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, 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. Battery cable terminals must be attached under battery switch stud to the mounting surface using the screws provided.

Ensure 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 (7610 or 9112). This combination creates a complete battery management system of isolated battery circuits, emergency cross connect (emergency parallel) functions, and automated charge management.

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: Continuous: 300A per circ. 350A per circ. Intermittent (5 min.): 450A per circ. 525A per circ.
- Cranking (30 sec.): 675A per circ. 700A per circ.
- Switch Terminal Studs: 3/8"-16 (accepts M10 terminal)
- Dimensions: 8686 8690
  - 4.50 x 7.50 114.3 x 190.50
  - 5.25 x 8.00 133.35 x 203.20
- Mounting Centers: 8686 8690
  - 3.67 x 6.67 93.22 x 169.42
  - 4.42 x 7.17 112.27 x 182.12
- Switch Terminal Studs: 3/8"-16 (accepts M10 terminal)

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. 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.

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.

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.

<table>
<thead>
<tr>
<th>DC voltage rating</th>
<th>CCA of all connected batteries</th>
<th>Ampere Interrupt Capacity (AIC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Main Circuit Breaker (Amperes)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Branch Circuit Breaker(Amperes)</td>
</tr>
<tr>
<td>12 Volt and 24 Volt</td>
<td>650 or less</td>
<td>1500</td>
</tr>
<tr>
<td></td>
<td>651-1100</td>
<td>3000</td>
</tr>
<tr>
<td></td>
<td>over 1100</td>
<td>5000</td>
</tr>
<tr>
<td>32 Volts</td>
<td>1250 or less</td>
<td>3000</td>
</tr>
<tr>
<td></td>
<td>over 1250</td>
<td>5000</td>
</tr>
</tbody>
</table>

Note: For wire with 105°C insulation rating and AWG wire sizes.
Chart courtesy of the West Advisor

<table>
<thead>
<tr>
<th>Wire Size</th>
<th>Wire Ampacity 3%</th>
<th>Wire Ampacity Engine</th>
<th>Voltage Drop</th>
<th>12 Famps</th>
<th>12 Famps</th>
<th>12 Famps</th>
<th>24 Famps</th>
<th>24 Famps</th>
<th>24 Famps</th>
<th>32 Famps</th>
<th>32 Famps</th>
<th>32 Famps</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>80.0</td>
<td>68.9</td>
<td>553</td>
<td>1643</td>
<td>1106</td>
<td>3686</td>
<td>1474</td>
<td>4915</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>120.0</td>
<td>102.0</td>
<td>879</td>
<td>2629</td>
<td>1757</td>
<td>5868</td>
<td>2343</td>
<td>7811</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>190.0</td>
<td>156.0</td>
<td>1396</td>
<td>4659</td>
<td>2796</td>
<td>9319</td>
<td>3727</td>
<td>12425</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>210.0</td>
<td>178.5</td>
<td>1992</td>
<td>7609</td>
<td>4445</td>
<td>14915</td>
<td>5926</td>
<td>19784</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>245.0</td>
<td>208.3</td>
<td>2833</td>
<td>9342</td>
<td>5605</td>
<td>18684</td>
<td>7474</td>
<td>24912</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>285.0</td>
<td>242.3</td>
<td>3536</td>
<td>11788</td>
<td>7073</td>
<td>23576</td>
<td>9430</td>
<td>31434</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>330.0</td>
<td>280.5</td>
<td>4457</td>
<td>14858</td>
<td>8015</td>
<td>29715</td>
<td>11886</td>
<td>39620</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>385.0</td>
<td>327.3</td>
<td>5610</td>
<td>17371</td>
<td>11238</td>
<td>37452</td>
<td>14985</td>
<td>49950</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6000</td>
<td>445.0</td>
<td>378.3</td>
<td>7066</td>
<td>23620</td>
<td>14722</td>
<td>47241</td>
<td>18896</td>
<td>52865</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>