
C-CHARGER®
MARINE ELECTRONIC BATTERY CHARGER

**INSTALLATION INSTRUCTIONS &
OWNER'S MANUAL
2000 SP Series**

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INTRODUCING... THE SP SERIES C-CHARGER®

Thank you for purchasing the SP SERIES C-CHARGER®. Your SP series C-Charger represents the latest in electronic, pulse-modulated switching chargers. The SP series C-Chargers incorporate Charles Industries' new battery selector switch that allows the use of currently available battery types (lead acid, gel cell and AGM). It is designed for hard-wired, on-board applications only. The SP series C-Charger converts AC shore power to DC charging current to maintain a selected battery type at 12 volts. The SP series models charge up to three battery banks simultaneously. All of the SP series C-Charger units operate under a wide range of input voltages yet maintain a constant output, avoiding any danger of overcharging marine batteries. When necessary, the SP series units are equipped with a cooling fan and an internal temperature compensation circuit that automatically adjusts to temperature variations, extending the life of the batteries.

The various models available in the 2000 SP series C-Charger product offering are listed in Table 1.

Table 1. SP Series C-Charger Specifications

Model Number	AC Input Voltage Range	AC Input Amps	DC Output Voltage	DC Output Amps	Dimensions LxWxH	Approx. Weight LBS.	Internal Replacement Fuse Size		Connection Reference
							AC	DC	
93-12102SP-A	100-135V	4	12V	10	8 1/8x9 5/8x3 3/4	5	8A/250V*	30A/32V**	Figure 1
93-12152SP-A	100-135V	4	12V	15	8 1/8x9 5/8x3 3/4	5	8A/250V*	30A/32V**	Figure 1
93-12202SP-A	100-135V	5	12V	20	8 1/8x9 5/8x3 3/4	5	8A/250V*	30A/32V**	Figure 1
93-12302SP-A	100-135V	7	12V	30	8 1/8x9 5/8x3 3/4	5	10A/250V*	40A/32V**	Figure 1
93-12402SP-A	100-135V	9	12V	40	10 1/2x9 5/8x3 3/4	7.5	10A/250V*	40A/32V**	Figure 1
93-12502SP-A	100-135V	11	12V	50	13 1/4x9 5/8x3 3/4	9	12A/250V*	(2)30A/32V**	Figure 2
* SLO-BLO FUSE									
**FAST ACTING FUSE									

Manual Purpose

With your personal safety in mind, this manual lists important safety precautions first, then covers installation, operation, maintenance, troubleshooting and warranty and customer service information.

WARNING

RISK OF EXPLOSIVE GASES! WORKING IN THE VICINITY OF A LEAD ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. THEREFORE IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE USING YOUR SP SERIES C-CHARGER YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.

To reduce risk of battery explosion, follow these instructions, those of the battery manufacturer, and the manufacturer of any equipment you use in the vicinity of the battery. Review cautionary markings on these products and on the engine.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. This manual contains important safety and operating instructions for your SP series C-Charger. Read the entire manual before usage. Also read all instructions and cautions for and on the SP series C-Charger and batteries.

Environmental Precaution

Do not expose the SP series C-Charger to rain, snow, or excessive moisture.

Application Precaution

These units are intended for hard-wired applications. Use of attachments not recommended or sold by Charles Marine & Industrial Products may result in risk of fire, electrical shock or personal injury.

Damaged Unit Precaution

Do not operate the SP series C-Charger if it has received a sharp blow, been dropped, or otherwise damaged. See the section in this manual on *Warranty & Customer Service*.

Disassembly Precaution

Do not disassemble SP series C-Charger. See the sections in this manual on *Maintaining the SP series C-Charger*, *Troubleshooting the SP series C-Charger* and *Warranty & Customer Service*.

Maintenance/Cleaning Precaution

To reduce the risk of electrical shock, disconnect the SP series C-Charger from AC power before attempting any maintenance or cleaning.

Personal Safety Precautions:

Adhere to the following personal safety precautions when installing or working with any SP series C-Charger:

1. Someone should be within voice range or close enough to come to your aid when you work near a lead acid battery.
2. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
3. Wear complete eye protection and clothing protection. Avoid touching eyes while working near a battery.
4. If battery acid contacts skin or clothing, wash them immediately with soap and water. If acid enters the eye, flood the eye with cold, running water for at least ten minutes and get medical attention immediately.
5. Never smoke or allow a spark or flame in the vicinity of the battery or engine.
6. Do not drop a metal tool onto the battery. It might spark or short circuit the battery or other electrical parts that may cause an explosion.
7. Remove all personal metal items such as rings, bracelets, necklaces and watches when working near a lead acid battery. A battery can produce short circuit currents high enough to weld a ring or the like to metal, causing a severe burn.
8. The SP series C-Charger is not intended to supply power to a low voltage electrical system other than in a marine application. Do not use the SP series C-Charger for charging dry cell batteries that are commonly used with home appliances. These batteries may burst and cause personal injury and property damage.
9. **NEVER** charge a frozen battery.

Preparing to Charge Precautions

CAUTION

To reduce risk of injury, refer to Figure 3 to insure that the proper cell type is selected. DO NOT attempt to charge multiple or non-recommended cell types. Other types of batteries may burst, causing personal injury and damage. When changing from one cell type to another, refer to Figure 3 to select the proper battery type.

Before charging a battery with the SP series C-Charger, read the following precautions:

1. If the battery must be removed from the boat, always remove the grounded terminal from the battery first.

Note: When removing the battery from the boat make sure all accessories in the boat are off.

2. Be sure the area around the battery is well ventilated while the battery is being charged. Gas can be forcefully blown away using a piece of cardboard or other non-metallic material as a "hand fan".
3. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
4. Add distilled water in each cell until battery acid reaches levels specified by the battery manufacturer. This helps purge excessive gas from cells. Do not overfill. For a battery without cell caps, carefully follow the manufacturer's recharging instructions.
5. Study all battery manufacturer's precautions, such as removing or not removing cell caps while charging and recommended rates of charge.

Connecting to the Battery Outside the Boat Precautions

SP series C-Chargers have been specifically designed for hard-wired marine use inside a boat. They are not designed or equipped for charging batteries on shore or outside a boat.

Grounding Precautions

When the SP series C-Charger is permanently mounted inside the boat, it must have a grounding conductor.

1. The SP series C-Charger should be connected to a metal, grounded, permanent wiring system. An equipment-grounding conductor should be run with the circuit wiring and connected through the SP series C-Charger housing grommets to the equipment grounding (GND) terminal on the SP series C-Charger.
2. Connections to the SP series C-Charger should comply with all local codes and ordinances.

INSTALLING THE SP SERIES C-CHARGER®

Verifying Proper Battery/Charger Type

SP series C-Charger models may be used for charging LEAD ACID (wet/flooded), GEL CELL (gelled electrolyte) or AGM (absorbed glass mat) batteries. All SP series C-Chargers have been factory preset for GEL CELL batteries. To change the battery type of the SP series C-Charger model, refer to Figure 3.

Choosing Mounting Location

The SP series C-Charger should be mounted vertically flush on a bulkhead in a protected area away from rain or spray, and be as close to the batteries as possible. The SP series C-Charger is designed to operate in high ambient temperatures, with the proper ventilation. Six inches of unobstructed area on all sides of the unit should be allowed for air circulation and cooling.

Note: When necessary, the SP series C-Chargers are equipped with cooling fans. The fans will start operation when the load is approximately 50% of the maximum rated output current. When a cooling fan is installed, a temperature compensation circuit automatically adjusts to room temperature variations. A

temperature coefficient of 0.02VDC/°C causes the output voltage of the SP series C-Charger to change inversely with the change in room temperature. The purpose of this circuit is to extend the life of the batteries.

Choosing Mounting Hardware

As with any marine equipment, secure mounting is of utmost importance. The bolts or screws used to secure the SP series C-Charger must be 1/4 inch diameter, backed with a flat washer, and kept vibration-free with a split-ring lock washer. If using bolts, they must be long enough to be secured on both sides of the bulkhead. If using screws, they should be at least 1-inch long. All hardware should be corrosion-resistant.

Mounting the SP Series C-Charger®

All corrosion-resistant mounting hardware should be readily available. Follow the steps below to mount the SP series C-Charger to the bulkhead.

Step	Action
1.	Mark the mounting holes.
2.	Remove the unit and drill the mounting holes.
3.	Insert one side of the mounting hardware half-way into the drilled mounting holes.
4.	Align the mounting slots on the SP series C-Charger with the inserted hardware and slide the SP series C-Charger's mounting flange under the washers.
5.	Insert the mounting hardware for the other side.
6.	Secure all mounting hardware.

Mounting the Optional Splash Guard

Step	Action
1.	Position and install the optional splash guard over the SP series C-Charger so that the back flange bottom rests on top of the SP series C-Charger. This ensures proper vertical spacing for ventilation. For optimum splash protection, be sure to center the splash guard horizontally over the SP series C-Charger.
2.	Secure with 1/4 inch diameter screws.

Choosing Electrical Wiring Hardware

The SP series C-Charger is intended for hard-wiring in a permanent application. Conduit or other appropriate marine electrical installation hardware should be used.

Note: Do not wire any additional AC and/or DC operated products and/or cables to the charger

Choosing Wire Gauge

Use Table 2 to determine the appropriate wire gauges. Avoid unnecessarily long runs of either AC or DC power lines.



Before working on electrical equipment, first determine there is no live power. Double check power connections and all battery terminations.

WARNING

Connections to the SP series C-Charger shall comply with the U.S. Coast Guard Electrical Regulations (33CFR183 subpart I).

Table 2. Minimum Wire Sizes

MODEL NO. (+/- 1.0)	AC INPUT			AC TORQUE SPEC.	DC OUTPUT		DC TORQUE SPEC. (+/- 1.0)
	25'	50'	100'		15'	25'	
93-12102SP-A	18 AWG	18 AWG	12 AWG	8 INCH LBS	12 AWG	12 AWG	8 INCH LBS
93-12152SP-A	18 AWG	18 AWG	12 AWG	8 INCH LBS	12 AWG	12 AWG	8 INCH LBS
93-12202SP-A	18 AWG	16 AWG	12 AWG	8 INCH LBS	12 AWG	12 AWG	8 INCH LBS
93-12302SP-A	16 AWG	16 AWG	10 AWG	8 INCH LBS	10 AWG	8 AWG	8 INCH LBS
93-12402SP-A	16 AWG	16 AWG	10 AWG	8 INCH LBS	8 AWG	6 AWG	8 INCH LBS
93-12502SP-A	16 AWG	14 AWG	8 AWG	8 INCH LBS	6 AWG	6 AWG	16 INCH LBS

Making AC Connections on Terminal Block 1 (TB1)

After determining the wire lengths and gauges (see Table 2), make the AC wiring connections to TB1. Use captive spade or ring terminals.

To make connections to terminal block 1:

Step	Action
1.	Depending on the unit either: Remove the screw(s) at the top and the single screw in the front of the unit, and then remove the cover. or Remove the small screw in the center of the unit securing the sliding door to the top cover, and slide the door until it stops.
2.	Bring the AC input wires in through the left side access hole on the bottom of the unit.
3.	Connect the WHT terminal to the white (neutral) input.
4.	Connect the BLK terminal to the black (hot) AC input
5.	Connect the GRN terminal to the green (ground) input.
6.	Torque the screws to the specifications indicated in Table 2 for your model.

Making DC Connections on Terminal Block 2 (TB2)

After the appropriate wire lengths and gauges have been determined, follow the steps below to make the DC connections to TB2. Use captive spade or ring terminals when necessary.

To make connections to terminal block 2:

Step	Action
1.	Route the DC wire through the right side access hole.
2.	Connect the positive (+) terminal to the battery. <i>Note: There are up to three positive (+) terminals for three batteries.</i>
3.	Connect the negative (-) terminal to the battery. <i>Note: This is a common negative for up to three batteries.</i>
4.	Torque the screws to the specifications indicated in Table 2 for your model.

Installing External Fuse (not supplied)

WARNING

In accordance with ABYC E-11, a fuse or circuit breaker must be placed within 7 inches of the battery on all positive conductors, or within 72 inches of the battery if the entire cable length is enclosed in a conduit. Also see Coast Guard Reg. 33CFR183, subpart I.

Fuses and/or circuit breakers must be sized 120 to 150% of the unit's output amperage (Table 1), but no greater than 150% of the rating of the conductor.

Replacing the Cover

Before replacing the cover, make sure that all electrical connections have been properly made at all the battery banks (most important) and at the SP series C-Charger. Also check that all wiring is properly dressed with no exposed, bare wires.

Applying Power

Step	Action
1.	Apply shore power to the unit and turn on the AC power source circuit breaker.
2.	Check the front-panel ammeter for movement. A substantial movement in a clockwise direction indicates the batteries need a charge (there should be a slight movement even if the batteries are charged). If a counterclockwise movement occurs, turn off power immediately and refer to Table 4.

If the SP series C-Charger does not charge batteries or perform as described, refer to the section in this manual on *Troubleshooting the SP Series C-Charger*.

OPERATING THE SP SERIES C-CHARGER®

Always follow all precautions in the section on *Important Safety Instructions* in this manual.

Proper Operation

When properly installed and connected, the SP series C-Charger will automatically charge and maintain the batteries. When power is applied, the SP series C-Charger will enter a bulk or "quick-charge" mode, during which a higher rate of charge is achieved to replenish the batteries. After four (4) hours in the quick-charge mode, the output will drop to a float rate to maintain the batteries at the selected finishing voltage (refer to the charge voltages in Table 3).

Table 3. Charge Voltages

CHARGE VOLTAGE (BULK)	CHARGE VOLTAGE (FLOAT)	BATTERY TYPE
14.5V	Lead Acid (Wet/Flooded)	13.6V
14.2V	Gel Cell (Gelled Electrolyte)	13.6V
14.2V	AGM (Absorbed Glass Mat)	13.4V

Changing Internal Fuses

Irregular conditions or loads may cause one or both of the internal fuses to blow. ALWAYS determine there is no live power before replacing a fuse.

Step	Action
1.	Open the cover as described in the <i>Making AC Connections</i> section.
2.	The AC fuse (F1) is located just above the AC terminal block (TB1) and the DC fuse (F2) is located to the right of the DC terminal block (TB2) (see Figures 1 or 2). When replacing fuses, use only fuses of the exact type and rating (see Table 1).
3.	Before reapplying power, replace and secure the cover.

MAINTAINING THE SP SERIES C-CHARGER®

There are no adjustment or maintenance requirements for the SP series C-Charger other than cleaning the outside cabinet with a dry cloth. Periodically have all connections checked by a qualified service person, especially if the boat is operated in heavy, pounding seas.

CAUTION

For lead acid batteries, check the water levels of the batteries frequently, especially if the boat is at dock for extended periods of time. Low water levels will damage batteries!

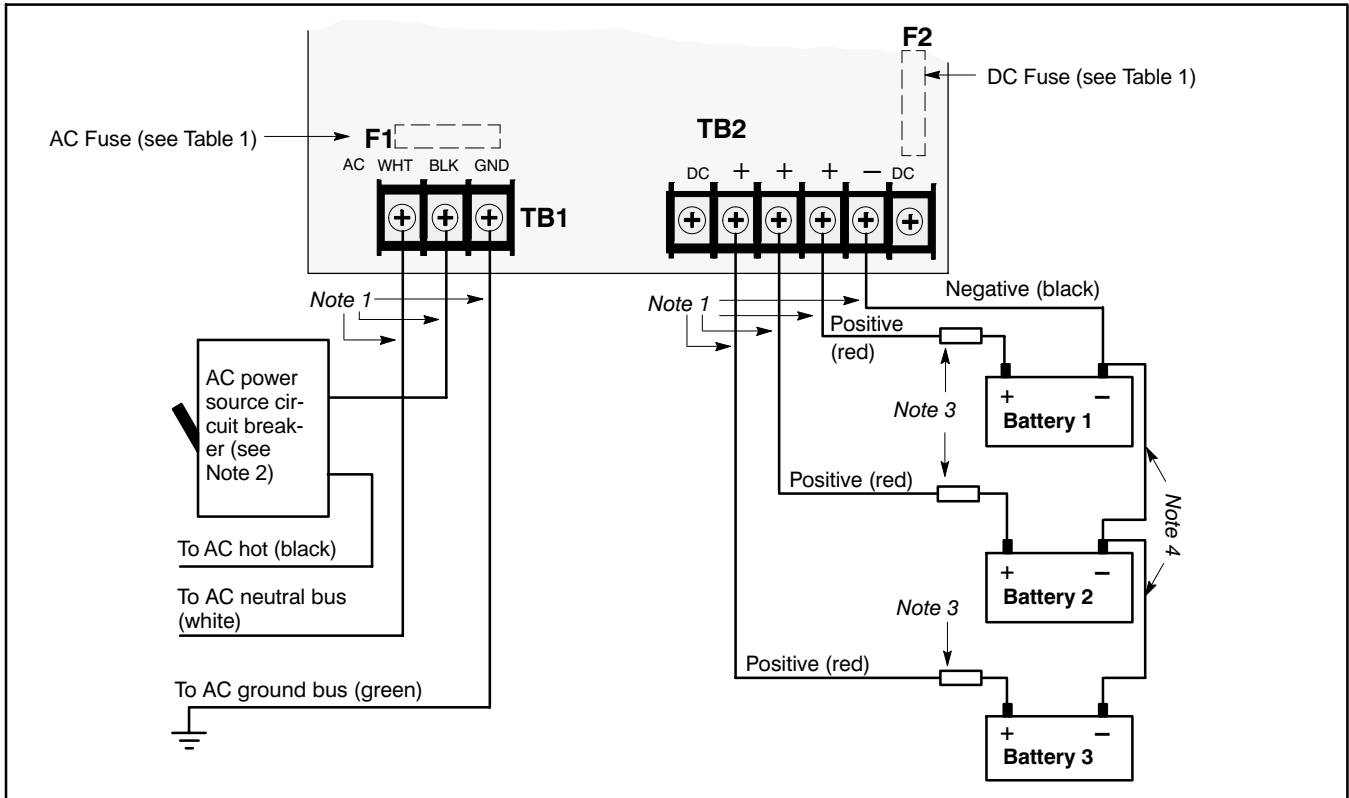


Figure 1. Wiring Diagram (Reference Table 1 for Applicable SP Series C-Charger Model)

- Note:
1. AC wiring and DC wiring (see Table 2).
 2. AC circuit breaker should be sized as closely as possible to the rated AC input amperage (see Table 1).
 3. DC fuse/circuit breaker installation—ABYC standards require a fuse or circuit breaker to be placed within 7 inches of the battery on all positive conductors, or within 72 inches of the battery if entire cable length is enclosed in a conduit. Fuses/circuit breakers must be sized 120–150% of the unit's output amperage, but no greater than 150% of the rating of the conductor.
 4. Black jumper (common negative) only necessary if batteries are not pre-wired with common negative.

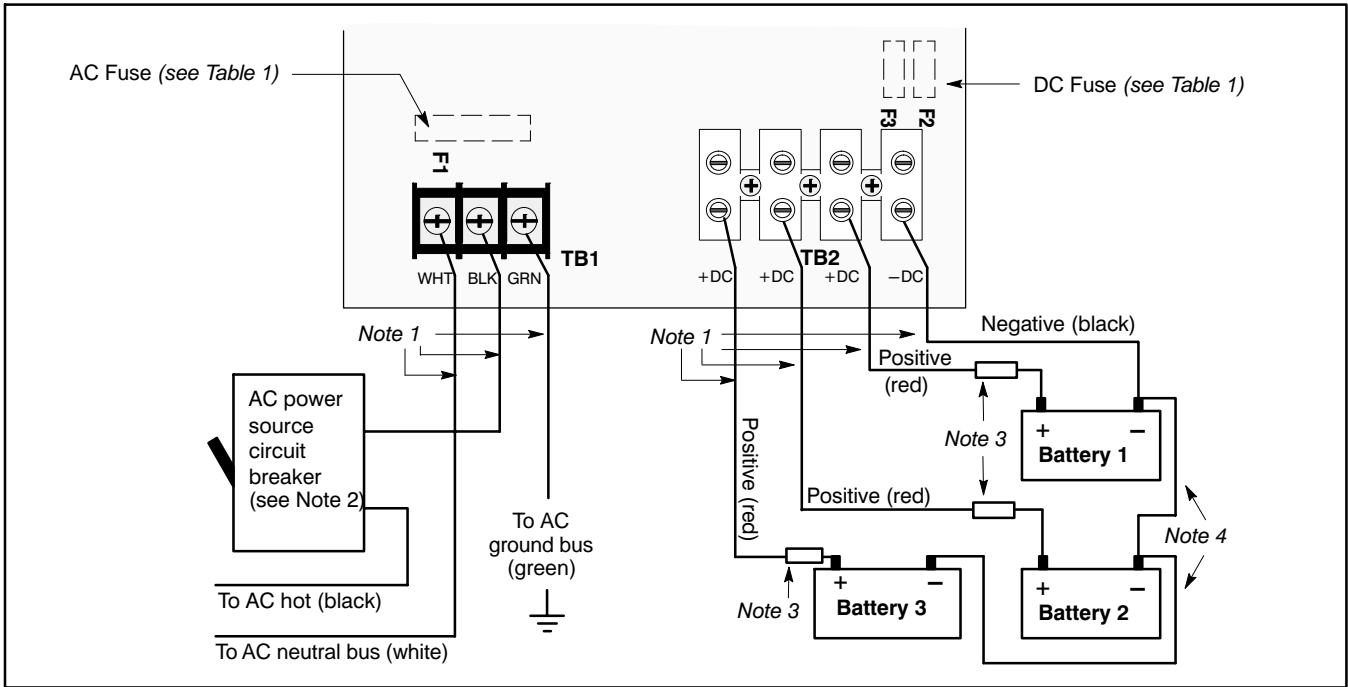


Figure 2. Wiring Diagram (Reference Table 1 for Applicable SP Series C-Charger Model)

- Note:
1. AC wiring and DC wiring (see Table 2).
 2. AC circuit breaker should be sized as closely as possible to the rated AC input amperage (see Table 1).
 3. DC fuse/circuit breaker installation—ABYC standards require a fuse or circuit breaker to be placed within 7 inches of the battery on all positive conductors, or within 72 inches of the battery if entire cable length is enclosed in a conduit. Fuses/circuit breakers must be sized 120–150% of the unit’s output amperage, but no greater than 150% of the rating of the conductor.
 4. Black jumper (common negative) only necessary if batteries are not pre-wired with common negative.

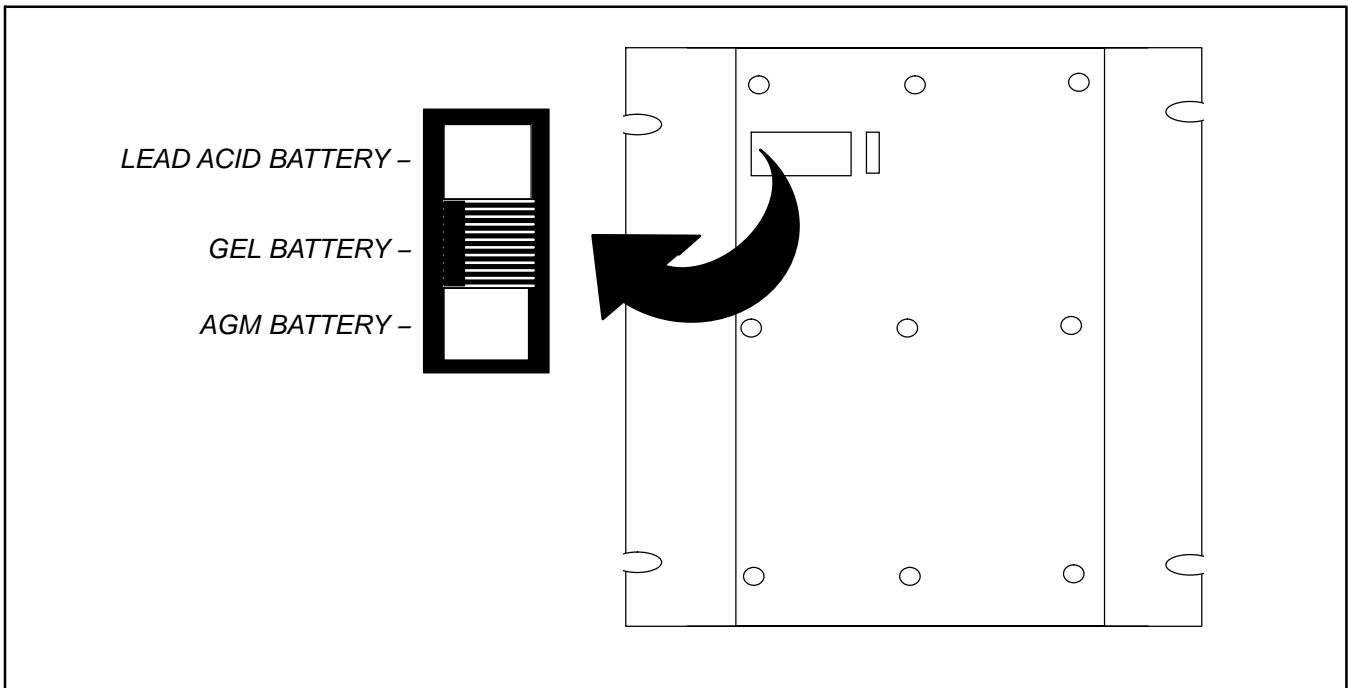


Figure 3. Battery Type Selectable Switch (Bottom View)

TROUBLESHOOTING THE SP SERIES C-CHARGER®

If there is a problem with the SP series C-Charger, check that all connections are correct and secure. If all connections are good, see if the problem is covered in Table 4. If the problem is not covered, or if the SP series C-Charger still malfunctions after performing the solution given, contact Charles Marine Products for technical assistance.

Table 4. Troubleshooting Suggestions

Item	Condition	Solution
1.	Not clear if batteries are fully charged.	As the batteries charge, the ammeter gradually falls. When it reads zero, the batteries are fully charged.
2.	It takes too long to charge batteries.	The SP series C-Charger brings a discharged battery voltage level up slowly to avoid shortening the life of the battery. The recharge time depends on the degree of discharge.
3.	Unable to identify if lack of battery charge is due to a battery problem or a SP series C-Charger problem.	<p>When the ammeter reads zero, test the condition of a battery by first turning off the AC power source to the SP series C-Charger, and disconnecting the battery from the SP series C-Charger for at least one hour. Connect battery to an ohm-volt meter. A reading of 12.6 VDC or more is desirable. A reading between 12.4 and 12.6 indicates a charge between 75 and 100%. A reading between 12.2 and 12.4 VDC indicates a charge between 50 and 75%. Consult the battery manufacturer's specifications and instructions.</p> <p>If it appears the battery is operating properly, proceed to check the following only after reading and fully understanding all safety instructions listed in this manual. Check input voltage at 120 VAC, check the SP series C-Charger's AC fuse and DC fuses, check the battery fuse/AC circuit breaker (Figures 1, 2 or 3, Note 3) and check all associated wiring connections. If these appear to be working, the SP series C-Charger's DC output can be tested by turning off all AC power to the unit and then disconnecting all DC outputs from the charger. Upon reapplying AC power, the DC voltage between any DC (+) and DC (-) output terminal on TB2 should be between 13.5 and 15 volts DC. Should the unit still be inoperable after all tests have been completed in sequence, refer to the section in this manual on <i>Warranty & Customer Service</i>.</p>
4.	The ammeter deflects in a counterclockwise direction.	Disconnect the unit immediately. Examine wiring instructions again to assure proper connections. A movement in a counter-clockwise direction or a full-scale movement indicates excessive current. A wiring error is suspected. A voltmeter can monitor the voltage at the battery when the SP series C-Charger is turned on. An increase in voltage should occur as power is applied.
5.	The internal red LED is on.	The unit is at half power because the ambient air is too hot. The unit may be at half power because the fans are not working. Full power will be restored when the temperature returns to normal.

WARRANTY AND CUSTOMER SERVICE

Warranty

The CHARLES Marine & Industrial Group warrants the unit will be free from defects in materials and workmanship that cause mechanical failure for two (2) years, as set forth in the Limited Warranty. Notice of any alleged defect in material or workmanship must be provided within thirty (30) days of discovering the problem, and within the warranty period. Follow the procedure outlined below to obtain warranty service.

Service

Note: Do not attempt to service the unit. Contact the Service Center.

Service Center and Repair Correspondence

To contact the Service Center via telephone directly:

800-830-6523 (Toll Free)

217-932-2317 (Voice)

217-932-2473 (FAX)

Call to obtain a Returned Materials Authorization (RMA) number prior to returning any unit to Charles Industries.

Return the unit for repairs to the Service & Repair Center address below:

Charles Industries, Ltd.

Marine & Industrial Group

503 NE 15th Street

Casey, IL 62420-2054

USA

Correspondence can be sent to Corporate Headquarters via the address below:

Note: Do not return the unit to this address.

Charles Industries, Ltd.

Marine & Industrial Group

5600 Apollo Drive

Rolling Meadows, IL 60008-4049

USA

847-806-6300

www.charlesindustries.com

SPECIFICATIONS

The specifications for the 2000 SP series C-Charger are listed in Table 1.

