

Hellroaring BIC-75150 & BIC-75300

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Q:	I am interested in installing a 2 battery set up in my Jeep. I do not have a winch but I do have many off road lights. I also have a 50 amp stereo system. If I used one of your 2 battery setups. What would be the best way to set it up? Run all the auxiliary lights off the second battery? or just leave the second battery as a back up starting battery? Will both batteries charge automatically?
A:	Our preference is to use the Basic Backup Battery system. It is very simple to install and provides the most power available for starting, and especially useful in cold weather conditions. With this setup, you run your lights and stereo from the main battery side. Under normal operation, they will be powered by your alternator. If your alternator can't keep up or if you operate with the engine OFF and your main battery becomes drained, your Backup Battery will remain fully charged and ready to go. If you regularly use engine off loads, you should use a high CCA rated deep cycle battery such as an Optima Yellow Top for your main battery. When using a Hellroaring BIC unit, both batteries receive charge automatically from the alternator.
Q:	I am interested in installing a dual battery system in my pickup. I would like to use the aux battery for power to a CB radio, possibly a winch and use for emergency starting of the vehicle. I assume that the battery will be kept charged by the truck alternator. Do your isolators work in this manner? Which system would you recommend?? Is installation simple enough for an amateur to install?? Thanks for any information.
A:	Again, our preference is to use the Basic Backup Battery setup. It provides the most power available for starting or winching. With this setup, you run your lights, stereo, winch, etc... from the MAIN battery side. Since you always have a fully charged backup starting battery, there is no need to separate your vehicle and accessory load circuits. If your main battery becomes drained or otherwise lacks sufficient power, your backup will remain fully charged and ready to go. When you winch, you can enable the backup for extra power also. However, In order to gain full cranking capability, you must not connect any loads to the backup battery to preserve isolation. Simply connect them to the Main battery. This setup is very simple to install (e.g. 2 AWG wire from starter to BIC, 4 AWG wire from BIC to backup battery, short 6 AWG jumper wire, small ground wire, small wire from BIC to Remote switch, and small wire from Remote switch to BIC battery terminal, small wire

from BIC to Remote LED, and small wire from LED to power.)

If you must have **loads on both batteries**, then choose one of the two methods described below. Either of these setups will isolate them in both directions and provide automatic charging to both. However, **neither** will allow **full cranking current** for emergency starting. **Full cranking** capability means that if a main battery is **effectively disconnected**, all cranking current must go through the BIC. **Most situations** require less than full cranking capability. Either of these two setups will provide **boost current** if the main battery has a partial charge. :

Starting Battery Isolation: If you choose isolation between the alternator and the main battery, you must choose weather to keep the ignition, fuel pump, etc... circuits on the main side or move them to the auxiliary side. Other items like AC, lights, etc... should be moved to the auxiliary side. But, you do not need to be concerned with your alternator size. With this setup, you will not have full backup cranking capability, but it keeps the main battery from being drained by auxiliary loads. You may experience quicker starts if you move the ignition circuits to the auxiliary side.

Auxiliary Battery Isolation: If you choose isolation between the alternator and auxiliary battery, you need to consider your maximum alternator output and your maximum load on the auxiliary side to not exceed the rating. This is also simple to install. With this setup, you will not have full backup cranking capability, but it also keeps the main battery from being drained by auxiliary loads.

In any of these setups, both batteries receive charge automatically from the alternator.

Q: Hello, found your page while looking for some alternator theory.

How would your isolator work on fuel injected cars? I'm thinking that the fuel pump, ecm, etc... also needs power while cranking.

A: For the starting battery isolation setup, you have a choice to leave the ignition, fuel pump, ECM circuits, etc... either connected to the main battery or the auxiliary battery side. If connected to the main battery side, the primary risk of drainage is due to alternator failure or leaving the keys ON. If you connect these circuits to the auxiliary battery, you may experience faster starts simply because the ignition circuits will have a higher voltage during cranking. The Auxiliary battery does not drop its voltage during cranking like the main battery does. If your alternator fails or if the auxiliary battery becomes drained, your engine will crank, but will not run unless you manually combine the batteries. Simply flip the Remote Switch and power from the main battery will flow to the ignition circuits, etc...

Q: I'm interested in using your BIC-75300 in a couple of my 4x4 vehicles and trailers. However I'm not really clear about one of the 75300 features.

Can the 75300 both hookup to and charge a 3rd battery while still providing the capability of jump-starting the starter battery from the 2nd or 3rd battery? If not, How can it provide this capability?

The reason for this is that I need to setup my 4x4 with 2 batteries with the jump-start capability and still be able to charge the trailer battery when I tow it along.

A: You can connect a battery to each of the three BIC-75300 terminals for charging. You will be able to transfer some charge to the starting battery and have some boost current capability, but you will **not** have **full backup cranking** capability.

However, we believe there is a **better**, very simple **solution**. Connect the BIC-75300 for a **Backup Battery Configuration**. Use a high CCA rated deep cycle battery such as the Optima Yellow Top for the primary (main) battery. Then connect the trailer battery wire to the alternator/main battery circuit. Since you have a fully charged backup battery, you don't need to worry about draining your main battery with the trailer connected. When you disconnect the trailer and go off 4 wheeling, you will still have the fully charged backup battery.

If you **must have** isolation to the trailer battery **and** have backup starting capability, you can use the BIC-75300 for the backup battery and also connect a BIC-75150 between the alternator and trailer battery.

Q: How do I know if the Hellroaring BIC-75150 or BIC-75300 is compatible with my vehicle/alternator system?

A:	If your vehicle is a 12 Volt, negative ground system, either unit is compatible. However, if you choose an auxiliary battery isolation configuration, you must be aware of the maximum current load you intend to draw continuously through your auxiliary battery system (auxiliary load plus 40-50 amps for charging if the alternator is 90 amps or larger). When configured for the basic starting battery isolation or the basic backup battery setup, virtually any size alternator is suitable.
Q	The indicator LED remains illuminated after I switch OFF the engine. Why doesn't it switch OFF automatically?
A:	This is generally a normal condition, especially in cooler weather. To check its function, switch ON your headlights for a few seconds and the LED should go out. The LED remaining ON after the engine is switched OFF indicates that Both batteries are fully charged with very little load (this is a good indication!) After the surface charge dissipates or if a sufficient load is applied, the LED will go out and the batteries will be isolated. You can actually use this indication to obtain a rough measure of full charge. For example: If (after the vehicle has been sitting for a while) you start your engine, the LED comes ON. If you immediately switch OFF the engine, you should notice that the LED goes out very quickly. This is because the main battery did not have time to obtain and replace the charge removed during starting and the auxiliary battery did not have time to build up a surface charge. When the engine was switched OFF, the main battery reduces the system voltage and consumes current from the auxiliary battery which causes the BIC-75150 or BIC-75300 to quickly enter isolation mode. See LED Diagnostics
Q:	I'm concerned about not obtaining full charge efficiently due to diode isolator voltage drop. Does either of the Hellroaring isolators have this effect?
A:	No. Both of the Hellroaring BIC-75150 and BIC-75300 isolators use solid state switching technology, not just simple diodes. When your auxiliary battery reaches full charge, you can expect less than a 0.005 Volt drop! It is often <i>less than</i> the voltage drop across the wiring used to connect it! On our test vehicle, a 4x4 suburban, the voltage drop at full charge measured about 0.001 Volt across a BIC-75150. See No diode effect!
Q:	I won't use relays or solenoids in my system because I'm concerned about excessive currents from a fully charged battery to a fully discharged battery and causing damage to them. How do the Hellroaring isolators handle this?
A:	When switched in parallel, a fully discharged battery voltage will quickly rise and the fully charged battery voltage will quickly be reduced. Both of these conditions as well as the wiring resistance's and battery internal resistance's tend to reduce the maximum current transfer. In addition, the BIC controls the switch ON rise-time to limit inrush currents over the first 2 milli-seconds, unlike the instant ON of solenoids or relays. When switching with the BIC-75150 or BIC-75300, the expected maximum current transfer should be less than 35 Amps. This level will not damage the battery.
Q:	After I start my engine, the LED indicator blinks rapidly. What does this mean?
A:	The rapidly blinking LED serves as a diagnostic tool. This can indicate one of several conditions. See LED Diagnostics .
1)	If you have a long run of wire from your alternator to your BIC-75150 or BIC-75300, and your auxiliary battery has been discharging a while, it will attempt to draw maximum currents initially. The Hellroaring BIC units will sense the voltage drop across the length of wire and go in pulsing mode. For example: assume your auxiliary battery system attempts to draw 40 amps of charge and accessory current. Your BIC-75150 is mounted on your trailer through 35 feet of 10 AWG wire to the alternator. Your alternator is outputting 14.5 Volts. There will be a 1.4 volt drop in the wiring to the trailer so the BIC-75150 will see 13.1 Volts. This low voltage will cause the BIC-75150 to switch off. When the current stops, the voltage will rise again and the unit will switch on again (after a short delay.) You will see this as a rapidly blinking LED. This will effectively reduce the average current in half. If you want

	more continuous alternator current available, you have at least three choices: Increase your wire size, or you can use the remote sense wire and connect it closer to the alternator end, or you can mount the BIC-75150 closer to the alternator end.
2)	If you have a shorter run of wire (<20 feet) of 10 AWG or larger, this indication will serve as a warning indicator that you have excessive resistance in your connections. If you did not have a Hellroaring Battery Isolator/Combiner, you would not notice this condition until your battery fails to perform. You should investigate and correct this condition soon or you risk a chronic undercharged battery condition and pre-mature failure.
3)	If you are attempting to supply charge or load current in excess of your alternator capability, you will see the blinking LED. The blinking does not hurt anything. Eventually, charge current may be reduced and blinking will stop. This is an indicator that your alternator is marginal to supply your electrical demands. If this is unusual for your particular setup, check for excessive resistance (described in 2 above).
Q:	After I start my engine, the LED indicator does not illuminate. Is there something wrong with my system?
A:	Most likely, nothing is wrong with the isolator. There can be several conditions that may exhibit a "no indication". See LED Diagnostics
1)	Verify that the remote switch is not in the OFF position.
2)	If your main and/or auxiliary system is using more load than your alternator can provide, then the BIC unit will stay disconnected. If this condition exists for an extended period, the battery (connected to the side opposite the alternator) will not charge. To solve this, you can reduce your load or upgrade to a larger alternator.
3)	Your alternator may have failed. Check the belts and the alternator output.
4)	Your connections may be loose or may have excessive resistance due to corrosion. Check the connections for a clean solid connection.
5)	If you are using a remote LED, verify that the built-in LED also is not illuminated. If it is illuminated, the isolator should be working. Check the remote LED and its connections.
Q:	I heard that cranking can draw up to 400 amps. Can the BIC-75150 handle this condition?
A:	The BIC-75150 does not need to handle 400 Amps. It is true that a stalled starting motor can consume up to 400 amps at 10 Volts. However, due to wiring voltage drops and battery internal resistance, the starting motor (for a gasoline engine) usually does not see more than about 300 amps and then, only for a fraction of a second. Diesel engines, however, will likely see more (up to double). On our test vehicle, a 4x4 suburban, the initial starting current was measured at < 300 amps for the first 50 milli-Seconds and then cranking averaged < 160 Amps at 0 degrees C. The BIC-75150 is not intended for full cranking current. When using the BIC-75150, you should not attempt cranking while combined if your main battery can not supply some major current (e.g. clicking solenoid, slow cranking, etc..) You must allow sufficient time for charge current to transfer. Or, you must jumper the battery positives together after combining them with the BIC-75150. The Hellroaring BIC-75150 particularly comes in handy during extreme cold weather, i.e. < -10F. As the main battery voltage drops during the cold cranking load, the auxiliary battery supplies extra power to keep the voltage up and crank the engine. See Cold Weather Starting or Auxiliary Cranking. A single Hellroaring BIC-75300 configured for high current with 2 AWG wire to the starter will handle the full cranking current of a typical 350 cubic inch V8 gasoline engine. This configuration supplies the most power transfer for cold weather or winching. Small Diesel engines will require two BIC-75300 units wired in parallel to achieve full cranking current capability.

Q:	I want extra power for my winch but it is rated up to 400 amps. These operate longer than starting motors. Won't this burn up the isolator?
A:	You will likely burn up your winch before you hurt the BIC-75300. If you use the Basic Backup Battery setup, you will be able to winch as long as your winch and batteries can handle. When you operate your winch, you will likely have a near fully charged main battery. In addition, the BIC-75300 can handle up to 150 amps continuously. Your backup battery can supply boost current to reduce the voltage drop at your main battery terminals. There are several points to keep in mind: 1) The only current through the Hellroaring BIC-75300 will be from just the backup battery. For batteries of equal charge, you can supply up to 300 amps continuously without alternator (for as long as the battery charge lasts and the winch doesn't overheat). 2) Your winch will quickly burn up if it is operated at full load continuously. A winch MFG. recommends less than 20 seconds at full load. Therefore, you likely will not operate at full load for very long. 3) Most winch ratings are at 12 volts. Full load (stall) current will be less due to battery terminal voltage drop. You can expect no more than about 88% of the rated current at full load (with a single battery). For the 400 amp rating, this is about 350 amps. With the Hellroaring BIC-75300 and another battery, this may be about 375 amps. 4) Your alternator can supply a portion of the current. This will be your alternator rating less about 10 to 15 amps for engine operation. Subtract more if you have other loads like headlights. With a 100 amp alternator, this should still leave about 75 amps for the winch. Even more is available with higher output alternators. 5) When wired for the Backup Battery setup, the Hellroaring BIC-75300 and backup battery will initially deliver close to 1/2 of the main battery current to the winch. For the example above, the batteries together will supply about 300 amps (375 amps less the 75 amp alternator output). Of this 300 amps, the main battery will supply about 160 amps and the auxiliary will supply about 140 amps. The backup will supply slightly less due to the typical unequal lengths of wire to the winch and some slight BIC resistance. This combination will increase the operating capacity to about 300% compared to a single battery alone. This is an excellent increase in performance. If the alternator output is not available, the BIC-75300 can handle initial currents up to 300 amps short term. 6) But, since a winch will quickly burn up if operated at full load for more than 20 seconds, a more realistic example will be the winch operating in the range of 125 to 200 amps. At the 200 amp load, the batteries together must supply 125 amps. Under this condition, the main battery would be expected to deliver 65 amps and the backup battery would be expected to supply about 60 amps. If the main battery charge is low, the backup battery and BIC-75300 will supply the majority of the 125 amps or more if needed. 7) With a BIC-75300 configured for the Backup Battery setup, you can also leave it in Auto mode and winch with your main battery only, thereby reserving your backup battery as a starting backup. In this case a battery such as an Optima yellow top (deep cycle) would be ideal as your main battery and any standard starting battery as your backup. If you winch often, and if you plan to use both batteries during winching, then both should be deep cycle rated batteries.