BALDOR®

25kVA(20kW)
60kVA(50kW)
100kVA(80kW)
Adjustable Speed Generator

Installation & Operating Manual

2/04 **MN2406**

WARNING:
CALIFORNIA PROPOSITION 65 WARNING:

Engine exhaust from this product contains chemicals known to the state of California to cause cancer, birth defects and other reproductive harm.

WARNING:
CALIFORNIA PROPOSITION 65 WARNING:

Diesel engine exhaust and some constituents are known to the state of California to cause cancer, birth defects and other reproductive harm.

WARNING:
CALIFORNIA PROPOSITION 65 WARNING:

Battery posts, terminals and related accessories are known to the state of California to cause cancer, birth defects and other reproductive harm.

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Section 1
Product Safety Information

Safety Notice

Be sure that you are completely familiar with the safe operation of this equipment. This equipment may be connected to other machines that have rotating parts or parts that are controlled by this equipment. Improper use can cause serious or fatal injury. Always disconnect all electrical loads before starting the generator.

Installation and repair procedures require specialized skills with electrical generating equipment and liquid cooled engine systems. Any person that installs or repairs this generator must have these specialized skills to ensure that this generating unit is safe to operate. Contact Baldor service department for repairs or any questions you may have about the safe installation and operation of this system.

The precaution statements are general guidelines for the safe use and operation of this generator. It is not practical to list all unsafe conditions. Therefore, if you use a procedure that is not recommended in this manual you must determine if it is safe for the operator and all personnel in the proximity to the generator and connected loads. If there is any question of the safety of a procedure please contact Baldor before starting the generator.

This equipment contains high voltages. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the start–up procedure or troubleshoot this equipment.

This equipment may be connected to other machines that have rotating parts or parts that are driven by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt the start–up procedure or troubleshoot this equipment.

- System documentation must be available to anyone that operates this equipment at all times.
- Keep non-qualified personnel at a safe distance from this equipment.
- Only qualified personnel familiar with the safe installation, operation and maintenance of this device should attempt start-up or operating procedures.
- Always stop engine before making or removing any connections.
- Always stop engine and allow it to cool before refueling.

Responsibility

When your generator is delivered, it becomes the responsibility of the owner/operator of the generator set to prevent unsafe conditions and operation of the equipment. Some responsibilities include (but are not limited to) the following:

1. It is the responsibility of the owner/operator of this generator to ensure that this equipment is correctly and safely installed.
2. It is the responsibility of the owner/operator of this generator to ensure that this equipment, when installed fully complies with all federal, state and local codes.
3. It is the responsibility of the owner/operator of this generator to ensure that any person operating this equipment has been properly trained.
4. It is the responsibility of the owner/operator of this generator to ensure that any person operating this equipment has access to all manuals and information required for the safe use and operation of this equipment.
5. It is the responsibility of the owner/operator of this generator to ensure that it is properly maintained and safety inspected at regular scheduled intervals.
6. It is the responsibility of the owner/operator of this generator to ensure that any person who has not been trained on the safe use of this equipment does not have access to this equipment.

Read This Manual Thoroughly

If you do not understand any concept, any procedure, any safety warning statement, any safety caution statement or any portion of this manual, contact Baldor or your nearest authorized Baldor representative. We are happy to make sure you understand the information in this manual so that you can safely enjoy the full use of this generator.

Baldor Generators
3815 Oregon Street
Oshkosh, WI 54902
(920) 236–4200 (voice); or (920) 236–4219 (fax); or www.baldor.com

Precaution Statements Used In This Manual

There are three classifications of precautionary statements used in this manual. The most critical is a **WARNING** statement, then the **Caution** statement and the least critical is the Note statement. The usage of each statement is as follows:

WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in injury or death.

Caution: Indicates a potentially hazardous situation which, if not avoided, could result in damage to property.

Note: Additional information that is not critical to the installation or operation.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS – This manual contains important instructions for the generator that should be followed during installation, operation and maintenance of the generator.

For ease of reading, the Warning statements are divided into four categories: Operation, Burn, Installation, and Maintenance.

Operation

WARNING: Generator may start automatically. Unit is equipped with Auto Start feature. Before servicing, place the Master Control switch in the "STOP" position and disconnect the battery cables to prevent accidental starting.

WARNING: Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death. For storage or refueling handle fuel with care and only in clean, approved, properly marked safety fuel containers.

WARNING: Do not overfill the fuel tank. Only fill the tank to within $^{1}/_{2}$″ of the top of the tank to allow space for fuel expansion. Overfilling of tank may cause fuel to spill out onto engine and cause fire or explosion.

WARNING: Clean up fuel spills by wiping completely dry before starting engine. Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death.

WARNING: Make sure the fuel cap is completely and securely closed after refueling to prevent spillage. Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death.

WARNING: Never operate this generator in a manner other than as described in this manual. Operation in any manner not described in this manual should be considered unsafe and should not be attempted. Never start the engine unless you have first verified that the installation and operation of the generator are as described in this manual.

WARNING: Be sure that you are completely familiar with the safe operation of this equipment. This equipment may be connected to other machines that have rotating parts or parts that are controlled by this equipment. Improper use can cause serious or fatal injury.

WARNING: Exhaust fumes/gases are extremely dangerous and can cause severe illness or death. Never breath exhaust fumes produced by a running engine. Only run the engine outdoors where ventilation is plentiful. Exhaust gases contain carbon monoxide, a colorless, odorless and extremely dangerous gas that can cause unconsciousness or death. Symptoms of carbon monoxide poisoning include: dizziness, nausea, headaches, sleepiness, vomiting or incoherence. If you or anyone else experiences these symptoms, get out into fresh air immediately. Stop the engine and do not restart the engine until it has been inspected and if necessary repaired or reinstalled in a well ventilated area.

WARNING: Hot exhaust gasses must never be directed toward anything that may catch fire or explode.

WARNING: This generator must not be used on or near any forest covered, brush covered, or grass covered land unless the engine's exhaust system is equipped with a spark arrestor. The spark arrestor must be maintained in effective working order by the operator.

WARNING: Some parts of this generator rotate during operation. Rotating parts can present extreme danger if clothing or body extremities are caught by the rotating part and can cause serious or fatal injury. Never touch a part of the generator until the engine has been stopped and all rotating parts are completely stopped. Also, disconnect the spark plug wires and battery connection to prevent accidental engine rotation during servicing.

WARNING: Never move a generator set that is running. Loads should be connected and position secure before starting the engine. Hazards are caused by moving a generator set that is running.

WARNING: Never connect or disconnect loads during operation. Always connect load circuits before starting the engine and use external branch disconnects etc. to switch loads On/Off.

Continued on next page.

Operation Warning Statements Continued

WARNING: Be sure that you understand how to stop the engine quickly in case of an emergency situation. Become familiar with the controls and safety systems provided with this generator set.

WARNING: Always wear safety glasses with side shields and hearing protection when working near the generator.

WARNING: Improper operation may cause violent motion of connected equipment. Be certain that unexpected movement will not cause injury to personnel or damage to equipment.

WARNING: Never operate the generator set indoors or in a poorly ventilated area such as a tunnel or cave. Exhaust fumes are extremely dangerous to all personnel that are in or in contact with that area.

WARNING: Never permit anyone to operate the generator without proper instructions. Be sure to keep a copy of this manual with the generator so that all users can be properly informed of its safe operation.

WARNING: Never allow children or pets to be in the area where the generator is running. The generator and the equipment being powered by the generator may cause injury or death.

WARNING: Never operate the generator unless all guards, covers, shields and other safety items are properly installed.

WARNING: Do not put hands, feet, tools clothing or other objects near rotating parts such as drive shaft, pulley, belt etc. Rotating parts cause extremely dangerous situations because they can catch loose clothing or extremities and cause serious or fatal injury.

WARNING: When operating this generator remain alert at all times. Never operate machinery when physically or mentally fatigued, or while under the influence of alcohol, drugs or medication.

WARNING: Never operate the engine when the air cleaner is removed. An engine backfire can cause serious burns.

WARNING: Never "jump start" a generator to start the engine. If the battery charge is insufficient to start the engine, charge or replace the battery and try to restart. Jump starting a battery can cause the battery to explode and cause severe injury or death to anyone in the area.

WARNING: High voltage is present whenever engine is running. Electrical shock can cause serious or fatal injury. Never operate electrical equipment while standing in water, on wet ground or with wet hands, feet or shoes or while barefoot.

WARNING: High voltage is present whenever the engine is running. Electrical shock can cause serious or fatal injury. Always stop engine before connecting or disconnecting power cords or external devices.

WARNING: Do not smoke near generator during operation or while refueling. Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death.

WARNING: Stop engine and allow engine to cool before refueling. Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death.

WARNING: Never store the generator with fuel in the tank. Never store the generator indoors or in an enclosed area or in a poorly ventilated enclosure where fumes may reach an open flame, electrical spark or pilot light as on a furnace, water heater, clothes dryer, etc. Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death.

WARNING: Allow generator to cool before transporting it or storing it. Always drain fuel from tank after generator has cooled.

WARNING: When transporting the generator (especially over rough roads) always drain the fuel tank to prevent leakage or spillage of fuel. Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death.

WARNING: Operate the generator only on a level surface. If the generator is tilted during operation, fuel spillage may result. Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death.

WARNING: Keep generator at least three feet away from buildings and other structures.

WARNING: Keep generator away from flammable or hazardous materials (trash, rags, lubricants, explosives, paints etc.) and grass or leaf build up.

WARNING: Keep a fire extinguisher near the generator while generator is in use. An extinguisher rated "ABC" by the National Fire Protection Association is appropriate.

Continued on next page.

Warning Statements Continued

Burn

WARNING: Parts of this generator are extremely hot during and after operation. To prevent severe burns, do not touch any part of the generator until you have first determined if the part is hot. Wear protective clothing and after use allow sufficient time for parts to cool before touching any part of the generator.

WARNING: Do not touch the hot exhaust parts or the high voltage spark plug or coil terminals of the engine. Although spark plug voltages are not normally lethal, a sudden involuntary jerk of the hand or body part caused by contact with high voltage or a hot surface can result in injury to yourself or others.

WARNING: Engine coolant is under pressure and is near the boiling point of water when engine is hot. Do not open the coolant system until the engine has completely cooled. Hot coolant can cause severe burns and other injuries. When engine is cool, coolant level can be checked.

Installation

WARNING: Installation and repair procedures requires specialized skills with electrical generating equipment and small engine systems. Any person that installs or performs repairs must have these specialized skills to ensure that the generator set is safe to operate. Contact Baldor for installation or repairs.

WARNING: Be sure all wiring complies with the National Electrical Code (NEC) and all regional and local codes or CE Compliance. Improper wiring may cause a hazardous condition and exposure to electrical hazards can cause serious injury or death.

WARNING: Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that grounds are connected. Electrical shock can cause serious or fatal injury. NEC requires that the frame and exposed conductive surfaces (metal parts) be connected to an approved earth ground. Local codes may also require proper grounding of generator systems.

WARNING: Place protective covers over all rotating parts such as drive shaft, pulley, belt etc. Rotating parts cause extremely dangerous situations because they can catch loose clothing or extremities and cause serious or fatal injury.

WARNING: Unauthorized modification of a generator set may make the unit unsafe for operation or may impair the operation of the unit. Never start a generator set that has been modified or tampered with. Be sure that all covers and guards are properly installed and that the unit is safe before starting the engine. If you are unsure, contact Baldor before starting the engine.

WARNING: When moving the generator, use reasonable caution. Be careful where you place fingers and toes to prevent injury "Pinch Points". Never try to lift a generator without a hoist or lift means because they are heavy and bodily injury may result.

WARNING: When transporting a generator (especially if it has wheel option installed) secure the unit to prevent movement during transport.

WARNING: Never connect this generator to any buildings electrical system unless a licensed electrician has installed an approved transfer switch. The National Electrical Code (NEC) requires that connection of a generator to any electrical circuit normally powered by means of an electric utility must be connected by means of approved transfer switch equipment so as to isolate the electrical circuit from the utility distribution system when the generator is operating. Failure to isolate the electrical circuits by such means may result in injury or death to utility power workers due to backfeed of electrical energy onto the utility lines.

WARNING: Circuit overload protection must be provided in accordance with the National Electrical Code and local regulations.

WARNING: Check Ground Fault Circuit Interrupt (GFCI) receptacles monthly by using the "Test" and "Reset" buttons.

Continued on next page.

Warning Statements Continued

Installation Continued

WARNING: Only a professional experienced technician should install a fuel supply system. Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death. Fuel supply lines should be kept away from sharp objects to prevent rupture. Comply with all NFPA regulations and local codes for shut–off valves, regulators, fuel line type etc.

WARNING: Have electrical circuits and wiring installed and checked by licensed electrician or qualified technician. Electrical shock can cause serious or fatal injury.

WARNING: Incorrect installation of this generator set could result in property damage, injury or death. Connection of the generator to its fuel source must be done by a qualified professional technician or contractor.

Maintenance

WARNING: Before cleaning, inspecting, repairing, refueling or performing any maintenance to the generator set, always be sure the engine has stopped and that all rotating parts have also stopped. After stopping, certain components are still extremely hot so be careful not to get burned. Before servicing the generator set, be sure to disconnect the spark plug wires and the battery terminals to prevent accidental engine rotation or starting.

WARNING: Engine coolant is under pressure and is near the boiling point of water when engine is hot. Do not open the coolant system until the engine has completely cooled. Hot coolant can cause severe burns and other injuries. When engine is cool, coolant level can be checked.

WARNING: Before servicing the generator set, be sure to disconnect the spark plug wires and the battery terminals to prevent accidental engine rotation or starting.

WARNING: Inspect all wiring frequently and replace any damaged, broken or frayed wiring or wires with damaged insulation immediately. Electrical shock can cause serious or fatal injury.

WARNING: Disconnect all electrical wires and load devices from generator power outlets before servicing the generator. Electrical shock can cause serious or fatal injury. Always treat electrical circuits as if they are energized.

WARNING: Check all fuel tanks, supply piping, and their connections monthly for fuel leaks. Gasoline and diesel fuel are flammable and can cause fire, explosions, injury or death. If a leak is found, replace only with approved pipe or components.

WARNING: A battery presents a risk of fire and explosion because they generate hydrogen gas. Hydrogen gas is extremely explosive. Never jump start a battery, smoke in the area around the battery or cause any spark to occur in the area around the battery.

WARNING: Do not mutilate the battery or dispose of a battery in a fire. The battery is capable of exploding. If the battery explodes, electrolyte solution will be released in all directions. Battery electrolyte solution is caustic and can cause severe burns and blindness. If electrolyte contacts skin or eyes, immediately flush the area with water and seek medical attention quickly.

WARNING: A battery presents a risk of electrical shock hazard and high short circuit current. Electrical shock can cause serious or fatal injury. Never wear jewelry, watch or any metal objects when in the area around the battery.

WARNING: The battery electrolyte is a dilute sulfuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive. If electrolyte contacts the skin, flush the area immediately with water and wash it off using soap and water. If electrolyte contacts the eyes, immediately flush the eye thoroughly with water and seek medical attention quickly.

WARNING: The capacitor used in this generator can store and discharge a high voltage charge. Before working with or in the area of the capacitor, discharge the capacitor by shorting its leads together with a screwdriver with an insulated handle or insulated jumper wire.

WARNING: Be extremely careful when flashing the generator. When the alternator cover is removed rotating parts and high voltage are present. Electrical shock can cause serious or fatal injury. Rotating parts can present extreme danger if clothing or body extremities are caught by the rotating part and can cause serious or fatal injury.

WARNING: Never store an engine with fuel in its tank indoors or in an enclosed, poorly ventilated area where gasoline fumes could reach an ignition source and cause an explosion.

Continued on next page.

Caution Statements

Caution: **Avoid installing the generator set beside heat generating equipment, or directly below water or steam pipes or in the vicinity of corrosive substances or vapors, metal particles and dust. Heat can cause engine problems to develop and unwanted substances can cause rust or generator failure over time.**

Caution: **Do not apply high voltage to windings in a moisture–saturated condition. Moisture can cause insulation breakdown, making it necessary to return the generator to the factory for repair, and consequent expense and loss of time.**

Caution: **Use only original equipment or authorized replacement parts. Using the correct parts will assure continued safe operation as designed.**

Caution: **Do not support the generator from the top of the wrap frame.**

Caution: **Do not tamper with or change the engine speed. Engine speed is factory set to produce the correct voltage and output frequency.**

Caution: **Never operate the engine without a muffler. The engine is designed to have the correct exhaust components installed and operating without these components can present a fire hazard, cause excessive exhaust gases and cause damage to engine. Inspect muffler periodically and replace if necessary.**

Section 2
General Information

Limited Warranty

Unless otherwise provided, Baldor generators are warranted against defects in Baldor workmanship and materials for a period of time as set forth in the Warranty Period chart below. If a Baldor product is defective due to Baldor workmanship or materials and the defect occurs during the warranty period, then Baldor will either repair the product or replace it with a new one, whichever Baldor believes to be appropriate under the circumstances. Service for warranty issues regarding any Baldor Generators Products Warranty is available by contacting Baldor Generators' Customer Service Department in Oshkosh, Wisconsin. A list of Baldor's generator repair facilities may be obtained by contacting Baldor Generators at: Customer Service, Baldor Generators, 3815 Oregon Street, Oshkosh, Wisconsin 54902, 920–236–4200 (telephone), 920–236–4219 (facsimile). All Baldor products requiring warranty service shall be transported or shipped freight pre–paid, at the risk of the party requiring warranty service, to a Baldor Generator repair facility, or to Baldor Generators' Customer Service Department in Oshkosh, Wisconsin. Written notification of the alleged defect in addition to a description of the manner in which the Baldor generator is used, and the name, address and telephone number of the party requiring warranty service must be included. Baldor is not responsible for removal and shipment of the Baldor product to the service center or for the reinstallation of the Baldor product upon its return to the party requiring warranty service. Customers who are unable to take or ship the Baldor product to a Baldor Generator repair facility, or who desire a repair to be made by other than a Baldor Generator repair facility, should contact Baldor Generators' Customer Service Department at 920–236–4200. Baldor, in advance of such service, must approve a repair by anyone other than a Baldor Generator repair facility in writing. Problems with Baldor products can be due to improper maintenance, faulty installation, non–Baldor additions or modifications, or other problems not due to defects in Baldor workmanship or materials. If a Baldor Generator repair facility determines that the problem with a Baldor product is not due to defects in Baldor workmanship or materials, then the party requesting warranty service will be responsible for the cost of any necessary repairs. Parties requiring warranty service not satisfied with a determination that a problem is outside of warranty coverage should contact Baldor Generators' Customer Service Department at 920–236–4200 for further consideration. EXCEPT FOR THE EXPRESSED WARRANTY SET FORTH ABOVE, BALDOR GENERATORS DISCLAIMS ALL OTHER EXPRESSED AND IMPLIED WARRANTIES INCLUDING THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY. NO OTHER WARRANTY, EXPRESSED OR IMPLIED, WHETHER OR NOT SIMILAR IN NATURE TO ANY OTHER WARRANTY PROVIDED HEREIN, SHALL EXIST WITH RESPECT TO THE GOODS SOLD UNDER THE PROVISIONS OF THESE TERMS AND CONDITIONS. ALL OTHER SUCH WARRANTIES ARE HEREBY EXPRESSLY WAIVED BY THE BUYER. UNDER NO CIRCUMSTANCES SHALL BALDOR GENERATORS BE LIABLE OR RESPONSIBLE IN ANY MANNER WHATSOEVER FOR ANY INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, OR ANTICIPATED PROFITS RESULTING FROM THE DEFECT, REMOVAL, REINSTALLATION, SHIPMENT OR OTHERWISE. This is the sole warranty of Baldor Generators and no other affirmations or promises made by Baldor Generators shall be deemed to create an expressed or implied warranty. Baldor Generators has not authorized anyone to make any representations or warranties other than the warranty contained herein.

Limited Warranty Continued

Warranty Period

Generator Series	Labor*	Parts
Portable Products (Premier, Powerchief, DG Series, K Series)	1 Year	3 Years
Towable Products (TS)	1 Year or 3,000 Hours Whichever comes first	3 Years or 3,000 Hours Whichever comes first
3600 RPM Standby Systems (Some AE Models)	1 Year or 1,000 Hours Whichever comes first	3 Years or 1,000 Hours Whichever comes first
1800 RPM Standby Systems (Some AE Models, DLC, GLC)	1 Year or 3,000 Hours Whichever comes first	3 Years or 3,000 Hours Whichever comes first
Industrial Standby Systems	1 Year or 1,000 Hours Whichever comes first	2 Years or 1,000 Hours Whichever comes first
Industrial Prime Power Systems	1 Year or 1,000 Hours Whichever comes first	1 Year or 1,000 Hours Whichever comes first
International	1 Year or 1,000 Hours Whichever comes first	1 Year or 1,000 Hours Whichever comes first

Notes for Warranty Period:

1. Labor coverage for warrantable repairs is provided for the applicable period not to exceed published rates as contained in the Baldor Generators Warranty Policy. Mileage is allowed only for permanent installations not to exceed published rates as contained in the Baldor Generators Warranty Policy.
2. Proof of purchase date is required for all Portable and Towable products to qualify for any warranty consideration. Serial number and model number will be required for all warranty work.
3. For all other products, a Start–up Inspection Form / Warranty Registration must be completed in its entirety and submitted to Baldor Generators within 30 days of start–up to qualify for any warranty consideration.

Owner's Responsibilities:

The owner is obligated to operate and maintain the generator in accordance with the recommendations published by Baldor Generators in the Operator's Manual for the generator. The owner is responsible for the costs associated with maintenance and any adjustments that may be required.

The owner is responsible for payment of any of the following expenses that might be incurred as a result of a failure under the terms of this warranty:

1. Rental equipment used to replace the equipment being repaired.
2. Telephone or other communication expenses.
3. Living and travel expenses of persons performing service, except as specifically included within the terms of specific warranty.
4. The premium costs for overtime labor requested by the owner.
5. All parts transportation costs.

All warranty claims must be submitted to a Baldor Generator repair facility prior to the expiration of the warranty period. Baldor Generators shall have no responsibility or liability for any defect, latent or otherwise, discovered after the expiration of the warranty period provided herein. Extended warranties are available for certain Baldor products. These warranties are described in Baldor's catalog and other sales literature. Extended warranties are subject to the terms and conditions of this Limited Warranty as modified by the additional terms of the extended warranty.

Limitations:

Baldor Generators is not responsible for the repair of generators required because of normal wear, accident, misuse, abuse, improper installation, lack of maintenance, unauthorized modifications or improper storage.

Normal Wear: This warranty will not cover repair where normal use has exhausted the life of a part or generator. It should be remembered that the service life of any generator is dependent on the care it receives and the conditions under which it has to operate. Some applications are very often used in dusty or dirty conditions, which can cause what appears to be excessive wear. Such wear, when caused by dirt, dust, grit or other abrasive material, which has entered the generator because of improper maintenance, is not covered by Warranty.

For all product lines, the engine manufacturer warrants engine systems.
Contact Baldor Generators for current engine warranties.

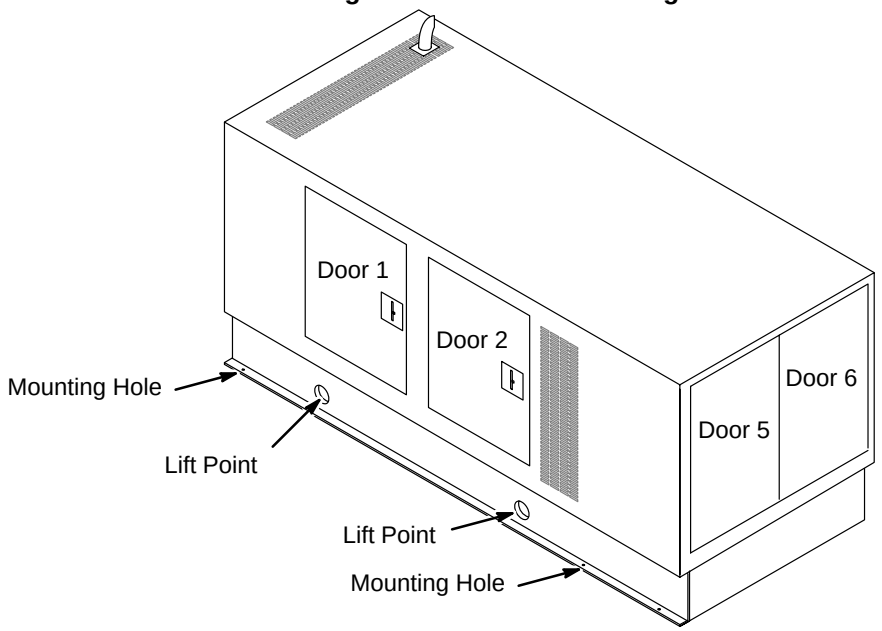
Section 3
Receiving & Installation

Receiving & Inspection When you receive your generator, there are several things you should do immediately.

1. Observe the condition of the shipping container and report any damage immediately to the commercial carrier that delivered your system.
2. Verify that the part number of the system you received is the same as the part number listed on your purchase order.
3. If the system is to be stored for several weeks before use, be sure that it is stored in a location that conforms to published storage temperature and humidity specifications. (Refer to Section 9 of this manual).

Lifting the Generator When lift or hoist equipment is used to lift the generator and move it to position, be careful not to contact overhead wires or other obstacles. The generator weighs over 1,500 lbs. Be sure lift or hoist equipment has appropriate tires for the terrain to avoid becoming stuck or tipping over. If the shipping pallet is intact, use a fork lift to move the generator. If the shipping pallet has been removed, use two steel pipes through the “Lift Point” holes to lift the generator. See Figure 3-1.

Figure 3-1 Generator Lifting



Physical Location The mounting location of the system is important. It should be installed in an area that is protected from direct harmful gases or liquids, dust, metallic particles, shock and vibration. It can only be installed in an outdoor location so the exhaust fumes are vented to the atmosphere. This system must never be installed inside an enclosed building, home, shop or garage etc.

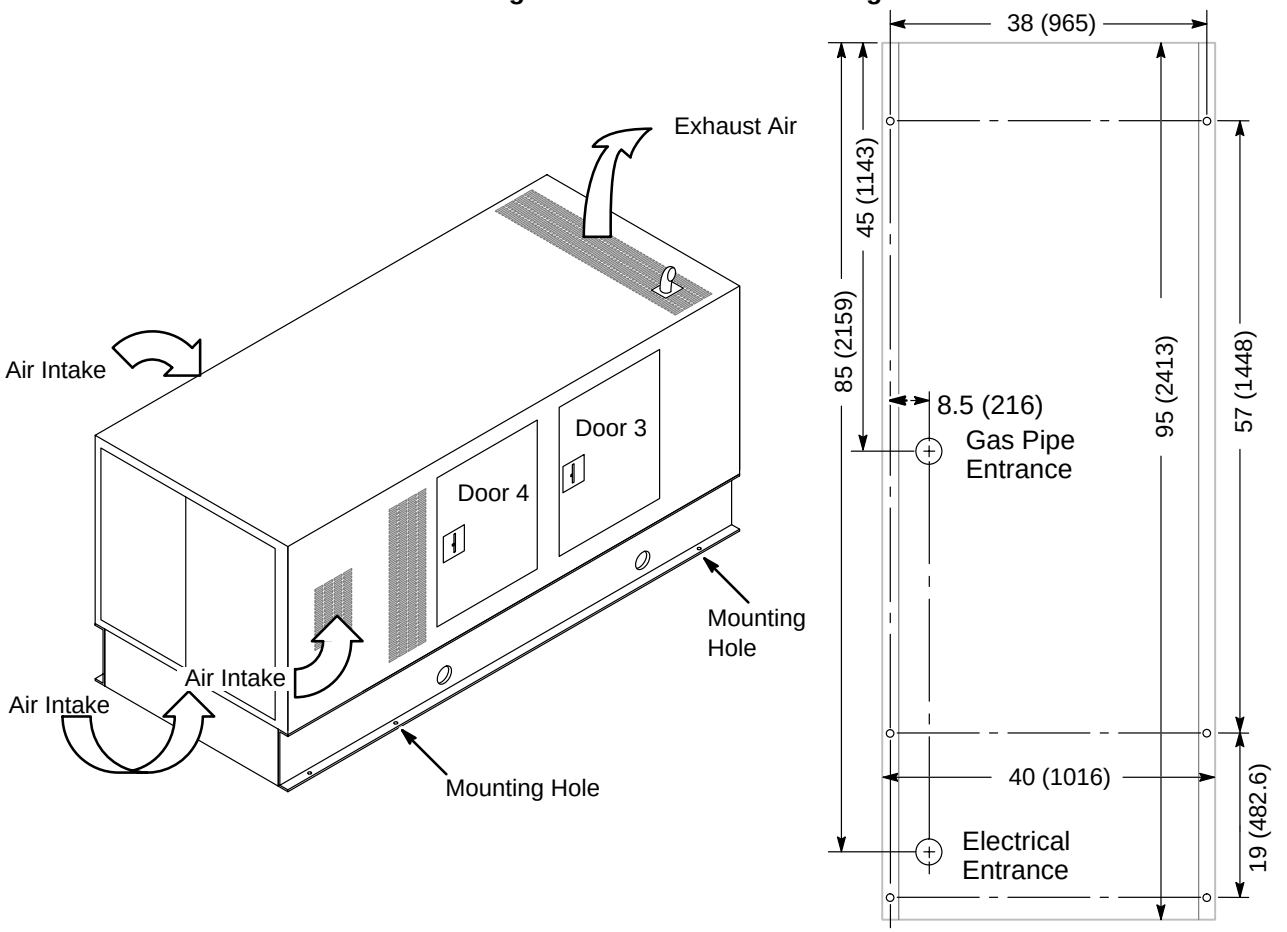
Several other factors should be carefully evaluated when selecting a location for installation:

1. For effective cooling and maintenance, the system should be mounted on a flat, smooth, non-flammable level surface. A concrete pad is ideal and provides a secure installation.
2. Installation should prevent obstructions by buildup of leaves, grass, sand, snow, etc. If these items pose a problem, consider building a small fence or other break to protect the unit from accumulation of debris.
3. Installation should place the generator as close as possible to the fuel supply and transfer switch.
4. At least thirty–six inches clearance must be provided on all sides for air flow.
5. Installation should prevent water levels from reaching the generator.
6. Access must be provided to allow the enclosure covers to be opened or removed for service and maintenance.

There are four mounting holes in the base frame. These four holes contain bolts that secure the generator to the shipping pallet. Remove these four bolts, lift the generator and remove the shipping pallet.

Refer to Figures 3-2 and secure the generator to the concrete pad using $^{3}/_{8}$″ anchor hardware (not provided) in the 4 mounting holes in the base frame as shown. Anchor bolts must be long enough to extend through the generator mounting frame.

Figure 3-2 Generator Mounting



Note: The electrical entrance must include 115VAC 20 amp service (shore power) to power onboard equipment (Space heater, Block Heater and Battery Charger) that must remain powered up when generator is not running.

Installation

The OptiGEN system is completely assembled, tested and adjusted at the factory before it is shipped to you. External connections required at the time of installation are:

1. Fuel System.
2. Electrical Connections – power wiring and control wiring.
3. Ground Connection.

After installation, the post installation checks must be performed prior to starting the engine.

After these checks have been performed and the system operation is verified to be good, refer to Section 6 Maintenance for periodic checks that must be performed at scheduled intervals to ensure continued operation with minimal problems.

Installation Considerations

The procedures defined in this manual are intended to provide steps to properly install this generator for safe operation. Two main areas where safety is extremely important and extra care must be taken during installation are installation of the Fuel Supply and the Electrical Service. The procedures presented in this manual are suggestion and it is the responsibility of the Owner/Operator to arrange for these procedures to be performed by licensed contractors according to all applicable codes including local codes peculiar to your Municipality/City/County and State.

Fuel Connections

Unless otherwise specified at time of order, your generator has been set for and will run on Natural Gas. If natural gas supply is used, follow the “Natural Gas Connections” procedure.

If Propane (LPG) supply is to be used, consult your Baldor representative about converting from Natural Gas to LPG. If your generator is already setup for LPG, follow the LP Gas Connections.

Natural Gas Connections

The incoming pressure must be 11 inches water column (6 oz. pressure).

Require flow rate for natural gas is 400 cubic feet per per hour.

Table 3-1 Natural Gas Flow Rate (Cubic Feet per Hour) per Pipe Length

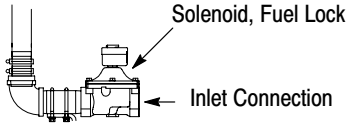
Pipe Length (Feet)	Iron Pipe Size										
	1/2″	3/4″	1″	1–1/4″	1–1/2″	2″	2–1/2″	3″	4″	6″	8″
15	73	165	332	722	1174	2386	3704	6253	13352	37229	
30	50	115	232	515	818	1712	2646	4521	9331	26330	53728
45	41	95	191	418	673	1419	2213	3752	7600	22462	43867
60	37	83	166	366	587	1241	1924	3319	6542	18595	37999
75		74	149	332	524	1077	1684	2886	5772	16652	33959
90		67	137	298	433	962	1501	2597	5291	15200	31025
105		63	126	274		885	1376	2357	4906	14064	28715
120			115	260	404	827	1289	2213	4618	13160	26859
150			105	233	366	750	1174	2011	4185	11775	24050
180			96	216	337	693	1077	1876	3848	10736	21934
210			89	197	308	635	991	1712	3559	9937	20298
240				183	289	596	933	1616	3357	9235	18990
270				171	274	558	875	1520	3127	8658	17903
300				164	260	524	827	1433	2886	8177	16998

Note: Almost all operation problems are related to the installation techniques used. Do Not guess, be sure pipe size is adequate for required flow rate.

1. Rotate the fuel switch (mounted on Operator Panel) to the “NAT” (Natural Gas–CW) position.
2. Connect the proper size gas pipe at the input to the Natural Gas regulator. Connect the Natural Gas pipe line shown in Figure 3-3 using the correct size pipe for the required flow rate and length of pipe. Refer to Table 3-1 for pipe size. Be certain that all connections are sealed and no leaks are present. The installer must ensure that all gas connections comply with all building codes.
3. Verify Fuel Supply Pressure
   Prior to initial operation of generator, verify that fuel system pressure is 11″ Water Column (6 oz. pressure) and fuel pipe sizes comply with Table 3-1.
4. Proceed to Electrical Connections.

Open the enclosure access panel Door 2 (Figure 3-1).

Figure 3-3 Gas Line Connections



LP Gas Connections

The LPG connections should only be made if your generator is setup to run on LPG. If it is setup to run on Natural Gas, contact your Baldor representative and do not continue with installation.

The incoming pressure must be 11 inches water column (6 oz. pressure).
Required flow rate for LP gas is 158 cubic feet per per hour.

Table 3-2 Natural Gas Flow Rate (Cubic Feet per Hour) per Pipe Length

Pipe Length (Feet)	Iron Pipe Size										
	1/2″	3/4″	1″	1–1/4″	1–1/2″	2″	2–1/2″	3″	4″	6″	8″
15	48	109	218	475	772	1570	2437	4115	8786	24497	50007
30	33	76	153	339	538	1127	1741	2975	6140	17325	35353
45	27	63	126	275	443	934	1456	2469	5001	14781	28865
60	24	54	110	241	386	817	1266	2184	4304	12236	25004
75		49	98	218	345	709	1108	1899	3798	10957	22345
90		44	89	196	310	633	987	1709	3482	10001	20414
105		41	83	180	285	582	905	1551	3228	9254	18895
120			76	171	266	544	848	1456	3038	8659	17673
150			69	153	241	494	772	1323	2754	7748	15825
180			63	142	222	456	709	1234	2532	7064	14432
210			58	130	202	418	652	1127	2342	6439	13356
240				120	190	393	614	1063	2209	6077	12405
270				113	180	367	576	1000	2057	5697	11780
300				108	171	345	544	943	1899	5381	11179

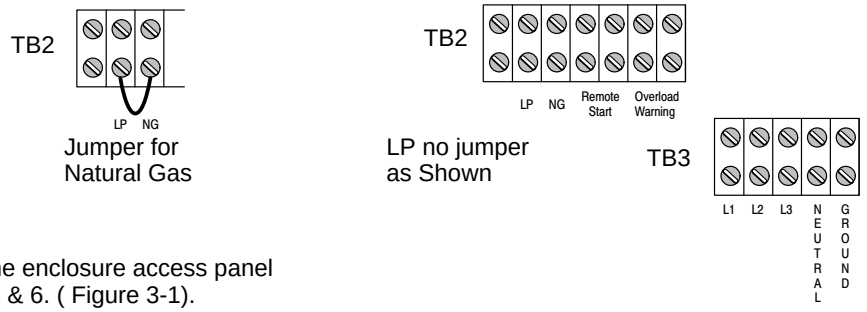
Note: Almost all operation problems are related to the installation techniques used. Do Not guess, be sure pipe size is adequate for required flow rate.

1. Rotate the fuel switch (mounted on Operator Panel) to the “LPG” (Propane–CCW) position.
2. Connect the proper size gas pipe at the input to the LP Gas regulator. Connect the LPG pipe line shown in Figure 3-3 using the correct size pipe for the required flow rate and length of pipe. Refer to Table 3-2 for pipe size. Be certain that all connections are sealed and no leaks are present. The installer must ensure that all gas connections comply with all building codes.
3. Verify Fuel Supply Pressure
   Prior to initial operation of generator, verify that fuel system pressure is 11″ Water Column (6 oz. pressure) and fuel pipe sizes comply with Table 3-2.
4. Proceed to Electrical Connections.

Electrical Connections Class 1 wiring methods must be used for field wiring connections to terminals of a Class 2 circuit.

The generator has a 480V three phase AC output. These connections are made at the Power Terminal Box shown in Figure 3-4. It is the responsibility of the Owner/Operator to arrange for these procedures to be performed by a licensed electrical contractor and ensure conformance to all applicable codes including local codes peculiar to your Municipality/City/County and State. Wire size and insulation type should be as required by NEC and local codes, see Table 3-3.

Figure 3-4 Power Terminal Box Connections



Open the enclosure access panel Doors 5 & 6. (Figure 3-1).

1. Be sure that the transfer switch is isolated and power is off. Use Lock Out Tag Out procedures.
2. Install conduit/wires between transfer switch and Power Terminal box.
3. Connect the transfer switch phase A wire to TB3 “L1” of the Power Terminal Box.
4. Connect the transfer switch phase B wire to TB3 “L2” of the Power Terminal Box.
5. Connect the transfer switch phase C wire to TB3 “L3” of the Power Terminal Box.
6. Connect the transfer switch neutral wire to TB3 “Neutral” of the Power Terminal Box.

WARNING: Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that grounds are connected. Electrical shock can cause serious or fatal injury. NEC requires that the frame and exposed conductive surfaces (metal parts) be connected to an approved earth ground. Local codes may also require proper grounding of generator systems.

WARNING: Do not connect the generator output neutral to the frame or local ground. The generator output is isolated from ground. NEC and local codes require that the generator output remain isolated from local ground reference.

7. Connect the TB3 Ground terminal of the Power Terminal Box to a local driven earth ground rod if required.
8. For LP Gas operation (as shown), do not connect TB2–LP and TB2–NG.
   For Natural Gas operation, connect a jumper wire between TB2–LP and TB2–NG.
9. Connect the Remote Start wires to the TB2 Remote Start of the Power Terminal Box.
10. Connect the Overload Warning wires to the TB2 Overload Warning of the Power Terminal Box. The overload warning input is a load anticipator. Before switching in a heavy load, this input should be closed to bring the engine to full speed before the load is actually connected to the generator.

Table 3-3 Wire Size

Maximum Output		Output			Wire Size	
					L1, L2, L3 and PE	
kVA	kW	Volts	PH	Fuse (A)	AWG/ kcmil	MM^2
25	20	480	3	35	10	5.26
60	50	480	3			
100	80	480	3			

Battery Connections The generator is shipped with no battery installed.

WARNING: Do not dispose of battery or batteries in a fire. The battery is capable of exploding. If the battery explodes, electrolyte solution will be released in all directions. Battery electrolyte solution is caustic and can cause severe burns and blindness. If electrolyte contacts skin or eyes, immediately flush the area with water and seek medical attention quickly.

WARNING: Do not mutilate the battery . The battery contains electrolyte solution which is caustic and can cause severe burns and blindness. If electrolyte contacts skin or eyes, immediately flush the area with water and seek medical attention quickly.

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

1. Remove watches, rings, necklaces and all other metal objects.
2. Use tools with insulated handles.
3. Wear rubber gloves and boots.

WARNING: The battery electrolyte is a dilute sulfuric acid that is harmful to the skin and eyes. It is electrically conductive and corrosive. The following precautions are to be followed when working on batteries:

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

WARNING: A battery presents a risk of fire because they generate hydrogen gas. Hydrogen gas is extremely explosive. Never jump start a battery, smoke in the area around the battery or cause any spark to occur in the area around the battery. The following precautions are to be followed when working on batteries:

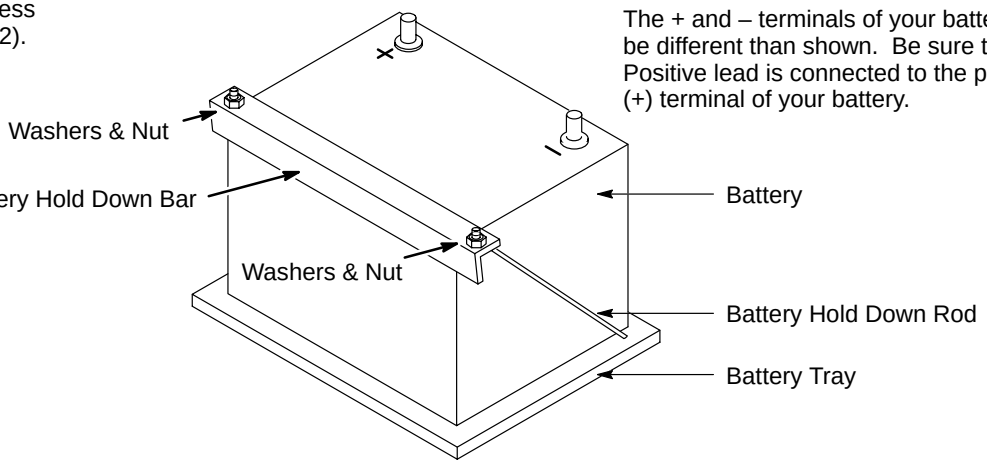
1. Do not smoke when near batteries.
2. Do not cause flame or spark in battery area.
3. Discharge static electricity from body before touching batteries by first touching a grounded metal surface.

Procedure: The correct type battery must be purchased and installed in the battery compartment provided.

1. Open Door 5 (Figure 3-1).
2. Remove the bag containing the battery box components.
3. Set the battery on the battery tray.
4. Install the Battery Hold Down Rods as shown in Figure 3-5.
   a. Place the bent end of the Battery Hold Down Rod through the hole in the Battery Tray.
   b. Place the threaded end of the Battery Hold Down Rod through the hole in the Battery Hold Down Bar and secure with flat washer, lock washer and nut.
   c. Repeat steps a and b for the other Battery Hold Down Rod.
5. Connect the battery cables to the battery, be sure the Positive lead is connected to the positive (+) battery terminal and the negative lead is connected to the positive (–) battery terminal.

Figure 3-5 Battery Installation

Open the enclosure access panel Door 4 (Figure 3-2).



Battery Charger Optional

1. Open Door 6 (Figure 3-1).
2. The battery charger is mounted on the right side of this space.
3. Connect the Battery Charger to the + and – terminals of your battery.
4. Plug the AC power cord to the 115VAC (shore power) described in Figure 3-2.

Space Heater Optional

1. Open Door 6 (Figure 3-1).
2. The Space Heater is mounted on the right side of this space. It has screw terminals on the bottom of the heater for AC power.
3. Connect the screw terminals of the heater to the 115VAC (shore power) described in Figure 3-2.

Block Heater Optional

1. Open Door 4 (Figure 3-2).
2. The Block Heater is mounted on the right side of this space.
3. Plug the AC power cord to the 115VAC (shore power) described in Figure 3-2.

Crank Time and Crank Cycle Settings

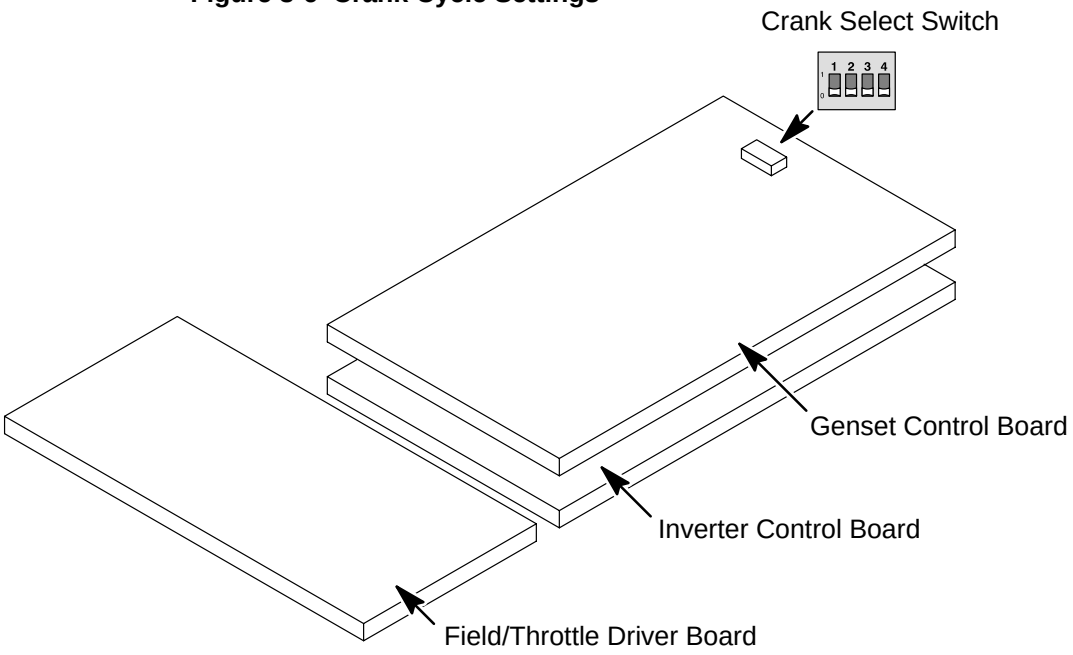
Crank Time Settings (See Figure 3-6)

Switch Position		
Switch 1	**Switch 2**	**Description**
0	0	Allows starter to crank for 15 seconds then rest for 15 seconds.
1	0	Allows starter to crank for 20 seconds then rest for 20 seconds.
0	1	Allows starter to crank for 25 seconds then rest for 25 seconds.
1	1	Allows starter to crank for 30 seconds then rest for 30 seconds.

Crank Cycle Settings (See Figure 3-6)

Switch Position		
Switch 3	**Switch 4**	**Description**
0	0	Allows 3 Crank Cycles to start the engine.
1	0	Allows 4 Crank Cycles to start the engine.
0	1	Allows 5 Crank Cycles to start the engine.
1	1	Allows 6 Crank Cycles to start the engine.

Figure 3-6 Crank Cycle Settings



Post Installation Checks

When the initial installation is complete, these checks must be performed before starting the engine. These checks are not required before each start, only after the initial installation.

1. Generators that have been in transit or storage for long periods may be subjected to extreme temperature and moisture changes. This can cause excessive condensation, and the generator windings should be thoroughly dried before bringing the generator up to full nameplate voltage. If this precaution is not taken, serious damage to the generator can result.

Caution: Do not apply high voltage to windings (do not start the generator set) in a moisture–saturated condition. Moisture can cause insulation breakdown, making it necessary to return the generator to the factory for repair, and consequent expense and loss of time.

Note: These precautions are especially necessary in locations such as seaboard installations and other high humidity areas. Some installations will be in atmospheres that are much more corrosive than others. Prevention of a failure is better than being forced to make a repair.

2. Verify that the transfer switch is in Utility Power mode. No power must be present at the generator or transfer switch connections. Verify with a voltmeter.
3. Verify that the engine starting battery is disconnected so accidental starting is not possible.
4. Verify that the generator is securely mounted and anchored to its cement pad.
5. Verify that proper clearance exists on all sides and top of enclosure.
6. Verify that the three phase generator power (A, B, C and N) are properly connected to the transfer switch.
7. Assure that generator is a safe distance from any flammable or combustible material.
8. Verify that the generator and transfer switch load are voltage compatible.
9. Verify that no load is connected to the circuit breaker and/or transfer switch.
10. Inspect the engine and generator and verify that there are no loose wires or components. Tighten if necessary.
11. Verify that the ground conductor is of correct wire size and properly connected.
12. Verify engine oil level is full. Refer to engine manual if necessary.
13. Verify engine coolant level is full. Refer to engine manual if necessary.
14. Verify exhaust system to assure it is in properly connected and pointing away from combustible materials.

Post Installation Checks Continued

15. Verify that the Master Control Switch is still in the “Stop” position. Connect the engine starting battery to the starter. Verify it is installed correctly.
16. Verify the fuel source is ON and the pressure and flow rate is correct.
17. Remove all tools, rags, etc. from inside the generator enclosure. Close all enclosure doors and be sure no hands are inside the generator enclosure when it starts.
18. At the Operator panel, press Lamp Test and ensure all lamps are operating. The emergency off lamp is not tested by this test.
19. Move the Master Control Switch to the “Manual Run” position to start the generator.
20. The engine should begin to crank and start when the fuel moves trough the pipe to the carburetor. If the engine fails to start, move the master control switch to “Stop” and refer to Section 5 Troubleshooting.
21. With the engine running, several checks must be made:
    a. Verify there are no fuel leaks. If a fuel leak is detected, stop the engine (move the Master Control Switch to the “Stop” position) immediately and repair the leak before proceeding.
    b. Verify there are no coolant or oil leaks. If a leak is detected, stop the engine (move the Master Control Switch to the “Stop” position) immediately and repair the leak before proceeding.
    c. Verify that operation is smooth. If belt squeals, vibrations or other sources of noise exist, stop the engine (move the Master Control Switch to the “Stop” position) immediately and repair before proceeding.
    d. Verify that the correct voltage exists on all three phases (A, B, C) to Neutral at the generator and at the transfer switch. Voltage should be $480V_{L-L}$ or $277V_{L-N}$.

WARNING: Engine coolant is under pressure and is near the boiling point of water when engine is hot. Do not open the coolant system until the engine has completely cooled. Hot coolant can cause severe burns and other injuries. When engine is cool, coolant level can be checked.

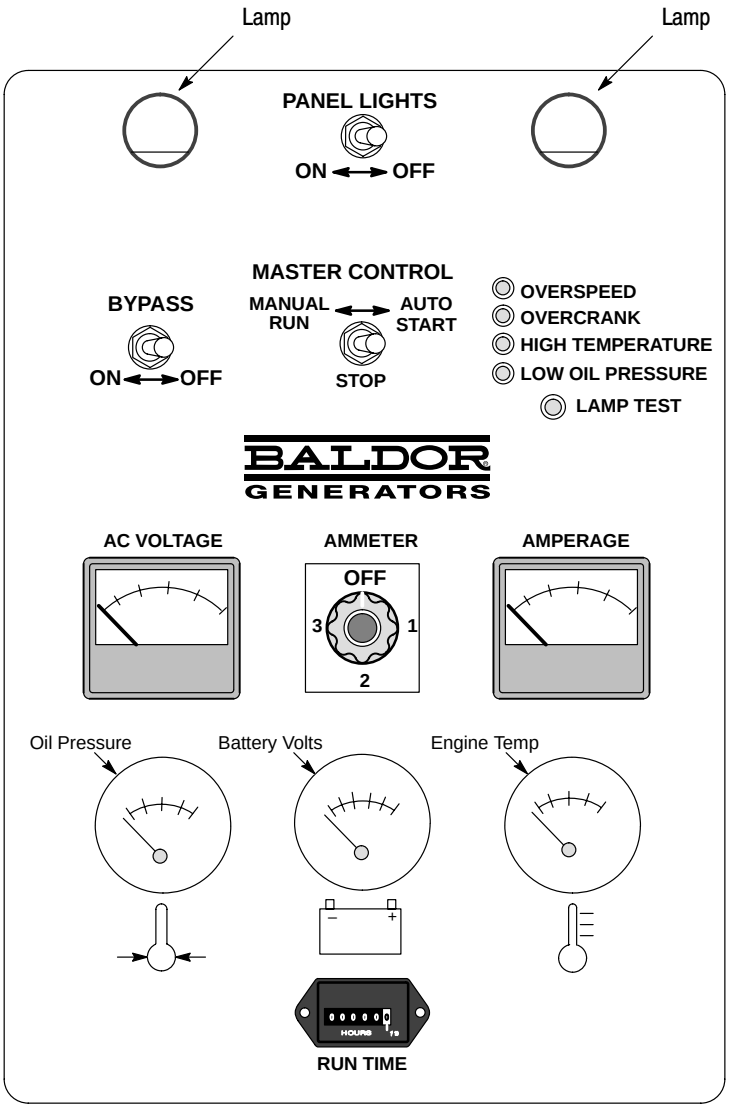
22. After the operation checks are made, stop the engine (move the Master Control Switch to the “Stop” position) and wait 2 hours for the engine to cool. When the engine is cool, check engine oil and coolant levels as instructed in the engine operation manual.
23. Close all enclosure covers. The post installation checks are now complete.

Note: When OptiGEN is started it does not stay at full speed like most generator sets. It first calibrates itself at various RPM levels then returns to idle until a load is applied. Therefore, when OptiGEN is first started it will speed up and slow down for several cycles during the first few moments of operation. This is normal and this is how OptiGEN calibrates itself. The output voltage and frequency remain constant at all times for all load conditions.

Operator Control Panel

The Operator Control Panel is shown in Figure 4-1. The features of each control or display is described in Table 4-1.

Figure 4-1 Operator Control Panel



Panel Lights switch (On-Off)
Turns on two lamps to illuminate the operator panel.

Bypass switch (On-Off)
On places engine in fixed speed mode for 60Hz operation.

Master Control switch (Manual Run-Stop - Auto Start)
Manual Run - Starts the engine manually.
Stop - Stops the engine and generator.
Auto Start - Starts the engine from a remote source whenever the utility AC power is lost.

Display Lamps
Overspeed - Indicates engine speed is greater than preset limit.
Overcrank - Failure of the engine to start by the end of the crank period results in an "overcrank" shutdown and alarm indication. Flashing indicates OptiGEN is optimizing engine performance.
High Temperature - Indicates excessive engine coolant temperature.
Low Oil Pressure - Indicates low engine oil pressure.

Lamp Test switch (momentary On)
Press switch to turn momentarily turn On the four Display Lamps.

AC Voltage meter
Analog display of generator output voltage in RMS volts.

AMMETER switch (3 position)
Off - No current is measured by the Amperage meter.
1 - Phase 1 current is measured by the Amperage meter.
2 - Phase 2 current is measured by the Amperage meter.
3 - Phase 3 current is measured by the Amperage meter.

Amperage meter
Analog display of generator output current in RMS amps.

Oil Pressure meter
Displays engine oil pressure.

Battery Voltage meter
Displays the voltage of the engine starting battery.

Engine Temperature meter
Displays the temperature of the engine coolant.

Run Time meter
Total elapsed time indicator of generator set operation.

Table 4-1 Control Features

Item	Description
Panel Lights	Two lamps located at the top of the operator panel illuminate the panel for viewing. The lamps are controlled by the Panel Lights switch. These lamps are fused.
Bypass	The Bypass feature is not implemented at this time.
Master Control	Sets the operating mode of the Generator. **Manual Run** – As soon as the Master Control switch is set to Manual Run, the engine will begin to crank and attempt to start. **Stop** – stops the engine and generator output is zero when engine speed reaches 0 RPM. **Auto Start** – Allows automatic operation whenever the utility AC power is lost. For this mode, the generator must be connected to a Load Switch and the run command is received at TB2 when utility AC power is lost. This will cause the OptiGEN to automatically start and produce output power.
Display Lamps	Four lamps display alarm status as follows: **Overspeed** – Indicates when engine speed is greater than the preset maximum speed. **Overcrank** – This feature provides a preset time duration that the engine is allowed to crank (attempt to start). Failure of the engine to start by the end of the crank period results in an “overcrank” shutdown and alarm indication. Note: When flashing, this indicates OptiGEN is optimizing engine performance. Usually requires a few moments after startup. **High Temperature** – Indicates when engine coolant has reached excessive temperature. Engine temperature monitoring begins immediately with the start signal. However, if engine temperature is excessive prior to start (i.e. heat soak after shutdown), the unit is permitted to start. The High temperature condition is permitted to exist for up to 60 seconds after the unit is running before shutdown when alarm occurs. If the excessive temperature condition is corrected within the 60 second period, the HT circuit reverts to normal monitoring. **Low Oil Pressure** – Indicates when engine oil pressure is too low. Monitoring of oil pressure begins for a preset time after unit starts and remains in effect until unit is stopped.
Lamp Test	Lamp Test switch causes all Display Lamps to illuminate for testing. Disabled when Master Control is in “Stop” position.
AC Voltage meter	Analog display of actual measured generator output voltage in RMS volts.
Ammeter	**Off** – No current is measured by the Amperage meter. **1** – Phase 1 current is measured by the Amperage meter. **2** – Phase 2 current is measured by the Amperage meter. **3** – Phase 3 current is measured by the Amperage meter.
Amperage meter	Analog display of actual measured generator output current in RMS amps.
Oil Pressure meter	Analog display of engine oil pressure.
Battery Volts meter	Analog display of engine starting battery voltage.
Engine Temp meter	Analog display of engine temperature.
Run Time	Hour meter indicates total accumulative hours that the generator set has been in operation.

Operation

There are two operating modes for the OptiGEN: Manual Run and Autostart. The difference between Manual Run and Autostart modes is how the engine is started and stopped. The output power regulation and engine speed control operates the same in either mode.

The PCS (Power Control System) electronics provides control for the engine and generator. The engine is commanded to run over a limited speed range to create the energy demanded by the load. As the load (current) decreases, engine speed is decreased to conserve fuel, reduce noise etc. As load (current) increases, engine speed is increased to meet the load demand. Output voltage and frequency remain constant over engine RPM range.

Pre Operation Checks

These procedures assume that the generator has been installed, adjusted and checked out and that this is not the initial start–up after installation. Before the engine is operated, be sure that all maintenance has been performed as specified in Section 6 “Maintenance” of this manual. Start–up may be performed on a periodic basis to ensure that the generator is operating properly (weekly or monthly etc.) Manual mode is used to start the generator without a start command from the transfer switch. In Automatic mode, a programmed start from an optional external device may issue the command to start. This optional device (if installed) can automatically start the generator periodically to verify operation.

Manual Run

The Operator controls are shown in Figure 4-1.

Be sure it is safe to start the generator.

1. Place the Master Control Switch in the “Manual Run” position. This initiates the engine start sequence. The engine begins to crank and start. If the engine fails to start within the start time limit, the Overcrank lamp will be on and the start cycle will terminate.
2. The engine will start and come up to operating speed (after a 10 minute warm–up period). When the PCS determines that the load demand is very low, engine speed will decrease to conserve fuel.
3. If a load demand is present, the PCS will regulate engine speed to meet the current (amperes) required by the load. The output voltage and frequency remain constant at all times for all load conditions.
4. To stop the engine, place the Master Control Switch in the “Stop” position. This will stop the engine immediately without waiting for internal delays.

Autostart

The Operator controls are shown in Figure 4-1.

1. Place the Master Control Switch in the “Auto Start“ position. The PCS is ready to start the engine when commanded to do so (TB2 “Remote Start”). A start command can be issued by the transfer switch (if power failure occurs) or by an optional remote starting device that periodically verifies generator performance.
2. Activate the remote start command (TB2 “Remote Start”).
   a. Command the remote start device to issue a start command.
   b. Trip the main breaker to remove utility power from the transfer switch (to simulate a power outage).
3. The engine will start and come up to operating speed (after a 10 minute warm–up period). When the PCS determines that the load demand is very low, engine speed will decrease to match the output to the load requirement.
4. If a load demand is present, the PCS will regulate engine speed to meet the current (amperes) required by the load. The output voltage and frequency remain constant at all times for all load conditions.
5. Issue the remote stop command.
   a. Command the remote start device to issue a stop command.
   b. Reset the main breaker to restore utility power to the transfer switch.
6. The engine will stop. This will stop the engine after the internal delays that have been set by the operator.

Bypass Mode

Bypass mode simply places the engine in full speed mode and bypasses the electronics (output is straight from the alternator output). All other functions, alarms and sensors are operational. With the engine operating in either Manual Run or Autostart, simply place the Bypass Mode switch in the ON position for full speed operation (maximum load). Place the Bypass Mode switch in the OFF position to return to the normal adjustable speed OptiGEN mode.

Section 5
Troubleshooting

Place the operator panel switches in the following positions and test for proper operation:

Switch Name	Position
Master Control	Manual Run
Bypass	Off

Table 5-1 Troubleshooting Guide

Problem	Possible Cause	Remedy
No output voltage	Loss of residual magnetism in exciter field poles.	Flash field.
	Open in stator windings	Check for continuity in windings. Return to factory for repair if open.
Output voltage varies	Irregular speed (fixed speed mode)	Check engine for malfunction or load for fluctuation
	Fluctuating speed (fixed speed mode)	Stabilize load. The addition of a lamp load (resistance load) may compensate partially for load changes caused by intermittent motor operation. Do not overload.
	Loose terminal or load connections	Verify all connections are proper and check tighness torque of terminals.
	Defective bearing (uneven air gap)	Replace worn bearing
Low output voltage	Excessive load	Reduce load. With 3 phase generators, the load on each leg should be as evenly balanced as possible and should not exceed the rated current on any leg.
	Low Engine Speed (fixed speed mode)	Check engine for malfunction or system for overload
	High resistance connections – connections will be warm or hot	Verify all connections are proper and check tighness torque of terminals.
	Shorted field	Test field coils for possible short by checking resistance with an ohmmeter or resistancebridge. Return rotor assembly to factory forrepair if alternator field coils are shorted.
	Low power factor	Reduce inductive (motor) load. Some AC motors use about the same current regardless of load. Do not use motors of greater horsepower rating than is necessary to move the mechanical load.
High output voltage	Excessive speed (fixed speed mode)	Check engine for malfunction
Electrical shock when frame is touched	Static charge.	Ground generator frame
	Grounded armature or field coil.	Return to factory for repair
Mechanical noise	Defective bearing	Replace bearing
	Rotor rubbing on stator	Bad bearing – replace. Bent shaft – return to factory. Loose end bell – tighten; Loose drive Discs – tighten
	Loose laminations	Return to factory for repair
	Loose or misaligned coupling	Tighten; align

Indicator Lamps If a lamp is lit during normal operation, see to Table 5-2.

Table 5-2

Problem	Possible Cause	Remedy
“HIGH TEMP” lamp is lit	Coolant Temperature is too high	Clean air intake system and remove debris that prevents proper cooling. When engine is cooled down, check coolant level and engine oil level.
“LOW OIL PRESSURE” lamp is lit	Low oil level in crankcase	Replenish oil supply
“OVERSPEED” lamp is lit	Engine shuts off if 125% of set speed is reached	
“OVERCRANK” lamp is lit	The engine failed to start after the preset number of starting attempts.	Determine cause of failure to start (check fuel supply etc.)
“OVERCRANK” lamp is Blinking	OptiGEN is performing engine optimization. Normal after startup.	This is normal after startup and is not a failure.

Section 6
Maintenance

Engine Refer to engine manual for maintenance recommendations and lubricant and coolant types.

Coolant Level Before starting the engine, while engine is cold check the coolant level.

Oil Level Before starting the engine, while engine is cold check the oil level.

Starting Battery Electrolyte level in the battery may need to be checked periodically. If you purchased a maintenance free battery periodic checking may not be required. Battery posts and cables and battery charger connections need be be clean and tight (check for corrosion). See the instructions that came with your battery. Refer to Section 3 for battery removal and replacement information.

Battery Charger Corrosion etc.

Block Heater Check hoses and connections to block heater for leaks, cracked hoses or loose hose clamps. Also verify that the insulation on the electrical cord is good and is not cracked. Replace if any damage is found.

Figure 6-1 Block Heater Hoses

Generator

Bearings: Ball bearings on the generator are pre–lubricated, double sealed and require no further lubrication for the life of the bearing.

Loading: Generator loading should be checked with an AC ammeter to see that the ampere rating stamped on the nameplate is not exceeded. A prolonged overload on the generator may cause it to overheat and fail. Separately check the current of each of the three phases.

Moisture: Generators that have been in transit or storage for too long periods may be subjected to extreme temperature and moisture changes. This can cause excessive condensation, and the generator windings should be thoroughly dried before bringing the generator up to full nameplate voltage. The electrical insulation can be very quickly broken down by carelessly applying full voltage to windings in a moisture–saturated condition. Mishandling in this respect can easily cause a breakdown, making it necessary to return the generator to the factory for repair.

1. If excessive moisture is present, dry with a warm air blower directed through windings.
2. If the generator has been operated and then put into storage for any period of time, an air dry fungus resistant varnish can be applied.

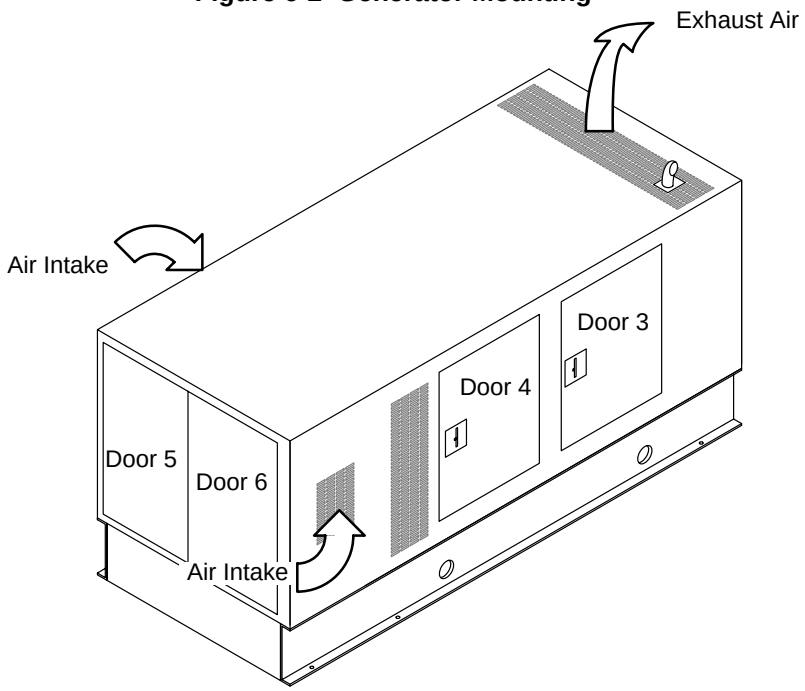
Electrical Connections: Verify that all wires are properly connected and that wire terminals are properly tightened to torque specifications. Vibration may cause terminals to loosen over time.

Enclosure

Improper Ventilation: Clear away debris from all sides and top of generator. Keep leaves, trash, snow or ice buildup etc. away from the enclosure. Clean air passages and screens. Proper air flow must occur to prevent overheating, see Figure 6-2.

Clean and prevent the buildup of dust or moisture.

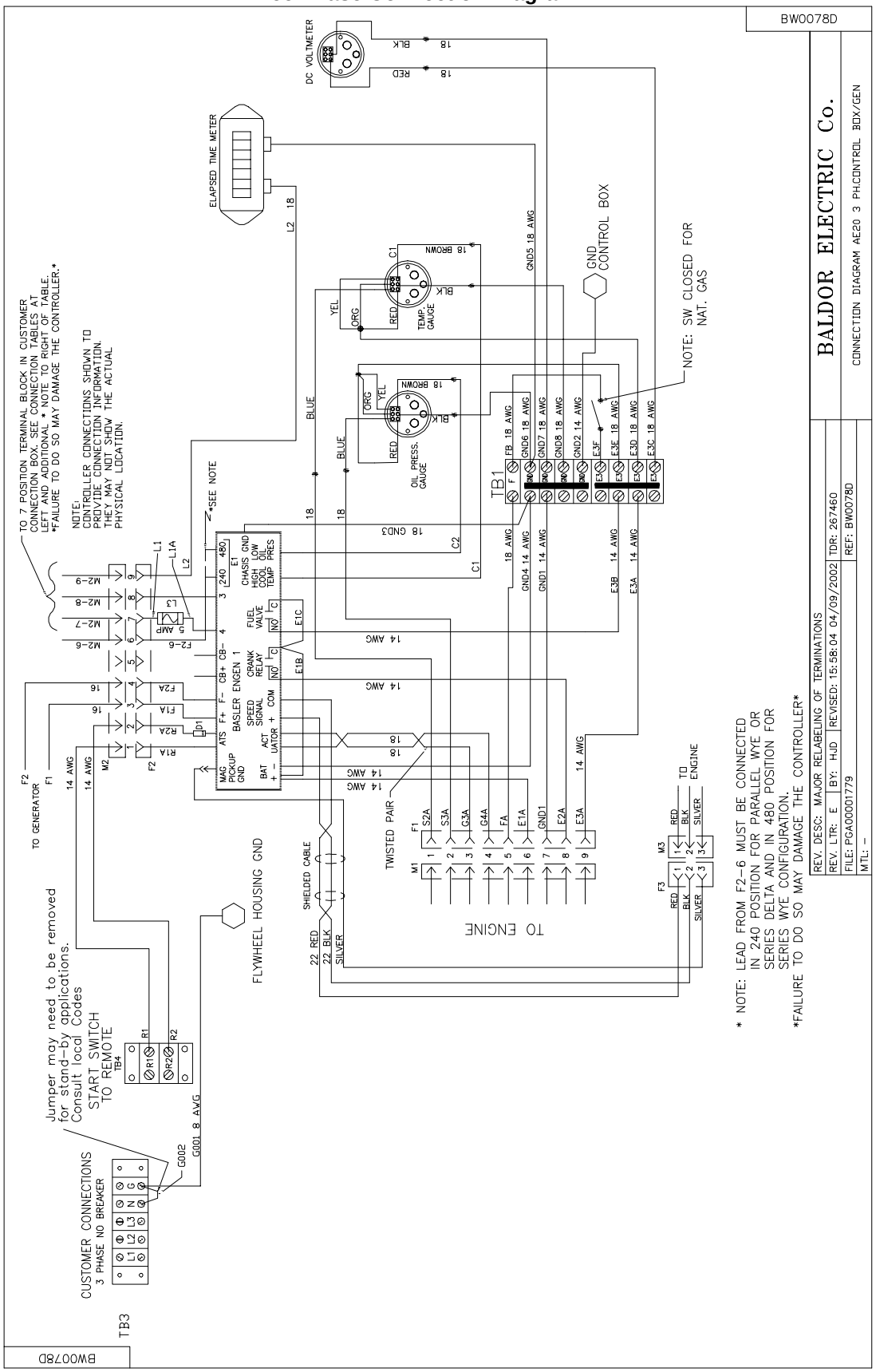
Figure 6-2 Generator Mounting



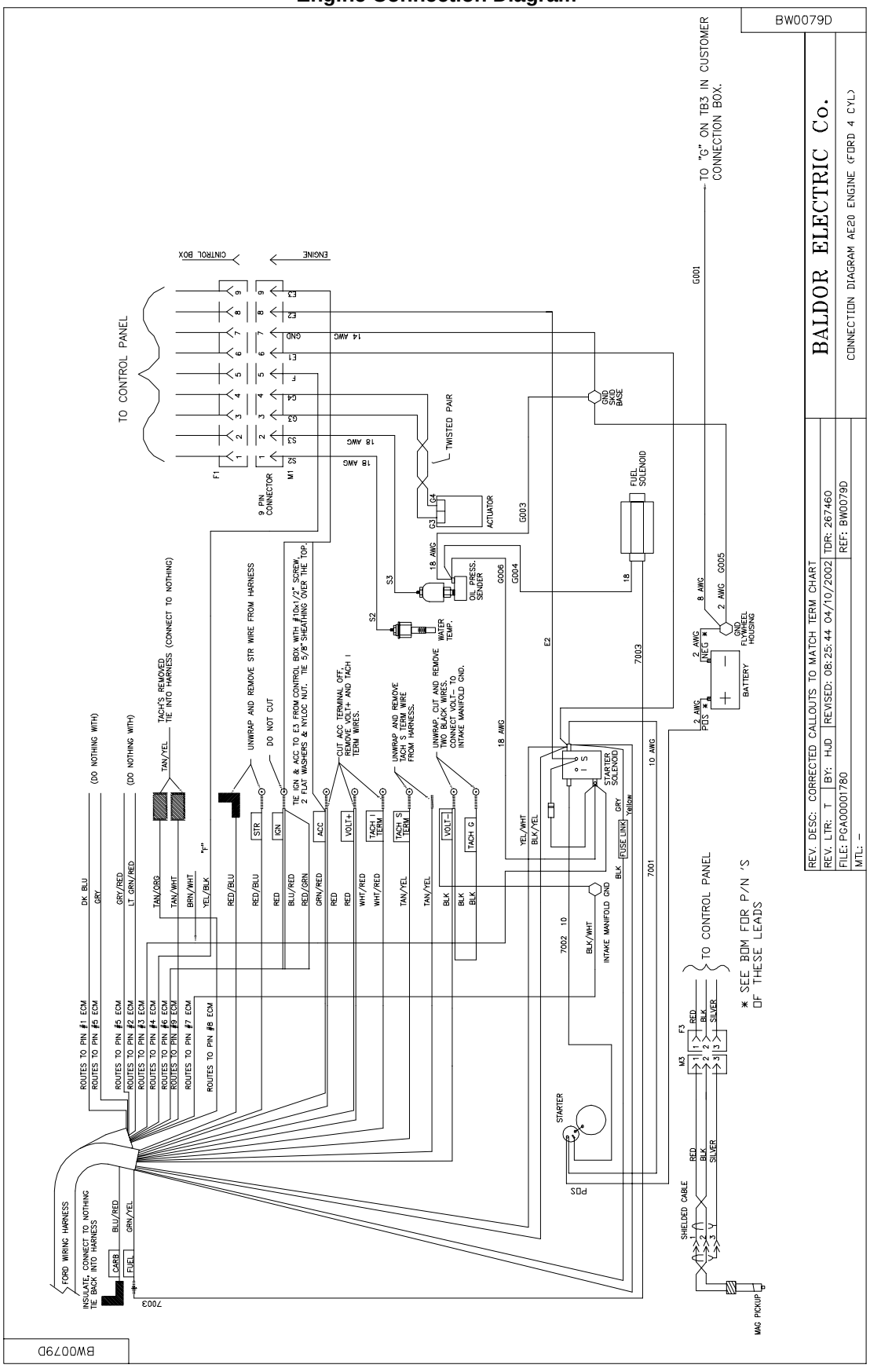
Periodic Maintenance The following maintenance items should be performed at the indicated intervals.

Task	Before Start–up	Monthly or 50 Hours	Semi Annual or 100 Hours	Annual or 100 Hours
Check Air Inlets. Remove debris.	•	•		
Replace Air Filter				•
Check Coolant Level	•			
Check Oil Level	•			
Change Oil & Oil Filter			•	

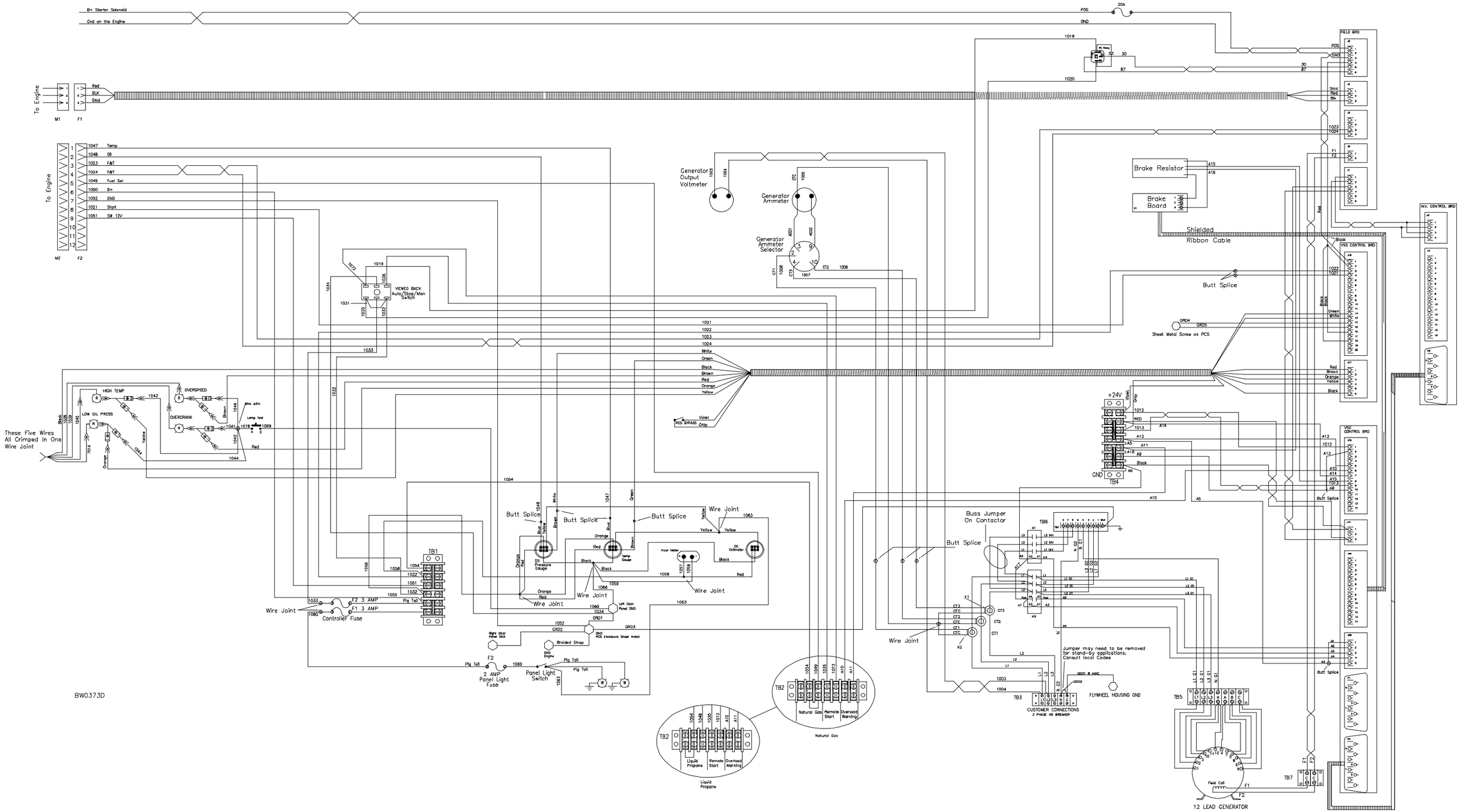
Three Phase Connection Diagram



Engine Connection Diagram



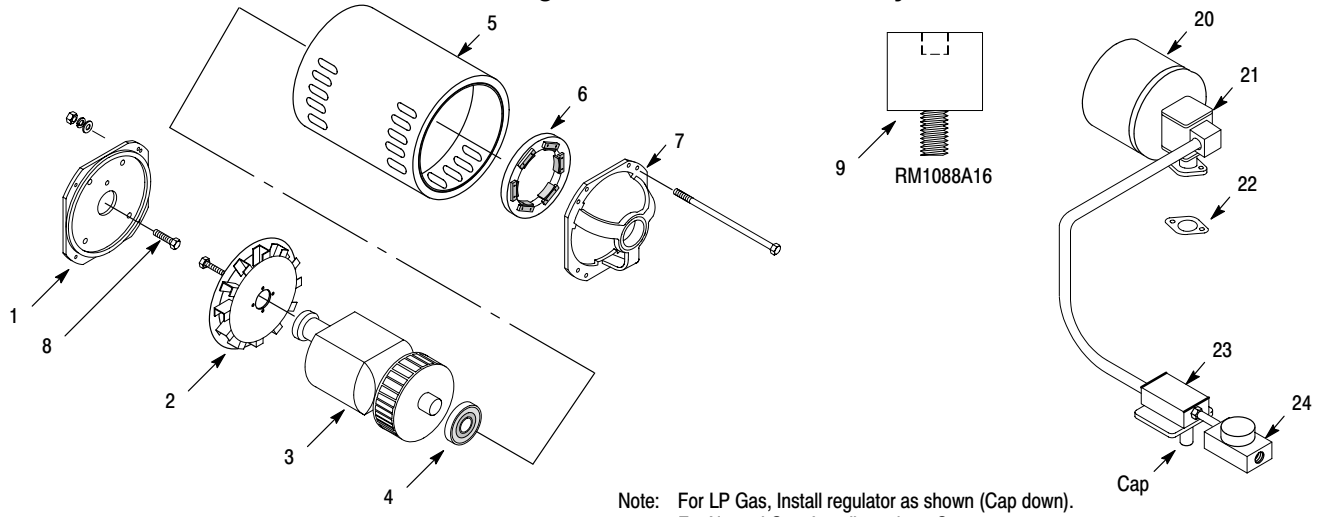
Control Box Connection



Section 8
Parts Information

Replacement Parts Replacement parts for the Alternator Assembly are shown in Figure 8-1. Parts information is provided in Table 8-1. Engine parts are identified in the engine manual that was provided with your generator set.

Figure 8-1 Alternator Assembly



Note: For LP Gas, Install regulator as shown (Cap down).
For Natural Gas, Install regulator Cap up.

Table 8-1 Generator Set Parts List

Ref No.	Part No.	Description
1	HB6179A00	Adaptor, Engine
2	62FN4002	Fan
3	62RA012A00	Rotor Assembly
4	BG6207H03	Rotor Bearing
5	62SA0015A00	Stator Assembly
6	62EX5002A03	Exciter Assembly
7	62EP3200A02M3	Bearing Bracket
8	HA3188A00	Rotor Bolt (Rotor to Engine)
9	RM1088A16	Isolator
20	EA0015A02	Filter,Air,D,9"ODX3H,250CFM
21	EA0031A00	CARB, LP GAS, AE20
22	GS0091A00	Gasket
23	EA0000A02	Regulator,LP/NAT
24	EA0030A00	Diaphragm, NAT GAS
Not Shown	RM1088A23	Isolator
Not Shown	BA0333A00	Base Frame
Not Shown	BA0333A01	Base Frame Extension
Not Shown	LB0094A11	Decal, Danger-high Voltage
Not Shown	LB0094C20	Decal, Rear Control Panel, OptiGEN
Not Shown	LB0094A30	Decal, Warning, Auto Start
Not Shown	LB0301A00	Decal, 18", "OptiGEN", Die Cut
Not Shown	LB0301A01	Decal, 29", "OptiGEN", Die Cut

Table 8-1 Generator Set Parts List Continued

Ref No.	Part No.	Description
Not Shown	HW3516A00	Battery Rack, Clamp
Not Shown	EA0001A01	Sender, Water Temp
Not Shown	EA0001A02	Sender, Oil Pressure
Not Shown	EM0049A00	Power Conditioner,25KV/480/3 PH
Not Shown	CT0050A05	C.T. 100:5
Not Shown	EF0041A00	115VAC,200W,50/60HZ, Electric Fan
Not Shown	RE5031A21	Contactor, Reversing 24VDC
Not Shown	EA0010A02	Charger, Battery, 12V, 6 AMP
Not Shown	EM0049A10	Brake, OPTIGEN, 3 PHASE 480V 1 KW
Not Shown	RR0260A00	Resistor, Braking, 32OHM, 1000WATT
Not Shown	FU0078A02	Fuse, Blade Type, ATC-3 AMP
Not Shown	WD3203A00	Gauge, Pressure
Not Shown	WD3204A00	Gauge, Temp
Not Shown	WD3201A11	Meter, Volt
Not Shown	WD3201A18	Meter, Volt
Not Shown	WD3201A20	Meter, Amp
Not Shown	WD3201A01	Meter, Elapsed Time
Not Shown	SP9095	Switch
Not Shown	SP9094	Switch, DPDT
Not Shown	SP9079	Switch, Toggle
Not Shown	SP9105	Switch
Not Shown	DI0181A05	Light, LED
Not Shown	DI0179A00	Lamp, Dash, Fixture
Not Shown	DI0180A00	Lamp, #67, 12 VOLT
Not Shown	DI0176A00	Diode, 1N5408
Not Shown	SE0052A00	Solenoid, Low Pressure
Not Shown	EA0005A03	Hose, Radiator
Not Shown	EA0005A20	Hose, Radiator
Not Shown	HW4049A03	Elbow, Exhaust 2" ID X 10 CRV
Not Shown	FN0023A02	Fan, Eng
Not Shown	EA0007A05	Assembly, Magnetic Pick-up
Not Shown	EA0082A00	Stack, Exhaust
Not Shown	EA0008A01	Muffler
Not Shown	EA0006A04	Radiator

Section 9
Specifications, Ratings & Dimensions

Specifications:

ASG25–480–3

Output Power	25kVA (20kW)
Fuel	LP Standard (Natural Gas requires jumper change – optional) 158 C.F.H. (LPG) / 400 C.F.H (Natural)
Dimensions in(mm)	L=68 (1727); W=33 (838); H=33 (838)
Net Weight lb (kg)	1660 (753.6)
Battery Group	

Electrical Ratings:

Output Voltage: 480 VAC Models	480VAC ± 1%
Phase	3 Phase
Power Factor	0.8
Output Frequency	50/60 HZ ± 1%
Total Harmonic Distortion	<5%
Output Current	30.0 Amps ± 1%
Motor Starting (hp)	20 hp standard load, 10 hp heavy load
Ambient Operating Temperature:	to 110 °F (43 °C) Derate by 2.77% per 10 °F over 110 °F (5 % per 10°F over 43 °C)
Rated Storage Temperature:	– 30 °C to +65 °C
Enclosure:	NEMA 3R: IPXX
Humidity:	10 to 90% RH
Altitude:	Sea level to 3300 Feet (1000 Meters) Derate 2% per 1000 Feet (303 Meters) above 3300 Feet
Shock:	1G
Vibration:	0.5G at 10Hz to 60Hz

Engine Controller:

Time Delay to Start Engine	Yes
Cycle or Single Crank	Yes
Tachometer	Yes
Hour Meter	Yes
Coolant Temperature Gauge	Yes
Engine Temperature Gauge	Yes
Oil Pressure Gauge	Yes
Overspeed Warning	Yes
Over Crank Warning	Yes
Panel Illumination Lamps	Yes
Warning Lamps with Lamp Test	Yes

Engine:

Make	Ford
Model	LSG423
Cooling	Liquid
Cylinders	4
Displacement	2.5L
HP	38.2
RPM	Adjustable (1950 RPM @ Full Load)
DC Charging Alternator	Yes
Coolant Capacity	11.6 qts (11.9L)
Coolant Type	50% Water and 50% Ethylene Glycol Base antifreeze
Oil Capacity	5 qts (4.73L)
Oil Type (10°F to 90°F)	SF/CC/CD –10W40 weight
Normal Oil Pressure PSI (kPa)	15 (50)
Emissions: NOx HC CO Particulates – PM – g/BHP–hr –g/kW–hr	 Meets EPA Tier One / CARB Consult factory for actual values

Alternator:

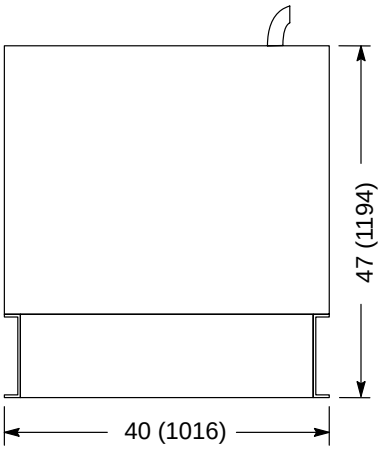
Generator Frame	
Exciter	
Excitation System	
Cooling Fan	
Bearing	
Connection Type	
Insulation Type	
Windings	
Pitch	
Amortisseur Winding	
Voltage Regulation NL – FL	
Overspeed RPM	2250
Rated Output	20kW
SKVA output with 30% voltage dip max. 100% recovery @60Hz	
Maximum SKVA at 90% sustained voltage dip	
Subtransient reactance at rated voltage	
Line–To–Line Total Harmonic Distortion	5%

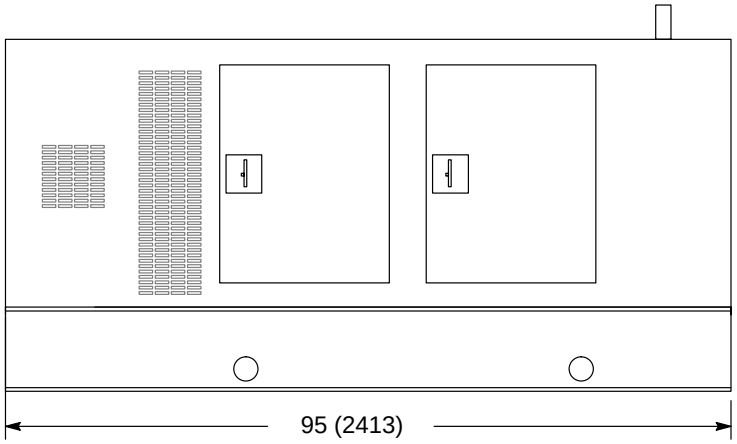
Terminal Tightening Torque Specifications

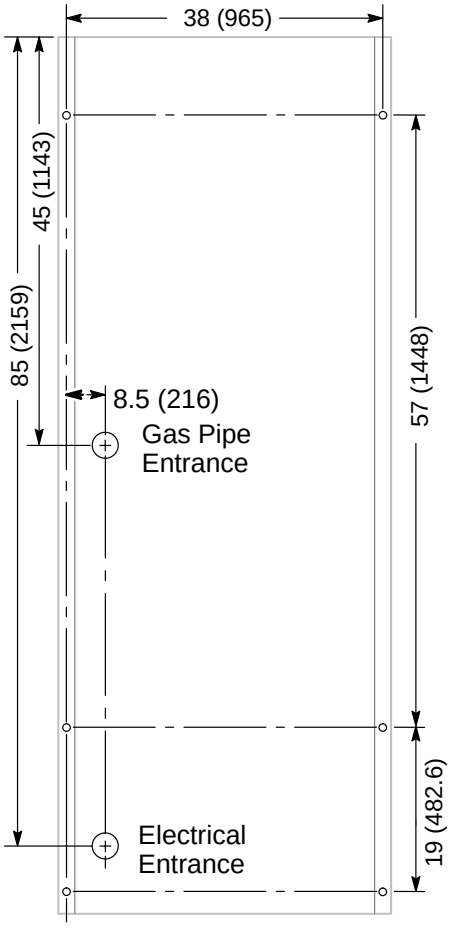
Catalog Number	Tightening Torque					
	Power Terminals		Frame Ground		Signal Terminals	
	Lb-in	Nm	Lb-in	Nm	Lb-in	Nm
ASG25–480–3						
ASG60–480–3						
ASG100–480–3						

Dimensions

25kVA (20kW) Generator Set







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MN2406

Printed in USA
2/04 FAR100