

Model: 90A 01467 S

Type: SD050

Engine: D4.0

OWNER'S Manual

GENERATOR SET

GENERAC[®]

POWER SYSTEMS, INC.

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

Printed in U.S.A.

IMPORTANT SAFETY RULES

Notice to Operator

Throughout this publication, DANGERS, WARNINGS and CAUTIONS are used to alert the operator to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. OBSERVE THEM CAREFULLY.

These "Safety Alerts" alone cannot eliminate the hazards that they signal. Complying with these special instructions when performing the service, plus operating the unit with "common sense", are major measures to prevent accidents.

Generac could not know of and advise standby generator operators of all conceivable operating and servicing procedures, or of possible hazards and/or results of each operating/servicing technique or method. We have not undertaken any such wide evaluation. The warnings in this Manual and on tags and decals affixed to the equipment are, therefore, not all-inclusive. If you use a procedure, work method or operating technique that Generac does not specifically recommend, you must satisfy yourself it is safe for you and others. You must also make sure that procedures or operating techniques you choose do not damage the equipment.

Comply with the following SAFETY RULES:

1. This equipment should be installed, operated serviced and repaired only by competent, qualified electricians or installation technicians who are familiar with applicable codes, standards and regulations. The installer and operator must comply with all such codes, standards and regulations.
2. Installation, operation, servicing and repair of this (and related) equipment must be accomplished in accordance with applicable standards, codes, regulations and laws. The National Electric Code (NEC), Occupational Safety and Health Administration (OSHA) regulations, local industrial codes and inspection requirements must be complied with in equipment use and service. In addition, the manufacturer's recommendations must be complied with fully.
3. Extremely high and dangerous voltages are present at power terminals of this and related equipment. Contact with such terminals will result in extremely dangerous and possibly lethal electrical shock. Never permit any unqualified persons to install, operate or service this equipment.
4. Before installing or servicing this (and related) equipment, make sure that all power voltage supplies are positively turned OFF at their source. Failure to do so will result in hazardous — and possible FATAL — electrical shock.
5. Never handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. Dangerous electrical shock will result.
6. If people must stand on metal or concrete while installing, operating, servicing, adjusting or repairing his equipment, place insulative mats over a dry wood platform. Work on the equipment only while standing on such insulative mats.
7. The frame and external electrically conductive parts must be properly connected to and APPROVED earth ground. Proper grounding will help prevent dangerous electrical shock that might be caused by a ground fault condition in the generator set or by static electricity.
8. Wire gauge sizes of electrical wiring, cables and cord sets must be adequate to handle the maximum electrical current (ampacity) to which they will be subjected.
9. In case of accident caused by electrical shock, shut down the source of electrical power at once. If you cannot do this, free the victim from the live conductor, but AVOID DIRECT CONTACT WITH THE VICTIM. Use a dry board, dry rope, or other non-conducting implement to free the victim from the live conductor. If the victim is unconscious, apply first aid and get medical help.

10. Keep this (and related) equipment clean and in good condition. Promptly repair or replace all worn, damaged or defective parts.
11. Gasoline is extremely FLAMMABLE and its vapors are EXPLOSIVE. Diesel fuels are highly flammable. Comply with all laws regulating the storage and handling of gasoline and diesel fuels. Inspect the unit for fuel leaks frequently and correct any leaks immediately.
12. Gaseous fuels (LP and natural gas) are highly EXPLOSIVE. Comply with all laws and codes regulating the storage and handling of such fuels. Test the system for leaks and correct any leaks immediately. Use leak detectors. Natural gas is lighter than air — install leak detectors high in room. LP gas is heavier than air — install leak detectors low in room.
13. Fuel supply lines must be properly purged and leak tested before placing this equipment into service.
14. Properly ventilate any room or building housing the generator to prevent buildup of explosive gases.
15. Keep a fire extinguisher on hand near this equipment and know how to use it. Do NOT use any carbon tetra-chloride type extinguisher. Its fumes are toxic and the liquid can deteriorate wiring insulation.
16. The engine that drives this equipment consume oxygen and gives off DEADLY carbon monoxide has, if breathed in sufficient concentrations, can cause unconsciousness or even death. For that reason, adequate ventilation must be provided. Exhaust gases must be piped safely away from any building or enclosure that houses the generator and to an area where people will not be endangered.
17. When an automatic transfer switch is installed for a standby generator set, generator engine may crank and start at any time without warning. To avoid possible injury that might be caused by such sudden startups, 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 switch is provided inside the transfer switch enclosure. Always set the SAFETY DISCONNECT switch to its MANUAL position.
18. Read and make sure you understand all safety precautions and warnings in this manual and on tags and labels affixed to equipment.

BE A SAFE OPERATOR — BY THINKING BEFORE ACTING AND BY READING THE INSTRUCTIONS IN THIS MANUAL CAREFULLY.

IN ADDITION TO THE PRECEDING SAFETY RULES, THERE MAY BE OTHER SAFETY RULES THAT REQUIRE COMPLIANCE. USE COMMON SENSE AND READ THE INSTRUCTIONS AND INFORMATION IN THIS MANUAL CAREFULLY.



WARNING:



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

IDENTIFICATION RECORD

DATA PLATE

Every generator has a DATA PLATE which contains important information pertinent to the generator. The data plate lists the unit's serial number, its rated voltage, amps, wattage capacity, phase, frequency, rpm, power factor, etc.

DATA CARD

A DATA CARD is shipped with each standby generator set. Like the DATA PLATE, this card also contains valuable information pertaining to your generator. When requesting information, ordering replacement parts, asking for service, etc., you may be asked to supply the information from this card. It provides the following information:

- Generator Model Number
- Date of Manufacture
- Generator Identification Code
- Generator Assembly Groups (A through G)

Generator Model Number: This number is the key to numerous engineering and manufacturing details pertaining to your unit. Always supply this number when requesting service, ordering parts, or seeking information.

Identification Code: Use this code to obtain important information about your generator. For example, if the code is --

SD 050 - A 1 6 4.0 D 18 CD Y N Y

-- you can identify your generator as follows:

- SD -- Standby Diesel Generator ("SG" indicates a standby GAS unit).
- 050 -- Unit rated 50,000 watts (50 kW).
- A -- Voltage Code (see "Voltage Codes").
- 1 -- Indicates 1-phase unit.
- 6 -- Indicates unit rated 60 Hertz (Hz).
- 4.0 -- Engine is 4.0 liter (244 cubic inches).
- D -- Unit has Diesel fuel system.
- 18 -- rpm rating (1800 rpm); "36" means 3600 rpm.
- C -- Unit has an Option "C" control console.
- D -- Direct excited unit with brushes and slip rings ("B" means a BRUSHLESS unit).
- Y -- Unit is equipped with a compartment ("N" means no compartment).
- N -- Unit does not have an exhaust muffler ("Y" means a muffler has been mounted).
- Y -- Unit has a main line circuit breaker ("N" means no circuit breaker has been mounted).

Groups and Assembly Numbers: The Data Card lists groups "A" through "G" along with assembly numbers for each lettered group. The assembly number refer to exploded view drawing numbers that are applicable to your specific generator model.

Voltage Codes: The Identification Code letter following the unit's kilowatt rating is the generator's "Voltage Code." Any one of the following Voltage Codes may be listed.

- A -- 120/240 volts, 1-phase, 60 Hz
- B -- 120/208 volts, 3-phase, 60 Hz
- C -- 240/416 volts, 3-phase, 60 Hz
- D -- 120/240 volts 3-phase, 60 Hz
- G -- 120/208 volts, 3-phase, 60 Hz Broad Range*
- H -- 240/416 volts, 3-phase, 60 Hz Broad Range*
- J -- 120/240 volts, 3-phase, 60 Hz Broad Range*
- K -- 277/480 volts, 3-phase, 60 Hz Broad Range*
- M -- 110/220 volts, 1-phase, 50 Hz
- N -- 220/380 volts, 3-phase, 50 Hz Broad Range*
- O -- 240/416 volts, 3-phase, 50 Hz Broad Range*
- P -- 120/240 volts, 3-phase, 50 Hz Broad Range*

* Stator is 12-wire reconnectable.

GENERAC CORP.		
MODEL NO. 89A 01256 S DATE 5/03/89		
SD050-A164.0D18CDYNY		
GROUP	DESCRIPTION	ASSEMBLY NUMBERS
A	Generator	00000 00000
B	Control Panel	00000 00000 00000
C	Mounting Base	00000 00000
D	Engine & Accy.	00000
E	Fuel System	00000
G	Wiring Diagram	00000 00000 00000

A Typical Data Card

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READ THIS MANUAL THOROUGHLY

If you don't understand any portion of this manual, ask your dealer for a demonstration of actual starting and operating procedures.

NOTICE

Throughout this publication and on your standby generator set, DANGER or CAUTION notes may be used to alert the user to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly. Observe them carefully.

These "safety alerts" alone cannot eliminate the hazards that they signal. Strict compliance with these special instructions while performing the service or operation, plus "common sense," are major accident prevention measures.

 **DANGER: AFTER THIS HEADING YOU WILL FIND SPECIAL INSTRUCTIONS THAT, IF NOT STRICTLY COMPLIED WITH, MAY RESULT IN PERSONAL INJURY OR DEATH.**

CAUTION: After this heading you will find special instructions that, if not strictly complied with, may result in damage to equipment.

NOTE: After this heading you will find explanatory statements that require special emphasis.

RULES FOR SAFE OPERATION

DANGER: CONNECTING THIS UNIT TO AN ELECTRICAL SYSTEM NORMALLY SUPPLIED BY AN ELECTRIC UTILITY SHALL BE BY MEANS OF A DOUBLE THROW SWITCH (such as a the Generac "GTS" type transfer switch) SO AS TO ISOLATE THE GENERATOR ELECTRIC SYSTEM FROM THE ELECTRIC UTILITY DISTRIBUTION SYSTEM WHEN THE GENERATOR IS OPERATING (NEC 701). FAILURE TO ISOLATE THE TWO ELECTRIC SYSTEM POWER SOURCES FROM EACH OTHER BY SUCH MEANS MAY RESULT IN DAMAGE TO THE GENERATOR AND MAY ALSO RESULT IN INJURY OR DEATH TO UTILITY POWER WORKERS DUE TO BACKFEED OF ELECTRICAL ENERGY.

Before operating or servicing your standby generator set or related devices, read these RULES carefully. Become familiar with this Manual and with the generator. Safe, efficient and dependable operation can be obtained only if the unit is properly operated and maintained. Many accidents are caused when people fail to follow simple and fundamental rules or precautions.

You should copy these "Safety Rules" and post them near the standby generator. All operator, potential operators, service and repair technicians should be made aware of these RULES.

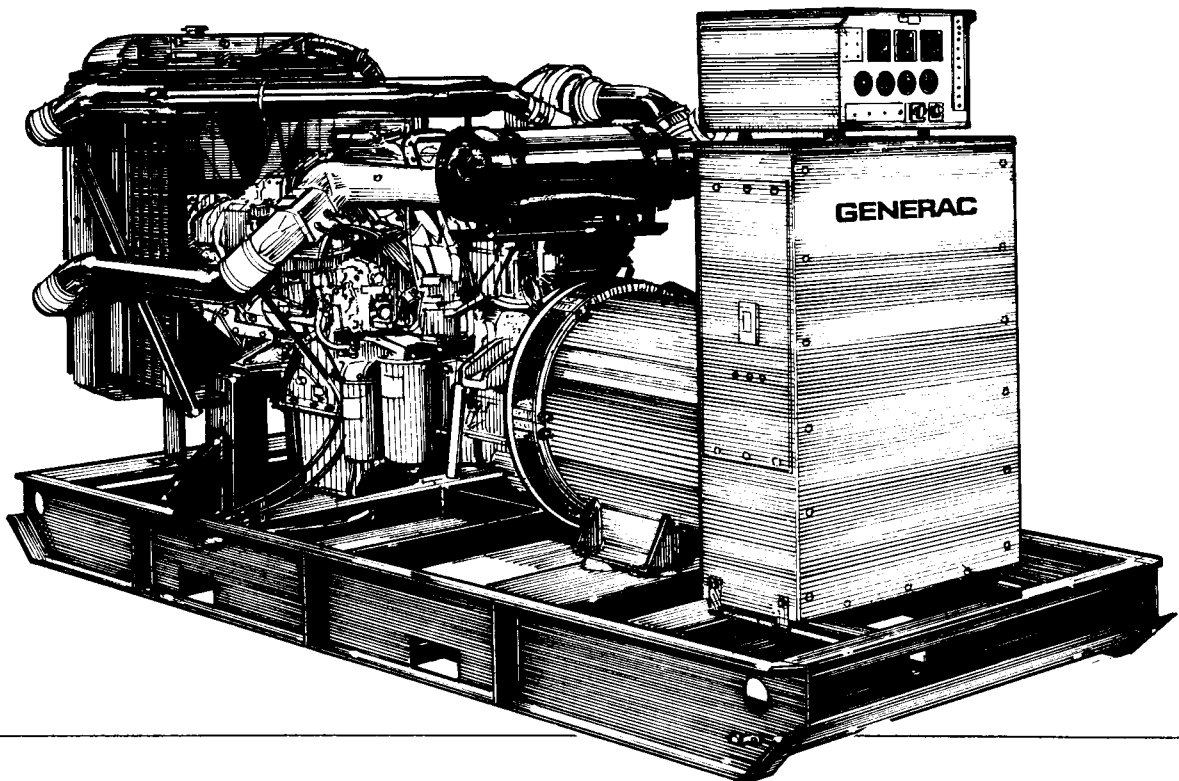
Every possible circumstance that might involve a hazard cannot be anticipated. The warnings in this Manual and on tags and decals affixed to the unit are, therefore, not all-inclusive. If you use a procedure, work method, or operating technique not specifically recommended by Generac, you must satisfy yourself that it is safe for you and others. You must also satisfy yourself that the procedure, work method, or technique you have chosen will not render the equipment unsafe or result in damage to such equipment.

- BE A SAFE OPERATOR -- BY THINKING BEFORE ACTING AND BY READING THE INSTRUCTIONS AND INFORMATION IN THIS MANUAL CAREFULLY.
- DO NOT permit anyone to operate the standby electric system without proper instruction.

- Installing a standby electric system is not a "do it yourself" project. Only qualified installation contractors or electricians who are familiar with applicable codes, standards, regulations and procedures should install the system. Improper or unauthorized installation, operation or service of this equipment is extremely hazardous and may result in serious personal injury or death.
- When using this equipment, comply with regulations the National Electric Code (NEC) and the Occupational Safety and Health Administration (OSHA) established.
- This equipment supplies extremely high and dangerous power voltages. Any contact with high electrically "hot" components will result in extremely hazardous, and possibly LETHAL, electrical shock. Use care to avoid contact with live terminals, bare connectors, bare wires, etc.
- Never handle any kind of electrical device while standing in water, while barefoot, or while hands or feet are wet. Dangerous electrical shock will result.
- Do not wear any kind of jewelry (such as rings, watches, bracelets, etc.) while operating this equipment. Jewelry conducts electricity which can cause dangerous electrical shock.

- Keep the area clean and uncluttered. Remove all materials that might become a fire hazard. Remove all slippery materials such as grease, oil, snow, water, or ice.
- Repair or replace all damaged or defective parts immediately. Never operate the generator with damaged or defective parts.
- When replacing parts, always use factory approved parts.
- When this generator is installed along with an automatic transfer switch, its engine can crank and start at any time without warning. To prevent possible injuries that might be caused by such a sudden startup, disable the generator's automatic start circuit before working on or around the unit. Refer to "Operation" section for procedures on disabling the automatic start circuit. After the circuit is disabled, place a "Do Not Operate" tag on the generator control console and on the transfer switch.
- Installing this standby generator must be done in strict compliance with applicable codes, standards and regulations. Following installation, nothing must be done that might render the unit in non-compliance with such codes, standards, and regulations.
- While diesel fuels are safer than gaseous fuels, the diesel fuels are still combustible. Comply with all laws governing the storage and handling of diesel fuels. Inspect frequently for fuel leakage and correct any leakage immediately.
- The generator engine consumes oxygen and gives off DEADLY carbon monoxide gas through its exhaust system. This dangerous gas, if breathed in sufficient concentrations, can cause unconsciousness or even death. The danger of carbon monoxide poisoning is greatly reduced when the generator is installed outdoors in a well-ventilated area. If the generator is installed inside a structure or in a room of a structure, exhaust gases must be piped safely away from such a structure and to an area where they will not endanger people or animals.
- The frame and external electrically conductive parts of this equipment must be properly connected to an approved earth ground in accordance with applicable code. Your generator should have been properly grounded during installation. Never disconnect the ground wire.
- Keep a fire extinguisher on hand near this equipment and know how to use it. Inspect the fire extinguisher and have it serviced according to manufacturer's recommendations. DO NOT use any carbon tetrachloride fire extinguisher -- its fumes are toxic and the liquid can help deteriorate wiring insulation.

A Typical Generator



OPERATION AND MAINTENANCE

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

Proper maintenance and care of your standby generator keeps the number of problems and overall operating expenses at a minimum. See your authorized Generac dealer for service aids and accessories.

Operating instructions presented in this Manual assume that the standby electric system has already been installed by a competent, qualified contractor. Installation of this equipment is not a "do-it-yourself" project.

GENERAL INFORMATION

INTRODUCTION

This Owner's Manual was prepared especially for the purpose of familiarizing personnel with the operation and servicing of the applicable equipment.

Every effort was expended to make sure that the information and instructions in the Manual was both accurate and current at the time the Manual was written. However, the manufacturer reserves the right to change, alter or otherwise improve his product(s) at any time without prior notice.

CAUTION! Read all instructions and safety rules before attempting to install, operate or service this (and related) equipment. Protect yourself and others by strictly complying with these instructions and rules. Failure to comply with these safety rules may result in personal injury, death or damage to equipment and/or property. Retain these instructions for future reference.

EQUIPMENT DESCRIPTION

General: This equipment is a revolving field, alternating current generator set. The generator was designed to supply electrical power for the operation of compatible, critical electrical loads when the UTILITY power supply has failed or has dropped to an unacceptable level.

The generator's revolving field is directly connected to and driven by a 4.0 liter diesel-fueled engine by means of flexible discs as follows:

- Units with 4-pole Rotor are driven at at rated speed of 1800 rpm to supply a rated frequency of 60 Hz; at 1500 rpm for a frequency of 50 Hz.

Refer to the DATA PLATE on your specific generator or to the DATA CARD included with the unit for rated a-c voltage, rated wattage and amperage capacities, rated phase, etc. See "Identification Record" on Page 1 for an explanation of the way to identify your unit's features.

Standard Generator Features: This generator incorporates the following generator features:

- The unit meets temperature rise standards for Class "F" insulation as defined by NEMA MG1-22.4 and NEMA MG1-1.65. The rotor, stator and other insulation was impregnated twice with Class "F" varnish.
- The generator system incorporates "thermal overload protection."
- The generator is self-ventilated and drip-proof constructed.
- The voltage waveform deviation, total harmonic content of the a-c waveform and "telephone influence factor" have been evaluated and are acceptable according to NEMA MG1-22.
- The state of the art magnetic circuit provides minimal level of waveform distortion and electro-magnetic interference level which meets accepted requirements for standard AM radio, television and marine radio telephone applications.
- All units have passed 3-phase symmetrical short circuit test to assure system protection and reliability.

ENGINE PROTECTIVE DEVICES

The standby generator may be required to operate for long periods of time without an operator on hand to monitor such engine conditions as coolant temperature, oil pressure, or rpm. For that reason, the engine has several devices designed to protect it against potentially damaging conditions by automatically shutting the unit down when the oil pressure is too low, the coolant temperature is too high, or the engine is running too fast.

Refer to Figure 1 and Page 6 for location of engine protective switches and sensors.

NOTE: Engine protective switches and sensors are mentioned here for the reader's convenience. Also refer to the applicable control console section (Option A, B or C) for additional automatic engine shutdown information.

Low Oil Pressure Switch: This normally closed (N.C.) switch is held open by engine oil pressure during startup and operation. Should oil pressure drop below about 15 psi, the switch contacts close, automatically shutting down the engine.

High Coolant Temperature Switch: Switch is normally-open (N.O.), closes to automatically shut down the engine if engine coolant temperature should rise above about 225°F.

Low Coolant Level Sensor: Should engine coolant level drop below the level of the high coolant temperature switch, it is possible for the engine to overheat without automatic shutdown. To prevent such overheating without automatic shutdown, the engine has a low coolant level sensor. If the level of engine coolant drops low, the engine automatically shuts down.

Overspeed: A solid state d-c control/latch-crank circuit board is housed inside the generator control console. That circuit board controls engine cranking, startup, operation and shutdown. Engine speed signals are delivered to the circuit board whenever the unit is running. Should the engine overspeed above a safe, pre-set value, the circuit board initiates an automatic engine shutdown.

RPM Sensor Loss Shutdown: Option C units only use an rpm sensor to deliver engine speed signals to the d-c control/latch-crank circuit board in the control console. engine.

NOTE: Units with Options A and B control consoles sense engine speed by monitoring a-c output frequency from the generator stator leads.

FUEL CONSUMPTION

60 HZ UNITS (max.)

		25%	50%	75%	100%
Gal./Hour	40 kW	1.0	1.8	2.6	3.4
	50 kW	1.2	2.2	3.2	4.2
	60 kW	1.4	2.6	3.8	5.0
	75 kW	1.6	3.1	4.6	6.2

50 HZ UNITS (max.):

		25%	50%	75%	100%
Gal./Hour	40 kW	0.8	1.5	2.1	2.8
	50 kW	1.0	1.8	2.6	3.4
	60 kW	1.2	2.1	3.1	4.0
	75 kW	1.4	2.6	3.8	5.1

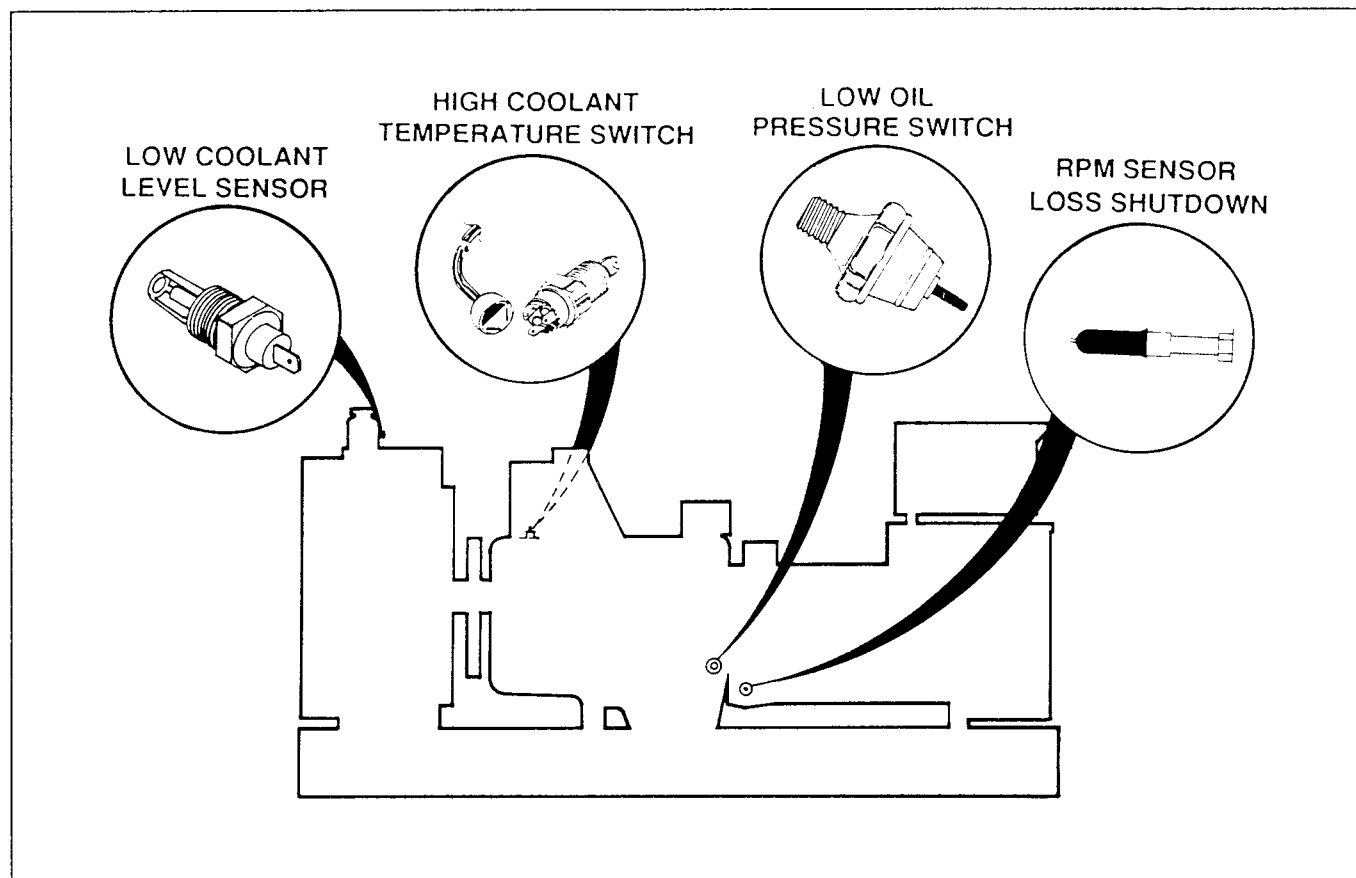


Figure 1. Engine Protective Devices

GENERATOR SPECIFICATIONS

Refer to the DATA PLATE on your particular generator for rated watts (kW), rated maximum amperes, rated a-c frequency, rated voltage, rated phase and other pertinent information.

Also refer to "Identification Record" on Page 1 for information on determining unit specifications.

ENGINE SPECIFICATIONS

General:

Cylinders and Arrangement..... 4, in-line
Displacement..... 4.0 Liter (244 inches³)
Bore..... 4.1 inches (104mm)
Stroke..... 4.6 inches (118mm)
Compression Ratio..... 17.9 to 1
No. of Main Bearings..... 5
Governed Engine Speed..... See DATA PLATE
Brake Mean Effective Pressure. 115
Type of Valve Lifters..... Solid

Engine Lubrication System

Type of Oil Pump..... Gear
Oil Filter Full Flow, Cartridge
Crankcase Oil Capacity..... 2.77 U.S. gallons
Automatic Low Oil Pressure
Shutdown Standard

Cooling System

Type Pressurized, Closed Recovery
Coolant Capacity 16 U.S. quarts (17 liters)
Coolant Flow Per Minute
At 1800 rpm..... 75 qts. (80 liters)
At 1500 rpm..... 79 qts. (75 liters)
Heat Rejection to Coolant 250,000 Btu/hour
Cooling Fan Pusher type
High Temperature Shutdown Standard
Low Coolant Level Shutdown.... Standard
Cooling Air Flow Required
60 Hertz Units 4500 feet³/minute
50 Hertz Units 3800 feet³/minute

Exhaust System

Exhaust Flow at Rated Output

At 1800 rpm 550 cu. ft. per minute
Exhaust Outlet Size 2.5-inch NPT
Exhaust Temperature at Rated Output
60 Hertz Units 980°F (504°C)
50 Hertz Units 890°F (454°C)

Engine Electrical System

D-C Alternator Output 20 amps at 27.4 volts
Starter Motor 24 volts d-c
Recommended Battery two 12 volt, 90 A.H.. 24BCI
Ground Polarity Negative (-)

RECOMMENDED FLUIDS

Engine Oil: Use a high quality detergent oil classified "For Service CC, SD, SE or SF." Detergent oils keep the engine cleaner and reduce carbon deposits. Use oil having the following SAE viscosity rating, based on the ambient temperature range anticipated before the next oil change:

Temperature	Oil Grade (recommended)
Above 80°F	SAE 30
30°-80°F	SAE 20W-20
Below 32°F	SAE 10W

Coolant: Use a mixture of half low silicate, ethylene glycol base anti-freeze and half soft water. Cooling system capacity is about 16 U.S. quarts (17 liters). Use only soft water and only low silicate anti-freeze. If you want, add a high quality rust inhibitor to the recommended coolant mixture. When adding coolant, always add the recommended 50-50 mixture.

CAUTION! Do not use any chromate base rust inhibitor with ethylene glycol base anti-freeze or else chromium hydroxide ("green slime") forms and causes overheating. Engines that have been operated with chromate base rust inhibitor must be chemically cleaned before you can add ethylene glycol base anti-freeze. Using any high silicate anti-freeze boosters or additives will also cause overheating. We also recommend that you DO NOT use any soluble oil inhibitor for this equipment.

GENERATOR A-C LEAD CONNECTIONS

GENERAL

See "Voltage Codes" on Page 1. Your generator may be rated at any one of several voltages, either single or 3-phase. Connect electrical wires in the unit's a-c connection (lower) panel according to the appropriate connection diagram. Refer to wiring diagram at back of this manual and use the one appropriate for the number of leads and the voltage phase required.

Voltage codes apply to the type of stator assembly installed on a particular generator.

TYPES OF STATOR WINDINGS

3-Wire, 1-Phase: Three wire generators are dual voltage coils or windings (Figure 2). These units are assigned the following voltage codes:

- Voltage Code "A" units are rated 120/240 volts, 1-phase, 60 Hz.
- Voltage Code "M" units are rated 120/240 volts, 1-phase, 50 Hz.

Each stator winding in this case delivers 110 or 120 volts a-c output; connecting the two windings series results in a 220 or 240 volts a-c output.

The neutral line is formed by a junction of stator leads 22 and 33. Thus, you may connect 120 volts (60 Hz) or 110 volts (50 Hz) loads across leads 11 and neutral; or across leads 44 and neutral.

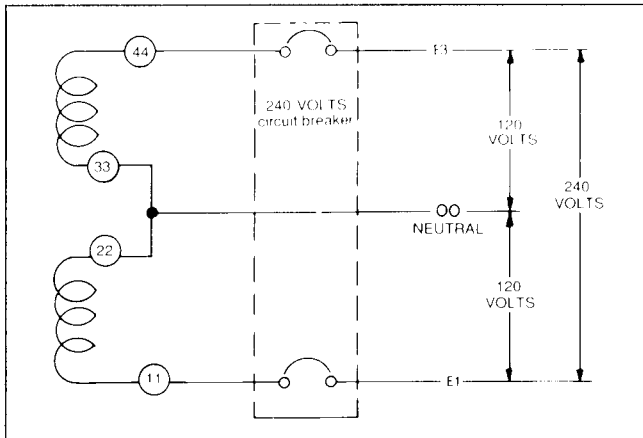


Figure 2. 3-Wire, 1-Phase Stator Leads

12 Lead, High Wye Stator: This type of stator winding forms a 12 lead configuration and has six coils or windings (Figure 3). Units may be assigned any of the following voltage codes:

- Voltage Code "H" units are rated 240/416 volts, 3-phase, 60 Hz.
- Voltage Code "K" units are rated 277/480 volts, 3-phase, 60 Hz.

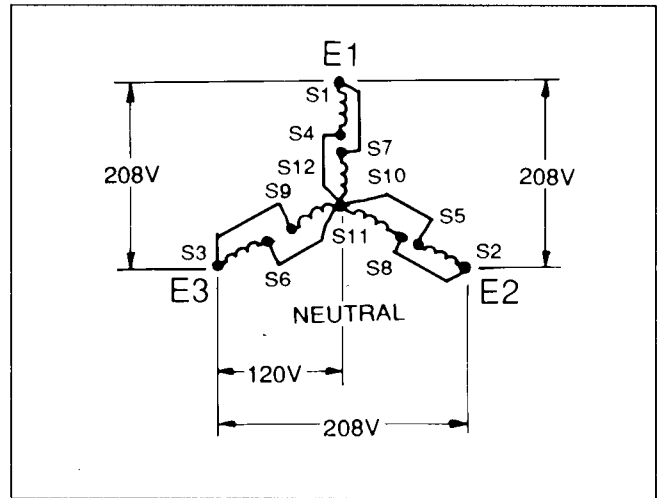


Figure 3. 12-Wire High Wye Stator

- Voltage Code "O" units are rated 240/416 volts, 3-phase, 50 Hz.

NOTE: Different voltage ratings are available from the same stator configuration by adjusting the voltage regulator.

12 Lead Low Wye Stator: Stator has six coils and 12 leads (Figure 4), may supply the following rated voltages:

- Voltage Code "G" units are rated 120/208 volts, 3-phase, 60 Hz.
- By adjustments of the voltage regulator, unit may supply 139/240 volts, 3-phase, 60 Hz.

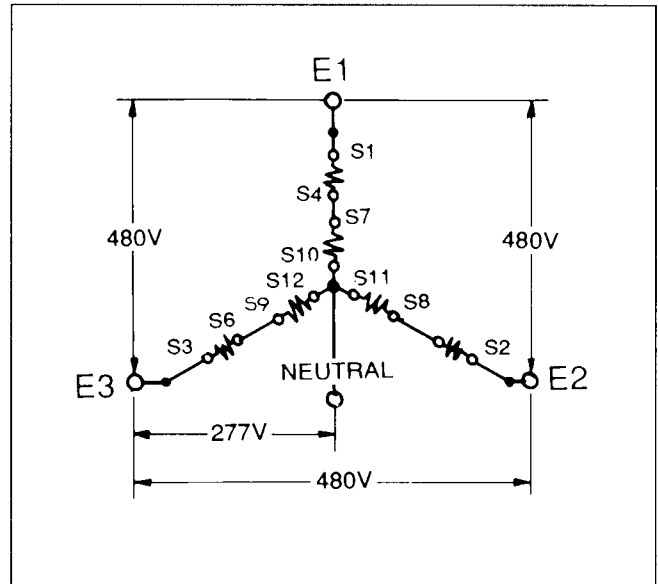


Figure 4. 12 Lead Low Wye Stator

12-Lead High Delta Stator: This stator has six coils and 12 leads (Figure 5), can supply any one of the following rated voltages:

- Voltage Code "J" units are rated 120/240 volts, 3-phase, 60 Hz.
- Voltage Code "P" units are rated 120/240 volts, 3-phase, 50 Hz.

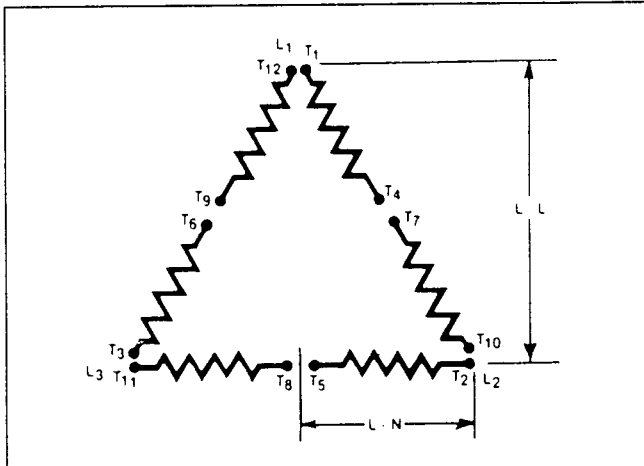


Figure 5. 12 Lead High Delta Stator

12 Lead Zigzag Stator: Stator has six coils connected in "zigzag" fashion (Figure 10), to deliver 120/240 volts, 3-phase, 60 Hz a-c output.

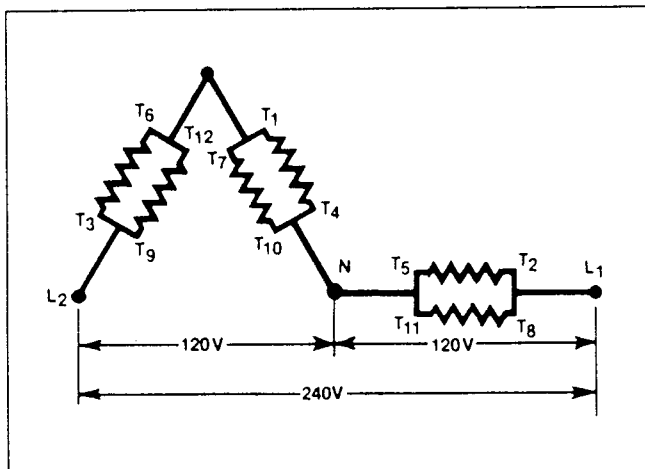


Figure 6. 12-Lead Zigzag Stator

OPTIONAL VOLTAGE CHANGEOVER BOARDS

Some generator models may be equipped with an optional voltage changeover board. Such boards are used along with 3-phase, 12-wire, reconnectable stators to permit easier changeover to different rated voltages. The board assembly consists of a "stud board", with the 12 stator leads connected to studs on the board; and a "strapping board". The strapping board can be bolted over the stud board to provide a specific rated voltage selection.

Stud Board: A typical optional stud board is shown in Figure 7. The 12 stator leads are connected to studs on the board as indicated. That is, numbers adjacent to each stud indicates the stator lead number that attaches to that stud. The stud board also mounts three switches, indicated by S1, S2 and S3. You can effectively reconnect stator leads to deliver a specific output voltage by physically repositioning the strapping board over the stud board. Repositioning the strapping board reconnects the studs (and the stator leads), and actuates the switches.

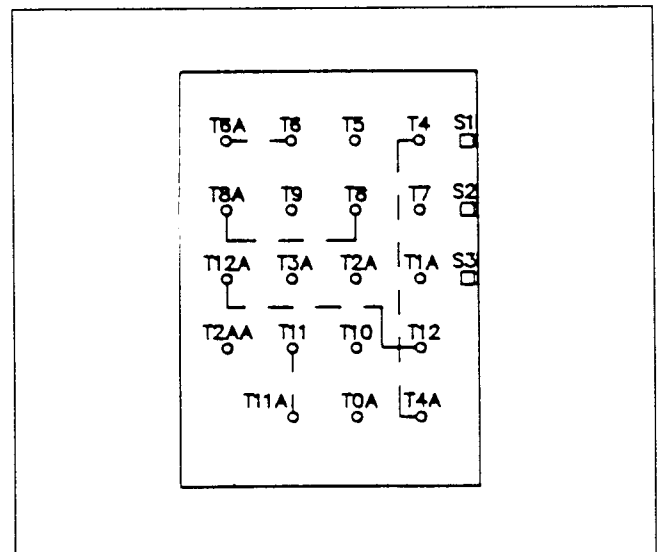


Figure 7. Typical Stud Board

Strapping Boards: Any of several different strapping boards are available as follows:

- High Wye strapping board
- Low Wye strapping board
- High Delta strapping board
- Zigzag strapping board

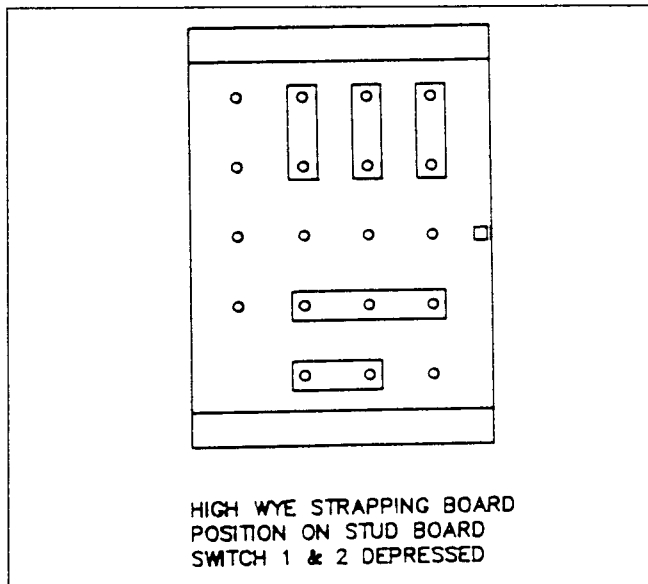


Figure 8. High Wye Strapping Board

High Wye Strapping Board: When a high wye strapping board is installed over the stud board, switches S1 and S2 will be actuated. A 277/480 volts, 3-phase, 3 or 4-wire system results (Figure 8).

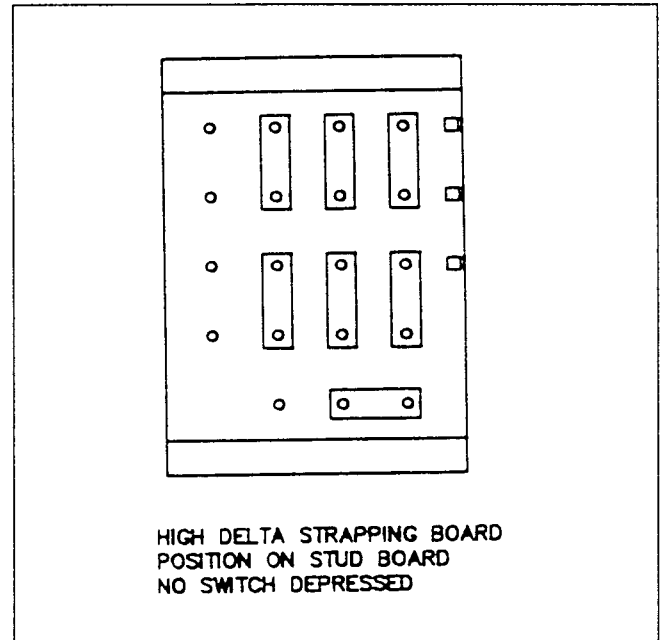


Figure 10. High Delta Strapping Board

High Delta Strapping Board: Installing this board over the stud board, presses no switch, resulting in a 120/240 volts, 3-phase, 3 or 4-wire a-c output (Figure 10).

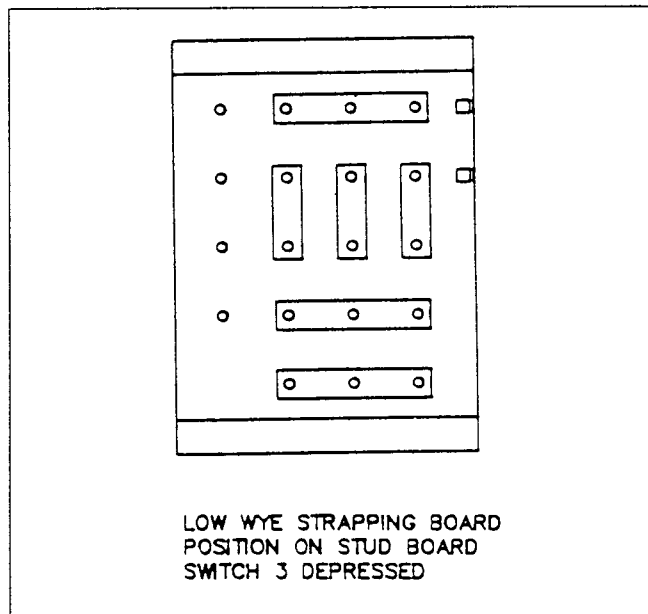


Figure 9. Low Wye Strapping Board

Low Wye Strapping Board: Installing this board over the stud board (Figure 9) actuates Switch 3, giving the generator 120/208 volts, 3-phase, 3 or 4-wire a-c output.

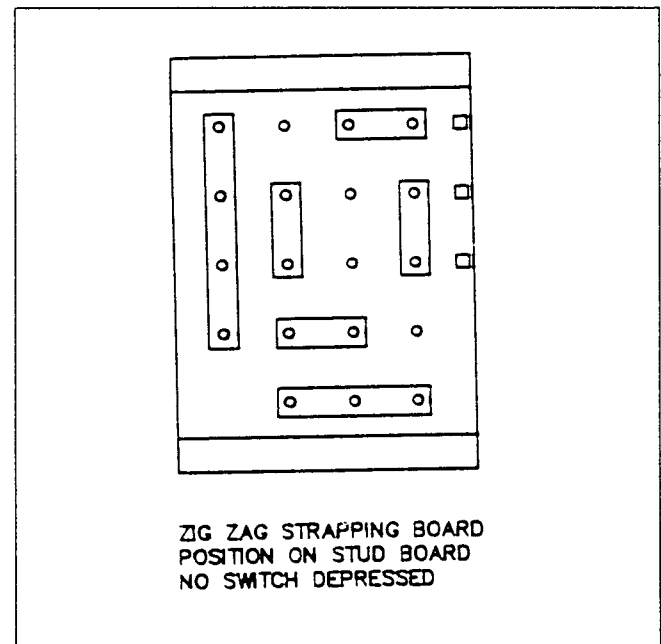


Figure 11. Zigzag Strapping Board

Zigzag Strapping Board: Depresses none of the switches, causing a 120/240 volts, 1-phase, 2 or 3-wire a-c output (Figure 11).

OPTIONAL VOLTAGE SELECTOR SWITCHES

Some generators may have on optional two or three-position switch, for easy selection of the desired voltage and phase. A typical 2-position switch is shown in Figure 12. The switch allows you to select either (a) 120/240 volts, 1-phase or (b) 120/208 volts, 3-phase output.

Figure 13 illustrates a typical 3-position voltage selector switch. The switch permits you to select (a) 120/240 volts, 1-phase, (b) 120/208 volts, 3-phase, or (c) 277/480 volts, 3-phase.

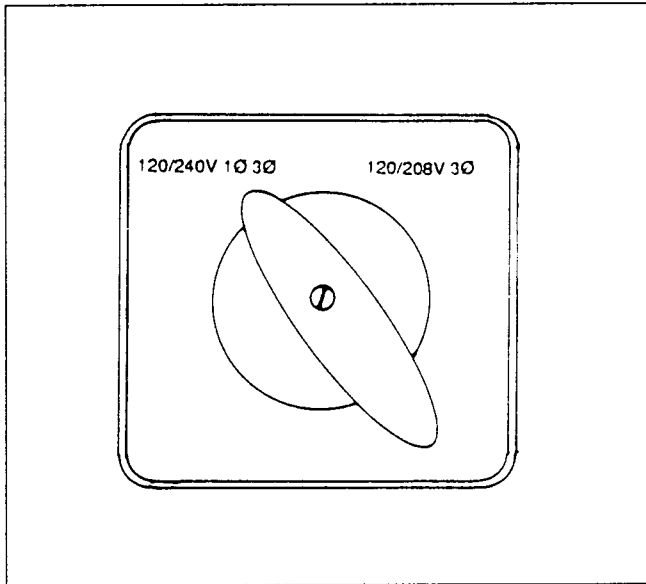


Figure 12. Typical 2-Position Switch

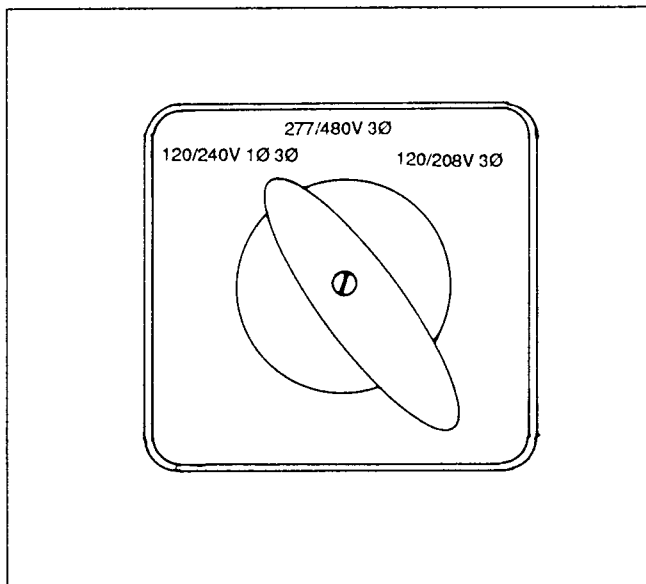


Figure 13. Typical 3-Position Switch

OPTIONAL VOLTAGE-PHASE RECONNECTION SWITCHES

This type of switch allows you to select two different voltage and phase configurations. The switch arrangement shown in Figure 14 permits the selection of either (a) 120/240 volts, 1-phase, or (b) 120/208 volts, 3-phase.

The voltage-phase reconnection switch shown actually consists of two groups of switches and circuit breakers. The group at left consists of two reconnection switches and two circuit breakers (120/240 volts group). The group at right consists of two reconnection switches and three circuit breakers. A mechanical interlock provides the following functions:

- Prevents the independent acutating of any single switch in a group.
- Prevents both the 1-phase and 3-phase groups from being set to ON at the same time.

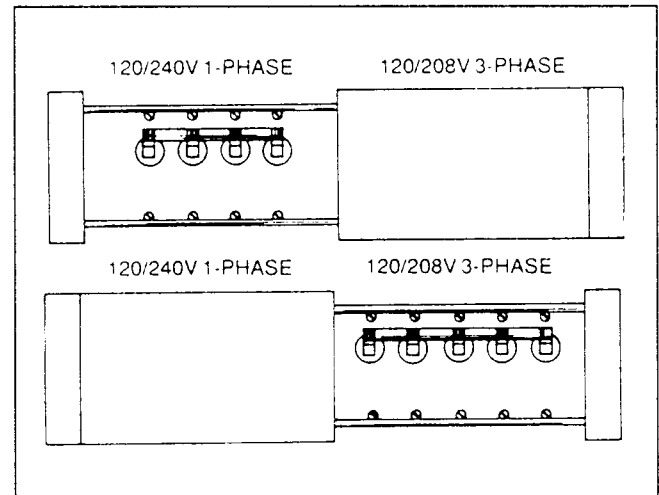


Figure 14. Typical Voltage-Phase Reconnection Switch

INSTALLATION



DANGER! INSTALLING AND INTERCONNECTING A STANDBY ELECTRIC POWER SYSTEM IS NOT A "DO-IT-YOURSELF" PROJECT. SUCH INSTALLATIONS MUST BE DONE IN STRICT COMPLIANCE WITH APPLICABLE ELECTRICAL, BUILDING AND SAFETY CODES. HAVE AN EXPERIENCED CONTRACTOR OR ELECTRICIAN INSTALL YOUR SYSTEM. IMPROPER OR INCORRECT INSTALLATION OF THIS EQUIPMENT MAY RESULT IN DEATH, SERIOUS INJURY OR DAMAGE TO EQUIPMENT AND/OR PROPERTY.

INSTALLATION MANUAL

You can order "Installation Manual for Standby Electric Systems" from Generac Corporation. To order, specify Manual Part No. 46622. The latest version of the installation manual at the time this Owner's Manual was written was Revision 8.

STANDARDS INDEX

- The 1990 National Electric Code, available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02169.
- NFPA No. 37, STATIONARY COMBUSTION ENGINES AND GAS TURBINES, available from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210
- NFPA No. 76A, ESSENTIAL ELECTRICAL SYSTEMS FOR HEALTH CARE FACILITIES, obtainable same as No. 37.
- Article X, NATIONAL BUILDING CODE, obtainable from the American Insurance Association, 85 John Street, New York, N.Y. 10038
- ASAE EP-364, INSTALLATION AND MAINTENANCE OF FARM STANDBY ELECTRICAL SYSTEMS, available from American Society of Agriculture Engineers, 2950 Niles Road, St. Joseph, MI 49085.
- A52.1, AMERICAN NATIONAL STANDARD FOR CHIMNEYS, FIREPLACES AND VENTING SYSTEMS, obtainable from the American National Standard Institute, 1430 Broadway, New York, N.Y. 10018.
- NFPA No. 220, STANDARD TYPES OF BUILDING CONSTRUCTION, available same as No. 37.
- NFPA No. 68, GUIDE FOR EXPLOSION VENTING, available same as No. 37.
- NFPA No. 30 (1987 edition), FLAMMABLE AND COMBUSTIBLE LIQUIDS CODE, available same as No. 37.
- AGRICULTURAL WIRING HANDBOOK, available from the Food and Energy Council, 909 University Avenue, Columbia, MO 65201.
- NFPA No. 10, INSTALLATION, MAINTENANCE AND USE OF PORTABLE FIRE EXTINGUISHERS, available same as No. 37.

SIMPLE STANDBY SYSTEM

Figure 15 is a schematic representation of a simple standby electric system. The transfer switch serves to isolate the utility and standby power supplies from each other.

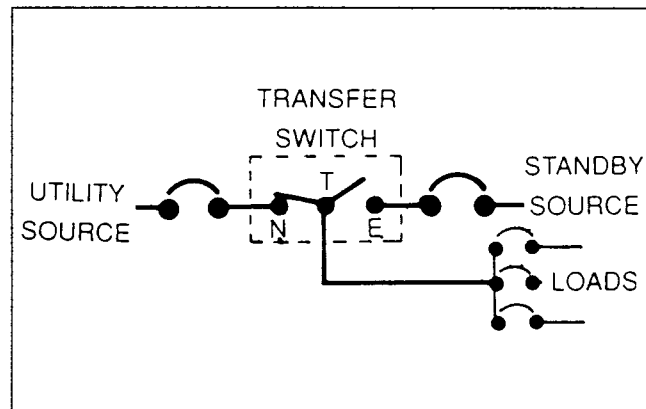


Figure 15. Simple Standby Electric System

EMERGENCY CIRCUIT ISOLATION METHOD

Prevent overloading the generator by keeping electrical loads below the wattage/amperage capacity. If the generator is powering only critical loads, within the wattage/amperage capacity, during utility power outages, you might consider using the emergency circuit isolation method (Figure 16 on Page 13).

Critical electrical loads are grouped together and wired into separate "Emergency distribution panel". Load circuits powered by that panel are within the wattage/amperage capacity of the generator set. When this method is used, it is difficult to overload the generator. The transfer switch must meet the following requirements:

- It must have an ampere rating equal to the total amperage rating of the emergency distribution panel circuit.
- Have it installed between the building's main distribution panel and the emergency distribution panel.

TOTAL CIRCUIT ISOLATION METHOD

When a generator capable of powering all electrical loads in the circuit is to be installed, you may use the "total circuit isolation method" (Figure 17 on Page 13). It is possible for the generator to be overloaded when this isolation method is employed. The following apply to the transfer switch in this type of system:

- Ampere rating of the transfer switch must equal the ampere rating of the normal incoming utility service.
- The transfer switch is installed between the utility service entrance and the building distribution panel.

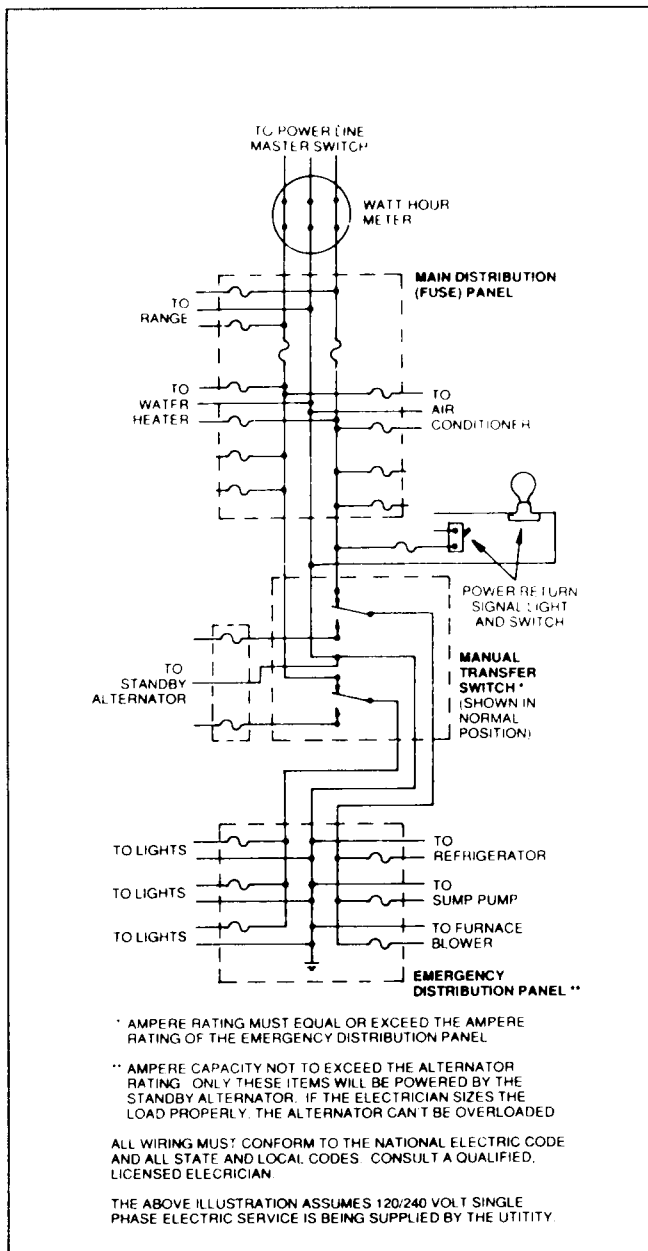


Figure 16. Emergency Circuit Isolation Method

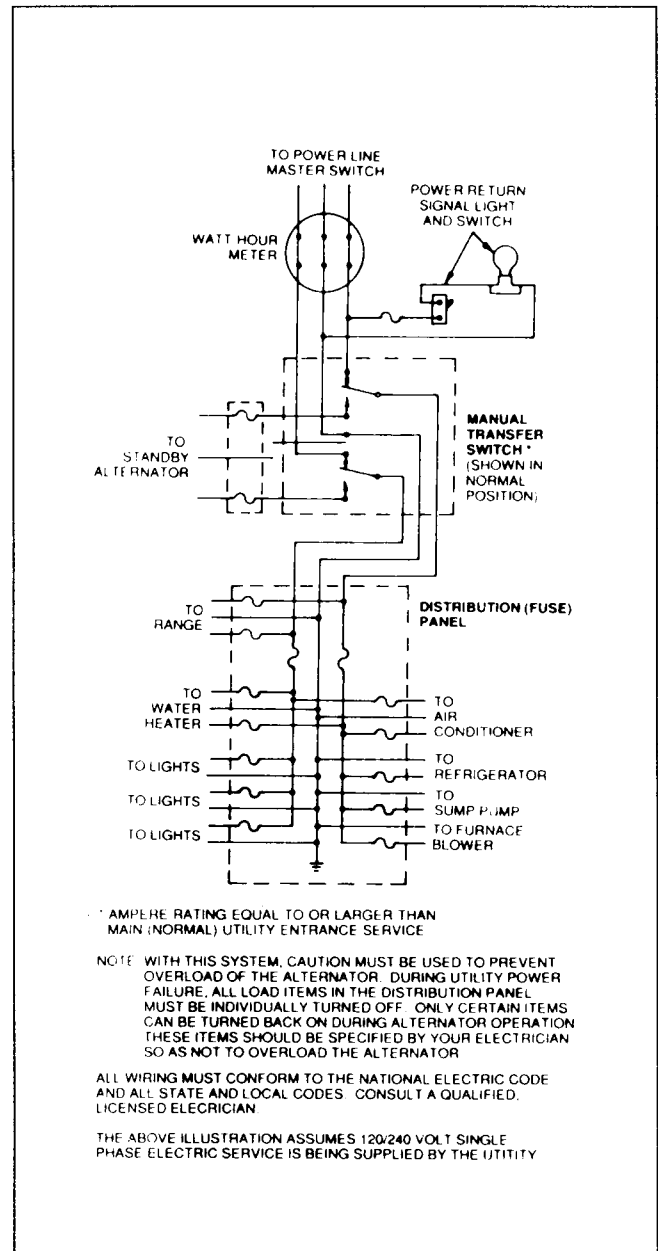


Figure 17. Total Circuit Isolation Method

DANGER! THE GENERATOR REQUIRES AN ADEQUATE FLOW OF COOLING AND VENTILATING AIR, AS WELL AS SUFFICIENT AIR FOR ENGINE COMBUSTION. WITHOUT SUFFICIENT AIR FLOW, THE GENERATOR CAN OVERHEAT AND CAUSE AN EXPLOSION OR FIRE, OR BE SERIOUSLY DAMAGED. THE INSTALLER MUST PROVIDE FOR (A) SUFFICIENT AIR FLOW, (B) SAFE AND EFFICIENT DELIVERY OF FUEL TO THE ENGINE, AND (C) SAFE INSTALLATION OF ENGINE EXHAUST SYSTEM. FOLLOWING INSTALLATION, NOTHING MUST BE DONE THAT MIGHT RENDER THE INSTALLATION UNSAFE OR IN NON-COMPLIANCE WITH APPLICABLE CODES, STANDARDS AND REGULATIONS.

GENERAC ASSUMES THAT THE STANDBY ELECTRIC SYSTEM HAS BEEN PROPERLY AND SAFELY INSTALLED IN ACCORDANCE WITH RECOMMENDATIONS OF GENERAC, AND WITH APPLICABLE CODES, STANDARDS AND REGULATIONS ISSUED BY COGNIZANT AUTHORITY

PREPARATION BEFORE USE

CAUTION: Prior to initially starting the generator, you must properly prepare it for use. Any attempt to crank or start the engine before it has been properly serviced with the recommended oil will result in an engine failure. Also, engine coolant level must be checked and replenished if necessary.

TRANSFER SWITCH

If this generator is to be used to supply electrical power to any electrical system normally powered by an electrical system normally powered by an electric utility, electric code requires using a double pole, double throw transfer switch. The transfer switch prevents electrical feedback between two different electrical systems.

A complete line of automatic transfer switches is available from Generac to use with units with Option A, B, C and P control consoles.

OPTIONAL STARTING AIDS

Your standby generator may be equipped with one or more optional starting aids (Figure 18), which serve to provide quicker, easier engine starts under varying climatic conditions. The generator may mount (a) an engine coolant heater, (b) engine oil heater, (c) battery charger, or (d) a battery heater. These aids are powered by a NORMAL (utility) power source circuit during non-operating periods.

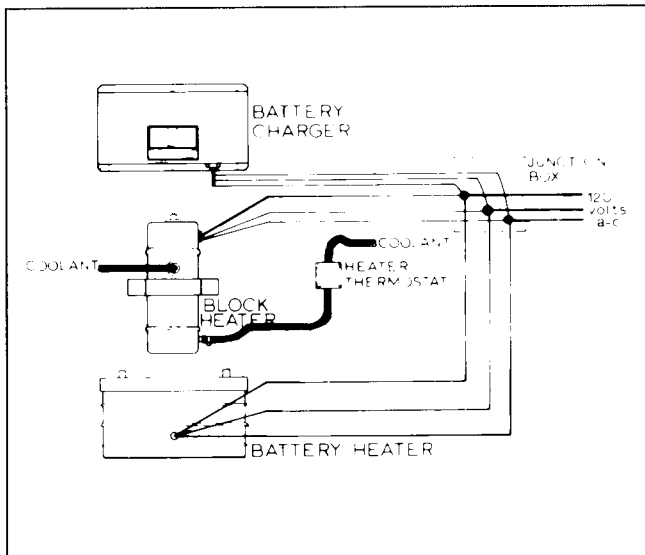


Figure 18. Optional Starting Aids

CHECKING ENGINE FLUIDS

Before beginning operation of the standby generator, make sure to check the engine for proper lubrication, coolant and fuel levels.

Engine Lubrication: Check engine crankcase oil level before operating and add oil to the proper level. Maintain oil level at dipstick "FULL" mark. Never operate the engine with oil level below the dipstick "ADD" mark. See PERIODIC MAINTENANCE section for recommendations.

Gearbox Lubrication (if so equipped): If your generator is equipped with a GEARBOX, check oil level prior to initial use and at the intervals recommended in the PERIODIC MAINTENANCE section. Recommended oil is SAE 90 GEARLUBE. Refer to "Maintenance" section for oil check and fill procedures.

Engine Coolant: Check engine coolant level and add the recommended coolant mixture as required. Refer to PERIODIC MAINTENANCE section.

Fuel: Fill the 30-gallon base-mounted fuel tank with the correct recommended diesel engine fuel. See PERIODIC MAINTENANCE section.

Bleed the Fuel System: If the unit has been idle for a long period of time or if fuel lines or fuel system components have been removed and re-installed, the fuel system may require bleeding to remove air from the system. Air in the fuel system causes hard starting and rough engine operation. All fuel system lines must be installed and must be tight. A loose line may show no sign of leakage, but may draw air into the system.

CAUTION! You will spill fuel during bleeding. Use a suitable container to catch fuel during the bleeding process. Clean up all spilled fuel after bleeding.

Check Fan Belt Tension: Check engine fan belt tension prior to placing the unit into service and periodically thereafter. Belt tension is correct when a force of about 22 pounds (10 kg), applied midway between pulleys, deflects the belt about 3/8 to 5/8-inch (0.94 to 1.57 cm).

Pre-Oil Turbocharger (if so equipped): Before you first operate the generator, or if it has not been operated for more than 30 days, pre-oil the turbocharger. Disconnect the turbocharger oil inlet line (Figure 19) and use an oil can to inject engine oil into the turbocharger inlet port. Use the same type and grade of oil that was used in the engine crankcase. When finished, install and tighten the oil inlet line.

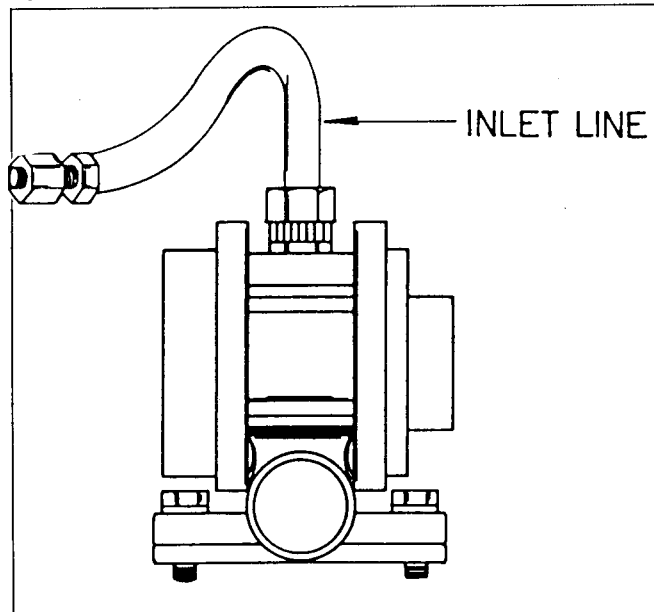


Figure 19. Turbocharger Oil Inlet Line (typical)

GROUNDING THE GENERATOR

The National Electrical Code requires the frame and external electrically conductive parts of this equipment must be properly connected to an approved earth ground. For that purpose, a GROUND LUG (Figure 20) is provided on the generator mounting base. Consult a qualified electrician for grounding requirements in your area. **DO NOT CONNECT THE GROUND WIRE TO ANY PIPE THAT CARRIES A FLAMMABLE OR EXPLOSIVE SUBSTANCE -- FIRE OR AN EXPLOSION MIGHT RESULT.**

Proper grounding helps protect personnel against electrical shock in the event of a ground fault condition in the generator or in connected electrical devices. In addition, grounding helps dissipate static electricity that often builds up in ungrounded devices.

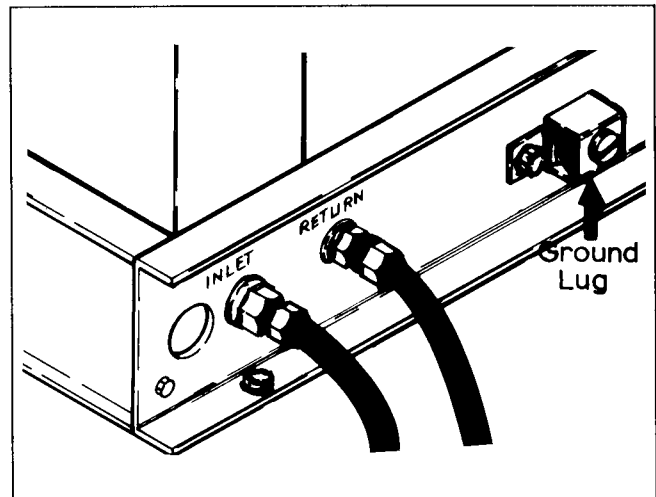


Figure 20. Generator Grounding Lug (typical)

GENERATOR A-C NEUTRAL CONNECTIONS

GENERAC standby generators use an **UNGROUND**ED a-c neutral. Grounding is recommended only at the main service entrance. If the neutral wire is grounded and one of the phase loads becomes grounded, the excessive current opens the load circuit breaker or collapses the generator field. The actual result depends on the electrical characteristics of the particular installed generator.

BATTERY INSTALLATION

⚠ DANGER! STANDBY GENERATORS INSTALLED WITH AN AUTOMATIC TRANSFER SWITCH WILL CRANK AND START AUTOMATICALLY WHEN NORMAL (utility) SOURCE VOLTAGE IS BELOW AN ACCEPTABLE PRESET LEVEL. TO PREVENT SUCH AUTOMATIC STARTUP AND POSSIBLE INJURY TO PERSONNEL, DO NOT CONNECT BATTERY CABLES UNTIL CERTAIN THAT NORMAL SOURCE VOLTAGE AT THE TRANSFER SWITCH IS CORRECT AND YOU ARE READY TO PLACE THE SYSTEM INTO OPERATION.

For recommended batteries, see **ENGINE SPECIFICATIONS**. The battery must be at 100% state-of-charge before installing the generator.

OPTIONS A AND B CONTROL CONSOLES

INTRODUCTION

Your generator may be equipped with either an Option A, Option B, Option C or Option P control console. See "Identification Record" on Page 1. Figure 21 shows the Option B console. The Option A control console is similar to the Option B console, but does not have the a-c meters (voltmeter, ammeter, frequency meter). This section discusses the Option A and Option B consoles.

CONSOLE COMPONENTS

Voltmeter: Not installed on units with Option A console. The voltmeter indicates generator a-c output voltage. Also see "Line-Phase Selector Switch" in this section, as well as "Voltage Adjust Potentiometer". To determine the nominal rated a-c voltage of your unit, refer to "Identification Record" on Page 1.

NOTE: Some generators are reconnectable to a variety of voltages. Some units may be equipped with a Voltage Changeover Board or a rotary Voltage Selector switch. Be sure to read "Generator a-c Lead Connections" on Pages 8 through 10 carefully.

Ammeter: Indicates the current draw of connected electrical loads, in amps. Not used on Option A units. Also see "Line-Phase Selector Switch". The rated maximum continuous current capacity of your generator should never be exceeded for continuous operation.

Frequency Meter: Indicates the generator's a-c output frequency in "Hertz" (cycles per second). Frequency at no-load is about 62 Hz (units rated at 60 Hz). Under full electrical load, the frequency should NEVER drop below 58 Hz (units rated at 60 Hz).

NOTE: Engine speed and frequency are proportional. Generators with 4-pole rotor supply 60 Hz at 1800 rpm. Units with 2-pole rotor deliver 60 Hz at 3600 rpm. The engine governor was factory set to 62 Hertz with no electrical loads connected to the generator (units rated at 60 Hz). Because the generator's a-c voltage regulator maintains voltage at a fixed ratio to frequency, a-c voltage will also be correspondingly high with no loads connected to the unit. For example, a 120/240 volts, 60 Hz unit will have a no-load a-c output of 124/248 volts at 62 Hz.

Coolant Temperature Gauge: Indicates engine coolant temperature. During operation, coolant temperature will normally be about 185° to 200°F (85° to 94°C).

NOTE: Actual coolant temperature obtained will vary, depending on ambient temperature, load on the engine, cooling system condition, etc. The engine automatically shuts down if coolant temperature exceeds about 225°F (107°C).

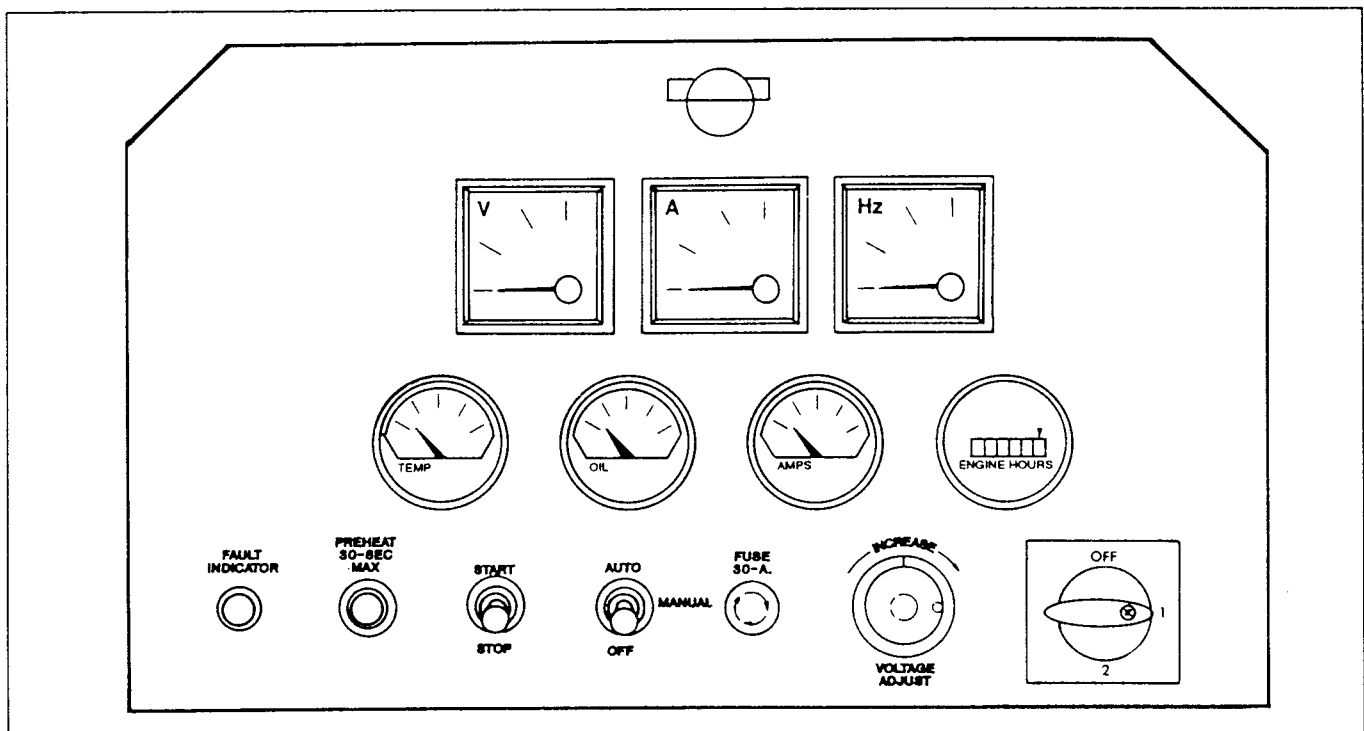


Figure 21. Typical Option "B" Control Console

Oil Pressure Gauge: Indicates oil pressure during operation. After warmup, oil pressure should be about 30-70 psi. Generac recommends that the operator record the normal oil pressure during initial start up. Sudden changes in oil pressure after first starting indicates a possible engine problem.

D-C Ammeter: The engine is equipped with a belt-driven d-c alternator which maintains battery state of charge while the unit is running. This ammeter indicates rate of charge to the battery during operation.

Immediately after startup, ammeter needle may swing to the right of zero (charging) but should drop to zero or just slightly to the right of zero within a few minutes.

If the needle drops to the left of zero, battery is discharging. Investigate and correct this problem immediately.

If the ammeter needle fluctuates, investigate and correct immediately.

Hourmeter: Provides a continuous indication of engine-generator operating time, in hours and tenths of hours. Use the hourmeter with the periodic maintenance schedule (See "Maintenance" section).

Preheat Switch: 4.0 Liter diesel engines come with GLOW PLUGS (one for each cylinder) to heat the combustion chamber air for quicker and easier starts. Prior to starting a cold engine manually, hold the PREHEAT switch for about 15 seconds. DO NOT PREHEAT FOR MORE THAN 30 SECONDS.

Fault Indicator Lamp: Lamp goes on if any one or more of the following automatic shutdown faults occurs:

- High coolant temperature (above about 225°F) or low coolant level.
- Low engine oil pressure (below 15 psi).
- Overspeed above about 74 Hz (2220 rpm).
- Overcrank during automatic startup


Start/Stop Switch: To crank and start engine, first set the Auto/Off/Manual switch to its "Manual" position. Then, hold the Start/Stop switch at "Start." When engine starts, release the switch to its center (run) position. To shut engine down, set the switch to its "Stop" position.

NOTE: See also "Auto/Off/ Manual switch.

Auto/Off/ Manual Switch: Switch must be set to "Manual" before starting with the Start/Stop switch. To prevent engine startup, set the switch to its "OFF" position.

- **AUTO Selected:** Always set switch to AUTO for automatic system operation. This means when this generator is installed along with a GTS type automatic transfer switch, the generator automatically cranks and starts when the UTILITY source voltage drops below a preset level. See "Engine Control Operation".

- **OFF Selected:** Engine cannot be started either automatically or manually. Always set switch to OFF before working on or around the engine-generator.
- **MANUAL Selected:** Engine can be cranked and started manually using the panel Start/Stop switch. Engine will not start automatically.

 **DANGER! WHEN THIS GENERATOR IS INSTALLED ALONG WITH A "GTS" TYPE AUTOMATIC TRANSFER SWITCH, THE ENGINE CAN CRANK AND START AT ANY TIME WITHOUT WARNING. TO PREVENT POSSIBLE INJURY THAT MIGHT BE CAUSED BY SUCH SUDDEN STARTUP, ALWAYS SET THE AUTO/OFF/MANUAL SWITCH TO "OFF" BEFORE WORKING ON OR AROUND THIS EQUIPMENT.**

30 Amp Fuse: Fuse protects the control console's d-c circuits against overload. If the fuse element has melted open due to an overload, engine cranking and startup will not be possible. Should fuse replacement become necessary, use only an identical 30 amp fuse.

NOTE: Some units may also be equipped with a 14 amp in-line fuse located inside the control console. When that fuse fails, the engine cannot crank or start.

Voltage Adjust Potentiometer: This potentiometer permits the operator to "fine adjust" the generator's a-c output voltage. Adjustment range is plus or minus 5%. Turn the knob clockwise to increase voltage; counterclockwise to decrease voltage.

Line-phase Selector Switch: This 4-position switch permits you to select either line-to-line or line-to-neutral readings on the panel voltmeter and ammeter. Switch positions are

ENGINE CONTROL OPERATION

General: A d-c control/latch-crank circuit board is housed inside the generator control console. This circuit board controls both automatic and manual startup and running by means of a 2-wire start/stop contact. The circuit board senses the engine is running by receiving a signal of generator a-c output voltage. The generator a-c output signals are also used by the circuit board to sense operating speed. Such operating speed signals are used to (a) provide starter cutout when cranking and (b) provide an overspeed shutdown.

Manual Cranking and Startup

- By holding the start/stop switch at START, you close the 2-wire start contact and the engine cranks.
- Starter cutout occurs when the generator a-c output reaches about 40 volts (about 1000 to 1250 rpm).

NOTE: If an engine fault (such as oil pressure or high coolant temperature) exists at the end of the 5-second delay, the engine shuts down and the Fault Indicator lamp goes On.

Automatic Operation

- For automatic operation, the Auto/Off/Manual switch must be set to AUTO and the Start/Stop switch must be at its centered (RUN) position.
- Closure of the 2-wire start contact on the d-c control/latch-crank circuit board is controlled by solid state circuits in the GTS type automatic transfer switch.

NOTE: The two-wire start circuit normally closes automatically when automatic transfer switch circuits sense that UTILITY source voltage has dropped below a preset level and remained there for a preset time delay. Refer to the manual for applicable installed transfer switch for automatic operation sequences, settings and other operating parameters.

- Engine cranks on closure of the 2-wire start/stop circuit.
- Automatic cranking is controlled by the generator's d-c control/crank-latch circuit board. Engine cranks for 5.4 seconds, rests for 5.4 seconds, then cranks again. Such crank-rest cycles will continue until the engine starts or until eight cycles have been completed.
- If engine has not started in the allotted eight crank-rest cycles, cranking is disabled and the Fault Indicator lamp goes ON (overcrank).

After Startup: When the engine has been running for five seconds or more after starter cutout, an engine fault (such as low oil pressure or high coolant temperature) causes the engine to shut down if the failure maintains longer than 2.2 seconds.

Overspeed: If the engine overspeeds, engine shuts down immediately and the Fault Indicator light comes on.

- For units rated 3600 rpm, overspeed shutdown occurs at about 69 Hertz (4140 rpm).
- For units rated 1800 rpm, overspeed shutdown occurs at about 74 Hertz (2220 rpm).

IMPORTANT: THE D-C CONTROL/LATCH-CRANK CIRCUIT BOARD CONTROLS OVERSPEED SHUTDOWN. WHEN INSTALLING A NEW CIRCUIT BOARD ON UNITS RATED 1800 RPM, CUT THE JUMPER WIRE ON THE CIRCUIT BOARD LABELED "CUT JUMPER FOR 4-POLE." DO NOT CUT THE JUMPER WIRE WHEN INSTALLING THE BOARD ON UNITS RATED 3600 RPM.

After an Engine Fault Shutdown: Starting is disabled after any fault shutdown, until you reset engine control manually.

- Reset engine control by placing the Auto/Off/Manual switch to OFF and then back to the desired (AUTO or MANUAL) starting position.

TO TEST THE FAULT INDICATOR LAMP:

- Set the Auto/Off/Manual switch to MANUAL.
- Set the Start/Stop switch to its centered (RUN) position. Lamp should go ON.

OPTION C CONTROL CONSOLE

GENERAL

The Option C control console (Figure 22) incorporates the following features:

- It provides either manual (electric) or automatic startup and shutdown.
- A 6-lamp engine monitor panel provides individual indicator lamps for annunciation of engine fault shutdowns.

CONSOLE COMPONENTS

A-C Voltmeter: Indicates generator a-c output voltage. Also see "Line-Phase Selector Switch" in this section, as well as "Voltage Adjust Potentiometer". To determine the nominal rated a-c voltage of your unit, refer to "Identification Record" on Page 1.

NOTE: Some generators are reconnectable to a variety of voltages. Some units may be equipped with a Voltage Changeover Board or a rotary Voltage Selector switch. Be sure to read "Generator a-c Lead Connections" on Pages 8 through 10 carefully.

A-C Ammeter: Indicates the current draw of connected electrical loads, in amps. Not used on Option A units. Also see "Line-Phase Selector Switch". For continuous operation, never exceed the rated maximum continuous current capacity of your generator.

Frequency Meter: Indicates the generator's a-c output frequency in "Hertz" (cycles per second). Frequency at no-load is about 62 Hz (units rated at 60 Hz). Under full electrical load, the frequency may droop to about 58-59 Hertz but should NEVER drop below 58 Hz (units rated at 60 Hz). Engine speed and frequency are proportional so that units rated 1800 rpm supply 60 Hertz at 1800 rpm.

Coolant Temperature Gauge: Indicates the engine coolant temperature. Temperature should read between 185° to 200°F (85° to 94°C). If coolant temperature exceeds 225°F, the engine shuts down automatically.

NOTE: Actual coolant temperature reading may vary due to such variables as ambient temperature, applied load or cooling system condition.

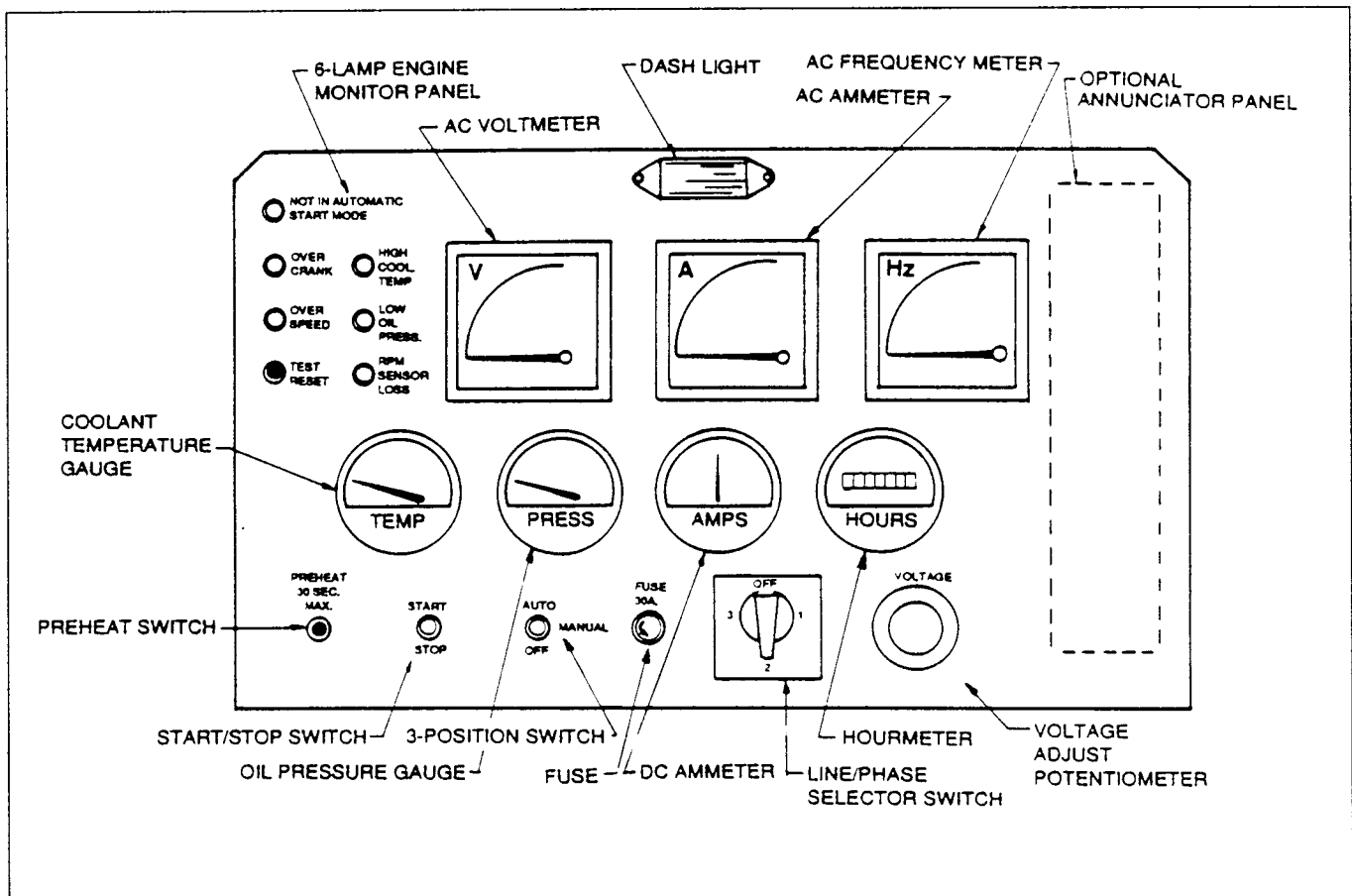


Figure 22. The Option C Control Console

Oil Pressure Gauge: Indicates oil pressure during operation. After warm up, oil pressure should be about 30-70 psi. Generac recommends that the operator record the normal oil pressure during initial start up. Sudden changes in oil pressure after first starting indicates a possible engine problem.

NOTE: Engine oil pressure may vary depending on oil viscosity, oil temperature, engine speed, ambient temperature, etc. The engine automatically shuts down if oil pressure drops below 15 psi.

D-C Ammeter: The engine is equipped with a belt-driven d-c alternator which charges the battery while the unit is running. This ammeter indicates rate of charge to the battery during operation. If the needle drops to the left of zero, battery is discharging. Investigate and correct this problem immediately. Erratic movement of the needle should also be corrected immediately.

Hourmeter: Provides a continuous indication of engine-generator operating time, in hours and tenths of hours. Use the hourmeter with the periodic maintenance schedule (See "Maintenance" section).

Preheat Switch: 4.0 Liter diesel engines come with GLOW PLUGS (one for each cylinder) to heat the combustion chamber air for quicker and easier starts. Prior to starting a cold engine manually, hold the PREHEAT switch for about 15 seconds. **DO NOT PREHEAT FOR MORE THAN 30 SECONDS.**

Start/Stop Switch: Use this switch to crank and start the engine manually, or shut down an operating engine.

- To crank and start engine, first set the Auto/Off/Manual switch to its "Manual" position.
- Hold the Start/Stop switch at "Start." When engine starts, release the switch to its center (run) position.
- To shut engine down, set the switch to its "Stop" position.

Auto/Off/ Manual Switch: This safety switch should be used to prevent automatic startup of the engine when working on the engine-generator. Use the switch as follows:

- **AUTO Position:** Always set switch to AUTO for automatic system operation. This means when this generator is installed along with a GTS type automatic transfer switch, the generator automatically cranks and starts when the UTILITY source voltage drops below a preset level. See "Engine Control Operation".
- **OFF Position:** Engine cannot be started either automatically or manually. Always set switch to OFF before working on or around the engine-generator.
- **MANUAL Position:** Engine can be cranked and started manually using the panel Start/Stop switch. Engine will not start automatically.

NOTE: Also see "Engine Monitor Panel." With switch set to OFF or MANUAL, a "Not in Automatic Start Mode" lamp lights up on the panel.

30 Amp Fuse: Fuse protects the control console's d-c circuits against overload. If the fuse element melts open due to an overload, engine cranking and startup will not be possible. Should fuse replacement become necessary, use only an identical 30 amp fuse.

NOTE: Some units may also be equipped with a 14 amp in-line fuse located inside the control console. When that fuse fails, the engine cannot crank or start.

Voltage Adjust Potentiometer: This potentiometer permits the operator to "fine adjust" the generator's a-c output voltage. Adjustment range is plus or minus 5%. Turn the knob clockwise to increase voltage; counterclockwise to decrease voltage.

Line-phase Selector Switch: This 4-position switch permits you to select either line-to-line or line-to-neutral readings on the panel voltmeter and ammeter. Switch positions are as follows:

SWITCH POSITION	1-PHASE UNITS	3-PHASE UNITS
1	Line E1 to Neutral	Line E1 to E2
2	Line E2 to Neutral	Line E2 to E3
3	Line E1 to E2	Line E3 to E1
OFF	No Reading	No Reading

ENGINE MONITOR PANEL

General: This panel has five advisory lamps for separate engine fault conditions plus a "Not in Automatic Start Mode" lamp. Cranking and starting will not be possible while any one or more of engine fault conditions lamps are lighted. The following apply:

- A "lamp on" condition indicates that fault condition has been "latched" by d-c control/latch-crank circuit board.
- If any one of the lamps is ON (fault condition latched), the engine cannot be cranked either manually or automatically.
- To unlatch a fault (that is, to turn a lamp OFF) and permit cranking, push the Test/Reset switch in. Lamp goes OFF, allowing for additional cranking.

Not in Automatic Start Mode Lamp: Comes ON to indicate that automatic startup of the engine is not possible. Lamp lights up whenever the Auto/Off/Manual switch is set to OFF or MANUAL.

Overcrank Lamp: The control console houses a d-c control/latch-crank circuit board which controls engine startup and shutdown. During automatic startup, then engine cranks for about five seconds, rests for about five seconds and so on, until eight of the crank-rest cycles have occurred. At the end of eight attempts, cranking stops and the overcrank lamp goes ON.

High Coolant Temperature Lamp: Comes ON if coolant temperature is too high or coolant level is too low. Engine shuts down automatically when such unsafe conditions occur. The following apply:

- If engine is started with an existing high coolant temperature or low coolant level condition, the engine shuts down and lamp comes ON when engine speed reaches about 1000 rpm.
- If engine starts normally but high temperature/low coolant level develops later, the engine shuts down and light comes ON immediately.

Overspeed Lamp: An engine overspeed above a safe limit causes the engine to automatically shutdown, which turns ON the indicator lamp. This sequence occurs as follows:

- For 1800 rpm units: Shutdown and "lamp on" will occur at 2070-2340 rpm (69-78 Hz), providing the overspeed lasts longer than about four seconds.

Low Oil Pressure Lamp: Lights up (latches) to indicate low oil pressure in engine as follows:

- During cranking, after engine has reached 800 to 1000 rpm, the circuit allows four seconds for oil pressure to build.
- If the unit runs above 800-1000 rpm for more than four seconds and oil pressure is below 15 psi, engine shuts down but lamp does NOT go ON. The system then attempts eight re-starts. If the oil pressure is still below 15 psi after eight re-start attempts, the engine shuts down and the lamp goes ON.
- If engine starts normally with good oil pressure, but oil pressure drops later, the system waits five seconds for oil pressure to be restored. If pressure is still low after five second delay, the engine shuts down and the lamp goes ON immediately.

RPM Sensor Loss Lamp: Units with Option C console are equipped with an rpm sensor, which is mounted directly over the engine flywheel gear teeth. The sensor essentially emits an electrical pulse when each flywheel gear tooth passes it. The d-c control/latch-crank circuit board uses these electrical signals to determine engine speed (rpm) signals. The circuit board uses these rpm signals to (a) establish a starter cutout speed, and to (b) shut the engine down if the engine runs too fast (overspeed). If the rpm signals to the circuit board are lost, the engine shuts down, but the lamp will not light. Then, depending on whether the sensor signal was lost during a manual or an automatic start attempt, the following events occur:

- **MANUAL STARTUP:** If engine starts within two seconds after cranking begins, shutdown occurs as soon as the Start/Stop switch is released but without a lamp ON condition (latching does not occur). If engine does not start within two seconds after cranking begins, which disables starting, the rpm sensor loss light goes ON.

- **AUTOMATIC STARTUP:** Engine re-cranks within about one second after it has stopped. If sensor loss persists, engine shuts down and lamp lights about two seconds after cranking has restarted.
- If engine starts within two seconds after re-crank has begun, the starter remains engaged until the two-second delay is over.

Test/Reset Switch: To test all lamps, push this switch in. Following any fault shutdown with any monitor panel lamp lighted, engine cranking is inhibited. To reset the system (unlatch a fault) and crank the engine again, push the switch in (lamp must go out). If the switch is actuated with engine running, only the lamps will be tested. The engine will not shut down.

NOTE: If engine shuts down due to some unmonitored problem (such as out of gas or failed ignition system), none of the lamps will come ON. If such an unmonitored shutdown occurs with the Auto/Off/Manual switch set to AUTO, engine recranks and attempts to start for any cycles remaining in the eight-crank limit. After all eight crank cycles have been used, the engine shuts down and the OVERCRANK lamp goes ON.

OPTIONAL ANNUNCIATOR PANEL

General: Some units may come equipped with a factory installed annunciator panel (Figure 23) having up to nine annunciated fault conditions displayed. This optional panel is often called a "prealarm" panel since it warns of impending problems before an actual fault shutdown occurs.

The panel is designed to monitor various engine condition sensing devices having normally-open (N.O.) or normally-closed (N.C.) contacts which deliver +d-c voltage to applicable lamps when contacts open or close.

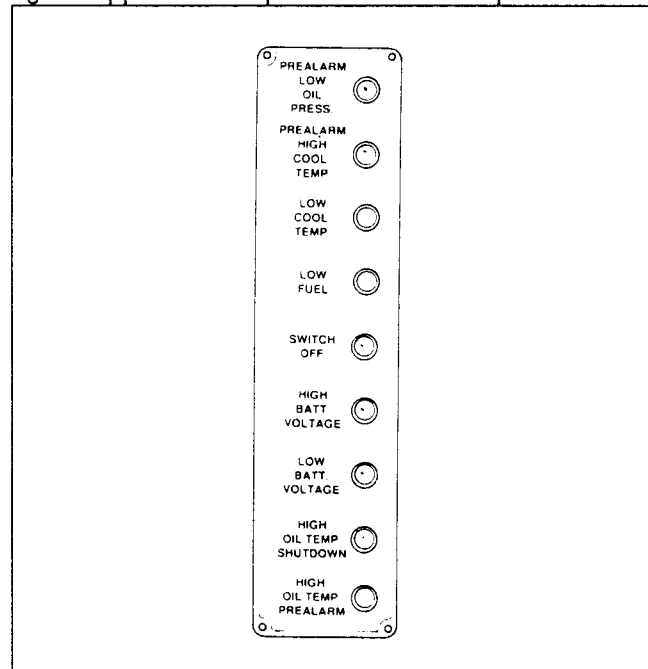


Figure 23. Optional Annunciator (Prealarm) Panel

OPTIONAL REMOTE ANNUNCIATOR

An optional 14-light annunciator (Figure 24) you can mount remotely is also available. For information on the remote annunciator panel, ask your dealer/distributor or consult the factory. Ask for information on Models 8702 and 8815 remote annunciator panels. The following items apply to them:

- They are designed for installations having a Generac GTS type transfer switch and an Option C control console.
- The panels are available in either flush mounted (Model 8815) or surface mounted (Model 8702) configurations.
- The panel has a built-in audible alarm horn with a silencer switch to quiet the horn without disturbing the lighted indication.
- Remote monitoring of the standby generator set provides you with enough information to avoid unnecessary maintenance trips to the generator site.

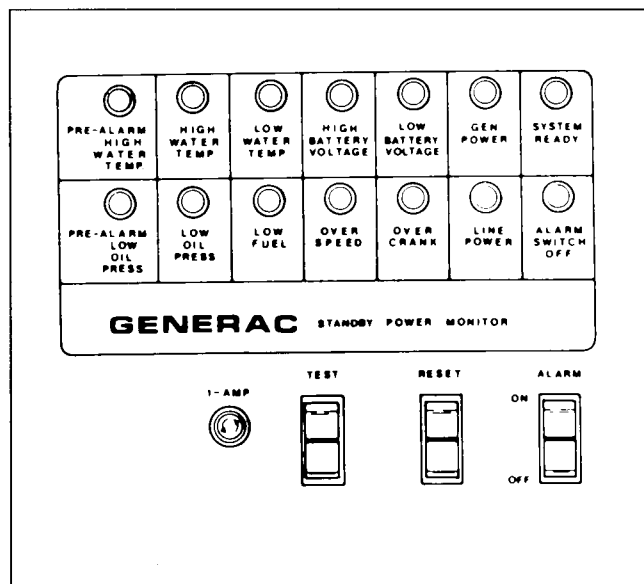


Figure 24. Option 14-Light Remote Annunciator

A remote mounted alarm or annunciator device may be connected across the relay contacts so that a failure will turn on the remote alarm or device. The alarm relay normally-open, normally-closed and common contacts are shown in Figure 24.

OPTIONAL ALARM RELAY

The generator's d-c control/latch-crank circuit board is equipped with an alarm relay "driver". Some units with Option C control consoles may be equipped with an alarm relay which is connected to the circuit board driver (Figure 25). If any one or more of the five annunciated shutdown faults occur, the circuit board driver energizes the optional alarm relay.

OTHER ALARM DEVICES

The connected alarm device may range from an alarm horn to a warning light or to a telephone dialer with a pre-recorded message, all devices you can order from Generac. Ask your dealer/distributor or consult the factory for more information.

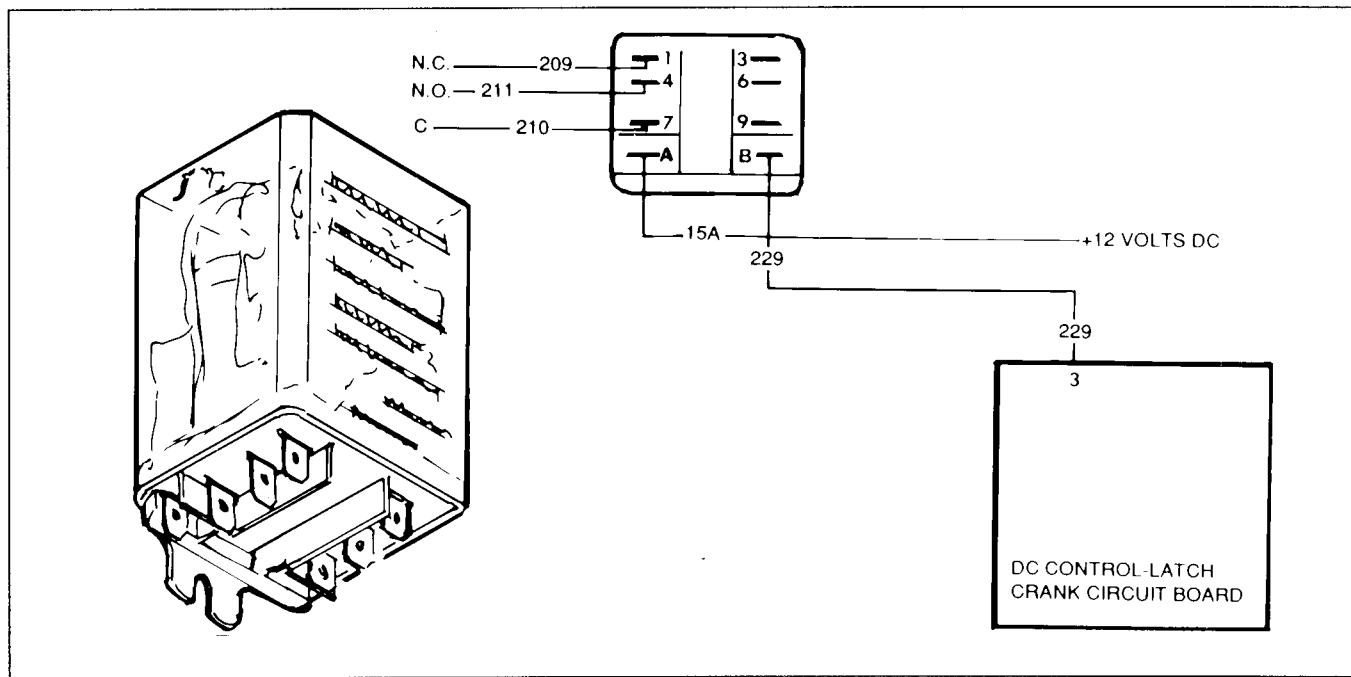


Figure 25. Optional Alarm Relay

PREPACKAGED GENERATORS

Prepackaged generators are, in most cases, shipped from the factory with an automatic transfer switch. However, these units can be installed and interconnected in conjunction with a standard Generac "GTS" type transfer switch, if desired.

The standard pre-packaged transfer switch has no sensing or controlling circuit boards. Instead, the generator control console houses a "Control Module Assembly", which controls all phases of operation, including engine start up and load transfer.

A-C WIRING INTERCONNECTIONS

Figure 26 is an interconnection diagram for a typical pre-packed generator set. The following connection points are shown:

- Connect utility power source leads to transfer switch terminal lugs N1, N2 and to the Neutral lug.
- Connect generator a-c output leads to the generator's main circuit breaker and to terminal lugs E1 and E2 in the transfer switch.
- Connect the generator neutral lead to the transfer switch neutral lug and to the generator neutral lug.
- Connect customer load leads to transfer switch terminal lugs T1, T2 and to the transfer switch neutral lug.

CONTROL LEAD INTERCONNECTIONS

Connect suitable approved wiring to the following generator terminals and to identically labelled terminals in the transfer switch. Control terminals are identified as follows:

Utility 1 and 2: Line-to-line utility source sensing leads permit the generator's control logic circuit board to monitor utility source voltage.

NOTE: Utility power source voltage delivered to the Utility 1 and 2 terminals is also used to operate a battery trickle charge circuit. This charging circuit helps maintain battery state of charge during non-operating periods.

Transfer Signal Leads 23 and 194: When Control Module circuit board closes this circuit, the transfer switch main contacts actuate to their "Standby" position (load connected to generator output). When Control Module circuit board opens this circuit, load circuits are transferred back to the Utility power source.

Load 1 and 2: Voltage from the transfer switch "Load" terminal lugs (T1, T2) is delivered to the Control Module circuit board. This voltage is used to operate an "exercise timer" circuit.

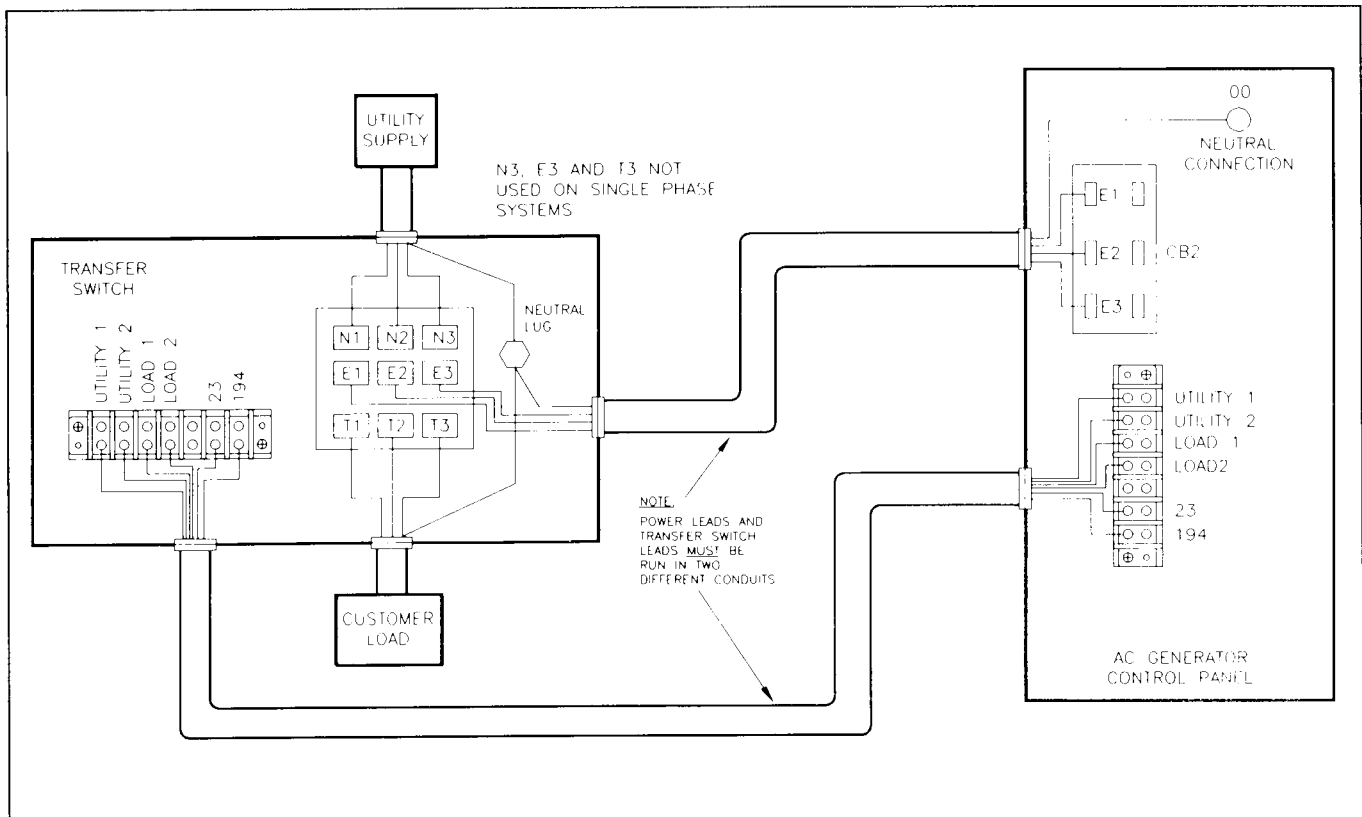


Figure 26. Prepackaged Interconnection Diagram

USING A STANDARD "GTS" TRANSFER SWITCH

When required, the pre-packaged standby generator can be installed with a standard Generac "GTS" type automatic transfer switch. See Figure 27 for an interconnection diagram for such an installation. Transfer switch terminals 178 and 183 must be interconnected with identical numbered terminals in the generator console. You must also connect 240 volts utility source to the Utility 1 and 2 terminals in the generator console (to operate the battery trickle charge circuit).

When you use a standard GTS type transfer switch, it controls automatic operation and automatic transfer as follows:

- Solid state circuits in the transfer switch monitor utility power source voltage.
- When utility source voltage drops below a pre-set level, transfer switch action closes the terminals 178/183 circuit. The engine then cranks and starts as controlled by the pre-packaged generator's Control Module circuit board.
- After the engine starts and when the generator a-c output voltage and frequency have reached a pre-set value, transfer switch circuits signal the transfer switch main contacts to actuate to the "Standby" power source side. Generator a-c output then powers load circuits.
- When the utility power source voltage is restored above a pre-set level, transfer switch solid state circuits signal the switch main contacts to move back to their utility power source side.

- Following re-transfer back to the utility power source side, transfer switch circuit board action opens the terminals 178/183 circuit. Engine then shuts down.

NOTE: If your pre-packaged generator is installed in conjunction with a standard GTS type transfer switch, refer to the applicable transfer switch manual for exact operating parameters and timing sequences.

CONTROL CONSOLE COMPONENTS

The components of a typical pre-packaged control console (Figure 28 on Page 25) are as follows:

A-C Voltmeter: The voltmeter displays generator a-c output voltage during operation. Voltage is regulated by a solid state voltage regulator and is proportional to a-c frequency. Refer to your unit's DATA PLATE for rated a-c voltage.

A-C Ammeter: Indicated current draw of connected electrical loads during operation. **DO NOT EXCEED YOUR UNIT'S RATED MAXIMUM CONTINUOUS CURRENT.** Refer to the unit DATA PLATE.

A-C Frequency Meter: Indicates generator a-c output frequency in "Hertz" (cycles per second). Frequency is proportional to engine speed. Units with 4-pole Rotor supplies 60 Hertz at 1800 rpm; or 50 Hertz at 1500 rpm. Units with 2-pole Rotor supply 60 Hertz at 3600 rpm; 50 Hertz at 3000. Frequency reading with no electrical loads connected (no-load condition) should be between 61-63 Hertz.

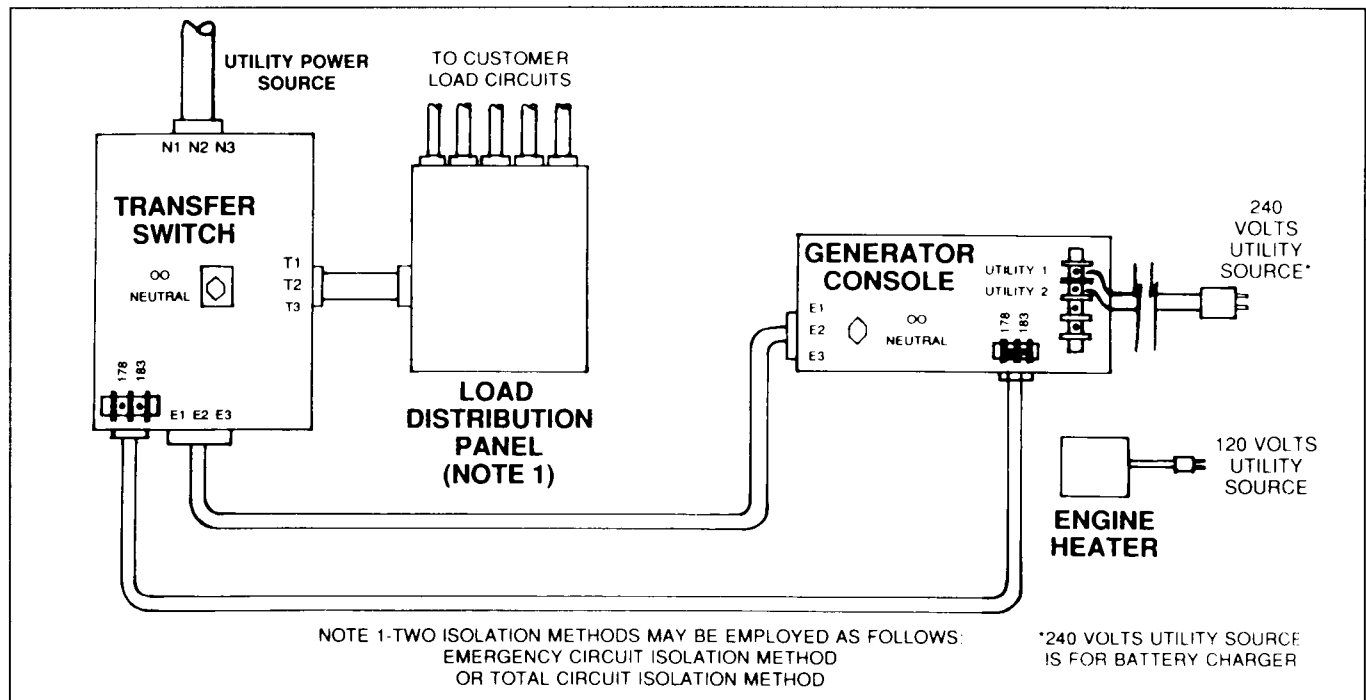


Figure 27. Interconnection with GTS Transfer Switch

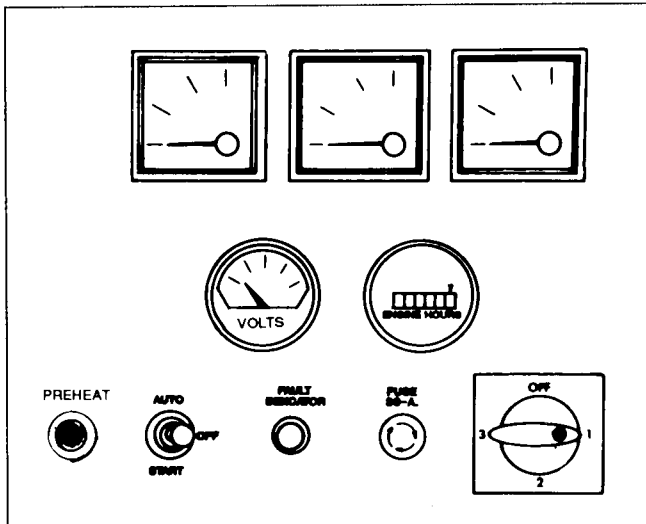


Figure 28. Pre-packaged Control Console

D-C Voltmeter: The generator is equipped with a belt-driven d-c alternator, which maintains battery state of charge when the engine operates. The Control Module Assembly also incorporates a trickle charge circuit which maintains battery state of charge during non-operating periods. Battery voltage should read about 12.5 to 14.5 volts d-c. A low battery voltage indicates the battery is discharging.

Hourmeter: Indicates time the engine-generator is operating, in hours and tenths of hours. Use the hourmeter along with the periodic maintenance schedule on your generator set.

Preheat Switch: 4.0 Liter diesel engines come with GLOW PLUGS (one for each cylinder) to heat the combustion chamber air for quicker and easier starts. Prior to starting a cold engine manually, hold the PREHEAT switch for about 15 seconds. **DO NOT PREHEAT FOR MORE THAN 30 SECONDS.**

Auto-Off-Start (Auto-Off-Manual) Switch: Use this 3-position switch as follows:

- Set the switch to "Auto" for fully automatic operation. See "Sequence of Automatic Operation".
- Set switch to "Start" (or "Manual") position to crank and start the generator engine.
- Set switch to "Off" position to shut down an operating engine. With "Off" selected, automatic operation will not be possible.

⚠ DANGER! WITH SWITCH SET TO "AUTO", ENGINE CAN CRANK AND START SUDDENLY WITHOUT WARNING. SUCH AUTOMATIC START UP NORMALLY OCCURS WHEN UTILITY SOURCE VOLTAGE DROPS BELOW A PRE-SET LEVEL. TO PREVENT POSSIBLE INJURY THAT MIGHT BE CAUSED BY SUCH SUDDEN STARTS, SET SWITCH TO "OFF" BEFORE WORKING ON OR AROUND THE UNIT. THEN, PLACE A "DO NOT OPERATE" TAG ON CONTROL CONSOLE.

Fault Indicator Lamp: Lamp goes ON when one or more of the following engine faults occurs and when engine shuts down.

- Low oil pressure
- High coolant temperature
- Overcrank
- Overspeed

30 Amp Fuse: Fuse protects the control console's d-c control circuit against electrical overload. If fuse has failed to open due to an overload, engine cranking and startup cannot occur. Should you need to replace the fuse, use only an identical 30-amp replacement fuse.

Meter Reading Selector Switch: Switch permits you to select either line-to-line or line-to-neutral voltage and amperage readings on the console a-c voltmeter and ammeter.

SWITCH POSITION	1-PHASE UNITS	3-PHASE UNITS
"1"	Line E1 to Neutral	Line E1 to E2
"2"	Line E3 to Neutral	Line E2 to E3
"3"	Line E1 to E3	Line E3 to E1
"Off"	No reading	No reading

SEQUENCE OF AUTOMATIC OPERATION

NOTE: The following sequences apply only to the pre-packaged standby generators that are installed along with the special pre-packaged transfer switch. The pre-packaged transfer switch is generally shipped with the special pre-packaged standby generators. For operating sequences when standard Generac "GTS" type transfer switch is used, refer to the Owner's Manual for the applicable GTS transfer switch.

- For automatic operation, the Auto-Off-Start (or Auto-Off-Manual) switch must be set to "Auto" position.
- A control module circuit board, located in the generator control console, constantly monitors utility power source voltage.
- If utility power supply voltage drops below about 60% of the nominal supply voltage, a 6-second delay timer starts timing.
- After the 6-second delay, generator cranks and starts.

NOTE: The 6-second time delay is required to prevent false starts that might otherwise be caused by transient voltage dips.

- An engine warmup time delay lets the engine warm up for about 15 seconds.
- At end of 15 seconds, a standby voltage sensor checks the generator a-c output voltage. If generator voltage is more than about 50% of nominal, the pre-packaged transfer switch transfers load circuits to "standby" power supply.

- If utility source voltage is restored above about 80% of the nominal source voltage, a "re-transfer time delay" starts timing.
- If utility source voltage is still above 80% of nominal at end of six seconds, the switch re-transfers load circuits back to that power source.
- Following re-transfer, an engine cool down timer starts timing. At end of one minute, engine shuts down.

WEEKLY EXERCISE CYCLE

The generator will start and exercise once every 7 days. During this weekly exercise, the unit runs for about 20 minutes and shuts down. Transfer of loads to generator output does not occur during the exercise.

To select day and time for exercising, proceed as follows:

- Set the Manual-Off-Auto switch to OFF.
- Set generator main circuit breaker to OFF or OPEN.
- Locate rocker switch on the control panel identified with the words "Set Exercise Time" (Figure 29).

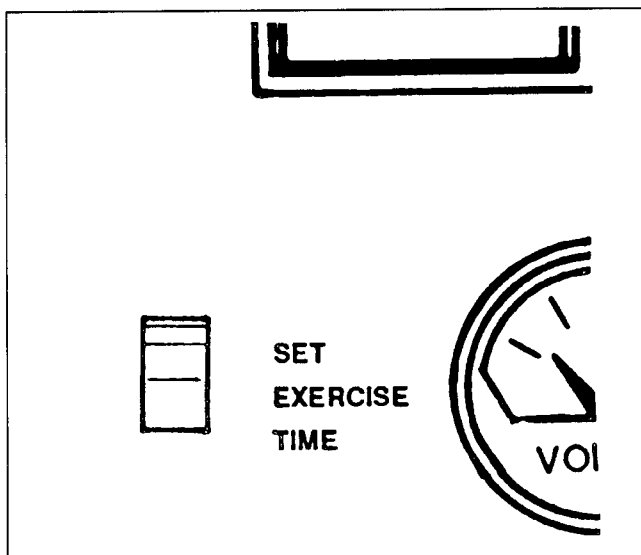


Figure 29. Location of Set Exercise Switch

- Push "Set Exercise" switch and hold in ON position for between 20 to 30 seconds. Switch will spring back into its original position when released.
- Wait about 30 seconds before setting the the Manual-Off-Auto switch to "AUTO" position.s thereafter, on day and time of day switch was pressed.

CAUTION: If you switch the Manual-Off-Auto switch too soon, the engine may start. If engine does start, it will shut down automatically in about two (2) minutes.

- Set generator main circuit breaker to ON or CLOSED.
- Generator is now programmed to start and exercise every 7 days thereafter, on day and time of day switch was actuated.
- Place a sign on the generator control panel and the transfer switch, indicating the day and time the generator will be exercising.

OPTIONAL ENGINE COOLANT HEATERS

You may equip your pre-packaged standby generator with an optional engine coolant heater. This electrical heater keeps the coolant (and thus the engine) warm and improves engine starting characteristics, especially in colder weather. Some units may be equipped with an optional lower radiator hose heater. Other units may be equipped with an optional block heater, similar to the block heaters used in automotive applications. Refer to applicable wiring diagram(s) and electrical schematic(s) at back of manual for wiring connections.

OPTIONAL 2 AMP BATTERY CHARGER

Some pre-packaged units may be equipped with an optional 2 amp battery charger (Figure 30). Refer to applicable wiring diagrams/schematics at back of your manual for wiring connections to the optional battery charger.

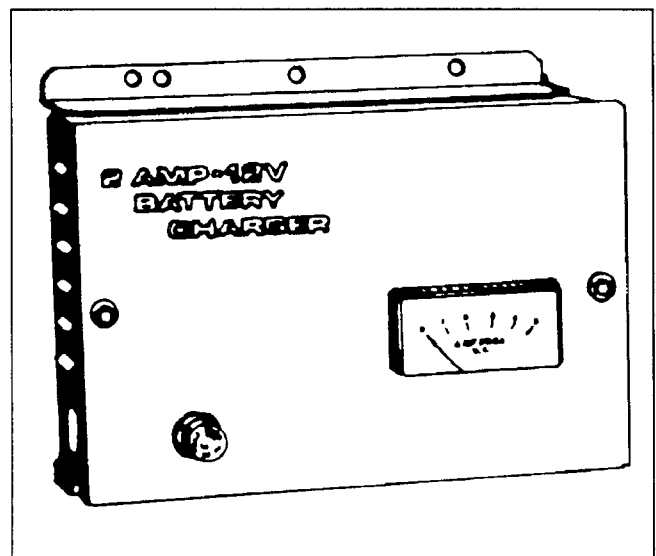


Figure 30. Optional 2 Amp Battery Charger

OPERATION -- OPTIONS A, B & C PANELS

PREPARATION BEFORE STARTUP

The instructions in this section assume that the standby generator has been properly installed, serviced, tested, adjusted and otherwise prepared for use by a competent, qualified installation contractor. Be sure to read **RULES FOR SAFE OPERATION** on Page 3 carefully before attempting to operate this (and related) equipment.

Prior to Initial Startup: Before starting the generator for the first time, the installer must complete the following:

- Properly locate and properly mount the generator, transfer switch, and other standby system components in strict compliance with applicable codes, standards and regulations.
- Make sure the fuel supply system to the generator (a) delivers the correct fuel at the correct pressure; (b) is properly purged and leak tested according to code. No fuel leakage is permitted.
- Have the engine crankcase properly filled to the correct level with the recommended oil.
- Have engine cooling system properly filled with recommended coolant mixture. Check the system for leaks and other problems.
- If engine is equipped with a mechanical governor, make sure the governor is properly filled with oil.
- Check engine v-belt tension and belt condition.
- Make sure the generator is properly connected to an approved earth ground.
- The generator battery must be fully charged, properly installed and interconnected and ready for use.

Startup Inspection: A standard 3-part form entitled "Startup Inspection for Standby Power Systems" (Part No. 67377) should be completed by the installation technician or engineer. As stated on the form, inspections are to be accomplished only by factory-trained personnel. The installer should complete the form and disseminate copies as follows:

- White copy: Mail to Generac Service Department, P.O. Box 8, Waukesha, WI 53187.
- Pink Copy: For service file of installing dealer.
- Yellow Copy: For the customer's records.

OPERATING UNIT WITH MANUALLY OPERATED TRANSFER SWITCH

If your generator was installed in conjunction with a transfer switch capable of manual operation only, the following procedure applies. A manually operated transfer switch is one that will not provide automatic startup and does not include an intelligence circuit.

Engine Startup and Transfer: Set the transfer handle to its **UTILITY** (normal) position with **LOAD** circuits connected to the **UTILITY** power supply.

- On the generator switch console, set the Auto/Off/Manual switch to **MANUAL**.
- Set the **STANDBY GENERATOR** main line circuit breaker to **OPEN** or **OFF** position.
- Turn **OFF** or disconnect the **UTILITY** power circuit to the transfer switch, using whatever means provided (such as the **UTILITY** source main line circuit breaker).
- On the generator console, hold the Start/Stop switch at **START** to crank engine. Hold the switch until it starts, then release the switch to its centered **RUN** position.

CAUTION! Do not crank engine continuously for longer than 30 seconds or the heat may damage the starter motor.

- Let engine stabilize and warm up.
- Check all applicable instrument and gauge readings. When certain that all readings are correct, move the transfer switch manual handle to its **STANDBY** (generator) position, i.e., **LOAD** circuits supplied by the generator.
- Set the **STANDBY** (generator) main line circuit breaker to its **ON** or **CLOSED** position.
- Load circuits are now powered by the standby generator.

Re-Transfer and Shutdown: When **UTILITY** power has been restored, to re-transfer the **LOAD** back to that source and shut the generator down, follow these directions:

- Set the **STANDBY** (generator) main line circuit breaker to its **OFF** or **OPEN** position.
- Manually actuate the transfer switch handle to **UTILITY**, i.e., **LOAD** circuits connected to the **UTILITY** power supply.
- Turn **ON** the **UTILITY** power supply to the transfer switch, using whatever means provided (such as **UTILITY** power source main line circuit breaker).
- Let the generator run at no-load for a few minutes to stabilize internal temperatures.
- Set the generator Start/Stop switch to **STOP**.


OPERATING UNIT WITH AUTOMATIC TRANSFER SWITCH

If your generator has been installed along with a Generac "GTS" type automatic transfer switch, the engine may be started and stopped automatically or manually.


IMPORTANT: BE SURE TO READ THE APPLICABLE AUTOMATIC TRANSFER SWITCH MANUAL CAREFULLY. DIFFERENCES EXIST BETWEEN TRANSFER SWITCHES.

Manual Startup and Transfer: To crank and start the engine and transfer electrical loads to the STANDBY power source, proceed as follows:

- See applicable transfer switch instructions. If so equipped, set the Safety Disconnect Switch to MANUAL.
- On the generator's Meter and Control Panel, set the 3-position (Manual-Off-Auto) switch to MANUAL.

 **DANGER! THE SAFETY DISCONNECT SWITCH AND THE AUTO/OFF/MANUAL SWITCHES MUST BE SET AS INSTRUCTED ABOVE OR THE GENERATOR WILL CRANK AND START AS SOON AS THE UTILITY POWER TO THE TRANSFER SWITCH IS TURNED OFF.**


- Turn OFF both the NORMAL (utility) and EMERGENCY (standby) power supplies to the transfer switch, using whatever means is provided (such as the main line circuit breakers).

 **DANGER!: DO NOT ATTEMPT MANUAL OPERATION UNTIL ALL POWER VOLTAGE SUPPLIES TO THE TRANSFER SWITCH HAVE BEEN POSITIVELY TURNED OFF, OR EXTREMELY DANGEROUS -- POSSIBLY LETHAL -- ELECTRICAL SHOCK WILL RESULT.**

- Refer to instructions for the applicable installed transfer switch. Manually actuate the switch main contacts to their STANDBY (emergency) position as outlined in that manual. LOAD circuit must be connected to the STANDBY power supply before proceeding.
- If operating in cold ambient temperatures and if engine is cold, push the Preheat Switch in and hold for about 15 seconds. DO NOT EXCEED 30 SECOND PREHEAT TIME.
- On the generator console, hold the Start/Stop switch to START to crank engine. Hold it until it begins running, then release the switch to its centered (RUN) position.
- Let engine warm up and stabilize at no-load.
- Turn ON the STANDBY power supply to the transfer switch using whatever means provided (such as STANDBY source main line circuit breaker).
- The generator now powers the load circuits.

Manual Retransfer and Engine Shutdown: To retransfer LOAD circuits back to the NORMAL (utility) power source and stop the engine, proceed as follows:


- Turn OFF both the UTILITY and STANDBY power supplies to the transfer switch, using whatever means provided, i.e., the power source main line circuit breakers.

 **DANGER!: DO NOT ATTEMPT MANUAL OPERATION UNTIL ALL POWER VOLTAGE SUPPLIES TO THE TRANSFER SWITCH HAVE BEEN POSITIVELY TURNED OFF, OR EXTREMELY DANGEROUS -- POSSIBLY LETHAL -- ELECTRICAL SHOCK WILL RESULT.**

- Refer to the applicable transfer switch instructions. Manually actuate the transfer switch main contacts to their utility position (LOAD connected to UTILITY power supply).
- Turn ON the UTILITY power supply to the transfer switch, using whatever means are provided (such as the UTILITY main line circuit breakers).
- Check that UTILITY voltage is available to the transfer switch (see appropriate transfer switch instructions).
- Let the generator engine run at no-load for a few minutes. Then, set the generator Start/Stop switch to STOP. Wait for engine to come to a complete stop.
- Reset the system for fully automatic operation.

Automatic Operation: The following information is offered as a guide only. Automatic operation is controlled by a solid state intelligence circuit that is usually housed in the automatic transfer switch enclosure. For more exact automatic operating sequences and procedures, refer to applicable transfer switch manual.

- Check that UTILITY source voltage is available to the automatic transfer switch.
- Check that the transfer switch main contacts are at their UTILITY position, i.e., LOAD circuits connected to the UTILITY power supply. See applicable transfer switch instructions.

 **DANGER! DO NOT PROCEED UNTIL CERTAIN THAT UTILITY SOURCE VOLTAGE IS AVAILABLE TO THE TRANSFER SWITCH AND TRANSFER SWITCH MAIN CONTACTS ARE SET TO "UTILITY."**

- If so equipped, set the transfer switch safety disconnect switch to its AUTOMATIC position. See transfer switch instructions.
- On the transfer switch, select AUTOMATIC OPERATION MODE. See transfer switch instructions.

- If so equipped, set the generator's Auto/Off/Manual switch to AUTO position.

NOTE: On Option C console units, the "Not in Automatic Start Mode" lamp should go OFF.

- Set the generator main circuit breaker to its "On" or "Closed" position.

With the preceding conditions established, dropout of utility source voltage below a pre-set level results in automatic start up and transfer of load circuits to the "Standby" power supply.

During automatic operation the transfer switch continuously monitors UTILITY power source voltage. If that source voltage should drop below a pre-set level, the engine cranks and starts. Following the engine startup, transfer of the LOAD circuits to the STANDBY source occurs. Once the UTILITY source voltage is restored to a pre-set level, LOAD circuits are retransferred back to the UTILITY source followed by a STANDBY engine shutdown.

OPERATIONAL TESTS

Generac GTS type automatic transfer switches may be equipped with a Mode Switch. That switch may be used to test automatic operation of the system, including generator start up and transfer, under "Normal Test" and a "Fast Test" operating mode. Refer to the appropriate transfer switch instructions.



DANGER! TRANSFER SWITCH ENCLOSURE DOORS SHOULD BE KEPT CLOSED AND LOCKED. ONLY AUTHORIZED PERSONNEL SHOULD BE ALLOWED ACCESS TO THE TRANSFER SWITCH INTERIOR. EXTREMELY HIGH AND DANGEROUS VOLTAGES ARE PRESENT IN THE TRANSFER SWITCH.

OPERATION -- OPTION "P" PANEL

This section provides important operating instructions for prepackaged generators, sometimes called Option "P" units. These units may be shipped from the factory with a transfer switch. In some instances, units with prepackaged control console may be installed in conjunction with a standard Generac GTS type transfer switch. Additional information about pre-packaged generators can be found on Pages 23-26.

MANUAL TRANSFER AND START UP

To transfer electrical loads to the "Standby" (generator) power source side and start the engine manually, proceed as follows:

- On the generator control console, set the Auto-Off-Start (or Auto-Off-Manual) switch to its "Off" position.
- Turn off the utility power supply to the transfer switch, using whatever means provided (such as a utility main line circuit breaker).
- Actuate the generator's main circuit breaker to its "Off" or "Open" position.

⚠ DANGER! DO NOT ATTEMPT MANUAL TRANSFER SWITCH OPERATION UNTIL ALL POWER VOLTAGE SUPPLIES TO THE SWITCH HAVE BEEN POSITIVELY TURNED OFF. FAILURE TO TURN OFF POWER VOLTAGE SUPPLIES MAY RESULT IN EXTREMELY DANGEROUS AND POSSIBLY LETHAL ELECTRICAL SHOCK.

- In the prepackaged transfer switch, remove the manual transfer handle.

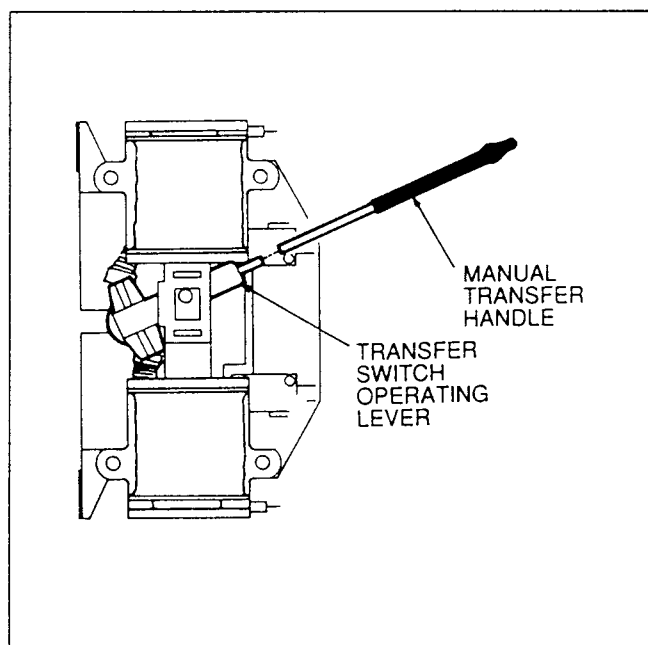


Figure 31. Transfer Switch Manual Operation

- Attach the manual transfer switch handle to the transfer switch operating lever (Figure 31). Move the handle downward and then back to its original position. If the handle is DOWN, load is connected to the utility power supply. If handle is UP, load is connected to generator output.
- On the generator control console, set the Auto-Off-Start (or Auto-Off-Manual) switch to its "Start" (or "Manual") position. Engine should crank and start.
- Let the engine stabilize and warm up for a few minutes.
- Set the generator's main circuit breaker to its "On" or "Closed" position. Loads are now powered by generator output.

RETRANSFER AND SHUTDOWN

When utility power source voltage has been restored, electrical loads may be retransferred back to that source and the generator can be shut down as follows:

- Verify that utility power supply voltage to the transfer switch has been positively turned OFF, using whatever means provided (such as utility main line circuit breaker).
- Set the generator's main circuit breaker to its "Off" or "Open" position.
- Let the generator engine run at no-load for a few minutes, to stabilize internal unit temperatures.
- On the generator console, set the Auto-Off-Start (or Auto-Off-Manual) switch to "Off" or "Manual." Wait for engine to come to a complete stop.
- With the manual transfer handle, move the switch's main contacts back to their utility position, i.e., load connected to utility power supply. Handle and operating lever of transfer switch should be in down position.
- Turn on the utility power supply to the transfer switch, using whatever means provided (such as a utility main line circuit breaker). The utility power source now powers the loads.

AUTOMATIC OPERATION

To set the system for fully automatic operation, proceed as follows:

- Check that load circuits are connected to the utility power supply (transfer switch operating lever is down).
- Set the Auto-Off-Start (or Auto-Off-Manual) switch to its "Auto" position.
- Set the generator main circuit breaker to its "On" or "Closed" position.

Periodic Maintenance Schedule

* Preventive Maintenance to be performed by an authorized mechanic.

** Preventive Maintenance to be performed by authorized operator.

A. After First 30 Hours of Operation

- *1. Check/adjust valve clearance.
- *2. Retorque engine cylinder head bolts.
- *3. Retorque intake/exhaust manifolds.
- *4. Retorque oil pan bolts.
- *5. Retorque engine fan bolts.
- *6. Test fuel injection nozzles.
- *7. Check injection timing.
- *8. Inspect wiring.
- *9. Change engine crankcase oil.
- *10. Inspect engine fan belts.
- *11. Inspect battery and cables.

B. Every Month

- ** 1. Test standby generator system.
- ** 2. Inspect battery and cables.
- ** 3. Check engine oil level.
- ** 4. Check gearbox oil level (if so equipped).
- ** 5. Check coolant level.
- ** 6. Check generator ground connections.
- ** 7. Test/inspect optional starting aids.

C. Every Two Years

- * 1. Replace all rubber hoses.
- * 2. Replace engine fan belts.
- * 3. Evaluate the Standby Generator System.
- * 4. Drain, flush, refill cooling system.

D. Every 120 Hours or Every Three Months (whichever comes first)

- ** 1. Inspect and test fuel system and connections.
- ** 2. Inspect exhaust system.
- ** 3. Inspect/test fuel supply system.

E. Once Every Six Months

- * 1. Change engine oil and filter.
- * 2. Lubricate engine controls.
- * 3. Service engine air cleaner.
- * 4. Service engine fuel filter.
- * 5. Inspect a-c generator.
- * 6. Test engine safety controls.
- * 7. Inspect fan belts.
- * 8. Check engine coolant level.
- * 9. Inspect engine cooling system hoses.
- *10. Check optional starting aids.
- *11. Check battery.
- *12. Check engine compression.
- *13. Check electrical connections.
- *14. Check/test annunciator panel.
- *15. Perform operational test.

F. Once Annually

- * 1. Check engine valve clearance.
- * 2. Test fuel injection nozzles.
- * 3. Test injection timing.
- * 4. Inspect all wiring.
- * 5. Test engine starter operation.
- * 6. Drain water from fuel tank.
- * 7. Retorque fan bolts.

G. Every 1000 Operating Hours

- * 1. Disassemble and inspect engine d-c alternator.
- * 2. Disassemble and inspect engine starter.
- * 3. Retorque engine mounting brackets.
- * 4. Retorque intake and exhaust manifold.
- * 5. Retorque oil pan bolts.
- * 6. Remove/test fuel injection pump.
- * 7. Remove/test cooling system thermostat.

H. As Required

- * 1. Bleed engine fuel system.
- * 2. Pre-oil turbocharger (if so equipped).

PERIODIC MAINTENANCE

INTRODUCTION

A rigorous program of scheduled periodic maintenance should be established and maintained. Such a program, if adhered to diligently, will provide added assurance that your standby electric system functions properly when it is needed.

Keeping a MAINTENANCE LOG is highly recommended. Such a log should be a continuous record of repairs, parts replacements, gauge and instrument readings during operational tests, etc.

GENERAC recommends that you establish a CUSTOMER MAINTENANCE INSPECTION AGREEMENT between the user of this equipment and the installing dealer/distributor. This agreement (Part No. 53263) provides for prestart and engine running tests and checks for a qualified service technician to perform at six-month and one-year intervals. Ask your dealer (or consult the factory) about this agreement.

The tasks listed in the PERIODIC MAINTENANCE SCHEDULE cover the minimum recommended maintenance requirements for this equipment.

Note that many of the tests and checks listed in the SCHEDULE are to be performed only by an authorized mechanic. Recommended torque values may be found in Table A. Fluid capacities and recommendations, as well as other applicable specifications, are listed in the SPECIFICATIONS section.

TEST STANDBY GENERATOR SYSTEM

At least once each month, you should have an authorized operator test the operation of the standby generator system. During this operational test, record all instrument and gauge readings in a MAINTENANCE LOG. Also have the transfer system tested at this time. Run the engine at least 30 minutes and immediately correct any discrepancies you find during the test.

Every six months, have an authorized mechanic or service technician perform a system operational test.

INSPECT BATTERY

Once each month an authorized operator should inspect the engine battery system. At this time battery fluid level should be checked and distilled water added if needed. Battery cables and connections should also be inspected for cleanliness and corrosion.

Once every six months, an authorized mechanic or service technician should inspect the battery system. At this time the battery CONDITION and STATE OF CHARGE should be checked using a battery hydrometer. Recharge battery or replace any defective battery as required.

INSPECT STANDBY GENERATOR SYSTEM

Qualified operators should perform a close inspection of the entire standby generator system monthly. Inspect the transfer switch for evidence of arcing, pitted or burned contacts. Inspect wiring and wiring connections. Check for engine oil and coolant leaks. Look for fuel leaks at engine and in fuel supply system. Check all fuel lines and fittings for tightness. If any discrepancies are found, contact an authorized service technician.

CHECK FLUIDS

Check Engine Oil Level: Engine oil level should be checked by a qualified operator at least once each month. Maintain oil level between the FULL and ADD marks on engine dipstick. See SPECIFICATIONS for recommended oil.

Check Gearbox Oil Level (if so equipped): If the generator is equipped with a gearbox (Figure 32), check gearbox oil level once each month. Replenish as needed with SAE 90 GEARLUBE oil.

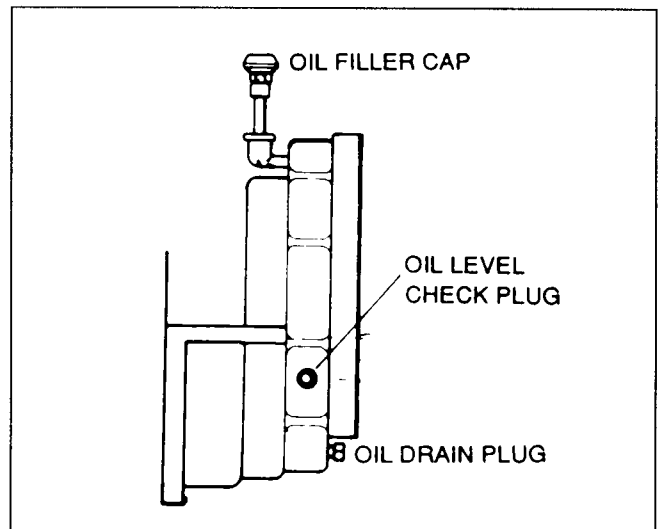


Figure 32. Gearbox Oil Servicing Points

Once annually, the gearbox should be completely drained and refilled with SAE 90 GEARLUBE oil.

To add oil to gearbox, remove OIL FILLER CAP and OIL LEVEL CHECK PLUG. Add the recommended oil until it just starts to flow from OIL LEVEL CHECK PLUG opening. Finally, install and tighten OIL FILLER CAP and OIL LEVEL CHECK PLUG.

Check Coolant Level: Check engine coolant level once each month. See SPECIFICATIONS for recommended coolant mixture.

CHECK CONNECTIONS

Check Generator Ground Connection: Inspect generator grounding system. Repair as necessary. Refer to GROUNDING THE GENERATOR on Page 16.

Test/Inspect Optional Starting Aids: Inspect optional starting aids (Battery Charger, Block Heater, Battery Heater, etc.) once each month. Make sure these devices are operational.

Check Fuel System Connections: Check all fuel system connections at least once every 120 hours of operation, or quarterly, whichever occurs first. All connections must be TIGHT and in good condition. A loose fuel system line may show no signs of leakage, but may draw air into the system, causing rough operation and starting difficulties.

INSPECT EXHAUST SYSTEM


Inspect the entire exhaust system every 120 operating hours, or quarterly, whichever comes first. Repair or replace any defective or leaking component immediately. During each operational test, listen for abnormal noise levels which may indicate a defective exhaust pipe or muffler.


INSPECT/TEST FUEL SUPPLY SYSTEM

Inspect and test the fuel supply system at least once every 120 hours of operation, or quarterly, whichever comes first.

RECOMMENDED ENGINE COOLANT MIXTURE

Use a mixture of half ethylene glycol base anti-freeze and SOFT water in the engine cooling system. Also add a high quality rust inhibitor to the recommended mixture. See SPECIFICATIONS for cooling system capacity.

 **DANGER! DO NOT REMOVE THE RADIATOR PRESSURE CAP WHILE THE ENGINE IS HOT OR SERIOUS BURNS FROM BOILING LIQUID OR STEAM COULD RESULT.**

 **DANGER! ETHYLENE GLYCOL BASE ANTI-FREEZE IS POISONOUS. DO NOT USE MOUTH TO SIPHON COOLANT FROM RADIATOR, RECOVERY BOTTLE OR ANY CONTAINER.**

CAUTION: Some commonly used rust inhibitors are CHROMATES, BORATES, NITRATES, NITRITES and SOLUBLE OIL. DO NOT use any CHROMATE base inhibitor with ethylene glycol base anti-freeze or chromium hydroxide (green slime) will form, causing a low heat transfer rate and possible overheating. Engines that have been operated with a chromate base inhibitor must be chemically cleaned before adding ethylene glycol base anti-freeze. Also, some SOLUBLE OILS are NOT recommended to use with this equipment.

Engine Component Tightening Torques

Table A

Fuel Injection Nozzle Holders	10-13 foot-pounds (1.3 - 1.9m-kg)
Injection Pump	14-18 foot-pounds (1.9 - 2.6m-kg)
Crankshaft Nut.....	348-412 foot-pounds (48-57m-kg)
Camshaft Gear Nut.....	80-94 foot-pounds (11-13 m-kg)
Main Bearing Caps	102-115 foot-pounds (14-16m-kg)
Connecting Rod Caps.....	84-97 foot-pounds (11.5-13.5 m-kg)
Camshaft Thrust Plate	14-18 foot-pounds (1.9 - 2.6 m-kg)
Cylinder Head Bolts	87-94 foot-pounds (12-14m-kg)
Oil Strainer Fitting Bolt.....	14-18 foot pounds (1.9 - 2.6m-kg)
Oil Pan Bolts	14-18 foot pounds (1.9 - 2.6m-kg))
Idle Gear Thrust Plate Bolt	80-94 foot pounds (11-13 m-kg)
Flywheel to Crankshaft	131-144 foot pounds (18-20 m-kg)
Flywheel Housing Bolt	73-94 foot pounds (10-13 m-kg)
Intake Manifold	14-18 foot pounds (1.9-2.6 m-kg)
Exhaust Manifold	33-36 foot pounds (4.5-5.0 m-kg)
Rocker Arm Support	14-18 foot pounds (1.9 - 2.6 m-kg)
Coolant Pump	14-18 foot pounds (1.9 - 2.6 - kg)
Oil Cooler.....	14-18 foot pounds (1.9 - 2.6 m-kg)
Engine Mounting Nut	51-57 foot pounds (7-8 m-kg)
Intake Heater Plug	17-19 foot pounds (2.25-2.75 m-kg)
Timing Gear Plate.....	14-18 foot pounds (1.9 - 2.6 m-kg)
Starter Fitting Bolt.....	80-108 foot pounds (11-15 m-kg)
Generator Through Bolt	33-36 foot pounds (4.5-5.0m-kg)
Transmission to Engine	26-36 foot pounds (3.5-5.0m-kg)
Oil Pump to Cylinder Block.....	15-18 foot pounds (2.0-2.6 m-kg)
Cooler Pump Pulley Nut	94-108 foot pounds (13 - 15 m-kg)

REPAIR PARTS

This section of your OWNER'S MANUAL consists of EXPLODED VIEWS pertaining to the standby generator and its engine, along with PARTS LISTS for the EXPLODED VIEWS. The PARTS LISTS consist of (a) an item number, (b) quantity required, (c) a part number and (d) a description of the part. The ITEM NUMBER relates to an identical number in the EXPLODED VIEW.

STANDBY GENERATOR INFORMATION CARD

An INFORMATION CARD is located under the generator's control panel cover. A second matching card is stapled to the OWNER'S MANUAL cover. Included on the information card is a BUILD NUMBER and a listing of PARTS GROUPS along with the description of each PARTS GROUP and ASSEMBLY (DRAWING) NUMBERS pertinent to each PARTS GROUP.

The BUILD NUMBER identifies your specific generator assembly. PARTS GROUP letter codes "A" through "F" identify the generator sub-assemblies as listed under DESCRIPTION and provide a reference to particular ASSEMBLY (DRAWING) NUMBER.

NOTE: You can also see the unit's BUILD NUMBER on the generator DATA PLATE.

HOW TO ORDER PARTS

To order a replacement part, locate the part in the applicable EXPLODED VIEW in this manual. Provide the dealer/distributor with the following information:

- Generator BUILD NUMBER (from the unit data plate or information card).
- Part NUMBER and DESCRIPTION (from the applicable PARTS LIST in this manual).
- The applicable exploded view DRAWING NUMBER.

NOTE: In most cases you can get repair parts by providing the dealer/distributor with the INFORMATION CARD data plus a description of the required part. If you have lost or misplaced your INFORMATION CARD, simply describe the part you need and provide your unit's BUILD NUMBER (from generator data plate).

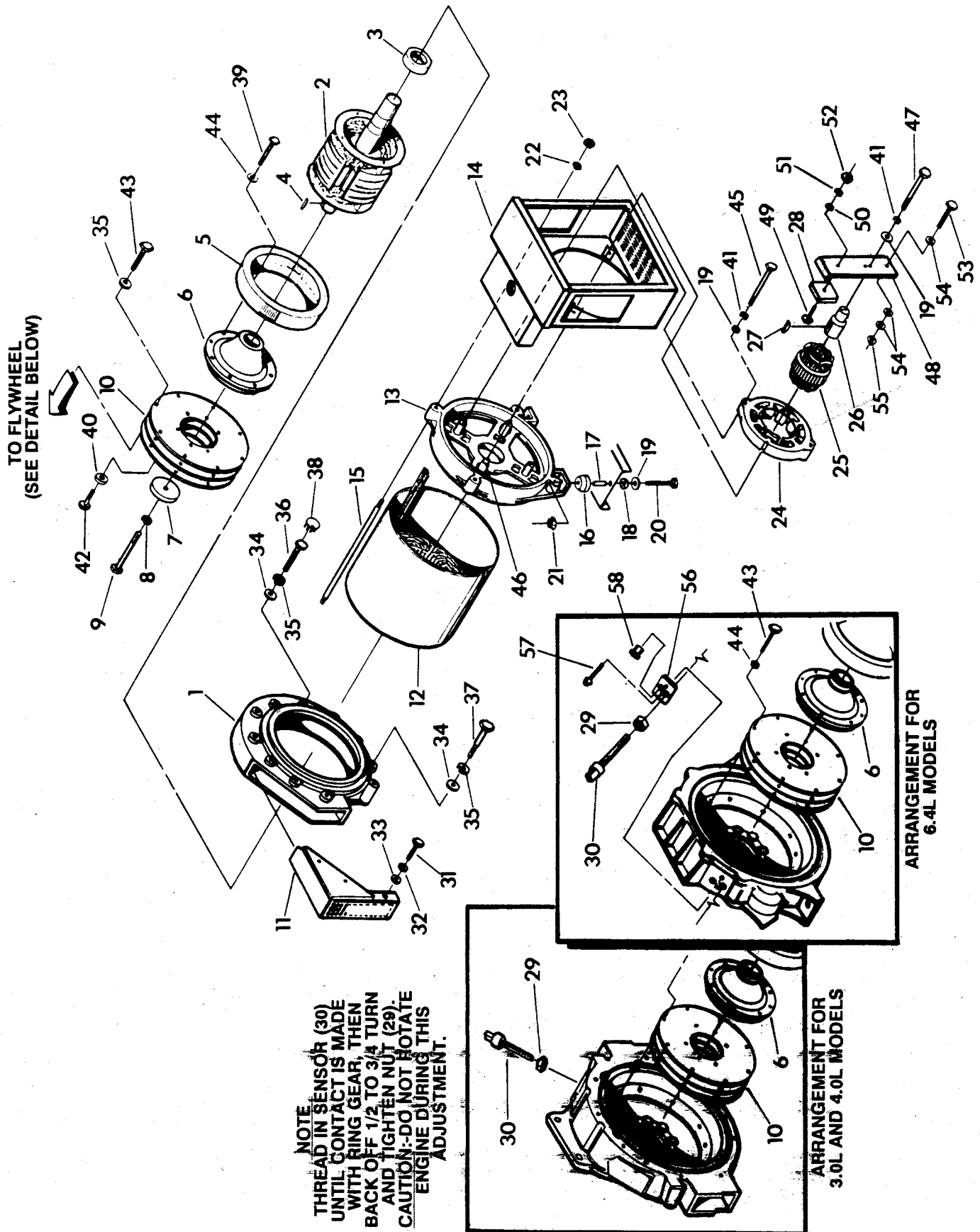
GENERAC CORP.		
BUILD NO. _____		DATE _____
GROUP	DESCRIPTION	ASSEMBLY NOS.
A	Generator	69463, 69250
B	Control Panel	64438
C	Mounting Base	70246, 70243
D	Engine & Accy.	70242, 66169
E	Fuel System	66182
F	Compartment	70240, 70241
WHEN ORDERING REPAIR PARTS, ALWAYS GIVE THE ABOVE INFORMATION.		

Typical Standby Generator Information Card

Notes

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GROUP A



EXPLODED VIEW GENERATOR

DRAWING NO. 74277

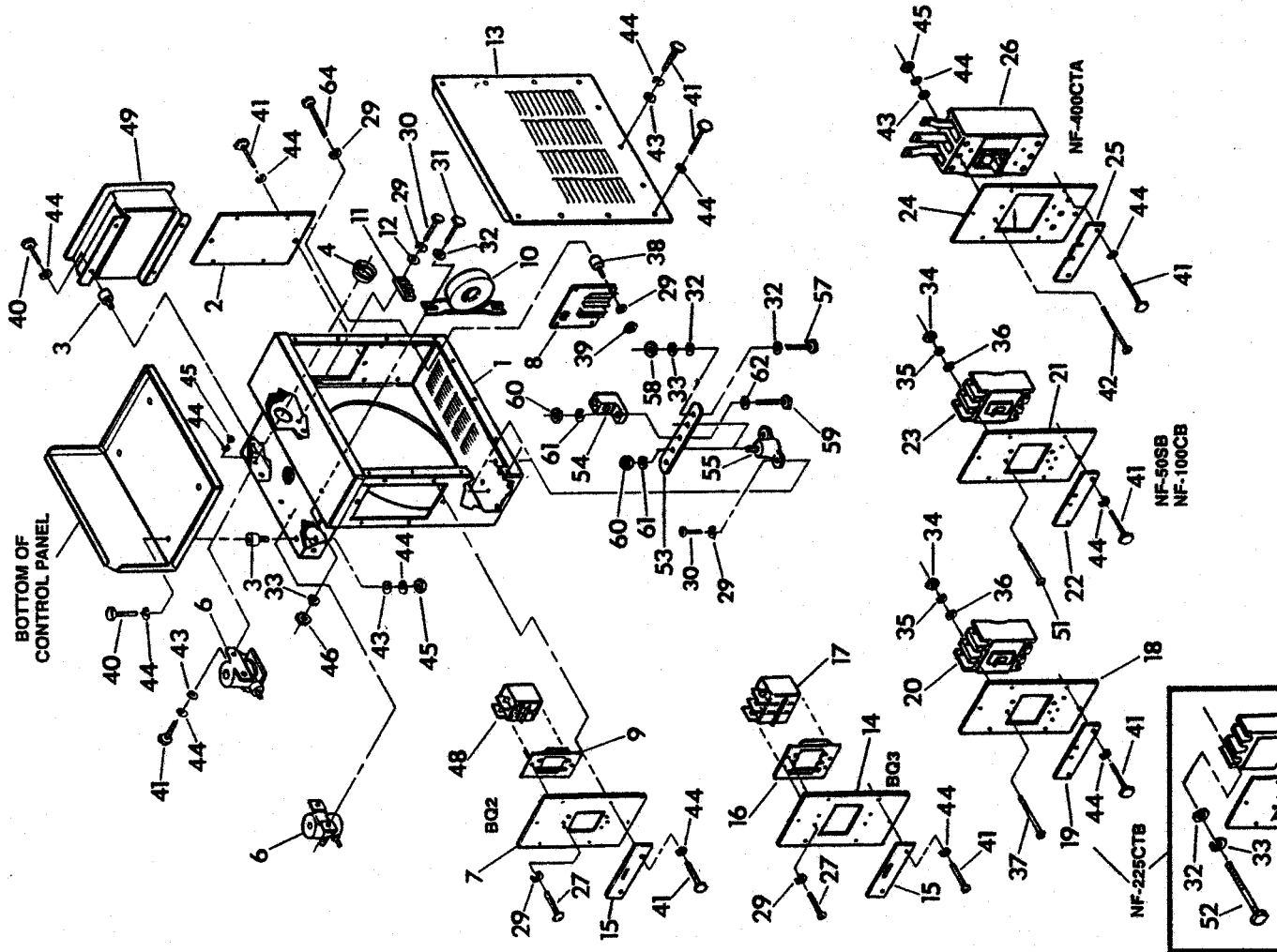
GROUP A

ITEM	PART NO.	QTY.	DESCRIPTION
1	63858	1	HOUSING, BLOWER
2	C-73304	1	ROTOR ASSY.-20KW, 1 & 3Ø
	C-73304	1	ROTOR ASSY.-25KW, 1 & 3Ø
	D-73304	1	ROTOR ASSY.-30KW, 1 & 3Ø
	D-73304	1	ROTOR ASSY.-35KW, 1 & 3Ø
	E-73304	1	ROTOR ASSY.-40KW, 1 & 3Ø
	F-73304-A	1	ROTOR ASSY.-50KW, 1 & 3Ø
	G-73304-A	1	ROTOR ASSY.-60KW, 1 & 3Ø
	H-73304-A	1	ROTOR ASSY.-80KW, 1 & 3Ø
	J-73304-A	1	ROTOR ASSY.-100KW, 1 & 3Ø
3	52624	1	BEARING
4	42558	1	KEY-3/8" SQUARE x 1" LONG
5	42535	1	FAN
6	73302	1	DRIVE HUB
7	72879	1	SPACER
8	70265	1	LOCK WASHER-M16
9	70263	1	CAPSCREW, HEX HEAD-M16-2.00 x 35MM
10	63855	3	FLEX PLATE
11	75114	1	SCREEN, AIR OUTLET
12	73400	1	STAT. ASSY.-20KW, 1Ø
	73401	1	STAT. ASSY.-20KW, 3Ø, LOW V.
	73402	1	STAT. ASSY.-20KW, 3Ø, BROAD RANGE
	73400	1	STAT. ASSY.-25KW, 1Ø
	73401	1	STAT. ASSY.-25KW, 3Ø, LOW V.
	73402	1	STAT. ASSY.-25KW, 3Ø, BROAD RANGE
	73403	1	STAT. ASSY.-30KW, 1Ø
	73404	1	STAT. ASSY.-30KW, 3Ø, LOW V.
	73405	1	STAT. ASSY.-30KW, 3Ø, BROAD RANGE
	73403	1	STAT. ASSY.-35KW, 1Ø
	73404	1	STAT. ASSY.-35KW, 3Ø, LOW V.
	73405	1	STAT. ASSY.-35KW, 3Ø, BROAD RANGE
	73406	1	STAT. ASSY.-40KW, 1Ø
	73407	1	STAT. ASSY.-40KW, 3Ø, LOW V.
	73408	1	STAT. ASSY.-40KW, 3Ø, BROAD RANGE
	73409	1	STAT. ASSY.-50KW, 1Ø
	73410	1	STAT. ASSY.-50KW, 3Ø, LOW V.
	73411	1	STAT. ASSY.-50KW, 3Ø, BROAD RANGE
	73412	1	STAT. ASSY.-60KW, 1Ø
	73413	1	STAT. ASSY.-60KW, 3Ø, LOW V.
	73414	1	STAT. ASSY.-60KW, 3Ø, BROAD RANGE
	73415	1	STAT. ASSY.-80KW, 1Ø
	73416	1	STAT. ASSY.-80KW, 3Ø, LOW V.
	73417	1	STAT. ASSY.-80KW, 3Ø, BROAD RANGE
	73418	1	STAT. ASSY.-100KW, 3Ø, BROAD RANGE
13	68113	1	CARRIER, REAR BEARING
14	68115	1	PANEL, LOWER
15	AZ-45761	4	STUD, M14-2.00 x 435MM(FOR 12.5" STATOR)
	BE-45761	4	STUD, M14-2.00 x 597MM(FOR 19" STATOR)
16	52251-A	2	DAMPENER, VIBRATION
17	52257	2	SPACER, 1-7/8" LONG
18	52252	2	DAMPENER, VIBRATION
19	52259	5	WASHER
20	55597	2	CAPSCREW, HEX HEAD-M12-1.75 x 80MM

ITEM	PART NO.	QTY.	DESCRIPTION
21	52860	2	NUT, HEX-LOCK, M12-1.75
22	43123	4	LOCK WASHER, M14
23	51779	4	NUT, HEX-M14-2.00
24	68404	1	FIELD EXCITER
	74246*	1	FIELD EXCITER
25	73910	1	EXCITER
	73911*	1	EXCITER
26	74245	1	CAP, ROTOR END
27	70274	1	KEY, 3/8" SQ. x 2-3/4" LONG
	72878*	1	KEY, 3/8" SQ. x 3-1/4" LONG
28	74244	1	DIODE BRIDGE
29	51548	1	NUT, HEX(S.S.) M12-1.75
30	64495	1	RPM SENSOR
31	47411	6	CAPSCREW, HEX HEAD-M6-1.00
32	22097	6	LOCK WASHER-M6
33	22473	6	FLAT WASHER-M6
34	22131	8	FLAT WASHER-M10
35	46526	16	LOCK WASHER-M10
36	57192	6	CAPSCREW, SOCKET HEAD-M10- -1.50 x 30MM
37	56768	2	CAPSCREW, HEX HEAD-M10-1.50- -x 90MM
38	61983	5	BUSHING, SNAP
39	51756	8	CAPSCREW, HEX HEAD-M10-1.50- -x 20MM
40	22250	6	FLAT WASHER-M12
41	51769	3	LOCK WASHER-M12
42	51768	6	CAPSCREW, HEX HEAD-M12-1.75 -x 25MM
43	59980	8	CAPSCREW, HEX HEAD-M10-1.50 -x 25MM
44	70264	16	FLAT WASHER-M10
45	68406	2	CAPSCREW, HEX HEAD-M12-1.75 -x 60MM
46	22392	2	DOWEL-1/2" DIA. x 1-1/4" LONG
47	67052*	2	CAPSCREW, HEX HEAD-M12-1.75 -x 70MM
48	73906	1	SUPPORT, DIODE BRIDGE
49	52619	1	CAPSCREW, HEX HEAD-M5-0.80- -x 20MM
50	23897	1	FLAT WASHER-M5
51	49226	1	LOCK WASHER-M5
52	51716	1	NUT, HEX M5-0.80
53	52786	1	CAPSCREW, HEX HEAD-M8-1.00 x 16MM
54	22473	3	FLAT WASHER-M8
55	52857	1	NUT, HEX LOCK-M8-1.00
56	66570	1	SUPPORT, RPM SENSOR-6.4L
57		2	REPLACE PART FROM ENGINE
58	61396	1	PLUG, PLASTIC

*FOR 40 TO 100KW UNITS ONLY

GROUP A



EXPLODED VIEW:
LOWER PANEL, 15"
DRAWING #: 81405

EXPLODED VIEW: LOWER PANEL, 15"

DRAWING #: 81405

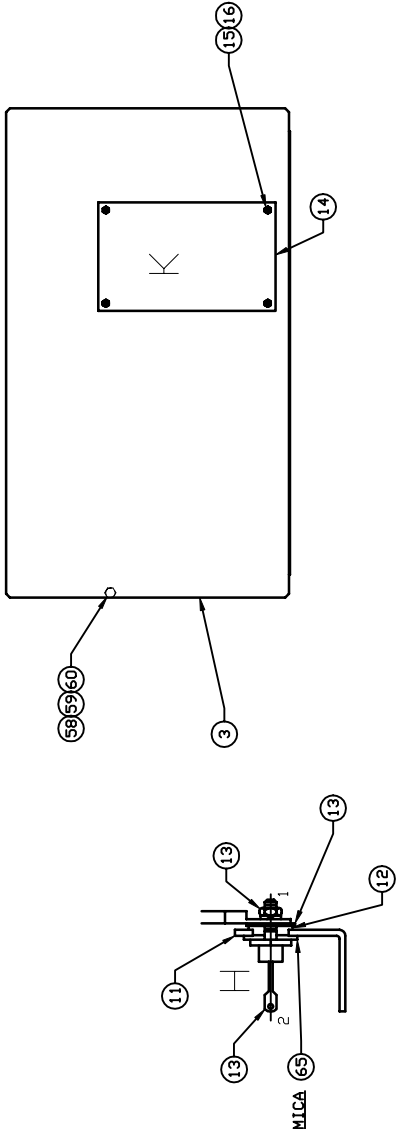
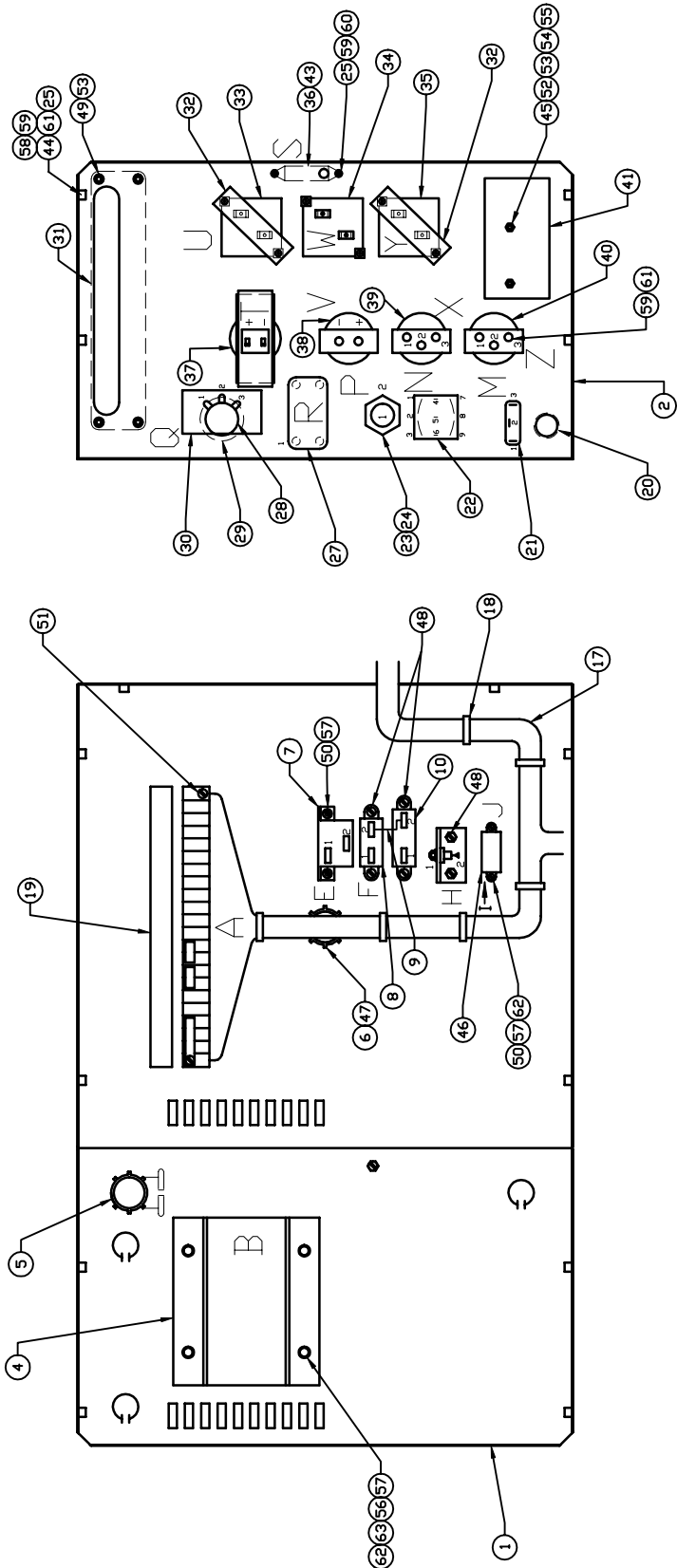
GROUP A

APPLICABLE TO:

ITEM	PART #	QTY.	DESCRIPTION
1	68115	1	PANEL, LOWER
2	68147	1	COVER, LOWER PANEL BLANK
3	40479	8	DAMPENER, VIBRATION
4	23484-N	1	BUSHING, SNAP
6	56739	2	SOLENOID (SILVER)
7	72868	1	COVER, CIRCUIT BREAKER (BQ2)
8	74137	1	CONVERTER-24V. DC. TO 12V. DC
9	39782	1	SUPPORT, CIRCUIT BREAKER (BQ2)
10	58568	3	TRANSFORMER, CURRENT-50/5
	61395	3	TRANSFORMER, CURRENT-100/5
	58318	3	TRANSFORMER, CURRENT-150/5
	58710	3	TRANSFORMER, CURRENT-200/5
	58377	3	TRANSFORMER, CURRENT-300/5
	57909	3	TRANSFORMER, CURRENT-400/5
11	48766	1	BLOCK, TERMINAL-2 CKT
12	22985	4	WASHER, FLAT-#6
13	68116	1	COVER, LOWER PANEL
14	68139	1	COVER, CIRCUIT BREAKER (BQ3)
15	68140	1	COVER, CIRCUIT BREAKER TERM.
16	39783	1	SUPPORT, CIRCUIT BREAKER
17	53691	1	BREAKER, CIRCUIT-90AMP. (BQ3)
	40532	1	BREAKER, CIRCUIT-100AMP. (BQ3)
	49135	1	BREAKER, CIRCUIT-70AMP. (BQ3)
	62812	1	BREAKER, CIRCUIT-80AMP. (BQ3)
18	81212	1	COVER, CIRCUIT BREAKER
19	81213	1	COVER, CIRCUIT BREAKER TERM.
20	54122	1	C/B-125A. (NF-225CTB))
	81311	1	C/B-150A. (NF-225CTB)
	81312	1	C/B-175A. (NF-225CTB)
	81313	1	C/B-200A. (NF-225CTB)
	81214	1	C/B-225A. (NF-225CTB))
21	81219	1	COVER, CIRCUIT BREAKER
22	81220	1	COVER, CIRCUIT BREAKER TERM.
23	81306	1	C/B-50A. (NF-50SB)
	80566	1	C/B-40A. (NF-50SB)
	76744	1	C/B-60A. (NF-100CB)
	81307	1	C/B-70A. (NF-100CB)
	81308	1	C/B-80A. (NF-100CB)
	81309	1	C/B-90A. (NF-100CB)
	81310	1	C/B-100A. (NF-100CB)
24	81302	1	COVER, CIRCUIT BREAKER
25	81301	1	COVER, CIRCUIT BREAKER TERM.
26	81314	1	BREAKER, CIRCUIT-250A. (NF-400CTA)
	81315	1	BREAKER, CIRCUIT-300A. (NF-400CTA)
	81316	1	BREAKER, CIRCUIT-350A. (NF-400CTA)
	81317	1	BREAKER, CIRCUIT-400A. (NF-400CTA)
27	33133	6	SCR., HEX HD. MACH.-#8-32 x 3/8"
29	22264	19	WASHER, LOCK-#8
30	C2212	4	M4-.7 x 16 TAPTITE
31	42907	6	CAPSCR., HEX HD.-5/16"-18 x 5/8"
32	22145	2	WASHER, FLAT-5/16"
33	22129	12	WASHER, LOCK-5/16"
34	22158	6	NUT, HEX-#10-32
35	22152	11	WASHER, LOCK-#10
36	23897	4	WASHER, FLAT-#10
37	69232	4	SCR., ROUND HEAD MACHINE SCREW #10-32 x 3-3/4"
38	71644	4	DAMPENER, VIBRATION
39	22471	9	NUT, HEX-#8-32
40	22507	8	CAPSCREW, SOCKET HD.-1/4"-20 x 3/4"
41	22287	27	CAPSCREW, HEX HEAD-1/4"-20 x 3/4"

ITEM	PART #	QTY.	DESCRIPTION
42	81320	4	CAPSCREW, SOCKET HD.-1/4"-20 x 4-1/2"
43	22473	19	WASHER, FLAT-1/4"
44	22097	47	WASHER, LOCK-1/4"
45	22127	12	NUT, HEX-1/4"-20"
46	45771	6	NUT, HEX-M8-1.25
47	27482	2	WASHER, LOCK (SHAKE PROOF)-5/16"
48	48374	1	BREAKER, CIRCUIT-100AMP. (BQ2)
49	62059	1	CHARGER, BATTERY-2AMP. 12VOLT
51	25853	4	SCREW, RD. HD. MACH.-#10-32 x 3"
52	58306	3	CAPSCREW, SOCKET HEAD-M8-1.25 x 25MM
53	69173	1	BAR, BUS-NEUTRAL STRAP
54	57329	1	LUG, GROUND-#6 AWG.
	62684	1	LUG, GROUND-2/0-#14 AWG.
55	57073	2	STUD, JUNCTION BLOCK
56	33530	2	SCREW, PAN HEAD MACHINE-#10-32 x 5/8"
57	39287	2	CAPSCREW, HEX HEAD-M8-.25 x 45MM
58	45771	2	NUT, HEX-M8 1.25
59	22511	1	CAPSCREW, HEX HEAD-3/8"-16 x 1-1/4"
60	22241	3	NUT, HEX HEAD-3/8-16"
61	22237	3	WASHER, LOCK-3/8"
62	22131	1	WASHER, FLAT-3/8"
63	22125	1	CAPSCREW, HEX HEAD-5/16"-18 x 1"
64	33130	4	HEX HEAD MACHINE SCREW-#8-32 x 14

GROUP B



EXPLODED VIEW:
CONTROL PANEL (OPTION C, 12 & 24V.)
DRAWING #: 70286

EXPLODED VIEW: CONTROL PANEL (OPTION C, 12 & 24V.)

DRAWING #: 70286

GROUP B

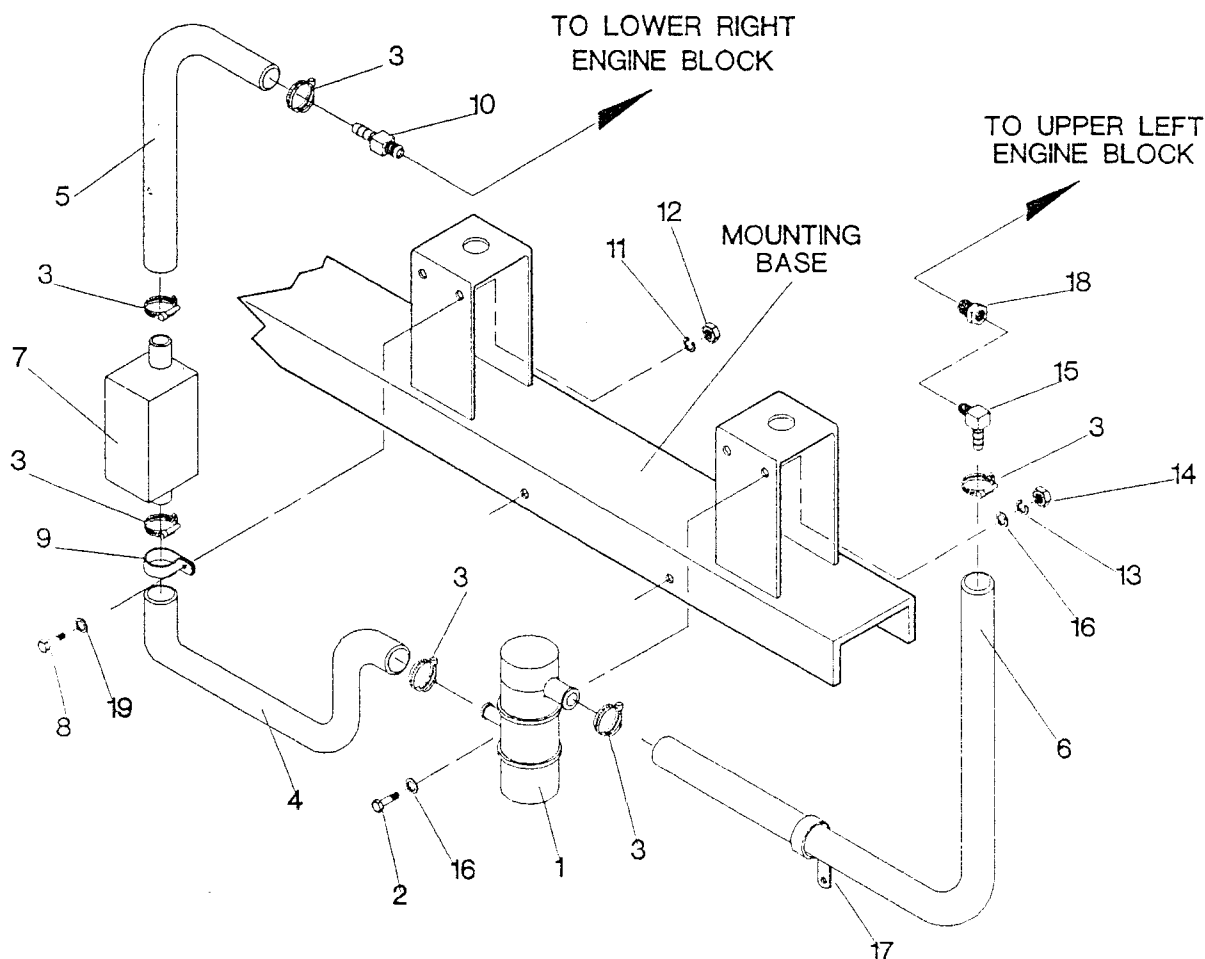
APPLICABLE TO:

ITEM	PART #	QTY.	DESCRIPTION
1	70023	1	BOTTOM, CONTROL PANEL
2	70026	1	FRONT, CONTROL CONSOLE
3	70028	1	SIDE, CONTROL CONSOLE
4	67680	1	REGULATOR, VOLT. (BRUSHLESS)
	67670	1	REGULATOR, VOLT. (DIRECT-EXCITED)
5	66050	1	CONNECTOR, 90 DEG.-3/4"
6	34616	1	CONNECTOR, STRAIGHT-3/4"
7	57159	1	CIRCUIT BREAKER-2AMP.
	53623	1	CIRCUIT BREAKER-2.5AMP.
	54502	1	CIRCUIT BREAKER-3AMP.
	56247	1	CIRCUIT BREAKER-3.5AMP.
	49350	1	CIRCUIT BREAKER-4AMP.
	48476	1	CIRCUIT BREAKER-4.5AMP.
	48512	1	CIRCUIT BREAKER-5AMP.
	54450	1	CIRCUIT BREAKER-5.5AMP.
	48505	1	CIRCUIT BREAKER-6AMP.
	48467	1	CIRCUIT BREAKER-7AMP.
	48468	1	CIRCUIT BREAKER-8AMP.
	48470	1	CIRCUIT BREAKER-9AMP.
8	57335	1	TERMINAL BLOCK
9	46669	6	JUMPER-TERMINAL BLOCK
10	* 48352	1	RESISTOR-5 OHM
	57907	1	RESISTOR-10 OHM
	57405	1	RESISTOR-25 OHM
11	55444	1	HEAT SINK
12	30468	1	WASHER, STEP (NYLON)
13	49839	1	RECTIFIER
14	69762	1	CIRCUIT BOARD-DC CONTROL- LATCH-CRANK
15	64525	4	STAND-OFF-CIRCUIT BOARD SUPPORT
16	64526	8	SCREW-SELF TAPPING-#6-32
17	70093	1	HARNESS, WIRING-24 VOLTS DIESEL ONLY
	70094	1	HARNESS, WIRING-12 VOLTS DIESEL ONLY
18	29333	6	TIE WRAP-7" LONG
19	70097	1	DECAL-TERMINAL STRIP
20	55920	1	SWITCH
21	55867	1	SWITCH, START/STOP
22	67625	1	SWITCH, AUTO/MANUAL/OFF
23	32300	1	HOLDER, FUSE
24	22668	1	FUSE-30AMP.
25	C2720	2	#10-32 x 3/8" TAPTITE
26	33147	1	#10-32 x 1" HHMS
27	61945	1	SWITCH
28	53693	1	POTENTIOMETER
29	50123	1	KNOB
30	55349	1	INSULATOR
31	70030	1	COVER
32	70080	2	INSULATOR
33	70042	1	FREQUENCY METER
34	70054	1	AC AMMETER-0 TO 50
	70055	1	AC AMMETER-0 TO 100
	70056	1	AC AMMETER-0 TO 150
	70045	1	AC AAMMETER-0 TO 200
	70057	1	AC AMMETER-0 TO 300
	70058	1	AC-AMMETER-0 TO 400
	70059	1	AC-AMMETER-0 TO 600
	70060	1	AC-AMMETER-0 TO 800
35	70043	1	AC-VOLTMETER-0 TO 300
	70044	1	AC-VOLTMETER-0 TO 600

ITEM	PART #	QTY.	DESCRIPTION
36	70202	1	PANEL LIGHT
37	70081	1	HOUR METER
38	62304	1	DC-AMMETER
39	55405	1	GAUGE, OIL PRESSURE
40	55406	1	GAUGE, OIL PRESSURE
41	70083	1	CIRCUIT BOARD-ENGINE MONITOR
42	55089	1	SOCKET HOUSING
43	70082	1	LIGHT BLOCKER
44	53247	1	LUG-#10
45	29187	2	SPACER
46	** 63617	2	RELAY (DPDT)-12V. DC, 10AMP.
47	59110-C	16"	FLEX-GUARD-5/8" I.D.
48	36261	6	POP RIVET
50	C2212	4	M4-.7 x 16 TAPTITE
51	A1661	2	POP RIVET
52	33142	2	SCREW, HEX HD. MACH.-#6-32 x 7/8"
53	22155	6	WASHER, LOCK-#6
54	22985	1	WASHER, FLAT-#6
55	22188	2	NUT, HEX-#6-32
56	33135	4	SCREW, HEX HD. MACH.-#8-32 x 1/4"
57	22264	8	WASHER, LOCK-#8
58	33121	7	SCREW, HEX HD. MACH.-#10-32 x 1/2"
59	22152	32	WASHER, LOCK-#10
60	23897	16	WASHER, FLAT-#10
61	22158	17	NUT, HEX-#10-32
62	38150	6	WASHER, FLAT-#8
63	22471	4	NUT, HEX-#8-32
64	70035	1	HARNESS ASSEMBLY (NOT SHOWN)
65	70370	2	WASHER, MICA
66	70882	1	SUPPRESSION ASSEMBLY

* NOT USED ON 24 VOLT DIESEL UNITS

** NOT USED ON 12 VOLT DIESEL UNITS

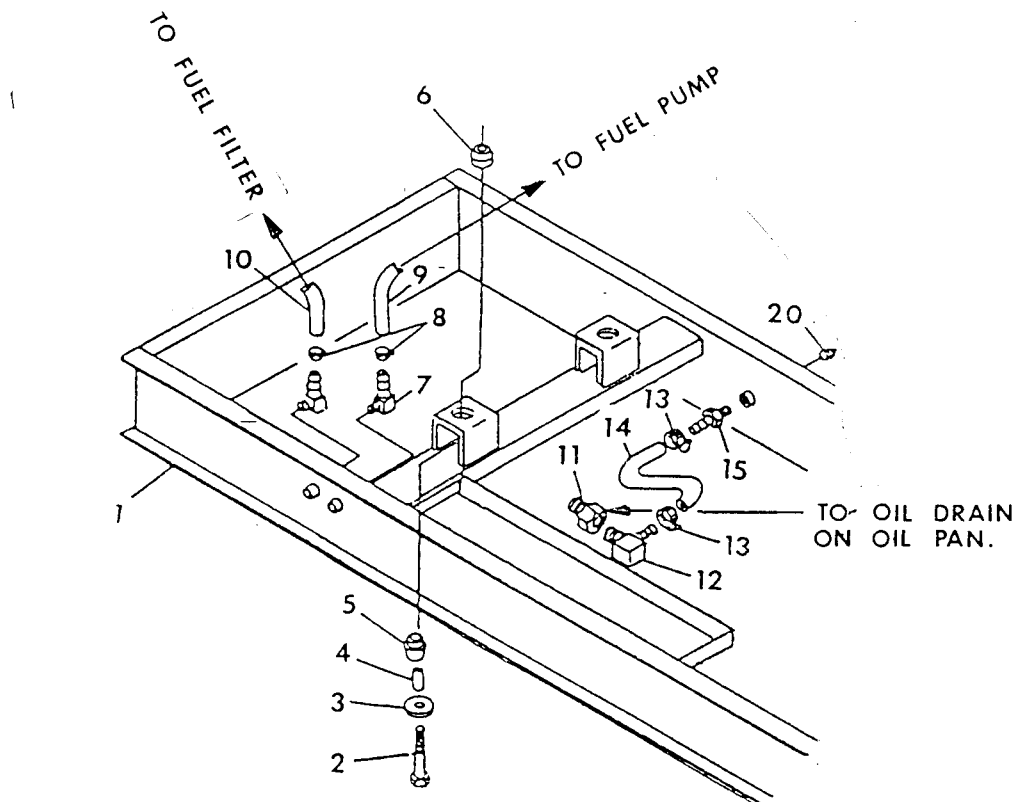


ITEM	PART NO.	QTY.	DESCRIPTION
1	66034-A	1	HEATER, BLOCK-1000 WATT-120VAC
	*66034F	1	HEATER, BLOCK-1500W-220VAC
2	42907	2	CAPSCREW, HEX HEAD-M8-1.25 x 16MM
3	57823	6	CLAMP, HOSE
4	50967	1	HOSE-5/8" I.D. x 22-1/2" LONG
5	50967	1	HOSE-5/8" I.D. x 7-3/4" LONG
6	50967	1	HOSE-5/8" I.D. x 18" LONG
7	66034-C	1	THERMOSTAT, HEATER
8	42568	2	CAPSCREW, HEX HEAD-M6-1.00 x 20MM
9	55934-E	3	CLAMP
10	63891	1	ADAPTOR, HOSE TO BLOCK
11	22097	2	WASHER, LOCK-M6
12	49813	2	NUT, HEX-M6-1.00
13	22129	2	WASHER, LOCK-M8
14	45771	2	NUT, HEX-M8-1.25
15	56460	1	ELBOW, BARBED 90 DEG.-5/8" x 1/2" NPT
16	22145	3	FLAT WASHER-5/16
17	55934A	1	CLAMP
18	30418	1	REDUCING BUSHING
19	22473	1	FLAT WASHER-1/4

* USED ON "R" VOLTAGE GENERATOR ONLY

Item	Part No.	Req'd	Description
1	74201	1	BASE, Mounting
2	52891	2	CAPSCREW, Hex Head- M12-1.75 x 80mm
3	52259	2	WASHER
4	55598	2	SPACER
5	52252	2	MOUNT, Vibration
6	52251-A	2	MOUNT, Vibration
7	49340	2	FITTING, Barbed 90° - 3/8" x 1/4" NPT
8	40173	4	CLAMP, Hose- #5.5
9	47290	1	HOSE- 3/8" ID x 28" long
10	47290	1	HOSE- 3/8" id X 26"
11	65317	1	ADAPTER, Oil Drain
12	56460	1	ELBOW, 90° - 1/2" x 5/8"
13	57823	2	CLAMP, Hose- No. 10
14	57448	1	HOSE- 5/8" ID x 18" long
15	44118	1	FITTING, Hose- 1/2" NPT x 5/8"
16*	51756	1	CAPSCREW, Hex Head- M10-1.50 x 20mm
17*	22131	1	WASHER, Flat- M10
18*	46526	1	WASHER, Lock- M10
19*	25507	1	WASHER, External Shakeproof
20	24310	1	PLUG, Pipe- 1/2"
21*	27-53621	1	WIRE ASSY
22*	43107	1	CAPSCREW, Hex Head- M8-1.25 x 25mm
23*	22145	2	WASHER, Flat- M8
24*	22129	1	WASHER, Lock- M8
24*	27482	1	WASHER, External Shakeproof- M8
25*	45771	1	NUT, Hex - M8-1.25

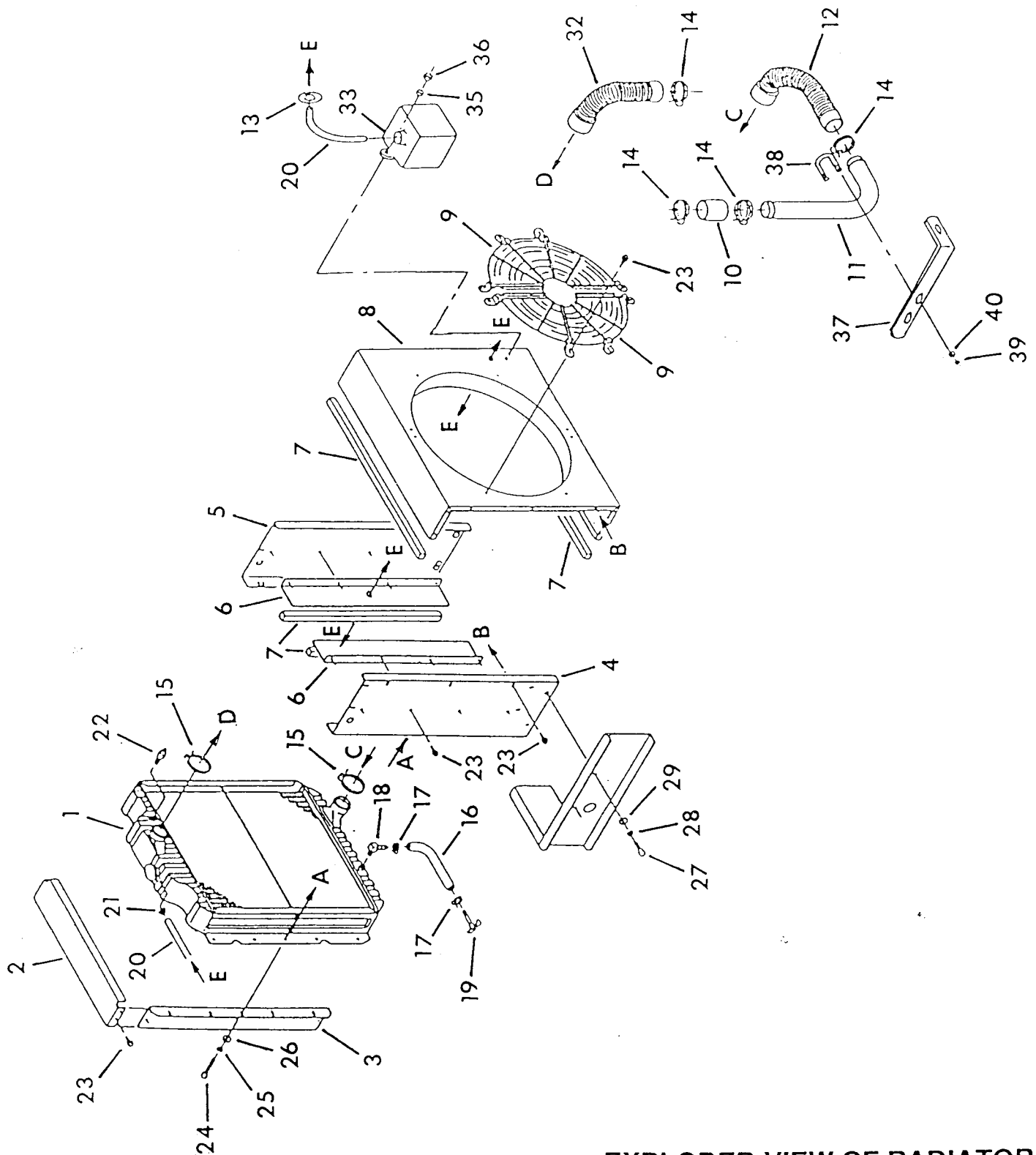
* NOT SHOWN- Parts are required to assemble grounding wire (Item 21) from engine to mounting base



Exploded View of Mounting Base

Drawing No. 74202

Issued- 11/10/87



EXPLODED VIEW OF RADIATOR

Drawing No. 74203

Issued- 11/10/87

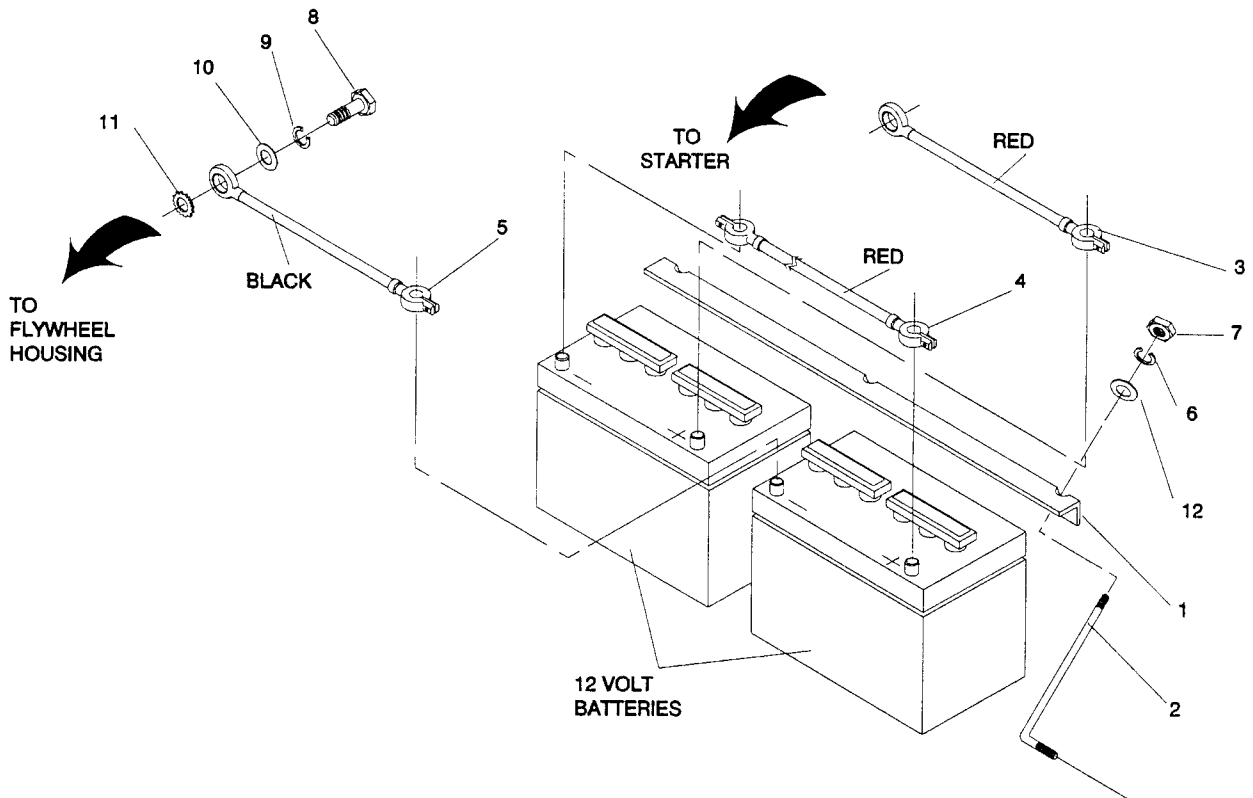
EXPLODED VIEW OF RADIATOR

Drawing No. 74203

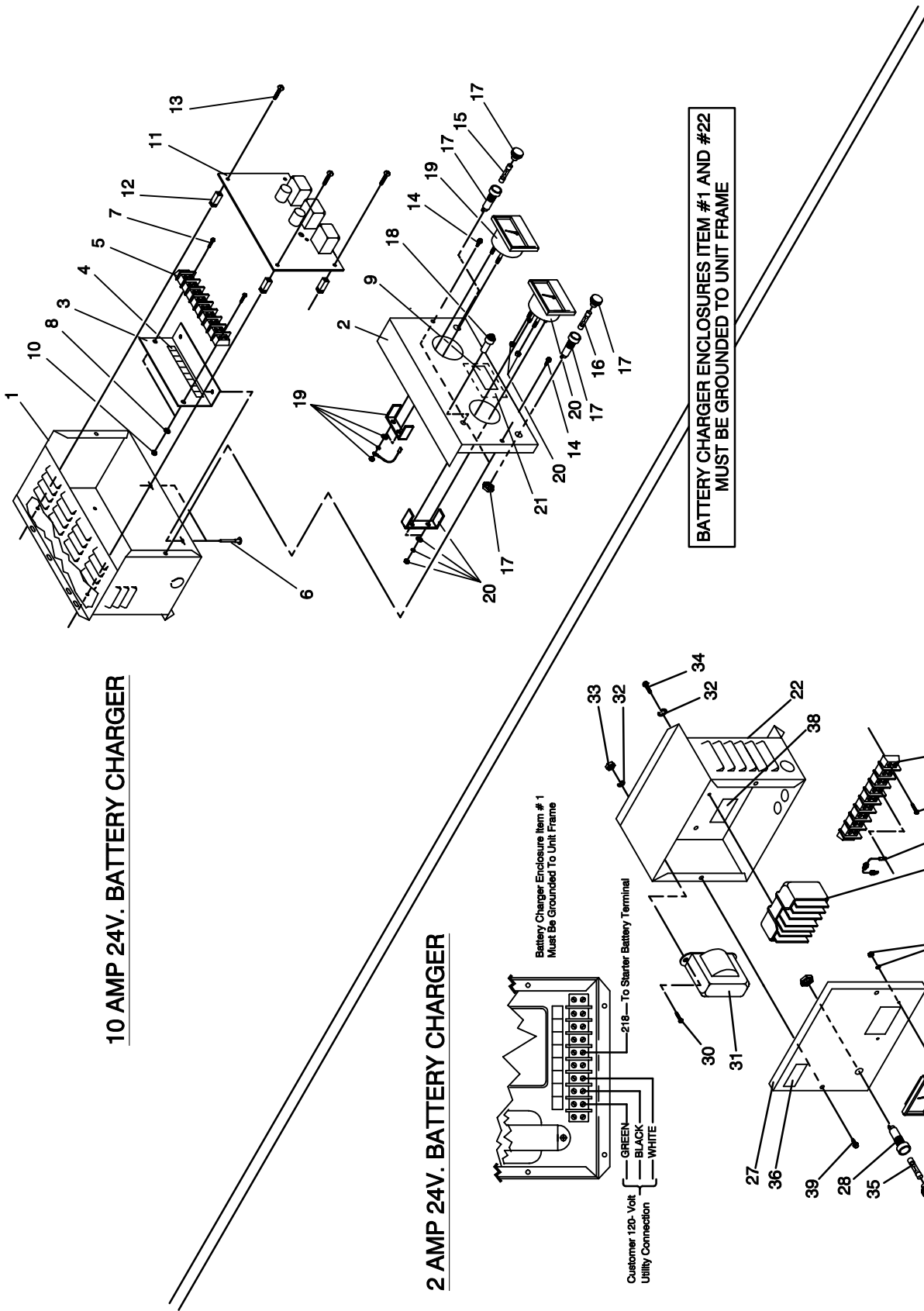
Issued- 11/10/87

Item	Part No.	Req'd	Description
1	69593-A	1	RADIATOR
2	70221	2	DUCT, Air- Top & Bottom (Optional)
3	70220	1	DUCT, Air- Side (Optional)
	70220-A	1	DUCT, Air- Side (Optional)
4	70218	1	SUPPORT, Radiator Side
5	70218-A	1	SUPPORT, Radiator Side
6	70219	2	SUPPORT, Side Seal
7	52250	1	TAPE, Foam- 1" square x 10' long
8	74200	1	VENTURI
9	55460	2	GUARD, Fan
10	58067	1	TUBING
11	69941	1	HOSE, Lower Radiator
12	73206	1	HOSE, Radiator- 2" ID x 20" long
13	23484-E	2	BUSHING, Snap
14	42561	5	CLAMP, Hose- No. 36
15	39294	2	CLAMP, Hose- No. 44
16	47290	1	HOSE- 3/8" ID x 17" long
17	35472	2	CLAMP, Hose- No. 6
18	49340	1	FITTING, Barbed 90°- 1/4" x 3/8"
19	36865	1	PETCOCK
20	29032	1	HOSE- 5/16" ID x 56" long
21	40161	2	CLAMP, Hose
22	57522	1	SENSOR, Water Level
23	58442	38	SCREW (Crimptite)- 1/4"-20 x 1/2"
24	39253	10	CAPSCREW, Hex Head- M8-1.25 x 20mm
25	22129	10	WASHER, Lock- M8
26	22145	10	WASHER, Flat- M8
27	52645	4	CAPSCREW, Hex Head- M12-1.75 x 30mm
28	51769	4	WASHER, Lock- M12
29	22250	4	WASHER, Flat- M12
32	73205	1	HOSE, Radiator- 2" x 1-3/4" ID x 23-1/2" long
33	61960	1	BOTTLE, Coolant Recovery
35	22473	1	WASHER, Flat- 1/4"
36	58443	1	SCREW (Crimptite)- 1/4"-20 x 5/8"
37	70235	1	SUPPORT, Radiator Tube
38	35480	1	U-BOLT - 2"
39	22259	2	NUT, Hex - 5/16"-18
40	22129	2	WASHER, Lock- 5/16"

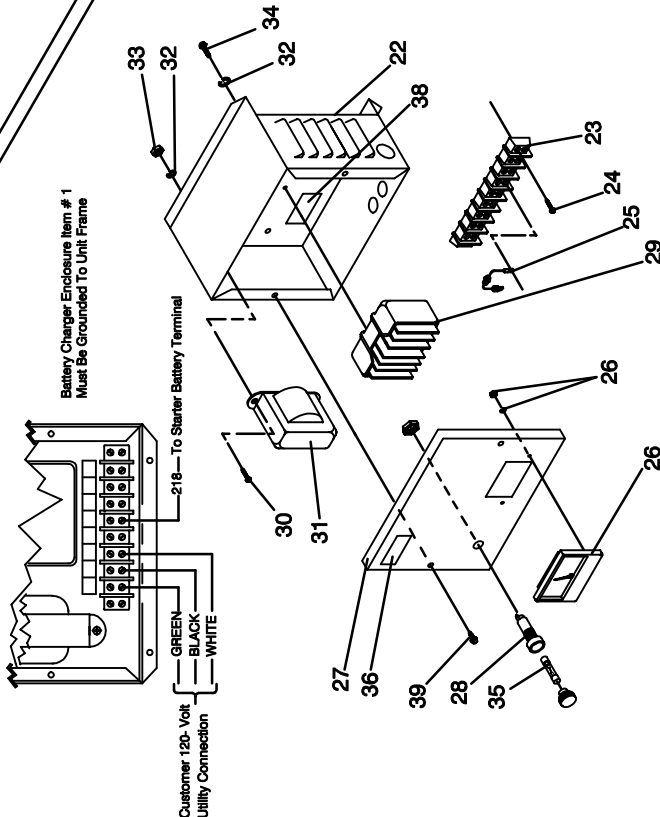
ITEM	PART NO.	QTY.	DESCRIPTION
1	78343	1	HOLD-DOWN, BATTERY-26" LONG
2	59567	3	BOLT, BATTERY HOLD DOWN
3	38804-T	1	CABLE, BATTERY(RED)-31" LONG
4	AA-38804	1	CABLE, BATTERY(RED)-44" LONG 4.0L-HINO SAE
5	65314-B	1	JUMPER, BATTERY CABLE(RED) 25" LONG
6	38805-K	1	CABLE, BATTERY(BLACK)-13" LONG
7	38805-J	1	CABLE, BATTERY(BLACK)-30" LONG 4.0L-HINO SAE
8	22129	3	LOCK WASHER, 5/16"-M8
9	22259	3	NUT, HEX LOCK-5/16"-18
10	52617	1	CAPSCREW, HEX HEAD-M12-1.75 x 20MM
11	51769	1	WASHER, LOCK-M12
12	22250	1	WASHER, FLAT-M12
13	25507	1	WASHER, EXTERNAL SHAKEPROOF
14	22145	3	FLAT WASHER-5/16"



10 AMP 24V. BATTERY CHARGER



2 AMP 24V. BATTERY CHARGER



EXPLODED VIEW: BATTERY CHARGER 10A./2A. 24V.

DRAWING #: 063543

GROUP D

APPLICABLE TO:

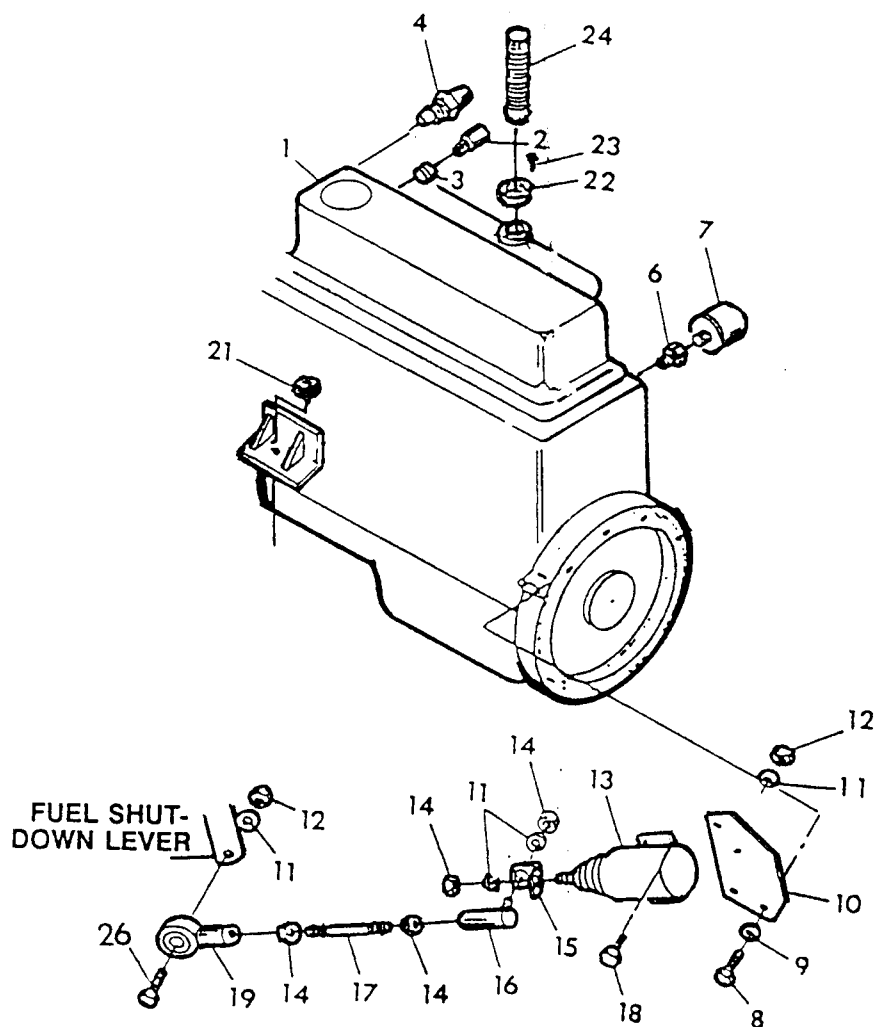
ITEM	PART #	QTY.	DESCRIPTION
<u>10 AMP 24V. BATTERY CHARGER</u>			
1	079517	1	BATT.CHGR. ENCLOSURE
2	079520	1	SILKSCREEN COVER
3	079523	1	TERMINAL BLOCK BRKT.
4	079527	1	TERMINAL BLOCK DECAL
5	079524	1	BLOCK TERM 30A 7 X 8 X 1600V
6	036261	2	RIVET POP .125 X .129-.133/#30
7	036935	2	SCREW PPHM #10-32 X 3/4
8	023762	2	WASHER SHAKEPROOF EXT #10 STL
9	049529	1	DECAL CAUTION 120-V
10	022158	2	NUT HEX #10-32 STEEL
11	067666A	1	ASSY PCB 10A 24/120V
12	072566A	5	NUT,SPACER .375 PCB
13	079529	5	PPHTC SCREW M4.2X16
14	056892	2	CRIMPTITE 10-24 X 3/8
15	067683	1	FUSE 12 AMP
16	067682A	1	FUSE 7A X 3AG SLO BLO GLASS
17	032300	2	FUSE HOLDER
18	061525	1	LIGHT 120V NEON LAMP/HOLDER
19	061526	1	AMMETER 0-15ADC 2-1/2"
20	061528	1	VOLTMETER 0-30VDC 2-1/2"
21	079528	1	WIRING DECAL BAT CHG
<u>2 AMP 24V. BATTERY CHARGER</u>			
22	062063	1	BATT CHRGR ENCLOSURE
23	022713	1	BLOCK TERM 30A 8 X 8 X 1600V
24	036935	2	SCREW PPHM #10-32 X 3/4
25	049903L	1	DOIDE BATT CH LUGGED
26	062060	1	AMMETER 0-5A DC 1/4FAST-ON TAB
27	062068A	1	SILK COVER 24V 2A BC
28	032300	1	HOLDER FUSE
29	062674	1	PCB 24V2A BATT CHRGR
30	036933	2	SCREW PPHM #10-32 X 3/8
31	062061L	1	TRANS BATT CH LUGGED
32	023762	6	WASHER SHAKEPROOF EXT #10 STL
33	022158	6	NUT HEX #10-32 STEEL
34	036932	2	SCREW PPHM #10-32 X 1/4
35	028578	1	FUSE 10A X AGC10
36	049529	1	DECAL CAUTION 120-V
37	067080	1	DECAL CHARG WIRING (NOT SHOWN ON INSIDE COVER)
38	063544	1	DECAL TERM BLK 8 PT
39	056892	2	CRIMPTITE 10-24 X 3/8

EXPLODED VIEW-ENGINE COMMON PARTS

DRAWING NO.71258

GROUP D

ITEM	PART NO.	QTY.	DESCRIPTION
1	64238	1	ENGINE-4.0 LITER DIESEL
2	53667	1	SENDER, COOLANT TEMPERATURE
3	63892	1	ADAPTOR, COOLANT TEMP. SENDER
4	35606	1	SWITCH, HIGH COOLANT
6	42574	1	ADAPTOR, OIL PRESSURE SENDER
7	53666	1	SENDER, OIL PRESSURE
8	52617	2	CAPSCREW-M12-1.75 x 20MM
9	51769	2	WASHER, LOCK-M12
10	66130	1	BRACKET, SOLENOID
11	22097	5	WASHER, LOCK-M6
12	49813	3	NUT, HEX-M6-1.00
13	66131	1	SOLENOID-24 VOLTS
14	36409	4	NUT-1/4"-28
15	57182	1	BRACKET
16	49954	1	JOINT, BALL
17	66132	1	STUD, 1/4"-28
18	42568	2	CAPSCREW, M6-1.00 x 20MM
19	51145	1	END, ROD
21	52860	2	NUT, LOCK-M12-1.75
22	63871	1	ADAPTOR, EXHAUST OUTLET
23	64416	3	CAPSCREW, HEX HEAD-M10-1.50 x 45MM
24		1	EXHAUST, FLEXIBLE
25	69930	1	HARNESS, ENGINE WIRING(NOT SHOWN)
26	38750	1	CAPSCREW, HEX HD.-1.00 x 30MM



EXPLODED VIEW-TURBOCHARGER

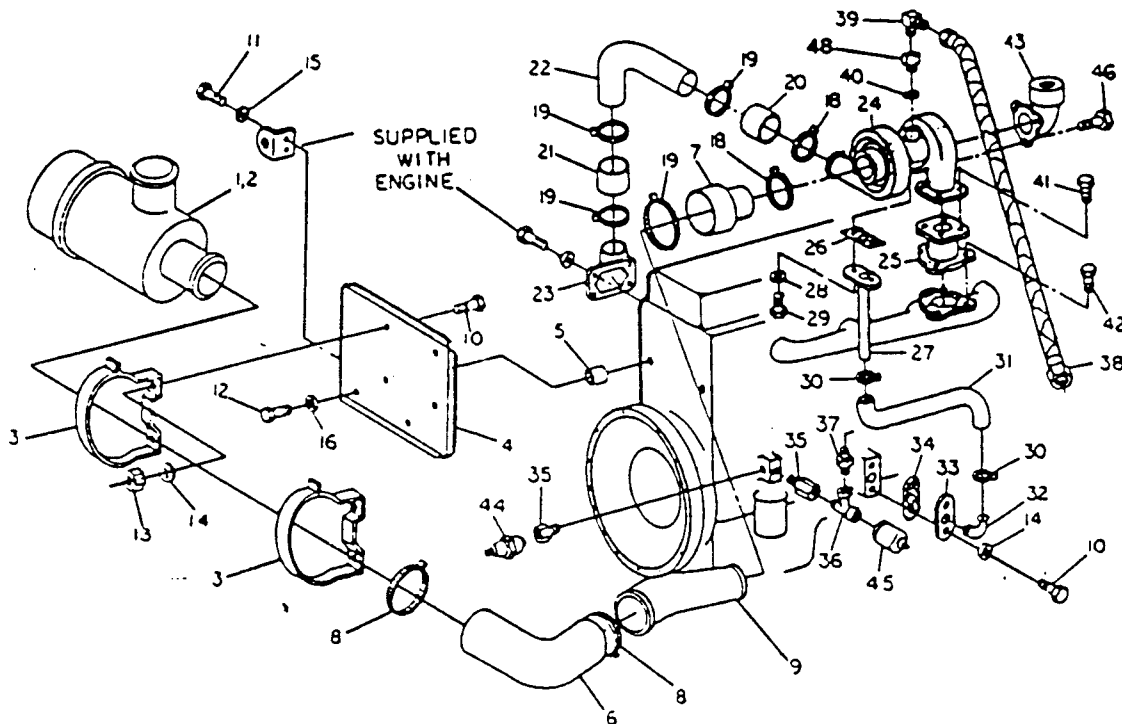
DRAWING NO. 65370

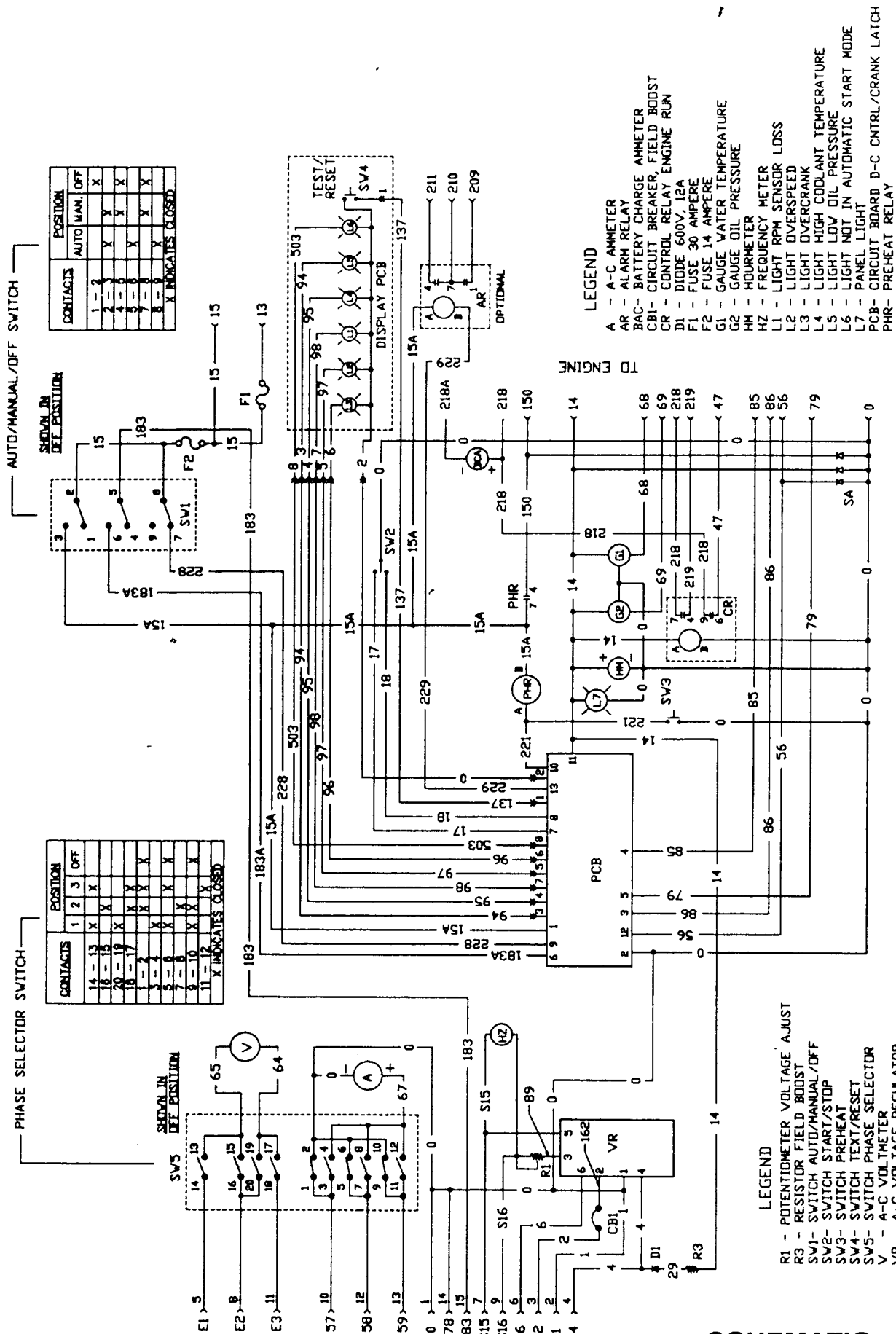
GROUP E

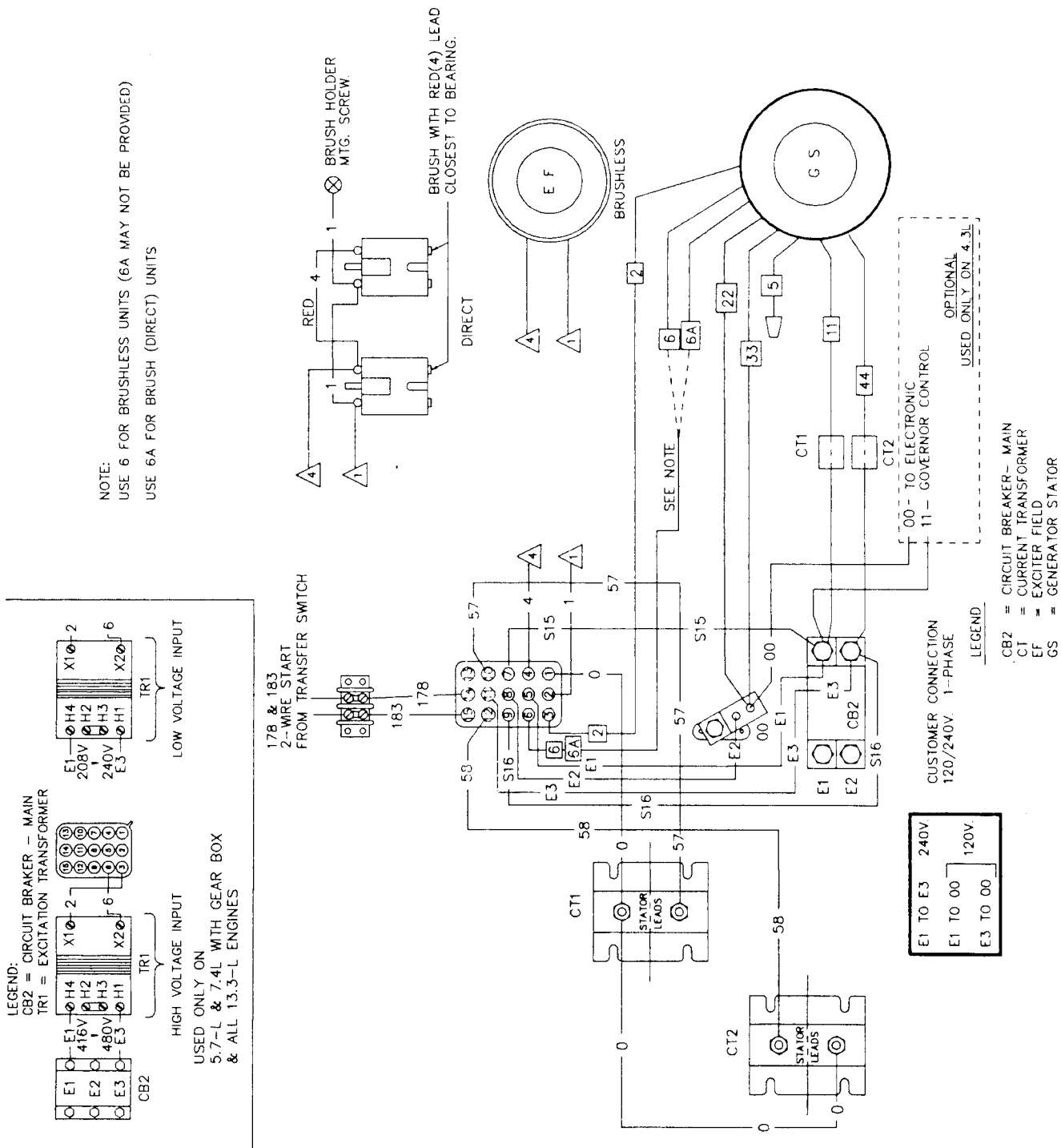
ITEM	PART NO.	QTY.	DESCRIPTION
1	65232	1	CLEANER, AIR
2	65234	1	ELEMENT, AIR CLEANER
3	57183	2	BAND, AIR CLEANER MTG.
4	63897	1	BRACKET, AIR CLEANER MTG.
5	65233	2	SPACER
6	65231	1	ELBOW, REDUCER-90DEG.
7	64085	1	COUPLING, REDUCER
8	66212	2	CLAMP, HOSE
9	66103	1	TUBE, INLET
10	39253	4	CAPSCR., HEX HD.-M8-1.25 x 20MM
11	49541	2	CAPSCR., M10-1.50 x 16MM
12	53559	2	CAPSCR., M12-1.75 x 45MM
13	45771	4	NUT, HEX-M8
14	22129	6	WASHER, LOCK-M8
15	46526	2	WASHER, LOCK-M10
16	51769	2	WASHER, LOCK-M12
18	35685	2	CLAMP, HOSE
19	42561	4	CLAMP, HOSE
20	59999-G	1	TURBO CONNECTOR
21	59379	1	COUPLING, REDUCER
22	65311	1	COUPLING, REDUCER
23	65336	1	ADAPTOR, MANIFOLD
24	80581	1	TURBOCHARGER

ITEM	PART NO.	QTY.	DESCRIPTION
25	65304	1	ADAPTOR, TURBOCHARGER
26	64417	1	GASKET
27	64086	1	LINE, OIL
28	47411	2	CAPSCR., M6-1.00 x 16MM
29	22097	2	WASHER, LOCK-M6
30	57822	2	CLAMP, HOSE
31	65386	1	HOSE, 5/8" I.D. x 16-1/2" LONG
32	34339	1	ELBOW, 90 DEG. BARBED-3/8" NPT x 5/8"
33	65346	1	COVER, FLANGE
34	65345	1	GASKET
35	42574	2	ADAPTOR
36	65376	1	FITTING, TEE-1/8" NPT
37	65375	1	ADAPTOR-1/8" NPT
38	64096-A	1	LINE, OIL
39	64094	1	ELBOW, 90DEG.
40	64093	1	WASHER (COPPER)
41	55173	4	CAPSCR., M8-1.25 x 20MM
42	51756	3	CAPSCR., M10-1.50 x 20MM
43	65356	1	ELBOW, EXHAUST OUTLET
44	60108	1	SWITCH, OIL PRESSURE
45	53666	1	SENDER, OIL PRESSURE
46	40976	3	CAPSCR., SOCKET HD.-M8-1.25 x 20MM
47*	65382	1	GASKET, MANIFOLD ADAPTOR
48	64092	1	ADAPTOR

* NOT SHOWN



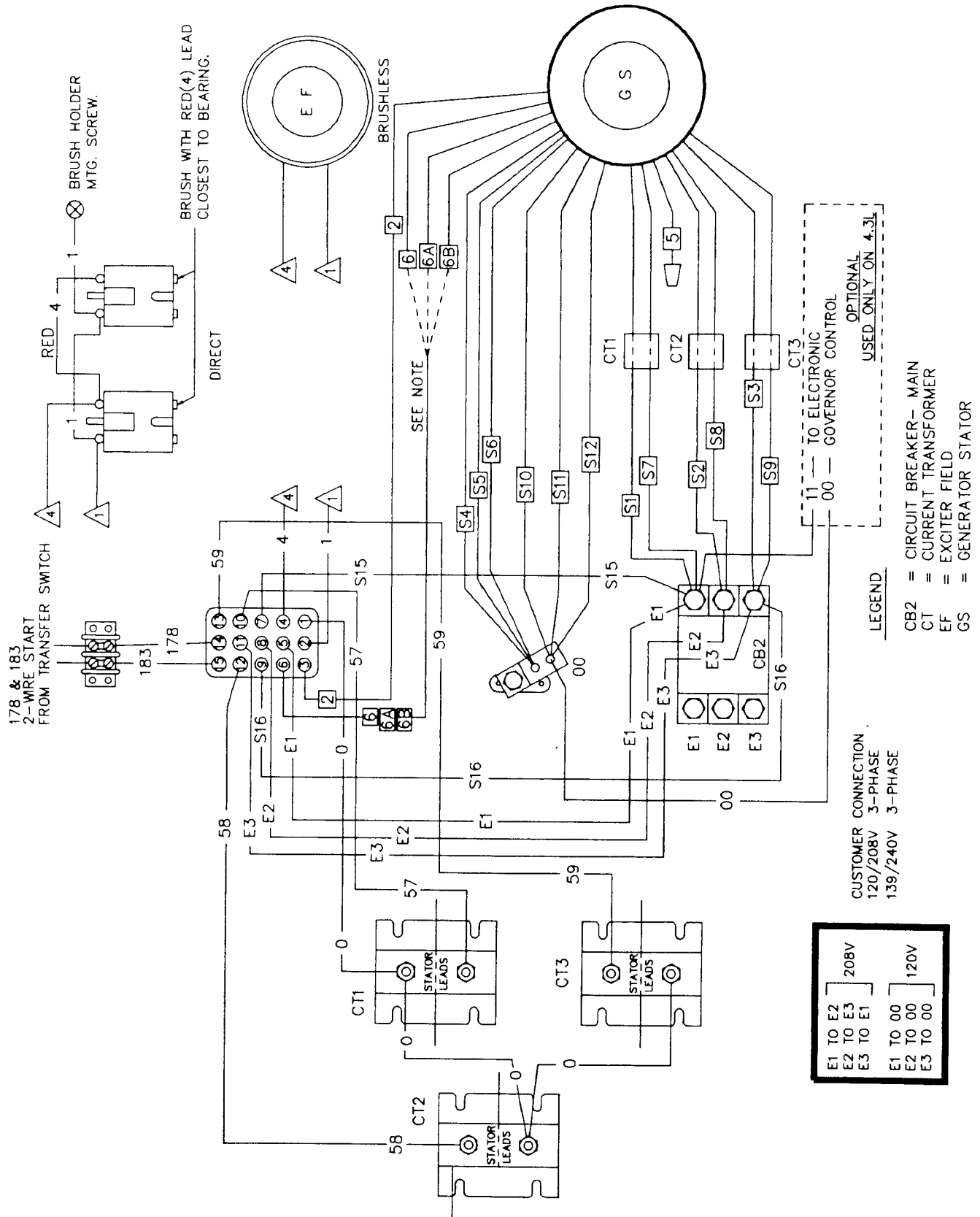




WIRING DIAGRAM
GENERATOR & AC CONNECTION PANEL
 DRAWING NO. 70289

NOTE:

USE 6 FOR BRUSHLESS UNITS (6A AND/OR 6B MAY NOT BE PROVIDED)
 USE 6A FOR 120/280V, 120/240V, AND 240/416V CONNECTED BRUSH (DIRECT) UNITS.
 USE 6B FOR 139/240V AND 277/480V CONNECTED BRUSH (DIRECT) UNITS.



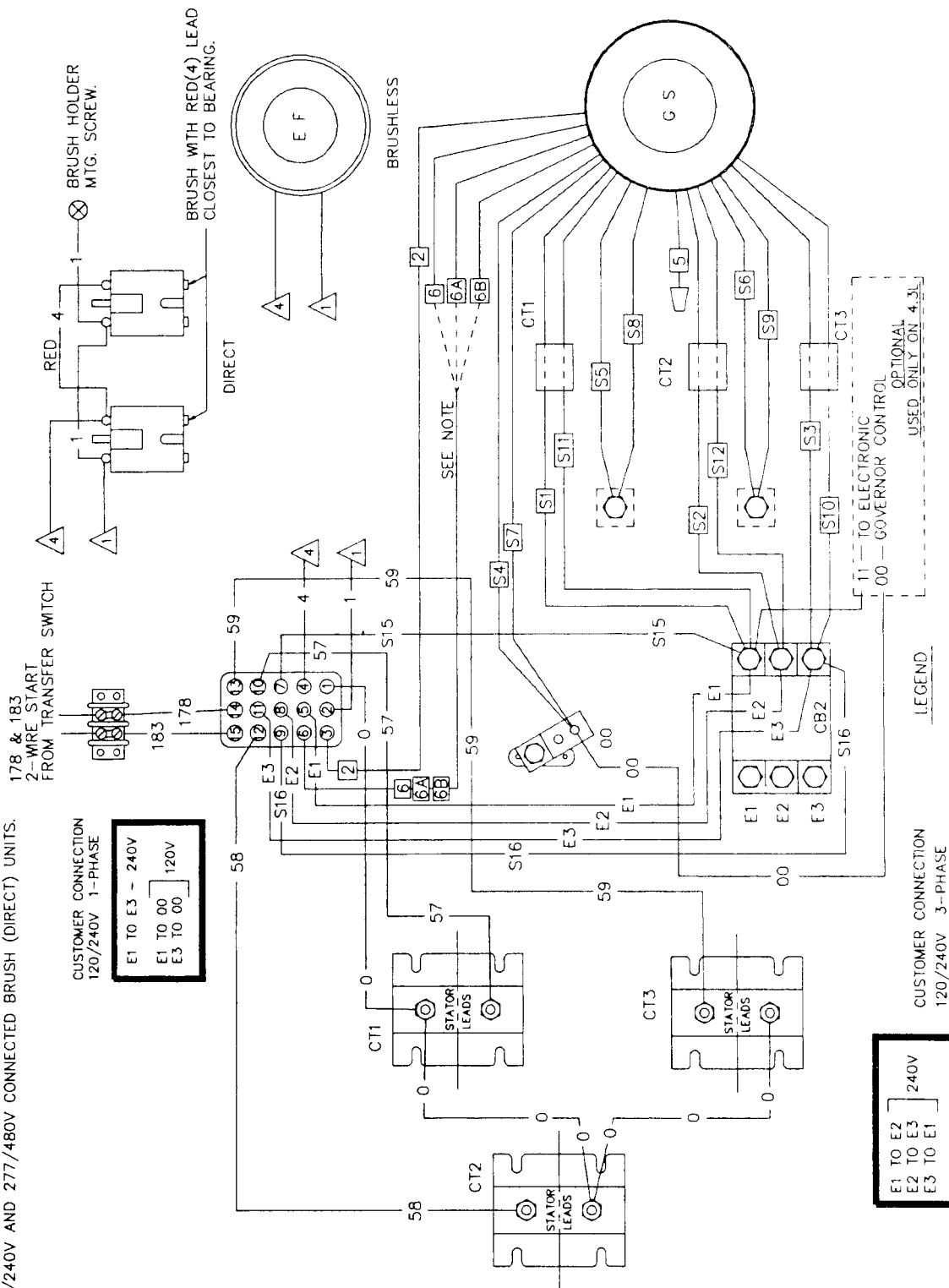
WIRING DIAGRAM
GENERATOR & AC CONNECTION PANEL
 DRAWING NO. 70289

REVISION:

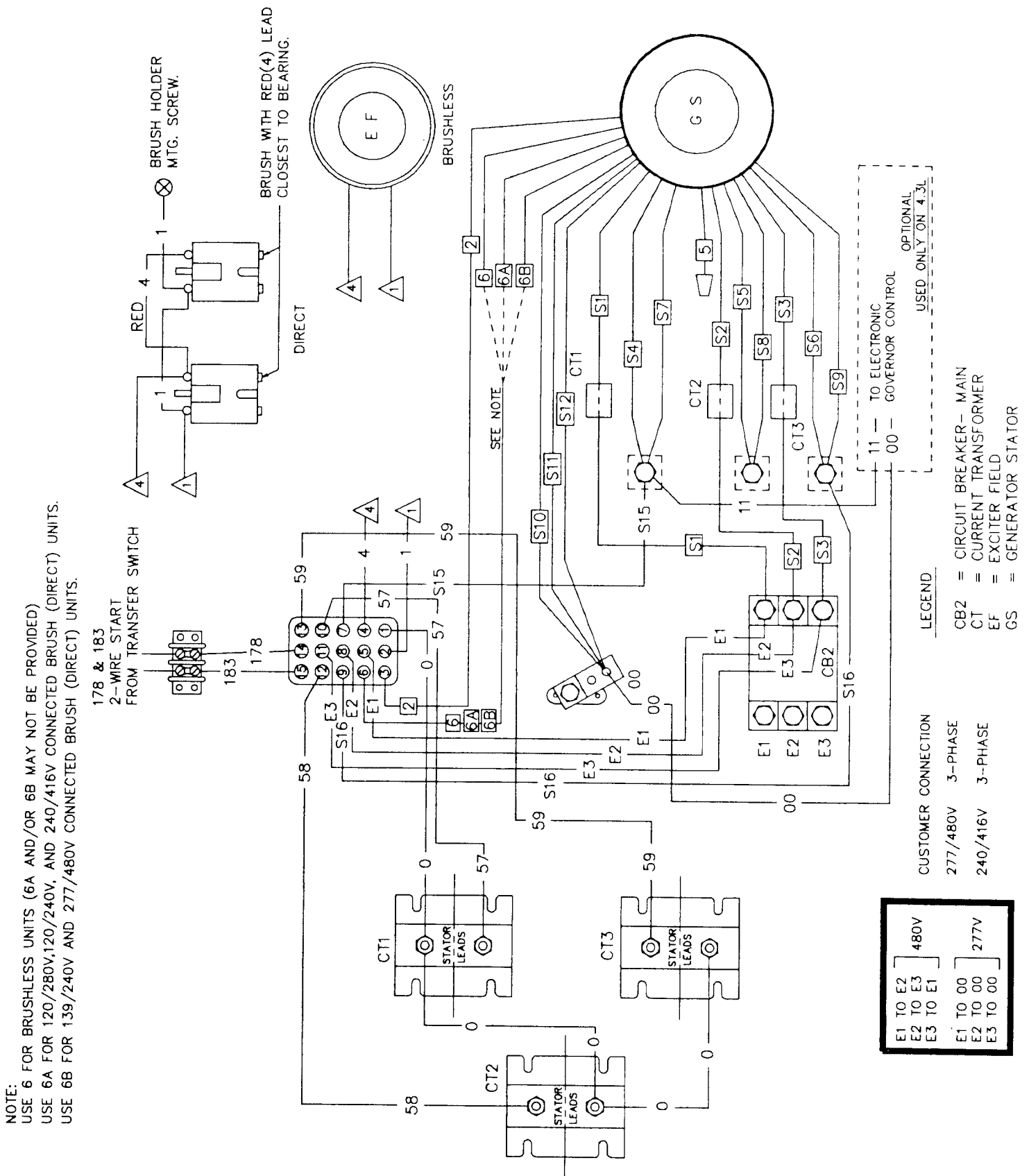
DATE: AUG. 8, 1991

PAGE 2 OF 4

NOTE:
 USE 6 FOR BRUSHLESS UNITS (6A AND/OR 6B MAY NOT BE PROVIDED)
 USE 6A FOR 120/280V, 120/240V, AND 240/416V CONNECTED BRUSH (DIRECT) UNITS.
 USE 6B FOR 139/240V AND 277/480V CONNECTED BRUSH (DIRECT) UNITS.



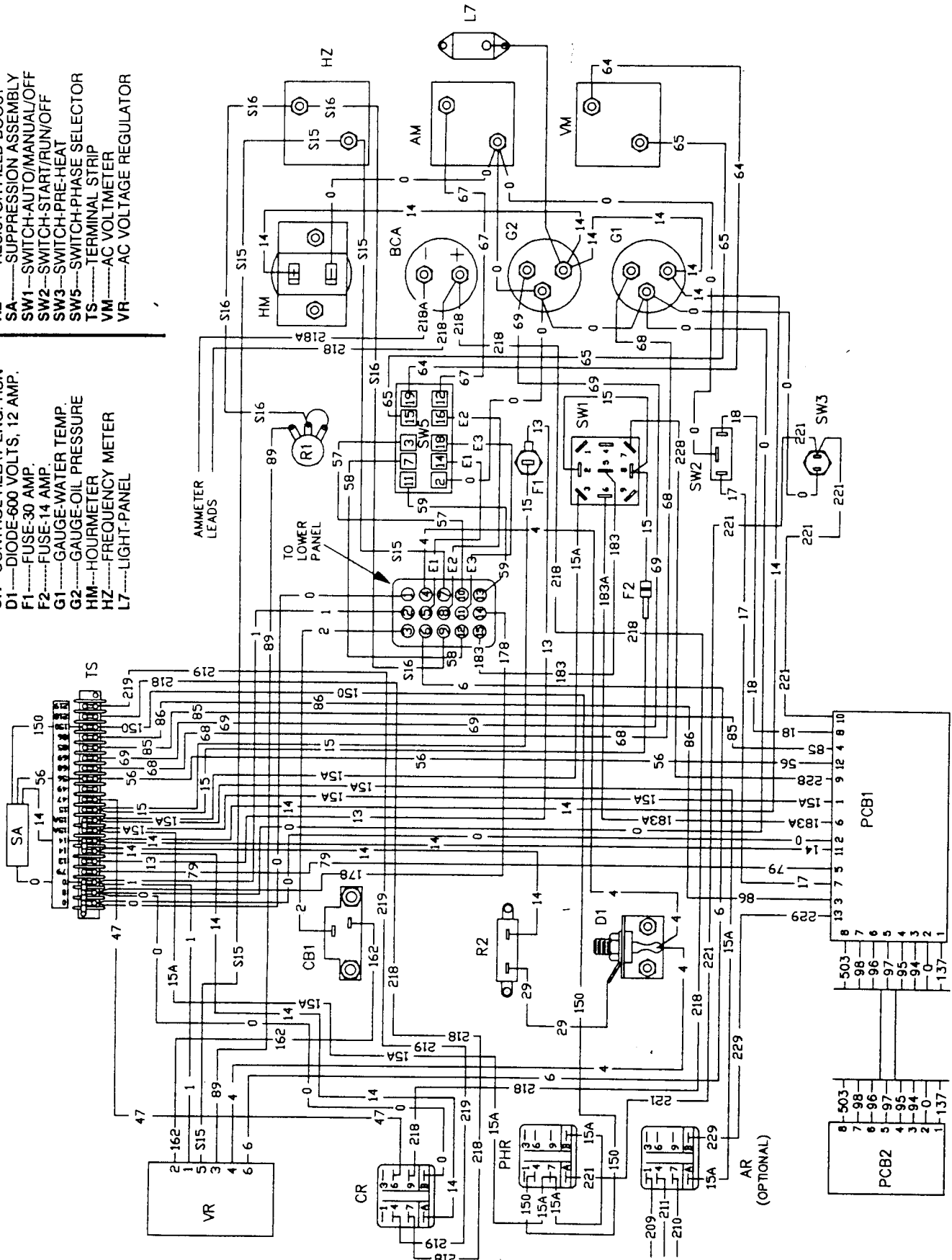
WIRING DIAGRAM
GENERATOR & AC CONNECTION PANEL
 DRAWING NO. 70289



WIRING DIAGRAM
GENERATOR & AC CONNECTION PANEL
DRAWING NO. 70289

LEGEND

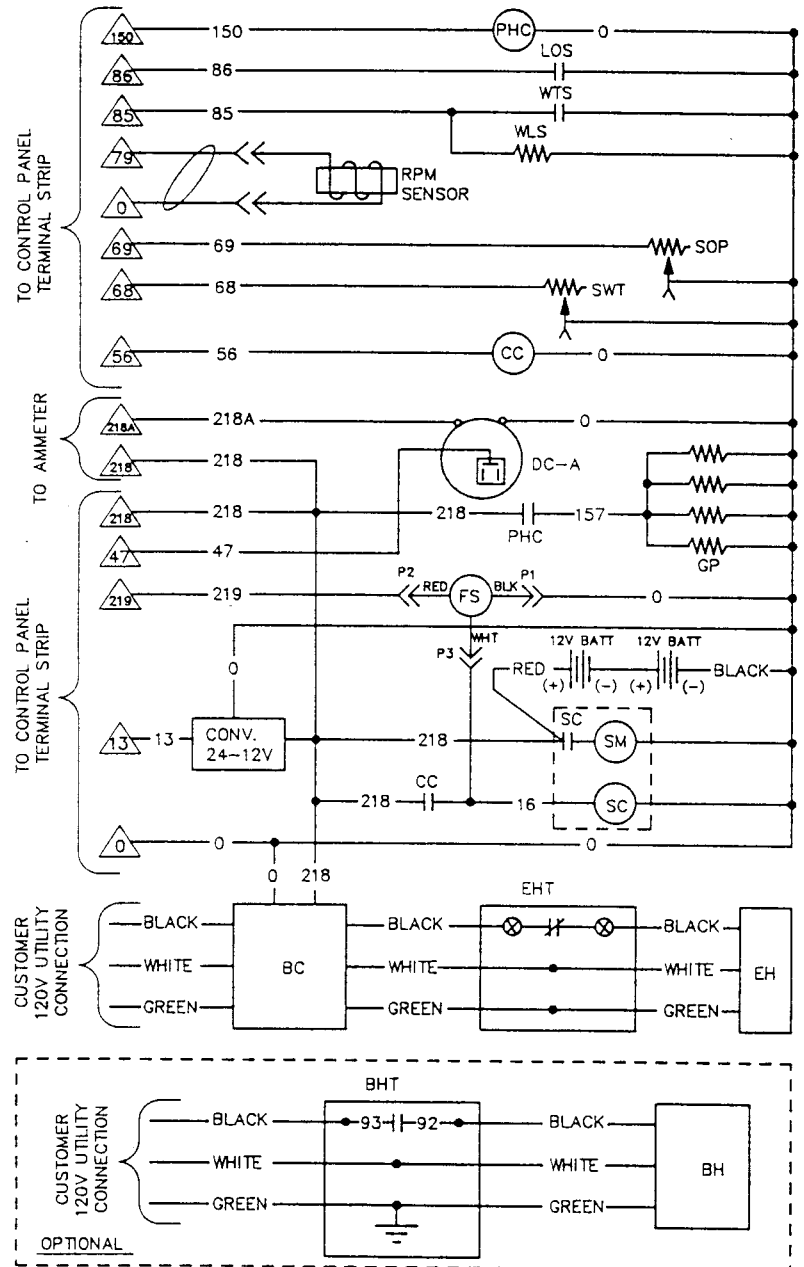
- AM---AC AMMETER
 AR---ALARM RELAY
 BCA---BATTERY CHARGE AMMETER
 CB1---C/B-FIELD BOOST
 CR---CONTROL RELAY-ENG. RUN
 D1---DIODE-600 VOLTS, 12 AMP.
 F1---FUSE-30 AMP.
 F2---FUSE-14 AMP.
 G1---GAUGE-WATER TEMP.
 G2---GAUGE-OIL PRESSURE
 HM---HOURMETER
 HZ---FREQUENCY METER
 L7---LIGHT-PANEL
 PCB1---C/B-DC CONTROL/CRANK-LATCH
 PCB2---C/B-ENGINE CONTROL
 PHR---PRE-HEAT RELAY
 R1---POTENTIOMETER
 R2---RESISTOR-FIELD BOOST
 SA---SUPPRESSION ASSEMBLY
 SW1---SWITCH-AUTO/MANUAL/OFF
 SW2---SWITCH-START/RUN/OFF
 SW3---SWITCH-PRE-HEAT
 SW5---SWITCH-PHASE SELECTOR
 TS---TERMINAL STRIP
 VM---AC VOLTMETER
 VR---AC VOLTAGE REGULATOR



WIRING DIAGRAM
 CONTROL PANEL "C" OPTION-24V. DIESEL
 DRAWINGNO. 71227

LEGEND

B - BATTERY 12-V.
 BC - BATTERY CHARGER
 BH - BATTERY HEATER THERMOSTAT
 BHT - BATTERY HEATER THERMOSTAT
 C - CONVERTER 24 TO 12-V. DC
 CC - CONTROL CONTACTOR
 DCA - DC ALTERNATOR
 EH - ENGINE HEATER
 EHT - ENGINE HEATER THERMOSTAT
 FS - FUEL SOLENOID
 GP - GLOW PLUG
 GRD - GROUND
 LOS - LOW OIL SWITCH
 PHC - PRE-HEAT CONTACTOR
 SC - STARTER CONTACTOR
 SM - STARTER MOTOR
 SOP - SENDER-OIL PRESSURE
 SWT - SENDER-WATER TEMPERATURE
 TP2 - THERMAL PROTECTOR
 WLS - WATER TEMPERATURE SWITCH
 WTS - WATER TEMPERATURE SWITCH



SCHEMATIC

4.0 LITER DIESEL ENGINE

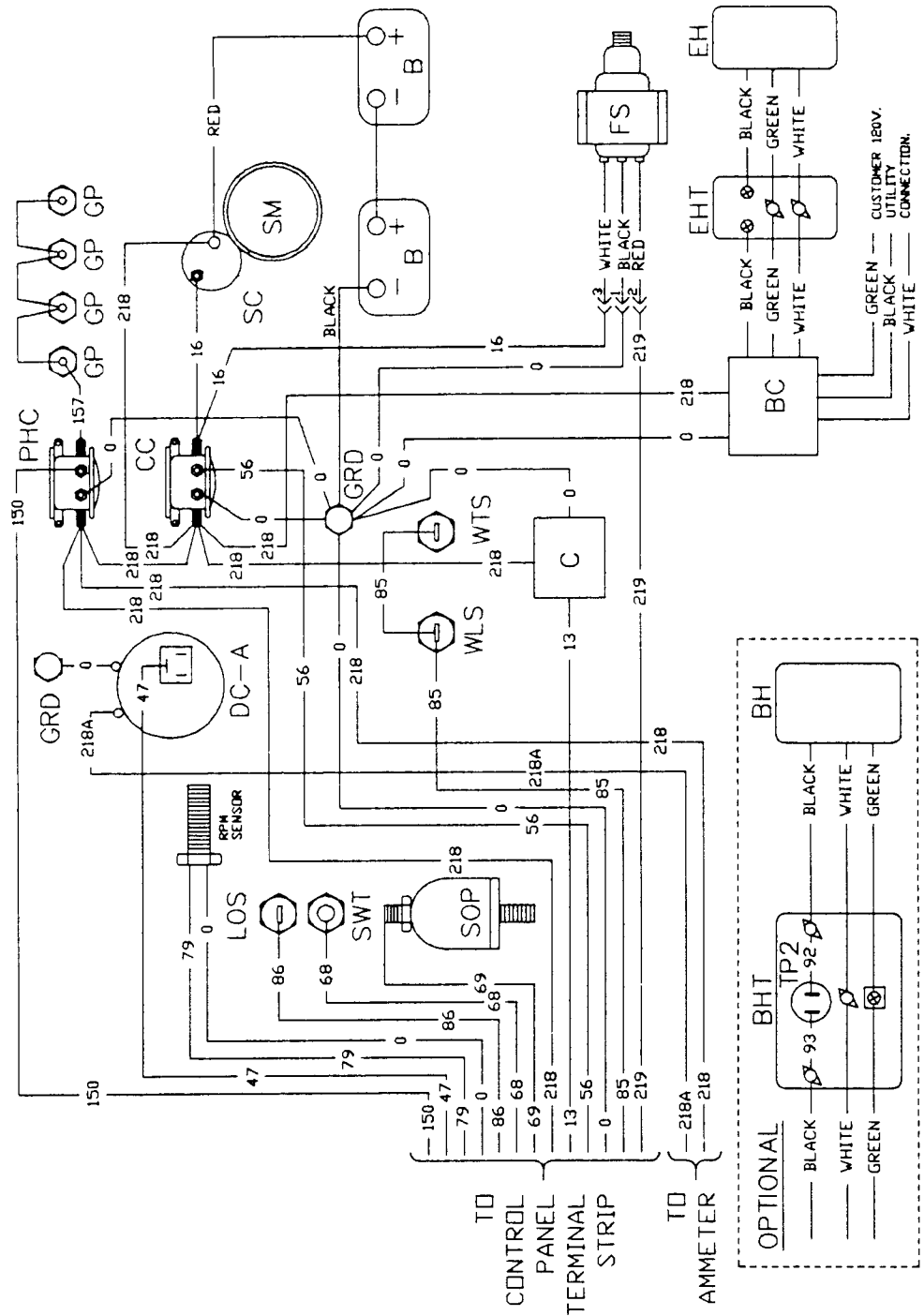
Drawing No. 71718

Issued- 02/18/87

File #10-87.2

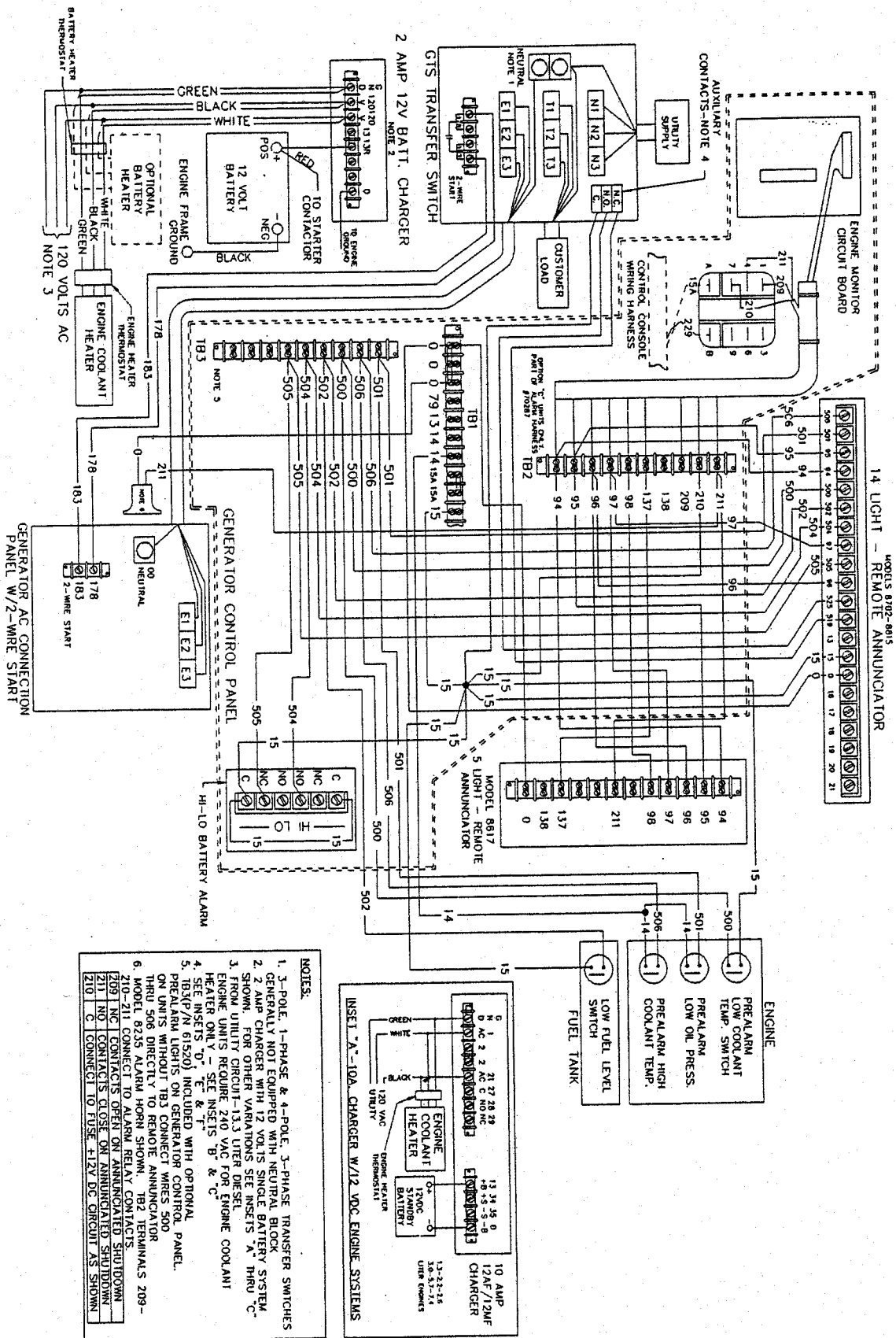
LEGEND

- | | |
|---------------------------------|--------------------------------|
| B - BATTERY 12V | GP - GLOW PLUG |
| BC - BATTERY CHARGER | GRD - GROUND |
| BH - BATTERY HEATER | LOS - LOW OIL SWITCH |
| BHT - BATTERY HEATER THERMOSTAT | PHC - PRE-HEAT CONTACTOR |
| C - CONVERTER 24 TO 12V DC | SC - STARTER CONTACTOR |
| CC - CONTROL CONTACTOR | SM - STARTER MOTOR |
| DCA - DC ALTERNATOR | SOP - SENDER OIL PRESSURE |
| EH - ENGINE HEATER | SWT - SWITCH WATER TEMPERATURE |
| EHT - ENGINE HEATER THERMOSTAT | TP2 - THERMAL PROTECTOR |
| FS - FUEL SOLENOID | WLS - WATER TEMPERATURE SWITCH |
| | WTS - WATER TEMPERATURE SWITCH |



WIRING DIAGRAM
4.0 LITER
DRAWING NO. 71719

GROUP G

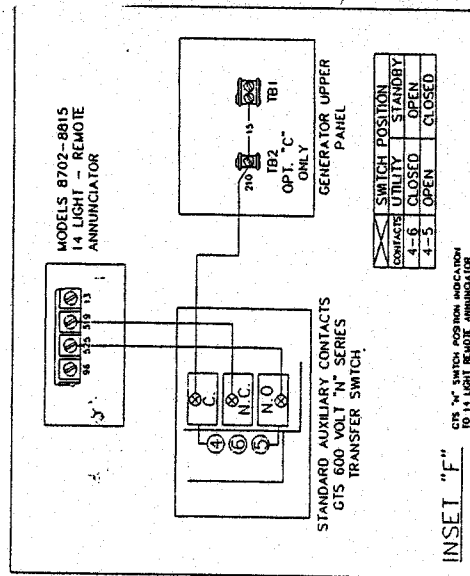
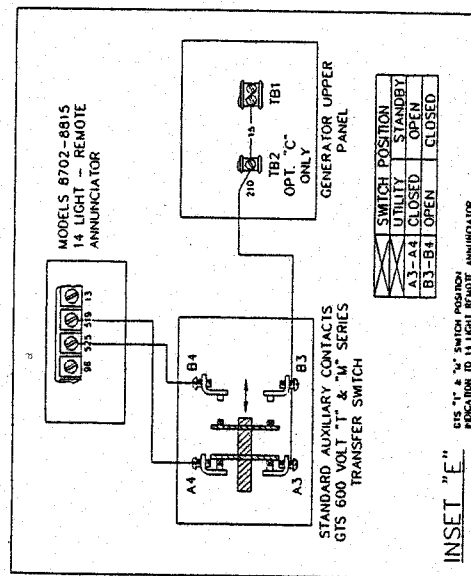
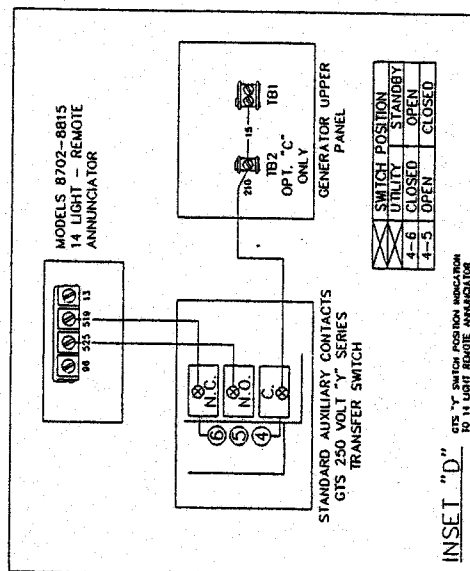
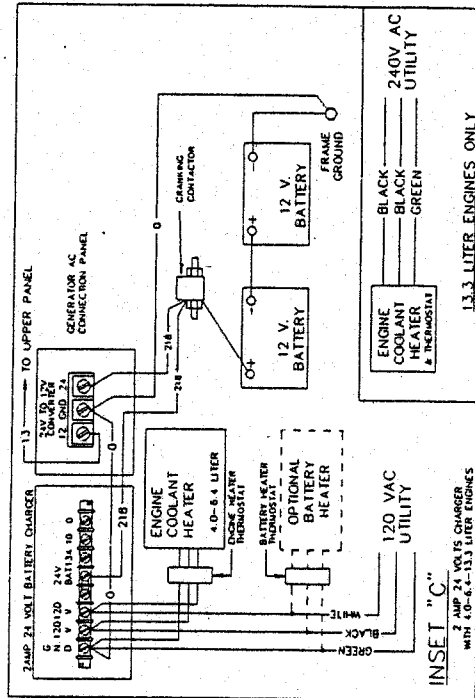
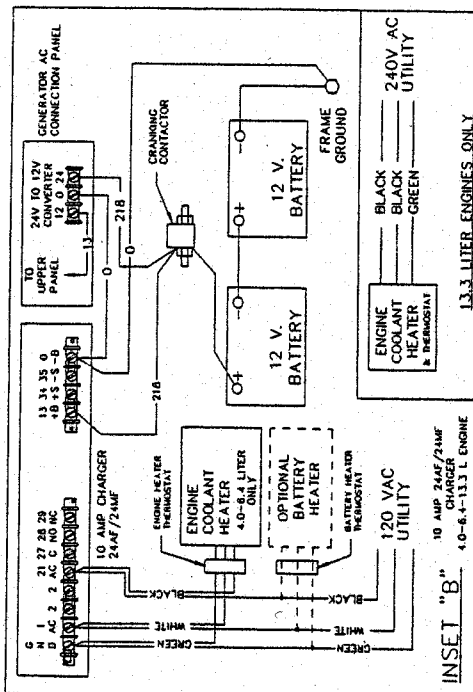


INTERCONNECTION DIAGRAM

Standby System

Drawing No. 73327

GROUP G



INTERCONNECTION DIAGRAM

Standby System

Drawing No. 73327

GENERAC'S STANDARD ONE YEAR LIMITED WARRANTY FOR STANDBY POWER SYSTEMS

For a period of one (1) year or 1500 hours of operation from the date of original sale, whichever occurs first, Generac will at its option repair or replace any part which, upon examination by Generac, is found to be defective under normal use and service. Any equipment which the buyer claims to be defective must be examined by Generac's nearest authorized service facility. All transportation costs under warranty, including return to the factory, are borne by the buyer and pre-paid.

WARRANTY SCHEDULE

YEAR ONE - 100% coverage on mileage*, labor and parts listed.

ENGINE - All components.

ALTERNATOR - All components.

TRANSFER SWITCH - All components.

*Mileage allowance is limited to 300 miles or 7.5 hours, whichever occurs first, and applies only to permanently wired and mounted units.

All warranty expense allowances are subject to the conditions defined in the PUBLISHED GENERAC POLICIES AND PROCEDURES MANUAL.

Units which have been resold are not covered under the Generac warranty.

The warranty shall not apply to:

- Costs of maintenance, adjustments, installation and startup.
- Failures due to normal wear, accident abuse, misuse, negligence, or improper installation.
- Products which are modified or altered in a manner not authorized by Generac in writing.
- Any incidental, consequential or indirect damages caused by defects in materials or workmanship, or any delay in repair or replacement of the defective parts.
- Failure due to misapplication.
- Telephone, telegraph, teletype or other communication expense.
- Living or travel expenses of persons performing service, except as specifically included within the terms of a specific unit warranty.
- Rental equipment used while warranty repairs are being performed.
- Overtime labor.
- Starting batteries, fuses, light bulbs and engine fluids.

THIS WARRANTY IS IN PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. SPECIFICALLY, GENERAC MAKES NO OTHER WARRANTIES AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

GENERAC'S ONLY LIABILITY SHALL BE THE REPAIR OR REPLACEMENT OF PARTS AS STATED ABOVE. IN NO EVENT SHALL GENERAC BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EVEN IF SUCH DAMAGES ARE A DIRECT RESULT OF GENERAC'S NEGLIGENCE. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you. Buyer agrees to make no claims against Generac based on negligence.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Manufactured exclusively for Caterpillar Dealers by Generac Power Systems, Inc.

GENERAC POWER SYSTEMS, INC. • P.O. Box 8 • Waukesha, WI 53187
Telephone: (262) 544-4811 • FAX (262) 544-4851

An optional 5-year warranty is also available. Ask your Dealer/Distributor or consult the factory for details.

Generac standby generators are designed and manufactured by:

GENERAC POWER SYSTEMS, INC. • P.O. BOX 8 • Waukesha, WI 53187

TELEPHONE: (262) 544-4811 • FAX: (262) 544-4851
