

WINPOWER

GP SERIES

Instruction Manual

GASOLINE ELECTRIC PLANT

AIR-COOLED

MODELS

GP2500B

GP4000B/GP4000BE/GP4000BS

GP5000B/GP5000BE/GP5000BS

GP8000BS

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I. INTRODUCTION

Thank you for purchasing a PIERCE CO. **WINPOWER** alternator.

This manual covers the operation and maintenance of models GP2500B, GP4000B/GP4000BE/GP4000BS, GP5000B/GP5000BE/GP5000BS, GP8000BS. This manual is based upon the latest product information available at the time of printing.

The Pierce Co. Inc. reserves the right to make changes at any time without notice and without incurring any obligation.

This manual shall not be reproduced without written permission.

The manual is the only means of obtaining the necessary information for operating and servicing the alternator. It therefore should be considered as a part of the alternator and should remain with the alternator when sold.

WARNING!



Indicates a strong possibility of severe personal injury, loss of life or a serious hazard condition could occur if instructions given in the manual are not followed.

CAUTION!



Indicates a possibility of personal injury, equipment damage or other property damage could occur if the instructions are not followed.

NOTE:

Lists helpful information which should assist you in getting satisfactory performance with your new alternator.

If you have a problem with your alternator, or have any questions about the alternator consult an authorized **WINPOWER** distributor, dealer or service center. Should you require additional information please consult the factory service department.

The **WINPOWER** alternator is designed to give safe and dependable service if operated according to the instructions given in this manual. Read and understand the owner's operation and service manual before operating the alternator. Failure to do so could result in personal injury or equipment damage.

II. PRECAUTIONS FOR SAFE USE

A. To avoid fires:

1. **WARNING!**



Do not store combustible material such as straw, waste paper, scrap wood, etc. where the alternator is stored.

2. **WARNING!**



Do not store dangerous or flammable materials such as lubricants, celluloid, gasoline, explosives, etc. nearby.

3. **WARNING!**



Operate the alternator on a level surface. If the alternator is tilted or moved during use, there is the danger of fuel spillage and/or a chance the alternator will overturn.

4. **CAUTION!**



During operation maintain a safe distance of at least 3 feet (1 meter) from building or other equipment. When an alternator is located close to a building or nearby other equipment, heat and exhaust from the engine will cause the surrounding temperature to rise. This will reduce the cooling and could cause the engine or alternator to overheat.

5. **CAUTION!**



Do not enclose the alternator or cover with a structure for this will cause it to overheat, creating a possible equipment damaging condition.

6. **WARNING!**



Always stop the engine when refueling because of the extreme danger from the fuel vapor or spilled fuel being ignited.

7. **CAUTION!**



Be careful not to spill fuel when refueling. If fuel is spilled, completely wipe up and let dry before starting the engine.

8. **CAUTION!**



Do not overfill the fuel tank.

9. **WARNING!**



Never refuel in the presence of a lighted cigarette or an open fire.

10. **WARNING!**



Never refuel a hot engine. Always allow the engine to cool before refueling.

B. Exhaust gases:

WARNING!



Do not operate the alternator in locations with poor ventilation such as home interiors, warehouses, tunnels, wells, pits, tanks, ship hold, etc. Fatal levels of gaseous fumes can accumulate in poorly ventilated areas and increase the danger of carbon monoxide poisoning. Always pay strict attention to the fire codes, building codes and safety regulations if the alternator is operated inside a building.

C. Other precautions:

1. **WARNING!**



Do not operate the alternator with wet hands. Possibility of severe electrical shock may be experienced. Do not operate in the rain or snow.

2. **CAUTION!**



Do not touch the muffler during operation or just after stopping, for a serious burn could result. The exhaust system operates at a very high temperature.

3. **CAUTION!**



Do not get water on the alternator. If the unit becomes wet allow it to completely dry before operating. Also, a wet spark plug may prevent the engine from starting.

4. **CAUTION!**



Do not connect the alternator to the household electrical system without using a U.L. listed double throw disconnect switch. Any such installation should only be made by a licensed electrician in accordance with all city, county, province, state, regional and national electric codes.

5. **CAUTION!**



If you should observe an abnormal noise, odor, vibration, etc. when the unit is operating it should be stopped immediately and the reason for the condition be determined. Failure to do so could permanently damage the unit as well as associated equipment. If the cause cannot be determined the unit should be taken to the nearest service center for proper diagnosis.

6. **WARNING!**



Make sure that the unit is grounded properly and is in accordance with all applicable regulating codes.

III. PRESTART PROCEDURES:

A. Check the engine oil level

1. **CAUTION!**



Remove the oil filler cap or dipstick to check the oil level. If oil level is low, add a high quality motor oil to the point of overflowing or to the full mark (when applicable). On units equipped with a dipstick—do not over fill.

2. **CAUTION!**



Engine oil is a major factor affecting engine performance and service life. Use only recommended types and grades of lubricating oil.

B. Recommended lubricating oil (See engine manual):

1. Supplementary guide if engine manual is misplaced:

Summer	SAE #20-30
Winter	SAE #10W-30

2. **CAUTION!**



NOTE: Engine is shipped **WITHOUT** oil. Use a high quality detergent oil classified "For service SF, SE, SD or SC." Detergent oils keep the engine cleaner and retard the formation of gum and varnish deposits. Use 4 stroke oil, do not use 2 stroke oil.

C. Oil capacity:

GP2500B	:	1.25 Pints (.59 liters)
GP4000B/GP4000BE/GP4000BS	:	3 Pints (1.42 liters)
GP5000B/GP5000BE/GP5000BS	:	3 Pints (1.42 liters)
GP8000BS	:	3 Pints (1.42 liters)

1. **CAUTION!**



Running the engine with insufficient oil can cause serious engine damage.

D. Fueling of the engine:

The engine manufacturer recommends the use of clean, fresh, **lead-free** gasoline. Leaded gasoline may be used if lead-free is not available. The use of lead-free gasoline results in fewer combustion deposits and longer valve life. If long-time storage is expected, a fuel stabilizer (such as STA-BIL®) should be used to eliminate the formation of fuel gum deposits in the fuel system.

E. Fuel capacity:

GP2500B	:	3.5 Gallons (13.2 liters)
All other Models	:	6.0 Gallons (22.7 liters)

NOTE:

When refueling the following steps are recommended:

1. **WARNING!**



Always stop the engine.

2. **CAUTION!**



Disconnect and ground the spark plug lead wire.

3. **NOTE:**

Close the fuel valve at the base of the fuel tank.

4. **NOTE:**

Check the fuel strainer (never operate without a fuel strainer).

5. **CAUTION!**



Always wipe up all spilled fuel.

6. **NOTE:**

Replace spark plug lead wire.

7. **NOTE:**

Open the fuel valve.

F. Ensure the circuit breakers are in the pushed in or "Reset" position.

1. **WARNING!** Before starting, disconnect all power cords from the AC receptacles on the alternator panel.
2. **WARNING!** The alternator may be hard to start if a load is connected and it is dangerous if electric tools are powered during start up. This could result in personal injury or damage the electric tools.

IV. ENGINE STARTING/STOPPING

All Models

- A. Check oil and fuel levels.
- B. Make sure the appliance is disconnected.
- C. Move engine Choke-A-Matic control as far forward as possible toward "Choke" or "Start" position. (When engine is warm or temperature is high, start engine with choke in the run position.)

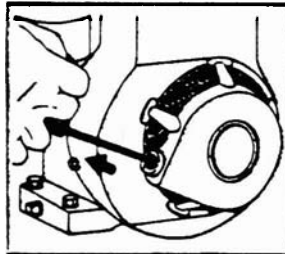


NOTE: On the model GP8000BS the choke is a ring tab located just under the engine air cleaner and must be fully extended during starting.

- D. Place the panel mounted "Stop-Run" switch in the "Run" position.
- E. Should the generator have the Economizer option, ensure the Economizer switch is in the "Off" position.

Models GP2500B, GP4000B/GP4000BE, GP5000B/GP5000BE

- A. Grasp the starter grip as illustrated and pull on the rope until you feel the maximum resistance. Then allow the rope to recoil to its original position and pull it again vigorously.



- B. When engine starts, open choke gradually. These units are equipped with a low oil level shutdown. If the oil level is low, this device will not allow the engine to start. The red annunciator light will blink during the attempt to start engine.

Models GP4000BS, GP5000BS

- A. With the choke fully closed press firmly on the "Stop-Run-Start" switch, pushing into the momentary "Start" position. Never crank for more than 5 second intervals and allow 20 seconds rest cycles between crank cycles.

Never crank the engine more than 5 cycles.

If the engine does not start review the status of the fuel supply and oil level. These unit are equipped with a low oil level shutdown. If the oil level is low, this device will not allow the engine to start. The red annunciator light will blink during the attempt to start engine. If both are satisfactory then review the engine manual for additional information.

- B. When engine starts, open choke gradually.

Model GP8000BS

- A. With the choke fully closed press firmly on the starter switch. Release when engine starts and slowly open choke. Never crank for more than 5 second intervals and allow 20 second rest cycles between crank cycles.

Never crank the engine more than 5 cycles.

If the engine does not start review the status of the fuel supply and oil level. If both are satisfactory then review the engine manual for additional information.

ENGINE STOPPING

- A. Remove all electrical load by disconnecting all power cords from the side alternator panel.
- B. Place the side panel "Stop-Run" switch into the "Stop" position.
- C. Should generator have the Economizer option, ensure the Economizer switch is in the "Off" position.

V. OPERATION

- A. The electrical alternator is comprised of a rotating magnetic field winding bolted to the engine output shaft situated in the center of a set of stationary windings which provide the electrical power output. The alternator is totally brushless which means there is not a physical connection between these rotating and non-rotating components. The only wear item in the alternator is the rear anti-friction, sealed ball bearing which requires no maintenance but should be replaced after 10,000 hours of operation.

The alternator excitation system is a static auxiliary winding connected to a capacitor which is very sensitive to armature reaction. The rotating diodes connected to the field windings rectify this excitation current which is a series of current pulses to create the necessary magnetic field.

The alternator output is very sensitive to engine speed as far as a proper output voltage is concerned. The design no-load speed is 3720 rpm or a frequency of 62 Hz. This has been factory set and should perform satisfactorily. However in the event engine maintenance has been performed, ensure the engine speed is adjusted in accordance with the engine manual.

- B. After the engine has been started the alternator is ready for loading. The available load can now be plugged into the appropriate receptacle.

WARNING!



Ensure the load to be plugged into the receptacle is turned "Off" at its control switch. Never energize a load by plugging it into a generator receptacle. Energize the load by turning its control switch "On" subsequent to plugging into a receptacle.

CAUTION!



(Models with full power output switch only) When full rated output power is required at 120vac, ensure the full power switch is in the 120 volt position.

- C. The alternator windings are protected from overloading by circuit breakers. Should overloading occur the circuit breaker will interrupt the overcurrent condition by disconnecting the winding from the load. This will be visually indicated by an extending of the "push to reset" buttons out beyond their normal length. To reset the circuit breaker—allow a few minutes for the circuit breaker to cool down, then push the circuit breaker in until it seats into its original position.

CAUTION!



Never energize the load by resetting the circuit breaker. Always disconnect the load before circuit breaker is "reset."

D. ECONOMIZER

Models GP4000BE, GP4000BS, GP5000BE, GP5000BS

The Economizer operates as an idling device which will sense the generator load and slow the engine speed down when a generator no-load condition exists. This is to save fuel, create less engine noise, and reduce wear and tear on the engine when the generator is not required to supply power on an intermittent basis. If the generator will be unloaded for extended periods of time, the engine should be shut off.

The Economizer switch on the side panel controls this device and with the switch in the "Off" position, the engine runs at rated speed continuously. The switch should be in the "Off" position when starting or stopping the engine. During starting, allow the engine to run for (5) five minutes before using the Economizer. This will allow the engine to warm-up such that it runs smooth at the lower speed as well as ensure proper engine lubrication. The proper idled down engine speed is 2600 rpm.

VI. MAINTENANCE

A. Preventive Maintenance

Before start-up perform the following routine maintenance items:

1. Check fuel supply
 2. Check engine oil level — if not full add as required or if at service interval start up engine to warm oil, drain and replace.
 3. Check air cleaner, service if required.
 4. Inspect for loose bolts and screws. Retighten all loose items. Replace all missing or broken items. Inspect for broken receptacles—replace broken items.
 5. Inspect for fuel and oil leaks. Service as required to stop leakage.
 6. Start up unit and check for abnormal noise and vibrations. Correct any abnormal condition.
 7. Inspect exhaust system.
 8. Ensure the generator cooling slots are clear for proper ventilation.
- B. Refer to the engine manual for the manufacturer's recommended maintenance procedures.
- C. To ensure reliable starting, start and run unit periodically to minimize carburetor clogging and fuel varnishing. Should it be known that the engine will be stored for long periods of time without exercising, drain all fuel from carburetor and fuel system.

VII. TROUBLE SHOOTING

A. MECHANICAL

Should an engine difficulty arise to necessitate adjustment see the adjustment section of the engine operation and maintenance instructions provided. Should service be required, see the service and repair information section for details.

B. ELECTRICAL

TRUBLE SHOOTING CHART

PROBLEM	CAUSE	DISPOSITION
Low or no alternator output voltage.	1. Engine operating speed is too low.	Increase engine no load speed to 3720 rpm or 62 Hz.
	2. Circuit breakers have opened due to overload.	Remove load and reset circuit breakers.
	3. Alternator output lead has been disconnected from the circuit breaker or receptacle.	Remove side alternator panel and inspect for and reconnect leads.
	4. Alternator rotor has lost its residual magnetism.	Flash field to re-establish magnetism. (See field flashing.)

PROBLEM	CAUSE	DISPOSITION
Low or no alternator output voltage.	5. Rotor thru-bolt has loosened and rotor shaft has backed off of engine shaft male taper.	Inspect tapers for damage, replace component if necessary, re-torque rotor thru-bolt.
	6. Rotor diode has shorted or opened. (See Diode Testing.)	Replace both rotating rectifiers. Then must flash field.
	7. Capacitor is defective (See Capacitor Testing)	Replace capacitor
	8. Winding failure; main winding, auxiliary winding, or rotor winding has opened or shorted. (See Winding Testing)	Determine defective winding and replace component.
Alternator output voltage is too high.	1. Engine operating speed is too high.	Decrease engine no load speed to 3720 rpm or 62 Hz.
Engine speed and alternator output decrease substantially when loaded.	1. Alternator is overloaded.	Reduce load to a level below nameplate rating.
	2. Engine governor is out of adjustment or malfunctioning.	Reference service and repair information in operating and maintenance instructions.

Models GP4000BE, GP4000BS, GP5000BE, GP5000BS only

PROBLEM	CAUSE	DISPOSITION
Economizer is inoperative	1. Economizer switch is in the off position.	Place economizer switch in the on position.
	2. Load is constantly applied to alternator.	Remove all load from alternator.
	3. Economizer circuit fuse has blown.	Remove rear panel and replace fuse. (1.5 amp, 125 volt)
	4. Economizer circuit has been disabled.	Check circuit for loose connections.
Engine speed "hunts" —cycles up and down.	1. Economizer coil is loose or misaligned.	Tighten economizer coil.
	2. Engine runs inconsistently or is rough running.	Consult engine manual for repair or adjustments.

C. DIODE TESTING:

A diode is an electrical device which will conduct the flow of current in one direction but will block the flow of current in the opposite direction. A diode is faulty when it loses this characteristic. To test for this characteristic, proceed as follows:


(Cathode) -  + (Anode)

Fig. 1

The schematic symbol in **Fig. 1** indicates the proper polarity orientation of a diode. Using an ohmmeter or a VOM, connect the positive lead to the anode and the negative lead to the cathode. Your VOM should read a low resistance. Then reverse the meter lead connections and your VOM should read a very high or infinite resistance.

Any other result to the above test is unacceptable and the diode should be considered defective and must be replaced.

D. CAPACITOR TESTING:

A capacitor is an electrical device which stores electrical energy. A simple test can be made to determine if the capacitor is functional.

Set the ohmmeter to read a high resistance and connect test leads across the capacitor leads with capacitor leads disconnected from connection block. Note the reading on the ohmmeter. If the capacitor is shorted, you will read zero resistance. If the capacitor is good, the meter will point momentarily to a low value and then fall back to a high value resistance.

E. WINDING TESTING:

The primary winding faults that normally occur are winding to winding short circuits and winding to ground short circuits. When these faults occur they can usually be detected by an ohmmeter. The first check for winding failure is a visual inspection for burned winding conductors. If there is no evidence of this, then the following checks can be performed.

Main Windings — These are the windings which are terminated by T1, T2, T3, and T4. Remove these conductors from the link board and measure the resistances between T1 and ground (alternator rear bearing support casting), T1 and T3, and T3 and ground. All of these measurements must be very high resistances, near the infinity or off scale range.

Auxiliary (Exciter) Windings — These windings are terminated at the capacitor by terminals T5 and T8. Remove these conductors from the link board and measure the resistances between T5 and ground, T5 and T1, and T5 and T3. All of these measurements must be very high resistances, near the infinity or off scale range.

Rotor Windings — These windings are terminated at the diodes on the rotating component of the alternator. The diode studs must be removed from the diode bracket to facilitate a proper measurement. Measure the resistance between the connection end of the diode to the rotor shaft. This resistance must be very high and near infinity or off scale.

Resistances of the Alternator Windings

	WINDING RESISTANCE CHART			
	STATOR WINDINGS		ROTOR WINDINGS	
	Main Winding	Auxiliary Winding	Field Winding	Damping Winding
GP2500B	1.72 Ω	5.20 Ω	6.80 Ω	1.30 Ω
GP4000B/E/S	.360 Ω	2.13 Ω	1.24 Ω / Pole	2.20 Ω
GP5000B/E/S	.285 Ω	1.40 Ω	.60 Ω / Pole	2.50 Ω
GP8000BS	.140 Ω	.80 Ω	.80 Ω / Pole	2.90 Ω

F. **FIELD FLASHING:** To re-establish the rotor residual magnetism so the alternator will build a voltage, the following procedure is recommended.

Step 1. Slightly overspeed the engine by manually manipulating the throttle to a higher engine rpm (approx. 4100). Measure the output voltage to observe if proper voltage develops. If it does **NOT**, proceed to step 2.

Step 2. Remove rear alternator panel so that you can access the link board. A 6, 9, or 12 volt DC battery will be needed. Start engine and run at proper speed. Momentarily connect the DC battery to the auxiliary winding terminals T5 and T8 to build the alternator output voltage. No particular polarity need be observed.

WARNING!



Do not leave the external DC source connected to the auxiliary winding for more than **1 second**. A large AC voltage will develop when alternator voltage builds that will be detrimental to the external DC source. It is imperative that the external source be just momentarily connected to the auxiliary winding.

VIII. DIAGRAMS AND PARTS LISTS