

# **BATTERY INTEGRATOR**

## **MODELS: BI-100, BI-24-100**

### **INSTALLATION/OPERATION INSTRUCTIONS**

#### **I) PRODUCT OVERVIEW**

The Battery Integrator serves a function similar to a battery isolator (sometimes called a diode divider) or a manual battery switch, but offers significant advantages over both of these more traditional methods of battery bank isolation.

The unit utilizes voltage sensing circuitry and a heavy duty solenoid/contacter to automatically integrate two normally separate battery banks whenever a charge voltage is being applied (essentially charging them as a single bank). When the charging source is off, or a large load causes the main battery voltage to drop, the unit breaks the tie between the banks. This achieves multiple bank charging from a single source, while permitting selective discharge of each dedicated bank, and preventing one bank from "dumping" into another.

Because the batteries are integrated by direct connection through the contactor, there is no voltage drop from the charging source to the batteries as with diode isolators, and because operation is automatic, there is no need for a manual switch to connect and disconnect the batteries before and after charging.

The Battery Integrator features a heavy duty contactor and solid state circuitry. One unit will accommodate two 12 or 24 volt battery banks (depending on model). If integration of additional banks is desired, one extra unit is required for each additional bank.

If there are circumstances in which the battery banks will need to be paralleled even though no charging voltage is being applied, the unit may be wired with a manual override switch.

#### **II) INSTALLATION**

**IMPORTANT:** Read through the instructions completely before you begin the installation. There are important safety warnings that must be understood prior to beginning the installation. Also, reading through these instructions first will help you determine what materials and tools will be required to complete installation.

##### **A) Location/Mounting**

Install the Battery Integrator at a convenient location near the battery banks being integrated, as close as possible, to keep the length of the connecting positive cables as short as possible.

**WARNING: The Battery Integrator is not ignition protected, so it must not be located in an area where ignition protected equipment is required.**

Either horizontal or vertical mounting is acceptable. The mounting flanges are electrically isolated from the input/output terminals so mounting on either a metal or non-metal surface is acceptable.

##### **B) Battery Positive Cable Wiring**

**WARNING: WORKING IN THE VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. ANY SPARKS GENER-**



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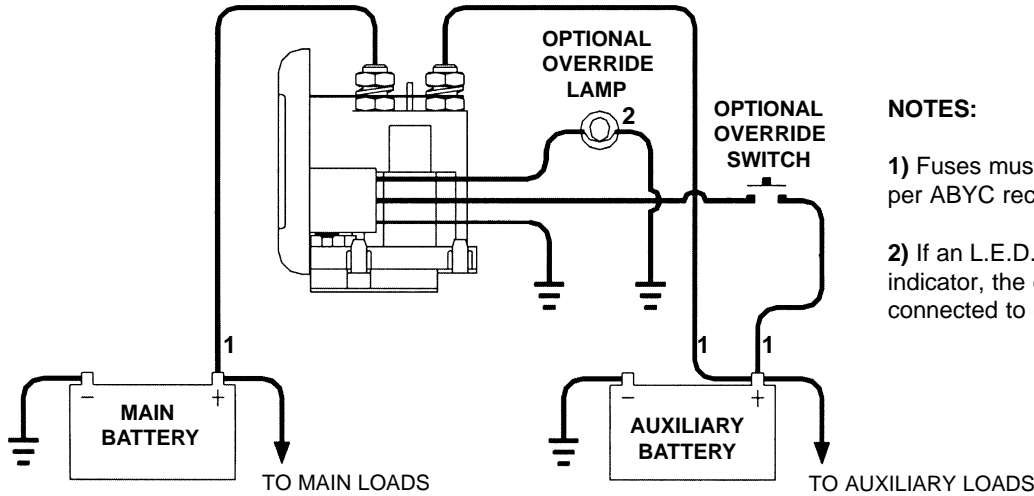
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**ATED WHILE WORKING WITH THE BATTERY POSITIVE CABLES MAY CAUSE THESE GASES TO EXPLODE. IN ADDITION, INADVERTENTLY TOUCHING ANY GROUNDED POINT ON THE VESSEL WITH A CABLE ATTACHED TO THE BATTERY POSITIVE POST WILL CREATE A DANGEROUS HIGH CURRENT SHORT CIRCUIT. THEREFORE, YOU MUST DISCONNECT THE BATTERY NEGATIVE CABLE OF EACH BATTERY PRIOR TO MAKING THIS INSTALLATION.**

Refer to the Typical Wiring diagram below for battery, ground and optional override wiring:

**FIGURE 1: Typical Battery Integrator Wiring**



**NOTES:**

- 1) Fuses must be installed at batteries as per ABYC recommendations
- 2) If an L.E.D. is used as an Override indicator, the cathode (-) side must be connected to ground

1) The proper gauge of the battery positive cables to and from the unit depends on the length of the cables. The table below may be used to determine the correct gauge cable, based on the combined length of the run from the Battery Integrator to both battery positive terminals.

**Battery Positive Cable Size Chart\***

Model	Combined Length of Battery Positive Cables			
	5'	10'	15'	20'
BI-100	#4	#2	#1/0	#2/0
BI-24-100	#6	#4	#2	#2

\*Assumes a maximum of 100 amps and 3% voltage drop as per ABYC E-9, Table IX

2) Attach cables as shown in the Typical Wiring diagram. The battery positive cables must be attached to the unit with 5/16" ring lug connectors to ensure a safe installation.

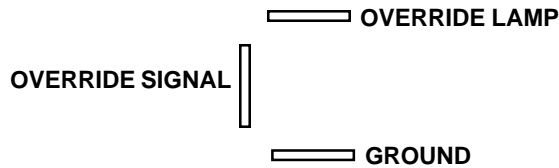
Note: Since the Battery Integrator will connect the batteries whenever there is a charge voltage on either bank, it makes little difference which battery positive cable is attached to which terminal unless the installation includes the override option. For more information on this function, see section D.

**C) Ground Wiring**

Refer to Figure 2 on the following page for identifying the ground terminal and optional-use override terminals. (This illustration may also be found on the label on the front of the unit.)



**FIGURE 2: Rear Terminal Configuration**



The Battery Integrator must be grounded for the internal solenoid to operate. Run a wire from any convenient grounding point on the vessel to the ground terminal on the rear of the unit, as shown in FIGURE 2. Since the unit requires very little current to operate, small gauge wire is acceptable for grounding, but no smaller than #14 AWG. The grounding terminal is a 1/4" quick-connect spade type.

#### **D) Manual Override Wiring (Optional)**

Installation of this option will allow you to override the automatic operation of the Battery Integrator and manually force the connection of both battery banks, if desired. A typical application might be, for instance, to provide an extra "boost" from the house bank if engine start batteries are depleted.

**Note:** The voltage of auxiliary battery must be higher than the voltage of the main battery for the manual override to engage. When the override switch is closed the logic circuitry of the Battery Integrator compares voltage on both banks, and if the auxiliary bank has a higher voltage than the main bank it will close the contactor to place both banks in parallel. If the auxiliary bank is lower (hence integration would serve no purpose) the unit will ignore the signal.

Therefore, if the override option is to be installed, this priority bank function must be taken into consideration when deciding which battery is wired to the MAIN terminal and which is wired to the AUX terminal. For instance, if using the override to get an engine start boost from the house bank, then the engine start battery must be wired to the MAIN terminal. That way, when the override switch is activated, it will only connect the batteries if the AUX battery has a higher voltage, i.e., extra power to deliver.

Use a single pole, single throw (SPST) switch for manual override. Connect the switch between the Override Signal terminal on the rear of the unit and the positive terminal of the auxiliary battery bank, using #14 AWG wire (as shown in FIGURE 1).

If a manual override switch is installed it is recommended that an override warning lamp also be installed to indicate that the switch is on, so that the user will not inadvertently leave the battery banks in parallel any longer than intended.

Use a 12/24 volt indicator light (available from NEWMAR) which is mounted in a conspicuous location. Connect the light between a convenient grounding point on the vessel and the Override Lamp terminal on the rear of the unit, using #14 AWG wire (as shown in FIGURE 1).

#### **Automatic Engine Start Override Wiring Option:**

The Battery Integrator may be wired so that the override function is engaged *automatically* every time the engine starter is engaged. Instead of wiring the manual switch to the auxiliary battery as explained at left, run the wire from the OVERRIDE SIGNAL terminal on the unit to the terminal on the starter switch which "sees" 12 or 24 volts (depending on model) whenever the starter is engaged. Alternatively, connect the wire to the starter motor solenoid.



### III) OPERATION

Battery Integrator operation is fully automatic (except as it relates to manual override). The unit continually senses battery voltage at both battery positive terminals. Since fully charged batteries typically have a "resting" voltage of approximately 12.6 VDC (12 volt) or 25.2 (24 volt), then whenever a voltage exceeding approximately 13.2 VDC (12 volt system) or 26.4 VDC (24 volt system) is sensed on either terminal it is an indication that charging is taking place. This will cause the internal contactor of the unit to parallel the battery banks, allowing charge current to flow to both banks for as long as the charge voltage is present.

When the alternator or charger is off—or if a large load causes the overall battery voltage to drop below the disconnect point (see below)—then the Battery Integrator breaks the connection between the banks.

The unit employs a built-in solid state voltage comparator circuit with time delay to prevent it from cycling when the battery experiences brief voltage fluctuations due to intermittent high load current demand.

### IV) SPECIFICATIONS

**MODELS:** BI-100, BI-24-100

**BATTERY INTEGRATION POINT:**

BI-100: 13.2 VDC (approx.)

BI-24-200: 26.8 VDC (approx.)

**BATTERY DISCONNECT POINT:**

BI-100: 12.8 VDC (approx.)

BI-24-100: 25.7 VDC (approx.)

**MAXIMUM CONTINUOUS CURRENT (CONTACTOR):** 100 amps

**MAXIMUM PEAK CURRENT (CONTACTOR):** 400 amps

**CURRENT CONSUMPTION:**

Stand-By: 5 mA

Momentary (when integrating or disconnecting latching relay): 800 mA max.

**OPERATING TEMPERATURE:** -28°C to + 48°C

**BATTERY CONNECTIONS:** 5/16" stud

**OVERRIDE AND GROUND CONNECTIONS:** 1/4" spade lug

**SIZE (H x W x D):** 3" x 3.25" x 2.5"

**WEIGHT:** 1 lb.

**ALL WIRING MUST CONFORM TO AMERICAN BOAT AND YACHT COUNCIL'S RECOMMENDATIONS FOR BOAT WIRING. FOR COPIES OF THESE RECOMMENDATIONS WRITE TO:**

**American Boat & Yacht Council  
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