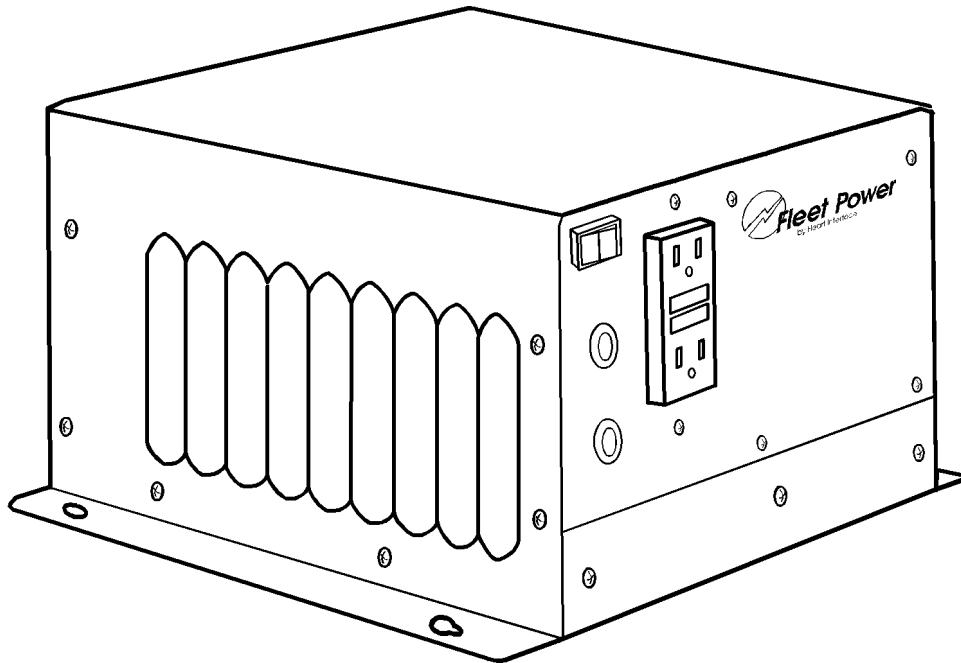


OWNER'S MANUAL

FLEET POWER INVERTER/BATTERY CHARGERS



FLEET POWER 1000
FLEET POWER 2000
FLEET POWER 2500



KKK

Fleet Power 1000 & 2000 models are certified by UL to comply with FED spec-KKK-A1822, SAE spec-SAE-JRR1, for emergency vehicle application. All models UL and C-UL Listed for Canadian use.



INTRODUCTION

General safety information for installation and operation is contained throughout this manual where it applies and are not included in this summary.

Warnings Warning statements identify conditions or practices which could result in personal injury, loss of life, damage to equipment or other property.

Fuse Replacement For continued protection against the possibility of fire, replace the fuse only with a fuse of the specified voltage, current and type rating.

Power Source To avoid damage, operate the equipment only within the specified AC (line) and DC (battery) voltages.

Servicing To reduce the risk of electric shock do not open this unit. There are no user serviceable parts inside. Refer all servicing to qualified personnel.

*The statements, specifications and instructions in this publication are believed to be correct. No warranty is made, expressed or implied by the seller or manufacturer with respect to any results or lack thereof from the use of information in this publication and no liability is assumed for any direct or consequential damages, personal loss or injury. All statements made herein are strictly to be used or relied on at the user's risk.
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INTRODUCTION

This owner's manual describes the Fleet Power Inverter/Chargers from Heart Interface. These units perform three distinct functions:

1. **DC to AC power inverting.**
2. **Automatic transfer switching between inverter power and incoming AC power.**
3. **Automatic 3-Stage Battery charging plus manual battery equalizing.**
4. **AC to DC power converter.**

- The inverters provide regulated 120 Volt AC power and crystal controlled frequency at 60Hz from a deep cycle battery bank in specified watts:

FP 1000-12.....	1000 watts
FP 2000-12.....	2000 watts
FP 2500-12.....	2500 watts

The output is a modified sinewave and is compatible with appliances, tools and other 120 VAC equipment. Momentary surge power of three times the inverter rating is available for starting electric motors. High efficiency insures the longest possible battery life between recharges.

- The transfer switch allows the Fleet Power Inverter/Chargers to be connected to an external AC source and transfer the source through to the loads. When disconnected, the transfer switch allows automatic switching back to the inverter.

Fleet Power Inverter/Chargers operate as self-contained backup power systems, just add batteries.

- Fleet Power battery chargers are electronically controlled and rated:

FP 1000-12.....	50 Amps DC
FP 2000-12.....	100 Amps DC
FP 2500-12.....	130 Amps DC

They are designed to rapidly and optimally recharge either wet* or gel* cell deep-cycle batteries. Battery charging is accomplished in 3 automatic stages: Bulk Charge, Acceptance Charge and Float Charge. In addition, using the remote control, a manually-engaged Equalizing Charge cycle is possible.

With an external AC source connected, the Fleet Power charger also serves the functions of a AC to DC converter to supply all of the DC loads which are connected to the battery.

Simple, automatic operation is made possible by the microprocessor in the Fleet Power Inverter/Chargers. In most cases, the unit is left on and no attention or maintenance is required.

*Adjustable with optional remote

THINGS YOU SHOULD KNOW

The optional Fleet Power Remote Control Panel provides a power switch, system status LEDs, DC Volts and DC Amps LED bargraphs. On the back of the remote is a set of dip switches which allow adjustment of the following:

- **Manual Initiation of Equalize Charging**
- **Ambient Battery Temperature**
- **Battery Type**
- **Charger Mode** (Auto or Controlled)
- **Power Sharing**

Circuit Breaker Protection

Fleet Power Inverter/Chargers are circuit breaker protected.

The Fleet Power 1000 has a 12 Amp INV/CHG circuit breaker on the front of the unit that protects against sustained inverter overloads over 1440 watts and the AC input to the battery charger. The 15 Amp INPUT circuit breaker on the unit protects the incoming AC circuit which is transferred through to the loads via the GFCI.

The Fleet Power 2000 has a 25 Amp INV/CHG circuit breaker that protects against sustained inverter overloads over 3000 watts and the AC input to the battery charger. .

The Fleet Power 2500 has a 30 Amp OUTPUT circuit breaker on the unit that protects against sustained inverter overloads over 3600 watts. The 30 Amp circuit breaker protects the incoming AC leg which feeds the battery charger.

The 30 Amp TRANSFER circuit breaker

on the units protect the incoming AC circuit which is transferred through to the loads connected by the hardwire output.

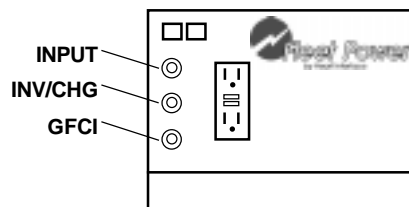
The 15 Amp circuit breaker protects the GFCI outlet on the Fleet Power 1000 and 2000 models. When a circuit breaker trips, the circuit breaker is reset by pushing the button back in.

Electronic Protection

Fast acting electronic circuits protect the inverter from extreme overloads and short circuits. Other protection includes a low and high battery cutoff and automatic shutdown if over temperature occurs. The fault condition must be eliminated before reset will occur. Example: remove overload, recharge batteries or allow to cool. Reset by cycling the power switch OFF/ON.

Power Sharing

When connected to shorepower or using a generator, the battery charger and transfer functions are engaged. A unique power sharing feature automatically reduces the AC consumption of the battery charger allowing necessary AC power to the load. This prevents the circuit breaker from tripping. This feature can be adjusted using the remote control panel. This feature is set at the transfer rating of each unit by default.



Fleet Power 2000 shown.

OPERATION

Power Switch

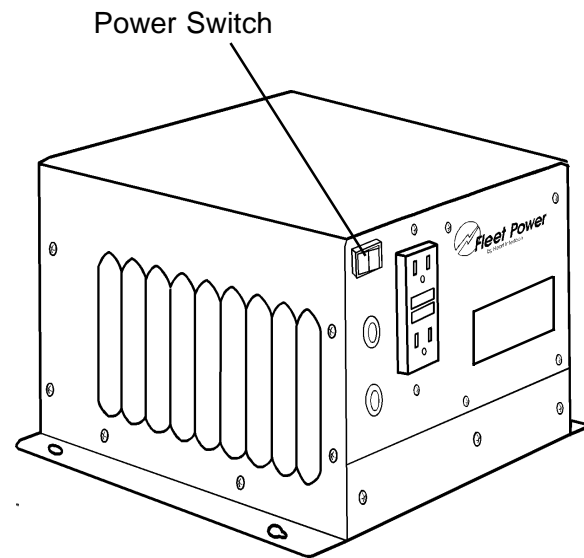
The Power Switch is located on the front panel. This switch controls ON/OFF and RESET for the inverter. Expect a 3 second delay when the power switch is turned ON before the unit is activated.

If the unit is connected to external AC power, the battery charger and transfer switch will continue to function, regardless of the position of the switch.

When external AC power is removed and the power switch is in the ON position, the inverter will automatically be ON. If the switch is in the OFF position and external AC power is removed, the inverter will be OFF.

Inverter overload protection, transfer switching, power sharing and battery charger regulation will all function automatically.

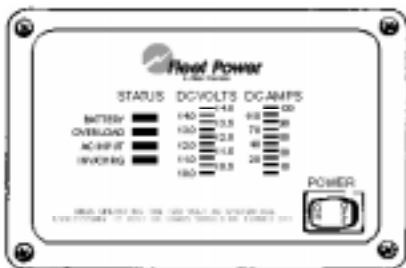
If installed with the remote control panel, the power switch on the unit should be left in the OFF position. Refer to Remote Control Panel, page 7.



Fleet Power 1000 shown.

REMOTE CONTROL PANEL

An optional remote control panel is available which offers several features not found on the unit. The remote control panel provides LED bargraphs which show system status, battery voltage, and DC Amps in both inverter and charge modes. These bargraphs can also display dip switch positions and shut down conditions.



Remote Power Switch

The switch on the remote is used to control the inverter and can also be used to control the battery charger function. When a remote control is used, the power switch on the inverter should be left in the OFF position.

System Status LEDs

These 4 LEDs monitor the system as described in the table on page 10.

DC Volts Bargraph

These LEDs indicate battery voltage as measured inside the unit. Each LED segment indicates .5 Volts. If an overload occurs and the unit shuts down, the DC

Volts bargraph will stop indicating battery voltage and display the dip switch settings. It will return to indicating battery voltage only after the unit has been reset.

DC Amps Bargraph

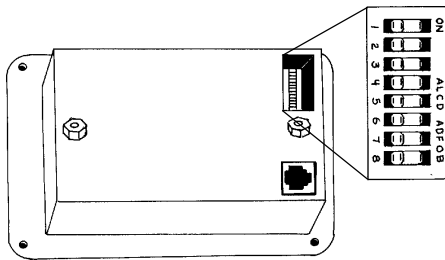
These LEDs approximate DC input current in inverter mode and DC output current in battery charger mode. Two ranges are used -- below 50 Amps each segment represents a 10 Amp increment, above 50 Amps each segment represents a 20 Amp increment. Above 130 Amps, a flashing LED segment indicates the value displayed plus 100 Amps (flashing 50 LED is equal to 50 + 100 or 150 Amps DC).

If a shutdown occurs, the DC Amps bargraph will stop indicating DC Amps and will indicate the type of problem. Each LED segment indicates a different problem as described in the troubleshooting section on page 34.

REMOTE CONTROL PANEL

Dip Switches

On the back of the Fleet Power remote control panel is a set of 8 dip switches which are used to make several adjustments. On the switch block, each switch is numbered . . .1 through 8 and the ON position is indicated. The switch settings can be changed at any time, even while the unit is operating. Following is a discussion of each adjustment. Refer to the table on page 11 for dip switch programming.



BACK VIEW
Fleet Power Remote Control Panel

SWITCH 1 - Manual Equalizing Cycling this switch ON for 1 second, then OFF, will initiate an equalizing charge cycle. The battery charger must be engaged before cycling the switch. **The dip switch must always be returned to the OFF position. If it is left ON, an equalizing charge cycle will initiate every time the charger is engaged - this could cause battery damage.**

The equalizing cycle is timed to last 8 hours from the time the switch is cycled, at which point the charger resumes normal charging in the float stage.

The battery LED blinks when equalizing. See page 18 for a discussion of the theory and procedure for battery equalizing.

SWITCH #2 & #3 - Battery Type Gel cell and wet cell batteries have slightly different charge voltage requirements. Optimum battery charging is temperature dependent. For these reasons, the dip switches allow four different battery charger voltage set points, depending on battery type and ambient temperature:

Cool Wet Cell	< 80 degrees F.
Warm Wet Cell	> 80 degrees F.
Cool Gel Cell	< 80 degrees F.
Warm Gel Cell	> 80 degrees F.

Refer to the table on page 21 for the specific voltages for each setting.

SWITCH #4 - Auto Charge With the switch in the OFF position, the remote panel ON/OFF switch only controls the inverter operation. With the switch turned ON, it allows the power ON/OFF switch on the front of the remote to control the battery charger as well as the inverter.

SWITCH #5 & #6 - Not used for adjustments.

SWITCH #7 & #8 - Power Sharing These switches should be set to match the value of the circuit breaker which protects the incoming AC power. They may also limit the output current from the battery charger.

REMOTE CONTROL PANEL

Use the 5 Amp setting for small generators, or for charging deeply discharged batteries.

Dip Switch Status

You can check the position of the dip switches by quickly cycling the power switch OFF/ON twice. The DC Volts bargraph will cease to display battery voltage and will indicate the settings of each dip switch. In this mode the bottom LED will illuminate if switch 1 is on; the second LED will illuminate if switch 2 is on, etc. Dip switch settings are indicated for 10 seconds after which time the display returns to indicating battery voltage.

Factory default settings for all dip switches are in the Off position.

Remote Control Wiring

The remote control panel is supplied with 25 or 50 ft. of telephone cable. The cable supplied may be 6 conductor, however, only 4 conductor is required. You may buy standard 4 conductor telephone cable and run up to 50 ft., if desired. Use only a single length of telephone wire, do not splice.

Refer to page 11 for the Dip Switch Programming chart.

STATUS LEDs

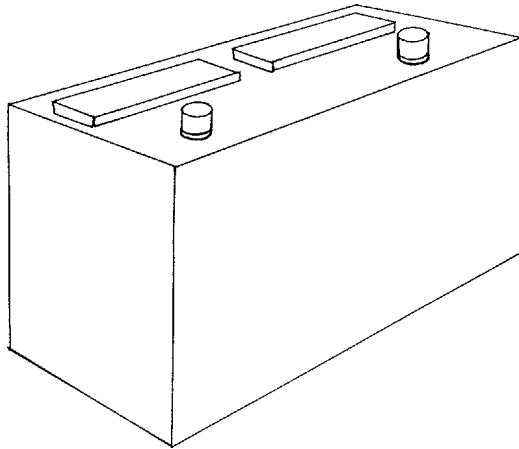
Status LED	Purpose
INV/CHRG (Inverter/Charg)	Power on light. It will be illuminated whenever the power switch is on (inverter on) or when there is incoming AC power and the charger comes on.
AC Input	Illuminates when incoming AC power has been applied and the transfer relays have engaged. There is a 7-12 second delay from the time the AC is applied and this LED illuminates.
Steady Overload	Indicates an over-temperature condition, the unit is shut down. It will reset automatically after cooling.
Blinking Overload	Inverter mode- Shutdown, diagnose problem using DC Amps bar graph. Charger mode- Thermal shutdown, after cooling reset by cycling power switch.
Steady Battery	This is a High/Low Battery warning condition. Inverter mode: Battery > 15.25 or < 10.50 volts Charger mode: Battery > 15.25 or < 10.00 volts
Blinking Battery	Indicates either a shutdown or equalizing. Battery > 15.50 volts, will auto-reset at 15.25. Inverter mode: Battery < 10.00 volts, will auto reset at charger float voltage or upon AC input. Charger mode: Battery < 8.00 volts for 1 minute, remove all DC loads and manually reset by disconnecting and reapplying shorepower.

DIP SWITCH PROGRAMMING

Feature	Switch Number		Set Point		
	Equalize or 3 Stage Charging	1			
Toggle On/Off			Equalize (Do not leave on.)		
Off			3 Stage Charging*		
Battery Type	2	3			
	On	On	Warm Gel Cell (>80 deg. F.)		
	Off	On	Cool Gel Cell (<80 deg. F.)		
	On	Off	Warm Wet Cell (>80 deg. F.)		
Auto Charge	4				
	On		Disable: Charger responds to On/Off switch.		
	Off		Enable: Charger on when AC connected.*		
	5	6	Not used.		
Power Sharing	7	8	1000	2000	2500
	On	On	2.5 Amps	5 Amps	5 Amps
	Off	On	5 Amps	15 Amps	20 Amps
	On	Off	10 Amps	20 Amps	30 Amps
	Off	Off	15 Amps*	30 Amps*	Disabled*

*indicates factory default setting.

BATTERIES



BATTERY TYPES

Use only deep-cycle batteries with your Fleet Power Inverter/Charger. These fall into two broad categories, wet cell and gel cell.

Wet Cell Batteries

True deep-cycle wet cell batteries are characterized by relatively thick plates that are alloyed with antimony.

Common marine/RV deep-cycle batteries are acceptable. However, golf cart batteries have better performance and life. They are 6 Volt batteries that must be used in series pairs. **High quality marine deep-cycle batteries offer good performance** and are available in a wide variety of sizes. Floor sweeper, fork lift or large 2 Volt cells can also offer excellent performance, if their large size can be accommodated.

It should be noted that high antimony deep-cycle batteries will give off gas as a natural result of charging and will experience some water loss. **It is very important that the electrolyte level be checked frequently** and topped off with distilled water when necessary. Never allow the tops of the plates to be exposed to air, as contamination of the cell will result. Keeping the tops of batteries clean will reduce self-discharging. Always provide ventilation for the battery storage compartment.

Do not use car batteries or engine starting batteries of any kind with your inverter/charger. Beware of any battery that is rated in Cold Cranking Amps (CCA). This is a rating which applies only to engine starting batteries. In general, most wet cell batteries that are described as hybrid batteries, suitable for either engine starting or deep-cycle applications, are a compromise and will give limited life if deeply discharged.

Beware of 8-D starting batteries that are commonly used for starting diesel engines. These batteries are not deep-cycle.

BATTERIES

Beware of so-called maintenance-free batteries. These batteries have calcium alloyed with the lead and hold the liquid electrolyte in a sponge-like material. They are sealed and water cannot be added. Do not confuse them with true gel cell batteries, they will not hold up to deep discharging.

Gel Cell Batteries

Gel cell batteries are lead-acid batteries similar in many ways to the common wet cell battery, but differences in the chemistry and construction provide some unique features.

No Maintenance - There is no need to add water and the tops of the batteries stay clean. Also, the batteries can be used in any position and may be used without a battery box.

Low Self-Discharging - Unlike wet cell batteries, the gel cell will hold its charge for months if left sitting with no load and no float charge. They can be stored without a constant float charge and without fear of freezing.

Low Internal Resistance - The result of low internal resistance is a higher battery voltage under load, which will result in better inverter performance on demanding high power loads. In addition, this allows the gel cell to accept a high rate of charge, a plus for rapid recharging.

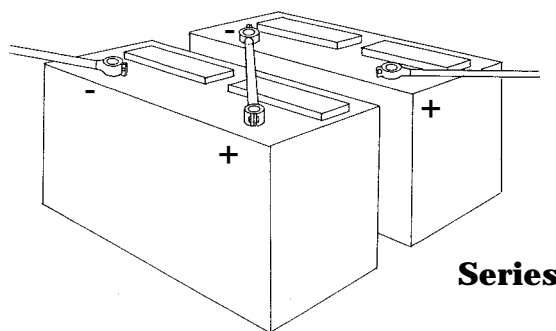
The features of the gel cell batteries solve many common problems. Cycle life is high, even under constant deep discharging.

BATTERY INTERCONNECTION

In most cases you will be using a bank of two or more batteries with your inverter/charger. You may connect batteries together in two configurations, series and parallel.

Series

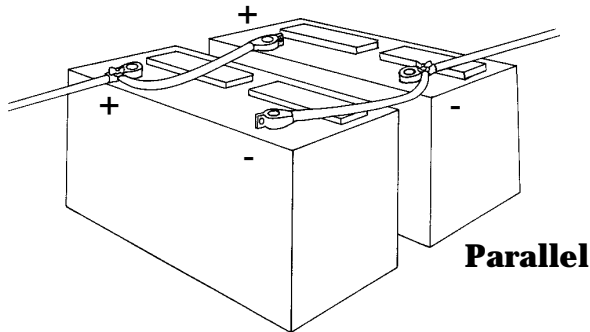
Connecting 2 batteries in series will double the voltage of the battery bank. For instance, two 6 Volt batteries connected in series will produce 12 Volts. The Amp-hour capacity of the battery bank will be the same as each individual battery. Example, two 6 Volt 220 Amp-hour batteries in series will produce on 12 Volt 220 Amp-hour battery bank.



BATTERIES

Parallel

Connecting 2 batteries in parallel will double the Amp-hour rating of the battery bank, while the voltage will be the same as each individual battery. Example, two 12 Volt 105 Amp-hour batteries in parallel will produce one 12 Volt 210 Amp-hour battery bank.



Only similar batteries should be connected together in one bank. Do not connect old and new batteries together or wet and gel cell batteries together. In the above drawing, the load is connected to the positive terminal of the first battery and the negative terminal of the last battery. This practice helps to balance the battery bank and is called cross connecting the battery bank.

Always use proper terminals for your interconnecting battery cables which are appropriate to handle the current.

Battery Bank Ratings and Sizing

Deep-cycle batteries are usually rated in **Amp-hours**. The Amp-hour rating is based on a 20 hour discharge cycle, therefore, a 100 Amp-hour battery can deliver 5 Amps for 20 hours. If the discharge rate is greater than 5 Amps, the available Amp-hours are decreased. If the load is increased to 100 Amps, only about 45 Amp-hours will be available at this rate of discharge.

Another common rating is **reserve capacity** expressed in minutes. This is derived by placing a 25 Amp load on the battery and measuring the time until the battery voltage reaches 10.5 Volts.

Deep-cycle batteries can be discharged about 80% before permanent damage occurs, though shallower cycling will result in much longer battery life. 50% cycling is generally considered to be a good compromise between long battery life and a reasonably sized battery bank.

BATTERIES

To achieve 50% cycling you should calculate your Amp-hour consumption between charging cycles and use a battery bank with twice that capacity.

To calculate Amp-hour consumption first look at the rating plate on your AC appliance or tools. Each appliance or tool will be rated in either AC Amps or AC watts or AC VA (Volts-Amps) apparent power. Use one of the following formulas to calculate the DC Amp-hour draw for a 12 Volt system:

(AC Amps x 10) x 1.1 x hours of operation = DC Amp-hours

(AC watts/12) x 1.1 x hours of operation = DC Amp-hours

(AC VA/12) x 1.1 x hours of operation = DC Amp-hours

In all formulas, 1.1 is the factor for inverter efficiency.

Calculate the above for every AC appliance or tool you intend to use on your inverter. This will give you the total number of Amp-hours used between recharges. Size your battery bank using this number as a guideline. A good rule to follow is to size the battery bank about 2 times larger than your total Amp-hour load requirement. Plan on recharging when 50% discharged.

Typical PowerConsumption

Loads	Watts
On-Board Computers	200
Quartz Halogen Flood	300
0.2 HP Bench Grinder	300
Hammer Drill	500
3/8" Electric Drill Motor	500
Sawzall	500
0.5 HP Bench Grinder	750
1.0 HP Tile Saw	800
0.5 HP Skil® Saw	1200
2.0 HP Radial Arm Saw	1200
2.5 HP Chain Saw	1200
Hand Blower/Vacuum	1450
Quartz Halogen Flood	1500
11 gal. Air Compressor	1600
Chain Saw	1700
20 gal. Air Compressor	1800
10" Table Saw	1800
10" Miter Saw	1800
Planer	1800
Coring System	2000

Many electric motors have momentary starting requirements well above their operational rating. Start up watts are listed where appropriate. Individual styles and brands of appliances may vary.

BATTERY CHARGING

Battery Charging

Completely recharging wet cell deep-cycle batteries requires the battery voltage to be raised beyond what is known as the gassing point. This is the voltage at which the battery begins to bubble and gas is given off. If charging stops short of this point, sulfate is left on the plates and deterioration of the battery begins. The gassing point will vary with battery temperature.

Gel cell batteries must not be charged to their gassing point. In fact, high voltage charging which gasses these batteries is harmful to them. They typically require a lower bulk charge voltage and a higher float voltage. Consult the battery manufacturer for specifications.

Conventional Battery Chargers

Most conventional battery chargers are single-stage constant voltage chargers. They must stop short of the gassing point or they will overcharge the battery bank. Therefore, most 12 volt battery chargers bring the battery voltage up to about 13.8 Volts.

This presents two problems. First, since the battery voltage does not reach the gassing point, sulfate is left on the plates. Second, 13.8 volts is close enough to the gassing point that some gas will escape, and the wet cell battery will need to be frequently topped off with distilled water.

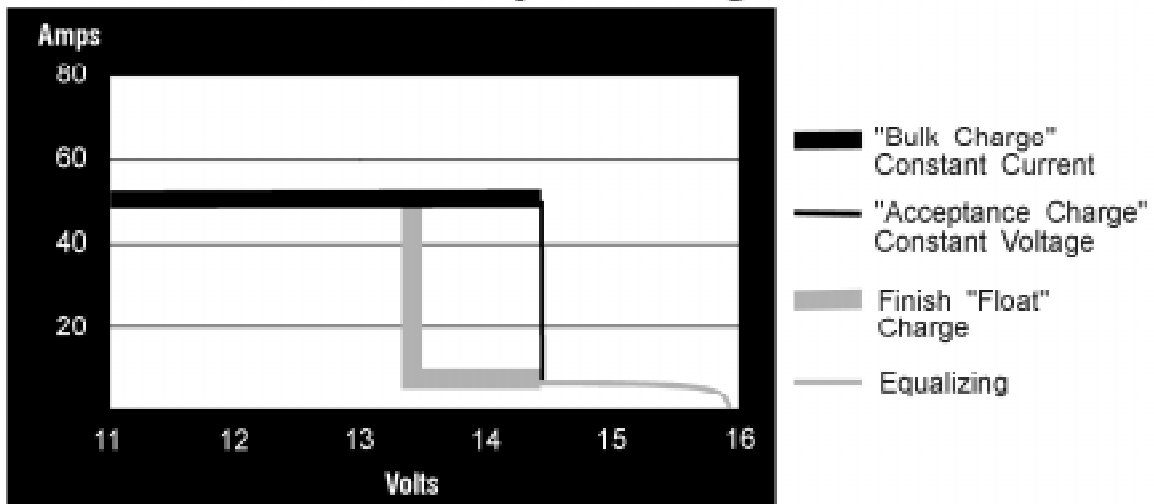
Conventional battery chargers also suffer from another inherent characteristic of design, which is a tapering output. While they will deliver their rated current into a deeply discharged battery, as the battery becomes charged and the voltage rises, the output current of the charger tapers down. This taper continues as the battery is charged, taking a very long time to reach an acceptable recharge.

Fleet Power Battery Chargers

Fleet Power battery chargers are designed to overcome the limitations of conventional chargers by utilizing 3 distinct stages, each designed for optimal recharging of both wet cell and gel cell deep-cycle batteries.

BATTERY CHARGING

Benefits of the Fleet Power 1000 Charger vs. the traditional taper charger



Quicker more complete recharging, safe long term charging and battery rejuvenation through an equalizing charge.

NOTE: Fleet Power battery chargers are on whenever there is AC power connected to the charger input, regardless of the condition of the On/Off switch. This feature can be disabled by setting the dip switch #4 (back of the remote) to "On" so that the charger will also be controlled by the On/Off switch.

Each time the battery charger is engaged, the 3 stages proceed automatically, resulting in an efficient, complete recharge and safe battery maintenance. Use of the remote control provides the ability to periodically apply an 8-hour timed equalizing charge.

The battery charger stages are:

Stage 1 - Bulk Charge During the bulk charge stage most of the charge current is delivered to the battery bank. This phase is engaged as soon as the battery charger is activated. Full rated charger current is delivered to the battery bank until the bulk charge voltage limit is reached. This results in a relatively rapid recharge.

Generally, a wet cell battery bank should not be charged up to the gassing point at a rate which exceeds 25% of its capacity. In other words, a 12 volt battery bank of 520 Amp-hours should not be charged at over 130 Amps.

BATTERY CHARGING

Gel cell batteries can accept a higher rate of charge. Consult the manufacturer for specifications.

Stage 2 - Acceptance Charge The acceptance stage immediately follows the bulk charge stage. During this stage the battery voltage is held constant at the bulk charge voltage limit and the current gradually ramps down. During this stage the battery is accepting its final amount of charge current and the last of the sulfate on the plates is removed.

The acceptance stage lasts until the charge current reaches about 6-7 Amps. A timer will terminate the acceptance stage if this current level is not reached. This timer is set automatically when the dip switches for battery type are set. Maximum acceptance time is 1 hour for wet cells and 3 hours for gel cells. Gel cell acceptance time can be increased because the battery is not gassing. Expect wet cell batteries to gas somewhat during acceptance, this is a necessary part of the charging process.

Stage 3 - Float Charge When the acceptance stage is terminated, either because the charge current ramped down to 6-7 Amps or the timer engaged, battery charger current will shut off. The unit monitors the battery voltage while it drifts down from the bulk charge voltage limit. When it reaches the float voltage set point, the float charge stage is engaged.

The float charge stage holds the battery voltage at a lower level, where it is safe for long term battery maintenance. During the float charge stage, the full output current of the battery charger is available to operate any DC appliances that may be on the system, while constantly maintaining the float charge voltage.

The battery charger remains in the float charge stage indefinitely until the charger is disconnected from incoming AC power.

Stage 4 - Equalizing Charge This is the only battery charger stage which is not engaged automatically. It must be manually initiated each time it is necessary to equalize using a dip switch on the back of the remote control. Applying an equalizing charge is not possible without the use of a remote.

Periodic equalizing is recommended by most wet cell deep-cycle battery manufacturers. There are no firm rules for how often an equalizing charge should be applied, but once a month is a good rule of thumb for batteries which are regularly cycled, less often for systems in only occasional use.

The equalizing charge is a timed, 8-hour cycle. If desired, it can be ended by interrupting the AC power to the charger at any time during the cycle. Equalizing should be engaged after the batteries have been fully charged by a normal battery

BATTERY CHARGING

charging cycle. The battery voltage will increase to 16.3 using the cool temperature wet cell setting. This will cause the battery bank to gas profusely and will accomplish the following:

1. Removal of residual sulfate. Each time a battery is cycled (discharged and recharged), a small amount of sulfate is left on the plates. Over time, this gradual build-up of sulfate will compromise the performance of the battery. By applying an equalizing charge, the sulfate is returned back to the electrolyte, raising the specific gravity and fully exposing the active material of the plates.

2. Bring all cells to the same potential. All lead-acid batteries are made up of individual 2 Volt cells. As the battery bank is cycled, slight differences in the cells result in different cell voltages, affecting the overall charge effectiveness. Equalizing brings all cells up to the same voltage and the electrolyte in each cell to the same specific gravity.

3. Mixing up of the electrolyte. Electrolyte in battery cells tend to separate into layers of acid and water. The vigorous boiling action of the battery during equalizing serves to physically mix the electrolyte.

Equalizing is not required on gel cell batteries. You will note that if the dip switches are set in one of the two gel cell positions, the equalizing charge voltage is the same as the bulk charge voltage, therefore, equalizing is equivalent to an 8-hour acceptance stage and is not harmful.

To limit the DC current during equalizing to less than 15 Amps, turn on dip switches 7 and 8 before starting the equalize charge. Do not operate AC loads that are on the output of the inverter/charger when equalizing.

Charging Over-Discharged Batteries

Charging into a battery bank with a terminal voltage of less than 8 Volts presents a special problem for the unit. If this situation arises, the unit will attempt to charge for 1 minute. If the inverter senses excessive ripple voltage, it will shut down to protect itself.

To successfully charge an over-discharged battery, you must remove as much DC load as possible. Set dip switches 7 and 8 to the ON position to limit the amount of charge current and the resulting ripple voltage. After the battery voltage has reached 10 Volts, these switches can be set to their previous positions.

BATTERY CHARGING

WARNINGS

- 1. Do not equalize gel cell batteries with the remote programmed for wet cells.**
- 2. Always monitor the equalize charge.** Provide proper ventilation for battery fumes. Do not allow any sparks during equalizing. If one or more cells begin to overflow, terminate the equalize charge.
- 3. Check and top off the battery electrolyte both before and after the equalizing charge.** Do not expose the battery plates to air. Leave the battery caps on while equalizing.
- 4. Remove all loads from the DC system before equalizing.** Some DC loads may not tolerate the high charge voltage.
- 5. Do not leave the equalize dip switch in the ON position.** It must be cycled OFF and left in the OFF position. If left ON, the unit will engage the equalizing cycle every time the battery charger is engaged.

Note: If a continuous DC load in excess of the charge rate is placed on the battery bank, eventually the battery voltage will drop below 8 Volts and the battery charger will shut off. This load must be significantly reduced and the power to the charger cycled to resume charging.

Blinking of the battery LED on the remote control while charging is a warning that an over-discharge is imminent and that the DC load should be reduced.

NOTE: Equalize only after a regular charge cycle.

BATTERY CHARGER VOLTAGE SETTINGS

Battery Type and Temperature	Bulk Voltage/ Max Time	Float Voltage	Equalize Voltage
12 Volt Wet Cell Warm Temperature	14.0 / 1 hr	13.1	15.8
12 Volt Wet Cell Cool Temperature	14.4 / 1 hr	13.5	16.3
12 Volt Gel Cell Warm Temperature	13.8 / 3 hr	13.3	13.8
12 Volt Gel Cell Cool Temperature	14.1 / 3 hr	13.6	14.1

INSTALLATION PRECAUTIONS

CAUTION This equipment is **not ignition protected** and employs components that tend to produce arcs or sparks. To reduce the risk of fire or explosions, **do not install in compartments containing batteries or flammable materials** or areas in which ignition-protected equipment is required.

WARNING

For continued protection against risk of electric shock, use only the ground-fault circuit interrupter (GFCI) type receptacles detailed in this owner's manual. Other types may fail to operate properly when connected to this inverter, resulting in a potential shock hazard.

CAUTION To reduce the risk of electric shock and prevent premature failure due to corrosion, **do not mount where exposed to rain or spray.**

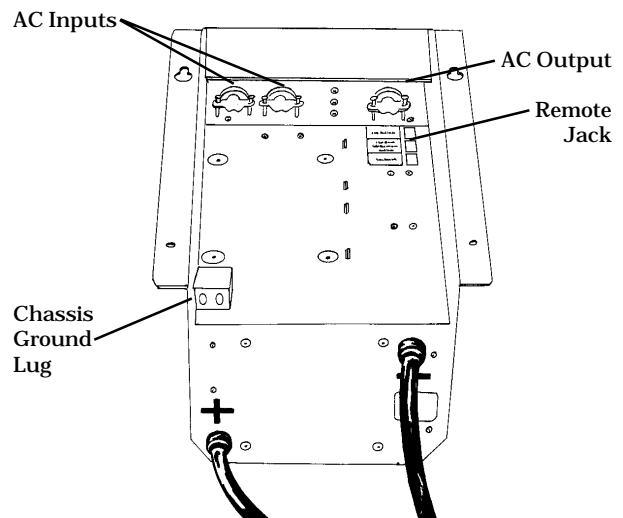
CAUTION To prevent fire, do not obstruct ventilation openings. Do not mount in a zero clearance compartment, overheating may result.

NOTICE The **output of this device is not sinusoidal.** It has a maximum total harmonic distortion of 47% and a maximum single harmonic of 34%.

CAUTION *Risk of electrical shock. Both AC & DC voltage sources are terminated inside this equipment.* Each circuit must be individually opened before servicing.

CAUTION *Risk of electrical shock. Do not remove cover, no user serviceable parts inside.* Refer servicing to qualified service personnel.

APPLICATION INFORMATION Provided with *integral electronic protection against AC & DC overloads.*



Fleet Power 2500 shown.

INSTALLATION

Key Installation Points

The Power Switch must be turned OFF before you begin.

1. Observe proper polarity when connecting batteries. Reverse DC polarity will result in damage to the unit and will void the warranty. Use care when making the DC connections.

2. Do not back-feed the AC output of the inverter with incoming AC power. A back-feed occurs when AC power from shore power or generator is connected to the output of the inverter. This will damage the inverter and void the warranty. Remember that incoming AC must be fed only to the AC input and never to the AC output. Always check for AC voltage before connecting wires to the AC output. Do NOT turn the inverter ON until all AC connections have been made. Back-feeding the inverter voids the warranty.

3. Do not connect the AC input to the AC output. In effect, this would be plugging the battery charger into the inverter. This could occur if the unit is connected to the entire leg of a circuit breaker panel, then a circuit breaker on that leg is used to feed the battery charger. This will cause the unit to oscillate ON and OFF when the unit is in inverter mode.

4. Always use proper wire and connectors. The proper battery cable size is critical because considerable amperage flows in the DC circuit. Fusing the positive

DC cable is required. The AC wire size is dependant on potential current in the circuit. Consult the NEC (National Electric Code) for proper wire gauge.

5. Keep the inverter/charger out of the elements and out of direct contact with water or spray. Remember that the unit is a piece of electronic equipment and treat it accordingly.

6. Mount the unit as close to the batteries as possible but not in the presence of flammable fumes or in an enclosed battery compartment.

7. The connectors for the remote control and the chassis ground bonding lug, as well as for the AC wires, are located on the bottom of the unit. Be sure to make these connections before bolting the unit down.

8. You may mount the unit horizontally (on a shelf) or **vertically** (on a wall or bulkhead). If mounted vertically, you must orient the unit so the switch and the circuit breakers are facing up and the fan and battery cables are facing down.

9. Allow several inches of clearance around the unit and allow for a supply of fresh air to the cooling fan. Do not block any of the vents or louvers. The fan pulls air from outside the unit. It blows air across the internal components, particularly the transformer and heat sinks, then out the side vents.

INSTALLATION

10. If installing in a system which includes an existing battery charger or converter, **make sure these do not operate from the inverter output AC power.** This sets up a power loop which, due to inefficiencies, will quickly drain the batteries.

11. Make sure all wiring conforms to local and national electrical codes. If in doubt, consult with a qualified electrician.

12. Keep the overall length of each battery cable less than 10 feet. If needed, attach short extension cables. Do not use frame ground or a ground bonding system as a current carrying conductor. Run the negative cable directly to the battery bank. If the positive and negative cables run parallel to each other, twist the cables together. This will minimize the adverse effects of inductance.

13. To meet electrical codes, a fuse must be installed in the positive battery cable within 18 inches of the battery post. This fuse is intended to protect the battery and cables against a dead short circuit. The inverter is protected internally and will not blow a properly sized fuse.

14. DC wiring is generally very simple, the positive and negative cables from the inverter/charger are connected to the house or auxiliary battery. In the case of multiple batteries the interconnecting jumper cables must be of the same AWG as those supplied with the inverter/charger.

15. If multiple battery banks are to be charged, a battery selector switch can be installed, allowing the banks to be charged either individually or simultaneously. A solenoid can also be used.

WARNING

Do not mount the unit in an enclosed battery compartment. Take precautions to keep road dirt and spray off the unit.

Grounding

For safety purposes, **the chassis of the inverter/charger must be connected to your AC ground system.** The chassis ground bonding lug is located on the bottom of the unit. This connector can accept two wires, the first is used to connect the unit to AC ground, the second can be used to connect other AC equipment to ground.

Use bare copper insulated wire, solid or stranded. Strip one end and use a screwdriver to secure it to the chassis ground bonding lug. This wire will connect to the ground in your AC electrical system, typically the vehicle chassis. Make sure the connection is clean and tight.

INSTALLATION

This procedure will connect the chassis of your unit to AC ground. In addition, the AC input and AC output green wires are connected to chassis ground. It is important to connect these wires to the AC ground bus in the circuit breaker panel.

Note: The battery cables are not connected to ground or the chassis of the unit.

Neutral Bonding

For safety purposes, the Fleet Power inverter/charger unit internally bonds the AC output neutral to the AC ground when the unit is OFF or in the inverter mode. When incoming AC power is applied and the transfer switch is engaged, the internal neutral-to-ground bond is automatically lifted.

This means that when the vehicle is connected to shore power, the grounding system is connected to the shore power ground, where neutral and earth ground are bonded together. This technique insures safety in all conditions and conforms to the requirements of the NEC.

AC Wiring

The AC wires route through the holes in the bottom of the unit. Use a screwdriver to remove the screws which secure the AC wiring compartment cover plate. Inside, the compartment is divided into 2 sections, one labeled **AC Input**, the other labeled **AC**

Output. Each side contains 3 pigtails: black, white and green. Six wire nut connectors are also provided.

Black	Hot or Line
White	Neutral
Green	Ground

Conventional metal strain reliefs are provided. These can be replaced by plastic strain reliefs for additional corrosion resistance or 3/4 inch conduit fittings if the wiring will be routed through the conduit.

Use proper wire sizes according to the NEC.

AC Input (Fleet Power 1000 and Fleet Power 2000): Feed the 3 conductor AC input wire through the strain relief and into the AC input compartment. You should have 6 inches of individually insulated black, white and green wire. Strip 1/2 inch of insulation off each conductor and connect to the pigtails: black to black, white to white and green to green.

AC Input (Fleet Power 2500): There are 2 options for configuring the AC input to the Fleet Power 2500.

Dual Inputs: The internal battery charger may be fed separately from the transfer input which feeds the AC loads. In this case, connect one 30 Amp feed to the charger pigtails and another 30 Amp feed to the transfer switch input.

Connecting the feeds in this way balances the AC loads when 2 legs of incoming AC power are available. These two feeds can be in or out of phase. Transfer will only

INSTALLATION

WARNING

Do not connect incoming AC from any source to the AC output of the inverter/charger. This is known as back-feeding and will damage the unit and void the warranty.

occur when power is applied to both inputs. The charger can draw up to 27 Amps on one leg of power and the transfer switch can pass up to 30 Amps from the other leg of power.

Single Input: Both the battery charger and the transfer switch may be fed from the same AC input. In this case, connect both pigtails together, black to black, white to white and green to green.

This allows up to 60 Amps of AC power to be brought in on a single cable. Up to 30 Amps is available to the loads, with the balance available to power the battery charger. A single cable should be protected by a 60 Amp breaker or smaller, and 6 gauge wire should be used.

AC Output: On the Fleet Power 1000, AC output is available at the GFCI outlet mounted on the unit. On the Fleet Power 2000, AC output is available at both the GFCI outlet and at the AC output compartment. The AC output for the Fleet Power 2500 is available at the AC output compartment only. When installing the Fleet Power 2000 and 2500, feed the 3 conductor AC output wire through the strain relief and

connect in the same fashion as the AC input wires.

If you are not connecting the hardwire output wires (Fleet Power 2000 only), make certain they can not cause a short circuit to the wiring compartment. Tug firmly on each connection to make sure they are secure. Check these connections first if the unit is not operating properly.

Carefully tuck the wires into the AC wiring compartment. Replace cover plate.

Ground Fault Circuit Interrupters

In order to conform to the NEC, certain branch circuits must be equipped with a Ground Fault Circuit Interrupter (GFCI). Please consult the code or a qualified electrician for details. Any such branch circuit must be protected by a circuit breaker consistent with the GFCI rating. Underwriters Laboratories has tested the following GFCI, and its use is recommended. Receptacle Type:

Pass & Seymour

Catalog Number 1591-RW

Rated: 15 Amps at 120 Volts AC

Fleet Power 1000 and 2000 inverter/chargers provide an integral GFCI outlet which is protected by a circuit breaker. This GFCI outlet does not protect the hardwire AC output. The hardwire AC output is protected by a non-GFCI circuit breaker on the Fleet Power 2000 only. The first outlet from the hardwire output should be GFCI protected to comply with applicable codes and standards.

The GFCI Receptacle is designed to protect from line-to-ground shock hazards which could occur from defective power

INSTALLATION

WARNING

Persons with heart problems or other conditions which make them susceptible to electric shock may still be injured by ground faults on circuits protected by the GFCI Receptacle. No safety devices yet designed will protect against all hazards or carelessly handled or misused electrical equipment or wiring.

tools or appliances operating from this device. It does not prevent line-to-ground electric shock, but does limit the time of exposure to a period considered safe for a normally healthy person. It does not protect persons against line-to-line, or line-to-neutral faults.

The GFCI Receptacle does not protect against short circuits or overloads. This is the function of the circuit breaker.

Any line-to-ground fault condition indicated by a tripped GFCI must be corrected. Grounded fault conditions are dangerous to personnel and property. Should you identify conditions not described in these instructions, contact a qualified electrician.

In the event of power failure which has not affected the breaker, unplug all cord-connected appliances and tools from the GFCI receptacle, and restore power by pressing in the RESET button on the GFCI receptacle. To test, press the TEST button. The RESET button will pop out indicating

that power is off at the GFCI protected outlets. Push the RESET back in and reconnect the appliances one at a time. A defective appliance which trips the GFCI should be repaired at once.

If the RESET button will not stay in after all appliances have been disconnected from the circuit, the GFCI outlet has failed.

If the RESET button does not pop out when the TEST button is pressed, protection is lost. Do not use.

Test Reminder: For maximum protection against electrical shock hazard, test your ground fault circuit interrupter at least once a month. Test procedure:

1. Push TEST button. The RESET button will pop out. Power is now ON or shore power is ON indicating that the device is functioning properly.
2. If RESET does not pop out when testing, do not use this circuit. Protection is lost.
3. To restore power, push the RESET button.

Remote Control Wiring

The remote control is supplied with a 25 or 50 foot section of telephone cable for connection to the unit. Simply plug one end of the cable into the remote connector on the bottom of the unit labeled remote and the other end into the connector on the back of the remote control panel.

Routing the remote cable away from AC and DC wires will minimize the potential for interference which may affect the LED bargraphs.

INSTALLATION

The remote control cable can be extended up to 50 feet if required. Use standard 4 or 6 conductor telephone cable. Use a single length cable with no connectors or in-line splices. If phone cable is left over, coil it up and store it in an area away from AC equipment to prevent electrical interference.

Once the above steps have been completed the unit can be bolted down.

DC Wiring

Two battery cables are provided with the unit. Both are black, the positive cable has a piece of red heat shrink insulation on the end. High current will pass through the DC wiring. All wires must be properly sized and all connections clean and tight.

It is recommended that the battery cables not be lengthened, however, it is possible to extend the cables if necessary. Extension cables must be 00 AWG or the same type of wire supplied with the unit, and the total length for each battery cable must not exceed 10 feet.

Make sure the connections to the extension cables are tight and properly insulated. Do not attempt to open the case and replace battery cables.

The negative cable should be connected directly to the negative post of the battery bank or the ground side of a current shunt. Do not use the vehicle frame as the negative conductor. Tighten securely.

The positive battery cable must be fused and connected to the positive post of the battery bank, or through a selector switch to one or more battery banks.

A spark may be generated when the final battery connection is made. This is normal and do not be alarmed, however, do not make the final connection in the presence of flammable fumes.

Battery Cable Fusing

A fuse is required by the NEC to protect the battery and cables. The fuse must be installed in the positive battery cable, within 18 inches of the battery.

Recommended Fuse: *Littlefuse Class T JLLN*

This fuse with fuse holder is available from your dealer or Heart Interface.

For Fleet Power 1000

200 Amp Fuse & Holder	PN# 84-4158-00
200 Amp Fuse Only	PN# 84-4157-00

For Fleet Power 2000, 2500

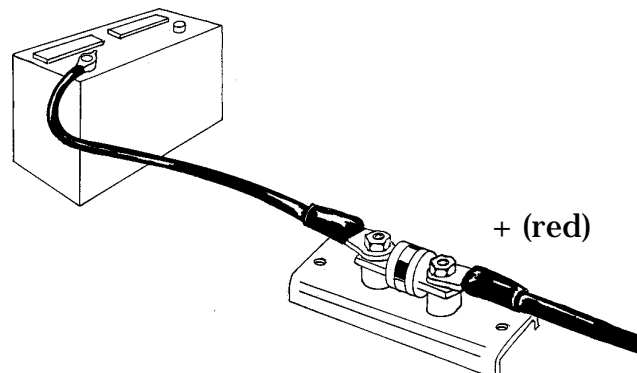
300 Amp Fuse & Holder	PN#84-4154-00
300 Amp Fuse Only	PN#84-4151-00

WARNING

Fleet Power inverter/chargers are not protected against DC reverse polarity. Be very careful to connect the negative and positive cable correctly or damage will result and the warranty will be void.

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10/97 Fltman.pm65



INSTALLATION OPTION 1

15, 20 or 30 Amp Shore Power Inverter Runs Entire Panel

In this system, the shore power is the only external AC power source available. The entire circuit breaker panel is connected to the output of the inverter/charger. Take these things into consideration are:

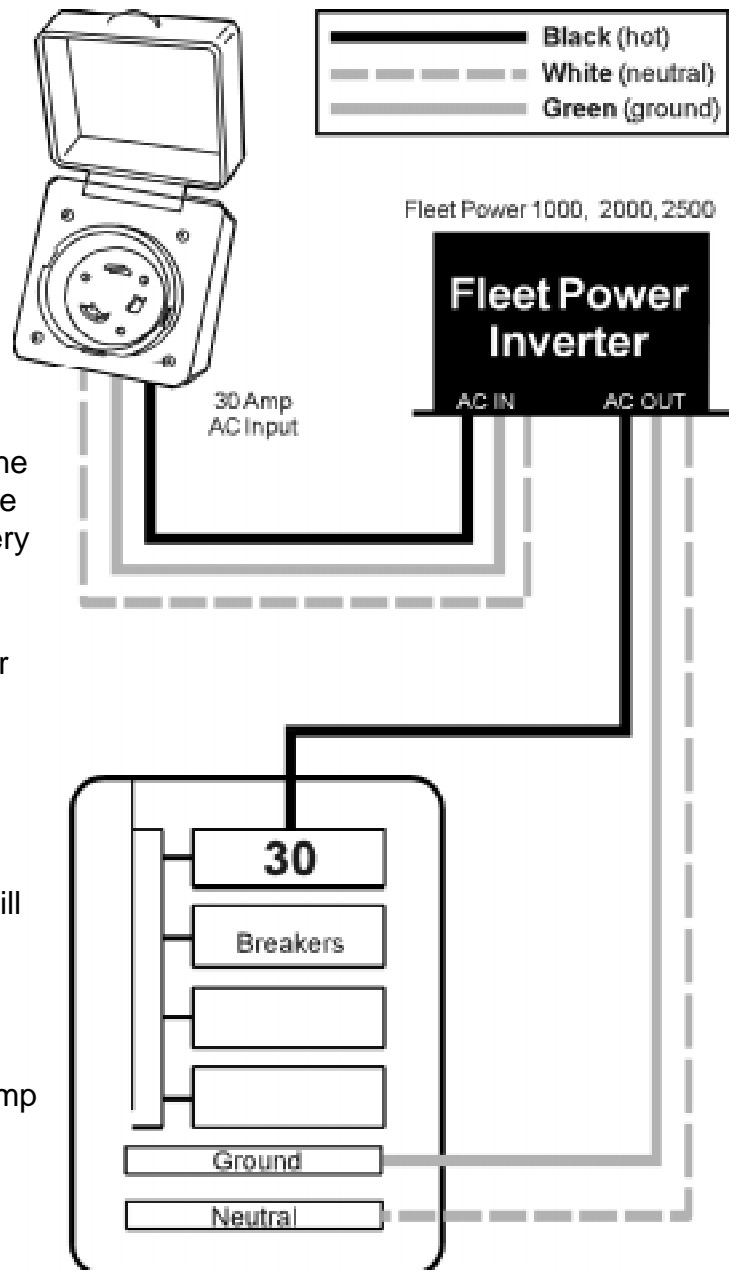
1. When you unplug from shore power, be sure to turn OFF any appliances or tools that you do not want on the inverter. This will prevent overloading the inverter or a rapid discharge of the battery bank.

2. Power Sharing should be set for the same value as the input shore power breaker.

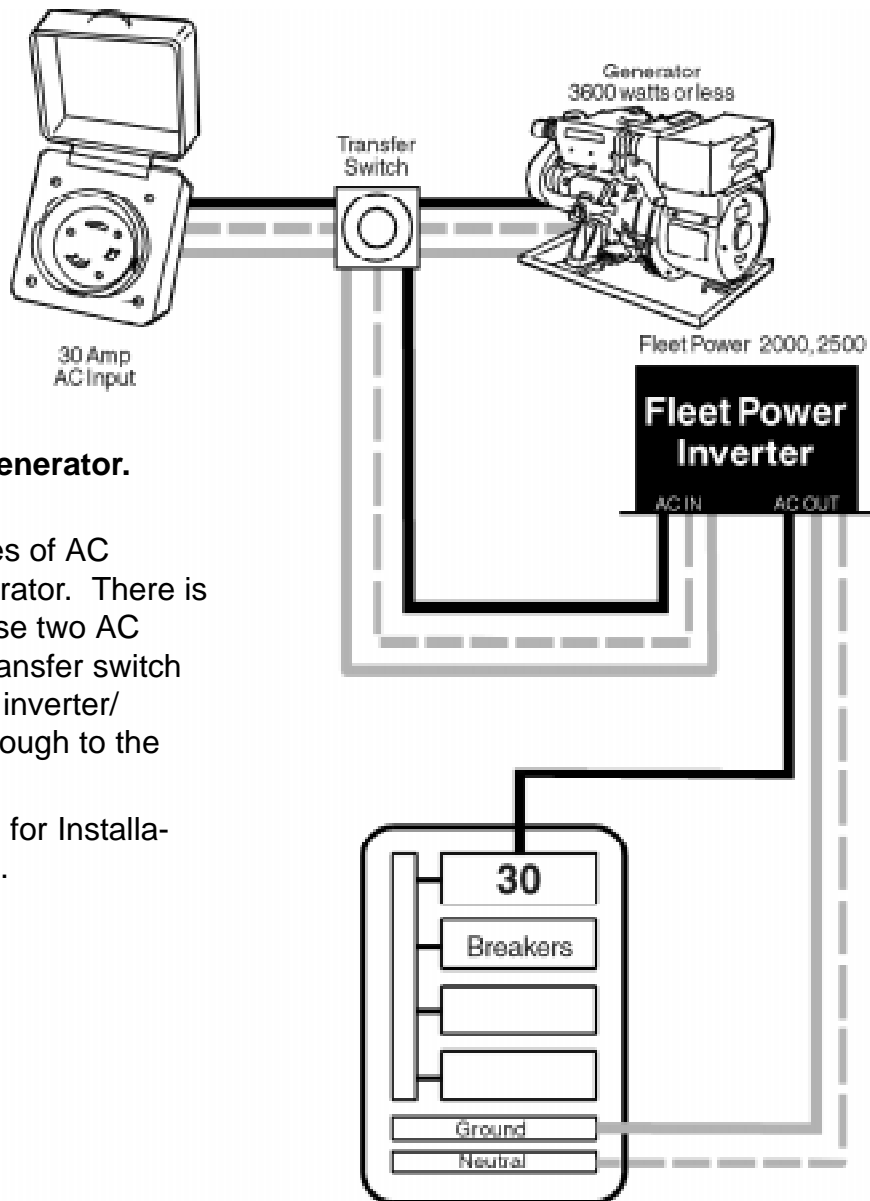
3. If a converter or battery charger was originally wired into the system, it should be disconnected. Do not allow a converter/charger to operate on the inverter power. This type of power loop will only discharge the batteries.

4. Fleet Power 1000 has 15 Amp transfer only.

5. Use the hardwire output for 30 Amp transfer on the Fleet Power 2000, and 2500.



INSTALLATION OPTION 2



30 Amp Shore Power and Generator. Inverter Runs Entire Panel.

This system has 2 sources of AC power, shore power and generator. There is a transfer switch between these two AC sources. The output of this transfer switch is switched to the input of the inverter/charger where it is passed through to the circuit breaker panel.

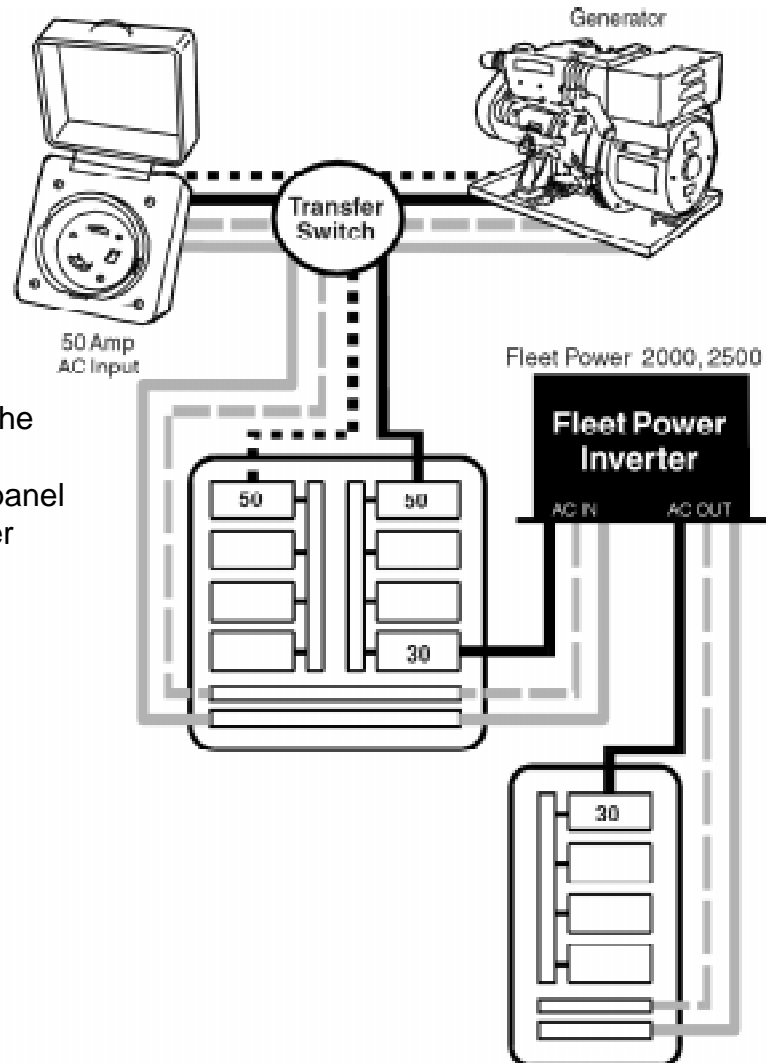
The same considerations for Installation 1 apply to this installation.

	Black (hot)
	White (neutral)
	Green (ground)

INSTALLATION OPTION 3

50 Amp Shore Power/Generator Inverter Runs 30 Amp Sub-Panel.

In this system the main circuit breaker panel contains many loads that will not operate from the inverter such as air conditioning, stove, water or space heater. The AC receptacle circuits are removed from the main circuit breaker panel and a 30 Amp sub-panel is installed. A 30 Amp branch circuit breaker on the main panel feeds the AC input of the inverter/charger, and feeds the sub-panel through the inverter's internal transfer switch.



.....	Red (hot 1)
————	Black (hot 2)
----	White (neutral)
----	Green (ground)

INSTALLATION OPTION 4 (Dual AC Input)

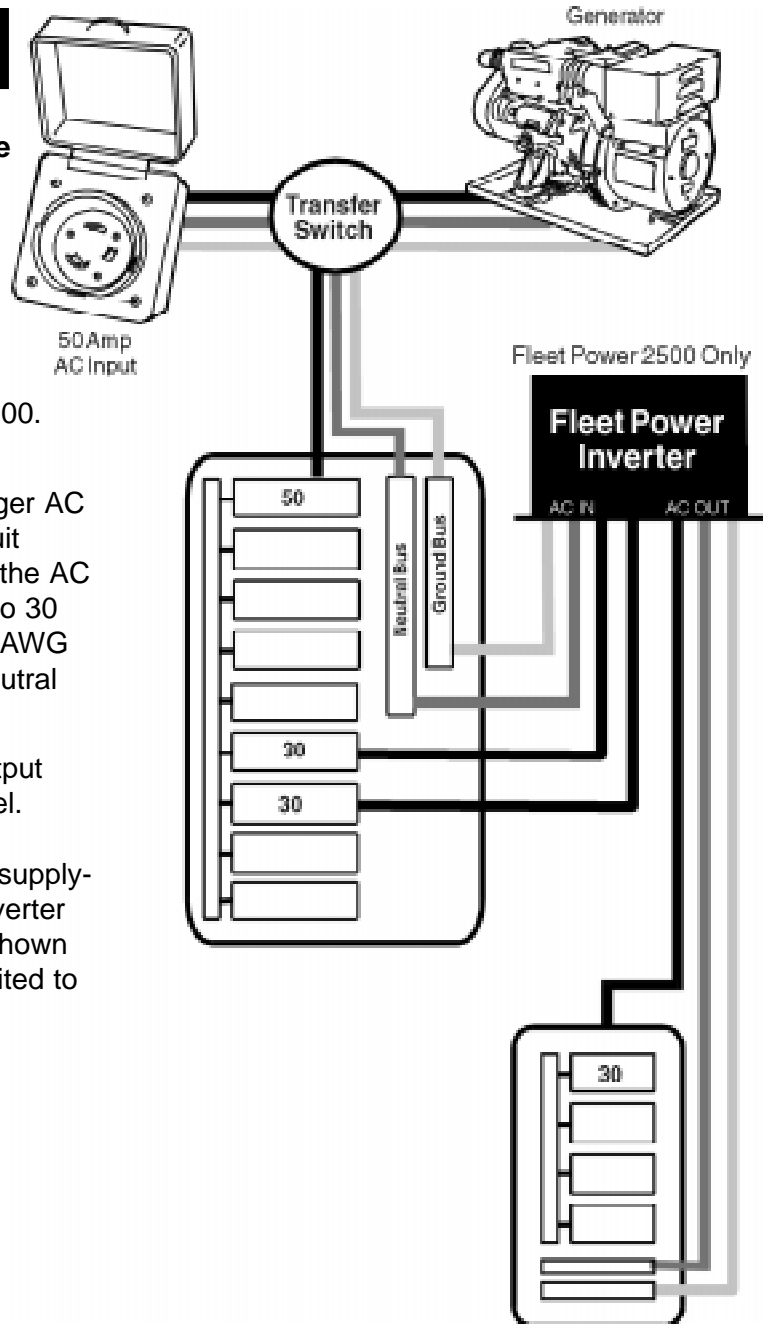
Fleet Power 2500 Only

- 50 Amp 120 Volt Shore Power Service
- Generator

The transfer switch shown, switches, either manually or automatically, between generator and shore power. This switch is unrelated to the transfer switch inside the Fleet Power 2500. This AC panel has a single 120 volt leg.

The transfer AC input and the Charger AC input are fed from separate 30 Amp circuit breakers. Make sure the wiring between the AC panel and the inverter will safely carry two 30 Amp circuits. Typically, a minimum of 10 AWG wires would be used. 6 each (2 hot, 2 neutral and 2 ground).

Please note that the inverter AC output breakers are isolated from the main panel. **Keeping the inverter loads isolated is important.** Do not back feed the unit by supplying AC from shore or generator to the inverter AC output. Three inverter breakers are shown in the particular diagram. You are not limited to three breakers.



	Black (hot 1)
	White (neutral)
	Green (ground)

DC WIRING OPTIONS

WARNING

For Installations using Battery Switches **NOTE:** No other DC loads should be connected to the common on the battery switch. This will prevent their operation directly from charger power when the battery switch is OFF.

DC Wiring #1 - Two Battery* System Using Manual Battery Switch

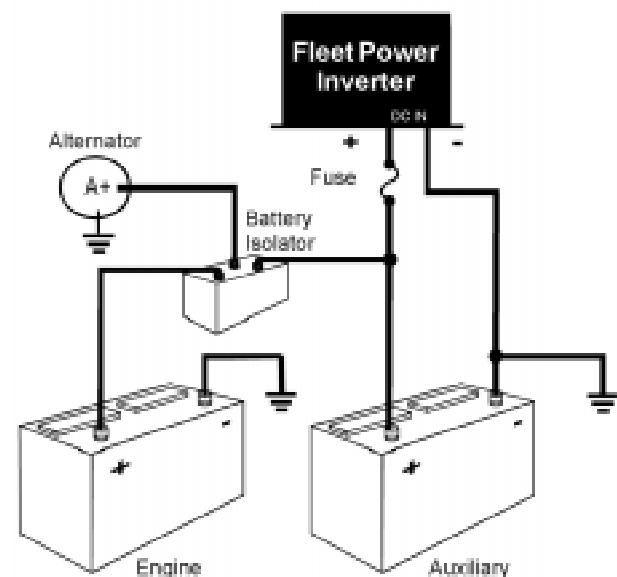
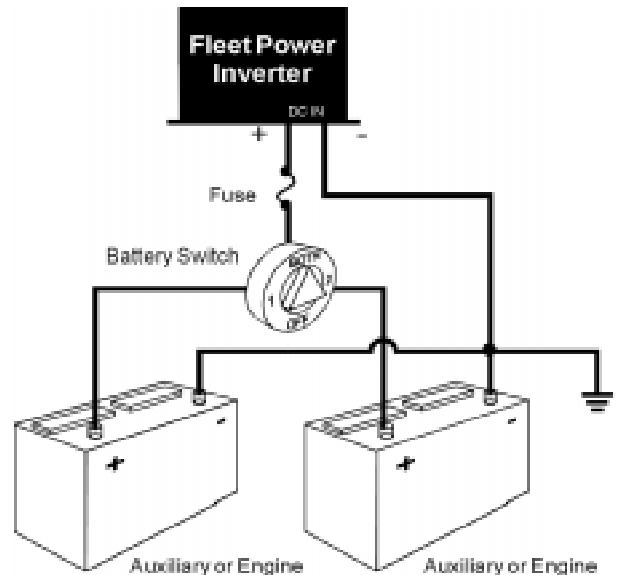
This system is simple and effective, providing the user with the ability to choose between either battery for inverter use or charging.

When charging, the battery switch is typically left in the "All" or "Both" position so that both batteries are charged. When using the inverter, the inverter battery should be selected with the battery switch.

The inverter/charger's negative battery cable should be connected directly to the battery that will normally supply the inverter. A fuse should be installed in the positive cable within 18 inches of the battery. If the cables to the switch exceed 18 inches, each cable will require a fuse.

DC Wiring #2 - Two Battery* System Using an Isolator for Charging both Batteries

This allows charging of both batteries from an alternator, but the inverter can only draw power from the auxiliary battery. This prevents accidental discharge of the engine battery by the inverter. A paralleling solenoid can be used in place of the isolator.

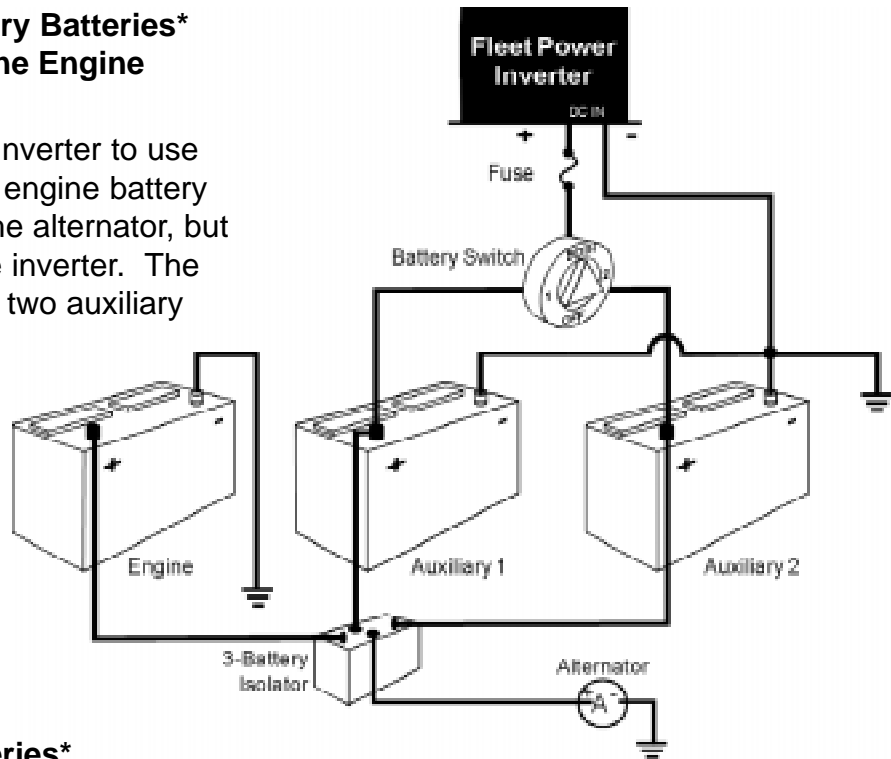


* Each battery shown can represent a battery bank.

DC WIRING OPTIONS

DC Wiring #3 - Two Auxiliary Batteries* with Battery Switch and One Engine Battery

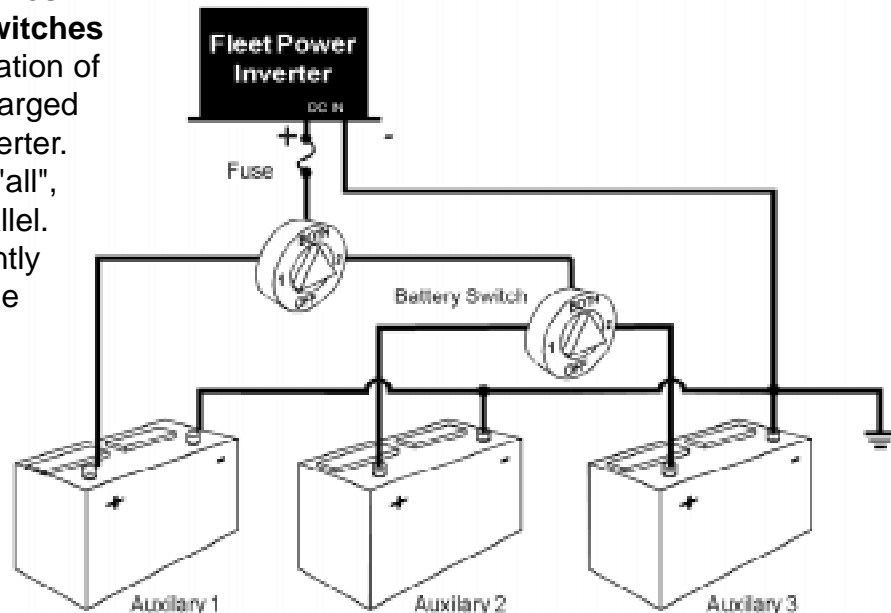
This system allows the inverter to use either auxiliary battery. The engine battery can always be charged by the alternator, but cannot be discharged by the inverter. The user can select between the two auxiliary batteries with the battery switch for charging or for inverter operation.



DC Wiring #4 - Three Batteries* Connected with Battery Switches

This allows any combination of three battery banks to be charged by or selected to run the inverter.

If both switches are on "all", then all batteries are in parallel. Batteries can be independently added to or removed from the system by selecting the appropriate switch position.



* Each battery shown can represent a battery bank.

TROUBLESHOOTING

LED Number	Indication
LED 1	Illuminates if the unit shuts down for any reason.
LED 2	Over-temperature. Allow to cool.
LED 3	The unit detected a failure. Call Heart Interface Technical Support.
LED 4	Inverter overload caused by too large a load or short circuit. Reset by cycling power switch or plugging in incoming AC power.
LED 5	Battery overload caused by excessively discharged batteries. Refer to page 40.
LED 6	Incoming AC backfeed. Potentially damaging to the unit. Disconnect incoming AC power and correct the situation.
LED 7	Triac thermal run away. Turn OFF and allow to cool down.
LED 8	High battery voltage shutdown during charge mode. Check all charging sources for proper voltage. Reset by cycling the power switch.
LED 9-10	Not used for troubleshooting.

TROUBLESHOOTING

Problem	Things to Check
No Inverter Output	<ol style="list-style-type: none"> 1. Battery voltage under load. 2. Battery connections and DC fuse. 3. Circuit breaker on front panel. 4. Thermal condition, high powered loads or inadequate ventilation may cause overheating. 5. Overloads or short circuit, check for excessive loads or bad wiring connections. 6. Reset button in GFCI outlet.
Low Inverter Output Voltage	<p>Confirm that your volt meter is a true RMS meter. Standard volt meters will not accurately read the waveform of the inverter and may read anywhere from 90 to 120 volts. If a true RMS meter is not available, check the brightness of an incandescent light bulb - if it appears normal, the output voltage is properly regulated.</p>
Little or No Output from Battery Charger	<ol style="list-style-type: none"> 1. Wiring connections - check both the AC and DC connections. 2. AC input voltage - low voltage input will result in low DC output current. Expect reduced charger output from generators under 3,500 watts. 3. AC reverse polarity - check for voltage between the incoming white and green wires. If 120 volts is measured, this is reverse polarity.
Microwave Oven Cooking Slow	<ol style="list-style-type: none"> 1. Microwave ovens will normally cook slow on inverters due to a slightly low peak AC voltage. 2. Cooking speed will be determined by battery voltage. Low voltage results in increased cooking time. Support the battery bank with an alternator or other charging source for quicker cooking.
Slow Digital Clock	<ol style="list-style-type: none"> 1. Digital clocks either employ an internal time base or derive their time base from the incoming AC waveform. The frequency is usually well regulated at 60 Hz. The clock either counts the number of peaks in the waveform or the number of times the waveform crosses zero volts. The circuitry to count the zero crossing events is more popular. The longer zero cross time of the inverter's modified sinewave may cause double clocking, resulting in a faster clock.

GLOSSARY

Alternating Current (AC) An electric current that reverses direction at regular intervals. Sources of alternating current are shore power, generator power, inverter power or household current.

Ampere (Amp, A) The unit of measure of electron flow rate of current through a circuit.

Ampere-hour (Amp-Hr., AH) A unit of measure for a battery's electrical storage capacity, obtained by multiplying the current in amperes by the time in hours of discharge (Example: a battery which delivers 5 amperes for 20 hours delivers 5 amperes times 20 hours, or 100 Amp-Hr. of capacity.)

AH Capacity The ability of a fully charged battery to deliver a specified quantity of electricity (Amp-Hr., AH) at a given rate (Amp, A) over a definite period of time (Hr.). The capacity of a battery depends upon a number of factors such as: active material, weight, density, adhesion to grid, number, design and dimensions of plates, plate spacing design of separators, specific gravity and quantity of available electrolyte, grid alloys, final limiting voltage, discharge rate, temperature, internal and external resistance, age and life of the battery (bank).

AWG (American Wire Gauge) A standard used to measure the size of wire.

Circuit An electric circuit is the path of an electric current. A closed circuit has a complete path. An open circuit has a broken or disconnected path.

Circuit (Series) A circuit which has only one path for the current to flow. Batteries arranged in series are connected with the negative of the

first to the positive of the second, negative of the second to the positive of the third, etc. If two 6 volt batteries of 50 ampere-hours capacity are connected in series, the circuit voltage is equal to the sum of the two battery voltages, or 12 volts, and the ampere-hour capacity of the combination is 50 ampere-hours.

Circuit (Parallel) A circuit which provides more than one path for current flow. A parallel arrangement of batteries (of like voltage and capacity) would have all positive terminals connected to a conductor and all negative terminals connected to another conductor. If two 12 volt batteries of 50 ampere-hour capacity each are connected in parallel, the circuit voltage is 12 volts, and the ampere-hour capacity of the combination is 100 ampere-hours.

Current The rate of flow of electricity or the movement rate of electrons along a conductor. It is comparable to the flow of a stream of water. The unit of measure for current is ampere.

Cycle In a battery, one discharge plus one recharge equals one cycle.

Dip Switch A series of small switches used for special programming of the Fleet Power inverter/charger. These switches are located on the back of the Fleet Power remote panel.

Direct Current (DC) Current that flows continuously in one direction such as that from batteries, photovoltaics, alternators, chargers and DC generators.

GLOSSARY

Equalize Charge A controlled overcharge of the batteries which brings all cells up to the same voltage potential, extends the battery life, restores capacity and mixes the electrolyte.

Gel Cell Battery A type of battery that uses a gelled electrolyte solution. These batteries are sealed and are virtually maintenance-free. Not all sealed batteries are the gel cell type.

GFCI (Ground Fault Circuit Interrupter) A protective device that rapidly de-energizes a circuit when current to ground exceeds a predetermined value.

Ground The reference potential of a circuit. In automotive use, the result of attaching one battery cable to the body or frame which is used as a path for completing a circuit in lieu of a direct wire from a component. This method is not suitable for connecting the negative cable of the inverter to ground. Instead, route the cable directly to the negative terminal of the battery.

LED (Light Emitting Diode) Indicator light.

Negative Designating or pertaining to electrical potential. The negative terminal is the point from which electrons flow during discharge.

Ohm A unit for measuring electrical resistance.

Ohm's Law Expresses the relationship between Voltage (V), Current (I) in an electrical circuit with resistance (R). It can be expressed as follows: $V=IR$. If any two of the three values are known, the third value can be calculated by using the above formula.

Positive Designating or pertaining to electrical potential; opposite of negative. The positive battery terminal is the point where electrons return to the battery during discharge.

Power Sharing The ability of the charger to reduce its output when the AC power being consumed by the charger and external AC loads connected to the output of the inverter are in excess of the input breaker rating.

Volt The unit of measure for electric potential.

Watt The unit for measuring electrical power, i.e., the rate of doing work, in moving electrons by or against an electric potential.

Watt-Hour (Watt-HR, WH) The unit for measuring electrical energy which equals Watts x Hours.

Wet Cell Battery A type of battery that uses liquid as an electrolyte. The wet cell battery requires periodic maintenance; cleaning the connections, checking the electrolyte level and performing an equalization cycle.

SPECIFICATIONS

MODEL	FP 1000-12	FP 2000-12	FP 2500-12
Nominal Battery Voltage	12 VDC	12 VDC	12 VDC
Battery Voltage Range	10.0 - 15.5 VDC	10.0 - 15.5 VDC	10.0 - 15.5 VDC
Low Battery Cutout	10 VDC	10 VDC	10 VDC
AC Input Voltage Range	90-130 VAC	90-130 VAC	90-130 VAC
Frequency Regulation	.05% @ 60 Hz	.05% @ 60 Hz	.05% @ 60 Hz
Inverter Output Power (Continuous)	1000 VA	2000 VA	2500 VA
Inverter Voltage Regulation	120V ± 5% True RMS	120V ± 5% True RMS	120V ± 5% True RMS
Wave Shape	Modified Sine Wave	Modified Sine Wave	Modified Sine Wave
Surge Power (15 seconds)	3000 VA	4500 VA	5200 VA
Output AC Amps at rated load	8.33	16.67	20.83
Input DC Amps	100	200	250
Power Factors Allowed	All	All	All
Full Load Efficiency	85%	84%	86%
Peak Efficiency	92%	93%	94%
Protection	Circuit Breaker, Electronic, Thermal, High Battery, Low Battery, GFCI	Circuit Breaker, Electronic, Thermal, High Battery, Low Battery, GFCI	Circuit Breaker, Electronic, Thermal, High Battery, Low Battery
Transfer Switch	Yes	Yes	Yes
GFCI	Yes	Yes	No
Charging Rate	50 Amps	100 Amps	130 Amps
Bulk Charge Voltage	14.4 VDC*	14.4 VDC*	14.4 VDC*
Float Charge Voltage	13.5 VDC*	13.5 VDC*	13.5 VDC*
Equalizing Charge Voltage	16.3 VDC*	16.3 VDC*	16.3 VDC*
Battery Cables	Yes 3'	Yes 3'	Yes 3'
Hardwire	No	Yes	Yes
Status Panel	Optional Remote	Optional Remote	Optional Remote
Weight	31 lbs.	52 lbs.	56 lbs.
Dimensions	12" x 9.75" x 7"	12" x 11.5" x 8.75"	12" x 11.5" x 8.75"

FP1000-12 and FP2000-12 models are certified by UL to comply with FED spec-KKK-A1822, SAE spec-SAE-JRR1, for emergency vehicle application. All models are UL and C-UL Listed for Canadian use.

*Indicates adjustable setting with the optional remote control.

WARRANTY

Your Heart Interface Fleet Power Inverter/Charger is under limited warranty for a period of 12 months from date of purchase.

Terms of the warranty are detailed on the warranty registration card. Please complete this card and return it to Heart Interface to register your warranty.

If the unit requires service, contact Heart Interface by telephone. The service technician will ask for the serial number of your unit. Please have this information ready.

**Phone numbers: (253) 872-7225
(800) 446-6180**

A return authorization number will be required on all returns. This number is issued by the service technician and should be written on the shipping box.

You must ship the unit to Heart Interface or a field service center freight prepaid.



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