On Board Solutions
A ProMariner Company

Digital **Mobile Charge**

Advanced Electronic In-Transit 4-Stage Alternator to Battery Charger

CHARGING • CONTROL • COMMUNICATION
C3
All Digital

CE

Owner's Manual and Installation Guide

Model	Part Number	Description
130 Amp Alternator to Battery	05513	12V Advanced In-Transit 4-Stage Charger
80 Amp Alternator to Battery	05514	24V Advanced In-Transit 4-Stage Charger

Your Satisfaction is Important to us. Do Not return this Product to the Retailer or Dealer for any service or warranty requirements. Please call our Customer Care Department line at 1-800-824-0524 from 8 am to 5 pm (Eastern Time) for warranty, service or installation assistance you may need. Thank you.

IMPORTANT SAFETY NOTICE - SAVE THESE INSTRUCTIONS

Please save and read all safety, operating and installation instructions before Installing or applying power to your Digital Mobile Charge.

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Digital Mobile Charge Overview:

On Board Solutions' Alternator to Battery Digital Mobile Charger is a combined split charge diode system and a voltage amplifier. The unit is comprised of one alternator input and two battery bank outputs. The output marked starter battery is a straight channel through a diode which has no boost function as it is the channel that must be connected to the boat/vehicle engine system; most vehicles E.C.U. (engine control unit) cannot deal with a high input voltage because this would set off alarms in the E.C.U. system.

Additionally, the Digital Mobile Charge ensures at all times that the power required to run the primary system of the vehicle or boat engine is not affected. The engine start battery is constantly monitored and receives top charging priority. The engine start battery cannot discharge through this system, even in the event of a unit failure.

The solution: The Digital Mobile Charger pulls the voltage down and allows the alternator to output at it maximum capability and then amplifies the voltage from 13 to 14.8 volts for 12V models (26V to 29.6V for 24V models) and the surplus power created by fooling the alternator is amplified into a higher voltage by the Digital Mobile Charge. This amplified output is used to charge a secondary battery bank using a totally isolated digitally controlled **4 step charging curve**.

In summary, the Digital Mobile Charge provides your extra battery system a charge that is approximately 5 times faster than could be achieved in using the vehicles alternator. This provides in transit charging of extra battery banks and increases the life of the batteries by de-sulphating them. The Digital Mobile Charge provides the same utility as an advanced regulator, a zero loss battery isolator, and a **4 step battery charger**.

Details of Operation:

The Digital Mobile Charge begins operation by monitoring the engine start battery. The unit will not start until the battery voltage exceeds approximately 13 volts for 12v models (26v for 24v models), then waits for 2.5 minutes to ensure that some charge is placed quickly into the engine start battery. After that, the Digital Mobile Charge pulls the engine battery down to no less than 13 volts for 12v models (26v for 24v models), which enables the engine battery to still receive a small charge and ensures the alternator works at its full potential.

Additionally, to further ensure the engine battery is O.K., every 20 minutes the Digital Mobile Charge stops for 3 minutes, allowing the engine start battery to be charged exclusively by the alternator. After the 3 minutes, the Digital Mobile Charge resumes battery bank charging by pulling down the engine start battery to 13 volts for 12v models (26v for 24v models) and so continues the charging cycle. After a period of time, calculated by the software, when the battery bank batteries are full, the system will float the batteries at 14 volts for 12v models (28v for 24v models); all while ensuring the viability of the engine battery comes first.

Other features included in this system are an alternator temp sensor, a remote battery temp sensor and a fully automatic sleep sensor, which switches the unit off when the engine has stopped. (Please See the **Additional Features Section** on page 7 in this manual for more detail on these features)

General Safety Instructions:

- **Before connecting your batteries, read all instructions and cautionary markings on the battery charger and batteries.**
- **CAUTION -** To reduce the risk of injury; charge only lead acid type rechargeable batteries (lead acid, gel cell and AGM). Other types of batteries may burst, causing personal injury.
- Use of attachments not recommended or sold by On Board Solutions or Professional Mariner, LLC may result in a risk of fire, electrical shock or personal injury.
- Do not operate the charger if it has received a sharp blow, direct hit of force, dropped or otherwise damaged in any way.
- Do not disassemble the charger. Call the factory directly when service or repair is required.
- Incorrect assembly may result in risk of electrical shock or fire.

WARNING: RISK OF EXPLOSIVE GASESWORKING IN THE VICINITY OF A LEAD ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON IT IS OF EXTREME IMPORTANCE THAT EACH TIME BEFORE USING YOUR CHARGER YOU FOLLOW THE SAFETY INSTRUCTIONS FOUND IN THIS MANUAL.

To reduce risk of battery explosion, follow these instructions and those published by the Battery manufacturer, and of any equipment you intend to use in the vicinity of a battery. Review all cautionary markings and labels.

Personal Safety Precautions

1. Someone should be within the range of your voice or close enough to come to your aid when installing this product or working near lead acid batteries.

2. Wear complete eye protection and protective clothing. Avoid touching eyes while working on or with batteries. Have plenty of soap and water nearby in case of battery acid comes in contact with skin, clothing or eyes.

3. If battery acid comes in contact with skin or clothing, wash immediately with soap and water. If acid enters the eye (s) flood eye (s) with running water for at least 10 minutes and get medical attention immediately.

4. Never smoke or allow a spark or a flame in the vicinity of a battery or engine.

5. Be extra cautious to reduce the risk of dropping a metal tool onto a battery. It may spark or short-circuit the battery or other electrical parts that may cause an explosion.

6. Remove all personal metal items such as rings, bracelets, necklaces, watches and jewelry when working near a battery. A battery can produce a short circuit high enough to weld a ring or any metal, causing serious burns.

Installation Warnings-

Set the unit as you would any other high power battery charger; fit it near the batteries in a cool, dry and **well-ventilated** space to ensure the unit has the ability to dissipate the heat it will generate. **Do not place directly above or below the batteries.**

WARNING: Electrical Shock and Fire Hazards-
On Board Solutions and ProMariner recommend all wiring is done by qualified personnel. Disconnect all power sources to prevent accidental shock. It is the installer's responsibility to ensure compliance with all the applicable installation codes and regulations.

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: Low Voltage - Electrical burn and spark hazard. Disconnect battery power before servicing.

WARNING: Be sure the area around the charger and batteries is well ventilated while the batteries are being charged.

WARNING: Add distilled water in each cell until electrolyte reaches levels specified by the battery manufacturer. This helps purge excessive gases from cells. Do not overfill. Always carefully follow manufacturer's recharging instructions.

WARNING: Study all manufacturer's specific precautions, such as removing or not removing cell caps while charging, in addition to rates of charge.

WARNING: Clean battery terminals with full eye protection to prevent corrosion from coming in contact with eyes.

WARNING: If necessary to remove a battery from this charger, always remove grounded terminal from battery first. Make sure all accessories are off, as to not cause an arc.

Positioning Battery Type Selector Switch:

Program the battery type into the unit. Do so by positioning the battery type dip switches on the unit to the appropriate battery type.

There are 4 possible battery type selections:

1) Non-Sealed Lead Acid Battery (Orange LED)
2) Exide Gel Battery (Green LED)
3) Gel Battery (All others except Exide) (Green Flashing LED for 10 times)
4) AGM Battery (Red LED)

Understanding Battery Types

There are three primary types of batteries in the marketplace today; Flooded (Lead Acid), AGM (Absorbed Glass Mat) and GEL cell (Gelled Electrolyte Lead-Acid). Traditionally, the most common type of batteries used are Flooded (Lead Acid batteries).

Almost all GEL cell batteries will state that they are GEL cell on the battery case or labels. **(Shown below)** are typical battery voltages at absorption and float levels.

Battery Type	12V Charging Profile	24V Charging Profile	Battery Information
Flooded (Lead Acid)	14.6 Absorption, 13.3 Float	29.2 Absorption, 26.6 Float	Water filled (with or without Removable caps)
AGM (Absorbed Glass Mat)	14.4 Absorption, 13.3 Float	28.8 Absorption, 26.6 Float	Sealed
GEL cell	14.1 Absorption, 13.8 Float	28.2 Absorption, 27.6 Float	Sealed

NOTE: AGM (Absorbed Glass Mat) batteries are <u>not</u> GEL (Gelled Electrolyte Lead-Acid) batteries. AGM batteries are charged at the same charging profile as Flooded (Lead Acid).

***If you are still unsure as to what kind of battery you have, we recommend that you contact the manufacturer of the battery.

Installation of the Unit:

1) Connect the main alternator output to the center stud marked alternator input, then connect the domestic battery to the domestic stud. Connect the engine battery to the stud marked starter battery. Please ensure that the cable used can carry the full current of the alternator. Please see Cable Size Charts for 12v and 24v models on page #10.
NOTE: Cable protection fuses or breakers must be used within 7" of the alternator and 7" of the battery.

2) The unit has a smaller negative wire which requires a # 6 AWG cable and should be connected directly to the alternator negative at the alternator case or negative engine stud.

3) If you already have a split charger diode, then the three positive cables are already there. Simply replace the diode with this unit and connect the negative. Please see the basic installation drawing.

Additional Features:

Battery Temp Sensor: Simply connect the ring end of one of the enclosed temperature sensor to a battery terminal post (neg. or pos.) Be sure not to crush the temp sensor which is enclosed inside the yellow ring terminal. Connect the wire end of the temp sensor to the 2 small terminals marked battery temp on the Digital Mobile Charge. Simply push the small lever down and insert one wire into each side. There is no polarity on these wires. The output voltage will be reduced in the event the battery temperature increases.

If the battery exceeds 50 degrees Celsius, the Digital Mobile Charge will switch off, as a major battery failure may have occurred. (It is important to note that the straight path from the alternator is still connected which means if the problem which has caused your batteries to overheat if the failure of your standard regulator in the alternator, the Digital Mobile Charge will be able to warn you with an illumination of the “High Alternator Voltage” LED, but it will not be able to stop it, as it is a component in the alternator. Please take this warning seriously and have your alternator or alternator’s regulator serviced.

Alternator high temp disengage: This is another supplied temperature sensor which should be connected to your alternator output post (b+) and will disengage the Digital Mobile Charge in the event the alternator reaches 100 deg Celsius. A warning LED will illuminate when the alternator reaches the threshold temperature. When the alternator cools to 80 degrees Celsius, the system automatically reengages and continues charging.

Battery Bank Voltage Monitoring: As a standard feature, this unit senses all the control voltages at the unit. However, if you want to sense the voltage at the domestic battery bank directly to overcome the voltage drop in the cable run, then simply connect a cable from the domestic sense connection directly to the domestic battery.

Starter Solenoid: Some alternators cannot work if there is no voltage on their main B+ terminal. This voltage fires up the alternator. This is easy to see because when you fit a split charge diode there is no feed on the B+ which in turn means that the engine will start, but that the alternator may not work.

If this is the case, the way to overcome this is to use the starter solenoid feed. This is a simple feed that connects the terminal on the starter motor and which only becomes live when the starter motor bendix is engaged (i.e. the first two seconds of having the ignition key fully on). Then when the starter is disengaged, the point becomes dead. What actually happens is that a 12 volt feed is sent to the alternator B+ terminal for the starter duration and the alternator will engage.

Low alternator regulator adjustment for 12V unit: (standard set switch 1 off) Most 12V regulators come as standard between about 13.8 and 14.4 volts. If the standard regulator is not within its limits and has a low voltage performance of below 13.8v, the unit may not work as well as it could. By switching on the switch number 1 on the regulation voltage, the engine battery is dropped from 13v to 12.8 volts, which in turn improves the boost effect from the unit. ***Warning: Do not do this unless you have the above-described problem as this could result in a low engine start battery performance.***

Figure #1- Simple Installation

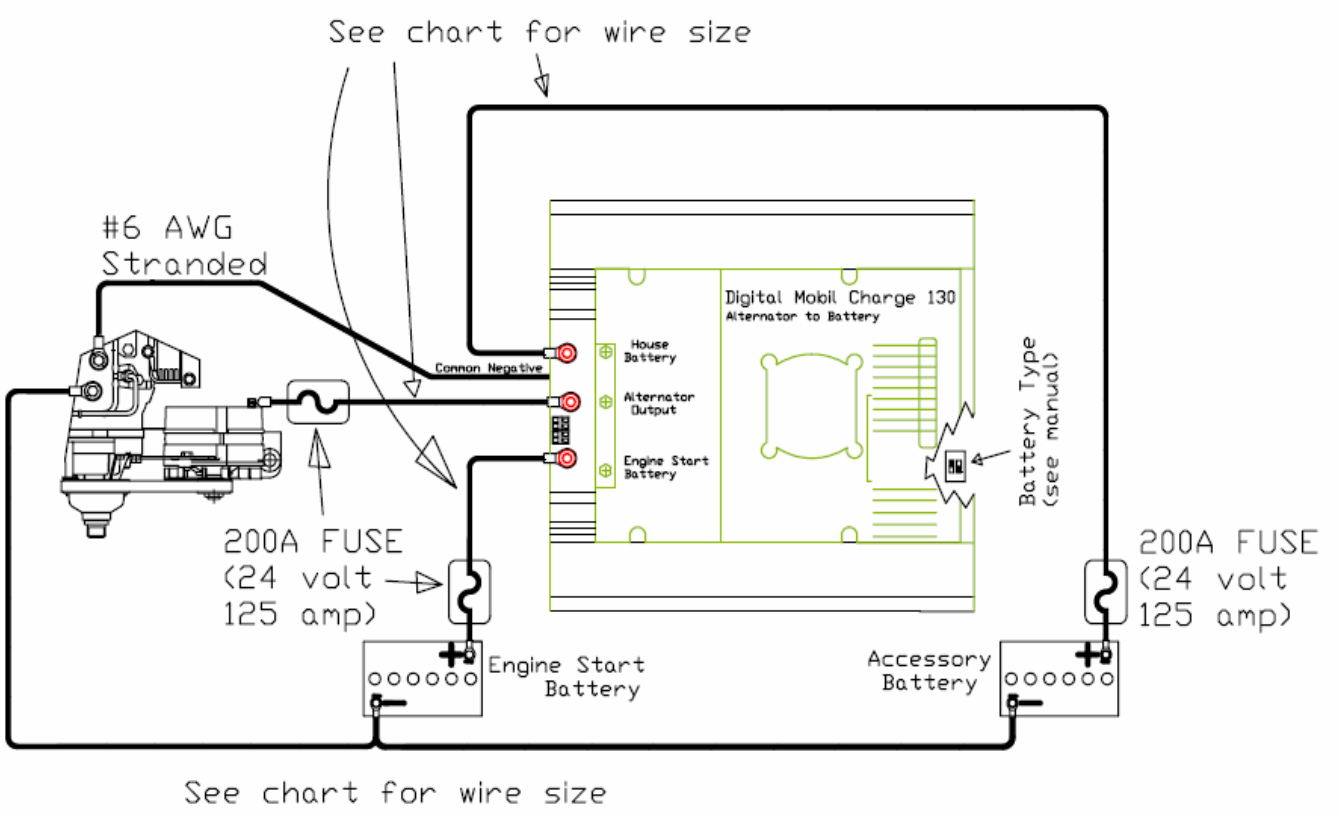
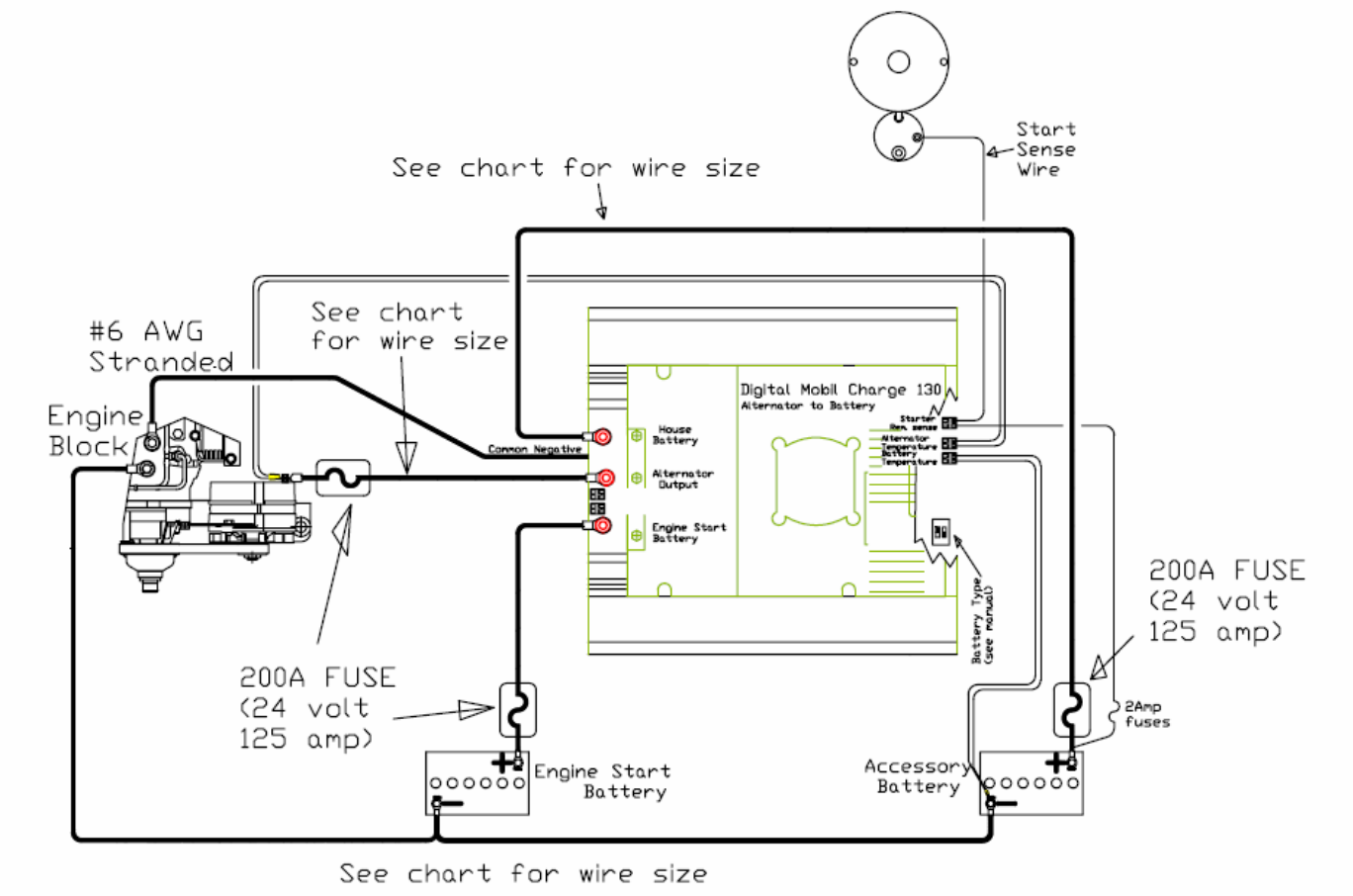


Figure #2- Complete Installation



AWG Wire Gauge Chart for 12V and 24V-

AWG Wire Gauge Size Needed for 12v Applications

	Current of Vehicles Alternator in Amps-															
Length in Ft.	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
10 ft.	8	6	6	6	4	4	4	4	4	4	4	2	2	2	2	2
15 ft.	6	4	4	4	2	2	2	2	2	2	1	1	1	1	1	1/0
20 ft.	4	4	4	2	2	2	2	1	1	1	1/0	1/0	1/0	1/0	2/0	2/0
25 ft.	4	2	2	2	1	1	1	1/0	1/0	1/0	2/0	2/0	2/0	2/0	3/0	3/0
30 ft.	2	2	2	1	1/0	1/0	1/0	1/0	2/0	2/0	2/0	3/0	3/0	3/0	3/0	4/0
40 ft.	2	1	1/0	1/0	2/0	2/0	2/0	3/0	3/0	3/0	4/0	4/0	4/0	4/0	4/0	
50 ft.	1	1/0	1/0	2/0	3/0	3/0	3/0	4/0	4/0	4/0						
60 ft.	1/0	2/0	2/0	3/0	3/0	4/0	4/0	4/0								
70 ft.	2/0	2/0	3/0	3/0	4/0	4/0										
80 ft.	2/0	3/0	3/0	4/0												
90 ft.	3/0	3/0	4/0													
100 ft.	3/0	4/0	4/0													

AWG Wire Gauge Size Needed for 24v Applications

		Current of Vehicles Alternator in Amps-															
Length in Ft.	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
10 ft.	12	10	10	10	8	8	8	8	6	6	6	6	6	6	4	4	4
15 ft.	10	8	8	8	6	6	6	6	4	4	4	4	4	4	4	2	2
20 ft.	8	8	6	6	6	4	4	4	4	4	4	2	2	2	2	2	2
25 ft.	8	6	6	6	4	4	4	4	2	2	2	2	2	2	1	1	1
30 ft.	6	6	6	4	4	4	2	2	2	2	2	1	1	1	1	1/0	1/0
40 ft.	6	4	4	4	2	2	2	2	1	1	1/0	1/0	1/0	1/0	2/0	2/0	2/0
50 ft.	4	4	2	2	2	1	1	1	1/0	1/0	1/0	2/0	2/0	2/0	3/0	3/0	3/0
60 ft.	4	2	2	2	1	1	1/0	1/0	2/0	2/0	2/0	3/0	3/0	3/0	3/0	4/0	4/0
70 ft.	4	2	2	1	1	1/0	1/0	2/0	2/0	3/0	3/0	3/0	3/0	4/0	4/0	4/0	4/0
80 ft.	2	2	1	1	1/0	2/0	2/0	2/0	3/0	3/0	3/0	4/0	4/0	4/0			
90 ft.	2	1	1	1/0	2/0	2/0	3/0	3/0	3/0	4/0	4/0	4/0					
100 ft.	2	1	1/0	1/0	2/0	3/0	3/0	3/0	4/0	4/0	4/0						

Description of LED's found on Unit:

1) **FAST CHARGE**: Green: This should be on from start up (slow flash shows unit is on but on rest mode for the first 2.5 minutes upon start-up and approx. every 20 min after) and shows that the alternator should be working at it's maximum. This LED should remain on until the Float Mode LED comes on and signals the high charge rate is complete.

2) **ABSORPTION CHARGE**: Yellow: Timer Activated: This LED comes on when the voltage reaches about 13.9 - 14 volts (27.8v – 28v for 24v models). The software will calculate the timing for the Absorption Charge and depending on how long it took to turn on will dictate how long the timing cycle will remain on. This will vary from 1 - 6 hours. This light will remain on until the Absorption Charge is over.

3) **FLOAT MODE**: Green Float Mode LED: This indicates that Absorption charge cycles are now over and should remain on after all the high charge lights are out. The system is now running at a Float rate, which is a maintenance charge rate.

4) **LOW BATTERY VOLTAGE**: Orange: Low Voltage Warning: This is simply saying that there is low voltage at the main battery bank and has no active function. For information only, this usually indicates a defective alternator, or perhaps a defective main battery.

5) **HIGH BATTERY VOLTS** / **TEMP**: Red Dual Information LED. This LED has two functions and shows a Red Flashing LED when the battery temperature sensor has picked up a temperature in excess of 50 deg C at its source (where ever you have fitted it) this will trip the unit until it has been reset. Please find the fault before resetting.

If the LED is on permanent Red, it means there is high voltage present at the output battery (or battery bank) being charged. This solid Red LED will warn you and switch off the charging. This LED indicates that either the Digital Mobile Charge has failed and was overcharging your battery bank, or you have some other charging source on your output battery bank which is overcharging the batteries and the Digital Mobile Charge senses the current which triggers the warning.

6) **BATTERY TYPE-** Tri Colored LED: This simply displays the battery type that the user has set the Battery Type Switch to**:**

1) Non-Sealed Lead Acid Battery (Orange LED)
2) Exide Gel Battery (Green LED)
3) Gel Battery (All others except Exide) (Green Flashing LED for 10 times)
4) AGM Battery (Red LED)

7) **HIGH ALTERNATOR VOLTAGE**: Specifically, this LED means that your alternators own regulator has failed and the alternator can now run unregulated with the possibility of overcharging damaging your batteries.

8**) ALTERNATOR TEMP-** Yellow: This monitors the temperature of the alternator and disengages the unit in the event of the alternator reaching 90 deg C, which waits for the alternator to cool down then automatically re-engages.

9) **UNIT FAILURE**: Red: This LED will give an indication in the event of a total unit failure.

Start-up and Test Procedure:

As soon as the unit is connected it senses the output voltage from the alternator, so when the alternator starts up, it will turn on the Digital Mobile Charge. Upon start up, the top battery type LED will illuminate yellow, red, green, or yellow flashing depending on the battery type selected, and the Fast Charge LED (3 down) will begin flashing slowly. This green LED slow flashes to shows that the unit is working but is inactive for the first 2.5 min. with the intention of allowing the engine start battery to recover a little.

After about 2.5 min. the Fast Charge green LED will stop flashing and change to a continuous green light, indicating the unit has begun charging. This high current output to the domestic battery bank will continue in cycles of approximately 20 minutes on and 3 minutes off to ensure the engine start battery is always maintained.

Once the domestic battery bank reaches a certain voltage (depending on the battery type setting but between 13.5-14v for 12v models or 27v-28v for 24v models), the Absorption LED will illuminate and the high rate of charging will continue for a period of time calculated by the Digital Mobile Charge (between 1-6 hours). This time period is determined by what battery type you have selected and the state of discharge of the domestic battery bank. The rest period continues to be 3 minutes off for every 20 minutes off. After the calculated amount of time is over, the unit drops to float at 13.5-13.8 Volts for 12v models or 27v - 27.6v for 24v models (dependent on battery selector switch) with no switch off period. A Float LED indication tells the operator the domestic battery bank is charged and is being held at a maintenance voltage.

The Digital Mobile Charge will attempt to hold the battery voltage at the above described Float range. If current is demanded, the Digital Mobile Charge will try to meet that demand and keep the domestic battery bank at float between 13.5-13.8 Volts (27v -27.6v).

If on start-up nothing happens, then:
1) Test the alternator voltage. It should be about 13.8 volts for 12v systems, but if it isn't then please check the user installed inline fuses. If you are still experiencing problems, please call 1-800-824-0524 as the unit may be defective.

2) If the alternator voltage is below 10 volts, then the alternator is either defective, or it may not be working because it needs 12 volts on the B+ terminal for it to work successfully. To check if this is the case, simply short for a couple of seconds a length of wire between the alternator output connection and one of the battery positive terminals in order to provide 12 volts up the alternator cable. If the alternator starts charging, then install the start sense wire as shown in Figure #2, (The Complete Installation Diagram).

Customer Service & 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 Digital Mobile Charge, simply call us at 1-800-824-0524 during standard business hours (8:30 AM – 5 PM Eastern Time) for Technical Support.

DIGITAL MOBILE CHARGE
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 and Professional Mariner, LLC 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.
- Warranty void if damage occurs due to negligent repairs.
- Customer is responsible for returning the product to On Board Solutions and Professional Mariner, LLC. 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 and Professional Mariner 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 and Professional Mariner. Additionally, On Board Solutions and Professional Mariner 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 and Professional Mariner 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 and Professional Mariner will ship the repaired or replaced product back to the purchaser.

Please contact Customer Service for additional assistance. 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.

Please Register your product with the enclosed warranty card, or online at www.promariner.com

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