

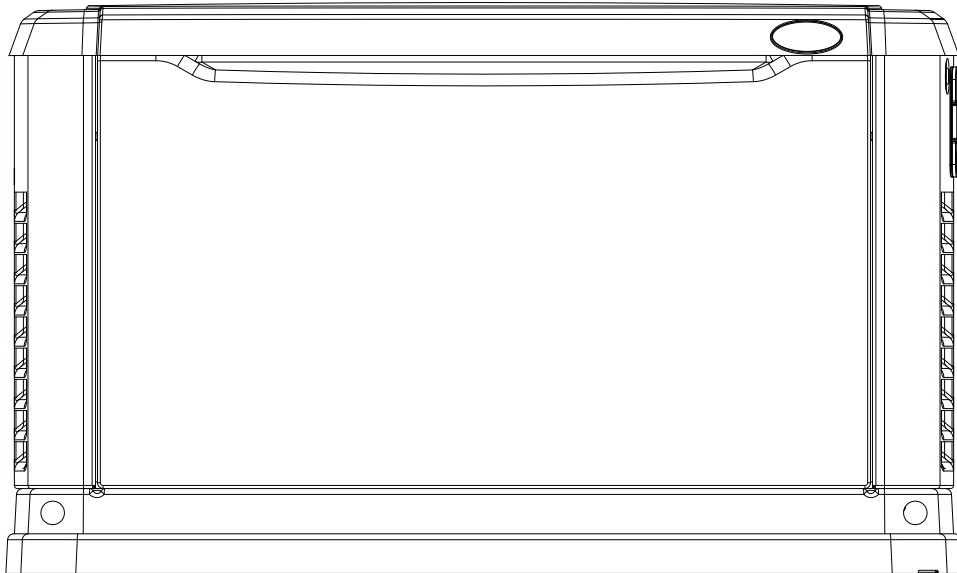
STUDY GUIDE

Air-Cooled Training

SERVICE TRAINING

Owner's Manual

8, 10, 12, 14, 16, 17 & 20kW Air-cooled, Automatic Standby Generators



DO NOT LIFT UNIT BY ROOF!



Not intended for use as Primary Power in place of utility
or in life-support applications.



—  **DANGER**  —

DEADLY EXHAUST FUMES. OUTDOOR INSTALLATION ONLY!

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 This generator will operate using either vapor withdrawn liquid propane (LP) or natural gas (NG).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:



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



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



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

NOTE:

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

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

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

Introduction Inside Front Cover

Read This Manual Thoroughly	IFC
Contents.....	IFC
Operation and Maintenance	IFC
How to Obtain Service	IFC

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 **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. 

**WARNING:**

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

**WARNING:**

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

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

The manufacturer cannot anticipate every possible circumstance that might involve a hazard. The warnings in this manual, and on tags and decals affixed to the unit are, therefore, not all-inclusive. If using a procedure, work method or operating technique 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 operate or maintain this equipment.
-  Potentially lethal voltages are generated by these machines. Ensure all steps are taken to render the machine safe before attempting to work on the generator.
-  Parts of the generator are rotating and/or hot during operation. Exercise care near running generators.

**GENERAL HAZARDS**

- For safety reasons, the manufacturer recommends that the installation, initial start-up and maintenance of this equipment is carried out by a Dealer.
- 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.
- Keep hands, feet, clothing, etc., away from drive belts, fans, and other moving or hot parts. Never remove any drive belt or fan guard while the unit is operating.
- Adequate, unobstructed flow of cooling and ventilating air is critical to 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 outdoors.
- 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.

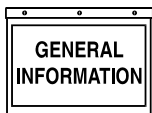
EXPLOSION HAZARDS

- 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.

◆ 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.

1.1 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.

1.2 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.

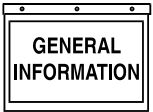
1.3 NEC REQUIREMENT FOR ARC FAULT CIRCUIT INTERRUPTION BREAKER FOR BEDROOMS

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.

◆ 1.3.1 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

1.4 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

1.5 THE GENERATOR

Figure 1.1 – 8kW, Single Cylinder, GH-410 Engine (door removed)

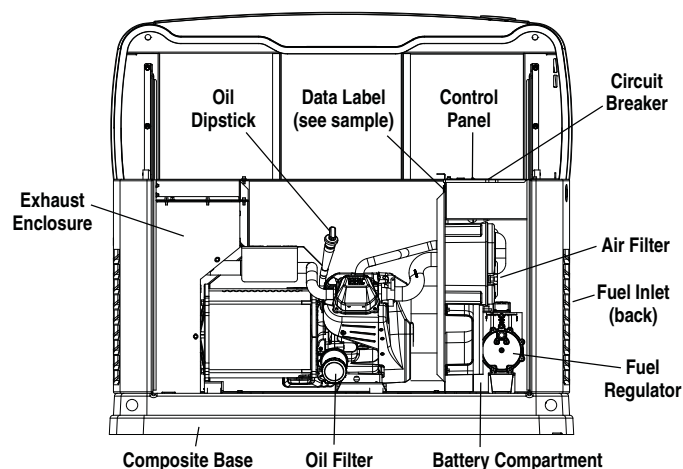


Figure 1.2 – 10kW, V-twin, GT-530 Engine (door removed)

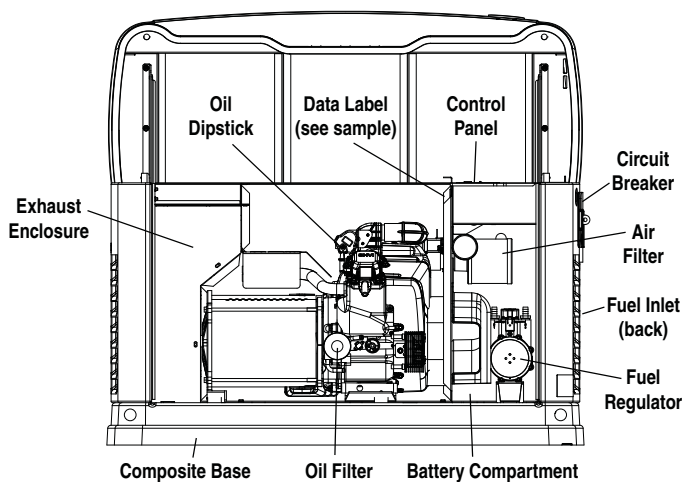
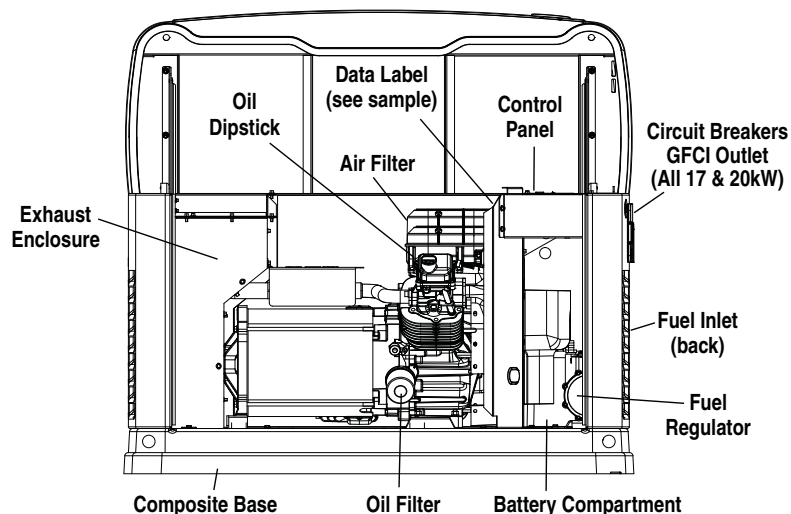


Figure 1.3 – 12, 14, 16, 17 and 20kW, V-twin, GT-990/GT-999 Engine (door removed)



Data Label Sample

MODEL	
SERIAL	
VOLTS	
AMPS	
1 PH, 60 Hz, RPM 3600	
RAINFOOF ENCLOSURE FITTED	
CLASS H INSULATION	
RATED AMBIENT TEMP – 25°C	
FOR STANDBY SERVICE	
NEUTRAL FLOATING	
MAX LOAD UNBALANCE – 50%	
WHITEWATER, WIS	
MADE IN U.S.A.	

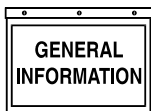
1.6 SPECIFICATIONS

◆ 1.6.1 GENERATOR

Model	8kW	10kW	12kW	14kW	16kW	17kW	20kW
Rated Maximum Power Capacity (Watts*)	7,000 NG 8,000 LP	9,000 NG 10,000 LP	12,000 NG 12,000 LP	13,000 NG 14,000 LP	16,000 NG 16,000 LP	16,000 NG 17,000 LP	18,000 NG 20,000 LP
Rated Voltage	120/240						
Rated Maximum Load Current (Amps)							
120 Volts** (NG/LP)	58.3/66.6	75.0/83.3	100.0/100.0	108.3/116.6	133.3/133.3	133.3/141.6	150.0/166.6
240 Volts (NG/LP)	29.2/33.3	37.5/41.6	50.0/50.0	54.2/58.3	66.6/66.6	66.6/70.8	75.0/83.3
Main Circuit Breaker	35 Amp	45 Amp	50 Amp	60 Amp	65 Amp	65 Amp	100 Amp
Circuits*** 50A, 240V	-	-	-	1	1	1	-
40A, 240V	-	-	1	1	1	1	-
30A, 240V	1	1	1	-	-	-	-
20A, 240V	-	1	-	1	1	1	-
20A, 120V	1	3	3	4	5	5	-
15A, 120V	5	3	5	4	5	5	-
Phase	1						
Number of Rotor Poles	2						
Rated AC Frequency	60 Hz						
Battery Requirement	Group 26R, 12 Volts and 350 CCA Minimum	Group 26R, 12 Volts and 525 CCA Minimum					
Weight (unit only in lbs.)	340	387	439	439	439	455/421	450
Enclosure	Steel	Steel	Steel	Steel	Steel	Steel/Aluminum	Aluminum
Normal Operating Range	-20° F (-28.8° C) to 77° F (25° C)						
* Maximum wattage and current are subject to and limited by such factors as fuel Btu content, ambient temperature, altitude, engine power and condition, etc. Maximum power decreases about 3.5 percent for each 1,000 feet above sea level; and also will decrease about 1 percent for each 6 C (10 F) above 16 C (60 F) ambient temperature.							
** Load current values shown for 120 volts are maximum TOTAL values for two separate circuits. The maximum current in each circuit must not exceed the value stated for the 240 volts.							
*** Circuits to be moved must be protected by same size breaker. For example, a 15 amp circuit in the main panel must be a 15 amp circuit in the transfer switch.							

◆ 1.6.2 ENGINE

Model	8 kW	10 kW	12/14/16/17 kW	20 kW
Type of Engine	GH-410	GT-530	GT-990	GT-999
Number of Cylinders	1	2	2	2
Rated Horsepower @ 3,600 rpm	14.8	18	32	36
Displacement	410cc	530cc	992cc	999cc
Cylinder Block	Aluminum w/Cast Iron Sleeve			
Valve Arrangement	Overhead Valves			
Ignition System	Solid-state w/Magneto			
Recommended Spark Plug	RC14YC	BPR6HS	RC14YC	RC12YC
Spark Plug Gap	0.76 mm (0.030 inch)	0.76 mm (0.030 inch)	1.02 mm (0.040 inch)	0.76 mm (0.030 inch)
Compression Ratio	8.6:1	9.5:1	9.5:1	9.5:1
Starter	12 VDC			
Oil Capacity Including Filter	Approx. 1.5 Qts	Approx. 1.7 Qts	Approx. 1.7 Qts	Approx. 1.7 Qts
Recommended Oil Filter	Part # 070185F			
Recommended Air Filter	Part # OG3332	Part # OE9581	Part # OC8127	Part # OG5894
Operating RPM	3,600			



Section 1 — General Information

Air-cooled Generators

1.7 SYSTEM SET LED

The "System Set" LED (single cylinder) or "Ready to Run" on the display (v-twin) is ready when all of the following conditions are true:

1. The AUTO/OFF/MANUAL switch is set to the AUTO position.
2. The utility voltage being supplied to the unit is being sensed by the PCB. If the utility sense voltage is not connected to the unit or if it is below approximately 150-160 volts AC, then the system set light will flash rapidly (8kW). This indicates that if the AUTO/OFF/MANUAL switch is placed in the Auto position, the generator will start.
3. No alarms are present, for example, low oil pressure, high temperature, etc.

1.8 FUEL REQUIREMENTS AND RECOMMENDATIONS

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

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

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

Required fuel pressure for **natural gas is five (5) inches to seven (7) inches water column (0.18 to 0.25 psi); and for liquid propane, 10 inches to 12 inches of water column (0.36 to 0.43 psi). The primary regulator for the propane supply is NOT INCLUDED with the generator.**

NOTE:

All pipe sizing, construction and layout must comply with NFPA 54 for natural gas applications and NFPA 58 for liquid propane applications. Once the generator is installed, verify that the fuel pressure NEVER drops below four (4) inches water column for natural gas or 10 inches water column for liquid propane.

Prior to installation of the generator, the installer should consult local fuel suppliers or the fire marshal to check codes and regulations for proper installation. Local codes will mandate correct routing of gaseous fuel line piping around gardens, shrubs and other landscaping to prevent any damage.

Special considerations should be given when installing the unit where local conditions include flooding, tornados, hurricanes, earthquakes and unstable ground for the flexibility and strength of piping and their connections.

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

All installed gaseous fuel piping must be purged and leak tested prior to initial start-up in accordance with local codes, standards and regulations.

1.9 FUEL CONSUMPTION

Unit	Nat. Gas		LP Vapor	
	1/2 Load	Full Load	1/2 Load	Full Load
7/8 kW	77	140	0.94/34	1.68/62
9/10 kW	102	156	1.25/46	1.93/70
12/12 kW	152	215	1.53/56	2.08/76
13/14 kW	156	220	1.56/58	2.30/84
16/16 kW	183	261	1.59/58	2.51/91
16/17 kW	183	261	1.61/59	2.57/94
18/20 kW	206	294	1.89/69	2.90/106

* Natural gas is in cubic feet per hour.

** LP is in gallons per hour/cubic feet per hour.

*** Values given are approximate.

Verify that gas meter is capable of providing enough fuel flow to include household appliances.

◆ 1.9.1 BTU FLOW REQUIREMENTS - NATURAL GAS

BTU flow required for each unit based on 1000 BTU per cubic foot.

- 7kW — 140,000 BTU/Hour
- 9kW — 156,000 BTU/Hour
- 12kW — 215,000 BTU/Hour
- 13kW — 220,000 BTU/Hour
- 16kW — 261,000 BTU/Hour
- 18kW — 294,000 BTU/Hour



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

NOTE:

A minimum of one approved manual shut-off valve must be installed in the gaseous fuel supply line. The valve must be easily accessible. Local codes determine the proper location.

1.10 RECONFIGURING THE FUEL SYSTEM

◆ 1.10.1 8 KW, 410CC ENGINE

To reconfigure the fuel system from NG to LP, follow these steps (Figure 1.4):

NOTE:

The primary regulator for the propane supply is **NOT INCLUDED** with the generator. A fuel pressure of 10 to 12 inches of water column (0.36 to 0.43 psi) to the fuel inlet of the generator **MUST BE SUPPLIED**.

1. Turn off the main gas supply (if connected).
2. Open the roof and remove the door.
3. Remove the battery (if installed).
4. Take the plastic T-handle fuel selector in the poly bag supplied with the generator.
5. Locate the selector knob on the air box cover, behind the yellow air filter door and power bulge. The unit comes from the factory in the NG (Natural Gas) position. Grasping the T-handle, insert the pin end into the hole in the selector knob and pull out to overcome spring pressure and then twist clockwise 90 degrees and allow the selector to return in once aligned with the LP (Liquid Propane) position.
6. Save this tool with the Owner's Manual.
7. Install the battery, door and close the roof.
8. Reverse the procedure to convert back to natural gas.

Figure 1.4 – Fuel Selector

**NOTE:**

Use an approved pipe sealant or joint compound on all threaded fittings to reduce the possibility of leakage.

◆ 1.10.2 10, 12, 14, 16, 17 AND 20KW, V-TWIN ENGINES

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

NOTE:

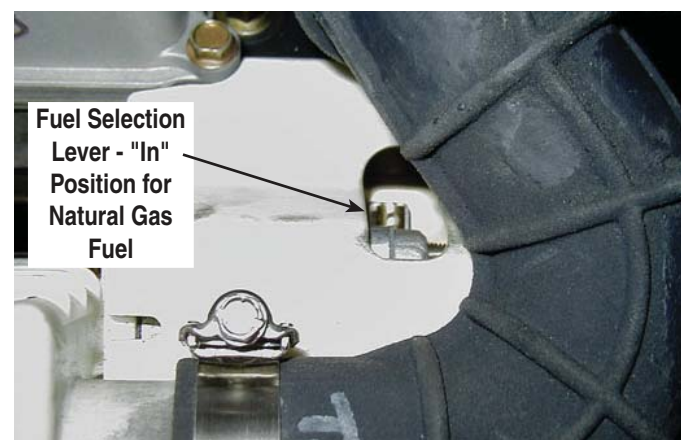
The primary regulator for the propane supply is **NOT INCLUDED** with the generator. A fuel pressure of 10 to 12 inches of water column (0.36 to 0.43 psi) to the fuel inlet of the generator **MUST BE SUPPLIED**.

1. Open the roof.
2. **For 10kW units:** Loosen clamp and slide back the air inlet hose.
 - Slide fuel selector on carburetor out towards the back of the enclosure (Figures 1.5 and 1.6).
 - Return the inlet hose and tighten clamp securely.

For 12, 14, 16, 17 and 20kW units: remove the air cleaner cover.

- Slide the selector lever out towards the back of the enclosure (Figures 1.7 and 1.8).
- Return the air cleaner cover and tighten the two thumb screws.

Figure 1.5 - 10kW, GT-530 (Inlet Hose Slid Back)



3. Close the roof.
4. Reverse the procedure to convert back to natural gas.

Figure 1.6 - 10kW, GT-530 (Inlet Hose Slid Back)

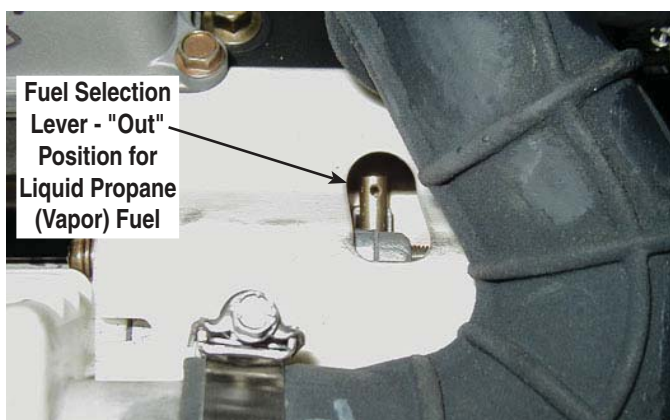


Figure 1.7 - 12, 14, 16, 17, & 20kW, GT-990/GT-999 (Airbox Cover Removed)



Figure 1.8 - 12, 14, 16, 17, & 20kW, GT-990/GT-999 (Airbox Cover Removed)



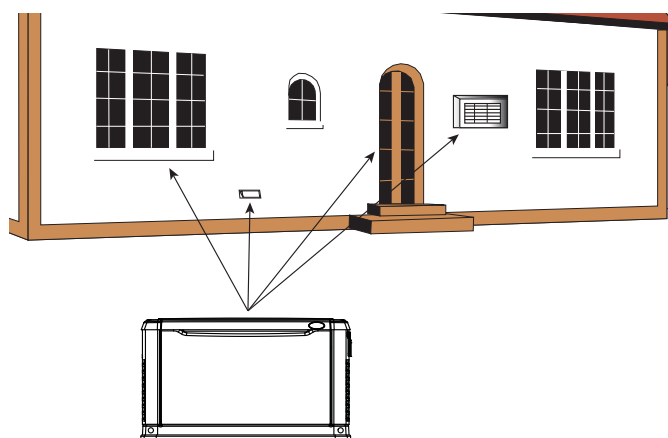
1.11 LOCATION

◆ 1.11.1 GENERATOR

Install the generator set, in its protective enclosure, **outdoors**, where adequate cooling and ventilating air is always available (Figure 1.9). Consider these factors:

- The installation of the generator **must comply strictly with NFPA 37, NFPA 54, NFPA 58, and NFPA 70 standards.**
- Install the unit where air inlet and outlet openings will not become obstructed by leaves, grass, snow, etc.. If prevailing winds will cause blowing or drifting, consider using a windbreak to protect the unit.
- Install the generator on high ground where water levels will not rise and endanger it.
- Allow sufficient room on all sides of the generator for maintenance and servicing. This unit must be installed in accordance with current applicable NFPA 37 and NFPA 70 standards; as well as any other federal, state and local codes for minimum distances from other structures. **DO NOT** install under wooden decks or structures unless there is at least four (4) feet of clearance above the generator, three (3) feet of clearance on sides and front, and 18 inches of clearance at back of unit.
- Install the unit where rain gutter down spouts, roof run-off, landscape irrigation, water sprinklers or sump pump discharge does not flood the unit or spray the enclosure, including any air inlet or outlet openings.
- Install the unit where services will not be affected or obstructed, including concealed, underground or covered services such as electrical, fuel, phone, air conditioning or irrigation.
- Where strong prevailing winds blow from one direction, face the generator air inlet openings to the prevailing winds.

Figure 1.9 – Generator Clearances



- Install the generator as close as possible to the fuel supply, to reduce the length of piping.
- Install the generator as close as possible to the transfer switch. REMEMBER THAT LAWS OR CODES MAY REGULATE THE DISTANCE AND LOCATION.
- The genset must be installed on a level surface. The base frame must be level within two (2) inches all around.
- The generator is typically placed on pea gravel or crushed stone. Check local codes if a concrete slab is required. If a concrete base slab is required, all federal, state and local codes should be followed. Special attention should be given to the concrete base slab which should exceed the length and width of the generator by a minimum of six (6) inches (0.152 meters) on all sides.

— **⚠ WARNING ⚠** —

⚠ 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. This exhaust system must be installed properly, in strict compliance with applicable codes and standards. Following installation, do nothing that might render the system unsafe or in noncompliance with such codes and standards.

- Operate the generator outdoors **ONLY**.
- Keep exhaust gases from entering a confined area through windows, doors, ventilation or other openings (Figure 1.9).

◆ **1.11.2 TRANSFER SWITCH (if included)**

✦ **1.11.2.1 8, 10, 12, 14, 16, 17 and 20kW Units (if equipped)**

The transfer switch that may have shipped inside the carton with the **8, 10, 12, 14, 16 or 17kW** generator is enclosed in a **NEMA 1 (indoor rated only)** enclosure. The transfer switch that may have shipped with the **20kW** generator is enclosed in a **NEMA 3R (indoor/outdoor rated)** enclosure.

- Install the transfer switch indoors on a firm, sturdy supporting structure.
- To prevent switch distortion, level the switch if necessary. This can be done by placing washers between the switch enclosure and mounting surface.
- Never install the switch where water or any corrosive substance might drip onto the enclosure.
- Protect the switch at all times against excessive moisture, dust, dirt, lint, construction grit and corrosive vapors.

— **⚠ WARNING ⚠** —

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

1.12 BATTERY REQUIREMENTS

See the Specifications section for correct battery size and rating.

1.13 BATTERY INSTALLATION

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

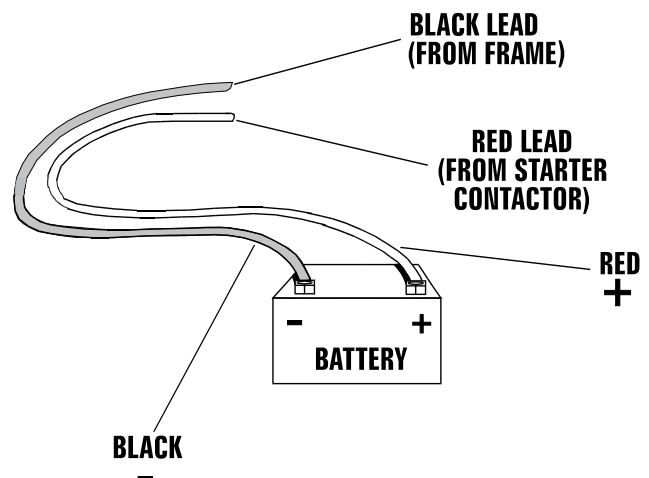
Before installing and connecting the battery, complete the following steps:

1. Set the generator's **AUTO/OFF/MANUAL** switch to **OFF**.
2. Turn off utility power supply to the transfer switch.
3. Remove the 7.5A fuse from the generator control panel.

Battery cables were factory connected at the generator (Figure 1.10). Connect cables to battery posts as follows:

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

Figure 1.10 – Battery Cable Connections



NOTE:

Dielectric grease should be used on battery posts to aid in the prevention of corrosion.

NOTE:

Damage will result if battery connections are made in reverse.

NOTE:

In areas where temperatures regularly fall below 10° F (-12° C) it is recommended that a pad type battery heater be installed to aid in cold climate starting.

1.14 THE BATTERY



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

 A battery presents a risk of electrical shock and high short circuit current. The following precautions are to be observed when working on batteries:

- Remove the 7.5A fuse from the generator control panel.
- Remove watches, rings or other metal objects;
- Use tools with insulated handles;
- Wear rubber gloves and boots;
- Do not lay tools or metal parts on top of the battery; and
- Disconnect charging source prior to connecting or disconnecting battery terminals.



 Do not open or mutilate the battery. Released electrolyte has been known to be harmful to the skin and eyes, and to be toxic.

 The electrolyte is a dilute sulfuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive.

The following procedures are to be observed:

- Wear full eye protection and protective clothing;
- Where electrolyte contacts the skin, wash it off immediately with water;
- Where electrolyte contacts the eyes, flush thoroughly and immediately with water and seek medical attention; and
- Spilled electrolyte is to be washed down with an acid neutralizing agent. A common practice is to use a solution of 1 pound (500 grams) bicarbonate of soda to 1 gallon (4 liters) of water. The bicarbonate of soda solution is to be added until the evidence of reaction (foaming) has ceased. The resulting liquid is to be flushed with water and the area dried.

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

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

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

 Be sure the utility power supply is turned off and the 7.5A fuse is removed from the generator control panel, or sparking may occur at the battery posts as the cables are attached and cause an explosion.

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

See the Specifications section for the correct size and rating when replacing the battery. Have these procedures performed at the intervals specified in the "Service Schedule." A negative ground system is used. Battery connections are shown on the wiring diagrams. Make sure the battery is correctly connected and terminals are tight. Observe battery polarity when connecting the battery to the generator set.

1.15 BATTERY CHARGER

NOTE:

These generators **DO NOT** contain an internal battery charger.

NOTE:

The manufacturer provides a battery trickle charger that is active when the unit is set up for automatic operation. With the battery installed and utility power source voltage available to the transfer switch, the battery receives a trickle charge to prevent self-discharge. The trickle charger is designed to help extend the life of the battery by maintaining the battery. The trickle charge feature cannot be used to recharge a discharged battery.

For units shipped with a transfer switch/load center, the battery charger is pre-installed in the transfer switch enclosure.

For units shipped without a transfer switch/load center, a separate battery charger module is included with the generator.

(For battery charger installation, see the Generator Install Guidelines and Battery Charger Instructions included with the unit.)

2.1 BEFORE INITIAL START-UP

NOTE:

These units have been run and tested at the factory prior to being shipped and do not require any type of break-in.

Before starting, complete the following:

1. Set the generator's main circuit breaker to its OFF (or OPEN) position.
2. Set the generator's AUTO/OFF/MANUAL switch to the OFF position.
3. Turn OFF all breakers on the load center of the transfer box (T1 and T2).
4. Turn OFF all loads connected to the transfer switch terminals T1 and T2.
5. Check the engine crankcase oil level and, if necessary, fill to the dipstick FULL mark with the recommended oil. Do not fill above the FULL mark.
6. Check the fuel supply. Gaseous fuel lines must have been properly purged and leak tested in accordance with applicable fuel-gas codes. All fuel shutoff valves in the fuel supply lines must be open.

During initial start up only, the generator may exceed the normal number of start attempts and experience an "over crank" fault (See the "Overcrank" section). This is due to accumulated air in the fuel system during installation. Reset the control board and restart up to two more times, if necessary. If unit fails to start, contact the local dealer for assistance.

CAUTION

-  **Never operate the engine with the oil level below the "Add" mark on the dipstick. Doing this could damage the engine.**

2.2 CHECK TRANSFER SWITCH OPERATION

Refer to the "Manual Transfer Operation" section, of the owner's manual for procedures.

DANGER

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

2.3 ELECTRICAL CHECKS

Complete electrical checks as follows:

1. Set the generator's main circuit breaker to its OFF (or OPEN) position.
2. Set the generator's AUTO/OFF/MANUAL switch to the OFF position.
3. Turn OFF all breakers on the load center of the transfer box (T1 and T2).
4. Turn on the utility power supply to the transfer switch using the means provided (such as a utility main line circuit breaker).

DANGER

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

5. Use an accurate AC voltmeter to check utility power source voltage across transfer switch terminals N1 and N2. Nominal line-to-line voltage should be 240 volts AC.
6. Check utility power source voltage across terminals N1 and the transfer switch neutral lug; then across terminal N2 and neutral. Nominal line-to-neutral voltage should be 120 volts AC.
7. When certain that utility supply voltage is compatible with transfer switch and load circuit ratings, turn OFF the utility power supply to the transfer switch.
8. On the generator panel, set the Auto/Off/ Manual switch to MANUAL. The engine should crank and start.
9. Let the engine warm up for about five minutes to allow internal temperatures to stabilize. Then, set the generator's main circuit breaker to its ON (or closed) position.

DANGER

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

10. Connect an accurate AC voltmeter and a frequency meter across transfer switch terminal lugs E1 and E2. 8kW voltage should be 230-240 volts at a frequency of 61-63 Hertz. 12, 14, 16, 17 and 20kW voltage should be 247-249 at a frequency of 59.5-60.5 Hertz. 10kW voltage should be 220-230 volts at a frequency of 59.5-60.5 Hertz.
11. Connect the AC voltmeter test leads across terminal lugs E1 and neutral; then across E2 and neutral. In both cases, voltage reading should be 121-126 volts AC (8kW), and 125-126 volts AC (10, 12, 14, 16, 17 and 20kW).

12. Set the generator's main circuit breaker to its OFF (or OPEN) position. Let the engine run at no-load for a few minutes to stabilize internal engine generator temperatures.
13. Set the generator's AUTO/OFF/MANUAL switch to OFF. The engine should shut down.

NOTE:

It is important not to proceed until certain that generator AC voltage and frequency are correct and within the stated limits. Generally, if both AC frequency and voltage are high or low, the engine governor requires adjustment* (*GH410 only). If frequency is correct, but voltage is high or low, the generator's voltage regulator requires adjustment.

2.4 GENERATOR TESTS UNDER LOAD

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

1. Set generator's main circuit breaker to its OFF (or OPEN) position.
2. Turn OFF all breakers on the load center of the transfer box (T1 and T2).
3. Set the generator's AUTO/OFF/MANUAL switch to OFF.
4. Turn OFF the utility power supply to the transfer switch, using the means provided (such as a utility main line circuit breaker).



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

5. Manually set the transfer switch to the STANDBY position, i.e., load terminals connected to the generator's E1/E2 terminals. The transfer switch operating lever should be down.
6. Set the generator's AUTO/OFF/MANUAL switch to MANUAL. The engine should crank and start immediately.
7. Let the engine stabilize and warm up for a few minutes.
8. Set the generator's main circuit breaker to its ON (or CLOSED) position. Loads are now powered by the standby generator.
9. Turn ON the load center of the transfer switch (T1 and T2).
10. Connect an accurate AC voltmeter and a frequency meter across terminal lugs E1 and E2.
 - 8kW voltage should be greater than 230 volts and frequency should be greater than 58 Hz.

- 10, 12, 14, 16, 17 and 20kW voltage should be greater than 240 volts and frequency should be 60 Hz.

11. Let the generator run at full rated load for 20-30 minutes. Listen for unusual noises, vibration or other indications of abnormal operation. Check for oil leaks, evidence of overheating, etc.
12. When testing under load is complete, turn OFF electrical loads.
13. Set the generator's main circuit breaker to its OFF (or OPEN) position.
14. Let the engine run at no-load for a few minutes.
15. Set the AUTO/OFF/MANUAL switch to OFF. The engine should shut down.

2.5 CHECKING AUTOMATIC OPERATION

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

1. Set generator's main circuit breaker to its OFF (or OPEN) position.
2. Check that the AUTO/OFF/MANUAL switch is set to OFF.
3. Turn OFF the utility power supply to the transfer switch, using means provided (such as a utility main line circuit breaker).
4. Manually set the transfer switch to the UTILITY position, i.e., load terminals connected to the utility power source side.
5. Turn ON the utility power supply to the transfer switch, using the means provided (such as a utility main line circuit breaker).
6. Set the generator's main circuit breaker to its ON (or CLOSED) position.
7. Set the AUTO/OFF/MANUAL switch to AUTO. The system is now ready for automatic operation.
8. Turn OFF the utility power supply to the transfer switch.

With the AUTO/OFF/MANUAL switch at AUTO, the engine should crank and start when the utility source power is turned OFF after a 10 second delay. After starting, the transfer switch should connect load circuits to the standby side after a five (5) second delay. Let the system go through its entire automatic sequence of operation.

With the generator running and loads powered by generator AC output, turn ON the utility power supply to the transfer switch. The following should occur:

- After about 15 seconds, the switch should transfer loads back to the utility power source.
- About one minute after re-transfer, the engine should shut down.

2.6 ENGINE GOVERNOR ADJUSTMENT

If both AC frequency and voltage are correspondingly high or low, adjust the engine governor as follows:

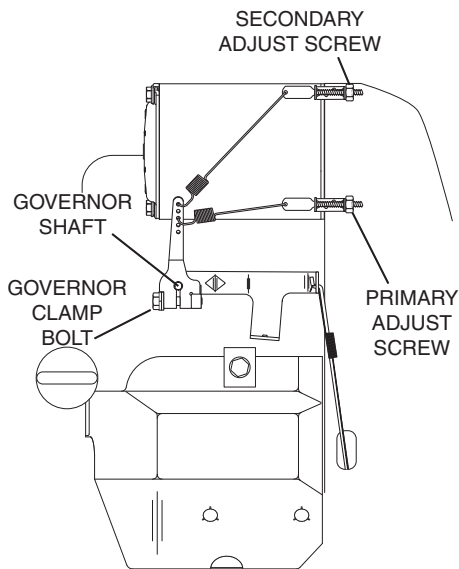
◆ 2.6.1 8 KW UNITS



 The engine must be OFF to perform steps 1 and 2.

1. Loosen the governor clamp bolt (Figure 2.1).
2. Hold the governor lever at its wide open throttle position (clockwise), and rotate the governor shaft clockwise as far as it will go. Then, tighten the governor lever clamp bolt to 70 inch-pounds (8 N-m).

**Figure 2.1 — Engine Governor Adjustment
Single Cylinder Engines**



3. Start the generator; let it stabilize and warm up at no-load.
4. Connect a frequency meter across the generators AC output leads.
5. Turn the primary adjust screw to obtain a frequency reading of 61.5 Hertz. Turn the secondary adjust screw to obtain a frequency of 62.5 Hz.

◆ 2.6.2 12, 14, 16, 17 & 20KW UNITS

NOTE:

All V-twin units **DO NOT** require an engine governor adjustment due to their design.

◆ 2.6.3 ADDITIONAL CORROSION PROTECTION

Periodically spray all engine linkage parts and brackets with corrosion inhibiting spray such as WD-40 or a comparable product.

2.7 VOLTAGE REGULATOR ADJUSTMENT

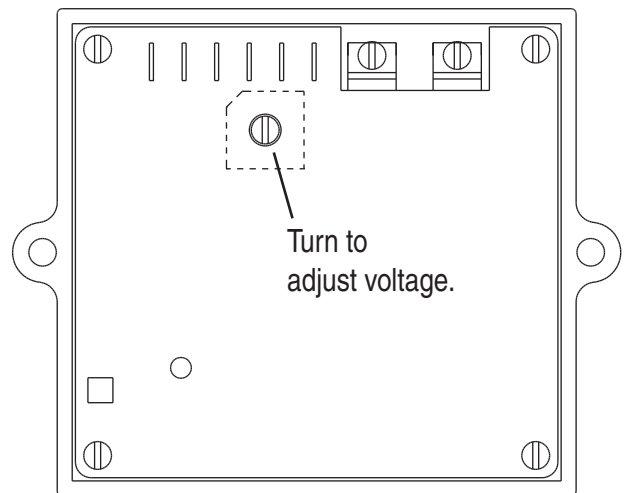
◆ 2.7.1 8 & 10KW UNITS

Due to the brushless design of these two alternators, no voltage regulator is used and therefore no voltage adjustment is required.

◆ 2.7.2 12, 14, 16, 17 & 20KW UNITS

With the frequency between 59.5 -60.5 Hertz at no-load, slowly turn the slotted potentiometer (Figure 2.2) until line voltage reads 247-249 volts.

Figure 2.2 – Voltage Adjustment Potentiometer

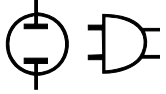


NOTE:

The access panel on top of the control panel must be removed to adjust the voltage regulator.

NOTE:

The voltage regulator is housed behind the generator's control panel. The regulator maintains a voltage in direct proportion to frequency at a 2-to-1 ratio. For example, at 60 Hertz, line-to-neutral voltage will be 124 volts.

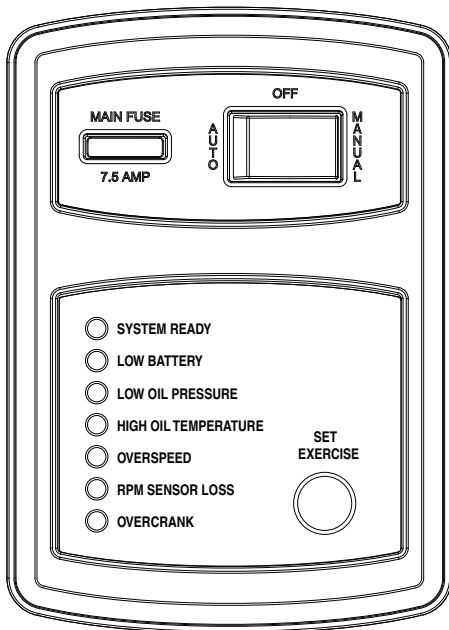


3.1 CONTROL PANEL INTERFACE

◆ 3.1.1 USING THE AUTO/OFF/MANUAL SWITCH (FIGURES 3.1 & 3.2)

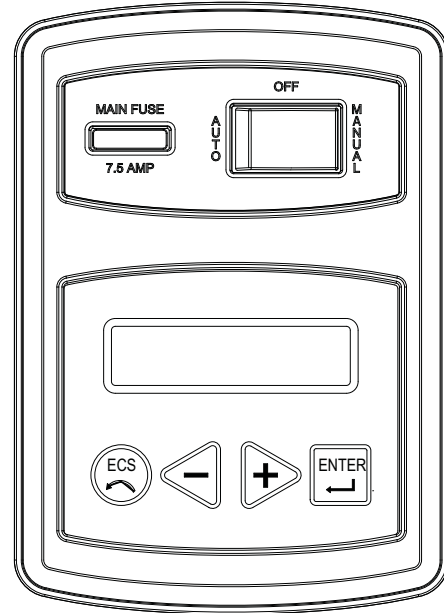
1. “AUTO” Position – Selecting this switch activates fully automatic system operation. It also allows the unit to automatically start and exercise the engine every seven days with the setting of the exercise timer (see the Setting the Exercise Timer section).
2. “OFF” Position – This switch position shuts down the engine. This position also prevents automatic operation.
3. “MANUAL” Position – Set the switch to MANUAL to crank and start the engine. Transfer to standby power will not occur unless there is a utility failure.

Figure 3.1 – 8kW Generator Control Panel



⚠ With the switch set to AUTO, the engine may crank and start at any time without warning. Such automatic starting occurs when utility power source voltage droops below a preset level or during the normal exercise cycle. To prevent possible injury that might be caused by such sudden starts, always set the switch to OFF and remove the fuses before working on or around the generator or transfer switch. Then, place a “DO NOT OPERATE” tag on the generator panel and on the transfer switch.

Figure 3.2 – 10/12/14/16/17 & 20kW Generator Control Panel



◆ 3.1.2 SETTING THE EXERCISE TIMER

This generator is equipped with an exercise timer. Once it is set, the generator will start and exercise every seven days, on the day of the week and at the time of day specified. During this exercise period, the unit runs for approximately 12 minutes and then shuts down. Transfer of loads to the generator output does not occur during the exercise cycle unless utility power is lost.

✦ 8kW

A switch on the control panel (see Figure 3.1) permits selection of the day and time for the system to exercise. At the chosen time, perform the following sequence to select the desired day and time of day the system will exercise. Remember seasonal time changes affect the exercise settings.

1. Verify that the AUTO/OFF/MANUAL switch is set to AUTO.
2. Press and hold the “Set Exercise” switch for several seconds. All the red LED’s will stop flashing immediately and the generator will start.
3. The generator will start and run for approximately 12 minutes and then shut down. The exerciser is now set to run at this time of day each week.

Example: If the “Set Exercise” pressed on Saturday afternoon at 2:00 p.m., the generator will start and exercise for approximately 12 minutes every Saturday at 2:00 p.m.

NOTE:

The exerciser will only work in the AUTO mode and will not work unless this procedure is performed. The exerciser will need to be reset every time the 12 volt battery is disconnected and then reconnected, and when the fuse is removed and/or replaced.

✦ **10 to 20 KW - INSTALLATION ASSISTANT**

Upon first power up of the generator, the display interface will begin an installation assistant. The assistant will prompt the user to set the minimum settings to operate. These settings are simply: Current Date/Time and Exercise Day/Time. The maintenance intervals will be initialized when the exercise time is entered (Figure 3.2).

The exercise settings can be changed at any time via the "EDIT" menu (see Appendix, "Menu System").

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

IF THE INSTALLER TESTS THE GENERATOR PRIOR TO INSTALLATION, PRESS THE "ENTER" KEY TO AVOID SETTING UP THE EXERCISE TIME. THIS WILL ENSURE THAT WHEN THE CUSTOMER POWERS UP THE UNIT, HE WILL STILL BE PROMPTED TO ENTER AN EXERCISE TIME.

NOTE:

The exerciser will only work in the AUTO mode and will not work unless this procedure is performed. The current date/time will need to be reset every time the 12 volt battery is disconnected and then reconnected, and/or when the fuse is removed.

◆ **3.1.3 DISPLAY INTERFACE**

✦ **8 kW LED Display**

Seven (7) LED's are provided for user status indications. The LED functions are:

1. System Ready (green)
2. Low Battery (red)
3. Low Oil Pressure (red)
4. High Oil Temperature (red)
5. Over Speed (red)
6. RPM Sensor Loss (red)
7. Over Crank (red)

See the Protection Systems section for details.

✦ **10 to 20KW DISPLAY INTERFACE MENUS**

The LCD display is organized as detailed below:

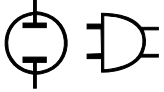
- The "Home" page, this page is the default page which will be displayed if no keys are pressed for 30 seconds. This page normally shows the current Status message and the current date and time. The highest priority active Alarm and/or Warning will be automatically posted on this page as well as flashing the backlight when such an event is detected. In the case of multiple Alarms or Warnings, only the first message will be displayed. To clear an Alarm or Warning, see the Protection Systems section - Clear Alarm.
- The display backlight is normally off. If the user presses any key, the backlight will come on automatically and remain on for 30 seconds after the last key was pressed.
- The "Main Menu" page will allow the user to navigate to all other pages or sub-menus by using the Left/Right and Enter keys. This page can be accessed at any time with several presses of the dedicated Escape key. Each press of the Escape key takes you back to the previous menu until the main menu is reached. This page displays the following options: HISTORY; STATUS; EDIT; AND DEBUG. (See the Appendix - "Menu System".)

3.2 AUTOMATIC TRANSFER OPERATION

To select automatic operation, do the following:

1. Make sure the transfer switch main contacts are set to their UTILITY position, i.e., loads connected to the utility power source (Figure 3.2).
2. Be sure that normal UTILITY power source voltage is available to transfer switch terminal lugs N1 and N2 (Refer to the Electrical Data section).
3. Set the generator's AUTO/OFF/MANUAL switch to AUTO.
4. Set the generator's main circuit breaker to its ON (or CLOSED) position.

With the preceding steps complete, the generator will start automatically when utility source voltage drops below a preset level. After the unit starts, loads are transferred to the standby power source. Refer to the Sequence of Automatic Operation section.



3.3 SEQUENCE OF AUTOMATIC OPERATION

◆ 3.3.1 UTILITY FAILURE

Initial Conditions: Generator in Auto, ready to run, load being supplied by utility source. When utility fails (below 65% of nominal), a 10 second (optionally programmable on the 17 and 20kW only) line interrupt delay time is started. If the utility is still gone when the timer expires, the engine will crank and start. Once started, a five (5) second engine warm-up timer will be initiated. When the warm-up timer expires, the control will transfer the load to the generator. If the utility power is restored (above 75% of nominal) at any time from the initiation of the engine start until the generator is ready to accept load (5 second warm-up time has not elapsed), the controller will complete the start cycle and run the generator through its normal cool down cycle; however, the load will remain on the utility source.

◆ 3.3.2 CRANKING

The system will control the cyclic cranking as follows: 16 second crank, seven (7) second rest, 16 second crank, seven (7) second rest followed by three (3) additional cycles of seven (7) second cranks followed by seven (7) second rests.

✦ Choke Operation

1. The 990/999cc engines have an electric choke in the air box that is automatically controlled by the electronic control board.
2. The 530cc engines have an electric choke on the divider panel air inlet hose that is automatically controlled by the electronic control board.
3. The 410cc engines have a choke behind the air box that is automatically controlled by the electronic control board.

✦ Failure to Start

This is defined as any of the following occurrences during cranking.

1. Not reaching starter dropout within the specified crank cycle. Starter dropout is defined as four (4) cycles at 1,000 RPM.
2. Reaching starter dropout, but then not reaching 2200 RPM within 15 seconds. In this case the control board will go into a rest cycle for seven (7) seconds, then continue the rest of the crank cycle.

During a rest cycle the start and fuel outputs are de-energized and the magneto output is shorted to ground.

✦ Cranking Conditions

The following notes apply during cranking cycle.

1. Starter motor will not engage within five (5) seconds of the engine shutting down.
2. The fuel output will not be energized with the starter.
3. The starter and magneto outputs will be energized together.
4. Once the starter is energized the control board will begin looking for engine rotation. If it does not see an RPM signal within three (3) seconds it will shut down and latch out on RPM sensor loss.
5. Once the control board sees an RPM signal it will energize the fuel solenoid, drive the throttle open and continue the crank sequence.
6. Starter motor will disengage when speed reaches starter dropout.
7. If the generator does not reach 2200 RPM within 15 seconds, re-crank cycle will occur.
8. If engine stops turning between starter dropout and 2200 RPM, the board will go into a rest cycle for seven (7) seconds then re-crank (if additional crank cycles exist).
9. Once started, the generator will wait for a hold-off period before starting to monitor oil pressure and oil temperature (refer to the Alarm Messages section for hold-off times).
10. During Manual start cranking, if the Mode switch is moved from the Manual position, the cranking stops immediately.
11. During Auto mode cranking, if the Utility returns, the cranking cycle does NOT abort but continues until complete. Once the engine starts, it will run for one (1) minute, then shut down.

◆ 3.3.3 LOAD TRANSFER

The transfer of load when the generator is running is dependent upon the operating mode as follows:

1. Manual
 - Will not transfer to generator if utility is present.
 - Will transfer to generator if utility fails (below 65% of nominal for 10 consecutive seconds.
 - Will transfer back when utility returns for 15 consecutive seconds. The engine will continue to run until removed from the Manual mode.

2. Auto

- Will start and run if Utility fails for 10 consecutive seconds.
- Will start a five (5) second engine warm-up timer.
- Will not transfer if utility subsequently returns.
- Will transfer to generator if utility is still not present.
- Will transfer back to utility once utility returns (above 75% of nominal) for 15 seconds.
- Will transfer back to utility if the generator is shut down for any reason (such as the switch is in the OFF position or a shutdown alarm).
- After transfer, will shut down engine after one (1) minute cool-down time.

3. Exercise

- Will not exercise if generator is already running in either Auto or Manual mode.
- During exercise, the controller will only transfer if utility fails during exercise for 10 seconds, and will switch to Auto mode.

◆ 3.3.4 UTILITY RESTORED

Initial Condition: Generator supplying power to customer load. When the utility returns (above 75% of nominal), a 15 second return to utility timer will start. At the completion of this timer, if the utility supply is still present and acceptable, the control will transfer the load back to the utility and run the engine through a one (1) minute cool down period and then shut down. If utility fails for three (3) seconds during this cool down period, the control will transfer load back to the generator and continue to run while monitoring for utility to return.

3.4 MANUAL TRANSFER OPERATION

◆ 3.4.1 TRANSFER TO GENERATOR POWER SOURCE

To start the generator and activate the transfer switch manually, proceed as follows:

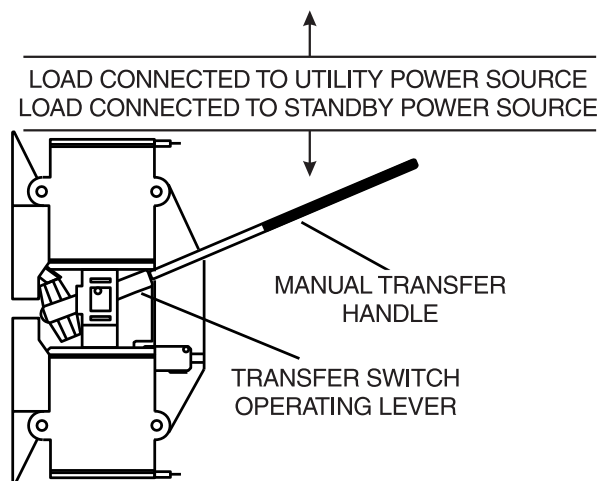
1. Set the generator's AUTO/OFF/MANUAL switch to OFF.
2. Set the generator's main circuit breaker to its OFF (or OPEN) position.
3. Turn OFF the utility power supply to the transfer switch using the means provided (such as a utility main line circuit breaker).

— ⚠ DANGER ⚠ —

⚠ Do not attempt to activate the transfer switch manually until all power voltage supplies to the switch have been positively turned off. Failure to turn off all power voltage supplies may result in extremely hazardous and possibly fatal electrical shock.

4. Use the manual transfer handle inside the transfer switch to move the main contacts to their STANDBY position, i.e., loads connected to the standby power source (Figure 3.3).
5. To crank and start the engine, set the AUTO/OFF/MANUAL switch to MANUAL.
6. Let the engine stabilize and warm up for a few minutes.
7. Set the generator's main circuit breaker to its ON (or CLOSED) position. The standby power source now powers the loads.

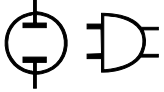
Figure 3.3 – Manual Transfer Switch Operation



◆ 3.4.2 TRANSFER BACK TO UTILITY POWER SOURCE

When utility power has been restored, transfer back to that source and shut down the generator. This can be accomplished as follows:

1. Set the generator's main circuit breaker to its OFF (or OPEN) position.
2. Let the engine run for a minute or two at no-load to stabilize the internal temperatures.
3. Set the generator's AUTO/OFF/MANUAL switch to its OFF (or OPEN) position. The engine should shut down.
4. Check that utility power supply to the transfer switch is turned OFF.



⚠ DANGER ⚠

⚠ Do not attempt to activate the transfer switch manually until all power voltage supplies to the switch have been positively turned off. Failure to turn off all power voltage supplies may result in extremely hazardous and possibly fatal electrical shock.

5. Use the manual transfer handle inside the transfer switch to move the main contacts back to their UTILITY position, i.e., loads connected to the utility power source (Figure 3.2).
6. Turn ON the utility power supply to the transfer switch using the means provided.
7. Set the system to automatic operation as outlined in Automatic Transfer Operation section.

3.5 SIDE COMPARTMENT (V-TWIN ONLY) (FIGURES 3.4 & 3.5)

Local codes may require this compartment to be locked. A hasp is provided so the owner can secure the compartment with their own padlock. Check local codes in the area.

◆ 3.5.1 MAIN CIRCUIT BREAKER

This is a 2-pole breaker rated according to the Specifications section.

◆ 3.5.2 EXTERIOR READY LIGHTS

- Green LED 'Ready' light (10, 12, 14, 16, 17 & 20 KW) is on when utility is present and switch is in AUTO indicating the generator is ready and when the generator is running.
- Red LED 'Alarm' light (10, 12, 14, 16, 17 & 20 KW) is on when the generator is OFF or a fault is detected. (See the Protections Systems section.)
- Yellow LED 'Maintenance' light (17 & 20 KW) (See the Protections Systems section.)

◆ 3.5.3 120 VAC GFCI OUTLET & 15 AMP BREAKER (17 & 20 KW ONLY)

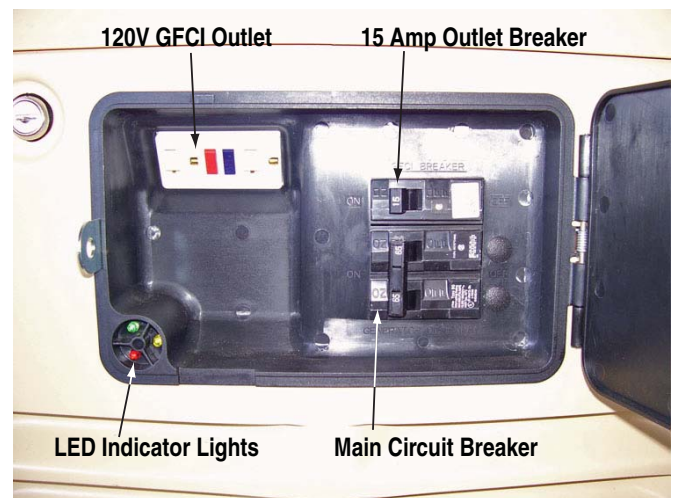
These models are equipped with an external, 15 amp, 120 volt, GFCI convenience outlet that is located in a compartment on the right side of generator (Figure 1.3).

When the generator is running, in the absence of utility power, this outlet may also be used to power items outside your home such as lights or power tools. This outlet may also be used when utility power is present by running the generator in manual mode. This outlet does not provide power if the generator is not running. This outlet is protected by a 15 amp circuit breaker in the same compartment as the outlet. (Do not use when the generator is running in exercise mode.)

Figure 3.4 – Side Compartment



Figure 3.5 – Open Side Compartment



3.6 PROTECTION SYSTEMS

◆ 3.6.1 ALARMS

Highest Priority (Latching) Displayed on the control panel and the external red LED (V-twins only). They must be cleared before the alarm message goes away. The alarm log records each occurrence (see Appendix - "Menu System").

✦ Low Oil Pressure (Shutdown Alarm)

A five (5) second delay on start-up and seven (7) second delay once the engine is running.

This switch (Figure 3.6) has normally closed contacts that are held open by engine oil pressure during operation. Should the oil pressure drop below the five (5) PSI range, switch contacts close and the engine shuts down. The unit should not be restarted until oil level is verified.

✦ High Engine Temperature (Shutdown Alarm – Auto Reset)

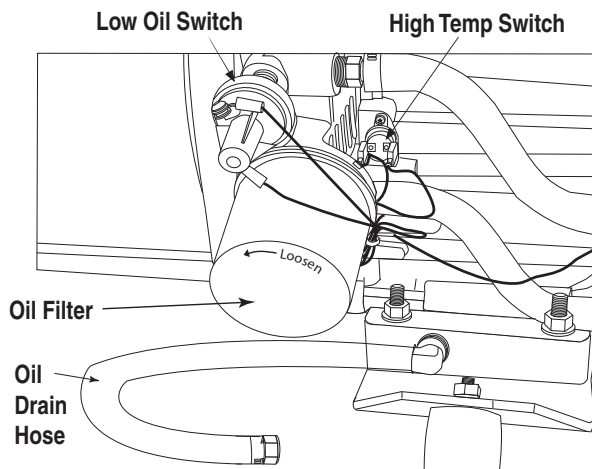
A 10 second delay on start-up and one (1) second delay before shutdown. Auto reset when the condition clears and restart the engine if a valid start signal is still present.

This switch's contacts (Figure 3.6) close if the temperature should exceed approximately 144° C (293° F), initiating an engine shutdown. Once the oil temperature drops to a safe level the switch's contacts open again.

✦ Over Crank (Shutdown Alarm)

This occurs if the engine has not started within the specified crank cycle. (See "Cranking" section.)

Figure 3.6 – Low Oil Pressure and High Temperature Switches



NOTE:

The oil drain hose may be routed in the opposite direction as shown in figure.

✦ Over Speed (Shutdown Alarm)

4320 RPM for three (3) seconds or 4500 RPM immediately. This feature protects the generator from damage by shutting it down if it happens to run faster than the preset limit. This protection also prevents the generator from supplying an output that could potentially damage appliances connected to the generator circuit. Contact the nearest Dealer if this failure occurs.

✦ RPM Sense Loss (Shutdown Alarm)

During cranking, if the Control Board does not see a valid RPM signal within three (3) seconds, it will shut down and lock out on RPM sense loss. While engine is running, if RPM signal is lost for one (1) second the Control Board will shut the engine down, wait 15 seconds, then re-crank the engine. If no RPM signal is detected within the first three (3) seconds of cranking, the Control Board will shut the engine down and latch out on RPM sensor loss. If the RPM signal is detected, the engine will start and run normally. If the RPM signal is subsequently lost again, the Control Board will try one more re-crank attempt before latching out and displaying the RPM sensor failure message.

✦ Under-frequency (Shutdown Alarm)

After starting, if the generator stays under frequency for more than 30 seconds it will shut down. The under-frequency setting is 50 Hz.

✦ Internal Fault (Shutdown Alarm)

This alarm cannot be cleared, call service dealer.

✦ CLEAR ALARM

- 8kW — Clear the alarm by setting the AUTO/OFF/MANUAL switch to the OFF position and back to AUTO.
- 10 - 20kW — Clear the alarm by setting the AUTO/OFF/MANUAL switch to the OFF position. Press the ENTER key to unlatch any active fault and clear the corresponding alarm message.

◆ 3.6.2 WARNINGS

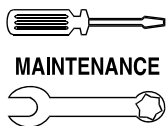
Second Priority (Non-latching) Displayed on the control panel and the external yellow LED (V-twins only). Warnings automatically clear when the monitored condition goes away. Warnings are recorded in the alarm log. Warnings cannot cause shutdowns.

✦ Low Battery

The Control Board monitors battery voltage and displays a warning if the battery voltage falls below 11.0 volts for one (1) minute. Warning is automatically cleared if the battery voltage rises above 11.0 volts. Battery voltage is not monitored during the crank cycle.

✦ Exercise Set Error

If the exercise period becomes corrupted, a warning message will be displayed. This message will only clear when the exercise period is reset.



Section 4 — Maintenance

Air-cooled Generators

◆ 3.6.3 MAINTENANCE ALERTS (10 - 20kW ONLY)

Third priority

✦ Maintenance Message

When a maintenance period expires, a warning message will be displayed. (16 through 20kW models include an external yellow LED which will illuminate.) The alert can be reset by pressing the Enter key, which will cause the user to be prompted to confirm the action. Resetting will clear the alert and reset the maintenance counters for all conditions annunciated. The history log will record the alert. The maintenance counter will not accumulate without battery power. Once battery power is restored, the set time prompt will be displayed. The maintenance counters will be adjusted to the new time and date.

NOTE:

Since most maintenance alerts will occur at the same time (most have two (2) year intervals), only one will appear on the display at any one time. Once the first alert is cleared, the next active alert will be displayed.

4.1 FUSE

The 7.5 amp fuse on the control panel protects the DC control circuit against overload (Figures 3.1 and 3.2). This fuse is wired in series with the battery output lead to the panel. If this fuse element has melted open, the engine will not be able to crank or start. Replace this fuse using only an identical 7.5 amp replacement fuse. Whenever the fuse is removed or replaced, the exercise timer needs to be reset.

4.2 CHECKING THE ENGINE OIL LEVEL

For oil capacities, see the Specifications section. For engine oil recommendations, see the Engine Oil Recommendations section. To check the engine oil level, proceed as follows (Figures 4.1, 4.2 and 4.3):

1. Move the AUTO/OFF/MANUAL switch to the OFF position.
2. Remove the dipstick and wipe it dry with a clean cloth.
3. Completely insert the dipstick; then, remove it again. The oil level should be at the dipstick "Full" mark. If necessary, add oil to the "Full" mark only. DO NOT FILL ABOVE THE "FULL" MARK.



⚠ **Never operate the engine with the oil level below the "Add" mark on the dipstick. Doing this could damage the engine.**

4. Install the dipstick.
5. Reset the AUTO/OFF/MANUAL switch to its original position.

Figure 4.1 — Oil Dipstick and Fill, 8kW

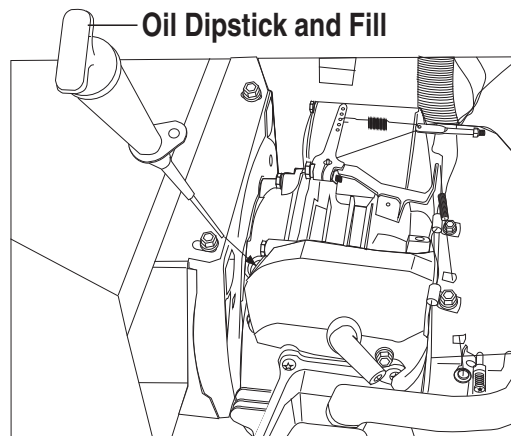
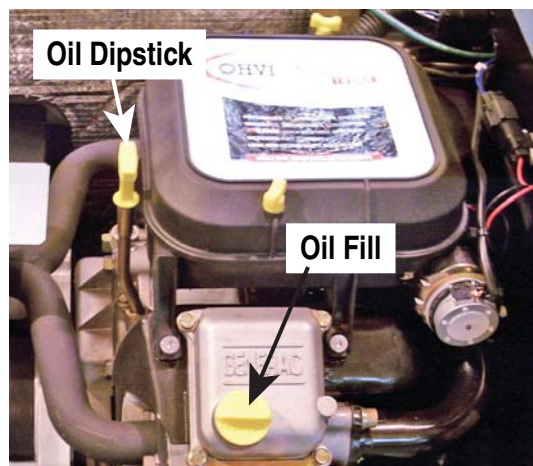
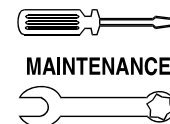


Figure 4.2 — Oil Dipstick, 10kW



Figure 4.3 — Oil Dipstick and Fill, 12, 14, 16, 17 & 20kW





4.3 CHANGING THE ENGINE OIL

◆ 4.3.1 OIL CHANGE INTERVALS

See the "Service Schedule" section.

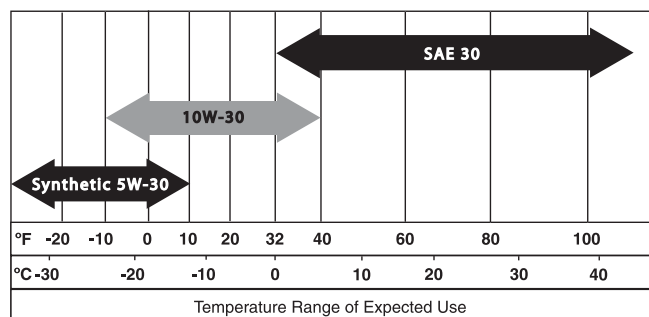
◆ 4.3.2 ENGINE OIL RECOMMENDATIONS

All oil should meet minimum American Petroleum Institute (API) Service Class SJ, SL or better. Use no special additives. Select the oil's viscosity grade according to the expected operating temperature.

- SAE 30 → Above 32° F
- 10W-30 → Between 40° F and -10° F
- Synthetic 5W-30 → 10° F and below



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



◆ 4.3.3 OIL & OIL FILTER CHANGE PROCEDURE

To change the oil, proceed as follows:

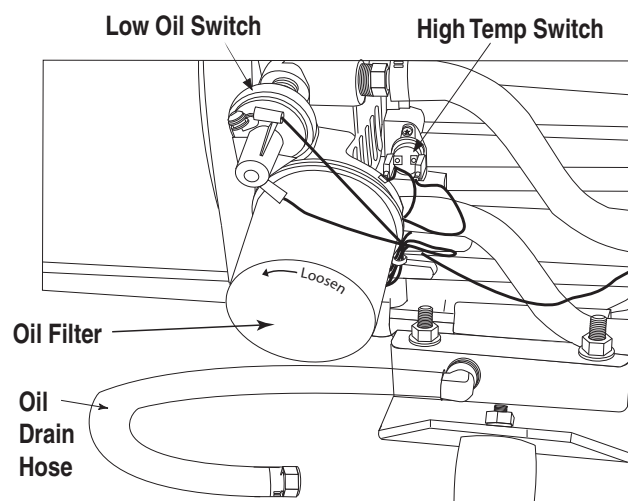
1. Start the engine by moving the AUTO/OFF/MANUAL switch to MANUAL and run until it is thoroughly warmed up. Then shut OFF the engine by moving the switch to the OFF position.
2. Immediately after the engine shuts OFF, pull the oil drain hose (Figure 4.4) free of its retaining clip. Remove the cap from the hose and drain the oil into a suitable container.
3. After the oil has drained, replace the cap onto the end of the oil drain hose. Retain the hose in the clip.

Change the engine oil filter as follows:

1. With the oil drained, remove the old oil filter by turning it counterclockwise.
2. Apply a light coating of clean engine oil to the gasket of the new filter. See the Specifications section for recommended filter.
3. Screw the new filter on by hand until its gasket lightly contacts the oil filter adapter. Then, tighten the filter an additional 3/4 to one turn (Figure 4.4).

4. Refill with the proper recommended oil (see the Engine Oil Recommendations section). See the Specifications section for oil capacities.
5. Start the engine, run for one (1) minute, and check for leaks.
6. Shutdown and recheck oil level, add as needed. DO NOT OVER FILL.
7. Reset the AUTO/OFF/MANUAL switch to the AUTO position.

Figure 4.4 – Oil Drain Hose and Filter



NOTE:

The oil drain hose may be routed in the opposite direction as shown in figure.

4.4 CHANGING THE ENGINE AIR CLEANER

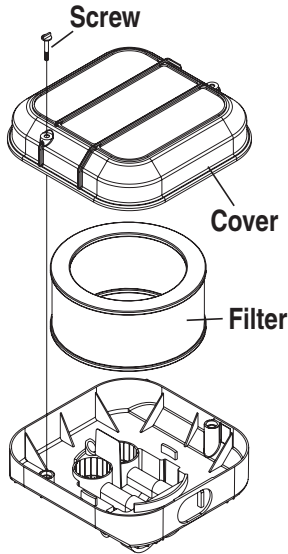
◆ 4.4.1 12, 14, 16, 17 & 20KW GENERATORS

See "The Generator" section for the location of the air cleaner. Use the following procedures (Figure 4.5):

1. Lift the roof and remove the door.
2. Turn the two screws counterclockwise to loosen.
3. Remove the cover and air filter.
4. Wipe away dust or debris from inside of the air box and around edges.
5. Install the new air cleaner into the air box.
6. Install the cover. Turn the two cover screws clockwise to tighten.

See the Service Schedule section for air cleaner maintenance. See the Specifications section for air filter replacement part number.

**Figure 4.5 — 12, 14, 16, 17 & 20kW
Engine Air Cleaner**

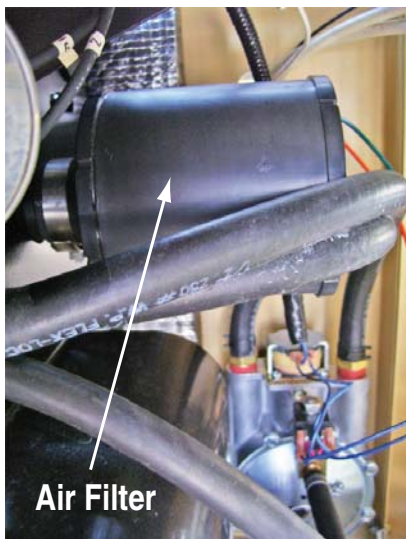


◆ 4.4.2 10KW GENERATORS

See "The Generator" section for the location of the air cleaner. Use the following procedure (Figure 4.6):

1. Lift the roof and remove the door.
2. Turn the worm gear clamp screw counterclockwise to loosen.
3. Pull the old filter off the divider panel hub.
4. Wipe away dust or debris from the panel hub.
5. Install the new air cleaner onto the hub.
6. Turn the worm gear clamp screw clockwise to tighten.
7. Replace door and roof.

Figure 4.6 — 10kW Engine Air Cleaner

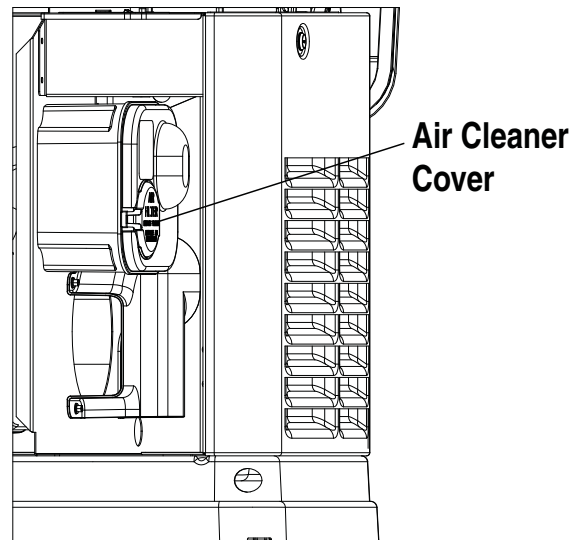


◆ 4.4.3 8KW GENERATOR

See "The Generator" section to locate the air box. Use the following procedures to replace the dirty air filter within the air box (Figure 4.7).

1. Lift the roof and remove the door.
2. Push back on the latch of the yellow air filter access door to swing open.
3. Pull out the old air filter and discard appropriately.
4. Install the new filter, open end first into the air box.
5. Swing the yellow door shut and snap to close.
6. Replace door and close roof securely.

Figure 4.7 — 8kW Engine Air Cleaner Location



4.5 SPARK PLUG(S)

Reset the spark plug(s) gap or replace the spark plug(s) as necessary. See the Service Schedule section for maintenance requirements.

1. Clean the area around the base of the spark plug(s) to keep dirt and debris out of the engine.
2. Remove the spark plug(s) and check the condition. Replace the spark plug(s) if worn or if reuse is questionable. See the Service Schedule section for recommended inspection. Clean by scraping or washing using a wire brush and commercial solvent. Do not blast the spark plug(s) to clean.
3. Check the spark plug gap using a wire feeler gauge. Adjust the gap to 0.76 mm (0.030 inch) for 8, 10 and 20kW; and 1.02 mm (0.040 inch) for 12, 14, 16 and 17kW by carefully bending the ground electrode (Figure 4.8).

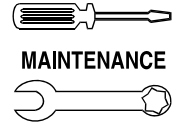
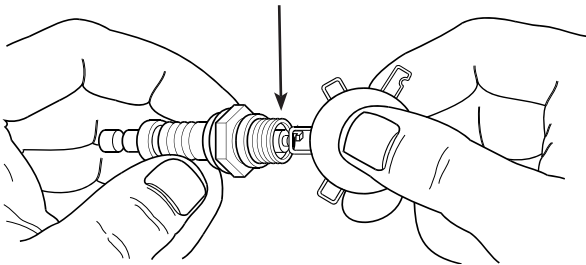


Figure 4.8 – Setting the Spark Plug Gap

SET PLUG GAP AT 0.76 mm (.030 inch) - 8, 10 & 20kW; 1.02 mm (.040 inch) - 12, 14, 16 & 17kW



4.6 BATTERY MAINTENANCE

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

1. Inspect the battery posts and cables for tightness and corrosion. Tighten and clean as necessary.
2. Check the battery fluid level of unsealed batteries and, if necessary, fill with Distilled Water Only. Do not use tap water in batteries.
3. Have the state of charge and condition checked. This should be done with an automotive-type battery hydrometer.

⚠ DANGER ⚠

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

⚠ A battery presents a risk of electrical shock and high short circuit current. The following precautions are to be observed when working on batteries:

- Remove the 7.5A fuse from the generator control panel.
- Remove watches, rings or other metal objects;
- Use tools with insulated handles;
- Wear rubber gloves and boots;
- Do not lay tools or metal parts on top of the battery; and
- Disconnect charging source prior to connecting or disconnecting battery terminals.

⚠ WARNING ⚠

⚠ Do not open or mutilate the battery. Released electrolyte has been known to be harmful to the skin and eyes, and to be toxic.

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

- Wear full eye protection and protective clothing;
- Where electrolyte contacts the skin, wash it off immediately with water;
- Where electrolyte contacts the eyes, flush thoroughly and immediately with water and seek medical attention; and
- Spilled electrolyte is to be washed down with an acid neutralizing agent. A common practice is to use a solution of 1 pound (500 grams) bicarbonate of soda to 1 gallon (4 liters) of water. The bicarbonate of soda solution is to be added until the evidence of reaction (foaming) has ceased. The resulting liquid is to be flushed with water and the area dried.

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

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

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

⚠ Be sure the utility power supply is turned off and the 7.5A fuse is removed from the generator control panel, or sparking may occur at the battery posts as the cables are attached and cause an explosion.

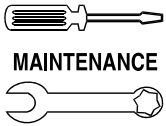
4.7 ADJUSTING GH-410/GT-530/990/999 VALVE CLEARANCE

After the first six (6) months of operation, check the valve clearance in the engine, adjust if necessary.

Important: If feeling uncomfortable about doing this procedure or the proper tools are not available, please contact the Dealer for service assistance. This is a very important step to ensure longest life for the engine.

To check valve clearance:

- The engine should be cool before checking. If valve clearance is 0.002" - 0.004" (0.05 - 0.1mm), adjustment is not needed.
- Remove spark plug wires and position wires away from plugs.
- Remove spark plugs.



MAINTENANCE

Section 4 – Maintenance

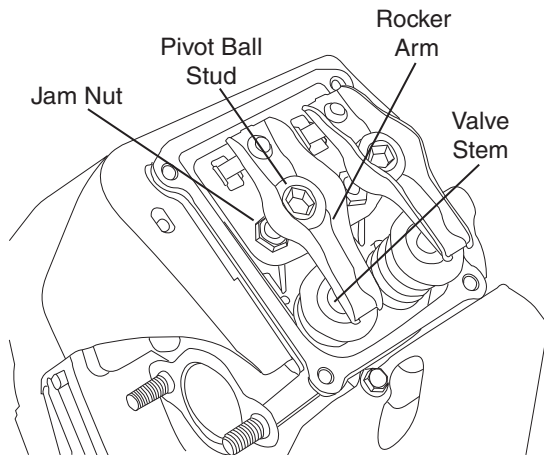
Air-cooled Generators

- Make sure the piston is at Top Dead Center (TDC) of its compression stroke (both valves closed). To get the piston at TDC, remove the intake screen at the front of the engine to gain access to the flywheel nut. Use a large socket and socket wrench to rotate the nut and hence the engine in a clockwise direction. While watching the piston through the spark plug hole. The piston should move up and down. The piston is at TDC when it is at its highest point of travel.

To adjust valve clearance (if necessary), (Figure 4.9):

- Make sure the engine is at 60° to 80° F.
- Make sure that the spark plug wire is removed from the spark plug and out of the way.
- Remove the four screws attaching the valve cover.
- Loosen the rocker jam nut. Use an 10mm allen wrench to turn the pivot ball stud while checking clearance between the rocker arm and the valve stem with a feeler gauge. Correct clearance is 0.002-0.004 inch (0.05-0.1 mm).

Figure 4.9 - Valve Clearance Adjustment



NOTE:

Hold the rocker arm jam nut in place as the pivot ball stud is turned.

When valve clearance is correct, hold the pivot ball stud in place with the allen wrench and tighten the rocker arm jam nut. Tighten the jam nut to 174 in/lbs. torque. After tightening the jam nut, recheck valve clearance to make sure it did not change.

- Install new valve cover gasket.
- Re-attach the valve cover.

NOTE:

Start all four screws before tightening or it will not be possible to get all the screws in place. Make sure the valve cover gasket is in place.

- Install spark plugs.
- Re-attach the spark plug wire to the spark plug.
- On the GT-530 and GT-990/999, repeat the process for the other cylinder.

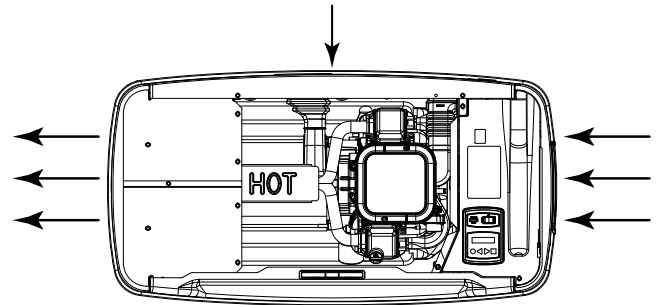
4.8 COOLING SYSTEM

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

Without sufficient cooling and ventilating air flow, the engine/generator quickly overheats, which causes it to quickly shut down. (See Figure 4.10 for vent locations.)

Make sure the doors and roof are in place during operation as running the generator with them removed can effect cooling air movement.

Figure 4.10 – Cooling Vent Locations



⚠ WARNING ⚠

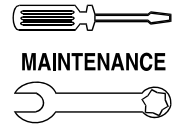
- ⚠ The exhaust from this product gets extremely hot and remains hot after shutdown. High grass, weeds, brush, leaves, etc. must remain clear of the exhaust. Such materials may ignite and burn from the heat of the exhaust system.

⚠ CAUTION ⚠

- ⚠ The maximum ambient temperature for the generator is 25° C (77° F).

4.9 ATTENTION AFTER SUBMERSION

If the generator has been submerged in water, it **must not** be started and operated. Following any submersion in water, have a Dealer thoroughly clean, dry and inspect the generator. If the structure (ex. home) has been flooded, it should be inspected by a certified electrician to ensure there won't be any electrical problems during generator operation or when utility is returned.



4.10 CORROSION PROTECTION

Periodically wash and wax the enclosure using automotive type products. Frequent washing is recommended in salt water/coastal areas. Spray engine linkages with a light oil such as WD-40.

4.11 OUT OF SERVICE PROCEDURE

◆ 4.11.1 REMOVAL FROM SERVICE

If the generator cannot be exercised every seven days, and will be out of service longer than 90 days, prepare the generator for storage as follows:

1. Start the engine and let it warm up.
2. Close the fuel shutoff valve in the fuel supply line and allow the unit to shut down.
3. Once the unit has shut down, switch to the OFF position.
4. Set the generator's main circuit breaker to its OFF (or OPEN) position.
5. Set the AUTO/OFF/MANUAL switch to OFF and turn off the utility power to the transfer switch. Remove the 7.5A fuse from the generator control panel. Disconnect the battery cables as outlined in "General Hazards".
6. While the engine is still warm from running, drain the oil completely. Refill the crankcase with oil. See "Engine Oil Recommendations".
7. Attach a tag to the engine indicating the viscosity and classification of the oil in the crankcase.
8. Remove the spark plug(s) and spray fogging agent into the spark plug(s) threaded openings. Reinstall and tighten the spark plug(s).
9. Remove the battery and store it in a cool, dry room on a wooden board. Never store the battery on any concrete or earthen floor.
10. Clean and wipe the entire generator.

◆ 4.11.2 RETURN TO SERVICE

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

1. Verify that utility power is turned off and that the AUTO/OFF/MANUAL switch is set to OFF.
2. Check the tag on the engine for oil viscosity and classification. Verify that the correct recommended oil is used in the engine (see the Engine Oil Recommendations section). If necessary, drain and refill with the proper oil.
3. Check the state of the battery. Fill all cells of unsealed batteries to the proper level with distilled water. **DO NOT USE TAP WATER IN THE BATTERY.** Recharge the battery to 100 percent state of charge, or, if defective, replace the battery. See "Specifications," for type and size.

4. Clean and wipe the entire generator.
5. Make sure the 7.5A fuse is removed from the generator control panel. Reconnect the battery. Observe battery polarity. Damage may occur if the battery is connected incorrectly.
6. Open the fuel shutoff valve.
7. Insert the 7.5A fuse into the generator control panel. Start the unit by moving the AUTO/OFF/MANUAL switch to MANUAL. Allow the unit to warm up thoroughly.
8. Stop the unit by setting the AUTO/OFF/MANUAL switch to OFF.
9. Turn on the utility power to the transfer switch.
10. Set the AUTO/OFF/MANUAL switch to AUTO.
11. The generator is now ready for service.

NOTE:

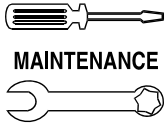
If the battery was dead or disconnected, the exercise timer (single cylinder), current date and time (v-twin) must be reset.

◆ 4.11.3 ACCESSORIES

There are performance enhancing accessories available for the air-cooled generators.

- **Cold Weather Kits** are recommended in areas where temperatures regularly fall below 10° F (-12° C).
- **Scheduled Maintenance Kits** include all pieces necessary to perform maintenance on the generator along with oil recommendations.
- **Auxiliary Transfer Switch Lockout** enables any of the transfer switches to completely lock out one large electrical load by tying into its control system.
- **A Fascia Skirt Wrap** is standard on all 20kW units. It's available for all other current production air-cooled units. It snaps together to provide a smoothing, contoured look as well as rodent/insect protection.
- **The PowerMaster** load prioritization device allows home owners to potentially operator two (2) large electrical loads by giving one (1) priority over the other.
- **The Remote Monitor System** is a wireless, indoor mounted, box that indicates generator run status and allows for exercise programing as well as provide maintenance reminders.
- **Touch-up Paint Kits** are very important to maintain the look and integrity of the generator enclosure. These kits include touch-up paint and instructions if the need should arise.

For more details on accessories, please contact a Dealer.



Section 4 – Maintenance

Air-cooled Generators

4.12 SERVICE SCHEDULE

ATTENTION: It is recommended that all service work be performed by the nearest Dealer.

SYSTEM/COMPONENT	PROCEDURE			FREQUENCY
X = Action R = Replace as Necessary * = Notify Dealer if Repair is Needed.	Inspect	Change	Clean	W = Weekly M = Monthly Y = Yearly
FUEL				
Fuel lines and connections*	X			M
LUBRICATION				
Oil level	X			M or 24 hours of continuous operation.
Oil		X		2Y or 200 hours of operation.**
Oil filter		X		2Y or 200 hours of operation.**
COOLING				
Enclosure louvers	X		X	W
BATTERY				
Remove corrosion, ensure dryness	X		X	M
Clean and tighten battery terminals	X		X	M
Check charge state	X	R		EVERY 6 M
Electrolyte level	X	R		EVERY 6 M
ENGINE AND MOUNTING				
Air cleaner	X	R		2Y or 200 hours
Spark plug(s)	X	R		2Y or 200 hours
GENERAL CONDITION				
Vibration, Noise, Leakage, Temperature*	X			M
COMPLETE TUNE-UP*	TO BE COMPLETED BY A DEALER			2Y or 200 hours
* Contact the nearest dealer for assistance if necessary.				
** Change oil and filter after first eight (8) hours of operation and then every 200 hours thereafter, or 2 years, whichever occurs first. Change sooner when operating under a heavy load or in a dusty or dirty environment or in high ambient temperatures.				



5.1 TROUBLESHOOTING GUIDE

Problem	Cause	Correction
The engine will not crank.	1. Fuse blown. 2. Loose, corroded or defective battery cables. 3. Defective starter contactor. (8 kW) 4. Defective starter motor. 5. Dead Battery.	1. Correct short circuit condition, replace 7.5A fuse in generator control panel. 2. Tighten, clean or replace as necessary. 3. * 4. * 5. Charge or replace battery.
The engine cranks but will not start.	1. Out of fuel. 2. Defective fuel solenoid (FS). 3. Open #14 wire from engine control board. 4. Fouled spark plug(s). 5. Valve lash out of adjustment. 6. Choke not operating.	1. Replenish fuel/Turn on fuel valve. 2. * 3. * 4. Clean, re-gap or replace plug(s). 5. Reset valve lash. 6. Verify choke plate moves freely.
The engine starts hard and runs rough.	1. Air cleaner plugged or damaged. 2. Fouled spark plug(s). 3. Fuel pressure incorrect. 4. Fuel selector in wrong position. 5. Choke remains closed.	1. Check, replace air cleaner. 2. Clean, re-gap or replace plug(s). 3. Confirm fuel pressure to regulator is 10-12" water column (0.36-0.43 psi) for LP, and 5-7" water column (0.18-0.25 psi) for natural gas. 4. Move selector to correct position. 5. Verify choke plate moves freely.
The AUTO/OFF/MANUAL switch is set to OFF, but the engine continues to run.	1. Defective switch. 2. AUTO/OFF/MANUAL switch wired incorrectly. 3. Defective control board.	1. * 2. * 3. *
There is no AC output from the generator.	1. Main line circuit breaker is in the OFF (or OPEN) position. 2. Generator internal failure.	1. Reset circuit breaker to ON (or CLOSED). 2. *
There is no transfer to standby after utility source failure.	1. Defective transfer switch coil. 2. Defective transfer relay. 3. Transfer relay circuit open. 4. Defective control logic board.	1. * 2. * 3. * 4. *
Unit consumes large amounts of oil.	1. Engine over filled with oil. 2. Improper type or viscosity of oil. 3. Damaged gasket, seal or hose. 4. Engine breather defective.	1. Adjust oil to proper level. 2. See "Engine Oil Recommendations". 3. Check for oil leaks. 4. *

***Contact the nearest Dealer for assistance.**



6.1 MENU SYSTEM NAVIGATION

To get to the MENU, use the "Esc" key from any page. It may need to be pressed many times before getting to the menu page. The currently selected menu is displayed as a flashing word. Navigate to the menu required by using the +/- keys. When the menu required is flashing, press the ENTER key. Depending on the menu selected, there may be a list of choices presented. Use the same navigation method to select the the desired screen (refer to the Menu System diagram).

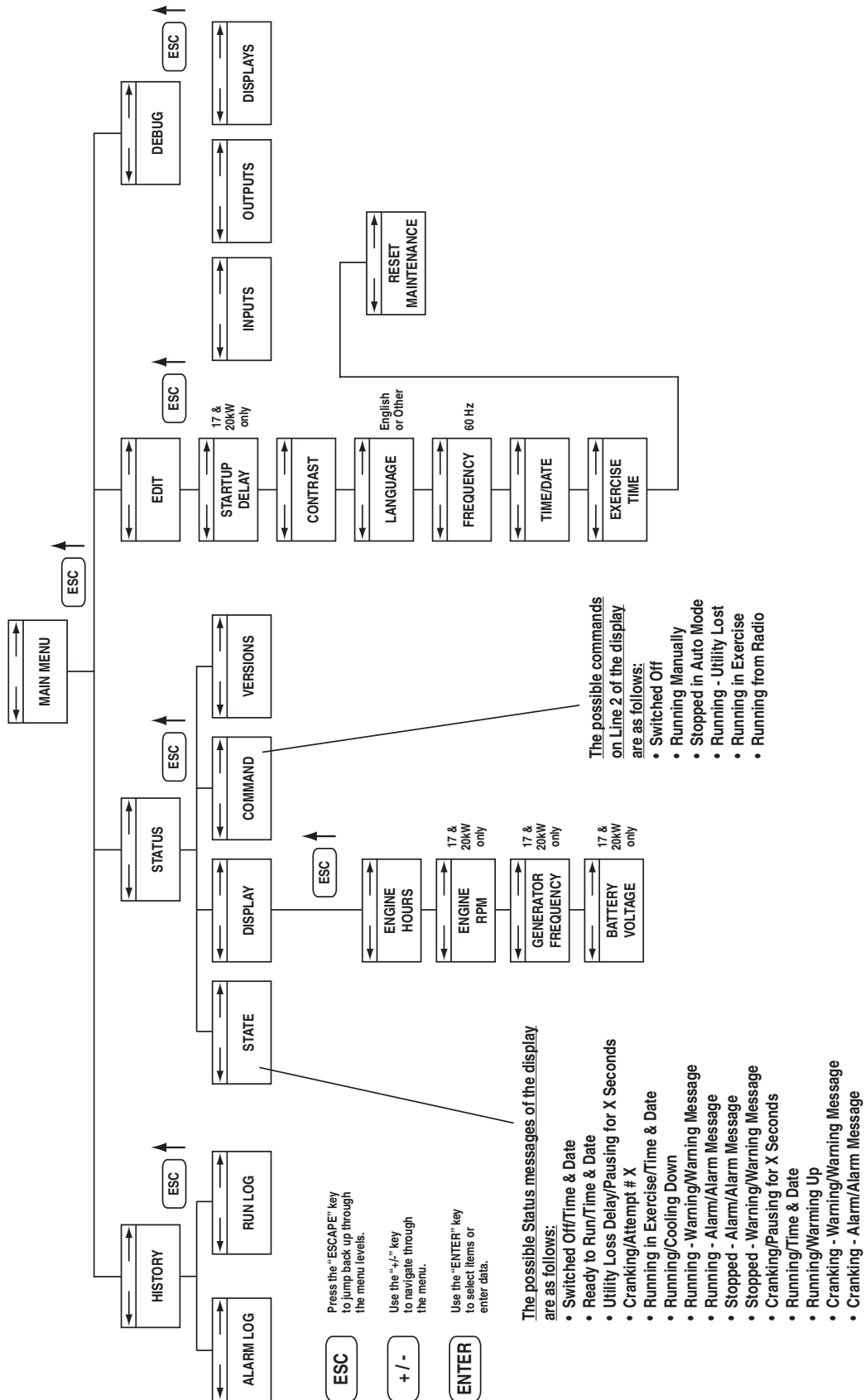
◆ 6.1.1 CHANGING SETTINGS (EDIT MENU)

To change a setting such as display contrast, go to the EDIT menu and use the +/- keys to navigate to the setting to change. Once this setting is displayed (e.g. Contrast), press the ENTER key to go into the edit mode. Use the +/- keys to change the setting, press the ENTER key to store the new setting.

NOTE:

If the ENTER key is not pressed to save the new setting, it will only be saved temporarily. The next time the battery is disconnected, the setting will revert back to the old setting.

MENU SYSTEM



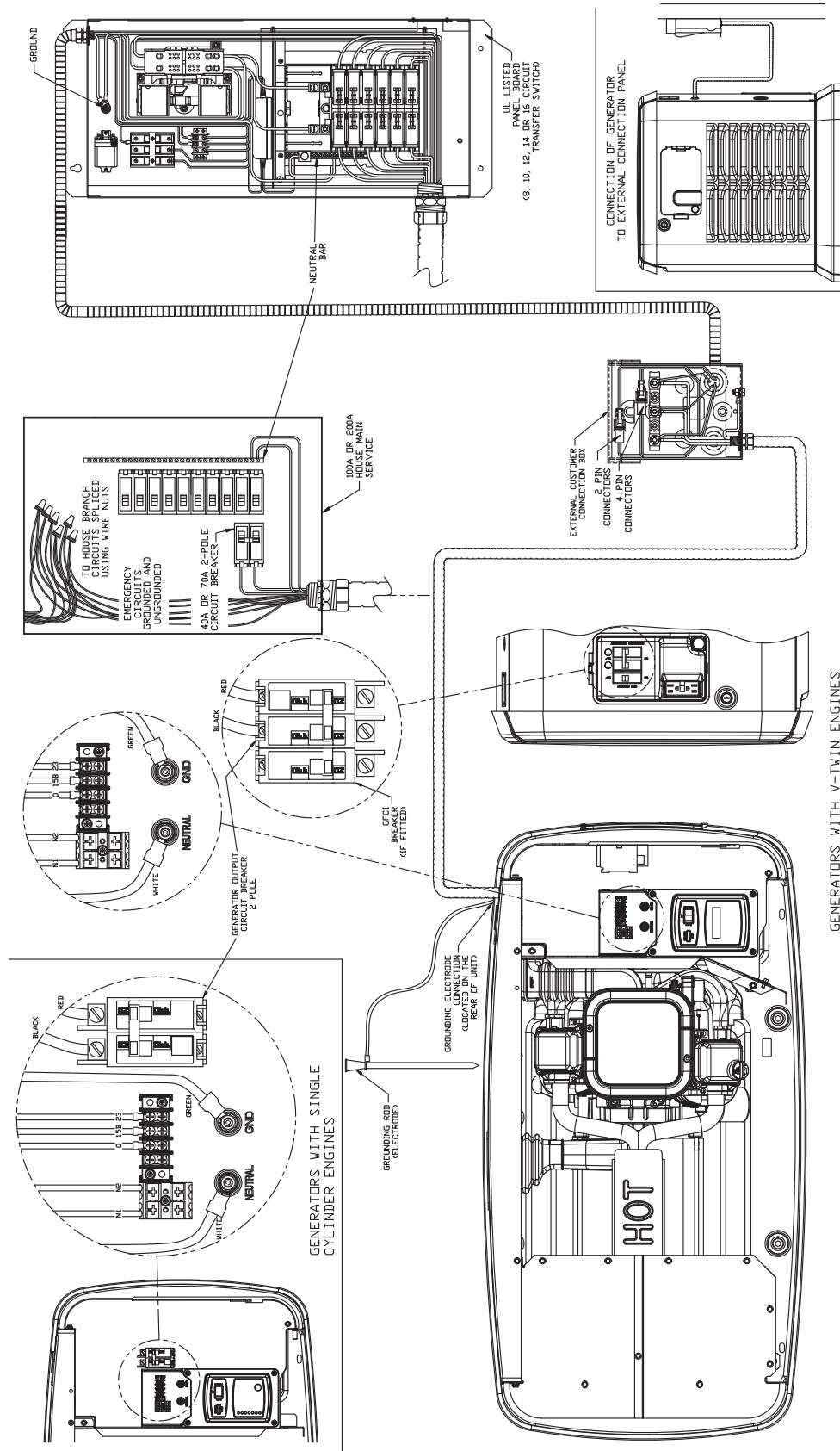
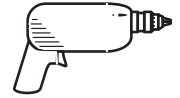
Section 7 – Notes
Air-cooled Generators

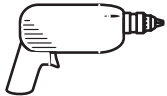
Section 8 – Installation Diagrams

Air-cooled Generators

Circuit Breakers - Drawing No. 0G8573-A

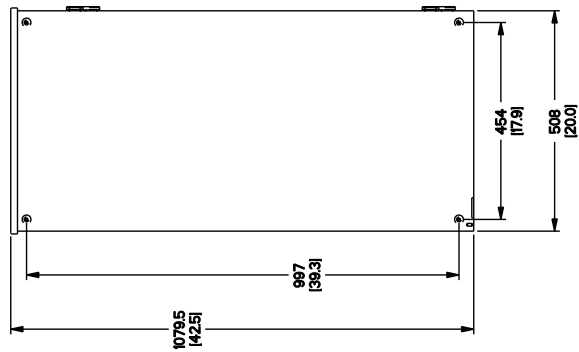
INSTALLATION



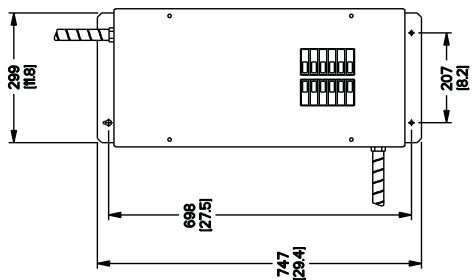


Section 8 — Installation Diagrams

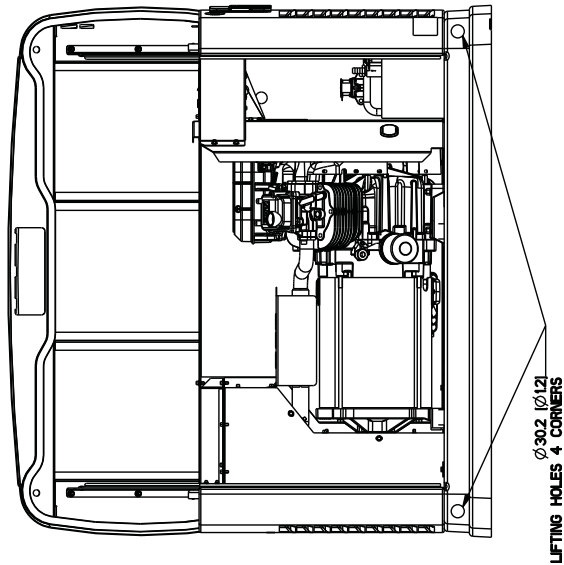
Air-cooled Generators
Generator - Drawing No. 0G8280-D



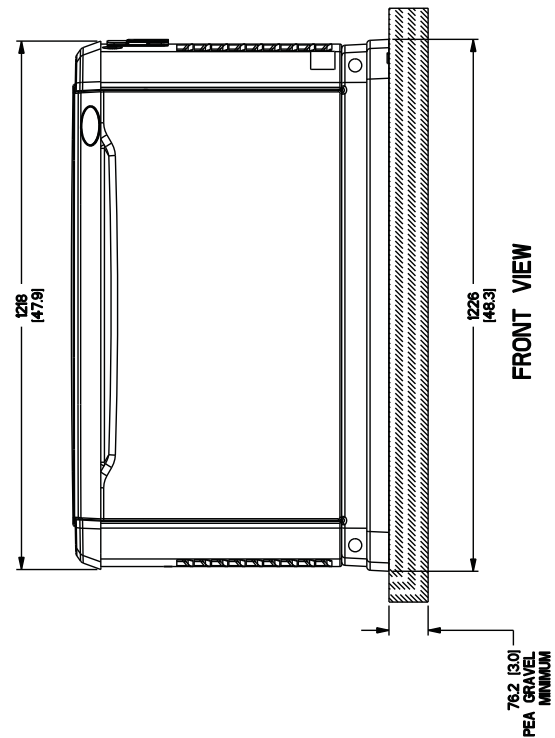
TRANSFER SWITCH
20KW
(IF SUPPLIED)



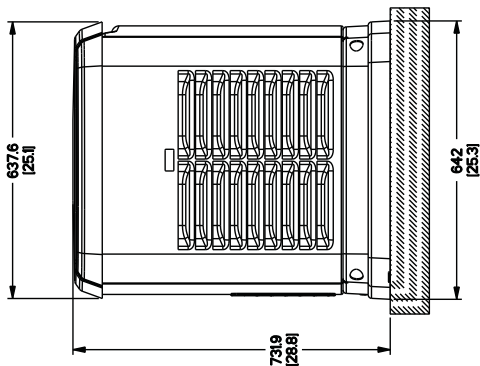
TRANSFER SWITCH
8KW - 17KW
(IF SUPPLIED)



"DO NOT LIFT BY ROOF"



FRONT VIEW

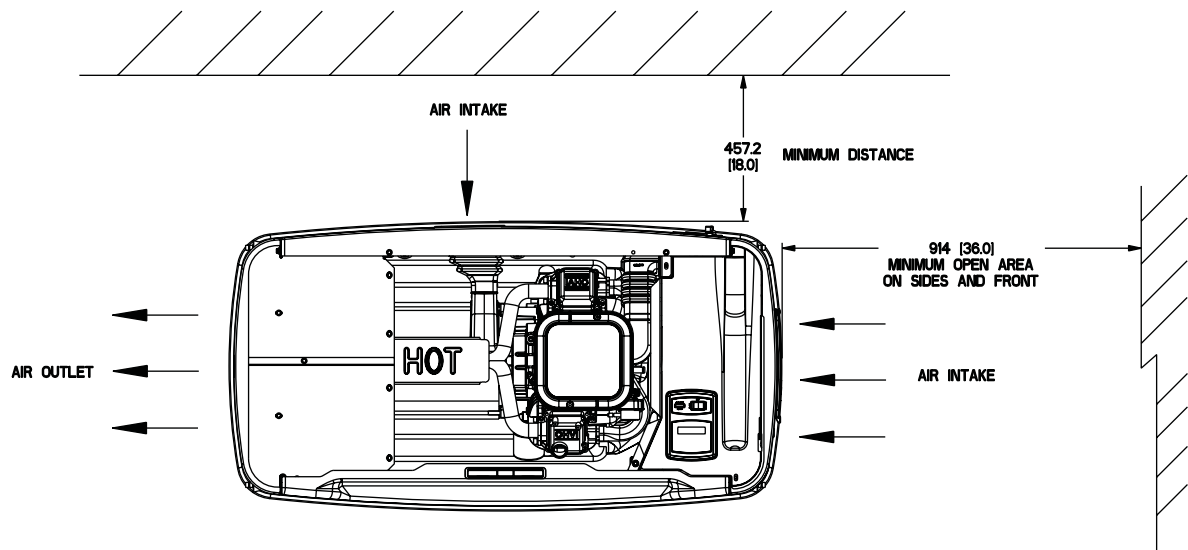
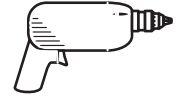


LEFT SIDE VIEW

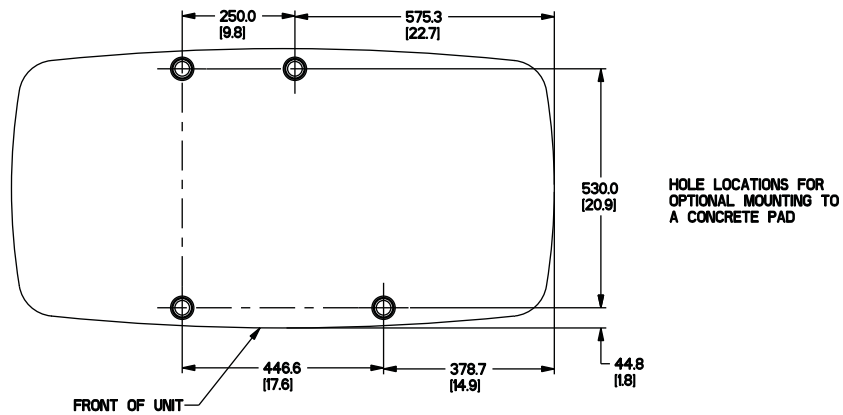
Section 8 – Installation Diagrams

Air-cooled Generators Generator - Drawing No. 0G8280-D

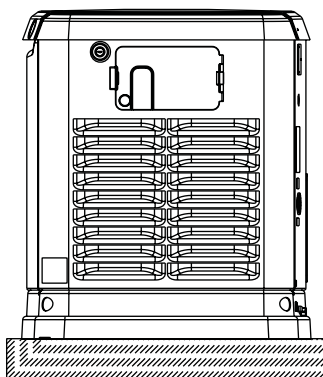
INSTALLATION



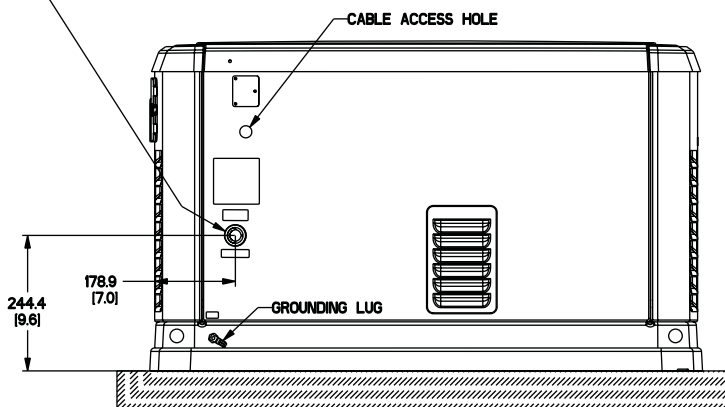
TOP VIEW



FUEL INLET - 12-20KW (1/2" NPT)
8 & 10KW (3/4" NPT) - USE SUPPLIED ADAPTER
REQUIRED FUEL PRESSURE: NATURAL GAS : 5-7" WATER COLUMN
LIQUID PROPANE (VAPOR) : 10-12" WATER COLUMN



RIGHT SIDE VIEW



REAR VIEW

••ALL DIMENSIONS IN:
MILLIMETERS [INCHES]



Section 9 – Warranty

Air-cooled Generators

NOTE: This Emission Control Warranty Statement pertains to this product only IF the generator size is 15 kW or below.

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT

YOUR WARRANTY RIGHTS AND OBLIGATIONS

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

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

MANUFACTURER'S EMISSION CONTROL SYSTEM WARRANTY COVERAGE:

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

PURCHASER'S/OWNER'S WARRANTY RESPONSIBILITIES:

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

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

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

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

1-800-333-1322

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

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

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

For Air-cooled Product ...

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

Part 1

For Liquid-cooled Product ...

**ATTENTION WARRANTY DEPARTMENT
GENERAC POWER SYSTEMS, INC.
211 MURPHY DRIVE
EAGLE, WI 53119**



EMISSION CONTROL SYSTEM WARRANTY

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

- (a) **Applicability:** This warranty shall apply to 1995 and later model year engines. The ECS Warranty Period shall begin on the date the new engine or equipment is purchased by/delivered to its original, end-use purchaser/owner and shall continue for 24 consecutive months thereafter.
- (b) **General Emissions Warranty Coverage:** Generac warrants to the original, end-use purchaser/owner of the new engine or equipment and to each subsequent purchaser/owner that each of its engines is ...
 - (1) Designed, built and equipped so as to conform with all applicable regulations adopted by the CARB pursuant to its authority, and
 - (2) Free from defects in materials and workmanship which, at any time during the ECS Warranty Period, may cause a warranted emissions-related part to fail to be identical in all material respects to the part as described in the engine manufacturer's application for certification.
- (c) The ECS Warranty only pertains to emissions-related parts on your engine, as follows:
 - (1) Any warranted, emissions-related parts that are not scheduled for replacement as required maintenance in the *Owner's Manual* shall be warranted for the ECS Warranty Period. If any such part fails during the ECS Warranty Period, it shall be repaired or replaced by Generac according to Subsection (4) below. Any such part repaired or replaced under the ECS Warranty shall be warranted for the remainder of the ECS Warranty Period.
 - (2) Any warranted, emissions-related part that is scheduled only for regular inspection as specified in the *Owner's Manual* shall be warranted for the ECS Warranty Period. A statement in such written instructions to the effect of "repair or replace as necessary" shall not reduce the ECS Warranty Period. Any such part repaired or replaced under the ECS Warranty shall be warranted for the remainder of the ECS Warranty Period.
 - (3) Any warranted, emissions-related part that is scheduled for replacement as required maintenance in the *Owner's Manual* shall be warranted for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement, the part shall be repaired or replaced by Generac according to Subsection (4) below. Any such emissions-related part repaired or replaced under the ECS Warranty shall be warranted for the remainder of the ECS Warranty Period prior to the first scheduled replacement point for such emissions-related part.
 - (4) Repair or replacement of any warranted, emissions-related part under this ECS Warranty shall be performed at no charge to the owner at a Generac Authorized Warranty Service Facility.
 - (5) When the engine is inspected by a Generac Authorized Warranty Service Facility, the owner shall not be held responsible for diagnostic costs if the repair is deemed warrantable.
 - (6) Generac shall be liable for damages to other original engine components or approved modifications proximately caused by a failure under warranty of any emission-related part covered by the ECS Warranty.
 - (7) Throughout the ECS Warranty Period, Generac shall maintain a supply of warranted emission-related parts sufficient to meet the expected demand for such emission-related parts.
 - (8) Any Generac authorized and approved emission-related replacement part may be used in the performance of any ECS Warranty maintenance or repairs and will be provided without charge to the owner. Such use shall not reduce Generac ECS Warranty obligations.
 - (9) Unapproved, add-on, modified, counterfeit and/or "grey market" parts may not be used to modify or repair a Generac engine. Such use voids this ECS Warranty and shall be sufficient grounds for disallowing an ECS Warranty claim. Generac shall not be held liable hereunder for failures of any warranted parts of a Generac engine caused by the use of such an unapproved, add-on, modified, counterfeit and/or "grey market" part.

EMISSION RELATED PARTS INCLUDE THE FOLLOWING:

- 1) Fuel Metering System:
 - 1.2) LPG/Natural Gas carburetion assembly and its internal components.
 - a) Fuel controller (if so equipped)
 - b) Mixer and its gaskets (if so equipped)
 - c) Carburetor and its gaskets (if so equipped)
 - d) Primary gas regulator (if so equipped)
 - e) LP liquid vaporizer (if so equipped)
- 2) Air Induction System including:
 - a) Intake pipe/manifold
 - b) Air cleaner
- 3) Ignition System including:
 - a) Spark plug
 - b) Ignition module
- 4) Catalytic Muffler Assembly (if so equipped) including:
 - a) Muffler gasket
 - b) Exhaust manifold
- 5) Crankcase Breather Assembly including:
 - a) Breather connection tube

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

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

RTSS Load Shed Automatic Transfer Switch

TECHNICAL MANUAL



This manual should remain with the unit.



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

 **SAVE THESE INSTRUCTIONS!** Read the following information carefully before attempting to install, operate or service this equipment. Also read the instructions and information on tags, decals, and labels that may be affixed to the transfer switch. Replace any decal or label that is no longer legible. 

 **DANGER!** Connection of a generator to an electrical system normally supplied by an electric utility shall be by means of suitable transfer equipment so as to isolate the electric system from utility distribution system when the generator is operating (Article 701 Legally Required Standby Systems or Article 702 Optional Standby Systems, as applicable). Failure to isolate electric system by these means may result in damage to generator and may result in injury or death to utility workers due to backfeed of electrical energy. 

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 chosen does not render the transfer switch unsafe.

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 personal injury, including without limitation, death, or property damage.

WARNING

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

CAUTION

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

NOTE:

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

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

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

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

 This symbol points out potential explosion hazard.

 This symbol points out potential fire hazard.

 This symbol points out potential electrical shock hazard.

GENERAL HAZARDS

- Any AC generator that is used for backup power if a NORMAL (UTILITY) power source failure occurs, must be isolated from the NORMAL (UTILITY) power source by means of an approved transfer switch. Failure to properly isolate the NORMAL and STANDBY power sources from each other may result in injury or death to electric utility workers, due to backfeed of electrical energy.
- Improper or unauthorized installation, operation, service or repair of the equipment is extremely dangerous and may result in death, serious personal injury, or damage to equipment and/or personal property.
- Extremely high and dangerous power voltages are present inside an installed transfer switch. Any contact with high voltage terminals, contacts or wires will result in extremely hazardous, and possibly LETHAL, electric shock. DO NOT WORK ON THE TRANSFER SWITCH UNTIL ALL POWER VOLTAGE SUPPLIES TO THE SWITCH HAVE BEEN POSITIVELY TURNED OFF.

- Competent, qualified personnel should install, operate and service this equipment. Adhere strictly to local, state and national electrical and building codes. When using this equipment, comply with regulations the National Electrical Code (NEC), CSA Standard; C22.1 Canadian Electric Code and Occupational Safety and Health Administration (OSHA) have established.
- Never handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. DANGEROUS ELECTRICAL SHOCK MAY RESULT.
- Jewelry conducts electricity and wearing it may cause dangerous electrical shock. Remove all jewelry (such as rings, watches, bracelets, etc.) before working on this equipment.
- If work must be done on this equipment while standing on metal or concrete, place insulative mats over a dry wood platform. Work on this equipment only while standing on such insulative mats.
- Never work on this equipment while physically or mentally fatigued.
- Keep the transfer switch enclosure door closed and bolted at all times. Only qualified personnel should be permitted access to the switch interior.
- In case of an 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 but 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.
- When an automatic transfer switch is installed for a standby generator set, the generator engine may crank and start at any time without warning. To avoid possible injury that might be caused by such sudden start-ups, the system's automatic start circuit must be disabled before working on or around the generator or transfer switch. For that purpose, a SAFETY DISCONNECT is provided inside the transfer switch. Always set that switch to its OFF position before working on the equipment. Then place a "DO NOT OPERATE" tag on the transfer switch and on the generator. Remove the Negative (Neg) or (-) battery cable.

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**For authorized service, reference
the dealer locator number found
in the generator owner's manual or
on the generator's data label.**

1.1 INTRODUCTION

This manual has been prepared especially for the purpose of familiarizing personnel with the design, application, installation, operation and servicing of the applicable equipment. Read the manual carefully and comply with all instructions. This will help to prevent accidents or damage to equipment that might otherwise be caused by carelessness, incorrect application, or improper procedures.

Every effort has been expended to make sure that the contents of this manual are both accurate and current. The manufacturer, however, reserves the right to change, alter or otherwise improve the product at any time without prior notice.

1.2 EQUIPMENT DESCRIPTION

The PowerManager™ LTS transfer switch will provide three major functions.

The first function is to provide an automatic transfer switch. The automatic transfer switch is used for transferring electrical loads from a UTILITY (NORMAL) power source to a GENERATOR (STANDBY) power source. Such a transfer of electrical loads occurs automatically when (connected to a Generac engine generator) the UTILITY power source has failed or is at a substantially reduced voltage and the GENERATOR source voltage and frequency have reached an acceptable level. The transfer switch prevents electrical feedback between two different power sources (such as the UTILITY and GENERATOR sources) and, for that reason, codes require it in all standby electrical system installations.

The second function is to provide a means to divide up the electrical loads on the electrical system. The electrical loads are to be divided into "critical loads" and non-essential loads. The "critical" loads are connected to the internal 16 circuit panel board. The non-essential electrical loads are to be powered from the load shed switch (LSS).

The UTILITY source will supply all electrical loads at all times. When the transfer signal is given by the engine generator controller, all loads, both critical and non-essential loads, are connected to the GENERATOR supply. If the generator is overloaded the LSS will operate and disconnect the non-essential loads which results in a reduction in the load on the generator.

The third function is a 16 circuit load center to connect the "critical loads" to. These loads will be normally powered by the UTILITY source and will be backed up by the GENERATOR source. The Siemens load center is provided with the following Siemens type QP circuit breakers; 1-50A 2-pole, 1-40A 2-pole, 1-20A 2-pole, 5-20A single pole and 5-15A 2-pole circuit breakers.

The PowerManager LTS transfer switch is suitable for use as SERVICE ENTRANCE EQUIPMENT – UTILITY (NORMAL) source only. The PowerManager LTS is only SERVICE ENTRANCE rated for the USA. The 200A 2-pole circuit breaker provided is the "service disconnect" and is labeled as such. An additional disconnect must be readily available for the alternate source, unless the alternate source is an accessible generator and can be shutdown.

◆ 1.2.1 TRANSFER SWITCH MECHANISM

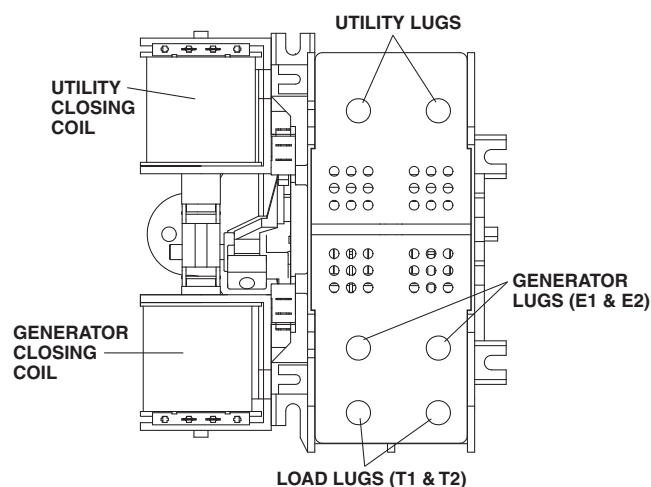
These switches (Figure 1.1) are used with a single-phase system, when the single-phase NEUTRAL line is to be connected to a Neutral Lug and is not to be switched.

Solderless, screw-type terminal lugs are standard.

Switch Rating	Wire Range	Conductor Tightening Torque
200A	#6-250 MCM	275 in-lbs.

This transfer switch is suitable for control of motors, electric discharge lamps, tungsten filament and electric heating equipment where the sum of motor full load ampere ratings and the ampere ratings of other loads do not exceed the ampere rating of the switch and the tungsten load does not exceed 30 percent of the switch rating.

Figure 1.1 — Typical ATS Transfer Mechanism



This transfer switch is for use in optional standby systems only (NEC® Article 702).

This transfer switch is suitable for use on a circuit capable of 22,000 rms symmetrical amperes, 240 VAC maximum.

◆ 1.2.2 UTILITY SERVICE DISCONNECT CIRCUIT BREAKER

The utility service disconnect circuit breaker for the 200 amp models are:

- Generac, Type 225AF, 2-pole
- 120/240VAC, 200A
- 50/60 Hertz
- Wire range: 300 MCM - 6 STR (Line), 250 MCM - 6 STR (Load)
- The conductor tightening torque is 375 in-lbs. (Line), 275 in-lbs. (Non-essential Load and Generator Terminals)

◆ 1.2.3 LOAD SHED CONTROLLER

The primary function of the Load Shed Controller (LSC) is to determine when there is excess load on the generator and has the ability to disconnect the non-essential loads connected to it. Excess load is determined by monitoring the generator supply frequency, if the frequency drops below 58 Hz for more than three (3) seconds, or below 50 Hz for 1/2 second, and the generator is considered to have excess load on it. When this happens, non-essential customer loads are disconnected. The non-essential loads are supplied via the load shed switch (LSS) and the LSS is actuated to disconnect these loads.

The non-essential loads are reconnected in one of 3 ways; Utility voltage is restored and ATS transfers all load back to the Utility supply, manual operation of LOAD SHED RESET push-button on the outside of the enclosure or, automatic operation setup on the DIP switches on the LSC.

For manual operation, set DIP switch #6 to the ON position. If the generator output is overloaded and the non-essential loads are disconnected, press the LOAD SHED RESET push-button to reconnect the non-essential loads to the generator. If the overload condition still exists the LSC will turn the non-essential loads off.

For automatic operation, the number of attempts to reconnect the non-essential loads can be selected. The 2 choices are one-shot or repeated. The time interval before each attempt is set on DIP switches 1-4. For "one-shot" operation mode set DIP switch #5 to ON. Reconnection of the non-essential loads will occur one time, after the time set on DIP switches 1-4. If DIP switch #5 is OFF, the LSC will attempt to reconnect the non-essential loads after the time interval set on DIP switches 1-4. If the overload still exists or comes back, the LSC and LSS will disconnect non-essential loads and the timer and the attempt to reconnect non-essential loads will be repeated.

DIP switch number	Function
1	Selects a 5 minute reconnection time
2	Selects a 15 minute reconnection time
3	Selects a 30 minute reconnection time
4	Selects a 60 minute reconnection time
1-4 all OFF	Selects a 1 minute reconnection time
5	Selects one-shot mode
6	Selects manual reconnect only
7	Selects 50 Hz units
8	Not used

◆ 1.2.4 BATTERY CHARGER

The POWER MANAGER LTS transfer switch is provided with a battery charger (item #44 on Generac #0G8054 assembly drawing) for charging of the engine generator 12 Vdc battery. The battery charger is powered from the load side of the transfer switch (line to neutral – 120V) and is protected by a 2A fuse on the LSC pcb. The battery charger will charge the battery at all times.

1.3 TRANSFER SWITCH DATA DECAL

A DATA DECAL is permanently affixed to the transfer switch enclosure. Use this transfer switch only with the specific limits shown on the DATA DECAL and on other decals and labels that may be affixed to the switch. This will prevent damage to equipment and property.

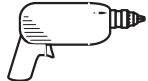
When requesting information or ordering parts for this equipment, make sure to include all information from the DATA DECAL.

Record the Model and Serial numbers in the space provided below for future reference.

MODEL #
SERIAL #

1.4 TRANSFER SWITCH ENCLOSURE

The standard switch enclosure is a National Electrical Manufacturer's Association (NEMA) 3R, UL listed. NEMA 3R type enclosures primarily provide a degree of protection against falling rain and sleet and is undamaged by the formation of ice on the enclosure.



1.5 SAFE USE OF TRANSFER SWITCH

Before installing, operating or servicing this equipment, read the SAFETY RULES (inside front cover) carefully. Comply strictly with all SAFETY RULES to prevent accidents and/or damage to the equipment. The manufacturer recommends that a copy of the SAFETY RULES are posted near the transfer switch. Also, be sure to read all instructions and information found on tags, labels and decals affixed to the equipment.

Three publications that outline the safe use of transfer switches are the following:

- NFPA 70; National Electrical Code
- NFPA 70E; Standard for Electrical Safety in the Workplace
- UL 1008, STANDARD FOR SAFETY-AUTOMATIC TRANSFER SWITCHES

NOTE:

It is essential to use the latest version of any standard to ensure correct and current information.

2.1 INTRODUCTION TO INSTALLATION

This equipment has been wired and tested at the factory. Installing the switch includes the following procedures:

- Mounting the enclosure.
- Connecting power source and load leads.
- Connecting non-essential loads.
- Connecting "Critical Load" branch circuits to the internal load center.
- Connecting the utility sensing and transfer relay circuits to the generator control panel.
- Connecting any auxiliary contact (if needed)
- Testing functions.

2.2 UNPACKING

Carefully unpack the transfer switch. Inspect closely for any damage that might have occurred during shipment. The purchaser must file with the carrier any claims for loss or damage incurred while in transit.

Check that all packing material is completely removed from the switch prior to installation.

2.3 MOUNTING

Mounting dimensions for the transfer switch enclosure are in this manual. Enclosures are typically wall-mounted. See "Installation Diagram".



- ⚠ **Handle transfer switches carefully when installing. Do not drop the switch. Protect the switch against impact at all times, and against construction grit and metal chips. Never install a transfer switch that has been damaged.**

This transfer switch is mounted in a NEMA 3R aluminum enclosure. It can be mounted outside or inside and should be based on the layout of installation, convenience and proximity to the utility supply and load center.

Install the transfer switch as close as possible to the electrical loads that are to be connected to it. Mount the switch vertically to a rigid supporting structure. To prevent switch distortion, level all mounting points. If necessary, use washers behind mounting holes to level the unit.

2.4 CONNECTING POWER SOURCE AND LOAD LINES



- ⚠ **Make sure to turn OFF both the UTILITY (NORMAL) and GENERATOR (STANDBY) power supplies before trying to connect power source and load lines to the transfer switch. Supply voltages are extremely high and dangerous. Contact with such high voltage power supply lines causes extremely hazardous, possibly lethal, electrical shock.**

Wiring diagrams and electrical schematics are provided in this manual.

NOTE:

All installations must comply with national, state and local codes. It is the responsibility of the installer to perform an installation that will pass the final electrical inspection.

Conductor sizes must be adequate to handle the maximum current to which they will be subjected, based on the 75°C column of tables, charts, etc. used to size conductors. The installation must comply fully with all applicable codes, standards and regulations.

Before connecting wiring cables to terminals, remove any surface oxides from the cable ends with a wire brush. All power cables must enter the enclosure through the knockouts provided. This is necessary to maintain the NEMA/UL type 3 rating. If mounted indoors, conduits can enter the enclosure above the knockouts. If not using the knockouts, entry must be at or below knockouts.

If ALUMINUM conductors are used, apply corrosion inhibitor to conductors. Tighten terminal lugs to the torque values as noted on the "Utility Service Disconnect Circuit Breaker", and on the decal located on the inside of the door. After tightening terminal lugs, carefully wipe away any excess corrosion inhibitor.

—▲ CAUTION ▲—

▲ Use a torque wrench to tighten the conductors, being sure not to overtighten, or damage to the insulating base could occur. If not tightened enough, a loose connection would result, causing excess heat which could damage the switch base.

Connect power source load conductors to clearly marked transfer mechanism terminal lugs as follows

1. Connect UTILITY (NORMAL) power source cables to the top of the UTILITY SERVICE DISCONNECT circuit breaker.
2. Connect GENERATOR (STANDBY) source power cables to ATS GENERATOR supply terminals, E1-E2.
3. Connect non-essential customer LOAD leads to LSS switch terminals E1, E2.
4. Connect critical customer loads to the circuit breakers on the load center provided.

Conductors must be properly supported, of approved insulative qualities, protected by approved conduit, and of the correct wire gauge size in accordance with applicable codes.

Be sure to maintain proper electrical clearance between live metal parts and grounded metal. Allow at least 1/2 inch for 100-400 amp circuits.

2.5 NEUTRAL CONNECTIONS

The main neutral block is provided for the connection of the neutral (ungrounded conductors) of the Utility, Generator and non-essential load neutrals. Tighten all wires to the specified torque. Torque values are given on the information decal located on the inside cover.

The main neutral block is connected (bonded) to the enclosure metal by a busbar. If bonding of the neutral is not necessary, the jumper can be removed. When the jumper bar is removed the control wires should be connected as follows:

- #00 wire to the neutral block.
- GRD wire to the enclosure.

The essential load neutrals are to be connected on the busbars mounted on the load center, next to the branch circuit breakers.

2.6 CONNECTING CONTROL WIRES

Control system interconnections consist of N1 and N2, and leads 0, 15B and 23. Control system interconnection leads can be run in the same conduit as the AC power lead if the conduit length is less than 35 feet, and ALL of the wiring is rated for 600V. If the conduit length between the generator and PowerManager LTS is more than 35 feet, the control and power leads must be routed in separate conduits. Recommended wire gauge sizes for this wiring depends on the length of the wire, as recommended in the following chart:

MAXIMUM WIRE RUN LENGTH	RECOMMENDED WIRE SIZE
35 feet (10.67m)	No. 16 AWG.
60 feet (18.29m)	No. 14 AWG.
90 feet (27.43m)	No. 12 AWG.

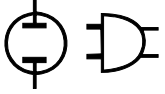
3.1 FUNCTIONAL TESTS AND ADJUSTMENTS

Following transfer switch installation and interconnection, inspect the entire installation carefully. A competent, qualified electrician should inspect it. The installation should comply strictly with all applicable codes, standards, and regulations. When absolutely certain the installation is proper and correct, complete a functional test of the system.

—▲ CAUTION ▲—

▲ Perform functional tests in the exact order presented in this manual, or damage could be done to the switch.

IMPORTANT: Before proceeding with functional tests, read and make sure all instructions and information in this section are understood. Also read the information and instructions of labels and decals affixed to the switch. Note any options or accessories that might be installed and review their operation.



3.2 MANUAL OPERATION



- ⚠ Do NOT manually transfer under load.
Disconnect transfer switch from all power sources by approved means, such as the main circuit breaker(s).

◆ 3.2.1 ATS MANUAL OPERATION

A manual HANDLE is shipped with the transfer switch. Manual operation must be checked BEFORE the transfer switch is operated electrically. To check manual operation, proceed as follows (Figure 3.1):

1. Turn the generator's AUTO/OFF/MANUAL switch to OFF.
 2. Turn OFF UTILITY SERVICE DISCONNECT circuit breaker.
 3. Note position of transfer mechanism main contacts by observing the moveable contact carrier arm. This can be viewed through the long narrow slot in the inside cover of the ATS. The top of the moveable contact carrier arm is yellow to be easily identified.
- Manual operation handle in the UP position - LOAD terminals (T1, T2) are connected to UTILITY terminals (N1, N2).

- Manual operation handle in the DOWN position - LOAD terminals (T1, T2) are connected to EMERGENCY terminals (E1, E2).

◆ 3.2.2 LSS MANUAL OPERATION

A manual HANDLE is shipped with the transfer switch. Manual operation must be checked BEFORE the LSS is operated electrically. To check manual operation, proceed as follows (Figure 3.2):

1. Turn the generator's AUTO/OFF/MANUAL switch to OFF.
 2. Turn OFF UTILITY SERVICE DISCONNECT circuit breaker.
 3. Note position of non-essential LSS main contacts by observing the moveable contact carrier arm. This can be viewed through the long narrow slot in the inside cover of the ATS. The top of the moveable contact carrier arm is yellow to be easily identified.
- Manual operation handle in the UP position - non-essential loads OFF.
 - Manual operation handle in the DOWN position - non-essential loads ON.



- ⚠ Do not use excessive force when operating the transfer switch manually or damage could be done to the manual handle.

Figure 3.1 — Actuating ATS Transfer Switch

Attach handle to the moveable contact carrier arm.



Move handle UP for the UTILITY (NORMAL) position.



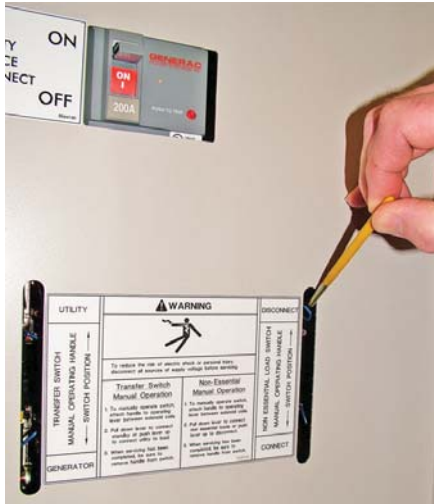
Move handle DOWN for the GENERATOR (STANDBY) position.



NOTE: Return handle to storage position in enclosure when finished with manual transfer.

Figure 3.2 — Actuating LSS Transfer Switch

Attach handle to the moveable contact carrier arm.



Move handle UP for the non-essential loads OFF.



Move handle DOWN for the non-essential loads ON.



NOTE: Return handle to storage position in enclosure when finished with manual transfer.

◆ 3.2.3 CLOSE TO UTILITY SOURCE SIDE

Before proceeding, verify the position of the switch by observing the position of manual operation handle in Figure 3.1. If the handle is UP, the contacts are closed in the UTILITY (NORMAL) position, no further action is required. If the handle is DOWN, proceed with Step 1.

Step 1: With the handle inserted into the moveable contact carrier arm, move handle UP. Be sure to hold on to the handle as it will move quickly after the center of travel.

Step 2: Remove manual operating handle from moveable contact carrier arm. Return handle to storage bracket.

◆ 3.2.4 CLOSE TO GENERATOR SOURCE SIDE

Before proceeding, verify the position of the switch by observing the position of the manual operation handle in Figure 3.1. If the handle is DOWN, the contacts are closed in the GENERATOR (STANDBY) position. No further action is required. If the handle is UP, proceed with Step 1.

Step 1: With the handle inserted into the moveable contact carrier arm, move the handle DOWN. Be sure to hold on to the handle as it will move quickly after the center of travel.

Step 2: Remove manual operating handle from moveable contact carrier arm. Return handle to storage bracket.

◆ 3.2.5 RETURN TO UTILITY SOURCE SIDE

Step 1: Manually actuate switch to return manual operating handle to the UP position.

Step 2: Remove manual operating handle from moveable contact carrier arm. Return handle to storage bracket.

3.3 VOLTAGE CHECKS

1. Turn ON the UTILITY power supply to the PowerManager LTS using the UTILITY SERVICE DISCONNECT circuit breaker.

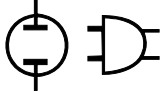
— **! DANGER !** —

! PROCEED WITH CAUTION. THE TRANSFER SWITCH IS NOW ELECTRICALLY HOT. CONTACT WITH LIVE TERMINALS RESULTS IN EXTREMELY HAZARDOUS AND POSSIBLY FATAL ELECTRICAL SHOCK.

2. With an accurate AC voltmeter, check for correct voltage. Measure across ATS terminal lugs N1 and N2. Also check N1 to NEUTRAL and N2 to NEUTRAL.

3. When certain that UTILITY supply voltage is correct and compatible with transfer switch ratings, turn OFF the UTILITY supply to the transfer switch.

4. On the generator panel, set the AUTO/OFF/MANUAL switch to MANUAL position. The generator should crank and start.



The voltage measurements should be as follows:

N1 - N2	240 VAC Nominal
N1 - Neutral	120 VAC Nominal
N2 - Neutral	120 VAC Nominal

5. Let the generator stabilize and warm up at no-load for at least five minutes.
6. Set the generator's main circuit breaker (CB1) to its ON or CLOSED position.



⚠ PROCEED WITH CAUTION. GENERATOR OUTPUT VOLTAGE IS NOW BEING DELIVERED TO TRANSFER SWITCH TERMINALS. CONTACT WITH LIVE TERMINALS RESULTS IN EXTREMELY DANGEROUS AND POSSIBLY FATAL ELECTRICAL SHOCK.

7. With an accurate AC voltmeter and frequency meter, check the no-load, voltage and frequency. Measure across ATS terminal lugs E1 to E2. Also check E1 to NEUTRAL and E2 to NEUTRAL.
 - a. Frequency60-62 Hertz
 - b. Terminals E1 to E2.....240-246 VAC
 - c. Terminals E1 to NEUTRAL.....120-123 VAC
 - d. Terminals E2 to NEUTRAL.....120-123 VAC
8. Set the generator's main circuit breaker (CB1) to its OFF or OPEN position.
9. Set the AUTO/OFF/MANUAL switch to the OFF position to shut down the generator.

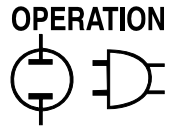
NOTE:

Do NOT proceed until generator AC output voltage and frequency are correct and within stated limits. If the no-load voltage is correct but no-load frequency is incorrect, the engine governed speed may require adjustment. If no-load frequency is correct but voltage is not, the voltage regulator may require adjustment.

3.4 GENERATOR TESTS UNDER LOAD

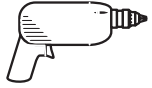
◆ 3.4.1 ATS & CRITICAL LOADS

1. Set the generator's main circuit breaker to its OFF or OPEN position.
2. Set the UTILITY SERVICE DISCONNECT circuit breaker to the OFF position.
3. Manually actuate the transfer switch main contacts to their GENERATOR (STANDBY) position. Refer to "Manual Operation".
4. Manually actuate the LSS main contacts to the UP position. Non-essential loads OFF.
5. To start the generator, set the AUTO/OFF/MANUAL switch to MANUAL. When engine starts, let it stabilize for a few minutes.
6. Turn the generator's main circuit breaker to its ON or CLOSED position. The generator now powers all LOAD circuits. Check generator operation under load as follows:
 - Turn ON electrical loads to the full rated wattage/ampere capacity of the generator. DO NOT OVERLOAD.
 - With maximum rated load applied, check voltage and frequency across transfer switch terminals E1 and E2. Voltage should be greater than 230VAC and frequency should be greater than 59 Hertz.
 - Let the generator run under rated load for at least 30 minutes. With unit running, listen for unusual noises, vibration, overheating, etc., that might indicate a problem.
7. When checkout under load is complete, set main circuit breaker of the generator to its OFF or OPEN position.
8. Let the generator run at no-load for several minutes. Then, shut down by setting the AUTO/OFF/MANUAL switch to its OFF position.
9. Move the switch's main contacts back to their UTILITY position. For example, LOAD connected to UTILITY power supply. Refer to "Manual Operation". Handle and operating lever of transfer switch should be in UP position.
10. Turn on the UTILITY power supply to transfer switch, using the UTILITY SERVICE DISCONNECT circuit breaker. The utility power source now powers the loads.
11. Set the generator's AUTO/OFF/MANUAL switch to its AUTO position.



◆ 3.4.2 LOAD SHED FUNCTIONAL TEST

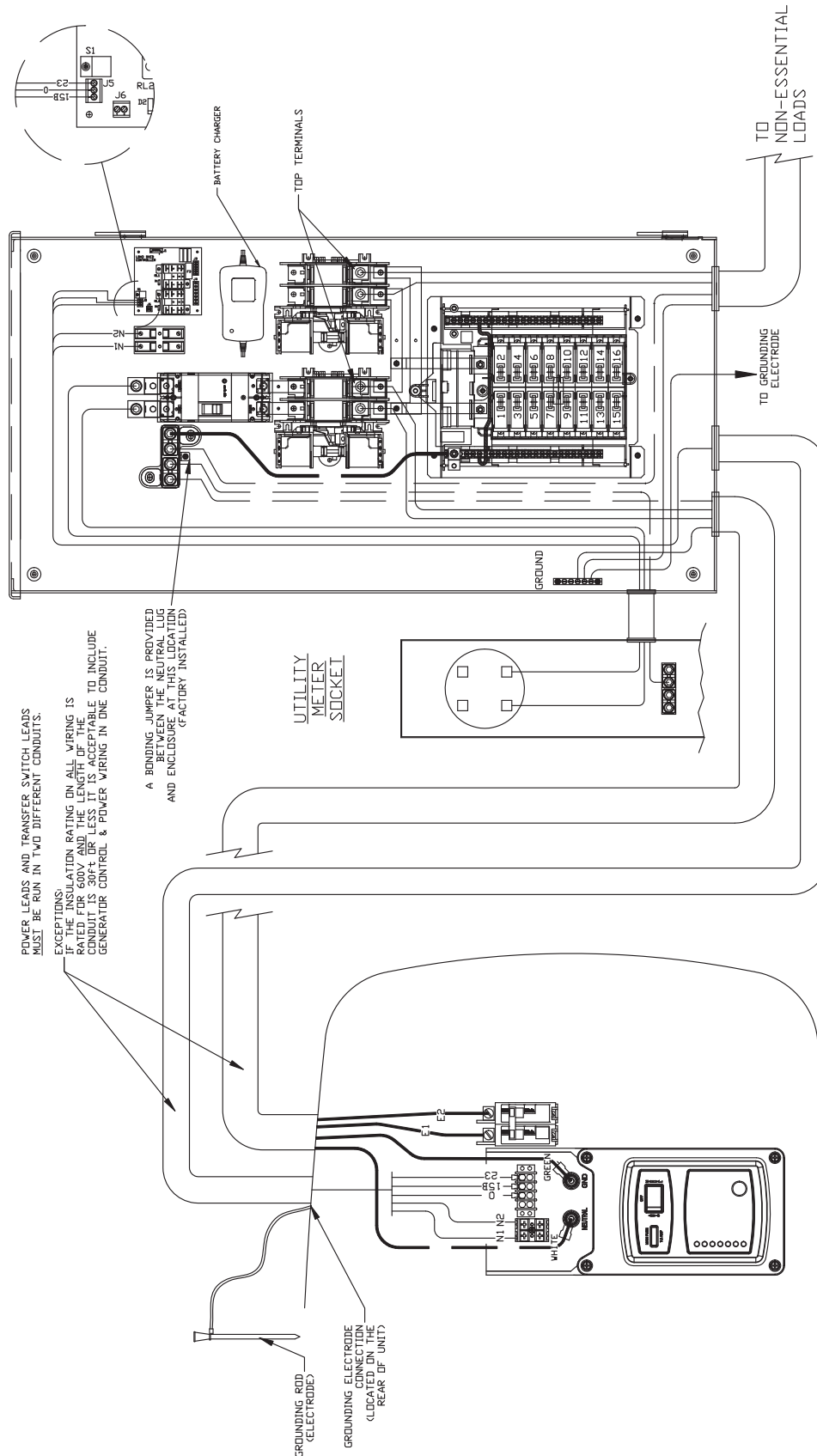
1. Set the generator's main circuit breaker to its OFF or OPEN position.
2. Set the UTILITY SERVICE DISCONNECT circuit breaker to the OFF position.
3. Manually actuate the transfer switch main contacts to the GENERATOR position. Refer to "Manual Operation" section of this manual.
4. Manually actuate the LSS main contacts to the DOWN position. Non-essential loads ON.
5. To start the generator, set the AUTO/OFF/MANUAL switch to MANUAL. When engine starts, let it stabilize for a few minutes.
6. Turn the generator's main circuit breaker its ON position. The generator now powers all LOAD circuits. Check generator operation under load as follows:
 - Turn ON electrical loads to the full rated wattage/ amperage capacity of the generator.
 - Increase the load to slightly overload the generator (load to draw frequency down 55-56 hz). This will require turning loads on that are connected to the LSS. Do not severely overload the generator.
 - The LSS should actuate after three (3) seconds to disconnect the non-essential loads. The door mounted LOAD SHED LED should be ON.
 - Decrease the electrical load on the generator to allow the generator frequency to increase to 60 Hz.
7. The next step will depend on how the LSC is set up (see the "Load Shed Controller" section). If set up for:
 - **Manual Operation** — Press the door mounted LOAD SHED RESET button. The LSS will reconnect non-essential loads.
 - **Automatic Operation** — The LSS will reconnect non-essential loads after the delay time setup on the DIP switches of the LSC.
8. Turn ON the UTILITY power supply to the transfer switch using the UTILITY SERVICE DISCONNECT circuit breaker. After the return to utility time delay, the utility power source will power the loads.
9. Set the generator's AUTO/OFF/MANUAL switch to the AUTO position.



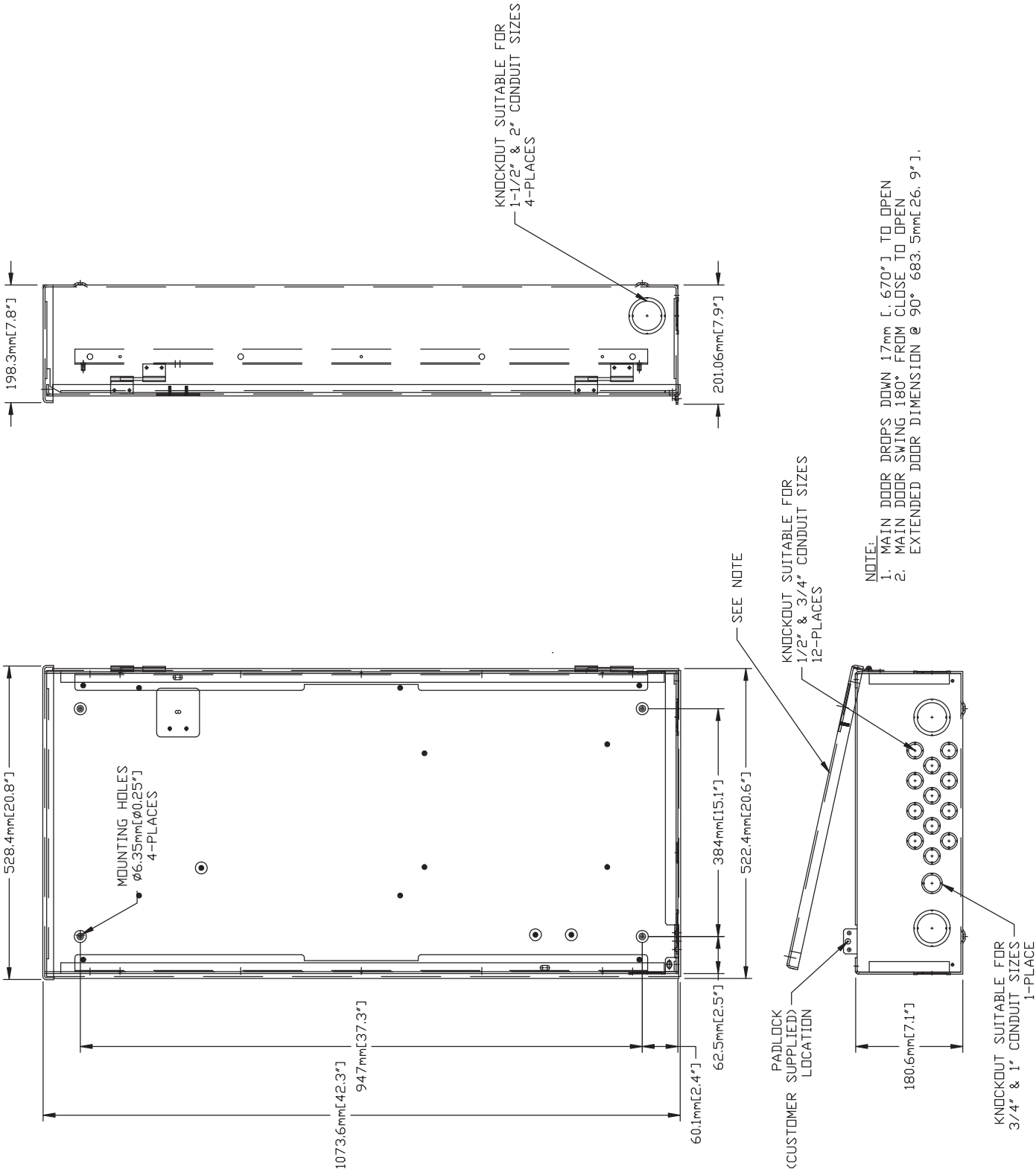
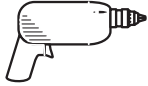
Section 4 – Installation Diagrams

RTSS Type Transfer Switch

Load Shed Interconnection - Drawing No. 0G8774-B



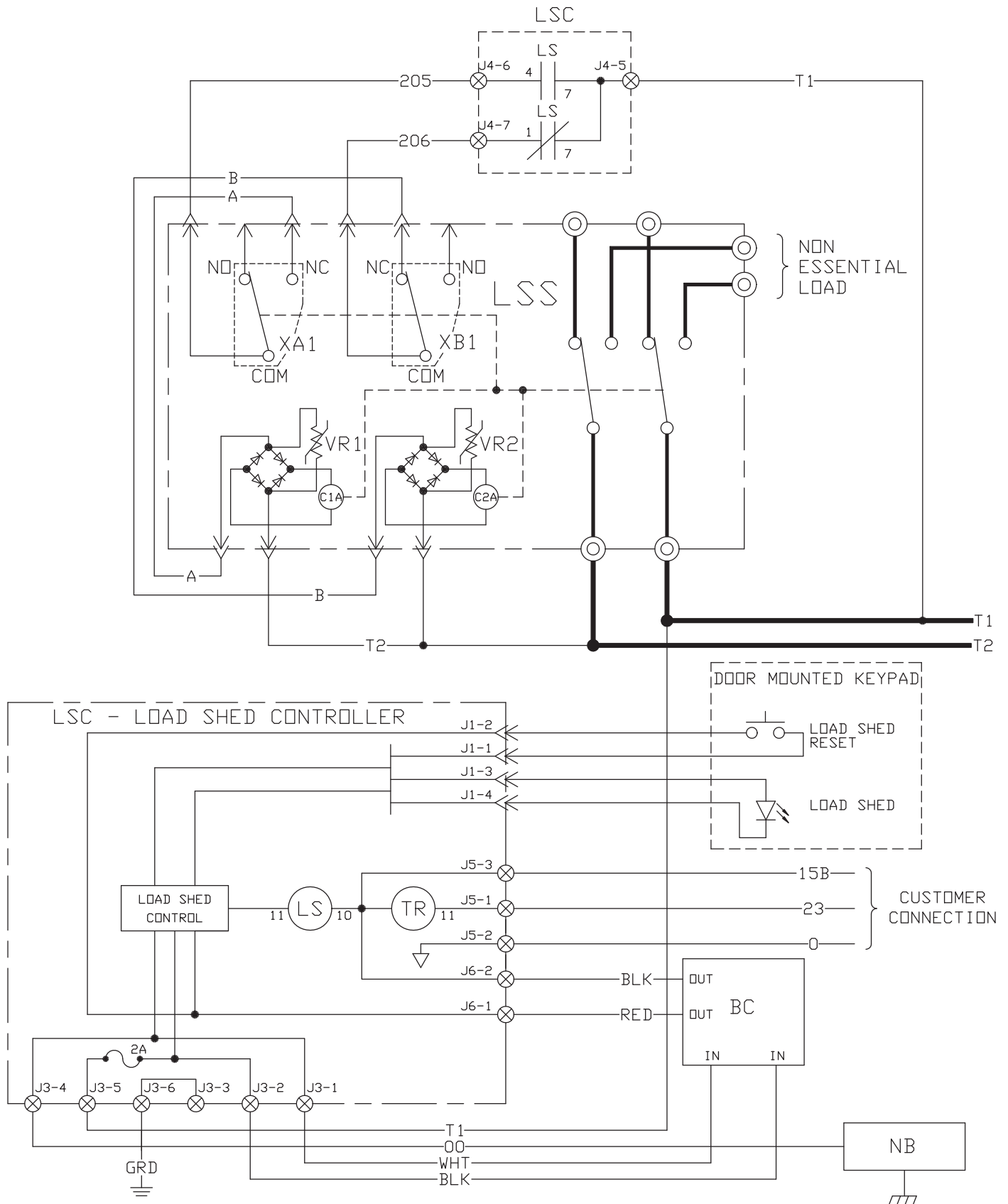
2008 AND LATER AIR-COOLED HSB GENERATORS



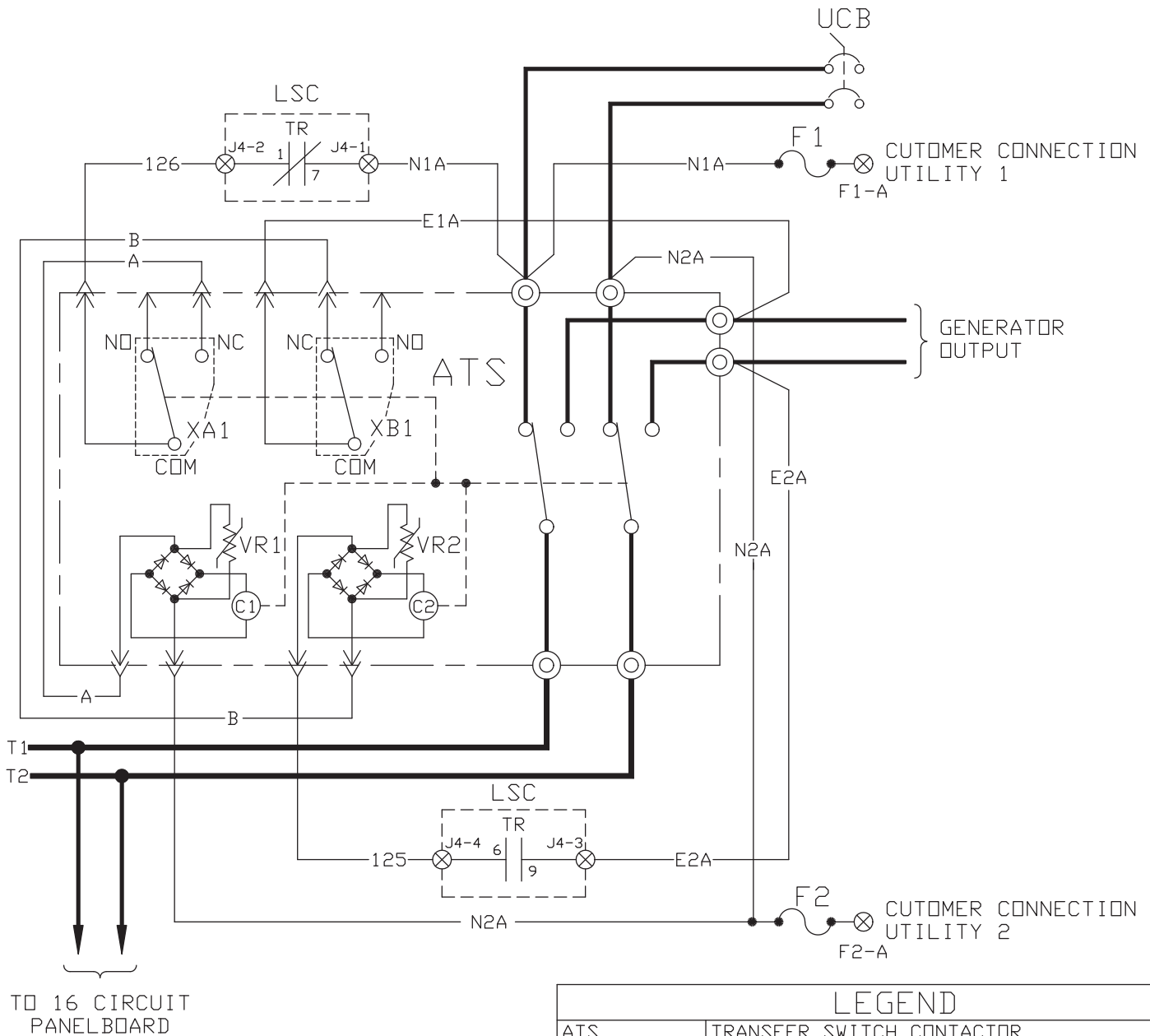
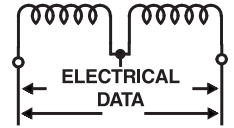
Section 5 – Electrical Data

RTSS Type Transfer Switch

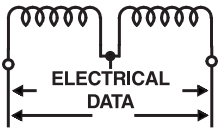
Electrical Schematic - Drawing No. 0G7816-A



Section 5 – Electrical Data
RTSS Type Transfer Switch
Electrical Schematic - Drawing No. 0G7816-A



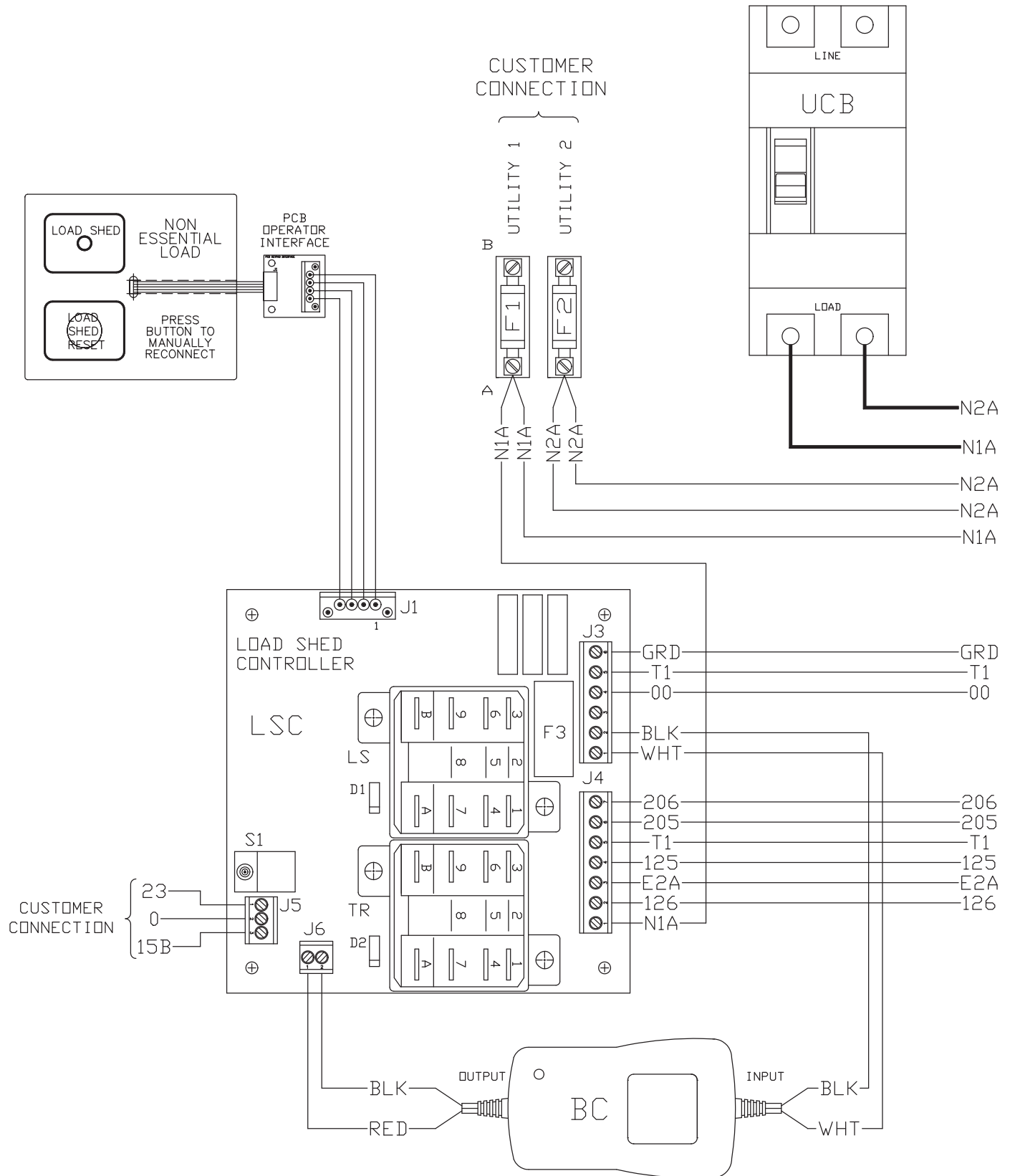
LEGEND	
ATS	TRANSFER SWITCH CONTACTOR
BC	BATTERY CHARGER
C1	SOLENOID COIL (UTILITY CLOSING)
C2	SOLENOID COIL (STANDBY CLOSING)
C1A	SOLENOID COIL (LSS-OFF)
C2A	SOLENOID COIL (LSS-ON)
F1, F2	FUSE, 5A
LS	RELAY, LOAD SHED
LSC	LOAD SHED CONTROLLER
LSS	LOAD SHED TRANSFER SWITCH CONTACTOR
NB	NB - NEUTRAL BLOCK
TR	RELAY, TRANSFER
UCB	UTILITY CIRCUIT BREAKER
VR1, VR2	VARIATOR
XA1, XB1	LIMIT SWITCHES, ACTUATOR



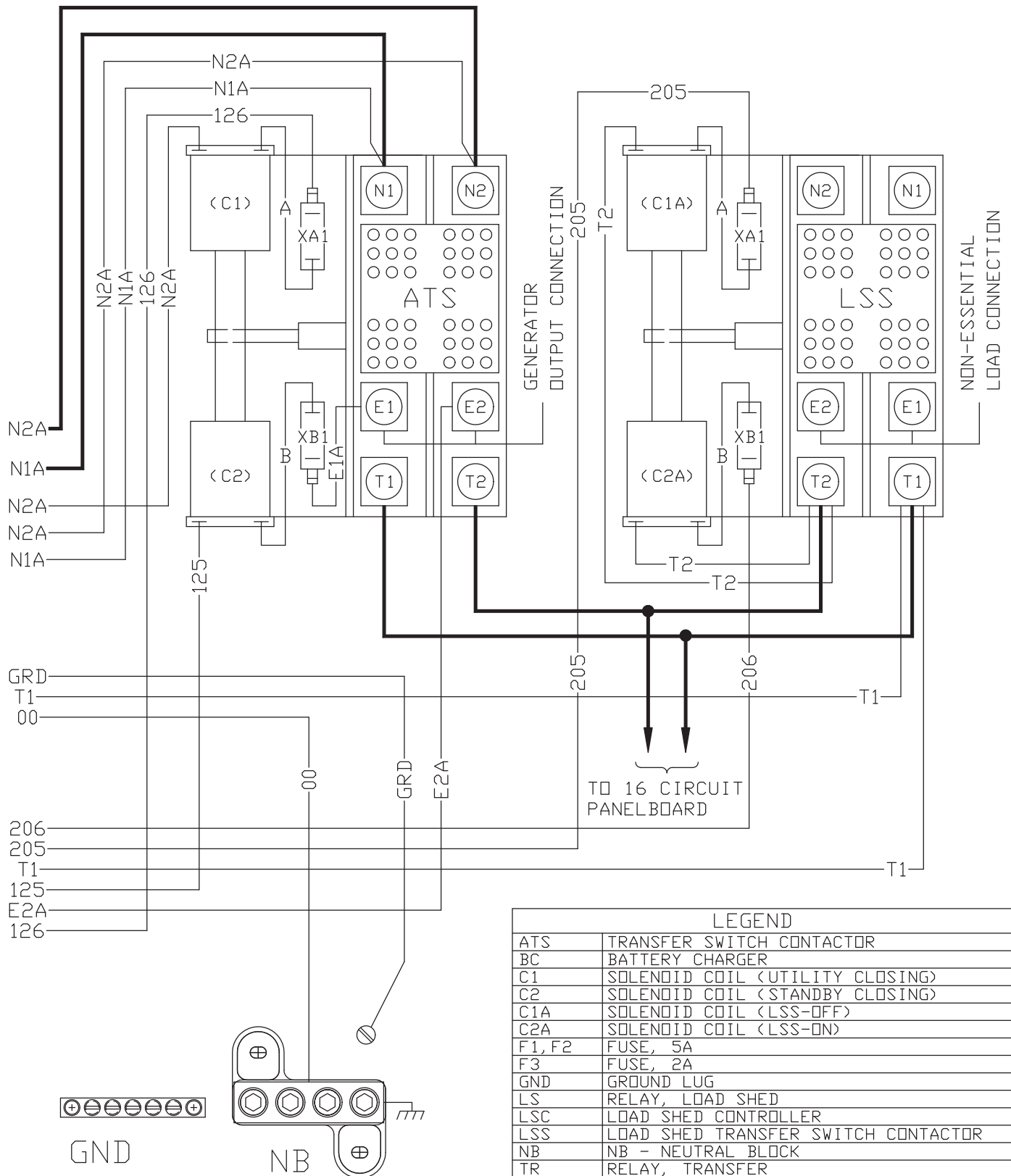
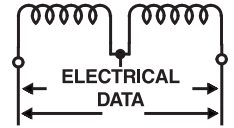
Section 5 – Electrical Data

RTSS Type Transfer Switch

Wiring Diagram - Drawing No. 0G7817-B



Section 5 – Electrical Data
RTSS Type Transfer Switch
Wiring Diagram - Drawing No. 0G7817-B



LEGEND	
ATS	TRANSFER SWITCH CONTACTOR
BC	BATTERY CHARGER
C1	SOLENOID COIL (UTILITY CLOSING)
C2	SOLENOID COIL (STANDBY CLOSING)
C1A	SOLENOID COIL (LSS-OFF)
C2A	SOLENOID COIL (LSS-ON)
F1, F2	FUSE, 5A
F3	FUSE, 2A
GND	GROUND LUG
LS	RELAY, LOAD SHED
LSC	LOAD SHED CONTROLLER
LSS	LOAD SHED TRANSFER SWITCH CONTACTOR
NB	NB - NEUTRAL BLOCK
TR	RELAY, TRANSFER
UCB	UTILITY CIRCUIT BREAKER
XA1, XB1	LIMIT SWITCHES, ACTUATOR

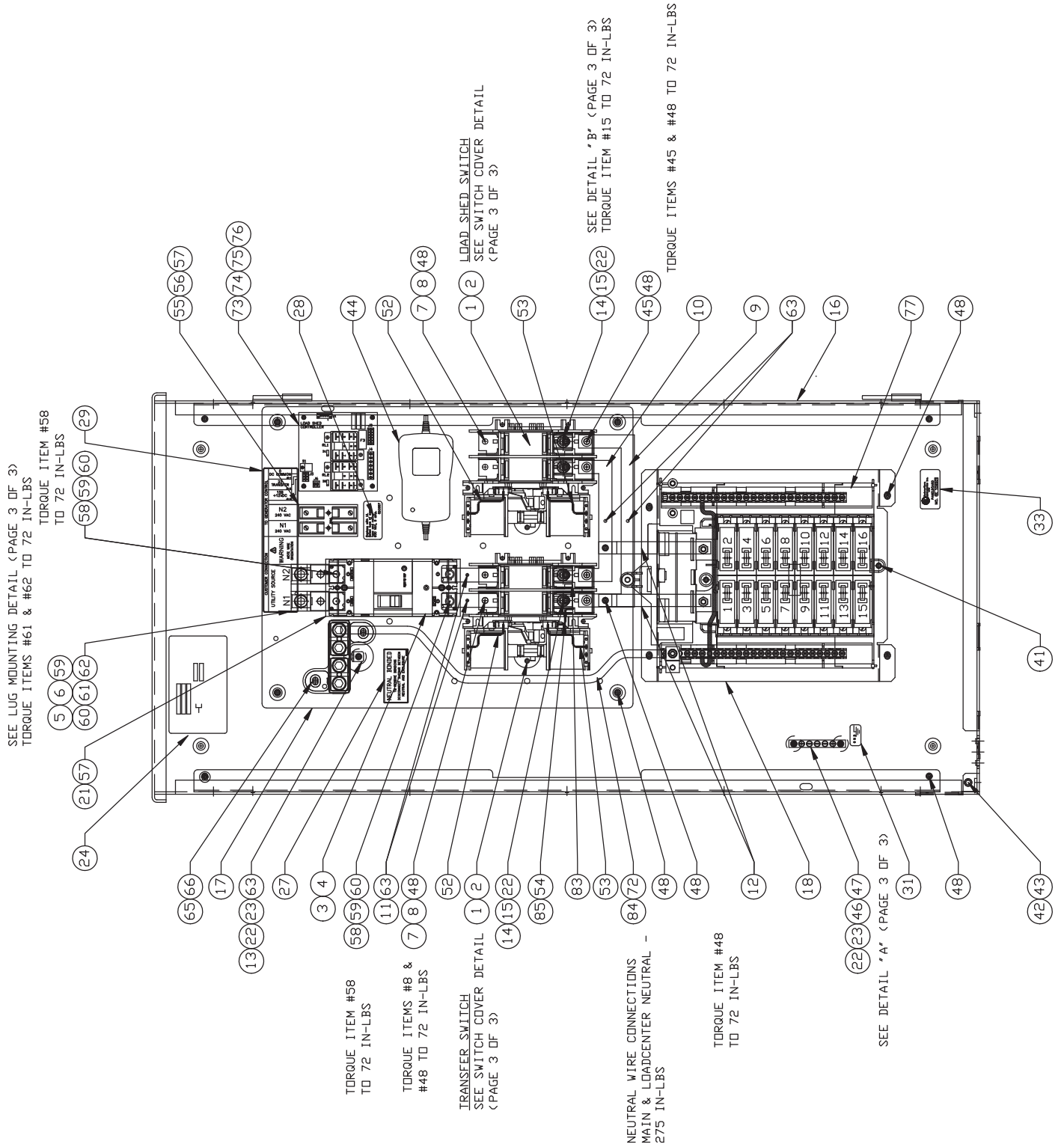


Section 6 – Exploded Views & Parts Lists

RTSS Type Transfer Switch

Load Shed Transfer Switch - Drawing No. 0G8054\$-C

Parts List on page 19.



PARTS LISTS

Diagram illustrating the interior components of the generator unit, labeled with callouts 19 through 51. The components include:

- 19: Main control panel area.
- 20: Control panel area.
- 25: ON/UTILITY/Disconnect/Off switch.
- 26: AUTOMATIC TRANSFER SWITCH AND EMERGENCY LOAD CENTER.
- 27: Emergency Load Center.
- 28: Emergency Load Center.
- 29: Emergency Load Center.
- 30: Emergency Load Center.
- 31: Emergency Load Center.
- 32: Emergency Load Center.
- 33: Emergency Load Center.
- 34: Emergency Load Center.
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- 49: Emergency Load Center.
- 50: Emergency Load Center.
- 51: Emergency Load Center.

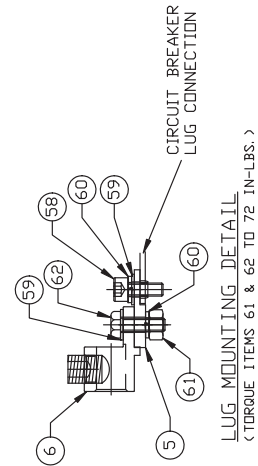
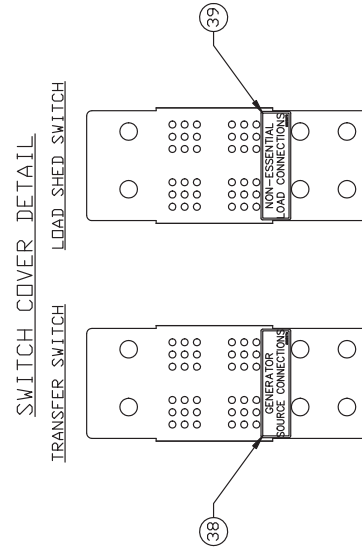
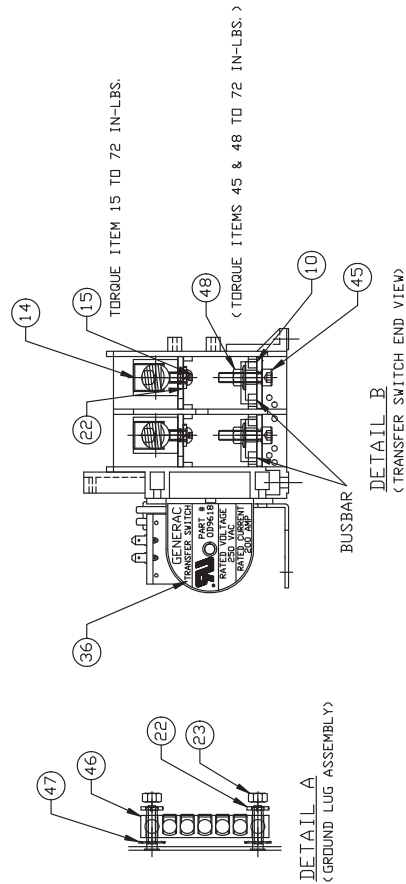
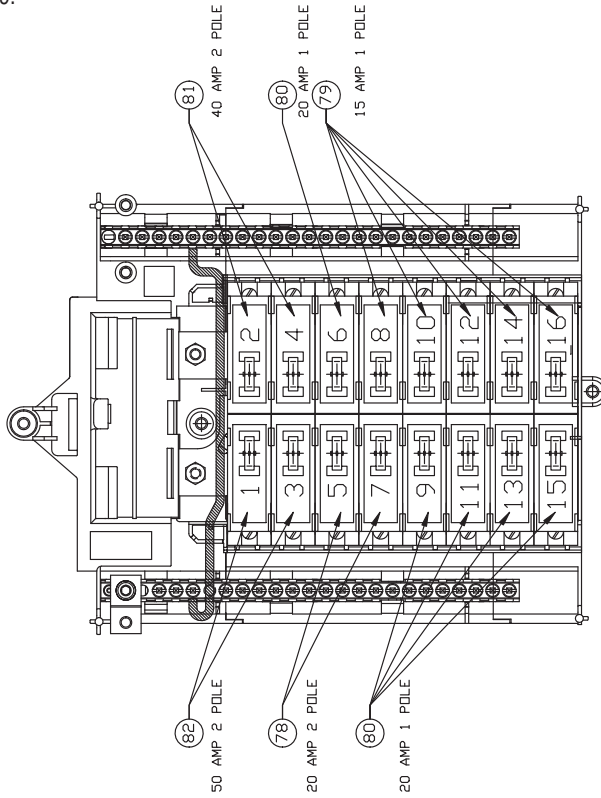


Section 6 – Exploded Views & Parts Lists

RTSS Type Transfer Switch

Load Shed Transfer Switch - Drawing No. 0G8054\$-C

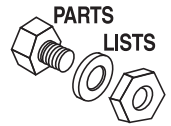
Parts List on page 19.



Section 6 — Exploded Views & Parts Lists

RTSS Type Transfer Switch

Load Shed Transfer Switch - Drawing No. 0G8054\$-C

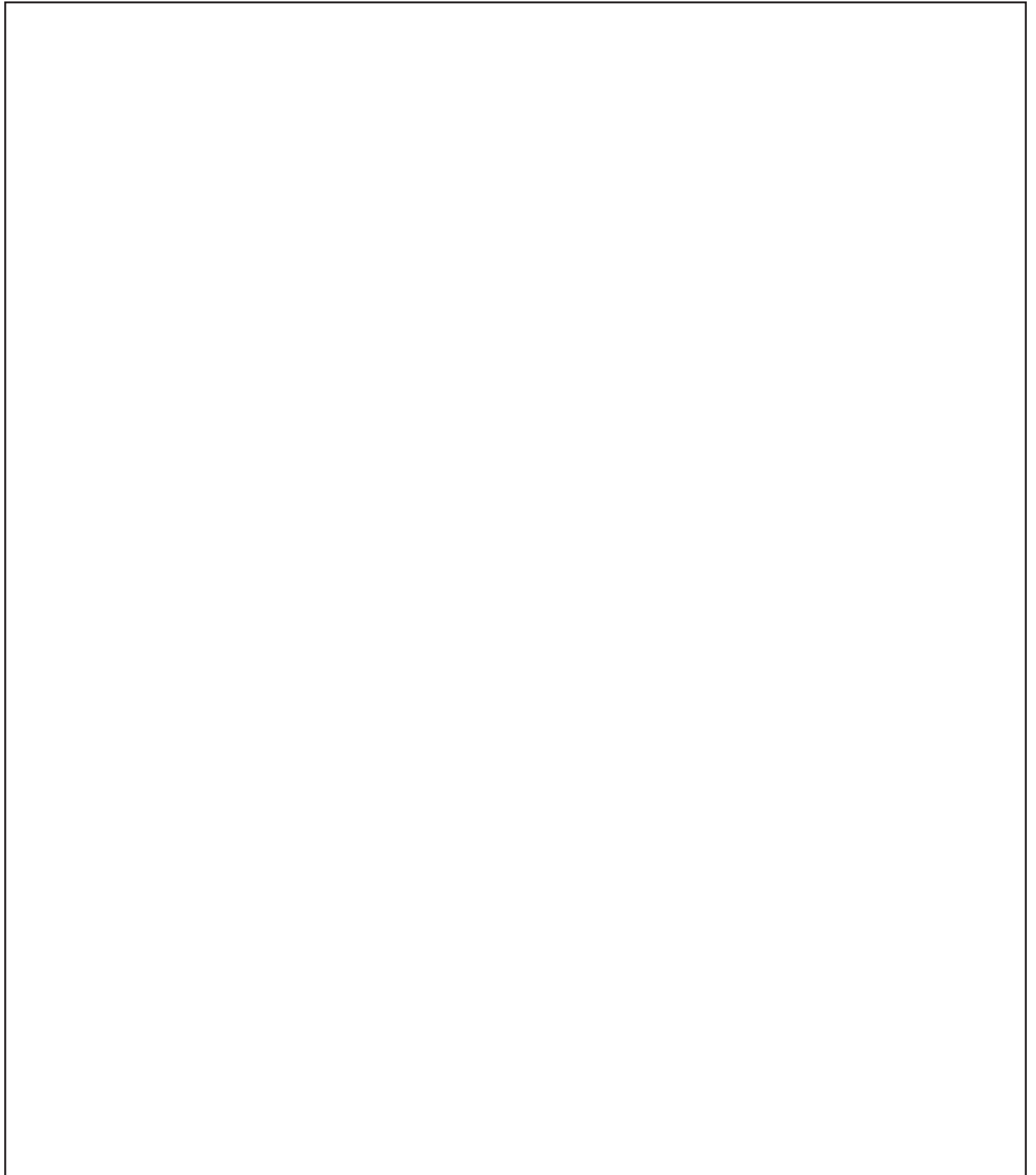


ITEM	PART NO.	QTY.	DESCRIPTION	ITEM	PART NO.	QTY.	DESCRIPTION
1	0D9618	2	TRANSFER SW. HSB 200A 2P 250V	41	066849	2	SCREW HHTT M5-0.8 X 16
2	074908	10	SCREW HHTT M5-0.8 X 10 BP	42	058000E	1	NUT TRIC 1/4-20 X .525
3	0G4478	1	CIRCUIT BREAKER, 200A 2-POLE	43	0E7213	1	THUMB SCREW 1/4-20x1/2
4	053640	2	SCREW RHM #8-32 X 3-1/4	44	0G8783	1	BATTERY CHARGER ASSEMBLY
5	0F8843	2	BUSBAR, 200A LUG ADAPTER	45	0G3976	4	SCREW BHSC 1/4-20 X 3/4
6	0F8451	2	LUG 300 MCM-6STR	46	0G6320	1	GROUND BAR (5) 2-14 AWG CONN
7	0G4413	4	SPACER 200 AMP TRANSFER	47	026850	2	WASHER SHAKEPROOF EXT 1/4 STL
8	024334	4	BOLT CARR 1/4-20 X 1"	48	0G8411	22	NUT HEX FL WHIZ 1/4-20
9	0G7847	1	BUSBAR, 200A TRANSFER SW T1	49	0E6193	1	BRACKET, ARM EXTENDER
10	0G7848	1	BUSBAR, 200A TRANSFER SW T2	50	0D6162	2	RIVET POP .156 X .362 AL
11	0G6352	2	BUSBAR, 200A TRANSFER SW N1,N2	51	0E6155	1	ARM EXTENDER PIN
12	0G8413	2	BUSBAR, PANELBOARD INTERCONNECTION	52	0E6303	2	WIRE-A
13	0G6417	1	BUSBAR, NEUTRAL BLOCK	53	0E6303A	2	WIRE-B
14	0E3375	4	LUG SOLDERLESS 250-#6 AL/CU	54	0E6303D	1	WIRE-E1
15	0F1252	4	SCREW BHSC 1/4-20 X 3/8	55	0D2806	1	FUSEBLOCK 30A 600V 2 POLE
16	0G78110AL14	1	ENCLOSURE,LOAD SHED TRANSFER SWITCH	56	073590A	2	FUSE 5A X BUSS HLDR73591
17	0G78120GS0R	1	SUBPLATE PANELBOARD	57	0A1495	6	SCREW HHTT M4-0.7 X 10 BP
18	0G78130GS0R	1	SUBPLATE, LOADCENTER	58	049897	4	SCREW SHC M8-1.25 X 20 G8
19	0G78140AL14	1	INSIDE COVER LOAD SHED	59	022145	6	WASHER FLAT 5/16-M8 ZINC
20	0G78150AL14	1	COVER LOAD SHED ENCLOSURE	60	022129	6	WASHER LOCK M8-5/16
21	0G44200AL14	1	CB BRKT 200A TRANSFER SWITCH	61	045771	2	NUT HEX M8-1.25 G8 CLEAR ZINC
22	022097	7	WASHER LOCK M6-1/4	62	043107	2	SCREW HHC M8-1.25 X 25 C8.8
23	085889	3	NUT HEX 1/4-20 SS	63	026902	5	SCREW HHTT #8-32 X 1/4 CZ
24	0G8574A	REF.	DECAL, TRANSFER SWITCH DATA	64	0G8300	1	WIRING HARNESS HSB (NOT SHOWN)
25	0G8574B	1	DECAL, TRANSFER SWITCH DATA 200	65	0E3717A	1	ASSY-NEUT BLK 200-400A W/TAP
26	0G8341	1	DECAL, WARN MANUAL OPER HANDLE	66	090388	2	SCREW HHTT M6-1.0 X 12 MM
27	0F9205A	1	DECAL, FRT GTS LD CTR 16 CIR GRY	67	0G8145	1	KEYPAD, LOAD SHED
28	0G4220	1	DECAL, NEUTRAL CONNECTION	68	0G8242	1	ASSY PCB INTFC LOAD SHED KEYPD
29	0D3587	1	DECAL, FUSE REPLACEMENT	69	0C6748	2	NUT HEX LOCK M4-0.7 SS NYL INS
30	0G8257	1	DECAL, CUSTOMER CONNECTION	70	0F4460	2	SPACER M4/#8 X 5/16 X 1/4 NYL
31	0G8264	1	DECAL, TEST SEQUENCE	71	0G8412	1	CABLE, KEYPAD INTERFACE
32	067210A	1	DECAL, GROUNDING LUG	72	0G8534	1	NEUTRAL WIRE
33	0G3259	1	DECAL, TERMINAL SHOCK HZD BI	73	0G7925	1	ASSY PCB 2008HSB LOAD SHEDCTRL
34	0E4987	1	DECAL, UL PANELBOARD	74	027911	2	RELAY SOC 12VDC DPDT 10A@240VA
35	0G3274	1	DECAL, LIVE CIRCUIT ENG/FRN/SPN	75	0D6511	4	SPACER .20 X .375 X .375 PL
36	0G8535	2	DECAL, TRANSFER SWITCH INFO	76	0E6423	4	NUT HEX FL WHIZ M5-0.8
37	0G8536	1	DECAL, UTILITY SERVICE DISCONNECT	77	0G8293	1	16 CIR L/CENTR 200A/240V SIEMS
38	0G8537A	1	DECAL, GENERATOR SOURCE CONNECTION	78	0E7888	1	CB 0020A 2P PLUG IN
39	0G8537B	1	DECAL, NON-ESSENTIAL LOAD CONN	79	0E7888B	5	CB 0015A 1P PLUG IN
40	0G8213	1	DECAL, GENERAC POWER SYSTEMS	80	0E7888C	5	CB 0020A 1P PLUG IN
				81	0E7888D	1	CB 0040A 2P PLUG IN
				82	0E7888E	1	CB 0050A 2P PLUG IN
				83	0E6034	1	STRAIGHT SPADE CONNECTOR
				84	0F6685	3	TIE-WRAP MOUNT(FIR TREE SYTLE)

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NOTES

Lined area for notes.



INSTALLATION GUIDE

**For 100 Amp Automatic Transfer Switch/Load Center Models:
8, 10, 12, 14 and 16 Circuit.
Installed with 8, 10, 12, 14, 16, 17 and 20kW Generators.**

This Automatic Transfer Switch with built-in Load Center includes an Express Install Kit.

- **Saves on installation time and cost, in many cases up to 50% compared to traditional transfer switch installations.**



- **Automatically supplies electricity to selected critical circuits.**
- **Can be installed prior to, or along with generator installation.**



This manual should remain with the unit.

PLEASE NOTE:

This installation guide should be used in conjunction with the “Installation and Owner’s Manual” that is furnished with the Air-cooled Standby Generator. Please review both manuals prior to installation of the generator and transfer switch. This Automatic Transfer Switch/Load Center is not intended for use with the Liquid-cooled Generator product line. This unit is not compatible with other generator manufacturer’s products.

INTRODUCTION

Thank you for purchasing this 100 Amp Automatic Transfer Switch/Load Center with Express Install Kit. The Express Install Kit includes:

- 30 foot, five foot, and two foot pre-wired conduits for making all required wiring runs.
- An outdoor junction box for making connections between outdoor and indoor pre-wired conduits.
- UL listed wire nuts for reconnecting emergency circuits within the main distribution panel.

The 100 Amp Automatic Transfer Switch/Load Center with Express Install Kit can be installed along with a 8, 10, 12, 14, 16 or 17kW Air-cooled Standby Generator, or can be used to pre-wire a home or small business in advance of generator installation. In either case, the Express Install Kit saves installation time and cost, since the majority of labor involved in installing a standby power system is in wiring the generator, automatic transfer switch and emergency circuit subpanel.

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



After this heading, read instructions that, if not strictly complied with, will result in serious personal injury, including death, and/or severe property damage.



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



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

NOTE:

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

- ⚠ This symbol points out important safety information that, if not followed, could endanger personal safety and/or property.
- 💣 This symbol points out potential explosion hazard.
- 🔥 This symbol points out potential fire hazard.
- ⚡ This symbol points out potential electrical shock hazard.
- ⚠ **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.

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 all personnel. Also make sure the procedure, work method or operating technique chosen does not render the equipment unsafe.

⚡ ELECTRICAL HAZARDS ⚡

- Utility power delivers extremely high and dangerous voltages to the transfer switch as does the standby generator when it is in operation.
- 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.**
- 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 non-conducting implement, such as a 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.

100 Amp Automatic Transfer Switch/Load Center with Express Install Kit

KIT INCLUDES:

A THE OUTDOOR CONNECTION BOX WITH FIVE FOOT PRE-WIRED LIQUID TIGHT CONDUIT

Mounted outside the home or business nearest the planned generator location. This is for connection to generator controls and main line circuit breaker.

C 30 FOOT FLEXIBLE CONDUIT

Pre-wired from the automatic transfer switch with built-in emergency load center for connection to the outdoor connection box.

D PRE-WIRED AUTOMATIC TRANSFER SWITCH AND EMERGENCY LOAD CENTER

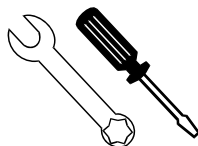
Installed within one (1) foot of the building's main distribution panel. This transfer switch provides smooth and safe transition between utility and generator power.

F TWO FOOT PRE-WIRED CONDUIT FOR EASY CONNECTION TO THE BUILDING'S MAIN DISTRIBUTION PANEL

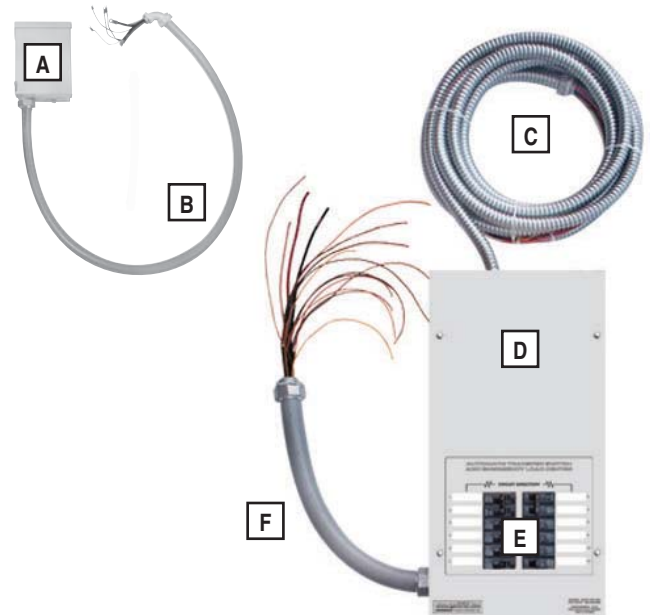
G UL LISTED WIRE NUTS (not shown)

TOOLS REQUIRED:

Drill, drill bits, hole saw (type and length will be determined by the materials to be drilled and cut), open-end wrenches or adjustable wrenches, socket wrenches or nut drivers, standard and Phillips screwdrivers, sledge hammer, level, pencil, channel-lock pliers, spade shovel, rake and safety goggles.

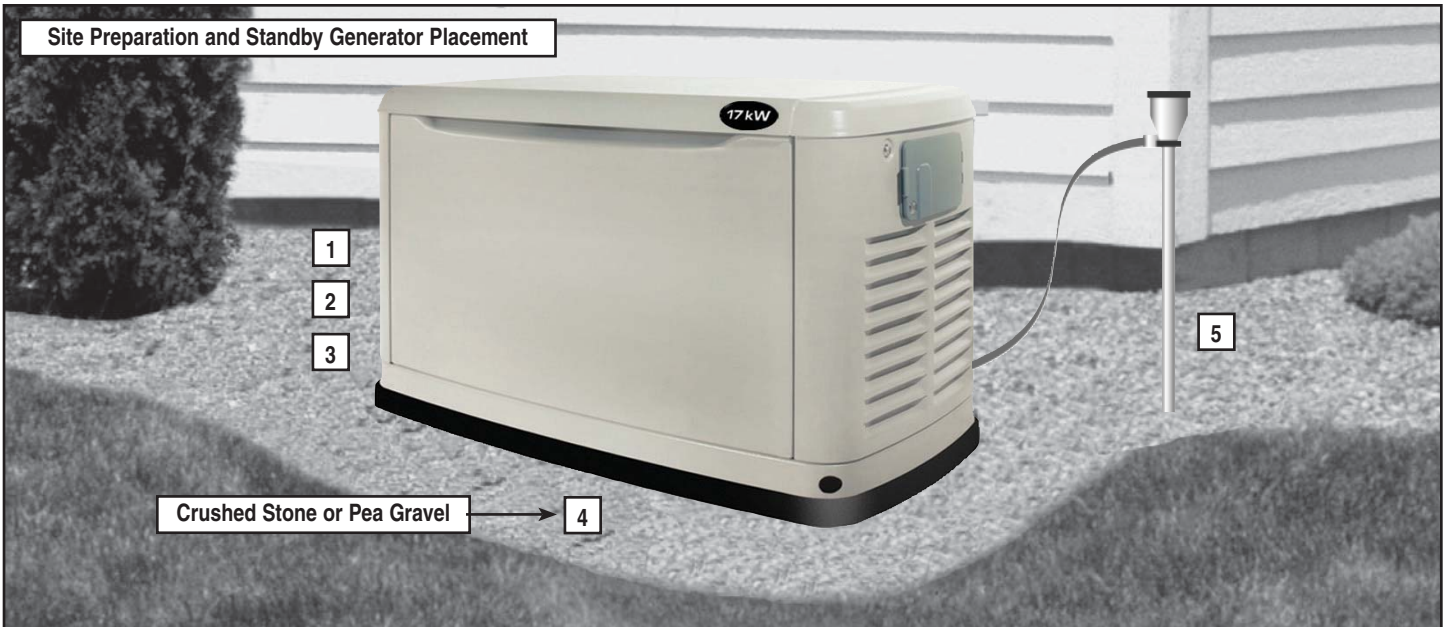


Designed with installation cost savings in mind!



ITEMS TO BE PURCHASED OR SUPPLIED FOR COMPLETE INSTALLATION:

- ☒ 70 amp or 40 amp (7kW) double pole circuit breaker (must be the same type as in the main electrical distribution panel)
- ☒ Ground rod with grounding strap (for generator installation)
- ☒ Padlock to lock outdoor connection box
- ☒ Crushed stone or pea gravel (approximately 10-12 cubic feet) (for generator installation)
- ☒ Black poly-film or other vegetation blocking fabric (for generator installation)
- ☒ Silicone caulk
- ☒ Fasteners (to mount outdoor connection box and automatic transfer switch)
- ☒ Battery - 12V automotive type, group 26R, negative ground, 350 CCA (8kW), 525 CCA (10, 12, 14, 16, 17 and 20kW) minimum capacity (required as part of generator installation).



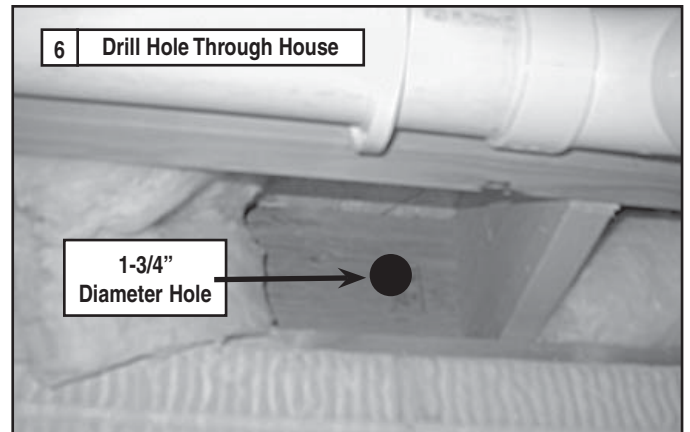
1. PLAN THE LOCATION OF THE GENERATOR.

NOTE:

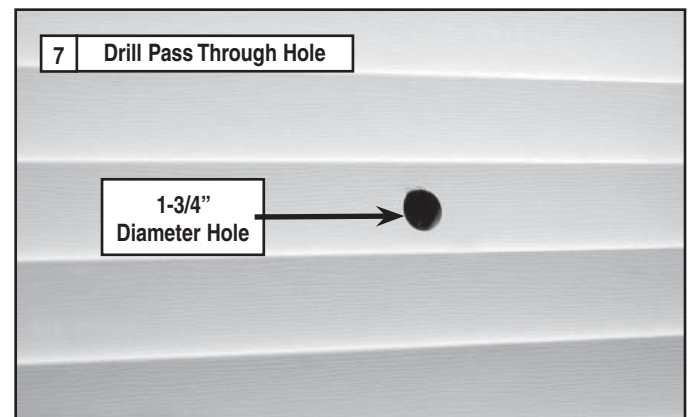
Do not place the generator directly under a window.

Select an area outside of the home or business nearest the incoming gas service. Determine where the generator will be placed outside of the building. Arrange for fuel piping with shut-off valve to be run to this location. Keep in mind that the manufacturer recommends placement no closer than **18 inches** to any structure. **Local codes may dictate placement farther from a structure.** If facing the unit from the front, the generator's fuel inlet is located at the rear lower right of the unit.

2. Clear an area **62 inches** by **50 inches** of grass and vegetation to a depth of **five** inches. This includes the distance the generator should be set away from a structure (**18 inches**) and **six** inches beyond the width and length of the generator mounting pad (**49" L x 25" W**).
3. Lay black poly-film to cover the area.
4. Fill the area to ground level with pea gravel or crushed stone.
5. Drive an eight foot grounding rod into the ground to grade. Make sure grounding rod and strap are not exposed above ground level. (NEC code applies to grounding method.)
6. Determine where the flexible conduit will pass through the building from inside to outside. When certain there is clearance on each side of the wall, drill a small pilot hole through the wall to mark the location. Drill a 1-3/4" diameter hole through the sheathing and siding with hole saw.

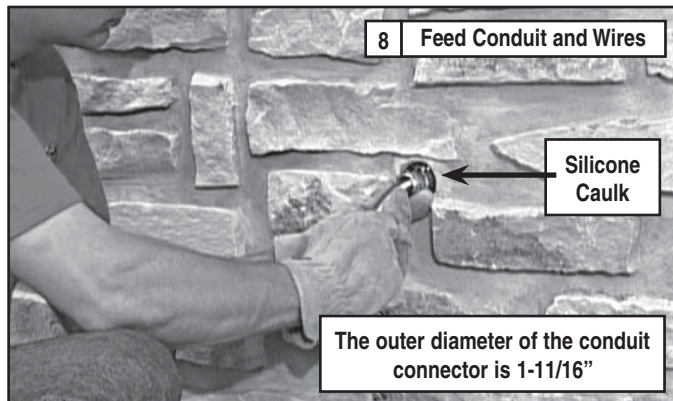


7. While adhering to all local electrical codes, route the 30 foot conduit along ceiling/floor joists and wall studs to the location where the conduit will pass through the wall to the exterior of the building.

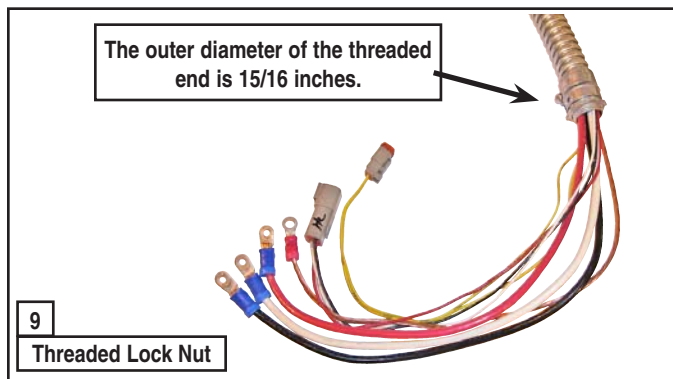


Residential Transfer Switch Installation Guide

8. From inside the building, feed the end of the 30-foot conduit (INCLUDED and pre-wired from transfer switch) through the wall to the outside.



9. Remove the threaded lock nut from the conduit coupling.

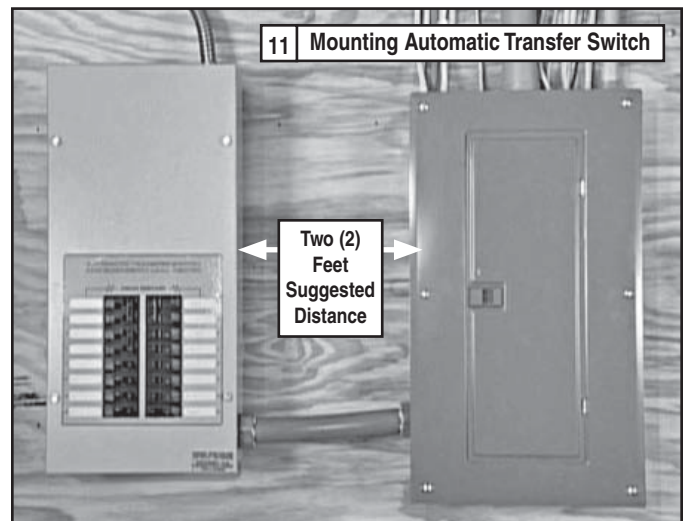


10. Lift cover. Remove internal cover plate screw and internal cover. Remove the knock out in the lower right corner of the external connection box. From the rear of the connection box, feed wires, 4-pin and 2-pin plugs into box. Slip the lock nut over wires and plugs and tighten securely onto conduit coupling. Using appropriate fasteners, mount external connection box over pre-drilled hole to fully conceal the hole. Seal around the hole and conduit with silicone caulk from both the inside and outside of the building. Also, caulk around the sides and top of the box to seal the edges to the siding or wall. Connect wires to lugs; black to black, white to white, and red to red. Torque nuts to 20 in/lbs. Snap together the 4-pin and 2-pin plug connector. Loosen nut from grounding lug and attach ground wire (green) from conduit. Reinstall nut and tighten to 45 in/lbs. Reinstall internal cover plate and screw. Close cover and install lock. This wiring is complete.

⚠ WARNING ⚠

- ⚠ The outdoor connection box must be locked to ensure safety and to discourage tampering.

11. Locate automatic transfer switch with built-in emergency load center in close proximity to the main distribution panel. The transfer switch can be located to the left or right of the main distribution panel. Two (2) feet is the suggested distance (see Figure 11). The transfer switch may be located a different distance from the main panel depending on available mounting area. Using the two (2) foot conduit connected straight across to the main panel is another option. Always adhere to local electrical codes during installation. Hold transfer switch against the mounting surface. Level the transfer switch and mark the mounting holes. Drill the appropriate size pilot holes. Mount transfer switch with built-in load center to mounting surface with appropriate fasteners.

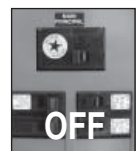


⚠ WARNING ⚠

- ⚠ The manufacturer recommends that a licensed electrician or an individual with complete knowledge of electricity perform the procedures in Sections 12 and 13.

⚠ WARNING ⚠

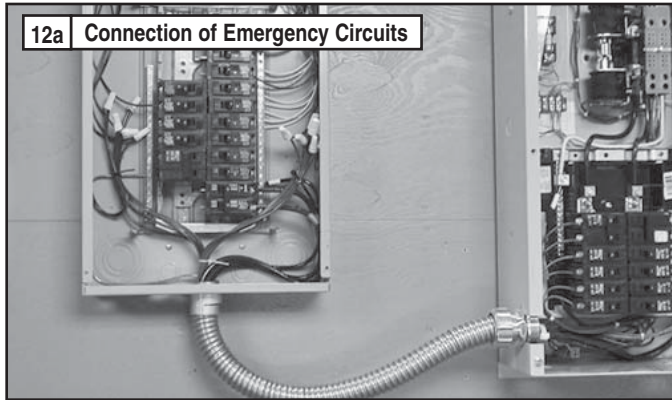
- ⚠ Switch service main circuit breaker to the OFF (OPEN) position prior to removal of cover or removal of any wiring of the main electrical distribution panel. The wires connected to the service main circuit breaker remain LIVE or HOT. Avoid contact with these wires and the service main circuit breaker connection lugs.



NOTE:

Balance must be maintained when moving circuit locations from main electrical distribution panel to emergency load center. Circuit breaker positions alternate buss bars vertically. Circuits sharing a neutral wire should either be moved together to adjacent positions in emergency load center or not moved. If unsure of the proper procedure or if the installation differs from that described in this guide, consult a licensed professional at this time.

- 12a.** Remove the main electrical distribution panel cover. Remove appropriate size knockout from the bottom or side of the main panel. (A two foot flexible conduit is pre-wired from the transfer switch with built-in load center). Remove threaded lock nut from conduit coupling. Feed all wires through knockout into main panel. Slip lock nut over wires and tighten securely onto conduit coupling.



NOTE:

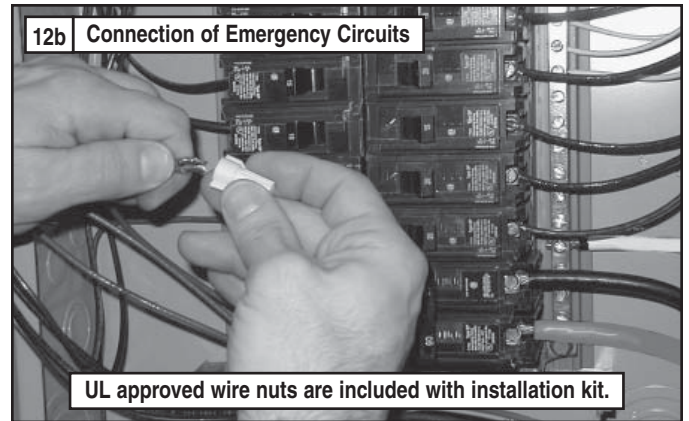
Circuits to be moved must be protected by same size breaker. For example, a 15 amp 120 volt circuit in emergency load center will replace a 15 amp 120 volt circuit in main electrical distribution panel.

- 12b.** In the main panel, remove the black (hot) wire from the circuit breaker that protects a circuit to be powered in the event of a power failure. Wire nut the black wire to the matching circuit lead wire from the emergency circuit breaker in the load center in the transfer switch. (All circuit wires are color coded and labeled for easy identification). **UL listed wire locknuts are included in installation kit.** Trace each black (hot) wire connected and wire nut the white (neutral) wire from the same Romex cable (circuit) to the matching circuit number on the white (neutral) wire from the emergency load center. Repeat for each circuit. Repeat this process with the remaining circuits to be powered by the generator.

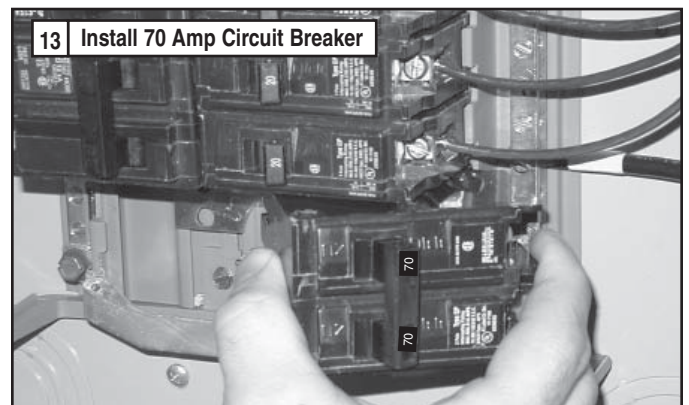
NOTE:

Both grounded and ungrounded conductors must be moved to the emergency panel and connected to the new wiring from the emergency panel using supplied wire nuts.

Models		8 Circuit	10 Circuit	12 Circuit	14 Circuit	16 Circuit
Circuits	50A, 240V	-	-	-	1	1
	40A, 240V	-	-	1	1	1
	30A, 240V	1	1	1	-	-
	20A, 240V	-	1	-	1	1
	20A, 120V	1	3	3	4	5
	15A, 120V	5	3	5	4	5



- 13.** Install the 70 amp double pole circuit breaker; **10, 12, 14, 16, 17 and 20kW units** or the 40 amp double pole breaker; 8kW units (purchased or supplied separately), into main electrical distribution panel. This circuit breaker **must be compatible with the main electrical distribution panel**. It may be necessary to reposition remaining circuit breakers or remove circuit breakers that have been disconnected to accommodate the insertion of the 70 amp or 40 amp double pole circuit breaker. Connect white wire to the main distribution panel neutral bar. Connect solid green wire to main electrical panel ground bar. Connect the black and red wires to the 70 amp or 40 amp double pole circuit breaker. Reinstall the main distribution panel cover.



THE AUTOMATIC TRANSFER SWITCH/LOAD CENTER IS NOW INSTALLED!

If a generator is being installed at this time, proceed to step 19. If a generator will not be installed at this time, perform steps 14 through 17 to complete the pre-wiring project.

14. Open the outdoor connection box and unplug the 4-pin and 2-pin connector. Remove the black, white, red, and green wires that lead from the five foot pre-wired conduit. Make sure the mating wires from the 30 foot conduit are on the connection box terminal lugs (or ground screw), re-install all washers and nuts and secure them in place.
15. Remove the lock nut holding the five foot pre-wired conduit coupling to the outdoor connection box. Slip the lock nut over the wires and plug, then remove the conduit from the connection box. Use a knockout plug to close off the opening where the conduit was removed.

⚠ WARNING ⚠

⚠ The external connection box must be locked to ensure safety and to discourage tampering.

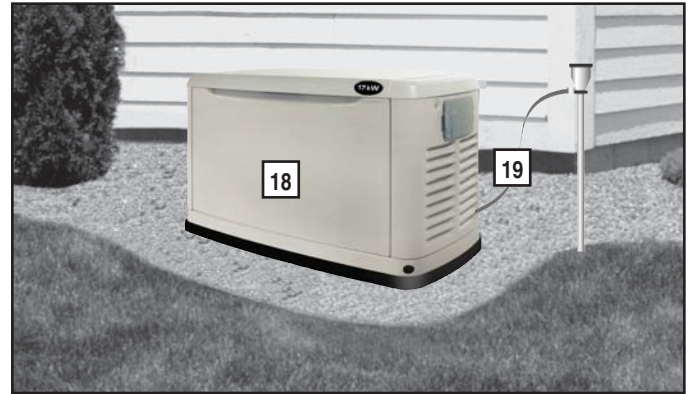
16. For pre-existing buildings, switch the service main circuit breaker back on to provide utility power to the building.
17. Save the five foot pre-wired conduit for re-installation at time of generator installation. At that time, re-install the conduit by reversing steps 14 and 15. The grounding strap will also be installed with the generator. Save this guide for reference at time of generator installation.

⚠ DANGER ⚠

⚠ Be sure the service main circuit breaker is switched OFF at time of generator installation.

This completes the pre-wiring portion of the 100 Amp Automatic Transfer Switch/Load Center Installation. Proceed with step 18 for generator installation.

18. Place the generator and mounting pad in the location prepared in steps one through five.

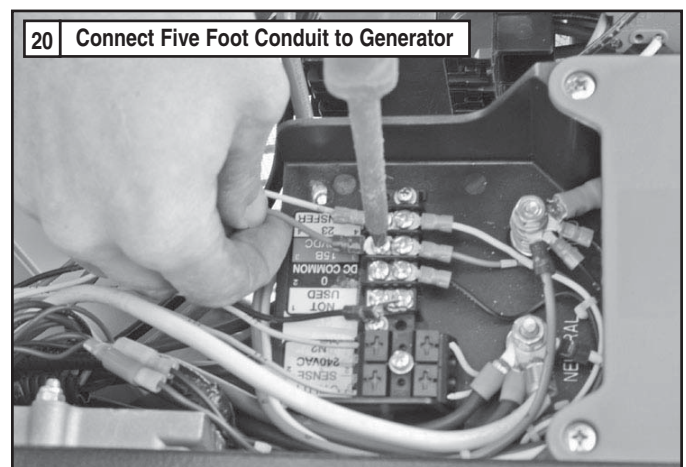


19. Attach one end of the grounding strap (No. 12 AWG stranded copper wire) to grounding rod, and the other end to the grounding lug (located at rear corner of unit). Make sure the grounding rod and strap are not exposed above ground level (NEC code applies to grounding method).

NOTE:

The generator mode switch should be placed in the OFF position. Generator main line circuit breaker should be switched to the OFF or OPEN position.

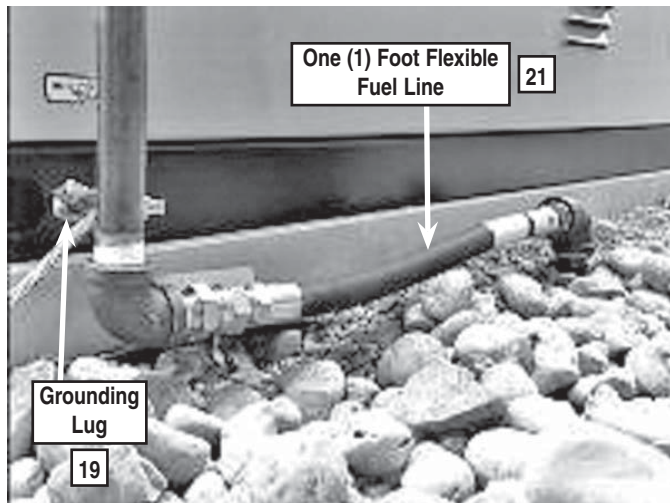
20. Access wiring connections for installation of five foot harness at the generator. To gain access to wiring connections and the circuit breaker you must remove the cover plate (black) over the control module. Remove the two screws retaining the cover plate. Lift the cover plate up and towards the front of the generator to remove.



Remove the small black cap (covering 1-1/16" diameter hole) from back of enclosure. Remove threaded lock nut from conduit coupling (with 90° elbow) and wires. Feed wires into 1-1/16" diameter hole. Place threaded lock nut over wires and onto conduit coupling. Tighten securely with screwdriver and hammer to ensure lock nut is tight. Connect power leads (red & black) to the circuit breaker lugs. Connect the neutral wire (white) to terminal connection (NEUTRAL). Connect ground wire (green) to grounding bolt with star washer below all ground wire lugs. Tighten securely ensuring the star washer makes good contact with metal base plate. Connect sensing wires to terminal strip as follows: Blue - N1, Yellow - N2, Brown - 23 and Orange - 194.

FUEL HOOKUP AND CHECK FOR LEAKS

21a. Make the connection between the rigid fuel piping and the generator using the supplied threaded flexible fuel line. Use a pipe sealant suitable for gaseous fuel connections. Check connections for leaks by opening manual fuel shut-off valve and swab, or spray, connections with soapy water. If a leak exists, the area will bubble with the presence of the soapy water.



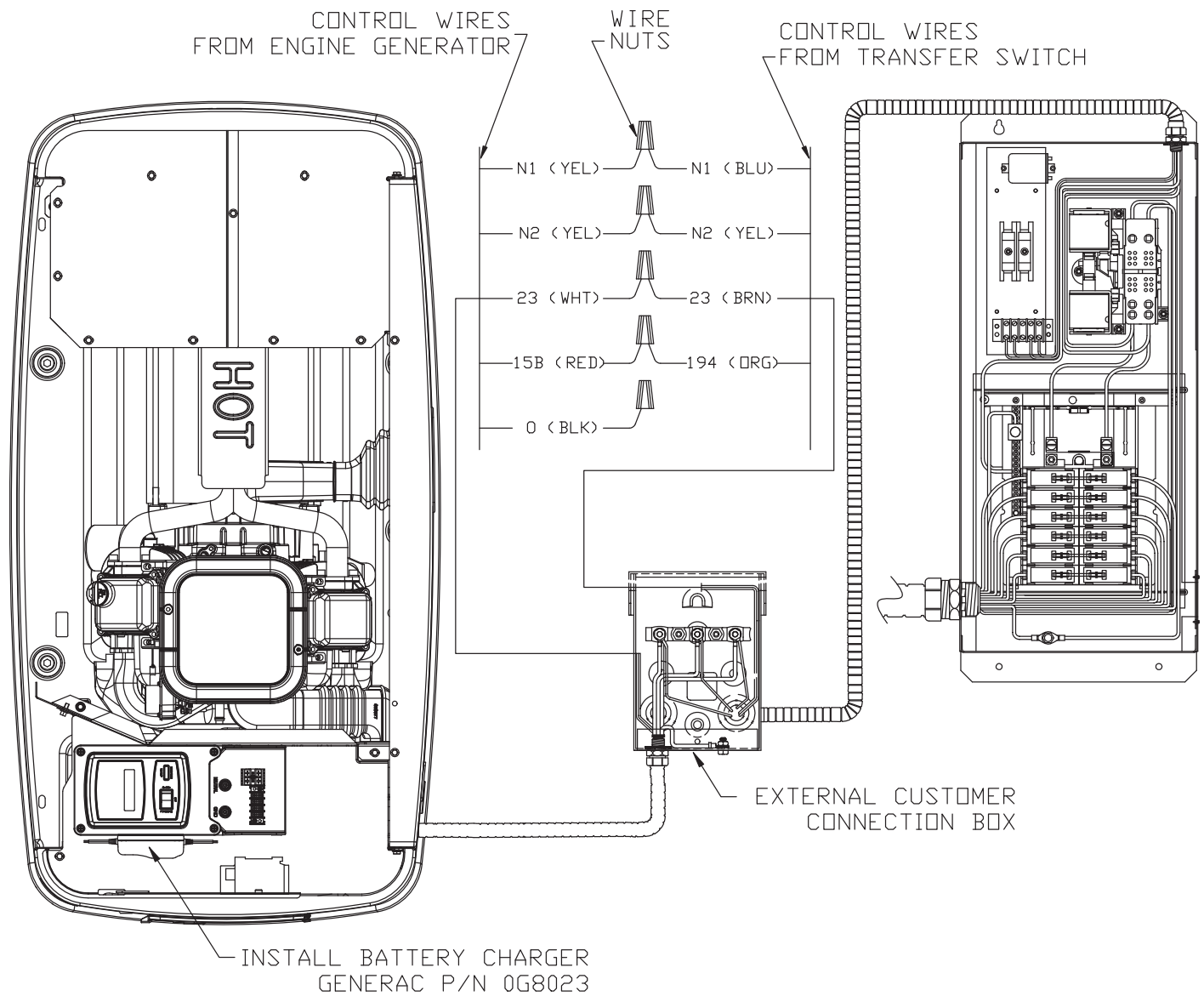
- 21b.** If a leak is located, shut off fuel and disconnect flexible piping. Dry the threaded ends and reapply an adequate amount of pipe sealant. Reconnect flexible fuel line, open fuel supply and recheck for leaks. If leak still exists, repeat step 21b.
- 22.** Follow all generator installation and setup instructions in the Installation and Owner's Manual provided with the generator. During testing performed in Section 2 of the generator Installation and Owner's Manual, utility power supply to the Automatic Transfer Switch/Load Center can be controlled using the 40 or 70 amp feeder circuit breaker located in the main distribution panel.

Residential Transfer Switch Installation Guide

Installation Drawing 0H0258-A

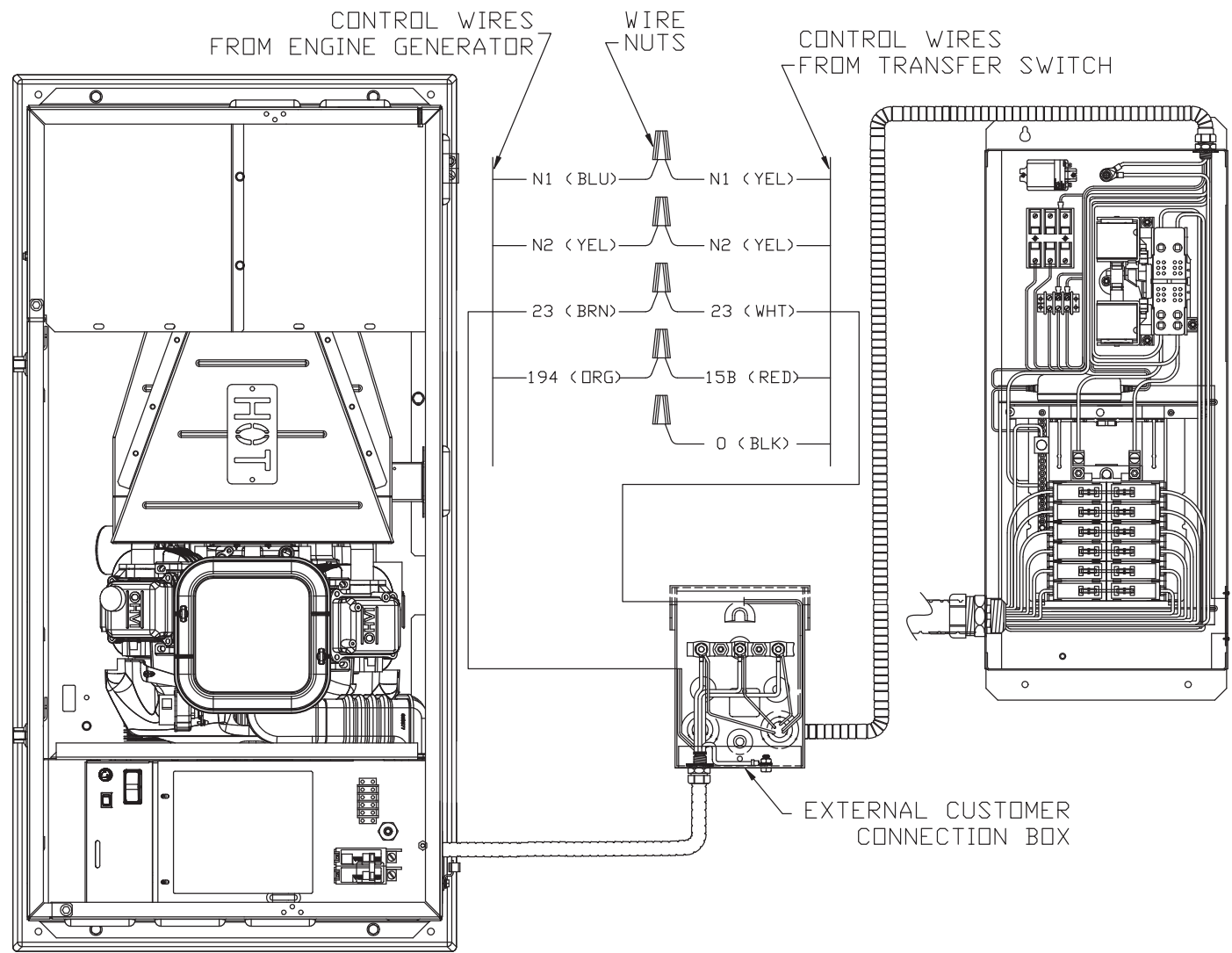
"08" & LATER HSB
AIR-COOLED GENERATORS
SINGLE & V-TWIN ENGINES

PRE "08"
LOAD CENTER
TRANSFER SWITCH



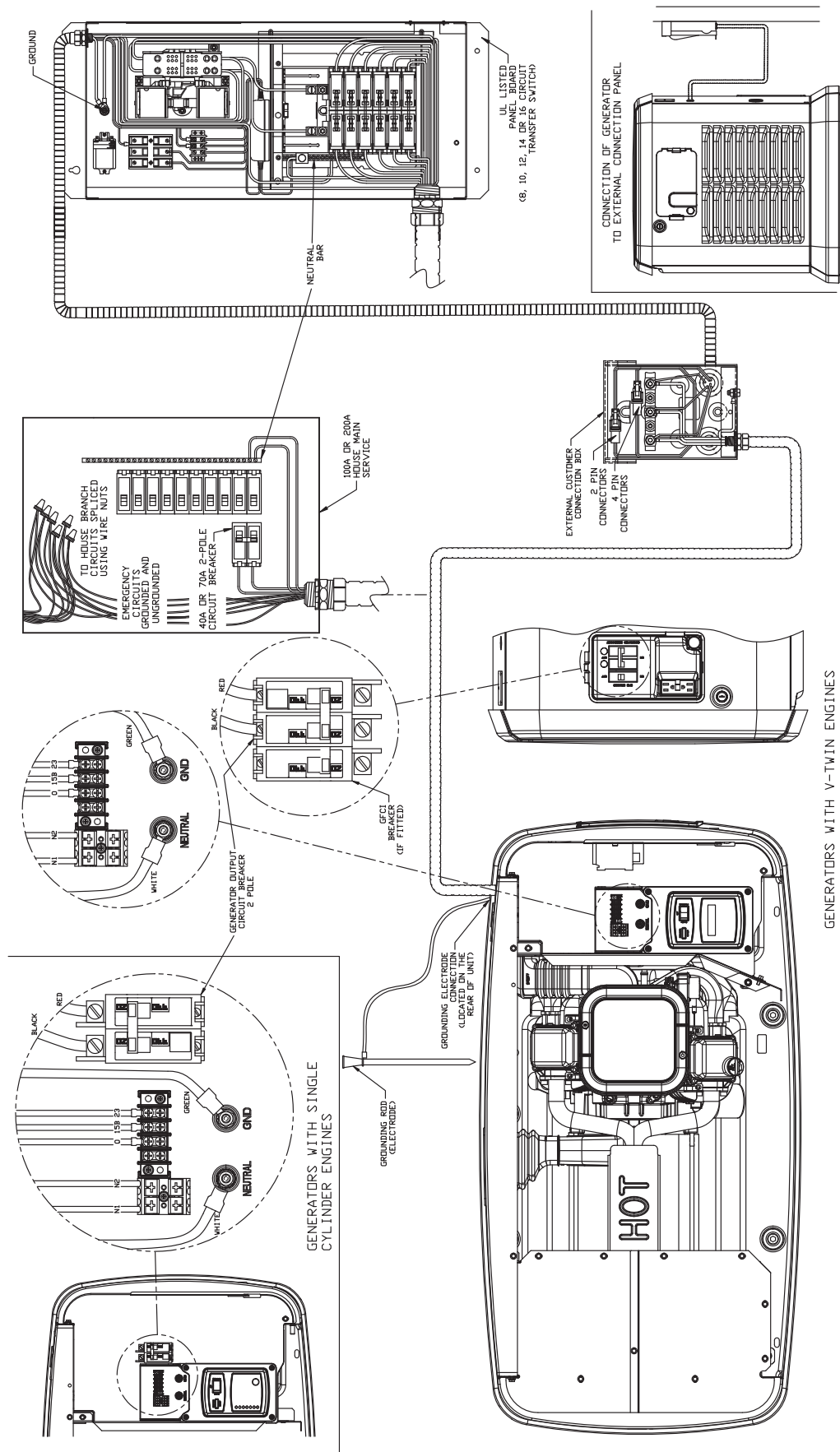
PRE "08" HSB
AIR-COOLED GENERATORS
SINGLE & V-TWIN ENGINES

"08" & LATER
LOAD CENTER
TRANSFER SWITCH



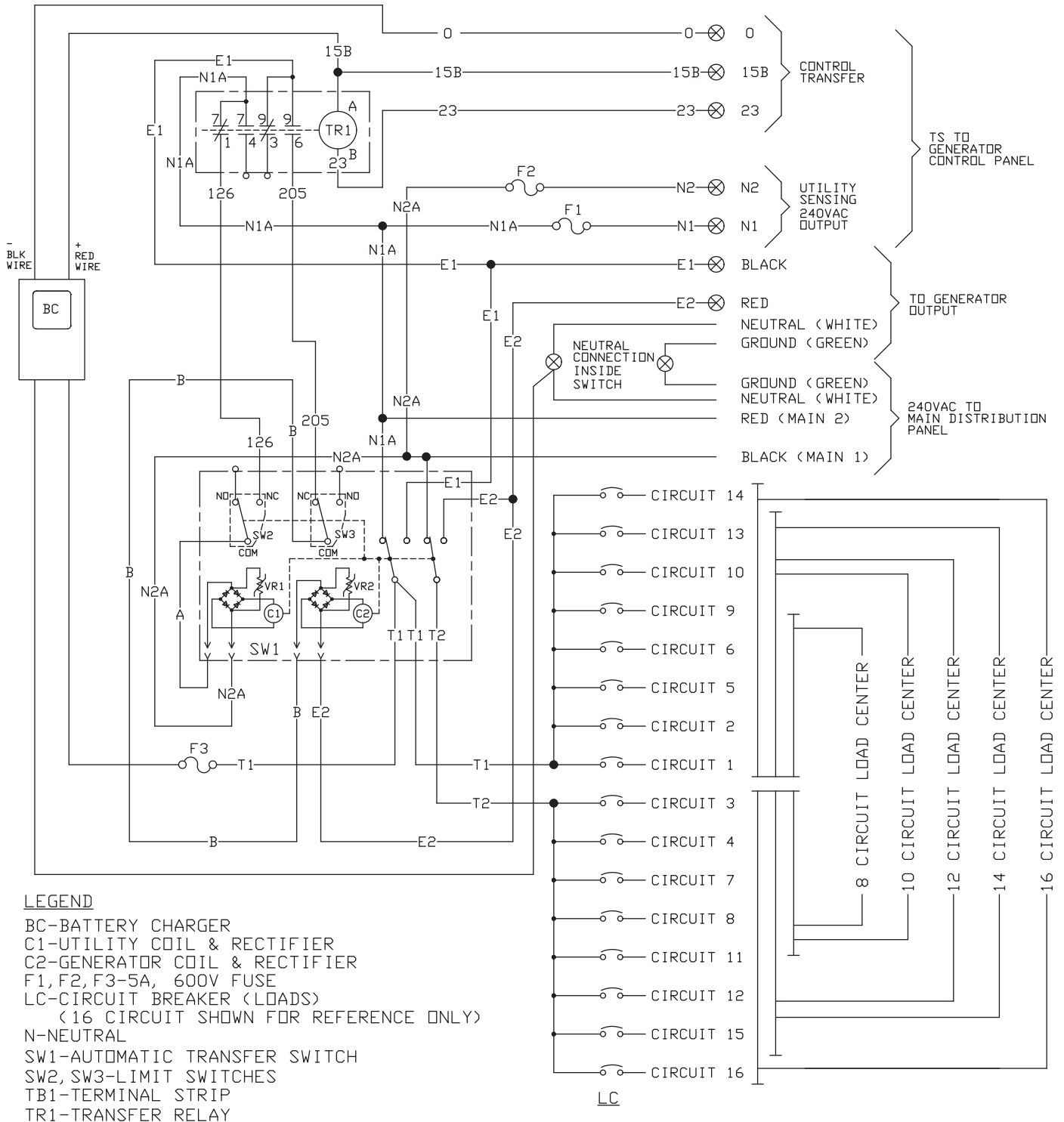
Residential Transfer Switch Installation Guide

Installation Drawing 0G8573-A



Residential Transfer Switch Installation Guide

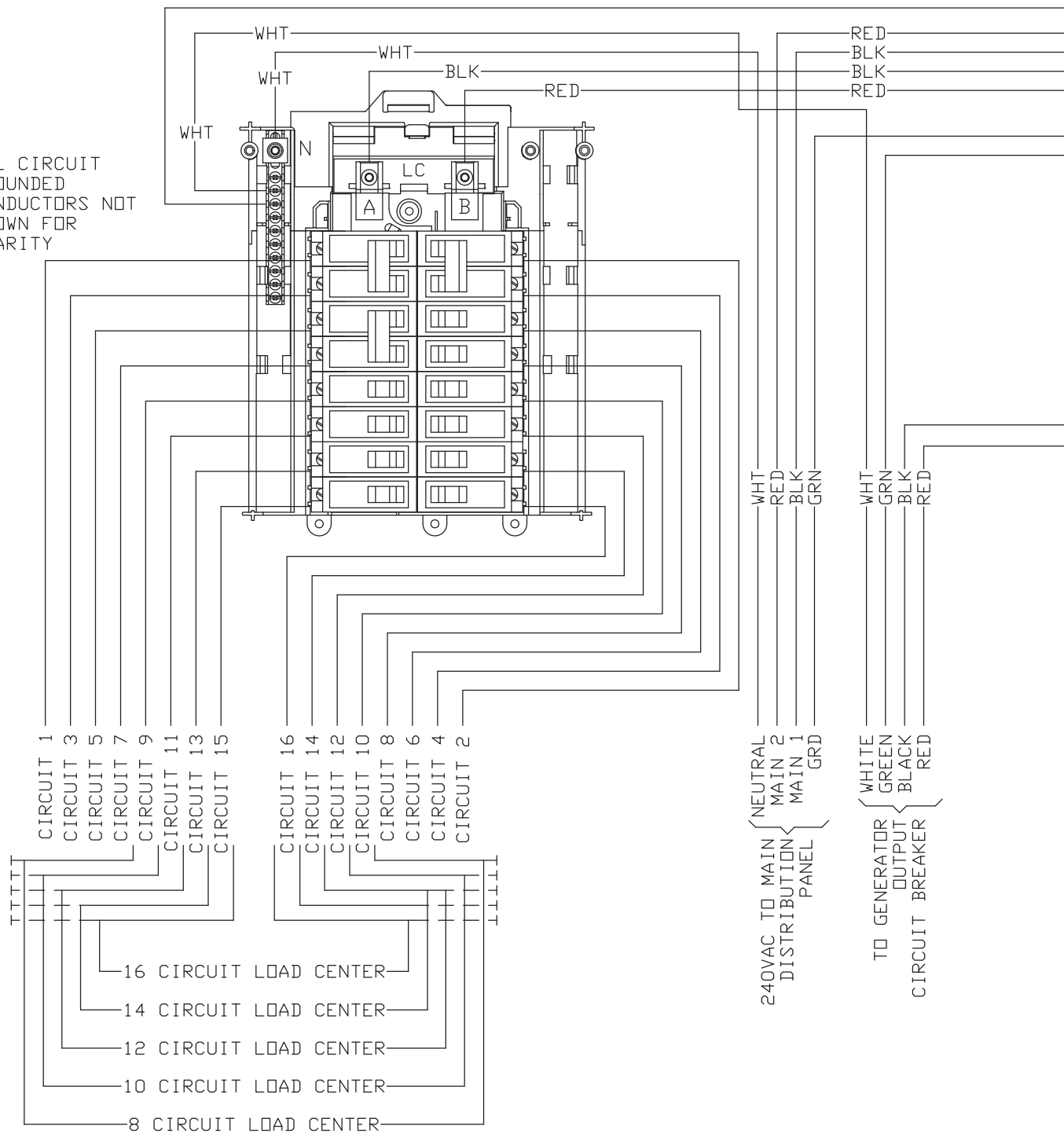
Electrical Schematic - Drawing 0G7959-A



Residential Transfer Switch Installation Guide

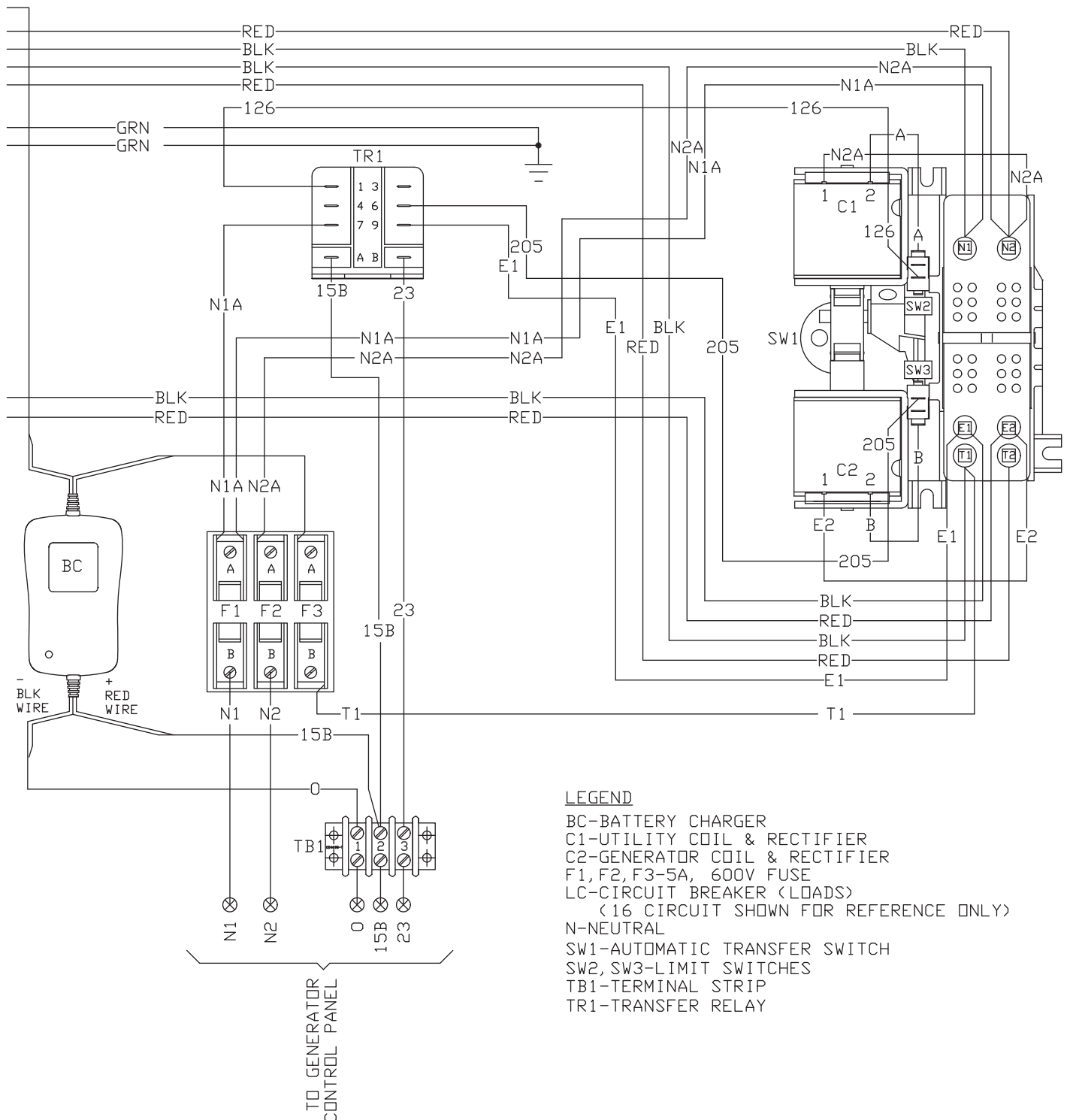
Wiring Diagram - Drawing OG7958-A

ALL CIRCUIT
GROUNDED
CONDUCTORS NOT
SHOWN FOR
CLARITY



Residential Transfer Switch Installation Guide

Wiring Diagram - Drawing 0G7958-A

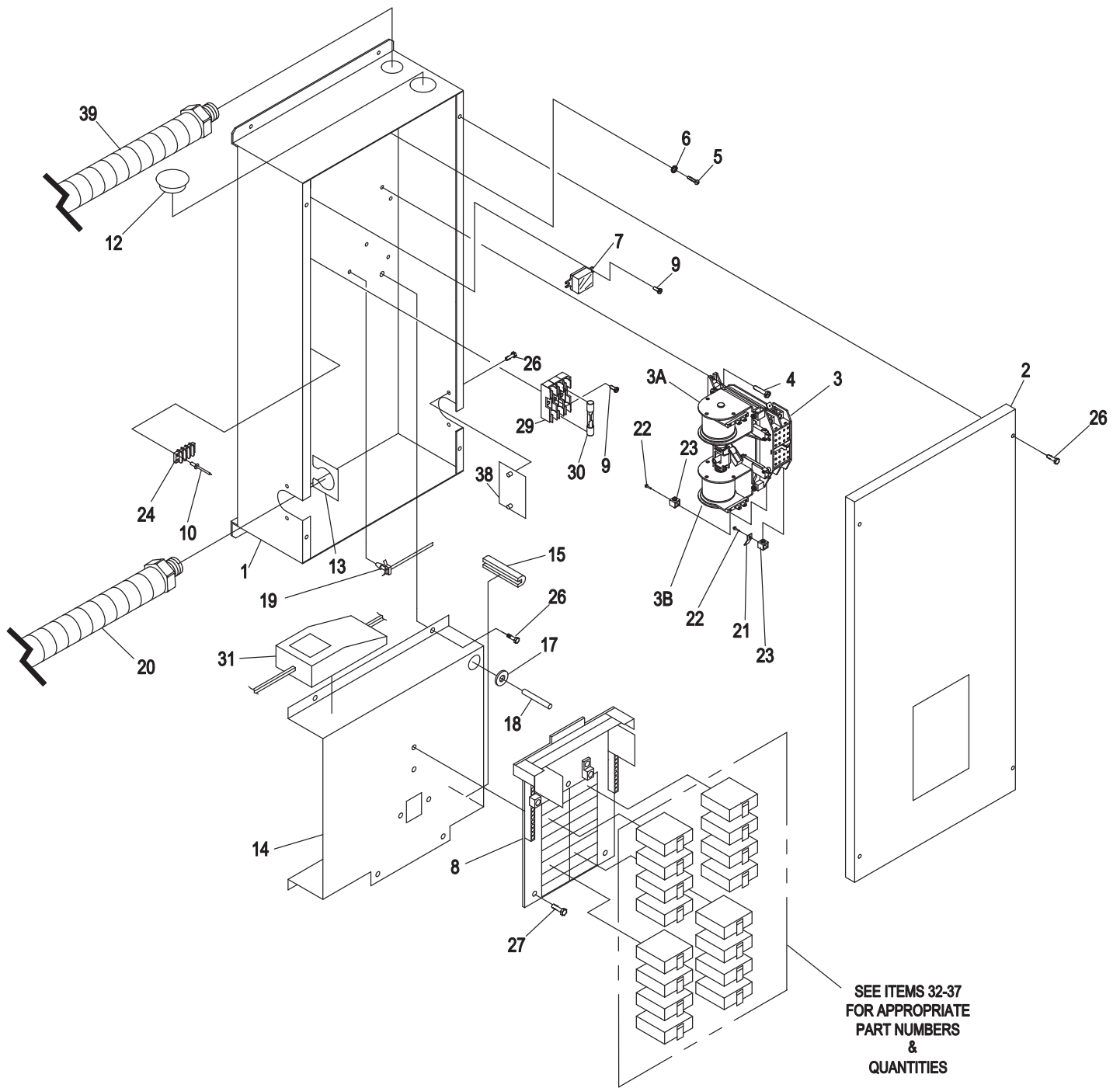


LEGEND

BC-BATTERY CHARGER
 C1-UTILITY COIL & RECTIFIER
 C2-GENERATOR COIL & RECTIFIER
 F1,F2,F3-5A, 600V FUSE
 LC-CIRCUIT BREAKER (LOADS)
 (16 CIRCUIT SHOWN FOR REFERENCE ONLY)
 N-NEUTRAL
 SW1-AUTOMATIC TRANSFER SWITCH
 SW2,SW3-LIMIT SWITCHES
 TB1-TERMINAL STRIP
 TR1-TRANSFER RELAY

Residential Transfer Switch Installation Guide

Load Center Exploded View - Drawing OG8786-C



Residential Transfer Switch Installation Guide

Load Center Exploded View - Drawing 0G8786-C

ITEM	PART NO.	QTY.	DESCRIPTION	ITEM	PART NO.	QTY.	DESCRIPTION
1	0G80700ST14	1	GTS LOAD CENTER ENCLOSURE GRAY	21	074138	3	LUG QUICK DISCONNECT NI-S 10X45 DEG BRASS / TIN
2	0G81010ST14	1	COVER 8 POS GTS LOAD CTR GRAY	22	0H0090A	6	SCREW PPHM #10-32X5/16 SEMS SC
	0G81020ST14	1	COVER 10 POS.GTS LOAD CTR GRAY	23	077033	6	LUG SLDLSS 1/0-#14X9/16 AL/CU
	0G81030ST14	1	COVER 12 POS.GTS LOAD CTR GRAY	24	0D4698	1	BLOCK TERM 20A 6 X 3 X 1100V
	0G81040ST14	1	COVER 14 POS.GTS LOAD CTR GRAY	-	-	-	-
	0G81060ST14	1	COVER 16 POS.GTS LOAD CTR GRAY	26	0A7215	10	SCREW SW 1/4"-20 X 5/8" WITH WASHER
3	0C2237	1	TRANSFER SWITCH HOME STANDBY 100A 2P 250V	-	-	-	-
3A	077220	1	COIL UTILITY	27	066849	2	SCREW HHTT M5-0.8 X 16 (8, 10, 12, 14, 16 CIRCUIT)
3B	077220A	1	COIL STANDBY	28	0G7954A	1	HARNESS LOAD CTR INT.CONN 8-16 (NOT SHOWN)
4	074908	4	SCREW HHTT M5-0.8 X 10		0G7954B	1	HARNESS LOAD CTR INT.CONN T1 (NOT SHOWN)
5	058443	1	SCREW CRIMPTITE 1/4-20 X 5/8		0G7954C	1	HARNESS LOAD CTR INT.CONN T2 (NOT SHOWN)
6	0A1658	1	LOCK WASHER, SPECIAL-1/4"	29	0D2572	1	FUSEBLOCK 30A 600V 3POS W/SQ
7	063617	1	RELAY PANEL 12VDC DPDT 10A @ 240 VAC	30	073590A	3	FUSE 5A
8	0E7889A	1	8CIR L/CNTR 125A/240V	31	0G8487	1	BATTERY CHARGER ASSY
	0E7889	1	12CIR L/CENTR 125A/240V (ALSO USED FOR 10 CIRCUIT)				<u>8 10 12 14 16 CIR</u>
	0F9213	1	16CIR L/CENTR 125A/240V (ALSO USED FOR 14 CIRCUIT)	32	0E7888	A/R	CIR BRKR 20A 2P 1 1 1
9	0A1495	4	SCREW HHTT M4-0.7 X 10	33	0E7888A	A/R	CIR BRKR 30A 2P 1 1 1
10	0A1661	2	RIVET POP .156" X .675"	34	0E7888B	A/R	CIR BRKR 15A 1P 5 3 5 4 5
11	-	-	-	35	0E7888C	A/R	CIR BRKR 20A 1P 1 3 3 4 5
12	081108	1	PLUG PLASTIC	36	0E7888D	A/R	CIR BRKR 40A 2P 1 1 1
13	0G8095AST14	1	HARNESS ADAPTER PLATE GRAY	37	0E7888E	A/R	CIR BRKR 50A 2P 1 1
14	0G81300ST14	1	SUBPLATE GTS LOAD CENTER GRAY	38	0G80860ST14	1	HARNESS ENTRY COVER GRAY
15	0F4790	2.63"	U-CHANNEL	39	0G7951	1	HARN GTS-EXT CONN BOX 8KW
16	-	-	-		0G7952	1	HARN GTS-EXT CONN BOX 10KW
17	022717A	1	GROMMET 3/8 X 1/16 X 1/4		0G7953	1	HARN GTS-EXT CONN BOX 14/17KW
18	0E6155	1	ARM EXTENDER PIN				
19	0G8233A	4	CABLE TIE SELF MOUNTING 4.3LG				
20	0G8138	1	HARN GTS-MAIN PNL 8CIR W/NEUT				
	0G8139	1	HARN GTS-MAIN PNL 10CIR W/NEUT				
	0G8140	1	HARN GTS-MAIN PNL 12CIR W/NEUT				
	0G7955	1	HARN GTS-MAIN PNL 14CIR W/NEUT				
	0G8141	1	HARN GTS-MAIN PNL 16CIR W/NEUT				

Notes

[illegible]

[illegible]

Installation Instructions

GenReady Load Center EZ Transfer™ Operator

Model #005447-0

—⚠ **DANGER** ⚠—



Hazardous voltage that will cause death, serious injury or substantial property damage. Turn off power supplying this equipment before working inside.

This instruction sheet outlines the general installation procedure. It is not intended to cover all details or variations in equipment nor does it provide for every possible contingency to be met in connection with installation. If unsure of the correct procedure, have any questions, or need assistance, contact a qualified electrical contractor.

This device should be installed in accordance with all local electrical codes and/or the latest edition of the National Electrical Code®.

NOTE: The GenReady Panel is designed to be directly compatible with any Generac manufactured product. Use of another manufacturer's generator may require the purchase and installation of additional sensing and control components.

STEP 1:

Remove the six (6) screws that hold the trim (front cover) on. Remove the trim from the front of the panel board.



STEP 2:

- Open outer trim door exposing the upper pan (dead front).
- Remove all twist-outs covered by existing labels.
- Apply one of the ATS Danger decals to the load center as shown in the following figure.

2a.

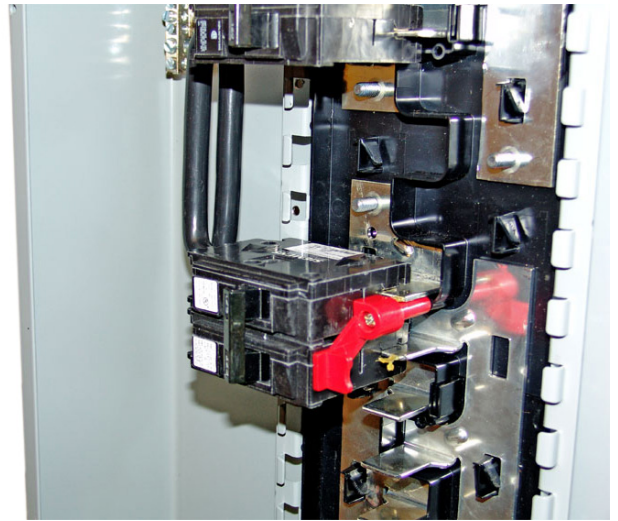


2b.



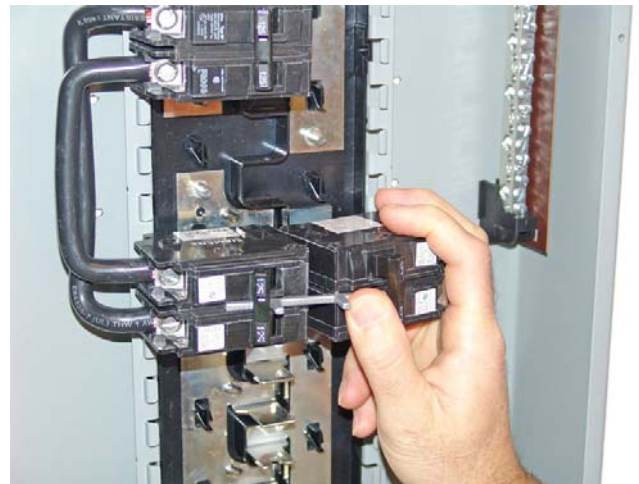
STEP 3:

Remove the RED retaining clip by unscrewing the fastener in the center of clip and discard.



STEP 4:

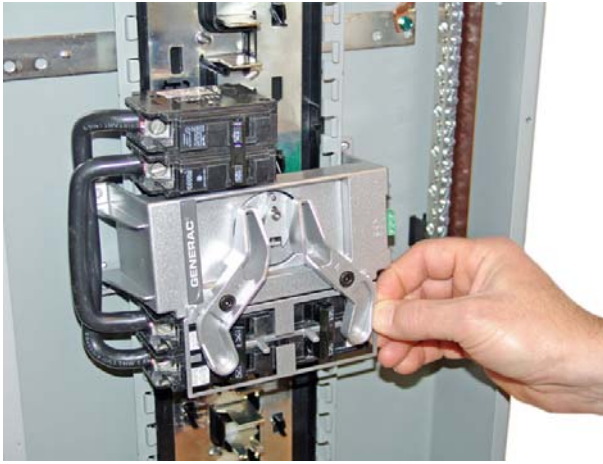
- Add additional 125 Amp, 2-pole switch on right. Place in OFF position. Before lowering switch on stabs install interlock bar under the existing switch handle and the new switch handle as shown.
- Push both switches into the bus stabs.



STEP 5:

- Position operator under the hold down bracket. Locate operator and switch tie bracket around the two 125 Amp switches.
- Install the two (2) screws (M3 x 6mm PPHMS) to mount the switch tie bracket to the operator mechanism.

5a.

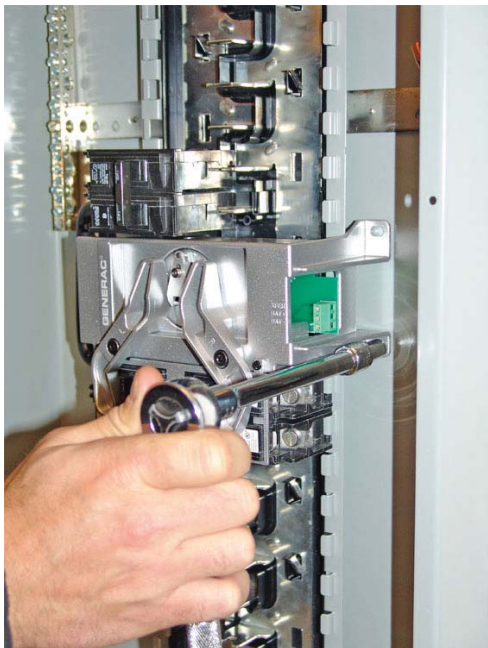


5b.



STEP 6:

Install the four (4) screws (10-32 x 5/16 HHTT) to mount operating mechanism to the back of the panel board.



STEP 7:

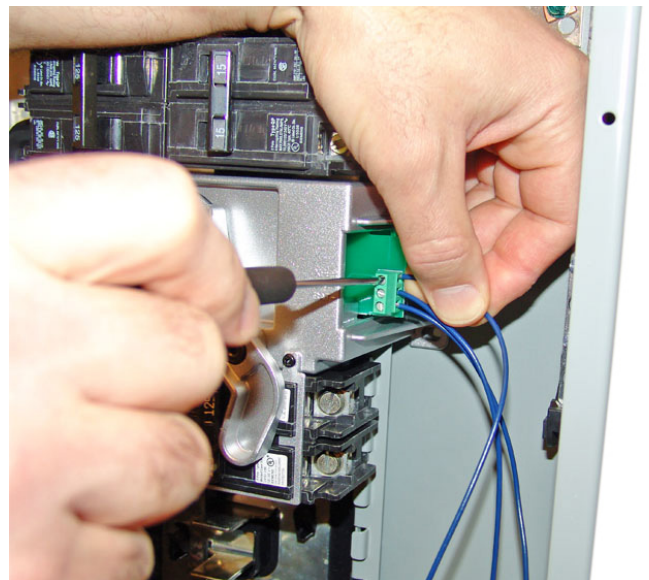
Install the 15 Amp 2-pole circuit breaker in the position shown.



STEP 8:

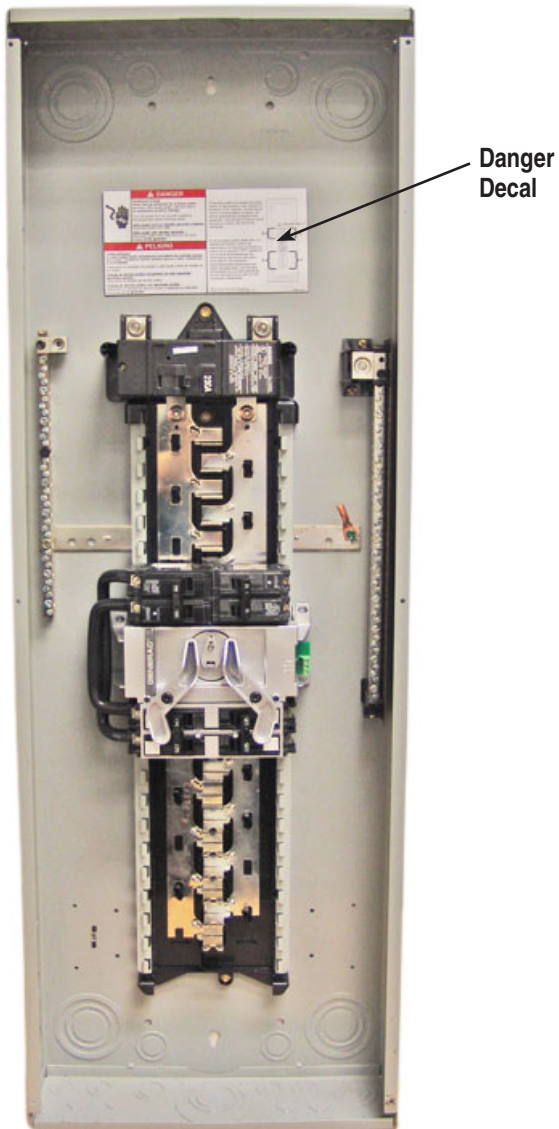
Install generator control wiring (must be installed in conduit). Install 5A fuse (if required) to the terminal strip in generator and connect the control wire from the generator.

Refer to the wiring diagram (P/N 0G4744) for further details. 2007 and earlier generator models – refer to 0G4744 page 1, for generator models introduced in 2008 and later- refer to 0G4744 page 2.



STEP 9:

Apply one of the ATS Danger decals to the load center as shown.



STEP 11:

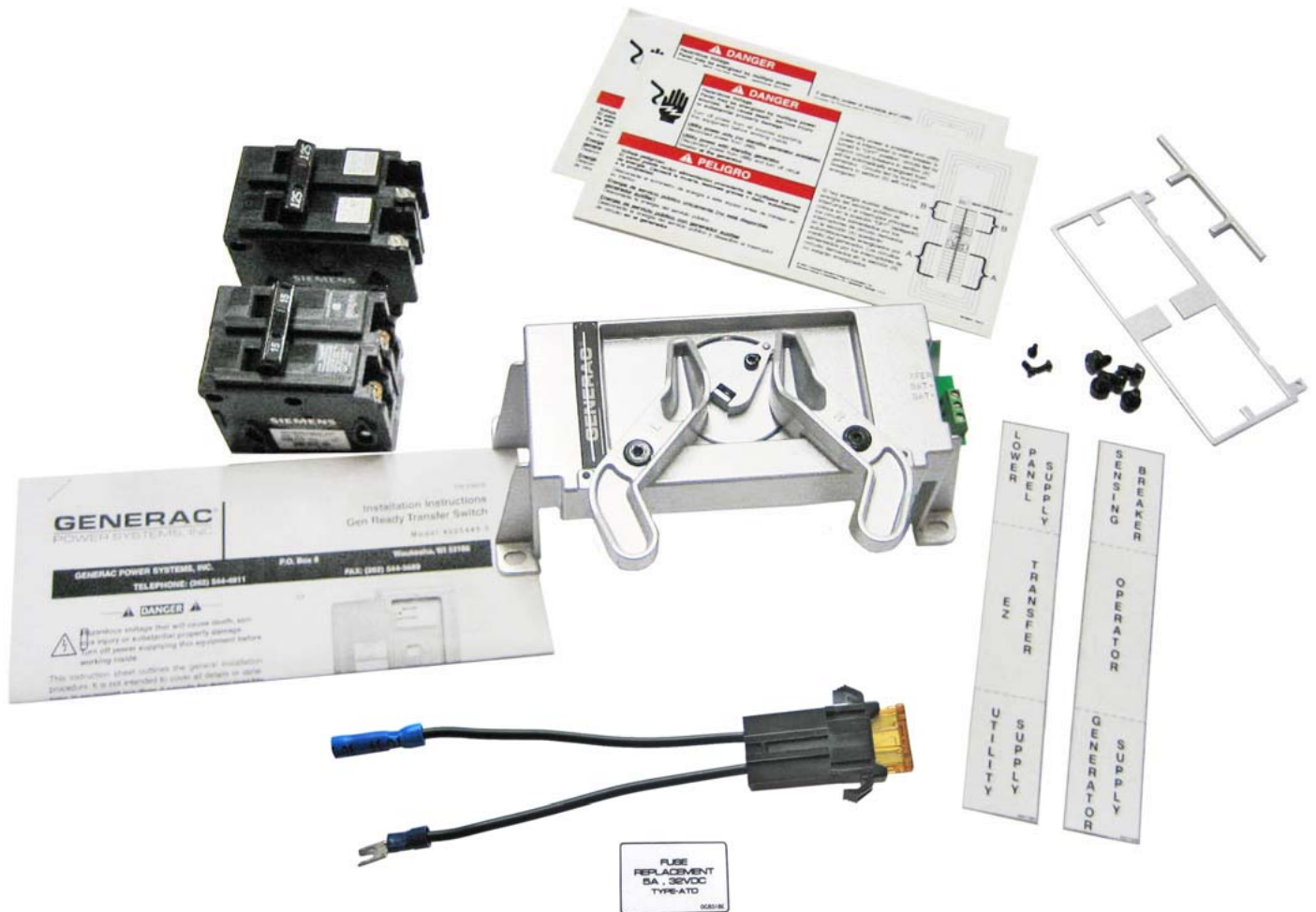
Apply decal 0G4742A on the left side, and decal 0G4732B on right side of the EZ Transfer™ operator box as shown.

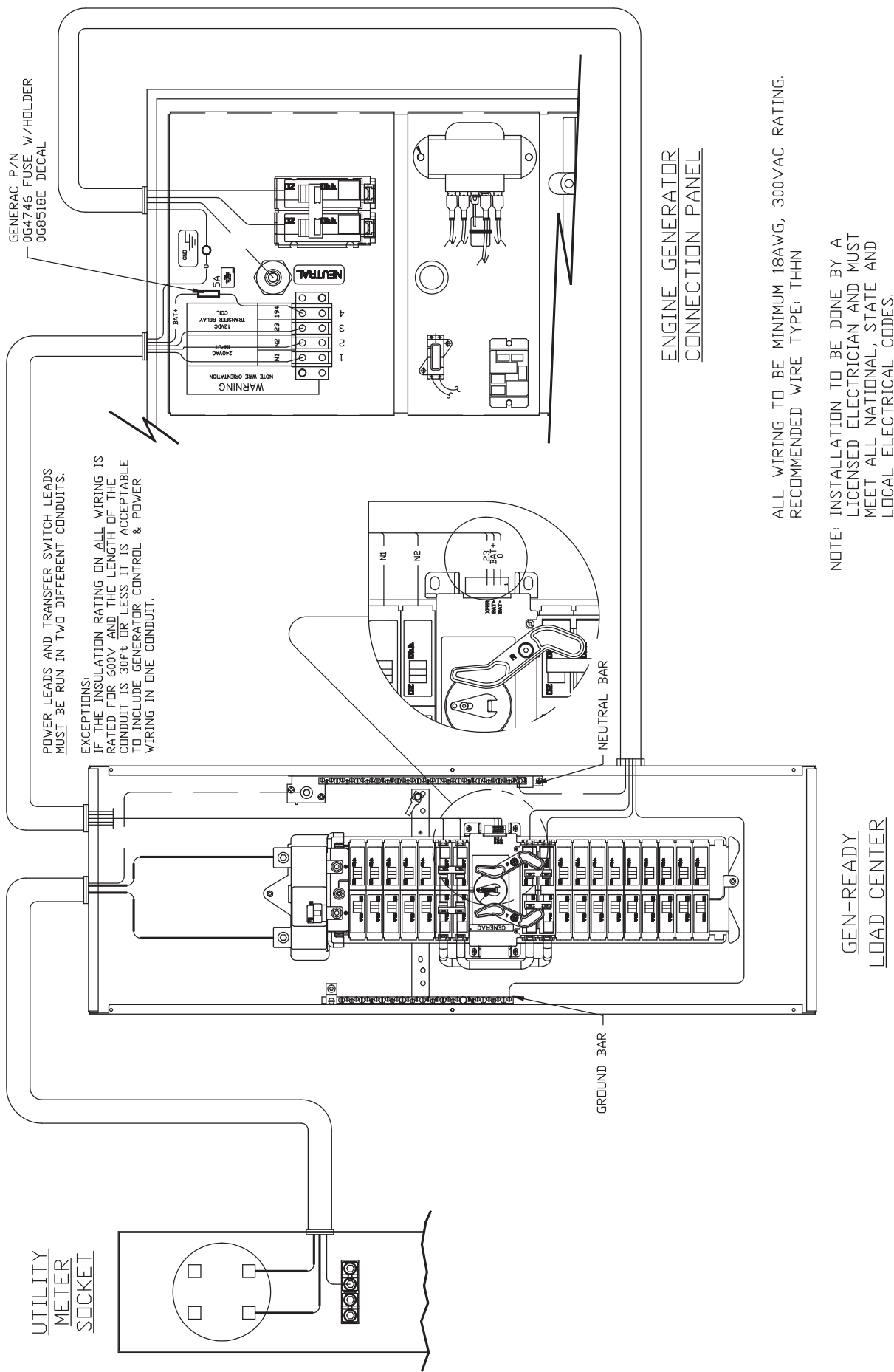


STEP 10:

Place the front cover on the panel board. Install the six (6) screws to hold the front cover on.

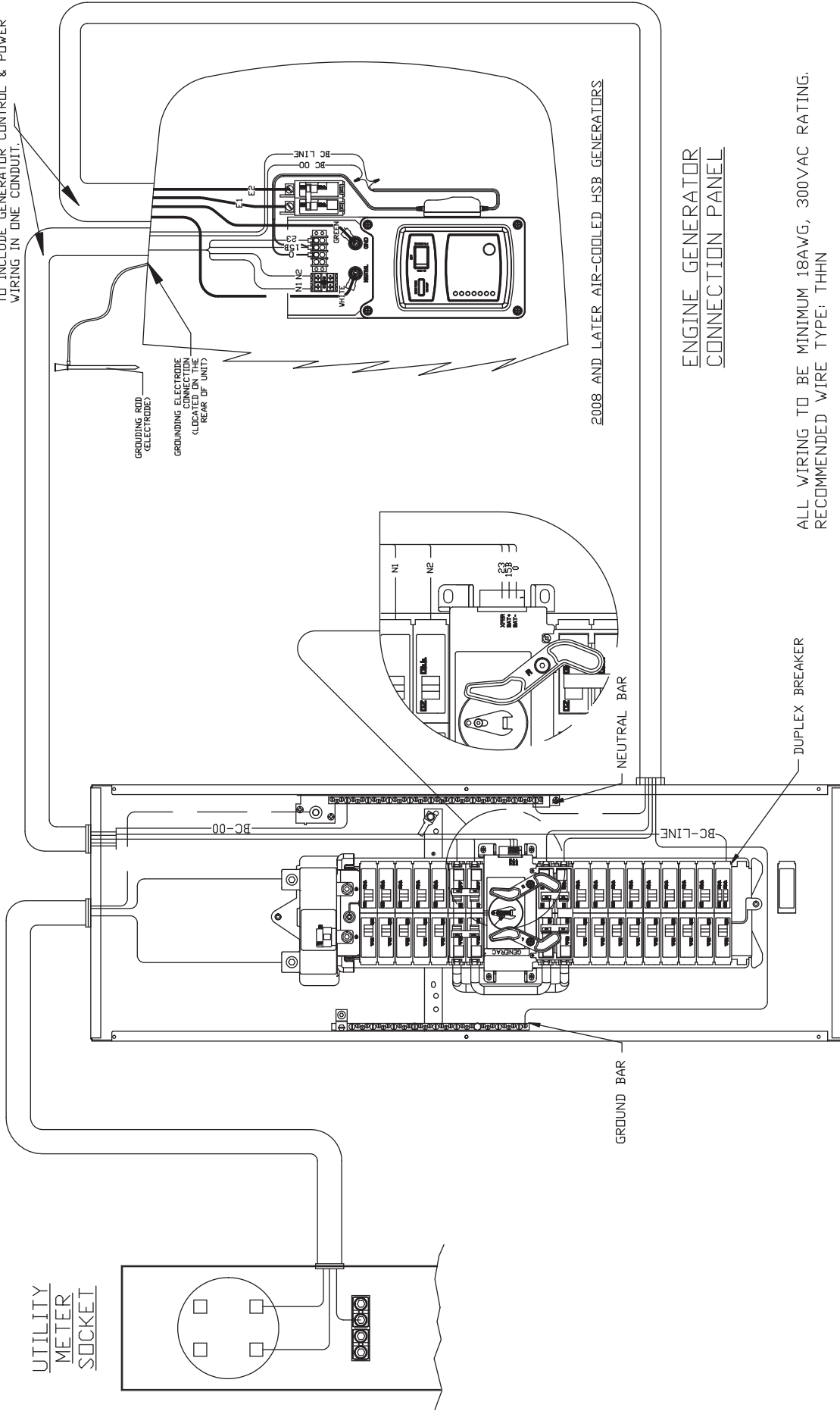
REFERENCE: Items supplied in the EZ Transfer™ operator kit.





POWER LEADS AND TRANSFER SWITCH LEADS
MUST BE RUN IN TWO DIFFERENT CONDUITS.

EXCEPTIONS:
IF THE INSULATION RATING ON ALL WIRING IS
RATED FOR 600V AND THE LENGTH OF THE
CONDUIT IS 30ft OR LESS IT IS ACCEPTABLE
TO INCLUDE GENERATOR CONTROL & POWER
WIRING IN ONE CONDUIT.



ENGINE GENERATOR CONNECTION PANEL

ALL WIRING TO BE MINIMUM 18AWG, 300VAC RATING.
RECOMMENDED WIRE TYPE: THHN

NOTE: INSTALLATION TO BE DONE BY A
LICENSED ELECTRICIAN AND MUST
MEET ALL NATIONAL, STATE AND
LOCAL ELECTRICAL CODES.

GEN-READY LOAD CENTER

Air-cooled Generator Battery Charger Installation Guidelines

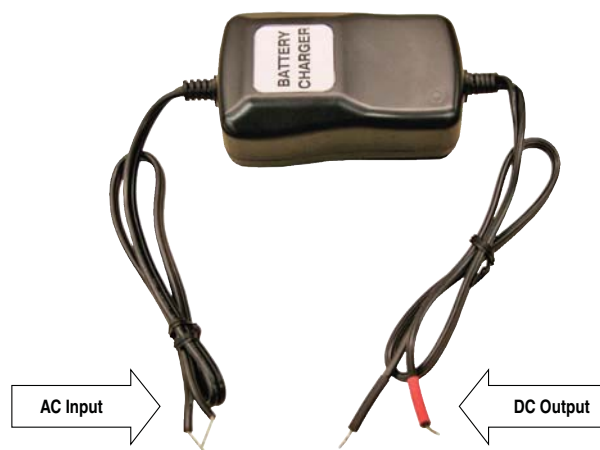


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1.1 INTRODUCTION

This battery charger supplies a trickle charging current and voltage to maintain the charge on the generator starting battery inside the generator enclosure. The charger will not replenish a fully discharged battery. It is intended to be connected to a 120VAC generator backed-up circuit only. If it is not connected to a generator backed-up circuit the battery could go “dead” while the generator is running for extended periods of time.

Figure 1.1 — Charger as Supplied Indicating Input and Output Wiring



⚠ WARNING ⚠

⚠ This battery charger must be properly installed and wired for correct operation of all 2008 model line Air-cooled Standby Generators. Failure to do so will result in a dead battery condition at the generator.

NOTE:

This installation guide should be used in conjunction with the “Installation and Owner’s Manual” that is furnished with the Air-cooled Standby Generator and the Installation and appropriate transfer switch manual. Please review all manuals prior to installation of the generator and transfer switch. This battery charger is not required with the Liquid-cooled Generator product line. This battery charger is not required for Air-cooled Standby Generators prior to the 2008 model line. This unit is not compatible with other generator manufacturer’s products.

For authorized service, reference the dealer locator number found in the generator owner’s manual or on the generator.

These Installation Guidelines are designed to familiarize personnel with the installation process for the battery charger required for the air-cooled generator only. It does not replace or supersede any information contained in any of the written documents shipped with the unit. This booklet should only be used in conjunction with the Owner's Manual, Installation Guide and other technical documents shipped with the unit.

Future product updates and/or modifications will be reflected in the written documentation included with the equipment. Always read all accompanying documentation carefully before attempting to install any generator, transfer switch or related equipment.

NOTE:

It is essential to comply with all regulations established by the Occupational Safety and Health Administration (OSHA) and strict adherence to all local, state and national codes is mandatory.

This device should be installed with all local electrical codes and/or the latest edition of the National Electrical Code. All wiring must be the correct size and type, and must conform to local codes, standards, and regulations.

1.2 BATTERY CHARGER COMPATIBILITY

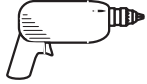
This battery charger is compatible, and required with all 2008 model line Air-cooled Standby Generators. For all generators that were supplied with a transfer switch/load center, the charger is already installed in the transfer switch enclosure and this charger is not needed. For all generators that were NOT supplied with a transfer switch/load center, the charger is NOT already installed and MUST be installed according to these guidelines.

◆ 1.2.1 DETERMINATION OF GENERATOR/TRANSFER SWITCH MODEL TYPE

The Battery charger included with this manual only needs to be used with certain transfer switch configurations. Some transfer switch configurations already have the battery charger installed in the transfer switch. Before proceeding it is necessary to select the transfer switch used from the following table.

Switch Type	Switch Description	Notes	Proceed to Section
RTSD	Pre-wire with 8 circuit load center	Battery charger is included and pre-wired with the transfer switch. Discard this charger. No further installation is required	Stop Here
RTSF ST100R10C	Pre-wire with 10 circuit load center	Battery charger is included and pre-wired with the transfer switch. Discard this charger. No further installation is required	Stop Here
RTSH	Pre-wire with 12 circuit load center	Battery charger is included and pre-wired with the transfer switch. Discard this charger. No further installation is required	Stop Here
RTSP ST100R14C	Pre-wire with 14 circuit load center	Battery charger is included and pre-wired with the transfer switch. Discard this charger. No further installation is required	Stop Here
RTSW ST100R16C KGATX0216100	Pre-wire with 16 circuit load center	Battery charger is included and pre-wired with the transfer switch. Discard this charger. No further installation is required	Stop Here
RTSS KGALT0101200 SR200RDPM	Power Manager LTS - Load Shed with 16 circuit load center	Battery charger is included with the transfer switch. Proceed with connections.	2
RTSN SRXXRX KGATX	Standard	The included battery charger must be installed and connected	3
RTSE SRXXRXD KGATD	Service Entrance Rated	The included battery charger must be installed and connected	3
005448-0 005449-0 KGATD0101RSP	GenReady	The included battery charger must be installed and connected	4

NOTE: Switch Type is the first four (4) digits of the model number and can be found on the data label inside the switch.



2.1 LOAD SHED TRANSFER SWITCH (RTSS) INSTALLATION

◆ 2.1.1 WIRING AND CONNECTIONS AT THE TRANSFER SWITCH

Connect the 15B, 0, and 23 low voltage control wires to the load shed controller connector J5 per the wiring diagram. Wires should be sized according to the following table.

CHARGER DC OUTPUT (TRANSFER SWITCH TO GENERATOR) WIRE SIZE CHART	
Maximum Wire Run Length	Recommended Wire Size (stranded copper)
35 feet (10.67m)	No. 16 AWG.
60 feet (18.29m)	No. 14 AWG.
90 feet (27.43m)	No. 12 AWG.

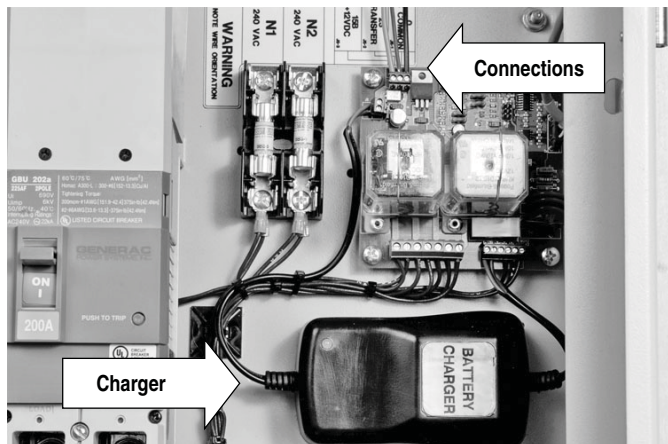
NOTE:

The charger is already mounted in the transfer switch (Figure 2.1).

NOTE:

See RTSS Installation/Wiring Diagram in the "Interconnection Diagrams" section for connections.

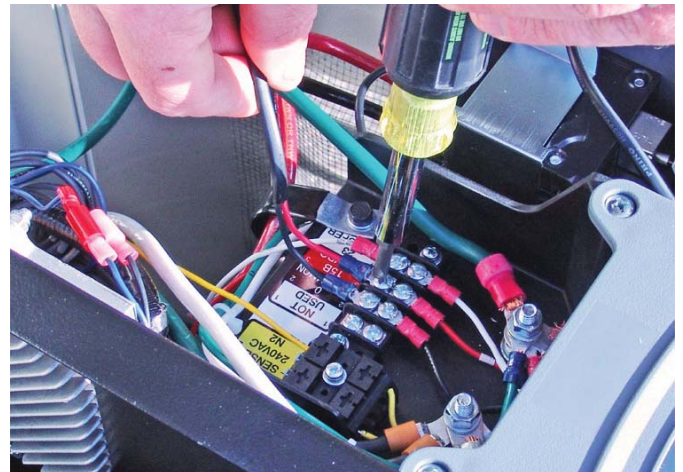
Figure 2.1 — Wiring Connections at the Transfer Switch



◆ 2.1.2 WIRING AND CONNECTIONS AT THE GENERATOR

1. Crimp spade lugs onto all three low voltage wires, 15B, 0, and 23 (Purchased or supplied separately).
2. Connect the low voltage wires, 15B, 0, and 23 to the terminal strip on the controller (Figure 2.2).

Figure 2.2 — Connection of Charger DC Output Wires in Generator Control Panel



◆ 2.1.3 OPERATIONAL TESTING

1. If already connected, disconnect the battery in the generator. Remove the negative cable first followed by the positive cable. Take care not to short the cables together.
2. Ensure power is applied to the battery charger input.
3. Connect a volt meter across the battery leads. The voltage reading should be between 12.8 VDC and 13.8 VDC (Figure 2.3).

Figure 2.3 — Measurement of Charger Output with Battery Disconnected





4. If the voltage is within range installation of the battery charger is complete. If the voltage is not within range verify all wiring and sizing and retest.
5. Re-connect the battery cables. Positive cable first followed by the negative cable.

3.1 STANDARD TRANSFER SWITCH (RTSN) OR (RTSE) SERVICE ENTRANCE RATED TRANSFER SWITCH INSTALLATION

◆ 3.1.1 WIRING AND CONNECTIONS AT THE TRANSFER SWITCH

Choose the appropriate option.

NOTE:

See the appropriate RTSN or RTSE Installation/Wiring Diagram in the "Interconnection Diagrams" section for connections.

Option 1 — Protected Load Provided in Load Center

1. Install a 15A breaker in the load center (Purchased or supplied separately). The breaker must be on a generator backed-up circuit or the battery in the generator will not maintain its charge during extended run periods.
2. Run the 120VAC hot wire and neutral wires to the generator.

NOTE:

See the appropriate RTSN or RTSE Installation/Wiring Diagram in the "Interconnection Diagrams" section for connections.

Option 2 — Protected Load Provided in the RTS, Fuse Block Installation

NOTE:

This section is only appropriate for 2008 RTSN or RTSE transfer switches.

1. Mount the optional 5amp 600V fuse and holder in the transfer switch. (Purchased or supplied separately). Pre-2008 transfer switches will not have holes pre-drilled for the fuse holder. In this case, it is necessary to drill holes in the enclosure to mount the fuse holder (see Figures 3.1 and 3.4).
2. Connect one side of the fuse to terminal (T1) of the transfer switch using a spade lug. Pre-2008 transfer switches will not have the spade lug attached to terminal T1. The spade terminal is available separately if required (see Figures 3.2 and 3.4).

3. Run the other side of the fuse holder (120VAC Hot) along with the neutral from the neutral lug to the generator (see Figures 3.1 and 3.5).

NOTE:

See the appropriate RTSN or RTSE Installation/Wiring Diagram for connections.

Figure 3.1 — RTSN Fuse Block Installation and Neutral Connection

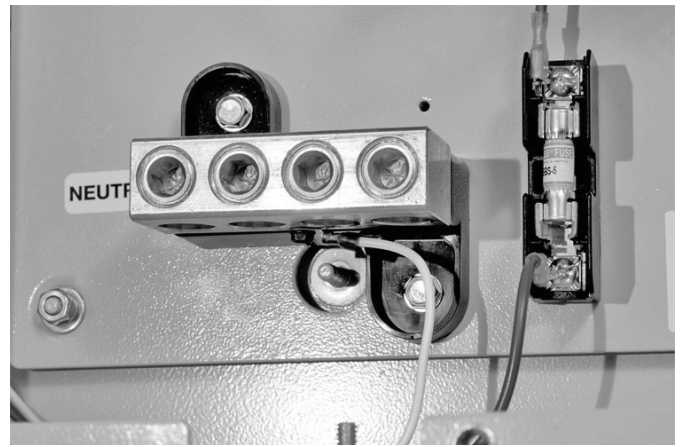


Figure 3.2 — RTSN Fuse Block Installation T1 Connection

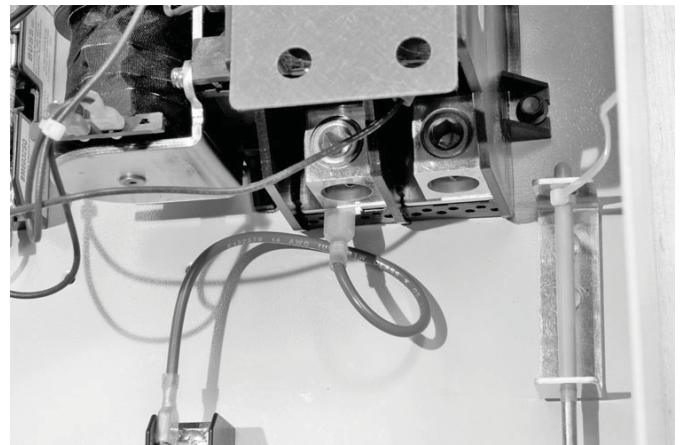




Figure 3.3 — RTSN Fuse Block Installation When Completed

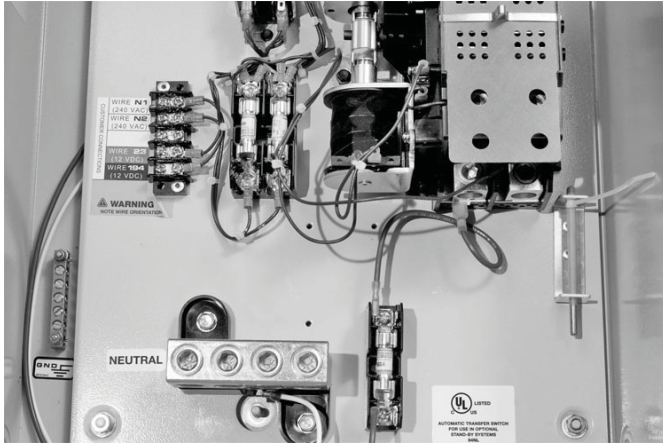


Figure 3.4 — RTSE Fuse Block Installation T1 Connection

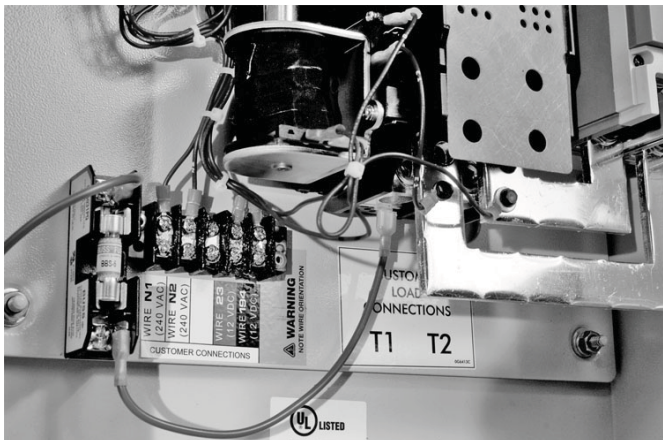
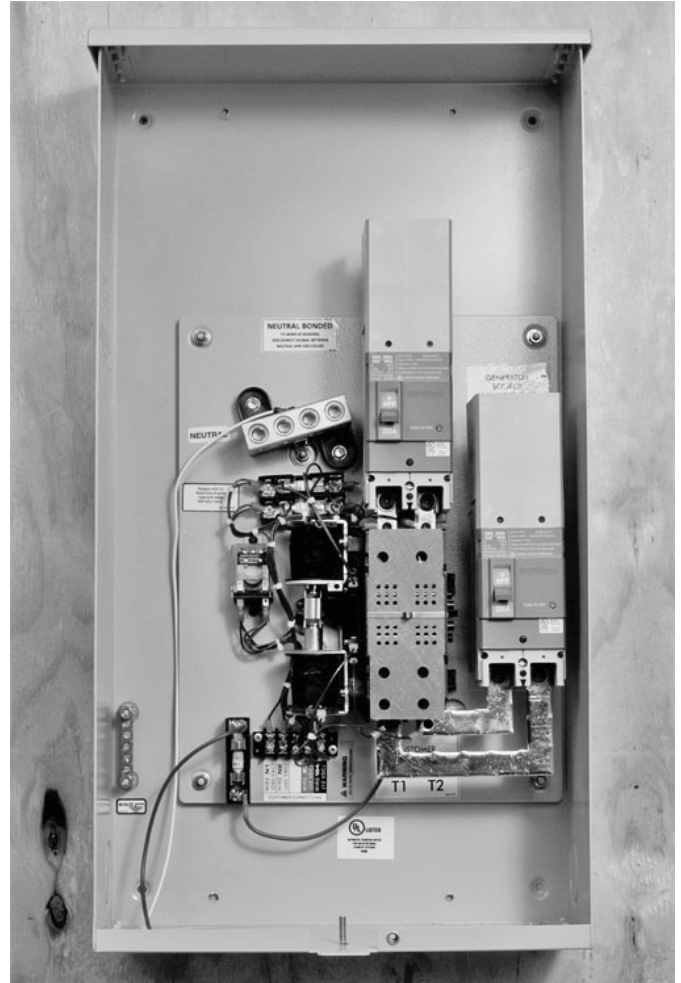


Figure 3.5 — RTSE Neutral Connection



Figure 3.6 — RTSE Fuse Block Installation When Completed



◆ 3.1.2 CHARGER MOUNTING

1. Remove the cover over the controller in the generator
2. The battery charger can be located anywhere within the controls area on the generator. It is convenient to mount the charger on the vertical surface on right-hand side of the controller (Figure 3.7).
3. Clean the surface where the charger is to be mounted prior to mounting with a damp cloth and wait for the area to dry.
4. Remove the adhesive covering on the backside of the charger and firmly press the charger into place as shown. Once mounted the charger may be removed for inspection by separating the hook & loop mounting (Figure 3.8).



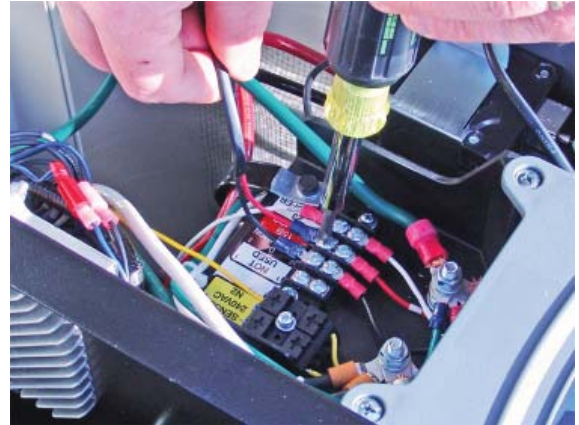
Figure 3.7 — Mounting Location of Charger in Generator



Figure 3.8 — Removal of Adhesive Covering on Hook and Loop for Mounting



Figure 3.9 — Connection of Charger DC Output Wires in Generator Control Panel



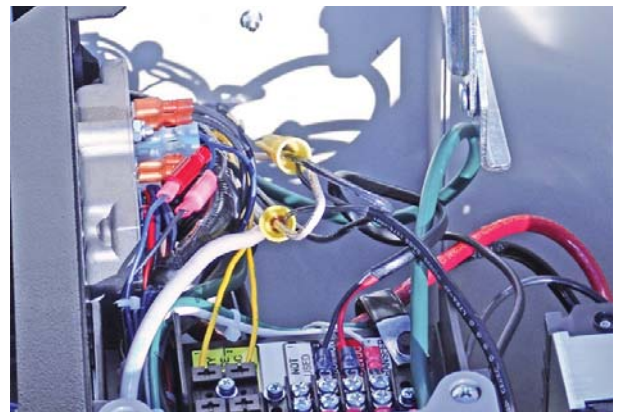
3. Using wire nuts attach the 120VAC input wires from the battery charger to the generator backed-up 120VAC circuit from the transfer switch (Figure 3.10).

Figure 3.10 — Connection of Charger AC Input Wires in Generator Control Panel



4. Dress all wires neatly (Figure 3.11).

Figure 3.11 — Completed Charger Connections on Generator Control Panel



◆ 3.1.3 WIRING AND CONNECTIONS AT THE GENERATOR

1. Identify the DC output wires on the battery charger and crimp spade lugs onto both the positive and negative lead (purchased or supplied separately) (see Figure 1.1).
2. Attach the positive and negative battery charger leads to the terminal strip in the controller. The positive lead is either a red wire or is marked with a (+) or (15B) designation. The negative lead is black and/or marked with a (-) or (0) designation. The positive lead attaches to the terminal labeled "15B". Note that there will be two wires attached to the "15B" terminal when the full installation is completed. One for the battery charger and one for the common connection to the transfer switch. The negative lead attaches to the terminal labeled "0" (Figure 3.9).



NOTE:

See the appropriate RTSN or RTSE Installation/Wiring Diagram in the "Interconnection Diagrams" section for connections.

◆ 3.1.4 OPERATIONAL TESTING

1. If already connected, disconnect the battery in the generator. Remove the negative cable first followed by the positive cable. Take care not to short the cables together.
2. Ensure power is applied to the battery charger input.
3. Connect a volt meter across the battery leads. The voltage reading should be between 12.8VDC and 13.8VDC (Figure 3.12).
4. If the voltage is within range installation of the battery charger is complete. If the voltage is not within range verify all wiring and sizing and retest.
5. Re-connect the battery cables. Positive cable first followed by the negative cable.

Figure 3.12 — Measurement of Charger Output with Battery Disconnected



4.1 GENREADY INSTALLATION

NOTE:

See the GenReady Installation/Wiring Diagram in the "Interconnection Diagrams" section for connections.

◆ 4.1.1 WIRING AND CONNECTIONS AT THE TRANSFER SWITCH

1. Install a 15A breaker in the bottom portion of the load center (Purchased or supplied separately). The breaker must be on a generator backed-up circuit or the battery in the generator will not maintain its charge during extended run periods (Figure 4.1).
2. Run the 120VAC hot wire and neutral wires to the generator.
3. Run the low voltage wires, 15B, 0, and 23 to the generator (Figure 4.2)

Figure 4.1 — GenReady Breaker Installation for Battery Charger

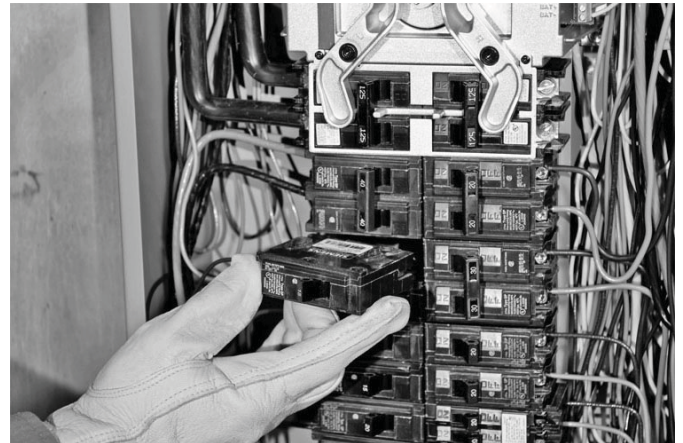
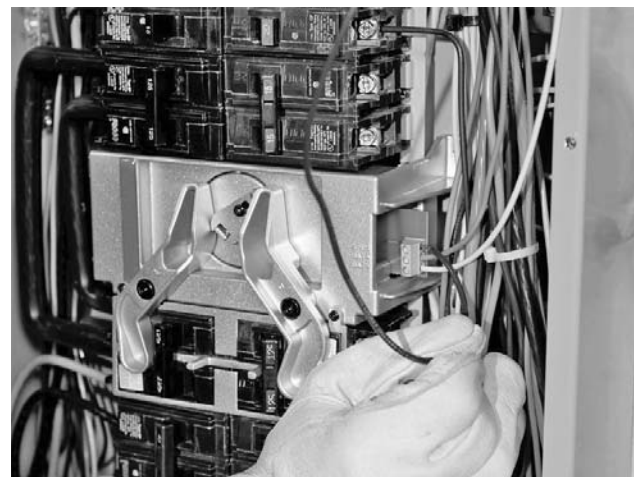


Figure 4.2 — GenReady Charger Connections

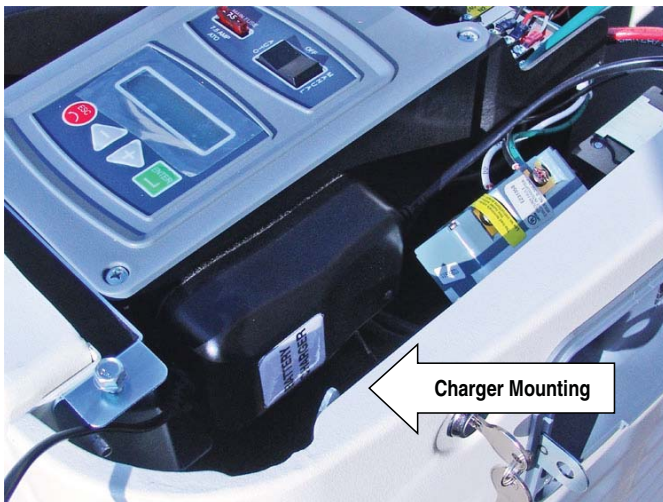




◆ 4.1.2 CHARGER MOUNTING

1. Remove the cover over the controller in the generator
2. The battery charger can be located anywhere within the controls area on the generator. It is convenient to mount the charger on the vertical surface on right-hand side of the controller (Figure 4.3).

Figure 4.3 — Mounting Location of Charger in Generator



3. Clean the surface where the charger is to be mounted prior to mounting with a damp cloth and wait for the area to dry.
4. Remove the adhesive covering on the backside of the charger and firmly press the charger into place as shown. Once mounted the charger may be removed for inspection by separating the hook & loop mounting (Figure 4.4).

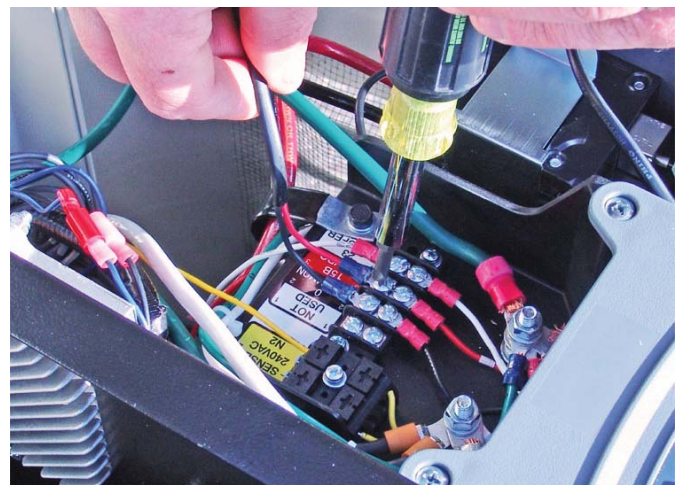
Figure 4.4 — Removal of Adhesive Covering on Hook and Loop for Mounting



◆ 4.1.3 WIRING AND CONNECTIONS AT THE GENERATOR

1. Identify the DC output wires on the battery charger and crimp spade lugs onto both the positive and negative lead (see Figure 1.1).
2. Attach the positive and negative battery charger leads to the terminal strip in the controller. The positive lead is either a red wire or is marked with a (+) or (15B) designation. The negative lead is black and/or marked with a (-) or (0) designation. The positive lead attaches to the terminal labeled "15B". The negative lead attaches to the terminal labeled "0". Note that there will be two wires attached to both the "0" and the "15B" terminals when the full installation is completed (Figure 4.5).

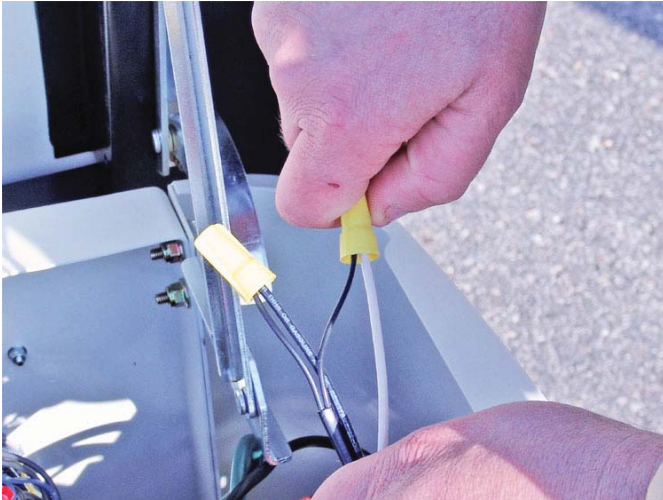
Figure 4.5 — Connection of Charger DC Output Wires in Generator Control Panel





3. Using wire nuts attach the 120VAC input wires from the battery charger to the generator backed-up 120VAC circuit from the transfer switch (Figure 4.6).

Figure 4.6 — Connection of charger AC input wires in generator control panel

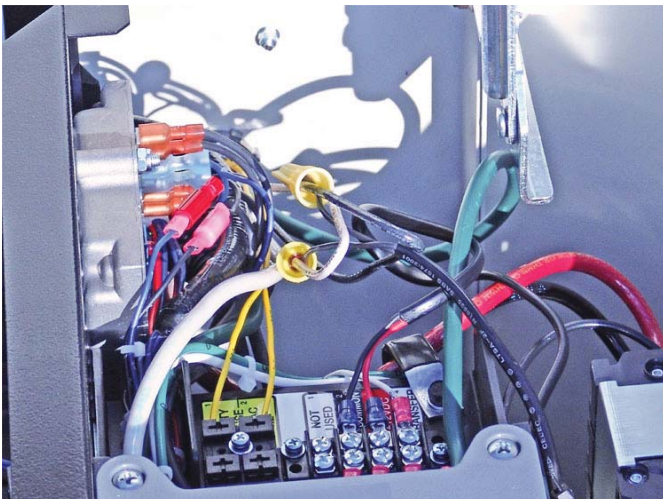


4. Dress all wires neatly (Figure 4.7).

NOTE:

See the GenReady Installation/Wiring Diagram for connections.

Figure 4.7 — Completed Charger Connections on Generator Control Panel



◆ 4.1.4 OPERATIONAL TESTING

1. If already connected, disconnect the battery in the generator. Remove the negative cable first followed by the positive cable. Take care not to short the cables together.
2. Ensure power is applied to the battery charger input.
3. Connect a volt meter across the battery leads. The voltage reading should be between 12.8VDC and 13.8VDC (Figure 4.8).
4. If the voltage is within range installation of the battery charger is complete. If the voltage is not within range verify all wiring and sizing and retest.
5. Re-connect the battery cables. Positive cable first followed by the negative cable.

Figure 4.8 — Measurement of Charger Output with Battery Disconnected

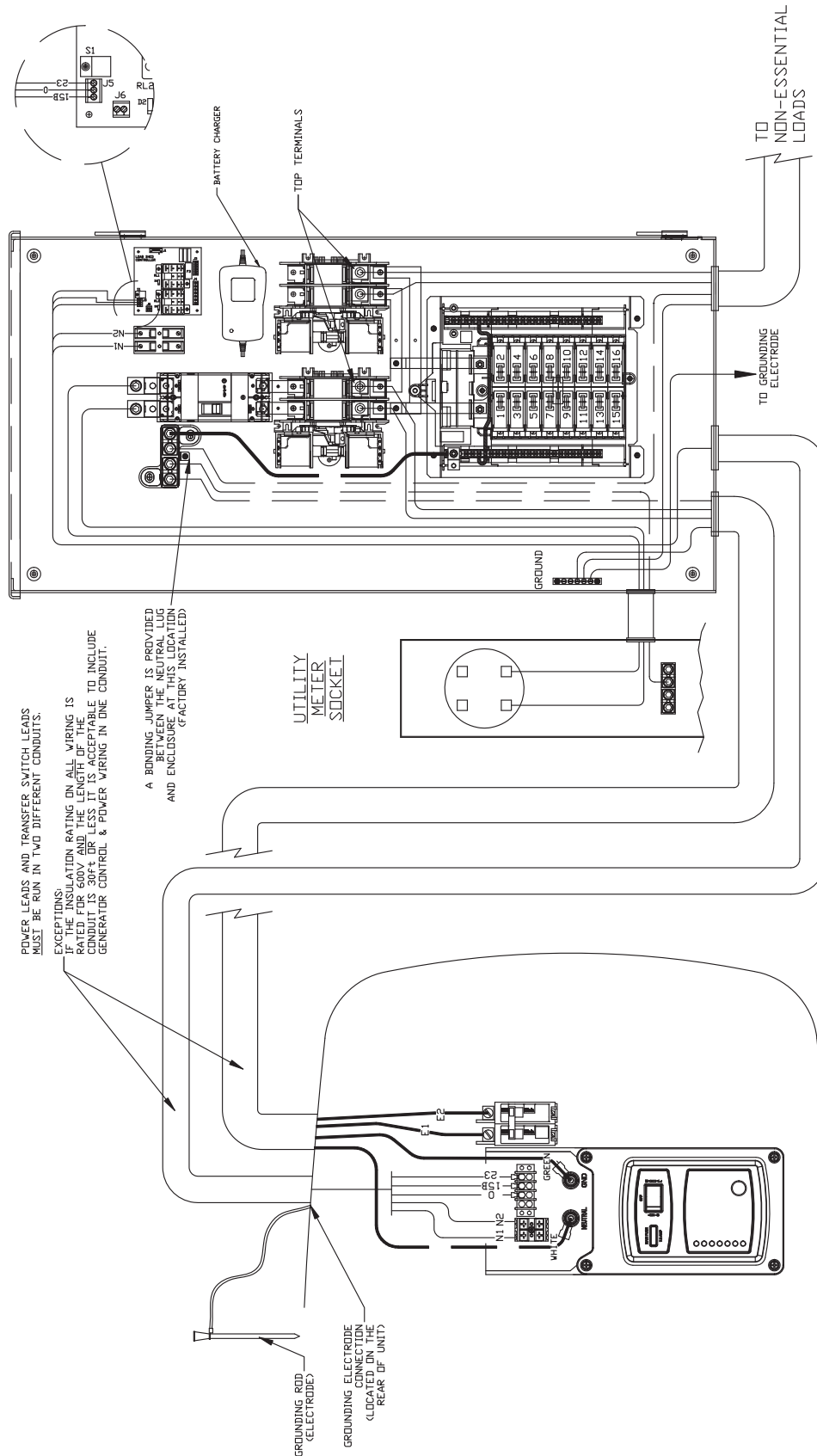
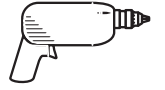


Section 5 – Interconnection Diagrams

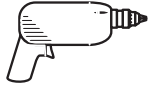
Battery Charger Installation Guidelines

RTSS Diagram - Drawing No. 0G8774-B

INSTALLATION



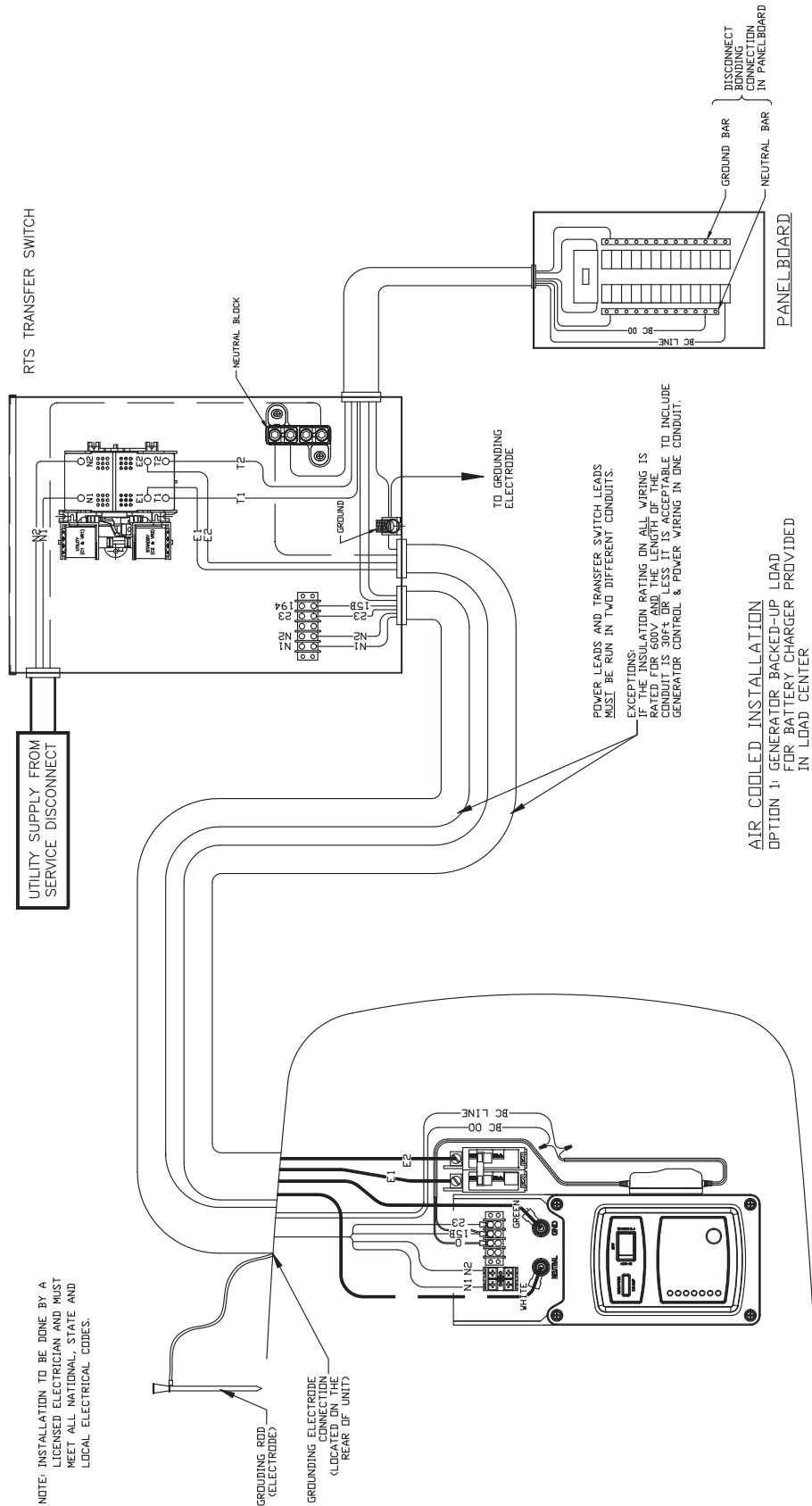
2008 AND LATER AIR-COOLED HSB GENERATORS



Section 5 – Interconnection Diagrams

Battery Charger Installation Guidelines

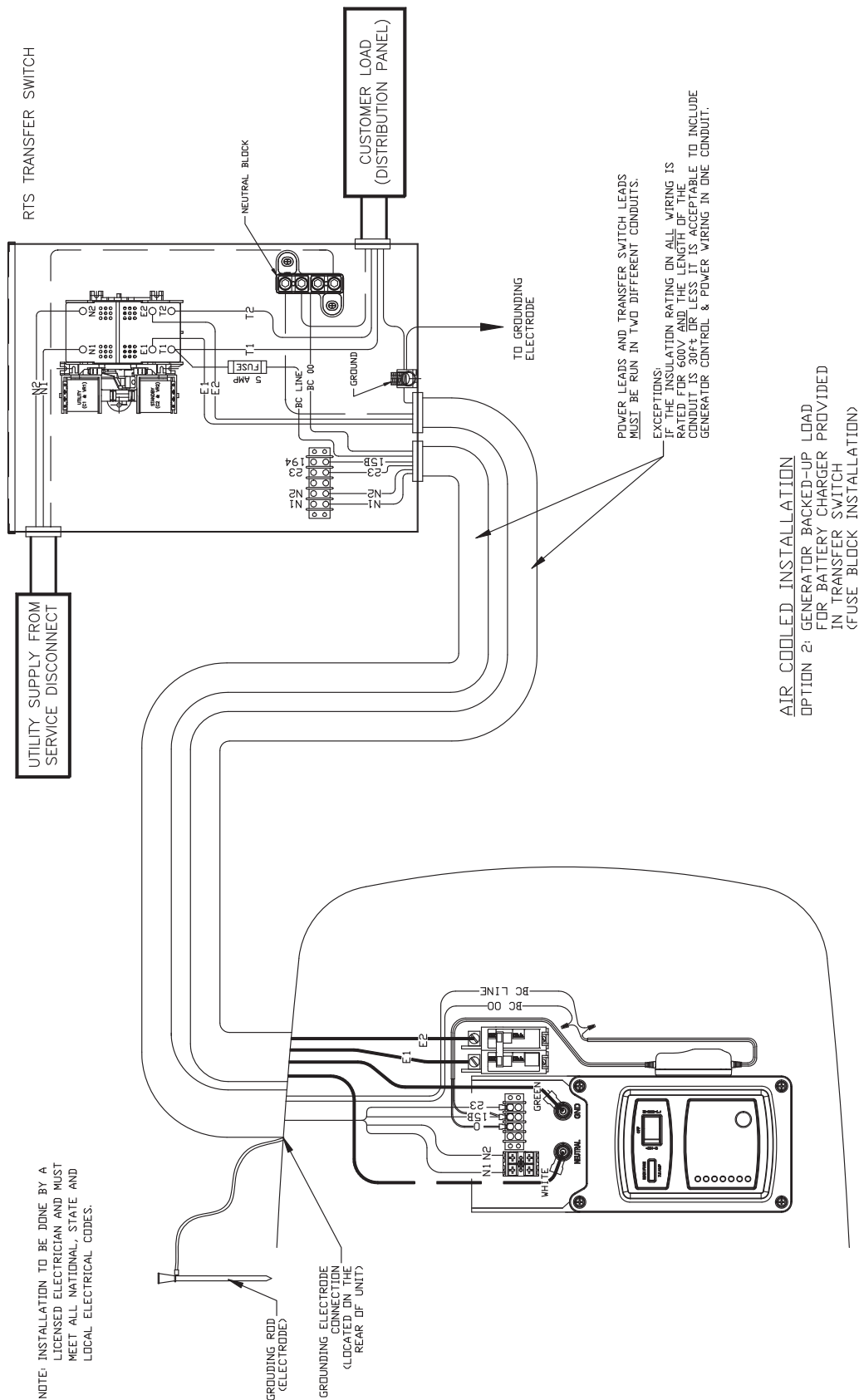
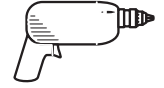
RTSN Diagram: Option 1 - Drawing No. 0G8832-A



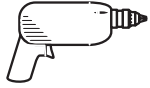
2008 AND LATER AIR-COOLED HSB GENERATORS

Section 5 — Interconnection Diagrams
Battery Charger Installation Guidelines
RTSN Diagram: Option 2 - Drawing No. 0G8832-A

INSTALLATION



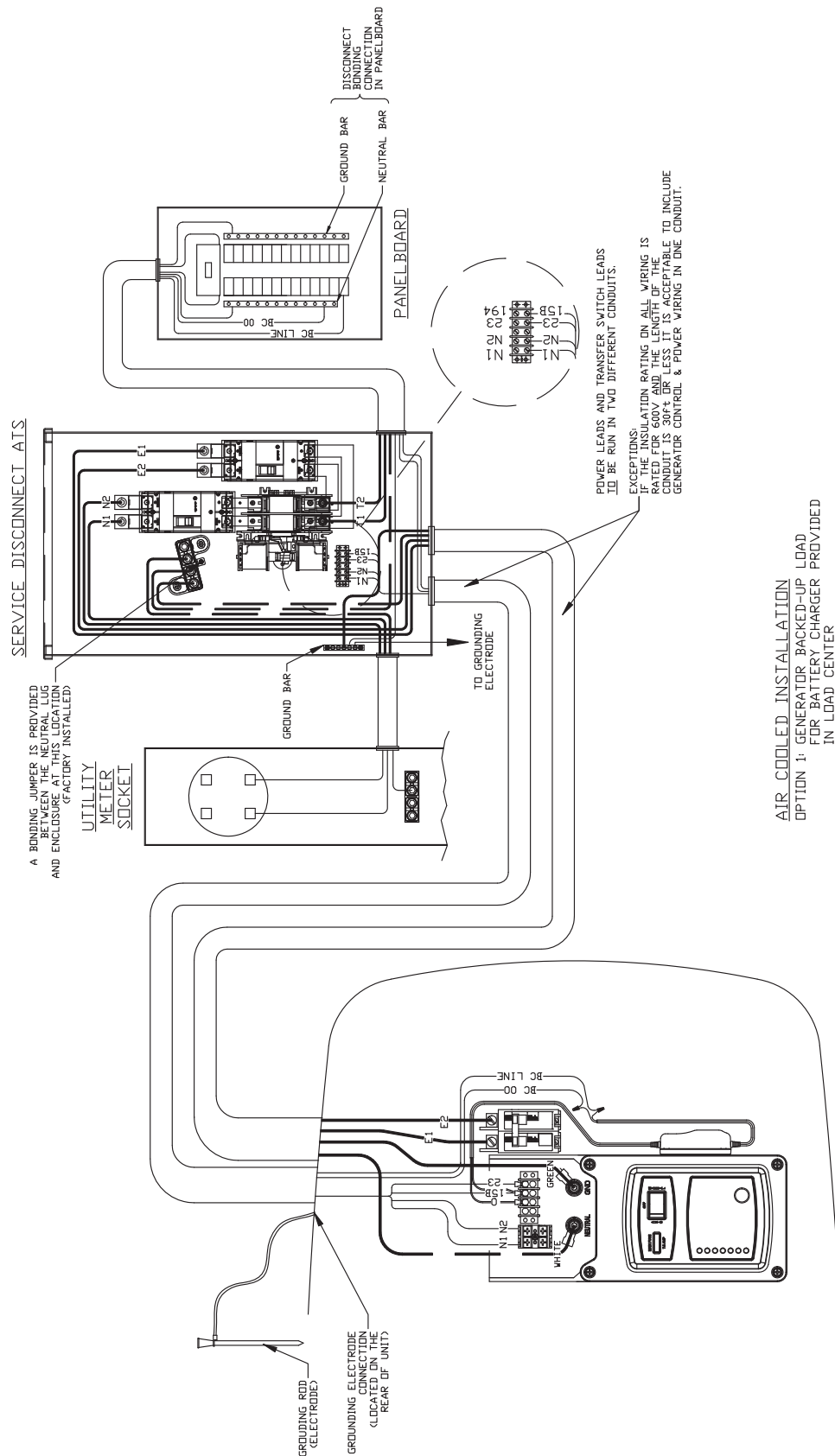
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Section 5 – Interconnection Diagrams

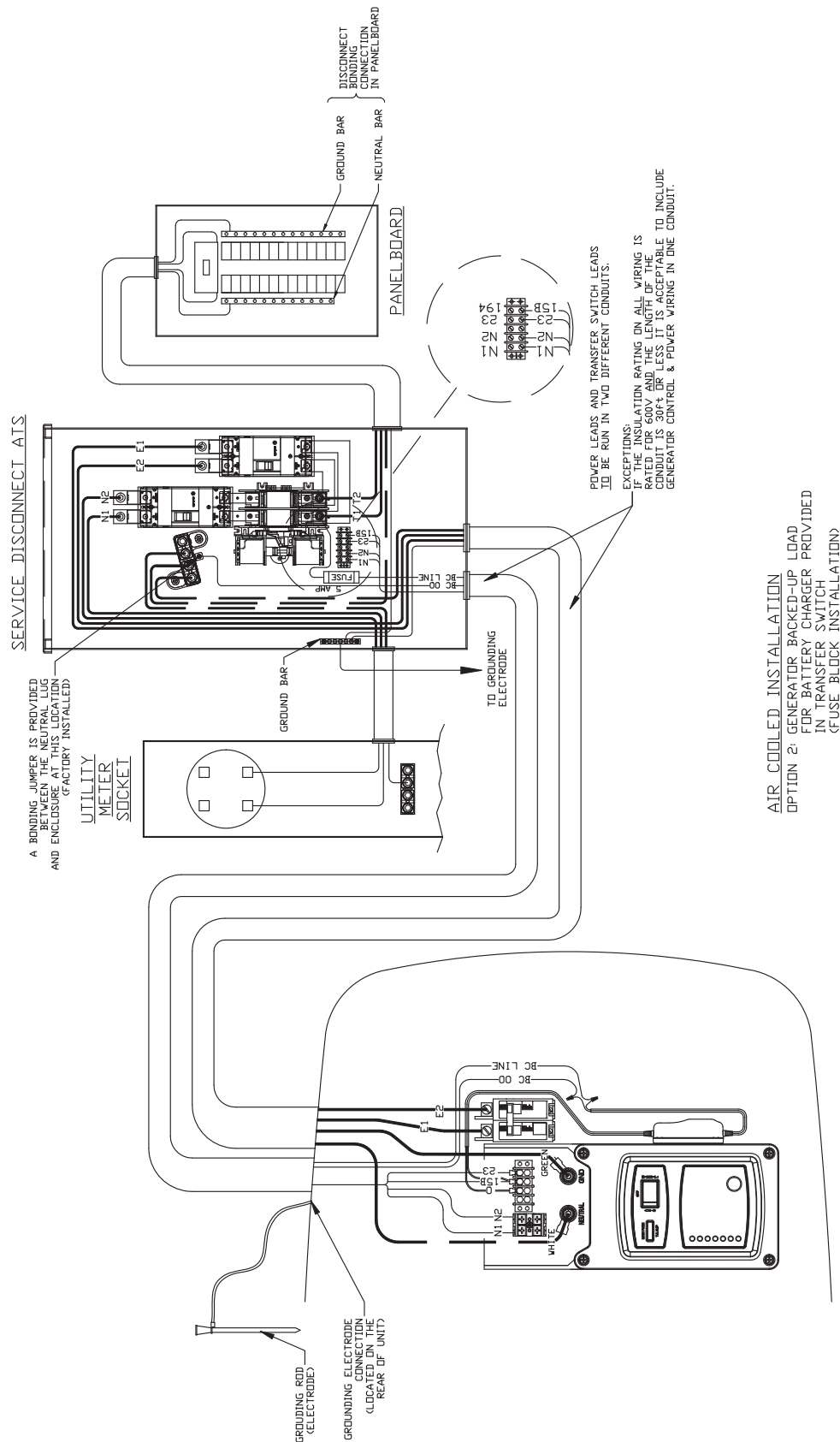
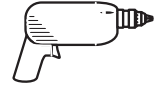
Battery Charger Installation Guidelines

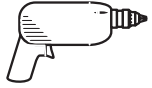
RTSE Diagram: Option 1 - Drawing No. 0G8829-A



Section 5 — Interconnection Diagrams
Battery Charger Installation Guidelines
RTSE Diagram: Option 2 - Drawing No. 0G8829-A

INSTALLATION

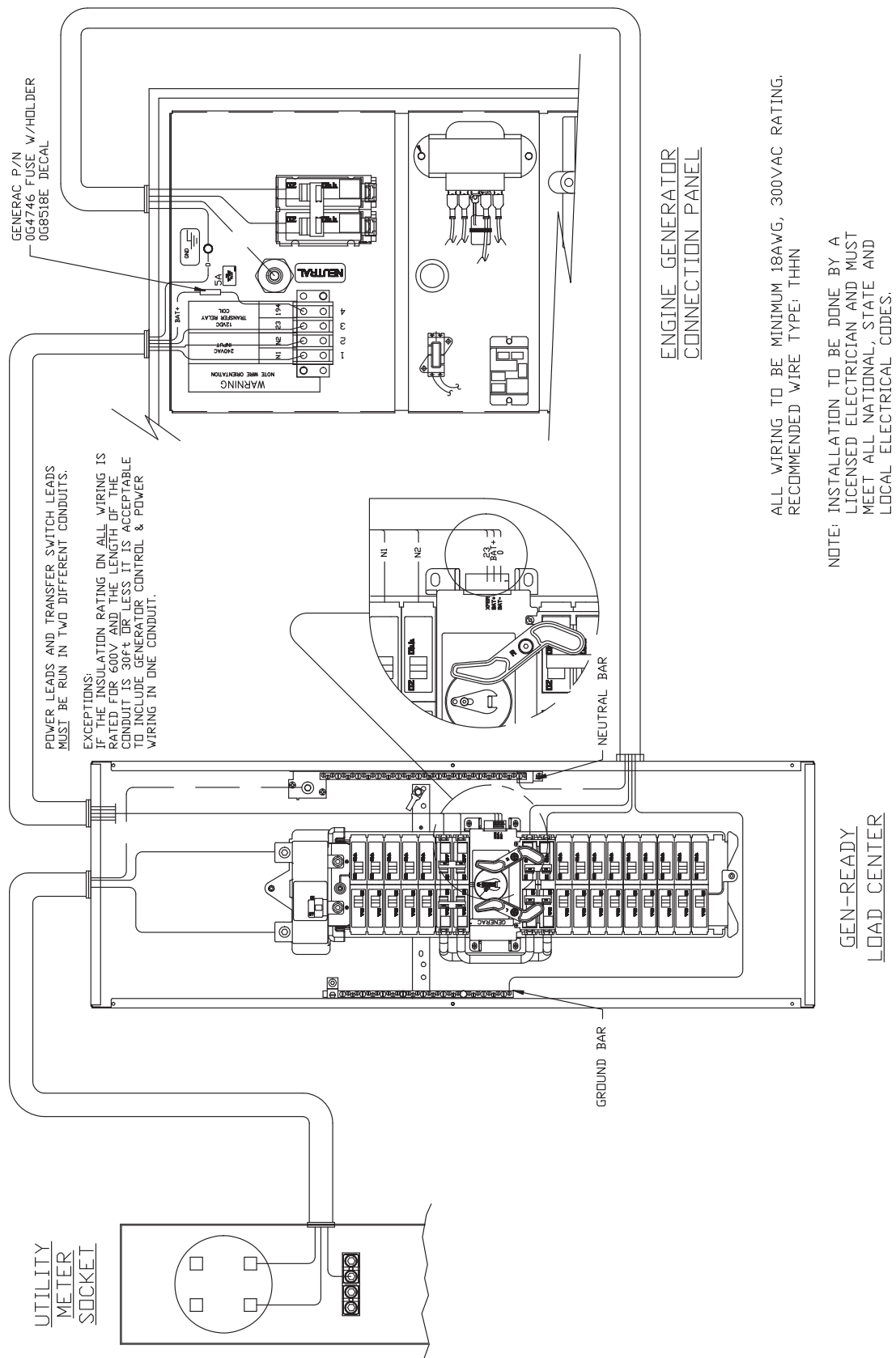




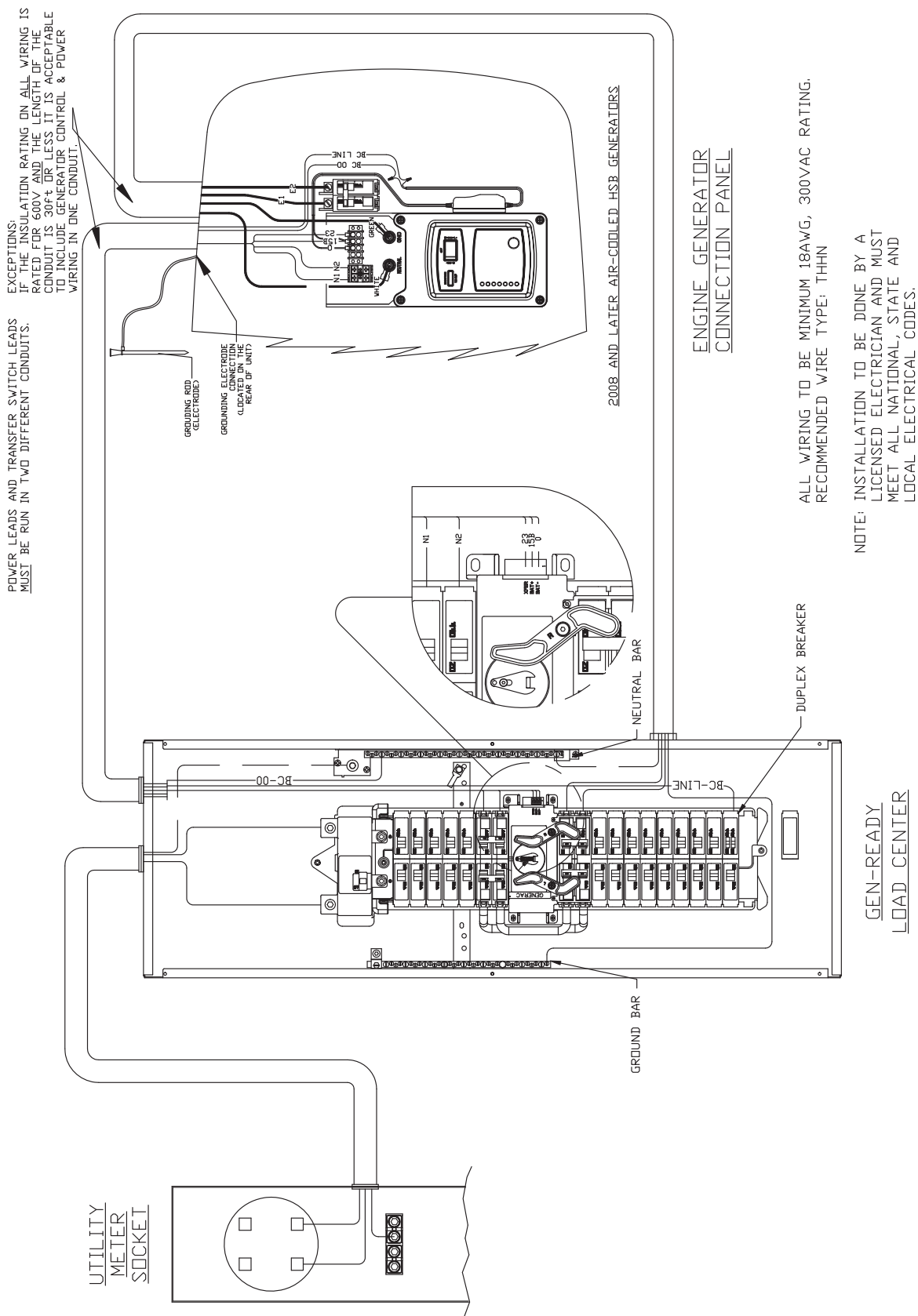
Section 5 – Interconnection Diagrams

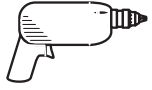
Battery Charger Installation Guidelines

GenReady Diagram - Drawing No. 0G4744-D



GenReady Diagram - Drawing No. 0G4744-D

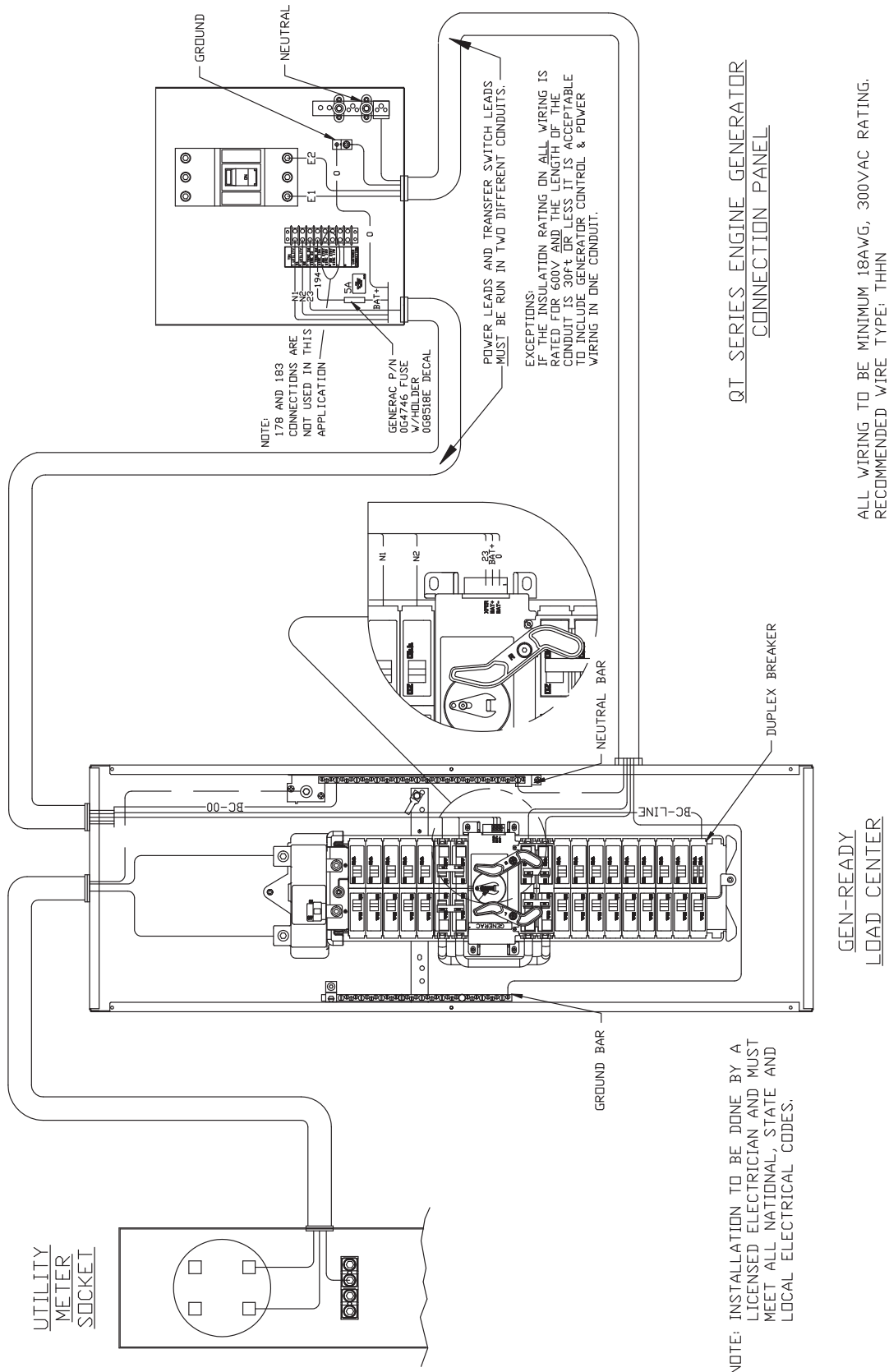




Section 5 – Interconnection Diagrams

Battery Charger Installation Guidelines

GenReady Diagram - Drawing No. 0G4744-D



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