

## Dual Battery Main Distribution Panel One Dual Circuit Plus™ Battery Switch PN 8686/8690

### Features

- Power distribution, switching, and circuit protection combined in one panel
- Configurable to suit specific needs of individual boat owners
- Dual Circuit Plus™ Battery Switch: m-Series (8686) or e-Series (8690)
- Two 15A thermal circuit breakers provide 24-hour circuit protection
- Each circuit contains circuit labels and LED indicator lights that provide circuit status
- Blank slots to accommodate additional circuit breakers or switches

### Panel Specifications

|                          |  |
|--------------------------|--|
| Material:                | 0.125" 5052-H32 Aluminum Alloy   |
| Primary Finish:          | Chemical Treatment per MIL SPEC C-5541C  |
| Final Panel Finish:      | Graphite color 2 part textured Polyurethane  |
| Maximum Voltage Rating:  | 24V DC   |
| House Amperage Rating:   | 100A Max (on installed circuit)  |
| Switch Amperage Ratings: | <b>Continuous:</b> 8686-300A, 8690-350A<br><b>Intermittent (5 min.):</b> 8686-450A, 8690-525A<br><b>Cranking (10 sec.):</b> 8686-1,000A, 8690-1,000A |

|                        | PN                             | Inches      | Millimeters     |
|------------------------|--------------------------------|-------------|-----------------|
| Dimensions:            | 8686                           | 4.50 x 7.50 | 114.3 x 190.50  |
|                        | 8690                           | 5.25 x 8.00 | 133.35 x 203.20 |
| Mounting Centers:      | 8686                           | 3.67 x 6.67 | 93.22 x 169.42  |
|                        | 8690                           | 4.42 x 7.17 | 112.27 x 182.12 |
| Switch Terminal Studs: | 3/8"-16 (accepts M10 terminal) |             |                 |
| Torque:                | 140 in-lbs.                    |             |                 |

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## How it works

The Dual Circuit Plus™ Battery Switch turns the house and start batteries on at the same time, but isolates them from each other. Battery isolation protects the start battery from being discharged from the many house loads like refrigerators, stereos, and lights, preserving it for starting the engine. Battery isolation also protects sensitive electronics from voltage spikes and sags that may occur during engine starting. The Dual Circuit Plus™ Battery Switch simplifies battery switch operation—it performs the same operation as three ON/OFF battery switches. The engine and house batteries are turned ON at the same time when the boat is boarded and OFF when the boat is not in use. This minimizes the opportunity for error. In an emergency requiring that both batteries be combined—e.g., a discharged start battery—the operator simply turns the switch knob to the COMBINE BATTERIES position.

The Dual Circuit Plus™ Battery Switch automates the charging of two battery banks when coupled with an Automatic Charge Relay (PN 7610 or PN 9112). This combination creates a complete battery management system of isolated battery circuits, emergency cross connect (emergency parallel) functions, and automated charge management.

## ⚠ WARNING ⚠

- ✓ If the installer is not knowledgeable about electrical systems, consult an electrical professional.
- ✓ If either the panel front or back is to be exposed to water it must be protected with a waterproof shield.
- ✓ Standard Blue Sea Systems battery management panels are ignition protected as shipped.
- ✓ Custom panels are ignition protected when supplied with ignition protected circuit breakers.
- ✓ The main positive connection must be disconnected at the battery post to avoid the possibility of a short circuit during the installation of this distribution panel.

### Guarantee:

Blue Sea Systems stands behind its products for as long as you own them. Find detailed information at [www.blueseasystems.com/about](http://www.blueseasystems.com/about). For customer service, call 800-222-7617.

### Applicable Standards

- American Boat and Yacht Council (ABYC) Standards and Recommended Practices for Small Craft sections: E-1, E-3, E-11.
- United States Coast Guard 33 CFR Sub Part 1, Electrical Systems.
- National Fire Protection Agency (NFPA) 302

### Useful Reference Books

- Calder, Nigel (2005). *Boatowner's Mechanical and Electrical Manual* (3rd ed). Camden, ME: International Marine / McGraw-Hill.
- Wing, Charlie (2006). *Boatowner's Illustrated Electrical Handbook* (2nd ed). Camden, ME: International Marine / McGraw-Hill.

### Other Innovative Products from Blue Sea Systems

- 360 Panel System
- Battery management solutions
- AC and DC circuit protection devices
- WeatherDeck™ waterproof panels
- BusBars, fuses, and fuse blocks
- Analog and digital meters

## Installation

### 1. Disconnect all DC power

To eliminate the possibility of a short circuit while installing the panel, disconnect the main positive cable from all batteries.

### 2. Select mounting location and cut opening

Select a mounting location that is protected from water on the panel front and back and is not in an area where flammable vapors from propane, gas or lead acid batteries accumulate.

Using the panel template provided, make a cut out in the mounting surface where the panel is to be mounted. Do not fasten the panel to the mounting surface.

### 3. Install LED negative feed wire

Use a 16 AWG wire to connect the LED negative feed (Yellow) wires to a DC negative bus.

### 4. Electrical Connections

Battery cable terminals must be attached under battery switch stud nut and lock washer. The electrical connection illustration is general in nature and is not meant to be a guide for the wiring of any specific vessel. There are many possible wiring configurations. Consult your marine electrical professional for the wiring system applicable to your boat.

Make appropriate adjustments to the wiring diagram to suit your specific installation and equipment. Fusing may be appropriate in several of the lines depending on the proximity of components, conductor sheathing, and the conductivity of the surrounding structure. Consult the **Wire Sizing Chart** to determine the appropriate wire sizes.

### 5. Apply Labels and Mount Panel

Apply a label to each of the circuits from the label sheet provided. Additional labels are available from Blue Sea Systems. Fasten the panel to the mounting surface using the screws provided.

## Wire Sizing Chart

1. Calculate the maximum sustained amperage of the circuit. Measure the length of the circuit from the power source to the load and back.
2. Calculate **Famps** (Feet x amps). Multiply circuit length by max. current.
3. Base the wire on either the 3% or 10% **voltage drop**. In general, items which affect the safe operation of the boat and its passengers (running lights, bilge blowers, electronics) use 3%; all other loads use 10%.
4. Are the circuit runs in an **engine space** or **non engine space**?
5. Starting in the **Famps** column with the right **voltage** and **voltage drop**, run down the list until arriving at a value which is greater than the calculated **Famps**. Move left to the **Ampacity** column to verify that the total amperage of the circuit does not exceed the maximum allowable amperage of the wire size for that row. If it does, move down until the wire ampacity exceeds the circuit amperage. Finally, move left to the **wire size** column to select the wire size.

### Example

A 12 volt system at 10% drop with a 40' circuit x 45 amps = 1800 Famps. A wire size of 8 is required.

| Wire Size | Wire Ampacity non-engine | Wire Ampacity engine | Voltage →      |       | 12    |       | 24    |       | 32    |  |
|-----------|--------------------------|----------------------|----------------|-------|-------|-------|-------|-------|-------|--|
|           |                          |                      | 3%             | 10%   | 3%    | 10%   | 3%    | 10%   |       |  |
|           |                          |                      | Voltage Drop → |       | Famps |       | Famps |       | Famps |  |
| 16        | 25.0                     | 21.3                 | 86             | 288   | 173   | 576   | 230   | 768   |       |  |
| 14        | 35.0                     | 29.8                 | 138            | 459   | 275   | 918   | 367   | 1223  |       |  |
| 12        | 45.0                     | 38.3                 | 219            | 729   | 437   | 1458  | 583   | 1944  |       |  |
| 10        | 60.0                     | 51.0                 | 348            | 1159  | 695   | 2317  | 927   | 3090  |       |  |
| 8         | 80.0                     | 68.0                 | 553            | 1843  | 1106  | 3686  | 1474  | 4915  |       |  |
| 6         | 120.0                    | 102.0                | 879            | 2929  | 1757  | 5858  | 2343  | 7811  |       |  |
| 4         | 160.0                    | 136.0                | 1398           | 4659  | 2796  | 9319  | 3727  | 12425 |       |  |
| 2         | 210.0                    | 178.5                | 2222           | 7408  | 4445  | 14815 | 5926  | 19754 |       |  |
| 1         | 245.0                    | 208.3                | 2803           | 9342  | 5605  | 18684 | 7474  | 24912 |       |  |
| 0         | 285.0                    | 242.3                | 3536           | 11788 | 7073  | 23576 | 9430  | 31434 |       |  |
| 00        | 330.0                    | 280.5                | 4457           | 14858 | 8915  | 29715 | 11886 | 39620 |       |  |
| 000       | 385.0                    | 327.3                | 5619           | 18731 | 11239 | 37462 | 14985 | 49950 |       |  |
| 0000      | 445.0                    | 378.3                | 7086           | 23620 | 14172 | 47241 | 18896 | 62988 |       |  |

Note: For wire with 105°C insulation rating and AWG wire sizes.

Chart courtesy of the West Advisor

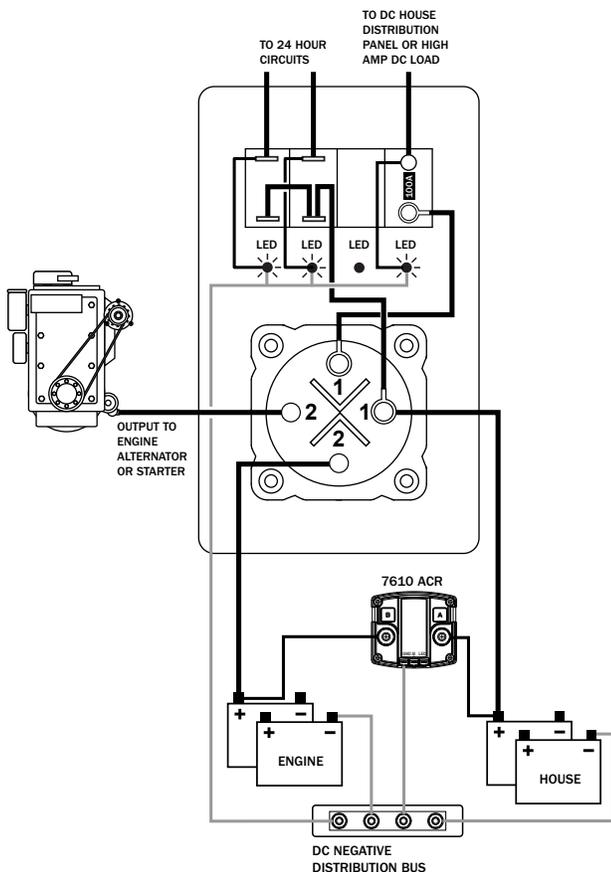
## Caution: ABYC Interrupt

In certain circumstances, main DC circuit breakers may have to break very high amperages. The ability of a circuit breaker to safely break high amperage is its Ampere Interrupt Capacity (AIC) rating. AIC is a function of a battery's Cold Cranking Amperes (CCA) capacity. According to ABYC E-11 standards, circuit breakers shall have a DC voltage rating of not less than the nominal system voltage, be capable of an interrupting capacity according to the values in the table below, and remain operable after the fault. For example, a boat with a group 24 or 27 battery may have as much as 650 CCA. The DC main circuit breaker for this circuit must have an AIC rating of 1500 Amperes.

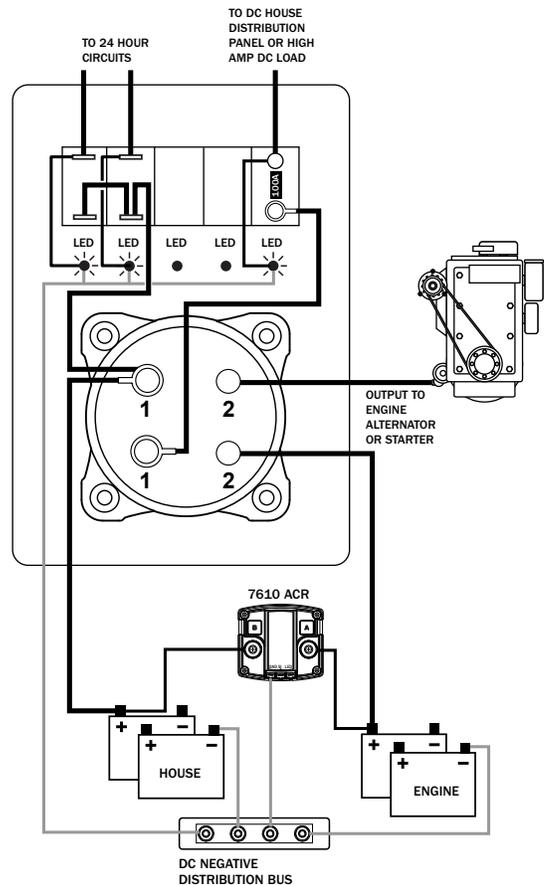
| DC voltage rating   | CCA of all connected batteries | Ampere Interrupt Capacity (AIC) |                                  |
|---------------------|--------------------------------|---------------------------------|----------------------------------|
|                     |                                | Main Circuit Breaker (Amperes)  | Branch Circuit Breaker (Amperes) |
| 12 Volt and 24 Volt | 650 or less                    | 1500                            | 750                              |
|                     | 651-1100                       | 3000                            | 750                              |
|                     | over 1100                      | 5000                            | 2500                             |
| 32 Volts            | 1250 or less                   | 3000                            | 1500                             |
|                     | over 1250                      | 5000                            | 2500                             |

Blue Sea Systems Battery Management Panels contain thermal (push button reset) circuit breakers rated at 15A. These circuit breakers are suitable for 24-hour circuits connected directly to 12V or 24V battery banks with CCA capacities less than 660A.

Installation of this panel in systems with battery banks of 660A or higher should include an additional fuse or circuit breaker of appropriate interrupt capacity in the line between the battery bank and the pushbutton circuit breakers to comply with ABYC E-11 and NFPA 302.



**Wiring Diagram**  
Dual Battery Main Distribution Panel  
PN 8686 Shown



**Wiring Diagram**  
Dual Battery Main Distribution Panel  
PN 8690 Shown