



Solar Controller
GP-PWM-30

MAXIMUM
POWER BOOST TECHNOLOGY™

Owner's Manual



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1.0 Installation Overview

1.1 Introduction

A Solar Controller (or Charge Controller / Regulator) is an essential component of your photovoltaic solar system. The Controller maintains the life of the battery by protecting it from overcharging. When your battery has reached a 100% state of charge, the Controller prevents overcharging by limiting the current flowing into the batteries from your solar array.

The GP-PWM-30 is a 12 volt flush mounted photovoltaic (PV) charge controller rated for a continuous solar current input of 30 amps. The GP-PWM-30 uses Pulse Width Modulation (PWM) technology and a unique four stage charging system that includes an optional equalize setting to charge and protect your battery bank. The GP-PWM-30 features an LCD digital display that shows solar array charge current, system battery voltage and battery capacity. The GP-PWM-30 also features Maximum Power Boost Technology™ for manual bulk charge at any stage of the charge cycle.

1.2 Specifications

Description	Value	Dimensions (H x W x D):
Nominal System Voltage	12V	107 x 190 x 35 mm 4.25 x 7.5 x 1.38 in
Max. Solar Array Current	30 amps	Weight: 172 grams
Battery Voltage Range	6V – 15.5V	6 oz
Max. Solar Voltage	28V	Maximum Wire Gauge: #6 AWG
Operating Consumption	6mA	Warranty: 5 years
Display Consumption	10mA	<ul style="list-style-type: none"> • PWM Charging • 3 Battery Charging profiles • 4 Stage Charging • Monthly Equalize option • Displays Charging Current, Battery Voltage and Battery State of Charge • Reverse Polarity protected • Temperature Compensated • RoHS Compliant, environmentally safe • Accepts up to 495 watts of solar at 12 volts • Maximum Power Boost Technology
Bulk/Absorption Voltage	14.1/14.4V (25°C / 77°F), 1 - 2h / Day	
Float Voltage	13.7 (25°C / 77°F)	
Equalization Voltage	14.8V (25°C / 77°F), 2h / 28 Day or V < 12.1	
Temperature Compensation	- 4mV/cell*K	
Operating Temperature	- 40 to 85°C / - 40 to 185°F	
Display Operating Temperature	- 20 to 55°C / - 4 to 131°F	
Humidity	99% N.C.	
Protection	Battery Reverse Polarity, Solar Array Reverse Polarity, Over Temperature, PV Short Circuit, Over Current	
<p>The total rated Maximum Power Current (Imp) of the PV input should not exceed 30 Amps.</p> <p>The GP-PWM-30 will limit PV current above 30 Amps. Although the GP-PWM-30 will accept PV current greater than 30 Amps for a short duration, damage may occur if the GP-PWM-30 operates continuously with greater than 30 Amps of PV input.</p>		

2.0 Warnings

	<p>Disconnect all power sources</p>	<p>Electricity can be very dangerous. Installation should be performed only by a licensed electrician or qualified personnel.</p>
	<p>Battery and wiring safety</p>	<p>Observe all safety precautions of the battery manufacturer when handling or working around batteries. When charging, batteries produce hydrogen gas, which is highly explosive.</p>
	<p>Wiring connections</p>	<p>Ensure all connections are tight and secure. Loose connections may generate sparks and heat. Be sure to check connections one week after installation to ensure they are still tight.</p>
	<p>Work safely</p>	<p>Wear protective eyewear and appropriate clothing during installation. Use extreme caution when working with electricity and when handling and working around batteries.</p>
	<p>Observe correct polarity</p>	<p>Reverse polarity of the battery terminals will cause the controller to give a warning tone. Reverse connection of the array will not cause an alarm but the controller will not function. Failure to correct this fault could damage the controller.</p>
	<p>Do not exceed the GP-PWM-30 Amp current and max voltage ratings</p>	<p>The current rating of the solar system is the sum of the Maximum Power Current (Imp) of the solar PV strings in parallel. The resulting system Imp current is not to exceed 30A. The voltage of the array is the rated open circuit voltage (Voc) of the PV array and is not to exceed 28V. If your solar system exceeds these ratings, contact your dealer for a suitable controller alternative.</p>

3.0 Tools and Materials Needed

- Phillips Screwdriver

NOTE

If the GP-PWM-30 Controller was purchased with a Go Power! RV Solar Power Kit then UV resistant wire is included. For instructions regarding the Go Power! RV Solar Power Kit installation, please refer to the Installation Guide provided with the Kit.

4.0 Choosing a Location

The GP-PWM-30 is designed to be mounted flush against a wall, out of the way but easily visible.

The GP-PWM-30 should be:

- Mounted as close to the battery as possible
- Mounted on a vertical surface to optimize cooling of the unit
- Indoors, protected from the weather

In a RV, the most common controller location is above the refrigerator. The wire from the solar array most commonly enters the RV through the fridge vent on the roof. PV connections should connect directly to the controller. Positive and negative battery connections must connect directly from the controller to the batteries. Use of a positive or negative distribution bus is allowed between the controller and battery as long as it is properly sized, electrically safe and an adequate wire size is maintained.

5.0 Installation Instructions

1. **Prepare for mounting.** Use the template provided at the end of the manual to mark the four mounting holes and the “*cutting line for flush mounting.*”
2. **Complete the installation of the solar modules.** If this GP-PWM-30 was purchased as part of a Go Power! Solar Power Kit, follow the Installation Guide provided. Otherwise, follow manufacturer’s instructions for solar module mounting and wiring.
3. **Select wire type and gauge.** If this GP-PWM-30 was purchased as part of a Go Power! Solar Power Kit, appropriate wire type, gauge and length is provided. Please continue to **Section 6**, “Operating Instructions.” If the GP-PWM-30 was purchased separately, follow the instructions included here.

Wire type is recommended to be a stranded aluminium UV resistant wire. Wire fatigue and the likelihood of a loose connection are greatly reduced in stranded wire compared to solid wire. Wire gauge should be able to sustain rated current as well as minimizing voltage drop.

Suggested Minimum Wire Gauge

(Cable length 25 ft. max. from solar array to battery bank)

50 Watt	#14 Wire Gauge
80 Watt	#12 Wire Gauge
95 Watt	#10 Wire Gauge
110 Watt	#10 Wire Gauge
125 Watt	#10 Wire Gauge
160 Watt	#10 Wire Gauge
240 Watt	#10 Wire Gauge
Terminal Screw Torque	16 inch pounds (1.8N.m)

IMPORTANT: Identify the polarity (positive and negative) on the cable used for the battery and solar module. Use colored wires or mark the wire ends with tags. Although the GP-PWM-30 is protected, a reverse polarity contact may damage the unit.

-
- 4. Wiring the GP-PWM-30.** Wire the GP-PWM-30 according to the wiring schematic in **Section 11**. Run wires from the solar array and the batteries to the location of the GP-PWM-30. Keep the solar array covered with an opaque material until all wiring is completed.
 - 5. Torque** all terminal screws to 16 inch pounds (1.8N.m). Connect the battery wiring to the controller first and then connect the battery wiring to the battery.

IMPORTANT: Always use appropriate circuit protection on any conductor attached to a battery.

With battery power attached, the controller should power up and display information. Connect the solar wiring to the controller and remove the opaque material from the solar array. The negative solar array and battery wiring must be connected directly to the controller for proper operation. Do not connect the negative solar array or negative battery controller wiring to the chassis of the vehicle.

- 6. Mounting the GP-PWM-30.** Mount the GP-PWM-30 to the wall using the included four mounting screws.

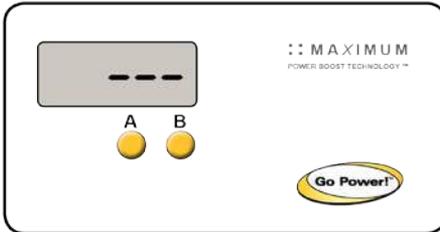
IMPORTANT: You must set the battery type on the GP-PWM-30 before you begin to use the controller. The default battery setting is for AGM batteries.

Congratulations, your GP-PWM-30 should now be operational. If the battery power is low and the solar array is producing power, your battery should begin to charge.

- 7. Re-torque:** After 30 days of operation, re-torque all terminal screws to ensure the wires are properly secured to the controller.

6.0 Operating Instructions

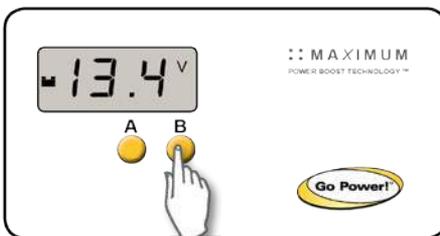
Power Up



When the GP-PWM-30 is connected to the battery, the GP-PWM-30 will go into Power Up mode.

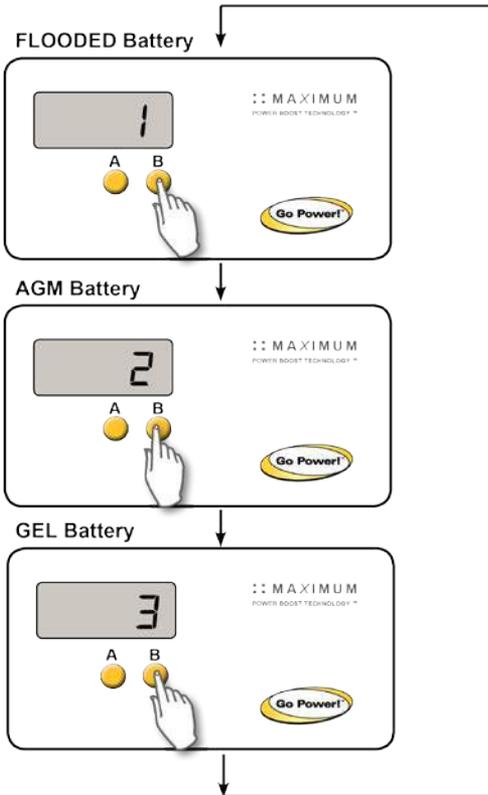
Icons Displayed: Three horizontal dashes

Setting the Battery Type / Charging Profile

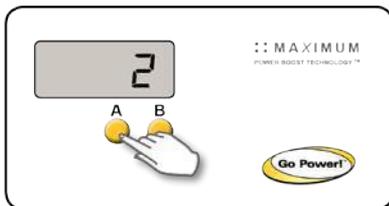


Set the Battery Type / Charging Profile by holding down the **B Button** for 5 seconds. When the display shows a single digit number, release the **B Button**. Set the Battery Type by toggling through the Charging Profile numbers 1, 2 or 3 by pressing the **B Button**.

NOTE: Non-volatile memory: Any settings made on the GP-PWM-30 will be saved even when the power has been disconnected from the controller.



Refer to the Battery Charge Profile Chart on page 13 for details on each profile.



Confirm the Battery Type / Charging Profile selection by pressing the **A Button**.

Depending on the battery voltage when the GP-PWM-30 Power Up occurs, the GP-PWM-30 may do a Boost Charge or quickly go into Float Charge. The Charging Profile selected will commence the following day after a Power Up.

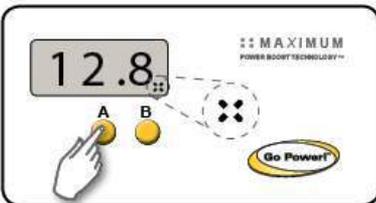
Maximum Power Boost Technology™

Maximum Power Boost Technology™ (MPBT) is a new feature on the GP-PWM-30 that allows you to override the normal charging algorithm of the solar controller. This feature will make the GP-PWM-30 go into a boost mode, bringing the voltage up to 14.4 VOC for 30 minutes regardless of the batteries state of charge. This feature **should not** be used more than twice a day as it could cause your batteries to require more distilled water top-ups due to more gassing of the batteries.

MPBT is designed to be used before the end of the day if you know you will require a lot of loads through the night. The MPBT feature can also be used when you have just installed the solar controller, to put batteries on a boost charge up to 14.4 right away.

IMPORTANT: Do not use the Maximum Power Boost function more than twice a day.

Max. Power Boost



To activate the Maximum Power Boost Technology™, hold the **A Button** for 5 seconds to put Controller into Max. Power Boost. As long as there is full sunlight present, your batteries (flooded only) will be boosted to 14.4V for 30 minutes

Icons Displayed: 4 dots at bottom right of display

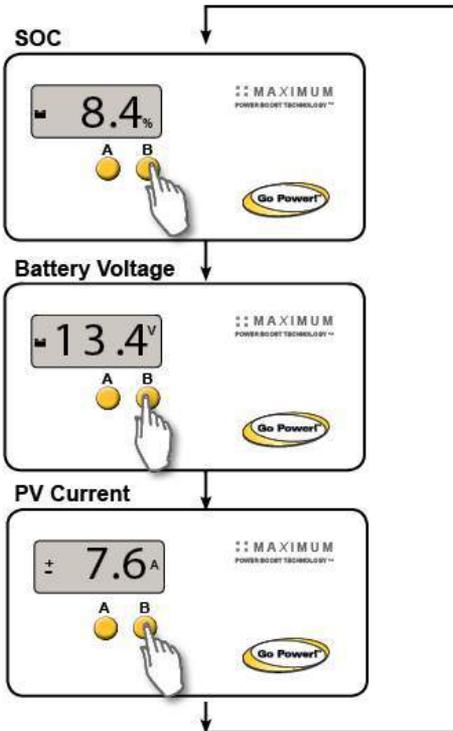
Battery Charge Profile Chart

Battery Type	FLOODED	AGM	GEL
Charging Profile #	1	2	3
Float Charge @ 25°C:	13.7V (+/- 0.1V)		
Bulk/Absorption Charge @ 25°C: Applied for 1h each morning	14.4V (+/- 0.1V)		14.1V (+/- 0.1V)
Boost Charge <i>Applied for 2 hours if the battery voltage drops below 12.3 volts.</i>	14.4V (+/- 0.7V)		14.1V (+/- 0.1V)
Equalization Charge <i>Applied for 2 hours every 28 days and if the battery voltage drops below 12.1 volts.</i>	14.8V (+/-0.1V)	N/A	N/A
<p>The Boost Charge will occur in addition to the Bulk Charge. The Equalization Charge will occur in addition to the Boost Charge.</p> <p>If a charging cycle is unable to complete in a single day, it will continue the following day.</p> <p>The terms FLOODED, AGM and GEL are generic battery designations. Choose the charging profile that works best with your battery manufacturer's recommendations.</p>			

Auto Equalize: The GP-PWM-30 has an automatic equalize feature that will charge and recondition your batteries once a month at a higher voltage to ensure that any excess sulfation is removed. This feature is recommended for Flooded batteries only. Check with your battery manufacturer.

IMPORTANT: This feature is only available for wet cell or flooded batteries (**Charging Profile 1**).

Viewing the Controller display information



To toggle between State of Charge (SOC), Battery Voltage and PV Charging Current, press the **B Button**. The battery state of charge is shown as a percentage.

Icons Displayed: Battery, Percent Symbol

Push the **B Button** to show the battery voltage.

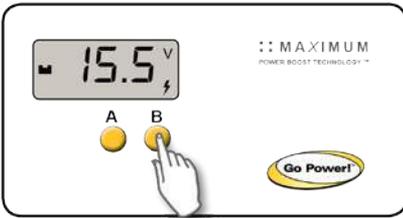
Icons Displayed: Battery, Volt Symbol (V)

Push the **B Button** to show the PV charging current. The GP-PWM-30 will begin to limit the current as the battery reaches a full charge.

Icons Displayed: Sun, Battery, Current Symbol (A)

Errors

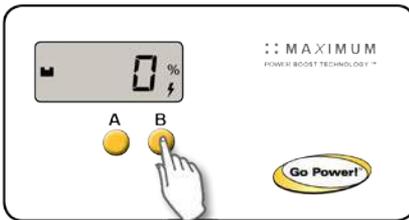
Over Voltage



If the GP-PWM-30 experiences a battery over voltage (15.5V), the controller will stop operating and the display will begin to flash. The controller will resume operating when the error is cleared.

Icons Displayed: Battery, Volt Symbol, Lightning Bolt

Low Voltage



If the GP-PWM-30 experiences the battery state of charge reaching 0 %, a lightning bolt symbol will begin to flash in the lower right corner of the display. The controller will continue operating. The controller will only stop operating if the voltage drops below 6 volts.

Icons Displayed: Battery, Percent Symbol, Lightning Bolt

7.0 Frequently Asked Questions (FAQs)

Before a problem is suspected with the system, read this section. There are numerous events that may appear as problems but are in fact perfectly normal. Please visit gpelectric.com for the most up-to-date FAQs.

It seems like my flooded batteries are losing water over time.

Flooded batteries may need to have distilled water added periodically to replace fluid loss during charging. Excessive water loss during a short period of time indicates the possibility of overcharging or aging batteries.

When charging, my flooded batteries are emitting gas.

During charging, hydrogen gas is generated within the battery. The gas bubbles stir the battery acid allowing it to receive a more full state of charge. Ensure they are in a well-ventilated space.

My voltmeter shows a different reading than the GP-PWM-30 display

The meter value on the GP-PWM-30 display is an approximate reading intended for indication purposes only. There is an approximate 0.1 volt inherent error present that may be accentuated when compared with readings from another voltmeter.

There may be a slight difference between the battery voltage displayed on the GP-PWM-30 display and the battery voltage measured at the battery terminals. When troubleshooting using a voltmeter, check both the battery voltage at the GP-PWM-30 controller terminals and battery voltage at the battery terminals. If a difference of more than 0.5 volts is noted, this indicates a large voltage drop possibly caused by loose connections, long wire runs, small wire gauge, faulty wiring, a faulty voltmeter or all the above. Consult the Suggested Minimum Wire Gauge chart in **Section 5** for wiring suggestions and check all connections.

8.0 Troubleshooting Problems

How to read this section

Troubleshooting Problems is split into three sub-sections, grouped by symptoms involving key components. Components considered irrelevant in a diagnosis are denoted 'Not Applicable' (N/A). A multimeter or voltmeter may be required for some procedures listed.

It is imperative all electrical precautions stated in the Warning Section and outlined in the Installation Section are followed. Even if it appears the system is not functioning, it should be treated as a fully functioning system generating live power.

8.1 *Problems with the Display*

Display Reading: Blank

Time of Day: Daytime/Nighttime

Possible Cause:

- (1) Battery or fuse connection and/or solar array connection (Daytime only).
- (2) Battery or fuse connection (Nighttime only).

How to tell:

(1) & (2) Check the voltage at the controller battery terminals with a voltmeter and compare with a voltage reading at the battery terminals.

If there is no voltage reading at the controller battery terminals, the problem is in the wiring between the battery and the controller. If the battery voltage is lower than 6 volts the controller will not function.

For the solar array, repeat steps 1 and 2 substituting all battery terminals with solar array terminals.

Remedy:

(1) & (2) Check all connections from the controller to the battery including checking for correct wire polarity. Check that all connections are clean, tight, and secure. Ensure the battery voltage is above 6 volts.

8.2 Problems with Voltage

Voltage Reading: Inaccurate
Time of Day: Daytime/Nighttime

Possible Cause:

(1) Excessive voltage drop from batteries to controller due to loose connections, small wire gauge or both.

How to tell:

(1) Check the voltage at the controller battery terminals with a voltmeter and compare with the voltage reading at the battery terminals. If there is a voltage discrepancy of more than 0.5 V, there is an excessive voltage drop.

Remedy:

(1) Check all connections from the controller to the battery including checking for correct wire polarity. Check that all connections are clean, tight, and secure. Shorten the distance from the controller to battery or obtain larger gauge wire. It is also possible to double up the existing gauge wire (i.e. two wire runs) to simulate a larger gauge wire.

8.3 Problems with Current

Current Reading: 0 A
Time of Day: Daytime, clear sunny skies

Possible Cause:

(1) Current is being limited below 1 Amp as per normal operation.
(2) Poor connection between solar array and controller.

How to tell:

(1) The State of Charge (SOC) screen is close to 100% and the Sun and Battery icon are present with an arrow between.
(2) With the solar array in sunlight, check the voltage at the controller solar array terminals with a voltmeter. If there is no reading at the controller solar array terminals, the problem is somewhere in the wiring from the solar array to the controller.

Remedy:

(2) Hold down the **A Button** for approximately 5 seconds to activate Maximum Power Boost. This will allow the controller to charge batteries to 14.4 +/- 0.1V with all current the solar array is producing.

(2) Check all connections from the controller to the array including checking for correct wire polarity. Check that all connections are clean, tight, and secure. Continue with the solutions below for additional help on low current readings.

Current Reading: Less than expected
Time of Day: Daytime, clear sunny skies

Possible Cause:

- (1) Current is being limited below 1 Amp as per normal operation.
- (2) Incorrect series/parallel configuration and/or wiring connections and/or wire gauge.
- (3) Dirty or shaded module or lack of sun.
- (4) Blown diode in solar module when two or more modules are connected in parallel.

How to tell:

- (1) Battery State of Charge screen is close to 100% and the Sun and Battery icon are present with an arrow in between.
- (2) Check that the modules and batteries are configured correctly. Check all wiring connections.
- (3) Modules look dirty, overhead object is shading modules or it is an overcast day in which a shadow cannot be cast. **Note:** Avoid any shading no matter how small. An object as small as a broomstick held across the solar module may cause the power output to be cut to almost nil. Overcast days may also cut the power output of the module to almost nil.
- (4) Disconnect one or both array wires from the controller. Take a voltage reading between the positive and negative array wire. A single 12 volt module should have an open circuit voltage between 17 and 22 volts. If you have more than one solar module, you will need to conduct this test between the positive and negative terminals of each module junction box with either the positive or negative wires disconnected from the terminal.

Remedy:

- (2) Reconnect in correct configuration. Tighten all connections. Check wire gauge and length of wire run. Refer to Suggested Minimum Wire Gauge in Section 5.
- (3) Clean modules, clear obstruction or wait for conditions to clear.
- (4) If the open circuit voltage of a non-connected 12 volt module is lower than the manufacturer's specifications, the module may be faulty. Check for blown diodes in the solar module junction box, which may be shorting the power output of module.

9.0 Limited Warranty

1. Carmanah warrants the GP-PWM-30 for a period of five (5) years from the date of shipment from its factory. This warranty is valid against defects in materials and workmanship for the five (5) year warranty period. It is not valid against defects resulting from, but not limited to:
 - Misuse and/or abuse, neglect or accident
 - Exceeding the unit's design limits
 - Improper installation, including, but not limited to, improper environmental protection and improper hook-up
 - Acts of God, including lightning, floods, earthquakes, fire, and high winds
 - Damage in handling, including damage encountered during shipment
2. This warranty shall be considered void if the warranted product is in any way opened or altered. The warranty will be void if any eyelet, rivets, or other fasteners used to seal the unit are removed or altered, or if the unit's serial number is in any way removed, altered, replaced, defaced, or rendered illegible.

9.1 *Repair and Return Information*

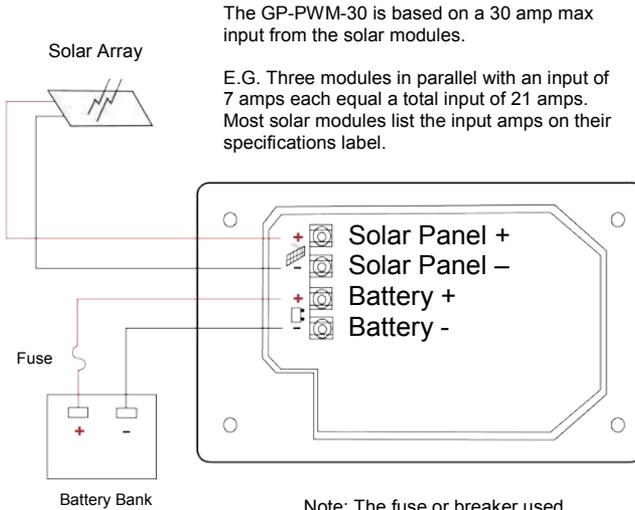
Visit www.gpelectric.com to read the "frequently asked questions" section of our website to troubleshoot the problem. If trouble persists:

1. Call your Go Power!™ Technical Support team (1-866-247-6527).
2. Return defective product to place of purchase

10.0 Installation Template

(see last page)

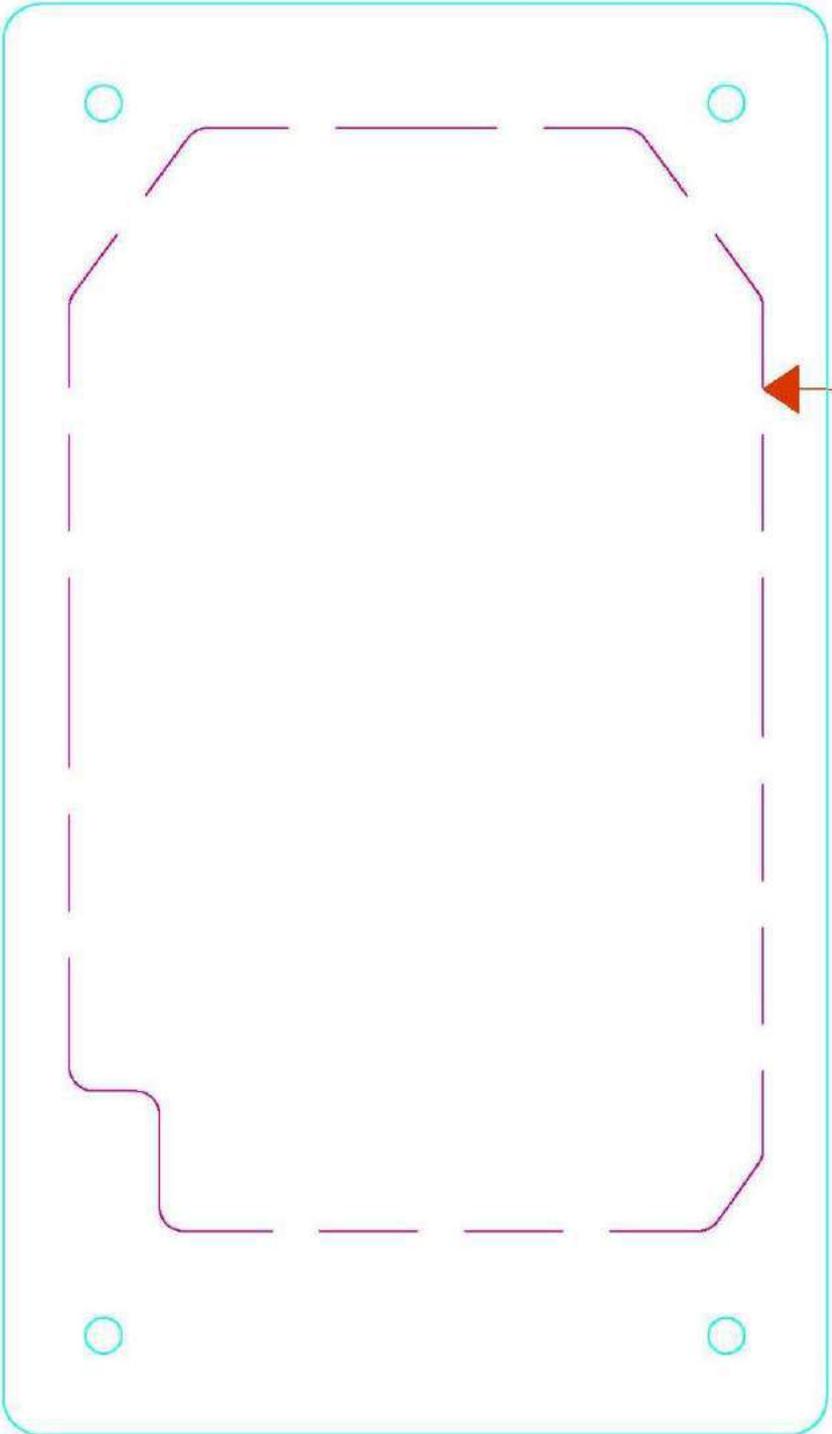
11.0 Wiring Diagram



The GP-PWM-30 is based on a 30 amp max input from the solar modules.

E.G. Three modules in parallel with an input of 7 amps each equal a total input of 21 amps. Most solar modules list the input amps on their specifications label.

Note: The fuse or breaker used should be no larger than 30 amps



Cut Line for flush mount



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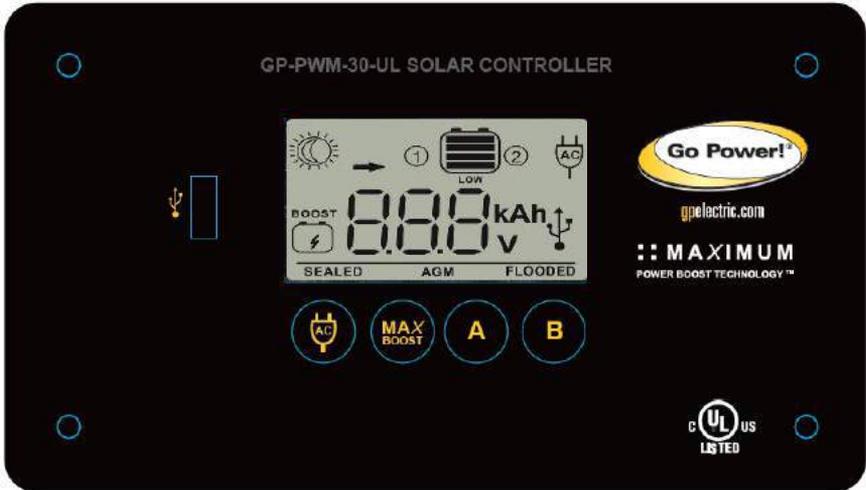
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gpelectric.com



GP-PWM-30-UL
:: MAXIMUM
POWER BOOST TECHNOLOGY™

User Manual



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1.0 Installation Overview

1.1 Introduction

A Solar Controller (or Charge Controller / Regulator) is an essential component of your photovoltaic solar system. The Controller maintains the life of the battery by protecting it from overcharging. When your battery has reached a 100% state of charge, the Controller prevents overcharging by limiting the current flowing into the batteries from your solar array.

The GP-PWM-30-UL uses Pulse Width Modulation (PWM) technology and a unique four stage charging system that includes an optional equalize setting to charge and protect your battery bank. The GP-PWM-30-UL features an LCD digital display that shows the charge current of the solar array, system battery voltage and battery state of charge. The GP-PWM-30-UL also features Maximum Power Boost Technology™ for manual bulk and absorption charge at any stage of the charge cycle.

1.2 System Voltage and Current

The GP-PWM-30-UL is intended for use at 12 VDC system voltage and is rated for a maximum continuous DC input current of 37.5A and input voltage of 35VDC.

Per the National Electric Code (NEC) article 690.7 and 690.8, PV module nameplate ratings must be multiplied by required values (typically 1.25 for both voltage and current) to obtain the true voltage and continuous current available from the module.

Applying the NEC factors, the maximum allowable nameplate PV Panel rated I_{sc} is 30A ($30A \times 1.25 = 37.5A$), and the maximum voltage, V_{oc} is 28VDC ($28VDC \times 1.25 = 35VDC$).

The voltage and current ratings of all equipment connected to PV panels must be capable of accepting the voltage and current levels available from PV panels installed in the field.

1.3 Battery Type

The GP-PWM-30-UL is suitable for use with lead acid batteries (vented, GEL, or AGM type).

1.4 Low Voltage Disconnect Function (USB Port)

To prevent the battery against over-discharge this function automatically switches off the USB output port when Battery 1 voltage is lower than 11.0 VDC. As soon as Battery 1 reaches a voltage of 12.8 VDC the USB output port is switched on again.

1.5 Regulatory Information



PV CHARGE CONTROLLER
 ALSO FOR LAND VEHICLES
 NO. E497008

1.6 Specifications

Description	Value	Dimensions (H x W x D):
Model	GP-PWM-30-UL	108 x 190 x 35 mm
Nominal System Voltage	12 VDC	4.25 x 7.48 x 1.38 in
Charging Output Voltage Range Battery 1	9.0 – 14.9 VDC	Weight: 300g / 10.6 oz
Charging Output Voltage Range Battery 2	9.0 – 14.9 VDC	Maximum Wire Gauge: #4 AWG
Maximum Charge Current Battery 1	37.5A	Warranty: 5 years
Maximum Charge Current Battery 2	37.5A	<ul style="list-style-type: none"> • PWM Charging • 3 Battery Charging profiles • 4 Stage Charging • Monthly Equalize option • Displays Charging Current, Battery Voltage and Battery State of Charge • Reverse Polarity protected • Temperature Compensated
Maximum DC Input Voltage	35.0 VDC	
Range of DC Input Voltage	9.0 – 35.0 VDC	
Maximum DC Input Operating Current	37.5 A	
Maximum DC Short Circuit Current	37.5	
Max. Series Fuse or Circuit Breaker Solar/Battery 1/Battery 2	50 A	

Operating Consumption (Display backlight on)	15mA		<ul style="list-style-type: none"> • RoHS Compliant, environmentally safe • Accepts up to 495 watts of solar at 12 volts • Maximum Power Boost Technology
Operating Consumption (Display backlight off)	6mA		
Battery Types Supported	Vented and Sealed (GEL, AGM etc.) Lead Acid		
Bulk/Absorption Voltage (Sealed/Gel, AGM, Flooded)	14.1/14.4/14.4V (25°C / 77°F), 30min / Day or 2hr if battery voltage < 12.3V		
Float Voltage	13.7V (25°C / 77°F)		
Equalization Voltage	14.9V (25°C / 77°F), 2h / 28 Days or if battery voltage < 12.1V		
Temperature Compensation	- 24mV/°C / 13mV/°F		
USB charger	5V, 800mA		
Low Voltage Disconnect (USB)	11.0 VDC Reconnects once battery reaches 12.8V		
Operating Temperature Display Operating Temperature	- 40 to 60°C / - 40 to 140°F - 10 to 55°C / 14 to 131°F		
Charge Current De-Rating (Based on internal temperature of the controller)	Internal Temp.	Max Charge Output Current	
	<80°C/176°F	37.5A	
	80°C/176°F	22.5A	
	81°C/177.8°F	15A	
	82°C/179.6°F	7.5A	
	>82°C/179.6°F	0A	
Humidity	99% N.C.		
Protection	Battery Reverse Polarity, Solar Array Reverse Polarity, Over Temperature, PV Short Circuit, Over Current		

2.0 IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

THIS MANUAL CONTAINS IMPORTANT INSTRUCTIONS FOR MODEL GP-PWM-30-UL THAT SHOULD BE FOLLOWED DURING INSTALLATION AND MAINTENANCE OF THE GP-PWM-30-UL.

	Disconnect all power sources	Electricity can be very dangerous. Installation should be performed only by a licensed electrician or qualified personnel.
	Battery and wiring safety	Observe all safety precautions of the battery manufacturer when handling or working around batteries. When charging, batteries produce hydrogen gas, which is highly explosive.
	Wiring connections	Ensure all connections are tight and secure. Loose connections may generate sparks and heat. Be sure to check connections one week after installation to ensure they are still tight.
	Work safely	Wear protective eyewear and appropriate clothing during installation. Use extreme caution when working with electricity and when handling and working around batteries.
	Observe correct polarity	Reverse polarity of the Battery 1 terminals will cause the controller to give a warning tone. Reverse connection of Battery 2 terminals will not cause an alarm. However, the controller <u>will not</u> charge or display information for Battery 2 on the LCD. The controller will not function unless Battery 1 terminals are connected to a battery with proper polarity. Failure to correct this fault could damage the controller.
	Do not exceed the GP-PWM-30-UL max current ratings	The maximum current of the solar system is the sum of parallel-connected PV module-rated short circuit Currents (Isc) multiplied by 1.25. The resulting system current is not to exceed 37.5A. If your solar system exceeds this value, contact your dealer for a suitable controller alternative.
	Do not exceed the GP-PWM-30-UL max voltage ratings	The maximum voltage of the array is the sum of the PV module-rated open-circuit voltage of the series connected modules multiplied by 1.25 (or by a value from NEC 690.7 provided in Table 690.7 A). The resulting voltage is not to exceed 35V. If your solar system exceeds this value, contact your dealer for a suitable controller alternative.

IMPORTANTES INSTRUCTIONS DE SECURITE

CONSERVEZ CES INSTRUCTIONS

CE MANUAL CONTIENT DES INSTRUCTIONS IMPORTANTES POUR LE MODÈLE GP-PWM-30-UL QUI DOIVENT ÊTRE SUIVIES PENDANT L'INSTALLATION ET L'ENTRETIEN DU GP-PWM-30-UL.

	<p>Débranchez toutes les sources d'énergie</p>	<p>L'électricité peut être très dangereuse. L'installation ne doit être effectuée que par un électricien agréé ou du personnel qualifié.</p>
	<p>Sécurité de la batterie et du câblage</p>	<p>Respectez toutes les consignes de sécurité du fabricant de la batterie lorsque vous manipulez des batteries ou que vous travaillez à proximité de celles-ci. Lors de leur chargement, les batteries produisent de l'hydrogène gazeux hautement explosif.</p>
	<p>Branchements de câblage</p>	<p>Assurez-vous que tous les branchements sont serrés et sûrs. Des branchements lâches peuvent produire des étincelles et de la chaleur. Vérifiez tous les branchements une semaine après l'installation pour vous assurer qu'ils sont toujours serrés.</p>
	<p>Travaillez en toute sécurité</p>	<p>Lors de l'installation, portez des lunettes de protection et des vêtements adaptés. Faites preuve d'une grande prudence lorsque vous travaillez avec du matériel électrique et lorsque vous manipulez des batteries ou que vous travaillez à proximité de celles-ci.</p>
	<p>Respectez la polarité correcte</p>	<p>Une polarité inversée des bornes de la batterie 1 provoquera un signal sonore du régulateur. Une polarité inversée de la batterie 2 ne provoquera pas d'alarme. Cependant, le régulateur ne chargera pas et <u>n'affichera pas</u> d'informations relatives à la batterie 2 sur l'écran CL. Le régulateur ne fonctionnera que si ses bornes batterie 1 sont connectées à une batterie avec la polarité appropriée. Si ce défaut n'est pas corrigé, le régulateur risque d'être endommagé.</p>

	<p>Ne dépassez pas le courant nominal maximum du GP-PWM-30-UL</p>	<p>Le courant maximum du système solaire est la somme des courants de court-circuit (Isc) des modules PV connectés en parallèle, multipliée par 1,25. Le courant du système qui en résulte ne doit pas excéder 37,5 A. Si votre système solaire dépasse cette valeur, veuillez contacter votre revendeur pour obtenir un régulateur plus approprié.</p>
	<p>Ne dépassez pas la tension nominale maximum du GP-PWM-30-UL</p>	<p>La tension maximum des panneaux est la somme des courants de court-circuit (Isc) des modules PV connectés en parallèle, multipliée par 1,25 (ou par une valeur de l'article 690.7 du Code National Électrique fournie dans le tableau 690.7 A). La tension qui en résulte ne doit pas excéder 35 V. Si votre système solaire dépasse cette valeur, veuillez contacter votre revendeur pour obtenir un régulateur plus approprié.</p>

3.0 Tools and Materials Needed

- Flathead Screwdriver (for wire terminals)
- Philips Screwdriver (for mounting screws)

NOTE

If the GP-PWM-30-UL Controller was purchased with a Go Power! RV Solar Power Kit, then UV resistant wire is included. For instructions regarding the Go Power! RV Solar Power Kit installation, please refer to the Installation Guide provided with the Kit.

4.0 Choosing a Location

The GP-PWM-30-UL is designed to be mounted flush against a wall, out of the way but easily visible.

The GP-PWM-30-UL should be:

- Mounted as close to battery 1 as possible
- Mounted on a vertical surface to optimize cooling of the unit
- Indoors, protected from the weather

In an RV, the most common controller location is above the refrigerator. The wire from the solar array most commonly enters the RV through the

fridge vent on the roof or by using the Go Power! Cable Entry Plate (sold separately) that allows installers to run wires through any part of the roof. PV connections should connect directly to the controller. Positive and negative battery connections must connect directly from the controller to the batteries. Use of a positive or negative distribution bus is allowed between the controller and battery as long as it is properly sized, electrically safe and an adequate wire size is maintained.

5.0 Installation Instructions

- 1. Prepare for mounting.** Use the template provided on **page 31** to mark the four mounting holes and the cutting line for flush mounting your controller.
- 2. Complete the installation of the solar modules.** If this GP-PWM-30-UL was purchased as part of a Go Power! Solar Power Kit, follow the Installation Guide provided. Otherwise, follow manufacturer's instructions for solar module mounting and wiring.

	<p>Do not exceed the GP-PWM-30-UL max current ratings</p>	<p>The maximum current of the solar system is the sum of parallel-connected PV module-rated short circuit Currents (Isc) multiplied by 1.25. The resulting system current is not to exceed 37.5A. If your solar system exceeds this value, contact your dealer for a suitable controller alternative.</p>
	<p>Do not exceed the GP-PWM-30-UL max voltage ratings</p>	<p>The maximum voltage of the array is the sum of the PV module-rated open-circuit voltage of the series connected modules multiplied by 1.25 (or by a value from NEC 690.7 provided in Table 690.7 A). The resulting voltage is not to exceed 35V. If your solar system exceeds this value, contact your dealer for a suitable controller alternative.</p>

	<p>Ne dépassez pas le courant nominal maximum du GP-PWM-30-UL</p>	<p>Le courant maximum du système solaire est la somme des courants de court-circuit (Isc) des modules PV connectés en parallèle, multipliée par 1,25. Le courant du système qui en résulte ne doit pas excéder 37,5 A. Si votre système solaire dépasse cette valeur, veuillez contacter votre revendeur pour obtenir un régulateur plus approprié.</p>
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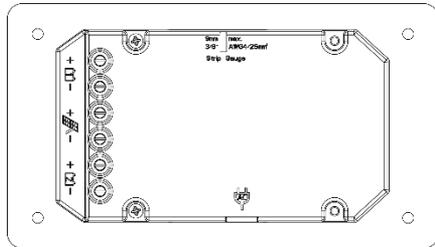
	<p>Ne dépassez pas la tension nominale maximum du GP-PWM-30-UL</p>	<p>La tension maximum des panneaux est la somme des courants de court-circuit (Isc) des modules PV connectés en parallèle, multipliée par 1,25 (ou par une valeur de l'article 690.7 du Code National Électrique fournie dans le tableau 690.7 A). La tension qui en résulte ne doit pas excéder 35 V. Si votre système solaire dépasse cette valeur, veuillez contacter votre revendeur pour obtenir un régulateur plus approprié.</p>
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- 3. Select wire type and gauge.** If this GP-PWM-30-UL was purchased as part of a Go Power! Solar Power Kit, appropriate wire type, gauge and length is provided. Please continue to **Section 6**, “Operating Instructions.” If the GP-PWM-30-UL was purchased separately, follow the instructions included here.

Wire type is recommended to be a stranded copper UV resistant wire. Wire fatigue and the likelihood of a loose connection are greatly reduced in stranded wire compared to solid wire. Wire gauge should be able to sustain rated current as well as minimize voltage drop.

Wire Strip Gauge

You will find a strip gauge diagram on the back of the GP-PWM-30-UL, which helps you to strip your wires to the correct length. Insert wire into the concave slot of the strip gauge until it meets the back of the Strip Gauge slot. Mark the length of wire from the back of the Strip Gauge slot to the edge of the controller with a pen or your finger and strip all wires to be connected to the controller to this length.



Suggested Minimum Wire Gauge

(Cable length 25 ft. max. from solar array to battery bank)

Wire Type	Wire size min (AWG)	Wire size Max (AWG)
Copper Only 90°C	AWG 10	AWG 4

IMPORTANT: Identify the polarity (positive and negative) on the cable used for the battery and solar module. Use colored wires or mark the

wire ends with tags. Although the GP-PWM-30-UL is protected, a reverse polarity contact may damage the unit.

Wiring the GP-PWM-30-UL. Wire the GP-PWM-30-UL according to the wiring schematic in **Section 6**. Run wires from the solar array and the batteries to the location of the GP-PWM-30-UL. Keep the solar array covered with an opaque material until all wiring is completed.

IMPORTANT: All wiring must be in accordance to National Electrical Code, ANSI/NFPA 70.

4. **Connect** the battery wiring to the controller first and then connect the battery wiring to the battery.
5. **Torque** all terminal screws per the following:

Stranded Copper 90°C Wire	
Wire Size AWG	Rated Torque (in-lbs)
10	20
8	25
6	35
4	35

With battery power attached, the controller should power up and display information. Connect the solar wiring to the controller and remove the opaque material from the solar array. The negative solar array and battery wiring must be connected directly to the controller for proper operation. Do not connect the negative solar array or negative battery controller wiring to the chassis of the vehicle.

6. **Mounting the GP-PWM-30-UL.** Mount the GP-PWM-30-UL to the wall using the included four mounting screws.

IMPORTANT: You must set the battery type on the GP-PWM-30-UL before you begin to use the controller. The default battery setting is for AGM batteries.

Congratulations, your GP-PWM-30-UL should now be operational. If the battery power is low and the solar array is producing power, your battery should begin to charge.

7. **Re-torque:** After 30 days of operation, re-torque all terminal screws to ensure the wires are properly secured to the controller



WARNING: This unit is not provided with a GFDI device. This charge controller must be used with an external GFDI device as required by Article 690 of the National Electric Code for the installation location.



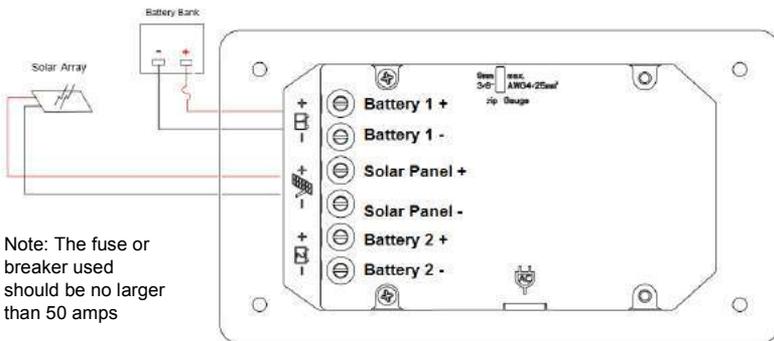
AVERTISSEMENT : Cet appareil n'est pas équipé d'un détecteur de défaut de terre. Ce régulateur de charge doit être utilisé avec un détecteur de défaut de terre comme l'exige l'article 690 du Code National Électrique pour l'emplacement de l'installation.

6.0 Wiring Diagram

The GP-PWM-30-UL Maximum 37.5A rating is based on a 30 amp total maximum short circuit current rating (Isc) from the solar modules nameplate ratings. The National Electric Code specifies the PV equipment/system rating to be 125% of the maximum Isc from the PV module ratings (1.25 times 30 = 37.5A). E.G. Three modules in parallel with an Isc of 7 amps each equal a total Isc input of 21 amps. When selecting PV modules for use with the GP-PWM-30-UL do not exceed a total nameplate Isc current of 30A. Solar modules list the Isc amps on their specifications nameplate label.

6.1 Charging Only One Battery

Use the following wiring diagram if you are using the GP-PWM-30-UL to charge only one battery. Connect your battery to the battery 1 terminals on the solar controller.



NOTE

The controller will not work unless there is a battery connected to the Battery 1 terminals



WARNING: When the photovoltaic (solar) array is exposed to light, it supplies a dc voltage to this equipment



AVERTISSEMENT : Lorsque le panneau photovoltaïque (solaire) est exposé à la lumière, il fournit une tension cc à cet équipement.

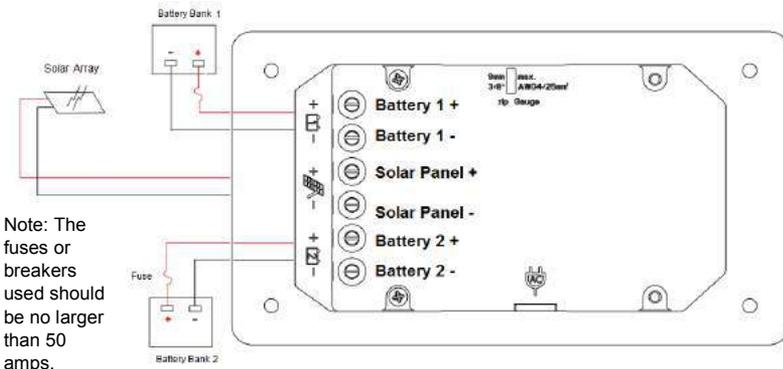
6.2 Charging Two Batteries

Use the following wiring diagram if you are using the GP-PWM-30-UL to charge two separate battery banks. Connect battery bank 1 to the battery 1 terminals and battery bank 2 to the battery 2 terminals on the back of the solar controller.

IMPORTANT: Ensure your primary/permanent battery (house bank) is connected to the battery 1 terminals. Connect your secondary battery to battery 2 terminals only. Your permanent battery (battery 1) will receive the full current first. Once battery 1 is fully charged, the full current will be available to charge battery 2.

NOTE

The controller will not work unless there is a battery connected to the battery 1 terminals.





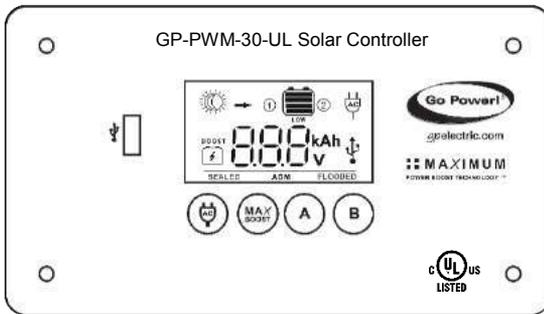
WARNING: When the photovoltaic (solar) array is exposed to light, it supplies a dc voltage to this equipment



AVERTISSEMENT : Lorsque le panneau photovoltaïque (solaire) est exposé à la lumière, il fournit une tension cc à cet équipement.

7.0 Operating Instructions

7.1 Power Up

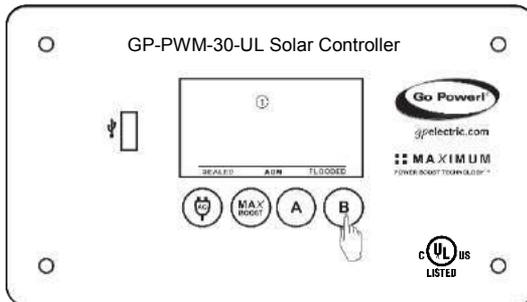


When the GP-PWM-30-UL is connected to the battery, the controller will go into Power Up mode.

Icons Displayed: All segments of the numerical display; Backlight blinks

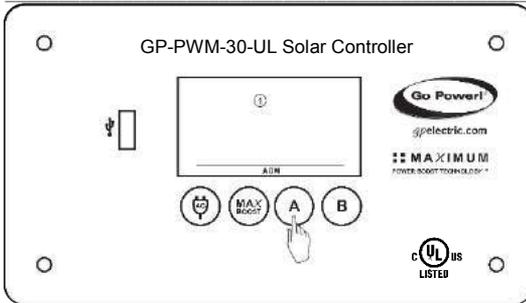
Depending on the battery voltage when the GP-PWM-30-UL Power Up occurs, the controller may do a Boost Charge or quickly go into Float Charge. The Charging Profile selected will commence the following day after a Power Up (refer to the Charging Profile Chart on page 17 for more details).

7.2 Setting the Battery Type and Charging Profile



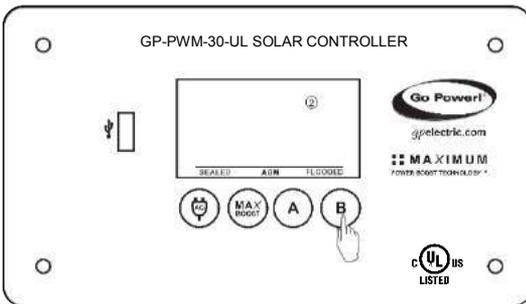
Setting Battery 1

To set the battery type for Battery 1, hold the **B Button** for 3 seconds. When the display shows a blinking number 1, release the **B Button**.



Next, select the charging profile of Battery 1 by pressing the **B Button** to toggle through the profile options: Sealed/Gel, AGM or Flooded.

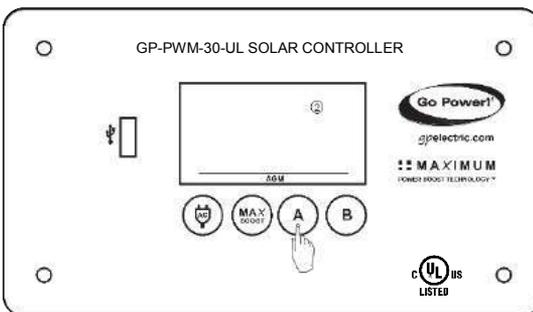
To confirm the battery profile, press and hold the **A Button** for 3 seconds.



Setting Battery 2

If you have a second battery connected, the controller will immediately prompt you to set the battery type for Battery 2 with a blinking number 2.

NOTE If there is not a second battery connected to the controller, or if the second battery is connected with reverse polarity, the controller will not prompt you to select battery type for Battery 2, and no status information will be displayed on the LCD screen.



To select the charging profile of Battery 2, press the **B Button** to toggle through the profile options: Sealed/Gel, AGM or Flooded.

To confirm the battery profile, press and hold the **A Button** for 3 seconds.

Non-volatile memory: Any settings made on the GP-PWM-30-UL will be saved even when the power has been disconnected from the controller.

Refer to the Battery Charge Profile Chart below for details on each profile.

7.3 Battery Charging Profile Chart

Battery Type	SEALED /GEL	AGM	FLOODED
Float Charge @ 25°C:	13.7 VDC (+/- 0.1 V)		
Bulk/Absorption Charge @ 25°C: Set to 30 minutes every morning. <i>Applied for 2 hours if the battery voltage drops below 12.3 volts.</i>	14.1 VDC (+/- 0.1V)	14.4 VDC (+/- 0.1V)	14.4 VDC (+/- 0.1V)
Equalization Charge @ 25°C: <i>Applied for 2 hours every 28 days and if the battery voltage drops below 12.1 volts.</i>	N/A	N/A	14.9 VDC (+/-0.1V)

If a charging cycle is unable to complete in a single day, it will continue the following day.

The terms SEALED/GEL, AGM and FLOODED are generic battery designations. Choose the charging profile that works best with your battery manufacturer's recommendations.

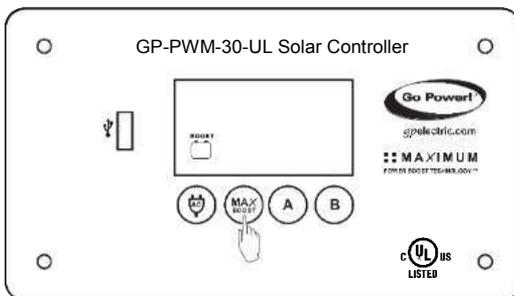
Auto Equalize: The GP-PWM-30-UL has an automatic equalize feature that will charge and recondition your batteries once a month at a higher voltage to ensure that any excess sulfation is removed.

NOTE

This feature is only available when Flooded batteries are selected.

7.4 Maximum Power Boost Technology™

Maximum Power Boost Technology™ (MPBT) allows you to override the normal charging algorithm of the solar controller. MPBT is designed to be used before the end of the day, if you know you will require many loads through the night. This feature can also be used when you have just installed the solar controller, to put batteries on a boost charge up to 14.4 VDC (Flooded and AGM) (14.1 VDC for Sealed/Gel) right away.



To activate, hold the **MAX BOOST Button** for 3 seconds. As long as there is full sunlight present, your battery voltage will be boosted (to 14.4 VDC for Flooded and AGM and 14.1 VDC for SEALED/GEL) for 30 minutes regardless of the battery's state of charge.

Icons Displayed: BOOST; Battery Symbol

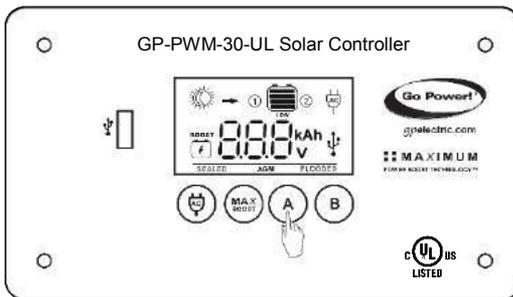
In older controllers, the BOOST text icon will remain on until the controller can maintain a Boost charge voltage for 30 cumulative minutes. In newer controllers, the BOOST text icon will only appear while the controller is maintaining a Boost charge voltage.

IMPORTANT: Do not use the Maximum Power Boost function more than twice a day as it could damage your batteries due to gassing.

NOTE

If sunlight is insufficient or not available, completing Max Power Boost may take much longer than 30 minutes from the time of the button press. Max Power Boost and the BOOST icon cannot be turned off by pressing the Max BOOST button.

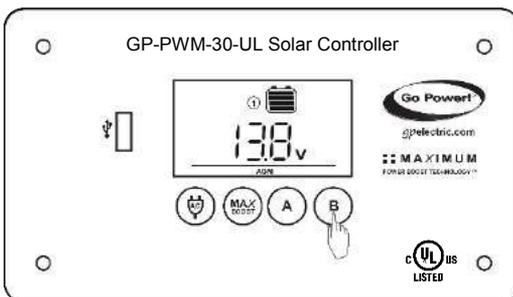
7.5 Viewing the Controller Display Information



The GP-PWM-30-UL has two modes to watch the display information, manual and auto scroll.

You can change between the two modes by holding down the **A Button** for 3 seconds.

Mode 1: Manually Scroll Through Display Information

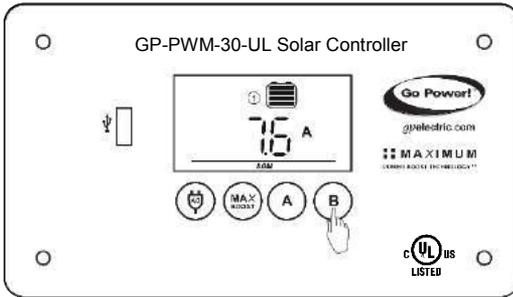


Battery 1 Status Values

To toggle between Battery Voltage, PV Charging Current and Battery State of Charge (SOC) for Battery 1 and 2, press the **B Button**.

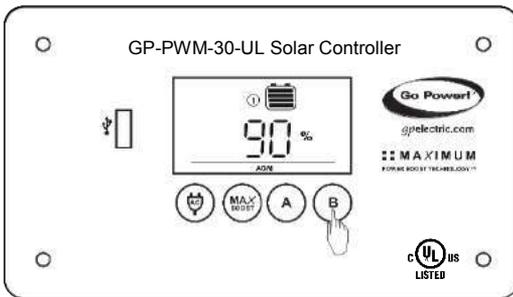
Push the **B Button** to show the voltage for Battery 1.

Icons Displayed: Battery SOC, Volt Symbol (V), Symbol 1



Push the **B Button** to show the PV charging current for battery 1. The GP-PWM-30-UL will begin to limit the current as Battery 1 reaches a full charge. The current that is not used for Battery 1, is used to charge Battery 2.

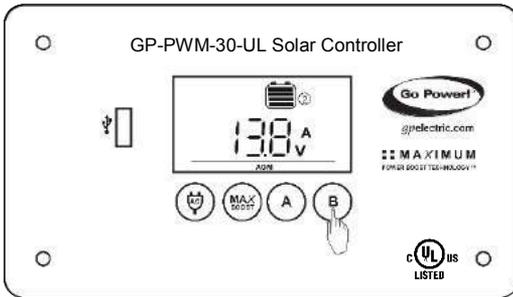
Icons Displayed: Arrow, Ampere Symbol (A), Battery SOC, Symbol 1



The battery state of charge is shown as a percentage.
Icons Displayed: Battery SOC, Percent Symbol (%), Symbol 1

A value of 100% will only be displayed after a Boost or Equalize charge completes.

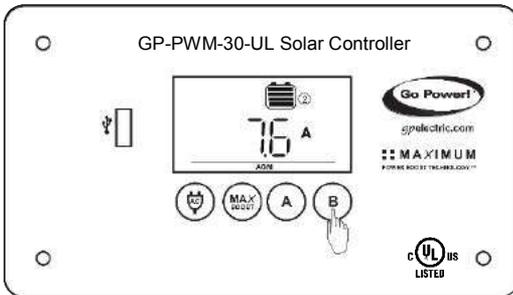
Battery 2 Status Values



Push the **B Button** to show the battery 2 voltage.

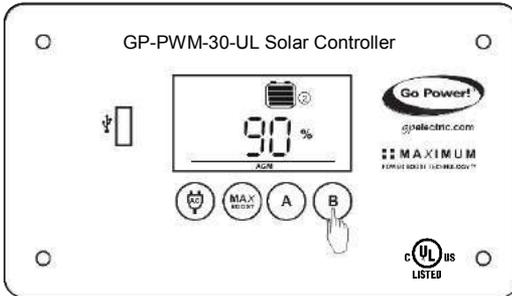
Icons Displayed: Battery SOC, Volt Symbol (V), Symbol 2

This will only be displayed if there are two battery banks connected and battery bank 2 is connected with correct polarity.



Push the **B Button** to show the PV charging current for battery 2. The GP-PWM-30-UL will begin to limit the current as the battery 2 reaches a full charge.

Icons Displayed: Arrow, Ampere Symbol, Battery SOC, Symbol 2



The battery state of charge is shown as a percentage.

Icons Displayed: Battery SOC, Percent Symbol (%), Symbol 2

Mode 2: Automatically Change Display Information

You can select the auto mode by holding down the **A Button** for 3 seconds.

The display shows the same information as in Mode 1 but changes the display automatically every 8 seconds between following information:

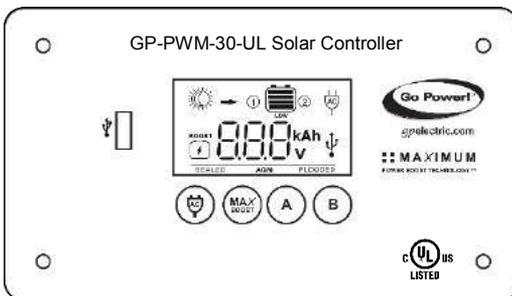
Battery 1: Voltage; PV Charging Current; Battery State of Charge (SOC)

Battery 2: Voltage; PV Charging Current; Battery State of Charge (SOC)

If Battery 2 is not connected, the Controller changes only the information for Battery 1.

7.6 Errors

Over Voltage



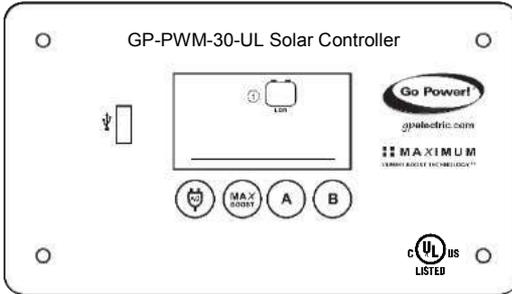
If the GP-PWM-30-UL experiences a battery over voltage (15.5 VDC) on battery bank 1, the controller will stop operating, and the display will begin to flash with all icons. The controller will resume operating when the voltage drops to a normal level <15.5 VDC.

Icons Displayed: All symbols

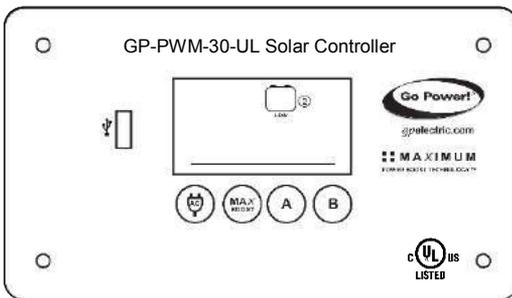
NOTE

The controller does not display over voltage on battery 2.

Low Voltage



Low battery 1: If the SOC of battery bank 1 reaches 0%, the battery SOC symbol will show the text “LOW” beneath it. The controller will continue operating in this condition and will only stop operating if the voltage of Battery 1 drops below 9.0 VDC.



Low battery 2: If there are two battery banks connected and the SOC of battery bank 2 reaches 0%, the battery SOC symbol will show the text “LOW” beneath it. The controller will continue operating in this condition and will only stop operating if the voltage of Battery 1 drops below 9.0 VDC (this is

because the GP-PWM-30-UL is powered by Battery 1).

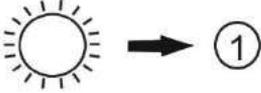
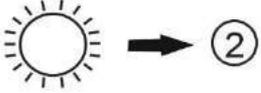
Icons Displayed: Battery SOC Symbol, LOW, Symbol 1 or 2

Battery 1 Reverse Polarity

If the GP-PWM-30-UL senses reverse polarity on battery 1, the controller will stop operating, beep continuously and display POL. The controller will resume operating when the error is cleared.

Icons Displayed: POL

8.0 Display Symbols

Symbol	Indicator For:
Battery 1	
	Day Time: PV Charge Current
	Night Time
	Battery Voltage
	Battery State of Charge
SEALED	Sealed/Gel
AGM	AGM
FLOODED	Flooded
Battery 2	
	Day Time: PV Charge Current
	Night Time
	Battery Voltage
	Battery State of Charge
SEALED	Sealed/Gel
AGM	AGM
FLOODED	Flooded

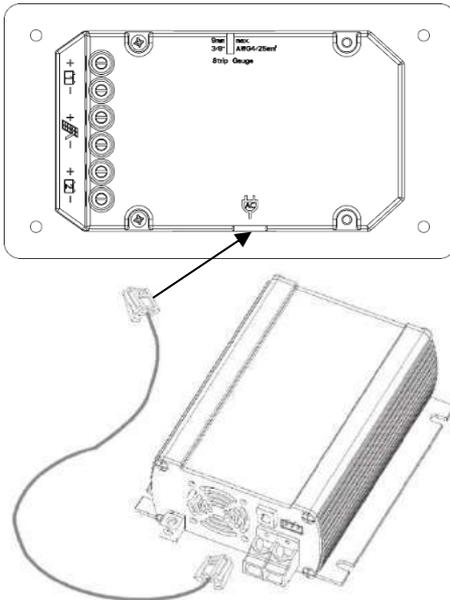
Other Symbols	
	USB charger on (When USB charger is off, no symbol will show)
	Inverter on (Can only be used when and inverter is hardwired. See Section 9.0. When inverter is off, no symbol shows)
BOOST	Max Power Boost activated, Boost charge incomplete
LOW	Battery 1 / 2 voltage is lower than 11.0 VDC
Whole display will start to blink	Battery 1 voltage > 15.5 VDC
No Symbol	Battery 2 voltage >15.5 VDC
POL	Battery 1 reverse polarity
Battery State of Charge	
Symbol	Battery Voltage
	Shows only after full Boost or Equalization Cycle
	>= 12.6 VDC
	>= 11.8 -12.6 VDC
	> 11.0 -11.8 VDC
 LOW	<= 11.0 VDC
100%	Shows only after full Boost or Equalization Cycle
90%	>= 12.8 VDC
$SOC = \frac{batteryvoltage - 11.0V}{1.8V} * 90\%$	< 12.8 VDC and > 11.0 VDC
0%	<= 11.0 VDC

9.0 Inverter Control (on/off)

The following Go Power!® inverters can be turned on/off through the GP-PWM-30-UL when a modular 6p4c RJ11 type connector is used (included with an optional Go Power!® inverter remote):

- GP-ISW700-12
- GP-ISW1000-12
- GP-SW1000-12
- GP-HS1500-12
- GP-ISW1500-12
- GP-ISW2000-12
- GP-SW2000-12
- GP-SW3000-12

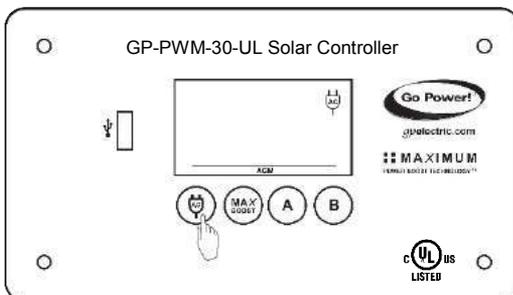
*The GP-SW1500 Inverter is not compatible.



First, connect the inverter directly to the battery (follow the installation instructions included with the inverter).

Then, connect the modular cable (found in the inverter remote box) to the remote terminal of the inverter and to the remote terminal of the GP-PWM-30-UL (marked with an **AC Plug symbol**).

Please change the switch of the inverter to Position 2 (Remote controlled).



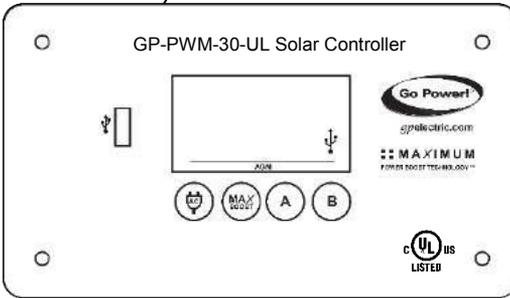
Now, you can turn the connected inverter on or off by holding down the **AC Symbol Button** for 3 seconds.

The inverter is enabled when the **AC plug symbol** appears on the display and is off when it disappears.

10.0 USB Charging

The GP-PWM-30-UL offers a standard USB connector for delivering 5.0 VDC to small mobile appliances such as cell phones, tablets, small music players. This charging port is capable of supplying up to 800 mA of current.

Remove the rubber cover of the USB terminal to access the terminal.



The USB charging port is always active when the **USB symbol** appears on the display.

Battery 1, connected to the Battery 1 terminals, supplies the power for the USB charger.

The controller disables the USB charger automatically if the battery 1 voltage drops below 11.0 VDC. If there is enough current from the PV panel/array available to charge Battery 1 to above 12.8 VDC, the USB terminal will be enabled again.

WARNING: Do not connect the charging device anywhere else! USB-Negative contact is connected to battery negative.

11.0 Frequently Asked Questions (FAQs)

Before a problem is suspected with the system, read this section. There are numerous events that may appear as problems but are in fact perfectly normal. Please visit gpelectric.com for the most up-to-date FAQs.

It seems like my flooded batteries are losing water over time.

Flooded batteries may need to have distilled water added periodically to replace fluid loss during charging. Excessive water loss during a short period of time indicates the possibility of overcharging or aging batteries.

When charging, my flooded batteries are emitting gas.

During charging, hydrogen gas is generated within the battery. The gas bubbles stir the battery acid allowing it to receive a fuller state of charge.

Important: Ensure batteries are in a well-ventilated space.

My voltmeter shows a different reading than the GP-PWM-30-UL display

The meter value on the GP-PWM-30-UL display is an approximate reading intended for indication purposes only. There is an approximate 0.1 VDC inherent error present that may be accentuated when compared with readings from another voltmeter.

There may be a slight difference between the battery voltage displayed on the GP-PWM-30-UL display and the battery voltage measured at the battery terminals. When troubleshooting using a voltmeter, check both the battery voltage at the GP-PWM-30-UL controller terminals and battery voltage at the battery terminals. If a difference of more than 0.5 VDC is noted, this indicates a large voltage drop possibly caused by loose connections, long wire runs, small wire gauge, faulty wiring, a faulty voltmeter or all the above. Consult the Suggested Minimum Wire Gauge chart in **Section 5** for wiring suggestions and check all connections.

For advanced users:

The GP-PWM-30-UL makes voltage measurement adjustments based on resistance it detects at the battery terminals. In addition to resistance in the wires, batteries also have an internal resistance due to chemical properties. The controller cannot distinguish between these two sources of resistance. It will compensate up to 250mV in the displayed value.

What causes a warning signal and when are the warnings triggered?

Connection	Warning	Notes	LCD
Battery 1 reverse polarity	“POL” on LCD and constant audible alarm		
Battery 2 reverse polarity	Battery 2 status display doesn't show	Battery 1 must be connected with correct polarity for unit to be powered on	
PV reverse polarity	“POL” on LCD and constant audible alarm		
PV short circuit		Unit shows moon symbol when PV is connected and in bright sunlight	 *must have bright sunlight on PV too

Why does the battery SOC % never reach 100%?

A 100% value will only appear after a 2 hour Boost or Equalize charge has completed. The charge voltage must be maintained for an extended period of time to replenish the energy in the battery bank back to its rated capacity.

If the charge voltage cannot be maintained continuously, then the actual time it takes to complete Boost or Equalize charging may take much longer than 2 hours, even more than 1 day.

If loads are consuming more power than the solar panels can supply, then the battery bank cannot be charged to 100%.

12.0 Troubleshooting Problems

How to Read this Section

Troubleshooting Problems is split into three sub-sections, grouped by symptoms involving key components. Components considered irrelevant in a diagnosis are denoted 'Not Applicable' (N/A). A multimeter or voltmeter may be required for some procedures listed.

It is imperative all electrical precautions stated in the Warning Section and outlined in the Installation Section are followed. Even if it appears the system is not functioning, it should be treated as a fully functioning system generating live power.

12.1 Problems with the Display

Display Reading: Blank

Time of Day: Daytime/Nighttime

Possible Causes:

Battery or fuse connection and/or solar array connection (Daytime only) or battery or fuse connection (Nighttime only).

How to tell:

1. Check the voltage at the controller battery terminals with a voltmeter and compare with a voltage reading at the battery terminals.
2. If there is no voltage reading at the controller battery terminals, the problem could be a fuse, or the wiring between the battery and the controller. If the battery voltage is lower than 6 volts the controller will not function.
3. For the solar array, repeat steps 1 and 2 substituting all battery terminals with solar array terminals.

Remedy:

Check all connections from the controller to the battery including checking for correct wire polarity. Check that all connections are clean, tight, and secure. Ensure the battery voltage is above 6 volts.

Display Reading: Nighttime

Time of Day: Daytime

Possible Causes:

Panel is covered by something; PV panel is too dirty to supply a high enough voltage to charge the battery; PV panel is not connected.

Remedy:

Check the panel and to ensure it is not obscured. Clean the panel if it is dirty. Check that PV cables are connected to the controller.

12.2 Problems with Voltage

Voltage Reading: Inaccurate

Time of Day: Daytime/Nighttime

Possible Cause:

Excessive voltage drop from batteries to controller due to loose connections, small wire gauge or both.

How to tell:

1. Check the voltage at the controller battery terminals with a voltmeter and compare with the voltage reading at the battery terminals.
2. If there is a voltage discrepancy of more than 0.5 VDC, there is an excessive voltage drop.

Remedy:

Check all connections from the controller to the battery including checking for correct wire polarity. Check that all connections are clean, tight, and secure. Shorten the distance from the controller to battery or obtain larger gauge wire. It is also possible to double up the existing gauge wire (i.e. two wire runs) to simulate a larger gauge wire.

12.3 Problems with Current

Current Reading: 0 A

Time of Day: Daytime, clear sunny skies

Possible Cause:

Current is being limited below 1 Amp as per normal operation or poor connection between solar array and controller.

How to tell:

1. The State of Charge (SOC) screen is close to 100% and the Sun and Battery icon are present with an arrow between.
2. With the solar array in sunlight, check the voltage at the controller solar array terminals with a voltmeter.
3. If there is no reading at the controller solar array terminals, the problem is somewhere in the wiring from the solar array to the controller.

Remedy:

1. Hold down the MAX BOOST Button for approximately 3 seconds to activate Maximum Power Boost. This will allow the controller to charge batteries to 14.4 +/- 0.1 VDC (14.4 +/- 0.1 VDC Sealed/Gel) with all current the solar array is producing.
2. Check all connections from the controller to the array including checking for correct wire polarity. Check that all connections are clean, tight, and secure. Continue with the solutions below for additional help on low current readings.

Current Reading: Less than expected

Time of Day: Daytime, clear sunny skies

Possible Causes:

- (1) Current is being limited below 1 Amp as per normal operation.
- (2) Incorrect series/parallel configuration and/or wiring connections and/or wire gauge.
- (3) Dirty or shaded module or lack of sun.
- (4) Blown diode in solar module when two or more modules are connected in parallel.
- (5) The battery is full.

How to tell:

- (1) Battery State of Charge screen is close to 100% and the Sun and Battery icon are present with an arrow in between.

- (2) Check that the modules and batteries are configured correctly. Check all wiring connections.
- (3) Modules look dirty, overhead object is shading modules or it is an overcast day in which a shadow cannot be cast.

NOTE

Avoid any shading no matter how small. An object as small as a broomstick held across the solar module may cause the power output to be reduced. Overcast days may also cut the power output of the module.

- (4) Disconnect one or both array wires from the controller. Take a voltage reading between the positive and negative array wire. A single 12 volt module should have an open circuit voltage between 17 and 23 VDC. If you have more than one solar module, you will need to conduct this test between the positive and negative terminals of each module junction box with either the positive or the negative wires disconnected from the terminal.

Remedy:

- (2) Reconnect in correct configuration. Tighten all connections. Check wire gauge and length of wire run. Refer to Suggested Minimum Wire Gauge in **Section 5**.
- (3) Clean modules, clear obstruction or wait for conditions to clear.
- (4) If the open circuit voltage of a non-connected 12 volt module is lower than the manufacturer's specifications, the module may be faulty. Check for blown diodes in the solar module junction box, which may be shorting the power output of module.

13.0 Limited Warranty

1. Go Power! warrants the GP-PWM-30-UL for a period of five (5) years from the date of shipment from its factory. This warranty is valid against defects in materials and workmanship for the five (5) year warranty period. It is not valid against defects resulting from, but not limited to:
 - Misuse and/or abuse, neglect or accident
 - Exceeding the unit's design limits
 - Improper installation, including, but not limited to, improper environmental protection and improper hook-up
 - Acts of God, including lightning, floods, earthquakes, fire, and high winds
 - Damage in handling, including damage encountered during shipment
2. This warranty shall be considered void if the warranted product is in any way opened or altered. The warranty will be void if any eyelet, rivets, or other fasteners used to seal the unit are removed or altered, or if the unit's serial number is in any way removed, altered, replaced, defaced, or rendered illegible.

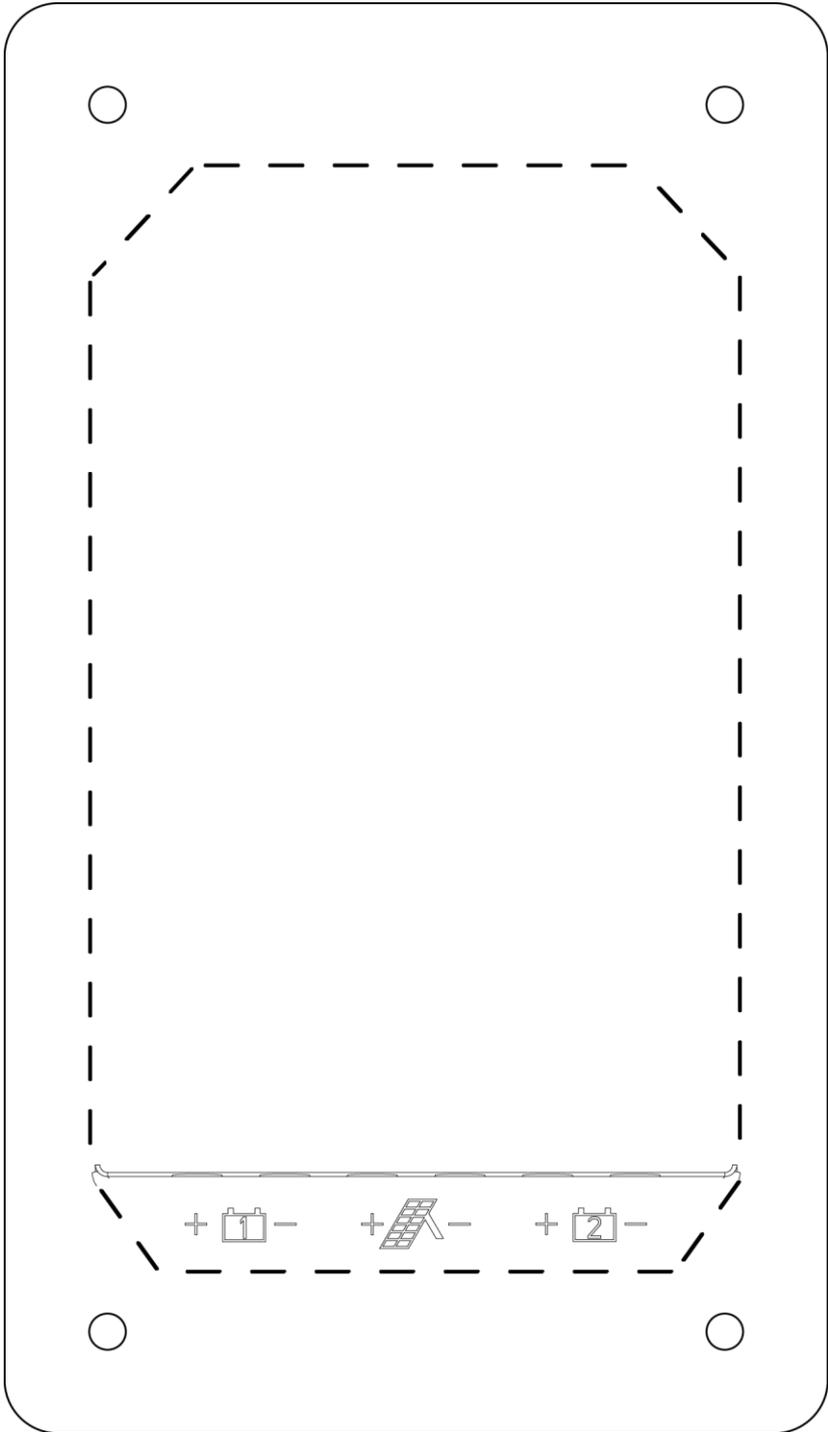
13.1 *Repair and Return Information*

Visit www.gpelectric.com to read the "frequently asked questions" section of our website to troubleshoot the problem. If trouble persists:

1. Call your Go Power!® Technical Support team (1-866-247-6527).
2. Return defective product to place of purchase

14.0 Installation Template

Use the template on page 34 for flush mounting the controller.





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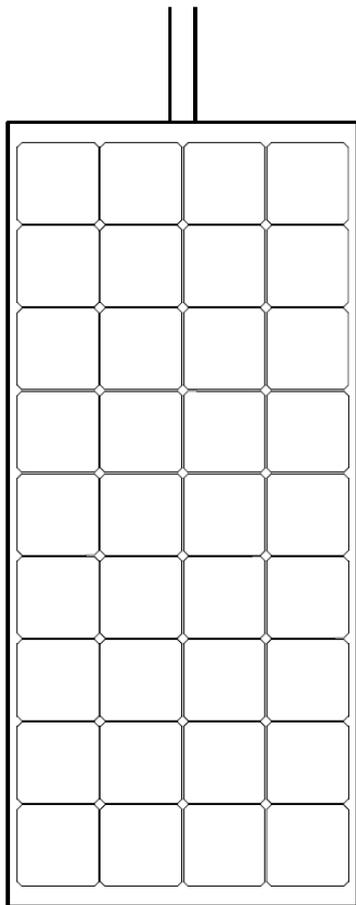
MOBI_MAN_GP-PWM-30-UL_vG

gpelectric.com

RV SOLAR POWER KITS™

User Manual

SOLAR EXTREME
SOLAR ELITE
WEEKENDER ISW
OVERLANDER
OVERLANDER-E
RETREAT
RETREAT-E



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Worldwide Technical Support and Product Information gpelectric.com

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56587_MANUAL_GP_RV-KITS-SYSTEMS_RevK



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2. GENERAL INFORMATION

Congratulations on purchasing your Go Power! RV Solar Kit. You have chosen a clean, quiet and sustainable power source. Go Power! Solar RV Kits allow you to power appliances in your RV, without hooking up to shore power or a noisy generator. Go Power! Solar RV kits will keep your batteries charged, ensuring you have power when you need it.

This mobile DC power system allows you to enjoy the luxuries that electricity provides, without a campsite hookup. For simple battery maintenance or full-time live-aboard power, Go Power! RV Solar Power Kits are available in a variety of sizes and can be installed on RVs, campers, trailers, fifth wheels and motor homes. As with any off-grid power systems, the user is required to manage electrical loads to ensure continual power availability for essential services. Your location and season (hours of sunlight available) play a role in how much energy can be harnessed from this kit.

Note This manual will aid in the process of installing the Go Power! Solar RV Kit. Please read and understand this manual and all included manuals before installing the Go Power! Solar RV Kit. Review all diagrams included in this guide for the easiest and safest installation. **Please retain this manual for future reference.**

2.1 HOW DOES A GO POWER! SOLAR CHARGING KIT WORK?

The solar panel converts the sun's energy into DC electricity and this electricity charges the battery. The battery stores the electricity, similar to a water tank storing water. This battery power may be used at any time to operate DC powered devices connected to the battery. To increase the battery service life, a solar controller is used to prevent the solar panels from overcharging the batteries. This process is managed by the GP-PWM-30 Solar Charge Controller included in this kit. See Figure 2-A (below) and 2-B (on following page) for solar system examples.



WARNING: When connecting multiple panels, they will be connected in PARALLEL. Failure to follow this connection procedure will cause the system to produce large currents which the protection device, DC fuse, is not designed to handle.

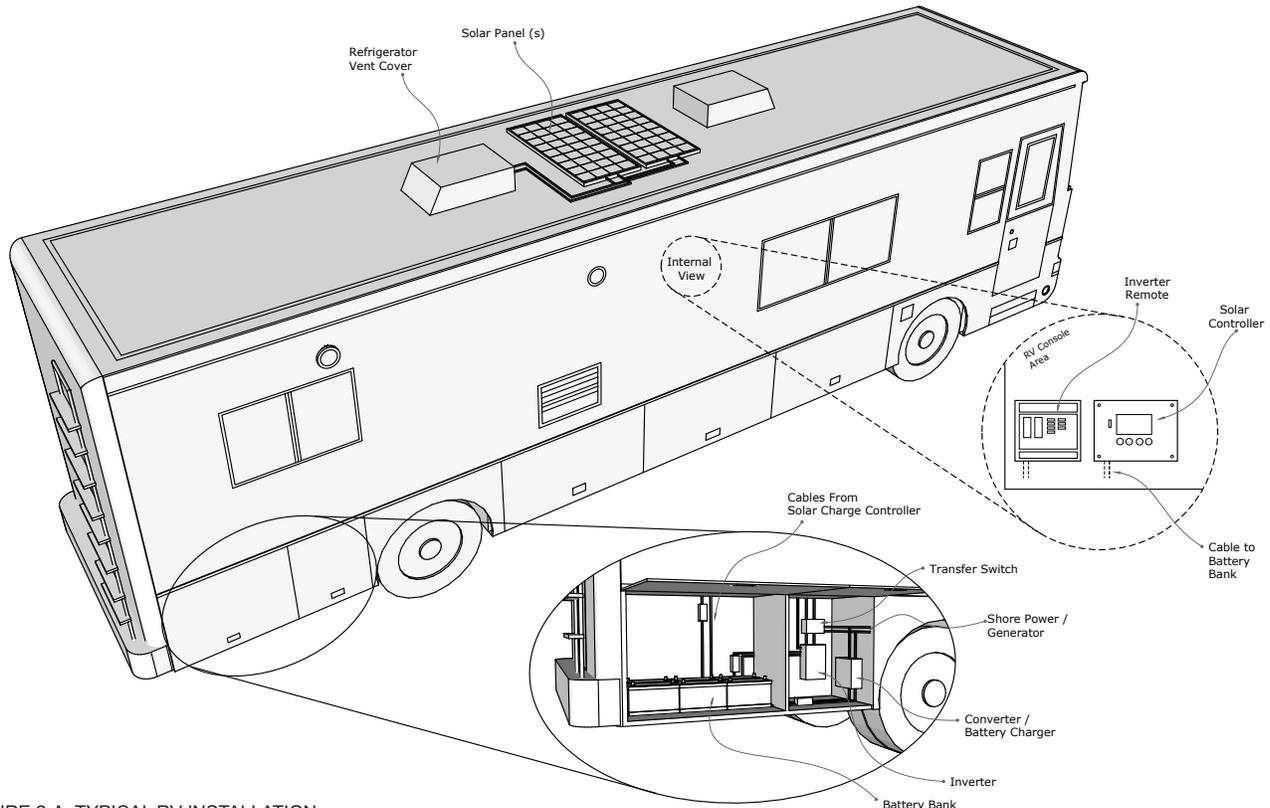


FIGURE 2-A: TYPICAL RV INSTALLATION

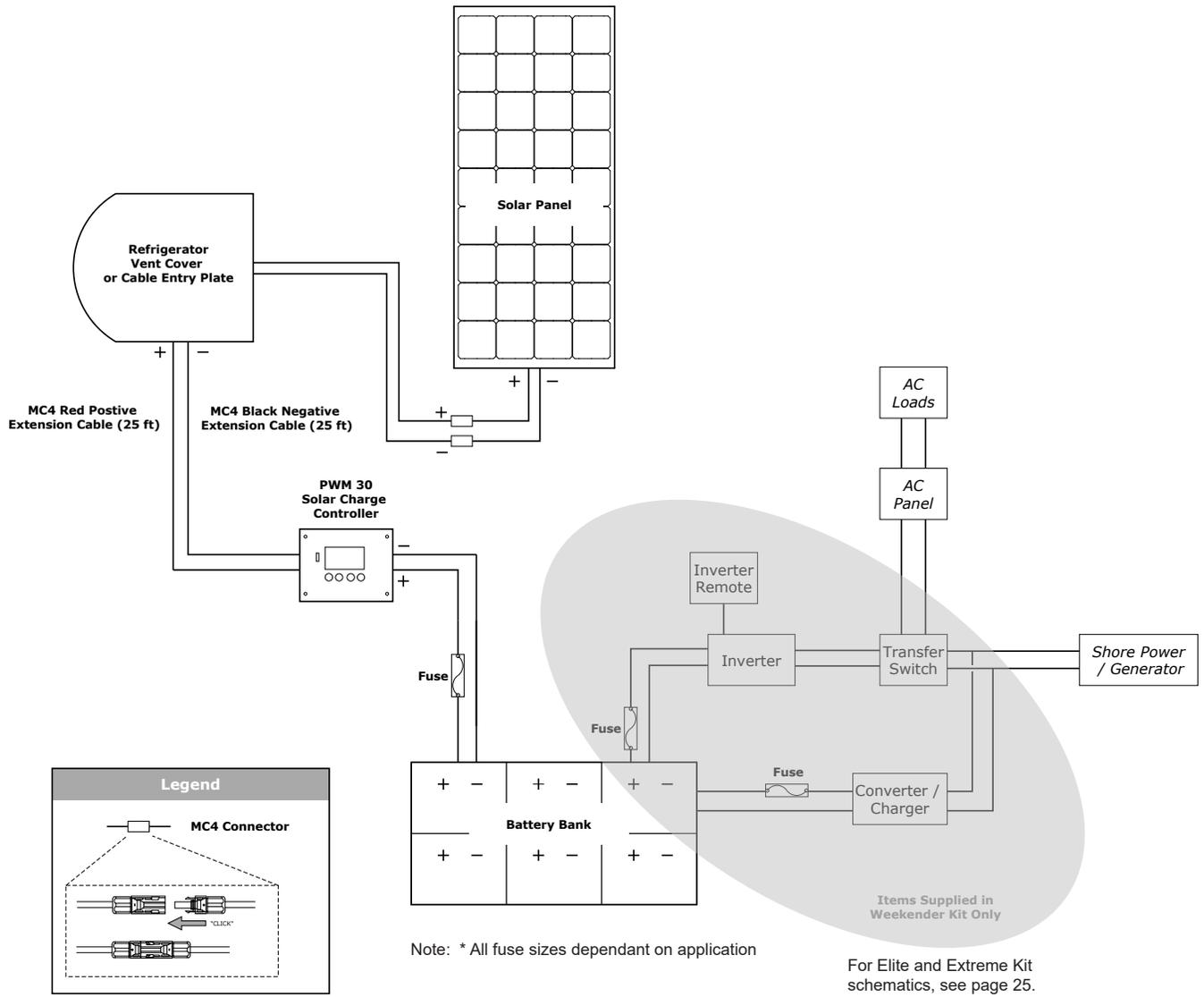


FIGURE 2-B: SOLAR SYSTEM TYPICAL WIRING DIAGRAM

2.2 CAUTIONS

Disconnect all power sources before attempting installation

Electricity can be very dangerous. Installation should be performed only by a licensed electrician or qualified personnel.



Solar panel safety

Photovoltaic panels generate DC electricity when exposed to sunlight or other light sources. Contact with the electrically active parts of the panel, such as terminals, can result in burns, sparks and lethal shock whether the panel is connected or disconnected.

When panels are connected in parallel, amperages are additive. Consequently, a system assembled from photovoltaic panels can produce high amperages, which constitute an increased hazard. Do not touch terminals while panel is exposed to light. Cover the panel face completely with opaque material to halt the production of electricity when installing or working with panels or wiring.



Battery and wiring safety

Observe all safety precautions of the battery manufacturer when handling or working around batteries. When charging, batteries produce hydrogen gas, which is highly explosive. Work in a well ventilated area and use caution when making or removing electrical connections. Ensure wires are disconnected from their power sources when wiring. Do not expose battery to open flame, cigarettes or sparks. Shield skin and eyes from battery acid.



Ensure all connections are tight and secure. Loose connections may generate sparks, heat and in extreme cases may catch fire. Be sure to check connections one week after installation to ensure they are still tight.



Work safely

Wear protective eye wear and appropriate clothing during installation. Use extreme caution when working with electricity and when handling and working around batteries. Use properly insulated tools only.



Observe correct polarity at all times

Reverse polarity of the battery terminals will cause the controller to give a warning tone. Reverse connection of the array will not cause an alarm but the controller will not function. Failure to correct this fault could damage the controller.



Do not exceed the voltage and current ratings of the Solar Controller

The total current of the solar system is the sum of the short circuit current of the solar panels in parallel, multiplied by a safety factor of 1.25. The resulting system current is not to exceed the amperage rating of the controller. The voltage of the array is the rated open circuit voltage of the solar panels and is not to exceed 28volts.

The current rating of the solar system is the sum of the Maximum Power Current (Imp) of the solar PV strings in parallel. The resulting system Imp current is not to exceed 30A. If your solar system exceeds these ratings, contact your dealer for a suitable controller alternative.



2.3 DISCLAIMERS

IMPORTANT: Please follow installation and wiring instructions exactly as outlined to ensure safety. We recommend installation by an RV technician or professional electrician to ensure adherence to relevant electrical codes. We have made every reasonable effort to ensure the accuracy of the instructions in this manual, but Go Power! does not guarantee that the information is error free, nor do we make any other representation, warranty or guarantee that the information is accurate, correct, reliable or current. The specifications in this manual are for reference purposes only and are subject to change without notice. For additional information please see www.gpelectric.com.

DISCLAIMER: Go Power! disclaims liability for any direct, indirect or incidental damages caused by, or in case of, installation not performed following the instructions and cautions in this manual. Go Power! will refuse requests for exchanges or returns, resulting from the purchase and installation of items which do not comply with local codes. To avoid such concerns Go Power! recommends installation by a professional electrician or RV technician. Examples that are shown within this manual are for illustrative purposes only.

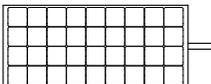
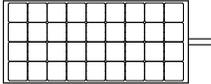
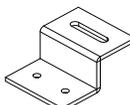
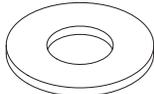
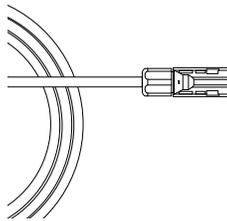
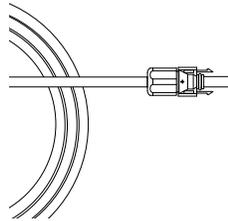
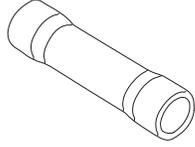
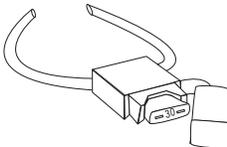
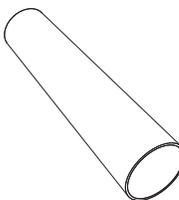
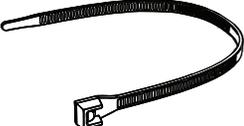
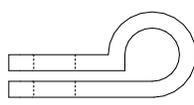
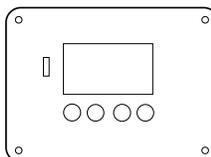
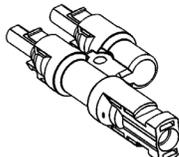
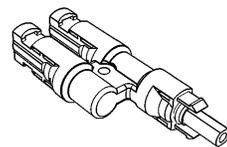
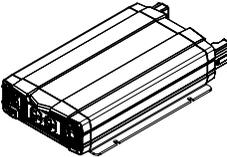
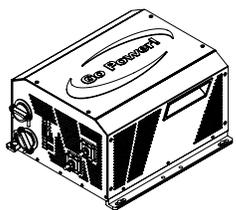
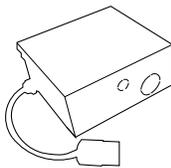
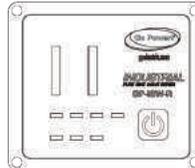
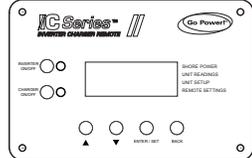


2.4 KIT PARTS

Note Please unpack and make sure all parts shown in the list below are included in the kit. If any parts are missing please contact the Go Power! customer service team at customersupport@gpelectric.com or 1.866.247.6527.

2.4.1 PARTS CHECKLIST

ITEM #	DESCRIPTION	RETREAT	RETREAT E	OVERLANDER	OVERLANDER-E	WEEKENDER ISW	SOLAR ELITE	SOLAR EXTREME
01	CTI-100, 100W solar panel	1	1					
02	GP-PV-170M, 170W solar panel			1	1	1	2	3
03	Solar panel mounting feet	4	4	4	4	4	8	12
04	1/4" bolt	4	4	4	4	4	8	12
05	1/4" lock nut	4	4	4	4	4	8	12
06	1/4" washer	8	8	8	8	8	16	24
07	#10-16 x 1" screw	8	8	8	8	8	16	24
08	#6 x 3/4" screw	6		6		6	6	18
09	MC4 Black Negative Wire Extension Cable (25 ft)	1		1		1	1	1
10	MC4 Red Positive Wire Extension Cable (25 ft)	1		1		1	1	1
11	Butt Splice, 12-10 AWG	2		2		2	2	2
12	Fuse Holder	1		1		1	1	1
13	30A Fuse	1		1		1	1	1
14	Heat Shrink	2		2		2	2	2
15	Tie Wrap	6		6		6	6	6
16	Cable Clamp	6		6		6	6	6
17	Ring Terminal	2		2		2	2	2
18	PWM 30 Amp Solar Charge Controller	1		1		1	1	1
19	MC4 Expansion Connector (1 Male, 2 Female)		1		1		1	2
20	MC4 Expansion Connector (2 Male, 1 Female)		1		1		1	2
21	1500 Watt Industrial Pure Sine Inverter					1		
22	2000 Watt Pure Sine Inverter Charger (with built-in 100 Amp Battery Charger and 50 Amp Transfer Switch)						1	
23	3000 Watt Pure Sine Inverter Charger (with built-in 125 Amp Battery Charger and 50 Amp Transfer Switch)							1
24	30 Amp Transfer Switch					1		
25	Industrial Pure Sine wave Inverter Remote					1		
26	Inverter Charger Remote						1	1
27	GP DC Kit 3					1		
28	GP DC Kit 4						1	
29	GP DC Kit 5							1

 <p>1</p>	 <p>2</p>	 <p>3</p>	 <p>4</p>	 <p>5</p>
 <p>6</p>	 <p>7, 8</p>	 <p>9</p>	 <p>10</p>	 <p>11</p>
 <p>12,13</p>	 <p>14</p>	 <p>15</p>	 <p>16</p>	 <p>17</p>
 <p>18</p>	 <p>19</p>	 <p>20</p>	 <p>21</p>	 <p>22, 23</p>
 <p>24</p>	 <p>25</p>	 <p>26</p>	 <p>27</p>	 <p>28</p>
 <p>29</p>				



2.5 REQUIRED TOOLS

a. Screwdriver (Phillips)	h. 1/16" and 3/8" Drill Bits
b. Keyhole Saw	i. 5/16" & 7/16" Wrench
c. Pencil or Marker	j. Heat Gun
d. Pliers	k. Caulking Gun
e. Wire Strippers and Cutters	l. Sealant
f. Butt Splice Crimping Tool	m. Digital Multimeter (troubleshooting only)
g. Electric Hand Drill	n. Torque Driver (optional)

Design your solar set up here:

3.1 PLAN YOUR SOLAR SYSTEM SETUP

1. Take a few minutes before commencing any installation work to layout your solar system on paper first. Use the diagrams within this manual (pages 20-27) to help.
2. Complete a simple block diagram identifying the key components and connections of your Solar charging system: Solar Panels, MC4 Positive and Negative Extension Cables, GP-PWM-30 Solar Charge Controller and your Battery Bank as detailed in the diagrams.
3. For the **Elite and Extreme Kits** include the Inverter, Charger/Converter and Transfer Switch. For detailed installation of these system components see the specific manuals included with each item.
4. Identify and prepare easy/safe access to possible installation locations in the 3 key installation areas within your RV;
 - **Roof** Solar Panels
 - **Instrument/Controls** Solar Charge Controller and/or Inverter Remote
 - **Storage Compartments** Inverter, Converter/Charger, Transfer Switch
5. Identify on your RV if you have a **Cable Entry Plate (CEP)** see **Fig 3-A** pre-installed by the RV Manufacturer. The Cable Entry Plate makes the Solar Panel to Solar Charge Controller installation simpler. (After market purchase of GP-CEP available)
6. If you do not have the Cable Entry Plate pre-installed on your RV, you will be following the 'Routing Power Cable through the Refrigerator Vent' steps.
7. Whilst on the roof of your RV identify the refrigerator vent and investigate the vent-fastening hardware.

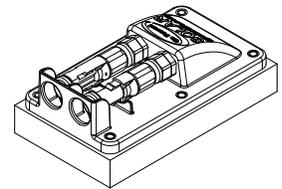


FIGURE 3-A: CEP

3.2 PLACEMENT OF SOLAR PANELS

1. Remove all solar panels from their boxes. **Set aside the boxes as they will be used in the instructions to follow.**
2. Using the solar panel boxes, plan the layout of the panels on your RV rooftop. Once you have positioned the boxes

Note

- Placement of the panel(s) should be as close together as possible. Each panel has 3.3' of cable coming from the junction box. It may be necessary to use solar panel extension cables. If required, longer extension cables can be purchased. Please contact customer service at 1.866.247.6527 to purchase.
- Select a location where the mounting surface is at least 1/2" thick and strong enough to support the solar panel mounting hardware.
- Solar panels should be located a minimum of 3' from the front of RV to reduce wind load on the panels.
- Avoid internal wiring when selecting the solar panel mounting locations for drilling the mounting holes.
- Ensure fixed obstacles, such as air conditioners, will not shade the solar panels. (Shading can greatly reduce the performance of the solar system).
- Ensure there is enough room to access the panels and other fixed obstacles for future inspection and maintenance.

3.3 LOCATING THE GP-PWM-30 AMP SOLAR CHARGE CONTROLLER

The GP-PWM-30 is included in all Go Power! RV Solar Kits detailed in this manual except for the expansion kits (Retreat-E, Overlander-E). The GP-PWM-30 provides the necessary protection for the RV battery system. A condensed version of the installation instructions appear in this manual. However, please read the full installation manual included with the GP-PWM-30 Solar Charge Controller.

1. Plan where the GP-PWM-30 solar charge controller will mount, see Figure 3-B.

- Note**
- The GP-PWM-30 is designed to be mounted vertically in an indoor location inside a weatherproof enclosure.
 - Ideally the GP-PWM-30 should be located so it can be easily seen for monitoring system operation. Locate at eye level (the backlit LED affects viewing angle)
 - The location will need access to the cable ends from the solar panels and the battery compartment.



WARNING: Failure to secure the GP-PWM-30 could cause it to become dislodged while the RV is in transit and cause severe damage to the unit and/or the RV.

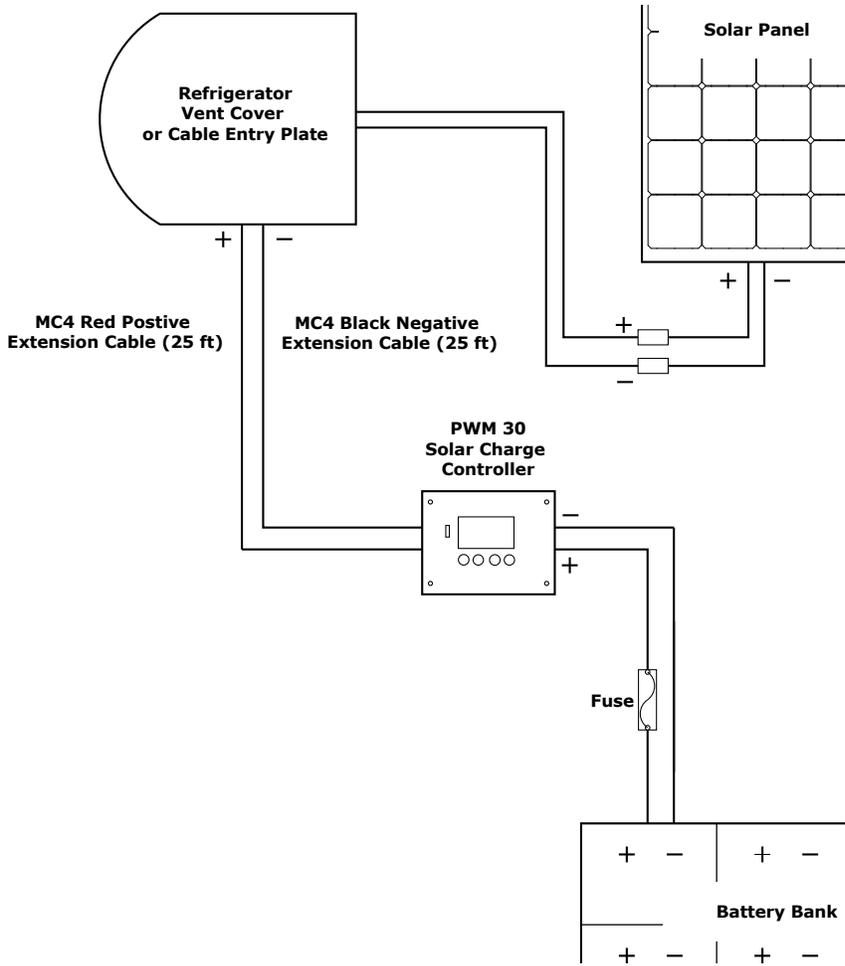


FIGURE 3-B

4.1 MOUNTING FEET

1. Assemble 4 mounting feet onto each of the solar panels frame using the 1/4" bolts and nuts. This assembly is easily completed on the ground before the panels are brought up to the RV roof. (See Figure 4-A)



WARNING:

- The mounting feet must be installed on the 4 outer holes in the panel frame.
- All 4 mounting feet must be used on a solar panel.
- The mounting surface must be at least 1/2" thick and strong enough to support the solar panel mounting hardware.

2. Tighten the nuts securely using a 7/16" wrench.

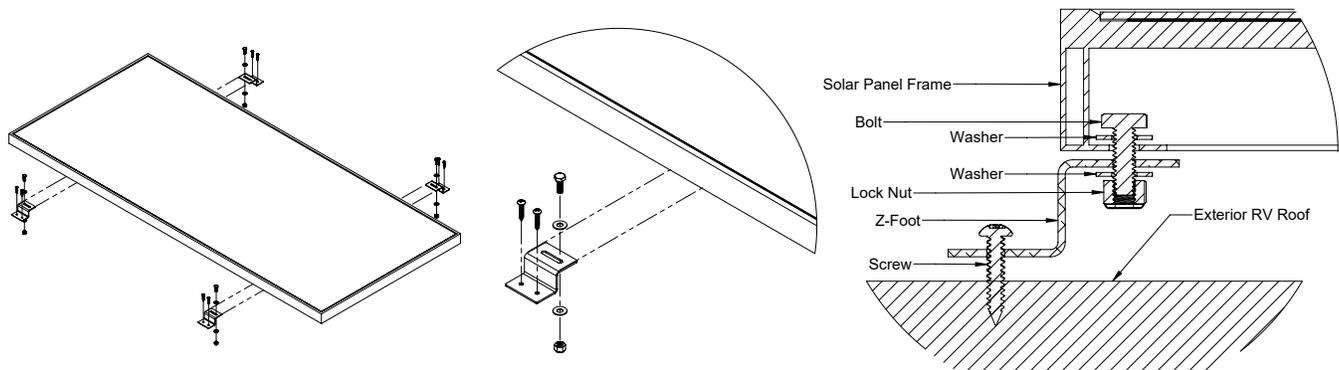


FIGURE 4-A: SOLAR PANEL INSTALLATION DETAILS

4.2 SOLAR PANELS



WARNING: Photovoltaic panels generate DC electricity when exposed to sunlight or other light sources. When exposed to light, contact with the electricity active parts of the panel, such as terminals, can result in burns, sparks and lethal shock whether the panel is connected or disconnected.

A solar system assembled from photo-voltaic panels can produce high currents which constitute an increased hazard. Do not touch the terminals while the panel is exposed to light. Cover the panel faces completely with an opaque material to stop the production of electricity when working with panels or wiring – the cardboard shipping boxes are the perfect option to cover glass surface of the panels.

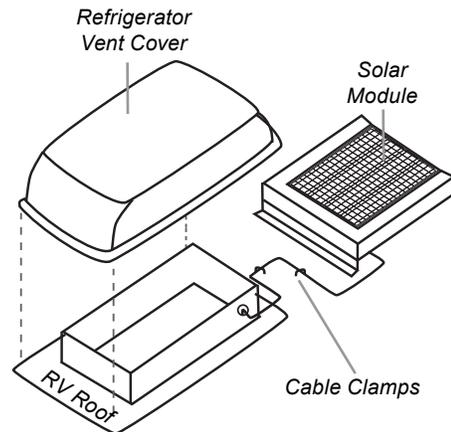
1. Locate the solar panels on the RV roof replacing each the boxes used in the planning step.
2. Locate the Cable Entry Plate / Fridge Vent Access Point on the RV roof.
3. Attached the MC4 Positive and Negative Extension Cables to the solar panel (s).
4. Test that the end solar panel cables can reach the CEP / Fridge Vent Access Point.
5. Use the screws provided in the kit to secure the 4 solar panel mounting feet to the RV.
6. Apply sealant under and around each of the 4 mounting feet to ensure a watertight installation.

WARNING: All 4 mounting feet must be securely fastened to the RV roof. Failure to do so could cause the panels to lift and separate from the RV while in transit which could cause significant damage and/or injury.

Note Use appropriate sealant as recommended by your RV Dealer for your RV roof.

4.3 REFRIGERATOR VENT ACCESS OPTION 1

1. Locate the refrigerator vent on the roof of the RV. Remove vent cover to gain access to the duct opening.
2. Drill a hole through the side of the vent (5/8" hole).
3. Remove any sharp edges from the hole.
4. Insert a rubber grommet (not included) into the hole.
5. Insert the MC4 Positive and Negative Extension Cables through the hole and carefully route it to the GP-PWM-30 Solar Charge Controller. Be certain to leave enough slack to allow cable routing from module to vent along desired path.
6. Use cable clamps with the #6 self-tapping screw and/or tie wraps every few feet along RV roof and interior route to the GP-PWM-30 Solar Charge Controller.
7. Ensure all penetrations into the RV roof are watertight. Use an appropriate sealant as recommended by your RV Dealer to seal holes wherever necessary.
8. Replace vent cover.



Caution: The drilled hole may have sharp edges or burrs - REMOVE

FIGURE 4-B

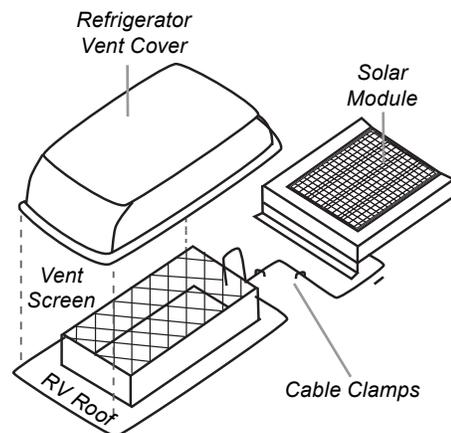
4.4 REFRIGERATOR VENT ACCESS OPTION 2

1. Locate the refrigerator vent on the roof of the RV. Remove vent cover to gain access to the duct opening.
2. Thread MC4 Positive and Negative Extension Cables carefully through the screen and into opening.
3. Enlarge screen grid hole if necessary.
4. Remove any sharp edges from the hole.
5. Avoid strapping the power cable to existing wire between the module and the battery.

Note

Allowing a few inches of space between the power cable and existing wire will lessen the chance of voltage loss through thermal conduction.

6. Use cable clamps with the # 6 self-tapping screw and/or tie wraps every few feet along RV roof and interior route to the GP-PWM-30 Solar Charge Controller.
7. Ensure all penetrations into the RV roof are watertight. Use an appropriate sealant as recommended by your RV Dealer to seal holes wherever necessary.
8. Replace vent cover.



Caution: The vent screen may have sharp edges or burrs.

FIGURE 4-C

4.5 CABLE ENTRY PLATE - OPTION 3

1. Remove the rubber sealing caps from the ends of the MC4 connectors in the CEP.
2. Plug the Positive and Negative MC4 Connectors from the solar panels directly into the CEP.
3. Locate the positive and negative cables exiting the CEP and route these to the GP-PWM-30 Solar Charge Controller.

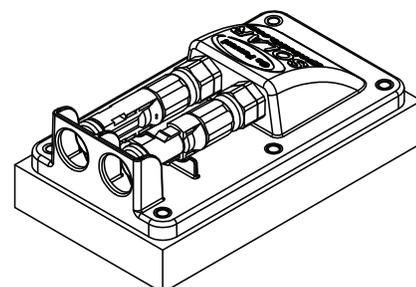


FIGURE 4-D

4.6 INSTALLING THE GP-PWM-30 SOLAR CHARGE CONTROLLER



Ensure the Solar Panels are covered. Cover the panel faces completely with an opaque material to stop the production of electricity when working with panels or wiring – the cardboard shipping boxes are the perfect option to cover glass surface of the panels.

1. Use the template included in the GP-PWM-30 Manual to mark the four mounting holes and the “cutting line for flush mounting”.
2. Drill the mounting holes
3. Use a keyhole or jig saw to cut along the rectangular outline previously marked
4. Cut the MC4 extension cables to length, allow some excess for strain relief/flexibility
5. Use the leftover cable to connect the controller to the batteries ensuring the 30A Fuse is installed as per 4.7. If extra battery cable is required to connect to the battery bank, Go Power! recommends using an equivalent cable to that supplied with the kits: 10 Gauge Wire rated to – UL/cUL/USE2.
6. Mount the controller to the wall using the four wood screws provided.
7. Ensure the back of the controller is protected from damage by any object

4.7 INSTALLING THE 30A FUSE AND FUSE HOLDER

1. Locate the positive battery cable from the PWM 30.
2. Plan where you can safely and easily access the fuse holder & fuse.
3. Cut the battery positive cable from the PWM 30 to the planned lengths.
4. Strip the fuse holder cable and positive cable from PWM 30 as shown in Fig 4-F.
5. Thread the red heat-shrink onto the fuse holder cable
6. Insert the fuse holder and PWM 30 stripped cable ends into the butt splice as shown in Fig 4-G.
7. Crimp the butt splice fully - test the connection by gently pulling on both cables.
8. Thread the heat-shrink over the butt splice as shown in Fig 4-H.
9. Use the heat gun to shrink the heat shrink over the butt splice as shown in Fig 4-I.
10. Repeat the process for the other fuse holder cable & battery bank connection.
11. Do not install the 30A Fuse at this stage.

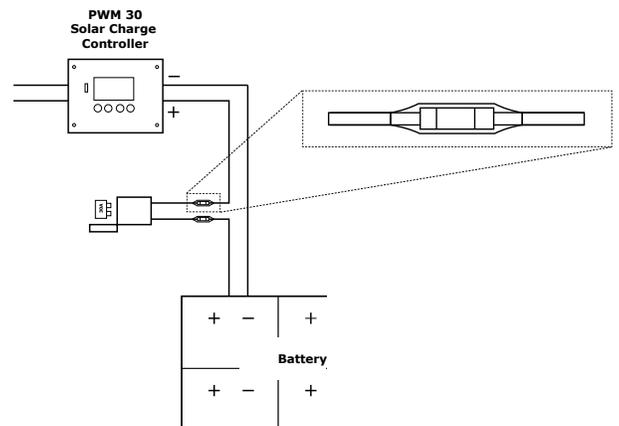


FIGURE 4-E

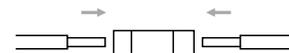


FIGURE 4-F

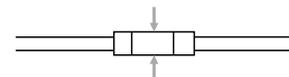


FIGURE 4-G

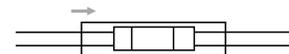


FIGURE 4-H

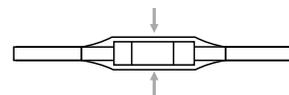


FIGURE 4-I

4.8 CONNECT THE GP-PWM-30 TO BATTERY BANK

It is recommended to connect directly to the battery whenever possible. You can also connect to the converter/charger where the battery positive and negative wires connect to the converter/charger

1. Clean all corrosion from the battery terminals before proceeding
2. Crimp ring terminals onto the positive and negative cables to be attached to the battery
3. Check the ring terminal crimp connection by gently pulling on the cable and ring terminal
4. Attach the Negative (Black) ring terminal to the battery bank and tighten according to the battery manufacturers specification
5. Attach the Positive (Red) ring terminal to the battery bank and tighten according to the battery manufacturers specification
6. Check all electrical connections
7. Apply a protective coating to the battery terminals

4.9 INITIAL CONNECTION AND OPERATING

1. Check all electrical connections and ensure all cables are securely fastened
2. Install the 30A Fuse into the fuse holder, ensure the fuse holder is securely fastened
3. Remove the opaque material from the solar panels
4. Follow the PWM 30 User Manual and operating steps

4.10 BATTERY BANK CONFIGURATIONS

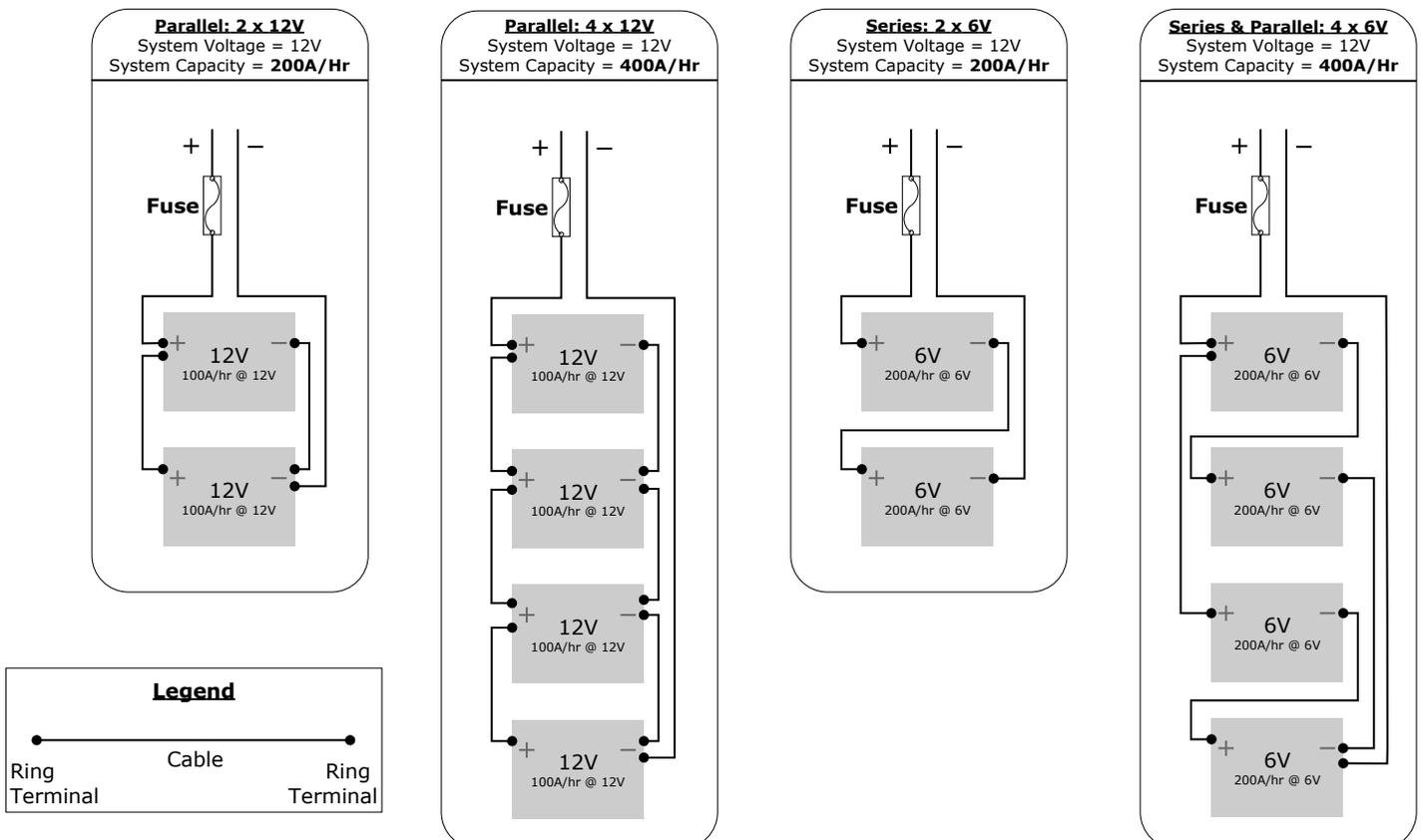


FIGURE 4-J: TYPICAL BATTERY BANK CONFIGURATIONS



5.1 INSPECTION

After installing any Go Power Solar RV Kit or any other Go Power products it is prudent to complete a periodic check of all electrical and mechanical connections to ensure no connections have become loose or dislodged through transit vibrations. These checks should be carried out at least once after the initial kit installation and the first prolonged RV transit. For safety reasons periodically check the solar panel rooftop connections and any battery connections for corrosion and possible failure points.

5.2 CLEANING

Although Go Power Solar RV Kits are generally maintenance free, significant performance gains can be made with clean solar panels

1. Clean the solar panels monthly. Use water and a soft sponge or cloth. A mild non-abrasive cleanser can be used for more stubborn residue. Rinse well.
2. Clean solar panels more frequently during drier months, as they may become covered in dust more quickly. A pressure washer is not recommended.
3. Visual inspection – check the exterior for cracks, missing or broken hardware or other potential problems. Check all roof penetrations and replace sealant areas as required

5.3 LONG TERM RV STORAGE

If your RV will be stored in extremely cold climates you may need to remove your batteries to prevent them from freezing. Please note if your solar panel(s) are covered by snow they will not produce power and can not be depended upon to keep the batteries topped up. In mild climate storage you can depend upon your solar system to top up your batteries when they are exposed to sunlight. Make sure that all parasitic draws are removed from the batteries i.e. Propane detector, clock radio, etc to make sure the solar panel(s) can keep the batteries topped up even with reduced sun exposure.



6. SPECIFICATIONS

CTI-100 Solar Panel Specs

Rated power (Pm)	100W
Maximum power voltage (Vmp)	18.4V
Maximum power current (Imp)	5.43A
Open circuit voltage (Voc)	22.6V
Short circuit current (Isc)	5.75A

GP-PV-170M Solar Panel Specs

Rated power (Pm)	170W
Maximum power voltage (Vmp)	19.35V
Maximum power current (Imp)	8.8A
Open circuit voltage (Voc)	22.78V
Short circuit current (Isc)	9.32A

GP-PWM-30 Specs (Detailed specs available in the manual)

Maximum Output Current	30A at 104°F (40°C)
Maximum Solar Panel Wattage at STC	488W at 12V
Maximum PV Open Circuit Voltage (Voc)	28VDC absolute maximum at coldest conditions

30A ATO Blade Fuse

Max DC Voltage	32VDC
Trip Amps	40.5A
Polarized	No



7. WARRANTY RETURN PROCEDURE

The Go Power! warranty is valid against defects in materials and workmanship for the specific product warranty period. It is not valid against defects resulting from, but not limited to:

- Misuse and/or abuse, neglect or accident
- Exceeding the unit's design limits
- Improper installation, including, but not limited to, improper environmental protection and improper hook-up
- Acts of God, including lightning, floods, earthquakes, fire, and high winds
- Damage in handling, including damage encountered during shipment

A warranty shall be considered void if the warranted product is in any way opened or altered. The warranty will be void if any eyelet, rivets, or other fasteners used to seal the unit are removed or altered, or if the unit's serial number is in any way removed, altered, replaced, defaced, or rendered illegible.

Warranty Return Procedure

Before contacting Go Power!'s customer service department, please read the "frequently asked questions" section of our website to troubleshoot the problem. If trouble persists:

1. Call your Go Power!™ Technical Support team (1-866-247-6527) or
2. Return defective product to place of purchase

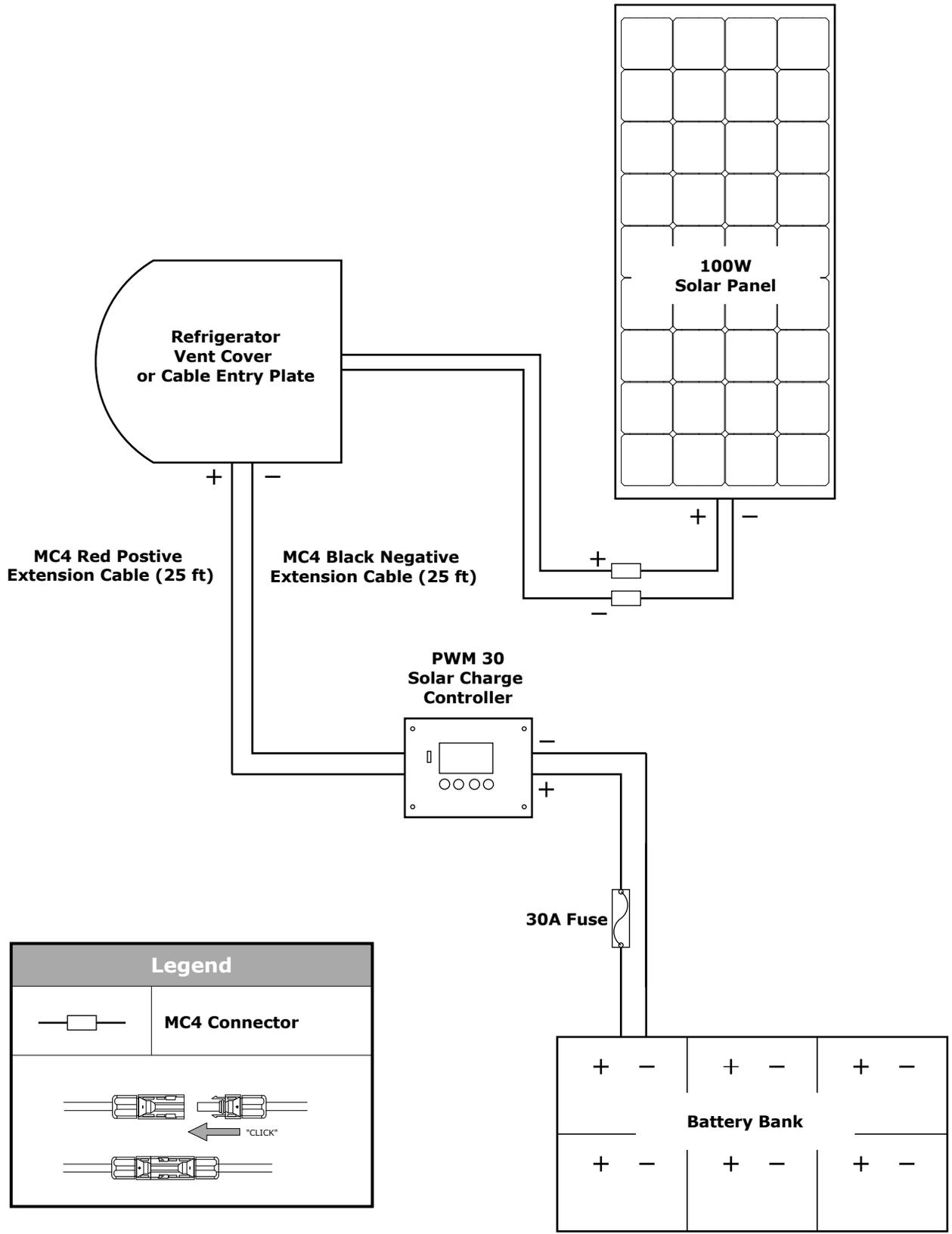
Unless approved by Go Power! Management, all product shipped collect to Go Power! will be refused. Test items or items that are not under warranty, or units that are not defective, will be charged a minimum bench charge of (\$50.00 US) plus taxes and shipping. A 15% restocking charge will be applied on goods returned and accepted as "new" stock.

An RMA number (Return Materials Authorization number) from Go Power! Customer Service is required prior to returning any Go Power! Products. Go Power! reserves the right to refuse any items sent to Go Power! without an associated RMA number. To obtain an RMA number, please contact customersupport@gpelectric.com or Telephone 1-250-380-0052 or Fax 1-250-380-0062 worldwide – or Toll Free for US & Canada 1-866-247-6527.

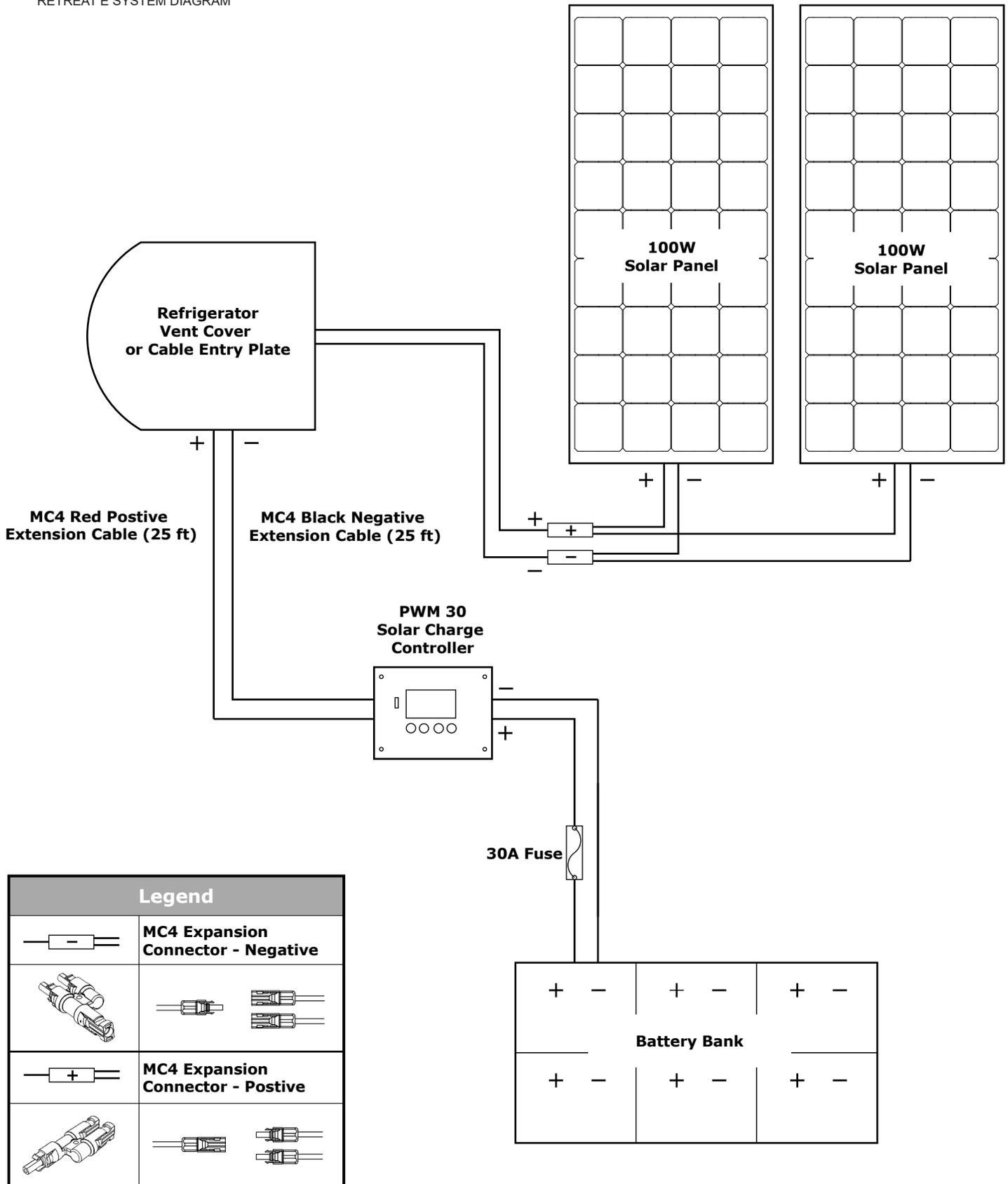
Out of Warranty

Go Power! electronic products are non-repairable, Go Power! does not perform repairs on its products nor does it contract out those repairs to a third party. Go Power! does not supply schematics or replacement parts for any of its electronic products.

RETREAT SYSTEM DIAGRAM

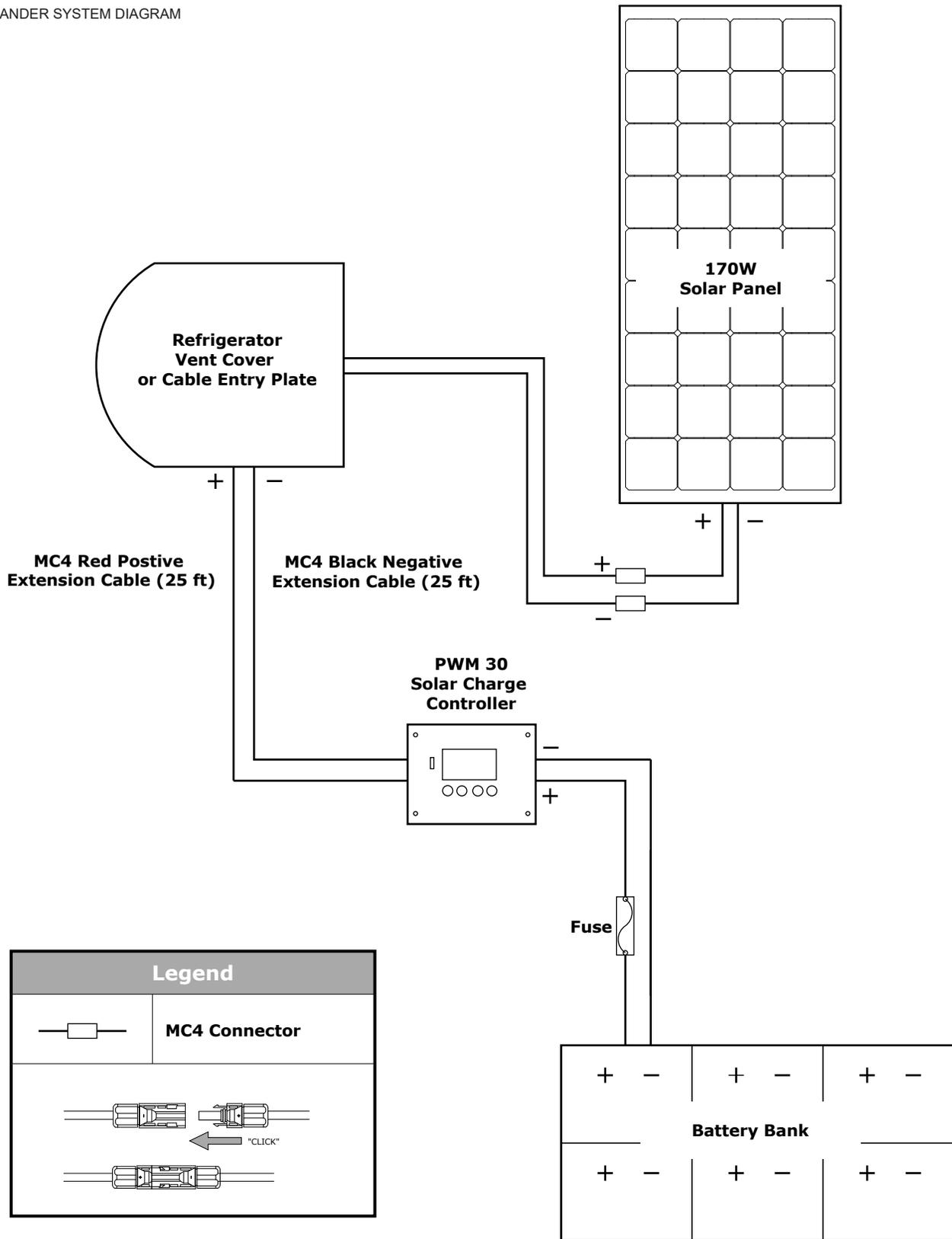


RETREAT E SYSTEM DIAGRAM



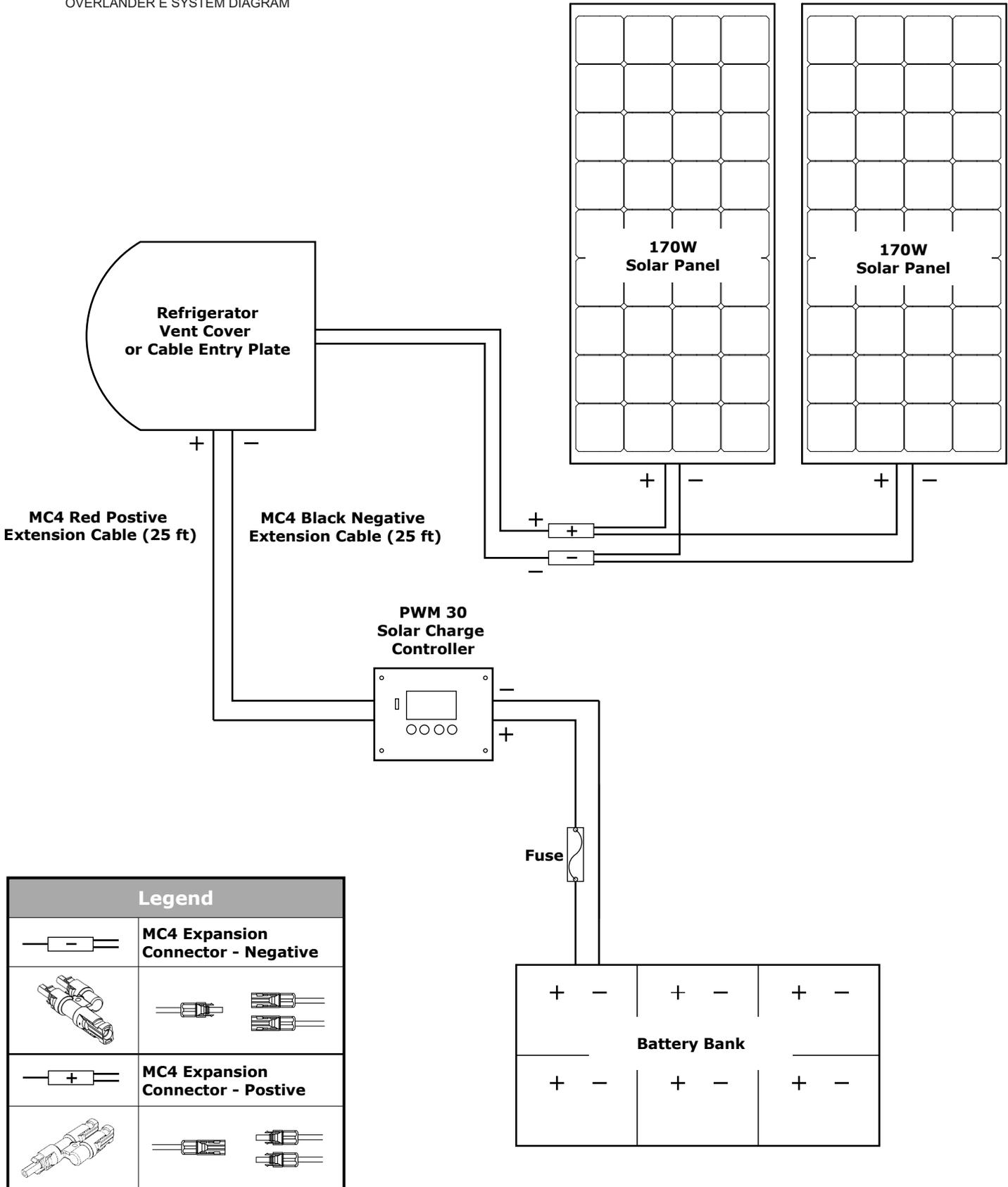
Legend	
	MC4 Expansion Connector - Negative
	MC4 Expansion Connector - Positive

OVERLANDER SYSTEM DIAGRAM



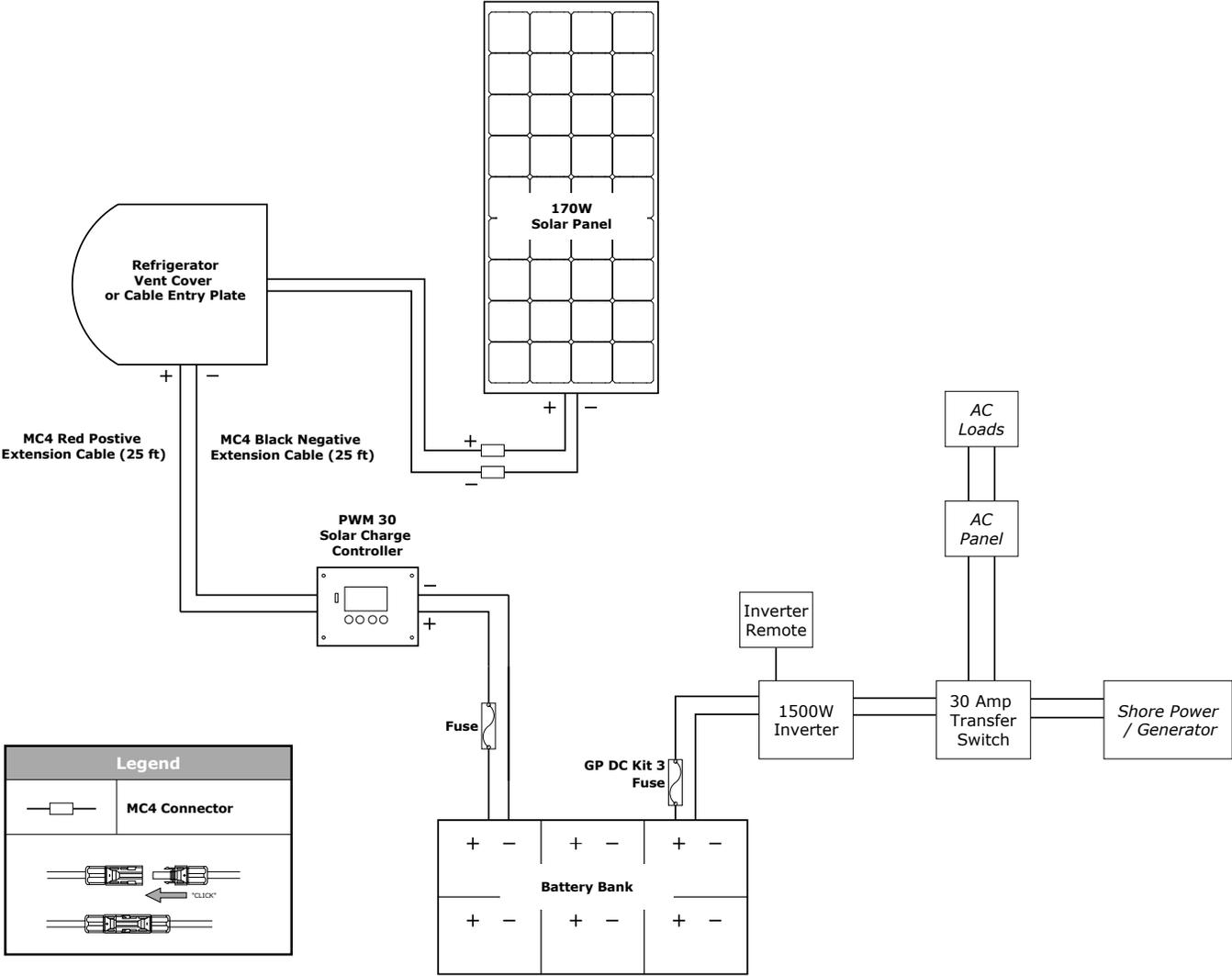
Legend	
	MC4 Connector

OVERLANDER E SYSTEM DIAGRAM

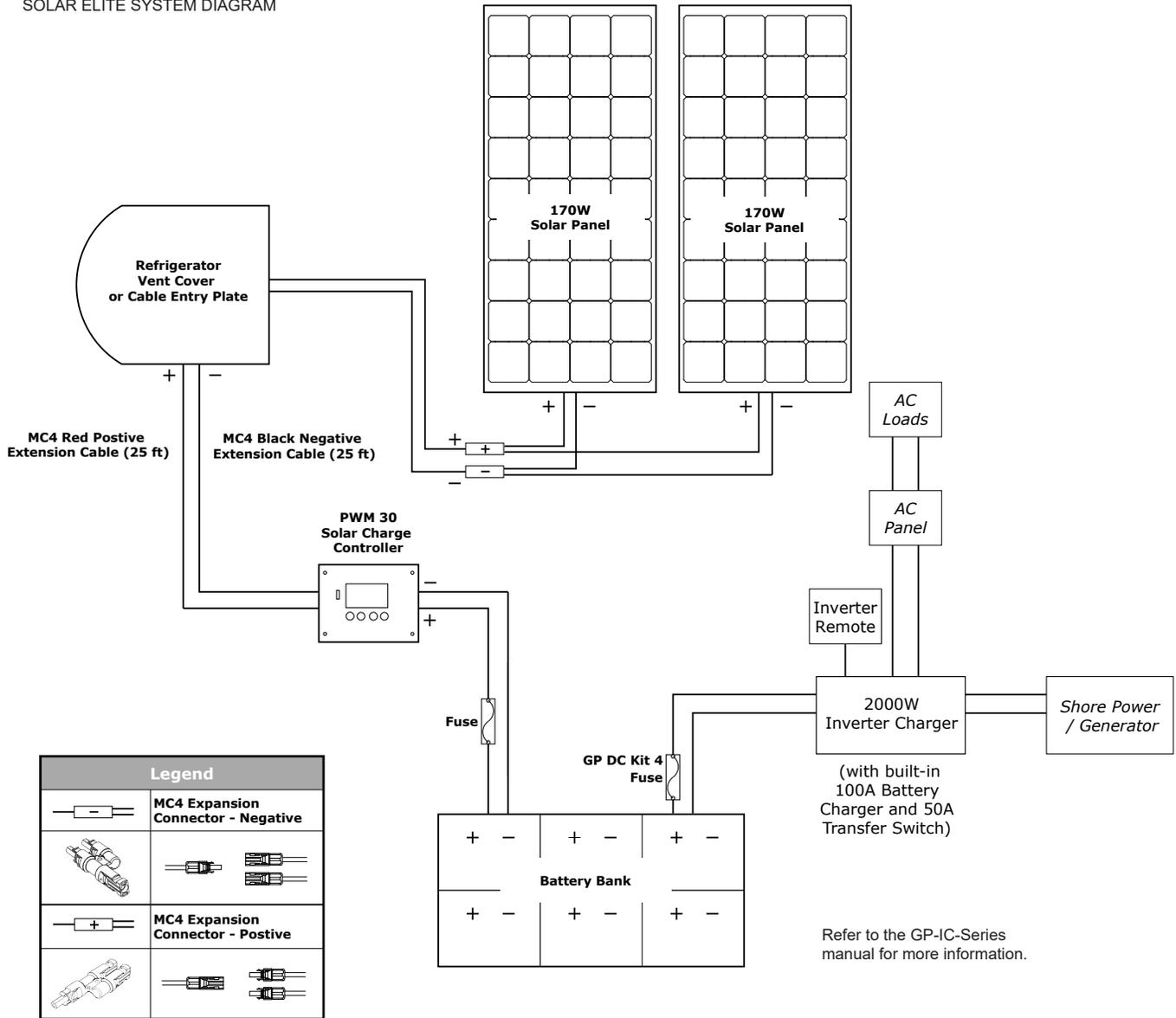


Legend	
	MC4 Expansion Connector - Negative
	MC4 Expansion Connector - Positive

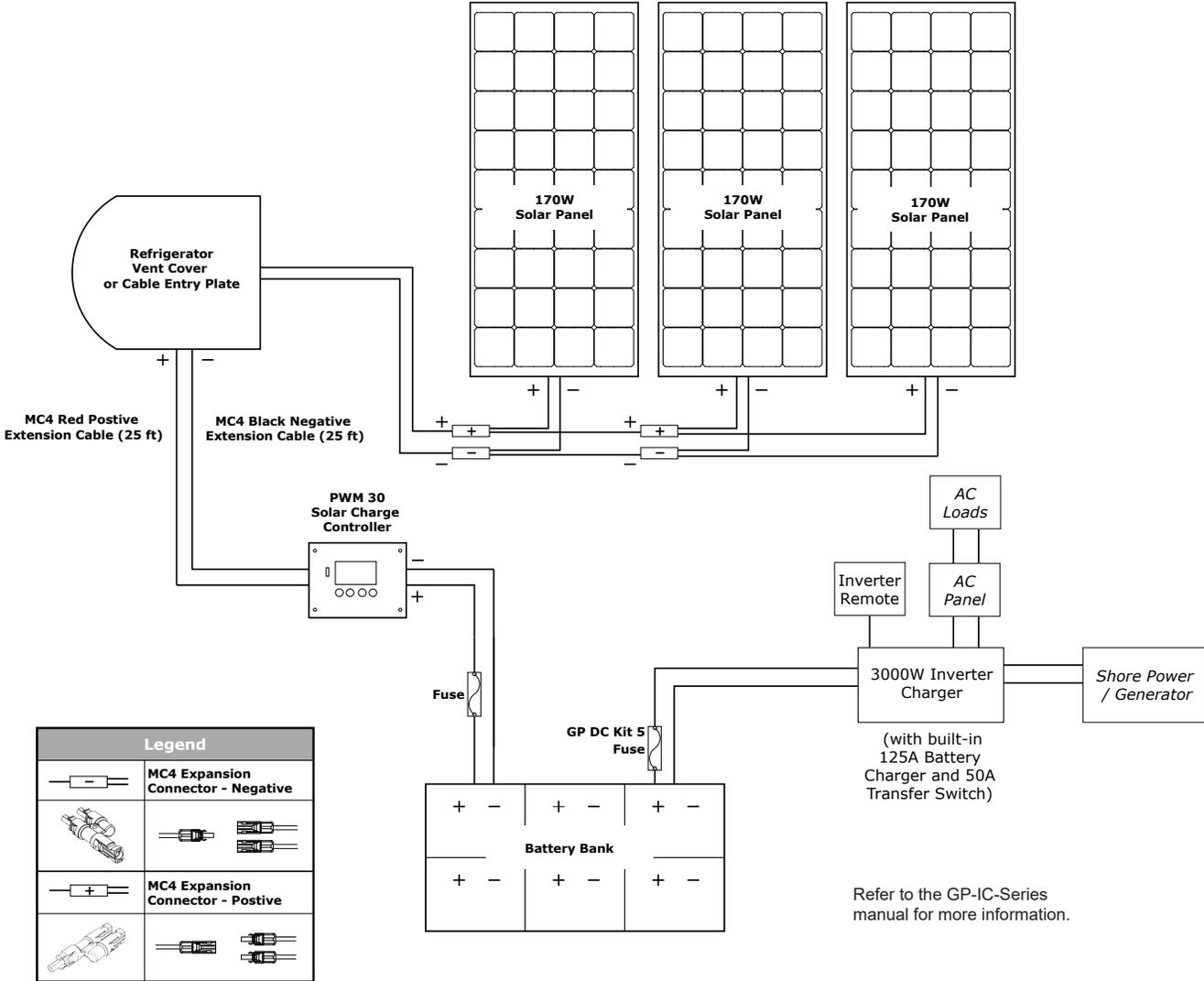
WEEKENDER ISW SYSTEM DIAGRAM



SOLAR ELITE SYSTEM DIAGRAM



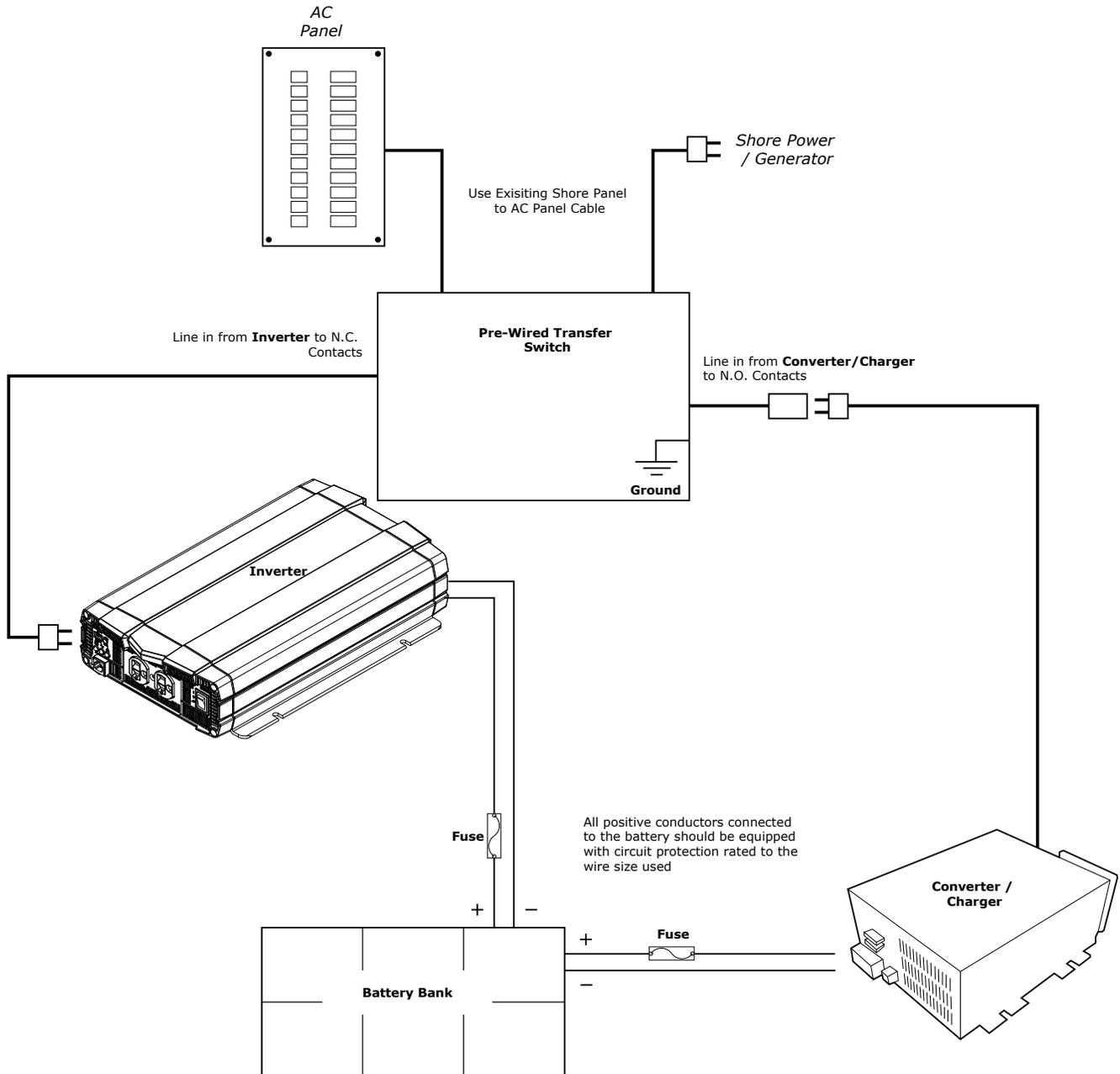
SOLAR EXTREME SYSTEM DIAGRAM



Legend	
	MC4 Expansion Connector - Negative
	MC4 Expansion Connector - Positive

Refer to the GP-IC-Series manual for more information.

TRANSFER SWITCH SYSTEM DIAGRAM





Model 41300 Automatic Transfer Switch Troubleshooting Guide

The table below gives general troubleshooting guidance.

CAUTION: To avoid damage to the transfer switch or the RV, the torque specifications on the terminal block cable installation diagram **MUST** be followed. Make sure that the screws holding the input and output power cables down to the terminal block are fully tightened to the correct torque. Failure to fully tighten these connections could cause an electrical shock or fire hazard. Care must be taken to assure that the terminal screws are not cross threaded, otherwise an improper torque will result.

Troubleshooting Steps

Problem	Troubleshooting Steps
<ul style="list-style-type: none"> • Unit does not engage shore contactor when shore power is present after 3-4 seconds. 	<ul style="list-style-type: none"> • Carefully check the input power at the RV pedestal. The voltage must be above approximately 90VAC for the contactor to pull in. • With the transfer switch unplugged from the pedestal, check all input connections to make sure that all of the input power cables are firmly torqued to within the specified limits. See mounting template 505-00055. • If the voltage is present but below approximately 90 VAC, you will need to move to a different source of power that is within the correct limits. <p>Note that the ATS takes approximately 40 seconds to complete the transfer from shore power to generator power after the generator is started. If this amount of time has passed and the generator contactor still does not engage:</p> <ul style="list-style-type: none"> • Carefully check the voltage level on the incoming generator lines. If the voltage on the lines is not present or is below approximately 90VAC, the contactor will not pull in. • If the voltage reads low, refer to the generator documentation to fix the incoming voltage to within acceptable limits. • With the RV unplugged from the pedestal and the generator off, check all electrical connections for proper torque. See mounting template 505-00055. • Check the generator breaker to make sure that it has not tripped.
<ul style="list-style-type: none"> • Unit does not transfer to generator power when the generator is turned on. 	<p>Note that the ATS takes approximately 40 seconds to complete the transfer from shore power to generator power after the generator is started. If this amount of time has passed and the generator contactor still does not engage:</p> <ul style="list-style-type: none"> • Carefully check the voltage level on the incoming generator lines. If the voltage on the lines is not present or is below approximately 90VAC, the contactor will not pull in. • If the voltage reads low, refer to the generator documentation to fix the incoming voltage to within acceptable limits. • With the RV unplugged from the pedestal and the generator off, check all electrical connections for proper torque. See mounting template 505-00055. • Check the generator breaker to make sure that it has not tripped.

WARRANTY INFORMATION



SURGE GUARD*

RV Power Protection

Limited Product Warranty

Southwire Company, LLC warrants that this product, when properly installed according to Southwire's installation procedures, shall be free of defects in materials and workmanship under normal use for a period of one year from date of purchase. For original equipment installed products, warranty is one year from date of purchase, not to exceed two years from date of manufacture. The warranty extends only to the original purchaser and is non transferable, unless it was factory installed onto the RV and is then transferable with the RV Coach. During the warranty period, Southwire™ will, at no charge, repair or replace defective parts or, at the option of Southwire™, replace the Surge Guard® product within a reasonable time after the unit is returned to us. This warranty does not extend to any Southwire™ product that has been damaged or rendered defective (a) as a result of an accident, misuse, or abuse; (b) by the use of parts not manufactured or sold by Southwire™, or (c) by modification of product. Labor charges for removal or replacement of the Surge Guard® product are the responsibility of the customer. This Limited Warranty covers only products purchased from an authorized dealer, retailer or seller and does not cover used, salvaged or refurbished products.

Nullification of Warranty

The occurrence of any of the following nullifies and voids this warranty:

1. Any non-authorized modification, repair, or physical damage to the Surge Guard® product, accidental or otherwise, not caused by a defect in material or workmanship.
2. If Southwire™ determines that the Surge Guard® product has been improperly installed (see installation instructions) altered in any way, or tampered with.

The Warranty does not protect against acts of God, such as direct lightning strikes, flood, earthquake and war. It also does not protect against vandalism, theft, normal use wear and tear, erosion, depletion, obsolescence, abuse, or damage due to low voltage disturbances for products without under voltage protection (i.e. brownouts, sags, or power outages), non authorized program or system equipment modification or alteration.

Sole Warranty

This warranty contains the sole warranty of Southwire™, there are no other warranties, expressed or, except as required by law in the State of Florida, implied, including implied warranty or condition of quality, merchantability or fitness for a particular purpose, and such implied warranties, if any, are limited in duration to the term of this warranty. Southwire™ expressly disclaims any liability under this warranty for any sums that exceed the retail value of the Surge Guard® unit. Some states do not allow limitations on how long an implied warranty lasts.

No agent or representative of Southwire™, retailer, distributor or dealer has any express or implied authority to make any representation, promise, guarantee or warranty not stated in the Limited Product Warranty.

In no event shall Southwire™ be liable for direct, indirect, incidental, special, consequential or multiple damages arising out of the use of the product or damage to the connected equipment, regardless of the legal theory on which such claim is based; even if advised of the possibility of such damage. The excluded damages include, but are not limited to, loss of profits, loss of savings or revenue, loss of life, injury, loss of use of the product or the connected equipment or any associated equipment, loss of software, cost of capital, cost of any subsequent equipment, facilities or services, downtime, the claims of third parties, including customers, and damage to property. Some states do not allow exclusion or limitations of incidental or consequential damages. This warranty is valid in the U.S. and Canada only.

This warranty is in lieu of all other warranties, obligations, or liabilities expressed or implied by the company. Any properly installed device that proves defective in normal use will be repaired or replaced at Southwire's option provided the procedure as stated below is followed:

1. Contact Southwire Customer Support at 1-800-780-4324 to obtain a Return Materials Number.
2. Properly package returned unit.
3. Display Return Materials Number on outside of box.
4. Include Proof of Purchase, including date of purchase.
5. Supply full written description of the problem.
6. Specify your name, address, and daytime phone number.
7. Ship unit postage prepaid directly to:

Return Materials Department
Southwire Company, LLC
4525 140th Avenue North, Suite 900
Clearwater, Florida 33762

Any questions regarding this warranty, please contact Southwire™ at 1-800-780-4324, or by email at productinfo@southwire.com.

For technical assistance, please call 1-800-780-4324 x 20311

SOUTHWIRE MODEL 41300

RV POWER AUTOMATIC TRANSFER SWITCH

INSTALLATION INSTRUCTIONS

1. Select correct knock-out, LINE & LOAD sides, select & install strain relief cable connector.
2. Use mounting template hole guide (to the right), to position RV POWER ATSW. Drill holes, in desired location, mount in place.

NOTE MOUNTING CAUTION ON UNIT COVER

WARNING: ALL CABLE PREPARATIONS MUST BE DONE OUTSIDE THE MOUNTED UNIT. ANY WIRE TRIMMINGS FALLING INTO AND LEFT INSIDE THE UNIT MAY CAUSE A FAILURE THAT WILL VOID THE FACTORY WARRANTY.

3. Cable preparations:	LINE SIDE	LINE SIDE	LOAD SIDE
SHORE INPUT	GENERATOR INPUT	SHORE OUTPUT	
Trim outer cable jacket	7 in	9-1/2 in	4 in
Wire length GREEN	7 in	9-1/2 in	4 in
Strip (bare conductor) GREEN	1/2 in	1/2 in	1/2 in
Wire lengths, WHITE & BLACK	1-1/2 in	2-1/2 in	3 in
Strip (bare conductors)	3/8 in	3/8 in	3/8 in

4. Install cables through strain relief connectors.
5. Tighten cable strain relief connections.
6. Bend into U-shape stripped bare conductor ends of input and output cables and fasten with terminal cup washers supplied.
7. TORQUE connections to values shown.

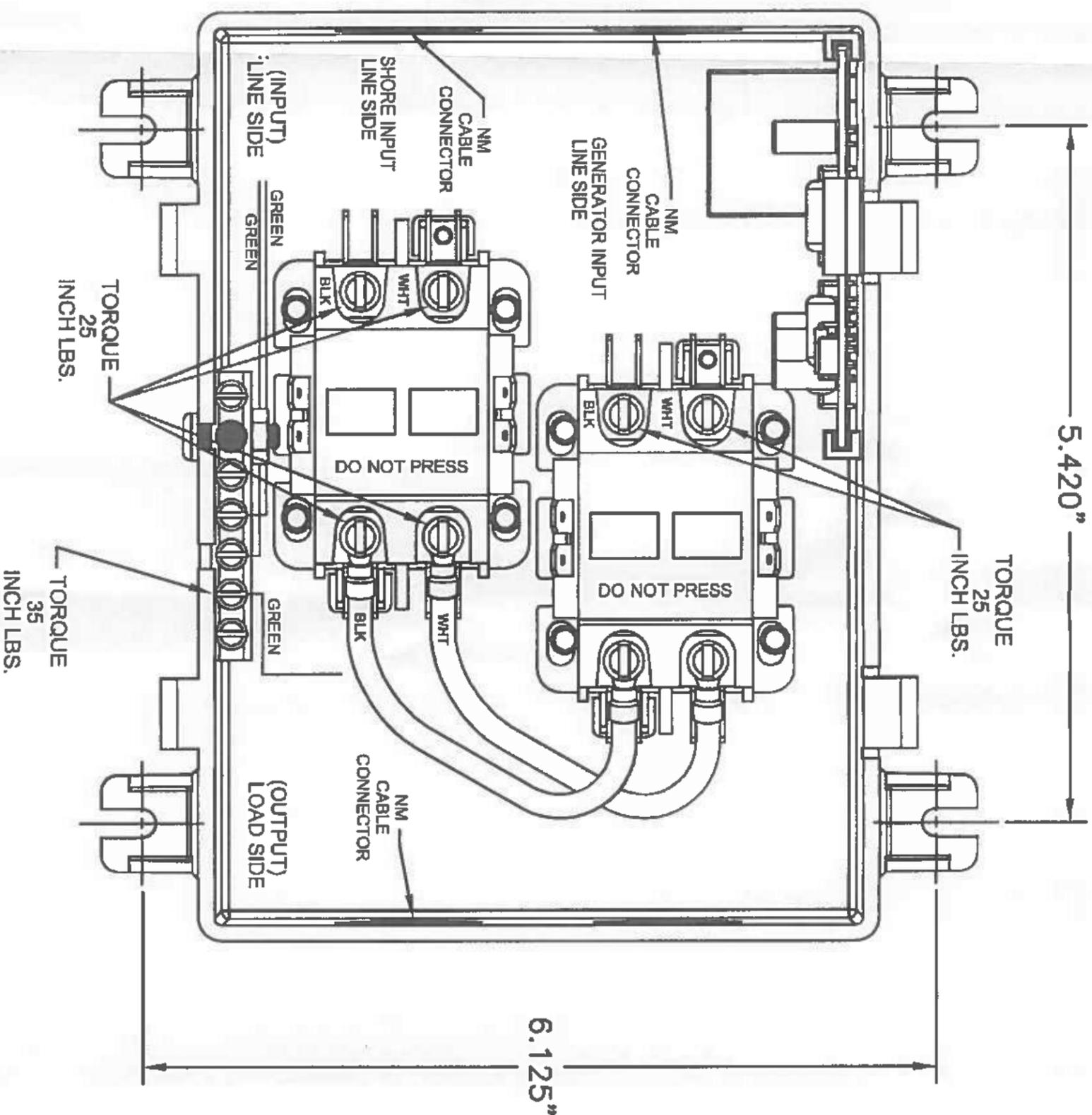
MAINTAIN WIRE COLOR CONTINUITY.

TEST PROCEDURE

1. Plug RV's shore power cord into utility power.
2. Shore power will be immediately available.
3. Turn on RV's generator.
4. Wait approximately 40 seconds and observe transfer of power to generator.
5. Switch off generator.
6. Transfer to shore power will be immediate.

GENERATOR CAUTION
VERY IMPORTANT
ALL TORQUE VALUES SHOWN MUST BE OBTAINED. OVERHEATING OF CONNECTION OR PHYSICAL DAMAGE TO CONNECTIONS MAY OTHERWISE OCCUR.

SHORE CAUTION
VERY IMPORTANT
ALL TORQUE VALUES SHOWN MUST BE OBTAINED. OVERHEATING OF CONNECTION OR PHYSICAL DAMAGE TO CONNECTIONS MAY OTHERWISE OCCUR.



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Certification:
Conforms to UL STD. 458 w/ Marine Supplement SA
Certified to CSA STD. C22.2 No. 107.2
FCI Class B

Design and Constructed to ABYC A-31



Made in China

Specifications subject to change without notice

02/17 A

TruePower Series

PLUS
Built-In AC Transfer Switch

Heavy Duty Marine, Mobile and Industrial Grade Inverters

ProPlus Digital Performance Technology Inside



2 Year Warranty

Owner's Manual and Installation

Model	Part No.	Wattage	DC Input	AC Input	AC Inverter	AC Waveform
TruePower Plus 1200MS	06120	1200W	12 VDC Input	115 VAC	30 Amps	Modified Sine Wave
TruePower Plus 1500MS	06150	1500 W	12 VDC Input	115 VAC	30 Amps	Modified Sine Wave
TruePower Plus 2000MS	06200	2000 W	12 VDC Input	115 VAC	30 Amps	Modified Sine Wave
TruePower Plus 1000PS	07100	1000 W	12 VDC Input	115 VAC	30 Amps	Pure Sine Wave
TruePower Plus 2000PS	07200	2000 W	12 VDC Input	115 VAC	30 Amps	Pure Sine Wave

IMPORTANT NOTICE - SAVE THESE INSTRUCTIONS

Please save and read all safety, operating and installation instructions before installing or applying DC or AC power to your TruePower Plus Inverter.

Your Satisfaction is Important to Us!

Do not return this product to a retailer or dealer for any service or warranty requirements. Please call our Customer Care Department at 800-824-0324 from 8:30 am to 5 pm Eastern Time for any warranty, service or installation assistance. Thank you - On Board Solutions Customer Care

PLEASE RECORD YOUR:

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Important Notice:

Please read this manual and all warnings including those provide by the battery manufacturer. This manual is written to assist in the safe installation of the TruePower Plus Inverter. Installation must comply to the applicable electrical codes and when installed on a boat the American Boat and Yacht Council (ABYC) E-11 standards.

⚠ WARNING TO OWNER AND INSTALLER:

Read to avoid risk of injury or fire. **INSTALL BY A CERTIFIED ELECTRICAL TECHNICIAN. INSTALLATION MUST COMPLY WITH THE FOLLOWING GUIDELINES:**

To prevent risk of fire damage: All DC stud and cable hardware must be securely tightened. Fasten DC input cables with proper strain relief within 6" of inverter.

Attaching battery cables to DC studs: Use two appropriately sized wrenches for each connection 7/16" or 1/2" wrench required (model specific). Tighten until lock washers compress.

Installing DC safety fuse: Install fuse in positive (+) cable within 7" of battery. See page 17 for recommended fuse sizes.

DC Input Cables: Cable size must be specified per length and DC input amperage of installed TruePower Plus Inverter. See page 17.

⚠ WARNING: Risk of Fire. Do not replace any fuse with a rating higher than recommended by the manufacturer. Ensure that the dedicated electrical system fuse can supply this product without causing the fuse to open. On no account should fuses be bypassed as this can cause serious damage, fire or risk of death.

⚠ WARNING: This device is not ignition protected, risk of fire or explosion. This equipment contains components that could produce arcs or sparks. To reduce the risk of fire or explosion, do not install this equipment in compartments containing batteries, flammable materials or fumes, or in a location containing gasoline-powered machinery, or joints, fittings, or other connections between components of the fuel system.

⚠ WARNING: Low voltage - electrical burn and spark hazard. Disconnect battery power before servicing.

⚠ WARNING: ELECTRICAL SHOCK HAZARD

Do not disassemble the TruePower Plus Inverter. It does not contain serviceable parts and attempting to service the unit could result in an electrical shock or burn.

CAUTION: Polarity and wire color must be observed when making the installation connection to a 12 volt battery.

Red DC input bar — + (positive) red cable battery connection only.

Black DC input bar — (negative) black cable battery connection only.

NOTE: REVERSE POLARITY CONNECTION WILL DAMAGE UNIT AND VOID WARRANTY

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 Installation... 11-17
 Operation... 18
 Maintenance... 19
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 Specifications... 21
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Introduction

Thank you from all of us at On Board Solutions and congratulations and congratulations on your recent purchase of a TruePower Plus Inverter.

TruePower Plus inverters have been taken to the next level of design using the latest in digitally controlled and software based power conversion technology.

TruePower Plus inverters address the trend of having the convenience of household power on board for electric grills, entertainment systems, refrigeration and more.

TruePower Plus not only converts 12 VDC to 110 VAC household power but will seamlessly pass through AC station power with its built in 30 amp AC transfer switch.

Unique in design, the TruePower Plus Series offers an intuitive dual color user interface consisting of:

- LCD display, AC power output and DC input power gauges.
- LED indicators are used for power input type and service notification.
- During normal operation display and gauges are blue and green.
- Anytime there are adverse conditions the LCD display and gauges will turn red based on the condition and the LCD display will provide a full fault message versus traditional error codes that must be deciphered.

- This innovative design takes the stress and mystery out of using an on-board inverter for RV's, boats and specialty vehicles.

Installation time is significantly reduced with our innovative, concealed and integrated AC cable strain relief with front screw connection AC terminal blocks. This eliminates the need of punching holes and using conduit style strain relief and ring terminals for AC power connections.

Designed with 2x surge capability for demanding loads and convenient GFCI protected outlets and a USB charging port. Shock resistant and internal conformal coated electronics for protection in harsh environments.

Household power that is ready when you are!

Heavy Duty Marine, Mobile and Industrial Grade Inverters

TruePower Plus Inverters are available in both Modified Sine Wave (MS) 1200, 1500 and 2000 watts and Pure Sine Wave (PS) models in 1000 and 2000 watt models.

Standard Features:

- Intuitive dual color digital LCD message center
- Dual color gauges for AC power output and battery DC input
- Internal 30 amp AC transfer switch will automatically pass through AC inlet power when present
- Integrated AC power cable strain relief for ease of installation
- USB power port and GFCI convenience outlets
- Compact and lightweight design
- Soft start noise filtered technology with 2x surge capability
- On/Off remote with 9 foot cable and DC cable covers included
- Built-in safety with overload, over temperature, short circuit and reverse polarity protection
- Audible alarm and shut down for low and high DC voltage, overload and over temperature conditions
- Shock resistant construction with internal conformal coated electronics
- 2 year warranty

Transfer Switch

The TruePower Plus includes an internal, automatic 30 amp AC transfer switch that senses the presence of AC shore/station power. Upon disconnection from shore power/shore station source, the inverter will switch to provide AC power via the DC battery source automatically. This switch, in compliance with A-31, disconnects the neutral AC lead from the AC ground when in shore/station power mode.

TruePower Plus Inverters are Protected by a Variety of Features Including:

- Convenience Outlet Safety Protected
- Input Polarity Protection
- Low Battery Alarm
- Low Battery Shutdown
- Overload Protection
- Output Short Circuit Protection
- Thermal Protection
- Over Voltage (15 VDC) Protection

TruePower Plus Remote



- On/Off control
- Input power source LED indicators
- Check fault LED indicator
- Remote mounting screws and 8 ft. cable included



Intuitive Dual Color Display and LCD Message Center



USB is 100% A1 Amp Port & GFCI Protected Outlets



Integrated AC Power Switch Model with Front Balance



DC Cable Covers Back (1 and red)

General Safety Instructions

Ⓢ IMPORTANT SAFETY INSTRUCTIONS: READ AND SAVE THESE INSTRUCTIONS!

This owner's manual contains important safety instructions for the TruePower Plus Series Inverters that must be adhered to during installation, operation and troubleshooting. Read and save this owner's manual for future reference.

Read these instructions carefully and become visually familiar with the equipment before installation, operation, servicing, or maintenance. The following precautionary messages may appear throughout this manual or equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

Before installing and using your new inverter, read all appropriate sections of this guide and any cautionary markings on the inverter, batteries and on your appliances.

CAUTION

- ⚠ Do not expose this unit to rain or snow
- ⚠ Use of attachments not recommended or sold by On Board Solutions will void warranty and may result in the risk of fire, electrical shock or personal injury.
- ⚠ To reduce the risk of electrical shock, remove connection to AC shore power and DC connections prior to maintenance or cleaning. Turning off controls WILL NOT reduce this risk.
- ⚠ HELP - Someone should be within the range of your voice or close enough to come to your aid when working with a lead-acid battery.

1. **CAUTION:** Do not operate the inverter if the carton or unit has significant damage from being dropped or crushed, received a direct hit of force or is otherwise damaged.
2. **CAUTION:** Do not dismantle the inverter. Call the factory directly when service or repair is required. Incorrect assembly may result in risk of electrical shock or fire. No user serviceable parts.
3. **CAUTION:** As a precaution - **Keep children away from the inverter and its components!** The same potentially hazardous or lethal AC power that is found in a normal household 115 AC power outlet can be found in the TruePower Plus Inverter.
4. **CAUTION:** For an ABYC E-11 compliant installation, this inverter must be installed with an inline fuse in the positive (+) cable on the DC side of the inverter (between the battery and the inverter) at a distance of seven inches (7") from the battery connection (Please see Specifications table in this manual for correct sizing).

Battery Precautions

- 1) To reduce risk of battery explosion, follow these instructions and those published by battery manufacturer and manufacturer of any unit you intend to use in vicinity of battery. Review cautionary marking on these products and on engine.
- ⚠ **SPARK** - Be very cautious about dropping metal objects such as screwdrivers and wrenches onto a battery. This could short-circuit the battery and immediately cause a spark that may result in a fire or explosion.

DC Connection Precautions

- 1) Connect and disconnect DC output connections only after setting any inverter switches to off and removing AC cord from electric power.

Personal Safety Precautions

1. **WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE SERVICING THE UNIT IN THE VICINITY OF THE BATTERY, YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.**

2. Never charge or invert power from a frozen battery.
3. If necessary to remove a battery from a vehicle or vessel, always remove grounded terminal from battery first. Make sure all accessories are off, so not to cause an arc.
4. Be sure area around battery is well ventilated.
5. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
6. Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.

WEAR - Complete eye protection and protective clothing. Avoid touching eyes while working near batteries.

NEVER - Smoke or allow a spark or flame within the vicinity of the battery work area.

REMOVE - All personal metal items such as rings, watches, bracelets, etc. when working near a battery. A battery can produce a short circuit current high enough to weld a ring or any other metal causing serious burns.

⚠ WARNING: Restrictions on Use - The TruePower Plus Inverter shall not be used in connection with life support systems or other medical equipment devices.

DANGER

HIGH VOLTAGE
AVOID SERIOUS INJURY OR DEATH FROM ELECTRICAL SHOCK.
BEFORE PERFORMING ANY ELECTRICAL WORK TURN OFF AC POWER SUPPLY

DANGER

EXPLOSION HAZARD
AVOID SERIOUS INJURY OR DEATH
MAKE CONNECTIONS IN AN ATMOSPHERE FREE OF EXPLOSIVE FUMES

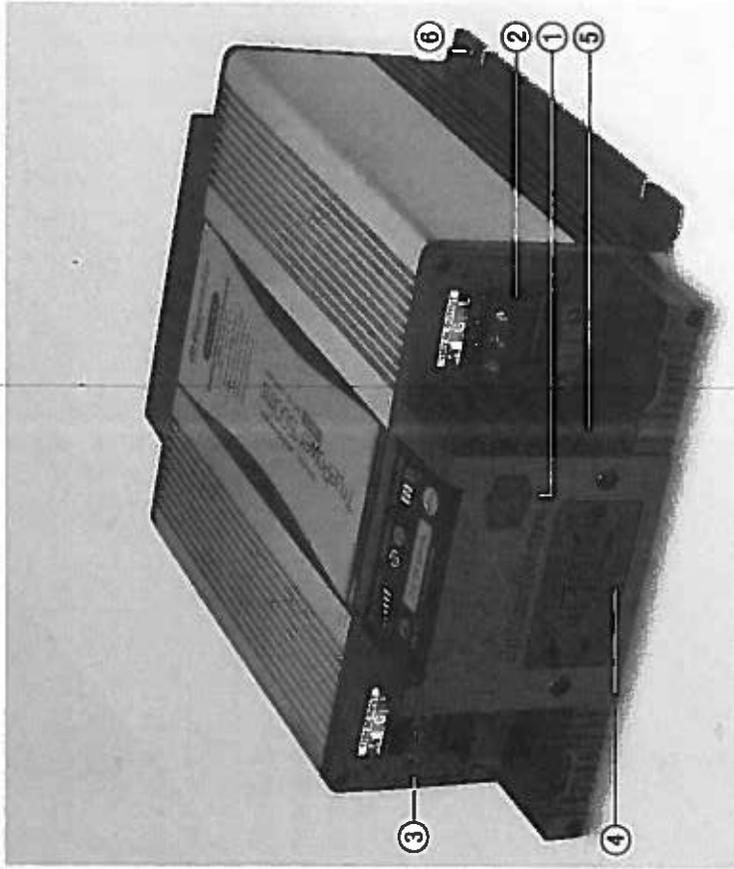
WARNING

LOW VOLTAGE
AVOID SERIOUS INJURY FROM ELECTRICAL BURNS AND SPARKS.
BEFORE PERFORMING ANY ELECTRICAL WORK DISCONNECT ANY DC POWER SUPPLY FROM UNIT

CAUTION

HOT SURFACES - TO REDUCE RISK OF BURNS DO NOT TOUCH WHILE IN SERVICE

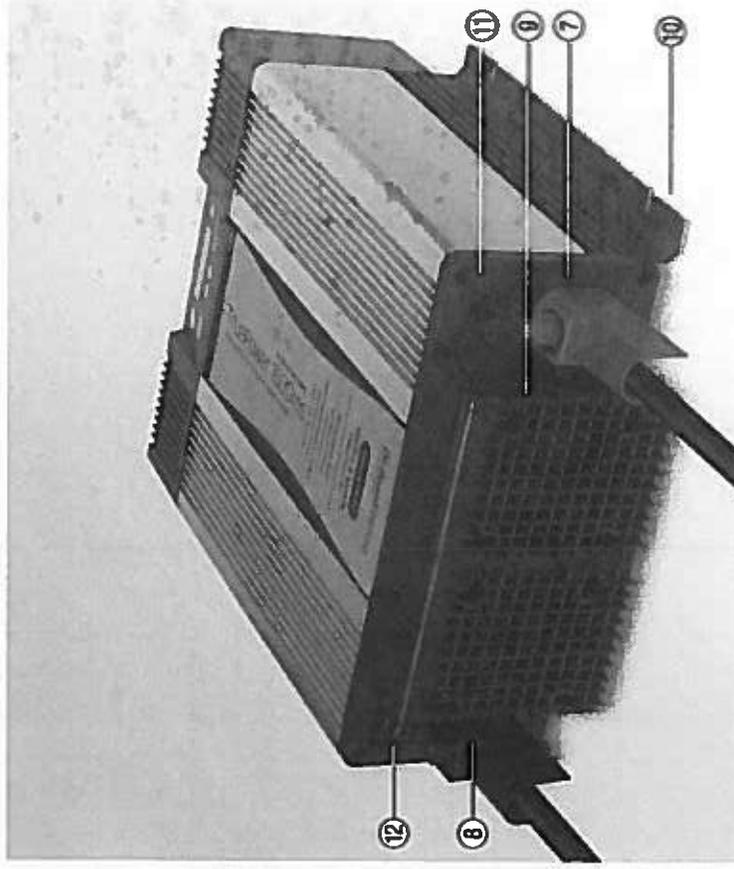
TruePower Plus Overview



The above picture outlines the front of the TruePower Plus Inverter. Please Reference Table below for features:

1. USB Charge Port
2. AC Output
3. AC Input
4. Two 15A GFCI Protected AC Outlets to power connected appliances.
5. Ventilation Openings provide air circulation for peak performance
6. Ground Stud

TruePower Plus Overview



The above picture outlines the back of the TruePower Plus Inverter. The table below references the above numbered features of the back panel

7. DC Input Cable (Positive +)
8. DC Input Cable (Negative -)
9. Fan Housings keep clear 16 Inches
10. Mounting flanges (Side)
11. Remote Port for simple remote with on / off switch and power and fault LED
12. GFCI Breaker

TruePower Plus Inverter Modes

The TruePower Plus inverter has 3 distinct modes which allow you to tailor the inverter behavior to your specific needs:

Pass-through Mode (LCD display is off):

- Pass-through mode is indicated by only  being lit on the display panel. All other LEDs are off.
- In pass-through mode up to 30A of shore power can be passed through the inverter.
- In this mode if the shore power is interrupted the inverter will not convert DC to AC to keep the loads on.
- DC draw from the batteries is lowest in this mode (<5 ma); which makes this ideal for long term storage.

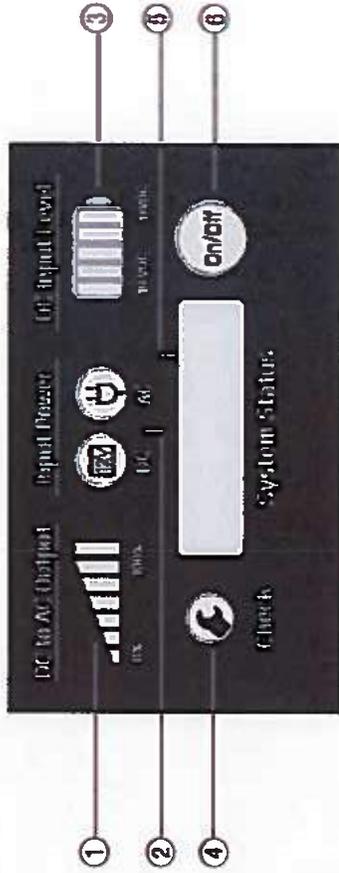
Stand-by Mode (LCD display is on)(Output supplied by station power, fast transfer to inverting when needed):

- Stand-by mode is indicated by both  and the LCD display being illuminated on the display panel.
- Power for the loads connected to the inverter comes from shore power.
- In the event of power interruption the inverter will switch automatically to inverting mode to keep the loads on. This is ideal for loads like computers where a power dropout could cause lost data.
- DC draw from the batteries is <1A in this mode; which may discharge batteries if they do not have an external source of charge.

Inverting Mode:

- Inverting mode is indicated by  and LCD display being illuminated on the display panel.
- Power for the loads is supplied by the attached batteries.
- The unit will automatically switch back to standby mode if AC power becomes present.

TruePower Plus Display Overview



	Inverter Mode		Pass-through
	Inverting Output generated from DC	Standby Output supplied by shore (fast transfer to batteries if needed)	
1. DC to AC Output 	The LED graph shows the percentage of the Inverters total DC to AC conversion capability (0 to 100%). The final LED turns red when the unit is overloaded.	Off	Off
2. Input Power 			
3. DC Input Level 	When the Input DC voltage is below 11 VDC, the first LED is lit red. From 11 to 13 VDC, the LEDs are lit green and incrementally indicate the battery level.		Off
4. Wrench Symbol 	The wrench symbol illuminates red when the Inverter is in fault condition.	Off	Off
5. System Status 	The System Status LCD screen shows the status of the inverter. When the inverter is running normal, the LCD indicates "SYSTEM NORMAL". If a fault condition occurs, the LCD screen turns red and display an error message.	Off	Off
6. On / Off button 	Pushing the button will change to pass-through mode	Pushing the button will change to Standby/inverting mode	Pushing the button will change to Standby/inverting mode

System Status Fault Modes

All faults conditions are accompanied by a 2 second on / off tone.

Fault Name	Explanation
LOW DC ALARM	Illuminates red when the DC Input level is below 10.5 VDC
LOW DC SHUTOFF	Illuminates red when the DC Input level is below 10.0 VDC
HI DC SHUTOFF	Illuminates red when the DC Input level is above 15.5 VDC
HI TEMP SHUTOFF	Illuminates red when the internal temperature is above 65 degrees Celsius
OVERLOAD SHUTOFF	Illuminates red when the output power is > 105%

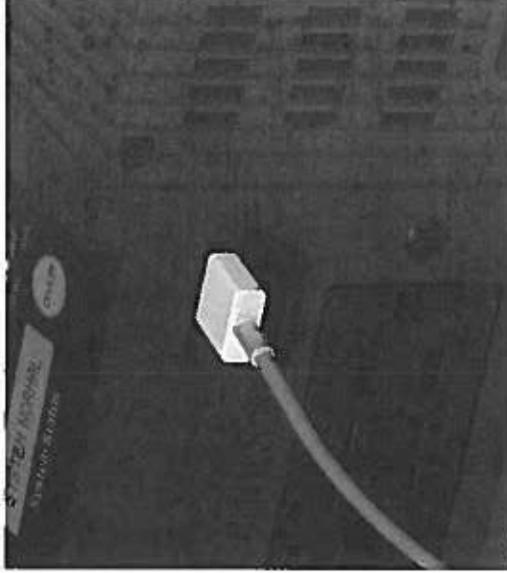
TruePower Plus Remote

The remote allows the user to remotely view inverter status. The blue AC plug symbol indicates when the inverter is running from AC shore power. The green 12V battery symbol indicates when the inverter is running from DC power. The wrench symbol illuminates red when the inverter is in fault condition. The button toggles between pass-through and Standby/Inverting modes.



USB Charge Port

The USB port on the front panel provides power (5 VDC, 2.1 ADC) to USB connected devices. The port can provide power when the inverter is running from DC power or AC shore power. When the port is not in use, be sure the rubber dust cover is sealed over the port.



Preparing for Installation

⚠ WARNING: This device is not ignition protected, risk of fire or explosion

This equipment contains components that could produce arcs or sparks. To reduce the risk of fire or explosion, do not install this equipment in compartments containing batteries, flammable materials or fumes, or in a location containing gasoline-powered machinery, or joints, fittings, or other connections between components of the fuel system.

⚠ WARNING: Do not mount the inverter above or below your batteries.

⚠ WARNING: Electrical shock and fire hazards

On Board Solutions recommends all wiring be done by qualified personnel. Disconnect all AC and DC power sources to prevent accidental shock. Disable and secure all AC and DC disconnect devices and automatic generator starting devices. It is the installer's responsibility to ensure compliance with all the applicable installation codes and regulations.

⚠ WARNING: Installation precaution

The TruePower Plus Inverter should be mounted on a flat horizontal surface or a vertical surface. In no case should the front or rear end caps be facing in an upward or downward position. This allows proper ventilation and product safety of the unit as intended by design.

⚠ WARNING: Fire hazard

Do not cover or obstruct the ventilation openings. Do not install this equipment in a compartment with limited airflow; Overheating may result.

⚠ WARNING: Risk of fire or explosion

⚠ WARNING: Low voltage - electrical burn and spark hazard.

Disconnect battery power before servicing.

NOTE: This unit requires a large amperage draw from a DC battery when in inverter mode. Care must be taken during installation to provide properly sized cables from the battery to the inverter. Cable runs must be as short as possible and of the appropriate size and type. See the installation section for more details.

Installation Recommendations and Requirements include the Following:

American Boat and Yacht Council (ABYC)

The Canadian Electrical Code (CEC)

Canadian Standards Association (CSA)

The U.S. National Electrical Code (NEC)

RV Industry Association (RVA)

Required Tools and Materials

You will need the following to install the inverter unit:

- Two 7/16" box wrenches (1000-1500 watt models)
- Two 1/2" box wrenches (2000 watt models)
- Wire strippers
- Phillips-head screwdriver
- Flat-head screwdriver
- Properly sized DC cabling
- Mounting hardware

Inverter Unit Location

NOTE: On Board Solutions highly recommends that this unit be installed by a Certified Electrical Technician. Guidance from ABYC E-11 AC & DC Electrical Systems and ABYC A-31 Battery Chargers & Inverters is offered throughout this manual to ensure a safe, trouble free installation. Please re-read the PERSONAL PRECAUTIONS section of this manual prior to installation.

This unit must be located in a cool, dry, well ventilated area, free from unsecured hardware. Temperature is also a serious consideration. Do not mount this unit in an engine compartment or area where temperatures will exceed 40° C (104° F).

In addition, the following should be considered when choosing a location:

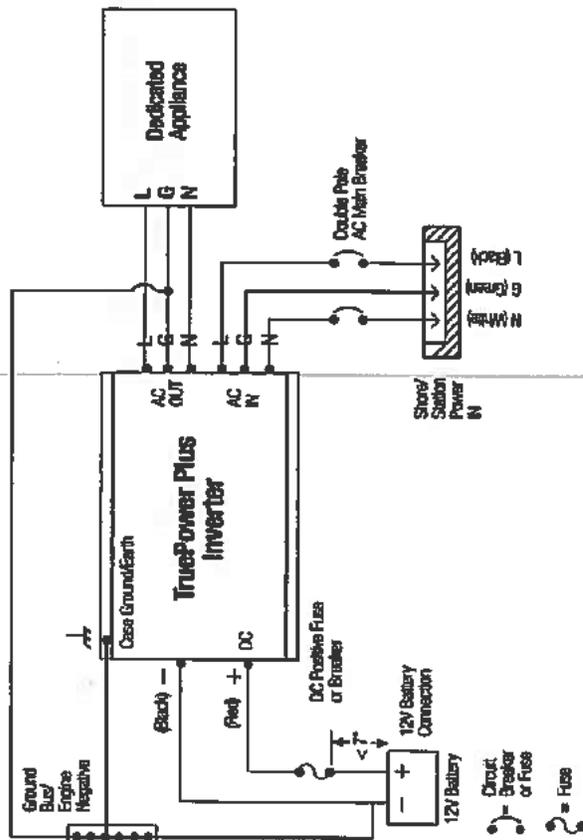
- 1) Locate inverter unit away from battery in a separate, well ventilated compartment.
- 2) Placement of the remote status panel - A length of communications cable is provided for remote-location of the status/on/off panel. Ensure the cable is long enough to reach the desired location (generally in proximity to the main panel board) and avoid any area where it can be damaged.
- 3) Service - Remember, there are items on this unit that should be routinely checked (connections, LED Status Center) to ensure that there is ample room to address those issues. Also consider space to adequately swing a standard wrench.
- 4) Cable Routing - Large DC cables and over current protection (fuses/circuit breakers) will be located in proximity to this unit. Choose a location as CLOSE AS POSSIBLE to the DC battery bank serving the unit. This will provide optimum performance for the unit and keep cable size smaller. Location of the AC power is less critical than the DC supply. More information on cable sizing follows.

MOUNTING - This unit must be mounted securely to an appropriate surface (e.g. plywood bulkhead, cored fiberglass hull structure) and through-bolled if possible.

AC Wiring Options (Continued)

2) DEDICATED APPLIANCE - This scenario is becoming popular with items like air conditioning units and refrigerators where the load of the appliance and the rating of the inverter are matched. With this type of installation, the inverter is dedicated to only one load, whether in invert or pass-through mode.

Advantages - With this installation type there is never an issue with overloading of the inverter capacity.



* Note: Unlike household wiring, the neutral (N) and ground (G) are only connected together at the SOURCE of power, either inverter or shore/station power. The TruePower Plus transfer switch maintains this wiring scheme automatically.

Installation

STOP!

BEFORE INSTALLING YOUR INVERTER READ AND FOLLOW THE BELOW CHECKLIST:

- ✓ Begin with the power switch and main shore/station power breaker in the off position.
- ✓ Ensure that all overcurrent protection (e.g. fuses and/or circuit breakers) are ready for use, not blown or tripped. Use great care to ensure the polarity of the DC connections are correct or damage will result to your inverter.
- ✓ Verify all connections are tight, corrosion free and of good integrity.

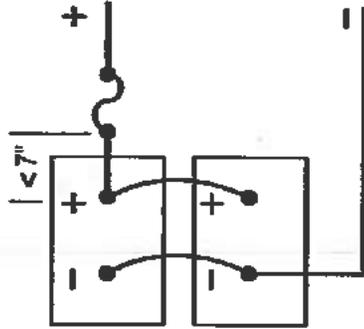
⚠ DO NOT OPERATE THIS UNIT WITHOUT THE EARTH CONNECTION ATTACHED.

The earth conductor is permitted to be 1 common size smaller than the DC positive (+) conductor (Example: DC + = 2 AWG, Earth = 4 AWG)

12 Volt DC Battery Source - On Board Solutions minimum recommended battery or battery bank is 200 Ahr. Batteries can be a single battery or multiple batteries in parallel. Batteries connected in parallel boost amp hours while maintaining voltage.

Tapping each battery as shown balances the load of the battery.

Parallel batteries illustrated:



Parallel Batteries (12V) for a 12V Bank (increases the Amp/Hr Capacity)

Installation (Continued)

INSTALLATION MATERIALS – CABLING

▲ Use great care to ensure the polarity of the DC connections are correct or damage will result to your inverter.

1) DC Cables - The DC portion of the TruePower Plus Inverter requires a large amount of amperage in inverter mode. Cable size and length is of extreme importance and should be well thought out and planned per this manual before beginning installation. Items to consider are as follows:

- a. Cable Size - Size is based on amperage draw of the unit compared to the maximum amperage a cable can carry based on ABYC E-11. On Board Solutions recommends NO MORE THAN a 10% drop in voltage from source (battery) to the TruePower Plus unit or a cable run not longer than 5 feet.

The following table outlines the cable size based on a 5' out and 5' back (10' round trip cable run). Recommended cable sizes (Based on UL 1426 105° C jacket temperature rating & a class T fuse)

Voltage	12 VDC Amp Draw	5' Length Cable Size (AWG) 2/3"	Recommended Fuse	DC Stud Size
1000	100A	4	150A	1/4"
1200	120A	2	175A	1/4"
1500	150A	1	200A	1/4"
2000	200A	00	250A	3/8"

b. Termination - Larger DC cables require specialty tools to ensure proper termination with ring terminals. Pre-terminated cable kits can be purchased through On Board Solutions or your local marine supply store. Cable type is as important as size. Cables must be acceptable under ABYC E-11 AC & DC Electrical Systems on Board Boats (types such as UL 1426 Boat Cable and SAE J1127 Battery Cable are common and marked as such)

c. Connection - The ring terminal must be directly on the battery terminal surface of the DC studs on the TruePower Plus Inverter, followed by the washer and nut with a torque of 10-15 foot-pounds. The use of a dielectric or anti-oxidant paste is recommended once the cables have been connected.

d. Strain Relief- Install proper strain relief within 6" of inverter to prevent weight and vibration of large cables from damaging the inverter.

e. Installing DC Safety Fuse: Install fuse in positive (+) cable within 7" of battery. See above table for recommended fuse

▲ DO NOT ATTEMPT CABLE TERMINATION BY MEANS OTHER THAN PROPER CRIMPING, WITH A PROPERLY CALIBRATED TOOL. SOLDER AND AUTOMOTIVE REPAIR TYPE BATTERY TERMINALS ARE NOT ACCEPTABLE. USE OF ANY OF THESE TYPES OF TERMINATIONS WILL RESULT IN PREMATURE, UNWARRANTED FAILURE OF THE TRUEPOWER UNIT.

2) AC Cables - AC Cables should be UL 1426 Boat Cable, per ABYC E-11. This type of cable is readily available in both 2 and 3 conductor. Size is based on the maximum amperage to be passed through the cable and unlike DC does not take into account the length of the cable run and voltage drop. The table below indicates the proper size for AC Cables.

- a. AC Connections - Screw terminal blocks have been provided to connect the input and output AC cables.

Shore/station power Service	Cable Size (AWG) 105° C Insulation
30 amp	10

Operation

Inverter Power On and Off

When AC shore power is provided to the AC input of the inverter, the unit operates in pass-through mode. When AC shore power is not present, the unit will switch over to inverter mode. In this mode, the AC output can be turned on or off by pressing the ON/OFF button on the display panel. With this remote feature, the inverter can be turned on or off remotely as well. See page 7 for a detailed explanation of the modes.

GFCI Testing

To test the GFCI, start by plugging a load such as a lamp into the outlet. Press the TEST button to shut power off to the load. If the load turns off, then this part of the test is a pass. Next, press the RESET button. If power is restored to the load, then this test is a pass and verifies the functionality of the GFCI.

Operating the Inverter within the Load Range

Load Type Precautions

Resistive Loads - Be careful with resistive loads that generate heat (boilers, electric stoves, etc.). Due to the high current drawn by these loads, a typical battery bank would be drained very quickly. Therefore, it would be impractical to run the inverter with these types of loads for an extended period of time.

Motor Loads - Use caution with the type of motor that you connect to the inverter. Induction motors require a much higher startup current than their running current. Since motors vary in their characteristics, it is best to test this motor load on the inverter. If the motor does not start or loses power, the inverter should be turned off and the motor removed. If the motor startup current is too high, the inverter will turn itself off.

Important Notice: FCC Class B Part 15 Notification

NOTE: 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 when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense. If in a residential setting you are encountering interference with TV and Radio reception while NOT in inverter mode, then simply disconnect AC power from the TruePower Plus Inverter to confirm if this unit is causing the interference. If so explore the following options to minimize interference:

- 1) Make sure your AC connections include a proper ground connection
- 2) Reposition your receiving antenna
- 3) Purchase a separate AC line filter
- 4) Relocate the affected appliance so it is further separated from the TruePower Plus Inverter

This equipment has been designed to comply with:

- American Boat & Yacht Council A-31 Battery Chargers and Invertors
- FCC Class B
- Underwriters Laboratories: Standard 458 Power Converter/Inverter Systems for Land Vehicles and Marine Crafts
- Certified to CSA STD. C22.2 No. 107.2



Maintenance

Battery Maintenance

Periodically, check the batteries to make sure they are good condition. Check the terminals for corrosion and clean them with a wire brush if necessary. If the batteries are flooded lead-acid, check the electrolyte levels every month and top off with distilled water if needed. Finally, check the battery voltage in accordance with the manufacturer's specifications.

Inverter Maintenance

Little maintenance is needed to keep the TruePower Plus Series inverter running properly. To keep the unit running optimally, you should:

- Wipe the unit's exterior with a damp cloth to clean off dust buildup.
- Check that the DC cables are securely connected and the fasteners are tight.
- Clear the ventilation holes of dust buildup.
- The GFCI outlet must be tested monthly. See page 18 for proper GFCI testing procedure.

Troubleshooting

WARNING

ELECTRICAL SHOCK HAZARD

Do not disassemble the TruePower inverter. It does not contain any serviceable parts and attempting to service the unit could result in an electrical shock or burn.

Failure to follow these instructions can result in death or serious injury

How to Troubleshoot Common Fault Conditions

This section details how to troubleshoot the TruePower Plus Series Inverter. Follow the process below to narrow down the cause of unit fault conditions. Go through the process before contacting customer service.

1. Check for any fault messages on the unit display screen. If a fault message is displayed, note it down before proceeding further.
2. Note the conditions around the time the fault condition occurred. Record the following details:
 - Battery voltage at the time of failure
 - How many watts the inverter was putting out
 - Extreme environmental factors (ambient temperature, vibrations, moisture, etc.)
3. If no fault messages are displayed, check the installation:
 - Is inverter properly mounted and located in a clean, dry, adequately ventilated environment?
 - Is the battery in good condition?
 - Are the DC and AC cables properly sized, in good condition, and have clean and tight connections?
 - Have any circuit breakers tripped?
 - Have any fuses blown?
4. When steps 1 through 3 have been completed, contact customer service for further troubleshooting. Be prepared to provide information surrounding the unit failure as well the unit model and serial number.

Fault Message	Condition	Action
LOW DC ALARM	Battery voltage has fallen below 10.5 V +/- 0.5 V	<ul style="list-style-type: none"> - Check battery voltage and recharge if needed - Check for proper DC cable sizing - Check for loose connections and tighten if needed - Charge batteries to clear fault
LOW DC SHUTOFF	Battery voltage has fallen below 10.0 V +/- 0.5 V and inverter output is shutoff	<ul style="list-style-type: none"> - Check battery voltage and recharge if needed - Check for proper DC cable sizing - Check for loose connections and tighten if needed - Charge batteries to clear fault
HI DC SHUTOFF	Battery voltage is above 16.5 V +/- 0.5 V and inverter output is shutoff	<ul style="list-style-type: none"> - Check for other DC inputs, such as an over voltage alternator, and disconnect if needed - Decrease input voltage to clear fault
HI TEMP SHUTOFF	Inverter internal temperature is above > 65 C and inverter output is shutoff	<ul style="list-style-type: none"> - Reduce the loads connected to the unit AC output. - Check for proper ventilation to the unit and remove any obstructions - Check the ambient temperature and move the unit to a cooler location if possible - Push button twice to clear fault
OVERLOAD SHUTOFF	Inverter output is greater than 105% and is shutoff	<ul style="list-style-type: none"> - Reduce the loads connected unit AC output - Check for loads that have a high surge & remove if needed - Push button twice to clear fault

Specifications

TruePower Plus Model:	1000	1200	1500	2000	2000
Continuous Output Power	1000 Watts	1200 Watts	1500 Watts	2000 Watts	2000 Watts
Surge Rating	2000 Watts	2400 Watts	3000 Watts	4000 Watts	4000 Watts
Output Waveform	Pure Sine	Modified Sine	Modified Sine	Modified Sine	Pure Sine
Dimensions	12.4" x 9.9" x 4.4"	11.5" x 9.9" x 4.4"	12.4" x 9.9" x 4.4"	14.2" x 10.7" x 4.4"	15.5" x 10.7" x 4.4"
Weight	8 lbs	7 lbs	7 lbs	11 lbs	11 lbs
DC Input					
Operational Voltage Range	11.0 - 15.0 VDC				
Nominal Voltage	12.5 VDC +/- 0.5 V				
High Voltage Shutdown	15.5 VDC +/- 0.5 V				
Low Voltage Shutdown	10.0 VDC +/- 0.5 V				
Low Voltage Alarm	10.5 VDC +/- 0.5 V				
Low Voltage Recovery	12.0 VDC +/- 0.5 V				
Reverse Polarity Protection	Via internal fuses (not end user serviceable)				
System Off/LCD Off Drain	< 5 ma				
System Standby/LCD On	< 1 Amp				
AC Output					
Output Voltage	115 VAC +/- 10 V				
Output Frequency	60 Hz +/- 3 Hz				
Pass-through Voltage Range	100 - 130 VAC				
Pass-through Current	30 A RMS				
Transfer Time	< 30 ms				
Efficiency	> 90 %				
Integrated GFCI Duplex Outlet	15 A Circuit Breaker				
Overload / Over Temperature Recovery	Manual AC re-power to recover				
Short Circuit Recovery	Shutoff output voltage, auto recover when short is removed				
USB Output					
Voltage	5 VDC +/- 5%				
Current	2.1 ADC				
Environmental Specifications					
Operating Temperature	0 - 40 C				
Storage Temperature	-20 to 60 C				
Operating Humidity	10 - 90% non-condensing				
Storage Humidity	10 - 95% non-condensing				

Customer Service and Warranty

We are committed to customer satisfaction and value your business. If at any time during the warranty period you experience a problem with your new TruePower Plus Inverter simply call us at 1-800-824-0524 during standard business hours (8:30 AM - 6 PM Eastern Time) for technical support.

TRUEPOWER PLUS - TWO YEAR LIMITED FACTORY WARRANTY

Each product is guaranteed against defects in material and workmanship to the original consumer in normal use for two full years from the date of purchase. On Board Solutions at its discretion will repair or replace free of charge any defects in material or workmanship.

The following conditions apply:

- Warranty is calculated from date of manufacture if not registered within two weeks of sale.
- Water intrusion will damage unit and void warranty.
- Reverse polarity connection will damage unit and void warranty
- Warranty void if damage occurs due to negligent repairs.
- Customer is responsible for returning the product to On Board Solutions. Inbound shipping costs must be prepaid.
- This warranty does not cover blemishes due to normal wear and tear or damages caused by accidents, abuse alterations or misuse.

Purchase or other acceptance of the product shall be on the condition and agreement that On Board Solutions SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND. (Some states do not allow the exclusion or limitation of consequential damages, so the above limitations may not apply to you.) This warranty is made in lieu of all other obligations or liabilities on the part of Onboard Solutions. Additionally, On Board Solutions neither assumes nor authorizes any person for any obligation or liability in connection with the sale of this product.

To make a claim under warranty, call Factory Service at 1-800-824-0524. Follow the company's return policy, which will be provided by the company. On Board Solutions will make its best effort to repair or replace the product, if found to be defective within the terms of the warranty, within 30 days after return of the product to the company. On Board Solutions will ship the repaired or replaced product back to the purchaser.

This warranty provides to you specific legal rights and you may also have other rights, which vary from state to state. This warranty is in lieu of all other, expressed or implied.

On Board Solutions
TruePower Plus Factory Service
15 Dartmouth Drive, STE 101

Auburn, NH 03032
Service Phone: 1-800-824-0524
Phone: (603) 433-4440
Fax: (603) 433-4442

Visit us on the web at: www.promanier.com
www.onboardsolutions.biz

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En voici quelques-uns :

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- Série ProSport – Chargeurs de batterie à usage intensif pour nautisme de plaisance
- ProTourmentelle – Chargeurs de batterie professionnels pour la compétition nautique
- Série ProNauticP – Chargeurs de batterie pour la navigation de plaisance et de croisière
- Série ProSoloCharge – Isolateurs chargeurs numériques sans chute de tension
- Chargeurs numériques mobiles de chargement en transit
- Mainteneur ProSport 1.5 A Multi-Usage
- Supports de fiche secteur
- Isolateurs de batterie
- Isolateurs galvaniques et systèmes contrôlés
- Produits anticorrosion
- Jumelles nautiques étanches
- Une ligne complète de multimètres portatifs
- Support technique et service à la clientèle en ligne

Consultez notre site fréquemment, nous ajoutons de nouveaux produits en permanence pour satisfaire votre plaisir de naviguer!

On Board Solutions

15 Dartmouth Drive, STE 101
Auburn, New Hampshire 03032
TEL : 1-603-433-4440
TELECOPIE : 1-603-433-4442
www.promariner.com

Fabrique à Chine

Caractéristiques et séries à modifications sans avis préalable

Certificats :
Conforme aux normes UL STD. 458 avec supplément marin SA
Certifié à CSA STD. C22.2 No. 107.2
FCC Class B

Conçu et fabriqué conformément à ABYC A-31



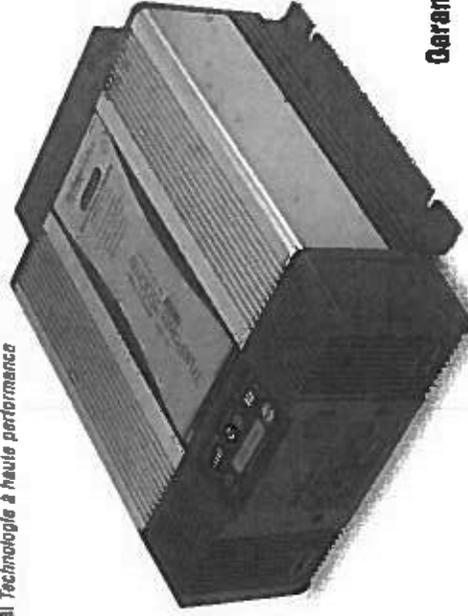
TruePower Series

PLUS

Commutateur de transfert c.a. intégré

Onduleurs pour service intensif, nautiques, mobiles ou de qualité industrielle

Prohibita Digital Technologie à haute performance



Garantie de 2 ans

Manuel du propriétaire et guide d'installation

Modèle	VAJ	Puissance	Entrée c.c.	Entrée c.a.	Transfert c.a.	Entrée à l'air c.a.
TruePower Plus 1200MS	08120	1200W	Entrée 12V c.c.	118V c.a.	30 Amperes	Orto étanche/moblie
TruePower Plus 1500MS	08180	1600W	Entrée 12V c.c.	118V c.a.	30 Amperes	Orto étanche/moblie
TruePower Plus 2000MS	08200	2000W	Entrée 12V c.c.	118V c.a.	30 Amperes	Orto étanche/moblie
TruePower Plus 1000PS	07100	1000W	Entrée 12V c.c.	118V c.a.	30 Amperes	Orto étanche/moblie purto
TruePower Plus 2000PS	07200	2000W	Entrée 12V c.c.	118V c.a.	30 Amperes	Orto étanche/moblie purto

REMARQUE IMPORTANTE - VEUILLEZ CONSERVER CES INSTRUCTIONS
Veiller à sauvegarder et à lire toutes les instructions d'utilisation et d'installation avant d'installer ou de connecter l'alimentation c.c. ou c.a. à l'onduleur TruePower Plus.

La satisfaction du client est notre priorité!

Ne vous inquiétez pas de retourner cet appareil si défectueux ni au concessionnaire pour toute demande d'entretien ou de garantie. Veuillez appeler notre Service d'aide à la clientèle au 1-800-824-0824 de 8 h 30 à 17 h, heure de l'est, pour toute demande de garantie, de service ou d'assistance à l'installation. Merci - Service à la clientèle de On Board Solutions

VEUILLEZ NOTER VOTRE :

Numéro de modèle : _____

Numéro de série : _____

Date d'achat : _____

Remarque importante :

Veuillez lire ce manuel ainsi que les avertissements fournis par le fabricant de la batterie. Le présent manuel est destiné à faciliter l'installation sécuritaire de l'onduleur TruePower Plus. L'installation de ce dernier doit se conformer aux codes électriques applicables et aux normes (ABYC E-11 de l'American Boat and Yacht Council lorsqu'il est installé sur un bateau).

⚠️ AVERTISSEMENT À L'INTENTION DU PROPRIÉTAIRE ET DE L'INSTALLATEUR :

Lire ce qui suit pour éviter tout risque de blessures ou d'incendie. INSTALLATION PAR UN ÉLECTRICIEN CERTIFIÉ. L'INSTALLATION DOIT ÊTRE CONFORME AUX DIRECTIVES D'INSTALLATION SUIVANTES :

Pour prévenir le risque de dommage causé par le feu : Toutes les bornes et fixations de câble doivent être bien serrées. Fixer les câbles d'entrée c.c. avec une décharge de traction à 150 mm (6 po) au plus de l'onduleur.

Raccordement des câbles de batterie aux bornes c.c. : Utiliser deux clés de taille adéquate pour chaque connexion. Des clés de 7/16 po ou de 1/2 po sont nécessaires (en fonction du modèle). Serrer jusqu'à ce que les rondelles de blocage soient comprimées.

Installation du fusible de sécurité c.c. : Installer le fusible sur le câble positif (+) à 175 mm (7 po) au plus de la batterie. Consulter la page 45 pour les calibres des fusibles recommandés.

Câbles d'entrée c.c. : Le diamètre du câble doit être spécifié d'après la longueur et l'intensité de l'entrée c.c. de l'onduleur TruePower Plus installé. Reportez-vous à la page 45.

AVERTISSEMENT : Risque d'incendie. Ne pas remplacer un fusible par un fusible de calibre supérieur à celui recommandé par le fabricant. Vérifier que le fusible du système électrique dédié peut alimenter le produit sans ouvrir le fusible. Les fusibles ne doivent en aucun cas être contournés car cela peut causer des dommages graves, un incendie ou un risque de mort.

⚠️ AVERTISSEMENT : Cet appareil n'est pas protégé contre l'incrimination, le risque d'incendie ou l'explosion.

Ce matériel contient des composants qui peuvent produire des arcs ou des étincelles. Pour réduire le risque d'incendie ou d'explosion, ne pas installer ce matériel dans des compartiments contenant des batteries, des matériaux ou des vapeurs inflammables, ni dans un endroit contenant de l'équipement alimenté à l'essence, ou des joints, des raccords, ou d'autres connexions entre les composants du système de carburant.

⚠️ AVERTISSEMENT : Basse tension - risques de brûlures électriques et d'étincelles. Débrancher la batterie avant toute intervention.

⚠️ AVERTISSEMENT : DANGER DE CHOC ÉLECTRIQUE

Ne pas démonter l'onduleur TruePower Plus. Il ne contient aucune pièce réparable et tenter de réparer l'appareil peut provoquer un choc électrique ou des brûlures.

ATTENTION : La polarité et la couleur du fil doivent être respectées lors de la connexion de l'installation d'une batterie de 12 volts.

Barrette d'entrée c.c. rouge = + (positif) connexion à un câble de batterie rouge uniquement.

Barrette d'entrée c.c. noire = - (négatif) connexion à un câble de batterie noir uniquement.

REMARQUE : UNE CONNEXION EN INVERSION DE POLARITÉ ENDOMMAGE L'APPAREIL ET ANULE LA GARANTIE.

Introduction...

Consignes de sécurité...

Présentation générale...

Installation...

Utilisation...

Maintenance...

Dépannage...

Caractéristiques...

Garantie...

Sommaire

DÉBALLAGE ET INSPECTION

Inspecter soigneusement l'appareil TruePower Plus. L'emballage doit contenir les articles suivants :

1) L'appareil TruePower Plus

2) Un sachet de pièces comprenant :

a. Des couvercles de bornes c.c. + (rouge) et - (noir)

b. Ensemble de télécommande, y compris le panneau, le câble et les vis de montage.

c. Le manuel du propriétaire et d'installation

DOMMAGES – Si des pièces sont manquantes ou endommagées, ou si l'appareil a été endommagé pendant le transport, veuillez communiquer avec le Service à la clientèle de On Board Solutions au 1 800 824-0624. Ne pas retourner l'appareil à l'endroit où il a été acheté, ni essayer de l'installer ou de l'utiliser.

Introduction

Toute l'équipe de On Board Solutions vous remercie et vous félicite pour l'achat récent d'un onduleur TruePower Plus.

Les onduleurs TruePower Plus ont été portés à un niveau supérieur de conception grâce à la dernière technologie de conversion de puissance basée sur l'utilisation de la commande numérique et de logiciel. Les onduleurs TruePower Plus répondent à la tendance d'avoir la commodité de l'alimentation domestique à bord pour les grils électriques, les systèmes de divertissement, la réfrigération et plus encore.

L'onduleur TruePower Plus convertit non seulement le 12 V c.c. en courant domestique de 110 V c.a., mais transmet aussi directement la puissance du courant secteur grâce à son commutateur de transfert intégré de 30 ampères.

Unique en son genre, la série TruePower Plus offre une interface utilisateur intuitive à deux couleurs intégrant :

- Un écran ACL, avec indicateurs de puissance de sortie c.a. et d'alimentation c.c..
- Des voyants DEL utilisés pour le type d'entrée d'alimentation et la notification de service.
- En fonctionnement normal, l'écran et les indicateurs sont bleus et verts.
- En cas de conditions défavorables, l'écran ACL et les indicateurs deviennent rouges en fonction des conditions, et l'écran ACL fournit un message d'erreur complet, bien plus avantageux que les codes d'erreur traditionnels qui doivent être déchiffrés.
- Cette conception innovatrice élimine le stress et le mystère de l'utilisation d'un onduleur embarqué pour les VR, les bateaux et les véhicules spécialisés.

Le temps d'installation est considérablement réduit grâce à notre câble c.a. muni d'une décharge de traction innovante, cachée et intégrée avec des borniers de connexion de c.a. avec des vis frontales. Cela élimine la nécessité de percer des trous et d'utiliser une décharge de traction de style conduite et des cosses rondes pour les connexions d'alimentation secteur.

Conçu pour des charges exigeantes présentant des valeurs de pointe de 2 fois la valeur nominale et avec des sorties commodes protégées par un disjoncteur de fuite de terre ainsi qu'un port de chargement USB. Electronique interne résistante aux chocs et revêtement conforme des composants pour la protection contre les environnements difficiles.

Une alimentation domestique qui est prête lorsque vous en avez besoin!

Onduleurs pour service intensif, nautiques, mobiles ou de qualité industrielle

Les onduleurs TruePower Plus sont disponibles en modèles onde sinusoïdale modifiée (MS) de 1200, 1500 et 2000 watts et en modèles onde sinusoïdale pure (PS) de 1000 et 2000 watts.

Fonctionnalités standard :

- Centre de messages numérique ACL intuitif à double couleur
- Double indicateur de couleur pour la sortie de courant alternatif et l'entrée c.c. de la batterie
- Le commutateur de transfert interne de 30 ampères du courant secteur transmet automatiquement le courant par l'entrée de c.a. lorsqu'il est présent
- Décharge de traction du câble d'alimentation c.a. intégrée pour faciliter l'installation
- Port d'alimentation USB et prises protégées par disjoncteur de fuite à la terre
- Conception compacte et légère
- Technologie de démarrage progressif et de filtrage du bruit avec une capacité d'absorption des pointes de charge doublée
- Télécommande Marche/Arrêt avec câble de 2,75 m (9 pi) et couvercles de câbles c.c. Inclus
- Décharge de traction du câble d'alimentation c.a. intégrée pour faciliter l'installation
- Sécurité intégrée de protection contre la surcharge, la surchauffe, le court-circuit et la polarité inverse.
- Alarme sonore et arrêt lors d'une condition de tension c.c. trop basse ou trop élevée, d'une surcharge et d'une surchauffe
- Construction résistante aux chocs avec revêtement conforme des composants électroniques
- Garantie de 2 ans

Commutateur de transfert

Le TruePower Plus intègre un commutateur de transfert interne de 30 ampères, qui détecte la présence d'une alimentation c.a. de qualité. Lors de la déconnexion de la source d'alimentation du quai/voiture station, l'onduleur commutera automatiquement pour fournir une alimentation en courant alternatif via la source de la batterie c.c.. Cet interrupteur, en conformité avec A-31, déconnecte la roulotte du câble d'alimentation en c.a. de la terre du c.a. en mode d'alimentation de qualité.

Les onduleurs TruePower Plus sont protégés par une diversité de fonctionnalités, y compris :

- Prise de courant de sécurité protégée
- Protection contre la polarité d'entrée Inverse
- Alarme de tension de batterie faible
- Arrêt de protection de batterie faible
- Protection contre les surcharges
- Protection de sortie contre les courts-circuits
- Protection thermique
- Protection contre les surtensions (15 V c.c.)

Télécommande TruePower Plus

Commande Marche/Arrêt

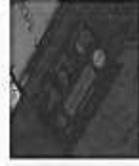
Voyants à DEL de source d'entrée de l'alimentation

Voyant à DEL de décharge

Via de montage de la télécommande et câble de 2,75 m (9 pi) inclus



Écran intuitif à double couleur et centre de messages ACL.



Port USB 5 V c.c. (5.1 A) et prises protégées par disjoncteur de fuite de terre



Décharge de traction de câble. Couvercles de câbles c.c. et commutateur en c.a. inclus (sur l'option 1)



Décharge de traction de câble. Couvercles de câbles c.c. et commutateur en c.a. inclus (sur l'option 1)

Consignes générales de sécurité

Ⓢ CONSIGNES DE SÉCURITÉ IMPORTANTES : LIRE ET CONSERVER CES INSTRUCTIONS! Le manuel du propriétaire contient des instructions de sécurité importantes pour les onduleurs de la série TruePower Plus qui doivent être respectées lors de l'installation, le fonctionnement et le dépannage. Lire ce manuel du propriétaire et le conserver pour toute consultation ultérieure.

Lire attentivement ces instructions et se familiariser avec le matériel avant de procéder à son installation, à son exploitation, à son entretien ou à sa maintenance. Les messages de précaution suivants peuvent apparaître tout au long de ce manuel ou sur le matériel pour avertir des dangers potentiels ou pour attirer l'attention sur des informations qui clarifient ou simplifient une procédure.

Avant d'installer et d'utiliser le onduleur, lire toutes les sections appropriées de ce guide et toutes les indications de mise en garde sur l'onduleur, les batteries et sur les appareils.

ATTENTION

- ⚠ Ne pas exposer cet appareil à la pluie ni à la neige.
- ⚠ L'utilisation d'accessoires non recommandés ou non vendus par On Board Solutions annule la garantie et peut entraîner un risque d'incendie, de choc électrique ou de blessure.
- ⚠ Pour réduire le risque de choc électrique, enlever l'alimentation secteur de quel et les connexions c.c. avant tout entretien ou nettoyage. La désactivation par les commandes NE REDUIT PAS ce risque.
- ⚠ ADE - Prévoir la présence d'une personne à portée de voix ou dans l'environnement proche qui puisse vous venir en aide lors d'un travail sur une batterie à électrolyte liquide.

1. ATTENTION : Ne pas faire fonctionner l'onduleur si le carton ou l'appareil présente des dommages significatifs en raison d'une chute ou d'un écrasement, d'un choc direct ou de toute autre détérioration.

2. ATTENTION : Ne pas démonter l'onduleur. Appeler l'usine directement lorsqu'un entretien ou une réparation est nécessaire. Un assemblage incorrect peut entraîner un risque de choc électrique ou d'incendie. Pas de pièces réparables par l'utilisateur.

3. ATTENTION : Par mesure de précaution - Garder hors de la portée des enfants l'onduleur et ses composants! Le même courant alternatif potentiellement dangereux ou mortel qui se trouve dans une prise de courant domestique normale de 115 V se trouve dans l'onduleur TruePower Plus.

4. ATTENTION : Pour une installation conforme à ABYC E-11, cet onduleur doit être installé avec un fusible en ligne dans le câble positif (+) du côté c.c. de l'onduleur (entre la batterie et l'onduleur) à une distance de 175 mm (7 po) ou raccourciment de la batterie (voir le tableau des caractéristiques dans ce manuel pour le calibre correct).

Précautions concernant la batterie

1) Pour réduire le risque d'explosion de la batterie, suivre ces instructions et celles publiées par le fabricant de la batterie et le fabricant de tout appareil susceptible d'être utilisé à proximité de la batterie. Examiner le marquage de mise en garde sur ces produits et sur le moteur.

⚠ **ÉTINCELLES** - Soyez très prudent avec la chute éventuelle d'objets métalliques comme des tournevis et des clés sur la batterie. Ils peuvent court-circuiter la batterie et provoquer immédiatement une étincelle qui peut provoquer un incendie ou une explosion.

Précautions pour la connexion c.c.

1) Ne connecter et ne déconnecter les câbles de sorties c.c. seulement qu'après avoir placé les interrupteurs de l'onduleur en position « Arrêt » et retiré le cordon d'alimentation c.a. de la prise électrique.

Précautions sécuritaires personnelles

1. TRAVAILLER À PROXIMITÉ D'UNE BATTERIE D'ACCUMULATEURS AU PLOMB EST DANGEREUX. LES BATTERIES PRODUISENT DES GAZ EXPLOSIFS DURANT LEUR UTILISATION NORMALE. POUR CETTE RAISON, IL EST EXTREMEMENT IMPORTANT, AVANT CHAQUE ENTRETIEN DE L'APPAREIL À PROXIMITÉ DE LA BATTERIE, DE LIRE CE MANUEL ET DE SUIVRE EXACTEMENT TOUTES LES INSTRUCTIONS.

2. Ne jamais charger ou tirer de l'énergie d'une batterie gelée.
3. S'il est nécessaire de retirer la batterie du véhicule ou d'un navire, veiller à toujours retirer la borne de terre de la batterie en premier. Vérifier que tous les accessoires sont débranchés, afin de ne pas provoquer d'arc.
4. Veiller à ce que la zone autour de la batterie soit bien ventilée.
5. Nettoyer les bornes de la batterie. Faire preuve de prudence pour éviter tout contact d'un élément corrodé avec les yeux.
6. Étudier toutes les précautions spécifiques du fabricant concernant les batteries telles que l'enlèvement ou non des bouchons de cellules pendant la charge et le taux de charge recommandé.

HABILLEMENT - Porter une protection oculaire complète et des vêtements de protection. Éviter de se boucher les yeux lors du travail à proximité de batteries.

NE JAMAIS - Fumer ou laisser une étincelle ou une flamme se produire à proximité de la zone de travail de la batterie.

ENLEVER - Tout objet personnel en métal, notamment les bagues, montres, bracelets, etc. lors du travail à proximité d'une batterie. Une batterie peut produire un courant de court-circuit suffisamment élevé pour souder une bague ou tout autre objet métallique, avec pour conséquence de graves brûlures.

⚠ AVERTISSEMENT : Restrictions d'utilisation - L'onduleur TruePower Plus ne doit pas être utilisé en liaison avec des systèmes de maintien de la vie ou d'autres équipements médicaux.

DANGER

HAUTE TENSION

VEILLER À ÉVITER TOUTE BLESSURE GRAVE VOIRE MORTELLE PROVOQUÉE PAR UN CHOC ÉLECTRIQUE AVANT D'EFFECTUER TOUTE INTERVENTION ÉLECTRIQUE, COUPER L'ALIMENTATION C.A.

DANGER

RISQUE D'EXPLOSION

ÉVITER UNE BLESSURE GRAVE OU LA MORT

EFFECTUER LE BRANCHEMENT DANS UN LIEU À L'AIR LIBRE EXEMPT DE VAPEURS EXPLOSIVES.

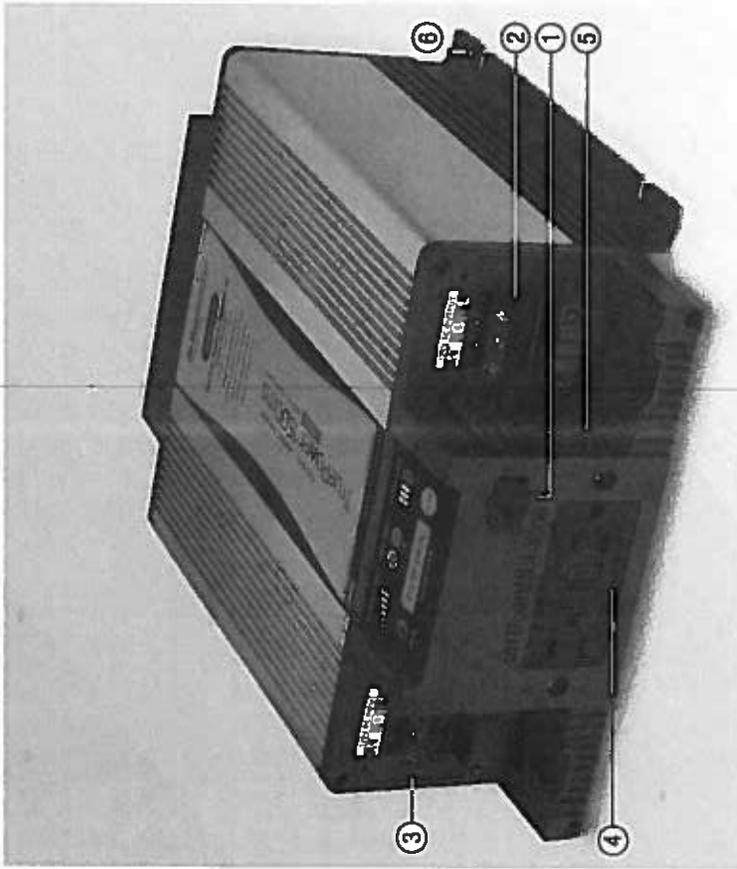
AVERTISSEMENT

BASSE TENSION

ÉVITER TOUTE BLESSURE GRAVE PROVOQUÉE PAR DES BRÛLURES OU DES ÉTINCELLES ÉLECTRIQUES AVANT D'EFFECTUER TOUTE INTERVENTION ÉLECTRIQUE, COUPER TOUTE ALIMENTATION C.C. VERS L'APPAREIL

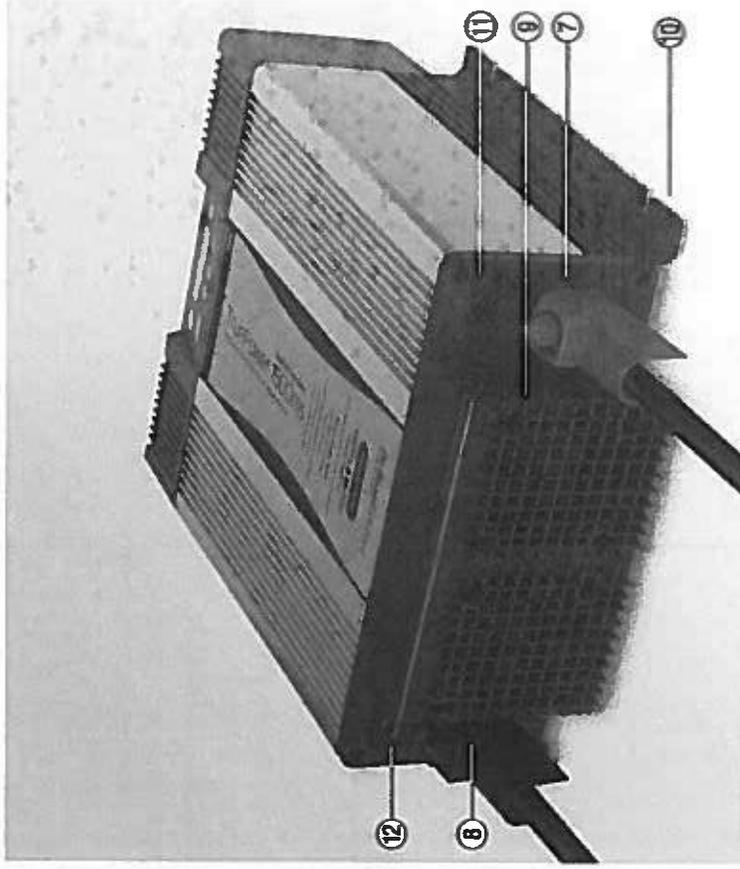
ATTENTION

SURFACES BRÛLANTES - POUR RÉDUIRE LE RISQUE DE BRÛLURES, NE PAS TOUCHER EN COURS DE FONCTIONNEMENT



L'image ci-dessus décrit l'avant de l'onduleur TruePower Plus.
Se reporter au tableau suivant pour les caractéristiques :

- 1. Port de chargement USB
- 2. Sortie c.a.
- 3. Entrée c.a.
- 4. Deux prises c.a. de 15 A protégées par disjoncteur de fuite de terre pour alimenter les appareils connectés
- 5. Ouvertures de ventilation permettant une circulation d'air optimale.
- 6. Borne de terre



L'image ci-dessus décrit l'arrière de l'onduleur TruePower Plus.
Le tableau suivant présente les caractéristiques numérotées ci-dessus du panneau arrière

- 7. Câble d'entrée c.c. (Positif +)
- 8. Câble d'entrée c.c. (Négatif -)
- 9. Cartera de ventilateur tenu à l'écart de 400 mm (16 po)
- 10. Brâches de fixation (côtés)
- 11. Port de télécommande pour simple télécommande avec interrupteur marche/arrêt et DEL d'alimentation et de défaillance
- 12. Disjoncteur de fuite à la terre

Modes de fonctionnement de l'onduleur TruePower Plus

L'onduleur TruePower Plus dispose de 3 modes distincts qui permettent d'adapter le comportement de l'onduleur à ses besoins spécifiques :

Mode transmission du courant c.a. (L'écran ACL est éteint) :

Le mode transmission du courant c.a. est indiqué uniquement par le voyant  allumé sur le panneau d'affichage. Toutes les autres DEL sont éteintes.

- En mode transmission jusqu'à 30 A d'intensité provenant du qui peuvent être passés par l'onduleur.
- Dans ce mode, si l'alimentation provenant du qui est interrompue, l'onduleur ne convertit pas de courant continu en courant alternatif pour maintenir les charges activées.
- La consommation de c.c. provenant des batteries est la plus faible dans ce mode (< 5 mA). Ce mode est idéal pour l'entreposage de longue durée.

Mode veille (l'écran ACL est allumé) (Sortie fournie par l'alimentation de la station, transfert rapide sur l'onduleur si nécessaire) :

Le mode veille est indiqué par le voyant  et par l'écran ACL allumés sur le panneau d'affichage.

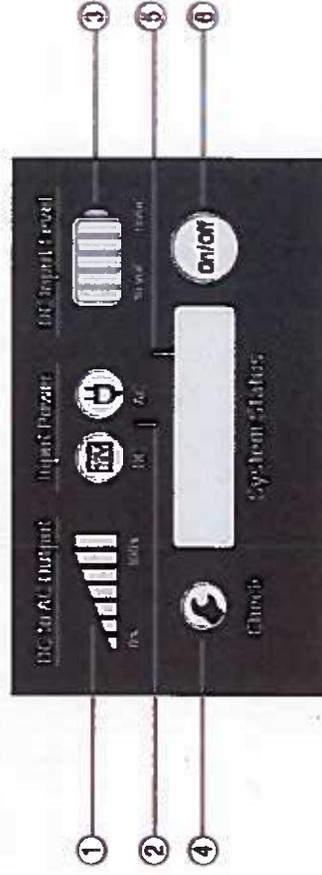
- L'alimentation des charges connectées à l'onduleur provient de l'alimentation de qui.
- En cas d'interruption de courant, l'onduleur passe automatiquement en mode onduleur pour maintenir les charges en fonctionnement. C'est idéal pour les charges comme les ordinateurs pour lesquels une perte de l'alimentation peut causer des pertes de données.
- Dans ce mode, le courant continu provenant des batteries est < 1 A, ce qui peut entraîner la décharge des batteries si elles ne disposent pas d'une source externe de recharge.

Mode onduleur :

Le mode onduleur est indiqué par le voyant  et par l'écran ACL allumés sur le panneau d'affichage.

- L'alimentation des charges est fournie par les batteries connectées.
- L'appareil repasse automatiquement en mode veille si l'alimentation secteur est présente.

Présentation du TruePower Plus



	Onduleur	Mode onduleur	Transmission directe du courant
1. Sortie c.c. vers c.a. 	Sortie générée à partir du c.c.	Veille Sortie fournie par le qui transfère rapide à partir des batteries si nécessaire) Désactivé	Désactivé
2. Alimentation en entrée 			 Désactivé
3. Niveau d'entrée c.c. 	Le graphique à DEL indique le pourcentage de la capacité totale de conversion du courant continu en courant alternatif des onduleurs (0 % à 100 %). La dernière DEL devient rouge lorsque l'appareil est en surcharge.		Lorsque la tension de courant continu d'entrée est inférieure à 11 V c.c., la première LED s'allume en rouge. De 11 V c.c. à 13 V c.c., les voyants s'allument en vert et indiquent de manière incrémentale le niveau de charge de la batterie.
4. Symbole de clé 			La symbole de la clé s'allume en rouge lorsque l'onduleur est débranché.
5. État du système	L'écran ACL de l'état du système affiche l'état de l'onduleur. Lorsque l'onduleur fonctionne normalement, l'écran ACL indique « SYSTEM NORMAL ». En cas d'anomalie, l'écran ACL devient rouge et affiche un message d'erreur.		Désactivé
6. Bouton marche/arrêt 	Un appui sur le bouton permet de passer au mode transmission du courant		Un appui sur le bouton permet de passer au mode veille/onduleur

Modes d'anomalie d'état du système

Toutes les conditions d'anomalie sont accompagnées d'une tonalité alternative de 2 secondes.

Nom de l'anomalie	Explication
LOW DC ALARM	S'allume en rouge lorsque le niveau de la tension d'entrée est inférieur à 10,5 V c.c.
LOW DC SHUTOFF	S'allume en rouge lorsque le niveau de la tension d'entrée est inférieur à 10,0 V c.c.
HI DC SHUTOFF	S'allume en rouge lorsque le niveau de la tension d'entrée est supérieur à 15,5 V c.c.
HI TEMP SHUTOFF	S'allume en rouge lorsque la température interne est supérieure à 65 degrés Celsius
OVERLOAD SHUTOFF	S'allume en rouge lorsque la puissance de sortie est de > 105 %

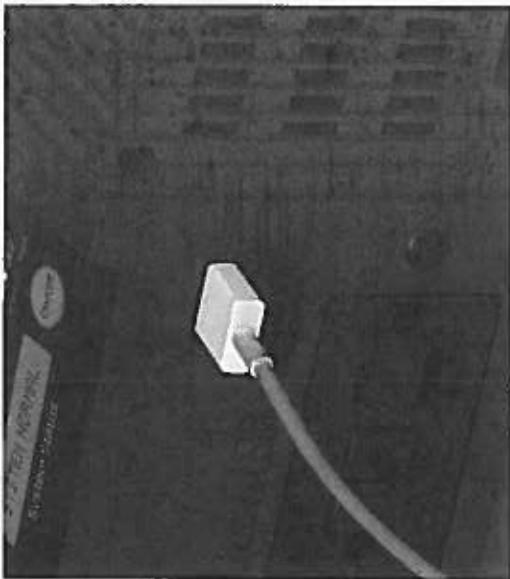
Télécommande TruePower Plus

La télécommande permet à l'utilisateur de visualiser à distance l'état de l'onduleur. Le symbole bleu de la fiche secteur indique que l'onduleur fonctionne à partir de l'alimentation secteur de qual. Le symbole vert de batterie 12 V indique que l'onduleur fonctionne à partir de l'alimentation en courant continu. Le symbole de la clé s'allume en rouge lorsque l'onduleur est défectueux. Le bouton permet de basculer entre les modes transmission du courant c.a. et veille/onduleur.



Port de chargement USB

Le port USB sur le panneau avant fournit l'alimentation (5 V c.c., 2,1 A) aux périphériques connectés par USB. Le port peut fournir de l'alimentation lorsque l'onduleur fonctionne à partir d'une alimentation c.c. ou de l'alimentation secteur du qual.. Lorsque le port n'est pas utilisé, vérifier que le pare-poussette en caoutchouc est scellé sur le port.



Préparation de l'installation

⚠ AVERTISSEMENT : Cet appareil n'est pas protégé contre l'inflammation, le risque d'incendie ou l'explosion

Ce matériel contient des composants qui peuvent produire des arcs ou des étincelles. Pour réduire le risque d'incendie ou d'explosion, ne pas installer ce matériel dans des compartiments contenant des batteries, des matériaux ou des vapeurs inflammables, ni dans un endroit contenant de l'équipement alimenté à l'essence, ou des joints, des raccords, ou d'autres connexions entre les composants du système de carburant.

⚠ AVERTISSEMENT : Ne pas installer l'onduleur au-dessus ou au-dessous de batteries.

⚠ AVERTISSEMENT : Risques de chocs électriques ou d'incendie

On Board Solutions recommande que tout le câblage soit effectué par du personnel qualifié. Débranchez toutes les sources d'alimentation c.a. et c.c. afin d'éviter tout choc accidentel. Désactiver et verrouiller tous les dispositifs de déconnexion c.a. et c.c. ainsi que les dispositifs de démarrage automatique des générateurs. Il incombe à l'installateur d'assurer la conformité avec tous les codes et règlements d'installation applicables.

⚠ AVERTISSEMENT : Précautions d'installation

L'onduleur TruePower Plus doit être monté sur une surface plane horizontale ou verticale. Les capuchons avant et arrière ne doivent jamais être orientés vers le haut ou vers le bas. Cela permet une ventilation adéquate et la sécurité de l'appareil comme prévu durant la conception.

⚠ AVERTISSEMENT : Risque d'incendie

Ne pas couvrir ni obstruer les ouvertures de ventilation. Ne pas installer ce matériel dans un compartiment avec un débit d'air limité. Une surchauffe peut en résulter.

⚠ AVERTISSEMENT : Risque d'incendie ou d'explosion

Débrancher la batterie avant toute intervention.

⚠ AVERTISSEMENT : Basse tension - risques de brûlures électriques et d'étincelles.

REMARQUE : Cet appareil nécessite une grande intensité provenant d'une batterie c.c. en mode onduleur. Lors de l'installation prendre soin de dimensionner correctement les câbles allant de la batterie à l'onduleur. Les câbles doivent être aussi courts que possible et de la taille et du type appropriés. Voir la section Installation pour plus de détails.

Les recommandations et exigences d'installation comprennent les suivantes :

American Boat and Yacht Council (ABYC)

Code électrique canadien (CEC)

Association canadienne de normalisation (CANOR)

Le code électrique national américain (NEC)

Association de l'industrie du VR (RVMA)

Outils et matériaux nécessaires

Les éléments suivants sont nécessaires pour installer l'onduleur :

- Deux clés fermées polygonales de 7/16 po (modèles de 1000 - 1500 watts)
- Deux clés fermées polygonales de 1/2 po (modèles de 2000 watts)
- Outils pour dénuder des fils
- Tournevis à tête Phillips
- Tournevis à tête plate
- Un câblage c.c. de dimension adéquate
- Du matériel de montage

Emplacement de l'onduleur

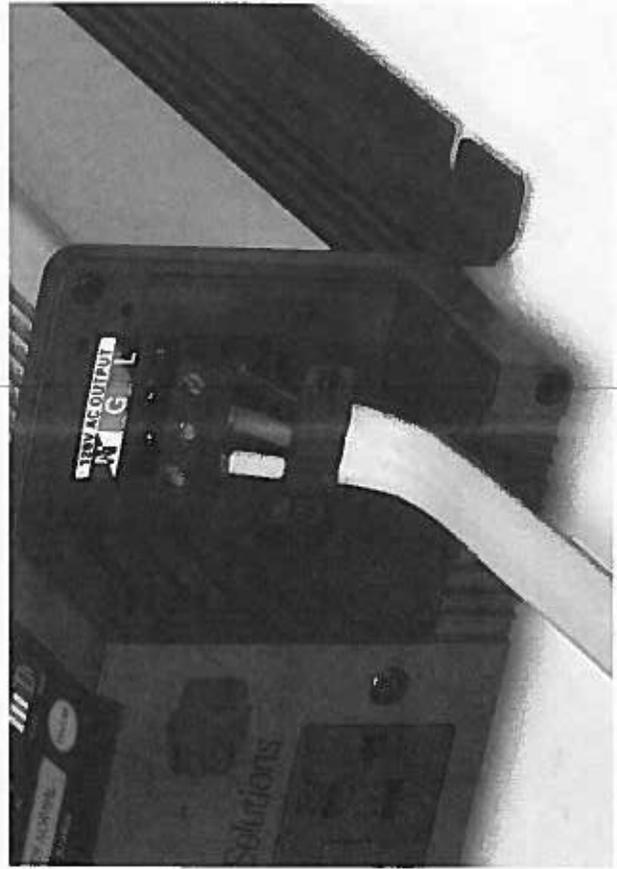
REMARQUE : On Board Solutions recommande fortement que cet appareil soit installé par un technicien certifié en électricité. Des directives ABYC E-11 concernent les systèmes électriques c.a. et c.c. et ABYC A-31 concernent les chargeurs et les onduleurs sont prodiguées dans le présent manuel pour garantir une installation sécuritaire et sans souci. Relire la section PRÉCAUTIONS PERSONNELLES du présent manuel avant de commencer l'installation.

Cet appareil doit être placé dans un endroit frais, sec et bien ventilé, exempt de matériel non livé. La température est aussi une considération sérieuse. Ne pas installer cet appareil dans un compartiment moteur ou dans des endroits où la température dépasse 40 °C (104 °F).

En outre, prendre en considération les consignes suivantes lors du choix d'un emplacement :

- 1) Placer l'onduleur à distance de la batterie dans un compartiment séparé et bien ventilé.
- 2) Emplacement de la télécommande/indicateur d'état - Une longueur de câble de communication est fournie pour la localisation à distance de la télécommande marche/arrêt/indicateur d'état. Vérifier que le câble est assez long pour atteindre l'emplacement désiré (généralement à proximité du panneau de contrôle principal) et qu'il n'est pas acheminé dans une zone où il peut être endommagé.
- 3) Entretien - Se rappeler que cet appareil comporte des éléments qui doivent être vérifiés régulièrement (connexions, affichage d'état à DEL). S'assurer qu'il y a suffisamment de place pour effectuer ces opérations. Prendre soin de réserver l'espace adéquat pour utiliser une clé standard.
- 4) Acheminement des câbles - D'épais câbles de courant continu et une protection contre les surintensités (fusibles / disjoncteurs) seront installés à proximité de cet appareil. Choisir un emplacement AUCS PROCHE QUE POSSIBLE de la batterie de courant continu alimentant l'appareil. Cela permet d'obtenir des performances optimales pour l'appareil et de réduire la taille des câbles. L'emplacement de l'alimentation en c.a. est moins critique que l'alimentation en c.c.. Se reporter ci-après pour le dimensionnement des câbles.

MONTAGE - Cet appareil doit être monté solidement sur une surface appropriée (par ex. une obison on contreplaqué, une structure de coque à âme de fibre de verre) et si possible boulonné de part en part.



Options de câblage c.a.

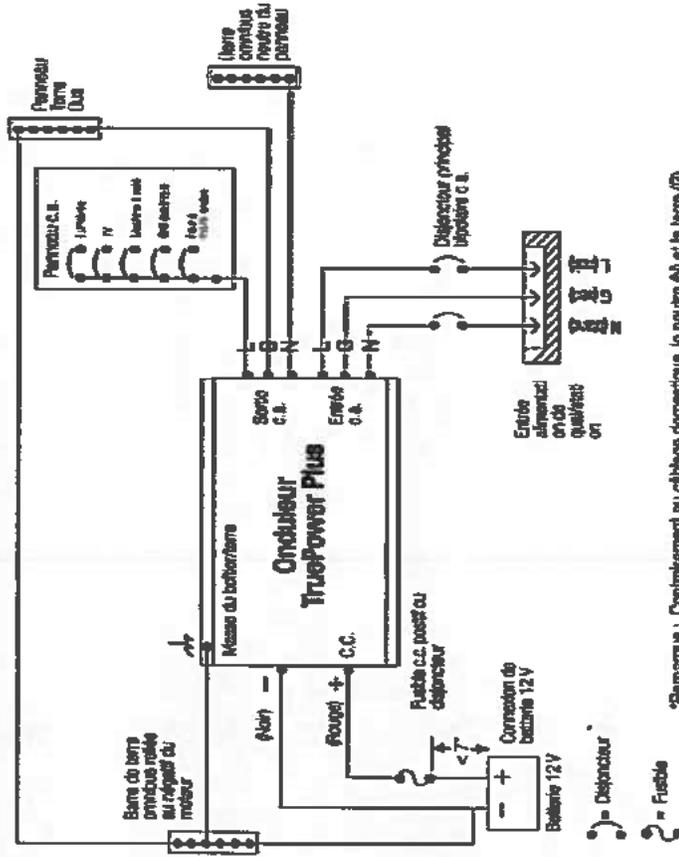
Schémas d'installation

AVERTISSEMENT - Les installations en courant alternatif peuvent potentiellement causer des blessures graves voire mortelles. Ces installations doivent être effectuées par un technicien certifié en électricité par ABYC pour garantir une installation sécuritaire et sans souci.

Selon les appareils et les charges destinés à être alimentés par l'onduleur TruePower Plus, il existe essentiellement 2 options d'installation :

1) **TRANSFERT VERS TOUTES LES CHARGES** - Ce scénario permet d'alimenter l'intégralité du panneau c.a. par l'onduleur TruePower Plus. Il s'agit de l'installation la plus simple pour un panneau c.a. existant. Ce scénario permet à l'utilisateur de choisir ce qui est alimenté par l'onduleur TruePower Plus. L'activation de l'ensemble du panneau électrique peut surcharger l'appareil en fonction de la taille et de la charge demandées. Le schéma ci-dessous fourni par ABYC se trouve dans les chargeurs de batterie et les onduleurs A-31.

Avantages - Des charges multiples du panneau électrique existant peuvent être choisies, l'utilisateur n'est pas bloqué dans des charges fixes. Cela peut nécessiter plus d'essais pour déterminer quelles charges l'onduleur TruePower Plus peut supporter.



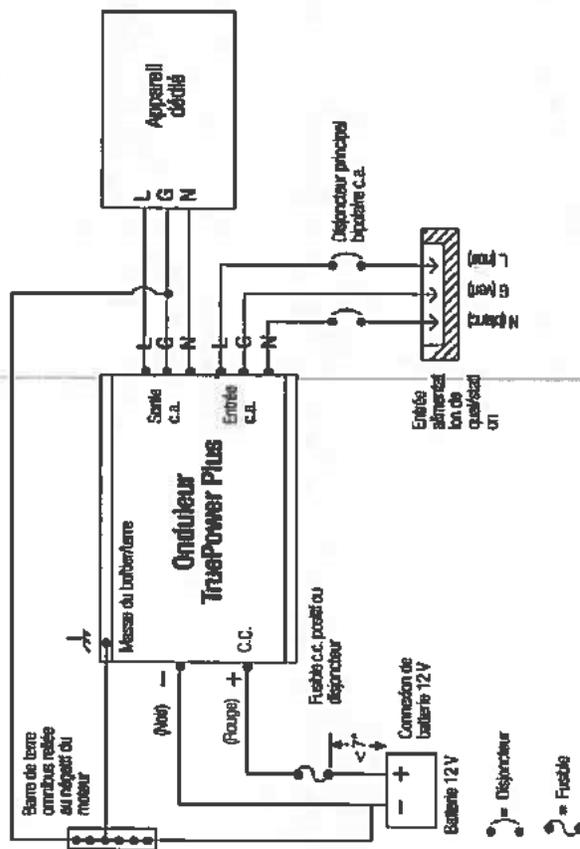
*Remarque : Contrairement au câblage domestique, le neutre (N) et la terre (G) ne sont reliés entre eux qu'à la SOURCE de puissance, que ce soit sur l'onduleur ou sur l'alimentation de qualification. Le commutateur de transfert du TruePower Plus maintient ce schéma de câblage automatiquement.

⊖ = Fusible

Options de câblage c.a. (suite)

2) APPAREIL DÉDIÉ - Ce scénario devient populaire avec des appareils comme des unités de conditionnement d'air et des réfrigérateurs pour lesquels la charge de l'appareil et la capacité de l'onduleur correspondent. Avec ce type d'installation, l'onduleur est dédié à une seule charge, que ce soit en mode onduleur ou transmission.

Avantages - Avec ce type d'installation, il n'y a jamais de problème de surcharge de la capacité de l'onduleur



*Remarque : Contrairement au câblage domestique, le neutre (N) et la terre (G) ne sont reliés entre eux qu'à la SOURCE de puissance, que ce soit sur l'onduleur ou sur l'alimentation de qualification. Le commutateur de transfert du TruePower Plus maintient ce schéma de câblage automatiquement.

Installation

ARRÊTEZI

AVANT D'INSTALLER L'ONDULEUR, LIRE ET RESPECTER LA LISTE DE VÉRIFICATION CI-DESSOUS :

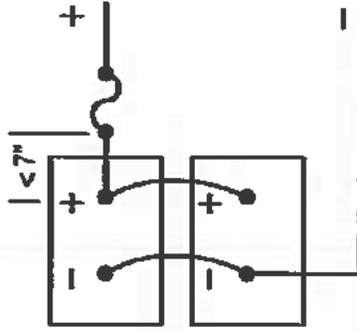
- ✓ Commencer par l'interrupteur d'alimentation et le disjoncteur principal de l'alimentation de qualification en position off (arrêt).
- ✓ S'assurer que toutes les protections contre les surintensités (par exemple les fusibles et/ou les disjoncteurs) sont prêts à l'emploi, ni grillés ni déclenchés. Veiller à ce que la polarité des connexions c.c. soit correcte sous peine d'endommager l'onduleur.
- ✓ Vérifier que toutes les connexions sont bien serrées, exemptes de corrosion et en bon état.

⚠ UTILISER CET APPAREIL UNIQUEMENT SI LA CONNEXION À LA TERRE EST CONNECTÉE.

Le conducteur de terre peut être d'un calibre inférieur à celui du conducteur c.c. positif (+)
(Exemple : Conducteur c.c. + = 2 AWG, conducteur de terre = 4 AWG)

Batterie 12 V c.c.source - La capacité minimale recommandée par On Board Solutions pour la batterie ou le banc de batteries est de 200 Ah. Les batteries peuvent être constituées d'une seule batterie ou de batteries multiples en parallèle. Les batteries connectées en parallèle amplifient la capacité en ampère-heure tout en maintenant la tension.

Connecter chaque batterie comme indiqué équilibre la charge de la batterie.
Illustration de batteries en parallèle :



Batteries en parallèles (12 V) pour un banc 12 V
(Augmente la capacité en ampère-heure)

Installation (Suite)

MATERIEL D'INSTALLATION - CÂBLAGE

⚠ Veiller à ce que la polarité des connexions c.c. soit correcte sous peine d'endommager l'onduleur.

1) Câbles c.c. - La partie c.c. de l'onduleur TruePower Plus nécessite une grande intensité de courant en mode onduleur. Le calibre et la longueur du câble sont d'une extrême importance et doivent être bien pensés et planifiés selon ce manuel avant de commencer l'installation. Les éléments à prendre en considération sont les suivants :

- a. Calibre du câble - Le calibre est basé sur l'intensité tirée par l'appareil par rapport à l'intensité maximale qu'un câble peut transporter basé sur ABYC E-11. On Board Solutions recommande de NE PAS ACCEPTER PLUS d'une baisse de 10 % de la tension à l'onduleur TruePower Plus par rapport à la source (batterie) ou un câble qui dépasserait 1,5 m de longueur. Le tableau suivant décrit le calibre du câble sur une longueur de 1,5 m (5 pi) (soit 3 m (10 pi) pour un aller-retour du câble). Calibres de câbles recommandés (basé sur une température de gaine admissible de 105 °C conforme aux normes UL 1426 et un fusible de classe 1)

Pression (bars)	Pression (psi)	Calibre (AWG) - Taille (in)	Intensité (A)	Longueur (m)
1000	100A	4	150A	6,35 mm (1/4 po)
1200	120A	2	175A	6,35 mm (1/4 po)
1500	150A	1	200A	6,35 mm (1/4 po)
2000	200A	00	250A	9,52 mm (3/8 po)

b. Terminaison - Les plus gros câbles c.c. nécessitent des outils spéciaux pour assurer une terminaison adéquate avec des coses rondes. Des kits de câbles pré-terminés peuvent être achetés par le biais de On Board Solutions ou de votre magasin d'approvisionnement maritime local. Le type du câble est aussi important que son calibre. Les câbles doivent être conformes aux normes ABYC E-11. Systèmes électriques c.a. et c.c. à bord des bateaux (tous types tels que le câble de bateau UL 1426 et le câble de batterie SAE J1127 sont communs et marqués comme tels).

c. Raccordement - La cosse ronde doit être appliquée directement sur la surface des bornes c.c. de batterie de l'onduleur TruePower Plus, suivi de la rondelle et de l'écrou, serré avec un couple de 13,5 Nm à 20 Nm (10 à 15 lb-pi). L'utilisation d'une pâte diélectrique ou antioxydante est recommandée une fois les câbles connectés.

d. Décharge de traction - Installer une décharge de traction appropriée à moins de 150 mm (6 po) de l'onduleur afin d'éviter que le poids et les vibrations des gros câbles n'endommagent l'onduleur.

e. Installation du fusible de sécurité c.c. : Installer le fusible sur le câble positif (+) à 175 mm (7 po) au plus de la batterie. Voir le tableau ci-dessus pour le fusible recommandé.

⚠ NE PAS TENTER LA TERMINAISON DES CÂBLES PAR DES MOYENS AUTRES QU'UN SERRISSEMENT CORRECT AVEC UN OUIL CORRECTEMENT CALBRÉ. LES TERMINAISONS SOUDÉES ET CELLES UTILISÉES EN RÉPARATION AUTOMOBILE NE SONT PAS ACCEPTABLES. L'UTILISATION DE TOUTS CES TYPES DE TERMINAISONS PEUT ENTRAÎNER UNE DÉFAILLANCE PRÉMATURÉE ET NON GARANTIE DE L'ONDULEUR TRUEPOWER.

2) Câbles c.a. - Les câbles c.a. doivent être des câbles pour bateaux UL 1426, conformes aux normes ABYC E-11. Ce type de câble est régulièrement disponible en 2 et 3 conducteurs. La taille est basée sur l'intensité maximale qui traverse le câble et contrairement au câble c.c. elle ne prend pas en compte la longueur du câble et la chute de tension. Le tableau ci-dessous indique la taille appropriée pour les câbles c.a.

- a. Recommandations c.a. - Des borniers à vis sont prévus pour raccorder les câbles c.a. d'entrée et de sortie.

Alimentation de quai/station	Calibre (AWG) du câble avec isolation 105 °C
30A	10

Fonctionnement

Alimentation marche/arrêt de l'onduleur

Lorsque l'alimentation de qual en courant alternatif est fournie à l'entrée c.a. de l'onduleur, l'unité fonctionnera en mode transmission. Lorsque l'alimentation de qual en courant alternatif n'est pas présente, l'appareil passera en mode onduleur. Dans ce mode, la sortie c.a. peut être activée ou désactivée en appuyant sur le bouton ON/OFF (marche/arrêt) sur le panneau d'affichage. Grâce à la télécommande, l'onduleur peut aussi être activé ou désactivé à distance. Se reporter à la page 35 pour une explication détaillée des modes de fonctionnement. Essai du disjoncteur de fuite à la terre

Pour essayer le disjoncteur de fuite à la terre, commencer par brancher une charge, telle qu'une lampe, dans la prise. Appuyer sur la touche TEST pour déconnecter la charge. Si la charge s'éteint, cette partie de l'essai est réussie. Appuyer ensuite sur le bouton RESET (réinitialisation). Si l'alimentation est rétablie sur la charge, alors cet essai est réussi et vérifie le fonctionnement du disjoncteur de fuite à la terre.

Utilisation de l'onduleur dans la plage de charge

Précautions en fonction du type de charge

Charges résistives - Faire attention aux charges résistives géométriques de chaleur (grille-pain, cuisinières électriques, etc.). En raison du courant élevé tiré par ces charges, un banc de batterie usuel serait drainé très rapidement. Par conséquent, il est hors de question de faire fonctionner l'onduleur avec ces types de charges pendant une période de temps prolongée.

Charges motrices - Faire attention au type de moteur connecté sur l'onduleur. Les moteurs synchrones nécessitent un courant de démarrage beaucoup plus élevé que leur courant de fonctionnement. Comme les caractéristiques varient en fonction des moteurs, il est préférable de tester la charge du moteur sur l'onduleur. Si le moteur ne démarre pas ou s'il perd de la puissance, l'onduleur doit être retiré hors tension et le moteur relâché. Si le courant de démarrage du moteur est trop élevé, l'onduleur s'éteint automatiquement.

Remarque importante : Notification de la FCC classe B partie 15

REMARQUE : Cet équipement a été testé et déclaré conforme aux limites d'un dispositif numérique de classe B, en vertu du chapitre 15 des règles de la FCC. Ces limites sont conçues pour fournir une protection raisonnable contre les brouillages préjudiciables lorsque l'appareil est utilisé dans un environnement commercial. Le fonctionnement de cet équipement dans une zone résidentielle est susceptible de causer des brouillages préjudiciables, auquel cas l'utilisateur devra corriger les brouillages à ses propres frais. Si, dans un environnement résidentiel, des brouillages de la réception TV et radio se produisent alors que l'appareil N'EST PAS en mode onduleur, il suffit de débrancher l'alimentation c.a. du variateur TruePower Plus pour vérifier si cet appareil provoque du brouillage :

- 1) Vérifier que les connexions c.a. comprennent une bonne mise à la terre
- 2) Repositionner l'antenne de réception
- 3) Acheter un filtre de ligne secteur séparé
- 4) Repositionner l'appareil concerné afin qu'il soit mieux séparé de l'onduleur TruePower Plus

Ce matériel a été conçu pour répondre aux normes et exigences suivantes :

- American Boat & Yacht Council A-31 Chargeurs de batteries et onduleurs
- FCC Classe B
- Underwriters Laboratories : Norme 458 concernant les convertisseurs de puissance / systèmes d'onduleur pour véhicules terrestres et embarcations
- Certifié conforme aux normes CSA C22.2 N° 107.2



Maintenance

Entretien de la batterie

Vérifier périodiquement que les batteries sont en bon état. Vérifier que les bornes sont exemptées de corrosion et les nettoyer au besoin avec une brosse métallique. Si les batteries sont de type à électrolyte liquide, vérifier les niveaux d'électrolyte tous les mois et compléter avec de l'eau distillée si nécessaire. Enfin, vérifier la tension de la batterie conformément aux spécifications du fabricant.

Entretien de l'onduleur

Peu d'entretien est nécessaire pour maintenir le bon fonctionnement de l'onduleur série TruePower Plus. Pour que l'appareil fonctionne de façon optimale, il est conseillé de :

- Nettoyer l'extérieur avec un chiffon humide pour enlever toute accumulation de poussière.
- Vérifier que les câbles c.c. sont bien branchés et que les fixations sont serrées.
- Dégager les orifices de ventilation de toute accumulation de poussière.
- Essayer le disjoncteur de fuite à la terre mensuellement. Se reporter à la page 46 pour la procédure d'essai appropriée.

Dépannage

AVERTISSEMENT - DANGER DE CHOC ÉLECTRIQUE

Ne pas démonter l'onduleur TruePower Plus. Il ne contient aucune pièce réparable et tenter de réparer l'appareil peut provoquer un choc électrique ou des brûlures.

La non-respect de ces instructions peut entraîner la mort ou des blessures graves. Comment résoudre les problèmes courants

Cette section détaille comment dépanner l'onduleur série TruePower Plus. Suivre le processus décrit ci-dessous pour cerner la cause des défaillances de l'appareil. Appliquer ce processus avant de communiquer avec le service à la clientèle.

1. Vérifier les messages d'erreur sur l'écran d'affichage de l'appareil. Si un message d'erreur s'affiche, le noter avant de continuer.
2. Noter les conditions au moment où la défaillance s'est produite. Préciser les informations suivantes :
 - Tension de la batterie au moment de la défaillance
 - Puissance en watts délivrée par l'onduleur
 - Facteurs environnementaux extrêmes (température ambiante, vibrations, humidité, etc.)
3. Si aucun message d'erreur n'est affiché, vérifier l'installation :
 - L'onduleur est-il correctement installé et placé dans un environnement propre, sec et suffisamment ventilé?
 - La batterie est-elle en bon état?
 - Les câbles c.c. et c.a. sont-ils correctement dimensionnés, en bon état et ont-ils des connexions propres et bien serrées?
 - Des disjoncteurs ont-ils déclenchés?
 - Des fusibles ont-ils grillés?
4. Lorsque les étapes 1 à 3 ont été achevées, communiquer avec le service à la clientèle pour poursuivre le dépannage. Se préparer à fournir des informations concernant la défaillance de l'appareil ainsi que son modèle et son numéro de série.

Message d'erreur	Condition	Action
LOW DC ALARM	La tension de la batterie est inférieure à 10,5 V +/- 0,5 V	<ul style="list-style-type: none"> - Vérifier la tension de la batterie et la recharger si nécessaire - Vérifier le dimensionnement correct des câbles c.c. - Vérifier si des connexions sont desserrées et les resserrer si nécessaire - Changer les batteries pour effacer le message d'erreur
LOW DC SHUTOFF	La tension de la batterie est inférieure à 10 V +/- 0,5 V et la sortie de l'onduleur est coupée	<ul style="list-style-type: none"> - Vérifier la tension de la batterie et la recharger si nécessaire - Vérifier le dimensionnement correct des câbles c.c. - Vérifier si des connexions sont desserrées et les resserrer si nécessaire - Changer les batteries pour effacer le message d'erreur
HI DC SHUTOFF	La tension de la batterie est supérieure à 15,5 V +/- 0,5 V et la sortie de l'onduleur est coupée	<ul style="list-style-type: none"> - Vérifier les autres entrées c.c. comme une surtension due à un alternateur, et les débrancher si nécessaire - Diminuer la tension d'entrée pour effacer le message d'erreur
HI TEMP SHUTOFF	La température interne de l'onduleur est supérieure à > 65 °C et la sortie de l'onduleur est coupée	<ul style="list-style-type: none"> - Résoudre les charges connectées à la sortie c.a. de l'appareil. - Vérifier la bonne ventilation de l'appareil et enlever toute obstruction - Vérifier la température ambiante et si possible déplacer l'appareil vers un endroit plus frais - Appuyer deux fois sur le bouton pour effacer le message d'erreur
OVERLOAD SHUTOFF	La puissance de sortie de l'onduleur est supérieure à 105 % et la sortie est coupée	<ul style="list-style-type: none"> - Résoudre les charges connectées à la sortie c.a. de l'appareil - Rechercher les charges qui dépassent les limites valeurs de régime et les enlever si nécessaire - Appuyer deux fois sur le bouton pour effacer le message d'erreur

Caractéristiques Techniques

Modèle TruePower Plus	1000	1200	1500	2000	2000
Puissance de sortie continue	1000 Watts	1200 Watts	1500 Watts	2000 Watts	2000 Watts
Puissance de pointe admissible	2000 Watts	2400 Watts	3000 Watts	4000 Watts	4000 Watts
Forme d'onde de sortie	Onde sinusoïdale pure				
	Onde sinusoïdale modifiée				
Dimensions (cm)	31,5 x 25 x 10	29 x 25 x 10	31,5 x 25 x 10	36 x 27 x 11,2	38,4 x 27 x 11,2
Poids	3,6 kg	3,2 kg	3,2 kg	5 kg	5 kg
Entrée c.c.					
Plage de tension de fonctionnement	11,0 V c.c. - 15,0 V c.c.				
Tension nominale	12,5 V c.c. +/- 0,5 V c.c.				
Arrêt pour haute tension	15,5 V c.c. +/- 0,5 V c.c.				
Arrêt pour basse tension	10,0 V c.c. +/- 0,5 V c.c.				
Alarme basse tension	10,5 V c.c. +/- 0,5 V c.c.				
Récupération basse tension	12,0 V c.c. +/- 0,5 V c.c.				
Protection contre la polarité inverse	Par fusible interne (non réparable par l'utilisateur)				
Consommation système et ACL désactivé	< 5 mA				
Consommation système en veille et ACL activé	< 1 A				
Sortie c.a.					
Tension de sortie	115 V c.c +/- 10 V				
Fréquence de sortie	60 Hz +/- 3 Hz				
Plage des tensions transmises	100 - 130 V c.a.				
Courant transmissible	30 A RMS				
Délai de transfert	< 30 ms				
Rendement	> 90 %				
Prise protégée par disjoncteur de fuite à la terre	Disjoncteur de 15 A				
Surcharge / surchauffe	Récupération par réabaissement manuel de l'alimentation				
Récupération	Récupération par réabaissement manuel de l'alimentation				
Récupération après un court-circuit	Coupeure de la tension de sortie, récupération automatique lorsque le court-circuit est arrêté				
Sortie USB					
Tension	5 V c.c +/- 5%				
Current	2,1 A c.c.				
Caractéristiques environnementales					
Température de fonctionnement	0 °C à 40 °C				
Température de stockage	-20 °C à 60 °C				
Taux d'humidité de fonctionnement	10 à 90 % sans condensation				
Humidité d'emballage	10 à 95 % sans condensation				

Service à la clientèle et garantie

Nous sommes réclus à obtenir la satisfaction de la clientèle et votre fidélité nous est précieuse. Si à tout moment de la période de garantie, vous rencontrez un problème avec votre nouvel onduleur TruePower Plus, il suffit de nous appeler au 1-800-824-0524 pendant les heures normales de bureau (de 8 h. 30 à 17 h, heure de l'Est) pour obtenir de l'assistance technique.

TRUEPOWER PLUS - GARANTIE D'USINE LIMITÉE DE DEUX ANS

Chaque produit est garanti à l'acheteur original pour une utilisation normale pendant 2 ans à partir de la date d'achat contre les défauts de matériaux et de fabrication. On Board Solutions réparera ou remplacera gratuitement à sa seule discrétion tous défauts de matériaux ou de fabrication.

Les conditions suivantes s'appliquent :

- La période de garantie est calculée depuis la date de fabrication et l'appareil n'est pas enregistré dans les deux semaines suivant la vente.
- L'intrusion d'eau endommage l'appareil et annule la garantie.
- Le raccordement en polarité inversée endommage l'appareil et annule la garantie.
- La garantie est annulée en cas de dommages causés par des réparations négligentes.
- Le retour du produit à On Board Solutions incombe au client. Les frais de port entrant doivent être prépayés.
- Cette garantie ne couvre pas les défauts causés par l'usage normal ou les dommages causés par des accidents, des altérations abusives ou le mésusage.

L'achat, ou autre acceptation du produit, est soumis à la condition et à l'entente que On Board Solutions NE PEUT ÊTRE TENU POUR RESPONSABLE DE DOMMAGES CONSÉQUENTS OU ACCESSOIRES D'AUCUNE SORTIE. (Certaines provinces interdisent l'exclusion ou la limitation des dommages consécutifs, de sorte que les exclusions ou les limitations susmentionnées peuvent ne pas s'appliquer à votre cas.) Cette garantie remplace toute autre obligation ou responsabilité de la part de On Board Solutions. En outre, On Board Solutions n'assume ni n'autorise quiconque à endosser une quelconque obligation ou responsabilité en connexion avec la vente de ce produit.

Pour effectuer une réclamation sous garantie, appeler le centre de service de l'usine au 1-800-824-0524. Suivre la politique de retour qui sera alors fournie par l'entreprise. On Board Solutions mettra tout en œuvre pour réparer ou remplacer le produit s'il est avéré défectueux selon les termes de la garantie, cela dans les 30 jours qui suivent le retour du produit à l'entreprise. On Board Solutions renverra le produit réparé ou remplacé à l'acheteur.

Cette garantie vous donne des droits légaux spécifiques, et vous pouvez également jouir d'autres droits qui varient d'une juridiction à l'autre. Cette garantie remplace toute autre garantie explicite ou implicite.

On Board Solutions
 TruePower Plus Factory Service
 15 Danmoulin Drive, STE 101
 Auburn, NH 03032 E.-U.
 Numéro de téléphone du service à la clientèle : 1-800-824-0524
 Tél. : 1-803-433-4440
 Télécopieur : 1-603-433-4442
 Rendez-vous visite sur le Web à : www.promatiner.com
www.onboardsolutions.biz

Cummins **Onan**



Operator Manual

RV Generator Set

HDZAA (Spec A-C)

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1 Important Safety Instructions

1.1 Overview

Thoroughly read the Operator Manual before operating the generator set. It contains important instructions that should be followed during operation and maintenance. Safe operation and top performance can only be achieved when equipment is properly operated and maintained. The owners and operators of the generator set are solely responsible for its safe operation.

Generator set operation, maintenance, and installation must comply with all applicable local, state, and federal codes and regulations. Electricity, fuel, exhaust, moving parts, and batteries present hazards which can result in severe personal injury or death. Only trained and experienced personnel with knowledge of fuels, electricity, and machinery hazards should perform generator set installation or adjustment procedures; or remove, dismantle, or dispose of the generator set.

Save these instructions.

1.2 Warning, Caution, and Note Styles Used In This Manual

The following safety styles and symbols found throughout this manual indicate potentially hazardous conditions to the operator, service personnel, or the equipment.

DANGER

Indicates a hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE

Indicates information considered important, but not hazard-related (e.g., messages relating to property damage).

1.3 General Safety Precautions

WARNING

*Operation of equipment.
Is unsafe when mentally or physically fatigued.
Do not operate equipment in this condition, or after consuming any alcohol or drug.*

⚠ WARNING

Maintaining or installing a generator set.

Can cause severe personal injury.

Wear personal protective equipment such as safety glasses, protective gloves, hard hats, steel-toed boots, and protective clothing when working on equipment.

⚠ WARNING

Running the generator set without the cover or service door can cause severe personal injury or equipment damage. Do not operate the generator set with the cover or service doors removed.

⚠ WARNING

Coolant under pressure.

Hot coolants under pressure can cause severe scalding.

Do not open a radiator or heat exchanger pressure cap while the engine is running. Let the engine cool down before removing the coolant pressure cap. Turn the cap slowly and do not open it fully until the pressure has been relieved.

⚠ WARNING

Hot metal parts.

Can cause severe burns.

Avoid contact with the radiator, turbo charger, and exhaust system.

⚠ WARNING

Starting fluids, such as ether.

Can cause explosion and generator set engine damage.

Do not use.

⚠ WARNING

Ethylene glycol.

Used as engine coolant, is toxic to humans and animals.

Clean up coolant spills and dispose of used antifreeze in accordance with local environmental regulations.

⚠ WARNING

Used engine oils.

Have been identified by some state and federal agencies to cause cancer or reproductive toxicity.

Do not ingest, breathe the fumes, or contact used oil when checking or changing engine oil. Wear protective gloves.

⚠ DANGER

Accidental or remote starting.

Accidental starting of the generator set while working on it can cause severe personal injury or death.

To prevent accidental or remote starting while working on the generator set, disconnect the negative (-) battery cable at the battery using an insulated wrench.

⚠ CAUTION

Unsecured or loose fasteners can cause equipment damage. Make sure all fasteners are secure and properly torqued.

⚠ CAUTION

Oily rags and other material can cause fire and restrict cooling. Keep the generator set, drip pan, and compartment clean.

⚠ CAUTION

Accumulated grease and oil can cause overheating and engine damage presenting a potential fire hazard. Keep the generator set clean and make sure oil leaks are repaired promptly.

NOTICE

Keep multi-class ABC fire extinguishers handy. Class A fires involve ordinary combustible materials such as wood and cloth. Class B fires involve combustible and flammable liquid fuels and gaseous fuels. Class C fires involve live electrical equipment. (Refer to NFPA No. 10 in applicable region.)

1.4 Automatic Generator Start Control Hazards

⚠ WARNING

Accidental starting can cause severe personal injury or death. Turn off the AGS whenever performing maintenance or service, when the vehicle is stored between uses, is awaiting service, or is parked in a garage or other confined area.

Unexpected starting may occur if the generator set is equipped with an inverter-charge or other Automatic Generator Start (AGS) control. This may cause exposure to:

- Unexpected generator starting.
- Moving parts hazards.
- Electric shock.
- Exhaust carbon monoxide (CO).

1.5 Electrical Shock and Arc Flash Can Cause Severe Personal Injury or Death

WARNING

Electrical shocks and arc flashes can cause severe personal injury or death. Adhere to the following guidelines:

- **Only qualified service personnel certified and authorized to work on power circuits should work on exposed energized power circuits.**
- **All relevant service material must be available for any electrical work performed by certified service personnel.**
- **Exposure to energized power circuits with potentials of 50 VAC or 75 VDC or higher poses a significant risk of electrical shock and electrical arc flash.**
- **Refer to standard NFPA 70E, or equivalent safety standards in corresponding regions, for details of the dangers involved and for safety requirements.**

1.6 Generator Voltage Is Deadly

WARNING

Improperly connected generator electrical output connections can cause equipment damage, severe personal injury, or death. Electrical connections must be made by a trained and experienced electrician in accordance with applicable codes.

WARNING

Improper installations can cause equipment damage, severe personal injury, or death. All installations must be conducted by trained and experienced personnel in accordance with the installation instructions and all applicable codes.

WARNING

Back feed to shore power can cause electrocution and damage to equipment. The generator set must not be connected to shore power or to any other source of electrical power. An approved switching device must be used to prevent interconnections.

WARNING

Live electrical equipment can cause electrocution. Use caution when working on live electrical equipment. Remove jewelry, make sure clothing and shoes are dry, stand on a dry wooden platform or rubber insulating mat, and use tools with insulated handles.

1.7 Engine Exhaust/Carbon Monoxide Is Deadly

WARNING

Substances in exhaust gases have been identified by some state and federal agencies to cause cancer or reproductive toxicity. Do not breathe in or come into contact with exhaust gases.

⚠ WARNING

Carbon monoxide is a poisonous gas. Inhalation of this gas can cause severe personal injury or death. Adhere to the following bullet points to make sure carbon monoxide is not being inhaled by occupants of the vehicle as well as others working on or around the generator set.

- **Inspect for exhaust leaks, and test and confirm that all carbon monoxide detectors are working in accordance with the manufacturer's instructions or owner's manual, prior to every startup, and after every 8 hours of running.**
- **Never occupy the vehicle while the generator set is running unless the vehicle is equipped with a working carbon monoxide detector.**
- **Never operate the generator set when the vehicle is in a confined space, such as a garage, basement, or building of any kind.**
- **Make sure the exhaust system is installed in accordance with the generator set installation manual.**
- **Never use engine cooling air for heating a working or living space compartment.**

Carbon Monoxide (CO) is odorless, colorless, tasteless, and non-irritating. It cannot be seen or smelled. Exposure, even to low levels of CO for a prolonged period can lead to asphyxiation (lack of oxygen).

Mild effects of CO poisoning include:

- headache
- dizziness
- drowsiness
- fatigue
- chest pain
- confusion

More extreme symptoms include:

- vomiting
- seizure
- loss of consciousness

1.8 Diesel Fuel Is Combustible

⚠ WARNING

Diesel fuel is highly combustible. Adhere to the following bullets to avoid igniting fuel and fuel vapors.

- **Do not smoke or turn electrical switches on or off where fuel fumes are present or in areas sharing ventilation with fuel tanks or equipment.**
- **Keep flame, sparks, pilot lights, arc-producing equipment and all other sources of ignition well away from fuel lines and sources.**
- **Fuel lines must be secured, free of leaks, and separated or shielded from electrical wiring.**

⚠ WARNING

Flammable vapor can cause a diesel engine to over speed and become difficult to stop, resulting in possible fire or explosion, and severe personnel injury or death. Do not operate a diesel-powered generator set where a flammable vapor environment can be created by fuel spill, leak, etc.

1.9 Battery Gas Is Explosive

⚠ WARNING

Battery gas is highly explosive and may cause personal injury or death if ignited. Take the proper precautions to avoid personal injury.

- *For personal safety, wear appropriate PPE when working on or around the generator set.*
- *To make sure battery gas is not ignited, do not smoke around the generator set.*
- *To reduce arcing when disconnecting or reconnecting battery cables, always disconnect the negative (-) battery cable first and reconnect it last.*

1.10 Moving Parts Can Cause Severe Personal Injury or Death

⚠ WARNING

Moving parts can cause severe personal injury or death, and hot exhaust parts can cause severe burns. Make sure all protective guards are properly in place before starting the generator set.

⚠ WARNING

Hot moving, and electrically live parts can cause severe personal injury or death. Keep children away from the generator set.

⚠ WARNING

Hot, moving, and electrically live parts can cause severe personal injury or death. Only trained and experienced personnel should make adjustments while the generator set is running.

⚠ WARNING

Moving parts can catch on loose items such as clothing or jewelry. Do not wear loose clothing or jewelry near moving parts such as PTO (power take-off) shafts, fans, belts, and pulleys.

⚠ WARNING

Moving parts can entangle appendages such as fingers. Keep the protective guards in place over fans, belts, pulleys, and other moving parts and keep hands away from all moving parts.

1.11 EPA CARB

⚠ CAUTION

Unauthorized modifications or replacement of fuel, exhaust, air intake, or speed control system components that affect engine emissions are prohibited by law in the state of California.

1.12 Generator Set Warning Labels

Warning signs are provided on the generator set at or near the point of risk. To avoid injury, always take the necessary precautions as indicated on the sample signs shown below.

	Caution or Warning. Indicates a risk of personal injury.
	Caution or Warning of Temperature Hazard. Indicates a risk of personal injury from high temperature.
	Caution or Warning of High Voltage Hazard. Indicates a risk of personal injury from electric shock or electrocution.
	Caution or Warning of Engine Coolant Pressure Hazard. Indicates a risk of personal injury from hot pressurized engine coolant.
	Caution or Warning. Indicates to read Operator Manual for additional information.
	Caution or Warning of No Step. Indicates a risk of personal injury or equipment damage from stepping on equipment.
	Caution or Warning of Combustion or Explosion Hazard. Indicates a risk of personal injury from explosion.
	Caution or Warning of Belt and Rotating Part Hazard. Indicates a risk of personal injury from entanglement in moving parts.

	<p>Caution or Warning of Chemical (Ingestion or burn) Hazard. Indicates a risk of personal injury or asphyxiation from poisonous fumes or toxic gases.</p>
	<p>Caution or Warning of High Voltage or Current Source Hazard. Indicates a risk of personal injury from electrical shock or electrocution.</p>
	<p>Caution or Warning of Fan and Rotating Part Hazard. Indicates a risk of personal injury from entanglement in moving parts.</p>

2 Introduction

2.1 About this Manual

This is the Operator Manual for the generator set or sets listed on the front cover. Each operator should study this manual carefully and observe all of its instructions and safety precautions. Keep this manual readily available for reference.

The information contained within the manual is based on information available at the time of going to print. In line with Cummins Power Generation policy of continuous development and improvement, information may change at any time without notice. The users should therefore make sure that before commencing any work, they have the latest information available. The latest version of this manual is available on QuickServe Online (<https://qsol.cummins.com/infindex.html>).

The Operation, Maintenance, and Troubleshooting Chapters of this manual provide instructions necessary for operating the generator set and maintaining it at top performance. The owner is responsible for performing maintenance in accordance with the information provided in [Chapter 5 on page 31](#).

This manual also includes generator set specifications and information on how to obtain service, emissions regulation compliance, and model identification.

See the Parts Manual for part identification numbers and required quantities. Genuine Cummins Onan replacement parts are recommended for best results.

2.2 Related Literature

Before any attempt is made to operate the generator set, the operator should take time to read all of the manuals supplied with the generator set, and to familiarize themselves with the warnings and operating procedures.

⚠ CAUTION

A generator set must be operated and maintained properly if you are to expect safe and reliable operation. The Operator manual includes a maintenance schedule and a troubleshooting guide. The Health and Safety manual must be read in conjunction with this manual for the safe operation of the generator set.

- Health and Safety Manual (0908-0110)

The relevant manuals appropriate to your generator set are also available, the documents below are in English:

- Operator Manual for RV Generator Set HDZAA (Spec A-C) (0983-0103)
- Installation Manual for RV Generator Set HDZAA (Spec A-C) (0983-0602)
- Generator Set Service Manual for RV Generator Set HDZAA (Spec A-C) (0983-0502)
- Recommended Spares List (RSL) for RV Generator Set HDZAA (Spec A) (RSL_527) and (Spec B) (RSL_528)
- Parts Manual for RV Generator Set HDZAA (Spec A-C) (0983-0203)

- Standard Repair Times - EN Family (A034T824)
- Service Tool Manual (A043D529)
- Failure Code Manual (F1115C)
- Warranty Manual (A040W374)
- Global Commercial Warranty Statement (A028U870)

2.3 Model Identification

Each generator set is provided with a nameplate that contains the model and serial numbers. This information is needed when contacting Cummins Onan for parts, service, and product information.

Every character of the model number is significant. The last character of the model number is the specification letter which is important for obtaining the correct parts.

Record the generator set model and serial numbers in the figure below to have them available if needed.

2.3.1 Nameplate Location

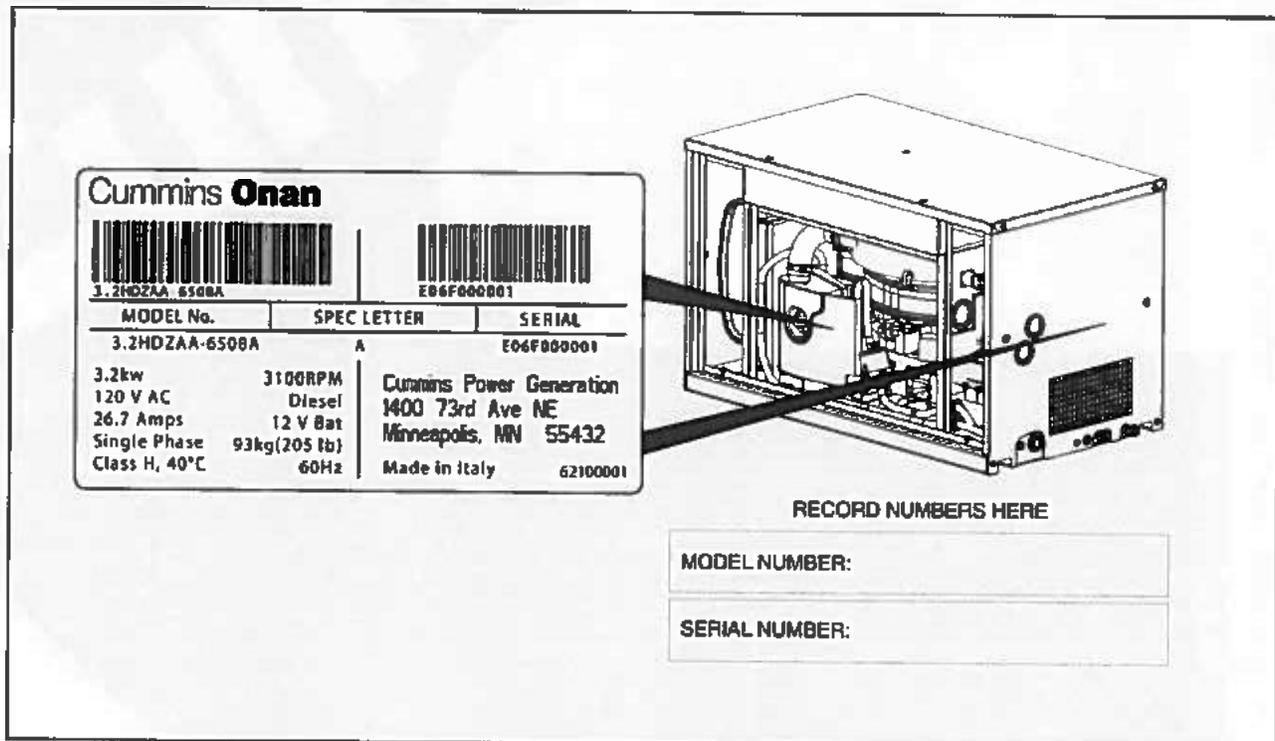


FIGURE 1. NAMEPLATE LOCATION

2.4 How to Obtain Service

For generator set parts, service, and literature, contact the nearest authorized Cummins Onan distributor. You may go to the Internet site www.power.cummins.com for information on contacting our distributors worldwide.

2.4.1 In North America

Call +01 800 8886626 for the nearest Cummins Onan distributor in the United States or Canada. Press 1 (option 1) to be automatically connected.

If you are unable to contact a distributor using the automated service, consult the Yellow Pages. Typically, our distributors are listed under: generators - electric.

2.4.2 Outside North America

Call Cummins Power Generation at +01 763 5745000 from 7:30 AM to 4:00 PM (Central Standard Time), Monday through Friday, or fax +01 763 5287229.

2.4.3 Information To Have Available

- model number
- serial number
- date of purchase
- nature of the problem (see [Chapter 6 on page 47](#))

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3 Overview

3.1 Electromagnetic Compatibility Compliance

Generator sets emit and receive electromagnetic (radio frequency) energy. If the generator set affects operation of nearby devices, or nearby devices affect generator set operation, increase the distance between them.

When used in countries where compliance to the EMC directive is required: This generator set has been evaluated for use in the residential, commercial, and light industrial environments.

3.2 Information for Generator Set Users

This generator set meets the requirements of California Air Resources Board (CARB) as stated on the nameplate.

As a user of this generator set, please be aware that unauthorized modifications or replacement of fuel, exhaust, air intake, or speed control system components that affect engine emissions are prohibited. Unauthorized modification, removal, or replacement of the generator set label is prohibited.

Carefully review Operator (Owner), Installation, and other manuals and information you receive with the generator set. If unsure that the installation, use, maintenance, or service of the generator set is authorized, seek assistance from an approved Cummins Onan dealer.

Generator set users may use the following table as an aid in locating information related to the CARB requirements for emissions control.

TABLE 1. EMISSIONS CONTROL INFORMATION

Generator Set Warranty Information	The emissions control warranty statement is located in the same packet of information as this manual when the generator set is shipped from the factory.
Engine Valve Lash	See Section 3.4 on page 15 .
Engine Fuel Requirements	The engine is certified to operate on diesel fuel. See Section 5.6 on page 37 for fuel recommendations.
Engine Lubricating Oil Requirements	See Section 5.5 on page 33 for engine oil recommendations.
Engine Fuel Mixture Settings	The generator set engines have precision-manufactured carburetors which are not adjustable.
Engine Adjustments	High idle speed. This is a service procedure requiring trained personnel and proper tools. See the Service Manual.
Engine Emission Control System	The engine emissions control system consists of engine design and precision manufacture (IFI).

3.3 Build Standards

The generator set and its control system have been designed, constructed and tested generally in accordance with the following Standards where applicable.

Standard	Title
BS EN 1037:1995+a1:2008	Safety of machinery - Prevention of unexpected start up.
BS EN ISO 14121-1:2007	Safety of machinery. Risk assessment principles.
BS EN ISO 13857:2008	Safety of machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs.
BS EN 349:1993+A1:2008	Safety of machinery - Minimum gaps to avoid crushing parts on the human body.
BS EN 547-1:1996+A1:2008	Safety of machinery - Human body dimensions - Part 1: Principles for determining the dimensions required for openings for whole body access into machinery.
BS EN 547-2:1996+A1:2008	Safety of machinery - Human body dimensions - Part 2: Principles for determining the dimensions required for access openings.
BS EN 547-3:1996+A1:2008	Safety of machinery - Human body dimensions - Part 3: Anthropomorphic data.
BS EN 60204-1:2006+A1:2009	Safety of machinery. Electrical equipment of machines. General requirements.
BS EN 614-1:2006+A1:2009	Safety of machinery. Ergonomic design principles. Terminology and general principles.
BS EN 953:1997+A1:2009	Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards.
BS EN ISO 12100-1:2003+A1:2009	Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology
BS EN ISO 12100-2:2003+A1:2009	Safety of machinery. Basic concepts, general principles for design. Technical principles
BS EN ISO 13732-1:2008	Ergonomics of the thermal environment. Methods for the assessment of human responses to contact with surfaces. Hot surfaces
BS EN ISO 13849-1:2008	Safety of machinery - Safety-related parts of control systems
BS EN ISO 13850:2006	Safety of machinery - Emergency stop. Principles for design.
BS EN 61310-1:2008	Safety of machinery - Indication, marking and actuation - Part 1: Requirements for visual, auditory and tactile signals.
BS EN 61310-2:2008	Safety of machinery - Indication, marking and actuation - Part 2: Requirements for marking.
BS EN 61000-6-1:2007	Electromagnetic compatibility (EMC). Generic standards. Immunity standard for residential, commercial and light-industrial environments.
BS EN 61000-6-3:2007	Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments.
BS EN 1299:1997+A1:2008	Mechanical vibration and shock - Vibration isolation of machines - Information for the application of source isolation
BS EN 1679-1:1998	Reciprocating internal combustion engines - Safety - Part 1: Compression ignition engines
BS EN 12601:2001	Reciprocating internal combustion engine driven generating sets - Safety

3.4 Specifications

3.4.1 Diesel Model Specifications

TABLE 2. DIESEL MODEL SPECIFICATIONS

	HDZAA
GENERATOR SET CONTROL: Integrated Microprocessor-Based Engine and Generator Controller and AC Output Inverter	
GENERATOR: Three-Phase, Permanent Magnet, 3600 RPM	
Power (@1.0 power factor)	3200 Watts
Frequency	60 Hz
Voltage	120 Volts
Number of Phases	1
Current	26.7 Amps per leg
Line Circuit Breaker	1-pole, 30 Amp
FUEL CONSUMPTION:	
No Load	0.7 l/h (0.2 gph)
Half Load	1.0 l/h (0.3 gph)
Full Load	1.4 l/h (0.4 gph)
ENGINE: Single-Cylinder, Air-Cooled, Direct-Injection, 4-Stroke Cycle Diesel	
Bore	80 mm (3.15 in)
Stroke	69 mm (2.72 in)
Displacement	347 cm ³ (21 in ³)
Compression Ratio	22 : 1
Fuel Injection Timing (BTDC)	16°
Fuel Nozzle Injection Pressure	20±1.18 MPa (2900±174 psi)
Cylinder Compression Test	2 to 2.2 MPa (290 to 319 psi)
Valve Lash: Intake and Exhaust (cold)	0.1 mm (0.004 in)
Oil Capacity	1.1 liters (1.16 qt)
DC SYSTEM:	
Nominal Battery Voltage	12 Volts
Minimum Battery Capacity CCA (Cold Cranking Amps)	475 Amps down to -17 °C (0 °F) 650 Amps down to -29 °C (-20 °F)
Battery Recharging	Installer must provide
Maximum Regulated Charging Current	20 Amps
INSTALLATION:	
Weight (wet)	93 kg (205 lbs)
Size (L x W x H)	766.4 mm x 439.4 mm x 457.7 mm (30.17 in x 17.3 in x 18.02 in)
Sound	71 dB(A) @ 2 kw @ 10 feet (3 meters)

3.5 List of Acronyms

TABLE 3. ACRONYM DEFINITIONS

Acronym	Definition
AC	Alternating Current
AGS	Automatic Generator Start
ANSI	American National Standards Institute
API	American Petroleum Institute
ASTM	American Society for Testing and Materials (now known as ASTM International)
BS	Build Standard
BTDC	Before Top Dead Center
CARB	California Air Resources Board
CCA	Cold Cranking Amp
CO	Carbon Monoxide
CPG	Cummins Power Generation
CSA	Canadian Standards Association
DC	Direct Current
EEPROM	Electrically Erasable Programmable Read Only Memory
EMC	Electromagnetic Compatibility
EPA	Environmental Protection Agency
GFCI	Grounded Fault Circuit Interrupters
hp	High Pressure
I.D.	Inside Diameter
ISO	International Organization for Standardization
LED	Light-emitting Diode
NFPA	National Fire Protection Agency
NPT	National Pipe Thread
OEM	Original Equipment Manufacturer
PPE	Personal Protective Equipment
PTO	Power Take-Off
RAM	Random Access Memory
ROM	Read Only Memory
RV	Recreational Vehicle
RVIA	RV Industry Association
SAE	Society of Automotive Engineers
US, U.S.	United States
WC	Water Column

TABLE 4. ACRONYMS FOR UNITS OF MEASUREMENT

Acronym	Definition
Amp	Ampere
C	Celsius
cm	centimeter
dB(A)	Decibel A-Weighted
F	Fahrenheit
ft	Feet, foot
ft-lbs	Foot-pounds
gph	Gallons per hour
H	Height
Hz	Hertz
in	Inch
kg	kilogram
kg/h	kilograms per hour
kW	kilowatt
l/h	Liters per hour
L	Length
lb	Pound
lbs/h	Pounds per hour
m	Meter
mm	millimeter
MPa	megapascal
Nm	Newton meter
qt	Quart
psi	Pounds per square inch
RPM	Revolutions per Minute
VAC	Volts Alternating Current
VDC	Volts Direct Current
W	Watts, Width

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4 Operation

4.1 Key Component Locations

The control panel and the components requiring attention during periodic maintenance (see [Section 5.1 on page 31](#)) are located behind a removable access cover. The figure below illustrates the components of a typical generator set. There may be some variation depending on the generator set model.

- To remove the access cover:
 1. Slide the cover latches up and pull the cover outward from the bottom.
 2. Lower the cover to remove it from the housing.
- To replace the access cover:
 1. Position the tabs on the top of the cover into the openings on the housing.
 2. Slide the latches up and push the bottom of the cover in place.
 3. Hold the cover in place firmly and release the latches.

⚠ WARNING

Operating the generator set with the access cover off can result in severe personal injury or equipment damage. Hot components are exposed when the access cover is removed and generator set cooling air does not circulate properly. Do not operate the generator set with the access cover removed.

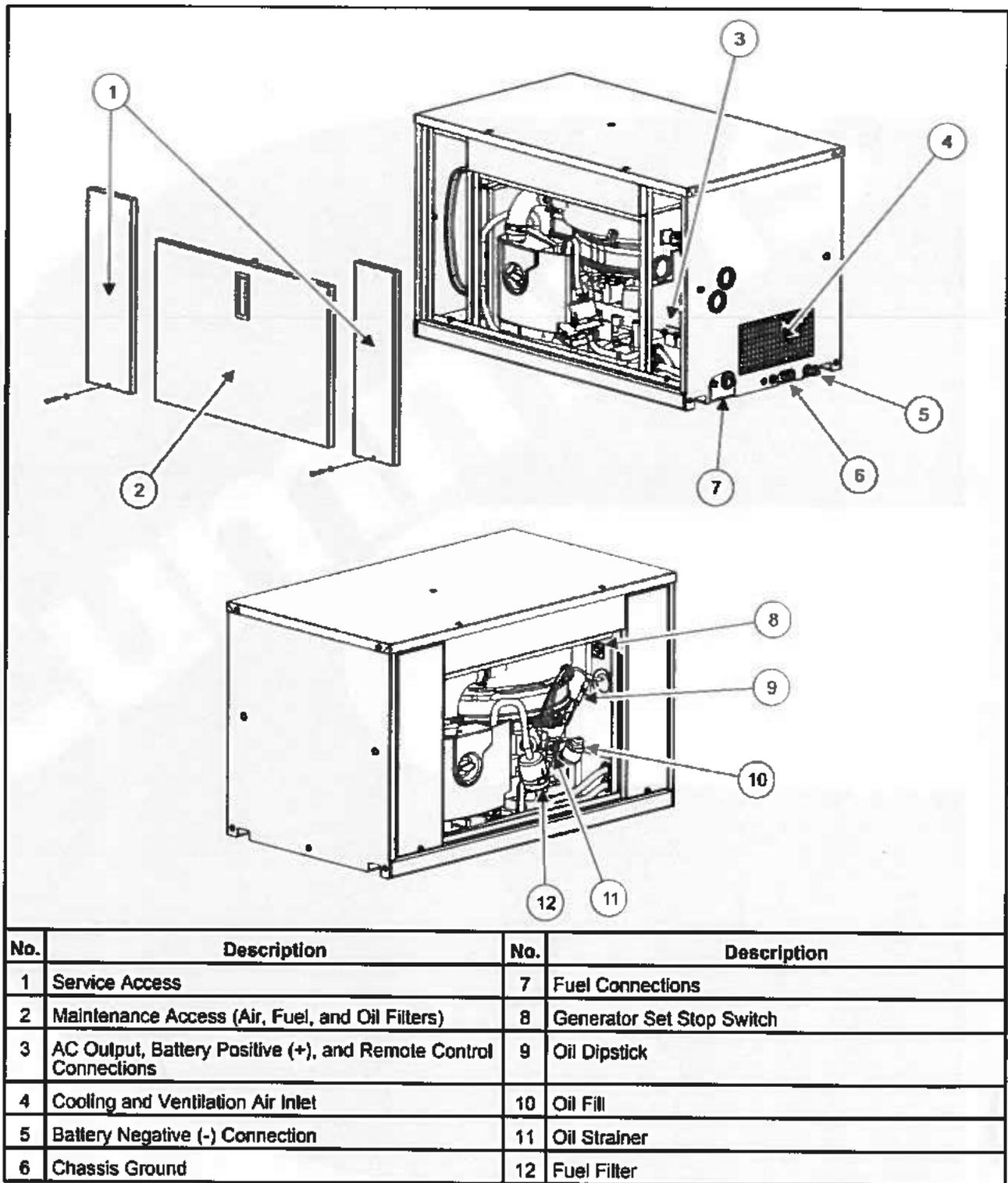


FIGURE 2. KEY COMPONENT LOCATIONS

4.2 Control Panel

4.2.1 Remote Operator Panel

The remote operator panel controls generator set operation and is installed inside the vehicle.

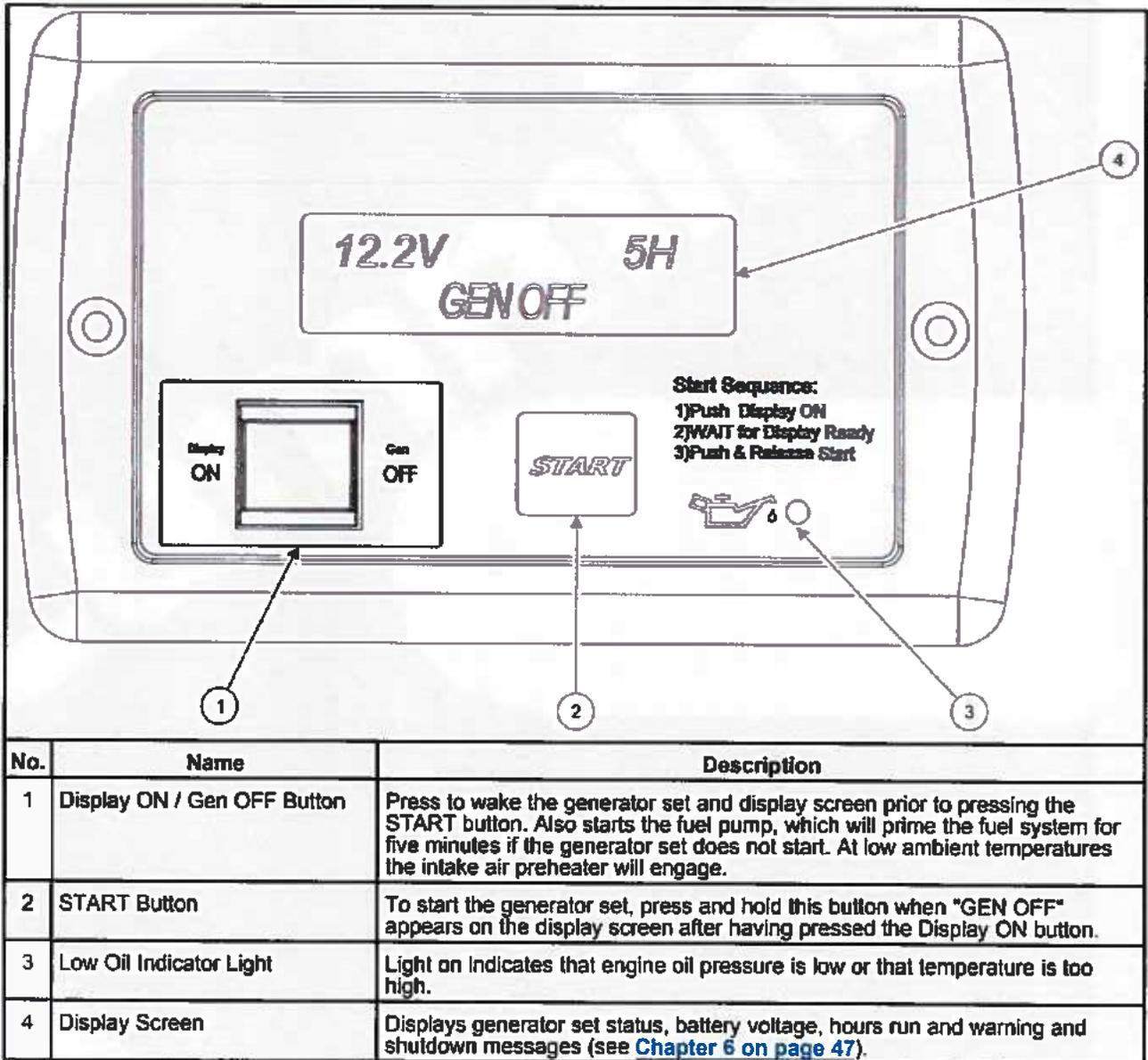


FIGURE 3. REMOTE OPERATOR PANEL

4.2.2 Stop Switch

Press the stop switch to stop the generator set or to prevent it from starting while performing maintenance and service. To allow the generator set to run, press the switch again. The switch must stay in its "1" position for the generator set to run.

NOTICE
This is not a start switch. The generator set can only be started using the remote operator panel.

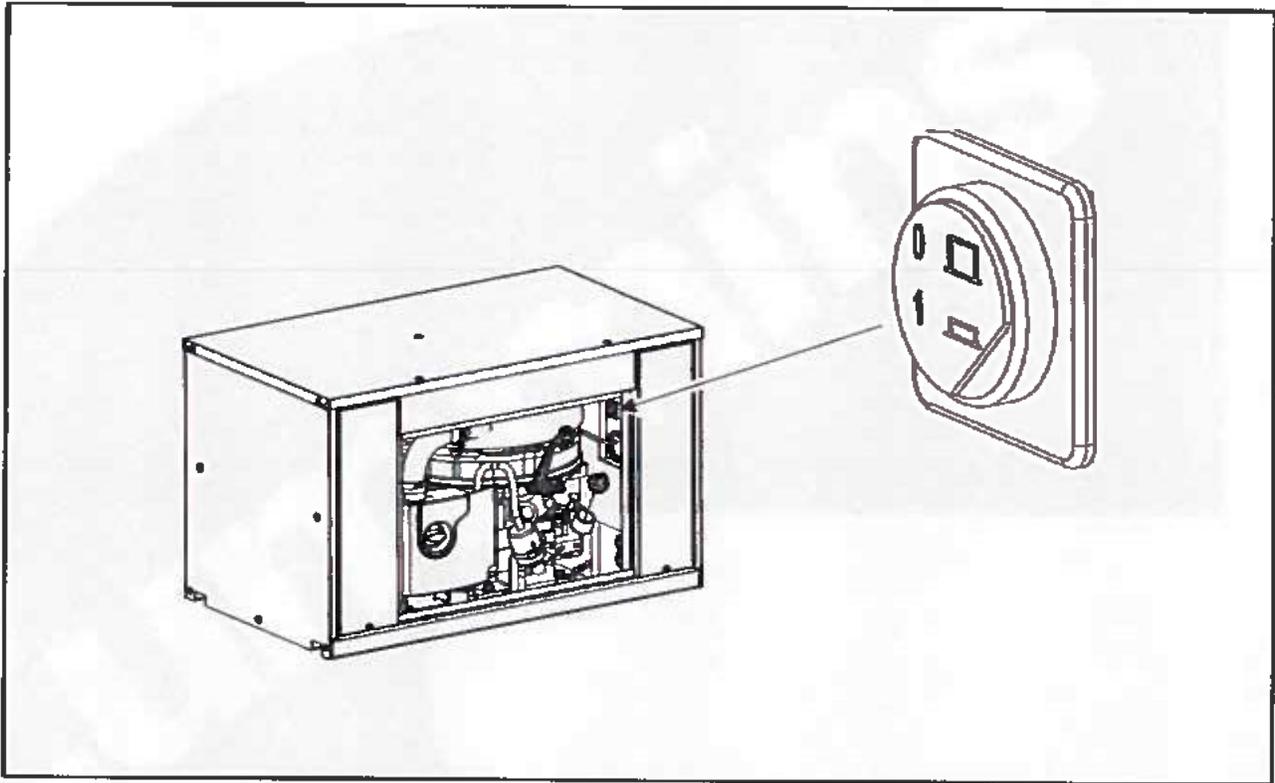


FIGURE 4. STOP SWITCH

4.3 Starting and Stopping the Generator Set

4.3.1 Pre-start Checks

⚠ WARNING

EXHAUST GAS IS DEADLY!
Exhaust gases contain carbon monoxide, an odorless, colorless gas. Carbon monoxide is poisonous and can cause unconsciousness and death. Symptoms of carbon monoxide poisoning include:

- *Dizziness*
- *Muscular twitching*
- *Weakness and sleepiness*
- *Throbbing in temples*
- *Headache*
- *Inability to think clearly*
- *Nausea*
- *Vomiting*

IF YOU OR ANYONE ELSE EXPERIENCES ANY OF THESE SYMPTOMS, GET OUT INTO THE FRESH AIR IMMEDIATELY. If symptoms persist, seek medical attention. Shut down the generator set and do not operate it until it has been inspected and repaired.

Never occupy the vehicle with the generator set running unless the vehicle is equipped with a working carbon monoxide detector. However, primary protection against inhaling carbon monoxide is proper installation of the exhaust system, and daily (every 8 hours) inspection for visible and audible exhaust system leaks.

Perform pre-start checks before the first start of the day and after every 8 hours of operation. See [Chapter 5](#) if the vehicle has been in storage.

1. Make sure all vehicle CO detectors are working properly.
2. Remove access cover.
3. Inspect the generator set as instructed in [Chapter 5](#).
4. Perform any maintenance due ([Section 5.1 on page 31](#)).
5. Keep a maintenance log ([Chapter 7 on page 53](#)).
6. Check for signs of fuel and exhaust leaks and for damage to the exhaust system.
7. Replace access cover.
8. Turn off the air conditioner and other large appliances.

4.3.2 Priming the Fuel System

The fuel system should be primed after the fuel filter is replaced or after the generator set runs out of fuel.

Position the control switch to **STOP/PRIME** for 30 seconds. The status indicator stays on while the pump is on.

4.3.3 Starting the Generator Set

1. Visually inspect for fuel and exhaust leaks. Do not start the generator set until any fuel or exhaust leak is repaired.
2. Start the generator set at the remote operator panel.
 - a. Press and release the Display ON button.
 - b. Wait for "GEN OFF" to appear. If the generator set ran out of fuel and it is necessary to prime the fuel system, wait at least one minute before pressing the START button to allow the fuel pump to prime fuel. At low ambient temperatures the intake air preheater will engage.
 - c. Press and hold the START button until the generator set starts. The generator set will make up to three attempts to start. "GEN ON" will appear on the display screen when the generator set starts. "GEN WAIT" will appear during rest periods between start attempts.
3. If the generator set fails to start after three attempts, press the GEN OFF button to reset the control. See [Chapter 6 on page 47](#) if the generator still does not start.

⚠ CAUTION

The starter motor can be damaged by overheating. Allow it to cool down for 30 seconds after every fifth crank.

4. For top performance and engine life, especially in colder weather, let the engine warm up for 2 minutes before connecting appliances.
5. See [Chapter 6 on page 47](#) if the generator set shuts down and the status indicator blinks, indicating a fault.

4.3.4 Stopping the Generator Set

1. Turn off the air conditioner and other large appliances.
2. Run generator set for 2 minutes to allow for cool down.
3. Press and release the GEN OFF button.

4.4 Loading the Generator Set

The power rating (kW) on the generator set nameplate determines how much electrical load (motors, fans, heaters, air conditioners, and other appliances) the generator set can power. If the sum of the loads exceeds the generator set power rating, the generator set will shut down or its line circuit breakers will trip.

NOTICE

It may be necessary to run fewer appliances at the same time—the sum of the loads must not be greater than the generator set power rating.

To avoid shutdowns due to generator set overload, use the electrical ratings on the nameplates of equipment (if available) to compare the sum of the electrical loads that are likely to be used at the same time to the generator set power rating. Refer to the table below for typical appliance ratings.

Appliance load and generator set power are measured in terms of Watts (W) or kilowatts (kW), where 1 kilowatt (kW) = 1000 Watts (W).

- If the equipment is marked in Amps and Volts only, multiply the Amps times the Volts to obtain the load in Watts.
- Divide Watts by 1000 to obtain load in terms of kilowatts.

It is possible that the generator set circuit breaker may trip even though the sum of the loads is less than the generator set power rating. When a large motor or air conditioner is started last or cycles off and on, the startup load is larger than its normal running load, causing the load to temporarily exceed the generator set power rating.

Typical "invisible" charging loads:

- During startup, air conditioners need "reserve" power and can draw 3–4 times the typical 1400–2400 Watts needed to run. Too much baseload can prevent air conditioners from starting.
- Battery chargers are activated automatically and can draw a large load (up to 3000 Watts). Manage electrical loads by adjusting battery charge rates to best suit your needs. Consult your inverter/charger manual or manufacturer.

TABLE 5. TYPICAL APPLIANCE LOADS

Appliance	Load (Watts)
Air Compressor (1hp)	900–1800
Air Conditioner	600–3500
Battery Charger ¹	Up to 3000
Blender	450–700
Broiler	1400–1700
Electric Broom/Vacuum	1000–1440
CD/MP3 Player and Speakers	85
Coffee Maker	900–1200
Computer	60–270
Computer (Laptop)	20–50
Converter	500–1000
Curling Iron	20–50
Dishwasher	1200–2400
Drill	250–1000
Electric Blanket	60–100
Fan	10–175
Flat Iron	40–80
Frying Pan/Wok	1000–1350

Appliance	Load (Watts)
Game Console	19-200
Hair Dryer	1200-1875
Iron	1000-1800
Light Bulbs	13-100
Microwave/Convection Oven	750-1100
Radio	50-200
Refrigerator	400-1000
Shaver	15-20
Space Heater	750-1500
Stove	900-2500
Television	43-600
Toaster	800-1400
VCR/DVD/Blu-ray Player	6-30
Washer/Dryer	350-500/1800-5000
Water Heater	1000-1500
Water Pump	250-1100
1. - Battery chargers can be a source of significant load and will be on whether connected to shore power or the generator set.	

4.4.1 Power Versus Altitude

The generator set is rated at standard barometric pressure, humidity, and air temperature (reference ISO 3046). Low barometric pressure (high altitude) or high ambient temperature decreases engine power.

- As ambient temperature increases, rated generator set engine power decreases approximately 1% for every 5.5 °C (10 °F) above 25 °C (77 °F).
- Power decreases approximately 3.5% of rated power each 305 m (1000 ft) of increase in elevation. Refer to the table below for typical elevation/generator set power calculations.

NOTICE

It may be necessary to run fewer appliances at higher altitudes and ambient temperatures.

TABLE 6. POWER VERSUS ALTITUDE

Elevation Above Mean Sea Level	Maximum Generator Set Power ¹
Up to 152 m (500 ft)	3200 Watts (rated)
762 m (2500 ft)	2980 Watts
1676 m (5500 ft)	2640 Watts
Above 1676 m (5500 ft)	2640 Watts minus 112 Watts each 305 m (1000 ft)

Elevation Above Mean Sea Level	Maximum Generator Set Power ¹
1. - Does not take into account the effect circuit breakers may have in limiting maximum power.	

4.5 Exercising the Generator Set

Exercise the generator set at least 2 hours each month if use is infrequent. Run the generator set at approximately 1/2 rated power. A single 2-hour exercise period is better than several shorter periods.

Exercising a generator set drives off moisture, relubricates the engine, replaces stale fuel in fuel lines, and removes oxides from electrical contacts and generator slip rings. The result is better starting, longer engine life, and greater reliability.

4.6 Resetting Line Circuit Breakers

If a generator set line circuit breaker or a circuit breaker in the power distribution panel trips, either a short circuit has occurred or too many loads were connected.

NOTICE

The generator set continues to run if its circuit breaker trips.

If a circuit breaker trips:

1. Disconnect or turn off as many electrical loads as possible.
2. Reset the circuit breaker.
3. If the circuit breaker trips right away, either the appliance (or electrical load) has a short or the circuit breaker is faulty. Call a qualified electrician.

NOTICE

It may be necessary to push the circuit breaker OFF to reset it and ON to reconnect the circuit.

4. If the circuit breaker does not trip right away, reconnect loads one-by-one making sure not to overload the generator set or cause a circuit breaker to trip. If a circuit breaker trips right away when an appliance is connected, that appliance or circuit probably has a short.

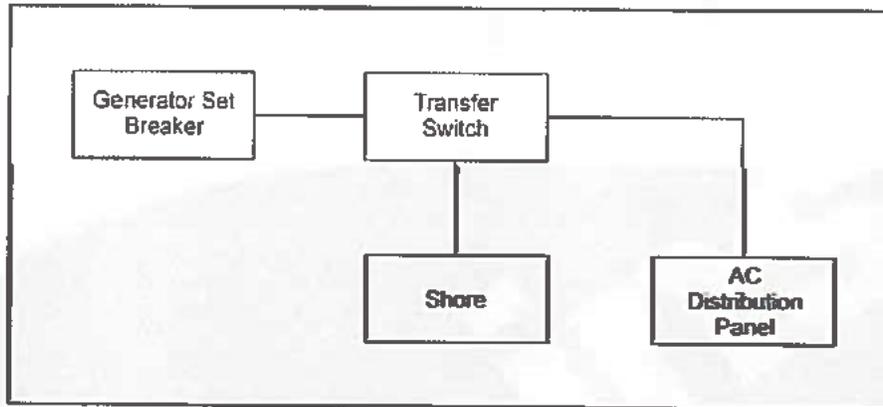


FIGURE 5. CIRCUIT BREAKER CONNECTIONS

⚠ WARNING

Short circuits in electrical equipment can cause fire and electrical shock leading to severe personal injury or death. Electrical equipment and its grounding must be maintained properly to protect against short circuits.

Electrical equipment must be used and maintained properly, and be properly grounded, to cause the line circuit breakers to trip when short circuits occur.

Electrical appliances and tools must be used and maintained in accordance with their manufacturer's instructions and safety precautions. Proper grounding is needed to reduce the risk of electric shock and fire.

4.7 Connecting Shore Power

⚠ WARNING

Interconnecting the generator set and shore power can lead to electrocution of utility line workers, equipment damage, and fire. Use an approved switching device to prevent interconnections.

A vehicle with provisions for connecting utility power must have an approved device to keep the generator set and utility from being interconnected. See the generator set Installation Manual for more information.

4.8 Operating in Weather Extremes

Pay particular attention to the following items when operating the generator set in cold or hot weather.

1. Make sure nothing blocks airflow to and from the generator set.
2. Make sure engine oil viscosity is appropriate for the ambient temperature. See [Section 5.5 on page 33](#) for engine oil recommendations.
3. Keep the generator set clean.
4. Perform maintenance due. See [Section 5.1 on page 31](#).

4.9 Operating in Dusty Environments

Pay particular attention to the following items when operating the generator set in dusty environments.

1. Do not let dirt and debris accumulate inside the generator set compartment. Keep the generator set clean.
2. Perform air filter element maintenance more often.
3. Change engine oil more often.

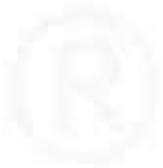
4.10 Care of New or Rebuilt Engine

Proper engine break-in on a new generator set or on one with a rebuilt engine is essential for top engine performance and acceptable oil consumption. Run the generator set at approximately 1/2 rated power for the first 2 hours and at 3/4 rated power for 2 more hours.

Proper engine oil and oil level are especially critical during break-in because of the higher engine temperatures that can be expected. Change the oil if the oil is not appropriate for the ambient temperatures during break-in. See [Section 5.5 on page 33](#) for engine oil recommendations.

Check oil level twice a day or every 4 hours during the first 20 hours of operation and change the oil after the first 50 hours of operation.

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5 Maintenance

⚠ WARNING

Only authorized and competent personnel who are familiar with the equipment and its operation should carry out maintenance.

5.1 Periodic Maintenance

⚠ WARNING

Accidental starting can cause severe personal injury or death. Turn off the AGS whenever performing maintenance or service, when the vehicle is stored between uses, is awaiting service, or is parked in a garage or other confined area.

Periodic maintenance is essential for top performance and long generator set life. Use the Periodic Maintenance Schedule below for normal periodic maintenance. In hot and dusty environments some maintenance procedures should be performed more frequently, as indicated by the footnotes in the schedule. Keeping a log of maintenance performed and hours run will help keep generator set maintenance regular and provide a basis for supporting warranty claims (see [Chapter 7 on page 53](#)).

Maintenance, replacement, or repair of emission control devices and systems may be performed by any any engine repair establishment or individual. However, warranty work must be completed by an authorized Cummins Onan Service Representative.

5.1.1 Periodic Maintenance Schedule

TABLE 7. PERIODIC MAINTENANCE SCHEDULE

MAINTENANCE PROCEDURE	MAINTENANCE FREQUENCY					
	After First 20 Hours	Every Day or Every 8 Hours	Every Month	Every 250 Hours	Every 500 Hours	Every 1000 Hours
General Inspection		X				
Check Engine Oil Level		X				
Check Battery and Battery Connections			X ¹			
Change Engine Oil	X ^{1, 2}			X ³		
Clean Spark Arrester				X ³		
Replace Air Filter Element					X ^{2, 3}	
Replace Fuel Filter					X ³	
Adjust Engine Valve Lash						X ⁴
Clean Oil Strainer						X
Check Fuel Injector Pressure						X ^{4, 5}

MAINTENANCE PROCEDURE	MAINTENANCE FREQUENCY					
	After First 20 Hours	Every Day or Every 8 Hours	Every Month	Every 250 Hours	Every 500 Hours	Every 1000 Hours
1 - Perform more often when operating in hot weather. 2 - Perform more often when operating in dusty conditions. 3 - Perform at least once a year. 4 - Must be performed by a qualified mechanic (authorized Cummins Onan Service Representative). 5 - EPA requirement.						

5.2 Consumable Parts

The following is a list of consumables associated with the generator models covered in this manual:

TABLE 8. CONSUMABLE PARTS

Part Number	Description	Quantity
0123-2399	Separator, Oil/Air	1
0140-4151	Element, Air Cleaner	1
0149-2834	Filter, Fuel	1

5.3 General Inspection

1. Check battery connections ([Section 5.4 on page 32](#)).
2. Check engine oil level ([Section 5.5 on page 33](#)).
3. Check engine coolant level ([Section 5.7 on page 40](#)).
4. Check fuel system ([Section 5.6 on page 37](#)).
5. Check exhaust system ([Section 5.8 on page 42](#)).
6. Check mechanical system ([Section 5.9 on page 43](#)).

5.4 Maintaining the Battery

The generator set requires a 12 Volt battery to power its control and starting circuits. Reliable generator set starting and starter service life depend upon adequate battery system capacity and maintenance.

⚠ WARNING
<p><i>Flames, sparks, or arcing at battery terminals, light switches, or other equipment can ignite battery gas, causing severe personal injury. Ventilate the battery area before working on or near a battery, wear safety glasses, and do not smoke. Turn work light on or off away from the battery. When performing maintenance procedures or when servicing a battery, stop the generator set and disconnect the charger before disconnecting battery cables. Using an insulated wrench, disconnect the negative (-) cable first and reconnect it last.</i></p>

Refer to [Section 5.1 on page 31](#) for the battery maintenance schedule and follow the battery manufacturer's instructions. Have the battery charging system serviced if DC system voltage is consistently low or high.

Check the battery terminals for clean, tight connections. Loose or corroded connections have high electrical resistance which makes starting harder.

1. Keep the battery case and terminals clean and dry.
2. Keep the battery terminals tight.
3. Remove battery cables with a battery terminal puller.
4. Make sure which terminal is positive (+) and which is negative (-) before making battery connections, always removing the negative (-) cable first and reconnecting it last to reduce arcing.

5.5 Maintaining the Lubrication System

Keep dirt, water, and other contaminants from entering the lubrication system and corroding or clogging lubrication components.

5.5.1 Oil Level

Park the vehicle on level ground and stop the generator set before checking engine oil level.

WARNING

Engine components (drains, filters, hoses, etc.) can be hot and cause severe burns, lacerations of the skin, and liquid splash. Use personal protective equipment when working with or around hazardous materials. Examples of personal protective equipment include (but are not limited to) safety glasses, protective gloves, hard hats, steel toed boots, and protective clothing.

WARNING

Crankcase pressure can blow hot engine oil out the fill opening causing, severe burns. Always stop the generator set before removing the oil fill cap.

WARNING

State and federal agencies have determined that contact with used engine oil can cause cancer or reproductive toxicity. Avoid skin contact and breathing of vapors. Use rubber gloves and wash exposed skin.

CAUTION

Too little oil can cause severe engine damage. Too much oil can cause high oil consumption. Keep the oil level between the high and low beads on the dipstick.

1. Pull out the dipstick.
2. Wipe off the dipstick and reinsert it.
3. Pull it out again to check oil level.
4. Add or drain oil as necessary. Keep the oil level between the full and add marks.
5. Insert the dipstick and secure the oil fill cap.

5.5.2 Engine Oil Recommendations

- Use API (American Petroleum Institute) performance Class SJ, SH or SG engine oil, which may be in combination with performance Class CH-4, CG-4 or CF-4 (for example: SJ/CH-4).
- Look for the SAE (Society of Automotive Engineers) viscosity grade. Choose the viscosity grade appropriate for the ambient temperatures expected until the next scheduled oil change.
- Single-grade SAE 30 oil is preferable when temperatures are consistently above freezing. Multigrade oils are better when wide temperature variations are expected.

TABLE 9. OIL VISCOSITY VS. TEMPERATURE

EXPECTED AMBIENT TEMPERATURES	SAE VISCOSITY GRADE
0 °C (32 °F) and higher	30 (OnaMax)
-12 to 38 °C (10 to 100 °F)	15W-40 (OnaMax)
-18 to 27 °C (0 to 80 °F)	10W-30 10W-40
-28 to 10 °C (-20 to 50 °F)	5W-30

5.5.3 Changing Engine Oil and Cleaning Oil Strainer

⚠ WARNING

Accidental or remote starting can cause severe personal injury or death. Before removing a panel or access door, or before working on the generator set, use an insulated wrench to disconnect the negative (-) cable from the battery to prevent accidental starting.

⚠ WARNING

Engine components (drains, filters, hoses, etc.) can be hot and cause severe burns, lacerations of the skin, and liquid splash. Use personal protective equipment when working with or around hazardous materials. Examples of personal protective equipment include (but are not limited to) safety glasses, protective gloves, hard hats, steel toed boots, and protective clothing.

⚠ WARNING

State and federal agencies have determined that contact with used engine oil can cause cancer or reproductive toxicity. Avoid skin contact and breathing of vapors. Use rubber gloves and wash exposed skin.

Refer to [on page 31](#) for the engine oil change schedule and the oil strainer cleaning schedule. Change oil and clean strainer more often in hot or dusty environments.

1. Park the vehicle on level ground and set the parking brake.
2. Run the generator set until it is warm and shutdown the generator set.
3. Place a pan large enough to hold the full oil capacity of the engine under the oil drain plug (see [Figure 6](#)).

⚠ WARNING

Crankcase pressure can blow hot engine oil out the fill opening causing, severe burns. Always stop the generator set before removing the oil fill cap.

4. Remove the front access door and remove the oil fill cap.
5. Unscrew the oil drain plug. Allow all the oil to drain from the engine.
6. Reinstall the oil drain plug.
7. Refill with oil (see [Section 3.4 on page 15](#) for oil capacity). Check the oil level and add or drain oil as necessary.
8. Screw the oil fill cap on securely.
9. Dispose of the used oil and oil filter in accordance with local environmental regulations.
10. Loosen the center screw of the oil strainer (about five turns) and withdraw the strainer from the engine block (see [Figure 7](#)).
11. Use compressed air to clean the strainer. Blow the debris from inside out.

⚠ WARNING

Flying debris from the oil strainer can cause severe injury. Wear safety glasses when using compressed air to clean the oil strainer.

12. Replace the O-rings or strainer if damaged.
13. Lubricate the O-rings with clean oil and insert the strainer until it stops.
14. Check for spring tension against the strainer and tighten the center screw.
15. Secure the front access door.

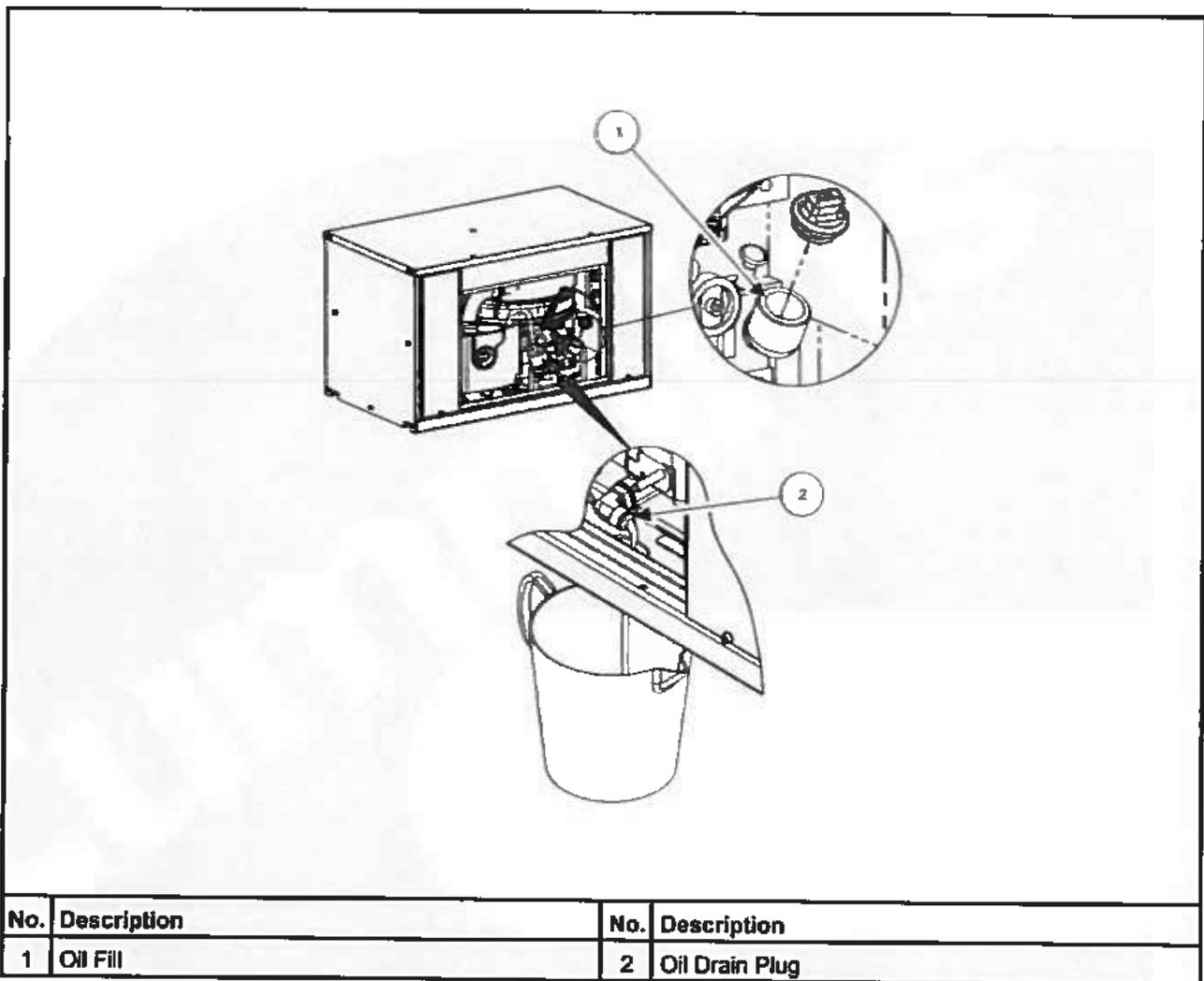


FIGURE 6. CHANGING ENGINE OIL

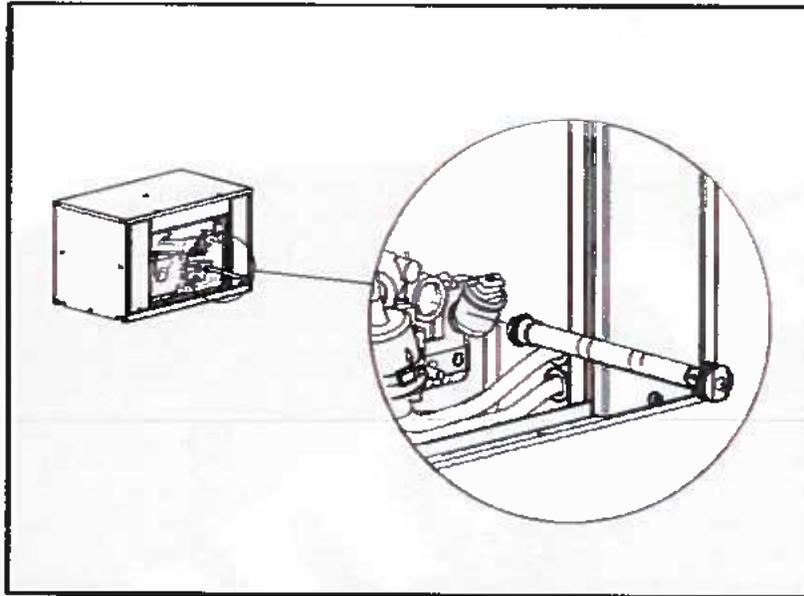


FIGURE 7. OIL STRAINER

5.6 Maintaining the Fuel System

Keep dirt, water, and other contaminants from entering the fuel system and corroding or clogging fuel system components.

5.6.1 Fuel System

⚠ WARNING

Diesel fuel leaks can lead to fire. Do not operate the generator set if operation causes fuel to leak.

1. Check for leaks at the hose, tube, and pipe fittings in the fuel supply system while the generator set is running and while it is stopped.
2. Check flexible fuel hoses sections for cuts, cracks, abrasions, and loose hose clamps.
3. Make sure the fuel line does not rub against other parts.
4. Replace worn or damaged fuel line parts before leaks occur.

5.6.2 Fuel Recommendations

⚠ WARNING

Diesel fuel is combustible and can cause severe personal injury or death. Do not smoke near fuel tanks or fuel-burning equipment, or in areas sharing ventilation with such equipment. Keep flames, sparks, pilot flames, electrical arcs and switches, and all other sources of ignition well away. Keep a multi-class ABC fire extinguisher handy.

- When the outdoor ambient temperature is above freezing, use clean, fresh No. 2 diesel fuel (ASTM 2-D).

- When the outdoor ambient temperature is below freezing, use No. 1 diesel fuel (ASTM 1-D).

The fuel should have a Cetane number of at least 45 for reliable starting.

5.6.2.1 Bio-diesel Fuels B5 – B20

B5 bio-diesel fuel that meets industry specifications and quality is suitable for use with this generator set.

Before using bio-diesel fuel blends above B5 and up to B20, the following conditions must be verified:

- The vehicle propulsion engine is capable of using B20 when sharing the same fuel tank.
- The OEM has installed a B20 compatible fuel line from the fuel tank to the generator set.
- The OEM has installed a water separator in the fuel line just before the generator set.

For bio-diesel blends above B5 and up to B20, Cummins Onan recommends that the fuel meet the specifications outlined in ASTM D7467. The bio-diesel component of this fuel blend must meet ASTM D6751 or EN14214, and the petroleum diesel component must meet ASTM D975. Blended bio-diesel fuels should be pre-blended and not made by customers.

⚠ CAUTION

Market applications contain properties that can affect engine operating characteristics. It is highly recommended that use of these bio-diesel fuel blends be avoided or exercised with extra care. Use standard fuels in applications that experience seasonal usage, storage for periods exceeding 90 days, and extreme temperatures or humidity.

The following bio-diesel fuel properties can affect engine performance:

- Poor oxidation stability can accelerate fuel oxidation. Fuel oxidation reduces generator performance. This effect is accelerated at increased ambient temperatures.
- Properties change at temperatures below -5°C (23°F). Necessary precautions must be taken when operating the generator with bio-diesel blends in low ambient temperatures.
 - Fuel heater
 - Hose insulation
 - Additional anti-gel fuel additives.
- Bio-diesel fuel blends are an excellent medium for microbial growth. Microbes cause fuel system corrosion and premature filter plugging. The effectiveness of all commercially available conventional anti-microbial additives, when used in bio-diesel fuel, is not known. Consult your fuel and additive supplier for assistance.

If bio-diesel fuel is used for seasonal applications (stored more than 90 days), the generator must be purged before storage by running the engine on pure diesel fuel meeting ASTM D975 for a minimum of 30 minutes.

NOTICE

The Cummins Onan Warranty covers failures that are a direct result of defects in material or factory workmanship. Generator damage, service issues, and/or performance issues determined by Cummins Onan to be caused by bio-diesel fuel blends not meeting the specifications outlined in the applicable Installation, Operator, and Service Manuals are not considered to be defects in material or workmanship and may affect your generator's warranty.

5.6.3 Replacing the Fuel Filter

⚠ WARNING

Accidental or remote starting can cause severe personal injury or death. Before removing a panel or access door, or before working on the generator set, use an insulated wrench to disconnect the negative (-) cable from the battery to prevent accidental starting.

⚠ WARNING

Engine components (drains, filters, hoses, etc.) can be hot and cause severe burns, lacerations of the skin, and liquid splash. Use personal protective equipment when working with or around hazardous materials. Examples of personal protective equipment include (but are not limited to) safety glasses, protective gloves, hard hats, steel toed boots, and protective clothing.

⚠ WARNING

Diesel fuel is combustible and can cause severe personal injury or death. Do not smoke near fuel tanks or fuel-burning equipment or in areas sharing ventilation with such equipment. Keep flames, sparks, pilot flames, electrical arcs and switches, and all other sources of ignition well away. Keep a multiclass fire extinguisher handy.

Refer to [Section 5.1 on page 31](#) for scheduled fuel filter replacement. Replace the fuel filter if the engine lacks power.

1. Disconnect the negative (-) cable at the battery to prevent the engine from starting.
2. Remove the front access door.
3. Let engine cool down to prevent igniting any fuel that may be spilled when disconnecting the fuel filter.
4. Loosen the two fuel line hose clamps and the filter body clamp and remove the fuel filter. Plug the fuel lines to prevent fuel leakage and vapor accumulation.
5. Connect the new fuel filter to the fuel line. Make sure the arrow on the filter element points up in the direction of fuel flow.
6. Prime the engine for at least 30 seconds to fill the new fuel filter. Check for leaks as the generator set runs for several minutes.
7. Tighten the clamps, if necessary.
8. Replace the front access door.
9. Connect the negative (-) cable at the battery.
10. Dispose of the old filter in accordance with local environmental regulations.

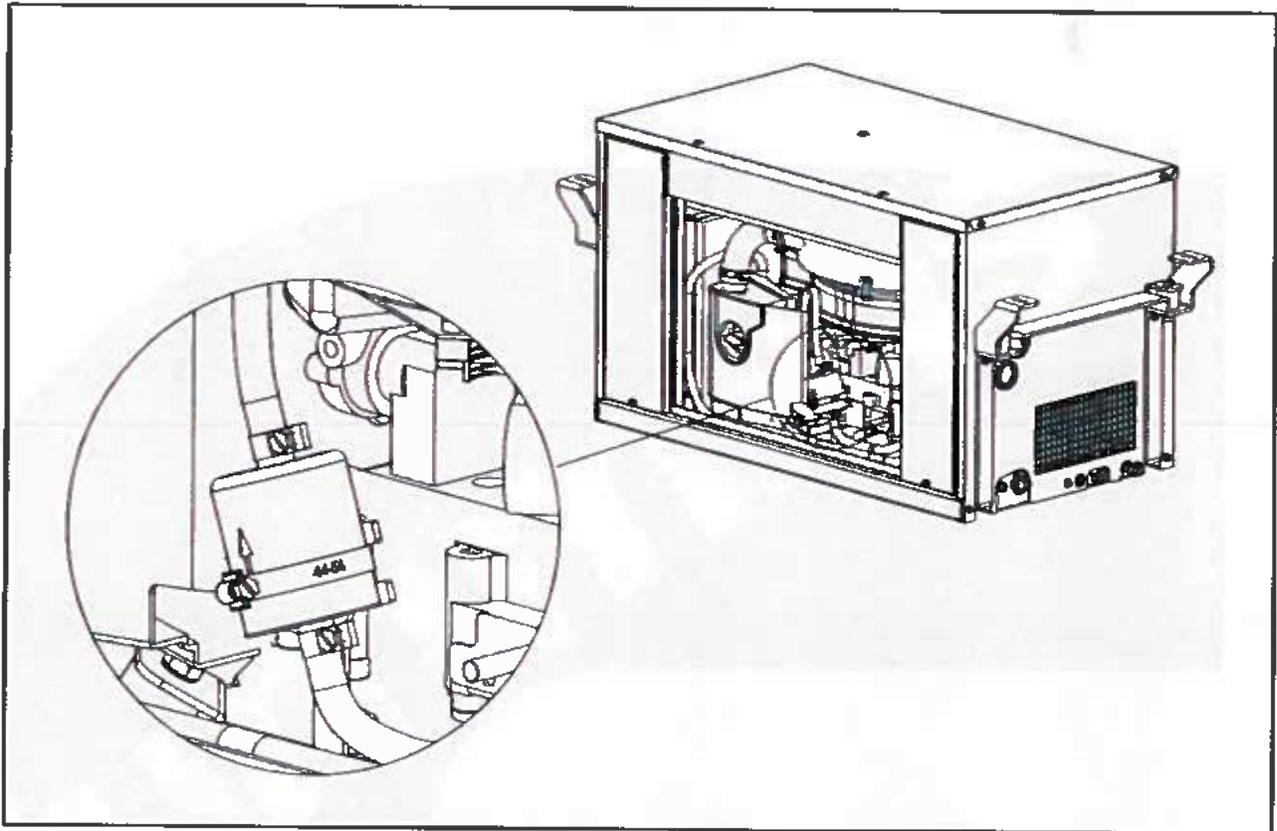


FIGURE 8. FUEL FILTER

5.7 Maintaining the Cooling System

The engine cooling system is filled with a 50/50 mixture of ethylene glycol antifreeze and water when the generator set leaves the factory. The mixture is suitable for temperatures down to -37°C (-34°F).

5.7.1 Cooling System

⚠ CAUTION

Operating the generator set when coolant level is low can cause serious engine damage.

Check the engine coolant level and look for coolant leaks around the bottom of the generator set and on the ground below. Minor leaks that can be replenished by daily additions of coolant to the recovery tank should be repaired by a qualified service technician as soon as possible. Larger leaks are cause for shutting down the generator set until it can be repaired.

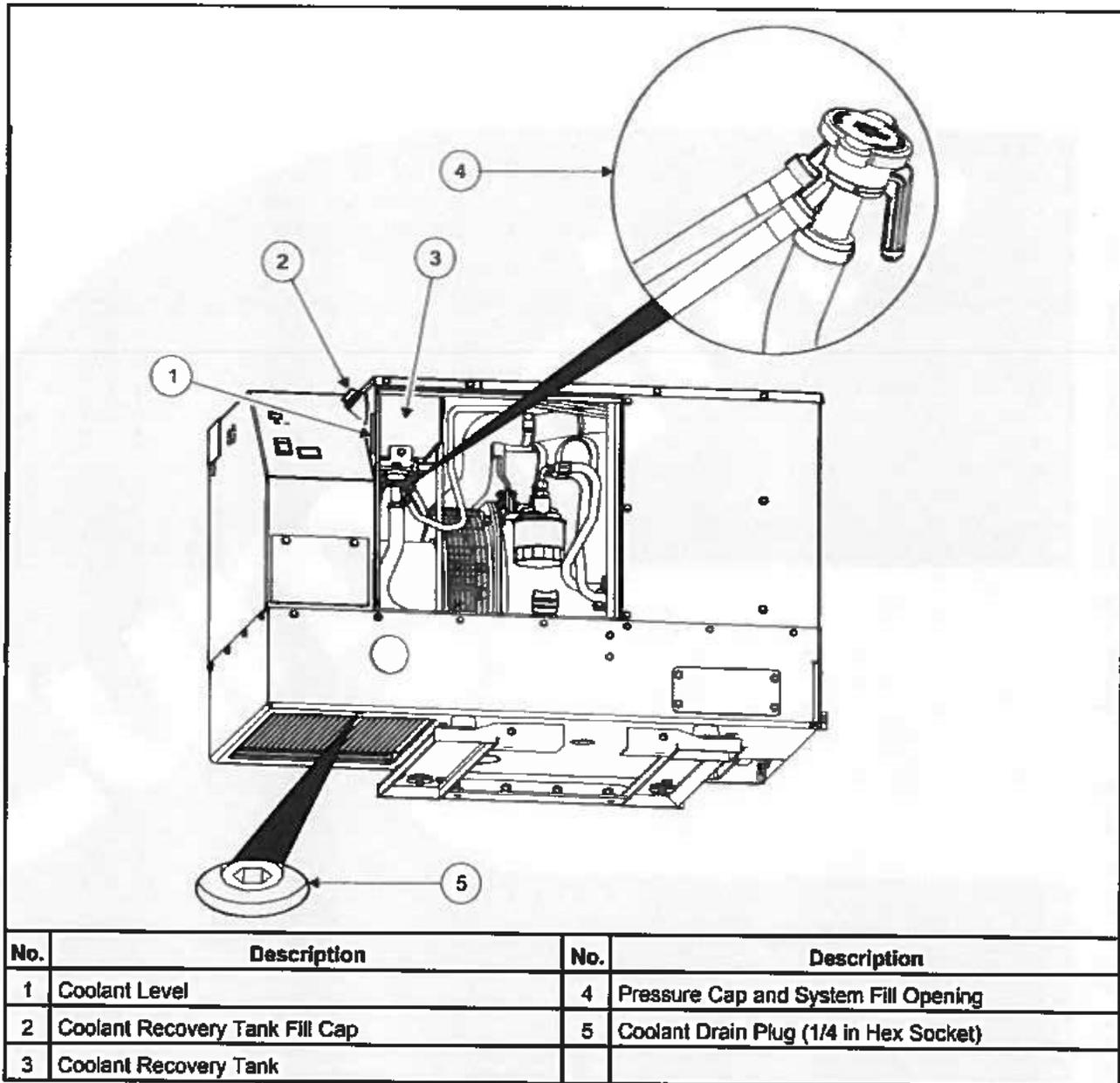


FIGURE 9. COOLING SYSTEM

5.7.2 Coolant Level

Check coolant level in the recovery tank before the first startup of each day and fill to the "COLD" mark if necessary.

5.7.3 Coolant Recommendations

Use the best quality ethylene glycol antifreeze available.

- Antifreeze should be fully formulated with rust inhibitors and coolant stabilizers.

- Mixed with fresh (distilled) water that is low in minerals and corrosive chemicals.

A 50/50 mixture is recommended for all climates and is suitable for temperatures down to -37°C (-34°F).

5.7.4 Draining and Cleaning Cooling System

WARNING

Hot coolant spray can cause severe burns. Let the engine cool before releasing the pressure cap or removing the drain plug.

Let the engine cool before removing the pressure cap.

1. Relieve any remaining pressure by turning the cap slowly, without pushing down.
2. When the pressure has been relieved, push down on the cap and turn it the rest of the way to withdraw it.

WARNING

Ethylene glycol antifreeze is considered toxic. Dispose of it according to local regulations for hazardous substances.

3. Remove the coolant drain plug and drain the coolant into a suitable container.

Flush and clean the cooling system before refilling. Radiator cleaning chemicals are available at local auto parts stores. Follow cleaning and flushing instructions on the product.

5.7.5 Refilling Cooling System

1. Install the coolant drain plug using pipe thread sealant.
2. Tighten it just enough to prevent leaks when the generator set is running and has warmed up.
3. Pull the hose connected to the pressure cap assembly out as far and high as it will go, and fill the system with coolant.
4. When the coolant level reaches the fill opening, start and operate the generator set for a few minutes and shut it down.
5. Add more coolant if necessary.
6. Secure the pressure cap.

5.8 Exhaust System

WARNING

EXHAUST GAS IS DEADLY! Do not operate the generator set if there is an exhaust leak or any danger of exhaust gasses entering or being drawn into the vehicle.

WARNING

Grass or brush in contact with the exhaust system can cause fire. Do not park the vehicle in high grass or brush.

1. Look and listen for exhaust system leaks while the generator set is running. Shut down the generator set if a leak is found and have it repaired before operating.
2. Look for openings or holes between the generator set compartment and vehicle cab or living space if the generator set engine sounds louder than usual. Have all such openings or holes closed off or sealed to prevent exhaust gases from entering the vehicle.
3. Replace dented, bent, or severely rusted sections of the tailpipe and make sure the tailpipe extends at least 25.4 mm (1 in) beyond the perimeter of the vehicle.
4. Park the vehicle so that generator set exhaust gases disperse away from the vehicle. Barriers such as walls, snow banks, high grass, brush, and other vehicles can cause exhaust gases to accumulate in and around the vehicle.
5. Do not operate power ventilators or exhaust fans while the vehicle is standing with the generator set running. The ventilator or fan can draw exhaust gases into the vehicle.
6. Check all CO monitors to assure proper operation.

5.9 Mechanical System

⚠ WARNING

Compressed air, pressure washers, and steam cleaners can cause severe eye injury. Always wear safety glasses when using.

1. Look for mechanical damage and listen for unusual noises and vibrations.
2. Check the generator set mounting bolts.
3. Check to see that the generator set air inlet and outlet openings are not clogged with debris or blocked.
4. Clean accumulated dust and dirt from the generator set. Do not clean the generator set while it is running or still hot. Protect the generator, air cleaner, control panel, and electrical connections from water, soap, and cleaning solvents.

5.10 Replacing the Air Filter Element

⚠ WARNING

Accidental or remote starting can cause severe personal injury or death. Before removing a panel or access door, or before working on the generator set, use an insulated wrench to disconnect the negative (-) cable from the battery to prevent accidental starting.

⚠ WARNING

Engine components (drains, filters, hoses, etc.) can be hot and cause severe burns, lacerations of the skin, and liquid splash. Use personal protective equipment when working with or around hazardous materials. Examples of personal protective equipment include (but are not limited to) safety glasses, protective gloves, hard hats, steel toed boots, and protective clothing.

Refer to [Section 5.1 on page 31](#) for scheduled air filter element replacement. Under dusty operating conditions, inspect and replace more often.

1. Remove the filter cover.
2. Unscrew the knurled nut and remove the old filter element
3. Wipe the air filter element sealing surfaces clean and install new air filter element into the cover and slide back into position.
4. Replace the front access cover.

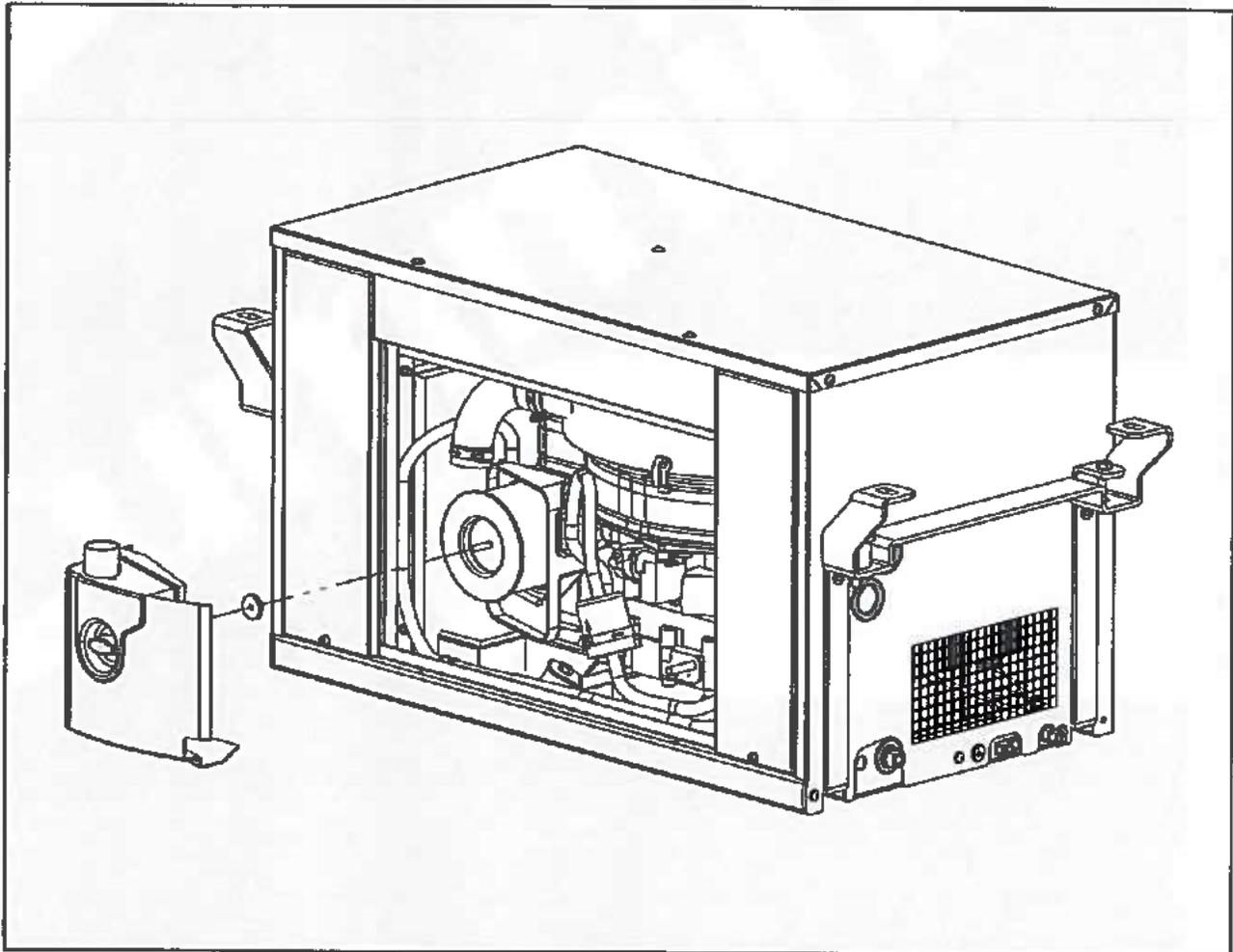


FIGURE 10. REPLACING THE AIR FILTER ELEMENT

5.11 Cleaning the Spark Arrester

⚠ WARNING

A hot muffler can cause severe burns. Let the muffler cool down before removing or installing spark arrester cleanout plugs or screens.

⚠ WARNING

Grass or brush in contact with the exhaust system can cause fire. Do not park the vehicle in high grass or brush.

Refer to [Section 5.1 on page 31](#) for scheduled spark arrester muffler cleaning (meets U.S. Forest Service requirements). Cleaning is required for maximum generator set performance.

1. Remove the cleanout plug on the side of the spark arrester canister.
2. Start and load the generator set to near full power. Let the generator set run for about 5 minutes to expel the soot in the muffler.
3. Stop the generator set, allow the muffler to cool, and reinstall the plug.

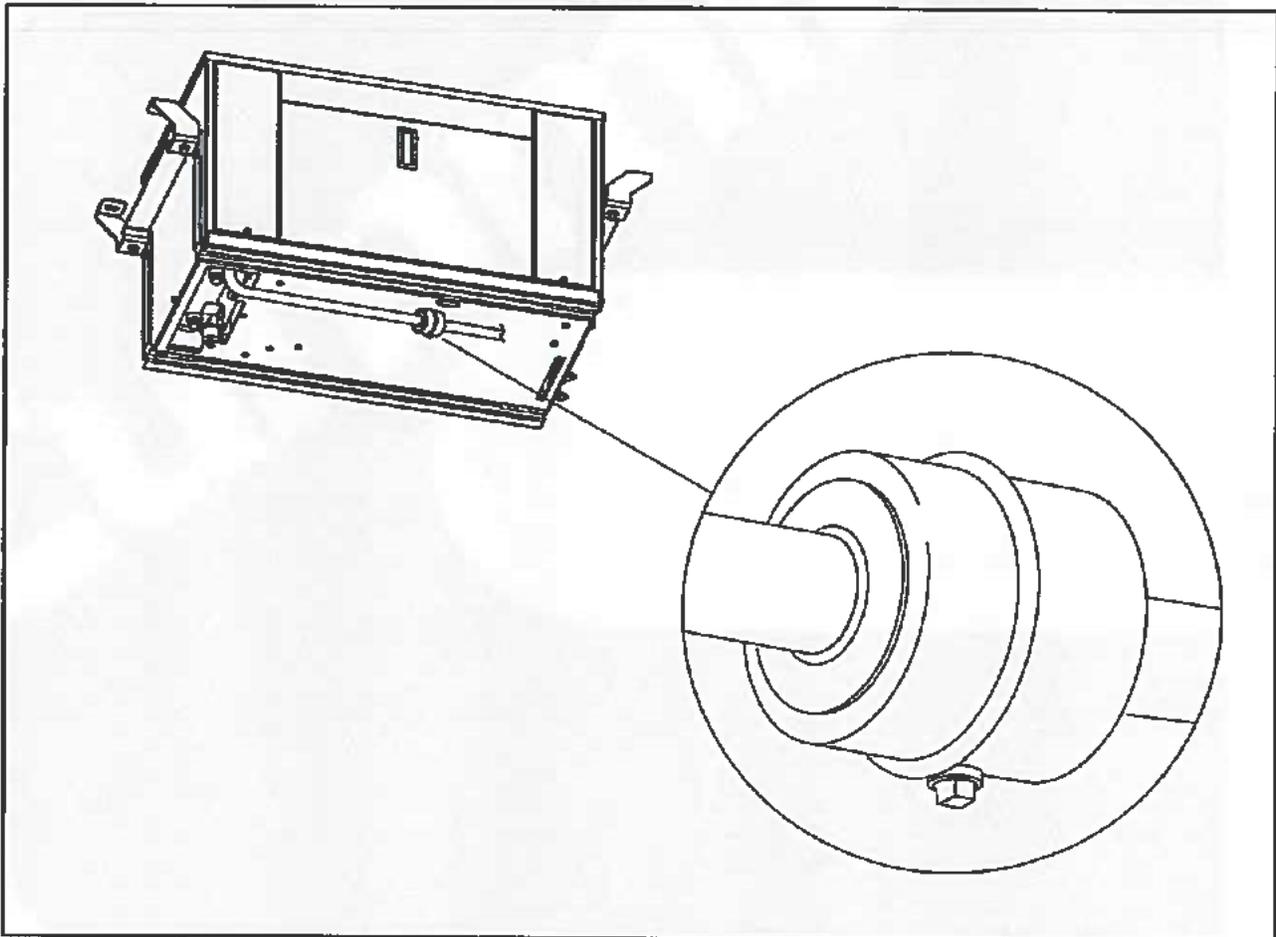


FIGURE 11. SPARK ARRESTER CLEANOUT PLUG

5.12 Storing the Generator Set

Proper storage is essential for preserving top generator set performance and reliability. If the generator set is not going to be exercised on a regular basis and not be used for more than 120 days, the generator set should be prepared for storage.

⚠ WARNING

Carbon monoxide is deadly and can accumulate to dangerous levels in garages and other confined spaces. Disable the automatic generator starting feature before storing the vehicle.

1. Disable the automatic generator set starting feature.
2. Change the engine oil and attach a tag indicating the oil grade viscosity.
3. Disconnect the battery cables, negative (-) cable first, from the starting battery and store the battery according to the battery manufacturer's recommendations.
4. Position the line circuit breaker to OFF.

5.13 Returning the Generator Set to Service

1. Check the oil tag on the generator set and change the oil if the viscosity indicated is not appropriate for the temperatures expected.
2. Reconnect the starting battery (negative [-] cable last).
3. Replace the air filter element. Use new air filter element if it is dirty.
4. Inspect the generator set.
5. Prime the generator set fuel system by positioning the control switch to STOP/PRIME for 30 seconds. The status indicator stays on while the pump is on.
6. Start the generator set.
7. Position the line circuit breaker to ON when the generator set is ready to power loads.

6 Troubleshooting

6.1 Overview

WARNING

Hot engine parts can cause severe burns. Always allow the engine to cool down before performing any maintenance or service.

The following paragraphs provide status, maintenance, and warning messages, fault messages, and symptom-based faults. If a problem is not resolved after taking the corrective actions suggested, contact a local dealer or distributor. See [Section 2.4 on page 11](#).

NOTICE

Maintaining engine oil level, keeping battery connections clean and tight, watching the fuel gauge, not overloading the generator set, etc. will prevent most shutdowns.

NOTICE

When the generator set and vehicle engine share a common fuel tank, the fuel dip tubes are usually arranged so that the generator set will run out of fuel first. Marking the generator set empty point on the fuel gauge will make it easier to tell when to stop the generator set before running it out of fuel.

6.2 Status Messages

The following table lists the status and periodic maintenance messages the Operator Panel displays. To clear faults, turn display off/on.

NOTICE

Warning and Fault messages cannot be retrieved once they are cleared.

TABLE 10. STATUS MESSAGES

Message	Description
GEN OFF	Indicates that the generator set is ready to start.
GEN ON	Indicates that the generator set is running.
GEN START	If this message appears while pressing START but the engine does not crank, check the stop switch (see Section 4.2.2) inside the generator set and push it on.
GEN CAL	Indicates that the generator set is in calibration mode and not yet able to produce AC output voltage. Wait a few seconds.

RESTART GEN?	This message appears every time the generator set stops. Turn off and restart the generator set.
GEN WAIT	Indicates that the generator set is either delaying the next start attempt to allow the starter motor to cool down, or that more time is being allowed for engine preheating because the ambient temperature is below freezing. Try restarting when the message turns off.
LOW BATTERY	Indicates that battery voltage is below the minimum value (9 VDC) necessary to start the generator set. Check battery connections and recharge or replace the battery.

6.3 Maintenance Messages

6.3.1 Oil Change / Check Oil Level

These messages appear every time the generator set hour counter reaches preset oil check/change intervals (change after the first 20 hours of operation and then once every 250 hours). The generator set continues to run while the message is displayed.

A. Check Oil Level

Check the oil level. Add or drain oil if necessary.

B. Reset Maintenance Message

Reset the maintenance message by holding START until the message clears.

NOTICE

If the message is not reset, it will reappear after one hour of generator set operation.

6.4 Warning Messages

6.4.1 Short Circuit

Indicates that a connected appliance probably has a short circuit. AC output voltage is turned off, but the engine is kept running to cool the generator set.

A. Disconnect All Appliances

B. Stop Engine

C. Restart Generator Set

D. Reconnect Appliances

Reconnect appliances one by one to determine which one shorted. Repair or replace the shorted appliance.

6.5 Fault Messages

6.5.1 Oil Temp-Press

Indicates that either the engine lubricating oil temperature is too high or that the pressure is too low.

A. Check Oil Level

Check the oil level. Add or drain oil if necessary.

6.5.2 Generator Alert

This fault message has three possible causes:

1. Communication between the Operator Panel in the vehicle and the inverter in the generator set is interrupted.
2. Without power from the PMA auxiliary windings AC3 and AC4, the inverter will not be able to communicate with the Operator Panel. If the output frequency detected by the inverter is too high (engine speed greater than 4000 RPM) the inverter will shut down the generator set.
3. Faulty inverter.

⚠ CAUTION

Always perform stator check before replacing the inverter. Failure to do so will result in damage to the inverter.

A. Contact Local Dealer or Distributor

6.5.3 Over Temperature (Inverter)

Indicates that the inverter temperature was detected to be over 70° C (158° F).

A. Reduce Load

Reduce the number of connected appliances, especially air conditioners and battery chargers. (Review load management in Loading the Generator Set.)

6.5.4 Overload

Indicates that too many applications are connected, or that the inverter is defective.

A. Measure Current Draw

If current draw is greater than 32 amps, reduce the number of appliances connected in the coach and wait a few minutes for generator set to cool down. Press STOP to stop engine and restart the generator set.

B. Disconnect Generator Set from Coach and Bench-Test with a Load-Bank

If the generator set runs fine without shutting down, then the problem likely exists within vehicle wiring and/or appliances. In the event that the generator set shuts down with no load connected, perform checks in Step C.

C. Ensure Stator is not Damaged

Ensure stator is not damaged and has no shorts internally or to Ground on all Main and Auxiliary Windings. Test winding insulation resistance with a Megger. Replace stator if necessary. If the stator is good, replace the inverter.

⚠ CAUTION

Always perform stator check before replacing the inverter. Failure to do so will result in damage to the inverter.

6.5.5 Low Engine Power

Indicates that engine speed is below 2300 RPM.

A. Contact Local Dealer or Distributor

6.6 Symptom Based

Diagnosis of some problems involves observing system operation.

6.6.1 Dead Operator Panel

A. Contact Local Dealer or Distributor

6.6.2 Engine Cranks But Does Not Start

NOTICE

The generator set will make up to three start attempts, cranking each time for 5 seconds and pausing for 2 seconds, if necessary, before the next crank. Gen Wait should appear on the display.

A. Clear the Gen Wait Message From the Operator Panel by Cycling it Off and On

After clearing the message, try starting again.

B. Check Fuel Level

Check the fuel level in the tank. If the fuel level is below the pickup tube, add fuel.

1. Check that the fuel level is not below the pickup tube.

2. If the fuel is found to be low, add fuel inside the fuel tank.

C. Press the Stop Switch

Press the stop switch if it is not in the "1" position (see [Section 4.2.2 on page 21](#)).

6.6.3 Engine Exhausts White Smoke

A. Prime Fuel System

Prime fuel system by turning on the display. Lift pump should run for 5 minutes to prime system. If problem is resolved, check for air leaks with soapy water at fittings and hoses.

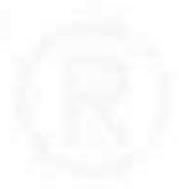
6.6.4 Engine Exhausts Black Smoke

A. Contact Local Dealer or Distributor

6.6.5 Engine Does Not Stop

A. Contact Local Dealer or Distributor

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RV generator set Quiet Diesel™ Series RV QD 3200



Cummins Onan

Performance you rely on.™



Features and benefits

- Computer-controlled constant speed operation - quiet diesel performance for smaller RVs.
- Special sound-controlling housing encloses cooling system and muffler.
- Double isolation mounting system reduces vibration.
- Easy, accessible maintenance points.
- Runs one rooftop air conditioner with power to spare.
- Integrated start/stop control with hour meter.

Weight, size and sound level

Weight	205 lb	(93 kg)
Length	30.2 in	(766 mm)
Width	17.3 in	(439 mm)
Height	18 in	(453 mm)
Sound	68 dB(A)	(readings at 10 ft (3 m) half load)

- Meets National Park Service sound level requirements (60 dB(A) @ 50 ft) for national park use.
- Typical installation will further reduce sound level.

Models and ratings

Model	Fan	Hz	Watts	Voltage	Amps	Phase	Circuit protector
3.2 HDZAA-6508A	Internal	60	3200	120	28.7	1	1 pole, 30 A

Ambient conditions for rated power output with muffler and RV enclosure, per ISO 8528-1:

- Temperature: 77° F (25° C)
- Altitude: 500 ft (152.4 m), (99 kPa dry)

Typical power output change based on ambient conditions:

- Temperature: Power output decreases 1% for every 10° F (5.5° C) increase
- Altitude: Power output decreases 3.5% for every 1000 ft (305 m) increase

Ratings represent minimums. Actual performance may be significantly higher based on installation and operating conditions.

Standard features

- 1 cylinder diesel engine
- Permanent magnet alternator
- Digital voltage regulation w/no adjustments required
- Integral enclosed muffler with stationary exhaust pipe connection point
- USDA-approved spark arrestor
- Sound insulated cover with cooling air inlet and outlet ducts
- Heavy-duty air cleaner
- Automotive type starter
- Hour meter
- Meets applicable U.S. EPA and California emissions standards
- Connector for remote operation
- Double isolation mounting system
- Terminal block connection for AC output
- Electric fuel pump
- Fuel filter
- Cleanable oil screen filter
- Service and maintenance through service doors
- Pure Sine

Control system

Microprocessor control
User and service personnel accessible diagnostics
Over voltage, over speed and overload safety
Low oil pressure safety
AC alternator over temp safety
Automatic timed glow plugs
One touch stop
Integrated display with start/stop switches and LCD

Engine details

Design: 4-cycle, air-cooled diesel engine
Cylinders: 1, vertical
Bore: 3.15 in (80.0 mm)
Stroke: 2.72 in (69 mm)
Displacement: 21.16 in³ (347 cm³)
Compression ratio: 22 to 1
Lube oil capacity: 1.2 qt (1.1 L)

Average fuel consumption:

Diesel	No load	Half load	Full load
3.2 HDZAA	0.2 Gal/h (0.7 L/h)	0.3 Gal/h (1.0 L/h)	0.4 Gal/h (1.4 L/h)

Alternator details

Design: Permanent magnet

Brushes: None

Exciter system: None

Cooling: Direct drive centrifugal blower; cast aluminum housing for excellent heat transfer

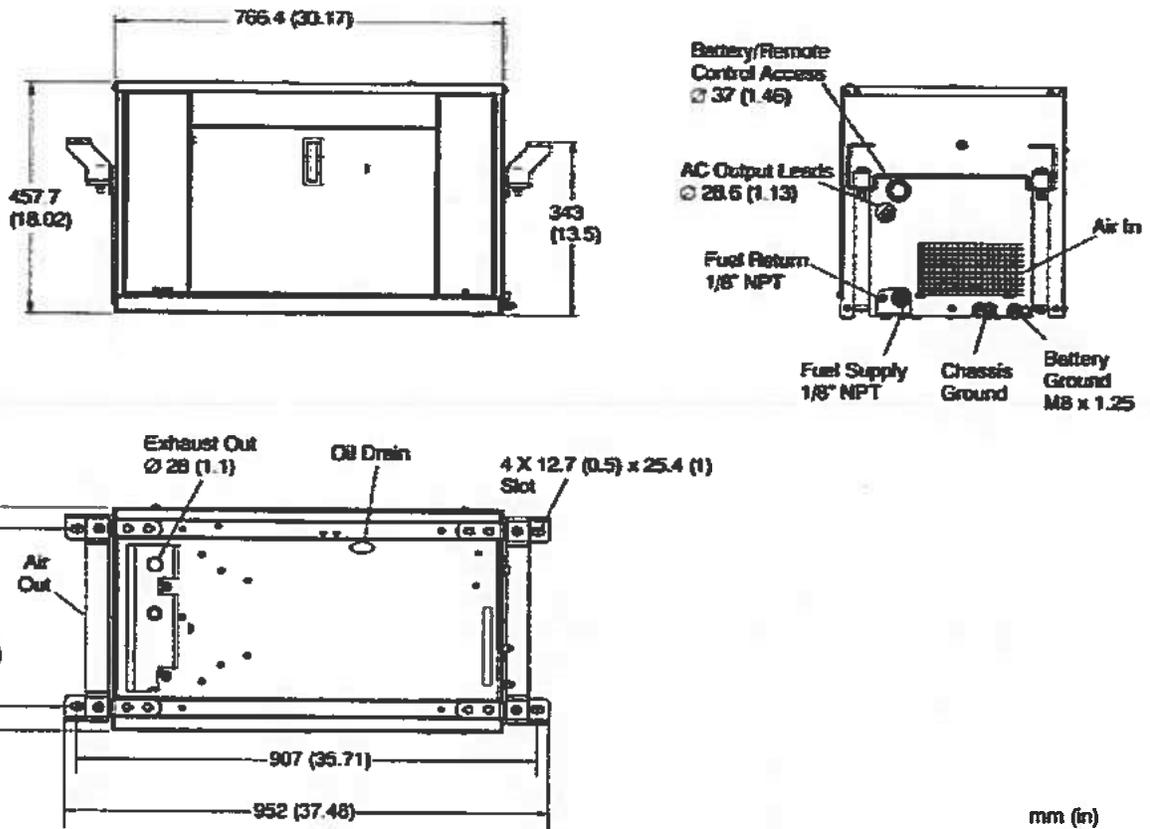
Generator set performance

Voltage regulation no load to full load: ± 8%

Frequency regulation no load to full load:
± 0.1% THD: <5%

Air conditioner operation: Will operate with one 13500 Btu air conditioner and an additional load up to 1000 W at 100° F and 500 ft (152.4 m) altitude

Basic dimensions



Note: This outline drawing is provided for general reference only and is not intended for design or installation. For more information see Operation and Installation manuals or obtain 500-4709 drawing and wiring diagram from your distributor/dealer.

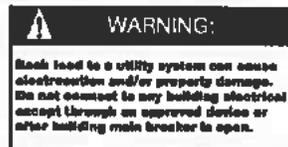
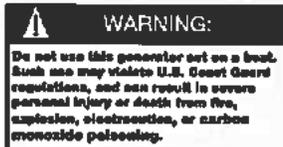
Testing for RV application

- Tested at extremes of temperature -20° F (-29° C) to 120° F (49° C) for starting and operation
- Tested with RV loads, air conditioners, microwaves, converter, TVs, VCRs
- Tested installed. Cummins Onan RVs used for product development testing
- Tested in high humidity conditions
- Tested in salt spray conditions
- Tested in heavy airborne dust conditions
- Field test program
- 60 Hz (120 V only) models listed by SGS United States Testing Company, Inc. per ANSI/RVIA EGS-1 and CSA-certified by Std. 100 Motors and Generators and TIL RV-06
- This generator set was designed and manufactured in facilities certified to ISO 9001
- 60 Hz models meet applicable U.S. EPA and California emissions standards



Warranty policy

This limited warranty covers virtually everything except routine maintenance for the first two years you own your RV generator set, and covers parts and labor on major power train and generator set parts during the third year. In addition, it also includes a free 90-day adjustment policy, which provides that Cummins Inc. will make minor adjustments during the first three months you own it - free of charge! Please note: This 3-year limited warranty applies to RV generator sets used in RV applications only, and does not apply to RV generator sets used in commercial mobile applications.



After sale support

Complete line of parts and accessories

Cummins Inc offers replacement and tune-up parts, accessories, oil and maintenance chemicals - all specially designed to help keep your Cummins Onan generator set running at peak performance.

Cummins Inc. also provides genuine Onan Green Label Parts™ that exactly match generator set specifications and will help maximize power output and extend the life of your generator set.



Largest distributor/dealer support network

Cummins Onan generator sets are supported by the largest and best trained worldwide certified distributor/dealer network in the industry. This network of knowledgeable Cummins Onan distributor/dealers will help you select and install the right generator set and accessories to meet the requirements of your specific application. This same network offers a complete selection of commonly used generator set maintenance parts, accessories and products plus manuals and specification sheets. Plus, they can answer your questions regarding proper operation, maintenance schedules and more.

Manuals: Operation and installation manuals ship with the generator set. To obtain additional copies or other manuals for this model, see your Cummins Onan distributor/dealer and request the following manual numbers: Operation (983-0103), Installation (983-0602), Parts (983-0203), Service (983-0502).

To easily locate the nearest Cummins Onan distributor/dealer in your area, or for more information, contact us at 1-800-888-6626 (or 763-574-5000), or visit www.cumminsonan.com.

Contact your distributor/dealer for more information

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A-1501 (11/07)





IN-WALK SLIDE-OUT
OWNER'S MANUAL

LIPPERT
COMPONENTS®

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Safety Information

WARNING

Failure to act in accordance with the following may result in death, serious injury, coach or property damage.

The IN-WALL® Slide-out System is intended for the sole purpose of extending and retracting the slide-out room. Its function should not be used for any purpose or reason other than to actuate the slide-out room. To use the system for any reason other than what it is designed for may result in death, serious injury or damage to the coach.

Before actuating the system, please keep these things in mind:

1. Parking locations should be clear of obstructions that may cause damage when the slide-out room is actuated.
2. Be sure all persons are clear of the coach prior to the slide-out room actuation.
3. Keep hands and other body parts away from slide-out mechanisms during actuation.
4. To optimize slide-out actuation, park coach on solid and level ground.

Operation

Prior To Operation

1. Coach should be parked on the most level surface available.
2. Leveling or stabilizing system should be actuated to ensure coach will not move during operation of slide-out system.

NOTE: In the case of a motorized unit, ignition **MUST** be off to operate the slide-out.

3. Be sure to keep all persons and pets clear of slide-out system during operation.

NOTE: Install transit bars (if so equipped) on the slide-out room during storage and transportation.

CAUTION

Always make sure that the slide-out room path is clear of people and objects before and during operation of the slide-out. Always keep away from the gear racks when the room is being operated.

Extending Slide-Out Room

1. Level the unit.

NOTE: In the case of a motorized unit, ignition **MUST** be off to operate the slide-out.

2. Remove the transit bars (if so equipped).
3. Press and hold the IN/OUT switch (Fig. 1B) in the OUT position until the room is fully extended and stops moving.

NOTE: It is important to continue to press the slide-out switch for a few seconds after the room is fully extended until the motor shuts off. The control will sense that the room has stopped and will shut off the motor after a few seconds.

4. Release the switch, which will lock the room into position.

Retracting Slide-Out Room

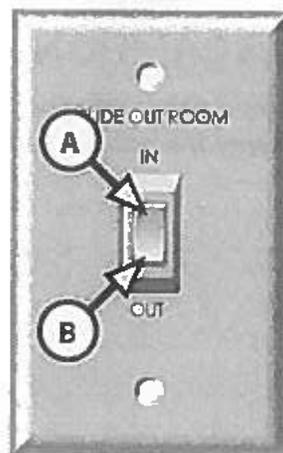
NOTE: In the case of a motorized unit, ignition **MUST** be off to operate the slide-out.

1. Press and hold the IN/OUT switch (Fig. 1A) in the IN position until the room is fully retracted and stops moving.

NOTE: It is important to continue to press the slide-out switch for a few seconds after the room is fully retracted until the motor shuts off. The control will sense that the room has stopped and will shut off the motor after a few seconds.

2. Release the switch, which will lock the room into position.
3. Install the transit bars (if so equipped).

Fig. 1



Controller Overview (B Version)

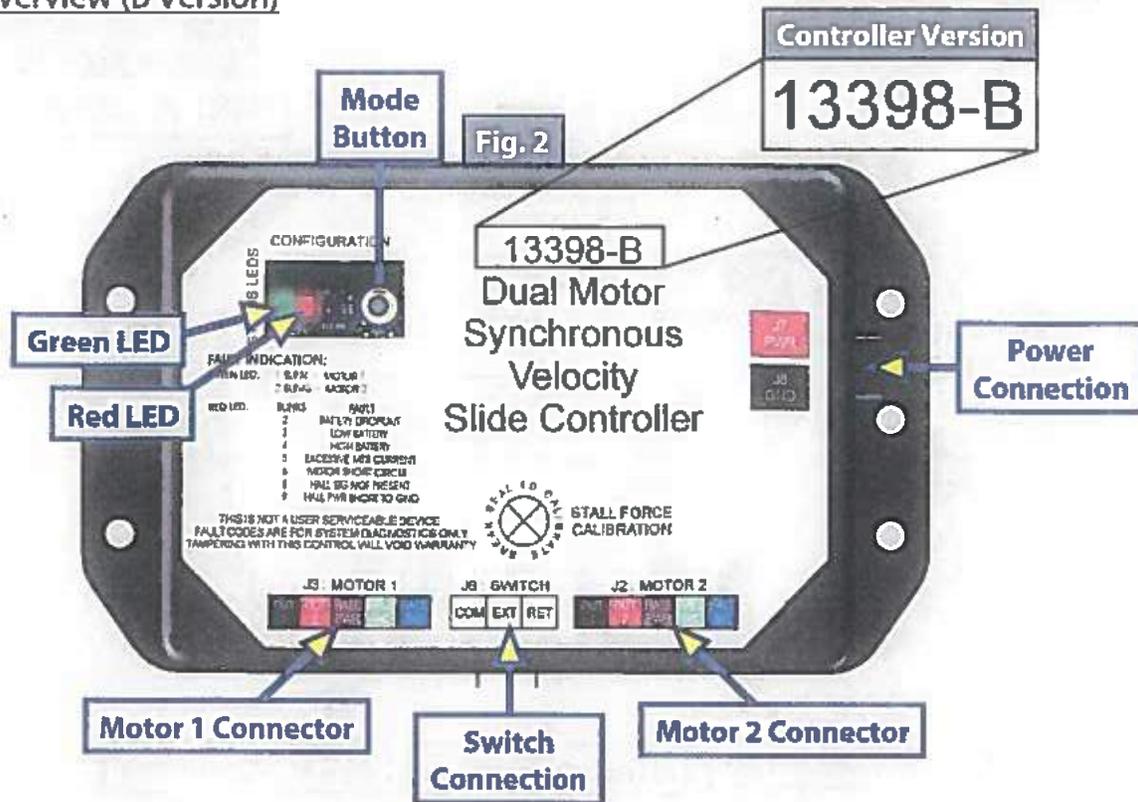


Fig. 3 - Controller Connections

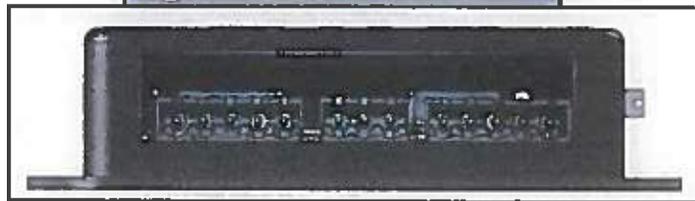
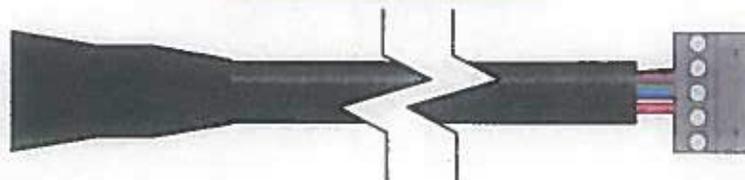


Fig. 4 - Motor Harness



Status LEDs: 2 LEDs, 1 green and 1 red, are provided to indicate current controller status and faults.

Power Connection: 12V DC input. Unit will operate from 8V DC to 18V DC.

Switch Connection: Spade connection for the switch wiring.

Motor 1 Connector: Power and encoder input for motor 1.

Motor 2 Connector: Power and encoder input for motor 2.

NOTE: Version B motor harnesses have five wire in-line connectors at the controller and the molded connector at the motor end (Figs. 3 and 4). Wire colors match with color codes on control board. It does not matter which motor is 1 or 2.

Controller Overview (C2 Version)

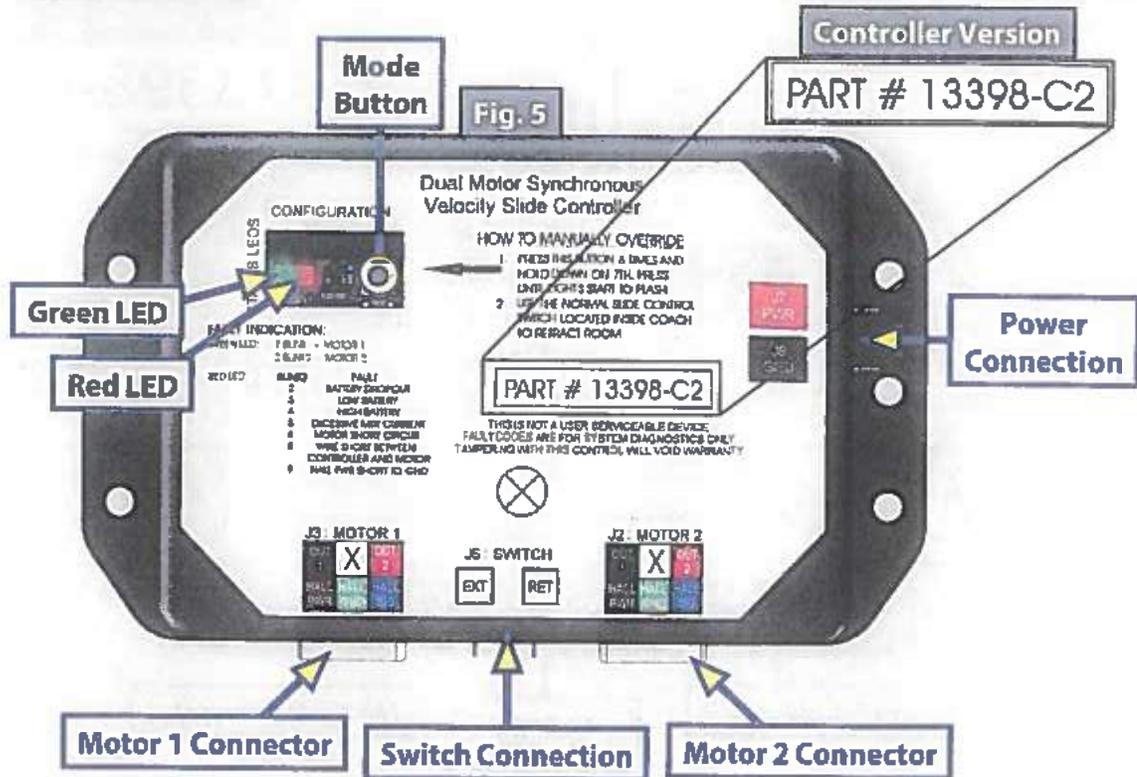
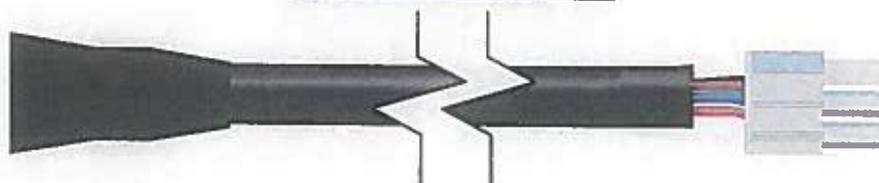


Fig. 6 - Controller Connections



Fig. 7 - Motor Harness



Status LEDs: 2 LEDs, 1 green and 1 red, are provided to indicate current controller status and faults.

Mode Button: Used to engage the electronic manual override.

Power Connection: 12V DC input. Unit will operate from 8V DC to 18V DC.

Switch Connection: Spade connection for the switch wiring.

Motor 1 Connector: Power and encoder input for motor 1.

Motor 2 Connector: Power and encoder input for motor 2.

NOTE: Motor harnesses have Molex® connectors at the controller and a molded connector at the motor end (Figs. 6 and 7). Wire colors match with color codes on control board. It does not matter which motor is 1 or 2.

Motor and Controller Compatibility

Part #	Controller Version	Controller Replacement	Motor(s) Used
<u>239657</u>	A (Daisy Chain) (Fig. 8)	A Only	Round-Square (Fig. 14), Round-Round (Fig. 15A)
<u>211852</u>	B (Fig. 9)	B/C2* Only	Round Square (Fig. 14)
	C (Fig. 10)	C/C2* Only	Round-Round (Fig. 15A, 15B), Round-Square Plate (Fig. 16)
	C1 (Fig.11)	C1/C2* Only	
	C2 (Fig. 12)	C2	
326876	8 Amp (Fig. 13)	8 Amp Only	Round-Round (Fig.15B)

NOTE: Always replace the motor in the system with the same motor except the Round-Square Plate (Fig. 16), which is obsolete. That motor will be replaced with the Round-Round (Fig. 15A, 15B).

NOTE: (*) Denotes that (2) new motor harnesses **MUST** be ordered, and re-wiring instructions **MUST** be used. See next page.

Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12



Fig. 13



Fig. 14 - 229466



Fig. 15A - 239657, 300:1



Fig. 15B - 287298, 500:1



Fig. 16 - Obsolete

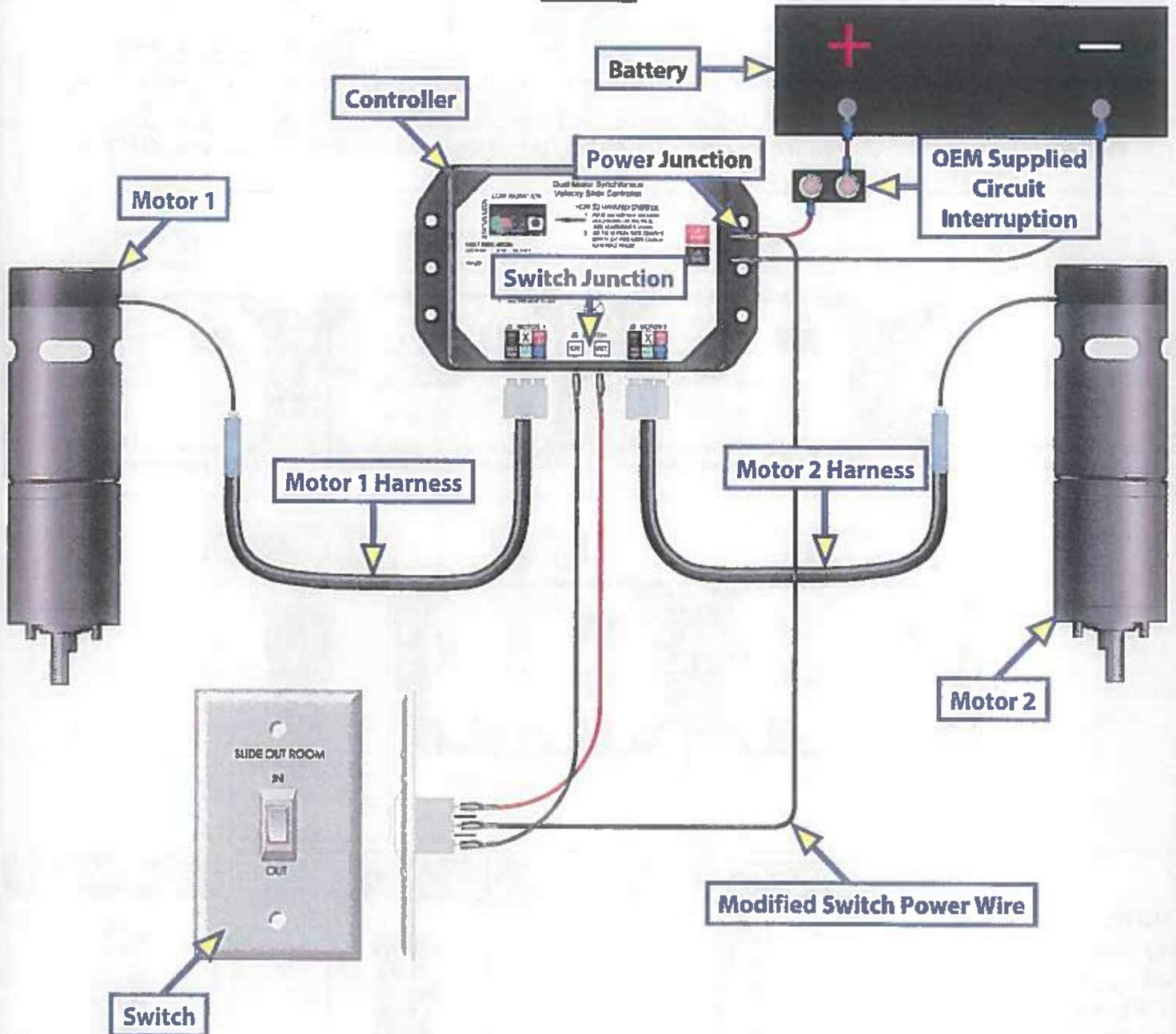


NOTE: Ensure that a 300:1 motor is replaced with a 300:1 motor (Fig. 15A), and that a 500:1 motor is replaced with a 500:1 motor (Fig. 15B).

Rewiring Instructions

If it is necessary to replace a malfunctioning Rev. B, C, or C1 controller, it is recommended that the customer do so with a new Rev. C2 controller. In order to properly rewire a Rev. B, C, or C1 controller to a new Rev. C2 controller, the customer will need two new motor harnesses (one for each motor.) Additionally, it will be necessary to modify the power wire from the controller to the extend/retract switch by adapting the wire to piggyback the connection at the power junction. This wire comes from the positive side of the buss bar to the controller (Fig. 17).

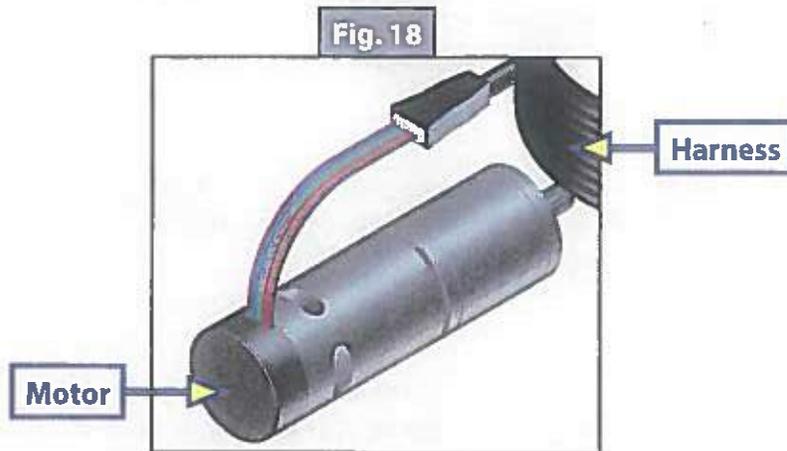
Fig. 17



Motors and Harnesses

1. Check for proper connections between the motors and harnesses (Fig. 18).
2. Visually inspect the exposed harnesses to ensure they are not pinched or damaged.

NOTE: Ribs on motor connector line up with notch inside of female connector on wiring harness. Color codes on wires also match (black to black, red to red, etc.)



Resynchronizing the Slide-Out Motors

1. Fully extend the slide room using the switch. Keep the switch engaged until the motors shut down on their own.
2. Retract the room 1-2 inches.
3. Repeat steps 1 and 2 until both motors shut down at the same time. In many cases, two or three repetitions are necessary to re-sync the system.
4. Fully extend the slide-out and keep the switch engaged until the motors shut down on their own. Fully retract the slide-out, again keeping the switch engaged until the motors shut down on their own. If both motors shut down at the same time at full extension and full retraction, the room is properly synchronized. If they do not shut down at the same time, repeat the process until they do.

Extend and Retract Switch Connections

Rev. A - Rev. C1 Controllers: Common connection on controller goes to common connection on extend and retract switch.

Rev. C2 and 8 amp Controllers: Extend and retract connections on the controller go to the extend and retract terminals on the switch. Switch is powered by the OEM supplied 12V DC power source.

Power and Ground Connections At the Controller

Power and ground are supplied to the controller through the spade terminals located on the right-hand side of the controller (Figs. 2 and 5 - Power Connection). 12V DC is recommended. A 10ga wire is the minimum size recommended. A 30 amp resetting or blade fuse is required (OEM supplied).

Troubleshooting

Checking Circuit Breakers

The IN-WALL® Slide-out requires a minimum of a 30-amp circuit breaker. Check the 12-volt circuit breaker box for blown circuit breakers, and replace any if necessary. Consult the RV manufacturer's documentation for the location of the 12-volt circuit breaker box, and the location of the IN-WALL® Slide-out controller's circuit breaker. If the circuit breaker blows immediately upon replacement, there is a problem with the wiring to the IN-WALL® Slide-out controller. Have qualified service personnel check and repair.

Obstructions

Check outside the RV for possible obstructions: tree, post, car, etc. Check inside the RV for any obstructions: luggage, furniture, open cabinets, etc. Also, check for smaller objects that may be wedged under the floor or in the sides of unit. Remove obstructions before proceeding.

Debris In the Rack

Check the sides of the slide room for any dirt or debris. Small dirt clumps or metal shavings can cause the spur gear to bind up and stop the movement of the slide-out. Use compressed air or a dry brush to remove any dirt or debris from the rack before attempting to actuate the system again.

Error Codes

During operation when an error occurs, the board will use the LEDs to indicate where the problem exists (Fig. 19). For motor-specific faults the green LED will blink 1 time for motor 1, and 2 times for motor 2. The red LED will blink from 2 to 9 times depending on the error code (Fig. 20).

When an error code is present, the board needs to be reset. Energizing the extend/retract switch (Fig. 1) resets the board. Energize the extend/retract switch again for normal operation.

Fig. 19

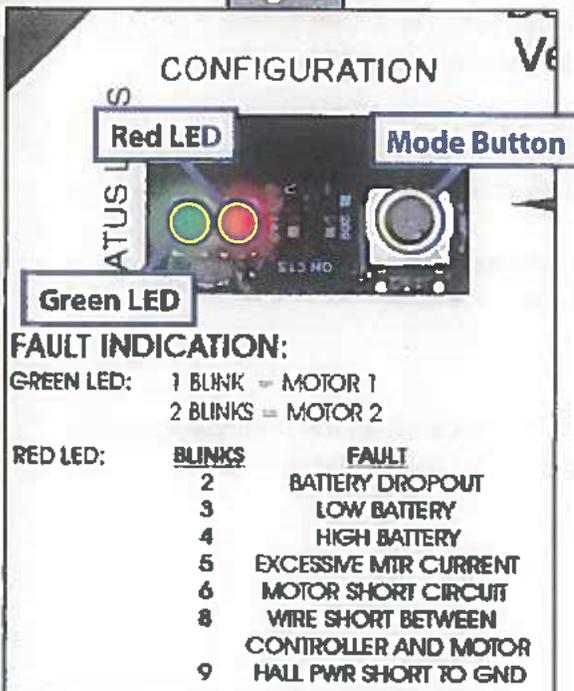


Fig. 20 - Error Code Description

Error Code	Name	Description
2	Battery Drop Out	Battery capacity low enough to drop below 6 volts while running or short in switch wiring.
3	Low Battery	Voltage below 8 volts at start of cycle.
4	High Battery	Voltage greater than 18 volts.
5	Excessive Motor Current	High amperage, also indicated by 1 side of slide continually stalling.
6	Motor Short Circuit	Motor or wiring to motor has shorted out.
8	Wire Short Between Controller and Motor	Encoder is not providing a signal. This is usually a wiring problem.
9	Hall Power Short To Ground	Power to encoder has been shorted to ground. This is usually a wiring problem.

Electronic Manual Override (Controllers C-1, C-2 and D-0 Only)

NOTE: See (Fig. 21) for locations of the mode button and LEDs.

1. Press the mode button on the controller six times and hold on the seventh for five seconds to enter electronic manual override mode.
2. Use the extend/retract switch to move both motors in or out.

NOTE: Over-current and short circuit detection are still enabled. Electronic manual override provides 12V directly to both motors.

3. To exit the mode, push and hold the mode button until the LEDs begin to blink simultaneously. Exiting the override mode resets the motor positions (you will have to resync motors).

NOTE: During this override procedure the motors are not synchronized. Visually watch the room: if one side is moving significantly slower than the other (or not at all) then immediately stop and use the "Motor Disengagement Procedure" below.

Motor Disengagement Procedure

1. Remove motor retention screws located near the top of each vertical column on the outside of the coach (under bulb seal if equipped with bulb seal on column).
2. Locate motor.
 - A. On units built prior to 2011: Bend back wipe seal from outside of coach.
 - B. On units from 2011 to current: See slot in H-column on the inside of the coach.
3. Pull motor up until disengaged (roughly ½"). A flat-head screwdriver can be used to pry the motor up.
4. Reinstall motor retention screw to hold motor in place or remove motor.

Low Voltage

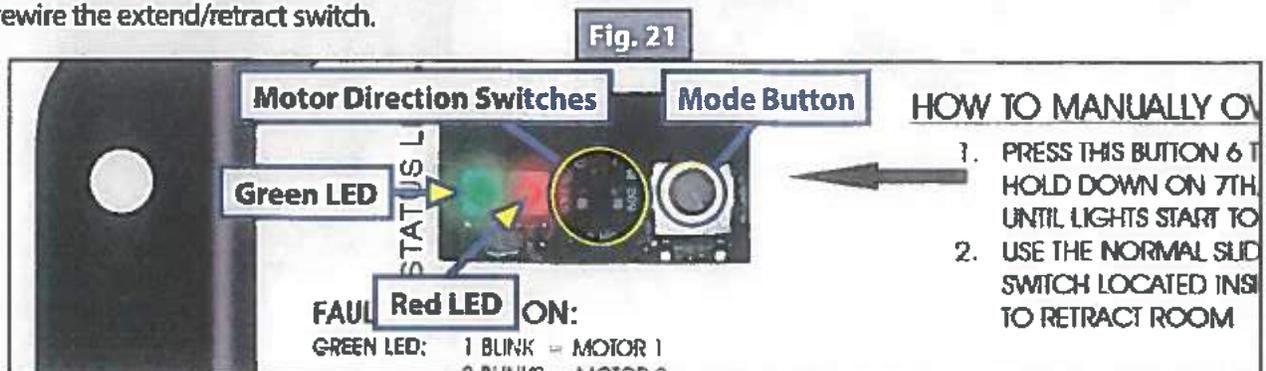
The Lippert IN-WALL® Slide-out Controller is capable of operating the room with as little as 8 volts. But at these lower voltages the amperage requirement is greater. Check voltage at the controller, see Figs. 2 and 5 for the location of power connections. If the battery is low, it needs to be charged or the unit should be plugged into shore power or the generator can be run, if equipped. It may be possible to "jump" the RV's battery temporarily to extend or retract the room. Consult the RV manufacturer's owners manual.

NOTE: Always connect directly to the battery and never to the controller power connections.

Motor Direction Switches

Motor direction switches (Fig. 21) are used to change the direction of individual motors. If when trying to extend or retract the room, one side goes in and the other side goes out, then there is a problem in the wiring. The motor direction switches can be used to correct this problem. The left switch controls motor 2 and the right switch controls motor 1. If motor 1 is going in the wrong direction then change switch 1's position. If motor 2 is going in the wrong direction then change switch 2's position.

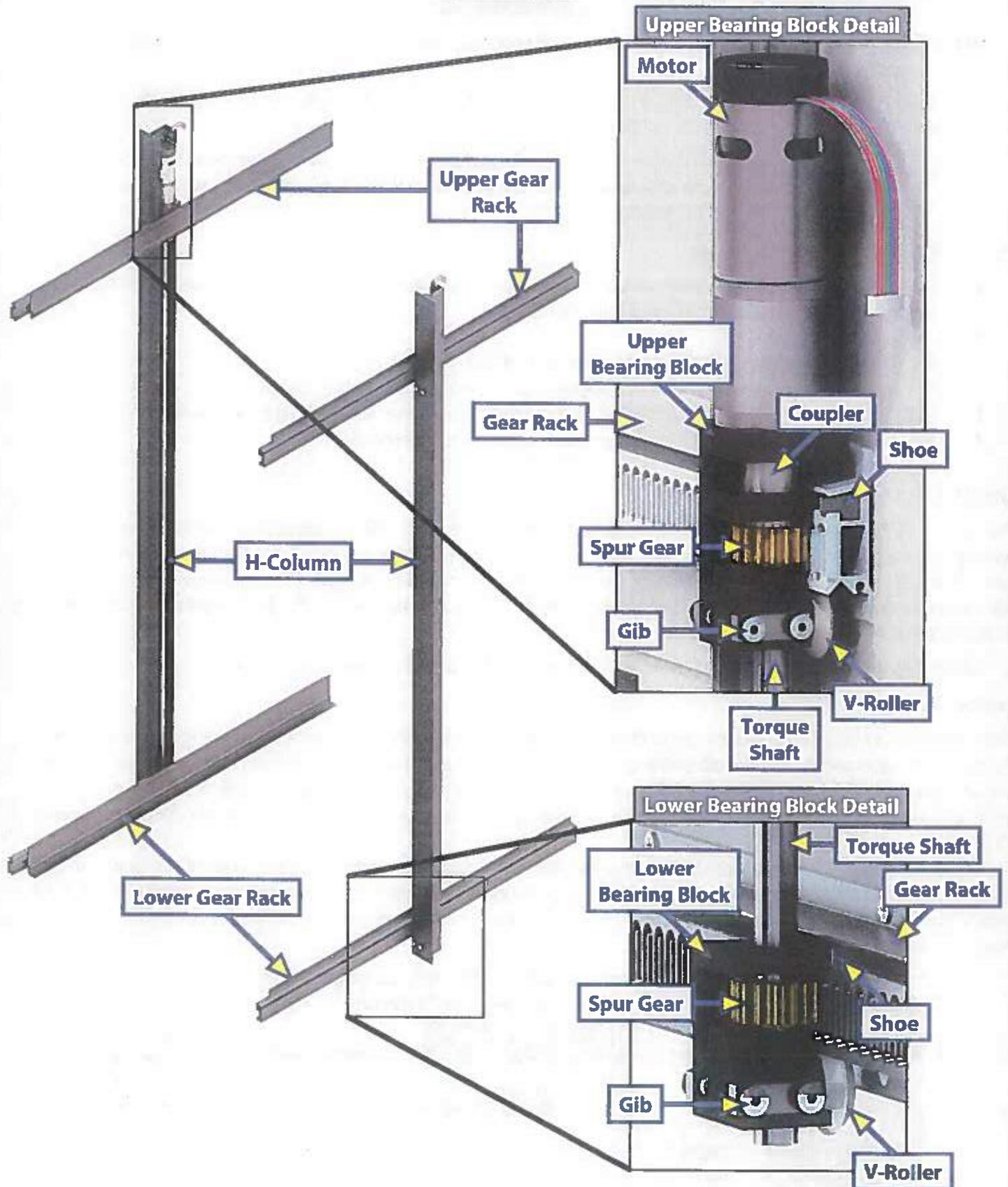
The motor direction switches can also be used to change the direction of the extend/retract switch. If the room extends when the extend/retract switch is moved to the retract position, its direction can be reversed by moving both switch 1 and switch 2 to their opposite positions. This feature can be used if it is more convenient to change the motor direction switches than to rewire the extend/retract switch.





IN-WALL® SLIDE-OUT ASSEMBLY

SLIDE-OUTS



SLIDE-OUTS

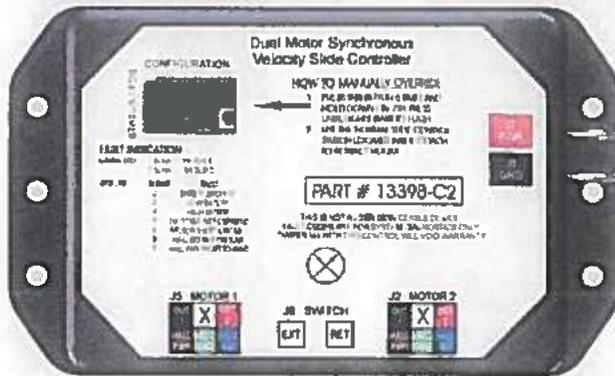
A



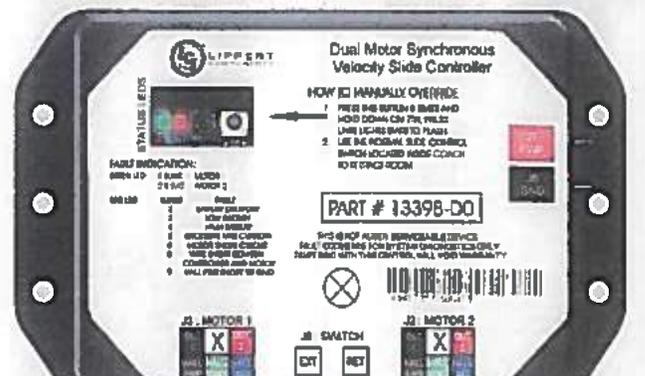
Rev B



Rev C-1

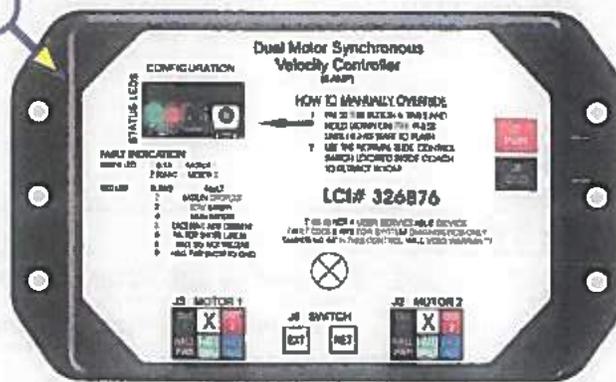


Rev C-2



Rev D-0

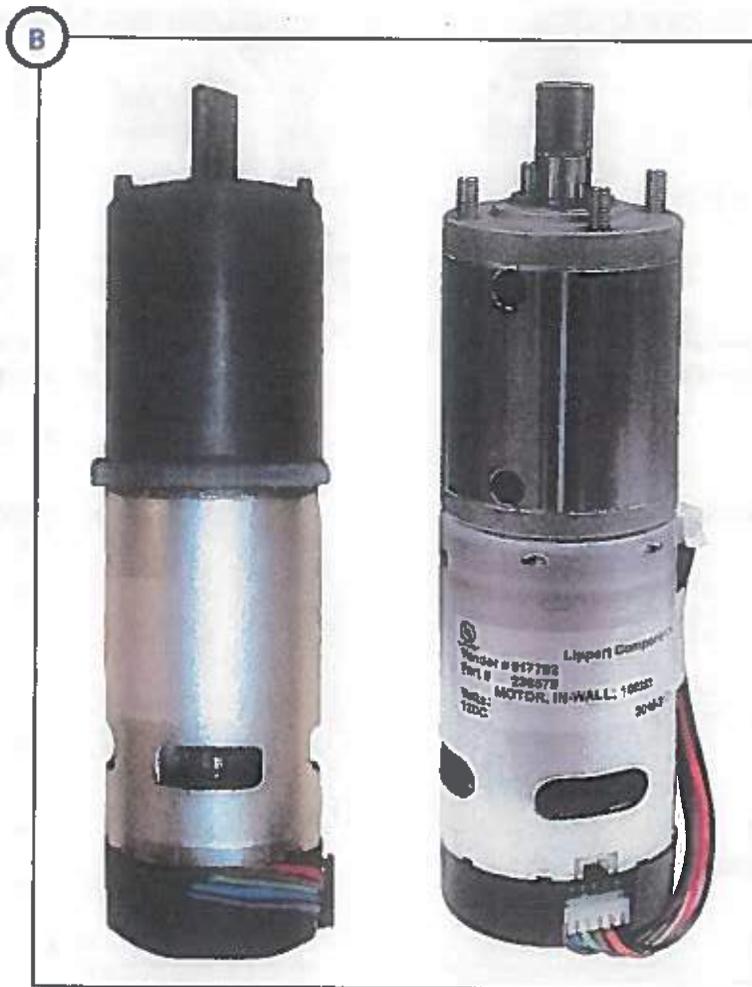
B



Rev 8 Amp

Callout	Part #	Description
A	211852 - Rev B, Rev C-1, Rev C-2, Rev D-0	Dual Motor Synchronous Velocity Slide Controller
B	326876 - 8 amp	Dual Motor Synchronous Velocity Slide Controller NOTE: This controller will not replace other controller versions.

SLIDE-OUTS

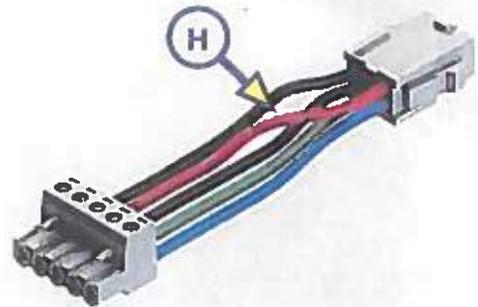
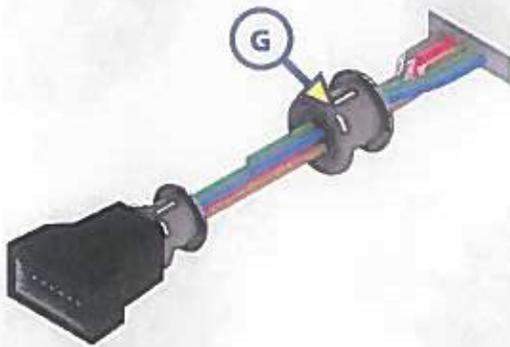
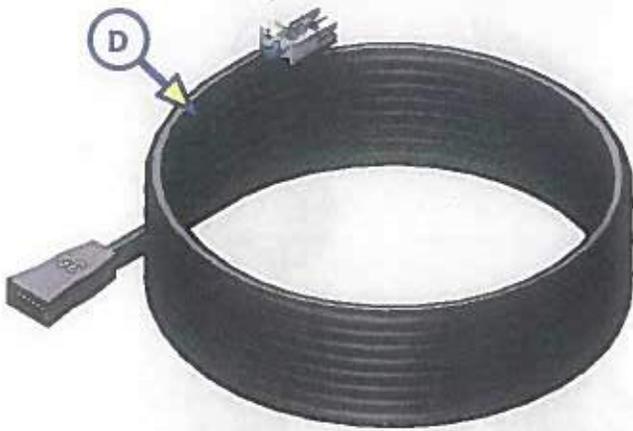


Original

Current

Callout	Part #	Description
A	<u>229466</u>	Motor, 300:1 (Cannot be substituted for Callout B; 236575)
B	<u>236575</u>	Motor, 300:1 (Original, No Longer Available)
		Motor, 300:1 (Current)
C	<u>287298</u>	Motor, High Torque 500:1

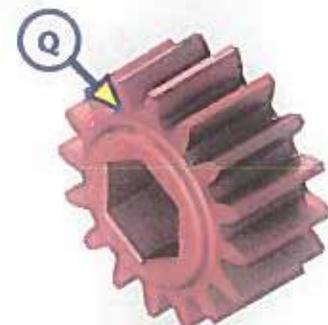
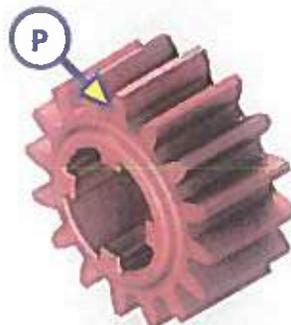
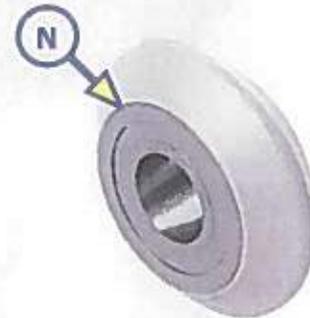
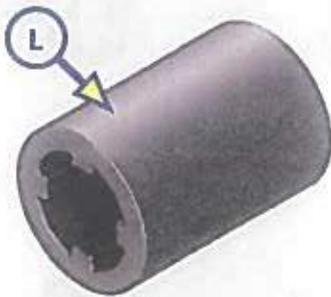
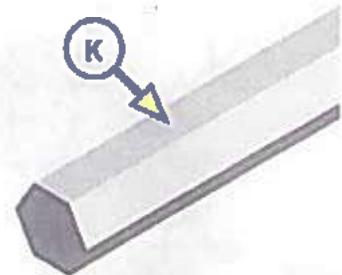
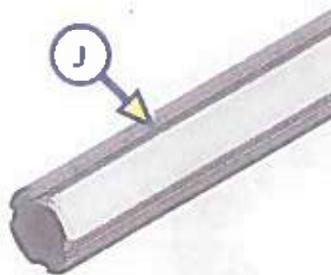
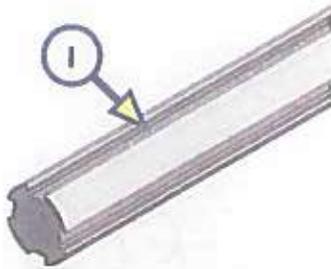
SLIDE-OUTS



Callout	Part #	Description
D	<u>238744</u>	5 ft. Controller to Motor Harness
	<u>238990</u>	10 ft. Controller to Motor Harness
	<u>247768</u>	15 ft. Controller to Motor Harness
	<u>229755</u>	20 ft. Controller to Motor Harness
	<u>238991</u>	25 ft. Controller to Motor Harness
	<u>229756</u>	30 ft. Controller to Motor Harness
	<u>238992</u>	35 ft. Controller to Motor Harness
E	229758	Harness Connector 5 Wires
F	229759	Harness Connector 3 Wires
G	<u>241834</u>	5 ft. Interconnect Harness
	<u>241835</u>	6 ft. Interconnect Harness
	<u>241836</u>	8 ft. Interconnect Harness
H	258760	Slide Controller 6" Pigtail Harness (For use with B and C-1 Controllers with (A) harness)

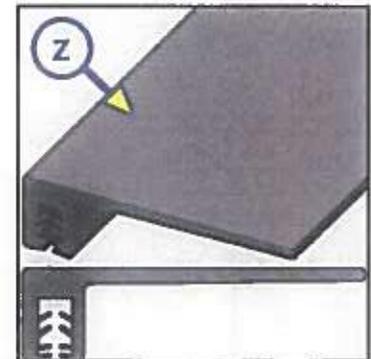
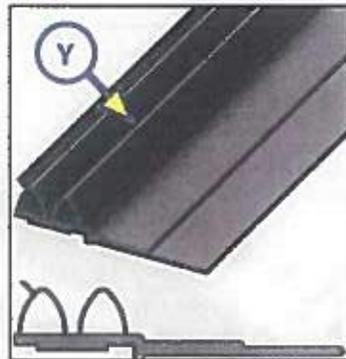
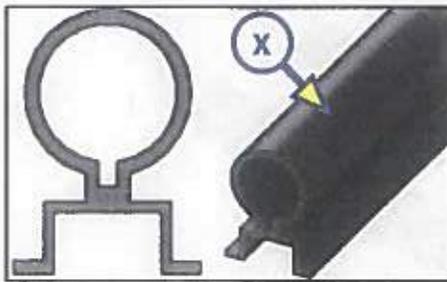
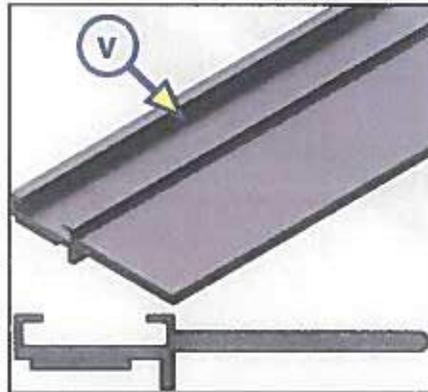
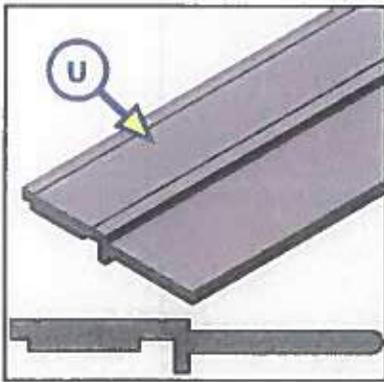
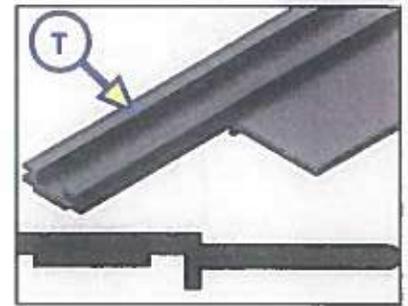
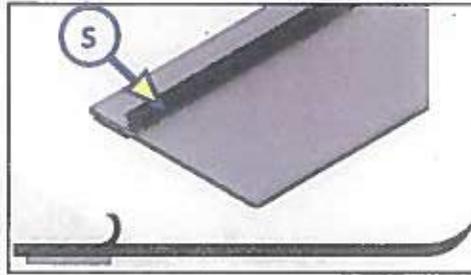
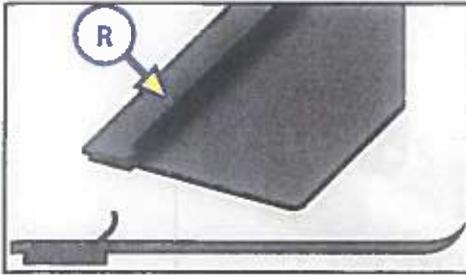
IN-WALL® SLIDE-OUT COMPONENTS

SLIDE-OUTS



Callout	Part #	Description
I	238462	Aluminum Torque Shaft
J	259065	Steel Torque Shaft
K	295873	Hex Torque Shaft
L	238461	Coupler - Old Style (for 229466 Motor)
		Coupler - New Style (for 236575 Motor)
M	285083	Hex Coupler
N	*292801	V-Roller Assembly
O	238893	Spur Gear
P	*292435	Copper Infused Spur Gear
Q	*285085	Hex Spur Gear
<p>NOTE: *Parts shown for reference only. The part is not available for individual replacement.</p>		

SLIDE-OUTS



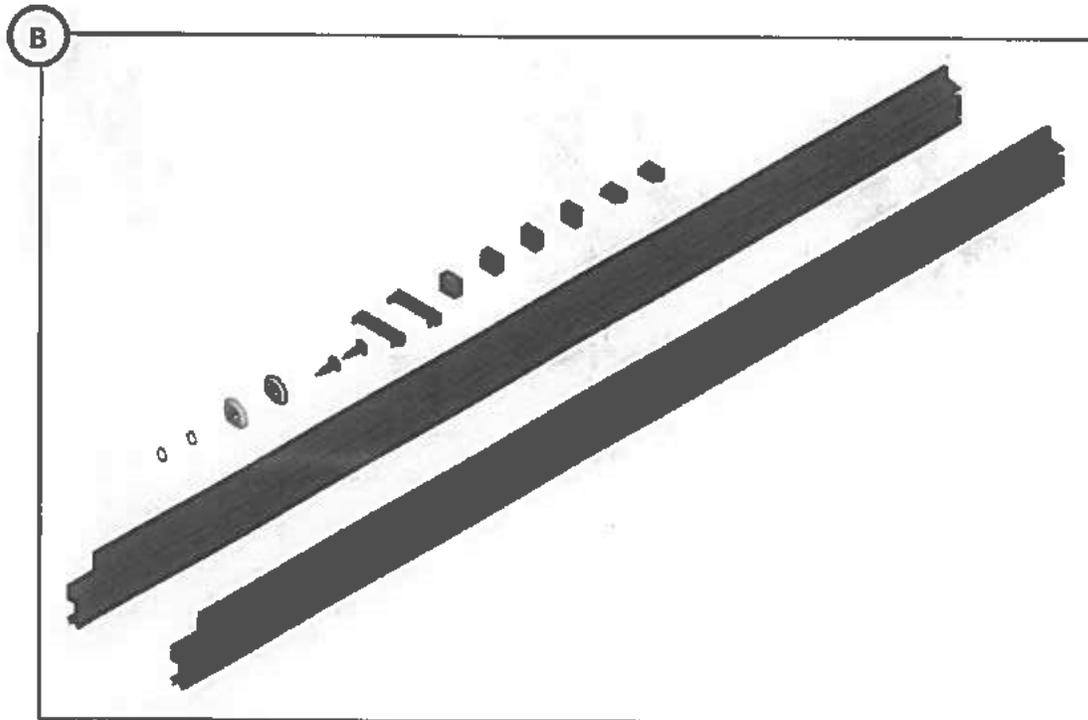
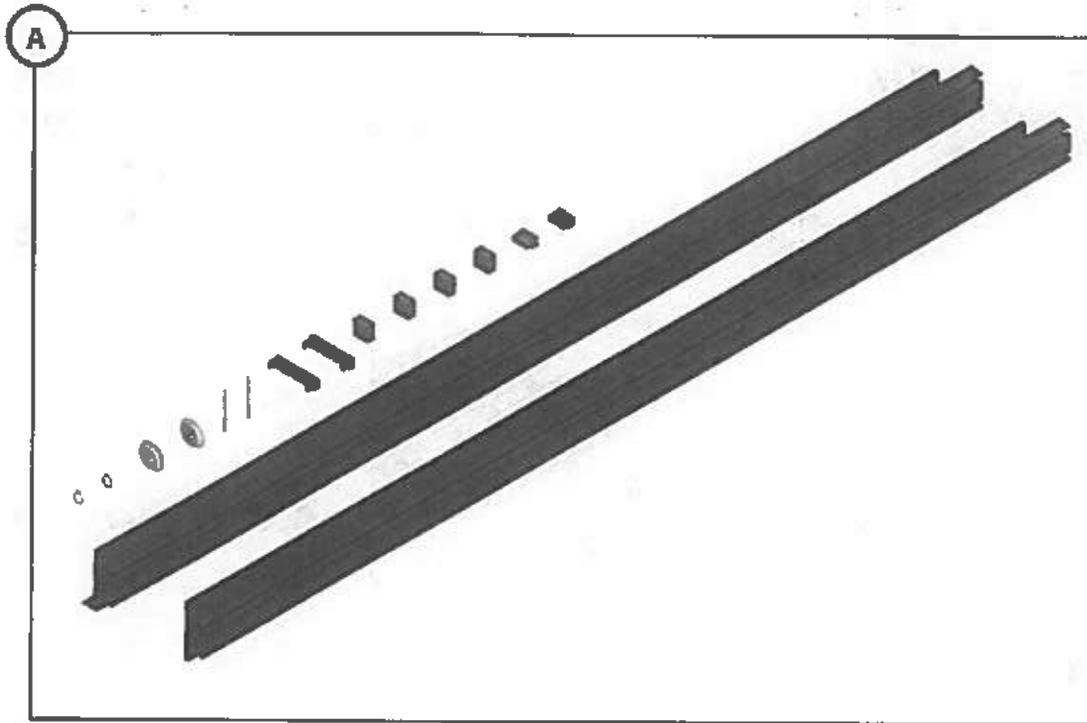
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R	156603	Seal	1" x 2 2 ¹ / ₃₂ " x 5 ⁵ / ₆₄ "
S	132733	Sweep Seal	2 4 ³ / ₆₄ " x 1 ¹ / ₁₆ "
T	239667	EK Design Flap	1 1 ¹ / ₄ "
U	240410	Flat Side Wiper	1 1 ¹ / ₄ "
V	240448	KE Black Single Wiper with Leg	1 1 ¹ / ₄ "
W	260406	KE Black Slide on D-Seal	-
X	240449	KE Black Slide on Bulb Seal	-
Y	253344	Winnebago Double Bulb Seal	-
Z	300614	Slide-out Seal	144"



IN-WALL® SLIDE-OUT REPAIR KITS

SLIDE-OUTS

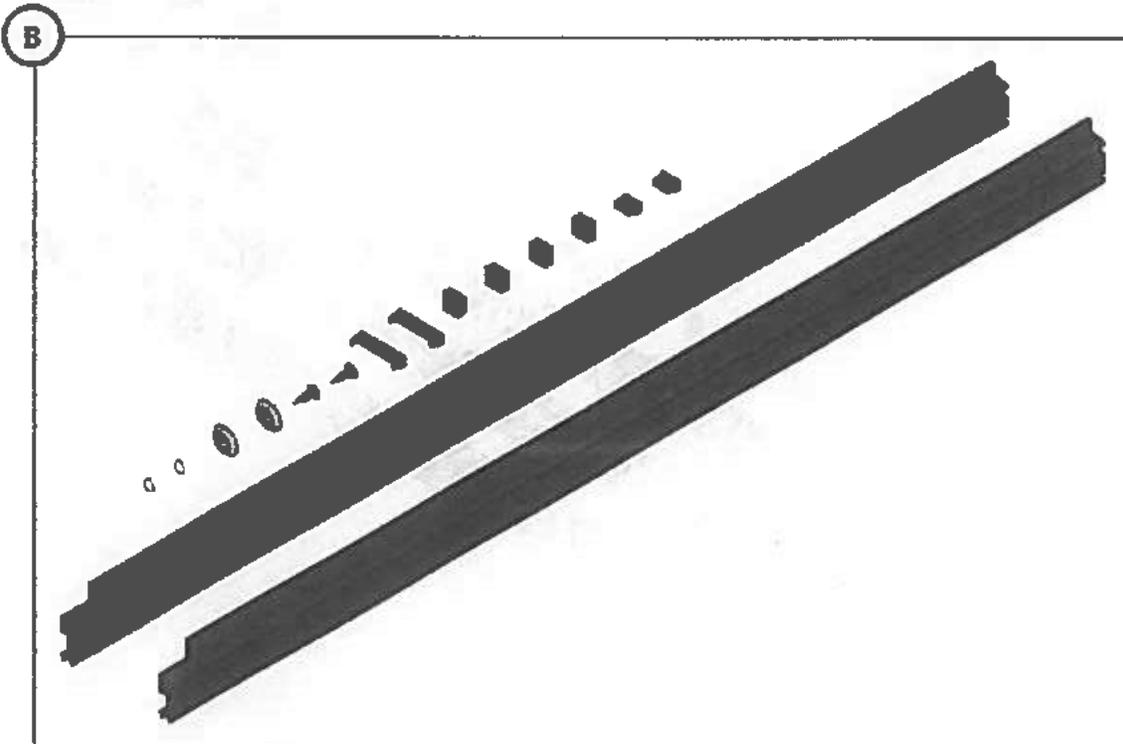
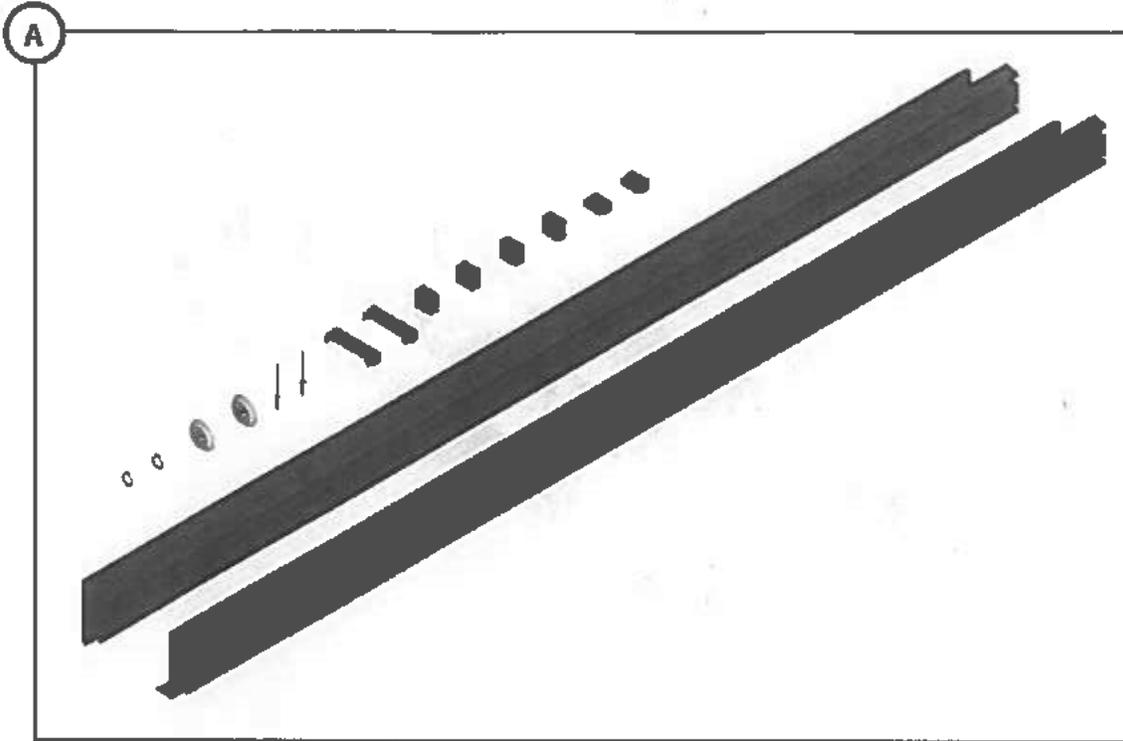
Standard (With 1.56" Notch)



Callout	Clear Part #	Black Part #	Description
A	<u>366154</u>	<u>366209</u>	Standard Fixed Repair Kit
B	<u>366156</u>	<u>366211</u>	Standard Float Repair Kit

SLIDE-OUTS

Inverted (With 1.56" Notch)



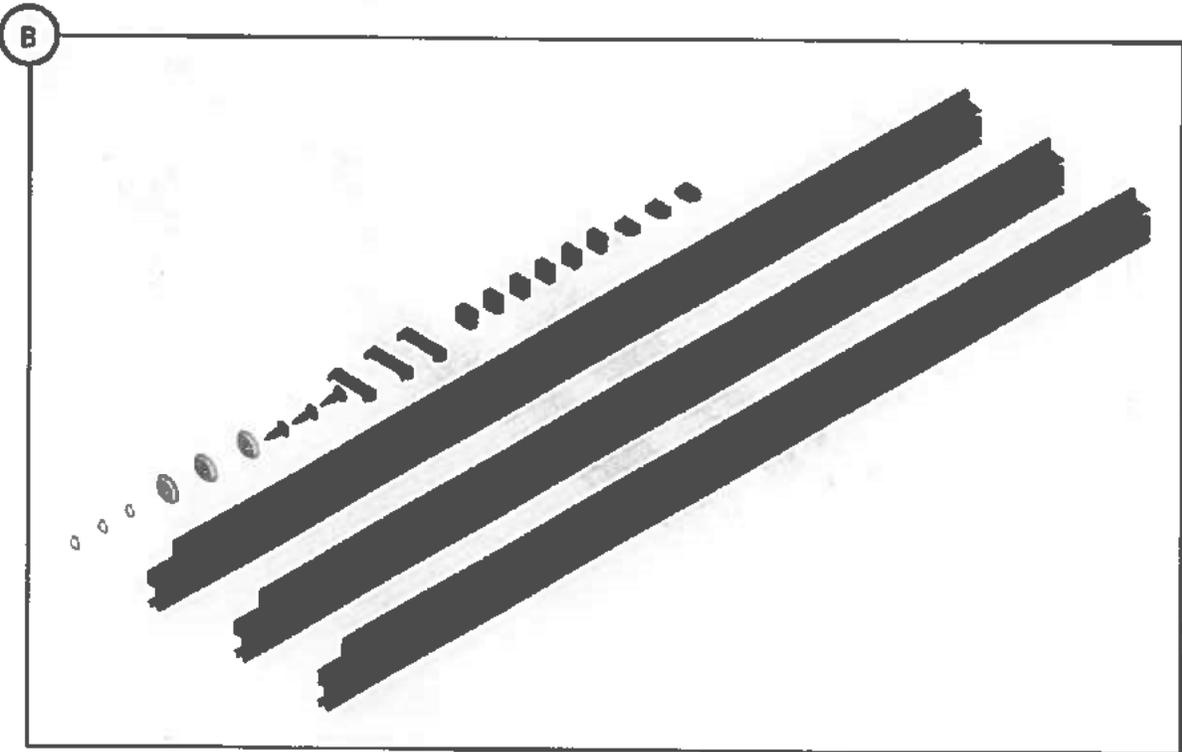
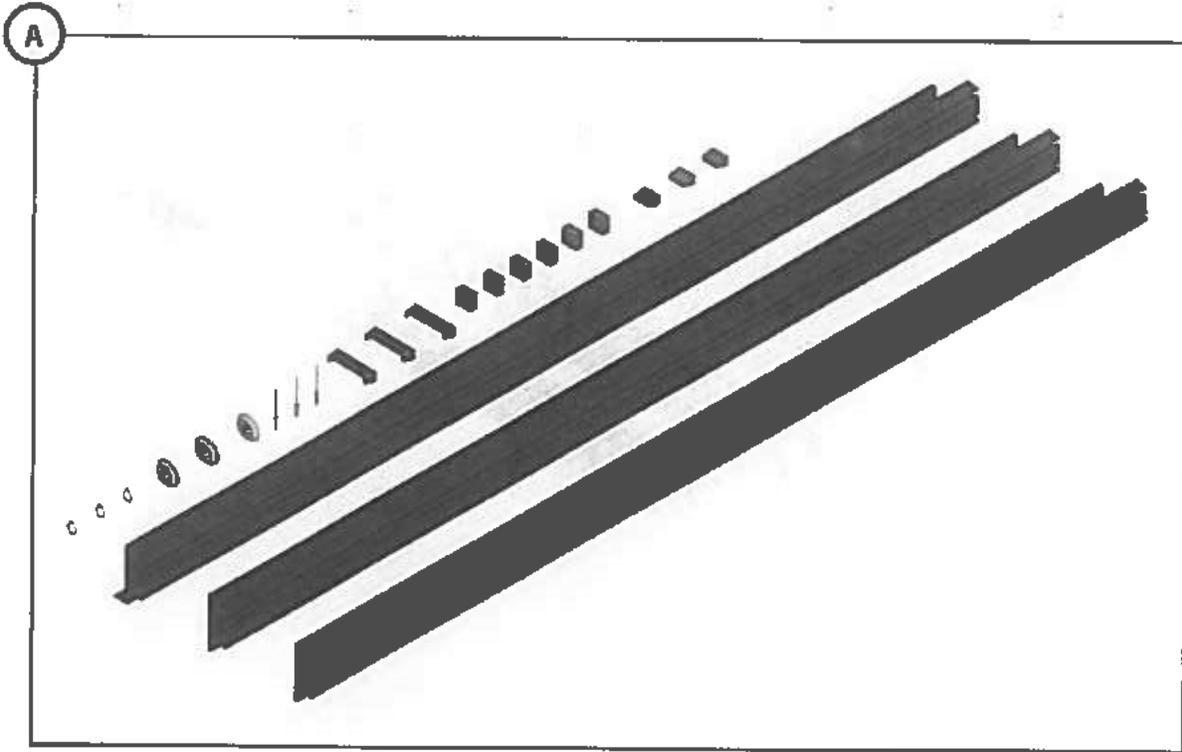
Callout	Clear Part #	Black Part #	Description
A	<u>366158</u>	<u>366212</u>	Inverted Fixed Repair Kit
B	<u>366159</u>	<u>366213</u>	Inverted Float Repair Kit



IN-WALL® SLIDE-OUT REPAIR KITS

SLIDE-OUTS

Triple (With 1.56" Notch)



Callout	Clear Part #	Black Part #	Description
A	<u>366160</u>	<u>366214</u>	Triple Fixed Repair Kit
B	<u>366161</u>	<u>366215</u>	Triple Float Repair Kit



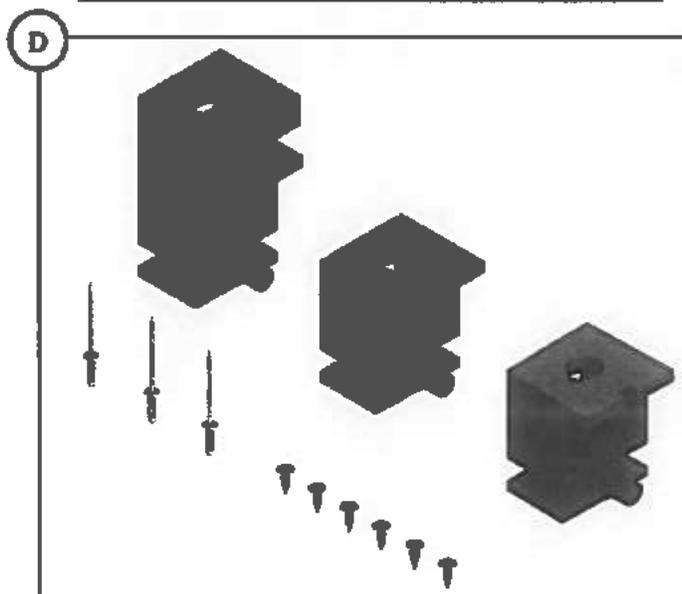
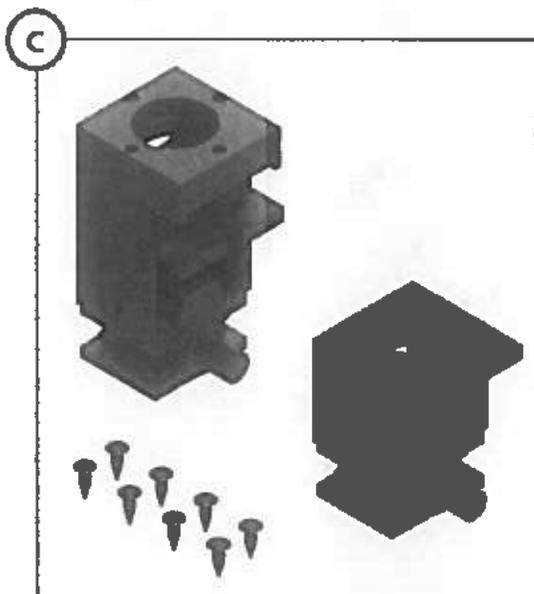
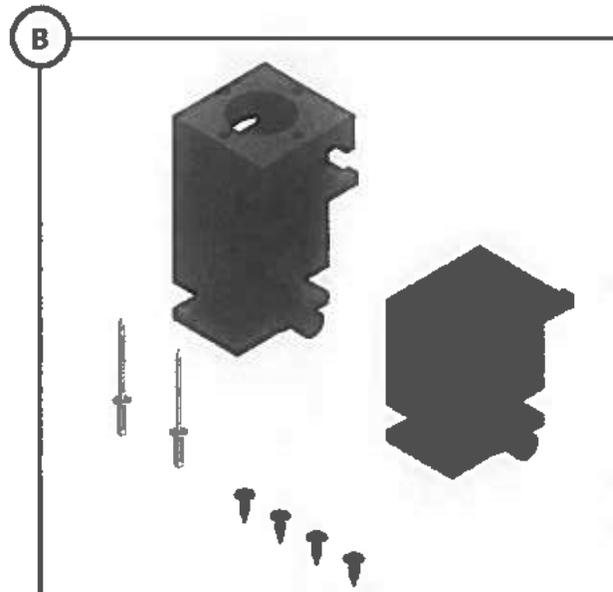
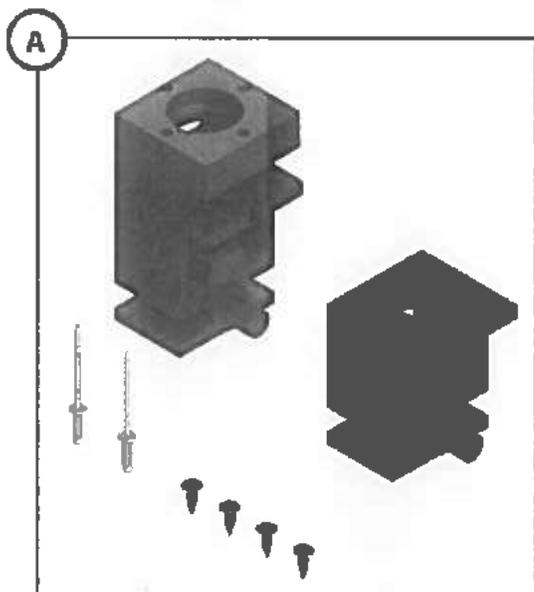
IN-WALL® SLIDE-OUT REPAIR KITS

SLIDE-OUTS

Bearing Block Repair Kit (With 1.56" Notch)

If the bearing blocks need to be replaced, a repair kit that includes one upper and one lower bearing block, four plastic rivets, and 2 aluminum rivets is available. Part numbers are on the table below.

NOTE: Triple Bearing Block kit will include one upper and two lower bearing blocks, 6 plastic rivets, and 3 aluminum rivets.



Callout	Kit #	Description
A	<u>379060</u>	Standard Bearing Block Repair Kit
B	<u>379076</u>	Inverted Bearing Block Repair Kit
C	<u>379077</u>	Narrow Bearing Block w/ Composite Gibs Repair Kit
D	<u>379720</u>	Triple Bearing Block Repair Kit



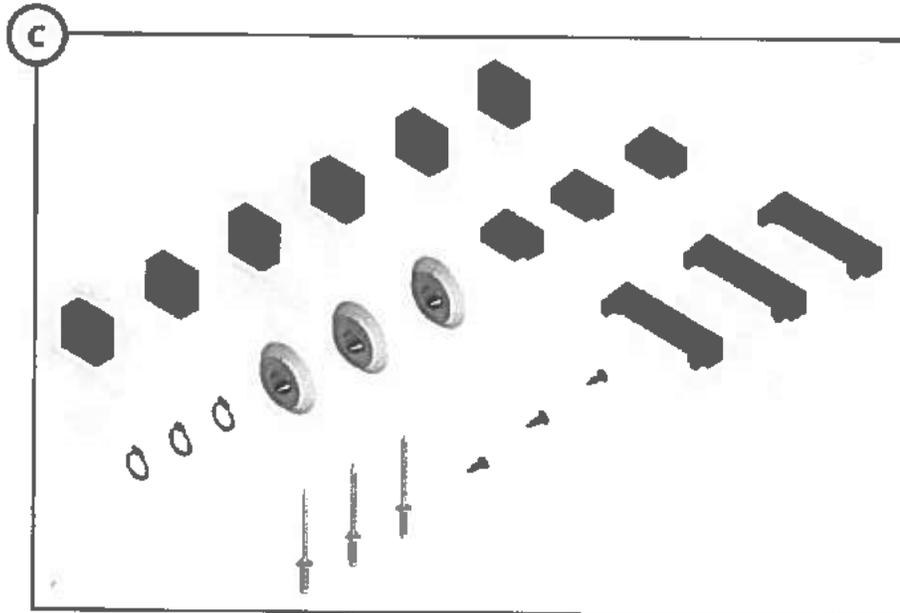
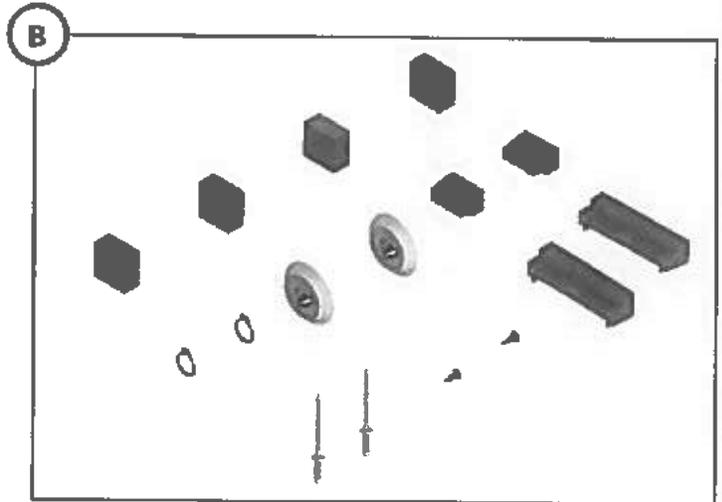
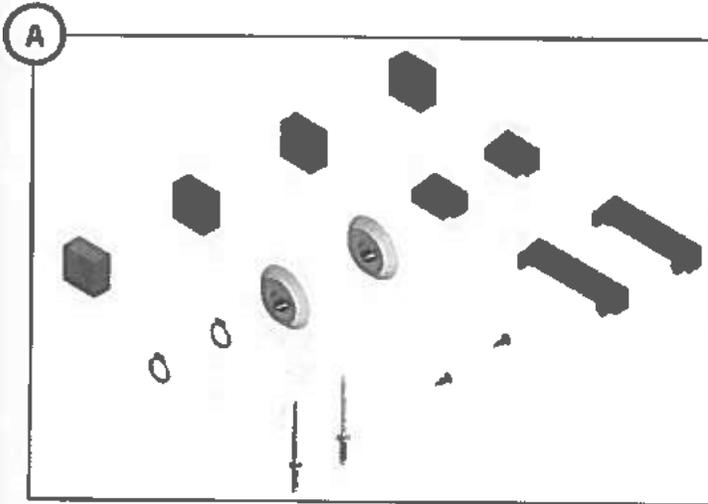
IN-WALL® SLIDE-OUT REPAIR KITS

SLIDE-OUTS

Custom

If the system being repaired has a different notch than the 1.56" described on the previous page, use the images below to identify the notch, then contact LCI Parts at (574) 537-8900 for ordering assistance.

NOTE: If the gear rack being replaced has notches on both ends, the rack will need to be custom ordered. Contact LCI Parts at (574) 537-8900 for ordering assistance.



Callout	Kit #	Description
A	366121	Standard (without gear racks)
B	366120	Inverted (without gear racks)
C	366106	Triple (without gear racks)



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