# INSTALLATION GUIDELINES

## Air-cooled Generators



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# INTRODUCTION

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

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enclosure that **is intended exclusively for outdoor installation.** This generator will operate using either vapor withdrawn liquid propane (LP) or natural gas (NG).

**NOTE:**

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

## ◆ READ THIS MANUAL THOROUGHLY

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

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

**⚠ DANGER ⚠**

**After this heading, read instructions that, if not strictly complied with, will result in serious personal injury, including death.**

**⚠ WARNING ⚠**

**After this heading, read instructions that, if not strictly complied with, could result in serious personal injury, including death.**

⚠ CAUTION ⚠

**After this heading, read instructions that, if not strictly complied with, might result in minor or moderate injury.**

**NOTE:**

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

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

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

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

**This symbol points out potential explosion hazard.**

**This symbol points out potential fire hazard.**

**⚠ This symbol points out potential electrical shock hazard.**

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

## ◆ CONTENTS

This manual contains pertinent owner's information for these models:

- 7 kW NG, 8 kW LP, single-cylinder GH-410 Engine
- 9 kW NG, 10 kW LP, V-twin GT-530 Engine
- 12 kW NG, 12 kW LP, V-twin GT-990 Engine
- 13 kW NG, 14 kW LP, V-twin GT-990 Engine
- 16 kW NG, 16 kW LP, V-twin GT-990 Engine
- 16 kW NG, 17 kW LP, V-twin GT-990 Engine
- 18 kW NG, 20 kW LP, V-twin GT-999 Engine

## ◆ OPERATION AND MAINTENANCE

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

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

## ◆ HOW TO OBTAIN SERVICE

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

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

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

# SAFETY RULES

**⚠ WARNING ⚠**

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

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

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

**⚠ DANGER ⚠**

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

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

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

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

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

**⚠ WARNING: ⚠**

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

**⚠ WARNING: ⚠**

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

## ⚠ GENERAL HAZARDS ⚠

- For safety reasons, the manufacturer recommends that this equipment be installed, serviced and repaired by a Service Dealer or other competent, qualified electrician or installation technician who is familiar with applicable codes, standards and regulations. The operator also must comply with all such codes, standards and regulations.
- Keep hands, feet, clothing, etc., away from drive belts, fans, and other moving or hot parts. Never remove any drive belt or fan guard while the unit is operating.
- When working on this equipment, remain alert at all times. Never work on the equipment when physically or mentally fatigued.
- Inspect the generator regularly, and contact the nearest Dealer for parts needing repair or replacement.
- Before performing any maintenance on the generator, disconnect its battery cables to prevent accidental start up. Disconnect the cable from the battery post indicated by a NEGATIVE, NEG or (–) first, then remove the POSITIVE, POS or (+) cable. When reconnecting the cables, connect the POSITIVE cable first, the NEGATIVE cable last.
- Never use the generator or any of its parts as a step. Stepping on the unit can stress and break parts, and may result in dangerous operating conditions from leaking exhaust gases, fuel leakage, oil leakage, etc.

## ⚠ ELECTRICAL HAZARDS ⚠

- All generators covered by this manual produce dangerous electrical voltages and can cause fatal electrical shock. Utility power delivers extremely high and dangerous voltages to the transfer switch as does the standby generator when it is in operation. Avoid contact with bare wires, terminals, connections, etc., while the unit is running. Ensure all appropriate covers, guards and barriers are in place, secured and/or locked before operating the generator. If work must be done around an operating unit, stand on an insulated, dry surface to reduce shock hazard.
- Do not handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. DANGEROUS ELECTRICAL SHOCK MAY RESULT.
- The National Electrical Code (NEC) requires the frame and external electrically conductive parts of the generator to be connected to an approved earth ground. Local electrical codes also may require proper grounding of the generator electrical system.
- After installing this home standby electrical system, the generator may crank and start at any time without warning. When this occurs, load circuits are transferred to the STANDBY (generator) power source. To prevent possible injury if such a start and transfer occur, always set the generator's AUTO/OFF/MANUAL switch to its OFF position before working on equipment and remove the 15A fuse from the generator control panel.
- In case of accident caused by electric shock, immediately shut down the source of electrical power. If this is not possible, attempt to free the victim from the live conductor. AVOID DIRECT CONTACT WITH THE VICTIM. Use a nonconducting implement, such as a dry rope or board, to free the victim from the live conductor. If the victim is unconscious, apply first aid and get immediate medical help.
- Never wear jewelry when working on this equipment. Jewelry can conduct electricity resulting in electric shock, or may get caught in moving components causing injury.

## ⚠ FIRE HAZARDS ⚠

- For fire safety, the generator must be installed and maintained properly. **Installation must always comply with applicable codes, standards, laws and regulations.** Adhere strictly to local, state and national electrical and building codes. Comply with regulations the Occupational Safety and Health Administration (OSHA) has established. Also, ensure that the generator is installed in accordance with the manufacturer's instructions and recommendations. Following proper installation, do nothing that might alter a safe installation and render the unit in noncompliance with the aforementioned codes, standards, laws and regulations.
- Keep a fire extinguisher near the generator at all times. Extinguishers rated "ABC" by the National Fire Protection Association are appropriate for use on the standby electric system. Keep the extinguisher properly charged and be familiar with its use. Consult the local fire department with any questions pertaining to fire extinguishers.

## ⚠ EXPLOSION HAZARDS ⚠

- Do not smoke around the generator. Wipe up any fuel or oil spills immediately. Ensure that no combustible materials are left in the generator compartment, or on or near the generator, as FIRE or EXPLOSION may result. Keep the area surrounding the generator clean and free from debris.
- Gaseous fluids such as natural gas and liquid propane (LP) gas are extremely EXPLOSIVE. Install the fuel supply system according to applicable fuel-gas codes. Before placing the home standby electric system into service, fuel system lines must be properly purged and leak tested according to applicable code. After installation, inspect the fuel system periodically for leaks. No leakage is permitted.

## ⚠ EXHAUST HAZARDS ⚠

- The engine exhaust fumes contain carbon monoxide, which can be DEADLY. This dangerous gas, if breathed in sufficient concentrations, can cause unconsciousness or even death. Do NOT alter or add to the exhaust system or do anything that might render the system unsafe or in noncompliance with applicable codes and standards.
- Install a battery operated carbon monoxide alarm indoors, according to manufacturer's instructions/recommendations.
- Adequate, unobstructed flow of cooling and ventilating air is critical to correct generator operation. Do not alter the installation or permit even partial blockage of ventilation provisions, as this can seriously affect safe operation of the generator. **The generator MUST be installed and operated outdoors only.**

### ◆ STANDARDS INDEX

In the absence of pertinent standards, codes, regulations and laws, the published information listed below may be used as installation guide for this equipment.

1. NFPA No. 37, STATIONARY COMBUSTION ENGINES AND GAS TURBINES, available from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
2. NFPA No. 76A, ESSENTIAL ELECTRICAL SYSTEMS FOR HEALTH CARE FACILITIES, available same as Item 1.
3. NFPA No. 54, NATIONAL FUEL GAS CODE, available same as Item 1.
4. NFPA No. 58, AMERICAN NATIONAL STANDARD FOR STORAGE AND HANDLING OF LIQUEFIED PETROLEUM GAS, available same as Item 1.
5. NFPA No. 70, NFPA HANDBOOK OF NATIONAL ELECTRIC CODE, available same as Item 1.
6. Article X, NATIONAL BUILDING CODE, available from the American Insurance Association, 85 John Street, New York, N.Y. 10038.
7. AGRICULTURAL WIRING HANDBOOK, available from the Food and Energy Council, 909 University Avenue, Columbia, MO 65201.
8. ASAE EP-3634, INSTALLATION AND MAINTENANCE OF FARM STANDBY ELECTRICAL SYSTEMS, available from the American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MI 49085.
9. NFPA No. 30, FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE, available same as Item 1.

**⚠ DANGER ⚠**

⚠ **Only qualified electricians or contractors should attempt such installations, which must comply strictly with applicable codes, standards and regulations.**

## UNPACKING/INSPECTION

After unpacking, carefully inspect the contents for damage.

- This standby generator set is ready for installation with a factory supplied and pre-mounted base pad and has a weather protective enclosure that is intended for **outdoor installation only.**
- This UL listed standby generator set may be packaged with an automatic transfer switch with built in load center. The combination transfer switch and load center is pre-wired with a two foot and 30 foot conduit. Circuit breakers for emergency circuit connections are included (if equipped).
- This UL listed, 2-pole switch is rated at 100 or 200 AC amperes at 250 volts maximum. **The 100 Amp transfer switch is for indoor use only. The 200 Amp transfer switch is for indoor/outdoor use (if equipped).**

**⚠ WARNING ⚠**

⚠ **If this generator is used to power electrical load circuits normally powered by a utility power source, it is required by code to install a transfer switch. The transfer switch must effectively isolate the electrical system from the utility distribution system when the generator is operating (NEC 700, 701 & 702). Failure to isolate an electrical system by such means will result in damage to the generator and also may result in injury or death to utility power workers due to backfeed of electrical energy.**

If any loss or damage is noted at time of delivery, have the person(s) making the delivery note all damage on the freight bill or affix their signature under the consignor's memo of loss or damage.

If a loss or damage is noted after delivery, separate the damaged materials and contact the carrier for claim procedures.

"Concealed damage" is understood to mean damage to the contents of a package that is not in evidence at the time of delivery, but is discovered later.

To properly open the roof, press down on the center top lip and release the latch. If pressure is not applied from the top, the roof may appear stuck. Always verify that the side lock is unlocked before attempting to lift the roof.

## PROTECTION SYSTEMS

Unlike an automobile engine, the generator may have to run for long periods of time with no operator present to monitor engine conditions. For that reason, the engine is equipped with the following systems that protect it against potentially damaging conditions:

1. Low Oil Pressure Sensor
2. High Temperature Sensor
3. Overcrank
4. Overspeed
5. RPM Sensor
6. Low Battery

There are readouts on the control panel to notify personnel that one of these failures has occurred. There is also a System Set LED (single cylinder) or a Status message on the display (V-twins) that displays when all of the conditions described in the "System Set LED" section are true.

## NEC REQUIREMENT FOR ARC FAULT CIRCUIT INTERRUPTION BREAKER FOR BEDROOMS

In 2001, the National Electric Code (NEC) introduced a requirement for new construction. This new requirement indicates the need for Arc Fault Circuit Interrupters to be used to protect the complete branch circuit that feeds a dwelling bedroom. The actual NEC requirement is indicated below.

### ◆ SECTION 210.12 ARC FAULT CIRCUIT INTERRUPTER PROTECTION

1. Definition: An arc fault circuit interrupter is a device intended to provide protection from the effects of arc faults by recognizing characteristics unique to arcing and by functioning to de-energize the circuit when an arc fault is detected.
2. Dwelling Unit Bedrooms: All branch circuits that supply 125 volt, single-phase, 15 and 20 ampere outlets installed in dwelling unit bedrooms shall be protected by an arc fault circuit interrupter listed to provide protection of the entire branch circuit.

Section 210.12 requires that AFCI protection be provided on branch circuits that supply outlets (receptacle, lighting, etc.) in dwelling bedrooms. The requirement is limited to 15 and 20 ampere, 125 volt circuits. There is no prohibition against providing AFCI protection on other circuits or in locations other than bedrooms. Because circuits are often shared between a bedroom and other areas such as closets and hallways, providing AFCI protection on the complete circuit would comply with 210.12.

If during the installation of the home standby system the decision is made to provide back up power to a bedroom branch circuit, then the circuit breaker in the transfer switch should be replaced with an Arc Fault Circuit Interrupter.

It is most important that breakers only be switched like for like. For instance, if replacing a 15A breaker, it MUST be replaced with a 15A AFCI breaker. Likewise, a 20A breaker MUST be replaced with a 20A AFCI.

These AFCI breakers are available at the nearest hardware store.

| Siemens Item # | Description |
|---|---|
| Q115AF | 15A Single Pole AFCI |
| Q120AF | 20A Single Pole AFCI |

## EMISSION INFORMATION

The Environmental Protection Agency requires that this generator complies with exhaust emission standards. This generator is certified to meet the applicable EPA emission levels. Additional information regarding the requirements set by the EPA is as follows:

The generator is certified for use as a stationary engine for standby power generation. Any other use may be a violation of federal and/or local laws. It is important that to follow the maintenance specifications in the “Maintenance” section to ensure that the engine complies with the applicable emission standards for the duration of the engine’s life. This engine is certified to operate on Liquid Propane fuel and pipeline Natural Gas. The emission control system on the generator consists of the following:

- Fuel Metering System
  - Carburetor/mixer assembly
  - Fuel regulator
- Air Induction System
  - Intake pipe/manifold
  - Air cleaner
- Ignition System
  - Spark plug
  - Ignition module

The Emissions Compliance Period referred to on the Emissions Compliance Label indicates the number of operating hours for which the engine has been shown to meet Federal emission requirements. See the table below to determine the compliance period for the generator. The displacement of the generator is listed on the Emissions Compliance Label.

| Displacement | Category | Compliance Period |
|---|---|---|
| < 66 cc | A | 300 Hours |
| | B | 125 Hours |
| | C | 50 Hours |
| ≥ 66 cc - < 225 cc | A | 500 Hours |
| | B | 250 Hours |
| | C | 125 Hours |
| ≥ 225 cc | A | 1000 Hours |
| | B | 500 Hours |
| | C | 250 Hours |

## BEFORE YOU BEGIN

Contact the local inspector or City Hall to be aware of all federal, state and local codes that could impact the installation. Secure all required permits before starting the job.

Carefully read and follow all of the procedures and safety precautions detailed in the installation guide. If any portion of the installation manual, technical manual or other factory-supplied documents is not completely understood, contact a dealer for assistance.

Fully comply with all relevant NEC, NFPA and OSHA standards as well as all federal, state and local building and electric codes. As with any generator, this unit must be installed in accordance with current NFPA 37 and NFPA 70 standards as well as any other federal, state, and local codes for minimum distances from other structures.

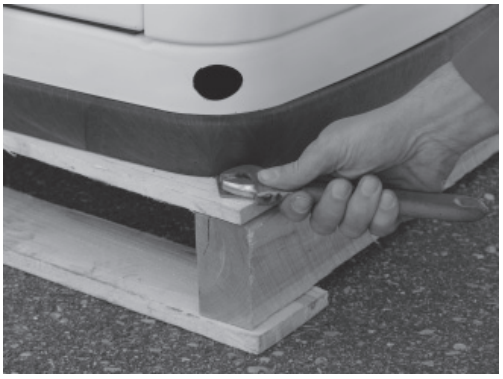
## SITE PREPARATION AND GENERATOR PLACEMENT



1. Locate the mounting area as close as possible to the transfer switch and fuel supply.
   Leave adequate room around the area for service access (check local code), and place high enough to keep rising water from reaching the generator.
   Choose an open space that will provide adequate and unobstructed airflow (see the “Location” section in the Owner’s Manual).



2. Place the unit so air vents won't become clogged with leaves, grass, snow or debris.
   Make sure exhaust fumes will not enter the building through eaves, windows, ventilation fans or other air intakes.
   Dig a rectangular area approximately five inches deep and about six inches longer and wider than the footprint of the generator. Cover with polyurethane film and fill with pea gravel or crushed stone. Compact and level the stone. A concrete pad can be poured if desired.



3. Inspect the generator for shipping damage and if necessary, file a claim with the shipper.
   Remove the bands holding the generator to the wooden pallet.



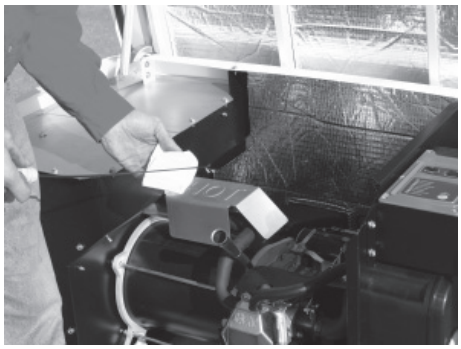
4. Make sure the lifting equipment to be used has sufficient capacity to safely handle the weight of the generator.
   Use nylon lifting straps and connect them to the lifting eyes on each corner of the base frame to avoid damaging the enclosure.



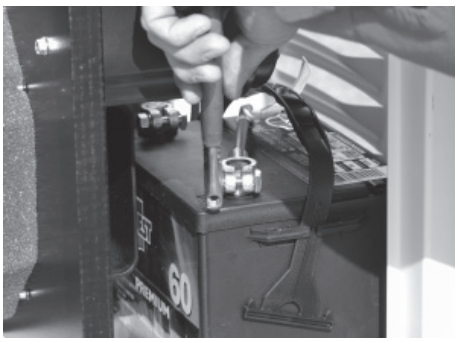
5. Set the generator onto the pad so that the gravel bed extends several inches beyond the generator on all sides.
   Make sure the generator is level within ½ inch.



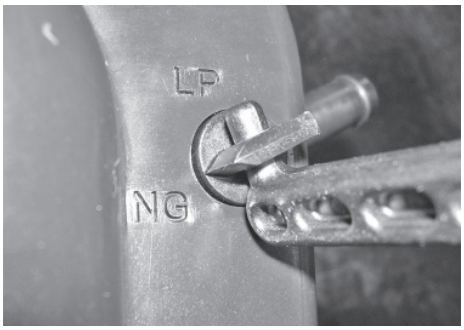

6. Connect an approved ground strap to the grounding lug on the base frame and to an approved earth ground or grounding rod as specified by local regulations.
7. Check the engine oil and, if necessary, add enough of the recommended oil to bring the level up to the FULL mark on the dipstick. Be careful not to overfill the crankcase.



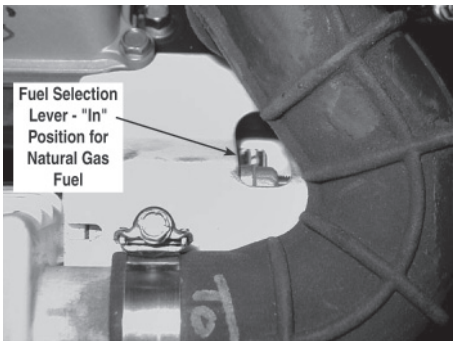
## CONVERTING TO LP VAPOR



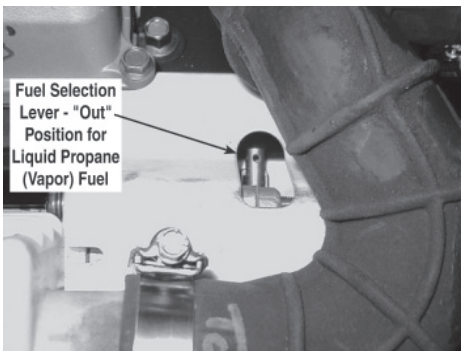
1. The generator was configured for natural gas operation at the factory. Switching over to LP Vapor is a simple procedure. On models with a single cylinder engine, begin by disconnecting and removing the battery if installed.



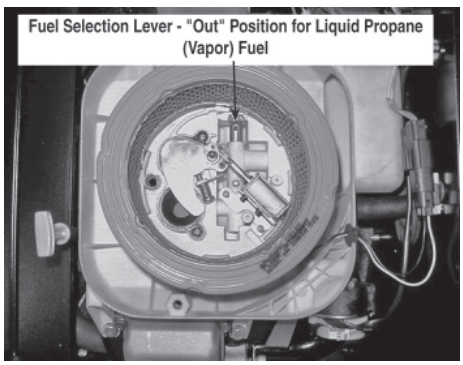

2. Take the plastic T-handle fuel selector in the poly bag supplied with the generator and locate the selector tab on the air box cover. Insert the pin end into the hole in the selector tab and pull outward to overcome spring pressure. Then twist clockwise 90 degrees and allow the selector to return in once aligned with the LP position.




3. On 10 kW units, open the roof, loosen the forward clamp on the air inlet hose, and slide the hose away from the hose fitting.




4. Slide the fuel selector pin on the carburetor out towards the back of the enclosure.
5. Replace the inlet hose and tighten the clamp securely.




6. On all other models, simply remove the air cleaner cover and slide the fuel selector pin outward from the natural gas to the LP position.

## INSTALLING & CONNECTING GAS LINES



1. Both natural gas and LP Vapor are highly volatile substances, so strict adherence to all safety procedures, codes, standards and regulations is essential.
   Gas line connections should be made by a certified plumber familiar with local codes. Always use AGA-approved gas pipe and a quality pipe sealant or joint compound.
   Verify the capacity of the natural gas meter or the LP tank in regards to providing sufficient fuel for both the generator and other operating appliances.



2. Most applications will require an external manual shutoff valve on the fuel line.



3. Where the gas line is to enter the generator, install a T-fitting to allow for gas pressure monitoring. On one opening of the fitting install a ¼" NPT nipple and threaded plug. In some cases a sediment trap may also be installed.



4. When connecting the gas line to the generator, use the provided section of UL Listed or AGA-approved flexible fuel line in accordance with local regulations. The purpose of the flexible fuel line is to ensure that vibration from the generator does not cause a gas leak at one of the connection points, so it's important that the line be installed with as few bends as possible.



5. Never bend the flexible fuel line to avoid using an elbow. Bending the flexible line decreases its ability to absorb vibrations and defeats its purpose as well as constricts the actual fuel flow.




6. After checking for leaks, check the gas pressure at the T-fitting installed earlier to make sure there's enough pressure for proper generator operation.
   The local gas supplier is responsible for ensuring adequate pressure, so if the pressure is too low, or if it's greater than 14 inches of water column, contact the gas supplier.

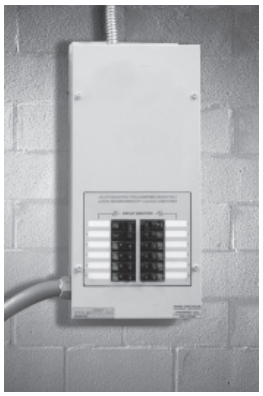


7. When finished checking the gas pressure, close the manual shutoff valve.

## BATTERY CHARGER INSTALLATION




1. If the generator came with a separately packaged battery charger, it may be necessary to install the charger, either in the generator or in the transfer switch. Refer to documentation included with the battery charger for installation and wiring of the battery charger.
   For applications with RTSN, RTSE and GenReady transfer switches the charger needs to be mounted in the generator. Refer to documentation included with the battery charger for installation and wiring of the battery charger.



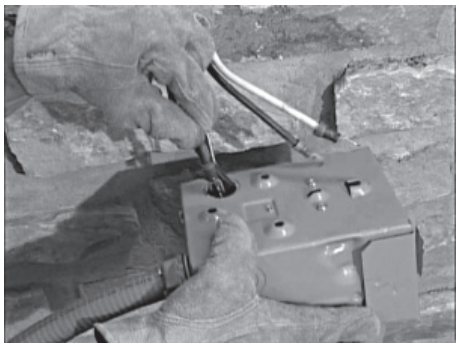


2. For applications with RTS Load Center switches and RTSS Load Shed transfer switches the charger has already been installed in the transfer switch. Discard the separately packed battery charger that came with the generator.

## EXTERNAL ELECTRICAL CONNECTIONS



1. Drill a 1 ¾ inch hole and feed the conduit through the hole.

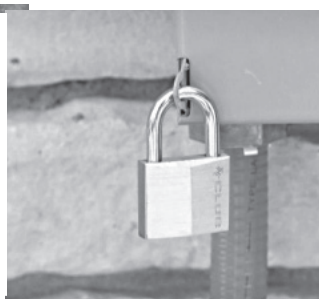


2. Remove the knockout in the back of the connection box, feed the wires through the back of the box and secure the conduit with the lock nut.
   Seal the hole with silicone caulk. Don't forget to caulk the hole inside the house as well.



3. Mount the connection box so that it completely covers the hole in the wall. Caulk around the sides and top of the box to ensure a good seal.
   Connect all wires to the lugs in the connection box (black to black, red to red and white to white). Attach the green ground wire to the ground screw and connect the two small plugs to their mating receptacle ends.



4. Replace the protective cover plate and retaining screw, and lock the connection box.





5. For 10-20 kW models, locate the metal hasp that is packaged in the owner's manual bag. Insert the hasp in the slot located on the left side of the external circuit breaker box. Be sure that the clip of the hasp is facing toward the front of the generator. If desired, lock the external box.

## GENERATOR CONNECTIONS – RTS LOAD CENTER TRANSFER SWITCH



1. If the generator comes with an external connection box and 5' seal-tite whip pre-wired and connected to the generator, no additional connections are necessary at the generator. Skip the following section and proceed with Appendix A, RTS Pre-Wired Load Center Transfer Switch Installation & Operational Testing.



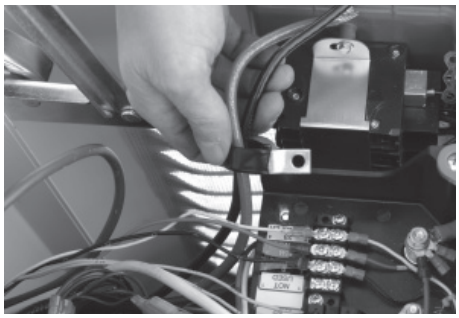
2. If the RTS Load Center transfer switch was purchased separately from the generator, the 5' seal-tite whip will need to be connected to the generator. To complete the wiring, run the ¾" conduit for the power leads and control wires from the external connection box to the generator.



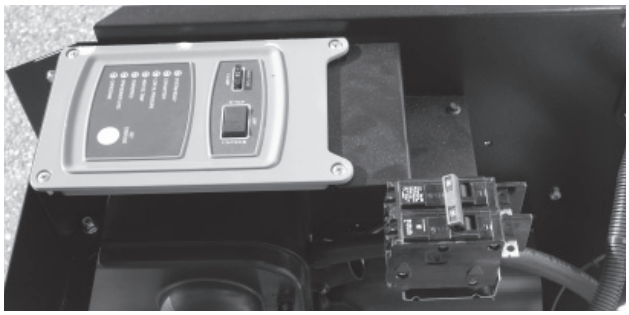
3. Remove the two screws securing the connection area cover, and remove the cover.



4. Feed the wires through the back of the generator and secure the conduit with the lock nut.



5. Run the power leads through the strain relief provided.



6. On 8 kW units, the main breaker is located inside the generator at the rear of the connection area.



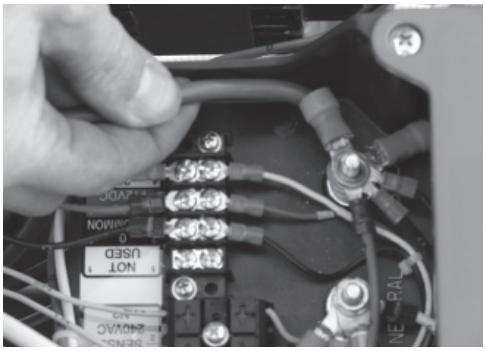
7. For all other models the circuit breaker is attached to the exterior access panel.



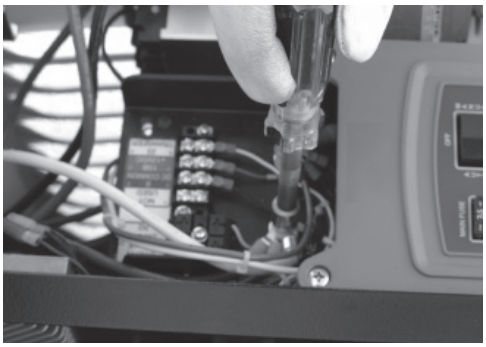
8. Remove the plastic plugs inside the main breaker access area to allow connection of the power leads to the circuit breaker.



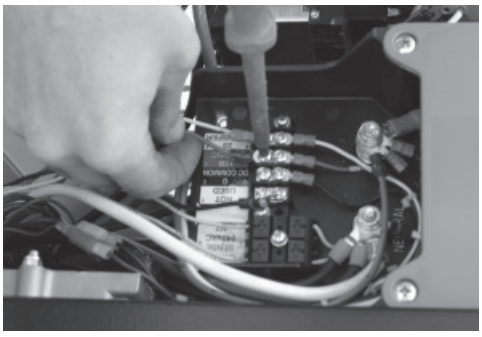
9. Now connect the red and black power leads to the circuit breaker. Since this is a single-phase application, it doesn't matter which wire is connected to which lug.



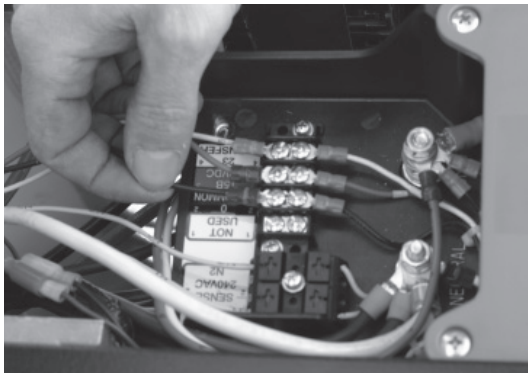
10. Connect the green equipment ground wire to the ground stud and torque to 80 inch lbs.



11. Connect the white neutral wire to the neutral post and torque to 100 inch lbs.

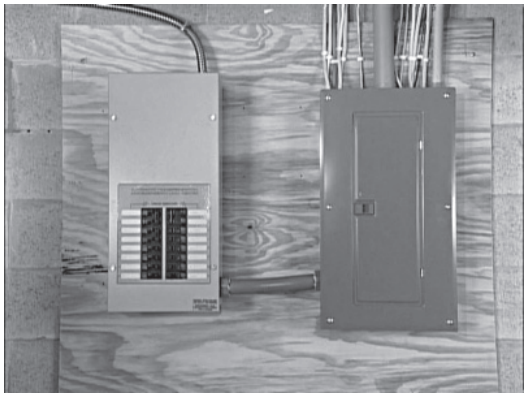


12. Connect the control wires to the correct terminals. The terminals are clearly marked N1, N2, 23 and 15B. If connecting a pre-wired switch a 0 (zero) wire will also be required.



13. If the battery charger was factory mounted in the transfer switch, 0 (zero) will also need to be connected between the generator and transfer switch.
14. An improperly connected control wire can damage the generator control board.

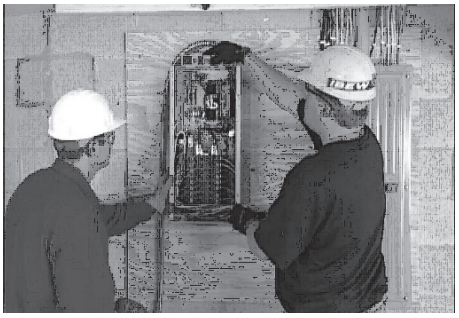
## APPENDIX A – RTS PRE-WIRED LOAD CENTER TRANSFER SWITCH INSTALLATION & OPERATIONAL TESTING



1. Before beginning any installation, make sure power is shut OFF to the main distribution panel and carefully read the Owner's Manual that came with the transfer switch.
   The distributed load center switch must be mounted close enough to the main distribution panel to accommodate the two-foot, pre-wired conduit. Make sure no water or corrosive substances can drip onto the transfer switch enclosure.



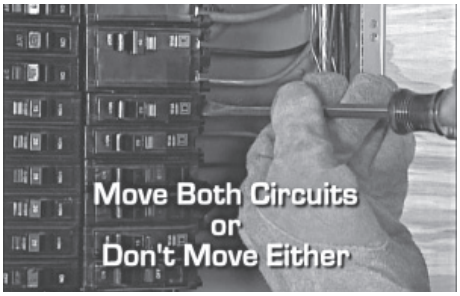
2. Always inspect the switch for shipping damage. Never mount a transfer switch that shows any evidence of damage.



3. Protect against impact and mount the switch vertically to a rigid support structure. Make sure the switch is level and plumb.
   The transfer switch is an open transition switch. Open transition switches prevent electrical feedback between the generator and the utility by only allowing load circuits to be connected to one power supply at a time.



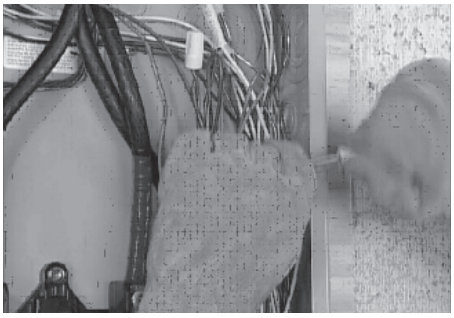
4. Each wire in the pre-wired transfer switch is color-coded to easily match circuits in the main panel to their new breakers in the transfer switch.



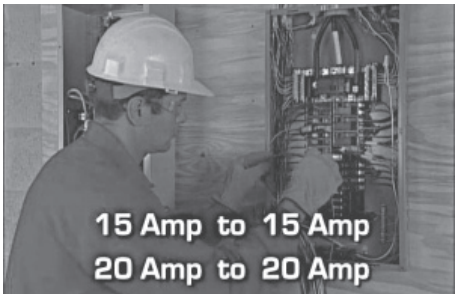

5. When three-conductor wiring is used, two 120 volt circuits will often share the same neutral wire. To avoid overloading the neutral, either move BOTH of the circuits that share the neutral or don't move either of them.



6. When moving two circuits with a shared neutral, they should be connected to adjacent positions (one above the other) in the transfer switch. That will assure that the two hot wires are on separate phases and will maintain their relationship to neutral.



7. Choose a circuit to be backed up and remove the power lead from the breaker.



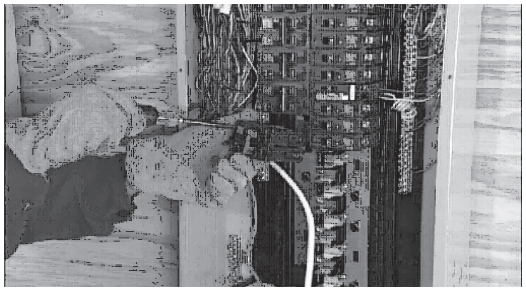

8. Using UL Listed wire nuts, reconnect the power lead to a matching breaker in the transfer switch.



9. Make sure each circuit moved is protected by the same size breaker in the transfer switch. 15 Amp circuits must be connected to 15 Amp breakers and 20 Amp circuits to 20 Amp breakers.



10. Connect the provided large neutral to the neutral bar in the distribution panel.



11. Install a 2-pole breaker in the distribution panel to protect the transfer switch. The required amp rating of the breaker depends on which transfer switch is used. If installing an 8-circuit, pre-wired load center switch, the breaker cannot exceed 40 Amps. For all other pre-wired load center switches the breaker cannot exceed 70 Amps. This breaker must be compatible with the existing electrical distribution panel. Install the breaker in two adjacent empty slots (one above the other) in the main panel.




12. When all priority circuits have been moved to the transfer switch, close the main breaker to restore utility power and make sure utility voltage at the transfer switch is correct. Refer to NFPA 70-E for the safety equipment required when working inside a live transfer switch.

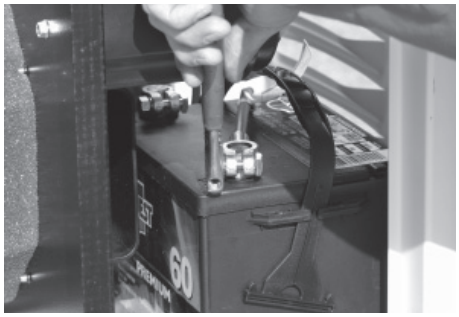


13. Before purchasing a battery for the generator, refer to the generator Owner's Manual for a list of recommended batteries. Follow all of the procedures and safety precautions in the Owner's Manual when installing the battery.

## ◆ BATTERY INSTALLATION



1. Before purchasing a battery for the generator, refer to the Owner's Manual for the recommended battery.
   - 8 kW: Group 26R, 12 Volt, 350cca minimum
   - 10-20 kW: Group 26R, 12 Volt, 525cca minimum

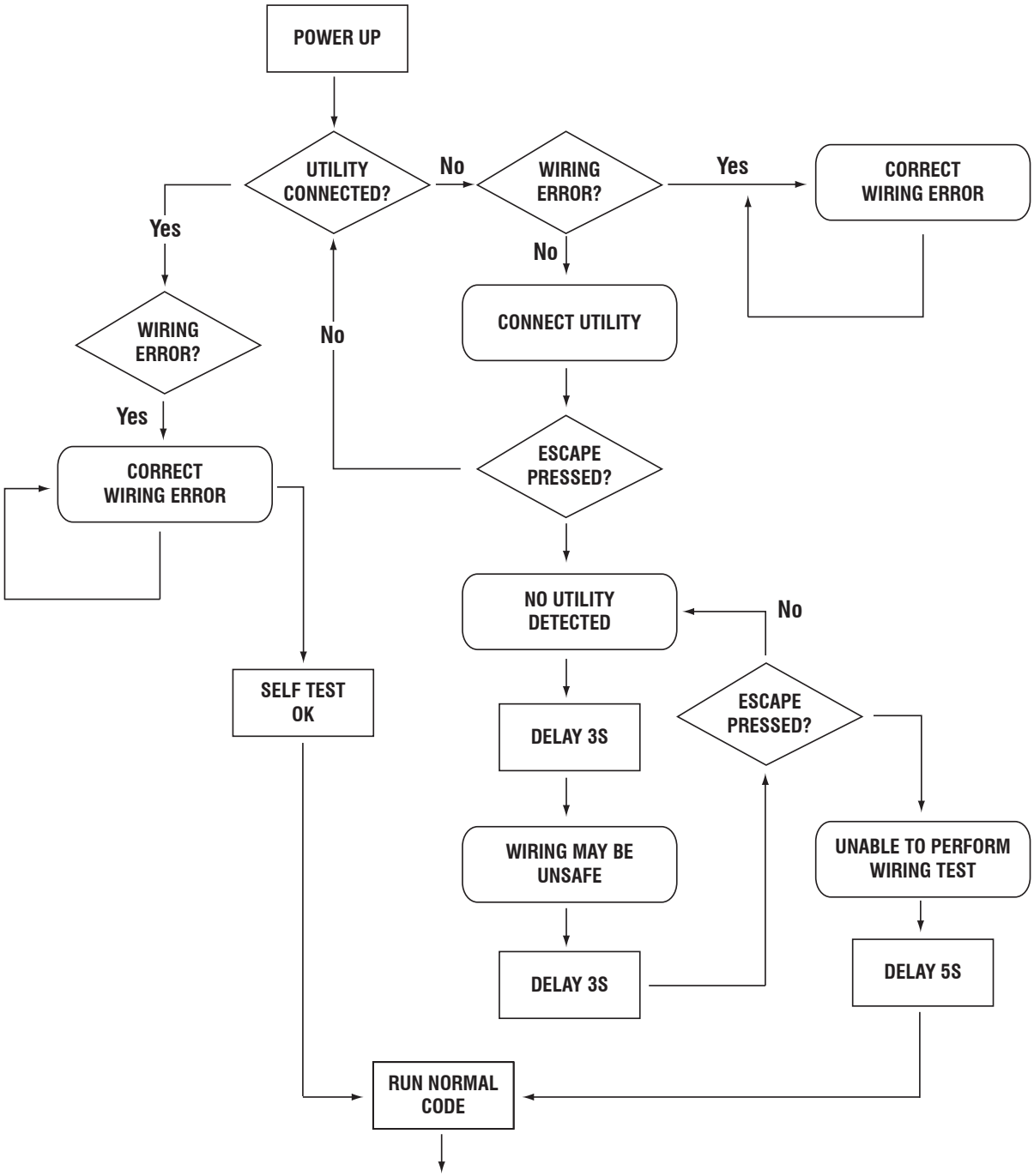


2. Follow all of the procedures and safety precautions in the generator Owner's Manual when installing the battery. Verify the switch is in the off position. When preparing for operational testing, DO NOT connect the battery until transfer switch connections are complete.

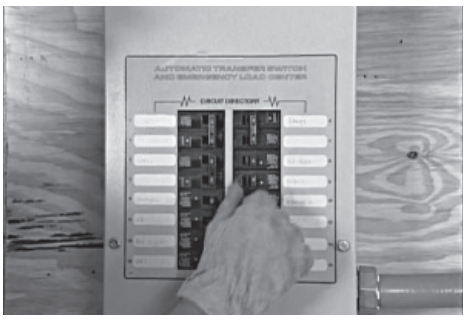
3. Battery Power-up: Interconnect system self test feature checks for the presence of utility voltage on the DC circuits at the control panel terminal blocks (see flow chart).

## ◆ OPERATIONAL TESTING

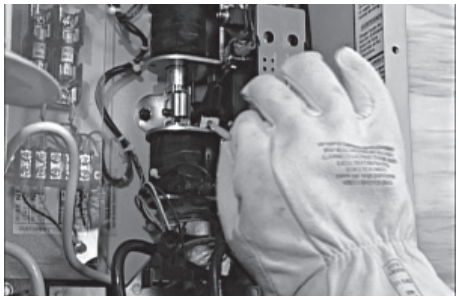




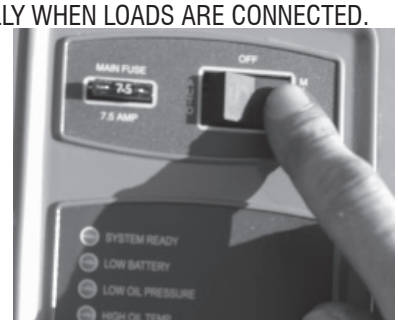
1. Switch the generator's main circuit breaker OFF and put the mode switch in the OFF position.



2. Make sure utility power is OFF and place all of the priority circuit breakers in the transfer switch in the OFF position.



3. Locate the transfer handle, insert the metal end into the slot in the main contactor assembly and pull the handle DOWN to move the main contacts to the standby power, or generator position.
   NEVER OPERATE THE TRANSFER SWITCH MANUALLY WHEN LOADS ARE CONNECTED.




4. Put the generator's mode switch in MANUAL to start the engine. Allow the engine to warm up, then switch the generator's main breaker to the ON position. The generator is now supplying electricity to the transfer switch but is not carrying any load.



5. For all models except the 8 and 10kW check to be sure that voltage and frequency from the generator is correct. If line-to-line voltage is not approximately 240 volts, refer to the Owner's Manual for the proper adjustment procedures. On all models, if line-to-neutral voltage is not 120 volts, check the neutral connection between the generator and transfer switch. For 8 kW models check to be sure that the frequency from the generator is correct. If the frequency is not approximately 60Hz, refer to the generator Owner's Manual for the proper adjustment procedure.



6. When finished checking the voltage, switch the generator's main circuit breaker OFF and put the mode switch in the OFF position to shut down the generator.



7. Make sure the 2-pole circuit breaker installed in the main distribution panel is in the OFF position.



8. Use the transfer handle to move the main contacts in the transfer switch to the UP (utility position). Switch the 2-pole breaker ON in the distribution panel.




9. Now switch the generator's main breaker ON, and put the mode switch in AUTO.



10. Shut OFF utility power and make sure the generator starts automatically.



11. If everything worked properly, switch the main breaker to ON and make sure that power is automatically transferred back to the utility.



12. After the engine has completed its cool down cycle and shut down, shut OFF utility power again.
    When the generator is supplying power to the transfer switch, move the breakers in the switch to the ON position, one at a time, until the generator has accepted the entire priority load.




13. With the generator carrying the entire priority load, recheck gas pressure to verify that it is at the same level it was before the generator was started.

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



14. Switch the main breaker ON to restore utility power.
    The generator will continue to run to allow the engine to cool down before shutting itself off.
    Shut off utility power again. The generator should start and the entire priority load should transfer to the generator.
    Close the main breaker to restore utility power and allow the engine to cool down and shut itself off.



15. Operational tests are now complete. Refer to – Setting the Automatic Exercise Function to complete the installation.

## APPENDIX B – RTSN AND RTSE TRANSFER SWITCH INSTALLATION & OPERATIONAL TESTING



1. Before beginning any installation, make sure power is shut OFF to the main distribution panel and carefully read the Owner's Manual that came with the transfer switch.
   To simplify the installation process, the transfer switch should be mounted as close to the main distribution panel as possible. Make sure no water or corrosive substances can drip onto the transfer switch enclosure.



2. Always inspect the switch for shipping damage. Never mount a transfer switch that shows any evidence of damage.



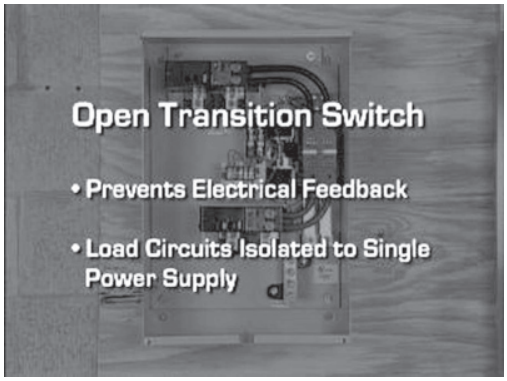
3. Protect against impact and mount the switch vertically to a rigid support structure. Make sure the switch is level and plumb. Check local codes before wiring the transfer switch. Some jurisdictions require that wiring inside the switch be done by a licensed electrician.




4. All wiring must be the correct size and type, and must conform to all codes, standards and regulations. Refer to the transfer switch Owner's Manual and the National Electrical Code for additional information.

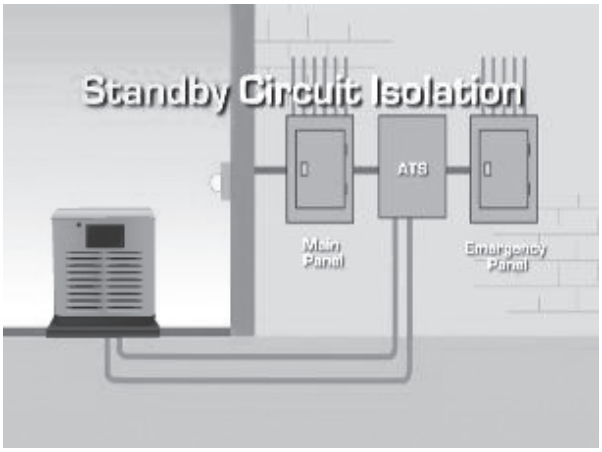


5. As with any product, design changes can occur over time, so always refer to the schematics in the transfer switch Owner's Manual for the required connections and safety precautions.



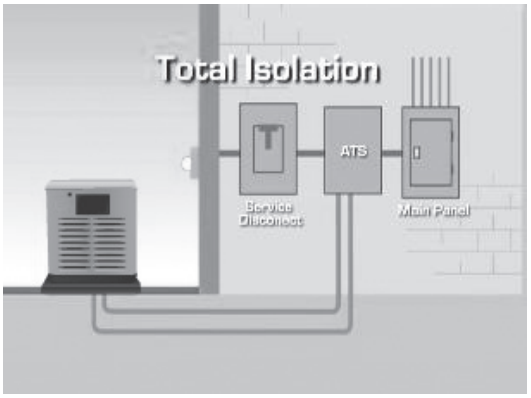

6. The transfer switch being used is an open transition switch. Open transition switches prevent electrical feedback between the generator and the utility by only allowing load circuits to be connected to one power supply at a time.

## ◆ SELECTED CIRCUIT COVERAGE



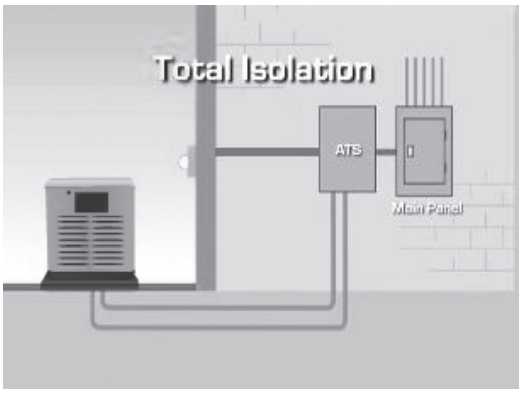

1. The generator powers only designated circuits that are grouped together and wired into a separate priority distribution panel. The transfer switch is installed between the main distribution panel and the priority panel.
   The amperage rating of the transfer switch must be equal to or greater than the highest amperage rating of the utility and generator breakers feeding the switch.

## ◆ WHOLE-HOUSE CIRCUIT COVERAGE

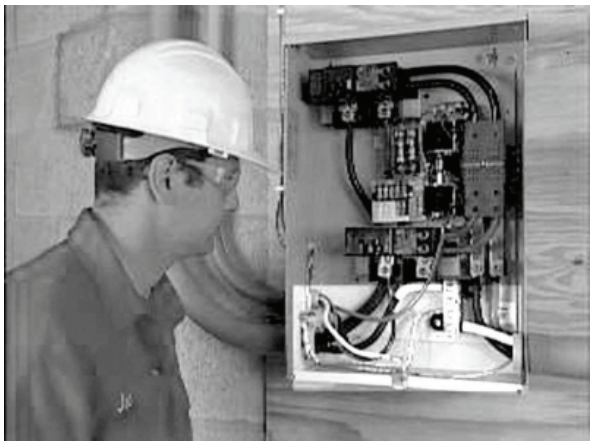



1. The generator will be backing up all electrical loads within the panel, so the amperage rating of the transfer switch must be equal to or greater than the amperage rating of the normal utility service.

Unless a service entrance rated transfer switch is used, a main service disconnect must be located before the transfer switch. The transfer switch must be installed between the utility service entrance and the building distribution panel.

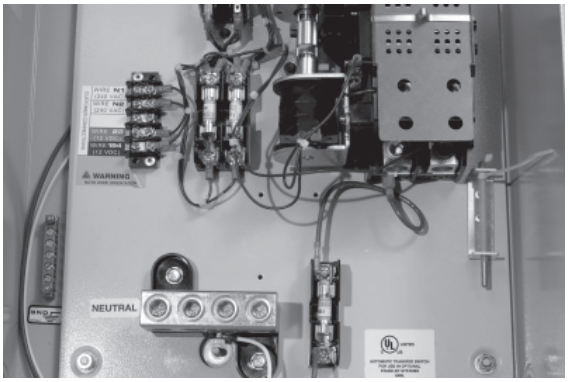



2. A service entrance rated transfer switch is installed between the service entrance and the main distribution panel. The service entrance rated switch becomes the main service so no service disconnect is needed. The existing main distribution panel becomes a sub-panel.



3. The grounding that is normally in the main panel must be accomplished in the service entrance rated switch and must be disconnected in the existing distribution panel. Refer to the National Electrical Code (NEC) for complete information on grounding and bonding.

## ◆ BATTERY CHARGER INSTALLATION

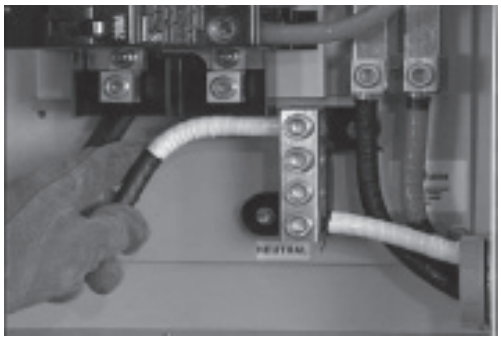



1. The battery charger is to be installed in the generator when using an RTSN or RTSE transfer switch. Refer to the Battery Charger Installation Guide for details.

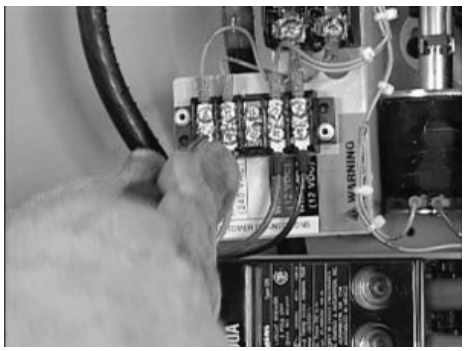
## ◆ ELECTRICAL CONNECTIONS



1. Connect the power leads from both the generator and the utility to the appropriate lugs in the transfer switch. The lugs are clearly marked in the switch.
   N = Normal Utility Supply
   E = Generator Connection Panel
   T = Load Distribution Panel



2. Neutral wires from both the utility and the generator are connected to the same neutral lug in the switch.



3. Connect the control wires from the generator to the terminal block in the transfer switch. The terminals are marked N1, N2, 23 and (194 or 15B). If the fourth terminal in the transfer switch is labeled 194, wire 15B from the generator will connect to terminal 194 in the transfer switch.

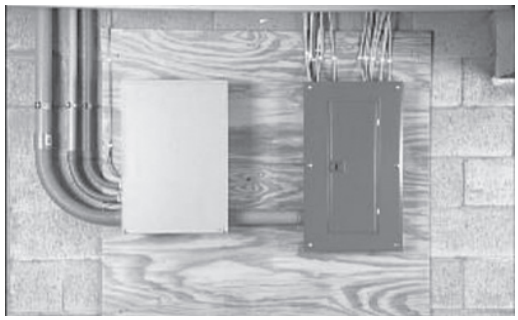


4. Complete the transfer switch wiring by connecting the equipment ground wires from both the utility and the generator to the ground lug.



5. Being careful to support the lugs, torque the lugs in the transfer switch to the specifications shown on the transfer switch. Decal located on the inside of the switch door.

## ◆ OPERATIONAL TESTING



1. If installing the RTSE switch, the service was changed so make sure the terminations are good before re-energizing the utility.



2 Switch the main utility breaker OFF. Refer to NFPA 70-E for the safety equipment required when working inside a live transfer switch.



3. Energize the utility and check line-to-line and line-to-neutral voltage at terminals N1 and N2 on the transfer contactor. If line-to-line voltage is not approximately 240 volts, de-energize utility power and check the terminations between the utility and N1 and N2.
If line-to-neutral voltage is not approximately 120 volts, de-energize utility power and check the neutral terminations.
Repeat the same voltage checks on terminals T1 and T2 to make sure current is flowing properly through the contactor.

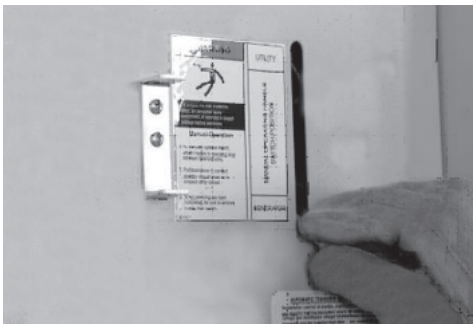





4. Switch the generator's main circuit breaker OFF and put the mode switch in the OFF position.



5. Make sure utility power is OFF and place all of the individual circuit breakers in the main distribution panel in the OFF position.



6. Locate the transfer handle, insert the metal end into the slot in the main contactor assembly. Pull the handle DOWN to move the main contacts to the standby power (generator) position. NEVER OPERATE THE TRANSFER SWITCH MANUALLY WHEN LOADS ARE CONNECTED.



7. Put the generator's mode switch in MANUAL to start the engine. Allow the engine to warm up, then switch the generator's main breaker to the ON position. The generator is now supplying electricity to the transfer switch but is not carrying any load.



8. For all models except the 8 and 10 kW check to be sure that voltage and frequency from the generator is correct. If line-to-line voltage is not approximately 240 volts, refer to the generator Owner's Manual for the proper adjustment procedures. On all models, if line-to-neutral voltage is not approximately 120 volts, check the neutral connection between the generator and transfer switch.
   For 8 kW models check to be sure that the frequency from the generator is correct. If the frequency is not approximately 60Hz, refer to the generator Owner's Manual for the proper adjustment procedure.



9. Switch the generator's main circuit breaker OFF and put the mode switch in the OFF position to shut down the generator.




10. With utility power still OFF, use the transfer handle to move the main contacts to the UP (utility) position.



11. Close the main breaker to turn utility power ON.



12. Switch the generator's main breaker to the ON position and put the mode switch in AUTO.



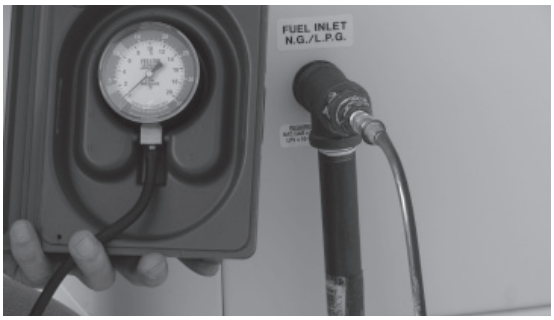
13. Shut OFF utility power and make sure the generator starts automatically after the line interrupt delay.



14. Switch the utility breaker to ON and make sure that power is automatically transferred back to the utility.



15. Shut OFF utility power again to automatically start the generator. When power has transferred to the generator, close each of the breakers in the distribution panel one at a time until the generator has accepted the entire load.




16. With the generator carrying the entire load, recheck gas pressure to verify that it's at the same level it was before the generator was started.

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



17. Switch the utility breaker ON to restore utility power to the home.



18. The generator will continue to run to allow the engine to cool down, then shut itself off.
19. Shut OFF utility power again. The generator should start and the entire priority load should transfer to the generator.

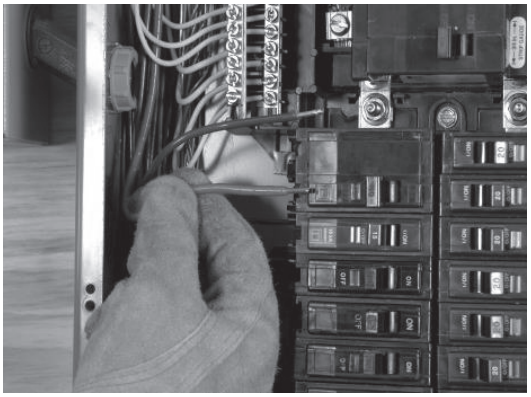


20. Close the main breaker to restore utility power and allow the engine to cool down and shut itself off.
    Operational tests are now complete. Refer to – Setting the Automatic Exercise Function to complete the installation.

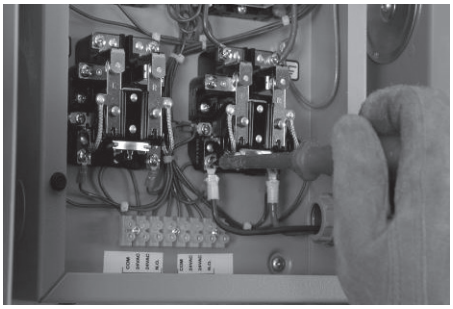
## APPENDIX C – POWERMASTER™ LOAD CONTROLLER INSTALLATION AND OPERATIONAL TESTING



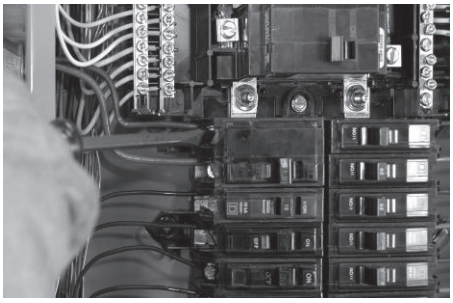
1. The PowerMaster load controller should be mounted as close to the main distribution panel as possible to avoid splicing. Refer to the instructions and wiring diagram in the PowerMaster Technical Manual before beginning the installation.



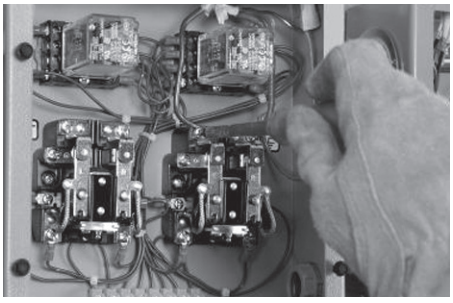
2. After making sure that all power supplies are shut off, remove the power leads from the 240 volt, 2-pole breaker that controls the selected appliance.



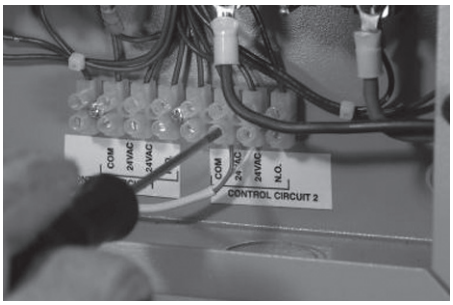
3. Using the ring lugs provided and the wire specified in the PowerMaster Technical Manual, connect one end of new power leads to one of the contactors in the load controller.



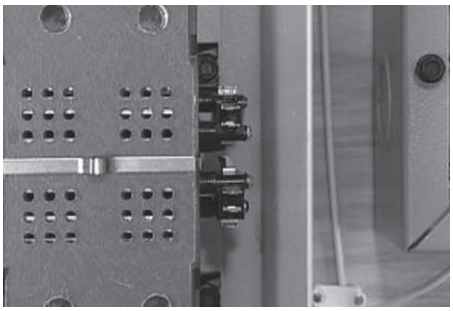
4. Connect the other end of the new power leads to the appliance breaker in the distribution panel.



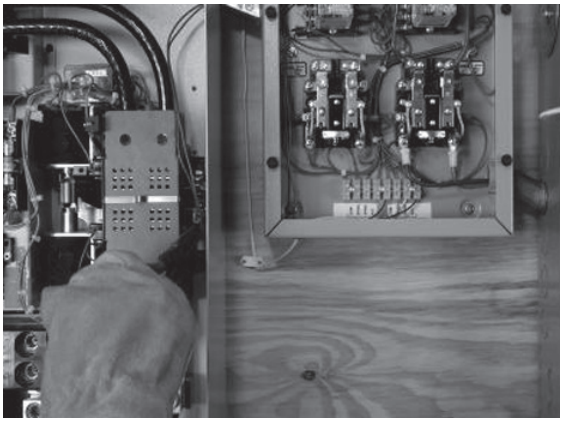
5. Connect the power leads that were removed from the appliance breaker to the load terminals in the controller.



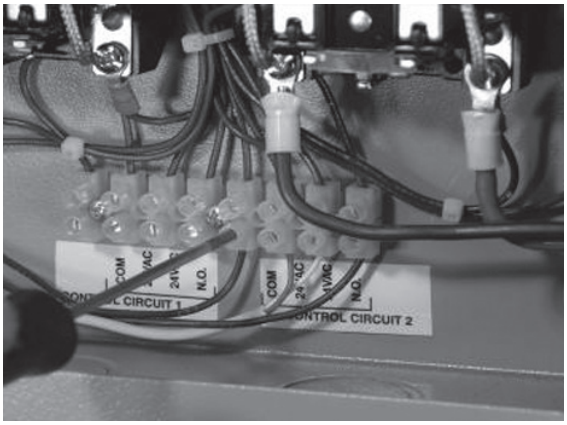

6. Now run 24 volt control wires from the air conditioning circuit to the terminal strip in the controller.



7. The auxiliary switches that came with the controller must be installed in the transfer switch. These switches ensure that the controller will only disconnect the selected appliances when utility power is off and the generator is running. Refer to the Technical Manual for specific instructions for installing the auxiliary switches.



8. Connect one end of two control wires to the COMMON and NORMALLY OPEN pins on the generator side of the transfer switch.




9. Connect the other ends of the control wires to the COMMON and NORMALLY OPEN positions of the selected control circuit in the controller.
   If moving a second load to the controller, follow the same procedure.

## ◆ OPERATIONAL TESTING






1. Switch the generator's main circuit breaker OFF and put the mode switch in the OFF position.




2. If using a service entrance rated transfer switch, put the generator disconnect switch in the ON position if applicable.



3. Make sure utility power is OFF and place all of the individual circuit breakers in the main distribution panel in the OFF position.




4. Locate the transfer handle and insert the metal end into the slot in the main contactor assembly. Pull the handle DOWN to move the main contacts to the standby power (generator) position.
NEVER OPERATE THE TRANSFER SWITCH MANUALLY WHEN LOADS ARE CONNECTED.






5. Put the generator's mode switch in MANUAL to start the engine. Allow the engine to warm up, then switch the generator's main breaker to the ON position. The generator is now supplying electricity to the transfer switch but is not carrying any load.



6. Check voltage and frequency from the generator. If line-to-line voltage is not 240 volts, refer to the Installation Guide for the proper adjustment procedures. If line-to-neutral voltage is not 120 volts, check the neutral connection between the generator and transfer switch.
Switch the generator's main circuit breaker OFF and put the mode switch in the OFF position to shut down the generator.




7. With utility power still OFF, use the transfer handle to move the main contacts to the UP (utility) position.




8. Close the main breaker to turn utility power ON.






9. Switch the generator's main breaker to the ON position an put the mode switch in AUTO.




10. Shut OFF utility power and make sure the generator starts automatically.




11. Switch the utility breaker to ON and make sure that power is automatically transferred back to the utility.



12. Shut OFF utility power again to automatically start the generator. When power has transferred to the generator, close each of the breakers in the distribution panel one at a time until the generator has accepted the entire load.




13. With the generator carrying the entire load, re-check gas pressure to verify that it's at the same level it was before the generator was started.



14. Switch the utility breaker ON to restore utility power to the home.



15. The generator will continue to run to allow the engine to cool down before shutting itself OFF.




16. Unhook the gas meter and reinstall the port plug on the regulator.

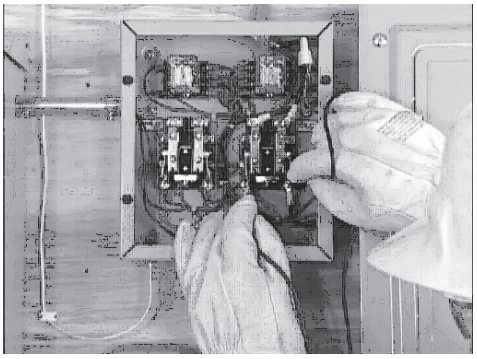


17. Shut OFF utility power again. The generator should start and the entire emergency load should transfer to the generator. Close the main breaker to restore utility power and allow the engine to cool down and shut itself OFF. If everything worked properly, the generator is now ready for automatic operation.

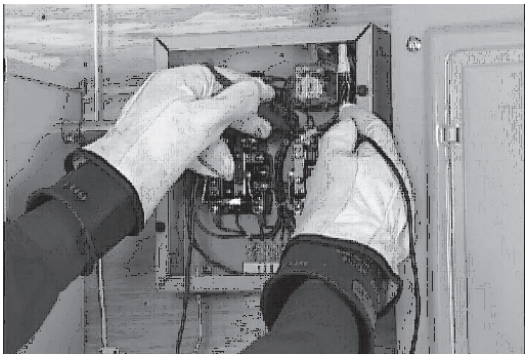
## ◆ CHECKING THE PRIORITY LOAD CONTROLLER



1. With utility power ON, make sure the central air conditioner will not start.



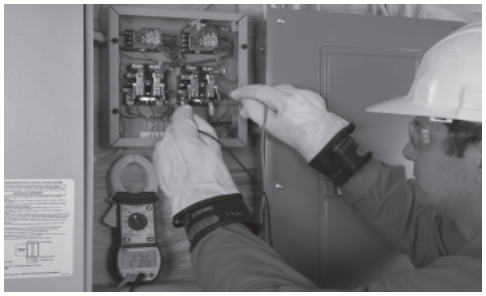
2. Using a multi-meter, make sure both the line and load sides of the contactors in the controller register 240 volts, and that the contactors are in the CLOSED position.



3. Start the central air conditioner and make sure the appliances selected are still working properly.



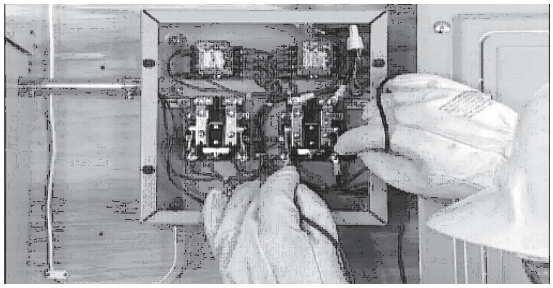
4. Make sure the central air conditioner will not start and simulate a power outage by shutting OFF utility power.



5. When the generator is carrying the entire load, check the voltage on the load side of the contactors to be sure the appliances connected to the controller are working properly.



6. With the generator still carrying the load, start the central air conditioner.



7. Check load side voltage again to be sure the selected appliances will not operate. Shut OFF the central air conditioner and re-check both line and load voltage to the selected appliances to be sure they are working again.



8. Turn the utility breaker back ON to restore utility power to the home.



9. The generator's engine will continue to run through a cool down period before shutting itself OFF.
   If everything worked properly, the generator is now ready for automatic operation.

## APPENDIX D – POWER MANAGER LOAD SHED TRANSFER SWITCH INSTALLATION AND OPERATIONAL TESTING



1. Before beginning any installation, make sure power is shut OFF to the main distribution panel and carefully read the Owner's Manual that came with the transfer switch.
   To simplify the installation process, the transfer switch should be mounted as close to the main distribution panel as possible. Make sure no water or corrosive substances can drip onto the transfer switch enclosure.
2. Always inspect the switch for shipping damage. Never mount a transfer switch that shows any evidence of damage.



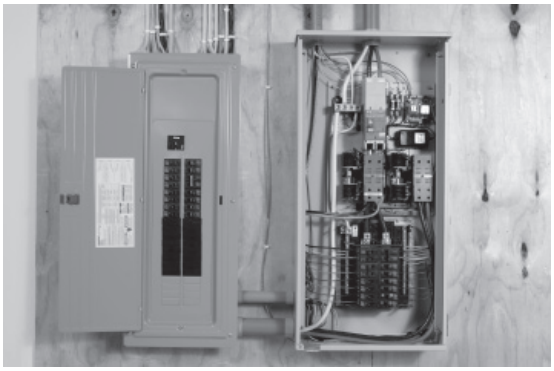
3. Protect against impact and mount the switch vertically to a rigid support structure. Make sure the switch is level and plumb.



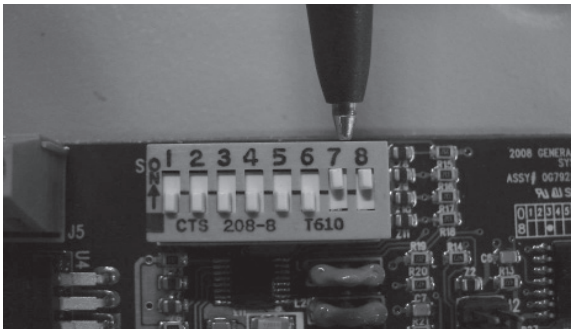

4. Check local codes before wiring the transfer switch. Some jurisdictions require that wiring inside the switch be done by a licensed electrician.



5. All wiring must be the correct size and type, and must conform to all codes, standards and regulations. Refer to the transfer switch Owner's Manual and the National Electrical Code (NEC) for additional information.
   As with any product, design changes can occur over time, so always refer to the schematics in the transfer switch Owner's Manual for the required connections and safety precautions.



6. The transfer switch being used is an open transition switch. Open transition switches prevent electrical feedback between the generator and the utility by only allowing load circuits to be connected to one power supply at a time.

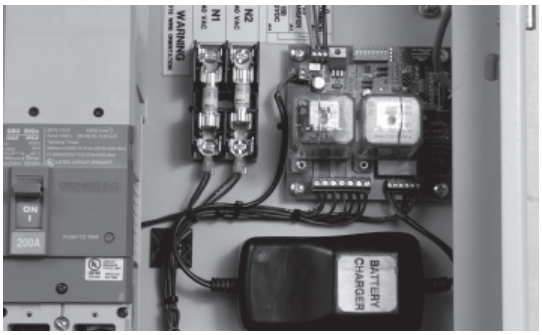



7. Locate the dip switches on the transfer switch control board and set them for the desired load shed delay as instructed in the transfer switch owner's manual.



8. The grounding that is normally in the main panel must be accomplished in the Power Manager Load Shed transfer switch and must be disconnected in the existing distribution panel. Refer to the National Electrical Code (NEC) for complete information on grounding and bonding.

## ◆ BATTERY CHARGER INSTALLATION

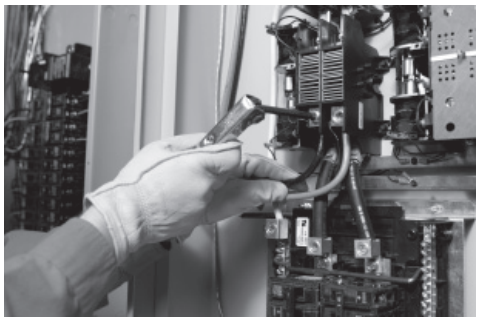



1. The battery charger is factory installed in the transfer switch.

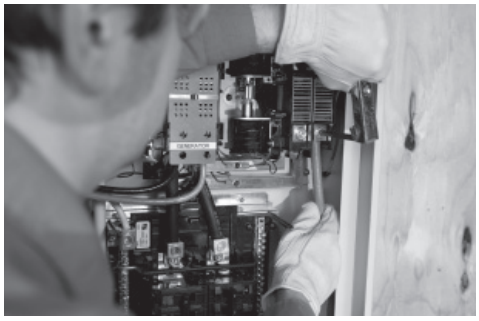
## ◆ ELECTRICAL CONNECTIONS



1. Connect the utility power leads from the meter to the Utility circuit breaker in the transfer switch.



2. Connect the generator power leads to the E1 and E2 terminals on the transfer switch contactor.



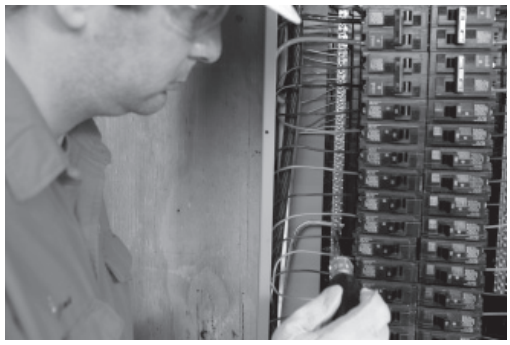
3. Connect the customer non-priority load leads to the E1 and E2 terminals on the load shed contactor.



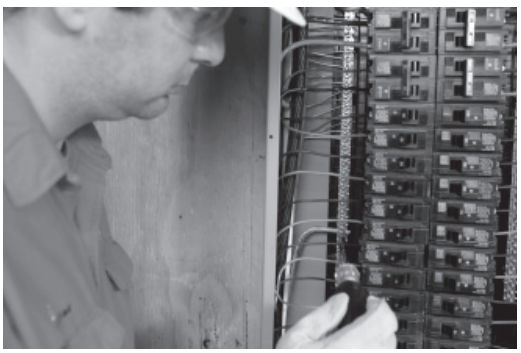
4. Be careful to support the lugs and torque the lugs in the transfer switch to the specifications shown in the transfer switch Owner's Manual.



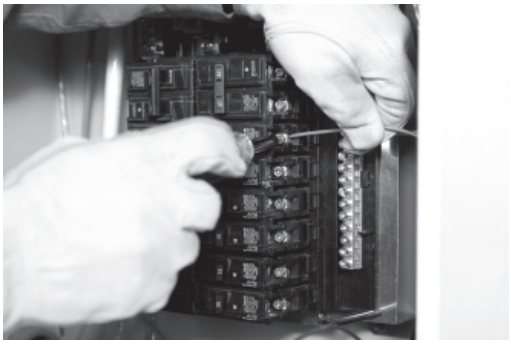
5. Neutral wires from the utility, generator and shedding panel are connected to the same neutral lug in the switch.



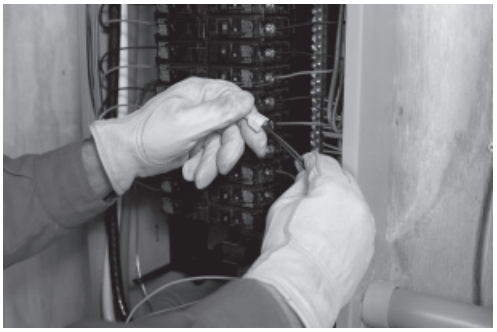
6. In this step, move priority load circuits, which will always be backed up by the generator, from the existing electrical distribution panel to the 16 circuit load center in the Power Manager Load Shed switch.



7. Select a priority circuit to be backed up and remove the power lead from the breaker.



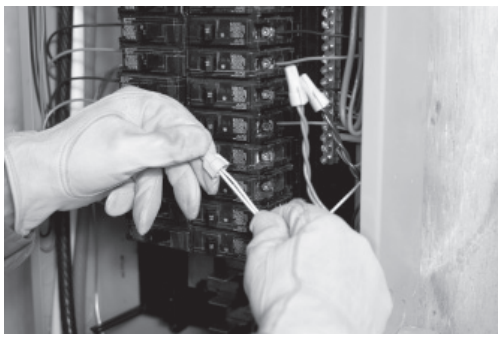
8. Reconnect the power lead to a matching breaker on the load center.



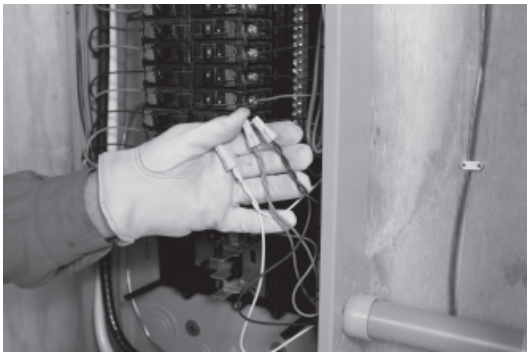
9. Make sure each circuit moved is protected by the same size breaker in the transfer switch. 15 Amp circuits must be connected to 15 Amp breakers and 20 Amp circuits to 20 Amp breakers.



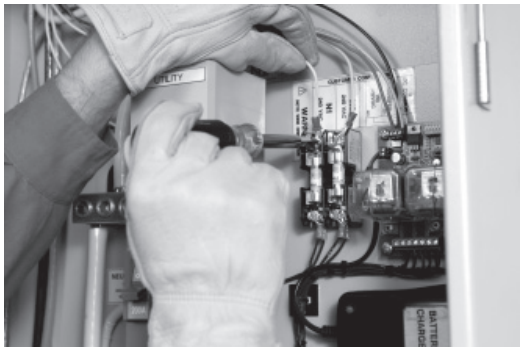
10. When three-conductor wiring is used, two 120 volt circuits will often share the same neutral wire. To avoid overloading the neutral, either move BOTH of the circuits that share the neutral or don't move either of them.



11. When moving two circuits with a shared neutral, they should be connected to adjacent positions (one above the other) on the load center. That will assure that the two hot wires are on separate phases and will maintain their relationship to neutral.



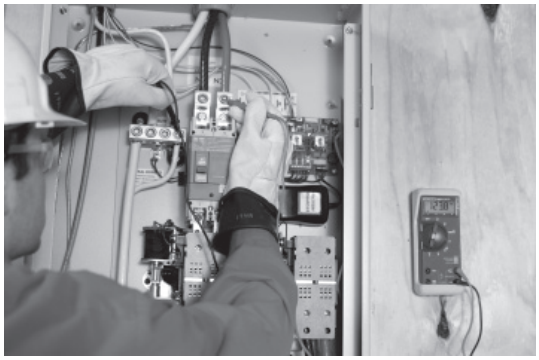
12. Remember that for every circuit moved from the main panel to the load center, the neutral will need to be relocated to the load center as well.



13. Connect the control wires from the generator to the terminal block in the transfer switch. The terminals are marked N1, N2, 23, 15B, and 0.



14. Complete the transfer switch wiring by connecting the equipment ground wire from the generator to the ground lug.



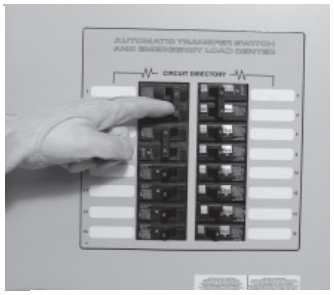
15. Close the Utility circuit breaker to restore utility power and make sure utility voltage at the transfer switch is correct. Refer to NFPA 70E for the safety equipment required when working inside a live transfer switch.

## ◆ OPERATIONAL TESTING




1. Before energizing utility power to the service, make sure the main breaker is in the open (OFF) position.





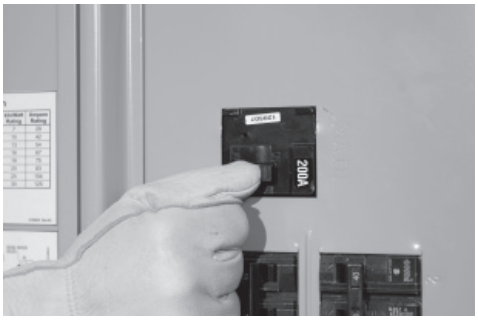
2. Next, make sure all of the individual circuit breakers in both the priority load center and in the non-priority sub-panel, are in the OFF position. If the sub-panel has a primary breaker, make sure it is in the OFF position as well.



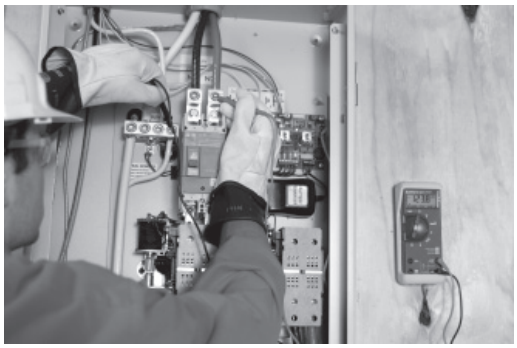

3. Locate the yellow transfer handle, insert the metal end into the slot for the transfer switch contactor assembly and move it UP into the UTILITY position.




4. Next, insert the transfer handle into slot in the non-essential load shed switch assembly and move the contactor DOWN into the closed position.
   NEVER OPERATE THE TRANSFER SWITCH MANUALLY WHEN LOADS ARE CONNECTED.



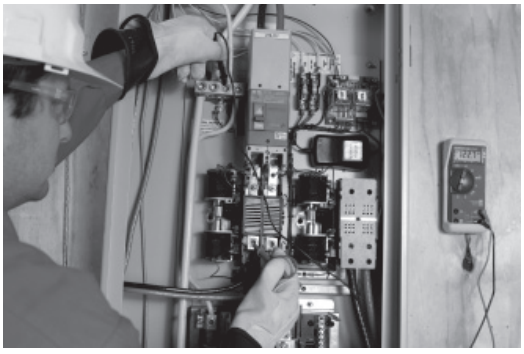

5. With the main breaker OFF, energize the utility and check the voltage at terminals N1 and N2 on the transfer contactor. If utility voltage is not approximately 240 volts, de-energize utility power and check all of the terminations between the utility and N1 and N2.



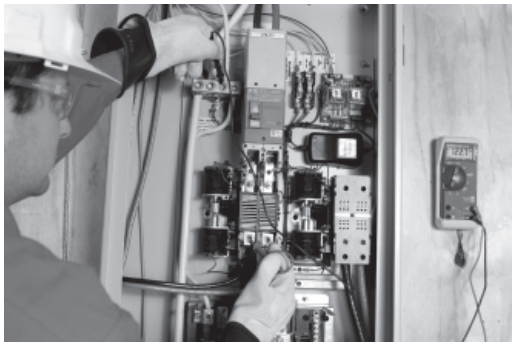
6. Check line-to-neutral voltage on N1 and N2. If voltage is not approximately 120 volts, de-energize utility power and check all of the neutral terminations between the utility and N1 and N2.



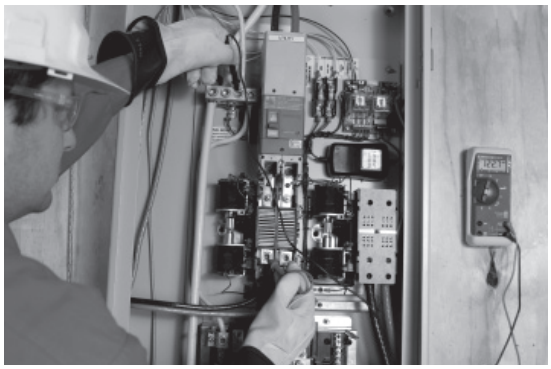

7. With all branch circuit breakers still OFF, close the main breaker by switching it to the ON position.



8. Check line-to-line voltage on terminals T1 and T2. If line-to-line voltage is not approximately 240 volts at any point in the system, switch the main breaker OFF and check terminations.



9. Next, make sure line-to-neutral voltage at T1 and T2 is approximately 120 volts. If line-to-neutral voltage is not approximately 120 volts at any point in the system, check neutral terminations.



10. Make sure there is no voltage on terminals E1 and E2 at the transfer switch contactor. If voltage is present, switch the main breaker OFF and check the terminations.



11. Next, check the voltage to the load shedding switch.



12. Check both line-to-line and line-to-neutral voltage on terminals E1 and E2. Terminations to T1 and T2 were made at the factory, but still make sure that voltage is correct at these terminals.

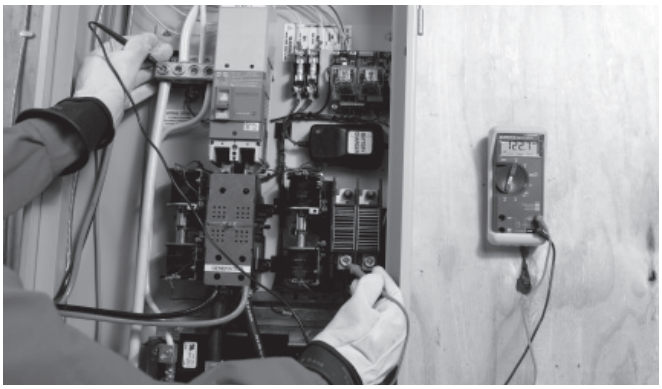


13. Now check the terminations in the sub-panel. If there is a primary breaker in the sub-panel, make sure it is in the OFF position. Then check line-to-line and line-to-neutral voltage at the primary breaker.

## ◆ VERIFYING LOAD SHEDDING OPERATION



1. Switch the main breaker OFF. If there is a primary breaker in the sub-panel, make sure it is in the closed (ON) position.



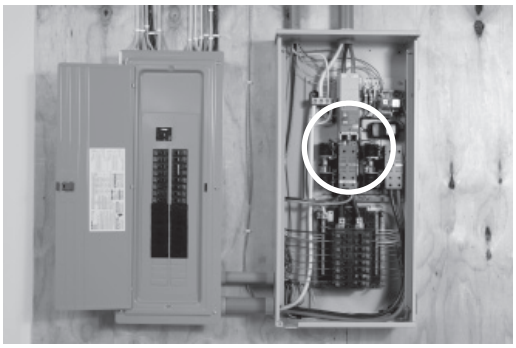
2. Make sure the transfer switch contactor is still in the UP (UTILITY) position, and use the transfer handle to move the non-essential load shed contactor UP to the open (SHED) position. To move the non-essential load shed contactor UP to the open (SHED) position.



3. With all branch circuit breakers still OFF, switch the main breaker ON. The load shed contactor should automatically move DOWN to the closed position, verifying that the load shedding switch is working properly.



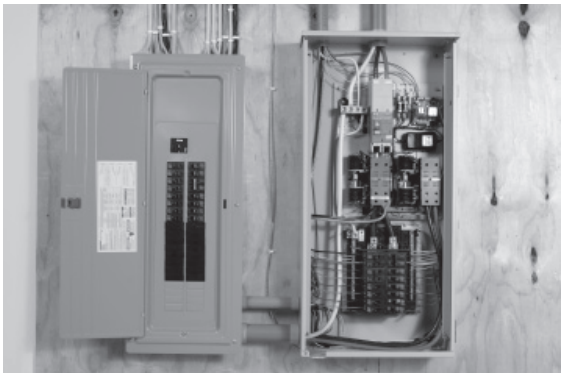
4. If not, switch OFF the main breaker, make sure all breakers and both contactors are in their correct positions and repeat the test.



5. Make sure that both the main breaker and the primary sub-panel breaker are closed (ON), all branch circuit breakers are open (OFF) and that the contactors for both the transfer switch and non-essential load shed switch are in the UTILITY position.




6. With the generator's main breaker OFF, place the mode switch in MANUAL to start the engine.



7. For all models except the 8 and 10kW check to be sure that output voltage from the generator is correct. If line-to-line voltage is not approximately 240 volts, refer to the generator Owner's Manual for the proper adjustment procedure. On all models, if line-to-neutral voltage is not 120 volts, check the neutral connection between the generator and transfer switch. For 8 kW models check to be sure that the frequency from the generator is correct. If the frequency is not approximately 60Hz, refer to the generator Owner's Manual for the proper adjustment procedure.
8. On all models, make sure line-to-line voltage on the control wires ( N1 and N2) is correct.




9. Using the mode switch, place the generator in AUTO. If utility power is still present, the generator will shut down.



10. Switch the generator's main breaker ON. The generator is now ready for automatic operation.

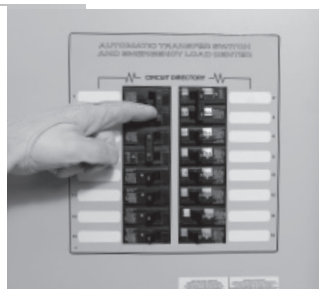



11. Shut OFF utility power at the transfer switch. The generator should start, and after a brief delay, the transfer contactor should move to the generator position.

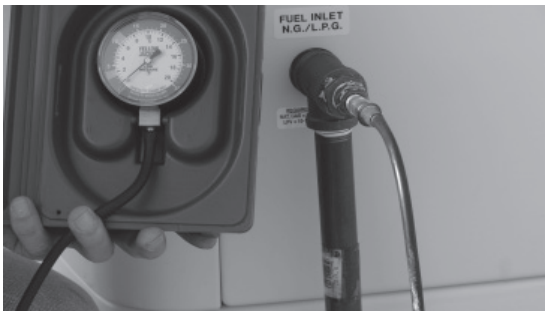


12. Switch the main breaker ON and make sure that power transfers back to the utility. The generator should shut down and go through a short cool-down cycle.





13. Shut OFF utility power again to automatically start the generator. When power has transferred to the generator, close each of the breakers in the priority load center, one at a time, until the generator has accepted the entire priority load.
14. Now close each of the breakers in the non-priority sub-panel one at a time until the generator has accepted the entire non-priority load. Be aware that should the generator become overloaded in the process, the Load Shed contactor will automatically move UP to the disconnect position, removing power from the non-priority loads. If this happens, it simply confirms that the load shedding switch is working properly. Close the remainder of the non-priority breakers.




15. With the generator carrying either the entire load (or the priority loads if the non-priority loads were shed) re-check gas pressure to the generator to verify that it's at the same level it was before the generator was started.




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



16. Switch the utility breaker ON to restore utility power to the home.



17. The generator will continue to run to allow the engine to cool down before shutting itself OFF.



18. Shut OFF utility power again. The generator should start and the entire load should transfer to the generator. If the load is too large, the non-essential load shed switch will automatically shed the non-priority loads.





19. Close the main breaker to restore utility power and allow the engine to cool down and shut itself OFF.
    Operational tests are now complete. Refer to Appendix F – Setting the Automatic Exercise Function to complete the installation.

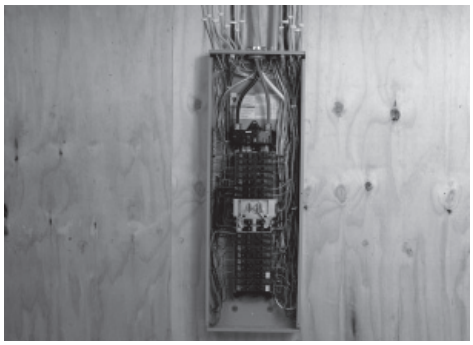
# APPENDIX E – GENREADY LOAD CENTER INSTALLATION AND OPERATIONAL TESTING



1. Before beginning any installation, make sure power is shut OFF and carefully read the Owner's Manual that came with the load center.
   When choosing a location for the load center, make sure no water or corrosive substances can drip onto the enclosure.
2. Always inspect the load center for shipping damage. Never mount a load center that shows any evidence of damage.



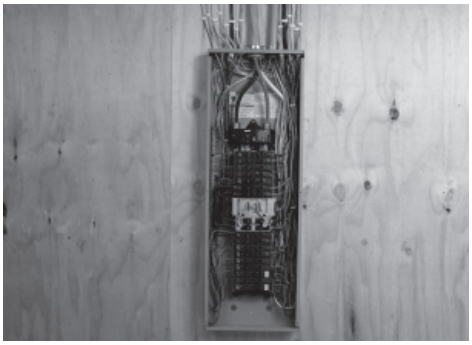

3. Check local codes before wiring the load center. Some jurisdictions require that wiring inside the load center be done by a licensed electrician.



4. Protect against impact and mount the load center vertically to a rigid support structure. Make sure the load center is level and plumb.



5. All wiring must be the correct size and type, and must conform to all codes, standards and regulations. Refer to the load center Owner's Manual and the National Electrical Code (NEC) for additional information.
   As with any product, design changes can occur over time, so always refer to the schematics in the load center Owner's Manual for the required connections and safety precautions.



6. The load center being used contains, or will contain, an open transition operator. Open transition prevents electrical feedback between the generator and the utility by only allowing load circuits to be connected to one power supply at a time.



7. If the load center will serve as the service entrance for the house, install the ground to neutral bond. Refer to the National Electrical Code (NEC) for complete information on grounding and bonding.

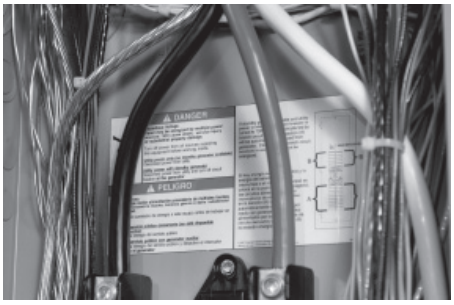
## ◆ BATTERY CHARGER INSTALLATION



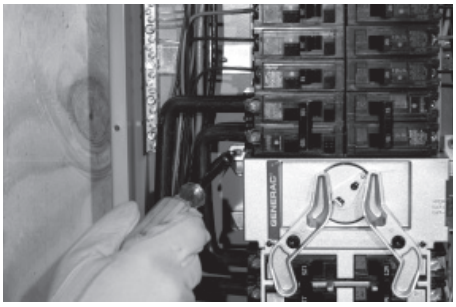

1. The generator battery charger is to be installed in the generator when using a GenReady load center. Refer to the Battery Charger Installation Guide for details.

## ◆ ELECTRICAL CONNECTIONS

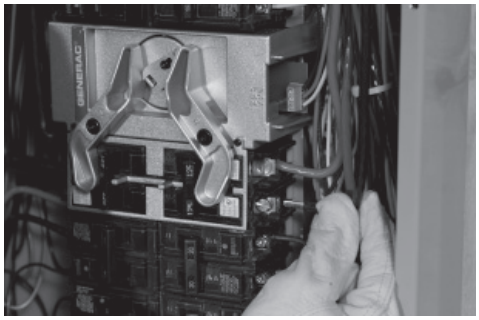
1. Connect the utility power leads from the meter to the main Utility circuit breaker in the load center.



During installation, be careful to torque the lugs on all circuit breakers to the specifications listed in the load center Owner's Manual.



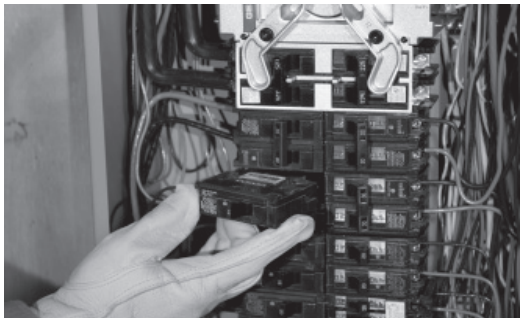
2. If the load center is being installed with a generator, locate and install the load center operator. Refer to the installation instructions packed with the operator for installation details.



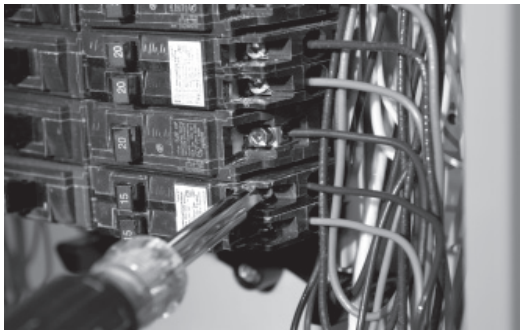
3. Connect the generator power leads to the generator feed breaker. This is the 2 pole breaker directly below the operator on the right side of the load center.



4. Connect the neutral wire from the utility and generator to the neutral bar on the right side of the load center panel and the generator equipment ground wire to the ground bar on the left side of the load center panel.



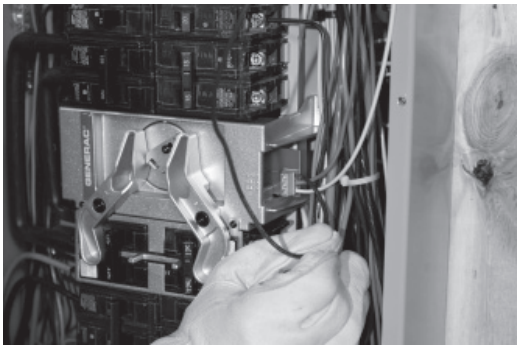
5. Connect the customer loads to the load center. The breakers above the operator are used for loads which will not be backed up during a power outage. Connect these loads to the appropriate sized breakers in the load center. When selecting circuits, note that the breakers immediately above and below the operator are dedicated for use by the generator and load center, and may not be used for customer loads.



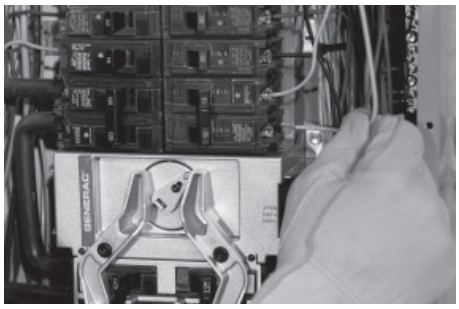
6. Next, connect the loads which are to be backed up. The breakers below the operator will be backed up by the generator during a power outage. Connect these loads to the appropriate sized breakers in the load center.



7. If the generator is not being installed at this time, loads can still be connected to the lower breakers. Simply make sure the utility feed breaker, the 2 pole breaker directly below the operator on the left side of the load center, is switched ON.



8. Connect the control wires from the generator to the load center operator. Connect the 23 wire to the XFER terminal, 15B to the BAT+ terminal, and 0 to the BAT- terminal.

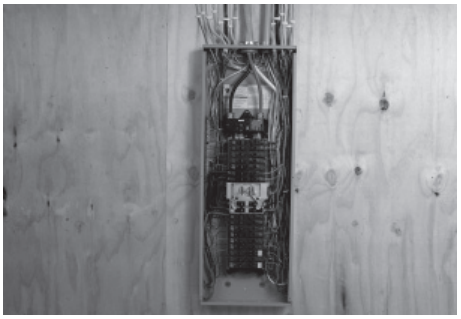



9. Connect the voltage sensing wires to the sense breaker. This is the 2 pole breaker directly above the operator on the right side of the load center. Connect N1 to one pole of the breaker, and N2 to the other.



10. Switch ON the main utility breaker if not already on and switch on the utility supply breaker for the priority circuits. Make sure utility voltage at the load center is correct. Refer to NFPA 70E for the safety equipment required when working inside a live load center.

## ◆ OPERATIONAL TESTING



1. The following operational tests are meant to be performed with a fully installed system. If the GenReady panel was installed without a generator, these tests cannot be performed.



2. Switch the generator's main circuit breaker OFF and put the mode switch in the OFF position.



3. Switch the main utility breaker OFF and place all of the individual protected branch circuit breakers (located below the transfer operator) in the OFF position.



4. Manually switch the generator circuit breaker (just below the transfer operator) to the ON position. This will also move the utility feed circuit breaker to the OFF position.
NEVER MOVE THE LOAD CENTER FEED BREAKERS MANUALLY WHEN LOADS ARE CONNECTED.



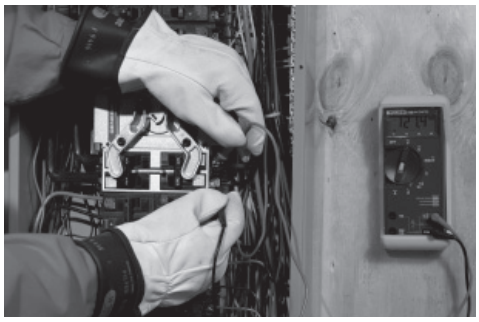

5. With the generator's main breaker OFF, put the mode switch in MANUAL to start the engine.



6. Allow the engine to warm up, then switch the generator's main breaker to the ON position. The generator is now supplying electricity to the lower half of the load center but is not carrying any load.



7. For all models except the 8 and 10 kW check to be sure that voltage from the generator is correct. If line-to-line voltage is not approximately 240 volts, refer to the generator Owner's Manual for the proper adjustment procedure. On all models, if line-to-neutral voltage is not 120 volts, check the neutral connection between the generator and load center.



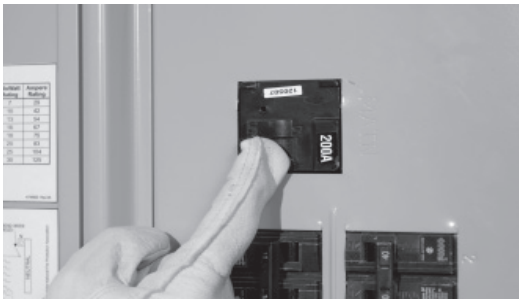
8. For 8 kW models check to be sure that the frequency from the generator is correct. If the frequency is not approximately 60Hz, refer to the generator Owner's Manual for the proper adjustment procedure.



9. Switch the generator's main circuit breaker OFF and put the mode switch in the OFF position to shut down the generator.




10. With utility power still OFF, switch the utility feed breaker (below the transfer operator on the left side of the load center) ON. This will also move the generator feed breaker to the OFF position.

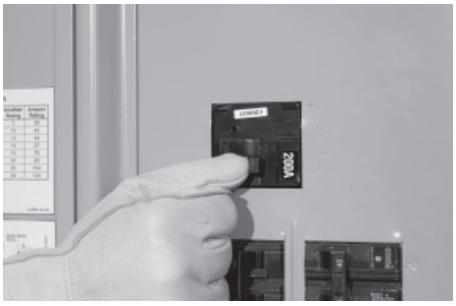



11. Switch the main utility breaker ON to restore utility power.






12. Switch the generator's main breaker ON and put the mode switch in AUTO.




13. Shut OFF utility power at the main utility breaker and make sure the generator starts automatically.




14. Switch the main utility breaker to ON and make sure that power on the lower half on the load center is automatically transferred back to the utility. This can be verified by noting the position of the utility feed and generator feed breakers.



15. Shut OFF utility power again to automatically start the generator. When power on the lower half of the load center has transferred to the generator, turn ON each of the branch circuit breakers in the lower half of the load center, one at a time, until the generator has accepted the entire priority load.




16. With the generator carrying the entire priority load, re-check gas pressure to verify that it's at the same level it was before the generator was started.

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

## APPENDIX F - SETTING THE AUTOMATIC EXERCISE FUNCTION






1. To set the exercise on 8 kW models, make sure with the mode switch is in AUTO. Press and hold down the EXERCISER switch for at least 10 seconds and release. The generator should start within a few seconds. The unit will run for about 12 minutes before shutting itself down automatically.
   If the battery is ever disconnected or the fused is removed for any reason, the exercise function will have to be reset.



2. On all other models, the display will enter an Installation Assistant mode when battery power is first connected. The assistant will prompt to first enter the current date and time, followed by the exercise day and time.
   If the battery is ever disconnected and reconnected, or fuse removed and replaced, the Installation Assistant will be displayed again, but only the current date and time will need to be entered.




3. If the exercise time or day ever needs to be changed, press the escape key to access the main menu.




4. Press the left or right arrow key until 'Edit' is flashing and press enter.




5. Press the right or left arrow key until the exercise time is displayed and press enter.




6. Using the arrow and enter keys first set the exercise hour in 24 hour format, followed by the minute, and finally the day.



7. Once set, the generator will exercise each week at the same time. Be sure to show the owners how to set the exercise function for the day and time they want the unit to exercise.




8. If the generator is equipped with the low speed exercise feature, it was enabled at the factory and no adjustment is needed.

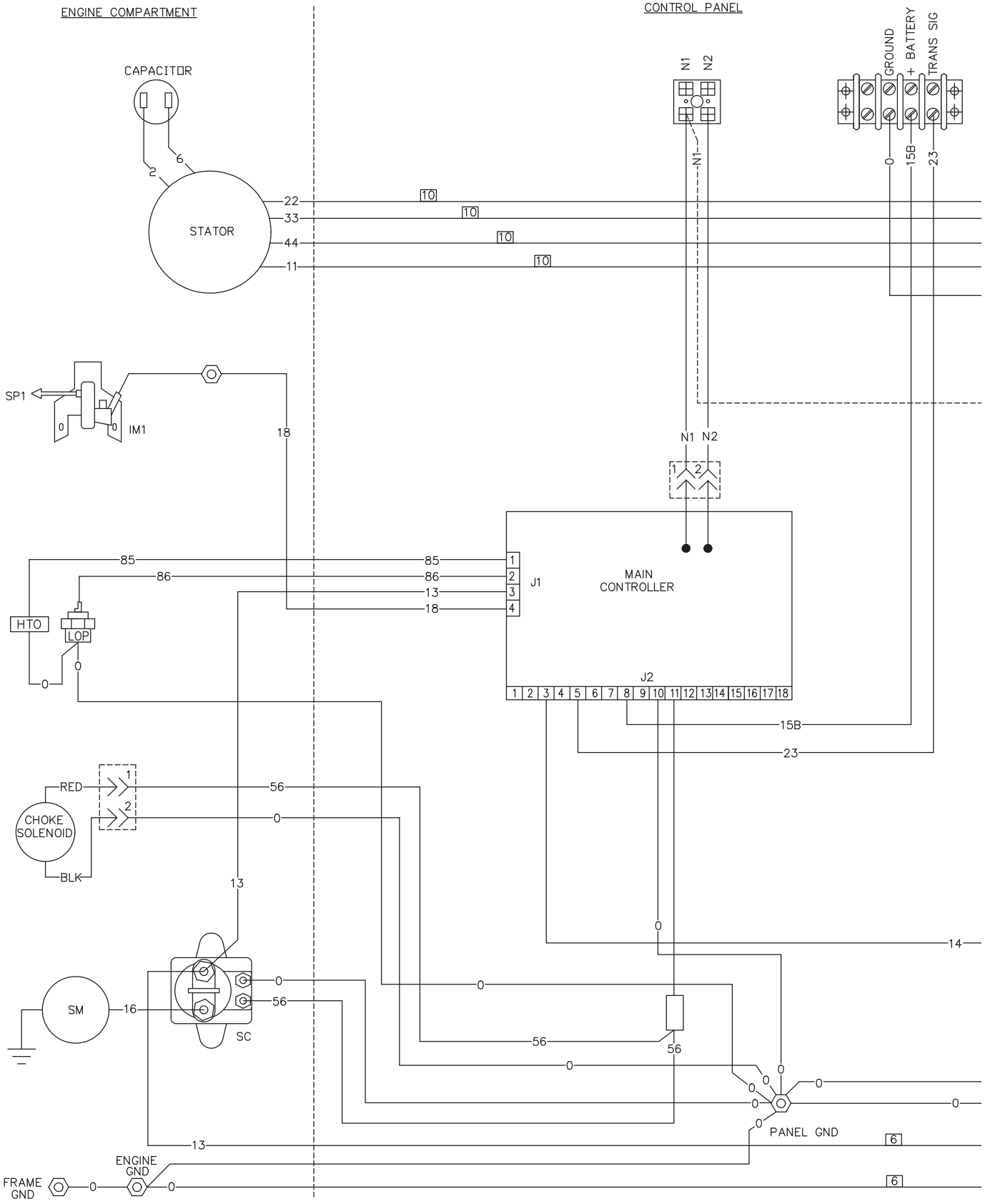
Every installation has its own unique set of circumstances and requirements. This booklet provides guidelines for basic installations only and is not intended to cover all applications. If there are any questions or concerns after carefully reading all documentation received with the equipment, contact the nearest dealer for assistance.

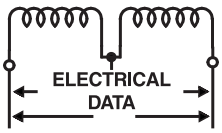
## NOTES

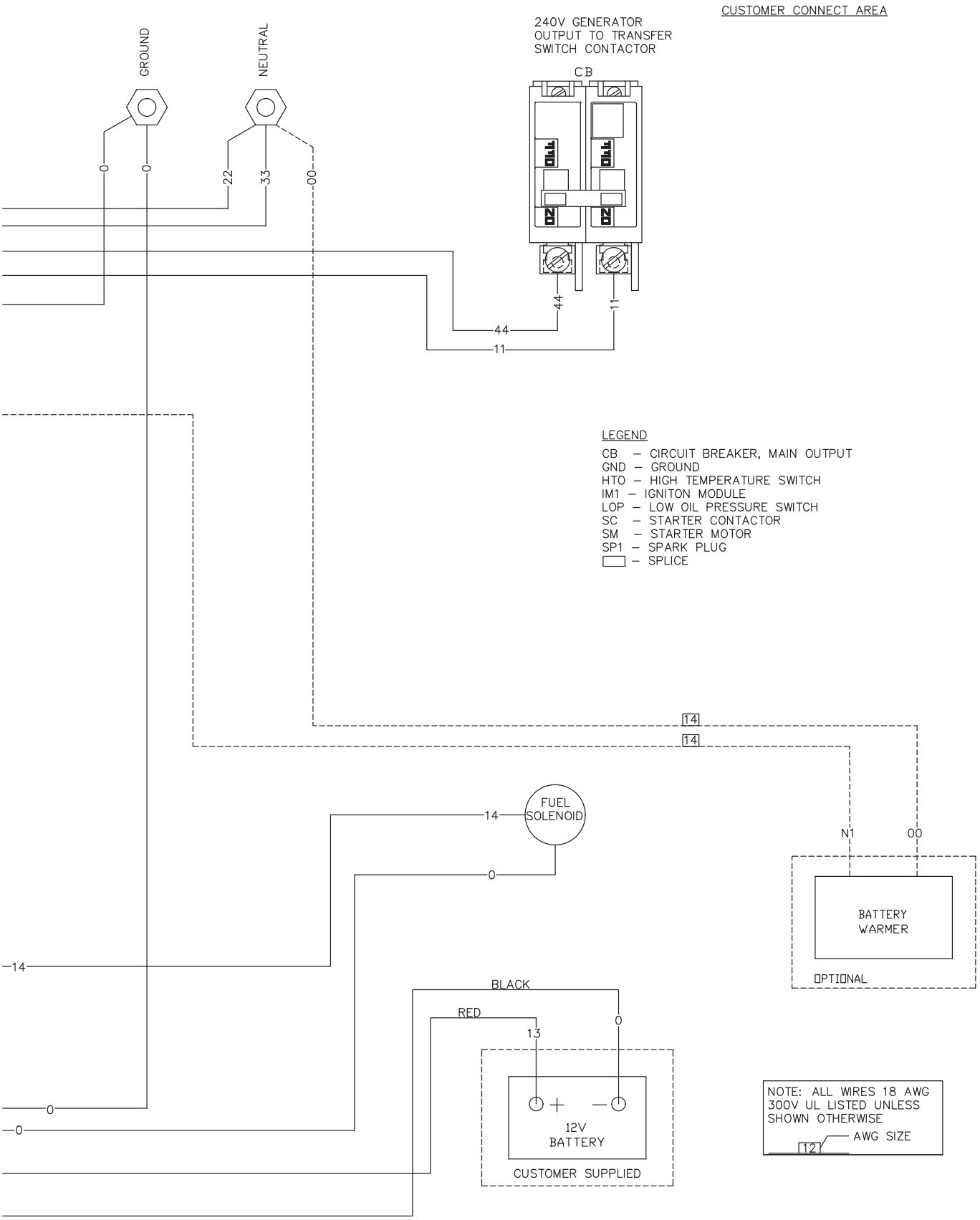
## NOTES

## NOTES

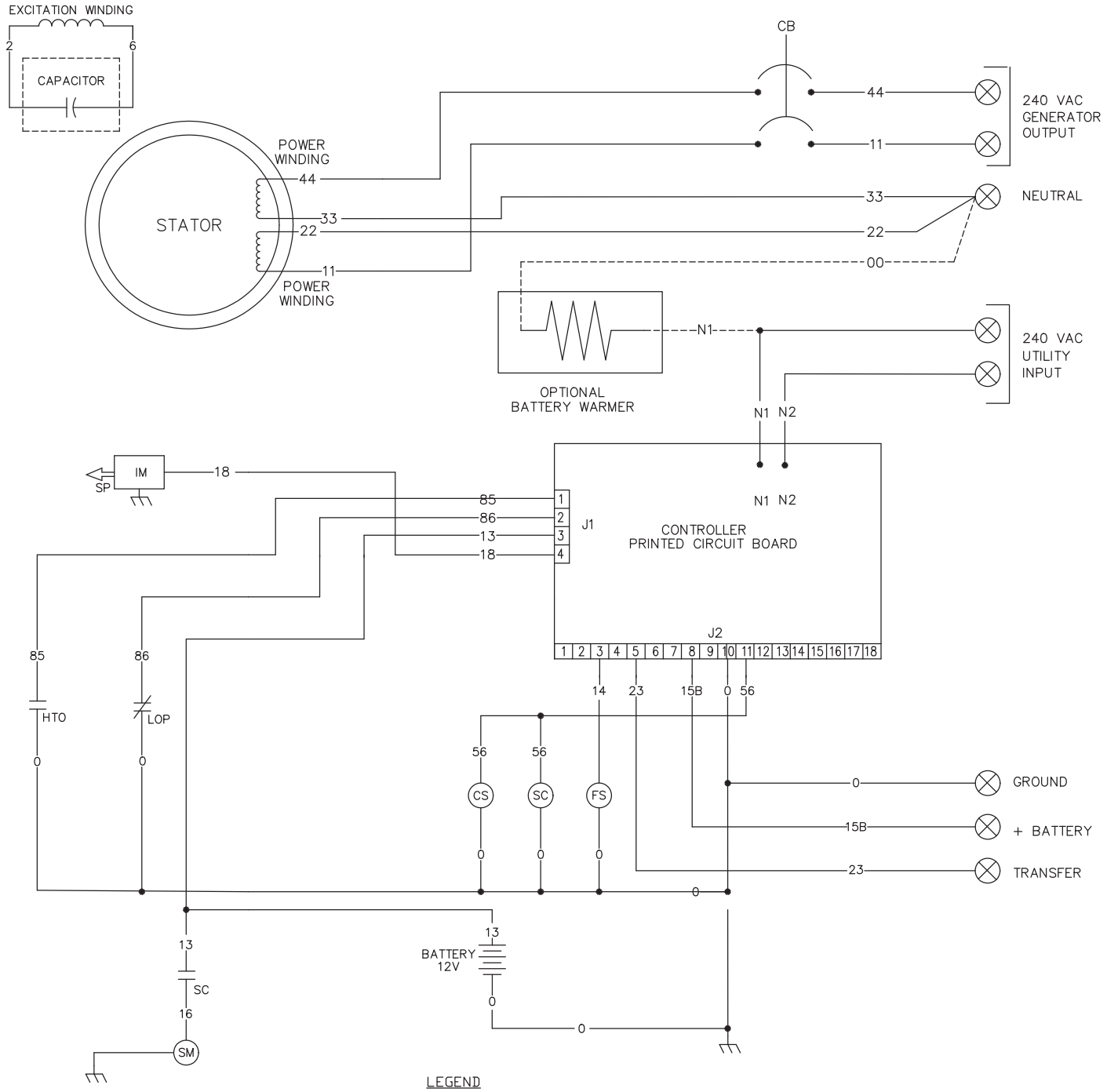
## Wiring Diagram - 8kW – Drawing No. 0G7945-A




ELECTRICAL
DATA

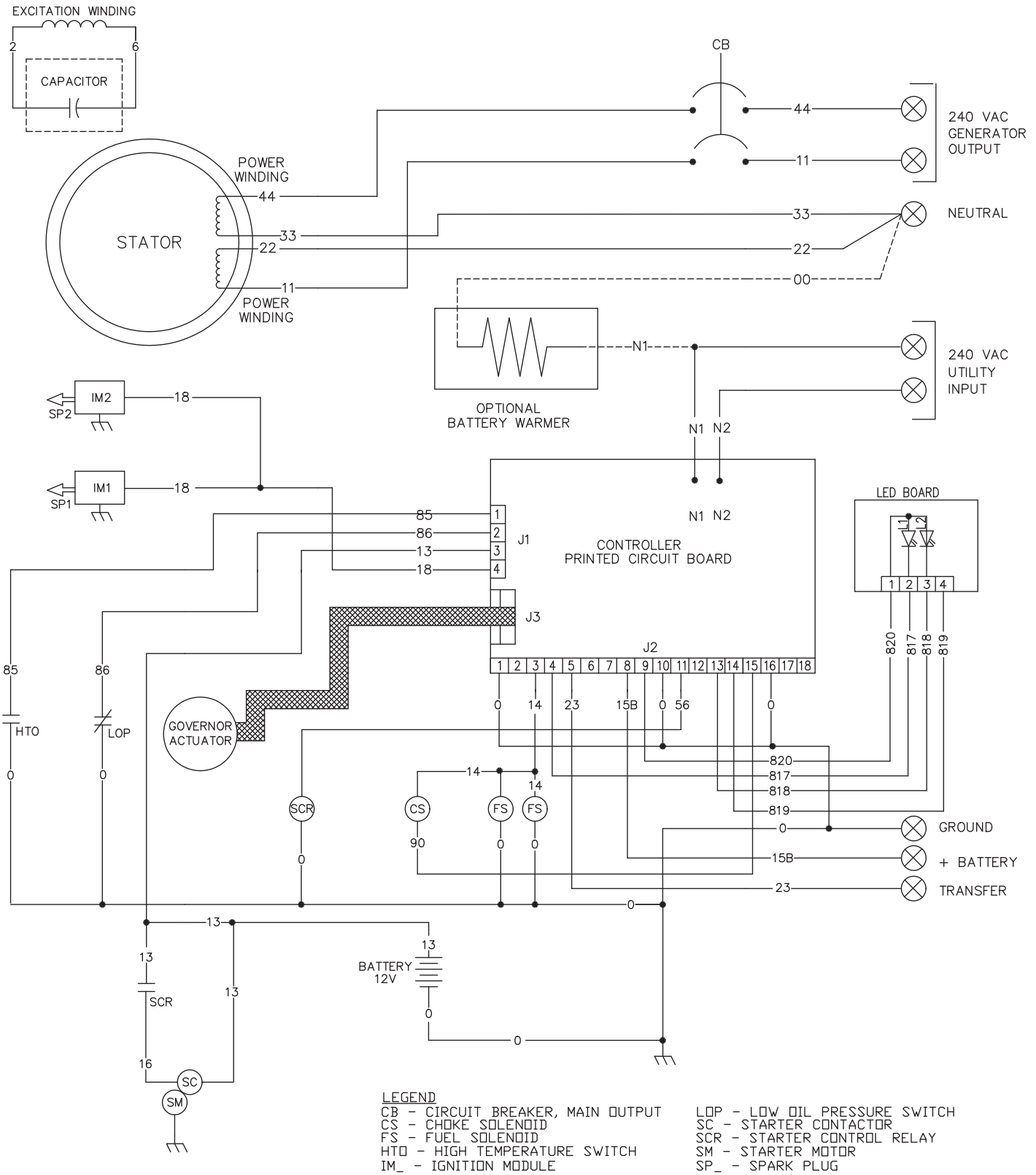

CUSTOMER CONNECT AREA
240V GENERATOR
OUTPUT TO TRANSFER
SWITCH CONTACTOR
CB
GROUND
NEUTRAL
0
0
22
33
00
44
11
44
11
LEGEND
CB – CIRCUIT BREAKER, MAIN OUTPUT
GND – GROUND
HTO – HIGH TEMPERATURE SWITCH
IM1 – IGNITON MODULE
LOP – LOW OIL PRESSURE SWITCH
SC – STARTER CONTACTOR
SM – STARTER MOTOR
SP1 – SPARK PLUG
– SPLICE
14
14
FUEL
SOLENOID
14
0
N1
00
BATTERY
WARMER
OPTIONAL
14
BLACK
RED
13
0
12V
BATTERY
CUSTOMER SUPPLIED
0
0
NOTE: ALL WIRES 18 AWG
300V UL LISTED UNLESS
SHOWN OTHERWISE
AWG SIZE
12

## Electrical Schematic - 8kW – Drawing No. 0G8511-A




LEGEND

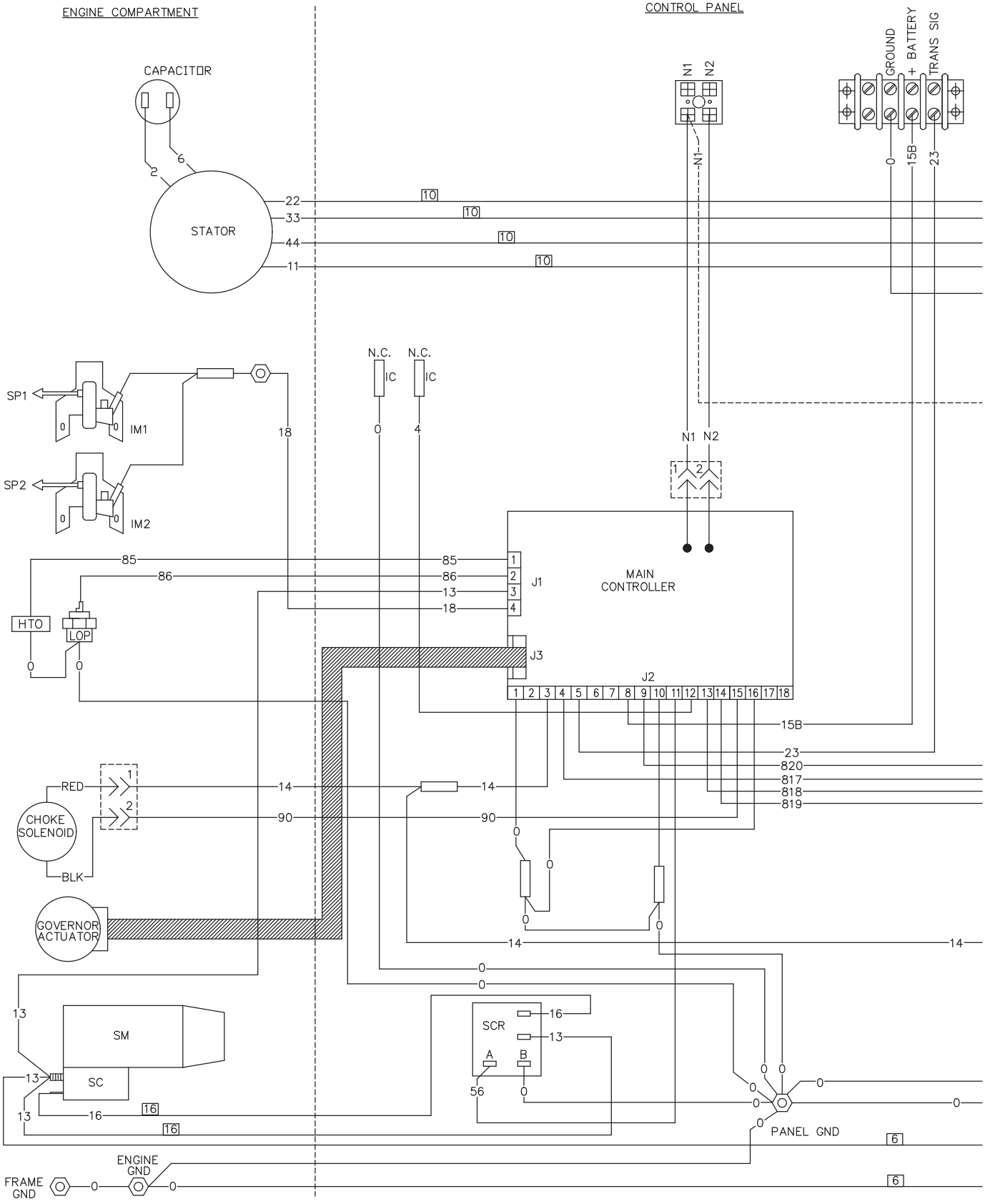
CB - CIRCUIT BREAKER, MAIN OUTPUT
CS - CHOKE SOLENOID
FS - FUEL SOLENOID
HTO - HIGH TEMPERATURE SWITCH
IM - IGNITION MODULE
LOP - LOW OIL PRESSURE SWITCH
SC - STARTER CONTACTOR
SM - STARTER MOTOR
SP - SPARK PLUG



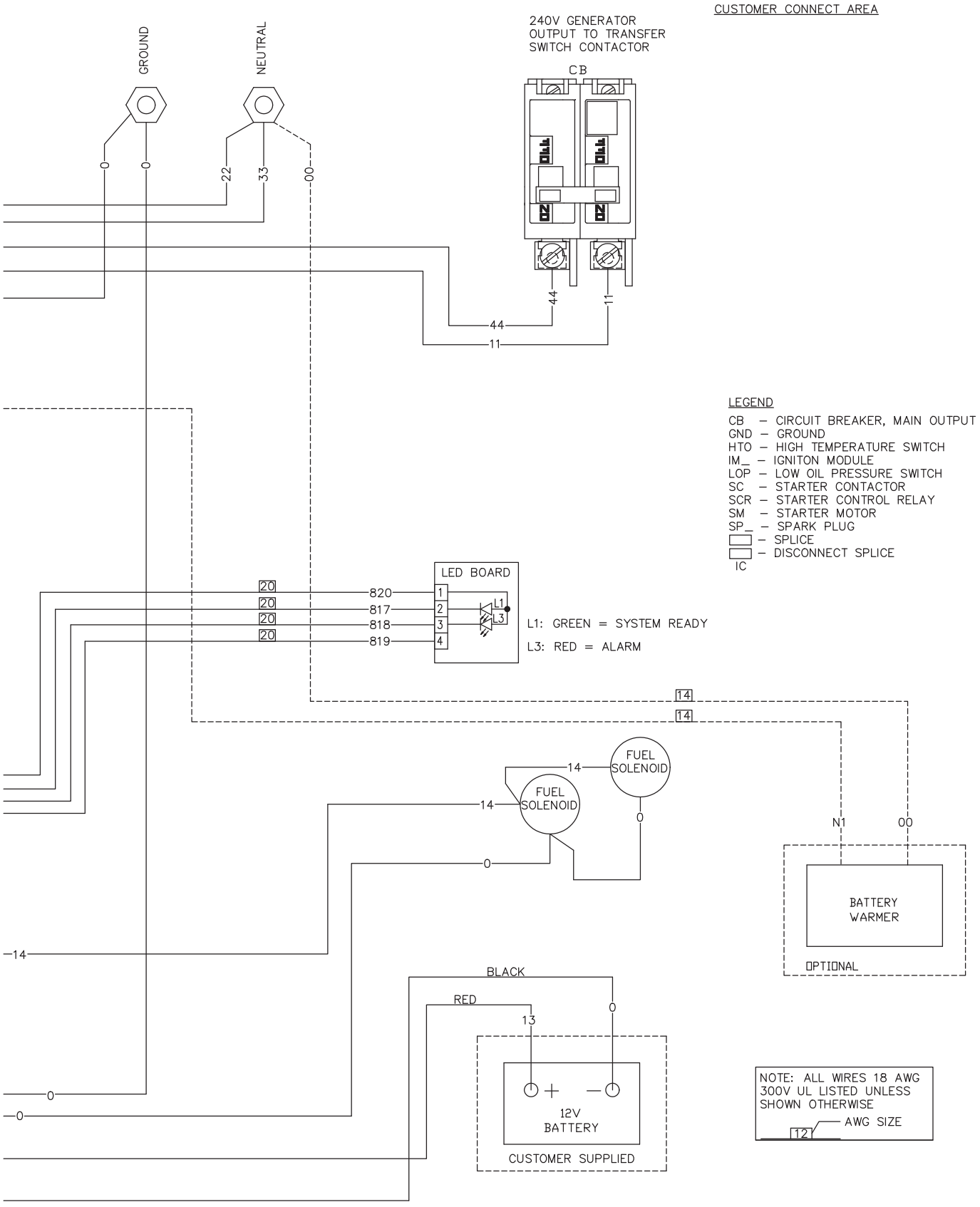

LEGEND

CB - CIRCUIT BREAKER, MAIN OUTPUT
CS - CHOKE SOLENOID
FS - FUEL SOLENOID
HTO - HIGH TEMPERATURE SWITCH
IM_ - IGNITION MODULE
LOP - LOW OIL PRESSURE SWITCH
SC - STARTER CONTACTOR
SCR - STARTER CONTROL RELAY
SM - STARTER MOTOR
SP_ - SPARK PLUG

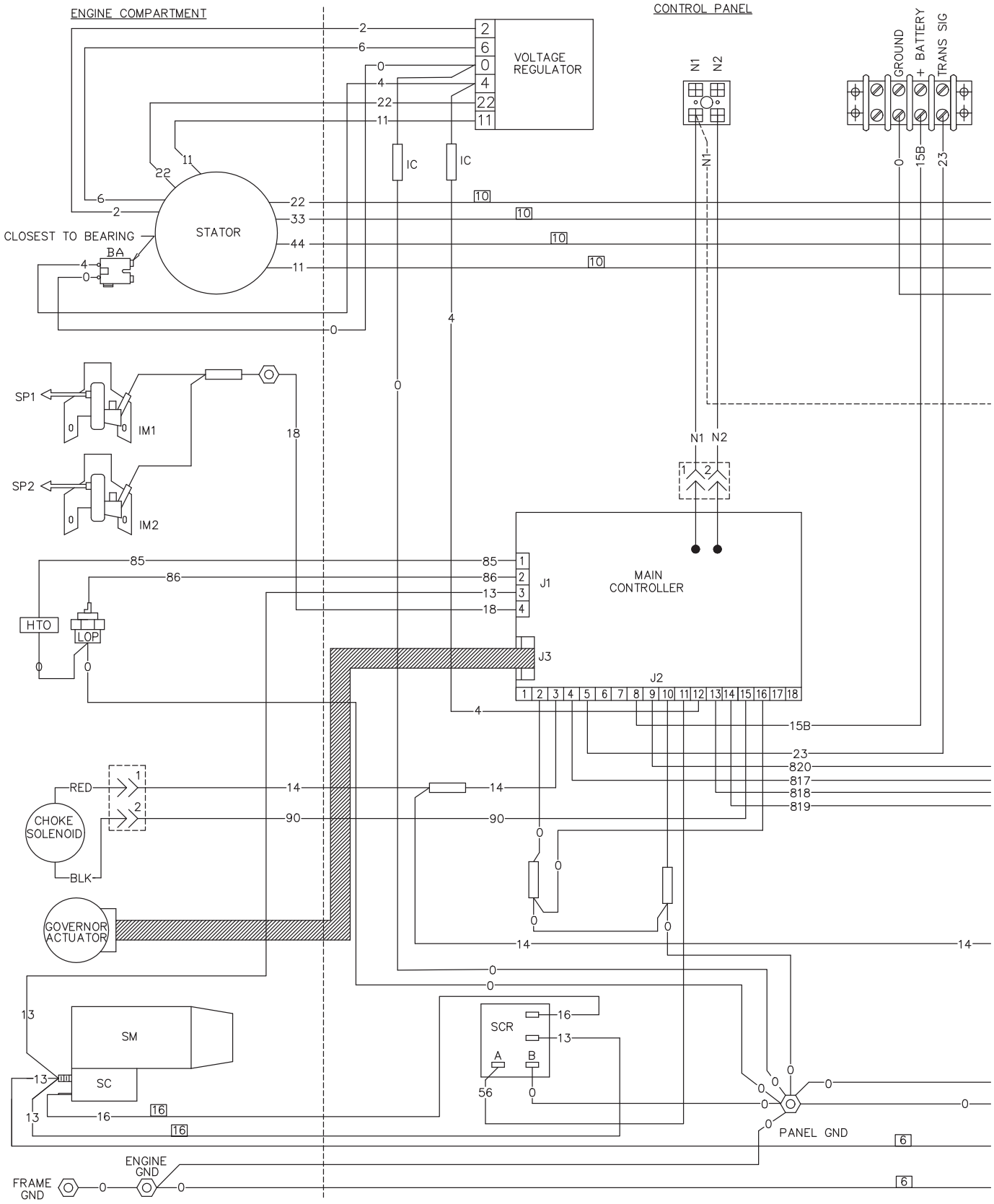
## Wiring Diagram - 10kW – Drawing No. 0G7946-A

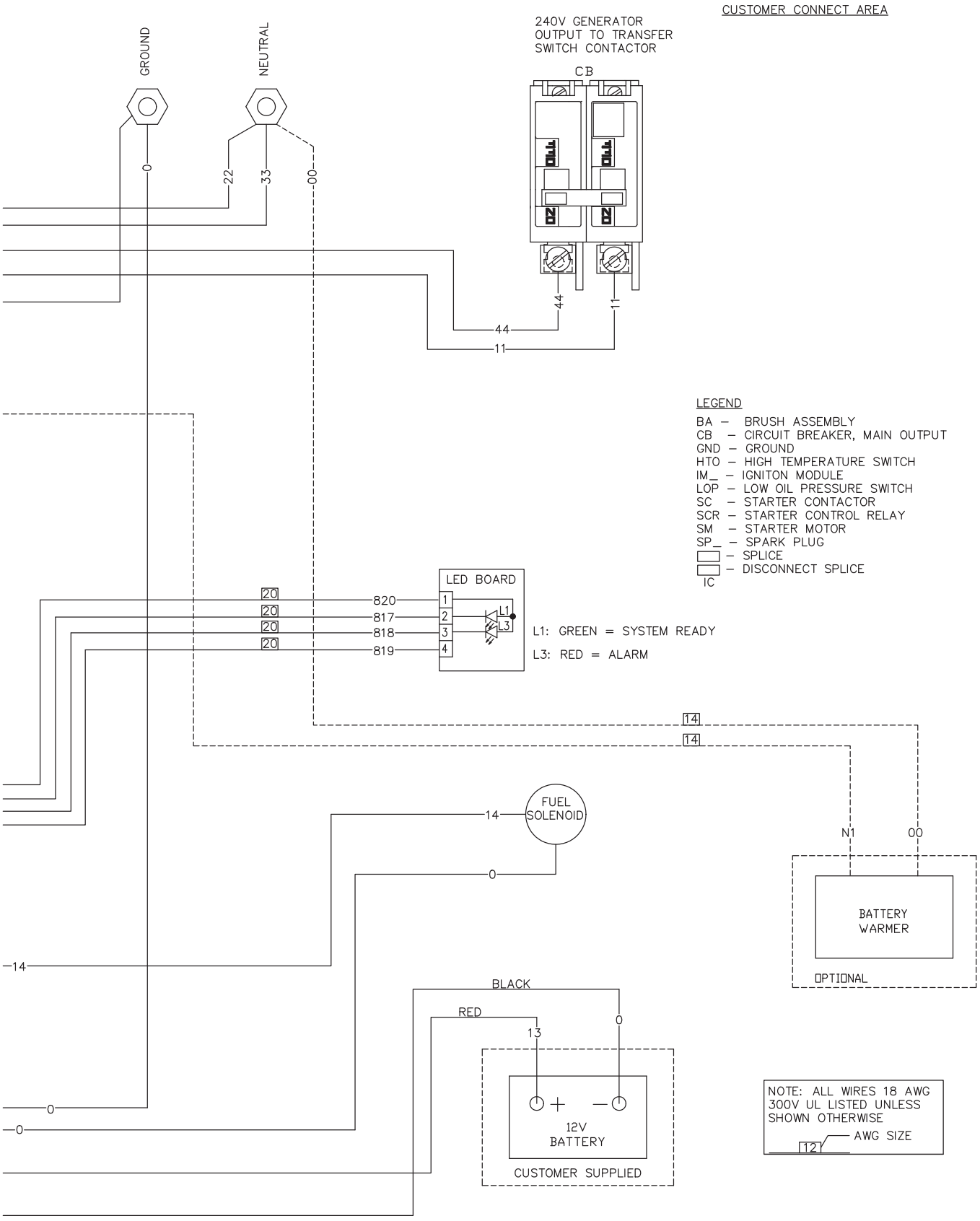


## Wiring Diagram - 10kW – Drawing No. 0G7946-A

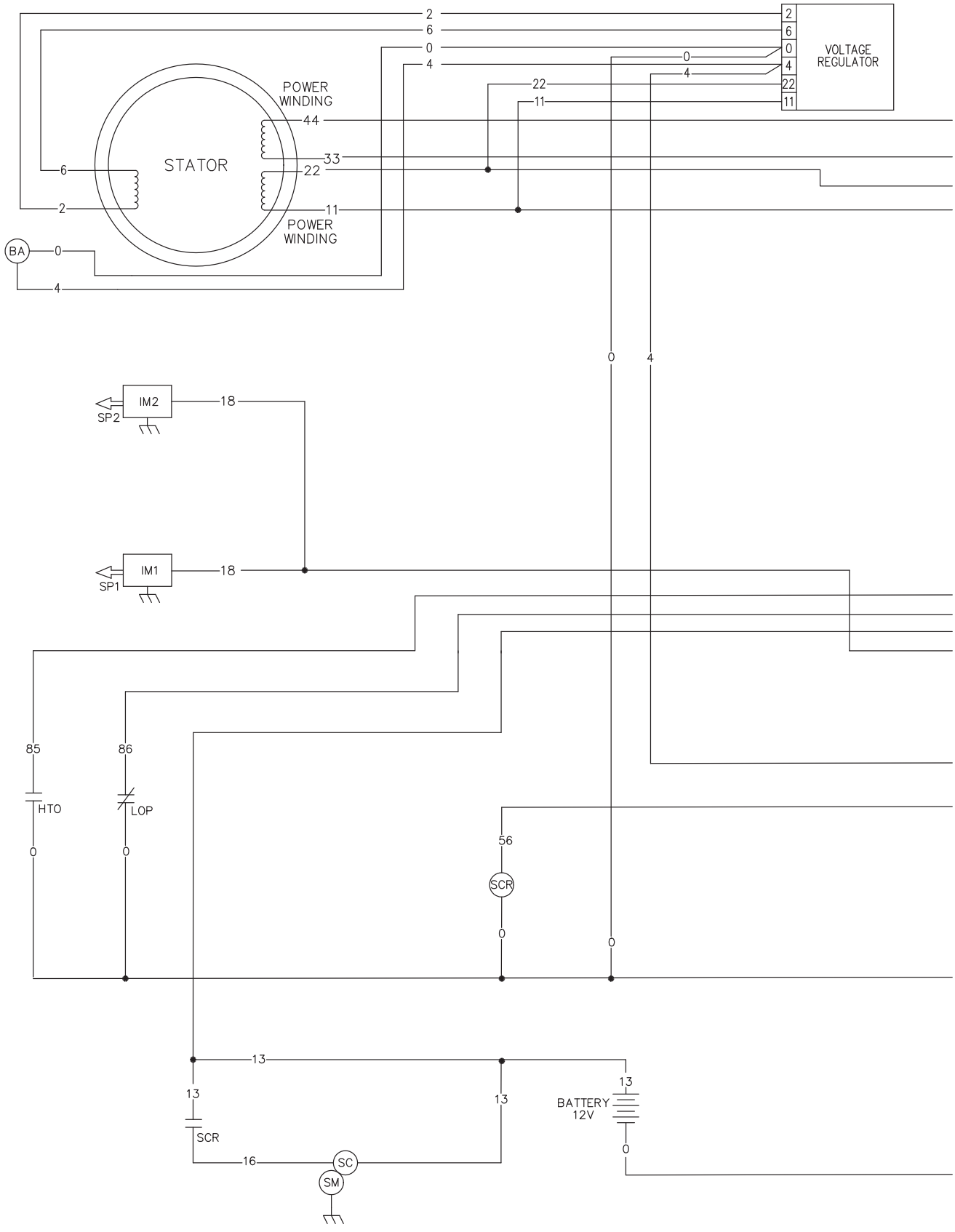


## Wiring Diagram - 12 & 14kW – Drawing No. 0G7947-A

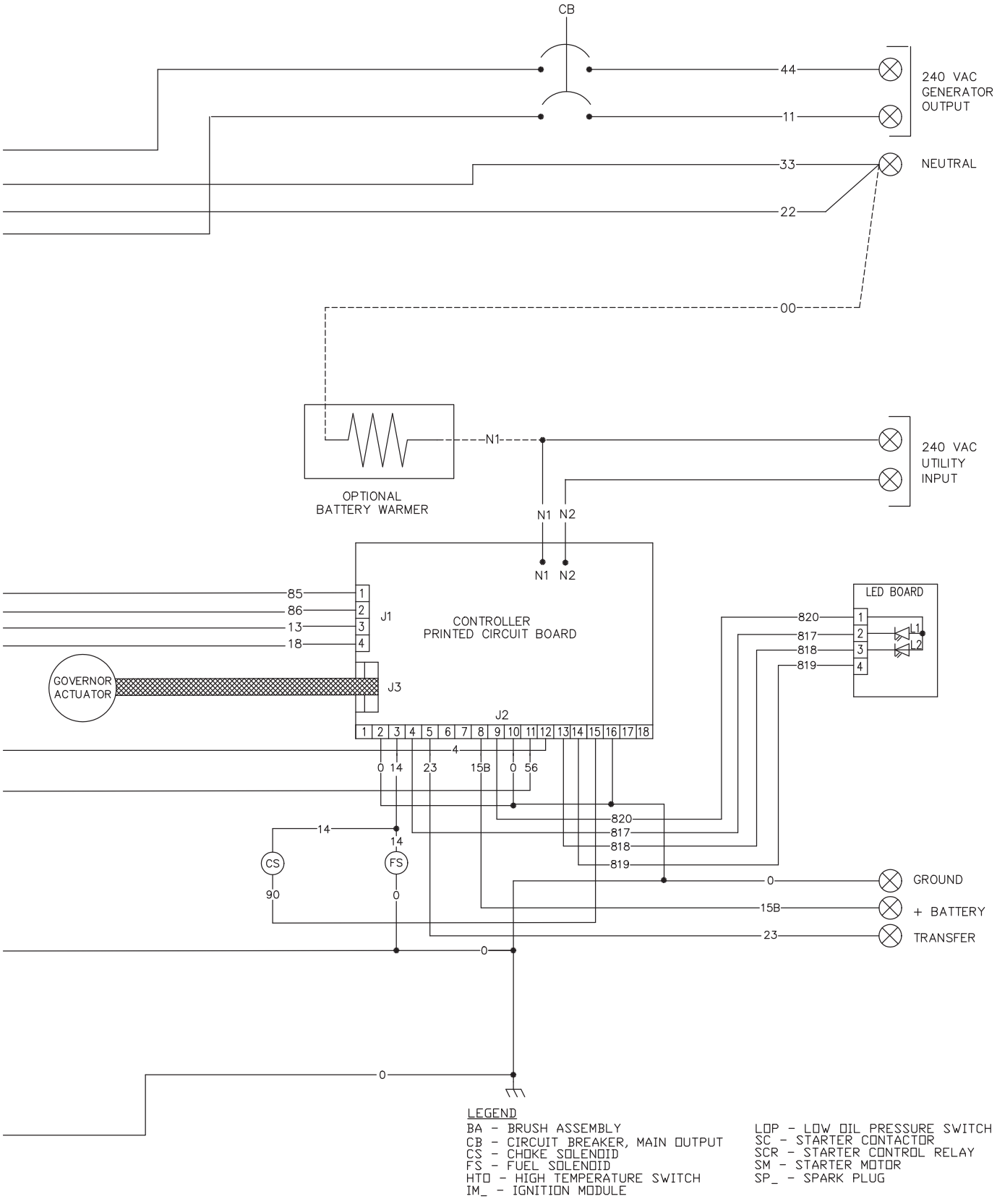



CUSTOMER CONNECT AREA
240V GENERATOR OUTPUT TO TRANSFER SWITCH CONTACTOR
CB
GROUND
NEUTRAL
0
22
33
00
44
11
LEGEND
BA – BRUSH ASSEMBLY
CB – CIRCUIT BREAKER, MAIN OUTPUT
GND – GROUND
HTO – HIGH TEMPERATURE SWITCH
IM_ – IGNITON MODULE
LOP – LOW OIL PRESSURE SWITCH
SC – STARTER CONTACTOR
SCR – STARTER CONTROL RELAY
SM – STARTER MOTOR
SP_ – SPARK PLUG
– SPLICE
– DISCONNECT SPLICE
IC
LED BOARD
20
820
817
818
819
L1
L3
L1: GREEN = SYSTEM READY
L3: RED = ALARM
14
FUEL SOLENOID
N1
00
BATTERY WARMER
OPTIONAL
BLACK
RED
13
12V BATTERY
CUSTOMER SUPPLIED
NOTE: ALL WIRES 18 AWG 300V UL LISTED UNLESS SHOWN OTHERWISE
AWG SIZE
12

## Electrical Schematic - 12 & 14kW – Drawing No. 0G8513-A



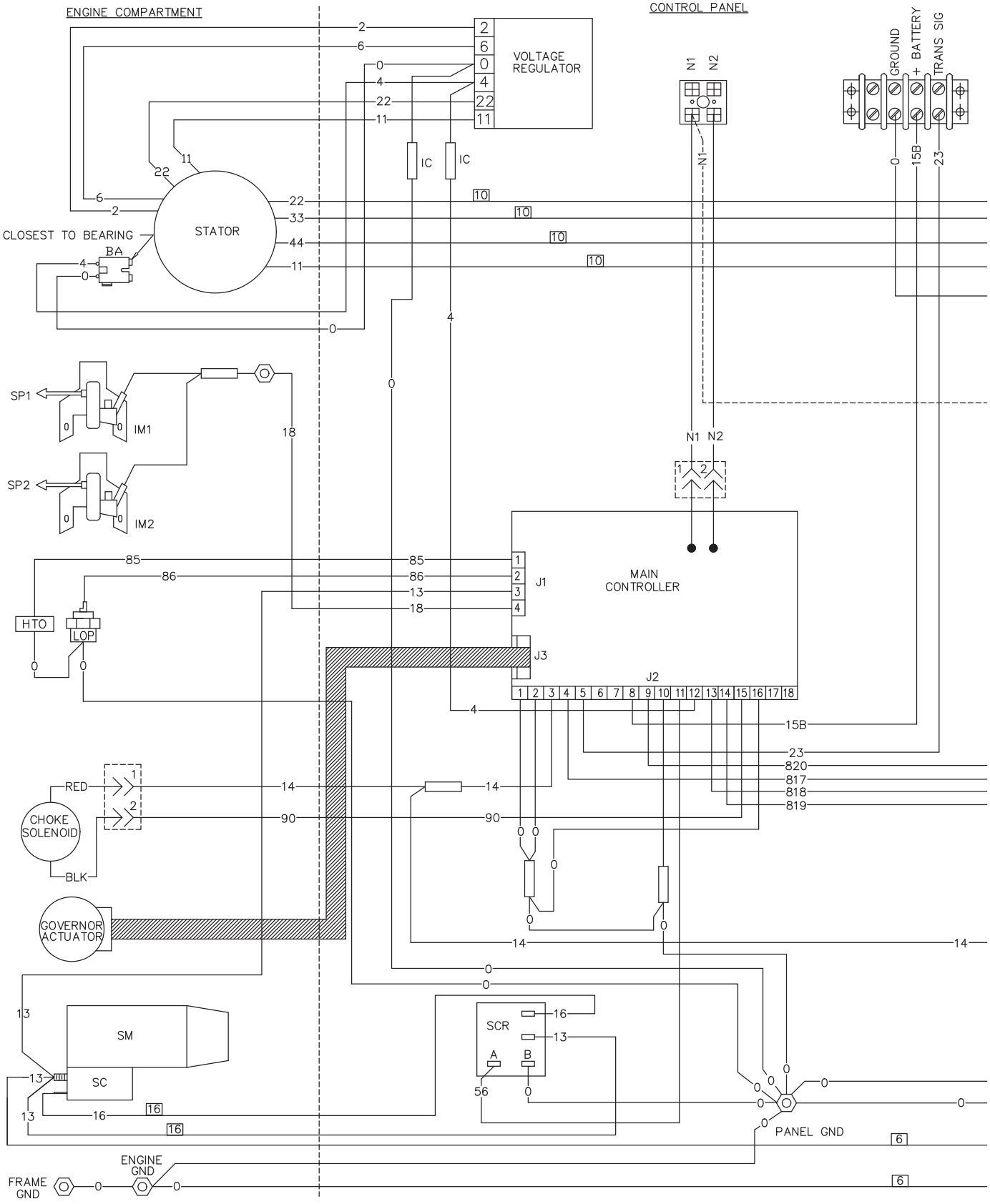
## Electrical Schematic - 12 & 14kW – Drawing No. 0G8513-A

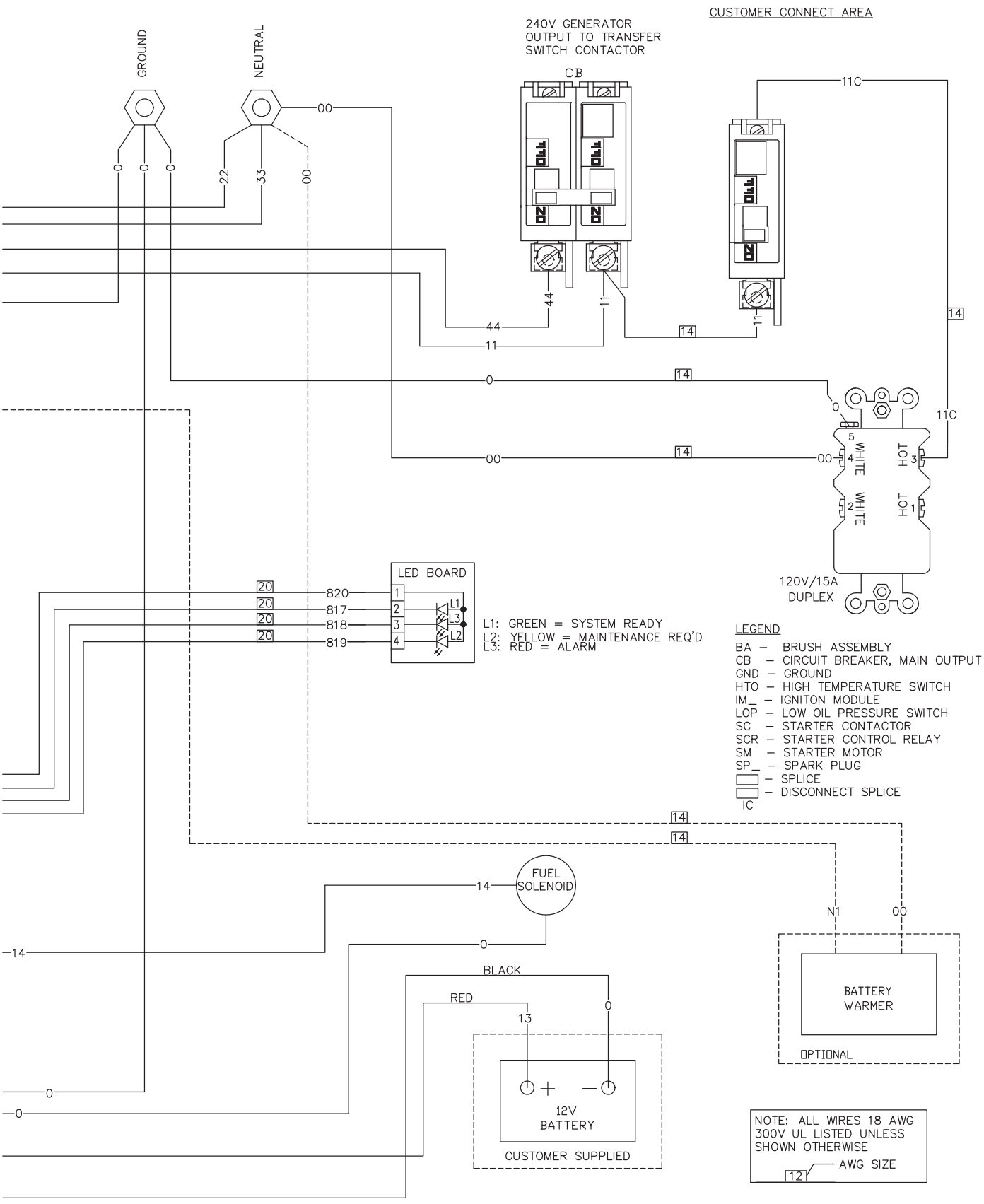



LEGEND

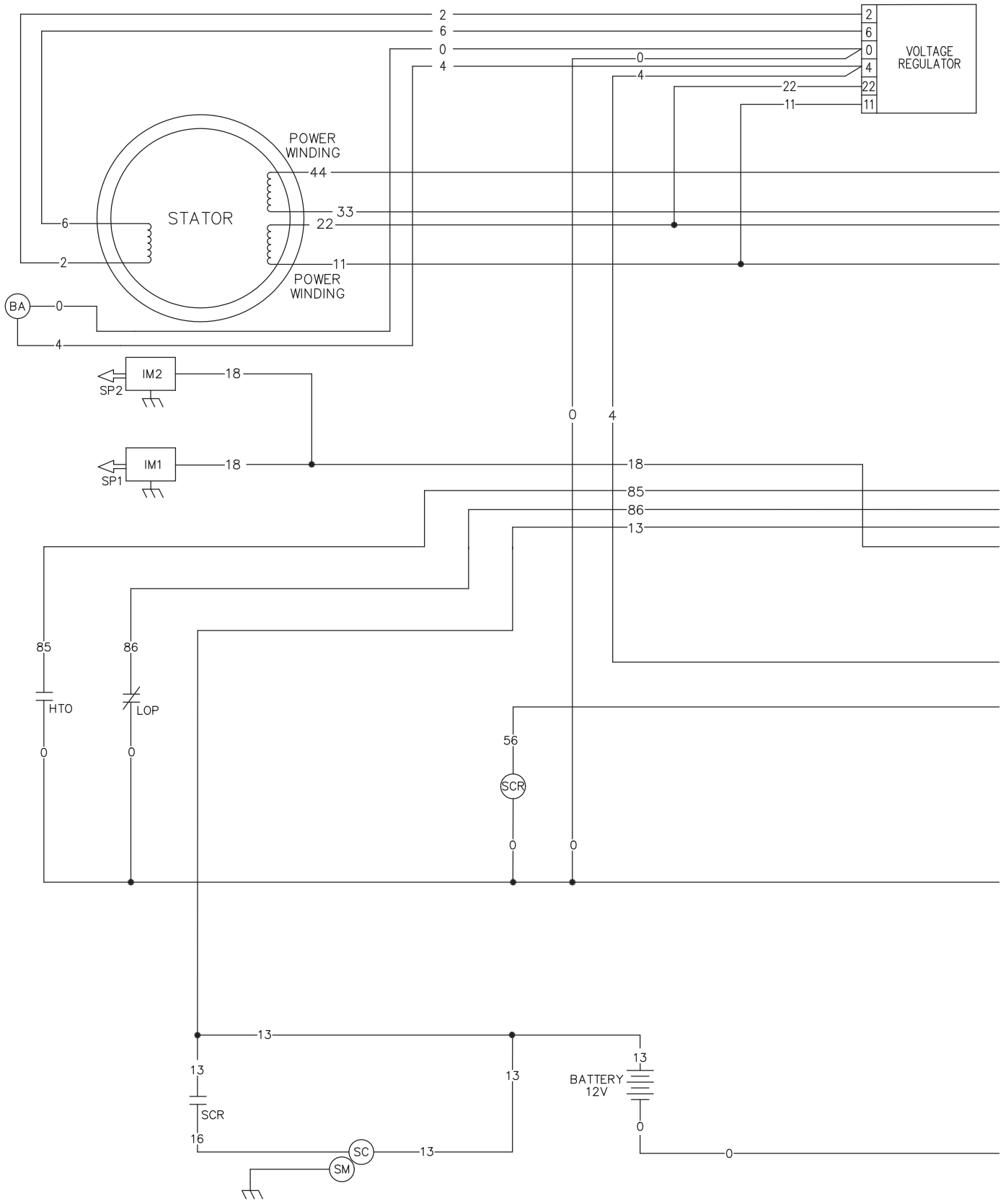
BA - BRUSH ASSEMBLY
CB - CIRCUIT BREAKER, MAIN OUTPUT
CS - CHOKE SOLENOID
FS - FUEL SOLENOID
HTO - HIGH TEMPERATURE SWITCH
IM_ - IGNITION MODULE
LOP - LOW OIL PRESSURE SWITCH
SC - STARTER CONTACTOR
SCR - STARTER CONTROL RELAY
SM - STARTER MOTOR
SP_ - SPARK PLUG

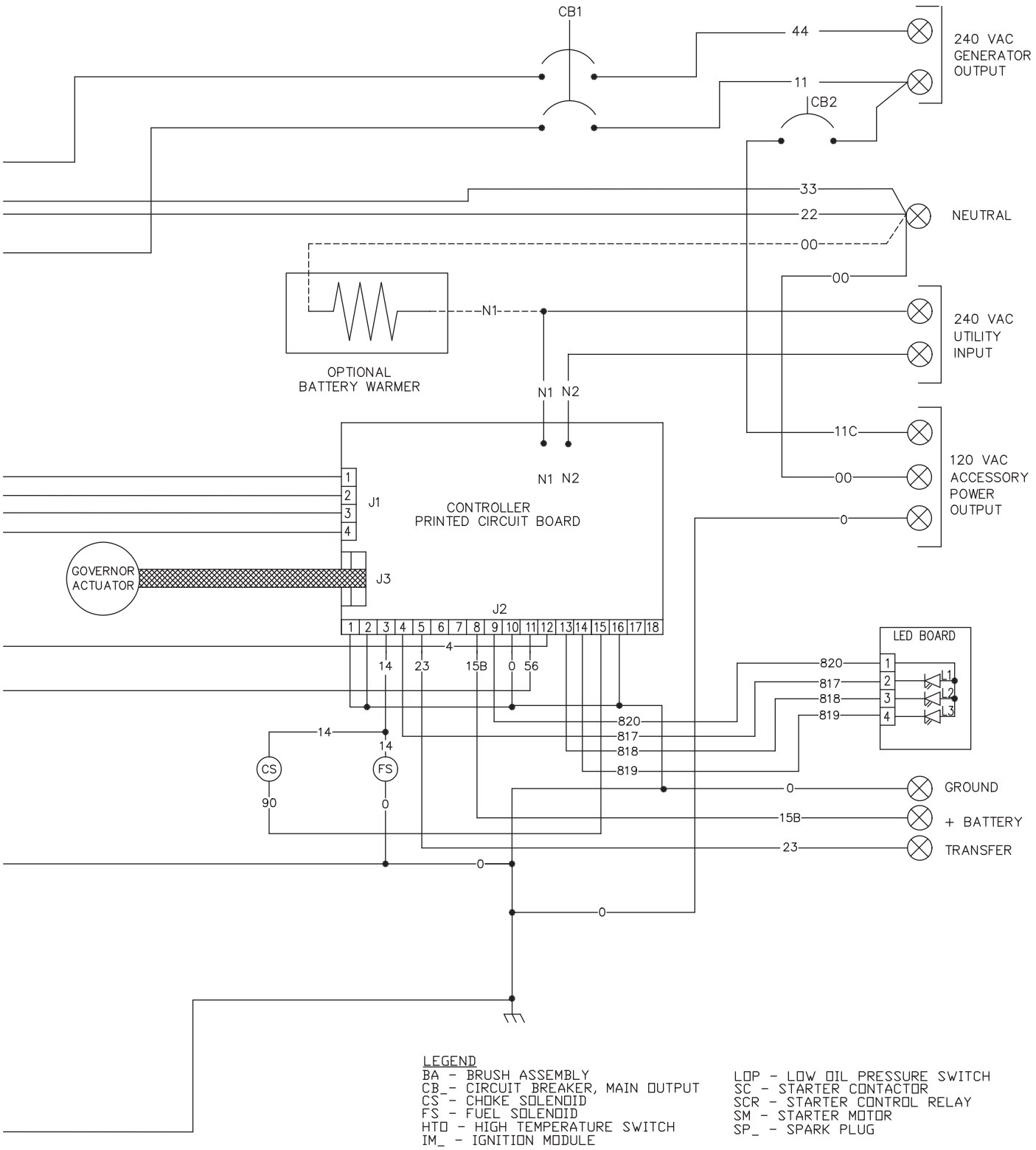
## Wiring Diagram - 16 & 17kW – Drawing No. 0G7948-A




CUSTOMER CONNECT AREA
240V GENERATOR OUTPUT TO TRANSFER SWITCH CONTACTOR
GROUND
NEUTRAL
CB
11C
00
0
22
33
44
11
14
WHITE
HOT
120V/15A DUPLEX
LED BOARD
820
817
818
819
L1: GREEN = SYSTEM READY
L2: YELLOW = MAINTENANCE REQ'D
L3: RED = ALARM
LEGEND
BA – BRUSH ASSEMBLY
CB – CIRCUIT BREAKER, MAIN OUTPUT
GND – GROUND
HTO – HIGH TEMPERATURE SWITCH
IM_ – IGNITON MODULE
LOP – LOW OIL PRESSURE SWITCH
SC – STARTER CONTACTOR
SCR – STARTER CONTROL RELAY
SM – STARTER MOTOR
SP_ – SPARK PLUG
– SPLICE
– DISCONNECT SPLICE
IC
FUEL SOLENOID
N1
BLACK
RED
13
12V BATTERY
CUSTOMER SUPPLIED
BATTERY WARMER
OPTIONAL
NOTE: ALL WIRES 18 AWG 300V UL LISTED UNLESS SHOWN OTHERWISE
AWG SIZE
12

## Electrical Schematic - 16 & 17kW – Drawing No. 0G8514-A

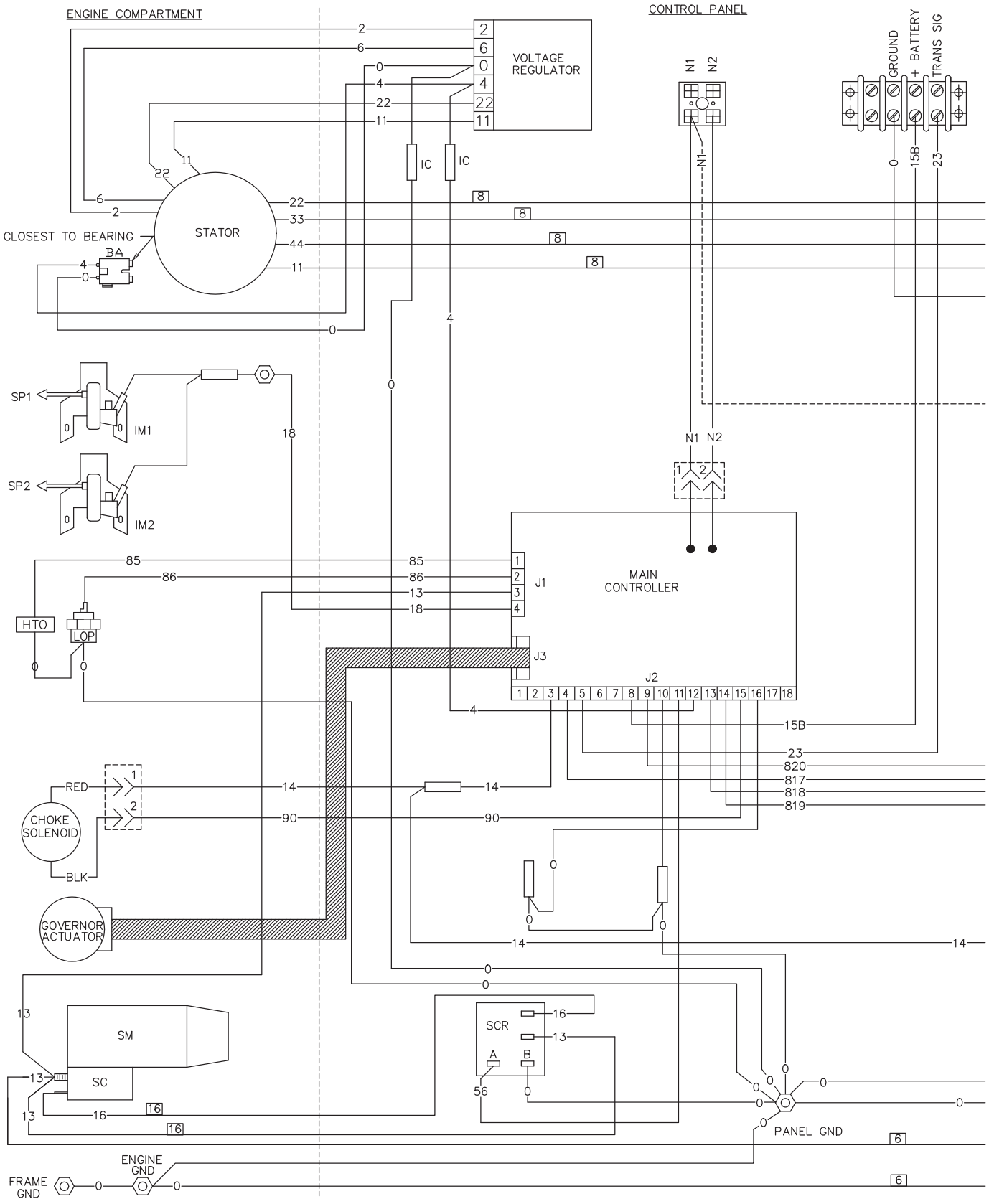


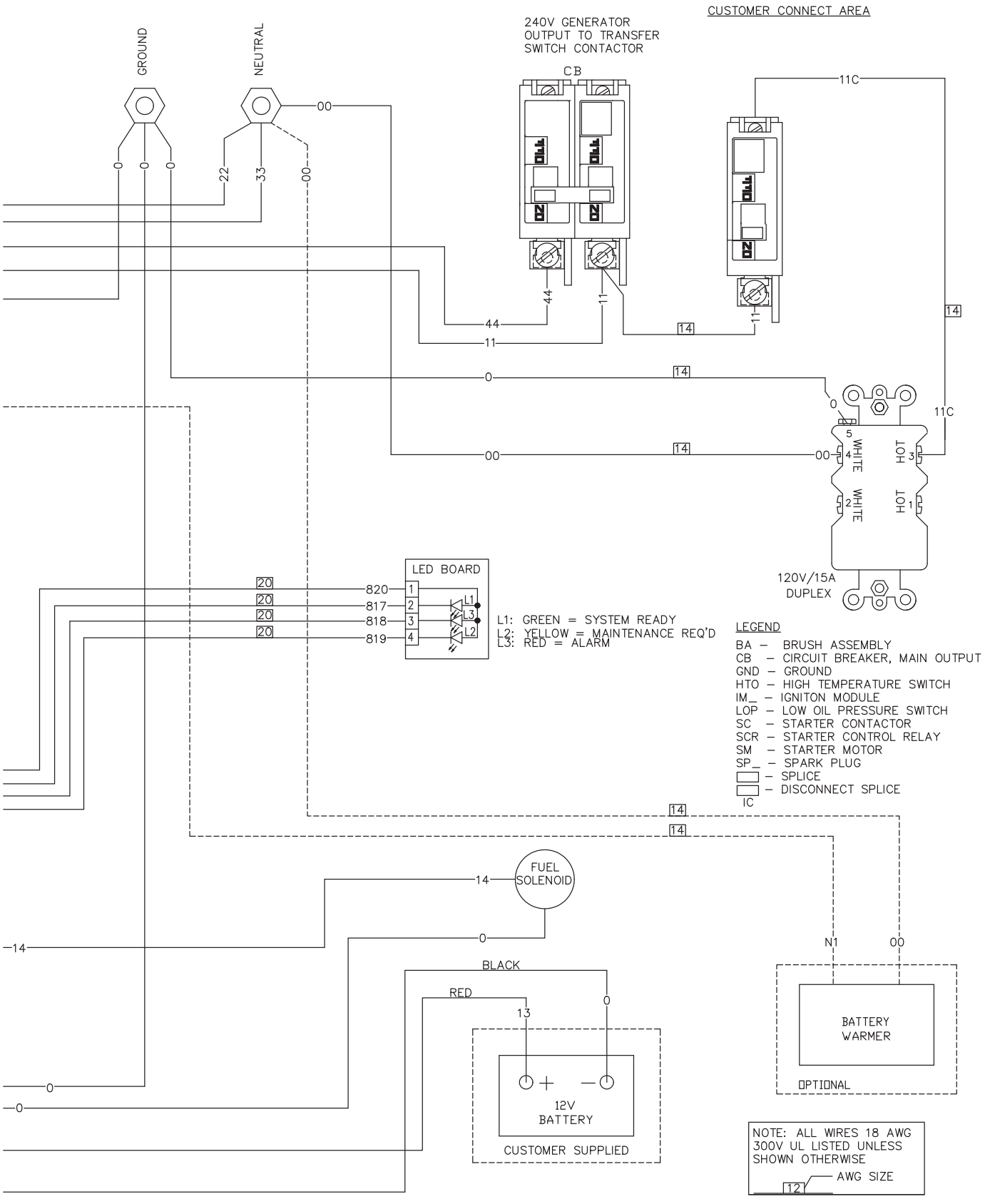



LEGEND

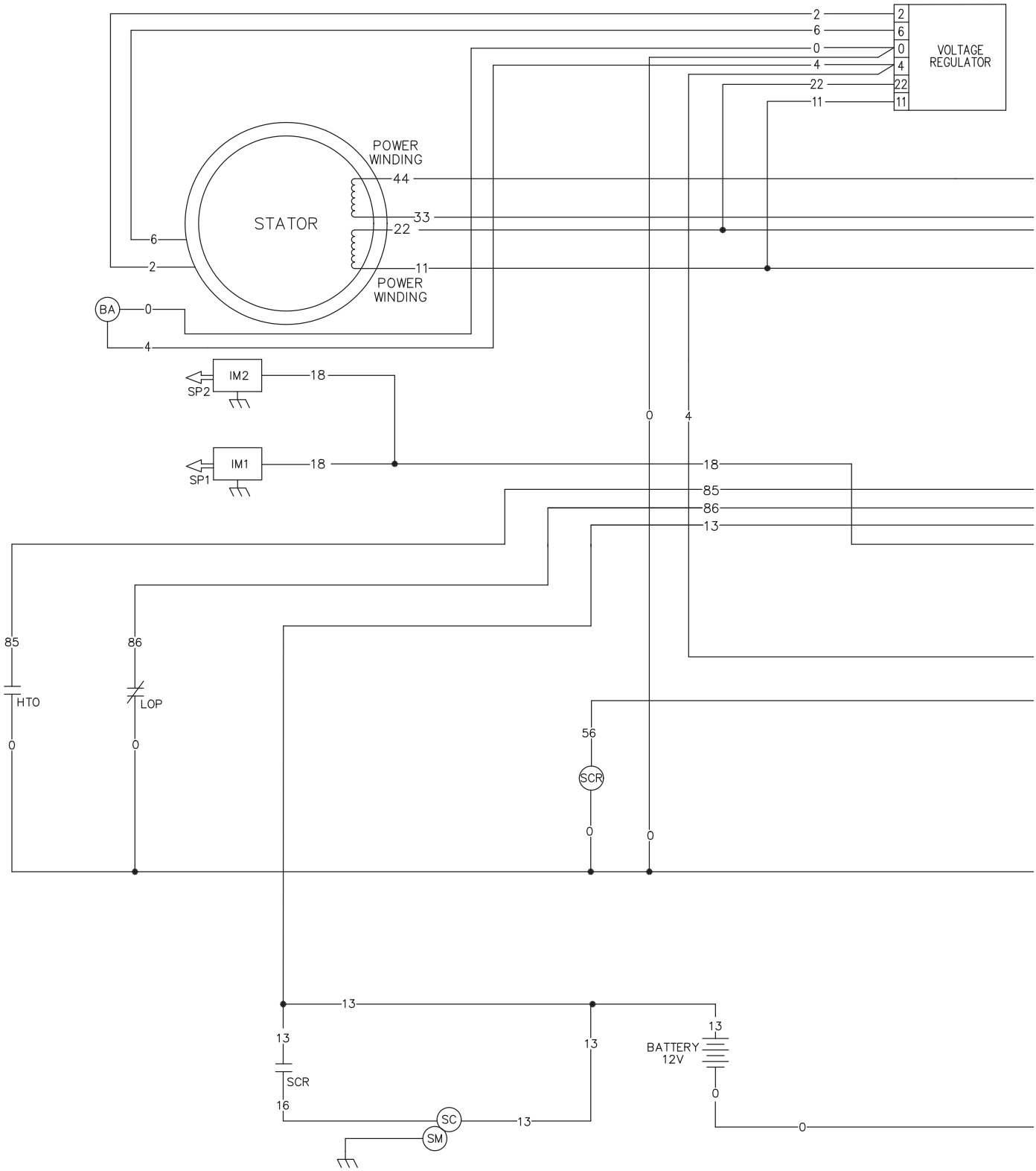
BA - BRUSH ASSEMBLY
CB_- CIRCUIT BREAKER, MAIN OUTPUT
CS - CHOKE SOLENOID
FS - FUEL SOLENOID
HTO - HIGH TEMPERATURE SWITCH
IM_ - IGNITION MODULE
LOP - LOW OIL PRESSURE SWITCH
SC - STARTER CONTACTOR
SCR - STARTER CONTROL RELAY
SM - STARTER MOTOR
SP_ - SPARK PLUG

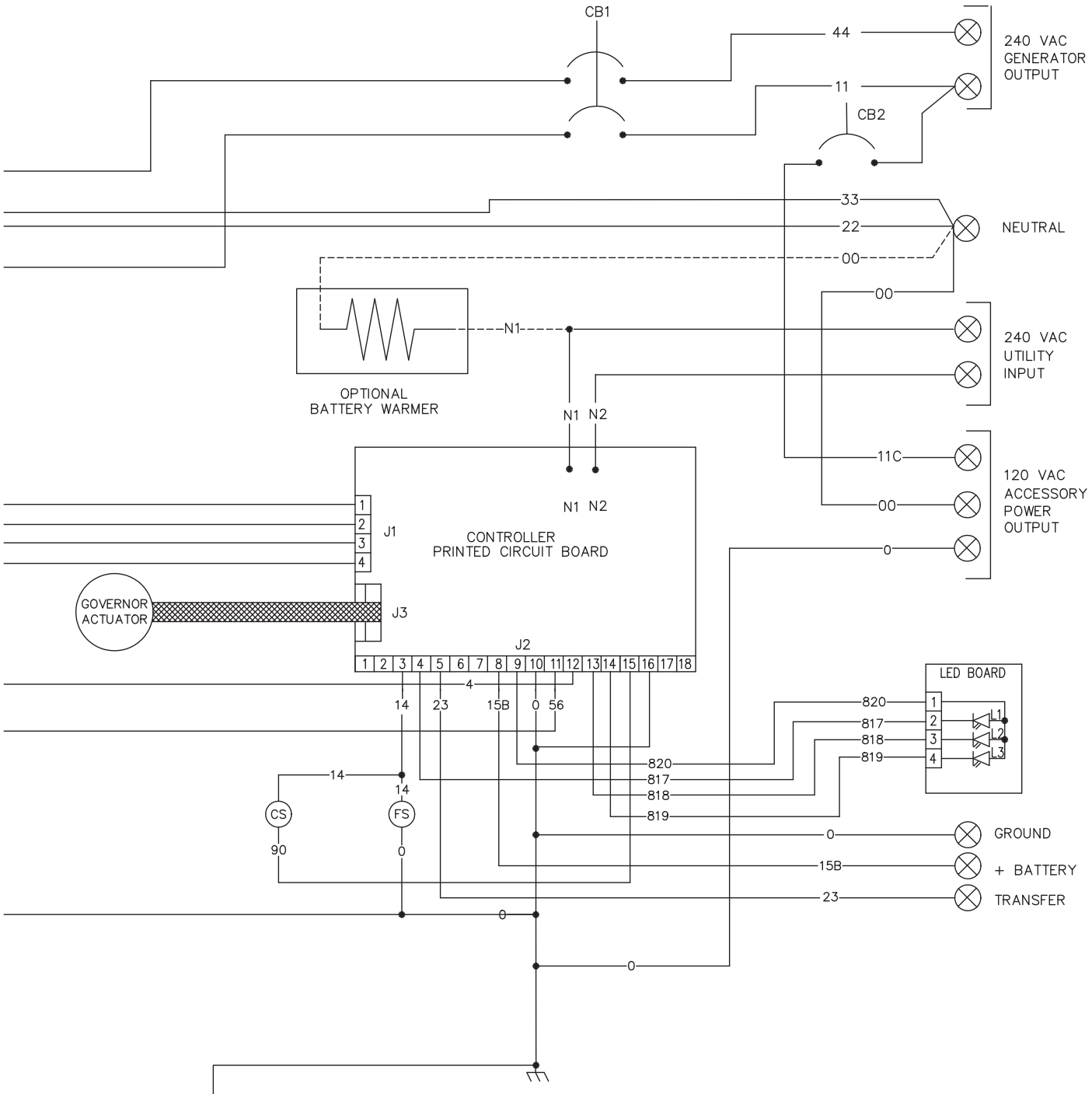
## Wiring Diagram - 20kW – Drawing No. 0G8186-A




CUSTOMER CONNECT AREA
240V GENERATOR OUTPUT TO TRANSFER SWITCH CONTACTOR
GROUND
NEUTRAL
CB
11C
00
0
22
33
44
11
14
WHITE
HOT
120V/15A DUPLEX
LED BOARD
820
817
818
819
20
L1: GREEN = SYSTEM READY
L2: YELLOW = MAINTENANCE REQ'D
L3: RED = ALARM
LEGEND
BA – BRUSH ASSEMBLY
CB – CIRCUIT BREAKER, MAIN OUTPUT
GND – GROUND
HTO – HIGH TEMPERATURE SWITCH
IM_ – IGNITON MODULE
LOP – LOW OIL PRESSURE SWITCH
SC – STARTER CONTACTOR
SCR – STARTER CONTROL RELAY
SM – STARTER MOTOR
SP_ – SPARK PLUG
– SPLICE
– DISCONNECT SPLICE
IC
FUEL SOLENOID
BLACK
RED
13
12V BATTERY
CUSTOMER SUPPLIED
N1
BATTERY WARMER
OPTIONAL
NOTE: ALL WIRES 18 AWG 300V UL LISTED UNLESS SHOWN OTHERWISE
AWG SIZE
12

## Electrical Schematic - 20kW – Drawing No. 0G8515-A






LEGEND

BA – BRUSH ASSEMBLY
CB_ – CIRCUIT BREAKER OUTPUT
CS – CHOKE SOLENOID
FS – FUEL SOLENOID
HTO – HIGH TEMPERATURE SWITCH
IM_ – IGNITION MODULE
LOP – LOW OIL PRESSURE SWITCH
SC – STARTER CONTACTOR
SCR – STARTER CONTROL RELAY
SM – STARTER MOTOR
SP_ – SPARK PLUG

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