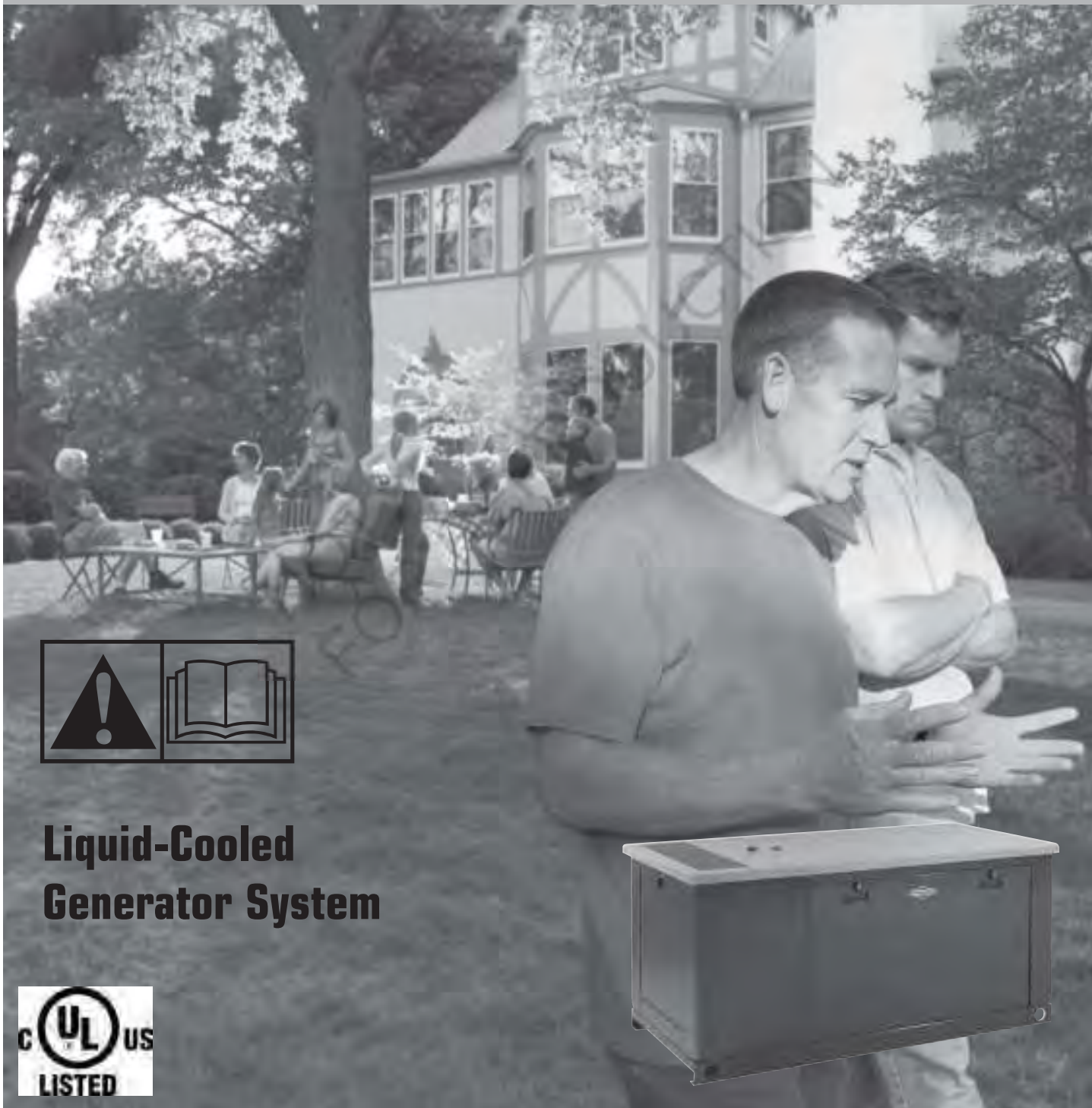




Generator Systems

Installation & Start-Up Manual



Liquid-Cooled Generator System



Thank you for purchasing this quality-built Briggs & Stratton generator. We are pleased that you've placed your confidence in the Briggs & Stratton brand. When operated and maintained according to the instructions in the operator's manual, your generator will provide many years of dependable service.

This manual contains safety information to make you aware of the hazards and risks associated with standby generators and how to avoid them. This product is only for use as an optional 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 inconvenience.

Save these original instructions for future reference.

This generator system 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 generator. Consult your Yellow Pages. There are many Briggs & Stratton authorized service dealers worldwide who provide quality service. You can also contact Briggs & Stratton Customer Service by phone at **800-743-4115** between 8:00 AM and 5:00 PM CT., or click on Find a Dealer at BRIGGSandSTRATTON.COM, which provides a list of authorized dealers.

For Future Reference

Please fill out the information below and keep with your receipt to assist in unit identification for future purchase issues.

Date of Purchase

Generator

Model Number

Model Revision

Serial Number

Engine

Model Number

Serial Number

Briggs & Stratton Power Products Group, LLC
P.O. Box 702
Milwaukee, WI 53201-0702

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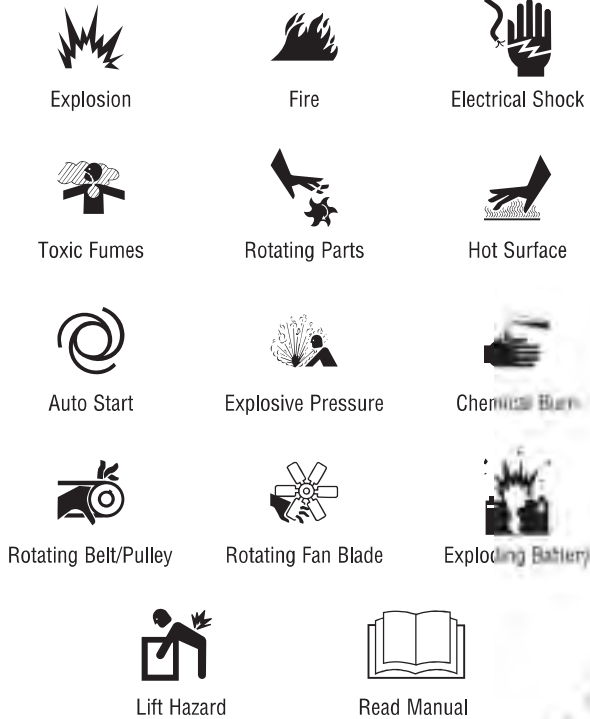
NOT FOR REPRODUCTION

Save These Instructions

Important Safety Instructions

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

Safety Symbols and Meanings



▲ The safety alert symbol indicates a potential personal injury hazard. A signal word (**DANGER**, **WARNING**, or **CAUTION**) is used with the alert symbol to designate a degree or level of hazard seriousness. A safety symbol may be used to represent the type of hazard. The signal word **NOTICE** is used to address practices not related to personal injury.


▲ 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, *could* result in minor or moderate injury.

NOTICE addresses practices not related to personal injury.




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

▲ WARNING Running engine gives off carbon monoxide, an odorless, colorless, poison gas.
 Breathing carbon monoxide could result in death, serious injury, headache, fatigue, dizziness, vomiting, confusion, seizures, nausea or fainting.

- Operate this product **ONLY** outdoors in an area that will not accumulate deadly exhaust gas.
- Keep exhaust gas away from any windows, doors, ventilation intakes, soffit vents, crawl spaces, open garage doors or other openings that can allow exhaust gas to enter inside or be drawn into a potentially occupied building or structure.
- Carbon monoxide detector(s) **MUST** be installed and maintained indoors according to the manufacturer's instructions/recommendations. Smoke alarms cannot detect carbon monoxide gas.


▲ 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 Certain components in this product and related accessories contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. Wash hands after handling.


▲ WARNING Storage batteries give off explosive hydrogen gas during recharging. Slightest spark will ignite hydrogen and cause explosion, resulting in death or serious injury.
   Battery electrolyte fluid contains acid and is extremely caustic.


Contact with battery contents could 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. Recycle battery.
- 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, rubber boots and rubber gloves.
- Remove watches, rings, or other metal objects.
- Use tools having insulated handles.

-  **WARNING** Generator produces hazardous voltage. Failure to properly ground generator could result in electrocution. Failure to isolate generator from utility power could result in death or serious injury to electric utility workers due to backfeed of electrical energy.
- DO NOT touch bare wires or bare 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 the risk of a 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, operating this equipment imprudently, neglecting its maintenance or being careless could 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 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** Hazardous Voltage - Contact with power lines could cause electric shock or burns, resulting in death or serious injury. Lifting Hazard / Heavy Object - Could result in serious injury.
- If lifting or hoisting equipment is used, DO NOT contact any power lines.
 - DO NOT lift or move generator without assistance.
 - DO NOT lift unit by roof as damage to generator will occur.

-  **WARNING** Propane and Natural Gas are extremely flammable and explosive, which could cause burns, fire or explosion resulting in death or serious injury.
- Install the fuel supply system according to NFPA 37 and other applicable fuel-gas codes.
 - Before placing the generator 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** Exhaust heat/gases could ignite combustibles or structures resulting in death or serious injury. Contact with muffler area could cause burns resulting in serious injury.
- DO NOT touch hot parts and AVOID hot exhaust gases.
 - Allow equipment to cool before touching.
 - Exhaust outlet side of weatherproof enclosure must have at least 5 ft. (1.5m) minimum clearance from any structure, shrubs, trees or any kind of vegetation.
 - Standby generator weatherproof enclosure must be at least 5 ft. (1.5m) from windows, doors, any wall opening, shrubs or vegetation over 12 inches (30.5 cm) in height.
 - Standby generator weatherproof enclosure must have a minimum of 5 ft. (1.5 m) overhead clearance from any structure, overhang, or trees.
 - DO NOT place weatherproof enclosure under a deck or other type of structure that may confine airflow.
 - Use only flexible fuel line provided. Connect provided fuel line to generator. DO NOT use with or substitute any other flexible fuel line.
 - Smoke detector(s) MUST be installed and maintained indoors according to the manufacturer's instructions/recommendations. Carbon monoxide alarms cannot detect smoke.
 - Keep at least minimum distances shown in *General Location Guidelines* to insure for proper generator cooling and maintenance clearances.
 - Replacement parts must be the same and installed in the same position as the original parts.

 **WARNING** Moving parts could crush and cut. Starter and other rotating parts could entangle hands, hair, clothing, or accessories resulting in serious injury.


- NEVER operate generator without protective housings, covers, or guards in place.
- DO NOT wear loose clothing, jewelry or anything that could be caught in the starter or other rotating parts.
- Tie up long hair and remove jewelry.
- Before servicing, remove 15 Amp fuse from control panel and disconnect **Negative (NEG or -)** battery cable.

 **WARNING** Hot pressurized coolant could cause serious injury.

- DO NOT open radiator cap when hot.
- Before servicing, allow coolant to cool.

 **CAUTION** Installing the 15A fuse could cause the engine to start at any time without warning resulting in minor or moderate injury.

- 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 could result in minor injury and/or equipment damage. Excessively low speeds impose a heavy load on generator.

- 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 could damage generator and/or electrical devices connected to it.

- Start generator and let engine stabilize before connecting electrical loads.

NOTICE Improper treatment of generator could damage it and shorten its life.

- Use generator only for intended uses.
- If you have questions about intended use, contact your authorized dealer.
- Operate generator only on level surfaces.
- Adequate, unobstructed flow of cooling and ventilating air is critical to correct generator operation.
- The access panels/doors must be installed whenever the unit is running.
- DO NOT expose generator to excessive moisture, dust, dirt, or corrosive vapors.
- 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 could 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 or makes unusual noises.

Installation

Equipment Description

This product is only for use as an optional 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 inconvenience.

NOTICE This product does NOT qualify for either an emergency standby or legally required standby system as defined by NFPA 70 (NEC).

- Emergency generator systems are intended to automatically supply illumination, power, or both, to designated areas and equipment in the event of failure of the normal supply. Emergency systems may also provide power for such functions as ventilation where essential to maintain life, where current interruption of the normal supply would produce serious life safety or health hazards.
- Legally Required standby generator systems are intended to automatically supply power to selected loads in the event of failure of the normal source which could create hazards or hamper rescue or fire-fighting operations.

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

Only current licensed electrical and plumbing professionals should attempt generator system installations. Installations must strictly comply with all applicable codes, industry standards and regulations.

Owner Responsibilities

- Read and follow the instructions given in the operator's manual.
- Follow a regular schedule in maintaining, caring for and using your generator, as specified in the operator's manual.

Installing Dealer/Contractor Responsibilities

- Read and observe the safety rules.
- Install only an UL approved transfer switch that is compatible with the generator.
- Read and follow the instructions given in this installation and start-up manual.

The system is equipped with an optional water heater that is activated when ambient temperature is less than 80°F AND utility power is present at the generator.

Unpacking Precautions

The unit is shipped ready for installation on a prepared reinforced cement slab or engineered base. Avoid damage from dropping, bumping, collision, etc. Store and unpack carton with the proper side up, as noted on the shipping carton.

Delivery Inspection

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

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:

- Fully-serviced coolant system
- Fully-serviced oil/lubricating system
- Flexible steel fuel hook-up hose
- Installation and start-up manual
- Operator's manual
- Spare access door keys
- Spare 15 Amp ATO-type fuse
- Tan-pin control panel connector
- Touch up paint
- Remote LED indicator kit (LED/plate/screws)
- Fuel selection service tool

Not Supplied:

- Carbon monoxide detector(s)
- Smoke detector(s)
- Starting battery
- Reinforced concrete pad
- Connecting wire and conduit
- Fuel supply valves/plumbing
- Two 60" lengths of 2" Schedule 40 pipe (NOT conduit)
- Crane, lifting straps, chains or cables
- Hole punches for 7 ga steel
- Torque screwdriver, 5 to 50 inch-pound range
- Voltage/frequency meter
- Various special tools and equipment
- Phase rotation meter

Installation Checklist

Proper installation of the home generator requires the completion of the following tasks:

Carbon Monoxide (CO) Detector

- Carbon Monoxide (CO) detector installed and in working order.
- Smoke detector(s) installed and in working order.

Placement

- Required permits have been obtained.
- Generator placed in an area free from Carbon Monoxide (CO) buildup. **See Placement of Standby Generator to Reduce the Risk of Carbon Monoxide Poisoning.**
- Generator placed in an area compliant to NFPA 37. **See Placement of Standby Generator to Reduce the Risk of Fire.**
- Generator placed in an area free from water damage. **See Other General Location Guidelines.**
- Generator placed in an area free from utility and other home systems. **See Other General Location Guidelines.**
- Generator placed in a debris free zone. **See Other General Location Guidelines.**
- Generator placed on flat ground with provisions for water drainage. **See Other General Location Guidelines.**

Fuel

- Generator is connected to fuel source with flexible fuel line, has no fuel leaks and conforms to local codes. **See The Gaseous Fuel System.**
- Proper fuel pressure has been measured with all gas appliances operating. **See The Gaseous Fuel System.**
- Fuel system has been configured for the proper fuel supply: Natural gas (NG) or liquefied petroleum (LP). **See Fuel Conversion.**
- Fuel type: (circle one) NG LP
- Fuel pipe size used: (circle one) 3/4" 1" 1-1/4" 1-1/2"
See NFPA 54, Chapter 6
- Fuel pressure at fuel inlet port with generator on and at full load and all gas appliances turned on and operating _____.

Electrical

- Generator neutral is connected to Automatic Transfer Switch. **See Generator AC Connection System.**
- Generator is grounded. **See Grounding the Generator and NFPA 70, NEC, Article 250.35B.**
- Generator is connected to the transfer switch with the specified wiring. **See Utility Circuit Connection and Transfer Switch Communication.**
- Generator is connected to the transfer switch with the specified wiring. #18AWG twisted pair wiring from the generator control panel to the transfer switch is installed in a separate conduit from high voltage wires unless the insulation rating on all wiring is rated for 600V. **See Transfer Switch Communication.**
- Dipswitches in most transfer switches must be set to correspond to the wattage of the generator. **See Transfer Switch Operator/Installation Manual.**

Operation

- Cold weather kit is installed in temperatures below 30°F (4°C). **See Cold Weather Kit.**
- Correct battery type is installed and fully charged. **See Final Installation Considerations.**
- Generator engine oil level is at full mark. **See Final Installation Considerations.**
- Circuit breaker is in the ON position.
- Utility was shut off to test the operation of generator and transfer switch. Note any fault codes and make corrections as required.
- AC Voltage Output _____.
- Frequency Output _____.

Owner Information

Name: _____

Address: _____

Phone/e-mail: _____

Unit Information

Generator Model: _____

Generator Serial Number: _____

Installing Contractor Information

Name: _____

Address: _____

Phone/FAX: _____

Electrician: _____

Signature: _____

Plumber: _____

Signature: _____

Inspector Information

Name: _____

Address: _____

Title: _____

Inspection Date: _____

This generator has been installed per the manufacturer's instructions:

Installing Contractor Signature: _____

Date: _____

Generator Placement

Before installing the generator, consult with the owner and convey the following requirements, which must be satisfied before the installation is complete.

There are two equally important safety concerns in regards to carbon monoxide poisoning and fire. There are also several general location guidelines that must be met before the installation is considered complete.

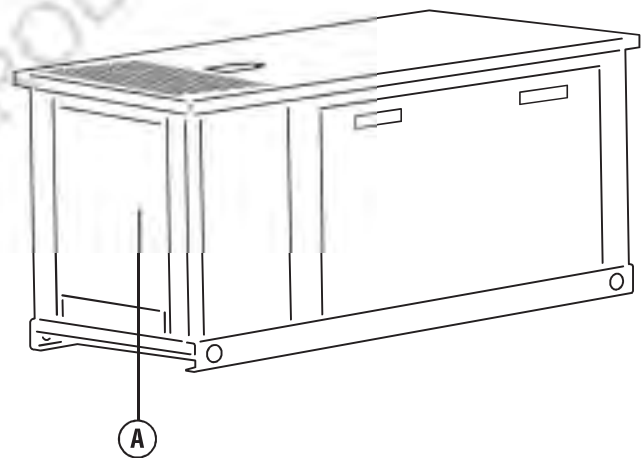
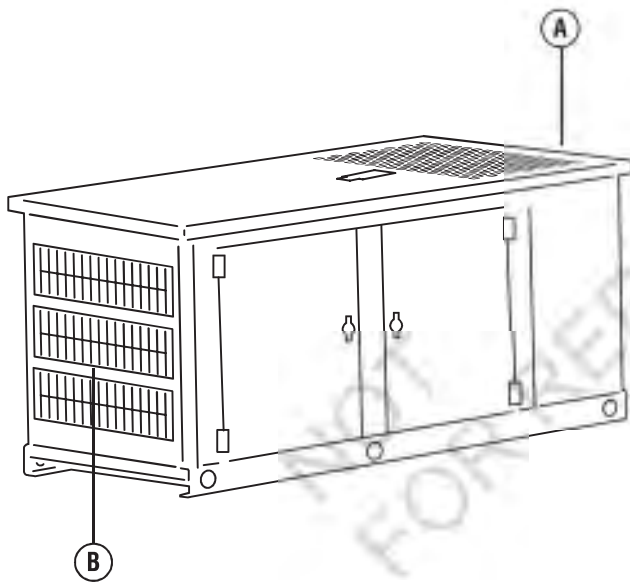
⚠️ WARNING Running engine gives off carbon monoxide, an odorless, colorless, poison gas.



Breathing carbon monoxide could result in death, serious injury, headache, fatigue, dizziness, vomiting, confusion, seizures, nausea or fainting.

- Operate this product **ONLY** outdoors in an area that will not accumulate deadly exhaust gas.
- Keep exhaust gas away from any windows, doors, ventilation intakes, soffit vents, crawl spaces, open garage doors or other openings that can allow exhaust gas to enter inside or be drawn into a potentially occupied building or structure.
- Carbon monoxide detector(s) **MUST** be installed and maintained indoors according to the manufacturer's instructions/recommendations. Smoke alarms cannot detect carbon monoxide gas.

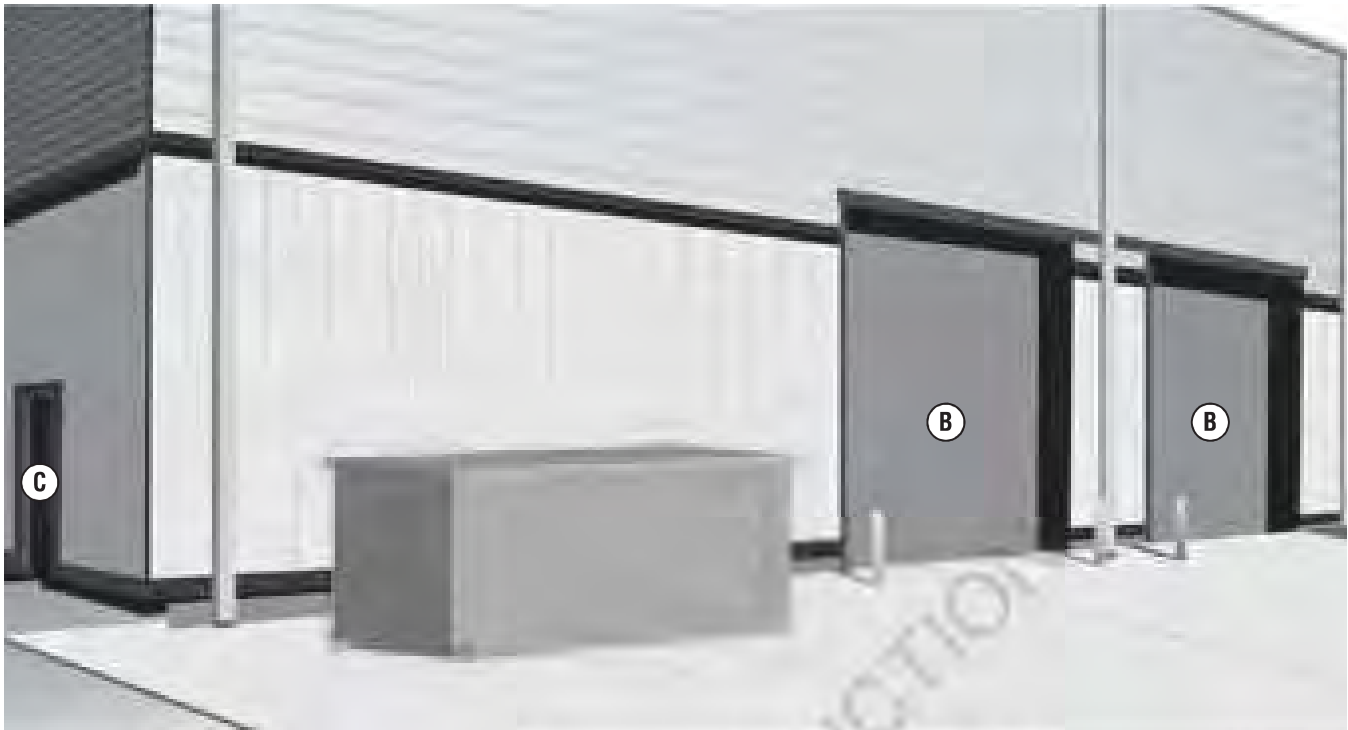
Exhaust Side of Generator



- Ⓐ Exhaust outlet side of weatherproof enclosure
- Ⓑ Weatherproof enclosure opposite exhaust side

Placement of Standby Generator to REDUCE THE RISK OF CARBON MONOXIDE POISONING

The arrows in the figure below point to POTENTIAL points of entry for Carbon Monoxide Gas.

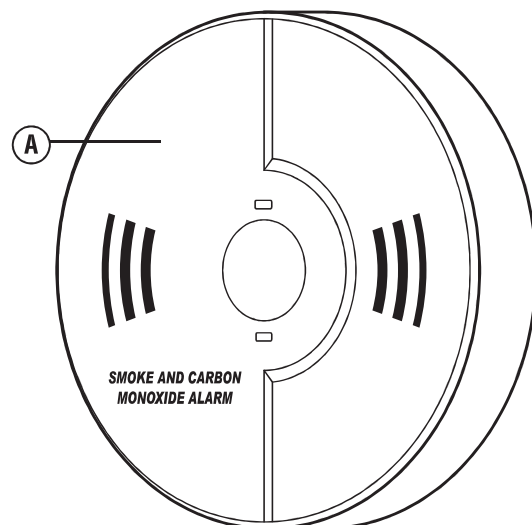


All fossil fuel burning equipment, such as standby generators, contains carbon monoxide (CO) gas in the engine exhaust. CO gas is odorless, colorless and tasteless and is unlikely to be noticed until a person is overcome. CO gas can kill you so it is required that the following is included as part of the installation:

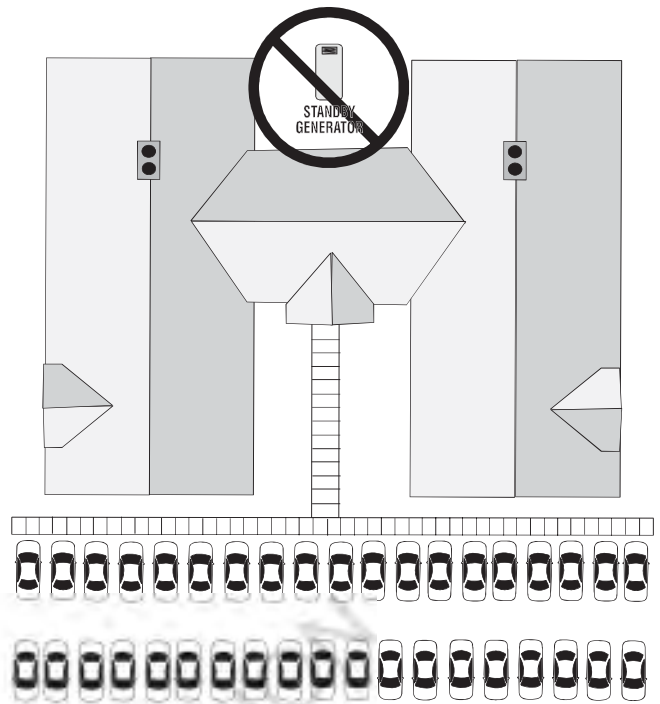
- Install generator outdoors in an area that will not accumulate deadly exhaust gas.
- DO NOT install generator where exhaust gas could accumulate and enter inside or be drawn into a potentially occupied building or structure.
- By law it is required in many states to have a Carbon Monoxide (CO) detector in operating condition in homes and other structures occupied by people. Carbon monoxide detector(s) (A) MUST be installed and maintained indoors according to the manufacturer's instructions / recommendations. A CO monitor is an electric device that detects hazardous levels of CO. When there is a buildup of CO, the monitor will alert the occupants by flashing visual indicator light and alarm. Smoke alarms cannot detect CO gas.
- Nearby structures may be exposed to the engine exhaust from your standby generator and must be considered when installing your standby generator.

• Ensure exhaust gas is kept away from:

- (B) overhead doors
- (C) doors
- (D) windows (not shown)
- (E) other openings that can allow exhaust gas to enter inside or be drawn into a potentially occupied building or structure.



- Direct the standby generator exhaust away from or parallel to the building or structure. DO NOT direct the generator exhaust towards a potentially occupied building, structure, windows, doors, ventilation intakes, soffit vents, crawl spaces, open garage doors or other openings where exhaust gas could accumulate and enter inside or be drawn into a potentially occupied building or structure.
- DO NOT place standby generator in any area where leaves or debris normally accumulates. Position standby generator in an area where winds will carry the exhaust gas away from any potentially occupied building or structure.



NOT FOR REPRODUCTION

Placement of Standby Generator to REDUCE THE RISK OF FIRE

The National Fire Protection Association (NFPA) standard NFPA 37 establishes criteria for minimizing the hazard of fire during the installation and operation of stationary combustion engines. NFPA 37 limits the spacing of an enclosed generator from openings in walls, structures and combustible materials outside the enclosure.

The placement requirements provided are based on compliance to NFPA 37 2010 section 4.1.4.



WARNING Exhaust heat/gases could ignite combustibles or structures resulting in death or serious injury.

- Exhaust outlet side of weatherproof enclosure must have at least 5 ft (1.5 m) minimum clearance from any structure, shrubs, trees or any kind of vegetation.
- Standby generator weatherproof enclosure must be at least 5 ft (1.5 m) from windows, doors, any wall opening, shrubs or vegetation over 12 inches (30.5 cm) in height.
- Standby generator weatherproof enclosure must have a minimum of 5 feet (1.5 m) overhead clearance from any structure, overhang or trees.
- DO NOT place weatherproof enclosure under a deck or other type of structure that may confine airflow.
- USE ONLY flexible steel fuel line provided. Connect provided fuel line to generator, DO NOT use with or substitute any other flexible fuel line.
- Smoke detector(s) MUST be installed and maintained indoors according to the manufacturer's instructions/ recommendations. Carbon monoxide alarms cannot detect smoke.
- DO NOT place weatherproof enclosure in manner other than shown in illustrations.

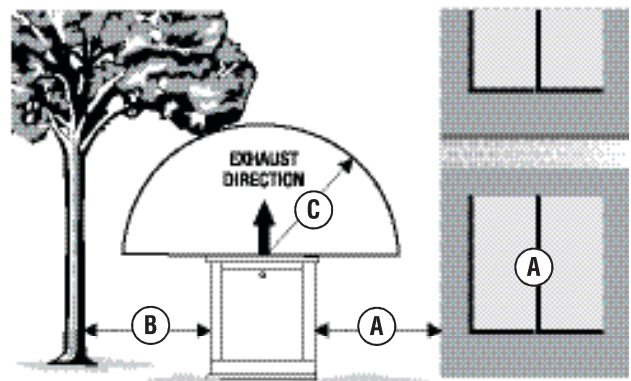
Examples of standby generator locations to reduce the risk of fire:

Legend for Generator Locations to reduce the risk of fire:

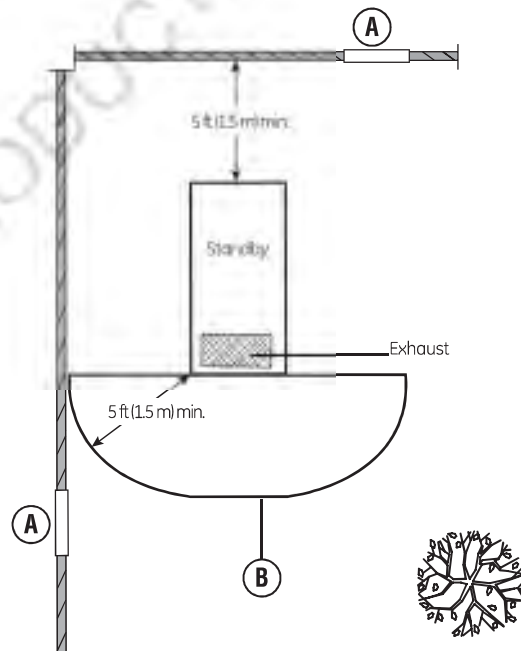
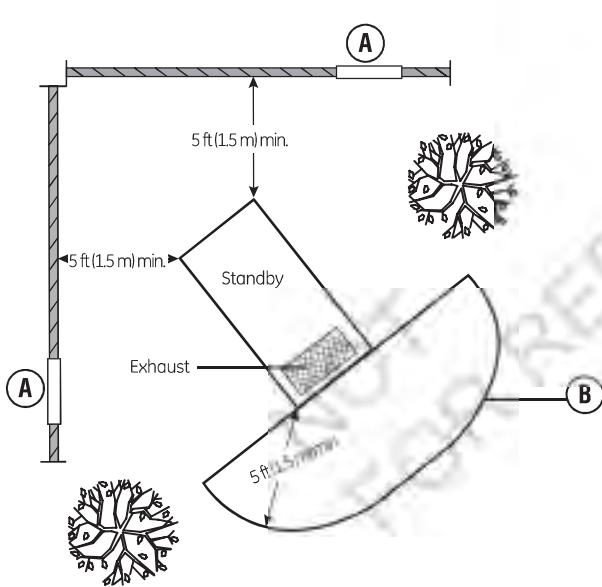
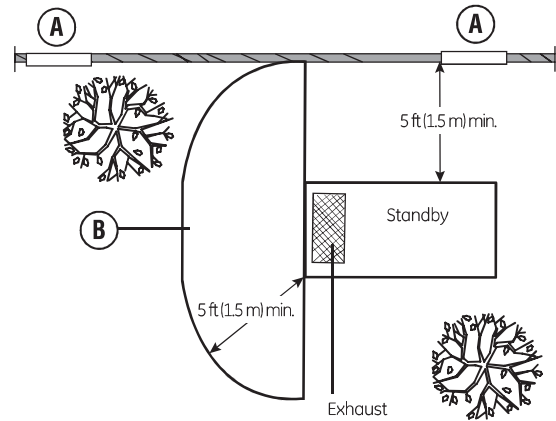
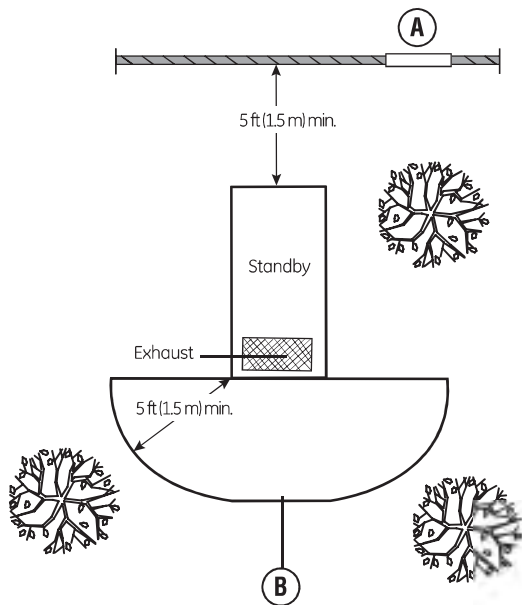
- (A)** Standby weatherproof enclosure must be at least 5 ft (1.5 m) from windows, doors, any wall opening, shrubs or vegetation over 12 inches (30.5 cm) in height.
- (B)** Exhaust outlet side of weatherproof enclosure must have at least 5 ft (1.5 m) minimum clearance from any structure, shrubs, trees or any kind of vegetation.
- (C)** Standby weatherproof enclosure must have a minimum of 5 feet (1.5 m) overhead clearance from any structure, overhang or trees.

NOTICE DO NOT place weatherproof enclosure under a deck or other type of covered structure that may confine airflow.

Vertical Clearances



Typical Installations with Structure Without a Fire Rating



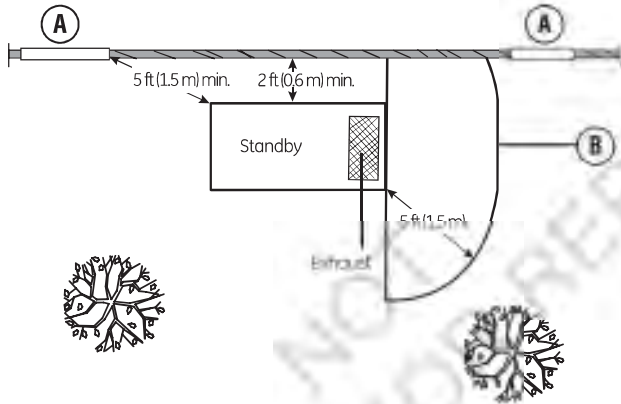
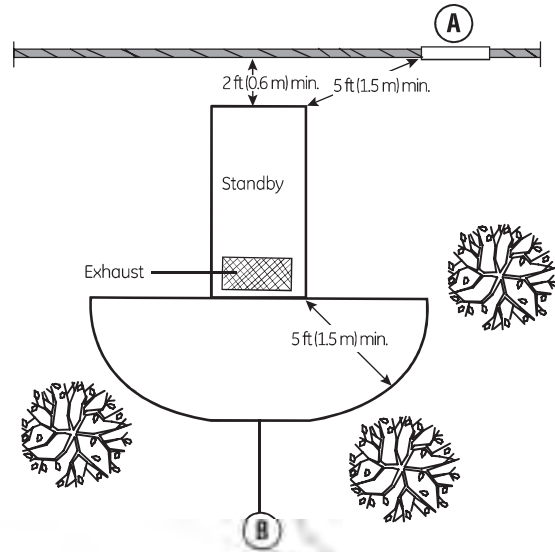
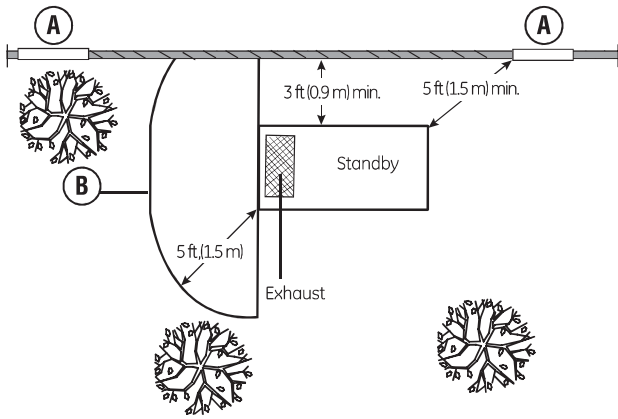
Legend for Generator Locations to reduce the risk of fire.

- A** Standby weatherproof enclosure must be at least 5 ft (1.5 m) from windows, doors, any wall opening, shrubs or vegetation over 12 inches (30.5 cm) in height.
- B** Exhaust outlet side of weatherproof enclosure must have at least 5 ft (1.5 m) minimum clearance from any structure, shrubs, trees or any kind of vegetation.

- C** Standby weatherproof enclosure must have a minimum of 5 feet (1.5 m) overhead clearance from any structure, overhang or trees.

NOTICE DO NOT place weatherproof enclosure under a deck or other type of covered structure that may confine airflow.

Typical Installation with Single Structure Having a Fire Resistance Rating of at Least 1 Hour.

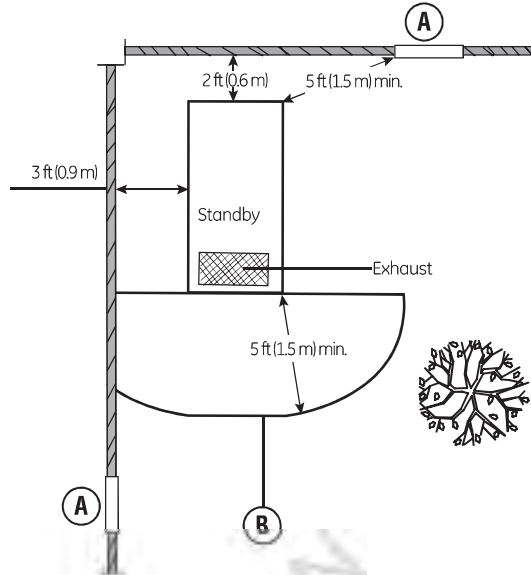
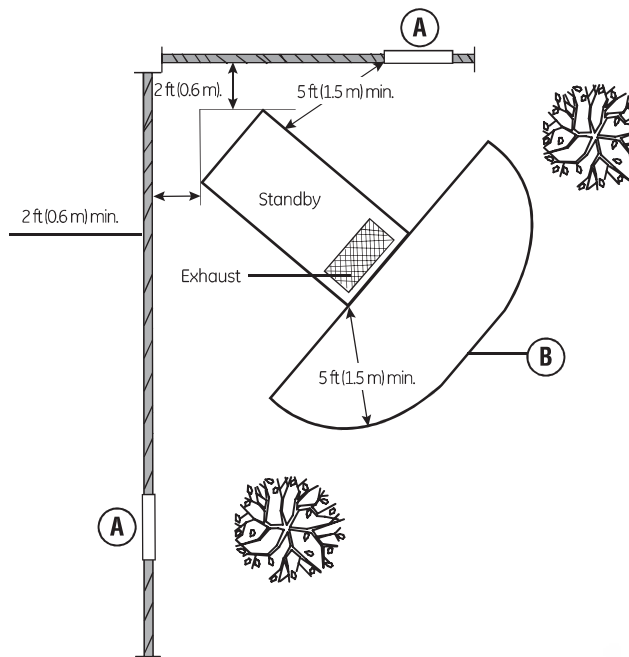


Legend for Generator Locations to reduce the risk of fire:

- Ⓐ - Standby weatherproof enclosure must be at least 5 ft. (1.5 m) from windows, doors, any wall opening, shrubs, or vegetation over 12 inches (30.5 cm) in height.
- Ⓑ - Exhaust outlet side of weatherproof enclosure must have at least 5 ft. (1.5 m) minimum clearance from any structure, overhang or trees.
- Ⓒ - Standby weatherproof enclosure must have a minimum of 5 ft. (1.5 m) overhead clearance from any structure, overhang, or trees.

NOTICE DO NOT place weatherproof enclosure under a deck or other type of covered structure that may confine airflow.

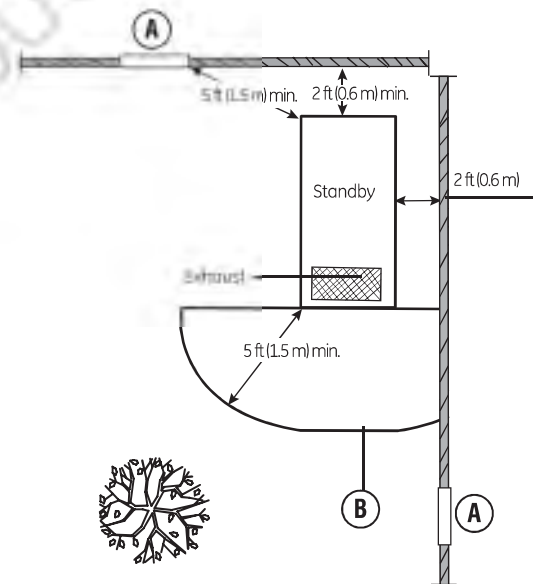
Typical Installation with Dual Structure Having a Fire Resistance Rating of at Least 1 Hour



Legend for Generator Locations to reduce the risk of fire:

- (A)** - Standby weatherproof enclosure must be at least 5 ft. (1.5 m) from windows, doors, any wall opening, shrubs, or vegetation over 12 inches (30.5 cm) in height.
- (B)** - Exhaust outlet side of weatherproof enclosure must have at least 5 ft. (1.5 m) minimum clearance from any structure, overhang or trees.
- (C)** - Standby weatherproof enclosure must have a minimum of 5 ft. (1.5 m) overhead clearance from any structure, overhang, or trees.

NOTICE DO NOT place weatherproof enclosure under a deck or other type of covered structure that may confine airflow.



Other General Location Guidelines

- Place the standby generator in a prepared location that is flat and has provisions for water drainage.
- Install the standby generator 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 or outlet openings.
- Install the standby generator where it will not affect or obstruct any services (including covered, concealed and underground), such as telephone, electric, fuel (natural gas / LPG vapor), irrigation, air conditioning, cable, septic, sewer, well and so forth.
- Install the standby generator where leaves, grass, snow, etc will not obstruct air inlet and outlet openings. If prevailing winds will cause blowing or drifting, you may need to construct a windbreak to protect the unit.

Concrete Slab

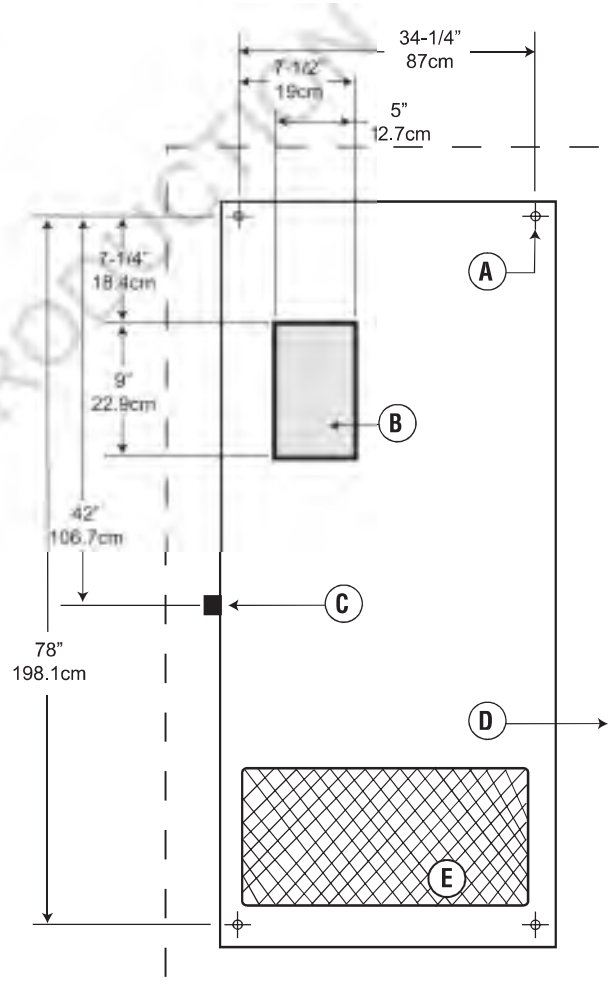
At the appropriate location, construct a concrete slab:

- 28 day compression strength of 3000 psi (200 MPa)
- Minimum 5" (13cm) thick
- Minimum 6" (15cm) wider than enclosure on all sides (shown as D in figure)
- Strengthen slab with No. 6 reinforcing bars (on 12" (30.5cm) centers) or 8 ga. steel wire fabric (6" (15cm) centers).

Avoid placing reinforcement in entrance stub up area (B).

Attach unit to slab at four corner locations (A) with minimum 5/16" (8mm) diameter masonry anchor bolts long enough to secure the unit.

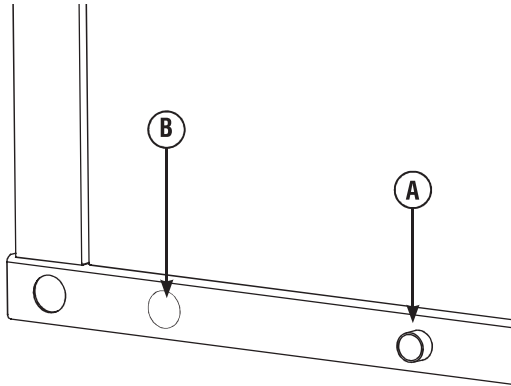
The fuel inlet location (C), the concrete slab (D), and the exhaust outlet (E) are shown for reference.



- (A) Holes located in base to anchor to pad
- (B) Stub up Area
- (C) Fuel Inlet
- (D) Concrete slab
- (E) Exhaust Outlet

Electrical and Fuel Inlet Locations

A through-slab power cable stub-up is preferred. If stub-up's are not used, (B) indicates the recommended location for punching holes for attaching power conduit. The 1 inch N.P.T. fuel inlet connector (A) is shown for reference.



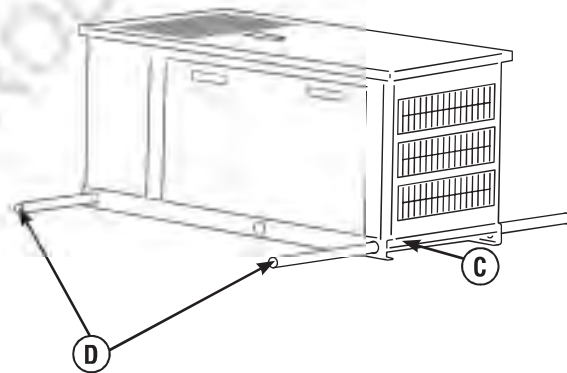
Lifting the Generator

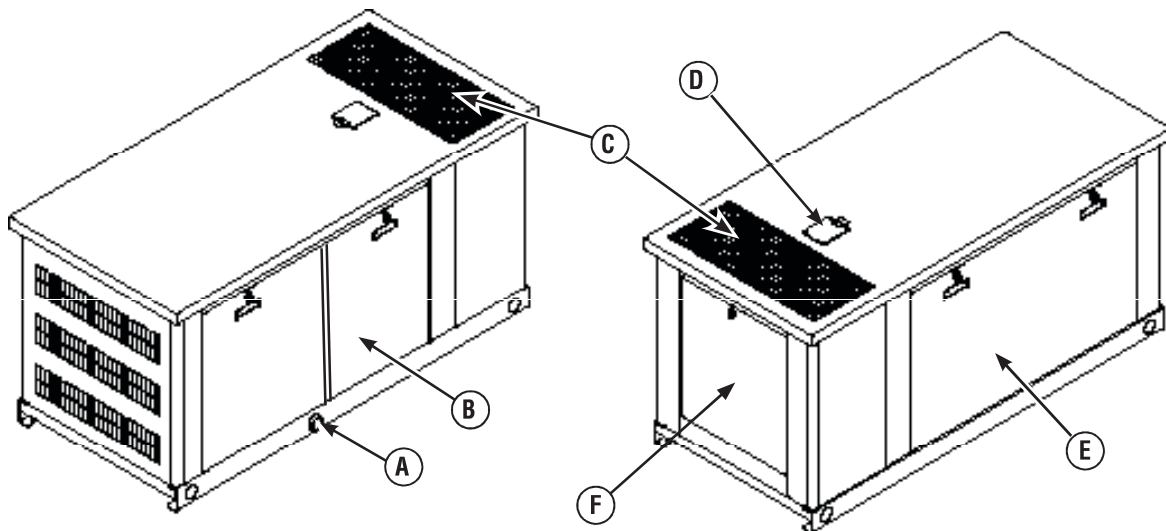
WARNING Hazardous Voltage - Contact with power lines could cause electric shock or burns, resulting in death or serious injury.
Lifting Hazard / Heavy Object - Could result in serious injury.

- 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 *Lifting the Generator*.
- DO NOT lift unit by roof as damage to generator will occur.

The generator weighs more than 1,500 pounds (682 kg). Proper tools, equipment and qualified personnel should be used in all phases of handling and moving the generator.

Remove circuit breaker box bottom plate prior to positioning generator. Two 60" (1.5m) lengths of 2" Schedule 40 pipe (C), supplied by the installer, are required to lift the generator onto cement pad. Insert pipes through the lifting holes (D) located near the unit's base. Use a spreader bar to ensure that the chains, straps or cables DO NOT touch the generator's roof. Retouch any chipped paint with supplied touch-up paint.





Access Ports

The generator is equipped with an enclosure that has several access doors, as shown above. The doors are named for a significant component located behind them, as follows:

- (A) Fuel Inlet port (shown for reference)
- (B) Control Panel door (may be two doors)
- (C) Exhaust opening (shown for reference)
- (D) Coolant/Oil Fill door
- (E) Battery door
- (F) Muffler door

To close access door:

1. Close door and turn door's handle one quarter turn clockwise.
2. Insert key into lock of door handle and turn key one quarter turn clockwise. Remove key.

WARNING Contact with muffler area could cause burns resulting in serious injury.



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

The Coolant Fill, Battery and Control Panel doors must be installed whenever the unit is running to assure proper cooling, reduce noise and for added safety. The enclosure also includes muffler and radiator access panels, used only for cleaning those components. Those panels should remain closed at all other times.

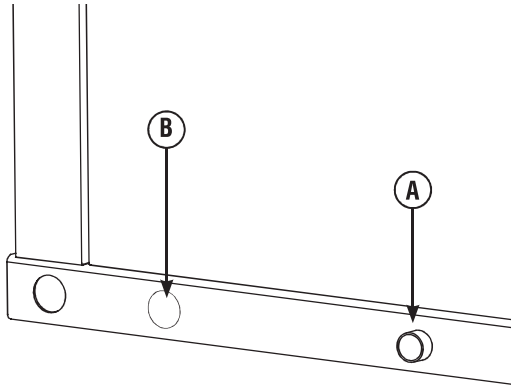
Each generator is shipped with a set of identical keys. These keys fit the locks that secure the access ports.

To open access door:

1. Insert key into lock of access door handle and turn key one quarter turn counterclockwise.
2. Grasp door's handle and turn one quarter turn counterclockwise to open. Remove key.
3. Coolant Fill door is unlocked in the same manner. It can be used for adding coolant or oil.

Electrical and Fuel Inlet Locations

A through-slab power cable stub-up is preferred. If stub-up's are not used, (B) indicates the recommended location for punching holes for attaching power conduit. The 1 inch N.P.T. fuel inlet connector (A) is shown for reference.



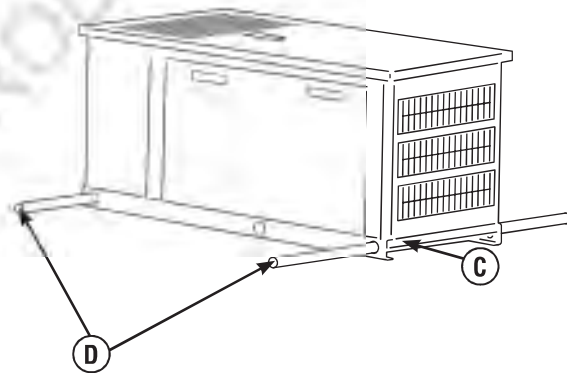
Lifting the Generator

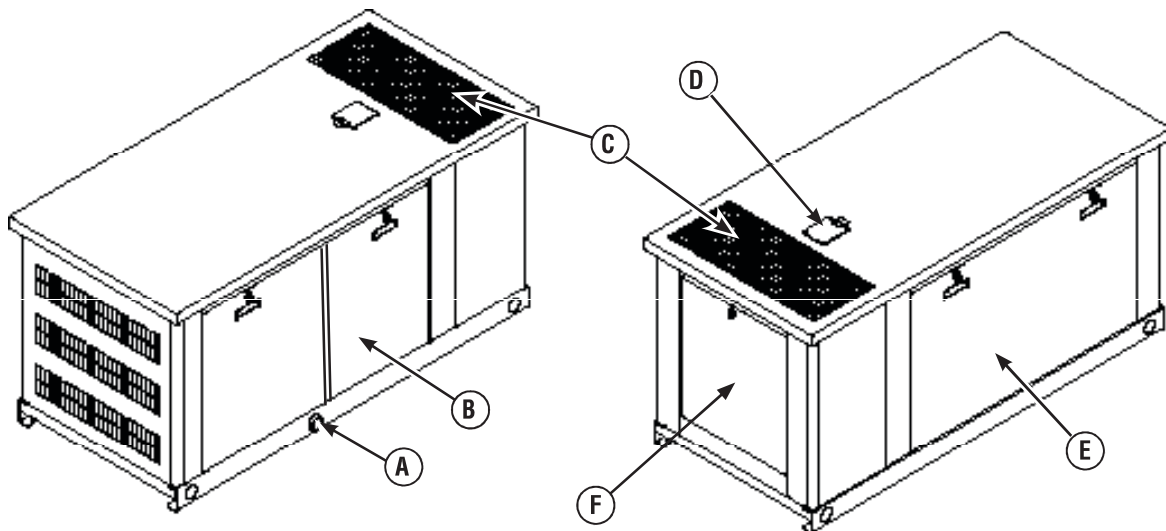
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NOTICE The supplied flexible gaseous pipe is not to be installed underground or in contact with the ground.

- The entire flexible gaseous pipe must be visible for periodic inspection and must not be concealed within nor contact nor run through any wall, floor, or partition.

The Gaseous Fuel System

The information below is provided 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.

WARNING Propane and Natural Gas are extremely flammable and explosive, which could cause burns, fire or explosion resulting in death or serious injury.

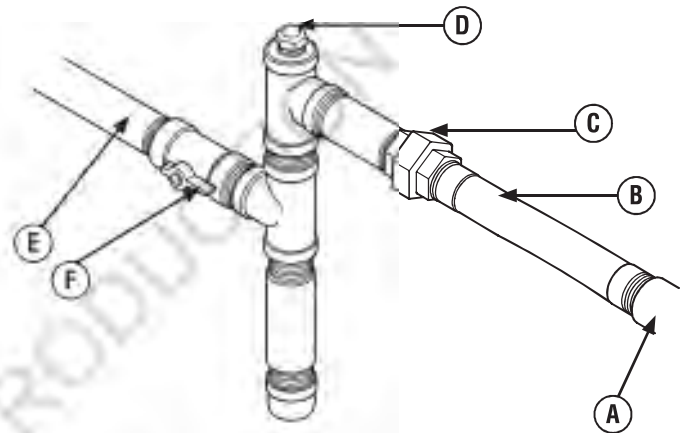
- LP gas is heavier than air and will settle in low areas.
- Natural gas is lighter than air and will collect in high areas.
- The slightest spark could ignite these fuels and cause an explosion.
- DO NOT light a cigarette or smoke.

TO THE INSTALLER: Consult with the generator 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.
- Install the flexible, gaseous hose (B) (supplied) between the generator fuel inlet port (A) and rigid piping to prevent thermal expansion or contraction from causing excessive stress on the piping material.
- A union (C) or flanged connection shall be provided downstream to permit removal of controls.
- A manometer port should be provided (D). A digital manometer, P/N 19495, is available at your Briggs & Stratton service center. When the initial test runs are completed, the manometer is removed and the port is plugged. The manometer port permits temporary installation of a manometer to ensure that the engine receives the correct fuel pressure to operate efficiently throughout its operating range.
- 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 (E) where condensate is not likely to freeze.
- A minimum of one accessible, approved manual shutoff valve (F) shall be installed in the fuel supply line within 6 ft (180 cm) of the generator.

- A manual fuel shut-off valve located in the interior of the building.
- 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.
- 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 a pipe sealant or joint compound approved for use with NG/LPG 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.



- (A) Generator Fuel Inlet
- (B) Flexible Fuel Hose
- (C) Union Fitting
- (D) Manometer Test Port
- (E) Sediment Trap
- (F) Manual Shut-off Valve

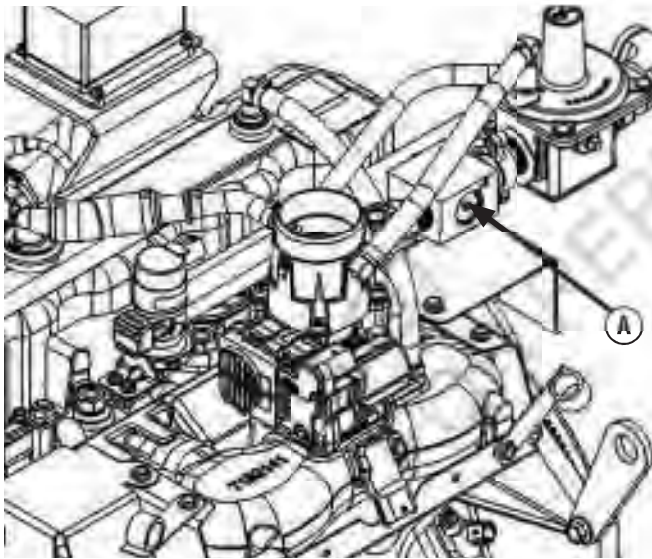
Fuel Pipe Sizing

There are numerous on-line or otherwise-published references for fuel pipe sizing. For example, NFPA 54 - National Fuel Gas Code, 2006 (Item #: 320-6031-06) is a common resource. The installer should consider the specific gravity of gas, compensate for a nominal amount of restriction from bends and fittings, and refer to federal and local codes for guidance.

Fuel Conversion

The unit is shipped from the factory calibrated for NG operation. To convert the engine from NG to LP vapor, follow these steps:

1. Set generator circuit breaker to OFF.
2. Set control panel system switch to OFF.
3. Remove 15 Amp fuse from system control panel.
4. Locate the fuel selector switch (A). Using a 6 mm Allen wrench, turn the selector switch to either LP or NG.
5. Reinstall 15 Amp fuse in system control panel.
6. Set exercise timer.



Fuel Pressure

Both LP vapor and natural gas fuel supply pressure at the generator's fuel inlet port should be between 7 to 11 inches (18 to 28 cm) of water (in. W.C.) at full load with all gas appliances turned on and operating. *Maximum pressure with engine OFF at No Load is 13.85 in. W.C.*

Power Loss

Air density is less at high altitudes, resulting in less available engine power. Specifically, engine power will decrease 3% for each 1,000 feet (300 m) above sea level and 1% for each 10° F (5.6°C) above 77°F (25°C). Generators located in these conditions, that use power management technology must have their transfer switch programmed appropriately for this power decrease.

Fuel Consumption

Estimated fuel supply requirements at half and full load for natural gas and LP vapor fuels are shown here.

	Natural Gas		LP Vapor	
	1/2 Load	Full Load	1/2 Load	Full Load
33kW	282 C	458 C	N/A	N/A
	282,000 B	458,000 B	N/A	N/A
35kW	N/A	N/A	117 C	186 C
	N/A	N/A	292,900 B	465,100 B

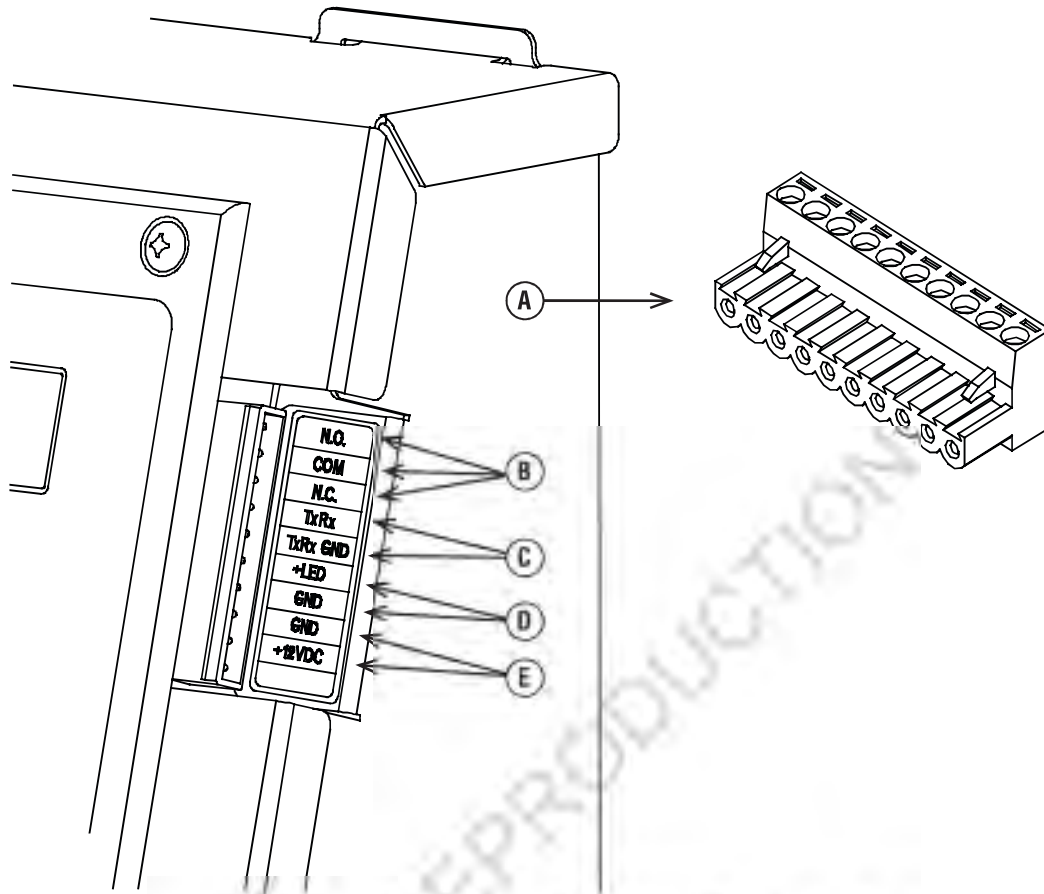
C = Cubic feet per hour
B = BTU's per hour.

Physical Properties	LP Vapor	Natural Gas
Normal Atmospheric State	Gas	Gas
Boiling Point (in °F):		
Initial	-44	-259
End	-44	-259
Heating Value:		
BTU per gallon (Net LHV*)	33,340	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".

System Connectors

Low voltage connections to signal fault contacts, transfer switch communication, remote LED and auxiliary 12VDC power are made via a removable ten-pin connector plug. Compare this illustration with your generator to familiarize yourself with the location of these connections. **Count down to the proper pin location on the control board since visual alignment with the decal can be misleading:**



A 10 Pin Connector Plug

B Fault Contacts — Use NO, COM and NC to hook up a siren, light, etc. to alert you in case of a fault. Contacts reverse state (NO goes to NC and vice versa) upon a fault condition.

C Transfer Switch Communication — Connect to transfer switch control board for communication interface using 18AWG twisted pair wire.

D 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 if certain faults are detected in the generator.

E +12 Volt DC, .5 Amp Output — Internal auxiliary power supply.

- For power output connection, use #2/0 AWG minimum 300 volt, 167 °F-194 °F (75 °C-90 °C) wire, (ref. NEC Table 310.16, 100 ft.(30 m) Use National Electric Code for correction factors and wire size calculations.)
- For Utility Circuit connection use #14 AWG minimum 300 volt, 167 °F-194 °F (75 °C-90 °C) wire.
- For transfer switch communication use #18 AWG twisted pair conductors, no greater than 200 ft (60 m) in length, 300 volt, 167 °F-194 °F (75 °C-90 °C) wire.
- When connecting to the ten-pin connector plug, fasten only one wire to each connector screw.
- Torque connector plug screws to 7 in-lb (7.9 Newton meter).

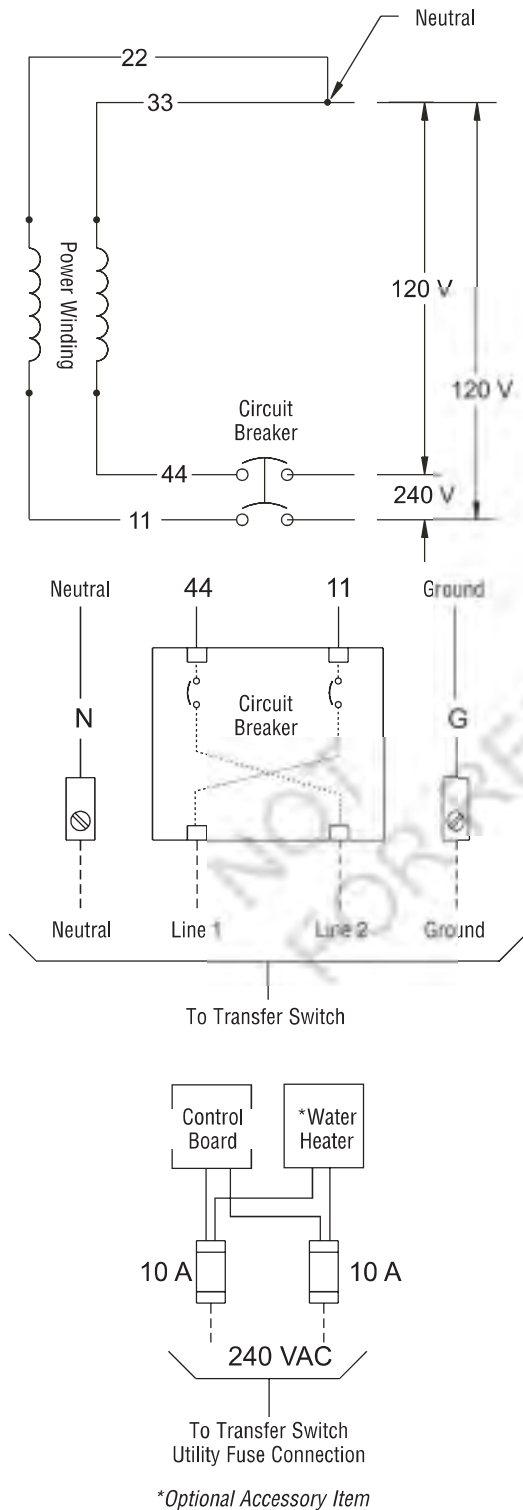
Generator AC Connection System

A single-phase, three-wire AC connection system is used in the generator. 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. A complete schematic and wiring diagram can be found later in this manual.

Neutral is not bonded to ground at generator.

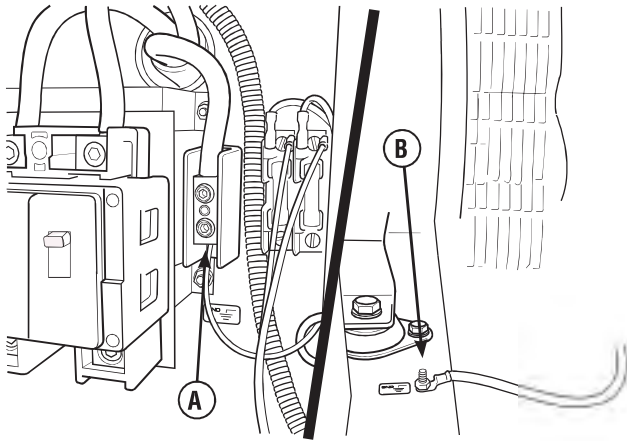
NOTICE Prior to making connections, verify phase rotation of utility power.

When making connections, obey wire type and torque specifications shown on the circuit breaker and neutral/ground connector.



Grounding the Generator

Ground the generator per applicable codes, standards and regulations. There are two generator GND lug locations. The one inside the alternator junction box next to the circuit breaker (A) is the primary lug and should suffice for most applications. The second generator GND lug (B) is located on the frame below the generator circuit breaker cover and should ONLY be used for a ground rod located at the generator, if required by local codes.



Utility Circuit Connection

“208/220/240V Utility” leads must be routed in conduit. The “208/220/240V Utility” leads deliver power to the generator’s circuit board, optional battery warmer and optional oil warmer. This power also charges the battery. When power on these leads is lost, the generator will start.

Using installer-supplied #14 AWG minimum 300 volt, 167 °F-194 °F (75 °C-90 °C) wire, connect each ten-amp fuse terminal (C) in the alternator junction box to the two-amp fuse terminals in the automatic transfer switch.

NOTICE When making connections, obey wire type and torque specifications printed on the circuit breaker and neutral/ground connector.

Fault Detection System

The generator may have to run for long periods of time with no operator present. For that reason, the system is equipped with sensors that automatically shut down the generator in the event of potentially damaging conditions, such as low oil pressure, high temperature, over speed, and other conditions. Refer to *Fault Detection System* in the operator’s manual for more detailed information.

The owner will use the remote LED indicator to observe the status of the generator system. The remote LED will turn on and off in a series of blinks if certain faults are detected in the generator system. Consult with the owner for a convenient location. Locate the electrical box in an area visible by the owner such as near a garage door opener or security control panel.

To install the remote LED indicator:

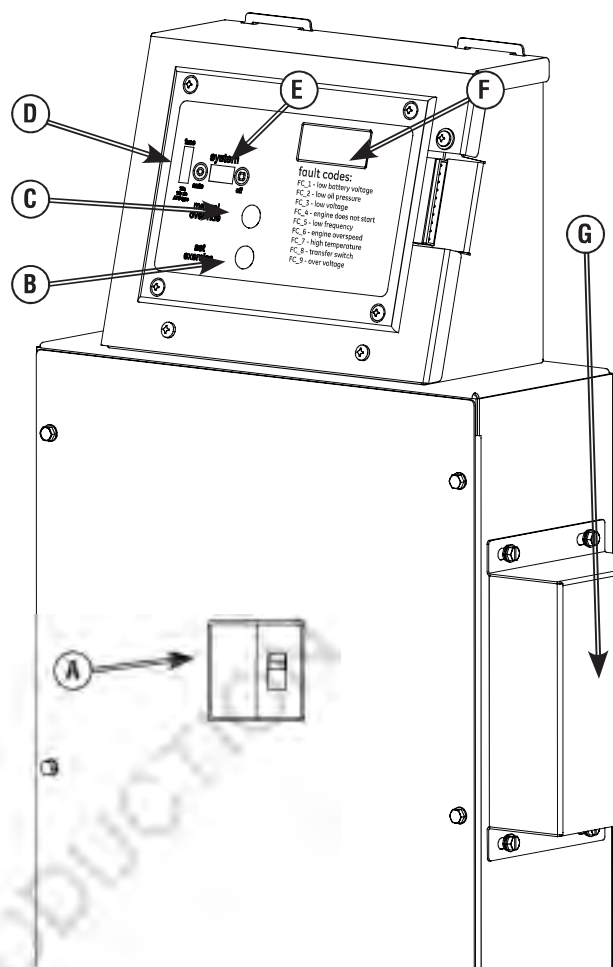
1. Push the LED through the mounting plate from the front until it snaps in place. The LED is polarity sensitive.
2. Using provided 10 pin connector and installer-supplied minimum 18AWG wire, connect the remote LED to the generator control board +LED and GND connection. Use wire nuts to attach wire to LED leads.
3. Attach mounting plate to installer-supplied electrical box.

System Control Panel

The generator control panel, located inside the generator housing, is shown below.

Brief descriptions of the controls used during installation are located below. More information may be found in *Controls* in the operator's manual.

- A Circuit Breaker** — Must be ON to supply power to the transfer switch. Breaker enclosure includes removable bottom panel to assist with conduit connections.
- B SET EXERCISE** — Used to set exercise cycle start time.
- C MANUAL OVER-RIDE** — Used to manually start and stop the generator.
- D 15 Amp Fuse** — Protects the generator 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. If fuse was blown or removed, you will need to reset the exercise timer (see *Setting Exercise Timer*).
- E System Switch** — This two-position switch is the most important control on the generator 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.
- F Digital Display** — Displays running time in hours, fault codes, and engine malfunction.
- G AVR Module** — Located under this cover.



Final Installation Considerations

Engine Oil

This engine is shipped from the factory pre-run and filled with non-synthetic oil (API SL 10W-30W). This allows for system operation in a wide range of temperature and climate conditions. Before starting the engine, check oil level and ensure that engine is serviced as described in the operator's manual.

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

- Refer to *Maintenance* in the operator's manual for coolant and oil fill information.
- Damage to equipment resulting from failure to follow this instruction will void engine and generator warranty.

Coolant System

This engine is shipped from the factory filled with a 50-50 mix of automotive ethylene-glycol anti-freeze and water. This will provide optimum year round protection against freezing, boiling and corrosion. The coolant system incorporates an optional water heater that operates when ambient temperature is below 80 °F (26.6 °C) AND utility power is present at the transfer switch. Periodically check coolant level as described in the operator's manual.

Battery

The installer must supply and install a valve-regulated rechargeable starting battery. The starting battery MUST conform to the specifications shown in this chart.

Battery Specifications	
Volts	12 Volt DC
Amps (MIN)	650 CCA (cold cranking amps)
Type	VRLA (Valve Regulated Lead Acid)
Terminal Hardware	Post
Dimensions (MAX):	
Width	7.5 inches (191 mm)
Length	11.25 inches (286 mm)
Height	10.0 inches (254 mm)

Install the battery as described in *Servicing the Battery* in the *Maintenance* section of the operator's manual. Always make sure the **NEGATIVE** cable is connected last.

⚠ WARNING Battery posts, terminals and related accessories contain lead and lead compounds - chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

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.

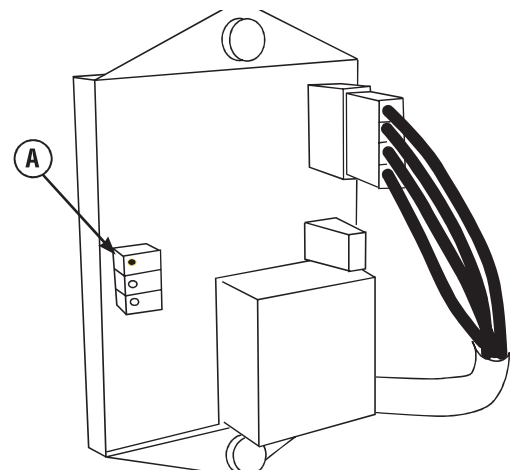
Initial Start-up (No Load)

Unit has been set-up for NG or LP vapor operation at the factory. Fuel conversion, if needed, must be completed prior to performing these steps.

Before operating the generator or placing it into service, inspect the entire installation carefully. Then begin testing the system without any electrical loads connected, as follows:

1. Connect an accurate AC voltmeter and a frequency meter to check generator output at load side of circuit breaker.
2. Set generator's circuit breaker to its **ON** (closed) position.
3. Confirm 15 Amp fuse is installed in system control panel.

4. Set generator's system switch to **AUTO**.
5. Push and hold **MANUAL OVER-RIDE** button on control panel for about six seconds. Engine will start.
When the generator 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.
6. Listen for unusual noises, vibration or other indications of abnormal operation. Check for oil or coolant leaks while engine runs.
7. Using a phase rotation meter, verify generator output at load side of circuit breaker matches utility power.
8. Let engine warm up for about five minutes to allow internal temperatures to stabilize.
9. No-load voltage should be 238 - 244 Volts for 240V generators and 206-210 volts for 208V generators. Frequency should be 59.8 - 60.2 Hz.
If AC voltage is outside these ranges, perform the generator adjustment, Steps 12 and 13 below.
10. Check generator output between each of the generator connection lugs and the neutral lug. In all cases, voltage reading should be 117 - 123 Volts for 208V generators and 136-142 for 240V generators.
DO NOT proceed until you are certain that generator AC voltage is correct and within the stated limits. Generator frequency is fixed and not adjustable.
11. If voltage and frequency values are correct, proceed to step 13.
12. Connect voltmeter as described in step 1 above.
13. While observing voltmeter, adjust alternator voltage control **(A)** for 240 volts for 240V generators and 208 volts for 208V generators. DO NOT adjust either of the other alternator controls.
14. Push and hold **MANUAL OVER-RIDE** button on control panel until engine stops.



15. Install alternator circuit breaker enclosure cover.

Controls

See the operator's manual for complete descriptions of the generator controls.

Operation

Automatic Operation Sequence

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 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 during the cycle).

If an exercise time is not set, the generator will never exercise. A button on the control panel is labeled "SET EXERCISE" (see *System Control Panel*). The specific day and the specific time of day this button is pressed is programmed into the control board memory. This date and time is then used to automatically initiate the system exercise cycle. The "SET EXERCISE" legend on the control panel will flash until the set exercise cycle is set.

To perform the Set Exercise procedure:

1. Choose the day and time you want your generator to exercise.

2. On that day and time, press and hold down the "Set Exercise" button for three seconds.

The "Set Exercise" display will illuminate then turn off to confirm that the exercise timer has been set. Then release the button.

The unit will crank and run the exercise cycle. During the cycle, "Set Exercise" will illuminate.

Once the exercise cycle is complete, the unit will turn off and "Set Exercise" will no longer be displayed.

The exercise cycle may be discontinued at anytime by turning the System Switch to OFF.

3. The unit will then start and run it's 20 minute exercise cycle.

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

"Set Exercise" will only work if the unit is in the AUTO 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 starting 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

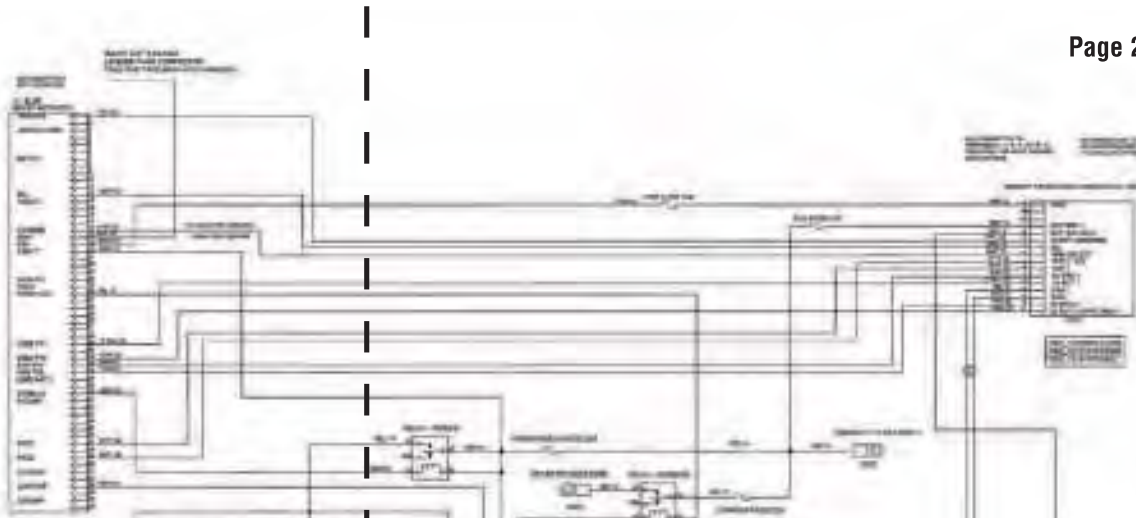
Before placing the generator system into service, inspect the entire installation carefully.

This completes the installation and start-up instructions. The operator's manual provides full details on Operation, Maintenance and Troubleshooting for this generator system.

Schematic Diagram

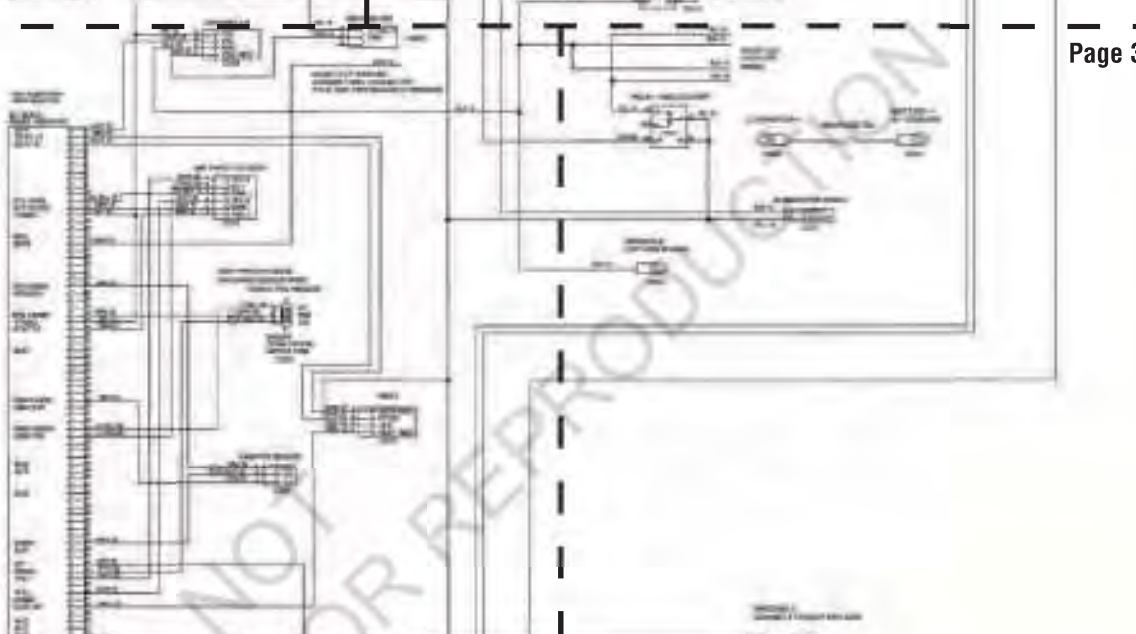
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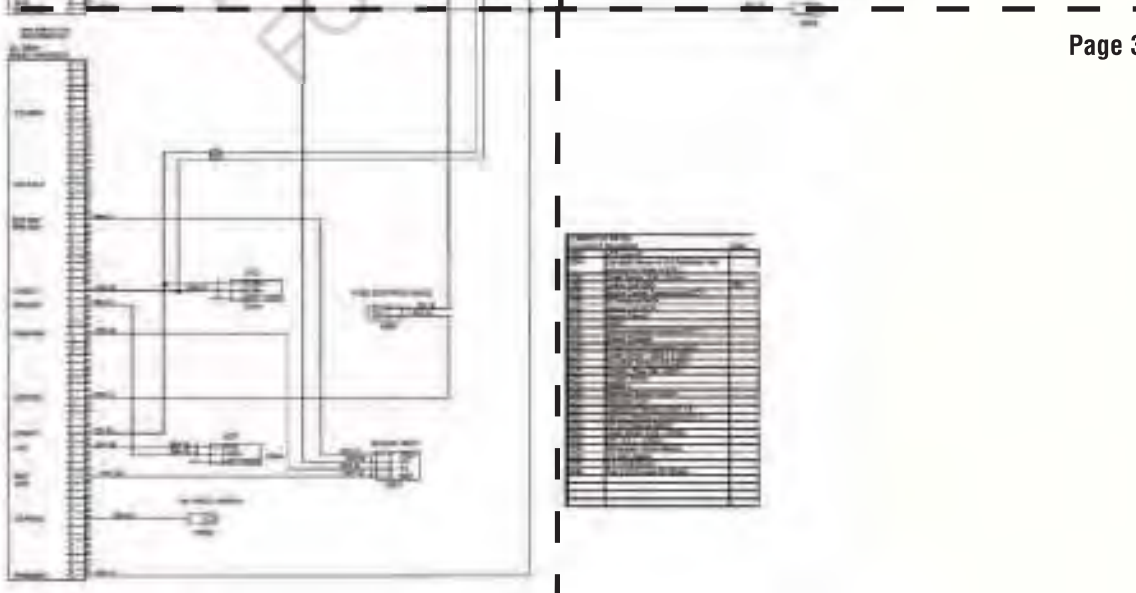
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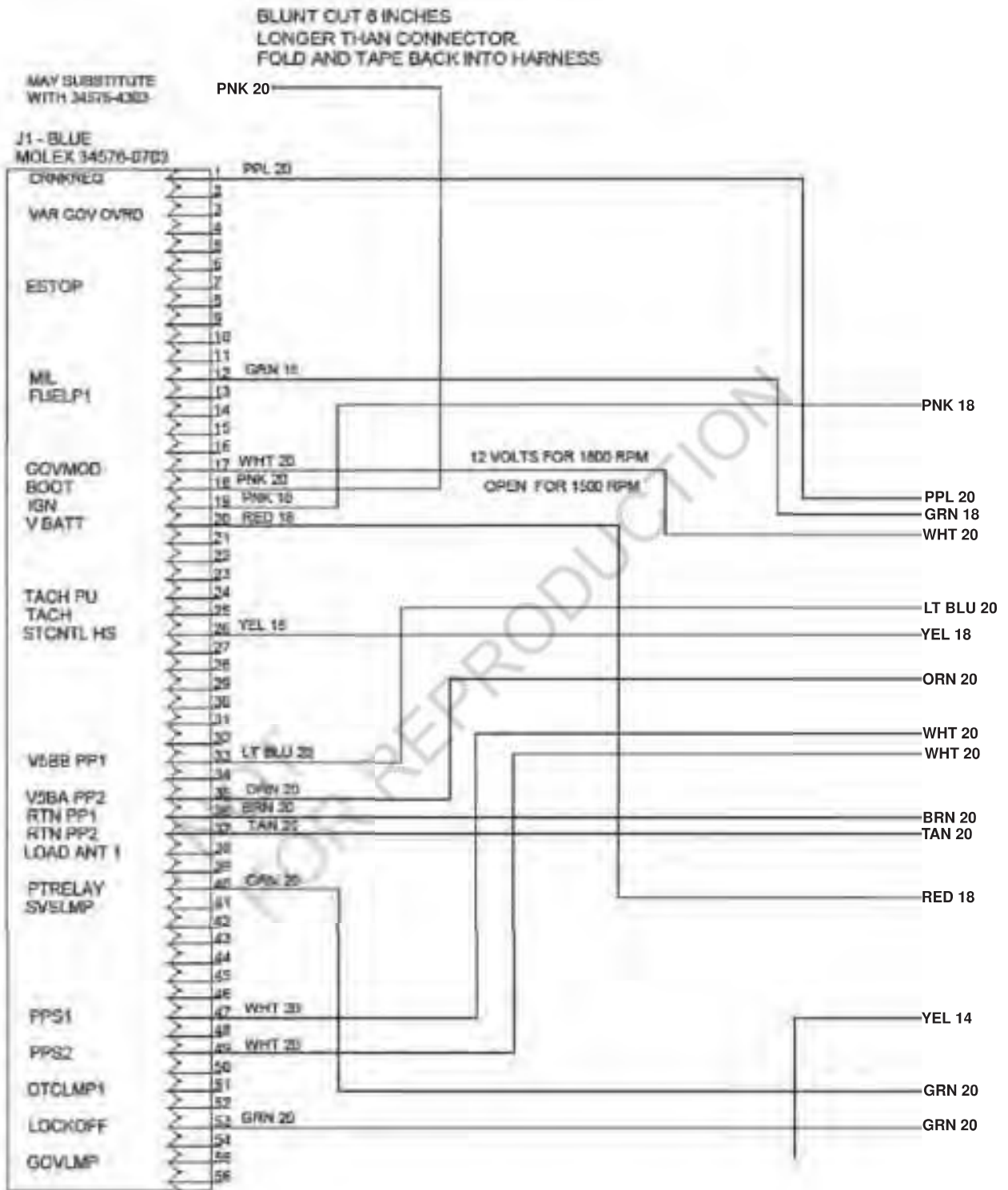


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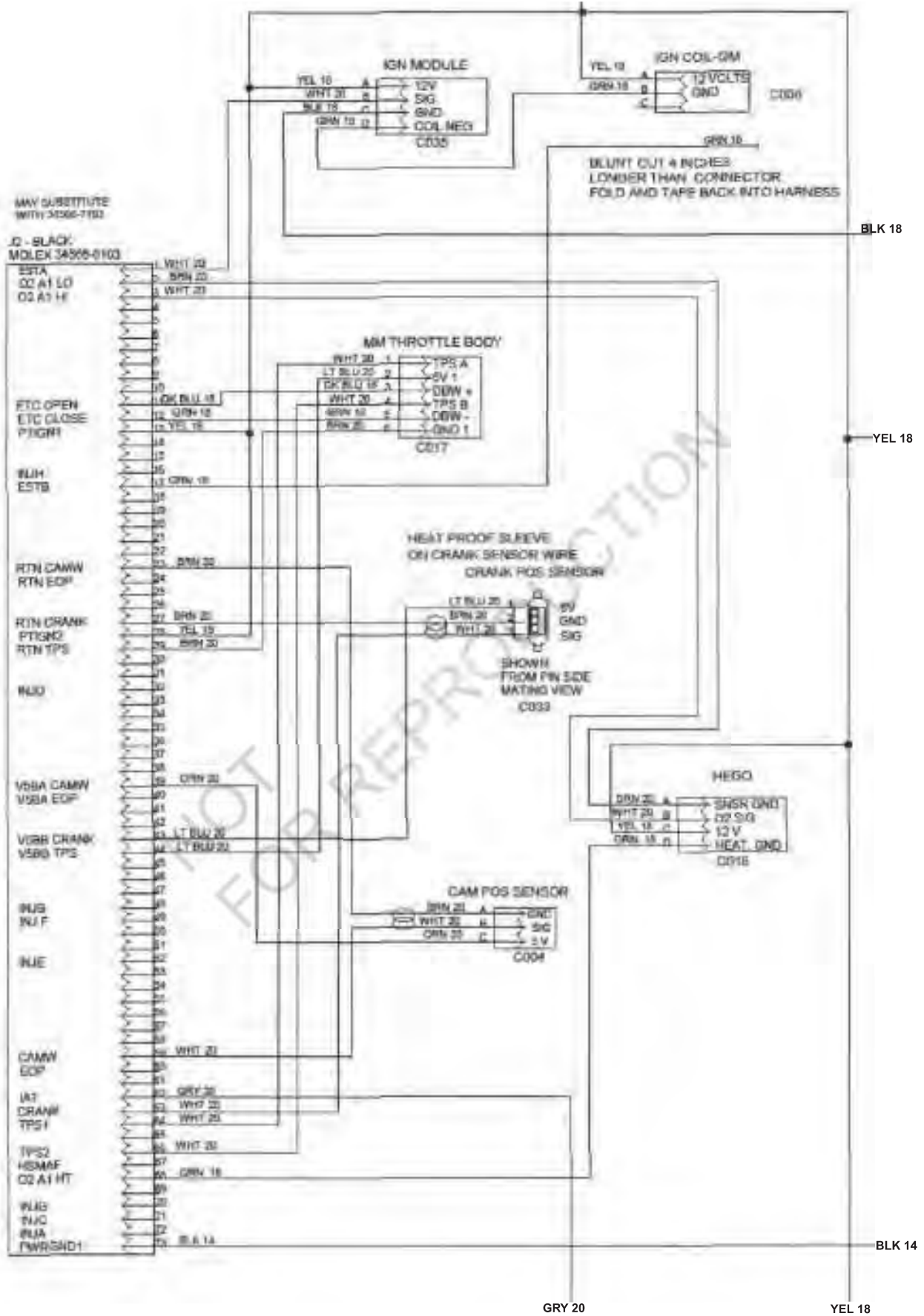
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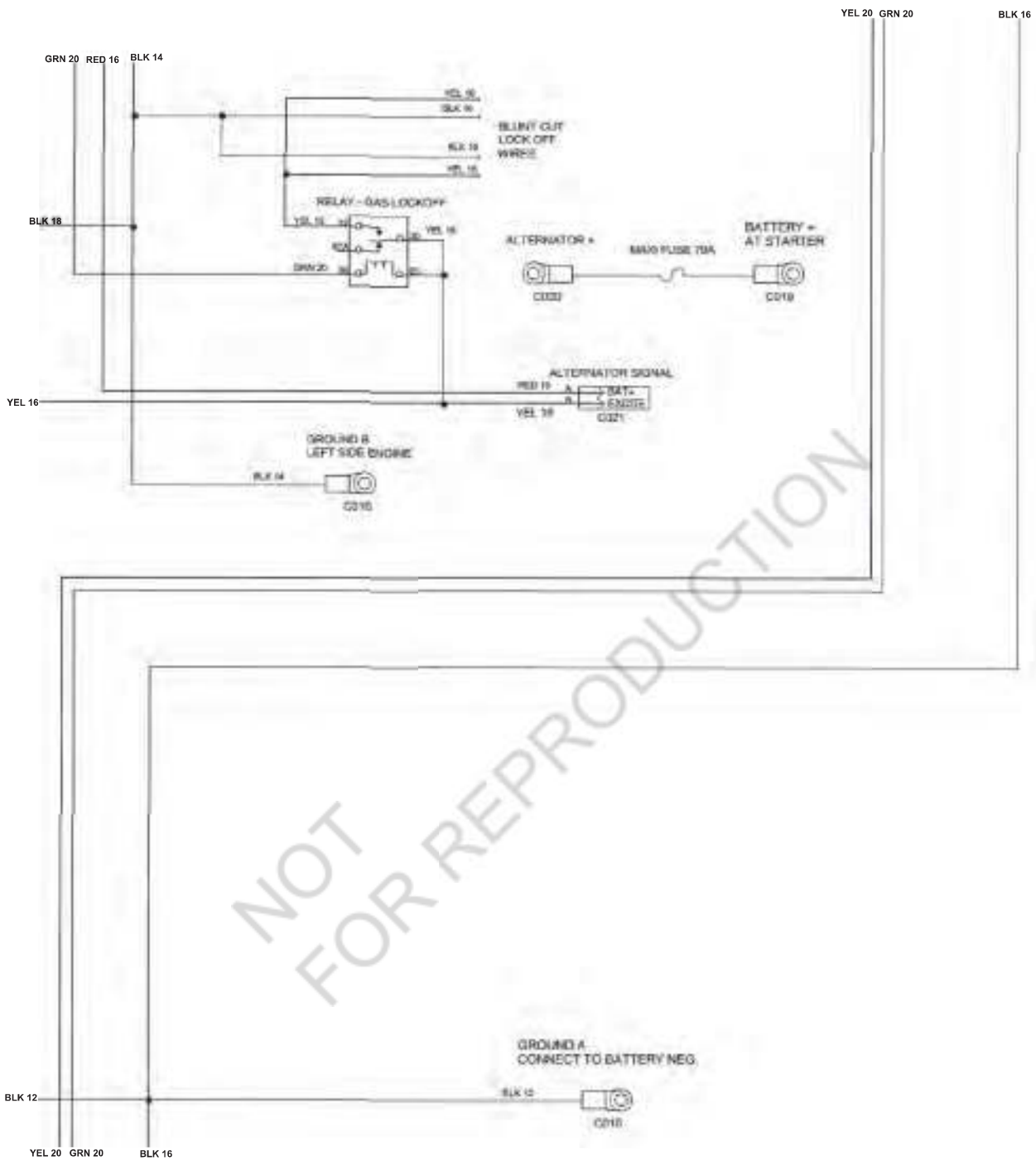
Schematic Diagram (continued)



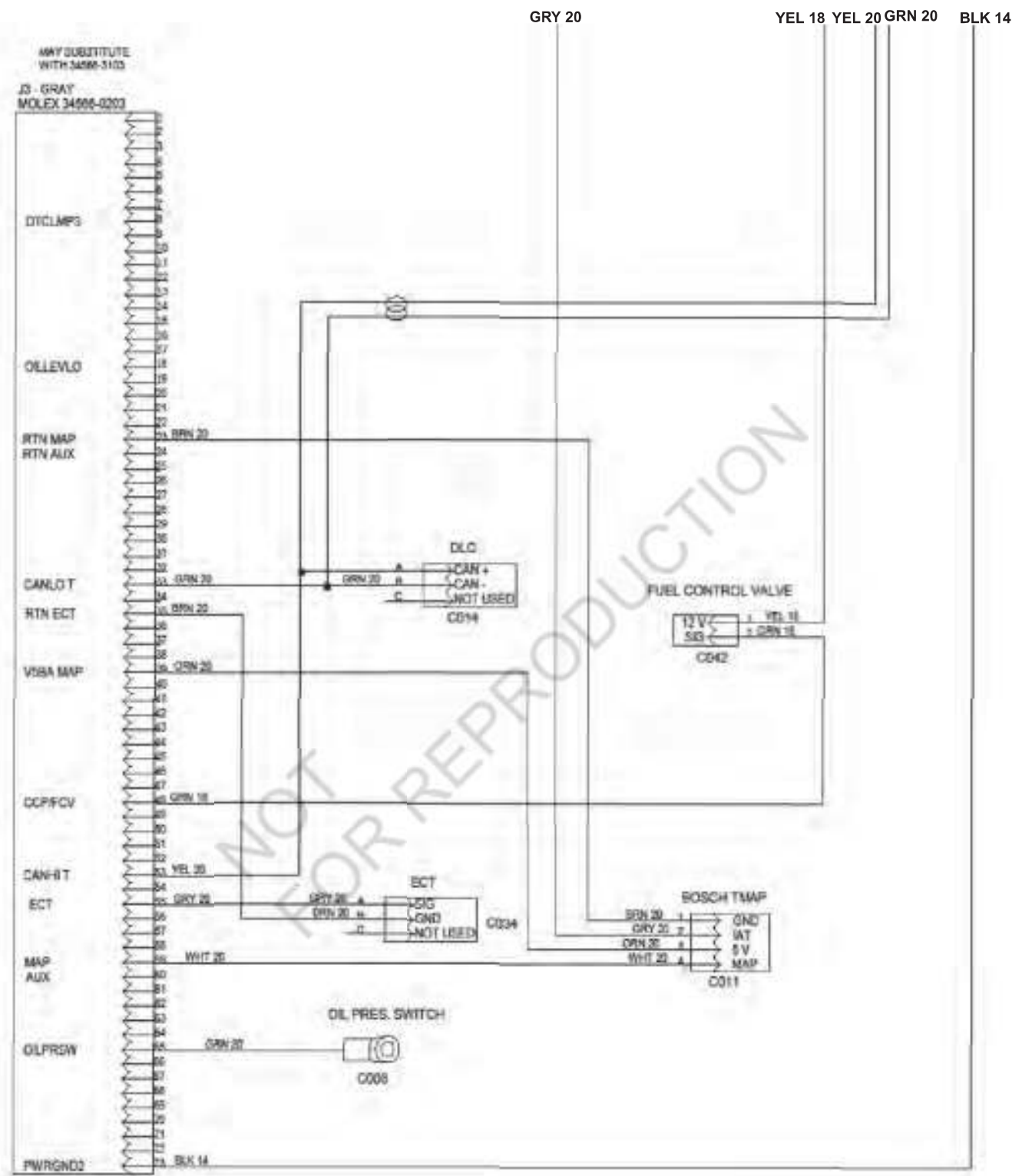
Schematic Diagram (continued)



Schematic Diagram (continued)



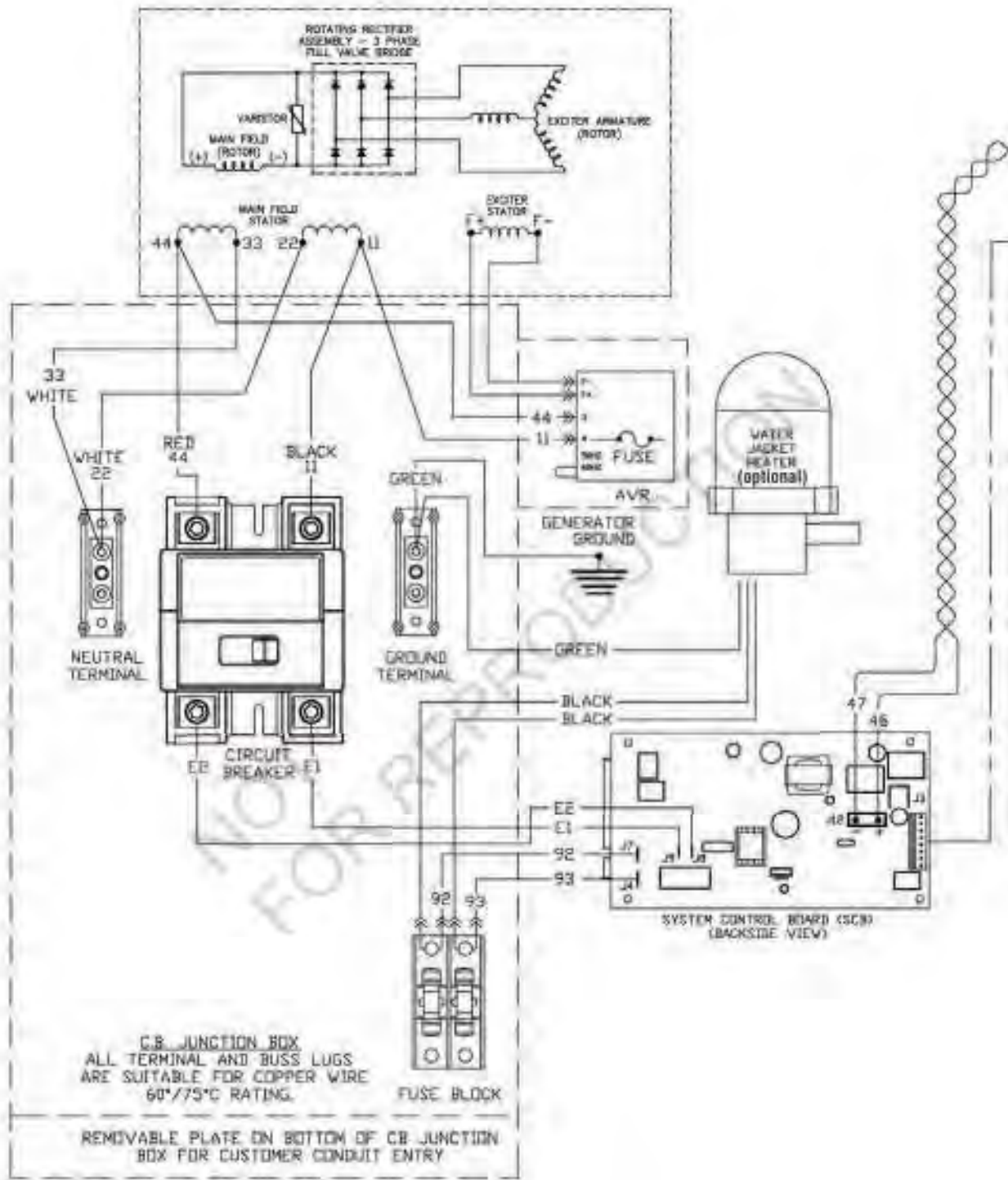
Schematic Diagram (continued)



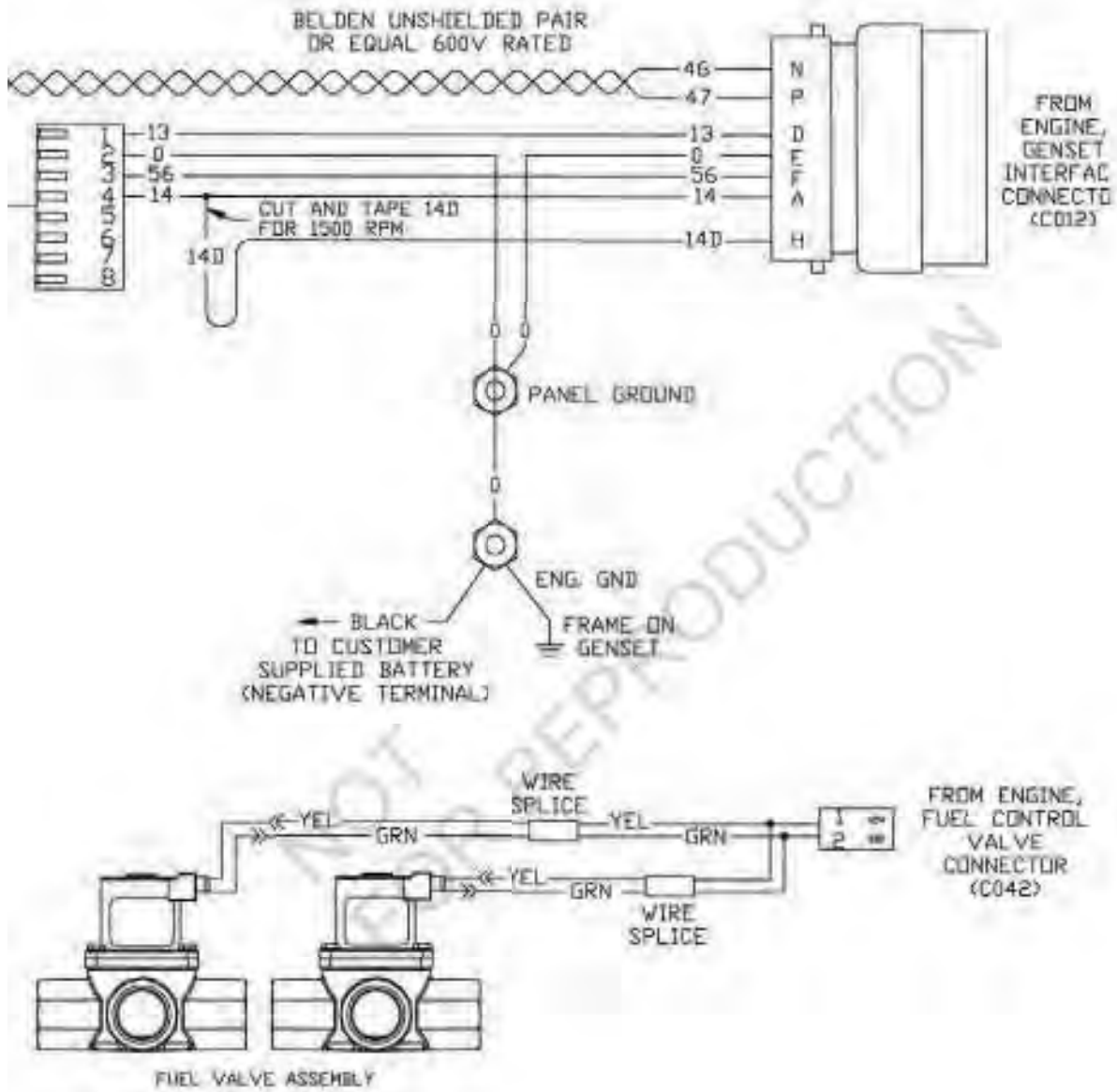
Schematic Diagram (continued)

CONNECTOR NUMBER (#)	DESCRIPTION
CD03	LPG Lock-Off
CD04	Camshaft Sensor on 3.0 Distributor
CD05	Crank Sensor (3.0L - 2Wire)
CD06	Ignition Coil (GM)
CD07	Engine Coolant Temperature (ECT)
CD08	Oil Pressure Switch
CD09	Ignition Coil (PCP)
CD10	Engine Ground
CD11	TMAP
CD12	Vehicle Interface Connector (VIC 1)
CD13	Starter Solenoid
CD14	Diagnostic Link Connector (DLC)
CD15	Crank Sensor
CD16	Camshaft Sensor
CD17	Throttle - Mag. Mel. (DBW)
CD18	Oxygen Sensor
CD19	Battery +
CD20	Alternator Battery/Ground
CD21	Alternator Field
CD26	Crankshaft Position Sensor
CD27	Vehicle Interface Connector (VIC 2)
CD29	1.8 Oil Pressure Switch
CD33	Crank Sensor (3.0L - 3 Wire)
CD34	ECT (3.0L - 3 Wire)
CD35	GM Ignition Control Module
CD36	2.4 Cam Sensor
CD37	V-8 Crank Sensor
CD42	Fuel Control Valve for Genset

Wiring Diagram



Wiring Diagram (continued)



NOTES

NOT
FOR REPRODUCTION