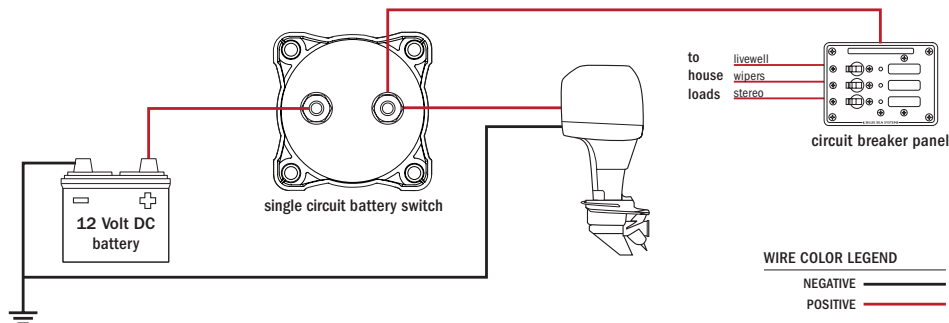


## Upgrading Battery Switching and Charge Management with the ADD A BATTERY Dual Circuit System

The ADD A BATTERY Dual Circuit System from Blue Sea Systems is a two-battery management system that simplifies switching and automates charging. It is easy to use and install, and is designed to be used with alternators with a maximum output of 120 Amperes. This article describes two typical single-engine marine charging systems, and details a common ADD A BATTERY installation.

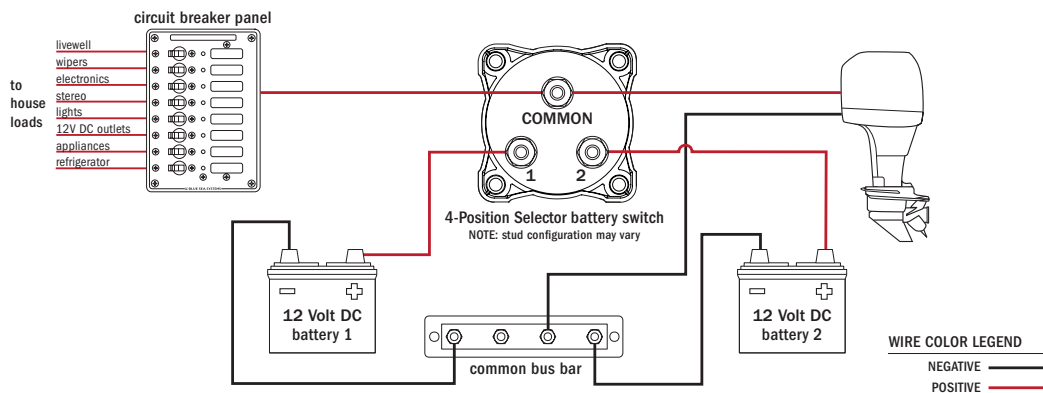
### SINGLE BATTERY BANK, WITH A SINGLE ON/OFF SWITCH

In a typical single battery system, the starting and house loads are powered by a single battery, resulting in a risk of draining the battery with a stereo or other large load. An afternoon of fishing could suddenly turn serious if the battery is too drained to start the engine. Consequently, the amount of current drawn by the house loads must be kept to a minimum, which could limit the number of accessories used.



Although this ON/OFF switch is simple to operate, keeping the battery charged may be difficult. Charge management is critical, but attending to it constantly detracts from the fun of boating. Failure to get it right could lead to a dead battery and a potentially dangerous situation.

### TWO BATTERY BANKS, WITH A 4-POSITION SELECTOR SWITCH



A common way to handle additional loads beyond starting requirements is with a second battery and a 4-position selector switch. This enables the addition of more loads than a single battery system would tolerate. Either battery can be used to power the starting and house loads, and the switch will also combine batteries for charging or emergency starting.

There is a problem with this arrangement, however. The switching sequence must be remembered and followed, every time. When charging of both batteries is desired, it is necessary to move the switch to the 1+2 position. If the switch is not moved back to the 1 or 2 position, and house loads are being used heavily, both batteries can be drained. Since there is only a 1-volt difference between a fully charged battery and a depleted one, it doesn't take much to drain both batteries to a point where they will no longer start the engine.

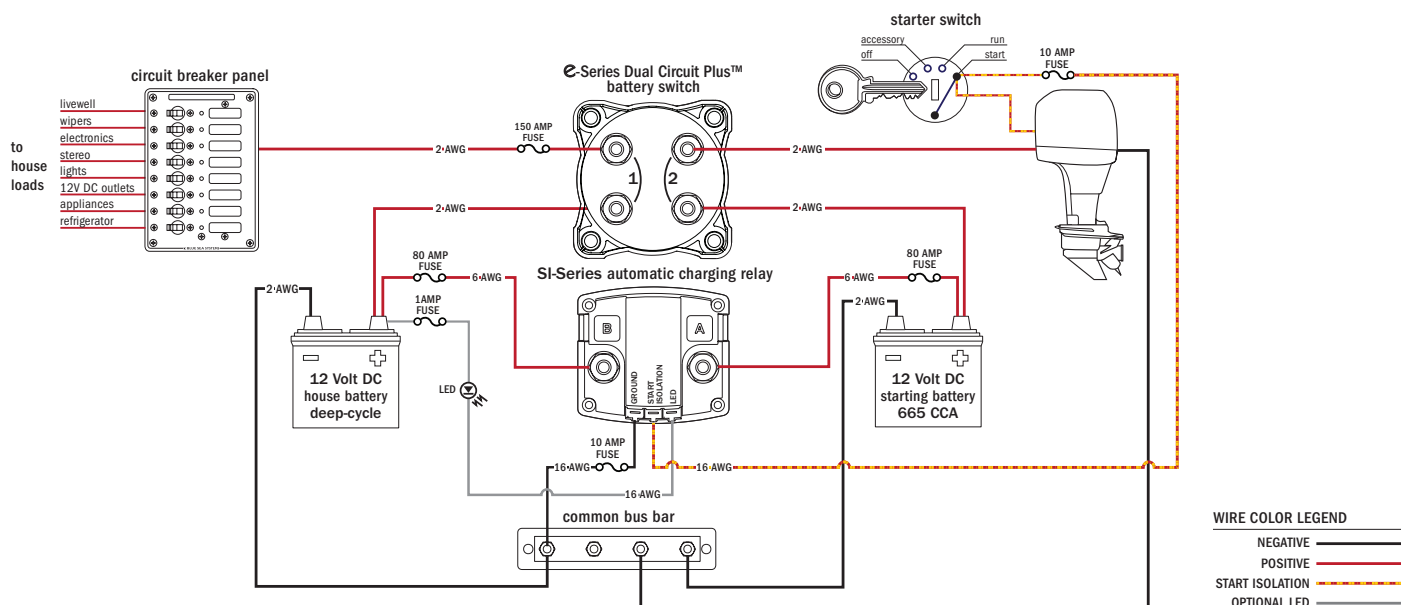
### TWO BATTERY BANKS, WITH THE ADD A BATTERY Dual Circuit System

An ideal way to switch and manage charge of the batteries while underway is with the ADD A BATTERY from Blue Sea Systems. This includes the Dual Circuit Plus™ battery switch and the 120 Ampere SI-Series Automatic Charging Relay (ACR). Together, these components simplify switching and automate charge sharing. In addition, the start isolation feature of the ACR protects sensitive electronics from potentially damaging voltage fluctuations during engine cranking.

The SI ACR fully automates charging of two batteries from a single charge source, eliminating the complication of "sharing the charge" manually with the selector switch. If the SI ACR senses that a charge is present on either battery (indicated by a high enough voltage) it will offer the charge to both batteries. If the battery voltage subsequently drops to a preset threshold, the ACR will isolate the batteries. Even if the house battery becomes fully discharged, the starting battery will remain charged.

## INSTALLING THE ADD A BATTERY Dual Circuit System

The following diagram shows one possible installation of the ADD A BATTERY Dual Circuit System.



The wire and circuit protection sizes shown will be adequate to meet the needs of many boats. The addition of a high-amperage load such as a trolling motor on the house battery will significantly change the wire size and circuit protection requirements of the house circuit. Further, long wire runs often require heavier gauge wire than shorter ones.

The following wire sizing and fuse rating charts are included to help with wire size and fuse selection. Remember that the total length of a wire must be calculated from the battery to the load and back.

Wire sizing chart		
Charging Amps	Minimum Wire Size*	Fuse Amps
60	#6	80
80	#4	110
100	#2	150
120	#1	175

Wire sizing chart		
Charging Amps	Minimum Wire Size*	Fuse Amps
50	10 mm <sup>2</sup>	75/80
70	16 mm <sup>2</sup>	80/90
90	25 mm <sup>2</sup>	125/130
110	35 mm <sup>2</sup>	150
120	50 mm <sup>2</sup>	150/175

\* Larger wire sizes may be required to minimize voltage drop in long wire runs.

For more information please visit Blue Sea Systems DC Circuit Wizard. Go to [www.bluesea.com](http://www.bluesea.com) and click on Use DC Circuit Wizard under the heading QUICKLINKS

This diagram and text are intended to provide assistance with the installation of this product, and are not a substitute for a more comprehensive knowledge of electrical systems. If the demands of this installation exceed available knowledge, please have a competent electrical professional perform this installation.

Mount the SI ACR and the Dual Circuit Plus™ battery switch close to the batteries. Always follow safety procedures when working in and around batteries, and disconnect all cables from the battery terminals before beginning installation.

Fuse all connections to the SI ACR, including the ground (GND) connection.

It is extremely important to have good, clean, ground connections. The negatives of the batteries must be tied together, and proper connection to the GND terminal of the SI ACR is critical. Connect all grounds to a bus bar.

The SI ACR uses a built-in LED to indicate when the batteries are combined. To monitor this status from a remote location, connect a remote LED as shown on the diagram. A Blue Sea Systems DC LED will have a red wire and a yellow wire. Be sure to connect the yellow wire to the LED terminal of the SI ACR, and the red wire to the positive terminal of the house battery or a positive terminal in the power distribution panel.

Wiring of the start isolation function of the SI ACR is not necessary for normal operation. However, many boaters find it worthwhile to enable this feature, since it protects sensitive (and expensive) electronics from voltage sags and spikes caused by engine cranking. Remember to install the SI wire to a point at 12V only when the engine key is in the START position. For more information about the start isolation feature, follow this link: <http://bluesea.com/viewresource/63>

## OPERATING THE ADD A BATTERY Dual Circuit System

Operation of the ADD A BATTERY system is as simple as using an ON/OFF switch. Upon arriving at the boat, turn the switch ON. When the day's boating activities are over, turn the switch OFF. Setting the switch to COMBINE BATTERIES will enable paralleling of the batteries for emergency starting if the starting battery should somehow become drained or is no longer accepting charge. This enables the starting circuit to use the house battery. It is not recommended that the COMBINE BATTERIES position be employed to use the starting battery to provide additional power for house loads, or while the engine is off.

Installing the Blue Sea Systems ADD A BATTERY Dual Circuit System may prevent a dangerous dead battery situation or eliminate the need for an embarrassing request for assistance to another boater. Whether the ADD A BATTERY is used to replace a selector switch or upgrade to a two-battery system, it combines the benefits of simple operation and sophisticated technology to offer today's boat owner convenience and peace of mind.