (0.91 m) at the front and ends of the enclosure. This would include trees, shrubs and bushes. Vegetation not in compliance with these clearance parameters could obstruct air flow. In addition, exhaust fumes from the generator could inhibit plant growth. For details, see the installation drawing within the owner's manual and Figure 3-1.

Generator exhaust contains DEADLY carbon monoxide gas, which can cause unconsciousness or death. Do not place the unit near windows, doors, fresh air intakes (furnaces, etc.) or any openings in the building or structure, including windows and doors of attached garage.

**⚠ WARNING!**

⚠ **If the generator is not set to the OFF mode, it can crank and start as soon as the battery cables are connected. If the utility power supply is not turned off, sparking can occur at the battery posts and cause an explosion.**

## 3.2 — Site Preparation

- Locate the mounting area as close as possible to the transfer switch and fuel supply.
- Leave adequate room around the area for service access (check local code), and place high enough to keep out rising water.
- Choose an open space that provides adequate and unobstructed airflow.
- Position the unit so air vents will not become clogged with leaves, grass, snow, or debris. Be sure exhaust fumes will not enter the building through eaves, windows, ventilation fans or other air intakes (see the "Site Selection" section).
- Select a gravel or concrete base depending upon local code requirements.

### 3.2.1— Material Sufficient for Level Installation

- Dig a rectangular area approximately 5 inches (127 mm) deep and about 6 inches (152 mm) longer and wider than the footprint of the generator. Fill with pea gravel, crushed stone or any other non-combustible material sufficient for level installation. Compact and level the material. A concrete pad can be poured if required. Make the concrete pad 4-5 inches (102-127 mm) thick and extend 6 inches (152 mm) beyond the outside perimeter of the generator in all directions.

**NOTE: If a concrete pad is required, follow all applicable Federal, State and local codes.**

***Figure 3-3. Compacted Gravel Site***

***Figure 3-4. Concrete Pad Site***

# *Section 4* Generator Placement

## 4.1 — Generator

With the Site Selection and Preparation performed, proceed with placement and installation of the generator itself.

See Figure 4-1. All air-cooled generators come with a composite pad. The composite pad elevates the generator and helps prevent water from pooling around the bottom. Place the generator (with composite pad) on a concrete pad or four inches (102 mm) of compacted pea gravel. Check local codes to see what type of site base is required. If a concrete pad is required, all federal, state and local codes must be followed. Place the generator on the mounting pad and position correctly based on the dimensional information presented in Subsection 3.1 — Site Selection.

**NOTE: Generator must be level within 0.5 inches (13 mm).**

**NOTE: If the composite pad is removed for concrete mounting, the fascia kit will not fit.**

***Figure 4-1. Composite Pad***

Four mounting points are provided for securing the generator to concrete- two holes at the inside front of the enclosure and two outside rear mounting brackets. See Figure 4-2.

**NOTE: Use the template at the top of the generator carton to mark the concrete pad for drilling of the two front mounting holes. For dimensions of the two rear mounting holes, see Subsection 10.1 — Installation Drawing. DO NOT USE brackets from shipping pallet. Use stainless steel brackets provided with loose parts.**

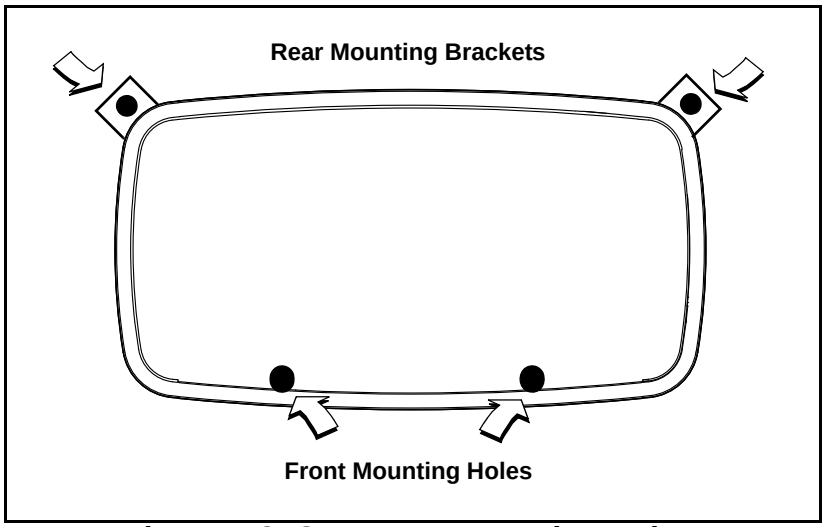


***Figure 4-2. Generator Mounting Points***

## 4.2 — Fascia Skirt Installation (If Applicable)

Install base fascia as follows:

1. Remove four rubber mounts from Owner's Manual bag.
2. Screw **two** rubber mounts into threaded holes of end piece. See A of Figure 4-3.
3. Snap end piece into side piece. See B of Figure 4-3.
4. Fit rubber mounts in end piece into lifting holes at base of generator. See C of Figure 4-3.
5. Repeat steps 2-4 to install second end and side pieces.
6. To complete assembly, snap end pieces into side pieces at opposite corners of fascia.

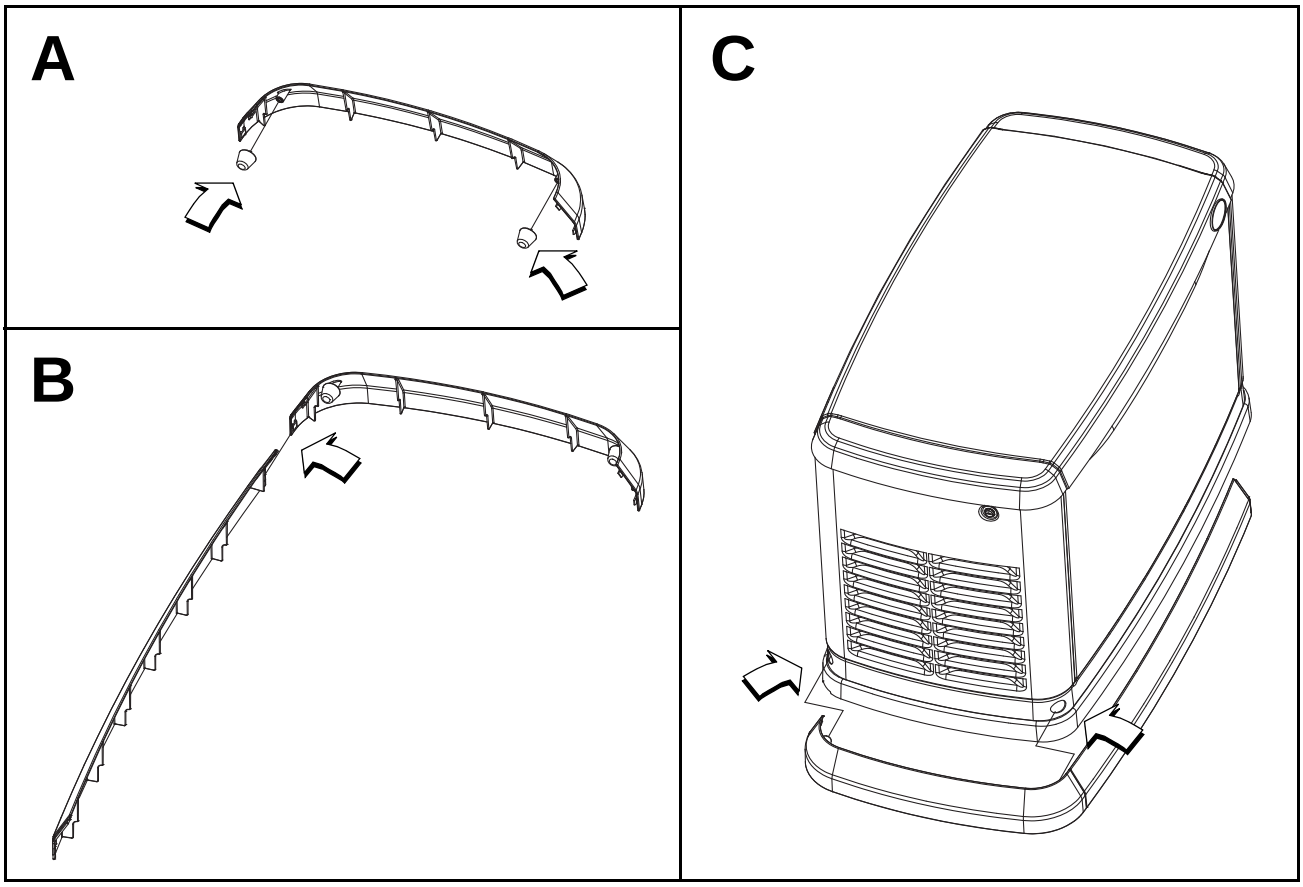


***Figure 4-3. Install Fascia Skirt***

## 5.1 — Fuel Conversion

Although the generator is configured at the factory for operating on natural gas, provision is made to switch over to LP Vapor.

**NOTE: The fuel selection (NG/LP) can be changed using the Installation Wizard at initial power up, or by accessing the EDIT Menu thereafter.**

**NOTE: The orange fuel conversion knob is located on the engine at the top of the fuel mixer.**

To change fuel selection, rotate fuel conversion knob to the desired fuel source (in the direction of the arrow) until it stops. Fuel knob rotates 180° and slides into mixer body when converting to LP gas.

**NOTE: If experiencing difficulty turning knob to LP position, lightly tap on knob before turning. Do not use a pliers!**

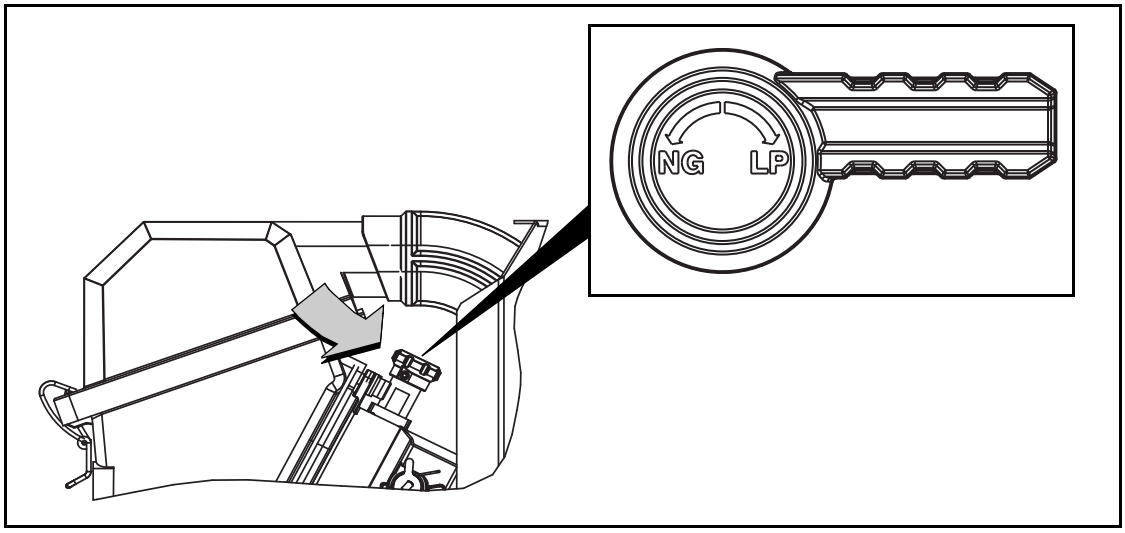


***Figure 5-1. Fuel Conversion Knob (As Viewed From Generator Air Box Side)***

## 5.2 — Fuel Requirements and Recommendations

With LP gas, use only the vapor withdrawal system, which uses the vapors formed above the liquid fuel in the storage tank.

The engine has been fitted with a fuel carburetion system that meets the specifications of the 1997 California Air Resources Board for tamper-proof dual fuel systems. The unit will run on natural gas or LP gas, but has been factory set to run on natural gas. Should the primary fuel need to be changed to LP gas, the fuel system needs to be reconfigured. See the Fuel Conversion section for instructions on converting the fuel system.

Recommended fuels should have a Btu content of at least 1,000 Btus per cubic foot (37.26 megajoules per cubic meter) for natural gas; or at least 2,500 Btus per cubic foot (93.15 megajoules per cubic meter) for LP gas. Ask the fuel supplier for the Btu content of the fuel.

**NOTE: Required fuel pressure for natural gas is 3.5-7 inches water column (7-13 mm mercury). Required fuel pressure for LP vapor is 10-12 inches water column (19-22 mm mercury).**

**NOTE: The primary regulator for the propane supply is NOT INCLUDED with the generator.**

**NOTE: All pipe sizing, construction and layout must comply with NFPA 54 for natural gas applications and NFPA 58 for liquid propane applications. Once the generator is installed, verify that the fuel pressure NEVER drops below its required fuel pressure rating. For more information regarding NFPA requirements, refer to www.nfpa.org.**

Prior to installation, consult local fuel suppliers or the fire marshal for applicable codes and regulations. Local codes mandate correct routing of gaseous fuel line piping around gardens, shrubs and other landscaping.

Special considerations with regard to the flexibility and strength of piping and connections may be required when installing the unit where local conditions are prone to flooding, tornadoes, hurricanes, earthquakes and/or unstable ground.

Use an approved pipe sealant or joint compound on all threaded fittings.

Purge and leak test all installed gaseous fuel piping prior to initial start-up in accordance with all local codes, standards and regulations.

## 5.3 — Fuel Consumption

The following are approximate values only. Use the appropriate specification sheet or Owner's Manual for specific values.

| Generator | Natural Gas | | LP Vapor | |
|---|---|---|---|---|
| | 1/2 Load | Full Load | 1/2 Load | Full Load |
| 20 kW Synergy | 174 / 4.93 | 285 / 8.07 | 1.64 / 6.20 | 3.42 / 12.94 |
| * Natural gas is in cubic feet per hour / cubic meters per hour.<br>** LP is in gallons per hour / liters per hour.<br>*** Values given are approximate. | | | | |

Verify that the gas meter is capable of providing sufficient fuel flow to include household appliances and all other loads.

**⚠ DANGER!**

⚠ **Gaseous fuels such as natural gas and liquid propane gas are highly explosive. Any spark can ignite these 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.**

**NOTE: Install a minimum of one approved full flow manual shut-off valve in the gaseous fuel supply line. The valve must be easily accessible. Check with local codes to determine proper location.**

**NOTE: The gas supply and pipe MUST be sized at 100% Load BTU / megajoule rating.**

## 5.4 — Fuel Line Sizing

1. Determine required pipe size. Refer to NFPA 54 for NG or NFPA 58 for LP.
2. Refer to the Owner's Manual for the proper BTU / megajoule and required gas pressures. To calculate BTU or Megajoules, proceed as follows:
   - Natural Gas: BTU = Cubic feet / hour x 1000
     Megajoules = Cubic meters / hour x 37.26
   - Liquid Propane Vapor: BTU = Cubic feet / hour x 2500
     Megajoules = Cubic meters / hour x 93.15
3. Measure the distance from the generator to the gas source. The generator should be plumbed directly from the fuel source and not off the end of an existing system.

4. When measuring pipe length, add 2.5 feet (0.76m) for each angle or bend in the pipe run and add that to the overall pipe distance.

### 5.4.1— Natural Gas Pipe Sizing

The following table indicates the maximum length (measured in feet / meters) allowed for various pipe sizes. The pipe sizes are measured by inside diameter (ID) to include any fittings, valves (must be full flow), elbows, tees or angles. Add 2.5 feet (0.76 m) to the overall distance for each bend, tee or angle in the pipe run.

**NOTE: Tables based on Schedule 40 black pipe.**

| Allowable Pipe Distances (feet / meters) | | | | |
|---|---|---|---|---|
| **Pipe Size (in. / mm)** | **1 / 25** | **1.25 / 32** | **1.5 / 38** | **2 / 51** |
| 20 kW Synergy | 20 / 6.1 | 130 / 39.62 | 305 / 92.96 | 945 / 288.04 |
| For 5-7 inches of water column (9-13 mm of mercury). | | | | |

| Allowable Pipe Distances (feet / meters) | | | |
|---|---|---|---|
| **Pipe Size (in. / mm)** | **1 / 25** | **1.25 / 32** | **1.5 / 38** |
| 20 kW Synergy | 10 / 3.05 | 60 / 18.29 | 125 / 38.1 |
| For pressures below 5 inches of water column (9 mm of mercury) down to 3.5 inches of water column (7 mm of mercury). | | | |

### 5.4.2— LP Vapor Pipe Sizing

The table indicates the maximum length (measured in feet / meters) allowed for various pipe sizes. The pipe sizes are measured by inside diameter (ID) to include any fittings, valves (must be full flow), elbows, tees or angles. Add 2.5 feet (0.76 m) to the overall distance for each bend, tee or angle in the pipe run.

**NOTE: Pipe sizes are using a second stage regulator.**

| Allowable Pipe Distances (feet / meters) | | |
|---|---|---|
| **Pipe Size (in. / mm)** | **1 / 25** | **1.25 / 32** |
| 20 kW Synergy | 115 / 35.05 | 480 / 146.3 |

### 5.4.3— Gas Installation Summary

Mistakes frequently occur when sizing gas pipe. A properly sized gas pipe is critical to the proper operation of the generator. The generator inlet size has no bearing on the proper gas pipe size. If using a piping method other than black pipe, refer to local codes and the pipe manufacturer’s specifications for sizing and installation information.

**IMPORTANT: Size the gas supply and pipe at 100% Load BTU / megajoule rating.**

## 5.5 — Installing and Connecting Gas Lines

1. Both natural gas and LP Vapor are highly volatile substances, so strict adherence to all safety procedures, codes, standards and regulations is essential.
2. Gas line connections should be made by a certified plumber familiar with local codes. Always use AGA-approved gas pipe and a quality pipe sealant or joint compound.
3. Verify the capacity of the natural gas meter or the LP tank in regards to providing sufficient fuel for both the generator and other operating appliances.
   - Fuel Regulator installed per laws or regulator manufacturer's specifications
   - AGA approved gas pipe
   - Flexible fuel line
     – Do not bend!!!
     – Install horizontally
     – Do not attach directly to generator
     – Check all connections for leaks
   - Sediment trap near generator (if applicable or required by code)
   - Full flow rated shut-off near generator per local jurisdiction or code
4. Most applications require an external manual shutoff valve on the fuel line.

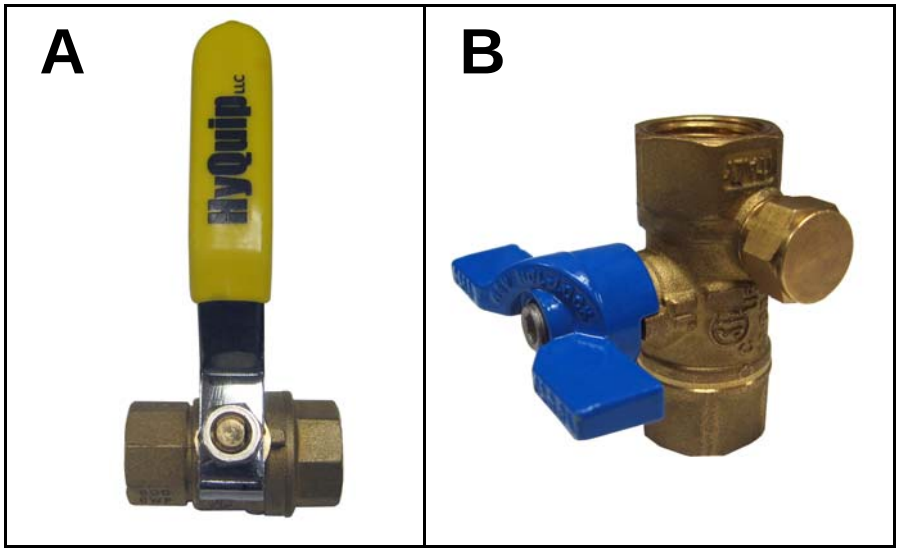


***Figure 5-2. Shutoff Valve (A), Accessory Valve with Manometer Port (B)***

**NOTE: The manometer port on the Generac accessory valve allows fuel pressure checks to be performed without opening the generator enclosure.**


***Figure 5-3. Sediment Trap***

***Figure 5-4. Incorrect Routing of Flexible Hose***

5. When connecting the gas line to the generator, use the provided section of UL Listed or AGA-approved flexible fuel line in accordance with local regulations. The flexible fuel line ensures that vibration from the generator does not cause a gas leak at one of the connection points. It is important that the line be installed with as few bends as possible. Configure the sediment trap (if required) as shown.
6. Always install the flexible fuel line horizontally. Never bend the flexible fuel line to avoid using a pipe elbow. Bending the flexible fuel line reduces its ability to absorb vibrations and may constrict fuel flow. See Figure 5-4.
7. Check for leaks by spraying all connection points with a solution of dish washing soap and water. Leaks exist If bubbles are observed or if the solution is blown away.

8. Check gas pressure at the generator fuel pressure regulator as follows:
   – Close gas supply valve.
   – Remove top test port from fuel pressure regulator.
   – Install gas pressure tester (manometer). See Figure 5-5.
   – Open gas supply valve.
   – Verify that fuel pressure is within specification.
   – Close gas supply valve.

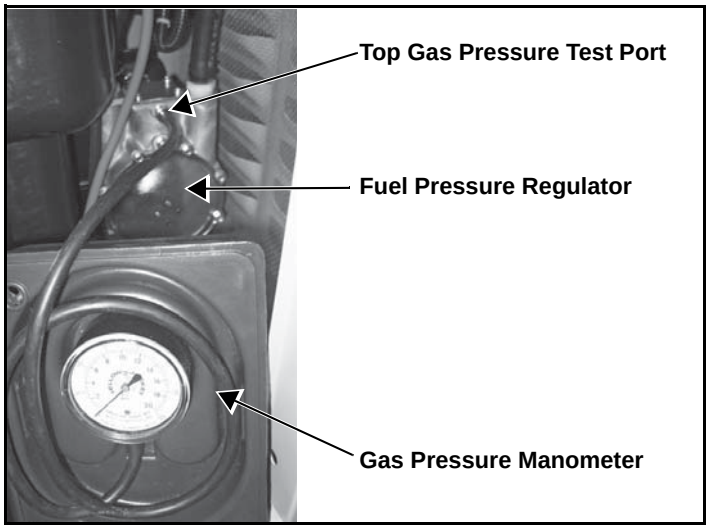


***Figure 5-5. Check Pressure with Manometer***

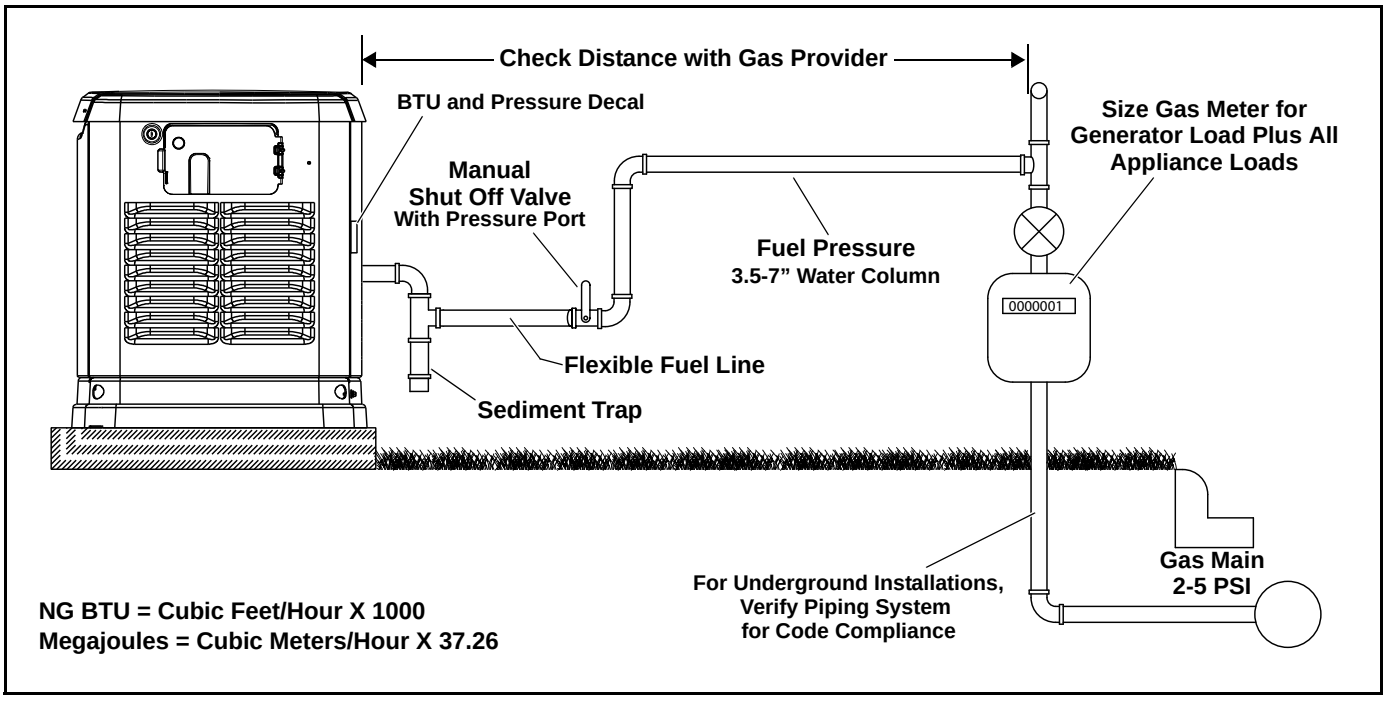


***Figure 5-6. Typical Natural Gas Installation***

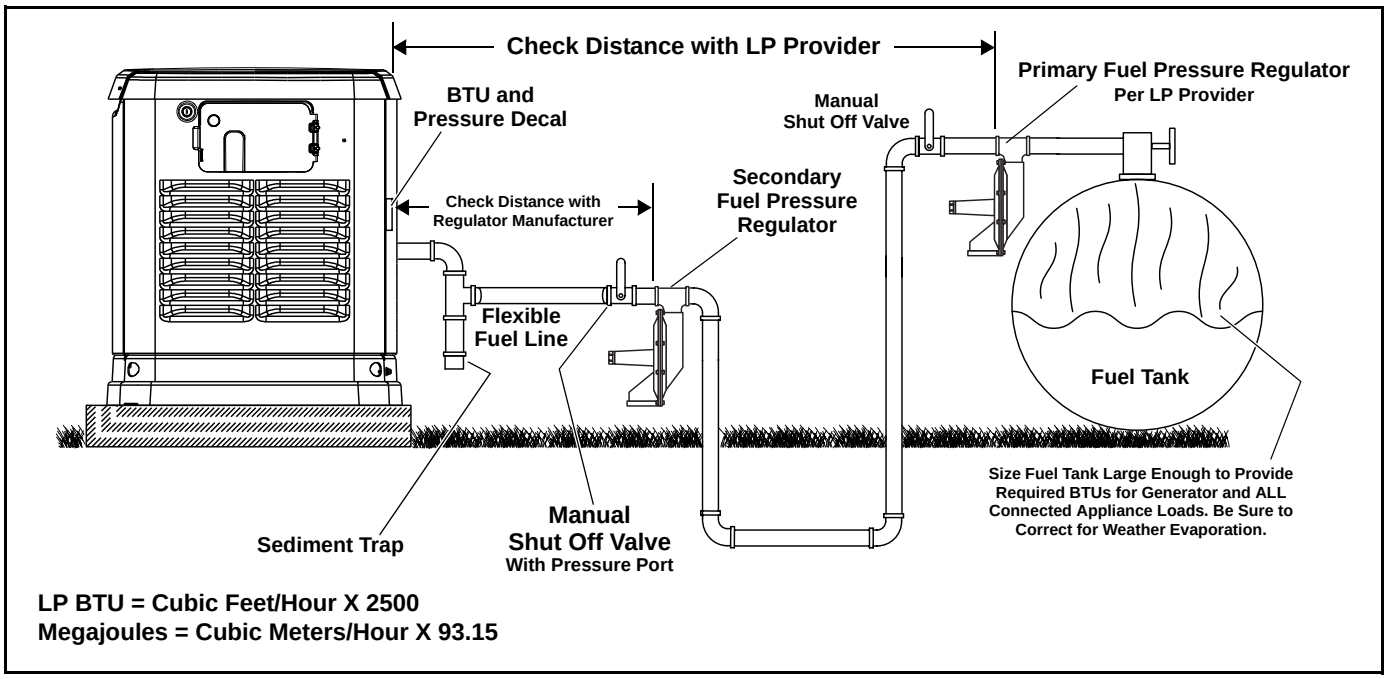


***Figure 5-7. Typical LP Vapor Installation***

**NOTE: When sizing a secondary regulator for LP or high pressure natural gas applications be sure to note the maximum individual load capabilities which will be lower than total capacity. This could impact generator starting performance if sized too small.**

**NOTE: Do not reduce the fuel pipe size exiting the secondary regulator unless necessary to accommodate the 3/4 inch flexible fuel line shipped with the generator. This may potentially cause starting or performance issues.**

**NOTE: Even if the generator is running smoothly, a drop in gas pressure indicates that the supply is barely adequate to supply the generator's needs. Changes in the generator load, or additional gas demand by other appliances may affect the generator's performance. Verify gas pressure and pipe sizing. Unhook the manometer and reinstall the port plug.**

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# Section 6 Electrical Connections

## 6.1 — Generator Connections

**NOTE: Wiring must be in accordance with local jurisdiction and codes.**

1. Remove the appropriate Main AC/Control Wiring Knock-out Plug at the back of the generator.
2. Install the conduit and Main AC and Control Wires between the generator and the transfer switch. See Figure 2.6 for knockout locations (verify specific transfer switch wiring/connections per model).

**NOTE: This wiring can be run in the same conduit if the appropriate insulation rated wire is used.**

3. Seal the conduit at the generator in compliance with any codes.
4. Strip insulation from wire ends. Do not remove excessive insulation.
5. To connect the control wires, push down on the spring loaded connection point with a flat head screwdriver, insert wire and release.

**NOTE: No wire insulation should be in the connection point, only bare wire.**

## 6.2 — Control Wiring

| Control Wire Length and Size | |
|---|---|
| **Maximum Wire Length** | **Recommended Wire Size** |
| 1-115 ft (1-35 m) | No. 18 AWG |
| 116-185 ft (36-56 m) | No. 16 AWG |
| 186-295 ft (57-89 m) | No. 14 AWG |
| 296-460 ft (90-140 m) | No. 12 AWG |

| Control Pad Connections | | |
|---|---|---|
| **Terminal Numbering Decal** | | **Wire Numbers** |
| A | Yellow #1 & #2 | N1 & N2 - 240 VAC - Sensing for Utility Dropout and Pickup |
| B | Blue #3 | T1 - Fused 120VAC for Battery Charger<br>(see NOTE beneath Fig. 6-1 on the following page) |
| C | Black #3 | 0 - DC (-) Common Ground Wire |
| D | Red #4 | 194 - DC (+) 12 VDC for Transfer Controls |
| E | White #5 | 23 - Transfer Control Signal Wire |

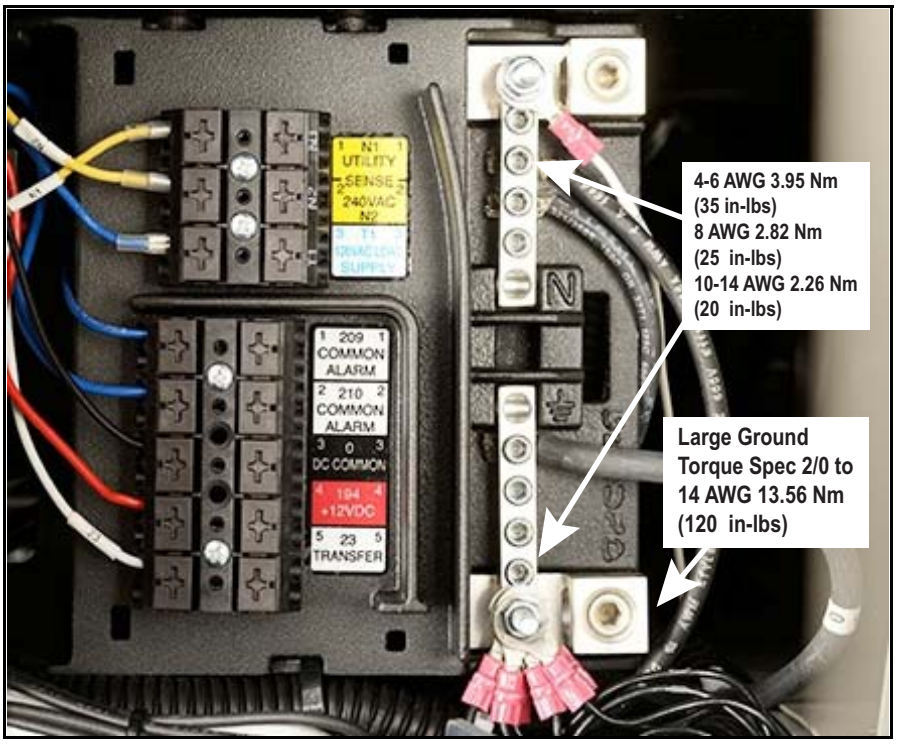



***Figure 6-1. Control Wiring (Behind Control Board)***

**NOTE: Run wires 23, 194 and 0 through the wire shielding provided in the manual bag to separate the low voltage from the high voltage wires unless the requirement of 300.3(c)(1) of the NEC are met (see the Parts Shipped Loose section).**

**NOTE: Regardless of whether unit is running or not, T1 must be connected to keep battery charged.**

## 6.3 — Main AC Wiring

***Figure 6-2. Main AC Wiring***

**NOTE: Main AC (E1, E2 and Neutral) wiring must be in accordance with local jurisdiction and codes.**

1. Strip insulation from wire ends. Do not remove excessive insulation.
2. Remove two cap plugs located behind the breaker door and to the right of the Main Breaker.
3. Loosen the lugs of the Main Breaker through the access holes.
4. Insert a power wire (E1 or E2) through the opening in the back cover and into the bottom lug. Torque to the proper specification.

**NOTE: Remove three screws inside the top of the breaker panel (behind the breaker door), and carefully pull out entire breaker box. When reinstalling, be sure that tabs at the bottom lock into place.**

5. Connect the Neutral wire to the Neutral Lug and torque to specification. See Figure 6-1.
6. Connect the Ground wire to the Ground Lug and torque to specification. See Figure 6-1.

**NOTE: Neutral Bonding - For installations that require the neutral to be bonded to the ground, this is to be done on the customer connections terminals inside the generator. Connect a suitably sized wire from the neutral bar to the ground bar. This is normally required when the generator is the source in a separately derived system. It is not required when the generator is a backup source in a utility supplied electrical system with a 2-pole transfer switch. See Figure 6-1.**

**NOTE: Torque all wiring lugs, bus bars and connection points to the proper torque specifications. Torque specifications for the Main Line Circuit Breaker (MLCB) can be found on a decal located on the inside of the Main Line Circuit Breaker Door.**

## 6.4 — Load Shed Functionality

The Synergy product Transfer Switch includes an Overload Prevention Control Board (OPCB) to shed critical loads.

The OPCB, commonly referred to as the Load Shed Board, has “Fast Load Shed” capability, which effectively prevents large loads from stalling the engine. **ALL LOADS GREATER THAN 10 kW OR 2 HP (MOTORS) MUST BE CONNECTED TO THE OPCB. If natural gas is the selected fuel type, then all loads greater than 9kW must be connected to the OPCB.** Examples of a large load are a 3T air conditioner, 3 HP well pump, 3 HP sump pump, etc.

When the generator senses the application of a large load (greater than 10 kW or 2HP) while the engine is at low speed, the load is instantly shed (within milliseconds) and the engine is instructed to run at 3600 RPM. This action prevents stalling of the engine. The loads are then reapplied when the engine is back up to speed. Normal loads take about **six** seconds. Large loads, such as an air conditioner, have specially designated connections on the OPCB, and are only reapplied after **five** minutes (to protect the air conditioner motor).

See the Transfer Switch Owner’s Manual for a complete description.

## 6.5 — Automatic Voltage Regulator (AVR) Cooling Fans

The system is equipped with two fans to cool the AVR electronics. The primary fan is powered by AC during operation. The secondary fan is powered by 12V DC through the controller. The fans are monitored during operation and if a failure occurs, an alarm is displayed.

The secondary fan continues to operate for up to **one hour** after the generator is shut down. Proper cooling must occur before removing either battery connections or 7.5 amp fuse for maintenance or other service activity.

**⚠ CAUTION!**

**The secondary 12V DC fan continues to operate for up to one hour after the generator is shut down, even if the 7.5 amp ATO fuse in the controller is removed. To prevent hand injury, always exercise caution when working near the AVR fan housing.**

**NOTE: The AVR cooling air inlet includes a filter. Verify the filter is installed and properly seated at time the unit is installed. Check the filter at regular maintenance intervals to verify proper airflow. See the Maintenance section of the Owner’s Manual for details.**

## 6.6 — Battery Requirements

Group 26R, 12V, 525 CCA (Minimum CCA)

## 6.7 — Battery Installation

Fill the battery with the proper electrolyte fluid if necessary and have the battery fully charged before installation.

Before installing and connecting the battery, complete the following steps:

1. Verify that the generator has been turned OFF.
2. Turn off utility power supply to the transfer switch.
3. Remove the 7.5A fuse adjacent to the generator control pad.

Battery cables were factory connected at the generator. See Figure 6-3. Connect cables to battery posts as follows:

4. Connect the red battery cable (from starter contactor) to the battery post indicated by a positive, POS or (+).
5. Connect the black battery cable (from frame ground) to the battery post indicated by a negative, NEG or (—).
6. Install the red battery post cover (included).

**NOTE: Apply Dielectric grease to battery posts to prevent corrosion.**

**NOTE: Damage will occur if battery connections are made in reverse.**

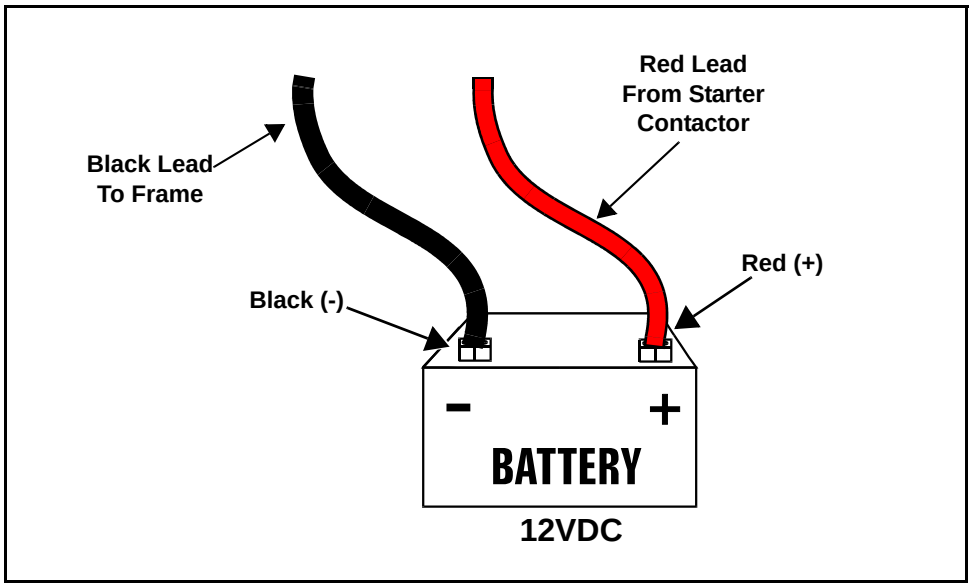



***Figure 6-3. Battery Cable Connections***

**NOTE: A Cold Weather Kit is required in areas where temperatures regularly fall below 32 °F (0 °C). The kit includes a pad type battery heater and engine oil warmer to aid cold climate starting. The kit can be obtained through Generac.com or an independent authorized service dealer.**

## 7.1 — Control Pad

**⚠ WARNING!**

⚠ **The control pad is intended for use by qualified service personnel only.**

See Figure 7-1. The control pad is located under the lid of the enclosure. The lid is secured by two locks, one on each side of the enclosure. For best results, press down on the lid directly above the side lock, and while holding the lid down, use key to unlock the latch. Repeat step on opposite side of enclosure. Always unlock both the left and right side locks before attempting to lift the lid.

**NOTE: The lid may appear stuck if pressure is not applied as described. Always verify that the side locks are unlocked before pulling up on lid.**

To remove the front access panel, lift it straight up to disengage side hooks, and then outward away from unit.

When closing the unit, remember to lock both left and right side locks.

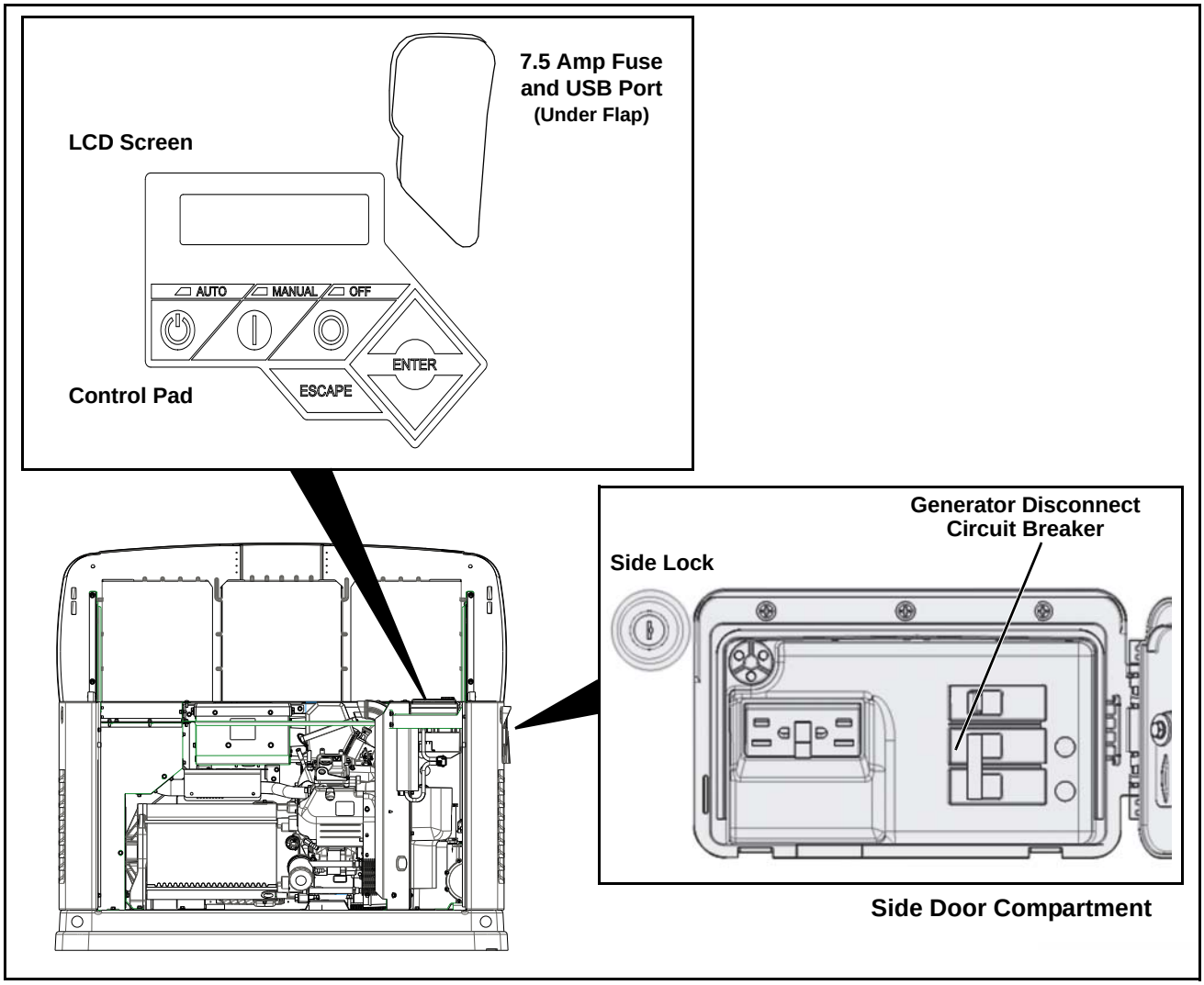



***Figure 7-1. Control Pad and Side Compartment***

**⚠ WARNING!**

**With the control pad set to AUTO, the engine may crank and start at any time without warning. Such automatic starting occurs during the programmed exercise cycle or when utility power source voltage drops below the configured level. To prevent possible injury that might occur during sudden starts, always set the control pad to OFF and remove the 7.5 amp fuse before working on or around the generator or transfer switch. For added security, place a DO NOT OPERATE tag or placard at both the control pad and transfer switch.**

**NOTE: Never run the generator with any access panel removed.**

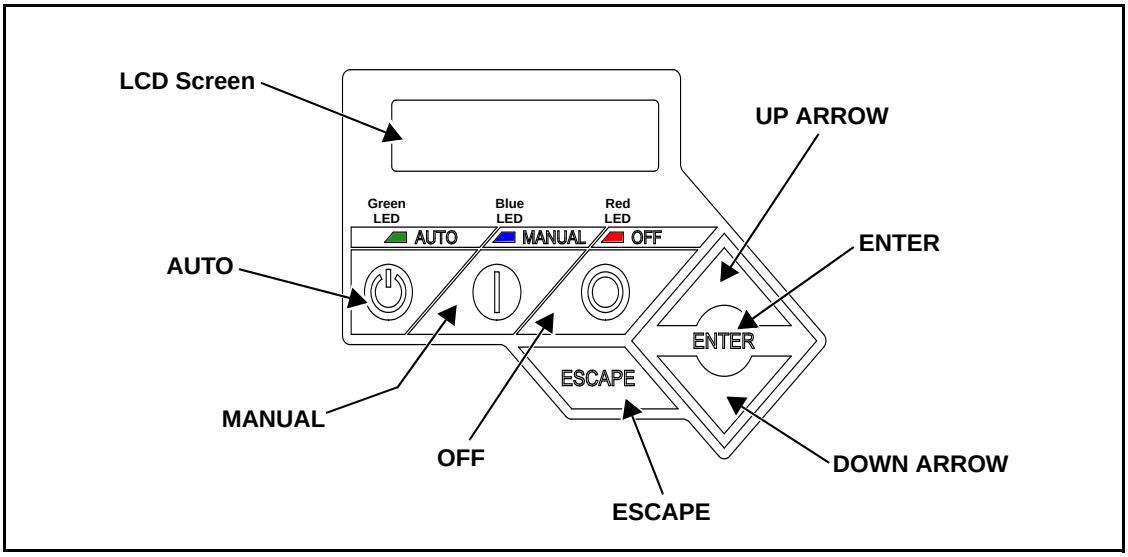



***Figure 7-2. Control Pad and LCD Screen***

## 7.2 — Auto/Manual/Off

| Feature | Description |
|---|---|
| **AUTO** | Press to activate fully automatic operation. Green LED illuminates to confirm that system is in AUTO mode.<br>Transfer to standby power occurs if utility power fails.<br>Functionality of exercise timer is enabled, if set. |
| **MANUAL** | Press to crank and start engine. Blue LED illuminates to confirm that system is in MANUAL mode.<br>Transfer to standby power occurs if utility power fails.<br>Functionality of exercise timer is disabled. |
| **OFF** | Press to shut down engine, if running. Red LED illuminates to confirm that system is in OFF mode.<br>Transfer to standby power does not occur if utility power fails. |

## 7.3 — Menu Navigation

| Feature | Description |
|---|---|
| **System Menus** | |
| **HOME Screen** | The system returns to the Home screen if the control pad is not used for five minutes. The screen normally displays a Status message, such as Ready to Run (Auto mode) or Switched to OFF (Off mode), and the total Hours of Protection. If an active alarm/warning condition occurs, the associated Alarm/Warning message is displayed. To clear the Alarm/Warning message, press OFF on the control pad followed by ENTER. In the event of multiple Alarms/Warnings, the next message is then displayed. The highest priority alarm is always displayed first. |
| **MAIN MENU** | Enables the operator to navigate the software using UP ARROW, DOWN ARROW, ENTER and ESCAPE. The Main Menu can be accessed from any sub menu by consecutively pressing ESCAPE. Each time ESCAPE is pressed, the preceding menu is displayed. The Main Menu is reached when the System, Date/Time, Battery, and Sub Menus are displayed. |
| **Navigation** | |
| **ESCAPE** | Used to abort a routine or back up to the preceding menu. |
| **ENTER** | Used to make a selection or save an entry. |
| **UP ARROW DOWN ARROW** | Used to move forward or backward from menu to menu or to scroll forward or backward (increment or decrement) through available selections. |
| **NOTE:** Pressing any button on the control pad illuminates the backlight for 30 seconds. The backlight also illuminates for 30 seconds whenever an active Alarm/Warning message is displayed. | |

## 7.4 — Change Time and Date

To change the time and date after activation, see the Navigation Menu in Figure 7-5. If power is lost (battery is disconnected/reconnected, 7.5 amp fuse is removed/installed, etc.), the display automatically prompts the user for the Time and Date. All other information is retained in memory.

## 7.5 — Programmable Timers

### 7.5.1— Dealer Programmable

**NOTE: A dealer password is required.**

#### 7.5.1.1—High Run Speed Timer

A programmable high run speed timer is provided. The timer controls the length of time the generator runs at maximum speed after application of a large load (such as an air conditioner). The time can be increased to prevent the potential cycling of engine RPM as loads turn on and off. For example, if the timer is currently set to **ten** minutes, and the normal AC cycling time is 15 minutes, increasing the timer to 20 minutes would prevent the engine speed from ramping up and down every ten minutes between AC cycles (even though fuel consumption would increase).

#### 7.5.1.2—Start-Up Delay Timer

A programmable line interrupt delay (or Start-Up Delay) timer is provided. When utility voltage fails (falls below 65% of nominal), the start-up delay timer is started. If the voltage rises above the Utility Volts Low threshold, the timer is reset. If the utility voltage remains below the threshold during the duration of the timer, the unit cranks and starts.

**NOTE: The factory default setting is five seconds, but is adjustable from 2 to 1500 seconds.**

### 7.5.2— User Programmable

#### 7.5.2.1—Exercise Time

A programmable exercise time is provided. In the AUTO mode, the engine starts and runs at the programmed interval, either weekly, bi-weekly (the default), or monthly, at the time and day specified. During the exercise cycle, the unit runs approximately **five** minutes and then shuts down. Transfer of loads to the generator does not occur unless utility power fails. For more information, see Subsection 7.8 —Setting the Exercise Timer.

## 7.6 — USB Port for Firmware Updates

A USB port is located beneath the rubber flap adjacent to the control pad, and is provided for firmware updates. Firmware updates must be performed by an Authorized Service Dealer.

**NOTE: The USB port is intended for use with a USB thumb drive only. The USB port is not intended for charging devices such as phones or laptops. Do not connect any consumer electronics to the USB port.**

## 7.7 — Generator Activation

When battery power is applied to the generator during the installation process, the control pad will light up. However, the generator still needs to be activated before it will automatically run in the event of a power outage.

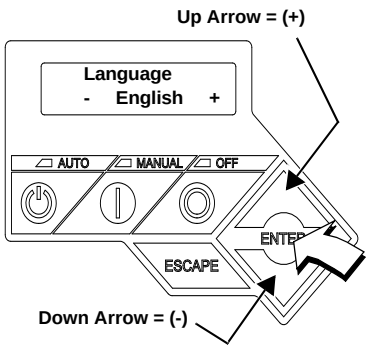
Activating the generator is a one-time process guided by prompts on the LCD screen. Once the product is activated, the LCD screen will not display the activation sequence a second time, even if the generator battery is disconnected.

After obtaining the activation code, use the control pad to complete the steps in the Activation Chart below.

Upon first power up of the generator, the display interface will begin an installation wizard. The installation wizard will prompt the user to set the minimum settings to operate the generator. These settings are: Current Date/Time and Exercise Day/Time. The maintenance intervals will be initialized when the exercise time is entered.

The exercise settings can be changed at any time using the EDIT menu.

If the 12 volt battery is disconnected or the fuse removed, the installation wizard will operate upon power restoration. The only difference is the display will only prompt the customer for the current Time and Date.

| | | |
|---|---|---|
| **Display Reads:**<br>  <br> | **Generator Active** is displayed on the LCD screen when the unit is first powered up. After displaying firmware and hardware version codes, as well as other system information, the Installation Wizard is launched, and the Language screen is displayed.<br><br>Use UP ARROW or DOWN ARROW to scroll to desired language.<br><br>Press ENTER. | If the wrong language is selected, it may be changed later using the Edit menu. |
| **Display Reads:**<br>**Activate me (ENT) or ESC to run in manual** | Press ENTER. | Press ESCAPE to abort the activation sequence. NOT ACTIVATED is displayed and the generator will run in manual mode only. Disconnect and reconnect the negative battery cable to restart the activation routine. If power is removed after a successful activation, no data is lost, but the time and date must be updated. |
| **Display Reads:**<br>**To Activate go to www.activategen.com** | Go to www.activategen.com or call 1-888-9ACTIVATE (922-8482, US & CA only) if activation passcode is not available.<br><br>If activation pass code is available, wait a few seconds for the next display. | |
| **Display Reads:**<br>**SN 1234567890 PASS CODE XXXXX** | Use UP ARROW or DOWN ARROW to increment or decrement the digit to correspond to the first number of the pass code.<br><br>Press ENTER.<br><br>Repeat step to enter remaining digits. | Press ESCAPE to return to preceding digits if a correction becomes necessary.<br><br>If attempts to enter the activation code are unsuccessful, check the number against the code given on activategen.com. If it is correct, contact 1-888-9ACTIVATE (922-8482, US & CA only). |

## 7.8 — Setting the Exercise Timer

This generator is equipped with a configurable exercise timer. The first of two settings specifies the Day/Time of the exercise. Once set, the generator will start and exercise on the day of the week and at the time of day specified. During the exercise period, the unit runs for approximately **five** minutes, and then shuts down. The second setting establishes exercise frequency, and can be set to WEEKLY, BIWEEKLY (the default), or MONTHLY. If monthly is selected, the day of the month must be entered. Transfer of loads to the generator does not occur during the exercise cycle unless utility power is lost.

IF THE INSTALLER TESTS THE GENERATOR PRIOR TO INSTALLATION, PRESS **ENTER** ON THE CONTROL PAD TO SKIP EXERCISE TIMER SETUP.

The exercise information and programming options is shown in Table 7-1.

Figure 7-3 illustrates the engine speed profile during a typical low speed exercise cycle. While providing the necessary periodic exercise, the lower RPM reduces fuel consumption, engine wear, and noise.

**NOTE: The exercise feature operates only when the generator is in the AUTO mode and the Exercise Timer is properly set. The current date/time must be reset every time the T1 circuit is shut down, the 12 volt battery is disconnected, the 7.5 amp fuse is removed, and/or the battery charger is disconnected (control pad has no power and LCD screen is blank).**

**Table 7-1. Generator Exercise Characteristics**

| Model | 20 kW Synergy |
|---|---|
| **Low Speed Exercise** | 1950 rpm |
| **Exercise Frequency Options** | Weekly/Bi-WeeklyMonthly |
| **Exercise Time Length** | 5 minutes |

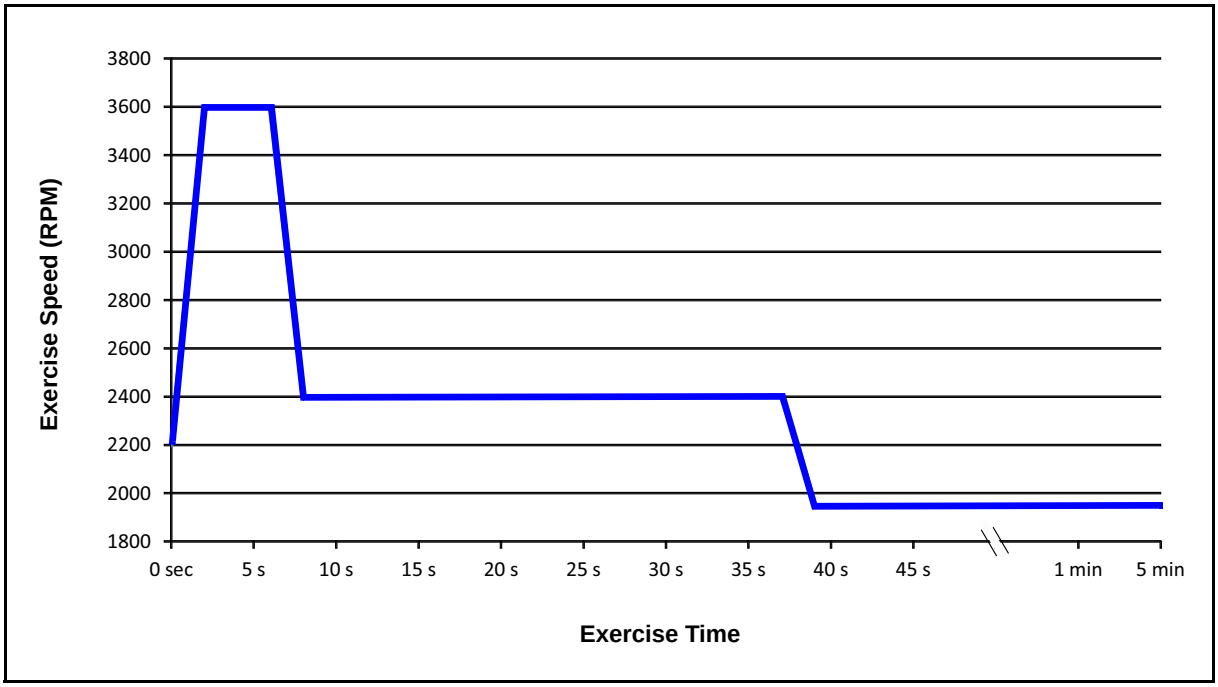



***Figure 7-3. Low Speed Exercise Profile - 20 kW Synergy***

## 7.9 — Before Initial Start-Up

**NOTE: This unit has been run and tested at the factory prior to shipment and does not require any break-in.**

**⚠ CAUTION!**

**⚠ Operating the engine with the oil level below the ADD mark on the dipstick can cause engine damage.**

**NOTE: This unit comes filled with 30 weight organic oil from the factory. Check the oil level and add the appropriate viscosity and amount if necessary.**

### 7.9.1— Installation Wizard

Once activation is complete, the Installation Wizard immediately follows. It allows the user to input generator settings upon power-up. See Figure 7-4.

The Installation Wizard will start every time power (both AC and DC) are removed and then re-applied.

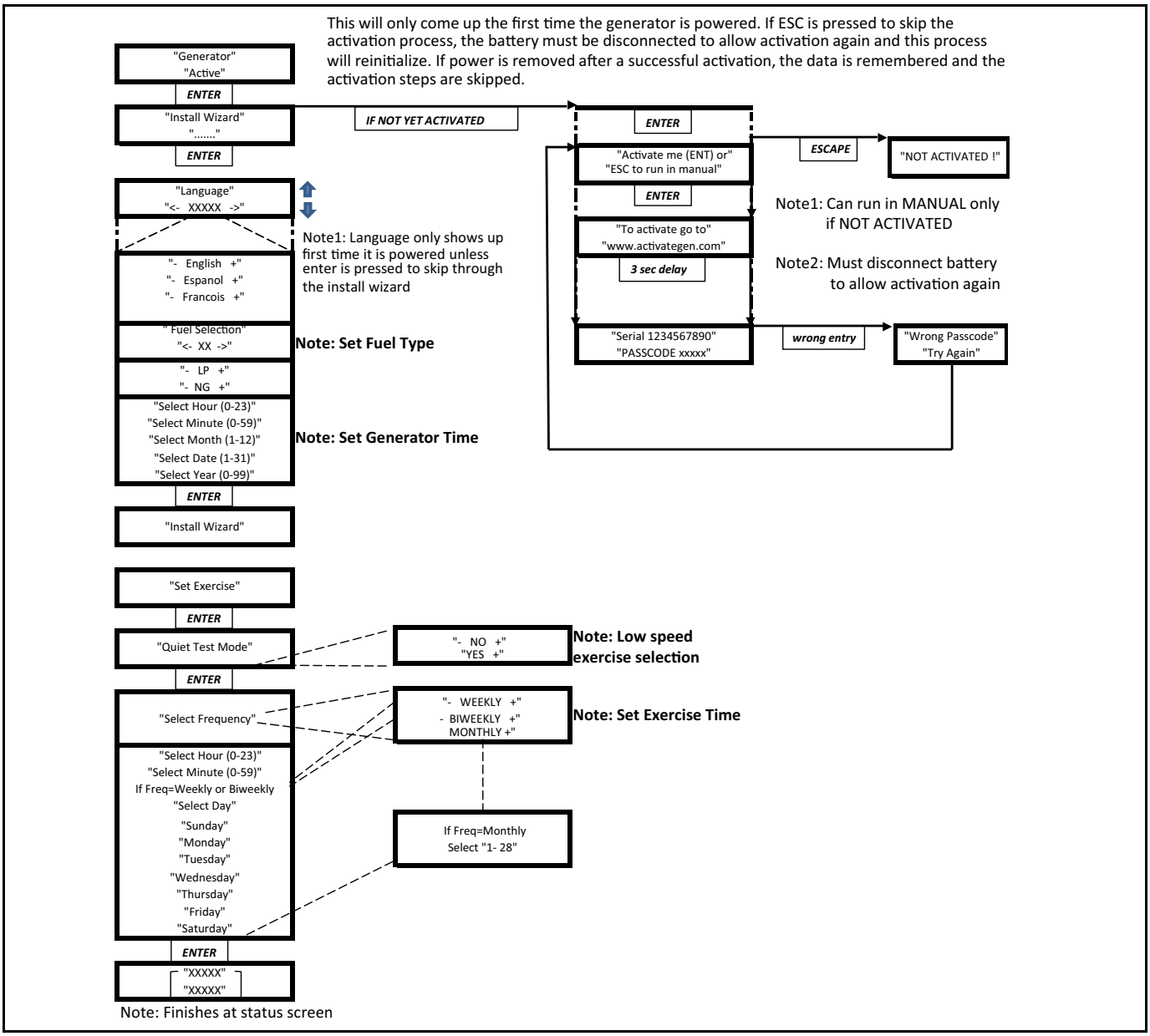



***Figure 7-4. Installation Wizard Menu***

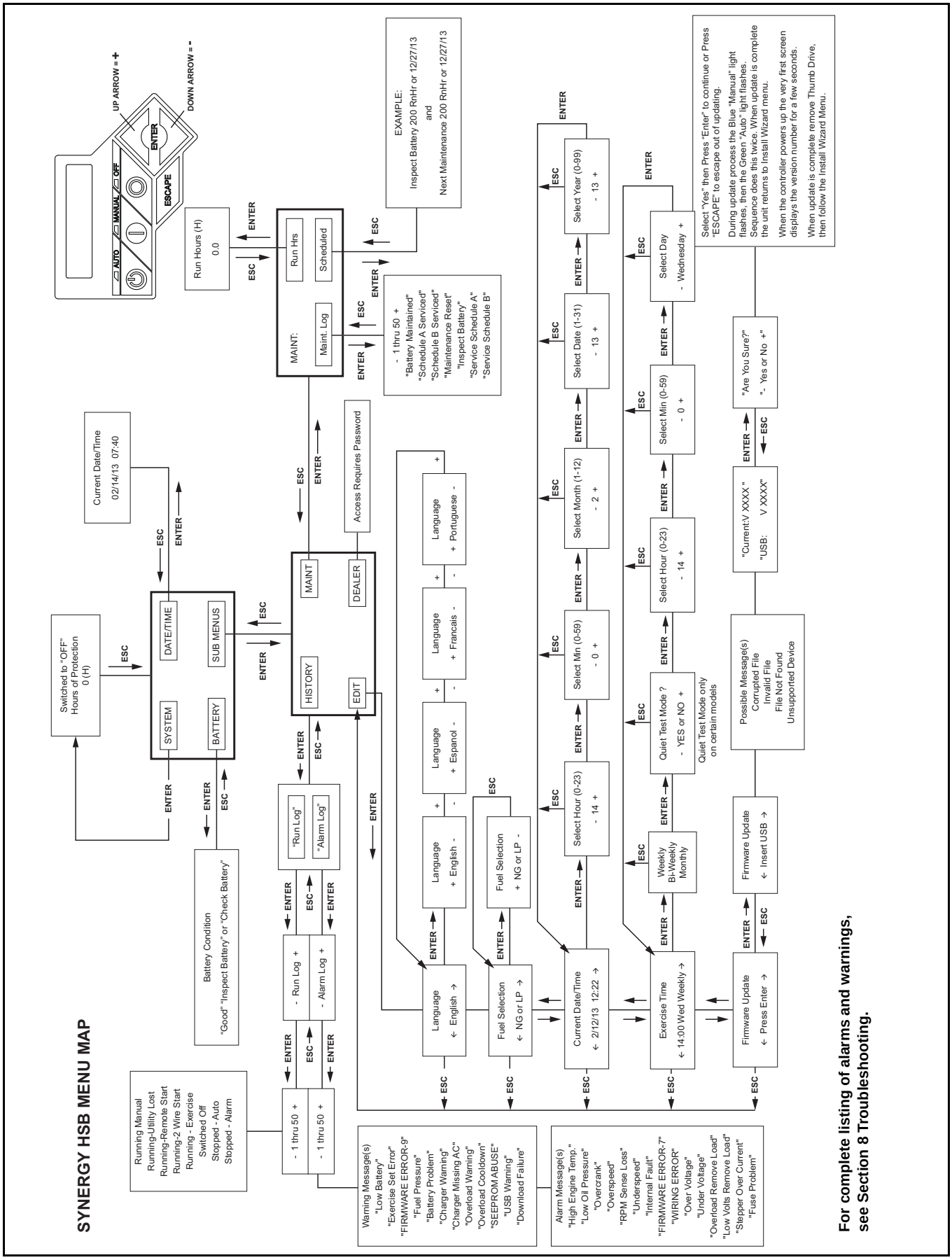



***Figure 7-5. Navigation Menu***

### 7.9.2— Interconnect System Self Test Feature

Upon power up, the system will go through a self test which checks for the presence of utility voltage on the DC circuits. This is done to prevent damage if the installer mistakenly connects AC utility power sense wires into the DC terminal block. If utility voltage is detected, a warning message is displayed to indicate a mis-wire, and the generator is locked out to prevent damage. Power must be removed to clear the warning.

**NOTE: This feature does not operate on transfer wire (23), so exercise caution to avoid mis-wiring the connection or DAMAGE WILL OCCUR.**

Utility voltage must be turned on and present at the N1 and N2 terminals inside the generator for this test to be performed and pass.

**NOTE: The generator is to be run with all appropriate access panels in place, including during troubleshooting.**

### 7.9.3— Before Starting

Complete the following:

1. Verify that the generator is OFF. A red LED illuminates to confirm that system is in OFF mode.
2. Move the Generator Disconnect Circuit Breaker switch to the OFF (Open) position.
3. Turn off all circuit breakers/electrical loads that are to be powered by the generator.
4. Check engine oil level. If necessary, add oil until the level is at or near the FULL mark on the dipstick. DO NOT OVERFILL.
5. Check fuel supply. Gaseous fuel lines must be properly purged and leak tested in accordance with applicable fuel-gas codes before use. Verify that all fuel shut off valves in the fuel supply lines are open.

During initial start up only, the generator may exceed the normal number of start attempts and experience an “over-crank” alarm. This is due to accumulated air in the fuel system during installation. Reset the control board by pressing OFF and then ENTER, and restart up to two more times if necessary. If unit fails to start, contact a local dealer for assistance.

## 7.10 — Check Manual Transfer Switch Operation

Refer to the Manual Transfer Operation section for procedures.

**⚠ DANGER!**

**DO NOT attempt to activate the transfer switch manually until all power voltage supplies to the switch have been completely turned off. Failure to turn off all power voltage supplies may result in extremely hazardous and possibly fatal electrical shock.**

## 7.11 — Electrical Checks

Complete electrical checks as follows:

1. Verify that the generator is OFF. A red LED illuminates to confirm that system is in OFF mode.
2. Move the Generator Disconnect Circuit Breaker switch to the OFF (Open) position.
3. Turn off all circuit breakers/electrical loads that are to be powered by the generator.
4. Turn on the utility power supply to the transfer switch using the means provided (such as a utility main line circuit breaker).

**⚠ DANGER!**

**The transfer switch is now electrically “hot.” Contact with “hot” parts will result in extremely hazardous and possibly fatal electrical shock. Proceed with caution.**

5. Use an accurate AC voltmeter to check utility power source voltage across transfer switch terminals N1 and N2. Nominal line-to-line voltage should be 240 volts AC. If it’s not, verify AC output and wiring from utility source to N1 and N2 lugs at transfer switch.

6. Check utility power source voltage across terminals N1 and the transfer switch neutral lug; then across terminal N2 and neutral. Nominal line-to-neutral voltage should be 120 volts AC. If it's not, verify AC output and wiring from utility source to N1 and N2 lugs at transfer switch.
7. When certain that utility supply voltage is compatible with transfer switch and load circuit ratings, turn OFF the utility power supply to the transfer switch to simulate a power outage.

**NOTE: Do not remove the N1 and N2 fuses in order to simulate an outage.**

8. Press MANUAL on the control pad. The engine cranks and starts.
9. Once the generator is running, IMMEDIATELY move the GENERATOR DISCONNECT Circuit Breaker switch to the ON (Closed) position. This prevents the speed from ramping down before the load is applied, a condition which could cause the engine to stall.

**⚠ DANGER!**

**Proceed with caution! Generator power voltage is now supplied to the transfer switch. Contact with live transfer switch parts will result in dangerous and possibly fatal electrical shock.**

10. Connect an accurate AC voltmeter and a frequency meter across transfer switch terminal lugs E1 and E2. Voltage should be 220-242 VAC (depending on load) at a frequency of 59.5-60.5 Hertz. If it's not, verify that the MLCB is closed and verify AC output and frequency (Hertz or Hz) at the MLCB. Also verify wiring from generator to E1 and E2 lugs at transfer switch.
11. Connect the AC voltmeter test leads across terminal lugs E1 and neutral; then across E2 and neutral. In both cases, voltage reading should be 110-121 VAC. If it's not, verify that the MLCB is closed and verify AC output between the E1 and E2 of the MLCB and Neutral at the generator. Also, verify wiring from generator to E1, E2 ans Neutral lugs at transfer switch.
12. Move the Generator Disconnect Circuit Breaker switch to the OFF (Open) position.
13. Press OFF on the control pad to shut down the engine.

**NOTE: At this point, the loadshed control sees no frequency (utility and generator are disconnected) and operates all loadshed relays. Once utility is restored, there is a delay before all loads are reconnected.**

**NOTE: It is important not to proceed until certain that generator AC voltage and frequency are correct and within the stated limits.**

**⚠ CAUTION!**

**If utility is present, the secondary 12V DC fan continues to operate for up to one hour after the generator is shut down (even if the 7.5 amp ATO fuse is removed). To avoid hand injury, always exercise caution when working near the AVR fan housing.**

## 7.12 — Generator Tests Under Load

To test the generator set with electrical loads applied, proceed as follows:

1. Verify that the generator is OFF. A red LED illuminates to confirm that system is in OFF mode.
2. Turn off all circuit breakers/electrical loads that are to be powered by the generator.
3. Turn OFF the utility power supply to the transfer switch using the means provided (such as a utility main line circuit breaker).

**⚠ WARNING!**

**Do not attempt manual transfer switch operation until all power voltage supplies to the transfer switch have been positively turned off. Failure to turn off all power voltage supplies will result in extremely hazardous and possibly fatal electrical shock.**

4. Manually set the transfer switch to the STANDBY position, i.e., load terminals connected to the generator's E1/E2 terminals. The transfer switch operating lever should be down.
5. Move the Generator Disconnect Circuit Breaker switch to the OFF (or open) position.
6. Press MANUAL on the control pad. The engine cranks and starts.

7. Once the generator is running, IMMEDIATELY move the GENERATOR DISCONNECT Circuit Breaker switch to the ON (Closed) position. This prevents the speed from ramping down before the load is applied, a condition which could cause the engine to stall. Loads are now powered by the standby generator.
8. One by one, turn ON the circuit breaker/electrical loads to be powered by the generator.
9. Connect a calibrated AC voltmeter and a frequency meter across terminal lugs E1 and E2. Voltage should be approximately 220-242 VAC (depending on load) and frequency should be 60 Hz. If the voltage and frequency are rapidly dropping as the loads are applied, the generator may be overloading or there may be a fuel issue. Check amperage value of loads and/or fuel pressure.

**NOTE: If the generator is loaded above 90% of its rating, the voltage will drop down to about 220V.**

10. Allow the generator run at full rated load for 20-30 minutes. Listen for unusual noises, vibration, or other indications of abnormal operation. Check for oil leaks, fuel leaks, evidence of overheating, etc.
11. Verify correct gas pressure while running under full load.
12. When testing under load is complete, turn OFF electrical loads.
13. Move the Generator Disconnect Circuit Breaker switch to the OFF (or open) position.
14. Allow the engine to run at no-load for 2-5 minutes.
15. Press OFF on the control pad to shut down the engine.

**NOTE: At this point, the loadshed control sees no frequency (utility and generator are disconnected) and operates all loadshed relays. Once utility is restored, there is a delay before all loads are reconnected.**

## 7.13 — Checking Automatic Operation

To check the system for proper automatic operation, proceed as follows:

1. Verify that the generator is OFF. A red LED illuminates to confirm that system is in OFF mode.
2. Install covers over transfer switch.
3. Turn ON the utility power supply to the transfer switch using the means provided (such as a utility main line circuit breaker).

**NOTE: Transfer Switch will transfer back to utility position.**

4. Move the Generator Disconnect Circuit Breaker switch to the ON (Closed) position.
5. Press AUTO on the control pad. The system is now ready for automatic operation.
6. Turn OFF the utility power supply to the transfer switch.

**NOTE: With the generator ready for automatic operation, the engine should crank and start when the utility source power is turned OFF after a 5 second delay (adjustable factory default setting). After starting, the transfer switch should connect load circuits to the standby side after a five (5) second delay. Let the system operate through its entire automatic sequence of operation.**

7. With the generator running and loads powered by generator AC output, turn ON the utility power supply to the transfer switch. The following should occur:
   - After approximately 15 seconds, the switch should transfer loads back to the utility power source.
   - Approximately one minute after re-transfer, the engine should shut down.

## 7.14 — Installation Summary

1. Ensure that the installation has been properly performed as outlined by the manufacturer and that it meets all applicable laws and codes.
2. Test and confirm proper operation of the system as outlined in the appropriate installation and owner’s manuals.
3. Educate the end-user on the proper operation, maintenance and service call procedures.

**IMPORTANT! If the end user ever finds it necessary to turn the generator off during prolonged utility outages to perform maintenance or conserve fuel, educate them on these simple, but important steps:**

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

1. Turn OFF (or OPEN) the main Utility disconnect.
2. Move the Generator Disconnect Circuit Breaker switch to the OFF (Open) position.
3. Press OFF on the control pad.
4. Allow the unit to run for **one** minute to cool down.
5. If the generator is to remain off for more than one hour and utility is not present, remove the 7.5 Amp fuse adjacent to the control pad to avoid draining the battery.

To turn the generator back ON:

**NOTE: If removed, install 7.5 amp fuse and T1 fuse, and then follow instructions under Install Wizard.**

1. Press AUTO on the control pad.
2. Once the generator is running, IMMEDIATELY move the GENERATOR DISCONNECT Circuit Breaker switch to the ON (Closed) position. This prevents the speed from ramping down before the load is applied, a condition which could cause the engine to stall. Loads are now powered by the standby generator.

The system is now operating in the AUTO mode. The main utility disconnect can be turned ON (or Closed), but to shut the unit off, this complete process must be repeated.

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## 8.1 — Engine Troubleshooting

### Table 8-1. Engine Diagnostics

| Problem | Cause | Correction |
|---|---|---|
| Engine will not crank. | 1) Fuse blown.<br>2) Loose, corroded or defective battery cables.<br>3) Defective starter contact.<br>4) Defective starter motor.<br>5) Dead Battery. | 1) Correct short circuit condition by replacing 7.5 Amp fuse in generator controller.<br>2) Tighten, clean or replace as necessary.*<br>3) Tighten, clean or replace as necessary.*<br>4) Tighten, clean or replace as necessary.*<br>5) Charge or replace battery. |
| Engine cranks but will not start. | 1) Out of fuel.<br>2) Defective fuel solenoid (FS).<br>3) Defective spark plug(s).<br>4) Valve clearance needs adjustment. | 1) Replenish fuel / Turn on fuel valve.<br>2) *<br>3) Clean, re-gap or replace plug(s).<br>4) Adjust valve clearance. |
| Engine starts hard and runs rough. | 1) Air cleaner plugged or damaged.<br>2) Defective spark plug(s).<br>3) Fuel regulator not set.<br>4) Fuel pressure incorrect.<br>5) Fuel selector in wrong position. | 1) Check / replace air cleaner.<br>2) Clean, re-gap or replace plug(s).<br>3) Set fuel regulator.<br>4) Confirm fuel pressure to regulator is 10-12” water column (19-22mm mercury) for LP, and 3.5 - 7” water column (9-13mm mercury) for natural gas.<br>5) Move selector to correct position. |
| Generator is set to OFF, but the engine continues to run. | 1) Controller wired incorrectly.<br>2) Defective control board. | 1) Repair wiring or replace controller.*<br>2) Replace controller |
| No AC output from generator. | 1) Main line circuit breaker is in the OFF (or OPEN) position.<br>2) Generator internal failure. | 1) Reset circuit breaker to ON (or CLOSED).<br>2) * |
| No transfer to standby after utility source failure. | 1) Defective transfer switch coil.<br>2) Defective transfer relay.<br>3) Transfer relay circuit open.<br>4) Defective control logic board. | 1) *<br>2) *<br>3) *<br>4) * |
| Unit consumes large amounts of oil. | 1) Engine over filled with oil.<br>2) Engine breather defective.<br>3) Improper type or viscosity of oil.<br>4) Damaged gasket, seal or hose. | 1) Adjust oil to proper level.<br>2) *<br>3) See “Engine Oil Recommendations.”<br>4) Check for oil leaks. |
| * Contact an Authorized Independent Service Dealer for assistance. | | |

## 8.2 — Generator Troubleshooting

### Table 8-2. Generator Diagnostics

| Active Alarm | LED | Problem | Things to Check | Solution |
|---|---|---|---|---|
| NONE | GREEN | Unit running in AUTO but no power in house. | Check Generator Disconnect circuit breaker. | Contact servicing dealer if Generator Disconnect circuit breaker is in the ON position. |
| HIGH TEMPERATURE | RED | Unit shuts down during operation. | Check the LEDs/Screen for alarms. | Check ventilation around the intake, exhaust and rear of generator. Contact serving dealer if no obstruction is found. |
| OVERLOAD REMOVE LOAD | RED | Unit shuts down during operation. | Check the LEDs/Screen for alarms. | Clear alarm and remove household loads from the generator. Put back in AUTO and restart. |
| RPM SENSE LOSS | RED | Unit was running and shuts down, attempts to restart. | Check the LEDs/Screen for alarms. | Clear alarm and remove household loads from the generator. Put back in AUTO and restart. If problem returns, contact servicing dealer to investigate possible fuel issue. |
| NOT ACTIVATED | NONE | Unit will not start in AUTO with utility loss. | See if screen says unit not activated. | Refer to activation section in Owner's Manual. |
| None | GREEN | Unit will not start in AUTO with utility loss. | Check screen for start delay countdown. | If the start up delay is greater than expected, contact servicing dealer to adjust from 2 to 1500 seconds. |
| LOW OIL PRESSURE | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Check oil level. Add oil per Owner's Manual. Contact servicing dealer if oil level is correct. |
| RPM SENSE LOSS | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Clear alarm. Navigate to the BATTERY MENU on the control pad LCD. Contact servicing dealer if battery is GOOD. Replace battery If CHECK BATTERY is displayed. |
| OVERCRANK | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Check fuel line shutoff valve is in the ON position. Clear alarm. Attempt to start the unit in MANUAL. If it does not start or starts and runs rough, contact servicing dealer. |
| LOW VOLTS REMOVE LOAD | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Clear alarm and remove household loads from the generator. Set back to AUTO and restart. |
| FUSE PROBLEM | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Check ATO 7.5 Amp fuse. Replace with same type fuse if bad. Contact servicing dealer if fuse is good. |
| OVERSPEED | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Contact servicing dealer. |
| UNDER VOLTAGE | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Contact servicing dealer. |
| UNDERSPEED | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Contact servicing dealer. |

## Table 8-2. Generator Diagnostics (Continued)

| Active Alarm | LED | Problem | Things to Check | Solution |
|---|---|---|---|---|
| STEPPER OVERCUR-RENT | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Contact servicing dealer. |
| MISWIRE | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Contact servicing dealer. |
| OVERVOLTAGE | RED | Unit will not start in AUTO with utility loss. | Check the LEDs/Screen for alarms. | Contact servicing dealer. |
| LOW BATTERY | YELLOW | Yellow LED illuminated in any state. | Check screen for additional information. | Clear alarm. Navigate to the BATTERY MENU on the control pad LCD. Contact servicing dealer if battery is GOOD. Replace battery If CHECK BATTERY is displayed. |
| BATTERY PROBLEM | YELLOW | Yellow LED illuminated in any state. | Check screen for additional information. | Contact servicing dealer. |
| CHARGER WARNING | YELLOW | Yellow LED illuminated in any state. | Check screen for additional information. | Contact servicing dealer |
| SERVICE A | YELLOW | Yellow LED illuminated in any state. | Check screen for additional information. | Perform SCHEDULE A maintenance. Press ENTER to clear. |
| SERVICE B | YELLOW | Yellow LED illuminated in any state. | Check screen for additional information. | Perform SCHEDULE B maintenance. Press ENTER to clear. |
| Inspect Battery | YELLOW | Yellow LED illuminated in any state. | Check screen for additional information. | Inspect battery. Press ENTER to clear. |

## 8.3 — Synergy Troubleshooting

**Table 8-3. Synergy Diagnostics**

| Ecode/Active Alarm | LED | Problem | Things to Check | Possible Causes/Solution |
|---|---|---|---|---|
| 1048 VSCF Overload | RED | Unit shuts down during operation. | Check the LEDs/Screen for alarms. | Alternator, AVR or wiring is damaged. Contact servicing dealer. |
| 1049 VSCF Overload | RED | Unit shuts down during operation. | Check the LEDs/Screen for alarms. | Generator output is shorted or severely overloaded. Identify and clear the overload, and then restart. |
| 1051 VSCF High Battery | YELLOW | Yellow LED illuminated in any state. | Check the LEDs/Screen for alarms. | Voltage supply to the AVR is high. If an external battery charger is in use, contact installing dealer to correct installation. If an external battery charger is NOT in use, contact servicing dealer. |
| 1052 VSCF DC Overvoltage | RED | Unit shuts down during operation. | Check the LEDs/Screen for alarms. | Probable causes are:<br>1) The generator was temporarily overloaded.<br>2) The output was temporarily shorted. Try to restart the unit. |
| 1053 VSCF Gate Fault | RED | Unit shuts down during operation or starting. | Check the LEDs/Screen for alarms. | AVR is damaged. Contact servicing dealer. |
| 1054 VSCF IGBT Overtemp. | RED | Unit shuts down during operation or starting. | Check the LEDs/Screen for alarms. | Probable causes are:<br>1) Replace AVR filter. Inspect fan.<br>2) Intake or exhaust air path is blocked. Check intake and exhaust.<br>3) The BIG fan is not running (only runs when the engine is running). **KEEP FINGERS AWAY FROM FAN HOUSING- PERSONAL INJURY CAN OCCUR IF FAN IS RUNNING.** Contact servicing dealer.<br>4) Air leak in AVR enclosure. Contact servicing dealer.<br>5) Engine running too hot. Inspect air intake and exhaust.<br>6) Ambient temperature has risen above 60º F. Derate the generator output per specifications. |
| 1055 VSCF Phase Error | RED | Unit shuts down during starting. | Check the LEDs/Screen for alarms. | An incorrect voltage and frequency has been detected during starting. Probable causes are:<br>1) Alternator damage. Contact servicing dealer.<br>2) Generator has started into a severe load. Manually operate transfer switch back to utility position and try to restart unit. If problem persists, remove load and attempt to restart unit again.<br>3) The engine may not be reaching its prescribed speed. Proceed as follows:<br>• Verify stepper motor is moving and linkage is free.<br>• Verify stepper motor is plugged in.<br>• Verify gas pressure is within specified limits. |
| 1056 VSCF Undervoltage | RED | Unit shuts down during operation or starting. | Check the LEDs/Screen for alarms. | The generator output voltage is too low. Probable causes are:<br>1) The load is too large. Remove load and attempt to restart unit.<br>2) Alternator or AVR damage. Contact servicing dealer. |

## Table 8-3. Synergy Diagnostics (Continued)

| Ecode/Active Alarm | LED | Problem | Things to Check | Possible Causes/Solution |
|---|---|---|---|---|
| 1057 VSCF Overvoltage | RED | Unit shuts down during operation or starting. | Check the LEDs/Screen for alarms. | Probable causes are:<br>1) The generator has been overloaded. Remove load and attempt to restart unit.<br>2) Generator has started into a severe load. Manually operate transfer switch back to utility position and try to restart unit. If problem persists, remove load and attempt to restart unit again. |
| 1058 VSCF DC Undervoltage | RED | Unit shuts down during operation or starting. | Check the LEDs/Screen for alarms. | The DPE winding supplies this voltage.<br>1) Alternator or brush damage. Contact servicing dealer. |
| 1059 VSCF Field Loss | RED | Unit shuts down during starting. | Check the LEDs/Screen for alarms. | Unit detects no output voltage while starting.<br>1) Alternator or brush damage. Contact servicing dealer. |
| 1061 VSCF Field Loss | RED | Unit shuts down during operation. | Check the LEDs/Screen for alarms. | Unit detects loss of output voltage while running.<br>1) Alternator or brush damage. Contact servicing dealer. |
| 1060 Big Fan Failure | RED | Unit shuts down during operation. | Check the LEDs/Screen for alarms. | This alarm occurs when the AVR electronics temperature exceeds 70 C. Possible causes are:<br>1) AVR filter faulty. Replace AVR filter.<br>2) Intake or exhaust air path is blocked. Check intake and exhaust.<br>3) The BIG fan is not running (only runs when the engine is running). **KEEP FINGERS AWAY FROM FAN HOUSING- PERSONAL INJURY CAN OCCUR IF FAN IS RUNNING.** Contact servicing dealer.<br>4) Air leak in AVR enclosure. Contact servicing dealer.<br>5) Engine running too hot. Inspect air intake and exhaust.<br>6) Ambient temperature has risen above 60º F. Derate the generator output per specifications.<br>If message is displayed when generator is stopped, also check SMALL fan. Small fan RUNS for 60 minutes after generator is stopped and keeps electronics cool during heat soak. |
| 1065 Overfrequency | RED | Unit shuts down during operation. | Check the LEDs/Screen for alarms. | Probable causes are:<br>1) Overload. Remove load and attempt to restart unit.<br>2) RPM sensor has failed. Contact servicing dealer.<br>3) Stepper motor problem. Contact servicing dealer. |
| 1066 VSCF Speed mismatch | RED | Unit shuts down during Operation or starting. | Check the LEDs/Screen for alarms. | 1) Fuel problem (pressure loss). Check fuel supply and attempt to restart unit.<br>2) A large load is not wired through the Loadshed module. Contact installing dealer to correct installation.<br>3) Large overload. Remove load and attempt to restart unit.<br>4) Throttle or engine problem. Contact servicing dealer. |
| 1070 Small fan failure | YELLOW | “Small fan failure” is displayed. If unit was running in AUTO and utility returns, it will continue to run for one hour to cool electronics without fan. | Check the LEDs/Screen for alarms. | Small fan current incorrect. Probable causes are:<br>1) Fan wiring or mechanical problem. Contact servicing dealer.<br>2) Air path is blocked. Check AVR filter.<br>**KEEP FINGERS AWAY FROM FAN HOUSING- PERSONAL INJURY CAN OCCUR IF FAN IS RUNNING.** |

## 8.4 — Load Shed Troubleshooting

**Table 8-4. Load Shed Diagnostics**

| Symptom | Possible Causes |
|---|---|
| Generator stalls when large load is supplied. | 1) Total load is too big for the generator and fuel type. Contact installing dealer to correct installation.<br>2) A large load is not wired through the Loadshed module. Contact installing dealer to correct installation. |
| Large loads keep getting shed and locked out (load LED goes out for 30 minutes). | Total load is too big for generator. Contact installing dealer to correct installation. |
| Output voltage is low/high. | Voltage calibration incorrect. Contact servicing dealer. |
| Generator does not pull full power. | Current calibration incorrect. Contact servicing dealer. |

## 9.1 — Descriptions

**NOTE: Contact an independent Authorized Dealer for additional information on accessories.**

**Table 9-1. Accessories**

| Accessory | Description |
|---|---|
| Cold Weather Kit | Required in areas where temperatures regularly fall below 32 º F (0 º C). |
| Scheduled Maintenance Kit | Includes all pieces necessary to perform maintenance on the generator along with oil recommendations. |
| Auxiliary Transfer Switch Lockout | Enables any of the transfer switches to completely lock out one large electrical load by tying into its control system. |
| Fascia Skirt Wrap | Standard on all 22 kW units. It is available for all other current production air-cooled units. It snaps together, around the base and mounting pad of the generator, to provide a smoothing, contoured look as well as rodent/insect protection. Requires use of the mounting pad shipped with the generator. |
| Mobile Link™ | Provides a personalized web portal that displays the generator's status, maintenance schedule, event history and much more. This portal is accessible via computer, tablet or smart phone. Sends emails and/or text notifications the moment there is any change in the generator's status. Notification settings can be customized to what type of alert is sent and how often. For more information, visit www.standbystatus.com. |
| Wireless Local Monitor | Completely wireless and battery powered, the Wireless Local Monitor provides you with instant status without ever leaving the house. Status lights (red, yellow and green) alert owners when the generator needs attention. Magnetic backing permits refrigerator mounting and gives a 600 foot line of sight communication. |
| Power Management Module (PMM) Starter Kit | Includes one module with transformer. The transformer, which is mounted inside the ATS enclosure, interfaces with the OPCB to generate the 24 Vac signal needed for control of the contactor (Load 1 on the OPCB). |
| Power Management Module (PMM) | Includes one module only. To achieve full system functionality, a total of three kits are required to allow control of the three remaining contactors (Loads 2/3/4 on the OPCB). |
| Touch-Up Paint Kit | Very important to maintain the look and integrity of the generator enclosure. This kit includes touch-up paint and instructions. |
| Extended Warranty Coverage | Extend your generator's warranty coverage by purchasing the 5 year extended warranty coverage. Covers 5 years of both parts and labor. Extended coverage can be purchased within 12 months of the end-users purchase date. This extended coverage is applicable to registered units and end-user proof of purchase must be available upon request.<br>Available for Generac ®, Guardian ® and Centurion ® products.<br>Not available for Corepower™ and EcoGen products or all international purchases. |

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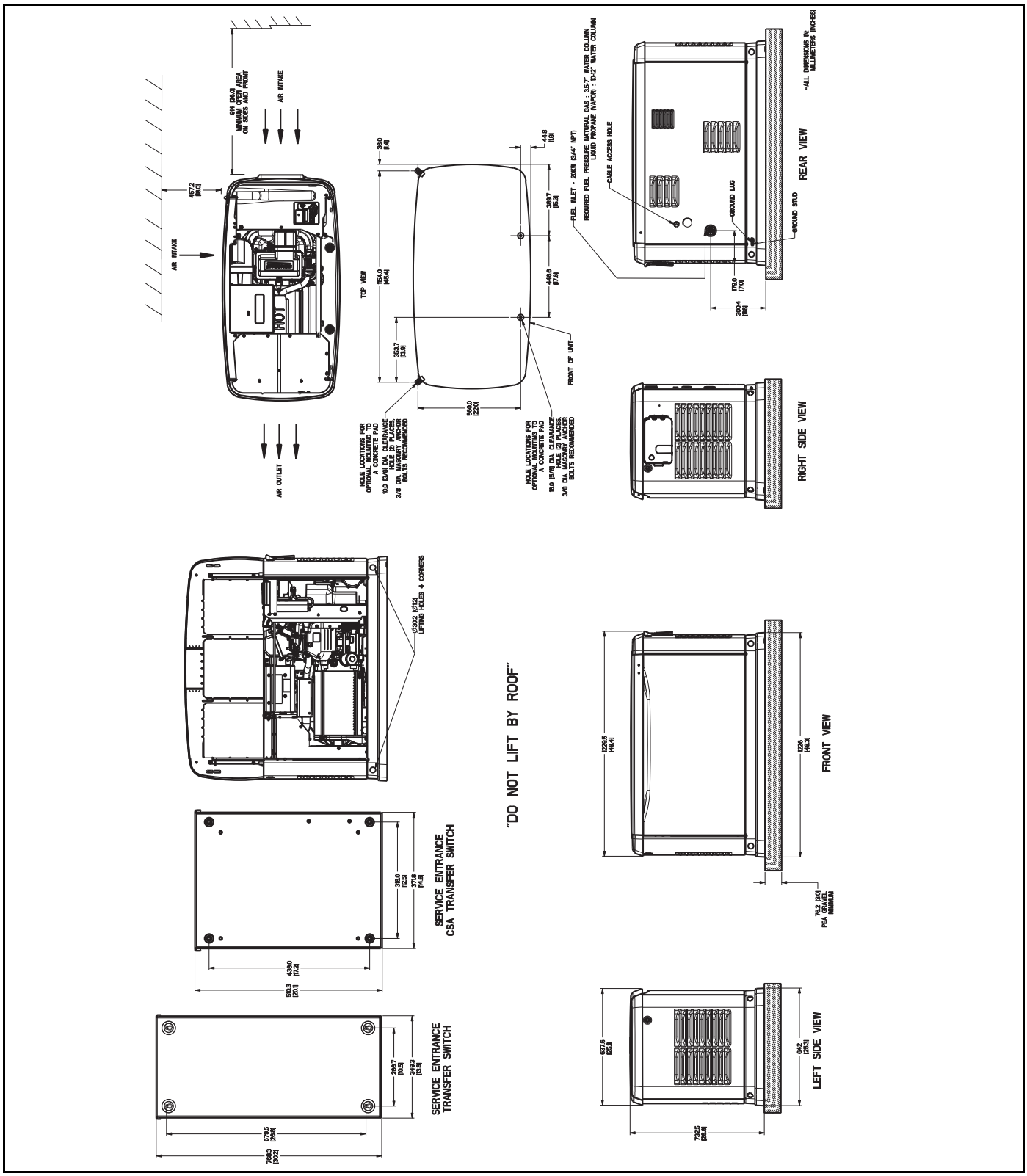
## 10.1 — Installation Drawing



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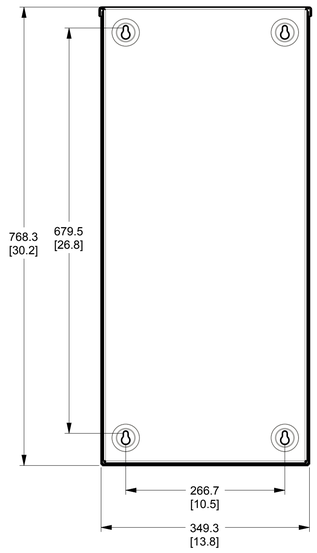
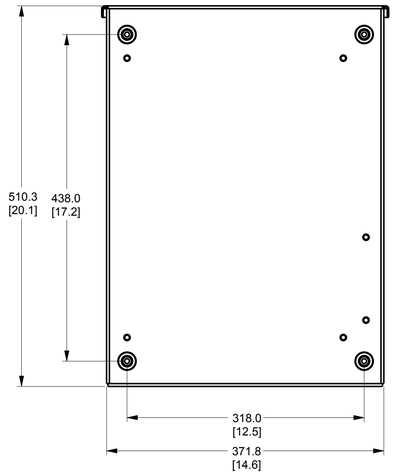
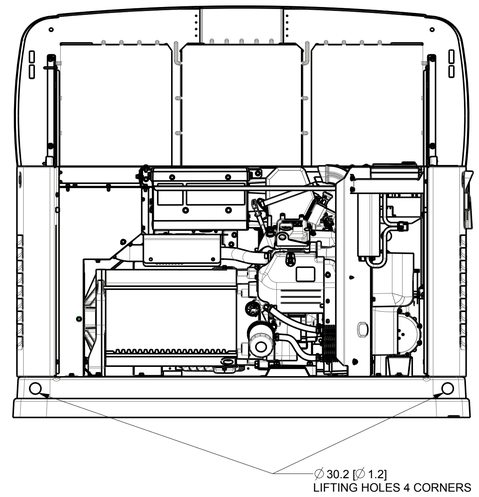


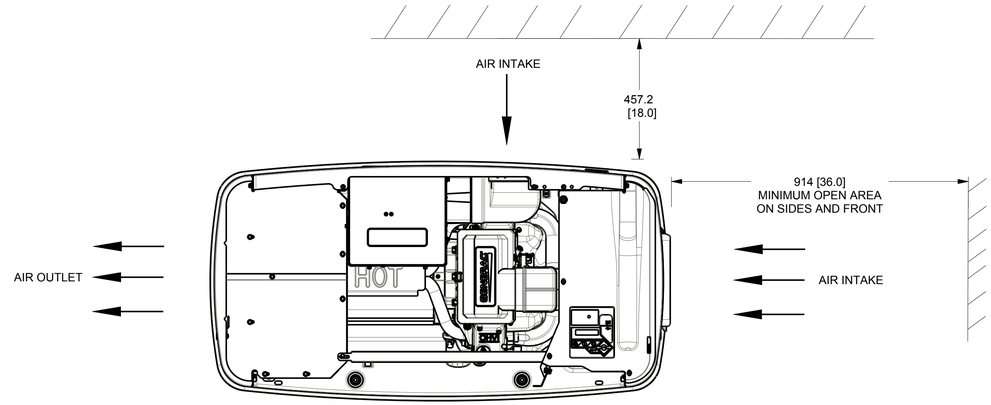

SERVICE ENTRANCE
TRANSFER SWITCH



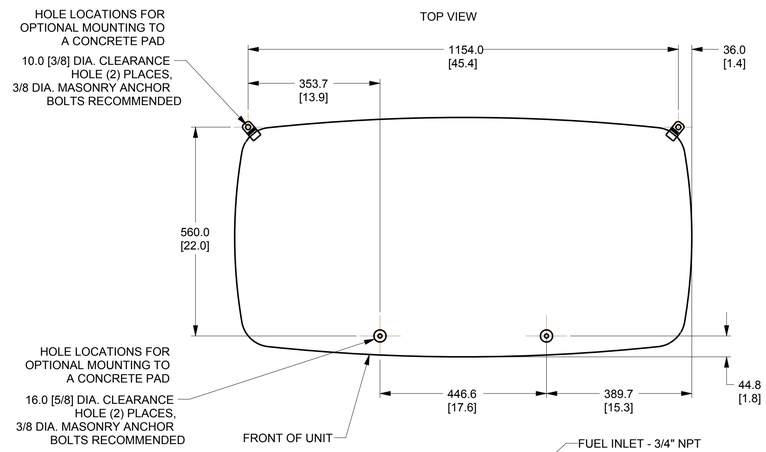

SERVICE ENTRANCE
CSA TRANSFER SWITCH

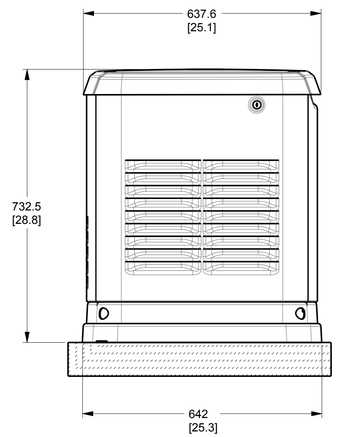



"DO NOT LIFT BY ROOF"

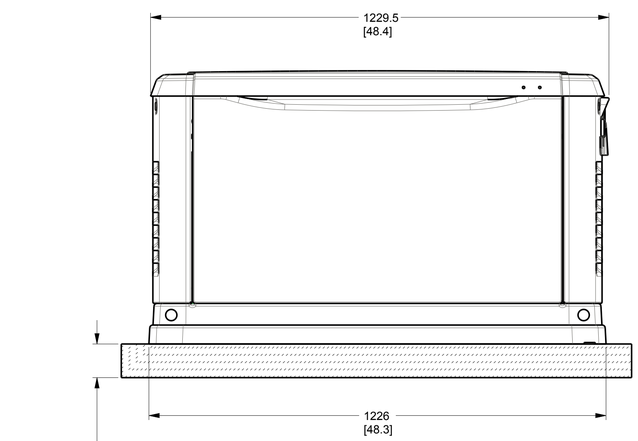



TOP VIEW

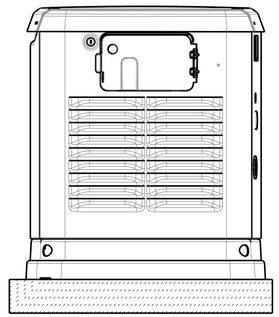


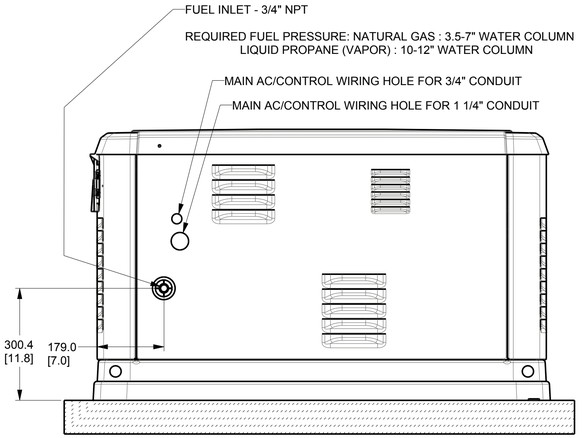

LEFT SIDE VIEW




FRONT VIEW



RIGHT SIDE VIEW




REAR VIEW

**ALL DIMENSIONS IN:
MILLIMETERS [INCHES]

DRAWING CREATED FROM PRO/ENGINEER
3D FILE: ECO MODIFICATION TO BE
APPLIED TO SOLID MODEL ONLY.

# INSTALLATION DRAWING

FIRST USE: 0060550

ELECTRONICALLY APPROVED
INSIDE WINDCHILL

GENERAC

TITLE
HSB INSTALL GENERATOR SYNERGY

| ISSUE DATE: | 6/17/14 | | | | |
|---|---|---|---|---|---|
| SIZE | CAGE NO | DWG NO | | | REV |
| B | N/A | 0K9041 | | | D |
| SCALE | NTS | WT-KG | N/A | SHEET | 1 of 1 |