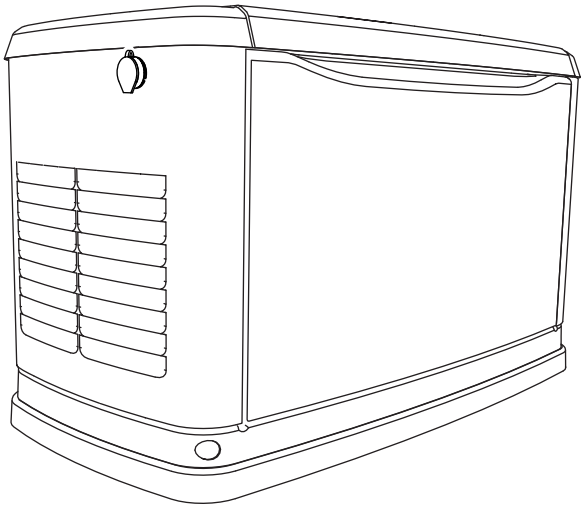
PRAMAC

Owner's Manual

50 Hz Air-Cooled Generator Sets

20 kVA

Original Instructions



This product is not intended to be used in a critical life support application.

ISO000209b

Register your Pramac product at:
www.activategen.com

SAVE THIS MANUAL FOR FUTURE REFERENCE

Use this page to record important information about this generator set.

Model:	
Serial:	
Production Date:	
Volts:	
LPG Amps:	
NG Amps:	
Hz:	
Phase:	
Controller P/N:	
STA MAC ID:	
SSID:	

Record the information found on the unit data label on this page. See ***General Information*** for location of unit data label. The unit has a label plate affixed to the inside partition, to the left of the control panel console as shown in ***Figure 2-1***. See ***Operation*** for directions on how to open the top lid and remove the front panel.

Always supply the complete model and serial numbers of the unit when contacting an Independent Authorized Service Dealer (IASD) about parts and service.

Operation and Maintenance: Correct maintenance and care of the generator set ensures a minimum number of problems and keeps operating expenses at a minimum. It is the operator's responsibility to perform all safety checks, to verify all maintenance for safe operation is performed promptly, and to have the equipment inspected periodically by an IASD. Normal maintenance, service, and replacement of parts are the responsibility of the owner/operator and are not considered defects in materials or workmanship within the terms of the warranty. Individual operating habits and usage may contribute to the need for additional maintenance or service.

Pramac recommends contacting an IASD for assistance when the generator set requires maintenance or service. Authorized service technicians are factory–trained and are capable of handling maintenance and service needs. To locate the nearest IASD, see ***Servicing Centers*** at the end of this manual.

EC Declaration of Conformity

Manufacturer: **Generac Power Systems, Inc.**
S45 W29290 Hwy 59
Waukesha, WI 53189 USA

Generac Power Systems, Inc. hereby declares that the machinery described below fulfils all the relevant provisions of the Machinery Directive 2006/42/EC. The Machinery also conforms to the relevant provisions of the Outdoor Noise Directive 2000/14/EC (as amended by Directive 2005/88/EC) Notified body: SNCH, 2a, Kalchesbruck L – 1852 Luxembourg and the Radio Equipment Directive 2014/53/EU.

Machinery Description: **Generator Set**
Model Numbers: **Generac Model Numbers; G007189# and G007289# (# – 0 to 9 for minor design changes)**

The following standards have been complied with in part or in full as relevant:

Machinery Directive 2006/42/EC Harmonised Standards applied:

EN ISO 8528-13:2016 – Reciprocating internal combustion engine driven alternating current generating sets
IEC 60204-1:2010/AC:2010 – Electrical equipment of machines – Part 1: General requirements
ISO 12100:2010 – General principles for design - Risk Assessment and risk reduction, includes EN 14121:2007

Additional standards that have either been referred to or been complied with in part or in full as relevant:

ISO 8528 series – Reciprocating internal combustion engine driven alternating current generating sets
ISO 8528-1:2005 – Application, ratings, and performance
ISO 8528-5:2013 – Generating sets
IEC 60034-1:2010 – Rotating electrical machines – Part 1: Rating and performance

Harmonised Standards applied for Outdoor Noise Emission Directive 2000/14/EC:

ISO 8528-10:1998 – Measurement of airborne noise by the enveloping surface method
EN ISO 3744:1995 – Determination of sound power levels and sound energy levels of noise sources using sound pressure
Model numbers G007189# & G007289# measured sound power level 94.4 dB(A), guaranteed sound power level 95 dB(A)

Harmonised Standards applied for Radio Equipment Directive 2014/53/EU:

EN 55012:2007+A1:2009 – Vehicles, boats and internal combustion engines – Radio disturbance characteristics
ETSI EN 300 328 V2.1.1:2016 – Electromagnetic Compatibility and Radio Spectrum Matters
ETSE EN 301 489-1:2017 Ed.V2.1.1 – Electromagnetic Compatibility for Radio Equipment
ETSE EN 301 489-17:2017 Ed.V3.1.1 – Electromagnetic Compatibility for Radio Equipment
EN 61000-6-2:2005+C1:2005 – Electromagnetic Compatibility – Part 6-2: Generic Standards – Immunity-Industrial
EN 61000-6-3-3:2007+A1:2011 – Electromagnetic Compatibility – Part 6-3: Generic Standards – Emission

A Technical file has been compiled in accordance with Part A of Annex VII of Machinery Directive 2006/42/EC and is available to the European National authorities upon request.

Jeffrey Jonas
Staff Engineer-Certifications
Generac Power Systems, Inc.
S45 W29290 Hwy 59
Waukesha, Wisconsin, USA

Signature: 

This document was made at Generac Power Systems, Inc. at the address noted above on October 4, 2018

Original document - written in English.

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Table of Contents

Section 1: Safety Information

Introduction

Thank you for purchasing this compact, high performance, air-cooled, engine-driven generator set. It is designed to automatically supply electrical power to operate critical loads during a mains (utility) power failure.

This unit is factory installed in an all-weather, metal enclosure intended exclusively for outdoor installation. This generator set will operate using either vapor withdrawn liquid propane (liquid propane gas [LPG]) or natural gas (NG).

NOTE: This generator set is intended to be used for supplying typical residential loads such as induction motors (sump pumps, refrigerators, air conditioners, furnaces, etc.), electronic components (computer, monitor, TV, etc.), lighting loads, and microwaves, when sized correctly. This unit is also equipped with a Wi-Fi® module, which enables owner to monitor generator set status from anywhere they have Internet access.

NOTE: Wi-Fi® is a registered trademark of Wi-Fi Alliance®.

The information in this manual is accurate based on products produced at the time of publication. The manufacturer reserves the right to make technical updates, corrections, and product revisions at any time without notice.

Read This Manual Thoroughly

Read instruction manual.
Read and understand manual completely before using this equipment.

ISO000100a

If any section of this manual is not understood, contact the nearest Independent Authorized Service Dealer (IASD) for starting, operating, and servicing procedures. The owner is responsible for correct maintenance and safe use of the unit.

This manual must be used in conjunction with all other supporting product documentation supplied with the product.

SAVE THESE INSTRUCTIONS for future reference. This manual contains important instructions that must be followed during placement, operation, and maintenance of the unit and its components. Always supply this manual to any individual that will use this unit, and instruct them on how to correctly start, operate, and stop the unit in case of emergency.

Safety Messages

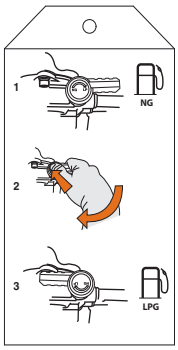
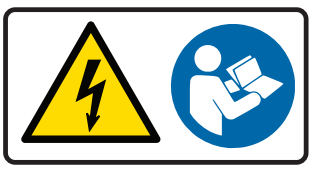
Throughout this publication and on tags and decals affixed to the generator set, three types of safety messages are used to alert personnel to special instructions about a particular operation that may be hazardous if performed incorrectly or carelessly. Observe them carefully. Their definitions are as follows:

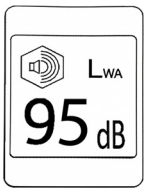
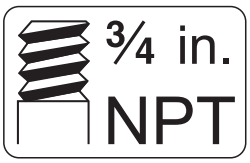
	**HAZARD WARNING** Yellow triangle with black border and black symbol; indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	**MANDATORY ACTION** Blue circle with white symbol; indicates an action required to safeguard personal health and / or avoid causing a hazardous situation which could result in death or serious injury.
	**PROHIBITION** Red ring with diagonal bar and black symbol; indicates a prohibited action. Performing the prohibited action may cause a hazardous situation which could result in death or serious injury.
—	**NOTE** Notes provide additional information important to a procedure or component.

These safety messages cannot eliminate the hazards they indicate. Observing safety precautions and strict compliance with the special instructions while performing the action or service are essential to preventing accidents.

Safety and Informational Decals

This unit is equipped with safety and informational decals displaying pictorial symbols. These symbols and decals are described below. Locations are identified in ***Figure 1-1***. Contact an IASD for a replacement if a decal is missing, damaged, or illegible.

ID	Decal	Description	Meaning
A		Oil Drain	Oil drain location
B		Positive Battery Cable	• Electricity is present. Keep positive terminal covered at all times when connected to battery. • Read and understand the manual completely before using this equipment. • Identifies positive battery cable.
C		Negative Battery Cable	Identifies negative battery cable
D		Fuel Selection	Step 1: Unit set for Natural Gas (NG) operation. Step 2: Press and rotate fuel selector 180° to change fuel type. Step 3: Unit set for Liquid Propane (LPG) operation. **NOTE:** This decal is intended to be discarded after installation and need not be replaced if missing.
E		Shock Hazard / Read The Manual	• Live components carrying potentially lethal voltages may be accessible inside. Render the equipment safe before attempting further access. • Read and understand manual completely before attempting further access.
F		Burn Hazard / Asphyxiation Hazard	• Surface may be hot. Do not touch when operating equipment. After equipment shutdown, allow sufficient time for surfaces to cool prior to contact. • Carbon monoxide, a colorless odorless poisonous gas, is emitted in engine exhaust while equipment is running. Avoid inhalation of exhaust gases.
G		Activation	• Activate the generator set before putting the unit into operation. • Read the manual for details.

H		No User Serviceable Parts	• Electricity is present at various locations inside this enclosure. • This equipment is designed for automatic operation and may start at any time. Render the unit inoperable before servicing. • Battery is present. Wear appropriate protective gear. • This equipment emits exhaust gases. Ensure proper installation to prevent asphyxiation. • Do not open the enclosure. There are no user-serviceable parts inside. Contact an IASD. • Read and understand the manual completely before installing or operating this equipment. • Do not smoke near this equipment. • Do not allow open flames near this equipment.
J		Read Owner's Manual	Read the manual for an explanation of this device.
K		Lifting Point	Install lifting attachments to this location and only this location. Do not connect lifting device directly to the lift point.
L		Pinch Point	Keep hands clear of these areas when installing the front panel or closing the roof.
M	See ***Data Decals***	Model Data Decal	Decal Location
N	See ***Data Decals***	Fuel Data Decal	Decal Location
P		Sound Power Level	Guaranteed sound power level per Directive 2000/14/EC. See ***Specifications*** for actual value.
Q		Threaded Connection	Fuel inlet has a 3/4 in. NPT threaded connection.

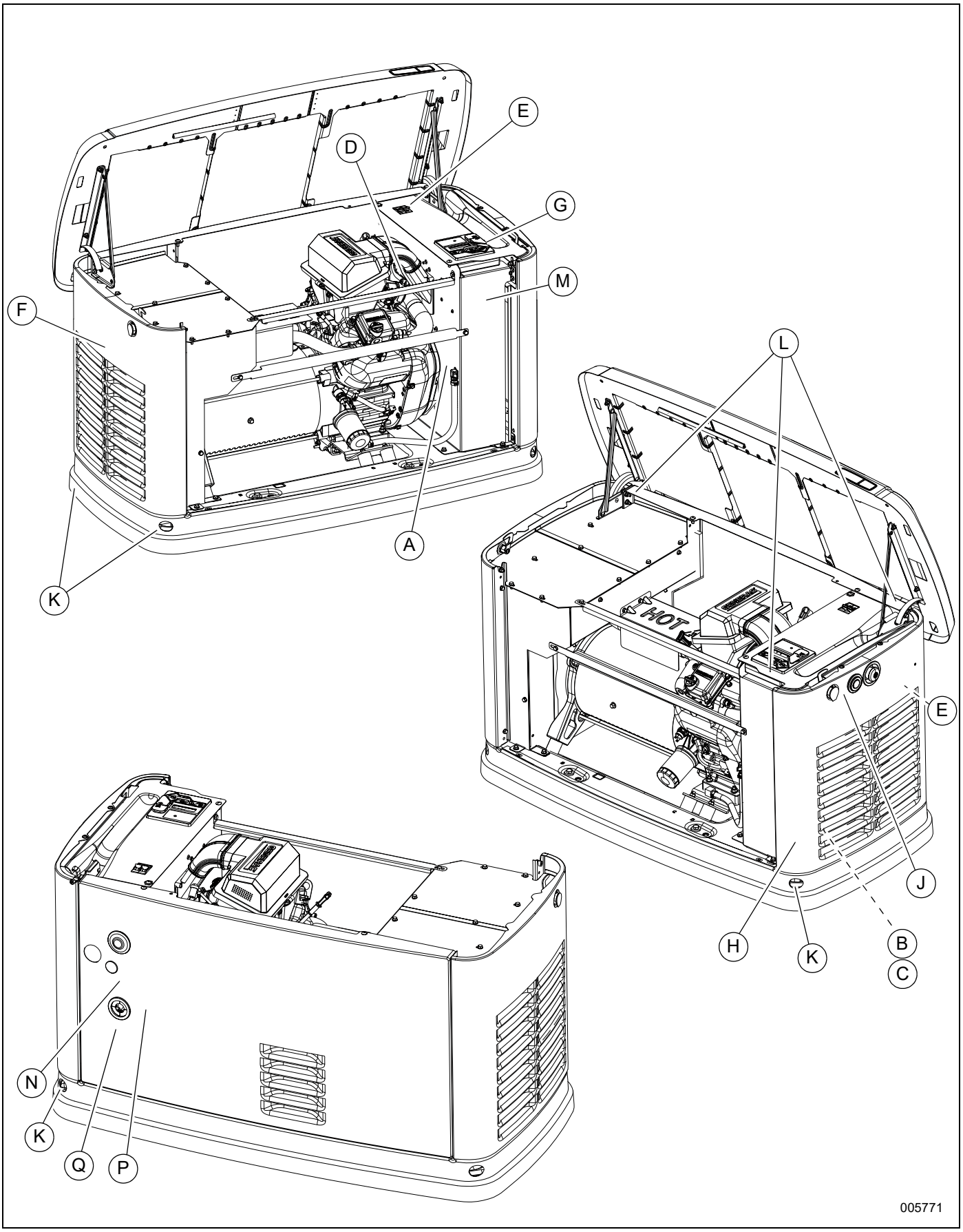


Figure 1-1. Safety Decals

Safety Rules

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

The manufacturer cannot anticipate every possible circumstance that might involve a hazard. The alerts in this manual and on tags and decals affixed to the unit are not all-inclusive. If using a procedure, work method, or operating technique the manufacturer does not specifically recommend, verify it is safe for others and does not render the generator set unsafe.

General Safety

Hot surface. Keep equipment away from combustible materials during operation. Do not touch hot surfaces when operating equipment. After equipment shutdown, allow sufficient time for surfaces to cool prior to contact.

ISO000110

The enclosure provides protection against hot surfaces inside the generator set. Hot surfaces may be present if the generator set has been operating under a large load. Do not open the generator set enclosure while the generator set is running.

ISO000533

Read instruction manual. Read and understand manual completely before using this equipment.

ISO000100a

Refer to local codes and standards for safety equipment required when working with a live electrical system.

ISO000257

Only qualified service personnel may install, operate, and maintain this equipment.

ISO000182a

Follow all safety precautions in the owner's manual, installation manual, and other documents included with your equipment.

ISO000531

Verify the generator set is installed in accordance with the manufacturer's instructions and recommendations.

ISO000539

Following proper installation, do nothing that might alter a safe installation and render the unit in noncompliance with locally applicable codes, standards, laws, and regulations.

ISO000540

Comply with regulations the local agency for workplace health and safety has established.

ISO000538

In the event of an electrical accident, immediately shut power OFF. Use non-conductive implements to free victim from live conductor. Apply first aid and get medical help.

ISO000145

Use only fully-charged fire extinguishers rated according to applicable industry standards.

ISO000252

No open flames near equipment. Flammable and explosive gases are present inside this equipment.

ISO000529

Do not obstruct cooling and ventilating airflow around the generator set.

ISO000217

Do not stand on top of generator set or use generator set as a step.

ISO000216

No smoking near equipment. Flammable and explosive gases are present inside this equipment.

ISO000528

User access prohibited. Do not open the enclosure. No user serviceable parts inside. Only qualified service personnel may install, operate, and maintain this equipment. Contact an IASD.

ISO000543

Installation

Installation must always comply with applicable codes, standards, laws, and regulations.

ISO000190

Only a trained and licensed electrician should perform wiring and connections to unit.

ISO000155a

Always use a battery operated carbon monoxide alarm indoors and installed according to the manufacturer's instructions.

ISO000178a

Connection of fuel source must be completed by a qualified professional technician or contractor.

ISO000151a

The generator set must be installed and operated outdoors only.

ISO000525

Fuel and vapors are extremely flammable and explosive. No leakage of fuel is permitted. Keep fire and spark away.

ISO000192

Use only approved switchgear to isolate generator from the normal power source.

ISO000237

Verify electrical system is properly grounded before applying power.

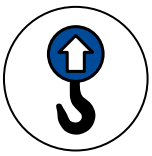
ISO000152

Installation must comply with all national and local electrical building codes.

ISO000218

Unit must be positioned in a manner that prevents combustible material accumulation underneath.

ISO000147



Lift point. Install lifting attachments to this location and only locations identified as such. Do not connect lifting device directly to the lift point.

ISO000532

Comply with regulations the local agency for workplace health and safety has established.

ISO000538

Verify the generator set is installed in accordance with the manufacturer's instructions and recommendations.

ISO000539

Following proper installation, do nothing that might alter a safe installation and render the unit in noncompliance with locally applicable codes, standards, laws, and regulations.

ISO000540

Never connect this unit to the electrical system of any building unless a licensed electrician has installed an approved transfer switch.

ISO000150

Do not alter construction of, installation, or block ventilation for generator set.

ISO000146

Operation

This product is not intended to be used in a critical life support application.

ISO000209b

Hot surface. Keep equipment away from combustible materials during operation. Do not touch hot surfaces when operating equipment. After equipment shutdown, allow sufficient time for surfaces to cool prior to contact.

ISO000108

Asphyxiating atmosphere. Carbon monoxide, a colorless odorless poisonous gas, is emitted in engine exhaust while equipment is running. Avoid inhalation of exhaust gases.

ISO000103

Pinch point. Keep hands clear of these areas when installing the front panel or closing the roof.

ISO000526

Inspect the generator set regularly, and contact the nearest servicing dealer for parts needing repair or replacement.

ISO000524

This unit is not designed for use in hazardous areas or explosive atmospheres.

ISO000547

Keep clothing, hair, and appendages away from moving parts.

ISO000111

This unit is not intended for use as a prime power source. It is intended for use as an intermediate power supply in the event of a temporary power outage only.

ISO000247a

Do not wear jewelry when starting or operating this product.

ISO000115

Maintenance

Batteries contain sulfuric acid and can cause severe chemical burns. Wear protective gear when working with batteries.

ISO000138a

Electricity present. Keep positive terminal covered at all times when connected to battery.

ISO000530

Electricity present. Potentially lethal voltages are generated by this equipment. Render the equipment safe before attempting repairs or maintenance.

ISO000187

Automatic start-up. Disconnect mains power and render the equipment inoperable before attempting repairs or maintenance.

ISO000191a

Do not open or mutilate batteries. Batteries contain electrolyte solution which can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

ISO000163a

Avoid water contact with a power source.

ISO000104

Disconnect the negative battery cable, then the positive battery cable, when working on unit.

ISO000130

Disconnect battery ground terminal before working on battery or battery wires.

ISO000164

Always recycle batteries at an official recycling center in accordance with all local laws and regulations.

ISO000228

Batteries emit explosive gases while charging. Keep fire and spark away.

ISO000548

Do not dispose of batteries in a fire. Batteries are explosive. Electrolyte solution can cause burns and blindness. If electrolyte contacts skin or eyes, flush with water and seek immediate medical attention.

ISO000162

Do not wear jewelry when starting or operating this product.

ISO000115

Hot Surfaces

The enclosure provides protection against hot surfaces inside the generator set. Hot surfaces may be present if the generator set has been operating under a large load. Do not open the generator set enclosure while the generator set is running.

ISO000533

The generator set enclosure provides protection against hot surfaces inside the enclosure. Surfaces which may be hot while the generator set is operating are identified in ***Figure 1-2***.

Follow the generator set shutdown procedure in ***Shutting Generator Set Down While Under Load Or During A Mains Power (Utility) Outage*** before opening the enclosure. This allows adequate cooling to reduce the risk of exposure to hot surfaces.

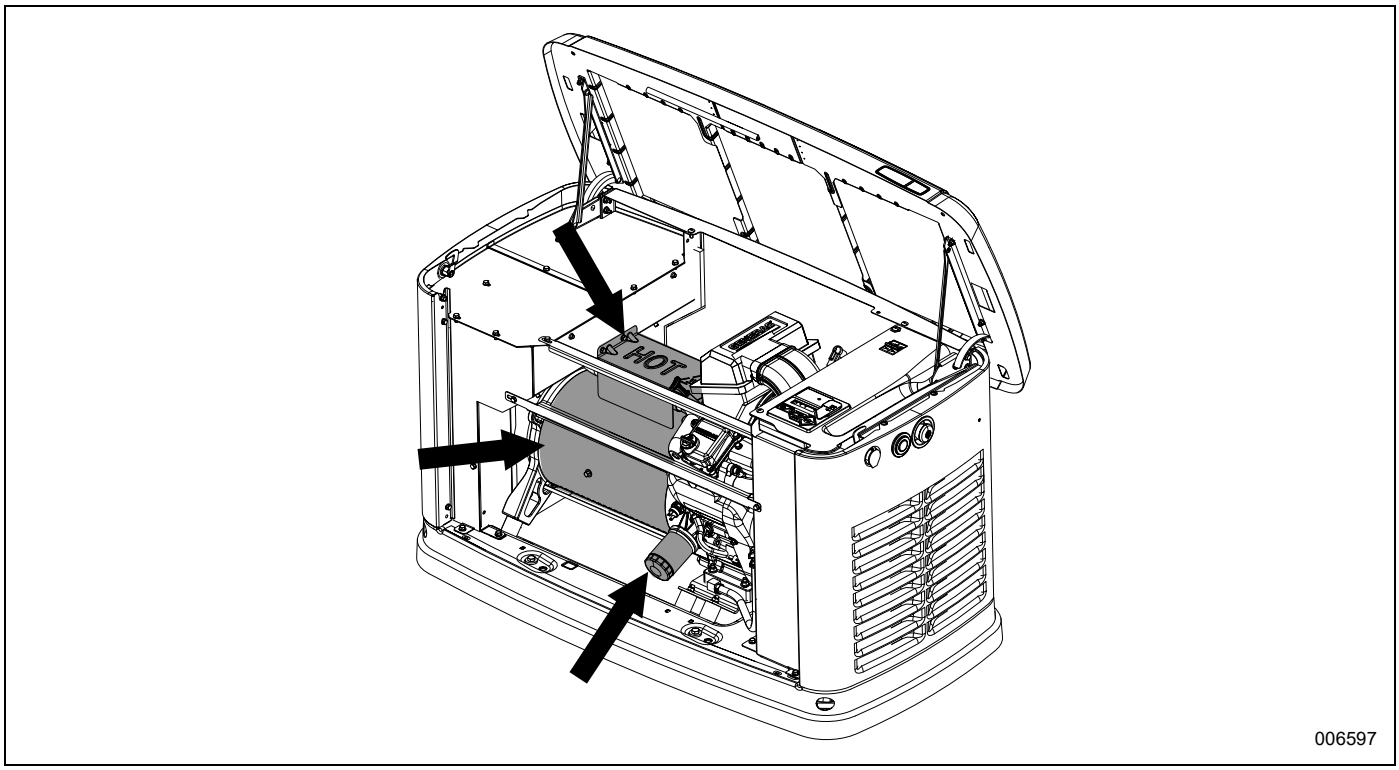


Figure 1-2. Hot Surfaces

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Section 2: General Information

Generator Set

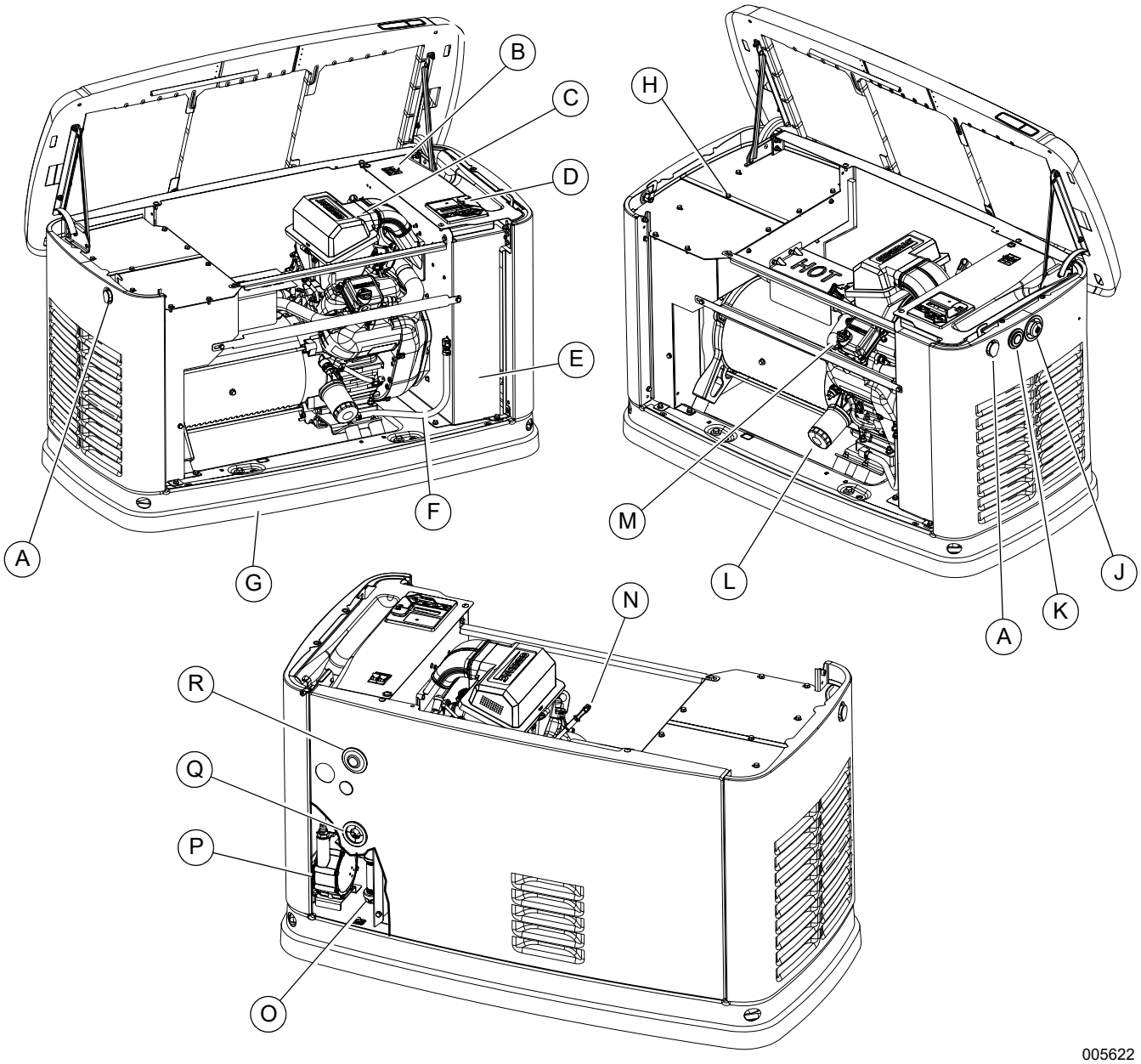
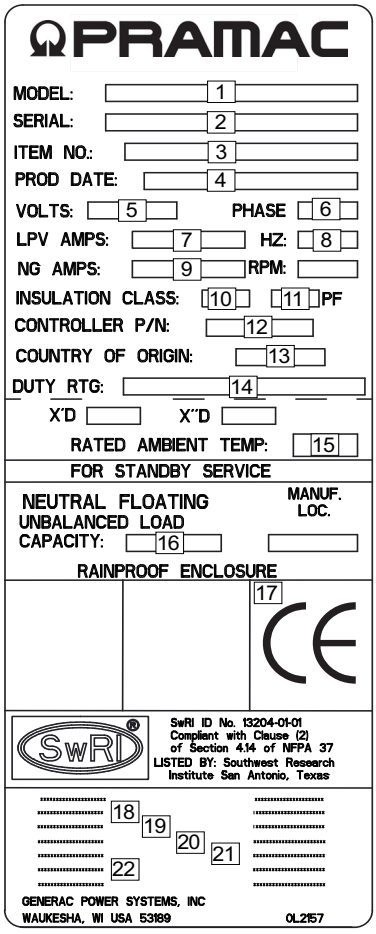


Figure 2-1. Components and Control Locations

A.	Lock with cover	**F.**	Oil drain	**K.**	Status LED indicators	**O.**	Sediment trap
B.	Main line circuit breaker (MLCB) (generator disconnect)	**G.**	Composite base	**L.**	Oil filter	**P.**	Fuel regulator
C.	Airbox with air cleaner	**H.**	Exhaust enclosure	**M.**	Oil fill cap	**Q.**	Fuel inlet
D.	Control panel	**J.**	Emergency stop	**N.**	Oil dipstick	**R.**	Wi-Fi module
E.	Battery compartment (battery not supplied)						

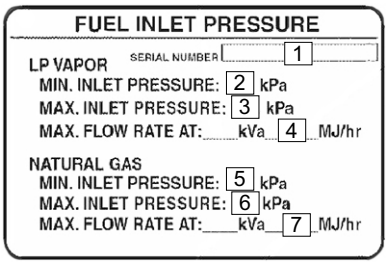
Data Decals

Two decals on the generator set provide information about the unit itself and the required fuel inlet pressure for correct operation.



Model Data Decal

1 Model Number
2 Serial Number
3 Item Number
4 Production Date
5 Volts
6 Number of Phases
7 Liquid Propane Vapor Amperage
8 Frequency
9 Natural Gas Amperage
10 Insulation Class
11 Power Factor
12 Controller Part Number
13 Country of Origin
14 Generator Duty Rating
15 Rated Ambient Temperature
16 Unbalanced Load Capacity
17 CE Conformity Marking
18 Generator Set Rated Power
19 Performance Class
20 Ambient Air Temperature
21 Degree of Protection
22 Approximate Mass



Fuel Inlet Pressure Decal

1 Serial Number
2 LPG Minimum Inlet Pressure
3 LPG Maximum Inlet Pressure
4 LPG Maximum Fuel Flow Rate
5 NG Minimum Inlet Pressure
6 NG Maximum Inlet Pressure
7 NG Maximum Fuel Flow Rate

Specifications

Generator Set

Model	20 kVA
Rated voltage	400
Alternate voltage	380 / 416
Power factor	0.8
Rated maximum load current (amps) at rated voltage*	28.9
Maximum load current (amps) at alternate voltage*	30.1 / 27.18
Main circuit breaker	32 A
Phase	3
Rated AC frequency	50 Hz
Battery requirement	Group 26R, 12 Volts and 540CCA Minimum (See ***Replacement Parts***)
Enclosure	Aluminum
Weight (kg / lb)	207 / 457
A-Weighted sound pressure level (LpA) at 1 m (3.3 ft)	80 dB(A)
Sound pressure measurement uncertainty	1 dB(A)
A-Weighted sound power level (LwA)	94 dB(A)
Sound power measurement uncertainty	1 dB(A)
Normal operating range	This unit is tested in accordance to ISO 8528 standards with an operating temperature of -29 °C (20 °F) to 50 °C (122 °F). For areas where temperatures fall below 0 °C (32 °F), a cold weather kit is recommended. There may be a decrease in engine power when operated above 25 °C (77 °F). See engine specifications section.
These generator sets are rated in accordance with ISO 8528, Reciprocating Internal Combustion Engine Driven Alternating Current Generating Sets–Safety. * Natural gas ratings will depend on specific fuel joules (BTU) content. Typical derates are between 10–20% off the LP gas rating.	

Engine

Model	20 kVA
Engine type	G-Force 1000 Series
Number of cylinders	2
Displacement	999 cc
Cylinder block	Aluminum with cast iron sleeve
Recommended spark plug	See ***Replacement Parts***
Spark plug gap	1.02 mm (0.040 in)
Valve clearance	0.05–0.1 mm (0.002–0.004 in)
Starter	12 VDC
Oil capacity including filter	Approx. 1.8 L (1.9 qt)
Oil consumption	Approx. 5–10 mL per hour (0.17–0.34 oz per hour) at an average load of 50%
Recommended oil filter	See ***Replacement Parts***
Recommended air filter	See ***Replacement Parts***
Engine power is subject to and limited by such factors as fuel joules (BTU), ambient temperature and altitude. Engine power decreases about 3.5% for each 304.8 m (1,000 ft) above sea level, and also will decrease about 1% for each 6 °C (10 °F) above 15 °C (60 °F) ambient temperature.	

A detailed specification sheet for the particular generator set is available from an IASD or at ***https://www.pramac.com/worldwide***.

Protection Systems

The generator set may need to run for long periods of time with no operator present to monitor engine/generator set conditions. The unit is equipped with protection systems to automatically shut down unit to protect against potentially damaging conditions. Some of these systems include:

Alarms:

- High Temperature
- Low Oil Pressure
- Overcrank
- Overspeed
- Overvoltage
- Undervoltage
- Overload
- Underspeed
- RPM Sensor Loss
- Controller Fault
- Wiring Error
- Stepper Overcurrent
- Emergency Stop

Warnings:

- Charger Warning
- Charger Missing AC
- Low Battery
- Battery Problem
- Exercise Set Error
- USB Warning
- Download Failure

The control panel contains a display which alerts operator when a fault condition occurs. The above list is not all inclusive. See ***Operation*** for more information about alarms and control panel operation.

NOTE: A warning will indicate a condition on generator set which should be addressed, but will not shut generator set down. An alarm will shut generator set down to protect system from damage. In event of an alarm, an operator can clear alarm and restart generator set prior to contacting an IASD. Contact an IASD if the intermittent issue occurs again.

Emissions

The United States Environmental Protection Agency (US EPA) (and California Air Resources Board (CARB), for engines/equipment certified to California standards) requires this engine/equipment to comply with exhaust and evaporative emissions standards. Locate the emissions compliance decal on the engine to determine applicable standards. See the included emissions warranty for emissions warranty information. Follow the maintenance specifications in this manual to ensure the engine complies with applicable emissions standards for the duration of the product's life.

This generator set is certified to operate on liquid propane vapor fuel or pipeline natural gas.

The Emission Control System code is EM (Engine Modification). The Emission Control System on this generator consists of the following:

System	Components
Air Induction	- Intake manifold - Air cleaner
Fuel Metering	- Carburetor and mixer assembly - Fuel regulator
Ignition	- Spark plug - Ignition module
Exhaust	- Exhaust manifold - Muffler

Fuel Requirements

The engine has been fitted with a dual fuel carburetion system. The unit will run on NG or LP gas (vapor), but it has been factory-configured to run on NG. The fuel system will be configured for the available fuel source during installation.

BTU Content

Recommended fuels should have a MJ or BTU content of at least 37.26 megajoules per cubic meter (1,000 BTUs per cubic foot) for NG, or at least 93.15 megajoules per cubic meter (2,500 BTUs per cubic foot) for LP gas.

NOTE: If converting to LP gas from NG, a minimum LP tank size of 946 L (250 gal) is recommended. See installation manual for complete procedures and details.

Battery Requirements

12 volts, Group 26R Wet Cell 540CCA minimum or Group 35 AGM 650CCA minimum (not included with unit). See ***Maintenance*** for correct battery maintenance procedures.

Battery Charger

The battery charger is integrated into the control panel module in all models. It operates as a smart charger, ensuring output charging levels are safe and continuously optimized to promote maximum battery life.

NOTE: A warning is displayed on the LCD when battery needs service.

NOTE: Do not use external battery chargers.

Engine Oil Requirements

See ***Engine Oil Requirements*** for correct oil viscosity.

Activating the Generator Set

The generator set should be activated upon initial start-up. See installation manual for complete instructions.

Wi-Fi Module

The generator set is equipped with a Wi-Fi module. See Wi-Fi module user manual for further instructions.

Replacement Parts

Description	20 kVA
26R Exide battery	0H3421S
Spark plug	0G0767A (RC12YC or equivalent)
Oil filter	070185E
Air filter	0J8478
Control panel fuse	0D7178T

Accessories

NOTE: Performance enhancing accessories are available for air-cooled generator sets. Contact an IASD or visit ***https://www.pramac.com/gasresidential*** for additional information on replacement parts and accessories.

Accessory	Description
Cold Weather Accessories*— • Battery Pad Warmer • Oil Warmer ** each sold separately*	• Recommended in areas where temperatures fall below -18 °C (0 °F). *(Not necessary for use with AGM-style batteries)* • Recommended in areas where temperatures fall below -18 °C (0 °F).
Scheduled Maintenance Kit	Includes all pieces necessary to perform maintenance on generator set along with oil recommendations. See ***http://www.pramacparts.com*** for more information.
Fascia Base Wrap	The fascia base wrap snaps together around the bottom of the new air-cooled generator sets. This offers a sleek, contoured appearance as well as offering protection from rodents, reptiles, and insects by covering lifting holes in the base. Requires use of mounting pad shipped with generator set.
Touch-Up Paint Kit	It is very important to maintain the look and integrity of the generator set enclosure. This kit includes touch-up paint and instructions.

Section 3: Operation

Site Prep Verification

Generator set must be installed so airflow into and out of generator set is not impeded.

Mechanical and gravity outdoor intake openings for air distribution and supply systems shall be located not less than 3048 mm (10 ft) horizontally from generator set enclosure. See Section 401.4 in the ICC Mechanical Code for additional information.

Verify all shrubs or tall grasses within 0.91 m (3 ft) of intake and discharge louvers on the sides of enclosure have been removed. Install generator set on high ground where water levels will not rise and endanger it. This unit should not operate in or be subjected to standing water. Verify all potential water sources such as water sprinklers, roof run-off, rain gutter downspouts, and sump pump discharges are directed away from generator set enclosure.

Generator Set Enclosure

Opening the Lid

See ***Figure 3-1***. Two locks secure lid—one on each side (A). Open protective rubber cap to access keyhole, and press down on lid above side lock and unlock latch to correctly open lid.

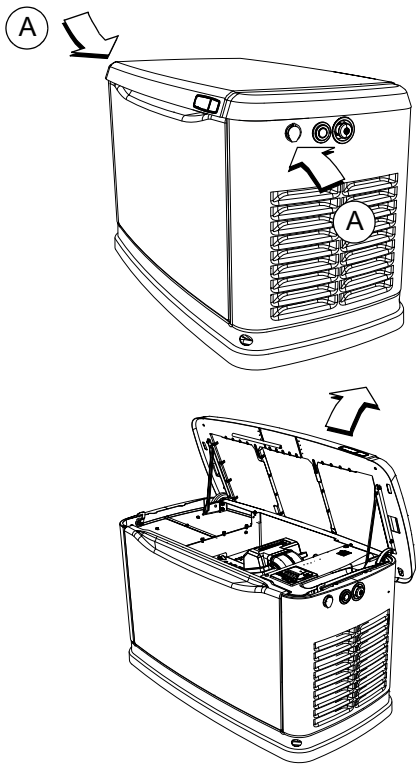


Figure 3-1. Side Lock Location

Repeat for other side. Lid may appear stuck if pressure is not applied from top.

Always verify side locks are unlocked before attempting to lift lid.

NOTE: Two identical sets of keys were provided with generator set as shipped from the factory. Keys are intended for service personnel use only. Contact installer if keys cannot be located.

Generator Main Line Circuit Breaker

See ***Figure 3-2***. This is a 3-pole circuit breaker (generator disconnect) (A) rated according to relevant specifications.

Indicator (B) Identifier—Green means OFF (OPEN). Red means ON (CLOSED).

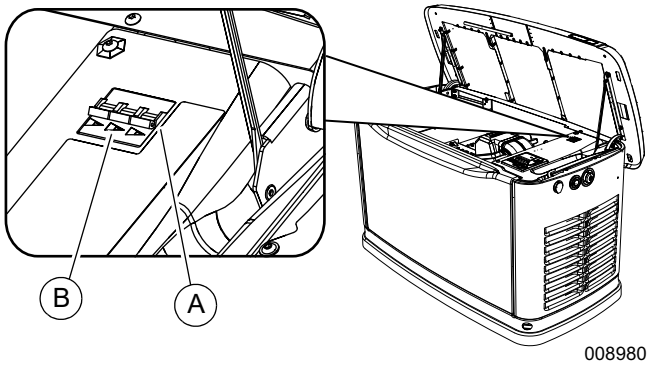


Figure 3-2. Generator Main Line Circuit Breaker (MLCB)

LED Indicator Lights

See ***Figure 3-3***. Three LEDs are visible behind a translucent lens on generator set side panel. These LEDs indicate operating status of generator set.

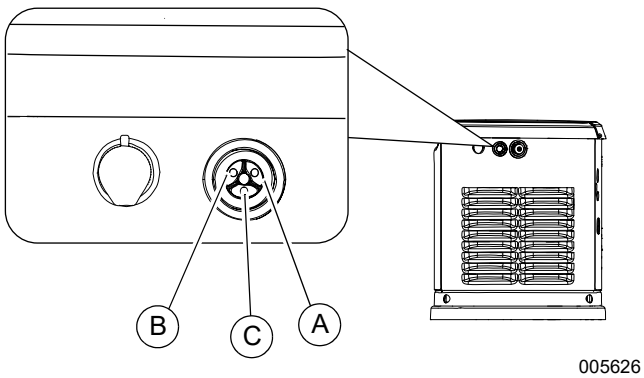


Figure 3-3. LED Indicator Lights

- Green LED “Ready” light (A) is illuminated when mains power is present and control panel is in AUTO mode. The LED flashes when generator set is running as a result of a mains power loss and transfer signal is active.
- Red LED “Alarm” light (B) is illuminated when generator set to OFF mode or a fault is detected. Contact an IASD.
- Yellow LED “Non-Critical Alert” light (C) is illuminated when maintenance is required.

NOTE: Yellow “Non-Critical Alert” light LED may be illuminated at the same time as either the Red or Green LED.

Control Panel Interface

See ***Figure 3-4***. The control panel interface (A) is located under enclosure lid. Verify both left and right side locks are unlocked before attempting to lift lid. Open lid as directed in ***Opening the Lid***.

The 7.5A fuse is located beneath the rubber cover (B) to the right of the control panel.

Verify both left and right side locks are securely out of the way before closing unit.

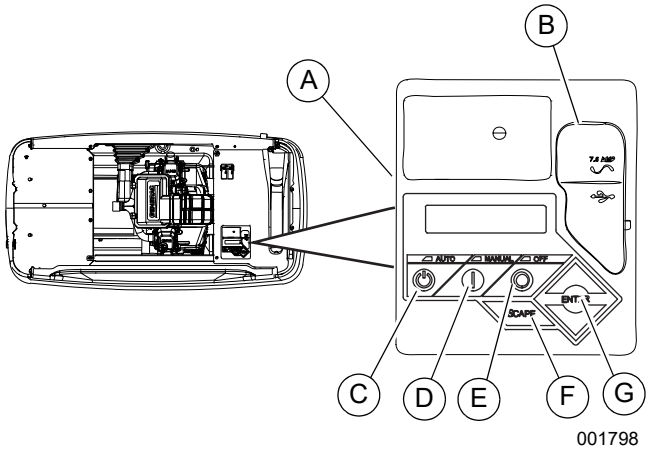


Figure 3-4. Generator Set Control Panel

All appropriate panels must be in place during any operation of generator set. This includes operation by a servicing technician while conducting troubleshooting procedures.

Using the Control Panel Interface

See ***Figure 3-4*** for button locations.

Button	Description of Operation
AUTO (C)	Activates fully automatic system operation. It allows unit to automatically start and exercise generator set according to exercise timer (see ***Setting the Exercise Timer***). Green LED on this button flashes when generator set is running as a result of a mains power loss.
MANUAL (D)	Cranks and starts generator set. Transfer to standby power will not occur unless there is a mains power failure. Blue LED on this button illuminates when generator set is running in MANUAL mode. LED flashes when generator set is running in MANUAL mode and mains power is lost.
OFF (E)	Shuts down engine and prevents automatic operation of unit.
ESCAPE (F)	Serves as an exit or “go back” function while navigating control panel menus.
ENTER (G)	When pressed, indicates acceptance of a selected setting or navigational menu option.

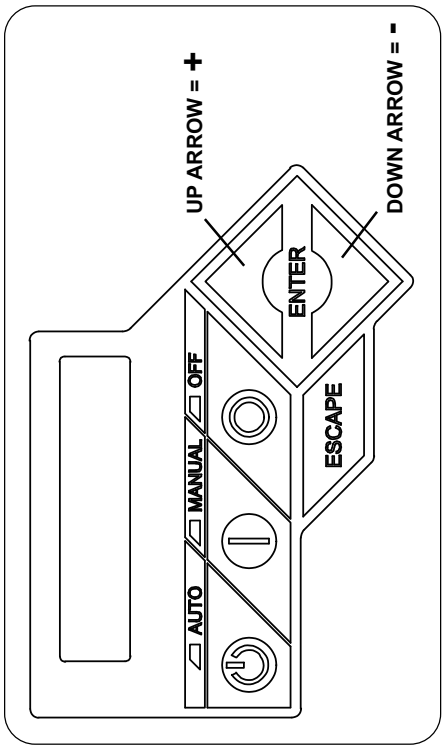
Interface Menu Displays

The LCD Panel

Feature	Description
HOME page	Default page displayed if no buttons are pressed for 60 seconds. Normally shows current status message and current date and time. Highest priority active alarm/warning is automatically posted on this page, as well as flashing backlight when such a condition is detected. In case of multiple alarms/warnings, only first message will be displayed. Press OFF mode button and then press ENTER button to clear an alarm or warning.
Display Backlight	Normally off. Backlight will automatically light and remain on for 30 seconds if operator presses any button.
MAIN MENU page	Allows operator to navigate to all other pages or sub-menus by using arrow keys and ENTER button. Page can be accessed at any time with several presses of dedicated ESCAPE button. Each press of ESCAPE button takes operator to previous menu until MAIN MENU displays. This page contains information for - History; Status; Edit; Debug.

Menu System Navigation

Use ESCAPE button from any page to get to MENU screen. Pressing ESCAPE button several times before reaching MENU page may be required. Navigate to desired menu by using ↑/↓ buttons. Press ENTER button when desired menu is displayed and flashing.



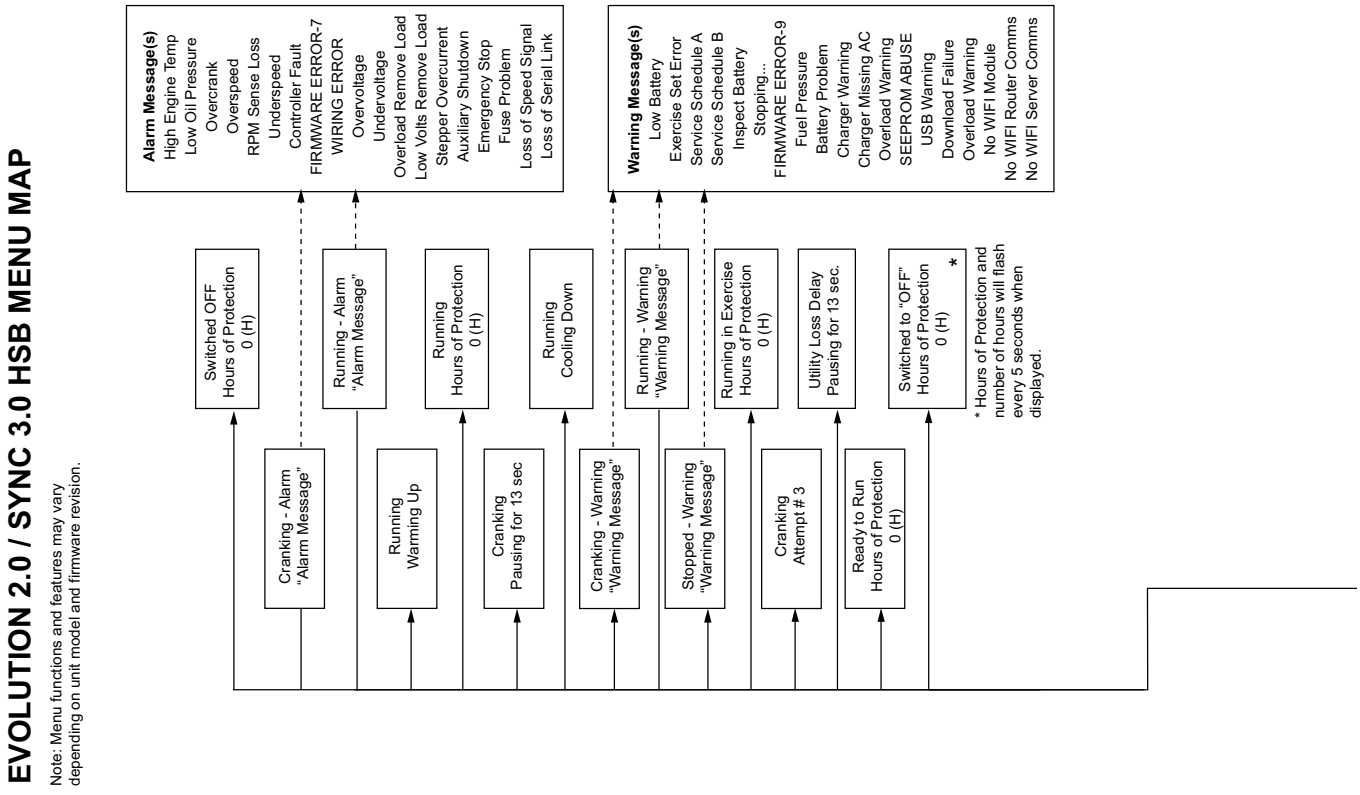


Figure 3-5. Navigation Menu

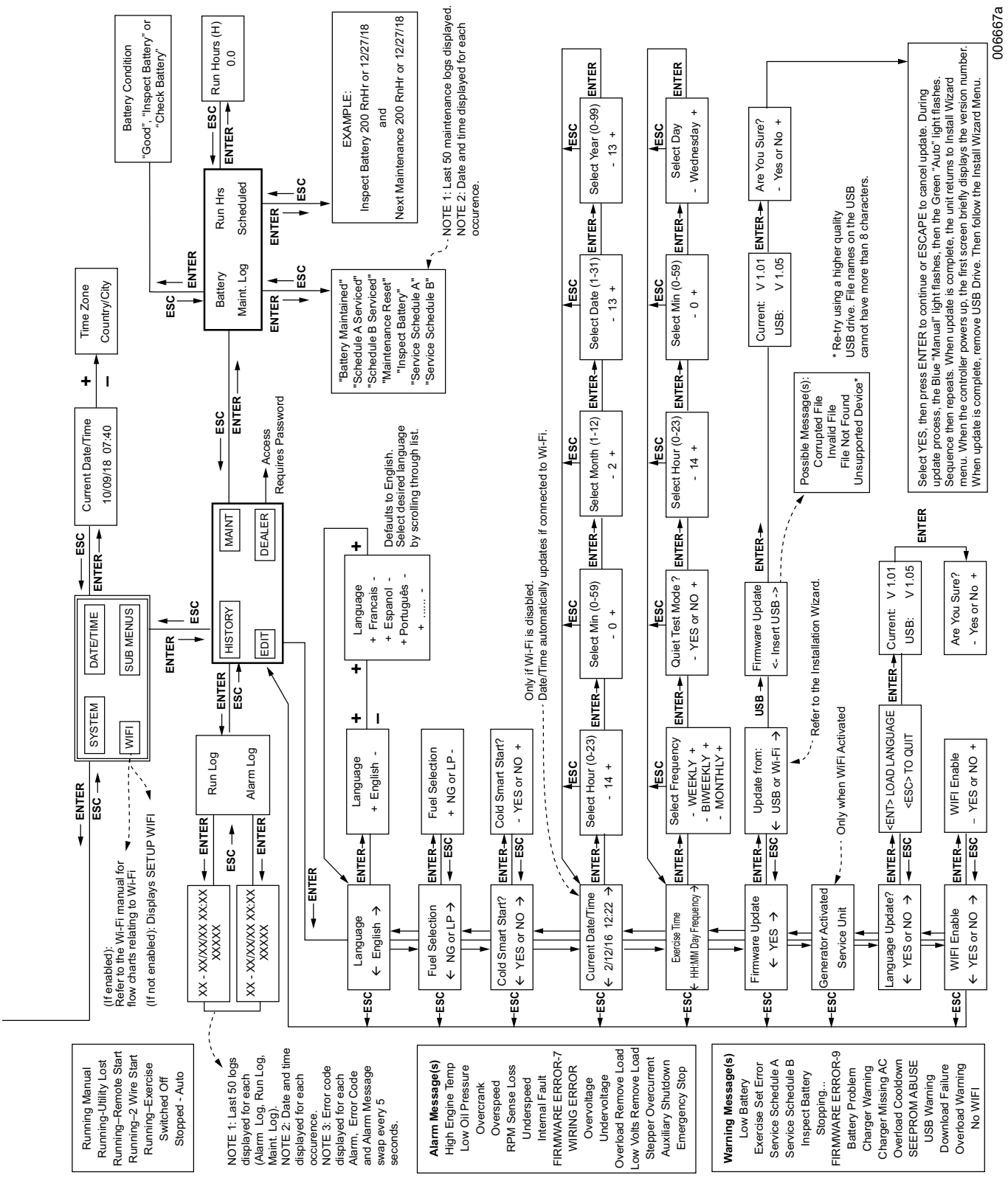


Figure 3-6. Navigation Menu

Setting the Exercise Timer

This unit is equipped with a configurable exercise timer. There are two settings for exercise timer:

Day/Time: Generator set will start and exercise for period defined, on day of the week and at time of day specified. During this exercise period, unit runs for approximately five minutes and then shuts down.

NOTE: If Wi-Fi is enabled, exercise timer will automatically adjust for Daylight Saving Time.

Exercise frequency: Exercise frequency can be set to Weekly, Biweekly, or Monthly. If Monthly is selected, day of the month must be selected from 1-28. Generator set will exercise on that day each month. Transfer of loads to generator set output does not occur during exercise cycle unless mains power is lost.

NOTE: The exercise feature will operate only when generator set is in AUTO mode, and will not work unless this procedure is performed. If Wi-Fi is NOT enabled, current date/time must be reset every time 12 volt battery is disconnected and then reconnected, and/or when the fuse is removed.

Table 3-1 details exercise information and programming options for all home standby generator sets. ***Figure 3-7*** illustrates engine speed profile during a typical exercise cycle.

Table 3-1. Generator Set Exercise Characteristics

Generator Set Size	20 kVA
Low Speed Exercise (Quiet Test)	1,950 rpm
Exercise Frequency Options	Weekly/Bi-Weekly/Monthly
Exercise Time Length	5 minutes

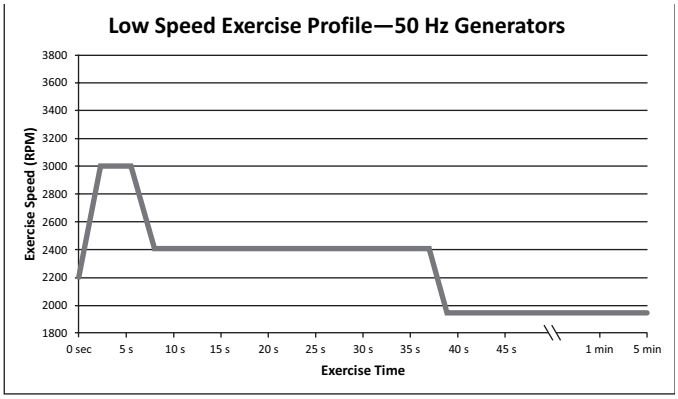


Figure 3-7. Low Speed Exercise Profile

Emergency Stop

All generator sets are equipped with an emergency stop device. This device is intended to be used in emergency circumstances where generator set must be shut down immediately to avoid harm. When emergency stop button is pressed, generator set will shut down and enter into an Alarm condition.

- This device is not intended to be used as the only safeguard during maintenance or service operations. Follow appropriate procedures in this manual to correctly disable generator set during maintenance and service operations.
- This device is not intended to be a primary means of shutting down generator set. See generator set shutdown sequence in ***Prepare Generator Set for Maintenance*** for correct shutdown procedures.

Proceed as follows to reset emergency stop:

1. Pull out emergency stop button.
2. Clear alarm by pressing OFF mode button and then ENTER button on control panel.
3. The generator set is now in OFF mode. Select desired operating mode (if required).

Operating Modes

Manual

- Will not transfer to generator set if mains power is present.
- Will transfer to generator set if mains power fails (below 264 volts for five consecutive seconds; voltage and delay time are dealer programmable) after warm-up.
- Will transfer back when mains power returns for 15 consecutive seconds. Engine will continue to run until removed from the MANUAL mode.

Auto

- Will start and run if mains power fails for five consecutive seconds (factory default).
- Will start an engine warm-up timer (duration varies when ***Cold Smart Start*** is enabled).
  - Will not transfer if mains power subsequently returns.
  - Will transfer to generator set if mains power is not present.
- Will transfer to mains power once mains power returns (above 350 volts; dealer programmable) for 15 seconds.
- Will not transfer to mains power unless mains power returns. Generator set will shut down if OFF mode button is pressed or a shutdown alarm is present.

- Once mains power is returned, generator set will shut down after one minute cool-down time.

Exercise

- Will not exercise if generator set is already running in either AUTO or MANUAL mode.
- During exercise, controller will only transfer if mains power fails during exercise for five seconds (varies based on ***Cold Smart Start***) and will switch to AUTO.

Manual Transfer Operation

Do not manually transfer under load. Disconnect transfer switch from all power sources prior to manual transfer.

ISO000132

Manual actuation of transfer switch is required if electronic operation should fail.

Transfer to Generator Set Power Source

Proceed as follows to manually transfer to generator set power source:

1. Verify generator set is in OFF mode.
2. Set MLCB (generator disconnect) to OFF (OPEN).
3. Turn off mains power supply to transfer switch using means provided (such as a main line utility breaker).
4. See ***Figure 3-8***. Manually actuate transfer switch (A) to STANDBY position. See transfer switch owner's manual for correct procedure.

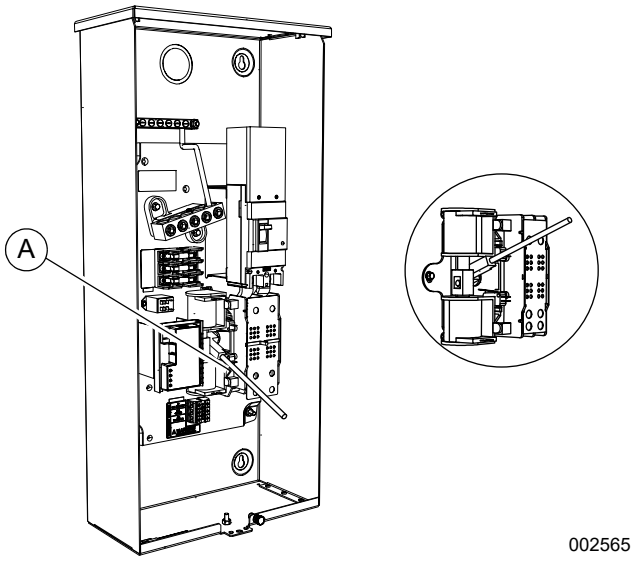


Figure 3-8. Typical Manual Transfer Switch Operation

5. Press MANUAL mode button on control panel to crank and start engine.
6. Allow engine to stabilize and warm up for a few minutes.
7. Set MLCB (generator disconnect) to ON (CLOSED). Loads are now powered by standby generator set.

Transfer to Mains Power Source

The enclosure provides protection against hot surfaces inside the generator set. Hot surfaces may be present if the generator set has been operating under a large load. Do not open the generator set enclosure while the generator set is running.

ISO000533

When mains power has been restored, shut down generator set and transfer to mains power source. Proceed as follows to manually transfer to mains power and shut down generator set:

1. Set main circuit breaker in distribution panel to OFF (OPEN) to remove all loads from generator set.
2. To shut down generator set:
   - Allow generator set to run for 5 minutes at no load.
   - After 5 minutes, use emergency stop button to shutdown generator set.
   - Wait 15 minutes to allow internal temperature to stabilize.

   NOTE: Failure to follow this procedure may expose user to hot surfaces. See ***Hot Surfaces*** in Section 1.
3. Open lid and reset emergency stop alarm on control panel.
4. Set MLCB (generator disconnect) to OFF (OPEN).
5. Verify mains power supply to transfer switch is turned off.
6. See ***Figure 3-8***. Manually actuate transfer switch back to MAINS position. See transfer switch owner's manual for correct procedure.
7. Turn on mains power supply to transfer switch using means provided.
8. Set main circuit breaker in distribution panel to ON (CLOSED).
9. Press AUTO mode button on control panel.
10. Return MLCB (generator disconnect) to ON (CLOSED).
11. Close and lock lid.

Automatic Transfer Operation

Proceed as follows to select automatic operation:

1. Verify generator set is not running.
2. Verify normal mains power source voltage is available to loads connected after transfer switch.
3. Press AUTO mode button on control panel.
4. Verify MLCB (generator disconnect) is set to ON (CLOSED).

Generator set will start automatically when mains power source voltage drops below a preset level. Loads are transferred to standby power source after unit starts.

Automatic Sequence of Operation

Mains (Utility) Power Failure

If generator set is set to AUTO when mains power fails (below 264 volts), a five second line interrupt delay timer starts (voltage and delay time are dealer programmable). The engine cranks and starts if mains power is still unavailable when timer expires. An engine warmup timer will be initiated once started. Timer duration varies depending on whether or not Cold Smart Start is enabled. The controller will transfer load to generator set when warmup time expires. If mains power is restored (above 350 volts; dealer programmable) at any time from initiation of engine start until generator set is ready to accept load (warmup time has not elapsed), controller completes start cycle and runs generator set through its normal cooldown cycle. However, load will remain on mains power source.

Cranking

The system will go through five cyclic cranking cycles as follows: 16 seconds cranking, 7 seconds resting, 16 seconds cranking, 7 seconds resting, followed by three additional cycles of 7 seconds cranking followed by 7 seconds resting. An alarm will be triggered if generator set does not start after five attempts.

Cold Smart Start

The Cold Smart Start feature is factory-enabled, but can be disabled in the EDIT menu. The generator set will monitor ambient temperature when Cold Smart Start is enabled. The warmup delay will be adjusted based on prevailing conditions.

If ambient temperature is below a fixed temperature (based on model) upon startup in AUTO mode, generator set will warm up for 30 seconds before a load is applied. The generator set will start with normal warmup delay of five seconds if ambient temperature is at or above the fixed temperature.

A check for correct output voltage buildup is performed when generator set engine is started.

If some condition impedes normal voltage creation, such as frost crystals or dust/dirt preventing a good electrical connection, start sequence will be interrupted for a cleaning cycle of internal electrical connections.

Cleaning Cycle

The cleaning cycle is an extended warmup period which lasts for several minutes as normal generator set voltage output is determined to be low. During this cycle, generator set controller will display “Warming Up” on the display screen.

The generator set controller display will show “Under Voltage” if cleaning cycle fails to clear obstruction. After several minutes, alarm message can be cleared and the generator set restarted.

If problem persists, make no further attempts to start. Contact an IASD.

Load Transfer

Load transfer priorities when generator set is running depend upon transfer switch design. See transfer switch owner’s manual.

Shutting Generator Set Down While Under Load Or During A Mains Power (Utility) Outage

Automatic start-up. Disconnect mains power and render the equipment inoperable before attempting repairs or maintenance.

ISO000191a

IMPORTANT NOTE: To avoid equipment damage, follow these steps, in order, during mains power outages. Shutdowns may be required during mains power outages to perform routine maintenance or to conserve fuel.

To turn generator OFF:

1. Turn off mains power supply to transfer switch using means provided (such as a main line utility breaker).
2. Set main circuit breaker in distribution panel to OFF (OPEN) to remove all loads from generator set.
3. To shut down generator set:
   - Allow generator set to run for five minutes at no load.
   - After five minutes, use emergency stop button to shut down generator set.
   - Wait 15 minutes to allow internal temperature to stabilize.

NOTE: Failure to follow this procedure may expose user to hot surfaces. See ***Hot Surfaces*** in Section 1.

4. Open lid and reset emergency stop alarm on control panel.
5. Set MLCB (generator disconnect) on generator set to OFF (OPEN).
6. Remove the 7.5A fuse from control panel.

To turn generator set back ON:

1. Install 7.5A fuse in control panel.
2. Verify MLCB (generator disconnect) is OFF (OPEN).
3. Press AUTO mode button on the control panel.
4. Generator set will start and run. Allow generator set to run and warm up for a few minutes.
5. Set MLCB (generator disconnect) to ON (CLOSED).
6. Close and lock lid.
7. Set main circuit breaker in the distribution panel to ON (CLOSED).
8. Turn on mains power supply to transfer switch using means provided.

The system now operates in automatic mode.

Section 4: Maintenance

Maintenance

Only qualified service personnel may install, operate, and maintain this equipment.

ISO000182a

Regular maintenance will improve performance and extend engine/equipment life. Pramac recommends all maintenance work be performed by an IASD.

Prepare Generator Set for Maintenance

Generator Set Enable/Disable Procedure

Automatic start-up. Disconnect mains power and render the equipment inoperable before attempting repairs or maintenance.

ISO000191a

NOTE: If generator set is running, follow procedure ***Shutting Generator Set Down While Under Load Or During A Mains Power (Utility) Outage***.

To turn generator set OFF:

1. Press OFF mode button on control panel.
2. Set MLCB (generator disconnect) on generator set to OFF (OPEN).
3. Turn off mains power supply to transfer switch using the means provided (such as a main line utility breaker).
4. Remove 7.5A fuse from the control panel.
5. Follow maintenance procedure(s).

To turn generator set back ON:

NOTE: If generator set was running before maintenance refer to “To Turn The Generator Set Back On” in ***Shutting Generator Set Down While Under Load Or During A Mains Power (Utility) Outage***.

1. Turn on mains power supply to transfer switch using the means provided.
2. Install 7.5A fuse in control panel.
3. Press AUTO mode button on control panel.
4. Set MLCB (generator disconnect) on generator set to ON (CLOSED).
5. Close and lock lid if maintenance is complete.

The system is now in automatic mode.

Enclosure Panel Removal

Maintenance procedures may require removal of front panel or intake side panel. The following procedures outline the removal process. Remove these panels only if directed to do so in the specific maintenance procedure to be performed.

Front Access Panel Removal

See ***Figure 4-1***. Remove front access panel (A) by lifting it straight up and out once lid is open.

Always lift front access panel straight up before pulling it away from enclosure. Do not pull panel away from enclosure before lifting up (B).

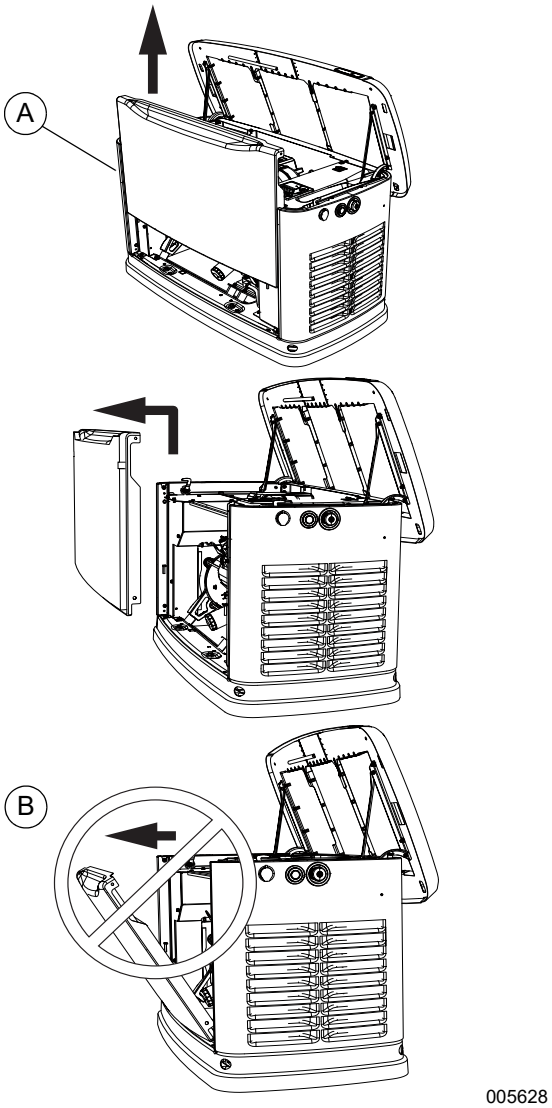


Figure 4-1. Remove Front Access Panel

Intake Side Panel Removal

See ***Figure 4-2***. The intake side panel (B) must be removed to access battery compartment, fuel regulator, and sediment trap. Proceed as follows to remove the intake side panel:

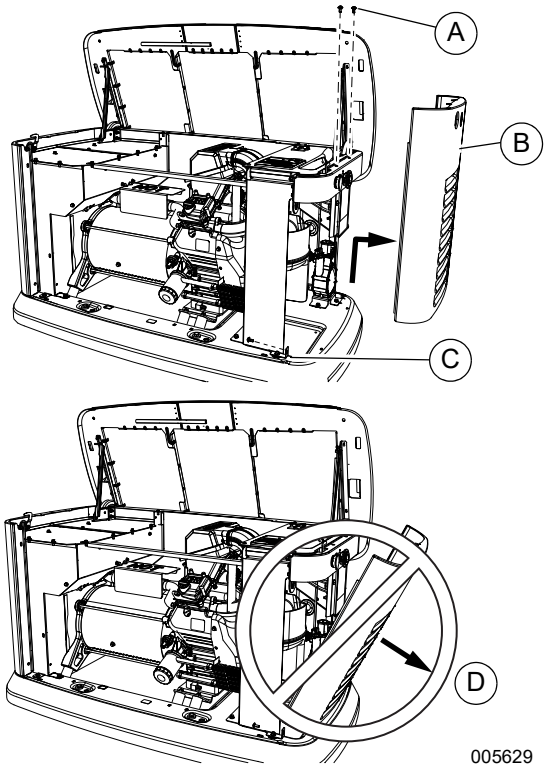


Figure 4-2. Remove Intake Side Panel

1. Raise lid and remove front panel.
2. Use a 4 mm hex key to remove two mounting screws (A) and L-bracket screw (C).
3. Lift intake panel up and away from generator set.

NOTE: Always lift intake side panel straight up before pulling away from enclosure. Do not pull panel away from enclosure before lifting up (D).

Performing Scheduled Maintenance

It is important to perform maintenance as specified in the ***Service Schedule*** for correct generator set operation. Engine oil and oil filter must be changed, and valve clearance adjusted after first 25 hours of operation.

Emissions-critical maintenance must be performed as scheduled in order for emissions warranty to be valid. Emissions-critical maintenance consists of servicing the air filter and spark plugs in accordance with the ***Service Schedule***.

The controller will prompt for Schedule A or Schedule B maintenance to be performed. Schedule A maintenance consists of the oil, oil filter, and battery check. Schedule B maintenance includes the oil, oil filter, battery check, air cleaner, spark plug(s), and valve clearance.

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

Service Schedule

Service	Daily If Running Continuously or Before Each Use	Every Year	Schedule A Every Two Years or 200 Hours	Schedule B Every Four Years or 400 Hours
Inspect enclosure louvers for dirt and debris *	•			
Inspect lines and connections for fuel or oil leaks	•			
Check engine oil level	•			
Test emergency stop operation		•		
Perform fuel system leak test		•		
Inspect for water intrusion **		•		
Check battery condition, electrolyte level, and state of charge		•	•	•
Replace engine oil and oil filter †			•	•
Replace engine air filter				•
Clean; inspect gap; replace spark plugs				•
Inspect/adjust valve clearance ‡				•
Inspect/clean sediment trap	*See local codes and guidelines.*			

Contact nearest IASD for assistance if necessary.

* Remove any shrubs or tall grasses which have grown within 0.91 m (3 ft) of intake and discharge louvers on the sides of the enclosure. Clean any debris (dirt, grass clippings, etc.) which may have accumulated inside enclosure.

** Verify all sources of potential water intrusion such as water sprinklers, roof run-off, rain gutter down spouts, and sump pump discharges are directed away from generator set enclosure.

† Change engine oil and filter after first 25 hours of operation. In cold weather conditions (ambient below 4.4 °C / 40 °F), or if unit is operated continuously in hot weather conditions (ambient above 29.4 °C / 85 °F), change engine oil and filter every year or 100 hours of operation.

‡ Inspect/adjust valve clearance after the first 25 hours of operation.

NOTE: Contact an IASD or visit ***https://www.pramac.com/worldwide*** for additional information on replacement parts.

Maintenance Log

Battery Inspection And Charge Check

Dates Performed:

Oil, Oil Filter, Air Filter, And Spark Plug Replacement

Dates Performed:

Valve Adjustment

Dates Performed:

Checking Engine Oil Level

Follow proper shutdown procedure for cooling if generator is running. Failure to do so may create a burn hazard.

ISO000139

Skin irritation. Avoid prolonged or repeated contact with used motor oil. Used motor oil has been shown to cause skin cancer in laboratory animals. Thoroughly wash exposed areas with soap and water. Rubber gloves are recommended.

ISO000210

Engine damage. Verify proper type and quantity of oil prior to starting engine. Failure to do so could result in engine damage.

ISO000135

IMPORTANT NOTE: Check oil level daily when power outages necessitate running generator set for extended periods.

Proceed as follows to check engine oil level:

1. Perform “To turn the generator set OFF” in ***Generator Set Enable/Disable Procedure***.
2. Remove oil dipstick and wipe dry with a clean cloth.
3. Completely insert oil dipstick into oil dipstick tube and remove it.
4. Observe oil level. Level should be at FULL mark on oil dipstick.
5. If necessary, remove oil fill cap and add oil to engine (with oil dipstick removed). Repeat steps 3–5 until oil level reaches FULL mark.
6. When oil level is correct, insert oil dipstick and tighten oil fill cap.
7. Perform all steps in “To turn the generator set back ON” in ***Generator Set Enable/Disable Procedure***.

Engine Oil Requirements

To maintain product warranty, engine oil should be serviced in accordance with the recommendations of this manual. For convenience, maintenance kits are available that include engine oil, oil filter, air filter, spark plug(s), a shop towel, and a funnel. These kits can be obtained from an IASD.

All oil kits meet minimum American Petroleum Institute (API) Service Class SJ, SL, or better. Do not use special additives.

Required Oil

Synthetic SAE 5W-30 for all temperature ranges. See ***Specifications***.

NOTE: Unit comes from factory filled with 5W-30 weight organic oil.

Changing the Oil and Oil Filter

Proceed as follows to change oil and oil filter:

1. Press MANUAL mode button on control panel to start engine, and run it until thoroughly warmed up. Press OFF mode button on control panel to shut down engine.
2. Perform “To turn the generator set OFF” in ***Generator Set Enable/Disable Procedure***.
3. See ***Figure 4-3***. A few minutes after engine stops, and when it has cooled slightly, remove front panel. Pull oil drain hose (A) free of retaining clip. Remove cap from hose and drain oil into a suitable container.

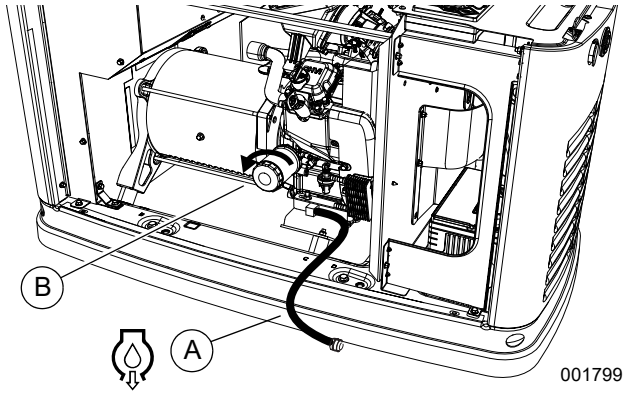


Figure 4-3. Oil Filter and Drain Location

4. Install oil cap after oil has drained. Position and secure hose with retaining clip.
5. Remove old oil filter (B) by turning it counterclockwise.
6. Apply a light coating of clean engine oil to gasket of new filter.
7. Install new filter by hand until gasket lightly contacts oil filter adapter. Tighten filter an additional three-quarter to one full turn.

8. Fill engine with recommended oil. See ***Engine Oil Requirements***.
9. Install front panel.
10. Perform “To turn the generator set back ON” in ***Generator Set Enable/Disable Procedure***.
11. Press MANUAL mode button on control panel to start engine, run for one minute, and inspect for leaks.
12. Press OFF mode button on control panel to stop engine. Wait five minutes.
13. Verify oil level. Add oil as needed. DO NOT OVER-FILL.
14. Insert oil dipstick and/or attach oil fill cap.
15. Press AUTO mode button on control panel to return unit to AUTO mode.
16. Close and lock lid.
17. Dispose of used oil and filter per local regulations and guidelines.

Servicing the Air Cleaner

Proceed as follows to service air cleaner:

1. Perform “To turn the generator set OFF” in ***Generator Set Enable/Disable Procedure***.
2. See ***Figure 4-4***. Remove cover clips (A) and air cleaner cover (B).

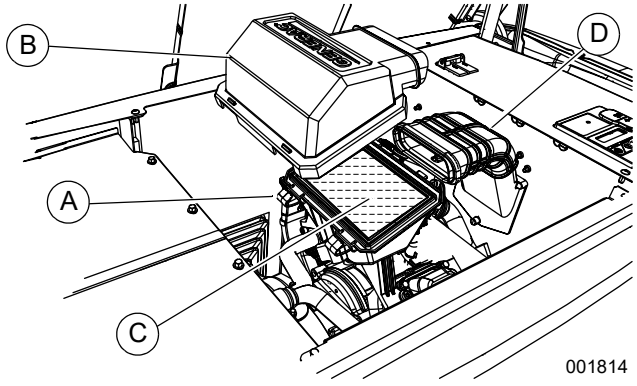


Figure 4-4. Servicing Air Cleaner

3. Remove old air filter element (C) and discard.
4. Thoroughly clean air cleaner enclosure of any dust or debris.
5. Install a new air filter element.
6. Install air cleaner cover and fasten cover clips.
7. Verify air inlet duct (D) is correctly connected to air cleaner cover.
8. Perform “To turn the generator set back ON” in ***Generator Set Enable/Disable Procedure***.

Spark Plugs

Proceed as follows to inspect spark plug(s) gap and replace spark plug(s) as necessary:

1. Perform “To turn the generator set OFF” in ***Generator Set Enable/Disable Procedure***.
2. Remove front panel.
3. Clean area around base of spark plug(s) to keep dirt and debris out of engine.
4. Remove spark plug(s) using a 5/8 in socket wrench and inspect condition. Install a new plug(s) if old plug(s) is worn or if reuse is questionable.
5. Clean plug(s) by scraping or washing with a wire brush and commercial solvent. Do not blast plug(s) to clean.
6. See ***Figure 4-5***. Inspect spark plug gap using a wire feeler gauge. Replace spark plug if gap is out of specification. See ***Specifications***.

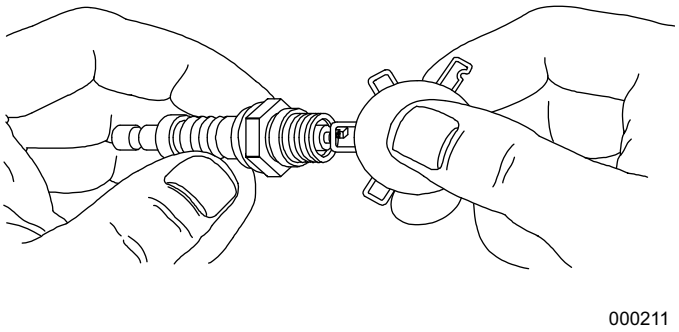


Figure 4-5. Spark Plug Gap Measurement

7. Install spark plug(s), and tighten to 25 Nm (18.4 ft-lbs).
8. Install front panel.
9. Perform “To turn the generator set back ON” in ***Generator Set Enable/Disable Procedure***.

Checking and Adjusting Valve Clearance

Contact an IASD for service assistance. Proper valve clearance is essential for prolonging engine life.

ISO000534

Check valve clearance according to ***Service Schedule***. Adjust if necessary.

Checking Valve Clearance

NOTE: Engine must be cool before checking valve clearance. Adjustment is not needed if valve clearance is within dimensions provided in ***Specifications***.

1. Perform “To turn the generator set OFF” in ***Generator Set Enable/Disable Procedure***.
2. Remove front panel and intake side panel as described in ***Front Access Panel Removal*** and ***Intake Side Panel Removal***.
3. Turn off generator set fuel supply and disconnect negative battery cable to avoid accidental startup.
4. Remove spark plug wires, and position wires away from plugs.
5. Remove spark plugs using a 5/8 in socket wrench.
6. Remove four screws attaching one valve cover using a 10 mm socket wrench. Remove and discard gasket.
7. Verify piston is at top dead center (TDC) of its compression stroke (both valves closed). To move piston to TDC, remove intake baffle at front of engine to access flywheel nut. Use a 36 mm socket to rotate flywheel nut clockwise, which will rotate crankshaft. Watch piston through spark plug hole. Piston will move up and down. Piston is at TDC when it is at its highest point of travel.
8. See ***Figure 4-6***. Verify valve clearance between rocker arm (A) and valve stem (B) with a feeler gauge.

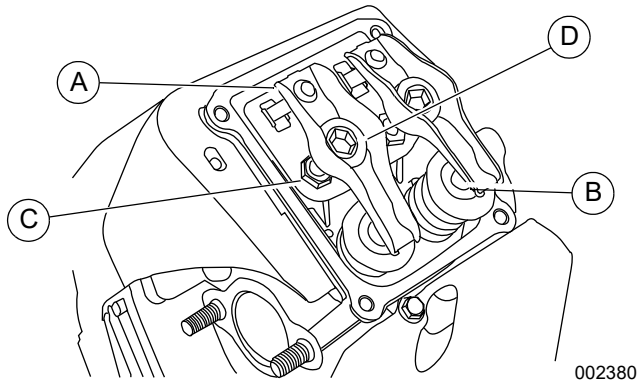


Figure 4-6. Check and Adjust Valve Clearance

9. Repeat steps 6–8 for second cylinder.
10. Install replacement valve cover gaskets.
11. Install valve covers.

NOTE: Start all four screws before tightening, or it will not be possible to get all screws in place. Verify valve cover gasket is in place.

12. Tighten fasteners to 6.8 Nm (60 **in-lbs**) in a cross pattern.
13. Install spark plugs and tighten to 25 Nm (18 ft-lbs).
14. Attach spark plug wires to spark plugs.
15. Connect negative battery cable and turn on generator set fuel supply.
16. Install intake side panel and front panel.
17. Perform “To turn the generator set back ON” in ***Generator Set Enable/Disable Procedure***.

Adjusting Valve Clearance

Proceed as follows to adjust valve clearance:

1. Perform “To turn the generator set OFF” in ***Generator Set Enable/Disable Procedure***.
2. Remove front panel and intake side panel as described in ***Front Access Panel Removal*** and ***Intake Side Panel Removal***.
3. Turn off generator set fuel supply and disconnect negative battery cable to avoid accidental startup.
4. Remove spark plug wires and position wires away from plugs.
5. Remove spark plugs using a 5/8 in socket wrench.
6. Use a 10 mm socket wrench to remove four screws attaching valve cover. Remove and discard gasket.
7. Verify piston is at TDC of its compression stroke (both valves closed).
8. See ***Figure 4-6***. Loosen rocker jam nut (C) with a 13 mm wrench.
9. Turn pivot ball stud (D) using a 13 mm wrench while inspecting clearance between rocker arm and valve stem with feeler gauge. Adjust clearance as per ***Specifications***.

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

10. When valve clearance is correct, hold pivot ball stud in place with a wrench and tighten rocker arm jam nut. Tighten jam nut to 19.68 Nm (174 **in-lbs**).
11. After tightening jam nut, verify valve clearance did not change.
12. Install new valve cover gasket.
13. Install valve cover. Tighten fasteners to 6.8 Nm (60 **in-lbs**) in a cross pattern.

NOTE: Start all four screws before tightening, or it will not be possible to get all screws in place. Verify valve cover gasket is in place.

14. Repeat process for other cylinder if necessary.
15. Install spark plugs and tighten to 25 Nm (18 ft-lbs).
16. Attach spark plug wires to spark plugs.
17. Connect negative battery cable and turn on generator set fuel supply.
18. Install intake side panel and front panel.
19. Perform “To turn the generator set back ON” in ***Generator Set Enable/Disable Procedure***.

Battery Maintenance

Batteries contain sulfuric acid and can cause severe chemical burns. Wear protective gear when working with batteries.

ISO000138a

Batteries emit explosive gases while charging. Keep fire and spark away. Wear protective gear when working with batteries.

ISO000137a

Disconnect battery ground terminal before working on battery or battery wires.

ISO000164

Wear full eye protection and protective clothing.

ISO000537

Wear rubber gloves and boots when working with batteries.

ISO000536

Strictly observe the following precautions when working on batteries.

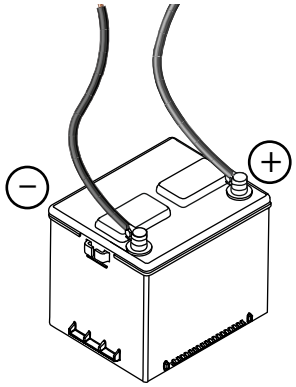
ISO000535

- Do not place tools or metallic objects on top of battery.
- Remove all jewelry, including watches, rings, and other metal objects.
- Use tools with insulated handles.
- If electrolyte contacts skin, wash it off immediately with water.
- If electrolyte contacts eyes, thoroughly flush with water immediately, and seek medical attention.
- Wash down spilled electrolyte with an acid neutralizing agent. A common practice is to use a solution of 454 g (1 lb) bicarbonate of soda to 3.8 L (1 gal) of water. Add bicarbonate of soda solution until evidence of reaction (foaming) has ceased. Flush resulting liquid with water and dry area completely.
- DO NOT smoke when near battery.
- DO NOT cause flame or spark in battery area.
- Discharge static electricity from body before touching battery by first touching a grounded metal surface.

Battery should be regularly inspected per the ***Service Schedule***. Contact an IASD for assistance.

Proceed as follows to inspect battery:

1. Perform “To turn the generator set OFF” in ***Generator Set Enable/Disable Procedure***.
2. Remove front panel and intake side panel as described in ***Front Access Panel Removal*** and ***Intake Side Panel Removal***.
3. See ***Figure 4-7***. Inspect battery posts and cables for tightness and corrosion. Tighten and clean as necessary.



001832

Figure 4-7. Battery Cables

4. **(Unsealed batteries only):** Completely disconnect battery. Check battery fluid level and, if necessary, fill with distilled water only. DO NOT use tap water. Have an IASD or a qualified service technician check state of charge and condition.

Disconnect the negative battery cable, then the positive battery cable, when working on unit.

ISO000130

5. Connect battery cables and install intake side panel when inspection is complete.
6. Perform “To turn the generator set back ON” in ***Generator Set Enable/Disable Procedure***.

Always recycle batteries in accordance with local laws and regulations. Contact your local solid waste collection site or recycling facility to obtain information on local recycling processes. For more information on battery recycling, visit the Battery Council International website at: ***http://batterycouncil.org***.

Cleaning the Sediment Trap

A sediment trap removes contaminants (moisture and fine particles) from gaseous fuels before they enter the fuel regulator. Accumulated moisture and particles must be emptied from sediment trap per local codes and guidelines.

Proceed as follows to clean sediment trap:

1. Perform all steps in ***Generator Set Enable/Disable Procedure***.
2. Remove intake side panel (see ***Intake Side Panel Removal***).
3. Turn generator set fuel supply off.
4. See ***Figure 4-8***. Unscrew and remove cap (A).

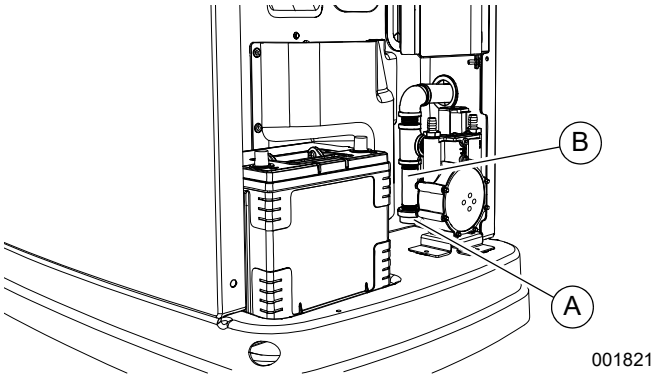


Figure 4-8. Cleaning the Sediment Trap

5. Use a clean-out tool (not provided) to remove accumulated moisture and particles from cap and body (B).
6. Wipe inside of each component with a clean, dry, lint-free cloth.
7. Seal threads of cap with appropriate sealing compound. Install cap and hand-tighten.
8. Tighten cap with an appropriately sized pipe wrench. DO NOT overtighten.
9. Turn generator set fuel supply on. Inspect for leaks by spraying all connection points with a non-corrosive gas leak detection fluid. The solution should not be blown away or form bubbles.
10. Install intake side panel.
11. Perform “To turn the generator set back ON” in ***Generator Set Enable/Disable Procedure***.

Attention After Submersion

DO NOT start or operate generator set if it has been submerged in water. Have an IASD thoroughly clean, dry, and inspect generator set following any submersion in water. If structure (home) has been flooded, it should be inspected by a certified electrician to verify there will not be any electrical problems during generator set operation or when mains power is returned.

Corrosion Protection

Regular scheduled maintenance should be conducted to perform a visual inspection of unit for corrosion. Inspect all metal components of generator set, including base frame, brackets, generator housing, entire fuel system (inside and outside of generator set), and fastener locations. If corrosion is found on generator set components (for example: regulator, engine/generator mounts, fuel plenum, etc.), replace parts as necessary.

Periodically wash and wax enclosure using automotive type products. Do not spray unit with a hose or power washer. Use warm, soapy water and a soft cloth. Frequent washing is recommended in salt water/coastal areas. Spray engine linkages with a light oil such as WD-40.

Remove From and Return To Service

Remove From Service

Disconnect the negative battery cable, then the positive battery cable, when working on unit.

ISO000130

If generator set cannot be exercised monthly, at a minimum, and will be out of service longer than 90 days, proceed as follows to prepare generator set for storage:

1. Start engine and allow it to warm up.
2. Turn off generator set fuel supply and allow engine to stop.
3. Once engine has stopped, set MLCB (generator disconnect) to OFF (OPEN).
4. Remove 7.5A fuse from generator set control panel.
5. Disconnect battery charger AC input T1/T2 cable (white sleeve) at controller.
6. Disconnect battery cables. Remove negative battery cable first, then positive battery cable.
7. Drain oil completely while engine is still warm, and then fill crankcase with oil.
8. Attach a tag to engine indicating viscosity and classification of new oil in crankcase.
9. Remove spark plugs using a 5/8 in socket wrench. Spray a fogging agent into spark plug(s) threaded openings. Install and tighten spark plug(s) to specification.
10. Remove battery and store in a dry place where temperatures do not drop below freezing.
11. Clean and wipe down entire generator set.

Return to Service

Proceed as follows to return unit to service after storage:

1. Inspect tag on engine for oil viscosity and classification. Drain and refill with correct oil, if necessary.
2. Verify battery state. Fill all cells of unsealed batteries to correct level with distilled water. DO NOT use tap water. Recharge battery to 100% state of charge. Replace battery if faulty.
3. Clean and wipe down entire generator set.
4. Verify 7.5A fuse is removed from generator set control panel.
5. Connect battery. Observe battery polarity. Damage may occur if battery is connected incorrectly. Install positive battery cable first.
6. Connect battery charger AC input T1/T2 cable (white sleeve) at controller.
7. Open fuel shutoff valve.
8. Insert 7.5A fuse into generator set control panel.
9. Complete Install Wizard information.
10. Press MANUAL mode button on control panel to start unit. Allow unit to warm up for a few minutes.
11. Press OFF mode button on control panel to stop unit.
12. Press AUTO mode button on control panel.

The system is now in automatic mode.

NOTE: If Wi-Fi is not enabled, exercise timer and current date and time must be reset when a battery is discharged or has been disconnected.

Decommissioning

The generator set owner is responsible for correct decommissioning and disposal of this equipment when it has reached the end of its service life. The generator set contains several recyclable materials such as metal, plastic, rubber, and electronics. Other materials are considered hazardous waste and must be safely disposed of according to local codes and regulations. These include, but are not limited to:

- Engine oil
- Engine oil filter
- Grease
- Electronic circuit boards

Contact local authority having jurisdiction (AHJ) for guidelines on disposal of this equipment. In general, the decommissioning procedure involves the following:

1. Disconnect electrical and fuel supplies.
2. Drain fluids, including engine oil and sediment trap.
3. Disassemble unit and sort all parts by material type.
4. Take recyclables to a local collection center.
5. Discard non-hazardous waste materials.
6. Notify Pramac that unit is no longer in service.

Section 5: Troubleshooting / Quick Reference Guide

Generator Set Troubleshooting

Problem	Cause	Correction
Engine will not crank	Blown fuse.	Correct short circuit condition by replacing 7.5 amp fuse in generator control panel. Contact an IASD if fuse continues to blow.
	Loose, corroded, or faulty battery cables.	Tighten, clean, or replace as necessary.*
	Faulty starter contact.	
	Faulty starter motor.	
	Discharged battery.	Charge or replace battery.
Engine cranks but will not start	No fuel.	Replenish fuel/turn on fuel valve.
	High fuel pressure.	Check and adjust fuel pressure.
	Fuel selector in wrong position.	Set fuel conversion knob to correct position, and program controller for fuel type.
	Faulty fuel solenoid (FS).	Contact an IASD.
	Open Wire 14 from controller.	
	Faulty spark plug(s).	Clean; inspect gap; replace plug(s) if necessary.
	Valve clearance out of adjustment.	Reset valve clearance.
Engine starts hard and runs rough	Plugged or damaged air cleaner.	Inspect and clean or replace air cleaner.
	Faulty spark plug(s).	Clean; inspect gap; replace plug(s) as needed.
	Incorrect fuel pressure.	Verify fuel pressure to regulator is 2.49–2.99 kPa (10–12 in water column) for LP gas, and 0.87–1.74 kPa (3.5–7.0 in water column) for NG.
	Fuel selector in wrong position.	Set fuel conversion knob to correct position, and program controller for fuel type.
	Valve(s) out of adjustment.	Adjust valve clearance.
	Internal engine issue.	Contact an IASD.
Unit is set to OFF, but engine continues to run	Controller wired incorrectly.	Contact an IASD.
	Faulty control board.	
No AC output from generator set	MLCB (generator disconnect) is OFF (OPEN).	Reset circuit breaker to ON (CLOSED).
	Generator internal failure.	Contact an IASD.
	Engine may be warming up. See ***Cold Smart Start***.	Check controller screen to verify status.
No transfer to standby after mains source failure	MLCB is OFF (OPEN).	Reset circuit breaker to ON (CLOSED).
	Faulty transfer switch coil.	Contact an IASD.
	Faulty transfer relay.	
	Transfer relay circuit open.	
	Faulty control logic board.	
	Engine may be warming up. See ***Cold Smart Start***.	Check controller screen to verify status.
Excessive engine oil consumption	Excessive engine oil.	Adjust oil to correct level.
	Faulty engine breather.	Contact an IASD.
	Incorrect type or viscosity of oil.	See ***Engine Oil Requirements***.
	Damaged gasket, seal, or hose.	Inspect for oil leaks.
	Restricted air filter.	Replace air filter.
* Contact an IASD or visit ***https://www.pramac.com/worldwide*** for assistance.		

Quick Reference Guide

To clear an active alarm, press OFF mode button and then ENTER button on control panel. Then press AUTO mode button. If alarm reoccurs, contact an IASD.

Active Alarm	LED	Problem	Things to Check	Solution
NONE	FLASHING GREEN	Unit running in AUTO but no power in house.	Check MLCB.	Check MLCB. If it is ON, contact an IASD.
HIGH TEMPERATURE	RED	Unit shuts down during operation.	Check LEDs / screen for alarms.	Inspect ventilation around generator set, intake, exhaust, and rear of generator set. If no obstructions are present, contact an IASD.
OVERLOAD REMOVE LOAD	RED	Unit shuts down during operation.	Check LEDs / screen for alarms.	Clear alarm and remove household loads from generator set. Put in AUTO and restart.
RPM SENSE LOSS	RED	Unit was running and shut down, attempts to restart.	Check LEDs / screen for alarms.	Clear alarm and remove household loads from generator set. Put into AUTO and restart. If generator set does not start, contact an IASD.
NOT ACTIVATED	NONE	Unit will not start in AUTO with mains power loss.	Check if screen says unit not activated.	See Activation in installation manual.
NONE	GREEN	Unit will not start in AUTO with mains power loss.	Check screen for start delay countdown.	If startup delay is greater than expected, contact an IASD to adjust from 2 to 1500 seconds.
LOW OIL PRESSURE	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Check oil level and add oil as needed. If oil level is correct, contact an IASD.
RPM SENSE LOSS	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Clear alarm. Using control panel, inspect battery by navigating to BATTERY MENU option from MAIN MENU. If battery condition displays GOOD, contact an IASD. If control panel displays CHECK BATTERY, replace battery.
OVERCRANK	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Verify fuel shutoff valve is ON. Clear alarm. Start unit in MANUAL. If it does not start, or starts and runs rough, contact an IASD.
LOW VOLTS REMOVE LOAD	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Clear alarm and remove household loads from generator set. Put in AUTO and restart.
OVERSPEED	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Contact an IASD.
UNDERVOLTAGE	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Contact an IASD.
UNDERSPEED	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Contact an IASD.
STEPPER OVERCURRENT	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Contact an IASD.
MISWIRE	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Contact an IASD.
OVERVOLTAGE	RED	Unit will not start in AUTO with mains power loss.	Check LEDs / screen for alarms.	Contact an IASD.

Active Alarm	LED	Problem	Things to Check	Solution
EMERGENCY STOP	RED	Unit will not start in AUTO with mains power loss.	Check screen for additional information.	Verify emergency stop button is disengaged (pulled out). Clear alarm.
LOW BATTERY	YELLOW	Yellow LED illuminated in any state.	Check screen for additional information.	Clear alarm. Using control panel, inspect battery by navigating to BATTERY MENU option from MAIN MENU. If battery condition displays GOOD, contact an IASD. If control panel displays CHECK BATTERY, replace battery.
BATTERY PROBLEM	YELLOW	Yellow LED illuminated in any state.	Check screen for additional information.	Contact an IASD.
CHARGER WARNING	YELLOW	Yellow LED illuminated in any state.	Check screen for additional information.	Contact an IASD.
SERVICE A	YELLOW	Yellow LED illuminated in any state.	Check screen for additional information.	Perform SERVICE A maintenance. Press ENTER to clear.
SERVICE B	YELLOW	Yellow LED illuminated in any state.	Check screen for additional information.	Perform SERVICE B maintenance. Press ENTER to clear.
INSPECT BATTERY	YELLOW	Yellow LED illuminated in any state.	Check screen for additional information.	Inspect battery. Press ENTER to clear.

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Section 6: Servicing Centers

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