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BIC-10200B instructions, Rev -

Congratulations!

You have selected the finest battery isolator/combiner series on the market. This Isolation device has more features than any standard isolator or any mechanical combiner. This one compact unit allows you to choose among several ways to utilize multiple battery systems based on your intended usage.

Installation Instructions:

Caution!

We believe that installation of your new battery isolator/combiner is very simple. However, in the interest of your safety, be warned that working around Batteries can be **hazardous**. They can produce explosive gasses as well as high currents, on metals, capable of producing severe burns and even cause fires. **If you are not experienced with electrical wiring and batteries, you may want to hire a professional to perform the installation.**

Step 1

Consider the suggested configurations, then determine how you intend to isolate your battery system.

- a) Deep cycle applications with isolation on the **auxiliary** battery side.. **Usually recommended**
- b) Deep cycle applications with isolation on the starting battery side.

or some other possibility.

Depending on your intended application, you will need to determine your planned wiring configuration. See the few suggestions included or check our web site; <http://www.hellroaring.com>. Should you have a specific application or question not covered there, feel free to send an e-mail technical support request. Include as much detail as practical regarding your application and vehicle setup. Send to: support@hellroaring.com.

Step 2

You will need the following material not supplied with the BIC-10200B unit.

1. Wire from one battery to the BIC. We suggest 20 feet of 8, or 10 AWG wire. You may consider 6 AWG wire if your run is longer than 35 feet. **Note:** your Battery Ground wire should be as large as the positive battery wire or larger.
2. Wire from your alternator to the BIC. This should also be 8 or 10 AWG.
3. Wire terminal lug for the alternator and battery ends.
4. Two Circuit Breakers, Fuses, or Fusible links as needed (depending on configuration chosen, routing of wires, and size of wires.)
5. # 1/4, or # 6 stud ring terminal lugs **if** you choose different gauge wires than for those terminals supplied. Best results are obtained by using ring terminal lugs with the ring size matched to the terminal size which are #1/4 and #6.

If you did not order the Remote Module and if you want the **Optional Remote Switch and Remote LED** functions, you will need:

- Small wire (18 to 22 awg suggested) for connections to the remote switch and remote LED.
- An ON, OFF, ON micro-switch (or larger if desired). A single ON-OFF switch can be used if you don't want the ability to disable the automatic feature. **Do not use an illuminated switch** since its internal lamp will cause the circuit to not function correctly.
- A device to mount or hold an LED. This could be as simple as a properly sized hole placed in a panel.

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- **Fuses** (5 amp or less). (If not accessible on your fuse panel)
- Hardware, clamps, and wire tubing as needed.

Tip: Obtain everything you need prior to beginning installation.

Step 3

Choose your mounting location

Determine a location for mounting, giving due consideration to wiring distances, and wire routing. A vertical mounting position in a space not normally accessed would be preferred, but usually not critical.

Step 4

Begin Installation

- 1) Measure the lengths of wire needed, then fabricate your connection cables using the terminal lugs supplied or use your own terminal lugs if desired. You should properly crimp the terminals. If you don't have a proper tool, you could improvise by using a bench vise with a "V" notch and a drill bit to compress a crimp. Pull on the terminal to assure a good crimp. In addition to crimping, you may solder the terminal lugs if desired. If you use emergency type battery terminals, we have found that soldering the wire to the terminal after clamping provides better reliability. The Use of Plasti-Dip from NAPA helps prevent corrosion on these type of terminal connections. You may consider purchasing a standard battery cable and retrofitting the one end for connection at a circuit breaker.
- 2) Ensure that the engine is not operating and that all loads are switched off, then **Disconnect** the battery **negative (-)** cable from **every** battery at the **Battery end**. That means **ALL** of them! (This will ensure that power is not available anywhere on the vehicle which could cause injury or damage.) **Ensure** that no wires are connected to the battery negative terminals before proceeding with the installation!
- 3) Mount the BIC-10200B in your chosen location. Ensure that the mounting is secure and will withstand vibration. The choice of mounting location should be such that normal functions do not allow something to fall on or otherwise touch the contacts. A vertical position in a space not normally accessed would be preferred.

Note: All current carrying terminal lugs should contact the BIC terminal face directly or directly on top of a previous lug without washers between them. When tightening the nuts, **tighten until snug only. Do not exceed 32 lbf in** (inch pounds of force) or **360 cN·M**. The hex style and material combination will provide a secure grip. The large studs are made of solid brass and can be stripped if over-torqued. Other terminal lugs such as the "Sense connection" or the Remote Module fuse wire can be mounted on top of a previously secured nut. Although the small terminals are made of stainless steel and are relatively strong, **Do NOT over-tighten** to the point of distorting the lug.

Refer to our connection diagrams for suggestions, then **choose your method**.

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Auxiliary Battery Isolation:

- 4) This connection method is the most popular method for **auxiliary battery applications** and does not require changing the existing alternator wire to the main battery.
- 5) Install the 10-8 AWG wire and, if you don't already have circuit protection between the main battery and alternator, an in-line **fuse** or circuit breaker from the alternator to the BIC-10200B terminal "A".
- 6) Install another 10-8 AWG wire from the BIC-10200B, terminal "C" through another in-line **fuse** or circuit breaker (close to the battery end is preferable) to the auxiliary battery **positive** terminal.
- 7) Any trailer battery should be wired, with proper circuit fuse protection, to the auxiliary battery side.
- 8) Go to step 9.

Important! Never connect a **ground** or negative wire to any of the large, ½" hex terminals! **Never!** (If you did, you could short out a battery when the BIC unit switches ON.) Doing so will void the warranty on the BIC unit.

Starting Battery Isolation:

- 4) This connection method may require re-routing your normal vehicle loads (ignition, fuel pump, lights, etc...). refer to one of the starting battery isolation diagrams for connections. If your main vehicle loads are connected to the battery or starter rather than the alternator side, then you may want to move these connections to the alternator side. See the suggested diagrams below.
- 5) Install the 10-8 AWG wire and an in-line **fuse** or circuit breaker from the alternator to the BIC-10200B terminal "A".
- 6) Install another 10-8 AWG wire from the BIC-10200B, terminal "C" through another in-line **fuse** or circuit breaker (close to the battery end is preferable) to the main battery **positive** terminal.
- 7) Connect your auxiliary battery **positive** directly to the alternator through an appropriately sized fuse or circuit breaker. For the **complete** isolation on the starter side battery, ensure that the ignition circuits are connected through an additional relay.
- 8) Any trailer battery should be wired, with proper circuit fuse protection, to the vehicle alternator side of the circuit.

Important! Never connect a **ground** or negative wire to any of the large, ½" hex terminals! **Never!** (If you did, you could short out a battery when the BIC unit switches ON.) Doing so will void the warranty on the BIC unit.

Note: The following table are recommendations for wire protection values.

Wire Size AWG	Circuit protection
6	80 A
8	60 A
10	40 A
12	25 A
14	Not Recommended Don't use this size or smaller

The circuit protection listed is for continuous current.

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- 9) Go to step 10. This step was deleted for the "B" model.
- 10) Connect the **ground terminal** (using the fused ground wire and #6 terminal lug supplied) on the BIC-10200B to the vehicle common (Wire size recommended is 18 to 22 AWG. We supply 22 AWG.) If it has a good electrical path to your battery, you can use your chassis as the common connection. Otherwise, use the battery (-) cable or your engine block (away from high heat sources) or frame. Insert the fuse (1/2 to 3 Amp) into the fuse holder. The fuse will prevent wire damage in the event of a short to the ground terminal.
- 11) If you desire to use the **remote switch or remote LED**, make those connections at this time. If you purchased the optional **Remote Module**, follow the instructions provided with that package then go to step 9. For reference, the LED "short lead" is the cathode and should be connected to the Remote LED terminal. The long lead is connected to a **fused** 12 volt source. Refer to Figure 1 for the typical connections.
- 12) Install the Nylon Cap Nuts onto Terminals "A" and "C". These nuts will serve as an insulator and should help prevent shorts. They have 1/4-20 threads and will easily cross thread onto the 1/4-28 studs to provide a secure insulated cap. Although they do not 100% prevent shorts, these nuts provide a little extra protection as compared to exposed terminals. The primary influence on safety from shorts is your choice of mounting location and orientation. These nuts are not intended to provide a secure attachment of the wires. Use the metal nuts provided for attachment of the wires.
- 13) If you have an ohmmeter, you should **verify** that none of the three large terminals are grounded. Then:
 - A) **Ensure** all **loads** are **switched OFF**. This includes shutting the doors to keep the interior lamp off.
 - B) **Ensure** all battery positive (+) cables have already been connected and are secure.
 - C) Place a rag or other protection on your batteries and put on safety glasses, then **Connect the Main Battery** negative (-) cable (other end to the engine block).
 - D) **Connect the Auxiliary Battery** negative (-) cable.

Tip: Prior to making the battery negative connections, If you temporarily touch a spare fuse between your battery negative terminal and negative cable, you can reduce the risk of large sparks if anything was connected improperly. **If you observe any sparks or if the fuse blows, Stop** and investigate for active loads, shorts, or for any other reasons. Then request technical support. If the fuse does not blow, then you should be ok to make your final battery negative (-) connections.

Note:

The terminals "A", and "C" have 1/4-28 threads on a flat 1/2" hex. This allows a large surface area on the flat hex. This larger surface contact area results in much less contact resistance for reliable connections. Other types of devices rely on the connection being made through the stud itself where a terminal lug must be sandwiched between nuts. Our 1/2 inch hex terminals have sharp edges which tend to bite into the terminal lug, maintaining a secure connection without washers. When properly tightened (**with no washers**), they should stay in position and should not turn unless you intentionally handle the cables and force it. We recommend some strain relief (tie down) on any cable within about 1 foot (0.3 Meter) of the unit. You should tighten the nuts only to the point of being **snug and secure**. **24 lbfin** or **270 cN·M** is about right. This is equal to about **only 6 pounds applied to a 4 inch wrench**. **Do not** apply **excessive** torque! Use of a small nut driver works well. Use of a long handled wrench can exceed torque if not careful.

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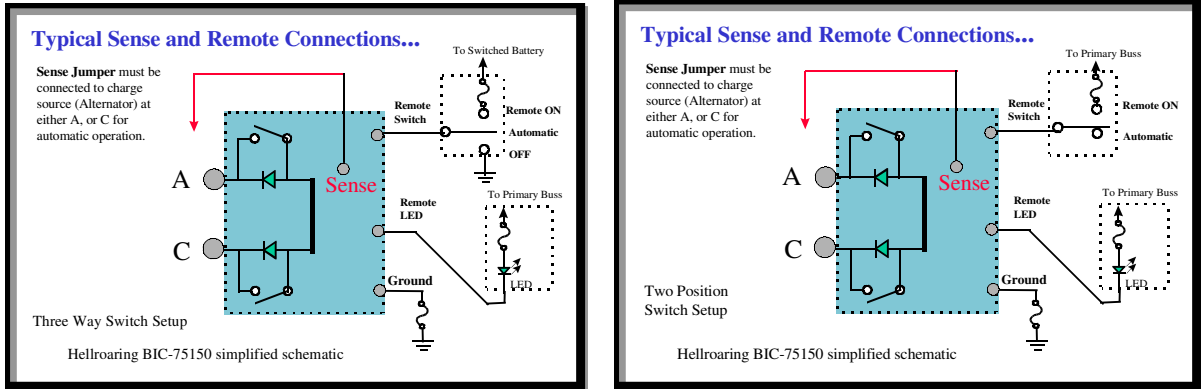


Figure 1

Fuses for the signal wires should be rated for no more than that appropriate for the wire size you use. We suggest from ½ to 5 Amps as maximum. These could be accessible from your primary fuse panel. You can use as small as 0.1 Amp fuse if desired. A fuse and holder for the Remote signals is included in the Remote Module package.

Note: The “B” model does not use the Sense connection...

Special Note

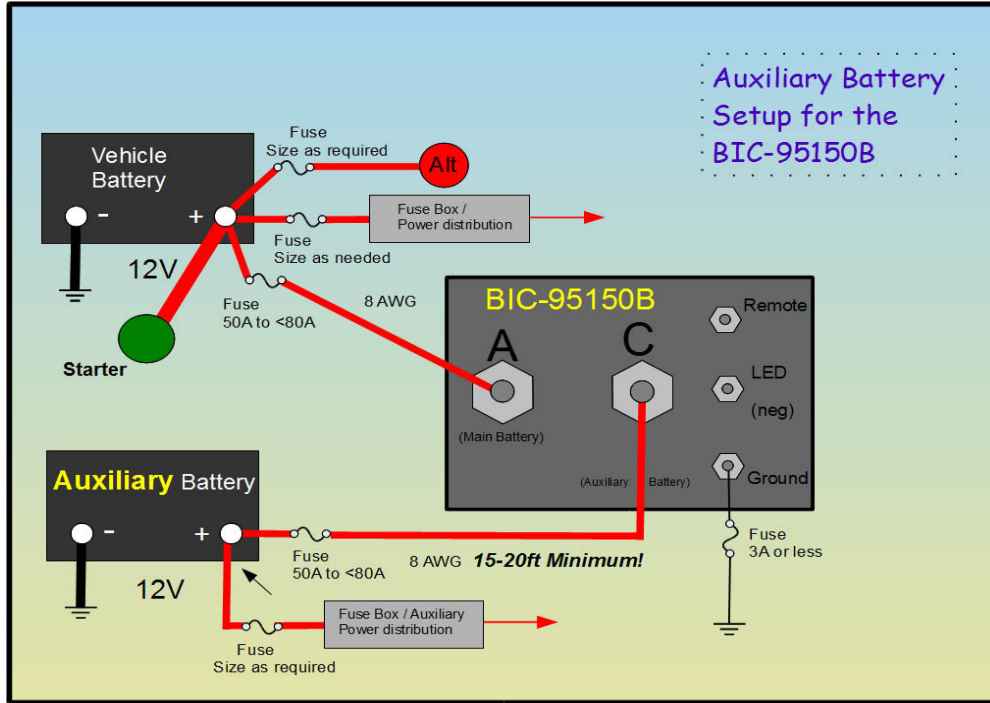
Most people who have applications with normal loads connected to the auxiliary battery choose the **Basic Auxiliary Battery Isolation** method with the “A” models. The “B” model is specifically intended for the Auxiliary setup. This is the simplest method and works well with most applications. If you have high current auxiliary loads **and** a high output alternator, you may want to consider using sufficient length of 8 or 6 AWG wire to limit the peak charge rate to within the BIC rating. See our wire selection tips sheet.

The following are a few suggestions from the many listed on our web site <http://www.hellroaring.com>. Check our web site for other suggestions and updates:

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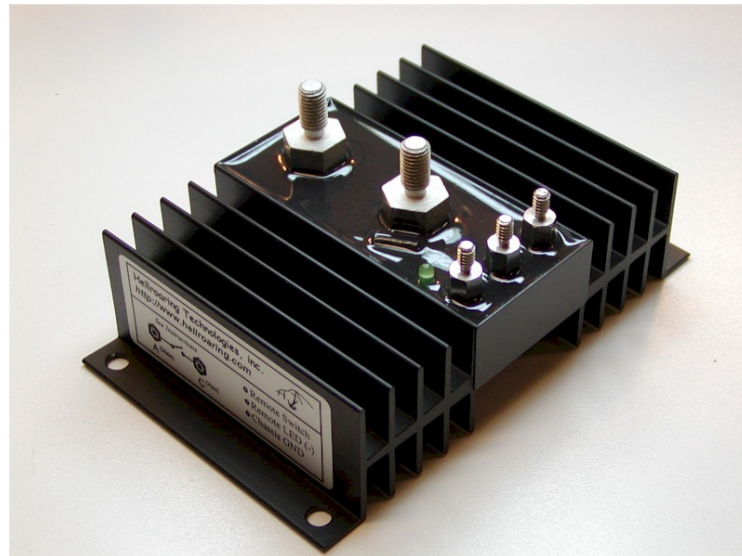
Basic Auxiliary Installation for the BIC-10200B:

The Basic Auxiliary Battery isolation is the simplest method to install and is the method of choice **for most installations**. The following diagram depicts the Basic Auxiliary Battery isolation method with a BIC-10200B. This will provide excellent charge to your auxiliary battery when the alternator is operational. Connections are the same as the BIC-95150B.



Basic Auxiliary* Battery Application

Simplest Installation. Must observe load rating for auxiliary side. *Isolation on the Auxiliary battery side requires that deep cycle loads not exceed the BIC rating if the alternator output is rated at 100 amps or higher. Proper wire size and length provide charge limiting for large banks. Remote switch may be used combining batteries. Not for starting with a flat or poorly connected main battery.

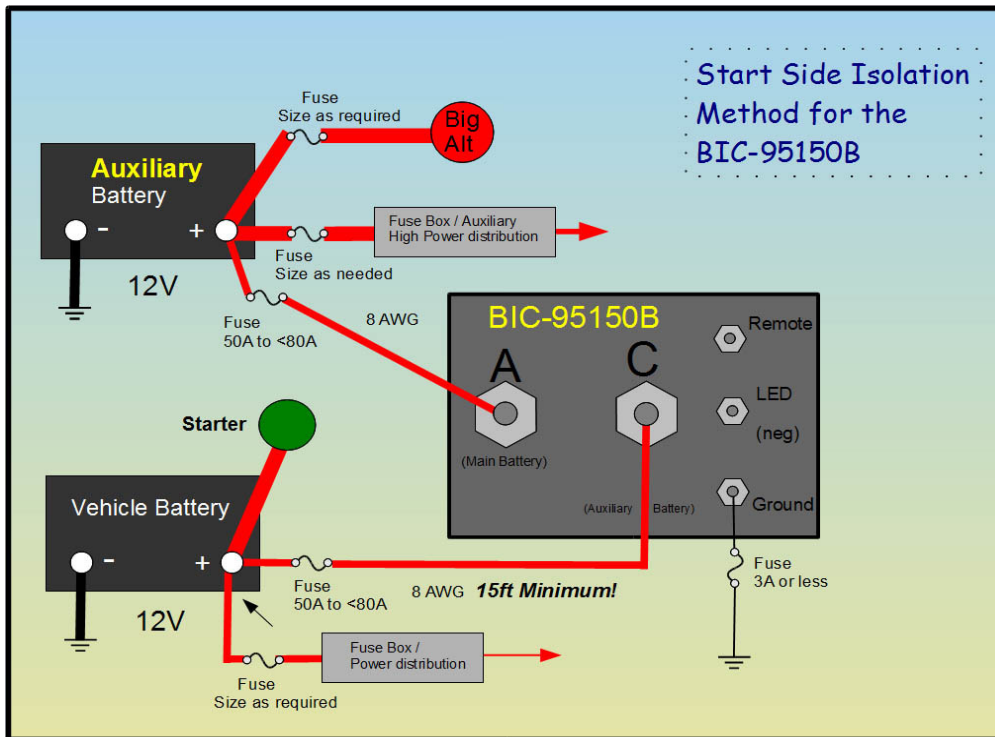


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Starting Side isolation method for the BIC-10200B:

The Starting side isolation method allows for connecting a high output alternator directly to the auxiliary battery and then using the BIC to isolate the starting battery. This method changes the charge priority to the auxiliary battery, so it is important to be sure that the auxiliary loads do not consume the alternator output continuously. Monitoring the Remote LED can help you determine if and/or how often this condition may occur. You can move normal vehicle loads such as lights, heater, or ac to the auxiliary battery side if desired. But, it is important to leave the ignition circuits on the main battery side. The following diagram depicts the Starting side isolation method with a BIC-10200B. This will provide charge to your main battery and provide power to the vehicle loads when the alternator output is not fully consumed by other loads. This is indicated by the LED being illuminated while the engine is running.



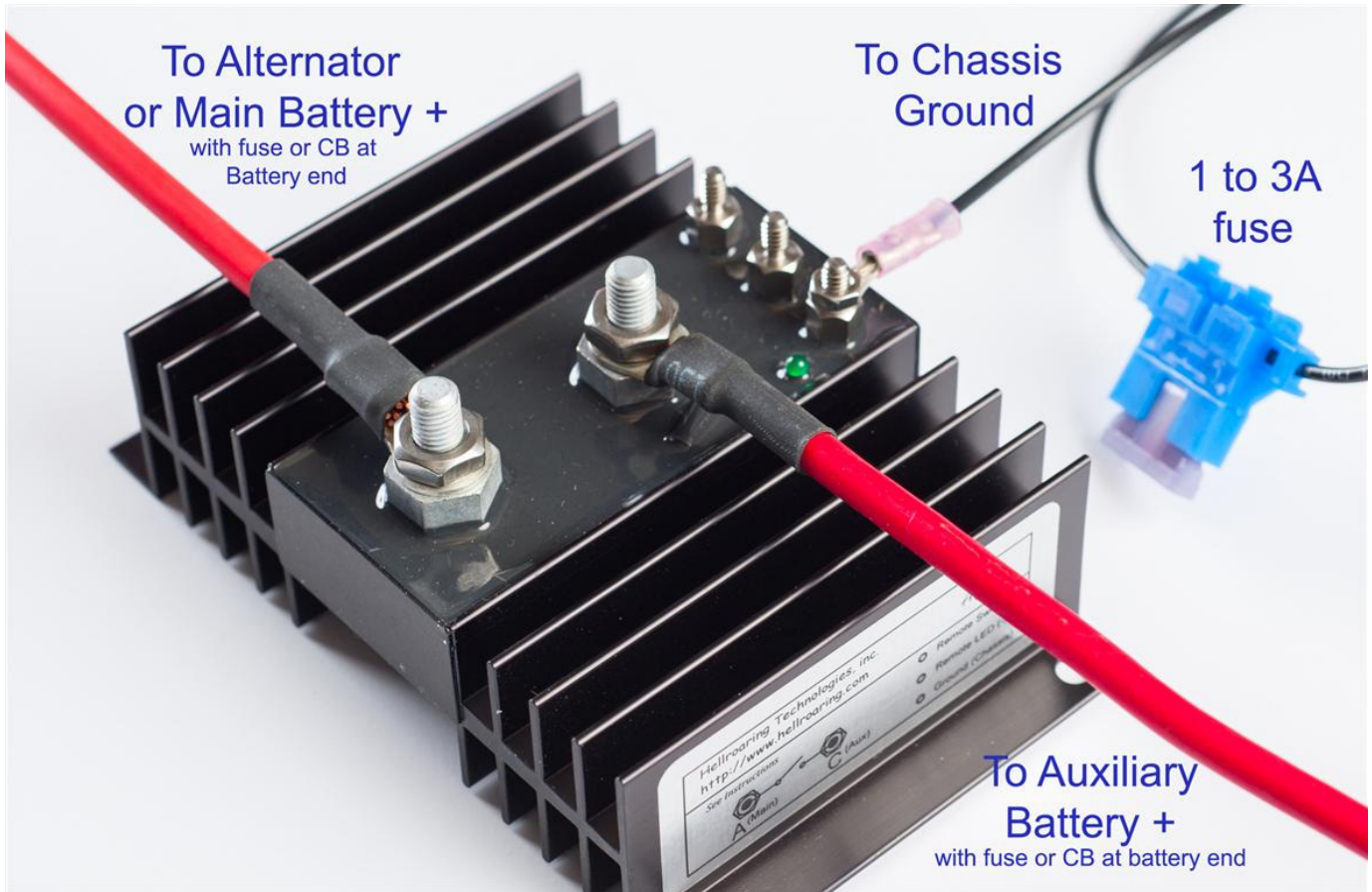
Starting side isolation method

Simple Installation. Allows for high output alternator and high demand loads on the auxiliary battery. Charge priority goes to the auxiliary battery. Remote switch may be used to combine batteries. Not for starting with a flat or poorly connected main battery.

For other applications or possible setups, check our web site <http://hellroaring.com> for additional suggested configurations or other tips. If you have other questions you can send e-mail to support@hellroaring.com. Please include your serial number.

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Image of a Basic Auxiliary Battery installation with Remote Module.



Remote Wires are optional. Ground wire and Remote Module Red wire must be connected through a 3 amp fuse. Terminal A always goes to the alternator side. Terminal C connects to the isolated battery (Auxiliary battery for auxiliary setup, main battery for the starting side isolation method.)

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Testing your unit:

After you have installed your unit, you will want to test that it functions. Basically, you can monitor the voltage of the auxiliary battery (side opposite of the alternator connection). Then add a load to the main battery such as turning on the head lights. The voltage on this main battery will drop slightly. The voltage on the auxiliary battery will not drop. Then, monitor the voltage of the main battery with the engine off. Switch ON an auxiliary battery load (a light for example). The Main battery voltage will not drop, but the auxiliary battery voltage will drop slightly. With the engine OFF, you can monitor the auxiliary battery voltage. Start the engine and note that its voltage does not drop while starting and rises after the engine starts. If both batteries are near full charge, check the voltage at both batteries and at the alternator output. All three points should be about the same (and near 14.0 to 14.7 volts depending on temperature.) Stop the engine. And verify the LED goes out within a few minutes. To test the Remote Switch function, switch it on while the engine is OFF and observe that the LED illuminates. Return the switch to the automatic position.

Definitions:

Remote Switch: This terminal, when connected to a voltage higher than about 7.2 volts (when the Sense terminal also has >7.2 volts) will cause the terminals A, and C to Combine. This terminal, when connected to ground will disable the unit from combining.

Remote LED: This terminal will sink about 12 milli amps (1k ohm internal ON resistance) to the cathode of an LED. The LED Anode must be connected to a fused 12V source. Normally, this is the main fused buss.

Ground Terminal: This terminal must be connected to the vehicle common or ground reference point. Usually this is through a fuse to the Engine block, Chassis, or Battery (-) tap.

Specifications:

BIC-10200B:

Max Current	100 Amps 200 Amps 300 Amps	Unless specified otherwise ambient temp=20C Continuous 20 seconds (5 minutes between operations) 50 mS
Max On Resistance	0.003	Ohms (terminal A to C) 0.002 typical
Max Turn-ON operation current	0.012	Amps (most for LED illumination)
Max quiescent current "Off"	0.0005	Amps
Max Remote Switch Control Current	0.0005	Amps
Max Power Consumption	0.18	Watts (most for LED illumination)
Switch ON voltage	13.4 volts	Nominal
Switch OFF voltage	13.2 volts	Nominal
Switching delay	0.05 Second	approximate
Turn ON time	2 mS	Typical
Turn OFF time	0.2 mS	Typical
Dimensions		4.8" by 3.0" by 2.0"
Weight	0.6 (0.27)	lb. (kg) typical
Shipping Weight	1.0 (0.45)	lb. (kg) typical

Note: Specifications are subject to change without notice.

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Standard Terms and Conditions of Sale

The sale of Hellroaring Technologies, inc. products shall be governed by the laws of the state of Montana. All sales shall transfer title within the state of Montana via common carrier. Hellroaring Technologies, inc. will not collect sales taxes for any other state. Should the unlikely event, a cause of action arises, buyer agrees that such action shall be held and governed in the state of Montana. The buyer recognizes that there exists inherent risks associated with batteries and installation & operation of battery devices. It is understood that any technical information published by Hellroaring Technologies, inc. including any installation instructions is of a general nature only and it is the user's responsibility to determine the proper application, installation, and operation of products. The buyer assumes all risk and agrees to indemnify Hellroaring Technologies, inc. against any and all causes for injury or damage to third parties that arises from use of such product.

Return Policy

Should any product sold by Hellroaring Technologies, inc. not meet or exceed your expectations, you may, within 30 days of our shipment to you, return such product for a full refund (credit on credit card orders) less a 15% restock charge, provided that:

- a) You obtain an RMA number and provide your shipping address by calling customer service at 406 883-3801 or send an RMA request via e-mail (include the model #, serial number, and your phone number), and
- b) The product, including all accessories, is returned in original and re-saleable condition, and
- c) Units are Shipped (prepaid and insured for damage in transit) in the original or equivalent packaging, and
- d) (optional) You include a simple note as to the reason for dissatisfaction. (This can help us improve our products)

After 30 days, products are covered by our standard Limited Warranty. If you purchased the product through a dealer, that dealer's return policy applies to you. Our standard Limited Warranty will apply if you register by sending your name, a copy of proof of purchase date, model # and serial number to us within 30 days of purchase. This can be via mail or e-mail (warranty@hellroaring.com). Those who purchased direct from us are **automatically** registered.

Limited Warranty

This Limited Warranty is extended to the original purchaser. For a period of one year from the date of purchase (30 days for industrial switching applications), Hellroaring Technologies, inc. warrants that our products will be free from defects in materials and workmanship under normal use and service. The sole and exclusive remedy for failure of the product shall be for us, at our option, to repair or replace the product, to whatever extent we deem necessary to restore the product to proper operating condition. We may make replacements with new or functionally equivalent products of equal value. Should Hellroaring Technologies, inc. be unable to repair or replace the product within a reasonable time, we reserve the right, at our option, to issue a refund or credit of the purchase price in lieu of repair or replacement. We reserve the right to assess a \$25 fee for units returned and proven not to be defective. To obtain warranty service you must:

- 1) Call Customer Service at 406-883-3801 for a Return Material Authorization (RMA) number and shipping address. Or send an RMA request via e-mail (include the model #, serial number, and your phone number and your return shipping address)
- 2) Return the product in the original or equivalent packaging (Shipping prepaid and insured for damage in transit), together with the RMA number AND a description of the problem. Include your return shipping address and your phone number.

Do not attempt to disassemble, or otherwise tamper with any of the 4 nuts on the bottom of each unit. Doing so will void this limited warranty.

Exclusions

This Limited Warranty is made expressly in lieu of and to the exclusion of any and all warranties, express or implied, oral or written, including, without limitation, any and all implied warranties of merchantability or fitness for a particular purpose, and all such other warranties are expressly disclaimed. This Limited Warranty shall not be applicable to failures of the product that result from accident, abuse, misapplication or alteration, improper installation or maintenance, unauthorized repair attempts, operation or attempts to operate it beyond its mechanical, chemical, thermal, or electrical capacity intentionally or otherwise, and we assume no liability as a consequence of such events under the terms of this warranty. Hellroaring Technologies, inc. shall not be liable for any special, indirect, incidental, consequential, exemplary, or punitive damages for claims in any claim, action, suit or proceeding arising out of the purchase, use or performance of the product, and whether or not it has been advised of the possibility of such damages. The foregoing allocation of risk is reflected in the price of the product. Nor shall there be any liability thereunder for claims of labor, loss, profit, goodwill, repairs or other expenses incidental to the repair or replacement of such product.

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Wire Selection Tips:

Selection of an appropriate size and length of wire can have a meaningful impact on performance of the system. **Too little** total resistance in the system can result in excessive charging current on components and demand on the alternator. **Too much** total resistance and the charge rate can become too low for the allowed recharge time. It is commonly known that using too small of wire can result in poor charging rates. And too small of wire can result in poor performance for electric motors. So, many adopt for “the larger, the better” point of view. Sometimes, this can result in undesirable consequences also when applied to a battery charge wire.

With the basic auxiliary battery configuration, you should aim to limit the maximum charge current to a 60 to 80 amp range or less to the auxiliary side. This provides some margin. 10 AWG wire provides more resistance per foot, but can only handle up to 40 amps continuous. 6 AWG and larger can handle more current, but would require much length to limit current. For a **basic auxiliary** battery application, **8 AWG** seems to be about ideal. It can handle up to 60 to 90 amps continuous current (depending on the insulation used) and has sufficient resistance at about **20 feet** of total length. The total length is most important when using high output alternators and a larger amp hour auxiliary battery bank. If, with 20 feet of length, you find that your batteries are charging at a rate lower than desired, then you can easily shorten some of the wire to increase the rate.

A large battery bank connected with large short length wires to a low or medium output alternator can result in maximum draw on the alternator for an extended time, stressing it and other components unnecessarily. Sufficient resistance in the charge line such as described above, will tend to limit the demand on the alternator to less than its maximum so it and other components perform more reliably.

Of course, the limited current in the charge line does not preclude the use of larger wire from the auxiliary battery to high current loads that are not operated continuously while the alternator is running. The wires from the battery to loads can be substantially larger. However, if the average auxiliary battery load is greater than about 50 amps when the alternator is operational, then another battery isolation configuration should be considered such as the starter side isolation method.