POWERHOUSE®

INVERTER GENERATOR

PH2400PRi/E

WITH ELECTRONIC FUEL INJECTION

Owner's Manual

PLEASE READ THIS MANUAL CAREFULLY BEFORE OPERATING THE GENERATOR

TIP: To navigate between hyperlink topics using a keyboard, select ALT+◄ or ALT+►.

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PREFACE

FCC Notice

Trade Name: LKQ Specialty Products Group / Model: PH2400PRi/E

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Pursuant to FCC regulations, do not to make any changes or modifications to the remote control transmitter or receiver that are not expressly approved by LKQ Specialty Products Group. Doing so could void your authority to operate the equipment and will void the warranty.

Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

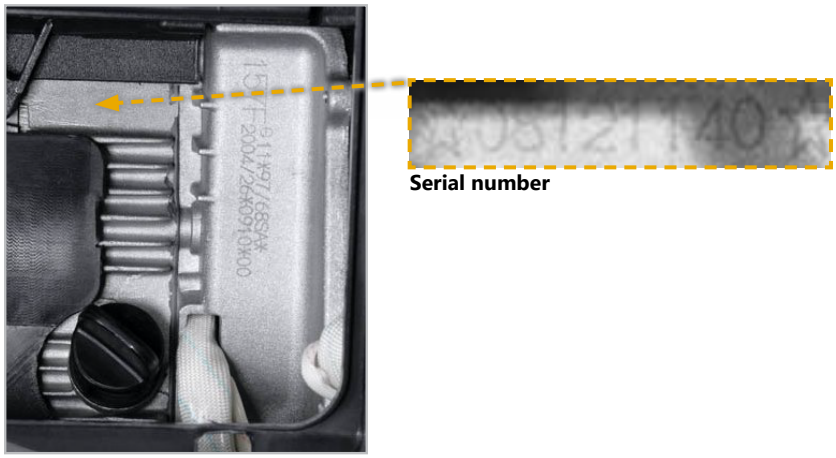
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

PH2400PRi/E Identification Numbers

The engine serial number (ESN) and the generator barcode number (BCN) identify your particular unit and are necessary when ordering parts and accessories. These two numbers are required for warranty administration.

Engine Serial Number (ESN)

The **ESN** is stamped on the engine block above the oil dipstick. It is visible when the maintenance door is removed.



Serial number

Barcode Number (BCN)

The **BCN** is found:

1. On the left side of the generator, at the bottom left of the maintenance door.
2. If you have the shipping carton for your generator, the BCN is also on the foil label on the carton.

BCN # 100122377055322

Sample BCN

Please record your generator identification numbers below and keep this manual in a safe place along with the bill of sale.

Engine Serial Number (ESN)	
Barcode Number (BCN)	
Date of Purchase	
Name of Selling Dealership	

SAFETY ALERTS AND ICONS

This generator is designed to give safe and dependable service if operated according to instructions. Read and understand this Owner's Manual and all safety alerts and labels before operating the generator.

Safety Alert Icons

The following safety alert icons are used throughout this manual to alert you to potential hazards. **Obey all safety messages to avoid injury or death.**

ICON	MEANING
DANGER	▲ Alerts you to a hazardous situation which, if not avoided, **will result in death or serious injury**.
WARNING	▲ Alerts you to a hazardous situation which, if not avoided, **could result in death or serious injury**.
CAUTION	▲ Alerts you to a hazardous situation which, if not avoided, **could result in minor or moderate injury**.
SAFETY INSTRUCTIONS	Alerts you to important safety tips or required safety topics **before performing a task**.

Informational Icons

The following icons call your attention to information about the setup, operation, or maintenance of your generator.

ICON	MEANING
NOTICE	Especially helpful information when using the generator.
	Link to a related topic, an internet resource, or an email address.
	Setup or preparation is required *before* performing a task.
	Regular maintenance is required.
	Take precaution to avoid damage to the generator.

Hazard-Specific Safety Alerts

Carbon Monoxide (CO) Poisoning Alerts

DANGER

- ▲ GENERATORS PRODUCE CARBON MONOXIDE FROM EXHAUST GAS. Carbon monoxide is a poisonous, colorless, odorless gas. When inhaled, CO can build up to dangerous levels in the bloodstream and cause unconsciousness, leading to serious injury or death within minutes.
- ▲ NEVER RUN THE GENERATOR IN AN ENCLOSED OR PARTLY ENCLOSED AREA, which leads to overheating, fire, or carbon monoxide (CO) poisoning leading to serious injury or death within minutes. Always ensure adequate ventilation.
- ▲ Do not install this generator inside a compartment.
- ▲ Generators should be used outdoors only, at least 3ft. (1m) away from buildings, open windows, and other equipment, and protected from rain and snow.
- ▲ Do not modify the enclosure of this generator or use the generator for purposes other than its intended use.
- ▲ Do not connect an extension to the exhaust pipe.

Explosion & Fire Alerts

WARNING

- ▲ Gasoline is extremely flammable and explosive under certain conditions. High temperatures inside could cause residual fuel to vaporize resulting in possible explosion.
- ▲ Keep cigarettes, sparks, and any source of ignition away from generator and the fuel tank at all times.
- ▲ Operate the generator on a level surface. If the generator is tilted, fuel spillage may result.
- ▲ Check for spilled fuel or leaks. Clean and/or repair before use. If any fuel is spilled, allow all fuel to evaporate before starting the engine.
- ▲ Always stop engine before refueling. Wait 5 minutes before restarting and allow all fuel to evaporate.
- ▲ Be careful not to spill fuel when refueling. Spilled fuel or fuel vapor may ignite.
- ▲ Refuel in a well-ventilated area with the engine stopped.

Electrical & Electrocution Alerts

⚠WARNING

- To prevent electrical shock, the generator should be grounded. Connect a length of heavy cable between the generator's grounding terminal and an external ground source.

- To avoid a potential shock, make sure that all appliances are in good working order before connecting them to the generator.
- If an appliance begins to operate abnormally, becomes sluggish, or stops suddenly, turn off the generator immediately. Disconnect the appliance and examine it for signs of malfunction.
- Do not operate with wet hands. Generators are a potential source of electrical shock when misused.
- Do not operate the generator in rain or snow and do not let it get wet.
- Do not exceed the current limit specified for any one receptacle.
- Do not connect the generator to a household circuit. This could cause damage to the generator or to electrical appliances in the house.
- This portable generator is designed for temporary power needs. If you need a back-up power system for your home, install a permanent stationary generator designed for this purpose.
- When an extension cord is required, be sure to use an insulated flexible cord. Also be sure to use the proper size and length cord.
  - A 16 Gauge Cord between 0 and 100 feet long will safely handle tool and appliance loads up to 10 amps.
  - A 14 Gauge Cord between 0 and 50 feet long will safely handle tool and appliance loads between 10 and 15 amps.
  - A 12 Gauge Cord between 50 and 100 feet will safely handle tool and appliance loads between 10 and 15 amps.
- Keep the generator away from other electric cables or commercial power supply lines.
- Never connect this generator to a manual or automatic transfer switch (ATS), which may result in severe damage to the generator or personal property, and/or severe personal injury or death. Back feed may also electrocute utility company workers or others who contact the lines during a power outage. When utility power is restored, the generator may explode, burn, or cause a fire in the building's electrical system.

Operational Safety Alerts

⚠CAUTION

- Never permit anyone to operate the generator without proper instructions.
- Know how to stop the generator quickly and understand operation of all controls.
- Always perform a pre-operation inspection before you start the engine to avoid accidents or equipment damage.
- Keep away from moving parts while the generator is running.
- Do not operate the generator on an uneven surface, such as sand, mud, or dense wet grass, which may restrict airflow to the generator and its components, resulting in overheating and potential damage.
- Be careful not to touch the muffler while it is hot. The muffler becomes very hot during operation and remains hot for several minutes after the engine is off.
- Let the engine cool before storing the generator indoors.
- Keep children and pets away from the generator when it is in operation.
- Avoid repeated or prolonged skin contact with fuel or breathing of fuel vapor.

Battery Safety Alerts

 **DANGER**	▲ Battery electrolyte is poisonous. If swallowed, drink large quantities of water or milk and follow with milk of magnesia or vegetable oil and seek medical help immediately.
 **WARNING**	▲ Batteries give off explosive gases; keep sparks, flames and cigarettes away. Provide adequate ventilation when charging. ▲ Do not use the generator to charge any other type of external battery except a 12V lead acid battery. Other types of batteries may burst causing personal injury or damage.
 **WARNING**	▲ Batteries contain sulfuric acid (electrolyte). Contact with skin or eyes may cause severe burns. Wear protective clothing and a face shield. ▲ If electrolyte gets on your skin, flush with water. ▲ If electrolyte gets in your eyes, flush with water for at least 15 minutes and seek medical help immediately. ▲ Keep batteries out of reach of children.

GENERATOR COMPONENTS

PH2400PRi/E Generator

FRONT OF GENERATOR, Right Side

BACK OF GENERATOR, Left Side

PH2400PRi/E Access Doors

Your generator has four primary access doors. You can remove the access doors as shown below when performing setup and maintenance.

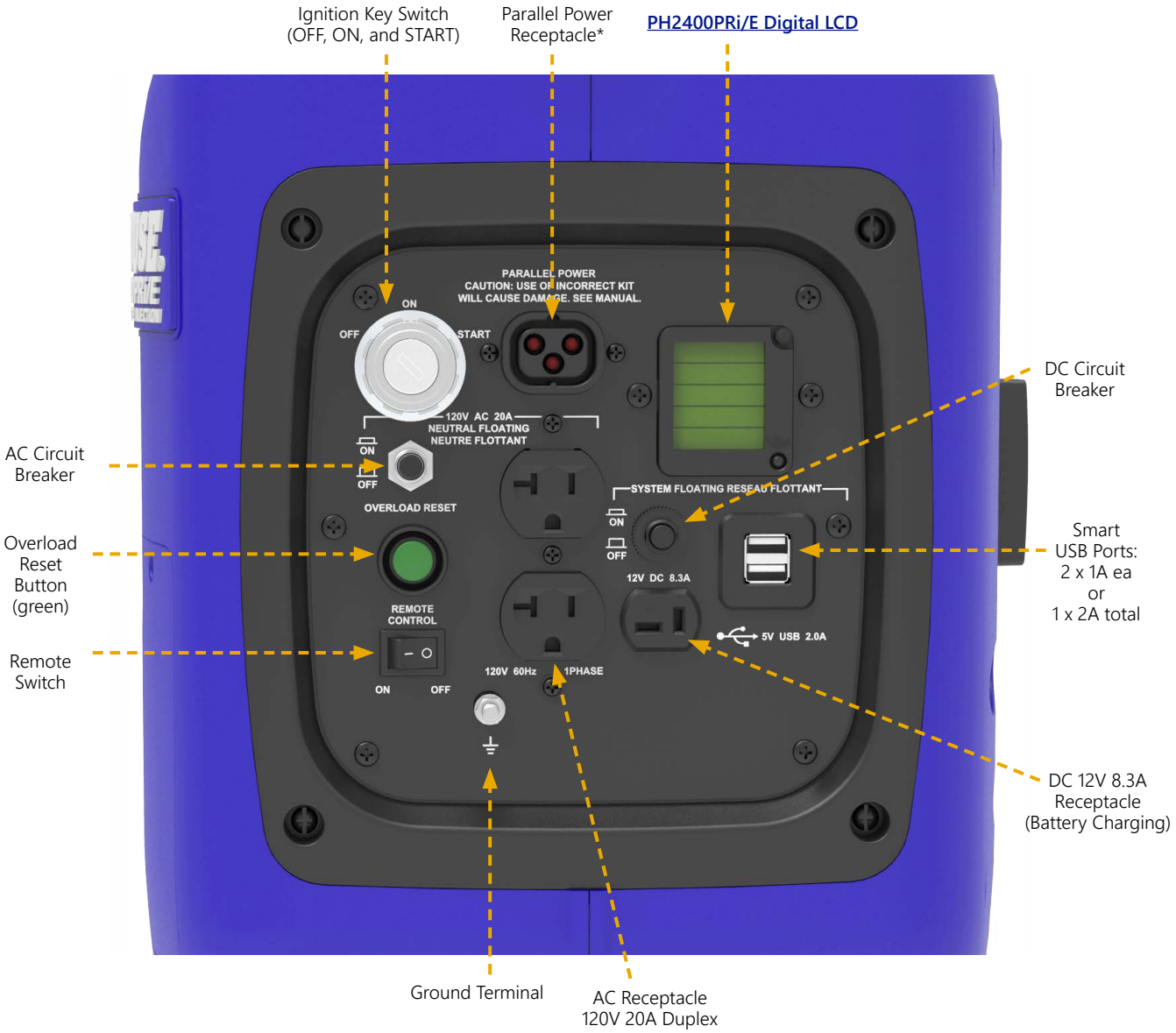
Maintenance Access Door

Spark Plug Access Door

Battery Access Door

Fuel Access Door

PH2400PRi/E Control Panel



*The parallel power receptacle enables you to increase your power output when you own the optional parallel kit (#67164) and a second compatible POWERHOUSE® generator for Parallel Mode Operation.

PH2400PRi/E Ignition Keys with USB

Your generator comes with two ignition keys and one USB flash drive with a digital Owner's Manual.

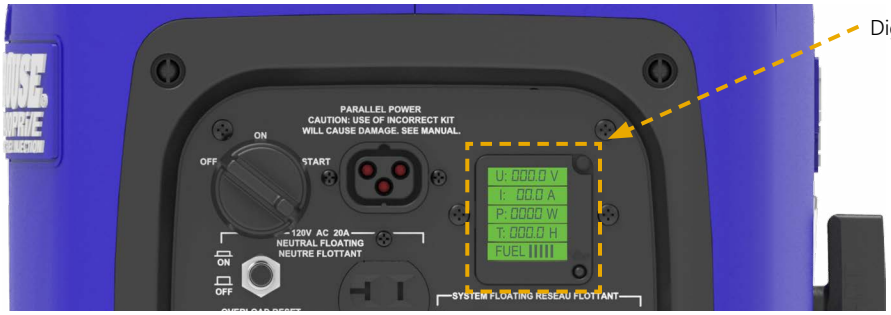
PH2400PRi/E Remote Key Fob

Your generator comes with two remote key fobs to use when starting the generator from up to 75ft. away with an unobstructed line of sight.

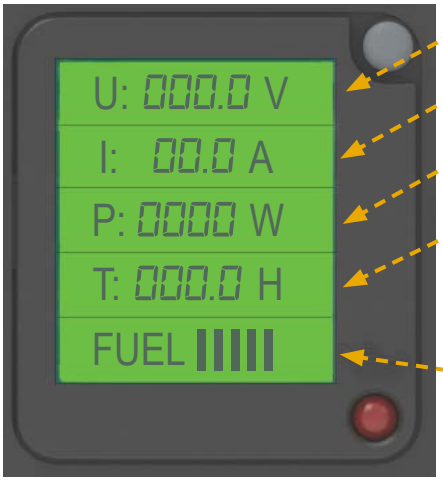
Parallel Mode Operation | Ignition Key Startup | Remote Startup

PH2400PRi/E Digital LCD

Use the digital LCD (liquid crystal display) on the control panel to monitor the generator's operating status.



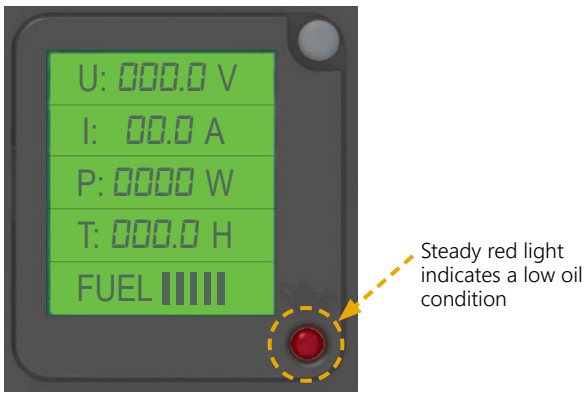
When the generator is running, the LCD illuminates to display real-time data for voltage, amps, watts, total hours of operation, and approximate fuel level.

LINE OF DATA		LCD	OUTPUT / UNIT OF MEASURE
U :	(voltage source)		**V**oltage
I :	(current)		**A**mps
P :	(power)		**W**atts
T :	(time)		**H**ours of operation Includes initial startup and testing hours at the factory.
FUEL			**Fuel Level** (Full tank is 5 bars) Each vertical bar represents approximately 20% of total fuel remaining.

Indicator Light

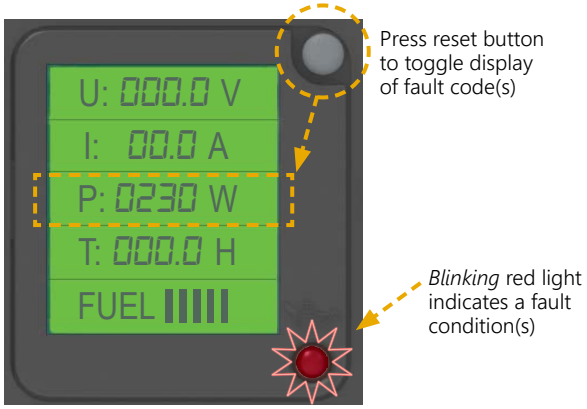
The **Indicator Light (red)** illuminates to alert you of the following operating conditions:

- Low Oil (steady red light)
- Fault Condition (*blinking* red light)



Display Reset Button

The **Display Reset Button** enables you to view and clear fault codes.



Clearing a Low Oil Condition | Clearing a Fault Condition

SETUP & PRE-OPERATION

SAFETY INSTRUCTIONS

▲ Ensure that the generator is OFF and on a level surface for all setup and pre-operation checks.

▲ When working with a battery, read and comply with all Battery Safety Alerts and warnings.

Your generator ships from the factory in a pre-operation state. In this section, to enable generator startup, you will complete the following steps: 1) Connect and 2) charge the 12V battery completely, 3) add engine oil, and 4) add fuel.

Connecting the 12V Battery

To connect the 12V battery:

1. On the left side of the generator, remove the screw and the Battery Access Door.
2. Plug the quick connect cable into the wiring harness.

3. Reinstall the battery access door and screw back onto the generator.

Charging the 12V Battery

The generator does not have to be running to back-charge the battery, and there are no special control panel settings to enable the battery to charge.

▲ Do not use a battery charger that exceeds 12V 5A, which may cause the battery to swell and burst leading to personal injury and property damage.

▲ To prevent over-charging, use a battery charger with an automatic shut-off feature.

To charge the 12V battery:

1. Choose an option to connect battery charging cables.

To connect an external 12V (max 5A) battery charger to the DC receptacle:

a. Connect the positive and negative alligator clips to the corresponding wires on the 12V charger.
b. Plug the T-style end of the charging cable into the DC receptacle.

To connect directly to the battery:

a. Remove the battery access door and screw.
b. Unplug the quick connect cable from the wiring harness.
c. Remove the battery hold down strap, then remove the battery.
d. Connect the positive and negative alligator clips of your charging cables to the corresponding battery terminals.

2. Charge the battery for 3 hours or until fully charged.

3. When the battery is fully charged:
   - **After back-charging**, disconnect the battery charger from the DC receptacle.
   - **After charging the battery directly**, reinstall the 12V battery and the battery access door and screw.

	Because a lead acid battery may become depleted when it's not in use, remember to recharge the 12V battery after long-term storage.

Replacing the 12V Battery

Checking and Adding Engine Oil

Engine oil capacity: 15.6 fl oz (0.97 pt) / 460 ml

Use a premium quality, 4-stroke engine oil that is a certified API grade SF/SG or better.

- For environmental temperatures above 32°F (0°C), use SAE 10W-30 viscosity oil.
- For environmental temperatures below 32°F (0°C), use SAE 0W-30 or 0W-40 viscosity oil, preferably synthetic.

▲ **Do not use non-detergent oil or 2-stroke engine oil which voids the warranty and shortens the service life of the engine.**

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

To check and add oil:

1. On the left side of the generator, remove the screw and the Maintenance Access Door.
2. Remove the dipstick from the oil reservoir, then wipe it with a clean rag.
3. Check the oil level and add oil if necessary. Insert the dipstick back into the oil reservoir, remove it, and check the oil level. (To ensure an accurate reading, do not tighten or screw the dipstick into the reservoir.)
   a. If the oil level is at the bottom of the etching on the dipstick, refill with recommended oil. Do not overfill.
   b. After refilling, check the oil level again, and ensure that the oil level is at the top of the etching on the dipstick.

4. Reinsert and tighten the dipstick in the oil reservoir.
5. Reinstall the maintenance door and screw back onto the generator.

◊ Change the oil after the first 4 to 6 hours of operation to remove any manufacturing debris or contamination.

◊ The low oil alarm system automatically stops the engine before the oil level falls below a safe limit. However, to avoid the inconvenience of an unexpected shutdown, visually inspect the oil level before each use.

Extreme Temperatures | Clearing a Low Oil Condition | Changing the Engine Oil

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To navigate between hyperlink topics using a keyboard, select ALT+◄ or ALT+►.

Checking and Adding Fuel

Fuel tank capacity: 1.2 gal (4.7 L)

SAFETY INSTRUCTIONS ▲ **Before adding fuel to the generator, read and comply with all Safety Alerts and Icons.**

⚠WARNING ▲ **Read and comply with all Explosion & Fire Alerts when adding fuel to the generator.**

Cautions on Gasoline Blends

- ▲ **Use only automotive unleaded gasoline in the generator, preferably with an octane rating of 87 or higher.**
- ▲ **Never use an oil/gasoline mixture or dirty gasoline.**
- ▲ **Make sure you do not use a fuel blend with more than 10% ethanol. If you notice any undesirable operating symptoms, replace it with a fuel that you know has the proper blend.**
- ▲ **Do not use gasoline containing methanol.**
- ▲ **Fuel system damage or engine performance problems, caused by improper fuel blend are not covered under warranty.**

To check and add fuel:

1. Ensure that the generator is OFF.
2. Remove the fuel cap and visually check the fuel level.
3. If fuel is low, pour fuel slowly through the fuel strainer. Do not overfill. Because the fuel strainer is positioned at an angle, refill to the lowest shoulder of the fuel strainer.

- ◊ Avoid getting dirt, dust, or water in the fuel tank.
- ◊ Temperature changes affect the volume of gasoline. Make sure that you leave extra room at the top of the tank when you refuel to allow for fuel expansion on warm days.
- ◊ Use a fuel stabilizer, such as STA-BIL® to help prevent fuel oxidation (breakdown), formation of gum and varnish, and corrosion in the fuel system.

When adding fuel to the tank for the first time (and after every 100 hours of operation), it is recommended that you use a fuel injector cleaner.

4. Replace and tighten the fuel cap securely.

Transportation and Storage

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STARTUP & SHUTDOWN

You can start the generator using any of the following methods:

- Ignition Key Startup at the control panel
- Remote Startup using the remote switch at the control panel and the remote key fob
- Recoil Pull Startup using the recoil handle on the right side of the generator

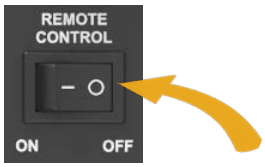
Ignition Key Startup

SAFETY INSTRUCTIONS ▲ **Before using the generator, read and comply with all Safety Alerts and Icons.**

	Before starting the generator, make sure the 12V battery is fully charged. The generator requires at least 10.5 cranking volts of battery charge to provide power for startup components and sensors.

To start the generator with the ignition key:

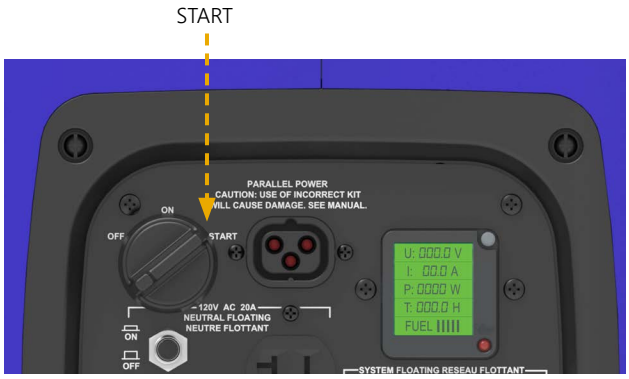
1. On the control panel, verify that the remote switch is in the OFF position.



2. Insert the ignition key, then turn and hold the ignition key in the START position. The LCD on the control panel illuminates.

	Once the ignition switch is ON, if you do not start the generator within 30 seconds, the LCD dims to conserve battery power.

If the engine does not start within 15 seconds, stop turning the key for 5 seconds before trying it again.



The LCD shows output voltage when the generator is ready for use.

3. Connect your appliance to the generator's output receptacle.

	Make sure that appliances are in good working condition and that the combined electrical rating of all connected appliances does not exceed that of the generator (2400W max). If you don't know the watts for your appliance, multiply the amperage by the output voltage. For example: 20A x 120V = 2400W.

4. Turn your appliance on.

Shutdown | Clearing an Overload Condition | Parallel Mode Operation

Remote Startup

SAFETY INSTRUCTIONS ▲ **Before using the generator, read and comply with all** Safety Alerts and Icons.

	Before starting the generator, make sure the 12V battery is fully charged. The generator requires at least 10.5 cranking volts of battery charge to provide power for startup components and sensors.

To start the generator with the remote key fob:

1. Verify that the ignition switch is in the OFF position.
2. On the control panel, set the remote switch to the ON position. The LCD on the control panel illuminates.

	Once the remote switch is ON, if you do not start the generator within 30 seconds, the LCD dims to conserve battery power.

3. Using the remote key fob, press and hold the gray start button for several seconds until the engine starts. Release and repeat if necessary.

	◊ When using the remote key fob, make sure you have an unobstructed line of sight to the generator and are no farther than 75ft. away. ◊ When pressing the start button on the remote key fob, there is a 1–3 second delay before the engine cranks while the fuel system reaches the proper pressure. ◊ For additional help, see **Troubleshooting: Engine Does Not Start with Remote Key Fob**.

The LCD shows output voltage when the generator is ready for use.

4. Connect your appliance to the generator's output receptacle.

	Make sure that appliances are in good working condition and that the combined electrical rating of all connected appliances does not exceed that of the generator (2400W max). If you don't know the watts for your appliance, multiply the amperage by the output voltage. For example: 20A x 120V = 2400W.

5. Turn your appliance on.

Shutdown with Remote Key Fob | Clearing an Overload Condition

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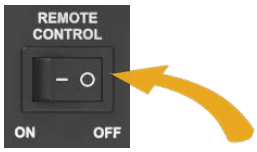
Recoil Pull Startup

SAFETY INSTRUCTIONS ▲ **Before using the generator, read and comply with all Safety Alerts and Icons.**

	Before starting the generator, make sure the 12V battery is fully charged. The generator requires at least 10.5 cranking volts of battery charge to provide power for startup components and sensors.

To pull-start the generator using the starter grip:

1. Verify that the remote switch is in the OFF position.



2. Insert and turn the ignition key to the ON position. The LCD on the control panel illuminates.

	Once the ignition switch is ON, if you do not start the generator within 30 seconds, the LCD dims to conserve battery power.

3. On the right side of the generator, grasp the starter grip and pull back lightly until resistance is felt, then pull briskly out. Repeat until the engine starts. Faster pulls generate more spark and enable successful startup.

	▲ **Do not allow the starter grip to snap back. Return it slowly by hand.** ▲ **Do not pull the starter grip while the generator is running.**
	▲ **Do not let the starter rope rub against the generator body or the rope will wear out prematurely.**

The LCD shows output voltage when the generator is ready for use.

4. Connect your appliance to the generator's output receptacle, then turn the appliance on.

	Make sure that appliances are in good working condition and that the combined electrical rating of all connected appliances does not exceed that of the generator (2400W max). If you don't know the watts for your appliance, multiply the amperage by the output voltage. For example: 20A x 120V = 2400W.

Shutdown | Clearing an Overload Condition

Shutdown

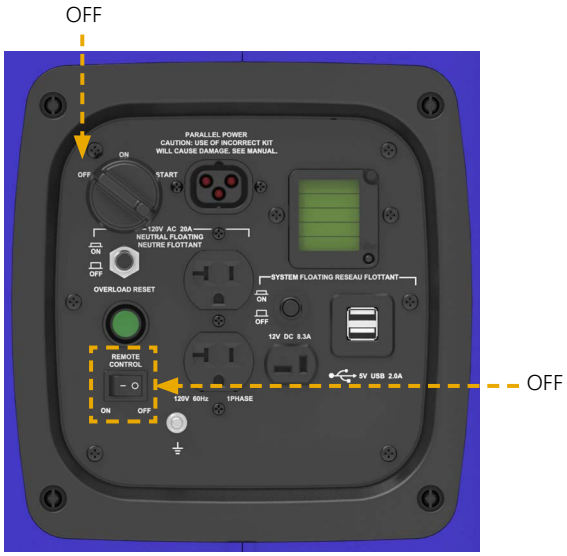
NOTICE ◊ You must shut down the generator using the same method you chose for startup.

To shut down the generator:

1. Turn off any appliances connected to the generator.
2. Shut down the generator using the same method you chose for startup.

If you started the generator with the ignition key or recoil starter grip:

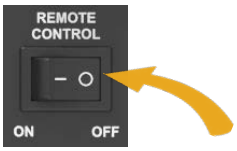
– On the control panel, turn the ignition key to the OFF position to shut down the generator.
– Verify that the remote switch is in the OFF position.



If you started the generator with the remote key fob:

– On the remote key fob, press the STOP button to shut down the generator.

– On the control panel, set the remote switch to the OFF position.



If you leave the remote switch ON:

◊ You can use the remote key fob to restart the generator within 12 hours of shutdown.

◊ After 12 hours, the generator automatically hibernates to conserve battery power. To deactivate hibernation and re-enable startup, you must toggle the remote switch: OFF–ON.

Shutdown (Parallel Operation)

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To navigate between hyperlink topics using a keyboard, select ALT+◄ or ALT+►.

GENERATOR OPERATION

SAFETY INSTRUCTIONS ▲ **Before using the generator, read and comply with all Safety Alerts and Icons.**

	▲ **Ground the generator with a length of heavy cable by connecting the generator's grounding terminal to an external ground source.** ▲ **Read and comply with all Electrical & Electrocution Alerts.**

Appliance Power Requirements

This generator is intended as a portable power source for appliances requiring less than 2400W maximum output. If you don't know the watts for your appliance, multiply the amperage by the output voltage. For example: 20A x 120V = 2400W.

You can connect appliances or devices to all receptacles on the control panel simultaneously as long as:

- The power load is not exceeded on each receptacle.

AND

- The combined power load of all appliances does not exceed the generator's total power output.

	◊ Keep in mind that most appliances require more energy for startup than their operating wattage. ◊ Because the generator has a floating ground circuit, if you test the generator receptacles with a circuit tester, it is normal to see an "Open Ground" test result. ◊ For additional help, see **Troubleshooting: Appliance Does Not Operate**.

AC Application

SAFETY INSTRUCTIONS ▲ Before using the generator, read and comply with all Safety Alerts and Icons.

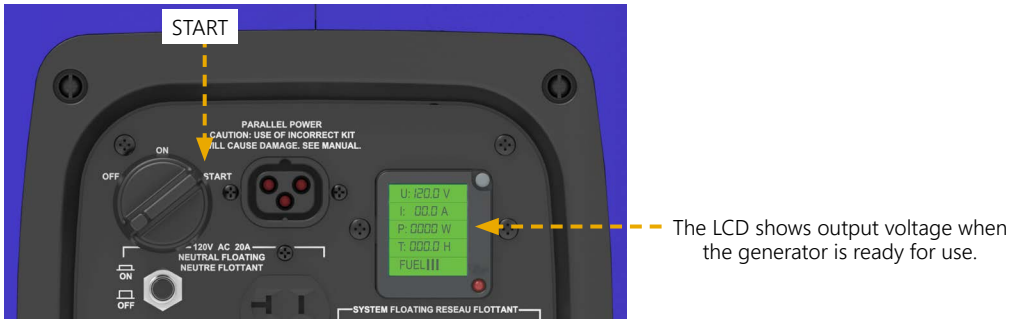
The generator provides a 120V, 20A supply through a 5-20R duplex AC receptacle on the control panel.

- The AC receptacles may be used while the DC power is in use.
- In the event of an overloaded AC circuit, see **Clearing an Overload Condition**.

To connect to the AC receptacle:

1. Make sure that the appliance is OFF.
2. Start the generator.

   The LCD shows output voltage when the generator is ready for use.



The LCD shows output voltage when the generator is ready for use.

3. Connect your appliance to the generator's output receptacle.

	Make sure that appliances are in good working condition and that the combined electrical rating of all connected appliances does not exceed that of the generator (2400W max). If you don't know the watts for your appliance, multiply the amperage by the output voltage. For example: 20A x 120V = 2400W.

4. Turn your appliance on.

Startup & Shutdown | **Parallel Mode Operation**

DC Application

SAFETY INSTRUCTIONS ▲ **Before using the generator, read and comply with all Safety Alerts and Icons.**

This generator provides a 12V, 8.3A supply through the DC receptacle on the control panel. The DC receptacle is designed for **Charging an External 12V Battery**, but it can also be used to power a maximum 7A DC device.

- ◊ The DC receptacle may be used while generator is running.
- ◊ You can use DC power while AC power is in use.
- ◊ The DC output comes directly from the battery, so powering a DC device places a load on the battery. If the generator is not running when you power a DC device, the 12V battery will become depleted. Once the 12V battery is depleted you need to fully recharge it in order to restart the generator.
- ◊ In the event of an overloaded DC circuit, reset the DC circuit breaker to resume operation. Make sure that the connected device is in good working condition and draws no more than 12V, 8.3A.
- ◊ For additional help, see **Troubleshooting: No Output at the DC Receptacle**.

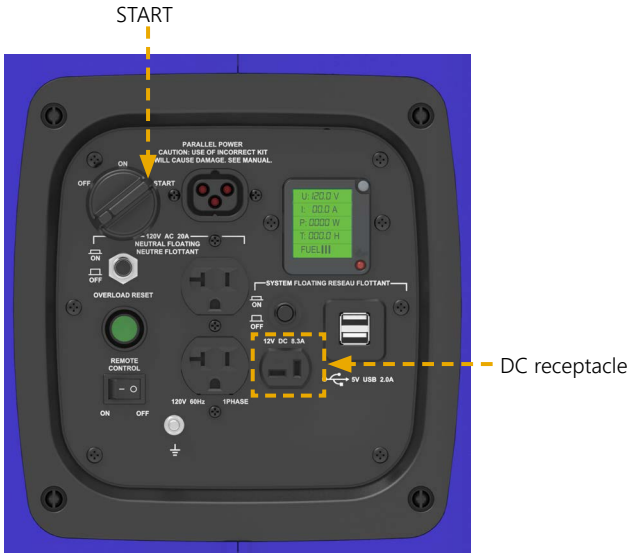
Powering a DC Device

When the generator is running, the DC receptacle can be used to power a maximum 7A DC device.

To power a DC device:

1. Start the generator and let it run for a few minutes to reach its normal operating temperature.

   The LCD shows output voltage when the generator is ready for use.



2. On the control panel, plug the T-style end of the device cable into the DC receptacle.

Using Smart USB Ports

This generator has two Smart USB ports which monitor the charge of the device you plug in. Smart USB ports trim back the power as the device reaches a full charge, which prevents over-charging of the device.

When the generator is running, you can use Smart USB ports for powering small electronic devices. Both ports can be used at the same time to draw 1.0A each, or you can use only one port to draw a maximum of 2.0A.

Charging an External 12V Battery

SAFETY INSTRUCTIONS ▲ **When working with a battery, read and comply with all Battery Safety Alerts and warnings.**

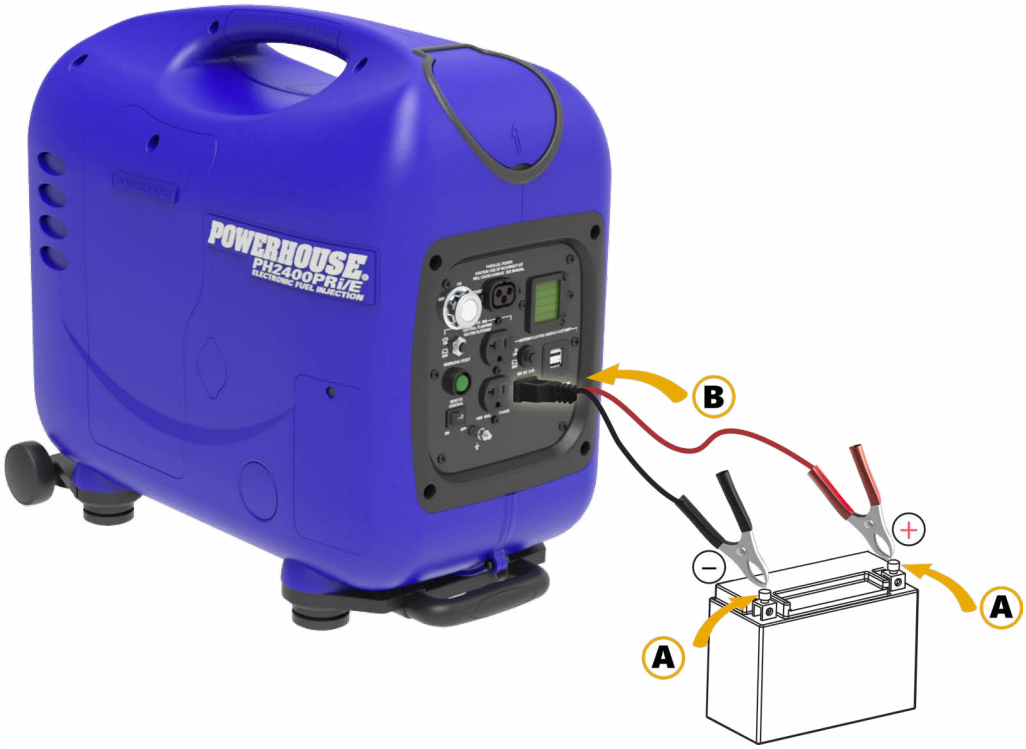
While the generator is running, the DC receptacle can be used to charge an external 12V lead acid battery.

	▲ **Before connecting charging cables to a battery that is installed in a vehicle, disconnect the vehicle's ground battery cable. Reconnect the vehicle's ground battery cable after the charging cables are removed. This procedure will prevent the possibility of a short circuit and sparks if you make accidental contact between a battery terminal and the vehicle's frame or body.**
	▲ **Do not attempt to start an automobile engine with the generator still connected to the battery. The generator may be damaged.** ▲ **Make sure you match the positive charging cable to the positive battery terminal. Do not reverse the charging cables or serious damage to the generator, the 12V starting battery, or personal injury may occur.**

To charge an external 12V battery:

1. Start the generator and let it run for a few minutes to reach its normal operating temperature.
2. Connect the two charging cables to the corresponding positive and negative battery terminals.

	▲ **To prevent the possibility of creating a spark near the battery, always connect to the battery terminals first (A), and then connect to the generator (B).**



3. On the control panel, connect the T-style end of the charging cable to the DC receptacle.
4. When charging is complete, disconnect the charging cable from the generator, then disconnect from the battery.

APPENDIX B - Vehicle Battery Charging Safety

Environmental Impacts on Generator Performance

Environmental conditions, such as high altitude and extreme temperatures, adversely impact the generator's performance. When environmental conditions are combined in any way, performance issues are compounded.

In other words, running the generator in an extreme temperature comes with its own considerations, but if you are also at a high altitude any performance issues are multiplied and increasingly difficult to overcome.

ENVIRONMENT	RATE OF INCREASE OF ENVIRONMENTAL CONDITION	DECREASE IN GENERATOR PERFORMANCE
High Altitude	Every 1000 ft. (305m) increase in altitude	3.5% decrease in engine horsepower
High Temperature	Every 10°F (5.5°C) increase in temperature above 85°F (29°C)	1% decrease in engine horsepower

High Altitudes

At high altitude, the air-fuel mixture will be excessively rich, performance will decrease, and fuel consumption will increase. The generator uses an Engine Control Unit (ECU) to maintain the proper air-fuel mixture. The ECU automatically compensates to ensure the maximum possible performance at high altitudes.

Extreme Temperatures

The normal operating range of this generator is 0° to 113°F (-18° to 45°C). Outside of this range, extreme temperatures adversely affect generator startup and operation.

- **Do not operate the generator when the ambient temperature is below 0°F (-18°C).**
- **Do not operate the generator when the ambient temperature is above 113°F (45° C).**

High Temperatures

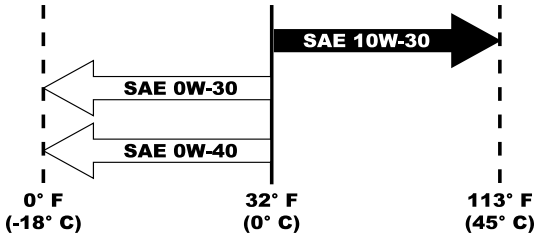
In extremely high temperatures, the performance of the generator decreases 1% for each 10°F (5.5°C) increase in temperature above 85°F (29°C).

Cold Temperatures

In extremely cold temperatures, the engine will be more difficult to start. To operate the generator in very cold climates, it is important to have a fully charged battery and use a lower viscosity engine oil.

Oil Viscosity for Cold Climates

Synthetic SAE 0W-30 or 0W-40 oil is recommended for temperatures below 32° F. Refer to the chart below for oil viscosity recommendations.

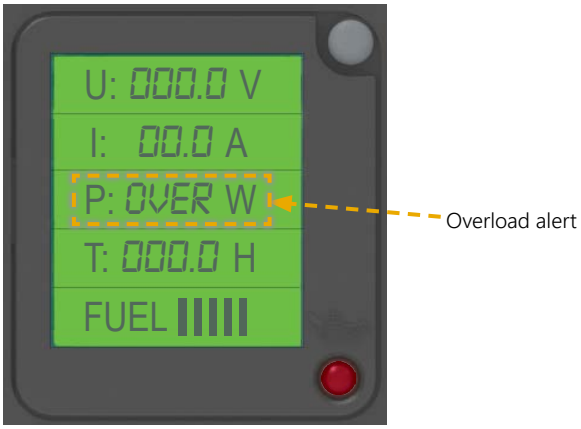


Because you need to use a low viscosity oil in extremely cold climates, the engine will actually take longer than normal to warm up due to reduced internal friction.

Clearing an Overload Condition

An overload is caused by an excessive power load on the generator that exceeds its maximum power output rating (2400W), or by a short in a connected appliance. When an excessive power load is detected, the generator alerts you by displaying the letters "OVER" on the P: (power/watts) output line on the LCD.

Correct the cause of the overload to enable the generator to resume normal operation.



When the generator *detects* an impending overload condition:

- "OVER" appears *intermittently* on the LCD.

When the generator is overloaded:

- "OVER" is a persistent alert on the LCD.
- Power output stops, but the engine continues to idle.
- Voltage and amp output values drop to zero on the LCD.

To reset the generator from an overload:

1. Remove all electrical loads from the generator.

	◊ All POWERHOUSE® generators come with InverterProtec™ technology. When an overload occurs, power to the inverter is turned off but the engine can continue to run to enable quicker resets. ◊ If you prefer, you can shut down the generator before resetting the overload condition.

2. Investigate and correct the cause of the overload.

	◊ Make sure that appliances are in good working condition and that the combined electrical rating of all connected appliances does not exceed that of the generator (2400W max). If you don't know the watts for your appliance, multiply the amperage by the output voltage. For example: 20A x 120V = 2400W.

3. To reset the generator and clear the "OVER" alert on the LCD, press and hold the green Overload Reset Button for 3 seconds. The LCD shows output voltage when the generator is ready for use.

	▲ **Repeatedly pressing the reset button without correcting the overload condition may cause permanent damage to the generator.**

If the generator does not return to normal operation, shut down and restart the generator.

Overspeed Protection

All POWERHOUSE® generators come with InverterProtec™ technology which shuts down the engine to protect the inverter from overspeed revving and subsequent damage to internal components.

In the rare event of an inverter failure, each of the following symptoms are present:

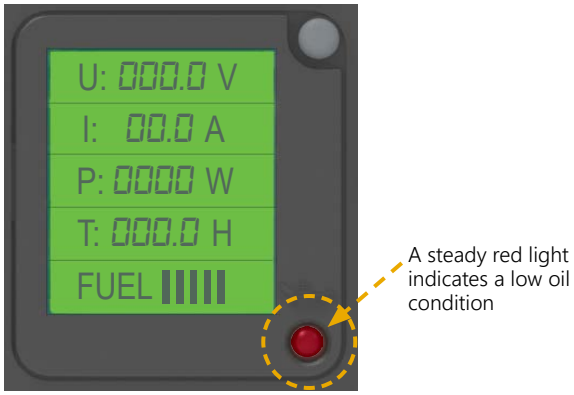
- Engine has a high RPM at first; then the ECU slows the engine down to idling speed to prevent overspeeding.
- Voltage output drops to zero and is no longer displayed on the LCD.
- The 120V receptacles do not supply voltage, regardless of breaker settings.
- Power is not restored after the overload reset button is pressed or after the generator is shut down and restarted.

Contact an authorized POWERHOUSE® service center.

Find a Service Center | Troubleshooting: Appliance Does Not Operate

Clearing a Low Oil Condition (steady red light)

When the generator detects a low oil condition, the red indicator light illuminates. The low oil alarm system automatically shuts down the engine before the oil level falls below a safe limit.



To correct a low oil condition, add enough of the recommended engine oil to raise the level to the top etching on the dipstick.

Once the generator detects a safe level of oil, the low oil light will stop illuminating.

	To avoid the inconvenience of an unexpected shutdown, visually inspect the oil level before each use.

Checking and Adding Engine Oil | Changing the Engine Oil

Clearing a Fault Condition (*blinking* red light)

If the generator detects a problem with its engine performance or components:

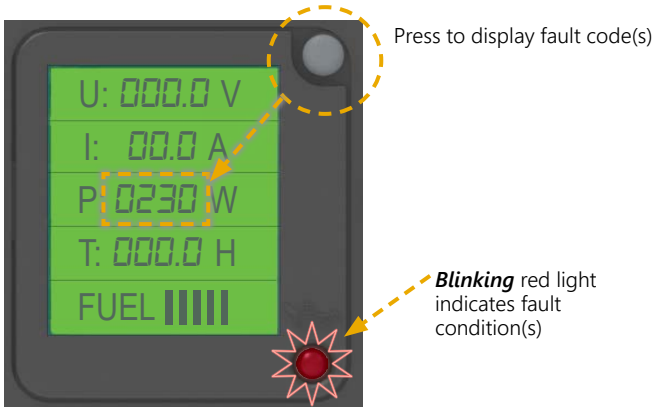
- The red display indicator light illuminates and *blinks* intermittently.
- The generator may continue to run.

View the fault code and correct the cause of the fault condition to resume normal operation.

For a complete list of conditions, see the **Fault Codes** table.

To view and clear a fault condition:

1. When the indicator light is blinking, press the Display Reset Button to view the fault code(s) on the P (power/watts) output line on the LCD.



   - If there are multiple fault codes, they are displayed in succession.
   - Once all fault codes have been displayed, a zero value appears on the P (power/watts) output line on the LCD.

ℹ	If the generator is not running, but the ignition switch is ON, the LCD dims after 30 seconds to conserve battery power. To view the fault codes again, simply toggle the ignition key (or remote switch) OFF-ON, then press the Display Reset Button again.

2. Compare the code(s) on the LCD to the **Fault Codes** table to identify the source(s) of the fault condition.

Fuel Pump Relay	**P0230**	Fuel Pump Primary Circuit Malfunction	Signal line short to battery voltage
			Signal line short to ground
			Signal line break

3. Shut down the generator, then correct the condition(s) causing the fault code(s).

ℹ	Some fault codes can only be corrected by a service technician. If you are unable to correct the fault condition, take the generator to an authorized POWERHOUSE® service center.

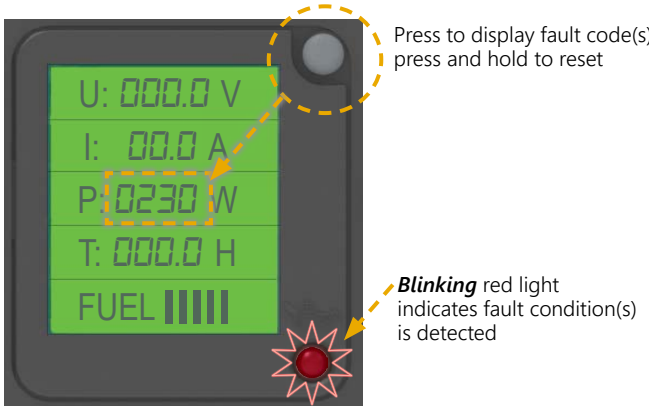
4. Restart the generator.
5. Press and hold the Display Reset Button for several seconds to reset the LCD and indicator light.

   The LCD shows output voltage when the generator is ready for use.

ℹ	If the fault code(s) or blinking indicator light is still present after you press the Display Reset Button, repeat the steps above to clear the remaining fault condition(s).

Fault Codes

When the generator experiences a fault condition, the indicator light *blinks* and the fault code(s) can be viewed on the P: (power/wattage) output line on the LCD.



Compare the fault codes on the LCD to the Fault Code (ODB II) list below to identify the condition that is producing the fault.

- When you correct the condition that is producing the fault, the generator resumes normal operation.
- If you are unable to locate or correct the condition, you must take the generator to an authorized POWERHOUSE® Service Center.

EFI SYSTEM DEVICE	FAULT CODE (OBD II)	FAULT DESCRIPTION (OBD II)	CONDITION(S) THAT PRODUCE THE FAULT
Fuel Injector	**P0261**	Cylinder 1 Injector Circuit Low	Signal line short to ground
	P0262	Cylinder 1 Injector Circuit High	Signal line short to battery voltage
MAP Sensor	**P0107**	MAP Circuit Low Input	Signal line short to ground
	P0108	MAP Circuit High Input	Signal line short to battery voltage
O2 Sensor	**P0130**	O2 Sensor Circuit Malfunction	Signal line break
	P0131	O2 Sensor Circuit Low Voltage	Signal line short to ground
	P0132	O2 Sensor Circuit Low Voltage	Signal line short to battery voltage
Fuel Pump Relay	**P0230**	Fuel Pump Primary Circuit Malfunction	Signal line short to battery voltage
			Signal line short to ground
			Signal line break
Engine Temperature Sensor	**P0117**	Engine Coolant Temperature Circuit Low Input	Signal line short to ground
	P0118	Engine Coolant Temperature Circuit High Input	Signal line short to battery voltage
			Signal line break
Step Motor	**P0505**	Idle Control System Malfunction	Signal line short to battery voltage
			Signal line short to ground
			Signal line break
Fault Code Indicator Light	**P0650**	FCI Control Circuit Malfunction	Signal line short to battery voltage
			Signal line short to ground
			Signal line break

Clearing a Fault Condition | PH2400PRi/E Service Manual | Find a Service Center

Table of Contents

To navigate between hyperlink topics using a keyboard, select ALT+◄ or ALT+►.

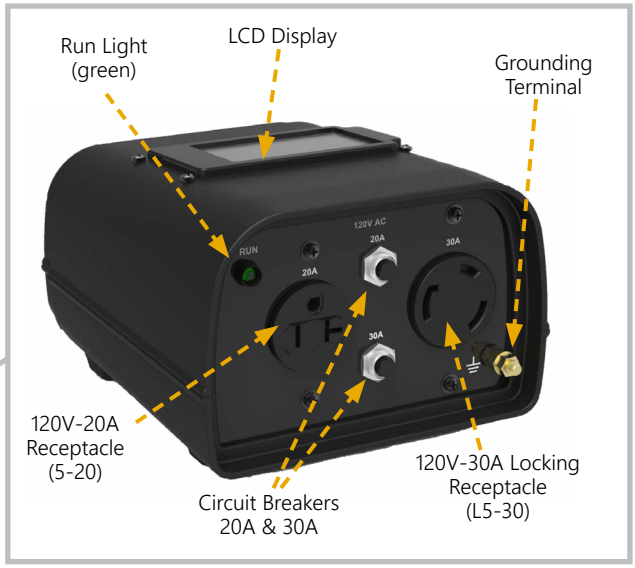
PARALLEL MODE OPERATION

Your generator can operate in a dual-generator parallel mode to use the power of two compatible POWERHOUSE® PH2400PRi/E generators to provide a combined maximum output of 4400W (4300W continual output). Both generators must be connected to the correct, corresponding PH24 Parallel Kit (#67164) in order to use parallel mode. See Identifying the Correct Parallel Kit.

PH2400PRi/E Parallel Configuration

When two compatible PH2400PRi/E generators are operating in parallel, the AC receptacles on the Parallel Kit Box supply the combined power output of both generators to your appliance(s).

PH24 Parallel Kit Box



PH24 PARALLEL KIT	
Parallel Power Cables (2)	The cables that deliver power from the generators to the parallel kit. • Each power cable connects the back of the parallel kit to the parallel power port on the control panel of each generator. It doesn't matter which PH24 power cable you plug into each generator. • Do not use any other power cables, such as from an older PH kit or different brand kit.
Control Panel	The front panel of the parallel kit box that provides the receptacles and breakers.
Parallel Signal Cable (1)	Disregard this cable; it is not used by your PH2400PRi/E generator. It is used for a different POWERHOUSE® model.

PARALLEL KIT BOX	
LCD Display	Displays parallel operating status information: • Volts • Amps • Frequency • Watts • Total Parallel Operating Hours
Run Light (green)	Illuminates during normal parallel operation.
120V-20A Receptacle (5-20)	A 120V receptacle for a 20A appliance.
120V-30A Receptacle (L5-30)	A 120V receptacle for a 30A appliance.
Grounding Terminal	Enables grounding of the parallel kit before operation. NOTE. If both generators are grounded, the parallel kit is already grounded by a shared ground wire.
Circuit Breakers 20A & 30A	Provides circuit protection for the appliance receptacles.

Find a Dealer | Identifying the Correct Parallel Kit | Startup (Parallel Operation) | Shutdown (Parallel Operation)

Startup (Parallel Operation)

SAFETY INSTRUCTIONS ▲ **Before using the generator, read and comply with all Safety Alerts and Icons.**

	◊ Before connecting a parallel kit to your generator, make sure you use the correct parallel kit (PH24). See **Identifying the Correct Parallel Kit**. ◊ The generators must be OFF during setup; DO NOT start the generators until the generators are properly configured.
	▲ **Using the wrong parallel kit damages the inverter which disables generator operation and voids the warranty.** ▲ **DO NOT CONNECT OR DISCONNECT THE PARALLEL KIT CABLES WHEN THE GENERATORS ARE RUNNING. Improper operation may cause irreparable damage to the generators and/or the parallel kit and is not covered by warranty.** ▲ **Use only the parallel power cables provided with the PH-24 parallel kit. DO NOT use other cables or connect to other brands of generators which will result in damage not covered by warranty.**
	▲ **To prevent electrical shock from faulty appliances, the parallel kit should be grounded. Connect a length of heavy cable between the parallel ground terminal and an external ground source.** ▲ **If both generators are grounded, the parallel kit is already grounded by a shared ground wire.**

To configure and start your generators for parallel power operation:

1. With both generators off, connect one of the parallel power cables from the back of the parallel kit box to the parallel power receptacle on the control panel of the first generator.
2. Take the remaining parallel power cable from the back of the parallel kit box and connect it to the parallel power receptacle on the control panel of the second generator.
3. Start both generators. Allow the generators to warm up before connecting any appliances.

	You can start the generators in any order and use any startup method.

The LCD on the parallel kit box illuminates and displays voltage when it's ready for use.

4. Plug the appliance into the appropriate 120V receptacle on the parallel kit, and then turn on the appliance.

	◊ The load requirement of the electrical appliance(s) cannot exceed the combined continual output of the paralleled generators. ◊ Both 20A and 30A receptacles on the parallel kit can provide power simultaneously as long as the individual rated circuits are not exceeded. If you exceed the rating of the 20A or 30A circuit, the breakers will trip, requiring a reset of the corresponding circuit breaker on the parallel kit.

Shutdown (Parallel Operation)

To shut down the generators after parallel operation:

1. Remove all power loads by turning off any connected appliances.
2. Shut down both generators.

	You can shut down both generators in any order and use any shutdown method.

3. Disconnect both parallel power cables from the control panel of each generator.

	▲ **Make sure the generators are OFF before disconnecting the parallel power cables from the generators. Improper operation may cause irreparable damage to the generators and/or the parallel kit and is not covered by warranty.**

4. On both generator control panels, set the remote switch to the OFF position.

	If you shut down the generator using the remote key fob, and you leave the remote switch ON: ◊ You can use the remote key fob to restart the generator within 12 hours of shutdown. ◊ After 12 hours, the generator automatically hibernates to conserve battery power. To deactivate hibernation and re-enable startup, you must toggle the remote switch: OFF–ON.

Using Parallel Mode to Run an Air Conditioner (13,500–15,000 BTU)

You can power a single 13.5K to 15K BTU air conditioner when using two compatible POWERHOUSE® generators in parallel mode. It is important to follow these steps and use a start capacitor.

1. Bring the generators up to normal operating temperatures before applying the air conditioning load.
2. Always allow the manufacturer's recommended wait period when manually cycling an air conditioner off and on. A longer wait period may be required under unusually hot weather conditions. It is also important to follow the air conditioner manufacturer's instructions for starting and restarting for proper operation.
3. Additionally, all other loads should be turned off until the air conditioner has started and is performing normally.

Using a Start Capacitor When Powering an Air Conditioner

It is recommended that you use an air conditioner that has a built-in starter capacitor. A start capacitor in an air conditioner helps provide immediate starting power so that the air conditioner doesn't pull too much current during startup. If there is no start capacitor, the air conditioner can overload the generator by pulling too much starting current.

	◊ Not all air conditioners have a start capacitor, and some air conditioner manufacturers may offer a start capacitor as an extra cost option. ◊ If you are having problems starting your air conditioner, check to see if it has a start capacitor installed. If it doesn't, we recommend contacting your air conditioner dealer to buy and install one.

Clearing an Overload Condition (Parallel Operation)

An overload condition occurs if the power demand of your appliance exceeds the combined maximum power output (4400W) of both generators operating in parallel, or by a short in a connected appliance

To reset after an overload:

When overloaded, the LCD on the parallel kit is no longer illuminated due to lack of power output from the generators. You need to correct the cause of the overload and reset the generators before applying a load again.

1. Turn off any appliance connected to the parallel kit or the generators.

	◊ All POWERHOUSE® generators come with InverterProtec™ technology. When an overload occurs, power to the inverter is turned off but the engine can continue to run to enable quicker resets. ◊ If you prefer, you can shut down the generator before resetting the overload condition.

2. Identify and correct the cause of the overload. Follow the steps for **Clearing an Overload Condition**.
3. On each generator, press and hold the green Overload Reset Button for 3 seconds until power output values reset to zero on the LCD.

   The LCDs on both generators and the parallel kit illuminate and display voltage when the parallel kit is ready for use. If the LCDs do not illuminate, shutdown and restart the generators.
4. Turn appliance(s) back on.

	◊ The load requirement of the electrical appliance cannot exceed the combined continual output of the paralleled generators. For overloads, see **Identifying Trouble During Parallel Operation**. ◊ Both 20A and 30A receptacles on the parallel kit can provide power simultaneously as long as the individual rated circuits are not exceeded. If you exceed the rating of the 20A or 30A circuit, the breakers will trip, requiring a reset of the corresponding circuit breaker.

MAINTENANCE

Use the Maintenance Schedule to keep your generator in the best operating condition. Maintenance includes checking the condition of a part used in the generator, as well as cleaning, adjusting, or replacing a part. The oil should be changed after the first 4 to 6 hours of operation to remove any manufacturing debris or contamination.

▲ **Use genuine POWERHOUSE® parts or the equivalent.**

▲ **The use of replacement parts which are not of equivalent quality may damage the generator or void the warranty.** **Find a Service Center**

When repairing or replacing the components of the emission control system, make sure to use OEM EPA-compliant components. For details, see **APPENDIX A - Emission Control System**.

Maintenance Schedule

PART	MAINTENANCE	REGULAR SERVICE PERIOD *Log hours of operation to determine proper maintenance.*				
		Each Use	1st Month or 4 to 6 Hours	Every 3 Months or 50 Hours	Every 6 Months or 100 Hours	1x per Year or 300 Hours
Engine oil	Check	O				
	Change		O		O	
Air filter element	Check	O				
	Clean			O *		
Spark plug	Clean / Adjust				O	
	Replace	The spark plug will last longer in a generator that runs at varying loads. If you always run the generator at the same load, you will need to replace the spark plug more frequently.				
Spark arrestor	Clean				O	
12V battery	Clean / Charge	Charge monthly during long term storage. Check terminals for corrosion monthly, clean as needed. Expected battery life is 2 years, but can be affected by operating environment.				
Fuel filter ◊	Check	O				
	Replace					O *
Fuel tank & strainer ◊	Clean					O *
Fuel injector ◊	Clean	Add fuel injector cleaner to the fuel tank every 100 hours.				
Fuel line ◊	Check	Every 2 years (replace as necessary) ┼				
Valve clearance ◊	Check / Adjust					O ┼

* Service more frequently when used in dusty areas. ┼ These items should be serviced by an authorized dealer unless the owner has the proper tools and is mechanically proficient. See the Service Manual. ◊ The maintenance of these parts is covered in the **Service Manual**.

SERVICE PERIOD FOR OIL CHANGES	NORMAL OPERATING TEMPERATURE
Normal –100 hr	77°F (25°C)
95 hr	86°F (30°C)
85 hr	95°F (35°C)
70 hr	104°F (40°C)

Changing the Engine Oil

Engine oil capacity: 15.6 fl oz (460 ml)

Change the oil after the first 4 to 6 hours of operation to remove any manufacturing debris or contamination, and as recommended in the **Maintenance Schedule**. Change the oil while the generator is OFF and the engine is still warm to assure rapid and complete draining.

Use a premium quality, 4-stroke engine oil that is a certified API grade SF/SG or better.

- For environmental temperatures above 32°F (0°C), use SAE 10W-30 viscosity oil.
- For environmental temperatures below 32°F (0°C), use SAE 0W-30 or 0W-40 viscosity oil, preferably synthetic.

	▲ **Use caution when draining hot oil from an engine that can cause severe burns.**
	▲ **Running the engine with insufficient oil can cause serious engine damage.**

To change the engine oil:

1. On the left side of the generator, remove the screw and the **Maintenance Access Door**.
2. Remove the dipstick from the oil reservoir.

3. Insert the oil drain pipe (included with the generator) into the oil reservoir.
4. Tilt the generator to drain the dirty oil into a container. Be sure to allow time for the oil to drain completely.

	Please dispose of used motor oil in a manner that is compatible with the environment and local disposal regulations. Do not throw it in the trash or pour it on the ground.

5. Place a funnel into the oil reservoir and refill with the recommended oil. Do not overfill.

6. After refilling, insert the dipstick back into the oil reservoir, **remove it, and check the oil level. (To ensure an accurate reading, do not tighten or screw the dipstick into the reservoir.)** Ensure that the oil level is at the top of the etching on the dipstick.

7. Reinsert and tighten the dipstick in the oil reservoir.
8. Reinstall the maintenance cover and screw back onto the generator.

	The low oil alarm system automatically stops the engine before the oil level falls below a safe limit. However, to avoid the inconvenience of an unexpected shutdown, visually inspect the oil level before each use.

Extreme Temperatures | Maintenance Schedule

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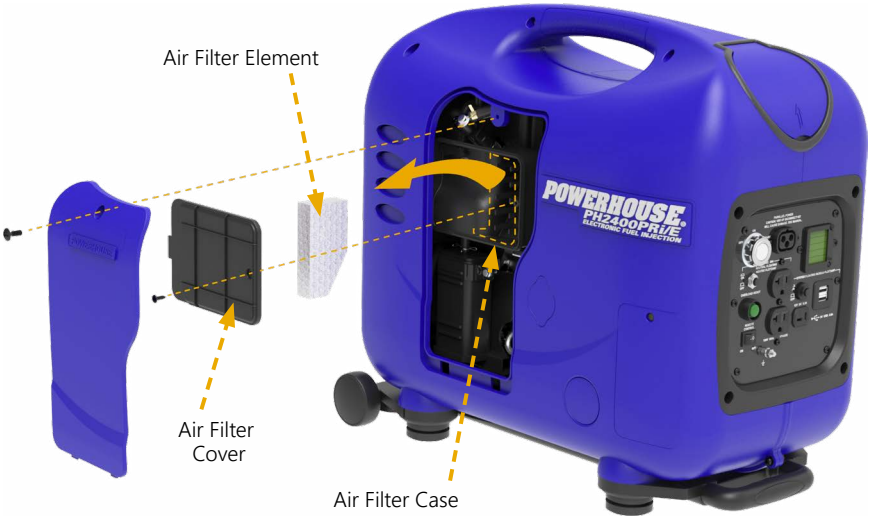
Cleaning the Air Filter Element

A dirty air filter will restrict airflow to the fuel system. To prevent fuel system malfunction, clean the air filter element as recommended in the Maintenance Schedule. Clean more frequently when operating the generator in extremely dirty areas with high dust or sand. Use a soapy solution or non-flammable solvent to clean the air filter element.

▲ **Never run the generator without the air filter element; rapid engine wear may result.**

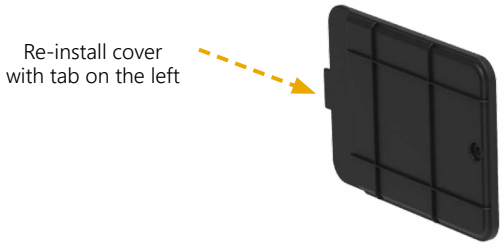


To clean the air filter element:

1. On the left side of the generator, remove the screw and the Maintenance Access Door.
2. Remove the screw from the air filter cover.
3. Remove the air filter element from the air filter case inside the generator.
4. Inspect the air filter element. If the element is dirty, wash it in a soapy solution and let it dry thoroughly.

▲ **Do not use gasoline or low flash point solvents for cleaning because they are flammable and explosive under certain conditions.**

5. Place the air filter element back into the air filter case inside the generator.
6. Reinstall the air filter cover and screw. Keep the tab positioned on the left when inserting the air filter cover onto the air filter case.



7. Reinstall the maintenance door and screw back onto the generator.

Maintenance Schedule

Cleaning the Spark Plug

Recommended spark plug: A7RTC

To ensure proper engine operation, the spark plug must be properly cleaned, gapped, and free of deposits. Clean and replace the spark plug as recommended in the **Maintenance Schedule**.

	Always use an A7RTC resistor-type spark plug. Using a non-resistor spark plug will interfere with AC output and the electronics and may prevent the engine from starting.
	▲ **When replacing a spark plug, always purchase an exact equivalent to the spark plug recommended in this manual. Using a spark plug with a different number designation could result in overheating and damage the generator.**
	The spark plug will last longer in a generator that runs at varying loads. If you always run the generator at the same load, you will need to replace the spark plug more frequently.

To clean the spark plug:

1. On the top of the generator, remove the screw and the **Spark Plug Access Door**
   - A screwdriver and a spark plug wrench are provided with the generator.
   - Use the screwdriver as a handle when inserted through a side hole in the spark plug wrench.
2. Remove the spark plug cap.
3. Clean any dirt from around the spark plug base.
4. Use the screwdriver with the spark plug wrench to loosen and remove the spark plug.
5. Visually inspect and clean the spark plug. If the insulator is cracked or chipped, or if the electrode has excessive wear, discard and replace the spark plug.
6. Clean the spark plug with a wire brush.
7. Measure the plug gap with a feeler gauge. The gap should be 0.024-0.028 in. (0.6-0.7mm). Adjust the gap as needed by carefully bending the side electrode.
8. Reinstall the spark plug carefully.
   a. To avoid cross-threading, start threading by hand.
   b. After seating the spark plug by hand, use the spark plug wrench with the screwdriver to tighten the spark plug by 1/8 to 1/4 turn. (For a new spark plug, tighten by a 1/2 turn in order to adequately compress the gasket.)

	▲ **The spark plug must be correctly and securely seated to avoid loss of spark or damage to the generator.**

9. Put the spark plug cap back on the spark plug securely.
10. Reinstall the spark plug access door and screw back onto the generator.

Maintenance Schedule

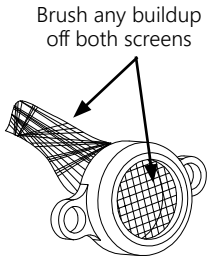
Cleaning the Spark Arrestor

To ensure optimal engine performance, clean the spark arrestor every 100 hours to remove any carbon buildup. Clean the spark arrestor as recommended in the **Maintenance Schedule**.

	Failure to remove carbon buildup on the spark arrestor can cause a decrease in horsepower.
	▲ **Make sure the generator is OFF. If the generator has been running, the muffler will be very hot. Allow it to cool before proceeding.**

To clean the spark arrestor:

1. On the back of the generator, remove the four screws and the exhaust grille.
2. Remove the two screws and the spark arrestor from the muffler.
3. Inspect the spark arrestor for holes or tears in the screens, and replace if necessary.
4. Use a wire brush to remove any carbon deposits from the spark arrestor screens. Brush off any deposits from both the front and back screen material.



5. Reinstall the spark arrestor and two screws.
6. Reinstall the exhaust grille and the four screws back onto the generator.

Maintenance Schedule

Replacing the 12V Battery

Clean and replace the 12V battery as recommended in the Maintenance Schedule.

To remove the battery for maintenance or replacement:

1. On the left side of the generator, remove the screw and the Battery Access Door.
2. Unplug the quick connect cable from the wiring harness.
3. Press down on the battery hold down strap and detach it from the battery box.

4. Turn the strap sideways and feed it onto the top of the 12V battery, between the red and black battery cables.

▲ **Ensure that you don't accidentally short the battery by touching the strap to the battery terminal or dropping tools across the battery leads.**

5. Slide the battery out.

▲ **Ensure that you don't accidentally short the battery when removing it by touching the positive terminal to the chassis.**

6. To replace the 12V battery, lift up the battery hold down strap while you slide the new battery into place.
7. Reattach the battery hold down strap to the battery box.
8. Plug the quick connect cable back into the wiring harness.
9. Reinstall the battery access door and screw back onto the generator.

Maintenance Schedule

TRANSPORTATION AND STORAGE

Transporting the Generator

To prevent fuel spillage when transporting, the generator should be secured upright in its normal operating position with the ignition switch and the remote switch in the OFF position.

▲ **Do not operate the generator while it is on or in a vehicle.**

▲ **If you must transport the generator in an enclosed vehicle, drain all fuel from the generator.**

▲ **Avoid storing the generator in an enclosed area or vehicle. Gasoline is extremely flammable and explosive under certain conditions. High temperatures inside could cause residual fuel to vaporize resulting in possible explosion.**

▲ **Avoid placing the generator in direct sunlight when storing.**

▲ **Keep cigarettes, sparks, and any source of ignition away from generator and the fuel tank at all times.**

Exercising the Generator

It is essential that you exercise the generator on a regular basis, which helps to:

- Maintain the charge for the 12V battery
- Prevent accumulation of varnish or sludge in the fuel system
- Remove moisture from the generator windings
- Keep the engine seals and moving components lubricated

Exercise the generator by running it with at least a 1/2 load (1200W) for 15 minutes per month.

Short-Term Storage

During short term storage, the generator should be secured upright in its normal operating position with the ignition switch and the remote switch in the OFF position.

Long-Term Storage

During long term storage, the generator should be secured upright in its normal operating position with the ignition switch and the remote switch in the OFF position.

▲ **When the generator is used infrequently, it is important to add a fuel stabilizer, such as STA-BIL® Fuel Stabilizer, to help prevent fuel oxidation (breakdown) and the formation of gum and varnish, and to inhibit corrosion in the fuel system.**

1. Be sure the storage area is free of excessive humidity and dust, and out of direct sunlight.
2. Depending on long how you are storing the generator, decide if you want to keep fuel in the fuel tank.

When storing up to one year:

– Keep the tank about 95% full to help prevent condensation during storage, leaving a little room at the top of the tank for fuel to expand on hot days.

– Add a gasoline fuel treatment (such as STA-BIL®) to prevent contamination of your fuel supply, and run the generator for a few minutes to push the as treatment through the fuel system.

When storing for more than one year:

– Drain fuel completely until no fuel remains in the fuel tank or fuel system.

3. Change the engine oil.
4. Remove the spark plug and pour about a tablespoon of clean engine oil into the cylinder.
5. Crank the engine several revolutions to distribute the oil and then reinstall the spark plug.
6. Slowly pull the starter grip until resistance is felt. At this point, the piston is coming up on its compression stroke and both the intake and exhaust valves are closed. Storing the engine in this position will help to protect it from internal corrosion.
7. Once a month, use a trickle charger to recharge the 12V battery.

TROUBLESHOOTING

Engine Will Not Start

Does the engine crank?

NO → Ensure the ignition key (or remote switch) is in the correct position:
- For **Ignition Key Startup**, turn key to START.
- For **Recoil Pull Startup**, turn key to ON.
- For **Remote Startup**, with ignition switch OFF, set remote switch to ON before pressing the start button on the key fob.

YES ↓

Is the battery fully charged and connected?

NO →
- Fully charge the battery.
  The internal battery must have at least 10.5 cranking volts to power electronic components and enable startup.
- Check all connections between the battery, control panel, and electric starter.
- Check that the battery fuse is not missing and not burned out.

YES ↓

Is there fuel in the tank?

NO → Refuel the tank.
Checking and Adding Fuel

YES ↓

Is there enough oil in the engine?

NO → Add the recommended oil.
Checking and Adding Engine Oil
Clearing a Low Oil Condition

YES ↓

Are the fuel filter and air filter free of debris?

NO → Clean or replace the fuel filter and air filter.
- For the air filter, see **Cleaning the Air Filter Element**.
- For the fuel filter, see the **PH2400PRi/E Service Manual**.

YES ↓

Is there a spark from the spark plug?
Warning! Be sure there is no spilled fuel around the spark plug. Spilled fuel may ignite.

NO → Replace the spark plug.
Cleaning the Spark Plug

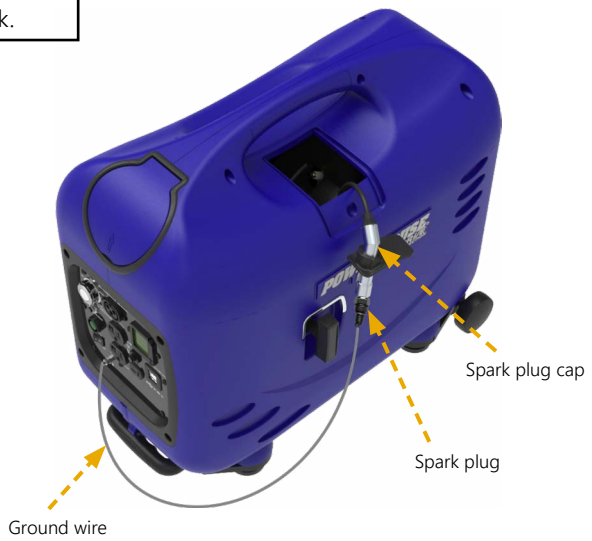
Check spark.

No Spark → Take the generator to an authorized POWERHOUSE® **Service Center**

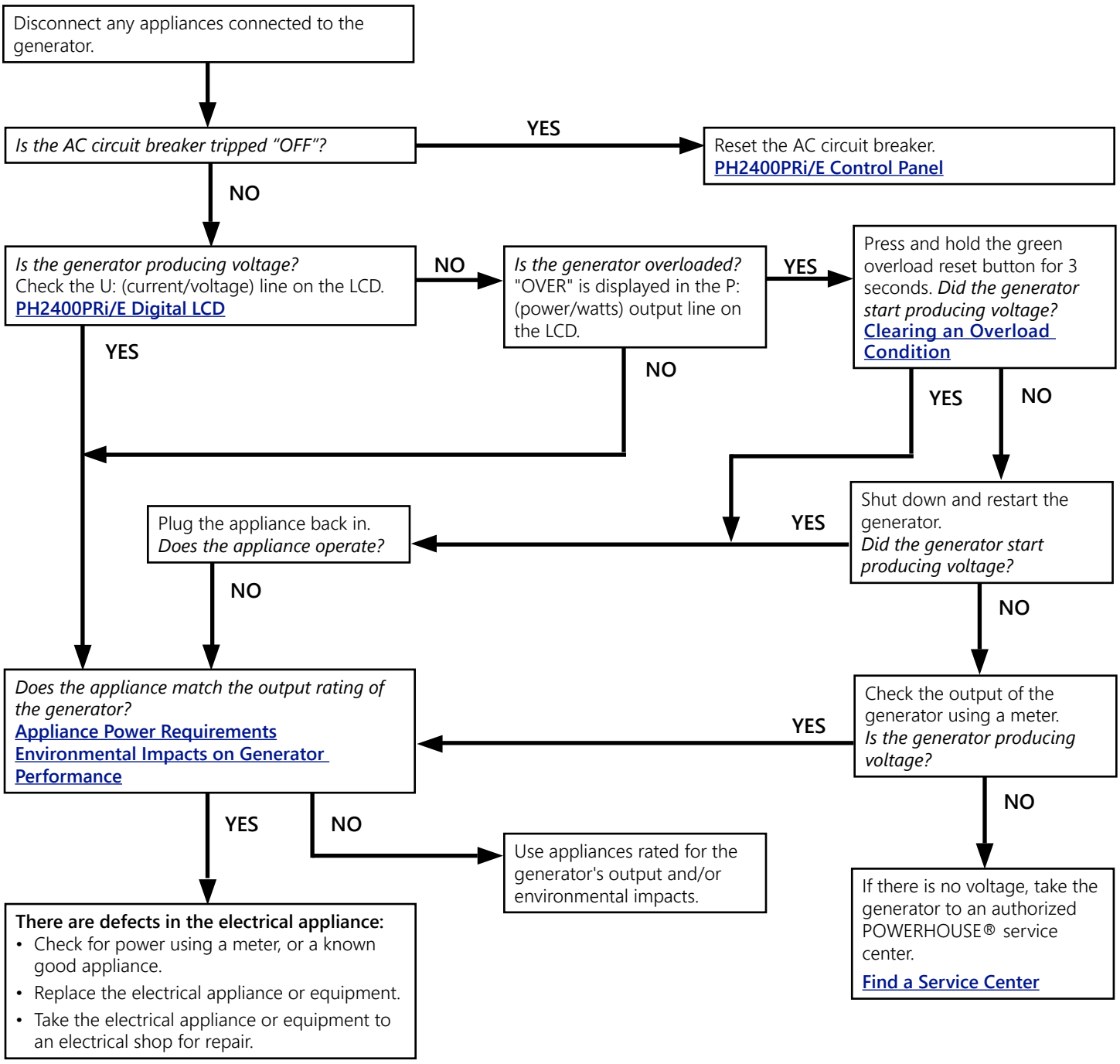
YES ↓

If the engine still does not start, take it to an authorized POWERHOUSE® **Service Center**

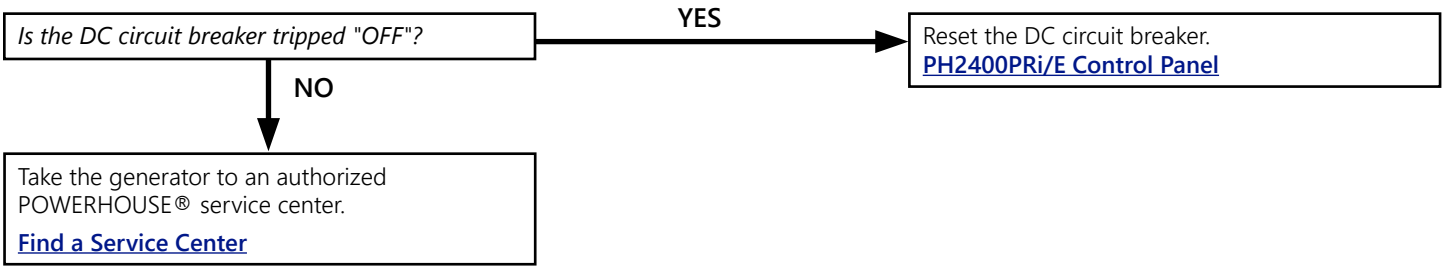
To check spark:
- Remove the spark plug cap and clean any dirt from around the spark plug.
- Remove the spark plug and install the spark plug in the spark plug cap.
- Attach the plug side electrode to your ground wire.
- Turn the ignition key in the START position for a few cycles -- sparks should jump across the spark plug gap.



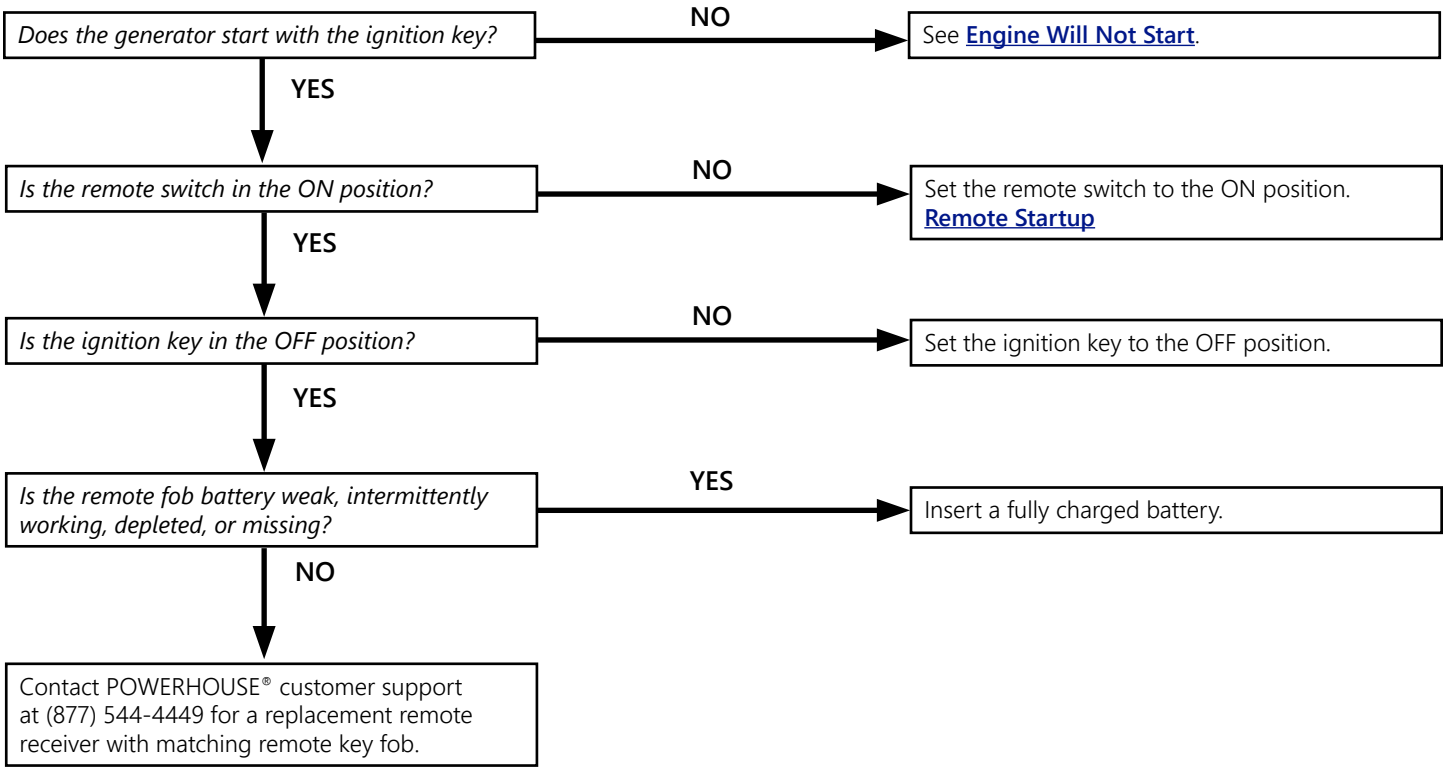
Appliance Does Not Operate



No Output at the DC Receptacle



Engine Does Not Start with Remote Key Fob



Troubleshooting (Parallel Operation)

Identifying the Correct Parallel Kit

It is critical to identify the correct parallel kit for your generators. USING THE WRONG PARALLEL KIT DAMAGES THE INVERTER WHICH MAKES THE GENERATOR INOPERABLE AND VOIDS THE WARRANTY.

- Parallel operation works only with two matching POWERHOUSE® PH2400PRi/E generators.
- Use only the correct PH24 (#67164) Parallel Kit with your PH2400PRi/E generator, shown below.

PH24 #67164
CORRECT

The correct parallel kit (PH-24) has an LCD screen on the top of the kit.

- Do not use any other parallel kit with your generators.
- Do not use an older, obsolete POWERHOUSE® Parallel Kit, such as the PH21-27 (#69276), shown below.

PH21-17 #69276
OBSOLETE / DO NOT USE

- Do not use two different POWERHOUSE® models, such as one electronic fuel ignition model and one carbureted model.
- Do not use two different brand generators, such as one POWERHOUSE® and one non-POWERHOUSE® generator.
- Do not use non-POWERHOUSE® brand parallel kits with any POWERHOUSE® generators.

Identifying Trouble During Parallel Operation

CONDITION		CAUSE	CORRECTION
One or more generators are overloaded.	The alert "OVER" is displayed on the LCD of one or both generators. Additional conditions: • There is no power output. • Both generators are running at an idle. • The LCD on the parallel kit is not illuminated.	**Excess Power Load:** The appliance load (wattage) has exceeded the combined power output of both generators.	Correct the excess power load: 1. Turn off any appliance connected to the parallel kit or the generators. 2. Press and hold the green reset button on each generator for 3 seconds. The LCDs on both generators and the parallel kit illuminate and display voltage when the parallel kit is ready for use. If the LCD does not illuminate, shutdown and restart the generators. 3. Turn appliances back on. **NOTE:** If the reset button is pushed without correcting the cause for the overload, the system will try to reset briefly but the units will again stop producing power. **CAUTION**: Repeatedly pressing the reset button without correcting the overload condition may cause permanent damage to the generators and/or the parallel kit.
		Electrical Short: There is a short in the appliance, or in one or both generators.	Correct the electrical short: 1. Turn off any appliance connected to the parallel kit or the generators. 2. Shut down both generators. 3. Check appliances and/or generators for a short. Repair or replace as needed. 4. Restart both generators. The LCDs on both generators and the parallel kit illuminate and display voltage when the parallel kit is ready for use. 5. Turn appliances back on.
Not enough power output.	Combined power output is less than expected. Additional conditions: • Generators are running at different speeds. For example, one at high speed; one at slow speed. • There is no power output.	**There is a loose or disconnected parallel power cable.**	Verify and fix the connections: 1. Turn off any appliance connected to the parallel kit or the generators. 2. Confirm and fix the secure connection of each power cable from the parallel kit to the power port on each generator. 3. Press and hold the green reset button on each generator for 3 seconds. The LCDs on both generators and the parallel kit illuminate and display voltage when the parallel kit is ready for use. If the LCD does not illuminate, shutdown and restart the generators. 4. Turn appliances back on.
No power output at the parallel kit.	The LCD on the parallel kit is not illuminated. The generators are producing voltage and the LCDs on both generators are illuminated. The alert "OVER" is displayed on the LCD of one or both generators.	**An excessive load is connected to either the 20A or 30A receptacle on the parallel kit.**	1. Remove or reduce excessive loads. 2. Check and reset the circuit breakers on the parallel kit. The LCDs on both generators and the parallel kit illuminate and display voltage when the parallel kit is ready for use. If the LCD does not illuminate, shutdown and restart the generators.

SPECIFICATIONS

Generator

Model	PH2400PRi/E
Part number	66873
Rated frequency	60Hz
Rated voltage	120V
Rated current (in Parallel)	19.2A (35.8A)
Max current (in Parallel)	20A (36.7A)
Rated output (in Parallel)	2300W (4300W)
Max output (in Parallel)	2400W (4400W)
DC output	12V, 8.3A
Phase	Single
Battery	12V Lead Acid Battery
Battery fuse	20 Amp, ATC style
Remote key fob battery	27A 12V

Engine

Model	XG-152F
Type	4 stroke, air-cooled, OHC, gasoline engine
Horsepower/displacement	4.35 hp / 125 cc
Compression ratio	9.2:1
Engine speed (max)	5000 RPM
Ignition system	Computer Controlled Electronic Ignition Capacitor Discharge (CDI)
Spark plug	A7RTC
Starting system	Electric, Remote, and Recoil
Fuel	Automotive Unleaded Gasoline
Lube oil (synthetic or conventional)	Above 32°F: SAE 10W-30 Below 32°F: 0W-30 / 0W-40
Oil capacity	15.6 oz. (460ml)
Fuel tank capacity	1.2 gal (4.7L)
Continuous running time at (rated output load)	2.8 hours
Continuous running time at (1/2 load)	4.5 hours
Continuous running time at (1/4 load)	6.3 hours
Noise level (no load - rated load) dB@ 23' (7m) (in Parallel)	61–72 dB (67–74 dB)

Tune Up Specifications

Spark plug gap	0.024–0.028in. (0.6–0.7mm)
Spark plug	A7RTC
Valve clearance (intake)	0.004±0.001in. (0.10±0.02mm)
Valve clearance (exhaust)	0.006±0.001in. (0.15±0.02mm)

Dimensions

Overall dimensions (with wheel kit) - H x W x D in. (mm)	19.5 X 12 X 22 in. (495 x 305 x 559mm)
Dry weight, with battery	88.4 lbs. (40.1kg)

Emission Control System Warranty

Your POWERHOUSE® generator engine complies with U.S. Environmental Protection Agency, Environment of Canada, and the state of California (if the model is certified by CARB). The following systems and/or parts are covered by this warranty. Failures or improper operation of the following systems and components will be diagnosed and repaired with no charge for labor or parts.

Fuel System

- Intake manifold
- Engine control module

Evaporative Control System

- Fuel tank
- Fuel cap
- Fuel strainer
- Fuel pump
- Fuel lines
- Carbon canister (including brackets and connectors)

Air Induction System

- Air filter element*
- Air filter housing

Ignition System

- Ignition module
- Ignition coil
- Ignition winding
- Spark plug*
- Spark plug cap and wire

Exhaust System

- Catalytic converter
- Exhaust manifold
- Secondary air injection assembly

Miscellaneous

Pipes, tubes, hoses and clamps, o-rings, seals, and gaskets associated with the above systems.

* Covered up to the first scheduled replacement only. See the **Maintenance Schedule**.

APPENDIX A - EMISSION CONTROL SYSTEM

Your generator has an engine that has been approved by the California Air Resources Board. Other than the tune up procedures specified in the **Maintenance Schedule** in this Owner's Manual, no additional maintenance is required.

The emission control system has the following components:

1. Fuel System: The fuel tank, cap, indicator and hoses are specially designed and constructed to not allow fuel vapors to permeate and be released to the atmosphere.
2. A carbon activated canister collects gasoline vapors from the fuel tank and returns them to the combustion chamber for burning.
3. A catalytic converter is built into the muffler to further treat the engine exhaust.
4. A secondary air injection valve adds fresh air to ignite unburned fuel in the exhaust.
5. Contact your authorized POWERHOUSE® service center to obtain the correct replacement parts and service on this system.

Emission source

Exhaust gas contains carbon monoxide, nitrogen oxides (NOX), and hydrocarbons. It is very important to control the emissions of NOX and hydrocarbons as they are a major contributor to air pollution. Carbon monoxide is a poisonous gas. The emission of fuel vapors is a source of pollution as well. The POWERHOUSE® generator engine utilizes a precise air-fuel ratio and emission control system to reduce the emissions of carbon monoxide, NOX, hydrocarbons, and evaporative fuel emissions.

Regulation

Your engine has been designed to meet current Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) clean air standards. The regulations dictate that the manufacturer provides operation and maintenance standards regarding the emission control system. Tune up specifications are provided in the Specifications section and a description of the emission control system may be found in the appendix to this manual. Adherence to the following instructions will ensure your engine meets the emission control standards.

Modification

Modification of the emission control system may lead to increased emissions. Modification is defined as the following:

- Disassembling or modifying the function or parts of the intake, fuel or exhaust system.
- Modifying or destroying the speed governing function of the generator.

Engine Faults That May Affect Emission

Any of the following faults must be repaired immediately. Consult with your authorized POWERHOUSE® service center for diagnosis and repair:

- Hard starting or shut down after starting
- Unstable idle speed
- Shut down or backfire after applying an electrical load
- Backfire or after fire
- Black smoke and/or excessive fuel consumption

Replacement Parts and Accessories

The parts making up the emission control system applied to POWERHOUSE® engine have been specifically approved and certified by the regulatory agencies. You can trust that the replacement parts supplied by POWERHOUSE® have been manufactured to the same production standard as the original parts. The use of replacement parts or accessories which are not designed by POWERHOUSE® may affect the engine emission performance. The manufacturers of replacement parts and accessories have the responsibility to guarantee that their replacement products will not adversely affect emission performance.

Maintenance

Maintain the generator according to the **Maintenance Schedule** in this Owner's Manual. Service items more frequently when used in dusty areas, or under conditions of high load, temperature, and humidity.

Air Quality Index (only for California certified models)

CARB requires that an air quality index label be attached to every certified engine showing the engine emission information for the emission duration period. The label is provided for the user to compare the emission performance of different engines. The lower the air index, the better the engine emission performance. The description of durability is helpful for the user to learn the engine emission duration period and the service life of emission control system. Refer to the Warranty section of this owner's manual for more information.

The air quality index label is designed to be permanently affixed to the generator and removal should not be attempted.


EMISSION CONTROL INFORMATION
YONGKANG XINGGUANG ELECTRICAL MANUFACTURE CO., LTD.
THIS ENGINE IS CERTIFIED TO OPERATE ON UNLEADED GASOLINE . THIS ENGINE MEETS U.S. EPA AND CALIFORNIA EXH AND EVP EMISSION REGULATIONS FOR SMALL OFF-ROAD ENGINES FOR 2013 MODEL YEAR. ENGINE FAMILY: DYKXS.2702XG EVAP ECS: CM EXH ECS: TWC+PAIR
EPA EVAP FAMILY: DYKXPNHEQ001 CARB EVAP FAMILY: CM2 DISPLACEMENT: 270cc
LUBRICANT REQUIREMENTS: SF15W-40 EMISSIONS COMPLIANCE PERIOD: 250HOURS
THE AIR INDEX OF THIS ENGINE IS 3
MOST CLEAN LEAST CLEAN
0 2 4 6 8 10
DATE OF MANUFACTURE:
2013 01 02 03 04 05 06 07 08 09 10 11 12

(Example Label)

APPENDIX B - VEHICLE BATTERY CHARGING SAFETY

(a) SAVE THESE INSTRUCTIONS. THIS MANUAL CONTAINS IMPORTANT SAFETY AND OPERATING INSTRUCTIONS.

(b) WORKING IN THE VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON IT IS OF THE UTMOST IMPORTANCE THAT EACH TIME BEFORE USING YOUR CHARGER, YOU READ AND FOLLOW THE INSTRUCTIONS PROVIDED EXACTLY.

(c) TO REDUCE RISK OF BATTERY EXPLOSION, FOLLOW THESE INSTRUCTIONS AND THOSE MARKED ON THE BATTERY.

(d) NEVER SMOKE OR ALLOW AN OPEN SPARK OR FLAME IN THE VICINITY OF THE BATTERY OR ENGINE.

(e) USE CHARGER FOR CHARGING A LEAD-ACID BATTERY ONLY. IT IS NOT INTENDED TO SUPPLY POWER TO AN EXTRA-LOW-VOLTAGE ELECTRICAL SYSTEM OR TO CHARGE DRY-CELL BATTERIES. CHARGING DRY-CELL BATTERIES MAY CAUSE THEM TO BURST AND CAUSE INJURY TO PERSONS AND DAMAGE TO PROPERTY.

(f) NEVER CHARGE A FROZEN BATTERY.

(g) IF IT IS NECESSARY TO REMOVE BATTERY FROM VEHICLE TO CHARGE IT, ALWAYS REMOVE GROUNDED TERMINAL FROM BATTERY FIRST. MAKE SURE ALL ACCESSORIES IN THE VEHICLE ARE OFF IN ORDER TO PREVENT AN ARC.

(h) STUDY ALL BATTERY MANUFACTURER'S SPECIFIC PRECAUTIONS SUCH AS REMOVING OR NOT REMOVING CELL CAPS WHILE CHARGING AND RECOMMENDED RATES OF CHARGE.

(i) FOR A CHARGER HAVING AN OUTPUT VOLTAGE SELECTOR SWITCH, REFER TO THE CAR OWNER'S MANUAL IN ORDER TO DETERMINE THE VOLTAGE OF THE BATTERY AND TO MAKE SURE THE OUTPUT VOLTAGE IS SET AT THE CORRECT VOLTAGE. IF AN OUTPUT VOLTAGE SELECTOR SWITCH IS NOT PROVIDED, DO NOT USE THE BATTERY CHARGER UNLESS THE BATTERY VOLTAGE MATCHES THE OUTPUT VOLTAGE RATING OF THE CHARGER.

(j) NEVER PLACE THE CHARGER DIRECTLY ABOVE OR BELOW THE BATTERY BEING CHARGED; GASES OR FLUIDS FROM THE BATTERY WILL CORRODE AND DAMAGE THE CHARGER. LOCATE THE CHARGER AS FAR AWAY FROM THE BATTERY AS DC CABLES PERMIT.

(k) DO NOT OPERATE CHARGER IN A CLOSED-IN AREA OR RESTRICT VENTILATION IN ANY WAY.

(l) CONNECT AND DISCONNECT DC OUTPUT CLIPS ONLY AFTER SETTING ANY CHARGER SWITCHES TO THE OFF POSITION AND REMOVING AC CORD FROM THE ELECTRIC OUTLET. NEVER ALLOW CLIPS TO TOUCH EACH OTHER.

(m) FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE. A SPARK NEAR BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

i. POSITION AC AND DC CORDS TO REDUCE RISK OF DAMAGE BY HOOD, DOOR, OR MOVING ENGINE PARTS;
ii. STAY CLEAR OF FAN BLADES, BELTS, PULLEYS, AND OTHER PARTS THAT CAN CAUSE INJURY TO PERSONS;
iii. CHECK POLARITY OF BATTERY POSTS. A POSITIVE (POS, P, +) BATTERY POST USUALLY HAS A LARGER DIAMETER THAN A NEGATIVE (NEG, N, –) POST;
iv. DETERMINE WHICH POST OF BATTERY IS GROUNDED (CONNECTED) TO THE CHASSIS. IF NEGATIVE POST IS GROUNDED TO CHASSIS (AS IN MOST VEHICLES), SEE ITEM (v). IF POSITIVE POST IS GROUNDED TO THE CHASSIS, SEE ITEM (vi);
v. FOR A NEGATIVE-GROUNDED VEHICLE, CONNECT THE POSITIVE (RED) CLIP FROM BATTERY CHARGER TO POSITIVE (POS, P, +) UNGROUNDED POST OF BATTERY. CONNECT THE NEGATIVE (BLACK) CLIP TO VEHICLE CHASSIS OR ENGINE BLOCK AWAY FROM BATTERY. DO NOT CONNECT CLIP TO CARBURETOR, FUEL LINES, OR SHEET-METAL BODY PARTS. CONNECT TO A HEAVY GAUGE METAL PART OF THE FRAME OR ENGINE BLOCK;
vi. FOR A POSITIVE-GROUNDED VEHICLE, CONNECT THE NEGATIVE (BLACK) CLIP FROM BATTERY CHARGER TO NEGATIVE (NEG, N, –) UNGROUNDED POST OF BATTERY. CONNECT THE POSITIVE (RED) CLIP TO VEHICLE CHASSIS OR ENGINE BLOCK AWAY FROM BATTERY. DO NOT CONNECT CLIP TO CARBURETOR, FUEL LINES, OR SHEET-METAL BODY PARTS. CONNECT TO A HEAVY GAUGE METAL PART OF THE FRAME OR ENGINE BLOCK;
vii. CONNECT CHARGER AC SUPPLY CORD TO ELECTRIC OUTLET; AND
viii. WHEN DISCONNECTING CHARGER, TURN SWITCHES TO OFF, DISCONNECT AC CORD, REMOVE CLIP FROM VEHICLE CHASSIS, AND THEN REMOVE CLIP FROM BATTERY TERMINAL.

(n) FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE. A SPARK NEAR THE BATTERY MAY CAUSE A BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

i. CHECK POLARITY OF BATTERY POSTS. A POSITIVE (POS, P, +) BATTERY POST USUALLY HAS A LARGER DIAMETER THAN A NEGATIVE (NEG, N, –) POST;
ii. ATTACH AT LEAST A 60 CM 6-GAUGE (AWG) INSULATED BATTERY CABLE TO A NEGATIVE (NEG, N, –) BATTERY POST;
iii. CONNECT THE POSITIVE (RED) CHARGER CLIP TO THE POSITIVE (POS, P, +) POST OF BATTERY;
iv. POSITION YOURSELF AND THE FREE END OF CABLE AS FAR AWAY FROM BATTERY AS POSSIBLE, THEN CONNECT THE NEGATIVE (BLACK) CHARGER CLIP TO FREE END OF THE INSULATED BATTERY CABLE;
v. DO NOT FACE BATTERY WHEN MAKING FINAL CONNECTION;
vi. CONNECT CHARGER AC SUPPLY CORD TO ELECTRICAL OUTLET; AND
vii. WHEN DISCONNECTING CHARGER, ALWAYS DO SO IN REVERSE SEQUENCE OF CONNECTING PROCEDURE AND BREAK FIRST CONNECTION WHILE STANDING AS FAR AWAY FROM BATTERY AS PRACTICAL.

(o) USE OF AN ADAPTER IS NOT ALLOWED IN CANADA. IF A GROUNDING TYPE RECEPTACLE IS NOT AVAILABLE, DO NOT USE THIS APPLIANCE UNTIL THE PROPER OUTLET IS INSTALLED BY A QUALIFIED ELECTRICIAN.

(p) THE GENERATOR (STATOR WINDING) IS ISOLATED FROM THE FRAME AND FROM THE AC RECEPTACLE GROUND PIN.

(q) ELECTRICAL DEVICES THAT REQUIRE A GROUNDED RECEPTACLE PIN CONNECTION WILL NOT FUNCTION IF THE RECEPTACLE GROUND PIN IS NOT FUNCTIONAL.