Installation and Start-Up Manual

GEN12S, GEN15S, GEN20B & GEN25B

12000 / 15000 Watt Residential Generator System

Questions?

Help is just a moment away!

Call: **Home Generator Helpline**

(877) 369-9400 M-F 8-5 CT

Manual No. 202113GS Rev. - (01/03/07)

Thank you for purchasing this quality-built Rheem / Ruud home standby generator. We are pleased that you've placed your confidence in the Rheem or Ruud brand. When operated and maintained according to the instructions in this manual, your Rheem / Ruud generator will provide many years of dependable service.

This manual contains safety information to make you aware of the hazards and risks associated with installing residential standby generators and how to avoid them. Because Rheem does not necessarily know all the applications this equipment could be used for, it is important that you read and understand these instructions thoroughly before attempting to install or start this equipment. Save these instructions for future reference.

This home standby generator requires professional installation before use. The installer should follow the instructions completely.

Where to Find Us

You never have to look far to find support and service for your home standby generator equipment. Consult your Yellow Pages. There are many Rheem and Ruud authorized service dealers who provide quality service. You can also contact Rheem/Ruud Customer Service by phone at **(877) 369-9400**.

Rheem Sales Company
Randleman, NC 27317
(877) 369-9400

Table of Contents

Save These Instructions

Important Safety Rules

The safety alert symbol (⚠) is used with a signal word (DANGER, CAUTION, WARNING), a pictorial and/or a safety message to alert you to hazards. **DANGER** indicates a hazard which, if not avoided, will result in death or serious injury. **WARNING** indicates a hazard which, if not avoided, could result in death or serious injury. **CAUTION** indicates a hazard which, if not avoided, might result in minor or moderate injury. **NOTICE** indicates a situation that could result in equipment damage. Follow safety messages to avoid or reduce the risk of injury or death.

Hazard Symbols and Meanings

⚠ WARNING

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

⚠ WARNING

Storage batteries give off explosive hydrogen gas during recharging.

Slightest spark will ignite hydrogen and cause explosion.

Battery electrolyte fluid contains acid and is extremely caustic.

Contact with battery contents will cause severe chemical burns.

A battery presents a risk of electrical shock and high short circuit current.

- DO NOT dispose of battery in a fire.
- Do not allow any open flame, spark, heat, or lit cigarette during and for several minutes after charging a battery.
- DO NOT open or mutilate the battery.
- Wear protective goggles, rubber apron, and rubber gloves.
- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.

⚠ WARNING

Running engine gives off carbon monoxide, an odorless, colorless, poison gas.

Breathing carbon monoxide can cause headache, fatigue, dizziness, vomiting, confusion, seizures, nausea, fainting or death.

- Operate generator ONLY outdoors.
- Install a battery operated carbon monoxide alarm near the bedrooms.
- Keep exhaust gas from entering a confined area through windows, doors, ventilation intakes, or other openings.

⚠ WARNING

Hazardous Voltage

Contact with power lines can cause electric shock or burn.

Lifting Hazard / Heavy Object

Can cause muscle strain or back injury.

- If lifting or hoisting equipment is used, DO NOT contact any power lines.
- DO NOT lift or move generator without assistance.
- Use lifting pipes as described in the section “Lifting the Generator” in installation manual.
- The unit may shift on the lifting pipes during movement, which can cause injury.
- DO NOT lift unit by roof as damage to generator will occur.

⚠ WARNING

Generator produces hazardous voltage.

Failure to properly ground generator can result in electrocution.

Failure to isolate generator from power utility can result in death or injury to electric utility workers due to backfeed of electrical energy.

- When using generator for backup power, notify utility company.
- Do not touch bare wires or receptacles.
- Do not use generator with electrical cords which are worn, frayed, bare or otherwise damaged.
- Do not handle generator or electrical cords while standing in water, while barefoot, or while hands or feet are wet.
- If you must work around a unit while it is operating, stand on an insulated dry surface to reduce shock hazard.
- Do not allow unqualified persons or children to operate or service generator.
- In case of an accident caused by electrical shock, immediately shut down the source of electrical power and contact the local authorities. **Avoid direct contact with the victim.**
- Despite the safe design of the generator system, operating this equipment imprudently, neglecting its maintenance or being careless can cause possible injury or death.
- Remain alert at all times while working on this equipment. Never work on the equipment when you are physically or mentally fatigued.
- Before performing any maintenance on the generator, disconnect the battery cable indicated by a **NEGATIVE**, **NEG** or **(-)** first. When finished, reconnect that cable last.
- After your generator system is installed, the generator may crank and start without warning any time there is a power failure. To prevent possible injury, always set the generator's system switch to **OFF**, remove the service disconnect from the disconnect box **AND** remove the 15 Amp fuse **BEFORE** working on the equipment.

⚠ WARNING

Propane and Natural Gas are extremely flammable and explosive.

Fire or explosion can cause severe burns or death.

- Install the fuel supply system according to applicable fuel-gas codes.
- Before placing the generator system into service, the fuel system lines must be properly purged and leak tested.
- After the generator is installed, you should inspect the fuel system periodically.
- NO leakage is permitted.
- DO NOT operate engine if smell of fuel is present or other explosive conditions exist.
- DO NOT smoke around the generator. Wipe up any oil spills immediately. Ensure that no combustible materials are left in the generator compartment. Keep the area near the generator clean and free of debris.

⚠ WARNING

Contact with muffler area can result in serious burns.

Exhaust heat/gases can ignite combustibles or structures causing a fire.

- DO NOT touch hot parts and AVOID hot exhaust gases.
- Allow equipment to cool before touching.
- DO NOT install the generator closer than 5 feet (1.5m) from any combustibles or structures with combustible walls having a fire resistance rating of less than 1 hour.
- Keep at least 3 ft. (91 cm) clearance on all sides of generator including overhead.
- Code of Federal Regulation (CFR) Title 36 Parks, Forests, and Public Property require equipment powered by an internal combustion engine to have a spark arrester, maintained in effective working order, complying to USDA Forest service standard 5100-1C or later revision. In the State of California a spark arrester is required under section 4442 of the California Public resources code. Other states may have similar laws.

⚠ WARNING

Starter and other rotating parts can entangle hands, hair, clothing, or accessories.

- NEVER operate generator without protective housing or covers.
- DO NOT wear loose clothing, jewelry or anything that may be caught in the starter or other rotating parts.
- Tie up long hair and remove jewelry.

⚠ CAUTION

Installing the 15A fuse could cause the engine to start.

- Observe that the 15 Amp fuse has been removed from the control panel for shipping.
- DO NOT install this fuse until all plumbing and wiring has been completed and inspected.

⚠ CAUTION

Excessively high operating speeds increase risk of injury and damage to generator.

Excessively low speeds impose a heavy load.

- DO NOT tamper with governed speed. Generator supplies correct rated frequency and voltage when running at governed speed.
- DO NOT modify generator in any way.

NOTICE

Exceeding generators wattage/amperage capacity can damage generator and/or electrical devices connected to it.

- See “Essential Circuits”.
- Start generator and let engine stabilize before connecting electrical loads.

NOTICE

Improper treatment of generator can damage it and shorten its life.

- Use generator only for intended uses.
- If you have questions about intended use, ask dealer or contact Rheem.
- Operate generator only on level surfaces.
- Adequate, unobstructed flow of cooling and ventilating air is critical to correct generator operation.
- The Oil Fill, Oil Drain and the Control Panel doors must be installed whenever the unit is running.
- DO NOT expose generator to excessive moisture, dust, dirt, or corrosive vapors.
- Despite the safe design of the residential generator system, operating this equipment imprudently, neglecting its maintenance or being careless can cause possible injury or death.
- Remain alert at all times while working on this equipment. NEVER work on the equipment when you are physically or mentally fatigued.
- DO NOT start engine with air cleaner or air cleaner cover removed.
- DO NOT insert any objects through cooling slots.
- DO NOT use the generator or any of its parts as a step. Stepping on the unit can cause stress and break parts. This may result in dangerous operating conditions from leaking exhaust gases, fuel leakage, oil leakage, etc..
- If connected devices overheat, turn them off and disconnect them from generator.
- Shut off generator if:
  - -electrical output is lost;
  - -equipment sparks, smokes, or emits flames;
  - -unit vibrates excessively.

Installation

Equipment Description

This system is intended for use as an optional residential generator system which provides an alternate source of electric power and to serve loads such as heating, refrigeration systems, and communication systems that, when stopped during any power outage, could cause discomfort, or the like. This product does not qualify for emergency standby as defined by NFPA 70 (NEC).

This manual contains installation, startup and adjustment instructions for a residential generator system that supplies 120/240 Volt, single phase, 60Hz devices. The generator system may be operated on LP or natural gas fuel. A separate Operator's Manual (part number 202114GS) contains operating and maintenance instructions for this system.

Every effort has been made to ensure that the information in this manual is both accurate and current. However, the manufacturer reserves the right to change, alter or otherwise improve the system at any time without prior notice.

Customer Responsibilities

- Read and follow the instructions given in the Operator's Manual, especially the section regarding selecting essential circuits.
- Follow a regular schedule in maintaining, caring for and using your generator system, as specified in the Operator's Manual.

Installer Responsibilities

- Read and observe the safety rules.
- Read and follow the instructions given in this Installation and Start-up Manual.
- If operating the generator below 40°F, it is recommended that a battery and oil warmer be installed. If operating the generator below 32°F, a battery and oil warmer must be installed. Both items are available at your local servicing dealer.

IMPORTANT: DO NOT OVERLOAD GENERATOR. Refer to *Essential Circuits* in the Operator's Manual and discuss your installation plan with the owner before commencing work.

Unpacking Precautions

The unit is shipped bolted to its mounting pad, ready for installation. Avoid damage from dropping, bumping, collision, etc. Store and unpack carton with the proper side up, as noted on the shipping carton.

⚠ CAUTION

Installing the 15A fuse could cause the engine to start.

- Observe that the 15 Amp fuse has been removed from the control panel for shipping.
- DO NOT install this fuse until all plumbing and wiring has been completed and inspected.

Delivery Inspection

After removing the carton, carefully inspect the generator system for any damage that may have occurred during shipment.

IMPORTANT: If loss or damage is noted at time of delivery, have the person(s) making delivery note all damage on the freight bill and affix his signature under the consignor's memo of loss or damage. If loss or damage is noted after delivery, separate the damaged materials and contact the carrier for claim procedures. Missing or damaged parts are not warranted.

Shipment Contents

The generator system is supplied with:

- Residential Generator System
- Pre-attached mounting pad
- One flexible hook-up hose
- This installation and start-up manual
- Operator's manual
- Illustrated parts list manual
- Installation checklist
- Two access door keys
- Four lifting hole plugs
- Oil fill spout
- One spare 15A fuse
- 2 Pole connector (for 240V from building)
- 10 Pole connector (for sensing and control wires)
- Air intake engine cover
- Alternator cover
- Diagnostic LED kit (red LED/plate/screws (2))

Required Specialty Tools/Equipment

- Two 48" lengths of 1" pipe (**NOT** conduit)
- Hole punches for 16ga steel
- Torque screwdriver, 5 to 50 inch-pound range

Generator Location

⚠ WARNING

Exhaust heat/gases can ignite combustibles or structures causing a fire.

- DO NOT install the generator closer than 5 feet (1.5m) from any combustibles or structures with combustible walls having a fire resistance rating of less than 1 hour.
- Keep at least 3 ft. (91 cm) clearance on all sides of generator including overhead.

Before installing generator, consult with homeowner and convey the following guidelines which may affect the desired location.

Install generator outdoors in an area which will not accumulate deadly exhaust gas. DO NOT install generator where exhaust gas could accumulate and enter inside or be drawn into a potentially occupied building. Ensure exhaust gas is kept away from any windows, doors, ventilation intakes or other openings that can allow exhaust gas to collect in a confined area (Figure 1). Prevailing winds and air currents should be taken into consideration when positioning generator.

⚠ WARNING

Running engine gives off carbon monoxide, an odorless, colorless, poison gas.

Breathing carbon monoxide can cause headache, fatigue, dizziness, vomiting, confusion, seizures, nausea, fainting or death.

- Operate generator ONLY outdoors.
- Install a battery operated carbon monoxide alarm near the bedrooms.
- Keep exhaust gas from entering a confined area through windows, doors, ventilation intakes, or other openings.

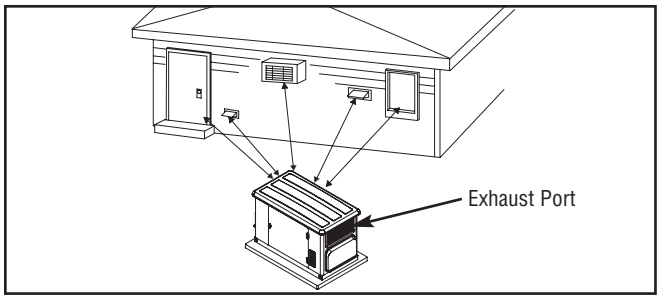


Figure 1 — Generator Location

General Location Guidelines

- Install the unit outdoors ONLY.
- Place the unit in a prepared location that is flat and has provisions for water drainage.
- Install the unit in a location where sump pump discharge, rain gutter down spouts, roof run-off, landscape irrigation, or water sprinklers will not flood the unit or spray the enclosure and enter any air inlet our outlet openings.
- Install the unit where the location of any services such as phone, electrical, fuel, air conditioning, irrigation, including covered, concealed and underground services will not be affected or obstructed.
- Install the unit where air inlet and outlet openings will not become obstructed by leaves, grass, snow, etc. If prevailing winds will cause blowing or drifting, you may need to construct a windbreak to protect the unit.
- Install the generator as close as possible to the Transfer Switch to reduce the length of wiring and conduit.
- Install the generator as close as possible to the fuel supply to reduce length of pipes.

IMPORTANT: Laws or local codes may regulate the distance to the fuel supply.

The generator system is shipped already attached to its mounting pad. Unless mandated by local code, a concrete slab is not required.

If mandated by local code, construct a concrete slab at least 3 inches thick and 6 inches longer and wider than the unit. Attach unit to slab with 1/4" diameter (minimum) masonry anchor bolts long enough to retain the unit.

Fuel and Electrical Inlet Dimensions

Figure 2 depicts the location of the fuel piping connector. Also shown is the recommended location for punching holes for attaching the power conduit.

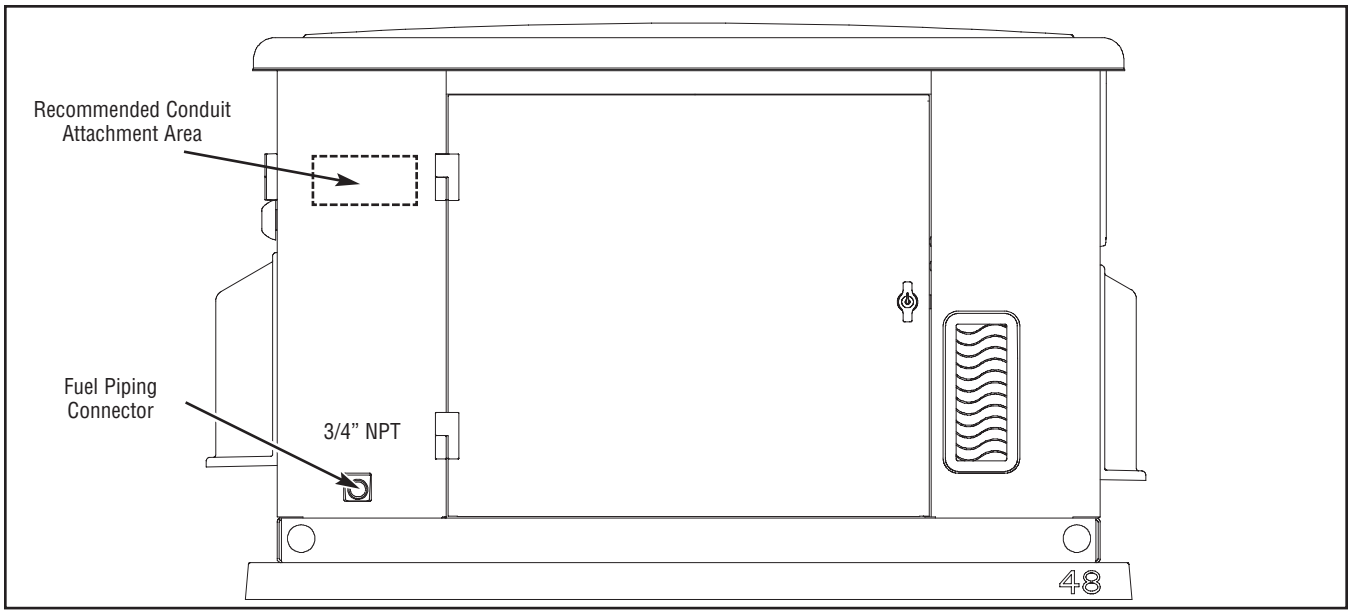


Figure 2 — Generator Fuel and Conduit Attachment Locations, Oil Fill Side of Unit

Lifting the Generator

The generator weighs more than 560 pounds. Proper tools, equipment and qualified personnel should be used in all phases of handling and moving the generator.

⚠ WARNING

Hazardous Voltage

Contact with power lines can cause electric shock or burn.

Lifting Hazard / Heavy Object

Can cause muscle strain or back injury.

- If lifting or hoisting equipment is used, DO NOT contact any power lines.
- DO NOT lift or move generator without assistance.
- Use lifting pipes as described in the section "Lifting the Generator" in installation manual.
- The unit may shift on the lifting pipes during movement, which can cause injury.
- DO NOT lift unit by roof as damage to generator will occur.

Two 48" lengths of 1" pipe (supplied by the installer) are required to lift the generator manually. Insert pipes through the lifting holes located near the unit's base, as shown in Figure 3.

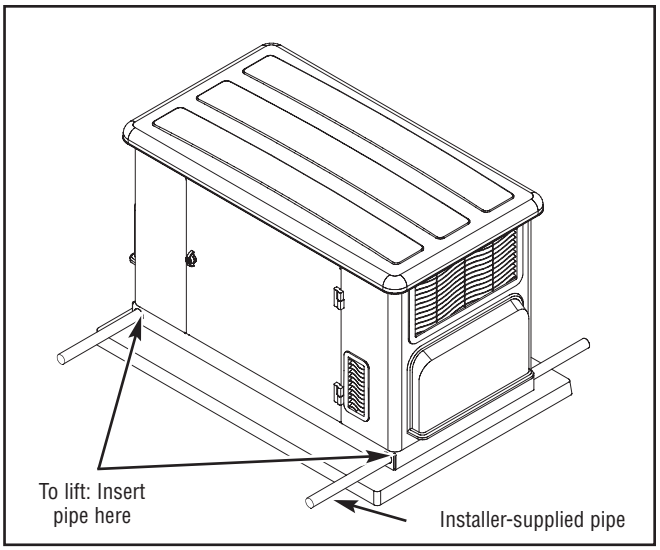


Figure 3 — Location of Lifting Holes

You may also lift the unit using a "hook and hoist" method attached to the lifting pipes, provided that you use a spreader bar to ensure that the chains or cables do not touch the generator's roof.

After unit is in place, fill the lifting holes with the supplied lifting hole plugs.

Access Doors

The generator system is equipped with an enclosure that has three access doors (Figure 4). The doors are named for a significant component located behind them. Starting with the side that has the fuel connection and proceeding clockwise, the doors are named:

- Oil Fill door
- Control Panel door
- Oil Drain door

Each generator system is equipped with two identical keys. These keys fit the locks that secure the access doors.

⚠ WARNING

Contact with muffler area can result in serious burns.

- DO NOT touch hot parts and AVOID hot exhaust gases.
- Allow equipment to cool before touching.

To Open an Access Door:

1. Insert key into lock of access door you wish to open and turn one quarter turn counterclockwise.
2. Grasp door's handle and turn one quarter turn counterclockwise to open. Remove key.

To Close an Access Door:

1. Close door and turn doors handle one quarter of a turn clockwise.
2. Insert key into lock of access door and turn one quarter turn clockwise. Remove key.

The Gaseous Fuel System

⚠ WARNING

Propane and Natural Gas are extremely flammable and explosive.

Fire or explosion can cause severe burns or death.

- LP gas is heavier than air and will settle in low areas.
- Natural gas is lighter than air and will collect in high areas.
- The slightest spark can ignite these fuels and cause an explosion.

The information provided below is to assist gaseous fuel system technicians in planning installations. In no way should this information be interpreted to conflict with applicable fuel gas codes. Consult with your local fuel supplier or Fire Marshall if questions or problems arise.

TO THE INSTALLER: Consult with the generator system owner(s) and convey any technical considerations that might affect their installation plans before applying these general guidelines.

The following general rules apply to gaseous fuel system piping:

- The piping should be of a material that conforms to federal and local codes, rigidly mounted and protected against vibration.
- Piping should be protected from physical damage where it passes through flower beds, shrub beds, and other cultivated areas where damage could occur.

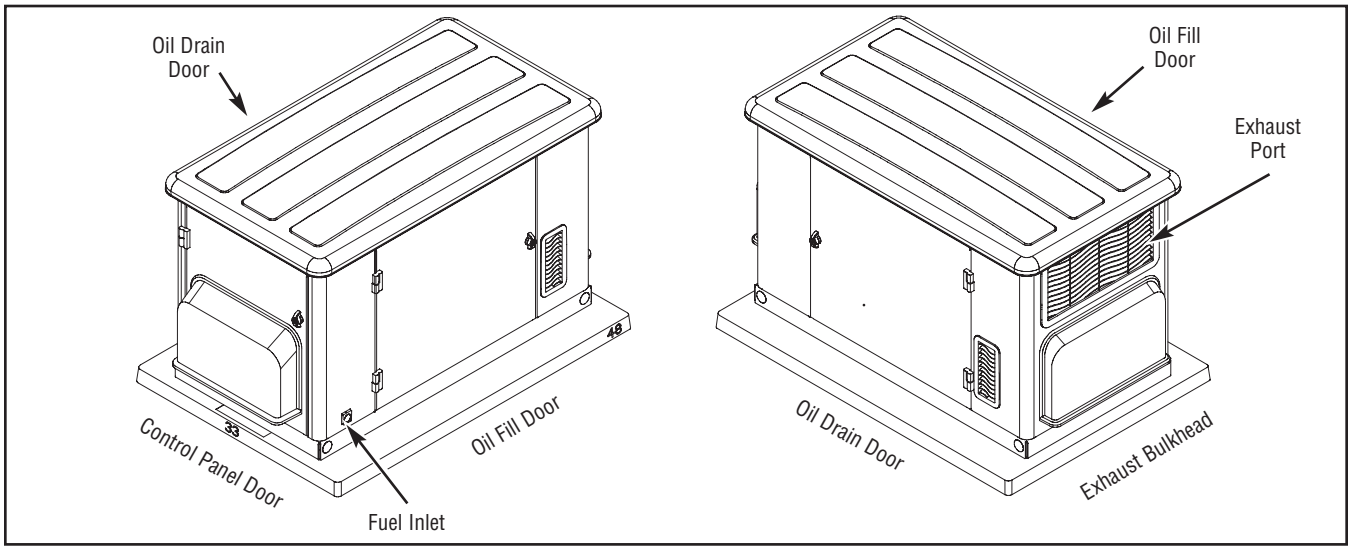


Figure 4 — Enclosure Access Doors

- Install the flexible, gaseous hose (supplied) between the generator system Fuel Inlet port and rigid piping to prevent thermal expansion or contraction from causing excessive stress on the piping material.

NOTE: Where local conditions include earthquake, tornado, unstable ground, or flood hazards, special consideration shall be given to increase strength and flexibility of piping supports and connections.

⚠ CAUTION

The supplied flexible gaseous pipe is not to be installed underground or in contact with the ground.

- The entire flexible gaseous pipe must be visible for periodic inspection and must not be concealed within, contact, or run through any wall, floor, or partition.

- Piping must be of the correct size to maintain the required supply pressures and volume flow under varying generator load conditions with all gas appliances connected to the fuel system turned on and operating.
- Use an approved pipe sealant or joint compound on all threaded fittings to reduce the possibility of leakage.
- Installed piping must be properly purged and leak tested, in accordance with applicable codes and standards.

⚠ WARNING

Propane and Natural Gas are extremely flammable and explosive.

Fire or explosion can cause severe burns or death.

- Before placing the generator system into service, the fuel system lines must be properly purged and leak tested.
- NO leakage is permitted.

Consider the following factors when planning to install the fuel supply system:

The generator system engine is fitted with a fuel mixer system that meets the specifications of the California Air Resources Board for “tamper-proof” dual fuel systems. The unit will run on natural gas or liquefied propane (LP) vapor.

- A minimum of one accessible, approved manual shutoff valve must be installed in the fuel supply line within 6 ft (1.8 m) of the generator system. A union or flanged connection must be provided downstream from this valve to permit removal of controls.
- Natural gas fuel supply pressure at the generator's fuel inlet port should be between 5 to 7 inches of water (in. W.C.) with the generator off and at full load with all gas appliances turned on and operating. LP fuel supply pressure should be 11 to 14 inches of water (in. W.C.) with the generator off and at full load with all gas appliances turned on and operating.

The generator system has been factory set to run on natural gas. If you need to change from natural gas to LP gas, the unit will need to be reconfigured, as described later in this manual.

It is recommended that the fuel connection incorporate the following components:

- A manual fuel shut-off valve located in the interior of the building.
- A manual fuel shut-off valve located outside the building, just before the generator unit.
- Where the formation of hydrates or ice is known to occur, piping should be protected against freezing. The termination of hard piping should include a sediment trap where condensate is not likely to freeze.
- A manometer port should be provided.

The manometer port permits temporary installation of a manometer (Figure 5), to ensure that the engine receives the correct fuel pressure to operate efficiently throughout its operating range.

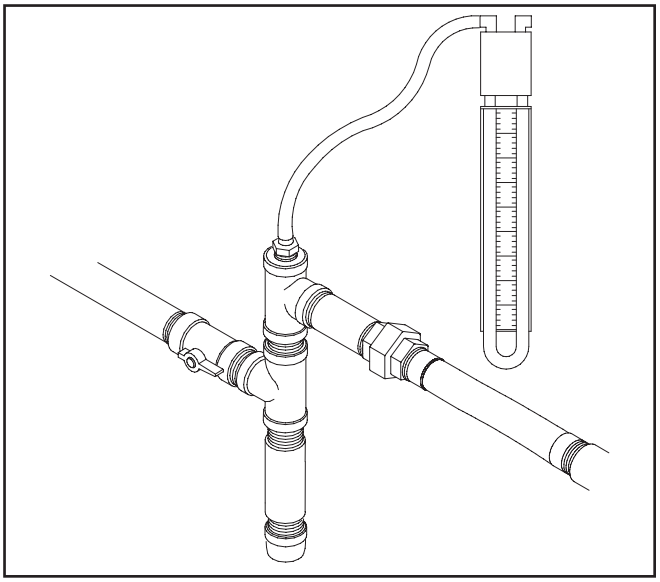


Figure 5 — Temporary Manometer Installed

When the initial test runs are completed, the manometer is removed and the port is plugged. A typical final fuel connection assembly is shown in Figure 6.

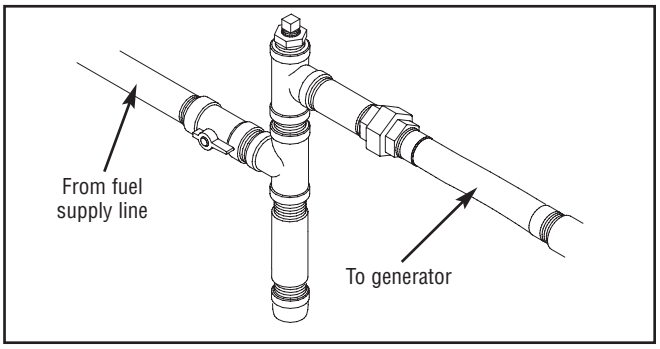


Figure 6 — Completed Fuel Connections

Fuel Consumption

See Figure 7 for estimated fuel supply requirements at half and full load for both natural gas and LP vapor.

	Natural Gas*		LP Vapor**	
	1/2 Load	Full Load	1/2 Load	Full Load
12kW	102	195	41	79
15kW	140	218	66	96
* = Natural Gas is in cubic feet per hour ** = LP Vapor is in cubic feet per hour				

Figure 7 — Fuel Supply Requirements

Fuel Pipe Sizing

Figures 8 and 9 provide the maximum capacity of pipe in cubic feet of gas per hour for gas pressures of 0.5 psi or less and a pressure drop of 0.3 in. water column. Specific gravity of gas is shown.

Listed values compensate for a nominal amount of restriction from bends, fittings, etc. If an unusual number of fittings, bends, or other restrictions are used, please refer to federal and local codes.

NPT	10ft	15ft	20ft	30ft	40ft	50ft	60ft	70ft	80ft	90ft	100ft
3/4”	346	293	240	192	163	145	132	120	113	106	99
1”	653	549	446	360	307	274	250	230	211	197	187
Natural Gas (sg=0.65)											

*Figure 8 — **NATURAL GAS (NG)** Pipe Size - Gas Flow Chart, in cubic feet per hour*

NPT	10ft	15ft	20ft	30ft	40ft	50ft	60ft	70ft	80ft	90ft	100ft
3/4”	277	192	158	126	107	95	87	79	74	69	65
1”	428	360	293	236	202	180	164	151	139	129	123
Liquid Propane (LP) (sg=1.50)											

*Figure 9 — **LIQUID PROPANE (LP)** GAS Pipe Size - Gas Flow Chart, in cubic feet per hour*

Fuel Comparison Chart

The fuel comparison chart shown below is provided for your reference.

Physical Properties	Propane	Natural Gas
Normal Atmospheric State	Gas	Gas
Boiling Point (in °F):		
Initial	-44	-259
End	-44	-259
Heating Value:		
BTU per gallon (Net LHV*)	83,340	63,310
BTU per Gallon (Gross**)	91,547	
Cubic Feet (Gas)	2,500	1,000
Density***	36.39	57.75
Weight†	4.24	2.65
Octane Number:		
Research	110+	110+
Motor	97	

*LHV (Low Heat Value) is the more realistic rating.

**Gross Heat Value does not consider heat lost in the form of water during combustion.

***Density is given in "Cubic Feet of Gas per Gallon of Liquid".

†Weight is given in "Pounds per Gallon of Liquid".

Fuel Comparison Chart

Size of Propane Tank Required at Various Temperatures When Kept at Least Half Full

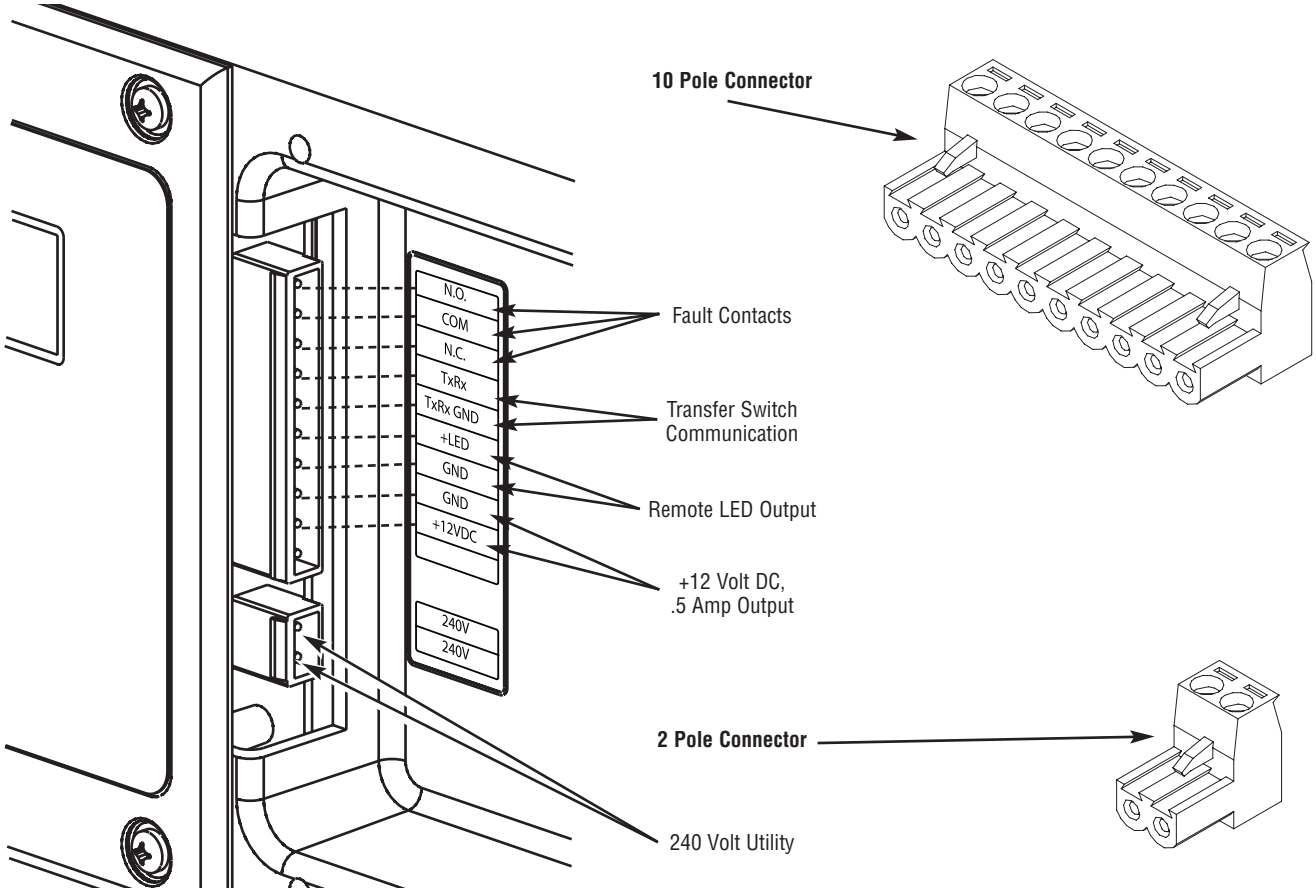
Given the gas withdrawal rate and the lowest average winter temperature, an installer can specify the required LP storage tank size. The table below provides guidance on tank size selection.

Withdrawal Rate	32°F	20°F	10°F	0°F	-10°F	-30°F	-40°F
50 CFH	115	115	115	250	250	400	600
100 CFH	250	250	250	400	500	1000	1500
150 CFH	300	400	500	500	1000	1500	2500
200 CFH	400	500	750	1000	1200	2000	2500
300 CFH	750	1000	1500	2000	2500	4000	5000

Required Propane Tank Size (Lowest Average Winter Temperature), in Gallons

System Connections

Compare this illustration with your generator to familiarize yourself with the location of these important connections:



Wiring for the 10 Pole Connector:

- **Fault Contacts** — Use NO, COM and NC to hook up a siren, light, etc. to alert for a fault. Contacts reverse state upon a fault condition.
- **Remote LED Output** — Use this to hook up the remote LED supplied with the generator. The remote LED will turn on and off in a series of blinks (Fault Codes) if certain faults are detected in the generator.
- **Transfer Switch Communication** — Use TxRx and TxRx GND to transfer switch and optional wireless StatStation™ to monitor generator functions.
- **+12 Volt DC, .5 Amp Output** — Internal power supply.

Wiring for the 2 Pole Connector:

- **240 Volt Utility** — Use to hook up the 240V utility leads from the transfer switch to the generator.

System AC Connections

A single-phase, three-wire AC connection system is used in the generator system. The stator assembly consists of a pair of stationary windings with two leads brought out of each winding. The junction of leads 22 and 33 forms the neutral lead, as shown schematically and as wiring diagram in Figure 10. A complete schematic and wiring diagram can be found in the illustrated parts list manual.

NOTE: Neutral is not bonded to ground at generator.

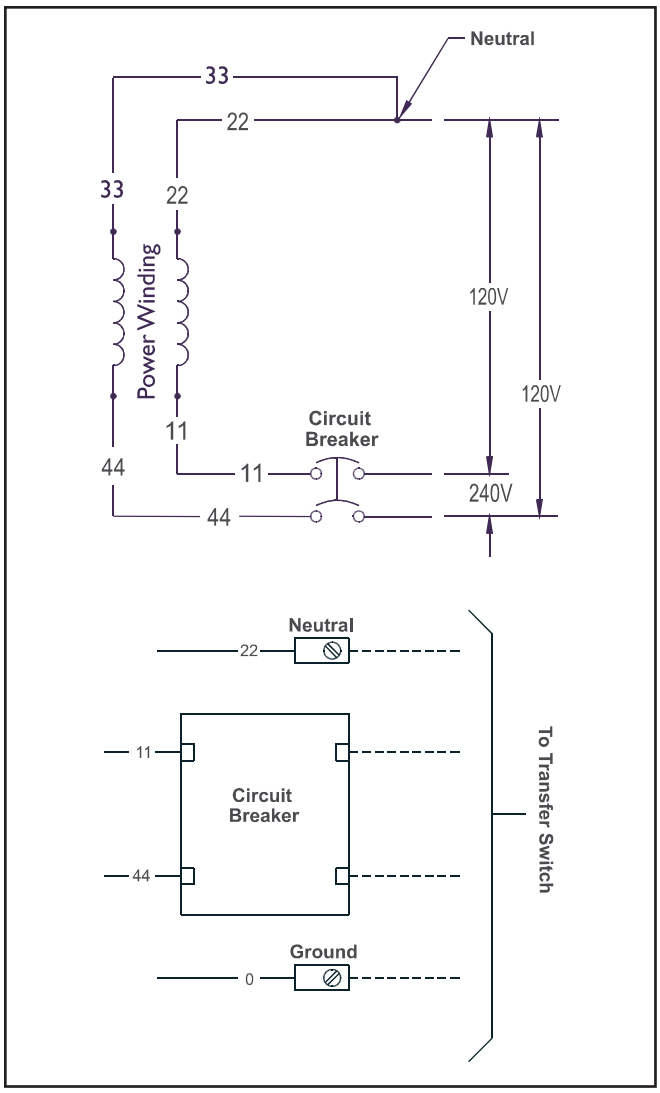


Figure 10 — System AC Connections

Grounding the Generator

Ground the generator system per applicable codes, standards, and regulations. The generator GND lug is located inside the control panel door under the circuit breaker cover.

Utility Circuit Connection

"240V Utility" leads must be routed in conduit. Functions are briefly described as follows:

- "240V Utility" delivers power to the generator's circuit board, optional battery and oil warmer, charge the battery and when utility is lost the generator will start.

Using provided 2 pole connector and installer-supplied minimum 300V, 14 AWG copper wire, connect each control circuit terminal in the generator to the Automatic Transfer Switch.

Fault Detection System

The generator's control panel has a digital display to show fault codes. It will display a fault code if certain faults are detected in the system. An extra LED and mounting plate is supplied so that it can be installed at a convenient indoor location. It will turn on and off in a series of blinks if certain faults are detected in the system. The owner will use it to observe the status of the generator system. Consult with the owner for a convenient location.

To install the remote LED panel:

- Push the LED through the mounting plate from the front until it snaps in place.
- Using provided 10 pole connector and installer-supplied minimum 18 AWG wire, connect the remote LED to the generator control board. Use wire nuts to attach wire to LED leads.

IMPORTANT: The LED is polarity sensitive.

- Attach mounting plate to installer-supplied electrical box.

Refer to *Fault Detection System* in the Operator's Manual for operation.

System Control Panel

Figure 11 depicts the generator system control panel, located inside the generator housing. Below are brief descriptions of the controls used during installation. More information may be found in the Operator's Manual.

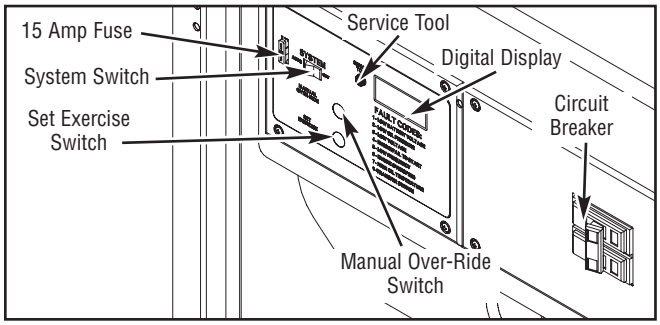


Figure 11 — Generator System Control Panel

System Switch

This two-position switch is the most important control on the system and is used as follows:

- "**AUTO**" position is the normal operating position. If a utility power outage is sensed, the system will start the generator. When utility power is restored, lets the engine stabilize internal temperatures, shuts off the generator, and waits for the next utility power outage.
- "**OFF**" position turns off running generator, prevents unit from starting and resets any detected faults.

15 Amp Fuse

Protects the generator system DC control circuits. If the fuse has 'blown' (melted open) or was removed, the engine cannot crank or start. Replace the fuse using only an identical ATO 15A fuse. One spare fuse is supplied with the unit.

Before Initial Start-up

Engine Oil

This engine is shipped from the factory filled with the recommended oil. Before starting the engine, check oil level and ensure that engine is serviced as described in the engine operator's manual.

Oil Considerations

Your generator system is equipped with an engine that has been pre-run at the factory.

NOTICE

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

- Refer to engine manual for oil fill information.
- Damage to equipment resulting from failure to follow this instruction will void warranty.

The system is filled with **synthetic oil** (API SJ/CF 5W-30W). This allows for system operation in the widest range of temperature and climate conditions.

NOTE: The use of synthetic oil **does not alter** the required oil change intervals described in the engine operator's manual.

Battery Connection

The generator system is supplied with a 12 Volt DC, AGM type, 55 Amp-Hour, valve regulated battery. It is a sealed, lead-acid rechargeable battery. It is installed in the unit and the battery cables are connected at the factory. The unit's 15 Amp fuse, which isolates the battery and prevents the unit from starting, has been removed for shipping. The battery will lose some charge charge prior to installation of the generator. If battery voltage is below 12 Volts, charge the battery.

IMPORTANT: If battery voltage is below 5 Volts, it may not take a charge and you will need a new battery.

Charging the Battery

If it is necessary to charge the battery, proceed as follows:

1. Set generator's system switch to **OFF**.
2. Remove 15 Amp fuse from control panel.
3. Disconnect negative battery cable to negative battery terminal (indicated by **NEGATIVE**, **NEG**, or **(-)**.

NOTICE

Failure to disconnect negative battery cable will result in equipment failure.

- DO NOT attempt to jump start the battery.
- Damage to equipment resulting from failure to follow this instruction will void warranty.

4. Charge battery with battery charger at 2 Amps until battery holds 12 Volts.

NOTE: DO NOT exceed 13.7 Volts charging.

⚠ WARNING

Storage batteries give off explosive hydrogen gas during recharging.

Slightest spark will ignite hydrogen and cause explosion.

Battery electrolyte fluid contains acid and is extremely caustic.

Contact with battery contents will cause severe chemical burns.

A battery presents a risk of electrical shock and high short circuit current.

- DO NOT dispose of battery in a fire.
- Do not allow any open flame, spark, heat, or lit cigarette during and for several minutes after charging a battery.
- DO NOT open or mutilate the battery.
- Wear protective goggles, rubber apron, and rubber gloves.
- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.

NOTE: With the battery installed and utility power available to the Automatic Transfer Switch, the battery receives a trickle charge whenever the engine is not running. This process may take up to 72 hours to fully charge a battery from 5 Volts. The trickle charge cannot be used to recharge a battery that is completely discharged.

5. Connect negative battery cable to negative battery terminal (indicated by **NEGATIVE**, NEG, or **(-)**).
6. Ensure hardware on both positive and negative battery terminals is secure.
7. Reinstall 15 Amp fuse in control panel.

⚠ CAUTION

Installing the 15A fuse could cause the engine to start.

- DO NOT install this fuse until all plumbing and wiring has been completed and inspected.

8. Set generator's system switch to **AUTO**.

Servicing the Battery

If it is necessary to service the battery, proceed as follows:

1. Open “Control Panel” access door.
2. Set generator's system switch to **OFF**.
3. Remove 15 Amp fuse from control panel.
4. Service or replace battery as required.
5. Connect red battery cable to battery positive terminal (indicated by **POSITIVE**, **POS**, or (**+**)).
6. Connect negative battery cable to negative battery terminal (indicated by **NEGATIVE**, **NEG**, or (**-**).
7. Ensure hardware on both positive and negative battery terminals is secure.
8. Reinstall 15 Amp fuse in control panel.
9. Set generator's system switch to AUTO.
10. Close “Control Panel” access door.

Fuel Supply System

Ensure that all fuel pipe connections are tight, secure and without leaks.

Ensure that all gas line shutoff valves are OPEN and that adequate fuel pressure is available whenever automatic operation is desired.

Fuel System Selection

The engine of your residential generator system is factory calibrated to run on natural gas (NG). It may also be operated on liquefied petroleum (LP) vapor. There is no additional hardware/equipment required to switch between either fuel. However, LP fuel inlet pressure must be between 11 and 14 inches water column.

To configure the fuel system for LP use:

1. Open control panel and oil fill access doors.
2. Set generator's system switch to OFF.
3. Remove 15 Amp fuse from control panel.

Proceed below using the configuration instructions appropriate to the generator system.

For a 12kW generator:

4. Connect the fuel select solenoid by joining the two-pin electrical connector shown in Figure 12.

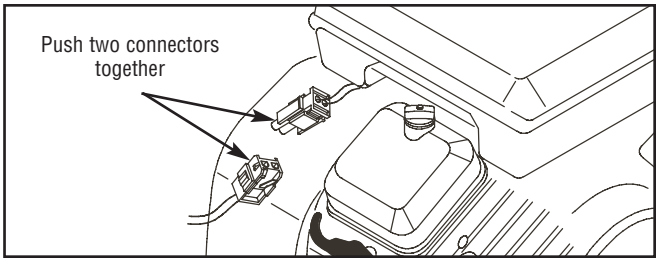


Figure 12 — Fuel Select Solenoid Connection

5. Reinstall 15 Amp fuse in control panel.
6. Set generator's system switch to **AUTO**.
7. Close control panel and oil fill access doors.

The system is now ready to operate automatically using LP fuel. With a fixed main jet for LP gas, there is no need to perform any engine adjustments for LP operation.

For a 15kW Generator:

4. Remove cap from LP inlet on T-valve (Figure 13).

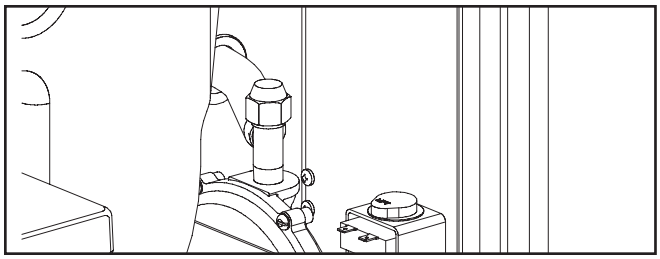


Figure 13 — T - Valve

5. Remove fuel line from NG inlet.
6. Place cap from LP inlet onto NG inlet.
7. From oil fill access area, pull fuel line out of top hole.
8. Remove and reverse fuel hose bushing and plug in sheet metal bulkhead. (Plug in top hole, bushing in bottom hole.)
9. Insert fuel hose in bottom hole towards fuel regulator.

IMPORTANT: Failure to route fuel line through bottom hole may cause the fuel line to kink. When tightening fuel hose fittings make certain the fuel hose does not twist or kink. If the fuel line kinks, the generator may start but will not operate properly.

10. Connect fuel line to LP inlet.
11. Reinstall 15 Amp fuse in control panel.
12. Set generator's system switch to **AUTO**.
13. Close control panel and oil fill access doors.

The system is now ready to operate automatically using LP fuel.

Initial Start-Up (No Load)

Begin testing the system without any electrical loads connected, as follows:

1. Set generator's main circuit breaker to its **ON** (closed) position.
2. **Install 15 Amp fuse in control panel.**
3. Set generator's system switch to **AUTO**.
4. Push MANUAL OVER-RIDE switch on generator control panel.

NOTE: When the generator system is started for the very first time, it will require that air in the gaseous fuel lines be purged. This may take a few minutes.

5. **DO NOT** crank engine for more than 10 seconds, then pause for 10 seconds to reduce heat in the starter.
6. Repeat process until engine starts.
7. Listen for unusual noises, vibration or other indications of abnormal operation. Check for oil leaks while engine runs.
8. Let engine warm up for about five minutes to allow internal temperatures to stabilize.
9. Connect an accurate AC voltmeter and a frequency meter to check generator output at load side of circuit breaker. Voltage should be 239-262 Volts, frequency should be 62.0 - 62.5 Hz.

NOTE: If either parameter is outside these ranges, perform the Engine Adjustments described below.

10. Check generator output between one of the generator connection lugs and the neutral lug, then between the other generator connection lug and the neutral lug. In both cases, voltage reading should be between 121-131 Volts.
11. Push and hold MANUAL OVER-RIDE switch on generator control panel again until engine stops.

IMPORTANT: **DO NOT** proceed until you are certain that generator AC voltage and frequency are correct and within the stated limits. To obtain the proper generator frequency, see *Engine Adjustments*.

Engine Adjustment

There are regional variances in the composition of natural gas. Each generator system is adjusted at the factory for NG operation. If the generator output voltage or frequency measured during *Initial Start-Up* (paragraph #9, earlier) is outside the listed ranges, the combustibility of the gas supplied at the installation site may be substantially different.

To adjust the engine for this difference, proceed as follows.

1. Open the oil drain and control panel access doors.
2. Remove the four screws that hold the circuit breaker cover to the air intake guard (Figure 14).

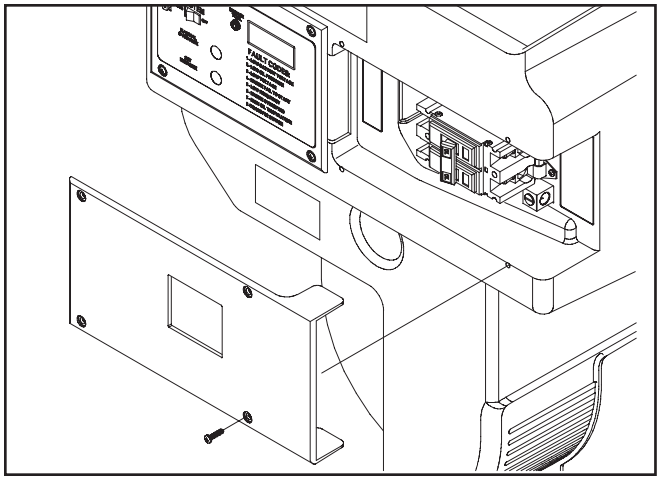


Figure 14 — Accessing Back of Circuit Breaker

3. Connect an accurate frequency meter to the line side of the generator's main circuit breaker.
4. Ensure that the 15 Amp fuse is installed.
5. Set the generator's main circuit breaker **ON**.
6. Set the generator's system switch to AUTO.
7. Push MANUAL OVER-RIDE switch on control panel. When the engine starts, allow it to warm up for five minutes.

8A. **For a 12kW generator**, normal no load frequency is 62.0 to 62.5 Hz. If adjustment is needed at no load, slowly rotate the governor adjustment nut (Figure 15) clockwise and/or counterclockwise until frequency is 62.0 to 62.5 Hz.

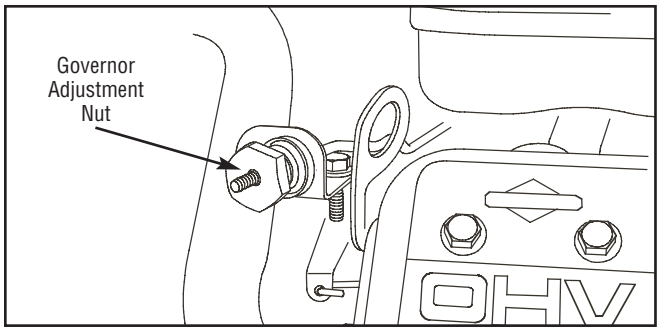


Figure 15 — Governor Adjustment Nut

8B. **For a 15kW generator**, normal no load frequency is 62.0 to 62.5 Hz. If adjustment is needed at no load, slowly rotate the governor adjustment screw (Figure 16) clockwise and/or counterclockwise until frequency is 62.0 to 62.5 Hz.

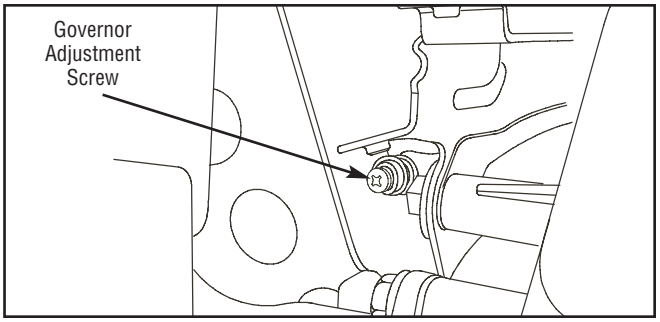


Figure 16 — Governor Adjustment Screw

9. Push and hold MANUAL OVER-RIDE switch on control panel again until engine stops.
10. Turn the service disconnect to the transfer switch off. After a short time delay, the transfer switch will connect to the generator.
11. Load generator to full load.
12. Connect an accurate frequency meter to the load side of the generator's main circuit breaker. Frequency should be above 57.0 Hz.
13. If frequency is below 57.0 Hz, slowly rotate the governor adjustment nut or screw clockwise and/or counterclockwise until frequency is above 57.0 Hz.
14. Turn the service disconnect to the transfer switch on. The transfer switch will connect to the utility after five minutes.
15. After the engine has stopped running,
    - If an adjustment was made in step 13, repeat steps 3 through 9.
    - If an adjustment was not made in step 13, proceed to step 16.

IMPORTANT: If the no load frequency falls out of the no load parameter after full load adjustment is made, contact an authorized service center.

16. Reinstall the circuit breaker cover to the air intake guard.
17. Close the oil drain and control panel access doors.

This completes the generator installation process. Proceed with transfer switch and other system component installation. Be sure to perform the *Installation Inspection*.

Controls

All generator system controls are fully described in the Operator's Manual. Please refer there for full information.

Operation

The primary source of generator system operating instructions is the Operator's Manual. Please refer to the Operator's Manual for detailed information. The following is a brief overview.

The generator's control panel houses a logic control circuit board. This control board constantly monitors utility power source voltage. Should that voltage drop below a preset level, control board action will signal the engine to crank and start.

When utility source voltage is restored above a preset voltage level, the engine is signaled to shut down.

The actual system operation is not adjustable and is sequenced by sensors and timers on the control board, as follows:

Utility Voltage Dropout Sensor

- This sensor monitors utility source voltage.
- If utility source voltage drops below about 70 percent of the nominal supply voltage, the sensor energizes a 10 second timer. The timer is used to 'sense' brown-outs.
- Once the timer has expired, the engine will crank and start.

Utility Voltage Pickup Sensor

This sensor monitors utility power supply voltage. When that voltage is restored above 80 percent of the nominal source voltage, a time delay starts timing and the engine will go to engine cool-down.

Engine Cool-down Timer

- When the load is transferred back to the utility power source, the engine cool-down timer starts timing.
- The timer will run for about one minute, then the generator will stop.
- Minimum engine run time is 5 minutes.

Setting Exercise Timer

The generator system is equipped with an exercise timer that will start and exercise the system once every seven days. During this exercise period, the unit runs for approximately 20 minutes and then shuts down. Electrical load transfer DOES NOT occur during the exercise cycle (unless an utility power outage occurs).

A switch on the control panel is labeled "Set Exercise" (see Figure 11). The specific day and the specific time of day this switch is pressed is programmed into the control board memory. This date and time is then used to automatically initiate the system exercise cycle. The LED on the control panel will flash until the set exercise is set.

To perform the Set Exercise procedure:

1. Choose the day and time you want your generator system to exercise.
2. On that day and time, press and hold down the "Set Exercise" switch for three seconds.

NOTE: The LED will flash until the switch is pressed for three seconds, then the LED will illuminate for 5 seconds and turn off.

For example, if you press the "Set Exercise" switch on Sunday morning at 10:00 AM, the unit will run an exercise cycle the following Sunday at 10:00 AM (+/- 1/2 hour).

NOTE: "Set Exercise" will only work if the unit is in the Automatic mode and this exact procedure is followed. The exerciser **will** need to be re-set if the 15 Amp fuse is removed or changed, or if the 12 Volt DC battery is disconnected.

If you want to change the day and time the unit exercises, simply perform the "Set Exercise" procedure at the exact weekday and time you want it to take place.

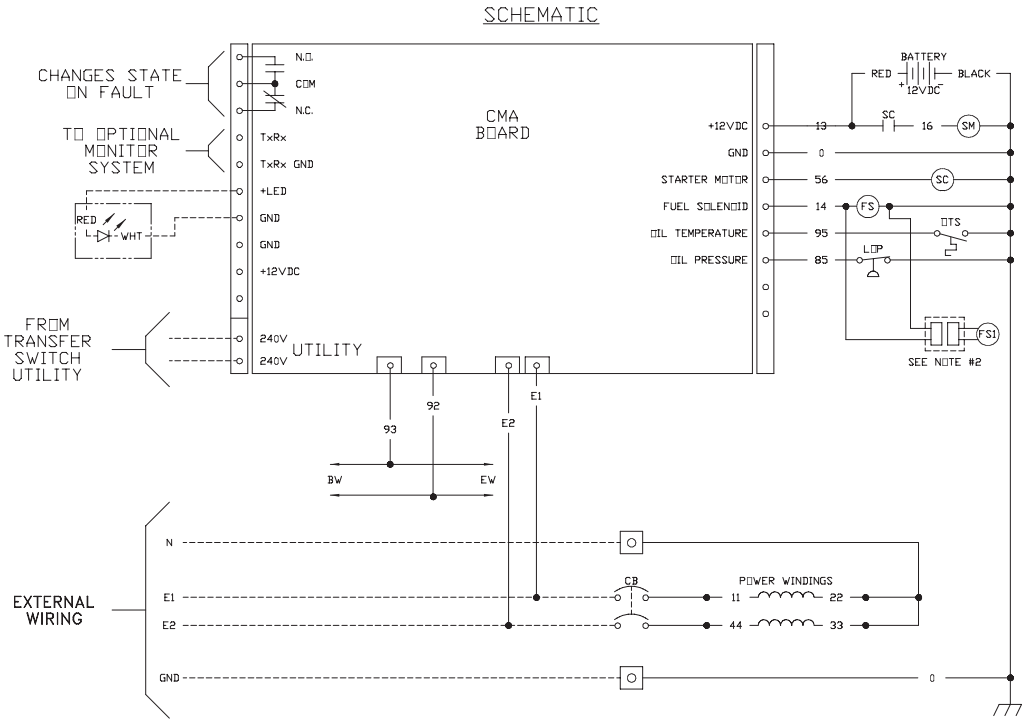
Installation Inspection

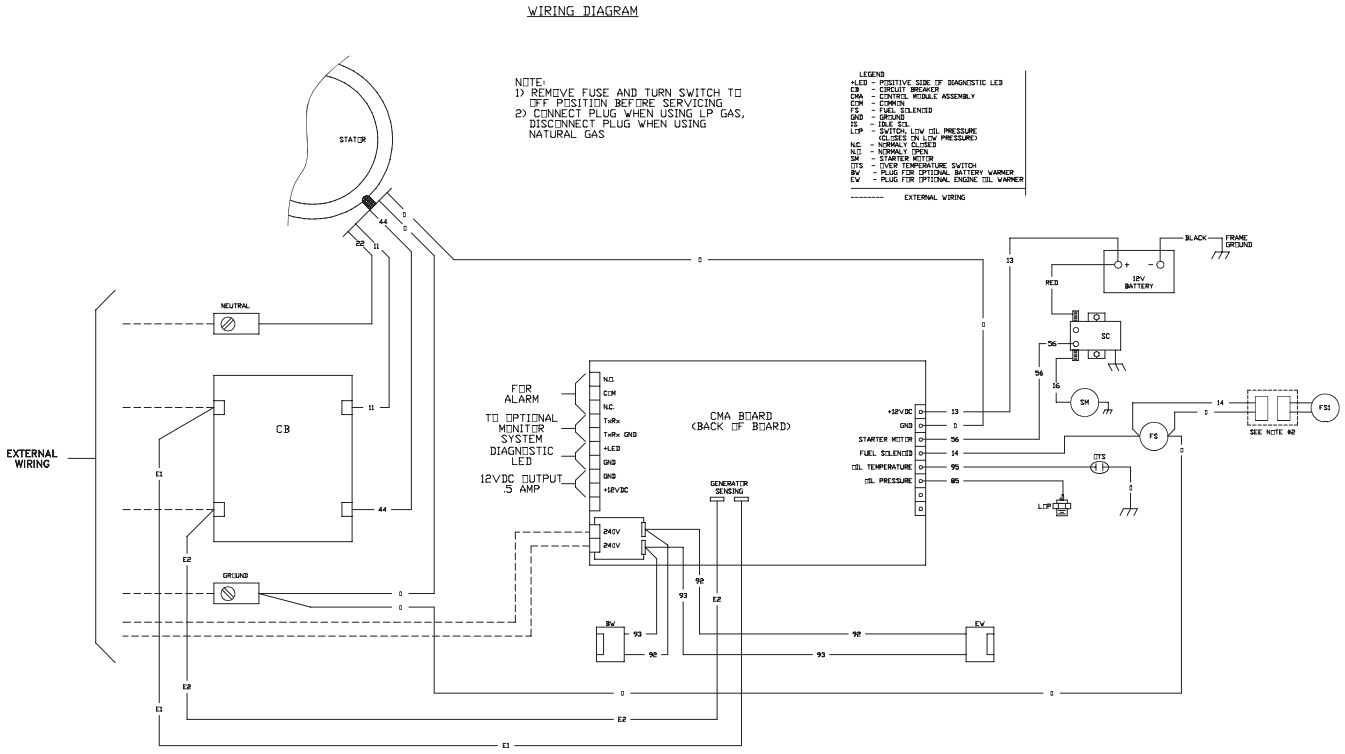
Before placing the generator system into service, inspect the entire installation carefully.

Complete the "Installation Checklist" as you make the inspection. Ensure all items have been filled-in and all signatures have been obtained. Return the completed form to your records department.

Notes

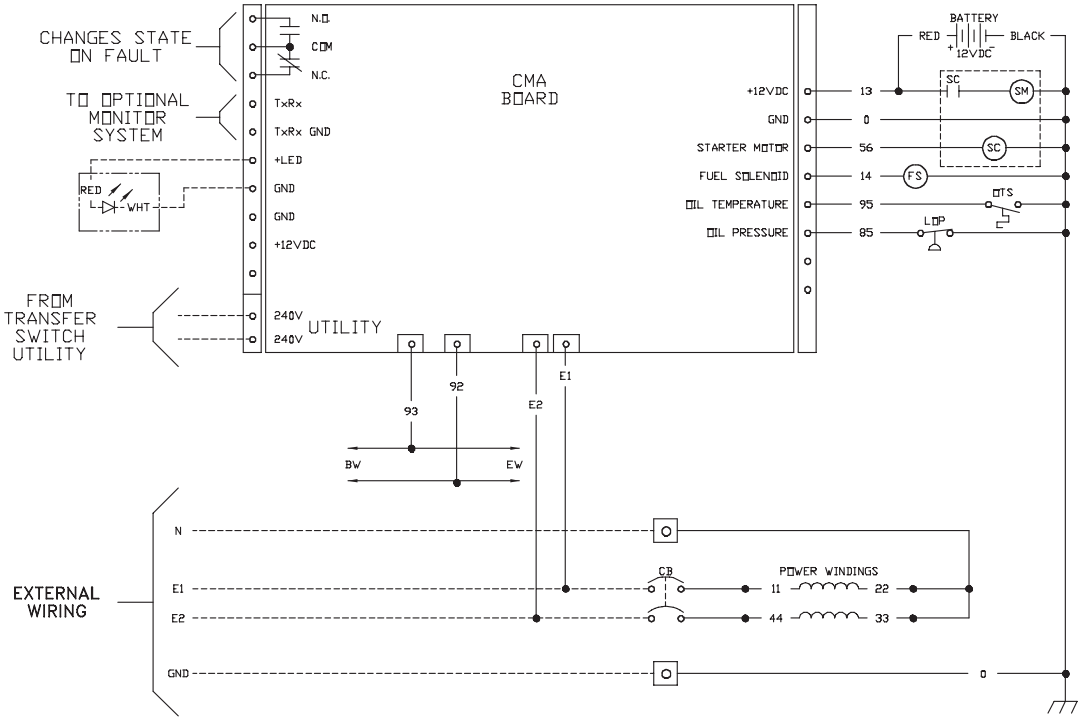
Schematic and Wiring Diagram for Models GEN12S and GEN20B





Schematic and Wiring Diagram for Models GEN15S and GEN25B

SCHEMATIC



WIRING DIAGRAM