

# Quiet Power (QP-1800) DC to AC Power Inverter



## AC POWER FROM A HMMWV

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# TABLE OF CONTENTS

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PURPOSE	1	OFF VEHICLE GROUNDING REQUIREMENTS	16
DESCRIPTION	2	QP-1800 FRONT PANEL	17
COMPONENTS	3	QP-1800 REAR PANEL	18
COMPONENT NSN's AND MANUALS	4	QP-1800 CONTROL PANEL	19
IISR (AN/PRC-153) SUPPORT	5	BEFORE/DURING/AFTER OPERATION CHECKS	20
WATTAGE GUIDE	6	OPERATING INSTRUCTIONS	21
VEHICLE CONSIDERATIONS	7	TESTING THE QP-1800	22
MILITARY VEHICLE BATTERIES	8	POWERSAVE MODE	23
GENERAL SAFETY PRECAUTIONS	9	ENABLING POWERSAVE	24
SAFETY FEATURES	10	SYSTEM TRIP VOLTAGES	25
MOUNTING THE QP-1800	11	32V FAST-BLOW FUSE REPLACEMENT	26
MOUNTING (APPROVED ORIENTATIONS)	12	FAULT INDICATOR GUIDE	27
MI 11460-OR/1	13	FAULT INDICATOR GUIDE	28
SECURING ANCILLARY DEVICES	14	TROUBLE SHOOTING TIPS	29
DC CABLE INSTALLATION AND GROUNDING	15	TROUBLE SHOOTING TIPS	30

## PURPOSE

This job aid provides basic operating instructions for the Quiet Power (QP-1800) DC-to-AC Power Inverter. The QP-1800 is designed to connect to a military vehicles' 24 VDC power system and was fielded to Marine Corps units for installation on the following USMC HMMWV models.

- HMMWVA2 M1123 Troop/Cargo Variant
- Heavy HMMWV M1097A2
- HMMWV ECV M1152 Expanded Capability Vehicle
- HMMWV ECV M1165 Expanded Capability Vehicle



**NOTICE TO USER.** This publication does not replace TM 11460A-OR/1. Review safety CAUTION and WARNING statements and warranty information in TM 11460A-OR/1 before operating the QP-1800.

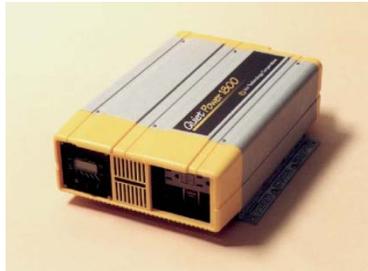
## DESCRIPTION

The QP-1800 Inverter is a semi-ruggedized 1800W DC-to-AC (true sine wave) inverter that draws power from the 24 VDC vehicle battery and delivers a true sine wave 115 VAC output. The QP-1800 will not operate from personal vehicles (12 VDC electrical systems).

The QP-1800 will continue to deliver power as long as the vehicle battery is within the required input voltage operating range. High and low battery shutdown will engage if DC voltage falls below 20 VDC or exceeds 32 VDC.

Continuous Power	1800W
Surge Power	2900W
Output Frequency	60Hz
Output Waveform	True Sine Wave
Input Voltage Range	20-32 Volts DC
Output Voltage	115 Volts AC
Weight (case only)	20 Lbs
Weight (inverter only)	16.5 Lbs
Weight (NATO cable)	18.0 Lbs
Total Weight	54.5 Lbs
Inverter LxWxH	15.4x11.0x4.5
Case LxWxH	22.1x17.9x10.4
NATO Cable Length	Approximately 12 Feet
Warranty Period	24 Months
Operating Temperature	+14°F to +140 °F
Storage Temperature	-22°F to +158 °F

# QP-1800 SYSTEM COMPONENTS



QP-1800 Inverter  
(1) per system



NATO Cable  
(1) per system



Case (1) per system



Mounting Bracket



Battery Terminal  
Covers (2) per system

32V Fast-Blow Fuse



MEG125 Replacement  
1 Spare per system



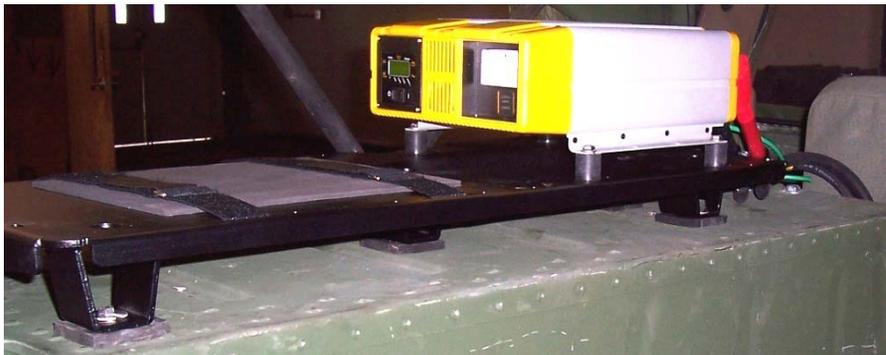
Operator's Manual  
(1) per system



Vibration Isolators  
(4) per system

# SL-3 COMPONENTS & MANUALS

NOMENCLATURE	NSN / PART NUMBER	SHORT TITLE	PCN NUMBER
Inverter	6130-01-496-6448	TM 11460A-OR/1	500 114600 00
NATO Cable	6150-01-497-2515	SL-3-11460A	123 114600 00
Transportation Case	7050-01-551-0600	MI 11460-OI/1	160 114600 00
Mounting Bracket	Part # 287A125 CAGE 78535	Job Aid	Over Packed with QP-1800
Battery Covers (Set)	Part # 2870140 CAGE 78535		
MEG125 Fuse	Part # 2870128 CAGE 78535		
Isolators (Set)	Part # 2870141 CAGE 78535		



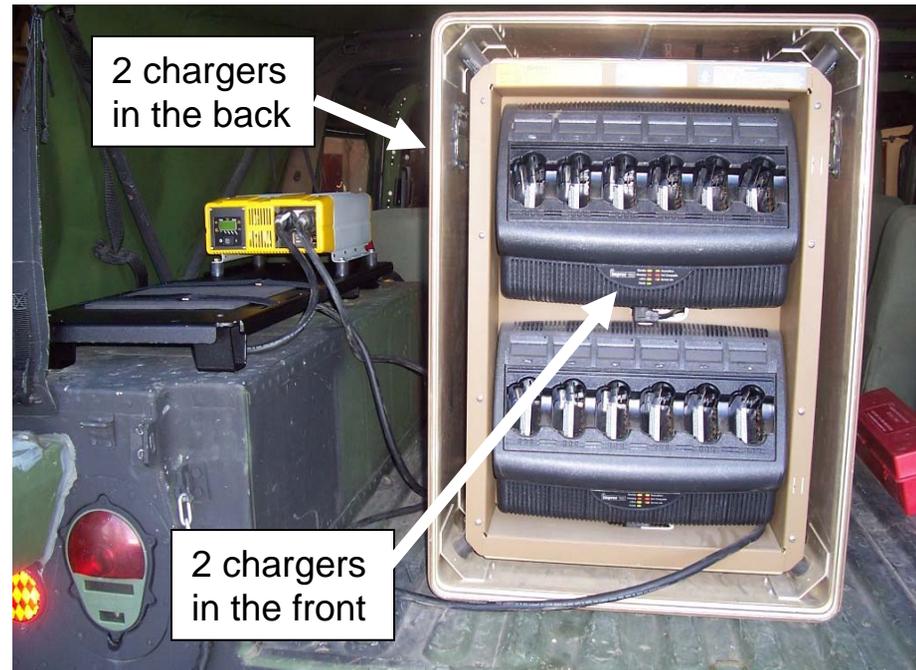
# RADIO SET AN/PRC-153 INTEGRATED INTRA SQUAD RADIO (IISR)

The 24 unit battery charger shown is a component of the AN/PRC-153 (IISR) radio set. This charger consists of four, six station charging assemblies. As pictured, the QP-1800 is capable of supporting all four charging assemblies.

*DO NOT ADD ANY  
ADDITIONAL LOADS  
WHEN OPERATING  
ALL FOUR CHARGING  
ASSEMBLIES.*



IISR



24 UNIT BATTERY CHARGER

# WATTAGE GUIDE

This table is a representation of approximate load values for various commercial appliances and military radio power adapters. These are meant for a general comparison. Wattages may vary according to manufacturer. For exact ratings refer to the appliance tag or Technical Manual.

<b>VOLTS X AMPS = WATTS</b>
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(\* ) The MSPA and MRPA each have six positions for radios. Power consumption is five watts per radio.

<b>COMMERCIAL</b>	<b>STARTING</b>	<b>RUNNING</b>
	<b>WATTS</b>	<b>WATTS</b>
Microwave Oven (625 Watts)	800	625
Commercial Radio	0	50 - 200
Hand Drill (1/4 inch)	500	350
Color Television	300	300
Laptop Computer	50 – 200	50 – 200
VCR	50	50
Printer	100	100
Coffee Maker	1750	1750
<b>MILITARY</b>	<b>STARTING</b>	<b>RUNNING</b>
	<b>WATTS</b>	<b>WATTS</b>
SSPA (PAC-216)	50	50
24V RPA (MRC-93)	170	170
Battery Charger (SPC)	375	375
PP-8333/U	575	575
MSPA (ASAPS Tower)	MAX 30*	MAX 30*
MRPA (ASAPS Suit Case)	MAX 30*	MAX 30*

## **VEHICLE CONSIDERATIONS**

When using the QP-1800 in vehicle installations, it is important to understand that the vehicle battery holds a limited amount of power from which the QP-1800 inverter draws to supply AC voltage.

When the vehicle is running, the battery is recharged and in most conditions the QP-1800 will supply power as long as there is fuel to run the vehicle.

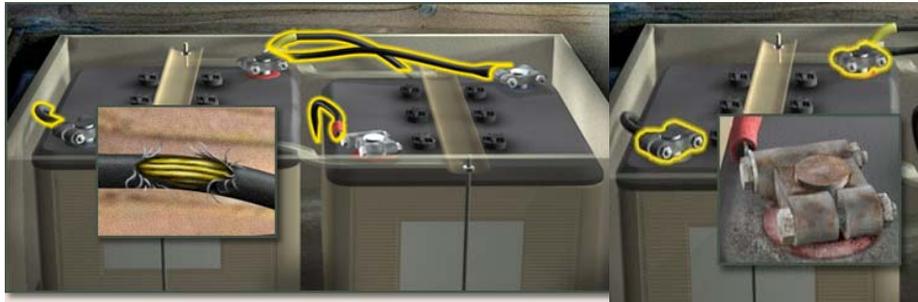
In vehicle engine-off situations, the QP-1800 draws power from the battery.

The vehicle battery can be discharged by inverter usage to a point below that required to start the vehicle.

**THE INVERTER SHOULD NOT BE USED FOR PERIODS EXCEEDING +45 MINUTES WITH THE VEHICLE ENGINE OFF.**

# MILITARY VEHICLE BATTERIES

Check the health of vehicle batteries and cables, they are an important part of this system. Check for good fluid levels (6T batteries), no corrosion, tight connections, and no frayed cables.



Loose connections or frayed cables may limit battery power supplied to the inverter and degrade inverter performance.



The OPTIMA battery is not authorized for installation in vehicles. The OPTIMA is authorized for generator use only.



The preferred battery is the HAWKER Armasafe Plus.

## **GENERAL SAFETY PRECAUTIONS**

Do not expose the inverter to rain or obstruct the ventilation openings.

Do not install the QP-1800 in a zero tolerance compartment. Overheating may result.

Make sure existing vehicle electrical wiring is in good condition.

Do not operate the QP-1800 if it has been damaged in anyway.

Disconnect DC power from the inverter before attempting any preventive or corrective maintenance.

This equipment contains components which can produce arcs or sparks. Do not install in compartments containing batteries or flammable materials.

## **SAFETY FEATURES, POWER STRIPS, & WATTAGE LIMITATIONS**

The QP-1800 is protected by an internal, 32V, fast-blow fuse.

The QP-1800 has a 15A resettable circuit breaker. It also has a Ground Fault Circuit Interrupter (GFCI) built into the duplex outlet.

The use of power strips IS NOT recommended. If required, closely monitor the power and battery voltage as the load increases.

The system has a thermostatically controlled fan and will shutdown the QP-1800 if it overheats.

If connected to vehicles with a 60A alternator, the QP-1800 is limited to 1,000 Watt output.

## MOUNTING THE QP-1800

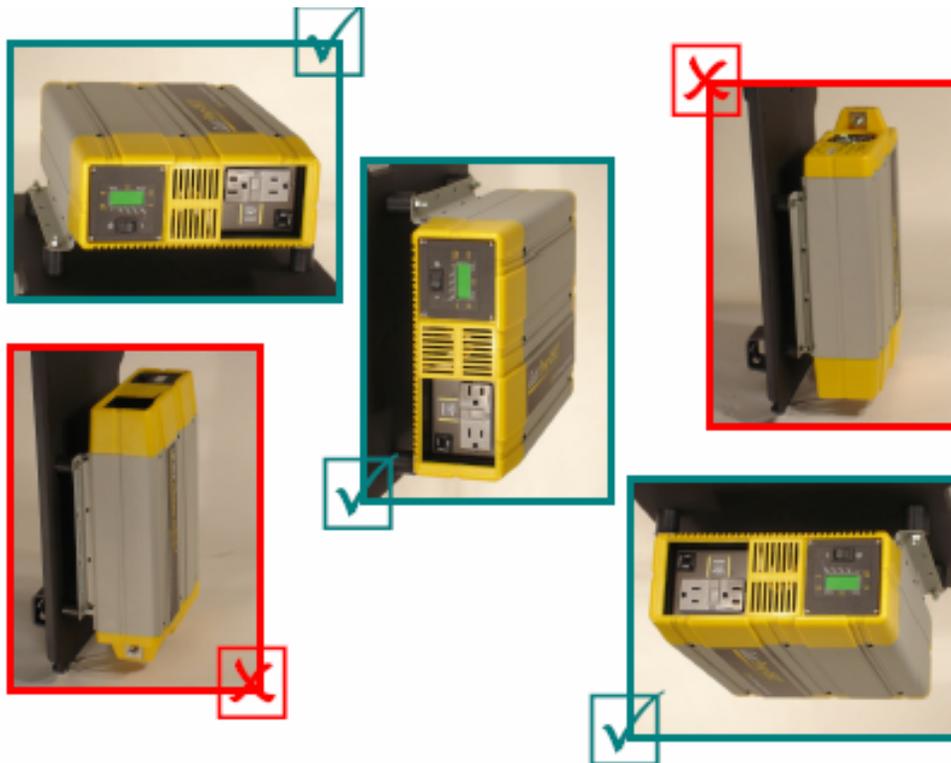
The primary method of mounting is using a mounting bracket as shown on page 13.

However, for unique mission requirements, the QP-1800 can be mounted on a horizontal or vertical surface (see page 12). The control panel can be removed and re-attached in different orientations to match the various mounting options. **Vibration Isolators must be installed to prevent damage to the inverter.**

The QP-1800 requires a minimum of 5 inches of free space on all sides, the more clearance the better the performance.

Do not install the QP-1800 in the same compartment as batteries. Do not mount in an area subject to splashing or dripping water.

# APPROVED MOUNTING ORIENTATION OF THE QP-1800



The QP-1800 must be mounted in one of the three approved orientations shown. Mounting in one of the two prohibited configurations could allow foreign objects to drop into the AC receptacle, controls, or cooling fan.

## MODIFICATION INSTRUCTIONS MI 11460-OI/1

MI 11460A-OI/1 provides instructions for installing the QP-1800 using the vehicle mounting bracket (top right) or directly to the top of the wheel well (bottom right).

When the wheel well contains air conditioning components, use of the vehicle mounting bracket is **MANDATORY**.

Vibration isolators are **MANDATORY** regardless of the method of installation used.



## SECURING ANCILLARY DEVICES



**Avoid the use of AC extension cord(s) wherever possible.** If extension cords must be used, they must be three (3) conductor cords (grounded) and must be suitable for the circuit current (15 amps).



The mounting bracket has an area for securing ancillary devices. Devices should be, whenever practical, secured with straps.

# DC CABLE INSTALLATION & GROUNDING

Ensure that the DC SLAVE Cable is disconnected from the vehicle and the QP-1800 is turned off. Connect cable ends to posts (+, red, left); (-, black, right). Install lock washers & nuts; tighten until snug).

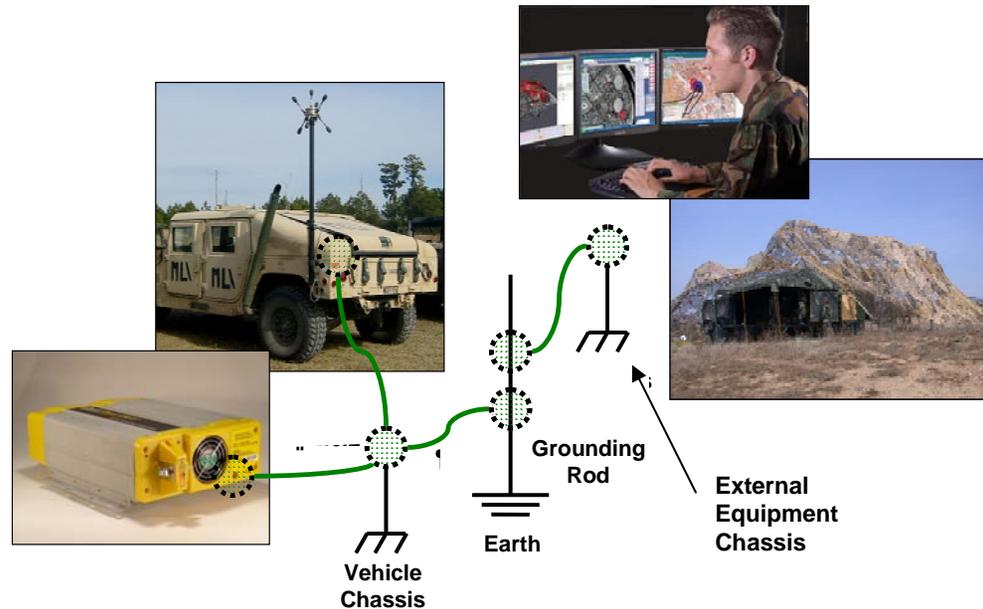
**Verify polarity** or the MEG 125 internal fuse will be blown (see page 26). Slide battery terminal covers over POS & NEG cables. Connect SLAVE Cable to vehicle. To disconnect, first unplug cable from vehicle.



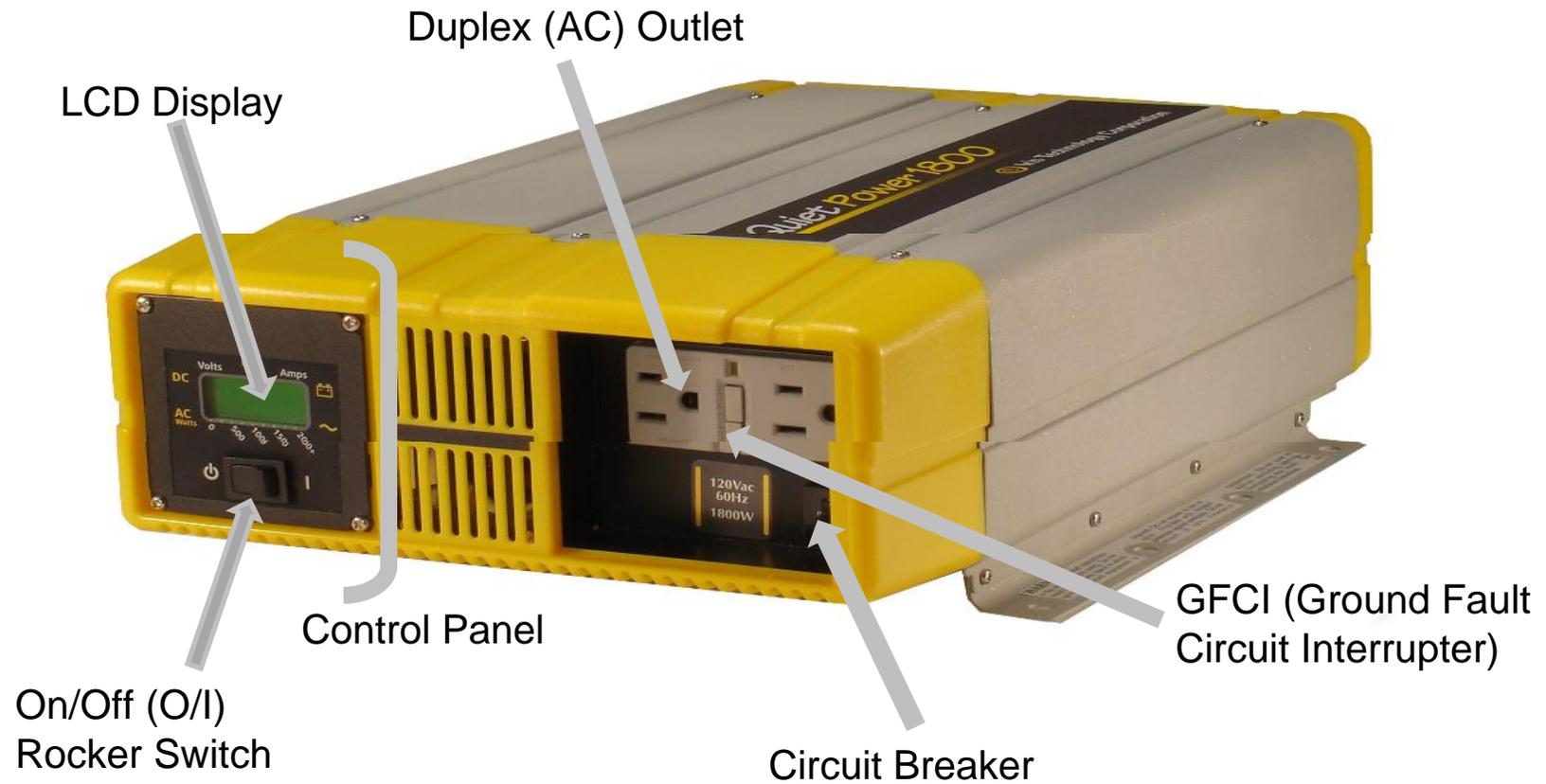
The QP-1800 has a Ground Lug on the rear chassis. This lug is used to connect the QP-1800 chassis to the grounding point on the vehicle. Use #6 AWG or larger (green if insulated).

# OFF VEHICLE GROUNDING REQUIREMENTS

When the vehicle comes to a stop, the inverter may be used to power off-vehicle accessories. When powering off-vehicle accessories, it is necessary to make an additional grounding connection between the grounding point on the vehicle and the grounding rod to make connection with the earth. The off-vehicle accessories must also be connected to the ground rod.



# QP-1800 FRONT PANEL



# QP-1800 REAR PANEL



## **QP-1800 CONTROL PANEL**

The QP-1800 control panel consists of the Off/On ('O/I') switch and Liquid Crystal Display (LCD) monitor screen.

INVERTER O/I. Turns the QP-1800 ON ('I'). Also used to enable or disable the POWERSAVE mode during the power-up sequence.

LIQUID CRYSTAL DISPLAY (LCD). Displays battery input current and voltage numerically. A multi-segment bar graph displays actual output power in watts when a load is operated. Initially it displays the model number, frequency configuration and Power Save mode.

FAULT CONDITION DISPLAY. Should a fault occur, the error will be immediately displayed on the LCD. An audible alarm sounds and the back-lighting of the display will flash. Refer to the fault indicator guide.

## **BEFORE AND DURING OPERATION CHECKS**

Check inverter casing, mounting, and control panel for obvious damage.

Check inverter ventilation openings for obstructions.

Check inverter for loose or missing mounting screws.

Check vibration isolators for obvious damage or excessive wear.

Check NATO cable for obvious damage.

Check NATO cable for tight connections to inverter and good connection to vehicle NATO receptacle.

Clean the outside of the case, control panel, mounts and NATO cable with a non-abrasive cloth dampened with soap and water (only).

# QP-1800 OPERATING INSTRUCTIONS

1. Move rocker switch to the 'I' position. The following will be displayed: model number (1800 watt), input voltage, output voltage, frequency configuration, and POWERSAVE mode OFF.
2. Following the initial display, the display panel defaults to the **standard display** information showing input voltage, input current and output power. When a load is connected, the output power (watts) is displayed in bar-graph form.
3. Once the **standard display** screen is shown, the QP-1800 is ready to deliver AC power to your equipment.
4. Monitor voltage regularly. With no load and engine at fast idle, the display should read 27.5 to 28.5 volts. When operating with the engine off, if voltage drops below 23 volts you may not have enough reserve energy to start the vehicle.

## **TESTING THE QP-1800**

STEP 1. Check wiring connections on the QP-1800 for correct polarity and secure connections.

STEP 2. Turn rocker switch to 'I' position. Observe the power-up sequence on the display. Input current and input voltage should be displayed.

STEP 3. Plug a test load into the QP-1800 outlet. The load should function and the output power bar graph should increase with load demand.

STEP 4. Repeat step 3 above with QP-1800 in the "Powersave" mode.

STEP 5. Remove test load. The QP-1800 is now ready for operation.

## **QP-1800 POWERSAVE MODE**

The QP-1800 has a function mode called POWERSAVE. When enabled by the operator, this sleep mode shuts off much of the control circuitry power reducing the standby current draw from your vehicle batteries (approximately 1.5 watts with no load).

In the POWERSAVE mode, the QP-1800 transmits a pulse every 2.5 seconds to detect if a load has been applied. Full output power is available with the detection of a load. The unit will remain in the POWERSAVE mode if the load it detects is less than 10W. This is a factory setting that cannot be changed.

Enable the POWERSAVE mode anytime the QP-1800 is only being used periodically. See the next page to ENABLE POWERSAVE.

## HOW TO ENABLE POWERSAVE

1. Turn the control panel switch to the 'O' position.
2. Switch the unit back to the 'I' position. You will see the initial power-up information being displayed (model/voltage/frequency).
3. When the control panel displays "POWERSAVE OFF" turn the switch back to the 'O' position, wait for approximately three seconds, and then turn the switch back to the 'I' position again. The initial power-up information will be displayed again except now the display will show "POWERSAVE ON". A small pointer will be visible indicating POWERSAVE as enabled. Follow the same procedures when disabling the POWERSAVE mode.

## SYSTEM TRIP VOLTAGES

The QP-1800 operates from an input voltage of 20 - 32 volts.

Peak performance occurs when DC voltage is in the range of 24 volts to 30 volts. The QP-1800 will indicate high and low voltage conditions as shown below.

<b>DC Input Over Voltage Alarm</b>	<b>DC Input Over Voltage Shut-down</b>	<b>DC Input Under Voltage Alarm</b>	<b>DC Input Under Voltage Shut-down</b>
31.6 VDC	32.0 VDC	21.0 VDC	20.0 VDC

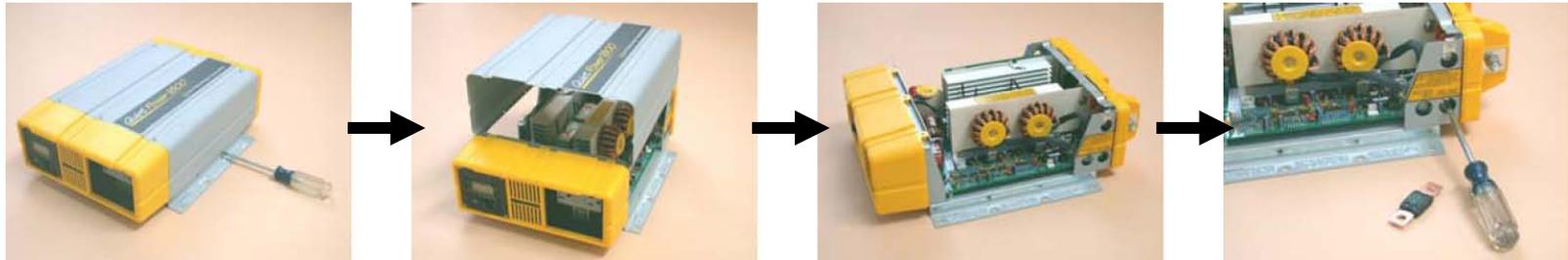
The QP-1800 requires a manual reset to re-start after shutdown from high or low input voltage. Turn the power switch to 'O' and then back to 'I' to re-start the unit.

## 32V FAST-BLOW FUSE REPLACEMENT

Verify that no AC voltage is present at the duplex outlet and that GFCI circuit breakers are properly reset.

Wait 15 minutes for capacitors to discharge. Remove screws from top cover (#2 Phillips) and lift off. Use 20 PSI compressed air to blow out dust.

Measure resistance of MEG125 fuse, verify a blown fuse, remove and replace with Iris PN 287.0128 "Fuse, Littlefuse Mega 125 (125 A)"



**Only qualified electronics maintenance technicians are authorized to perform this function.**

# FAULT INDICATOR GUIDE

Fault conditions are displayed on the control panel along with an alarm sound and blinking LCD back-light.

Control Panel Indication	Fault Condition	Solution
HIGH BATT SHUTDOWN	Battery voltage too high.	Check for fault with battery charging system. Manually reset inverter by turning switch to 'O' then to 'I' again.
LOW BATT SHUTDOWN	Battery voltage too low.	Charge battery. Manually reset inverter by turning switch to 'O' then to 'I' again.
OVERLOAD SHUTDOWN	Battery current too high, probable AC overload.	Reduce load on the inverter. Disconnect/unplug devices.
OVERTEMP SHUTDOWN	System over-temperature.	Improve ventilation and cooling and/or reduce Load on the inverter. Check fan.

# FAULT INDICATOR GUIDE

Control Panel Indication	Fault Condition	Solution
SYSTEM SHUTDOWN PS_FAULT SHUTDOWN DC-DC SHUTDOWN	Output overloaded or system hardware fault.	Ensure all loads are disconnected. Try to reset the unit by switching to 'O' and back to 'I'. If unit still does not operate, contact Iris Technology for service warranty replacement.
CIRCUIT BREAKER TRIP (MECHANICAL INDICATOR)	Circuit overload condition existed (in excess of 15A).	Turn system off, remove load, reset circuit breaker, and restart system. Then reapply load.
GFCI TRIP (MECHANICAL INDICATOR)	Ground fault condition occurred.	Turn system off, remove load, reset GFCI, and restart system. Inspect AC load wiring for any damage or moisture. Then reapply load.
BLANK CONTROL PANEL INDICATIONS, NO OUTPUT	Unit may have blown fuse due to 24VDC POS/NEG input cables reversal or significant circuit overload.	Have qualified electronics maintenance technician check the fuse (see page 26).

# TROUBLE SHOOTING TIPS

Problem or Symptom	Possible Cause	Solution
Inverter does not operate.	Dust or other foreign matter in unit or clogged ventilation openings.	Refer unit to qualified electronics technician for internal cleaning.
No output voltage and control panel reading 20.4 VDC or lower.	Low in-out voltage shutdown.	Recharge vehicle batteries, check connections and cable. Turn vehicle on to run alternator.
No output voltage, no voltage indication.	Inverter switched to 'O'. No battery power to inverter Reverse DC polarity connection - internal fuse open.	Turn inverter power switch to 'I' Check wiring to inverter.
No output voltage and control panel reading 32.0 VDC or higher.	High input voltage shutdown.	Make sure that the inverter is connected to correct battery voltage, check alternator voltage output.

# TROUBLE SHOOTING TIPS

Problem or Symptom	Possible Cause	Solution
Low battery warning on all the time, voltage indicator below 22.0 VDC.	Poor DC wiring, poor battery condition.	Use proper cable and make solid connections. Charge batteries or use new charged vehicle batteries.
Circuit breaker trip (Mechanical Indicator).	Circuit overload condition existed (in excess of 15 amps).	Turn system off, remove load, reset circuit breaker, and restart system. Reapply load.
GFCI trip (Mechanical Indicator).	Ground fault condition occurred.	Turn system off, remove load, reset GFCI, and restart system. Inspect AC load wiring for any damage or moisture. Then reapply load.
Blank control panel indications, no output.	Unit may have blown fuse due to cable reversal or significant overload.	Have qualified electronics maintenance technician check the fuse (see page 26).

