

# Service Tips from the Pros



## Evolution of Battery Management

In the motorized segment of the RV industry, the concept of having a separate battery for the chassis and another battery for the house has proven to be very successful. A customer would be disappointed if the engine wouldn't start due to the house loads draining power from the chassis battery...and it's comforting to know there's additional power available in the house battery package should the chassis battery be low on charge and need assistance with a jump-start. But there are additional reasons the coach manufacturers have designed the electrical systems allowing the isolation of the chassis from the house batteries.

**Getting Along...** Most RV operators understand that the engine's alternator provides power for the DC loads on the chassis side...while the power converter or inverter / charger is the 12-volt DC power source on the coach side. On average, the voltage output of present day alternators generally ballpark in the low / mid 14-volt levels – a voltage threshold that present day chassis / starting batteries find friendly. Unfortunately, the deep-cycle batteries on the house side of the electrical system are not as comfortable at this voltage...especially after the house battery package has been fully charged. The constant 14+ volts from the alternator tends to overdrive a deep-cycle battery and results in a creation of undesirable heat. What the higher temps will cause is an increase in the 'gassing action' within the battery...the audible bubbling noise which some describe as boiling the battery, even though the electrolyte is well below a boiling temperature. While some internal gassing or stirring of the electrolyte in a battery is beneficial, long periods of too much heat can shorten the service life of the battery—primarily due to an increased rate of plate distortion and shorting out of the cells inside the battery. Arguably, the ambient conditions a battery is exposed to has a direct bearing on the service life of that battery. for example, it's likely that a set of house batteries will stay in service several years longer in a coach based in Duluth, Minnesota versus a coach based in El Paso, Texas or Tucson, Arizona—simply

due to the cooler temperatures. The lesson here is...once the house batteries have been adequately charged, it's beneficial to the house batteries to isolate them from the alternator's output once they're adequately charged.

**Isolating the 12-volt chassis battery** and the house battery installation has been a common practice for several reasons. First, a chassis battery (commonly referred to as the cranking battery) is designed to provide high amperage / current to start an engine. The coach batteries are designed to provide power to a variety of loads, over a period of time...lighting, vent fans, a variety of 12-volt powered appliances, and inverters to name a few.

To the vast majority of us, identifying which battery is which based solely on the physical exterior characteristics of a battery, is a guessing game. Without a specification label, it's highly unlikely the average RV owner could confirm a standard maintenance-free, deep-cycle battery from an AGM (absorbed glass matt) deep-cycle battery. While the BCI (the Battery Council International – the battery industry's governing body) has standards regarding the physical size and capacity of the battery, the battery manufacturers choose their unique lead alloys, separator plates, and add features such as handles and different battery posts depending on type of battery and the performance characteristics they've targeted. Simply, while both types of batteries may look similar, it's likely there are distinct differences under the surface—including their inherent discharging and charging voltage characteristics.

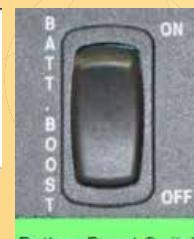
**There have been a variety of methods** used to isolate the chassis battery and house battery installations from each other while the vehicle is turned off. The Battery Isolator (a diode module / device) was used in a few models back in the early 1980s, but a consequence of using diode-equipped devices is the surrender / loss of a portion of the charging voltage—a voltage drop of 1 volt across the device. This may not seem like much, but a charge voltage of 13.5 vs. 12.5 volts is a deal-breaker when trying to top off a pair of house batteries.

A less expensive and more efficient installation that is standard equipment on Winnebago Industries built motorhomes is commonly referred to as the Emergency Start Solenoid or Dual-Battery Solenoid (i.e., a continuous duty electrical switch). These solenoids are very reliable and robust devices...and most importantly, there's very little voltage drop across the connections / contacts which makes them ideal for connecting the chassis battery with the house battery installation.

**The earliest installations** used a simple continuous duty solenoid wired to a 3-position switch located on / near the dash. The driver had the option to depress and lock this switch into the 'Dual-Mode,' sending ignition power to energize the solenoid...thus connecting the chassis electrical system with the house batteries while driving. The switch could be left in a neutral / centered position allowing the driver to isolate the house batteries from the alternator and a momentary pressing of the spring-loaded position of the switch energized the solenoid allowing the house batteries to assist the chassis battery with a jump-starting of the engine. This installation has been identified by a variety of names over the years including: the Dual / Boost solenoid, the Battery Boost solenoid, the Dual / MOM solenoid, the Aux (Auxiliary Start) solenoid, and the Emergency Start solenoid. This basic installation is still employed on present day Class B, Class C, and select Class A models.



The Class A diesel and high-end gas models are usually the first products to feature new electronics—with an eventual trickling down into the other product lines as the popularity grows. While Smart Charging Systems on the house side have come a long way in recent years, this technology has been improving on the



Battery Boost Switch

chassis side as well. The latest systems have become very smart and require very little input from the operator. Other than the Boost Switch to aid a hard-starting situation, our newest system works behind the scenes to manage both the chassis battery side and the house battery side...while driving or when parked and on shore power.

The following information is a collection of product information—some provided on the manufacturer's website, while some is a recollection from memory lane:

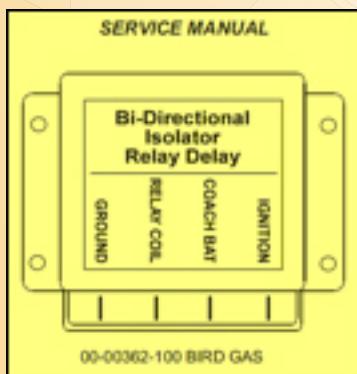
**The BIRD** (BI-DIRECTIONAL ISOLATOR RELAY DELAY) performs two important functions. It provides a method of charging the coach battery from the engine alternator and charges the chassis battery from the converter when the coach is plugged into shore power. When neither battery is being charged, the batteries are isolated from each other to prevent the loads of one battery from inadvertently discharging the other battery.

The unit is housed in a plastic enclosure suitable for mounting under the hood, out of direct water spray. It operates in combination with a continuous duty solenoid to connect the two batteries at the proper times for charging.

**Cons:** While the operation of BIRD module was very reliable, the noise created by the frequent latching and unlatching of the solenoid—especially during the middle of the night, was extremely annoying. This lead to a very short offering of this device.

(*Winnebago Industries P/N 130366-01-000 – Usage beginning on select 1999 diesel products.*)

**BIRD Information Link:** <http://bacrallies.com/PDF/PDF%20Manuals/intellitecbigboyandbird/BIRD.pdf>



maintain / trickle charge the chassis battery while the vehicle is parked for extended periods, is a great concept. An easy method to keep the chassis battery 'fresh' and ready to crank when it was time to pack up and head for home!

**Cons:** The 'hard knocks' education begins when the coach has been sitting idle (storage) with the shore cord unplugged from shore power and with the house battery disconnect switch having been left in the ON position. The advertised stealing from the house batteries continues because those constant parasitic draws on the chassis battery do not stop! Like Robin Hood and his Merry Men...the Trik-L-Start module will continue to drain power from the house side and give to the chassis battery side until the entire system is flat or dead.

(*Winnebago Industries P/N 156431-01-000 – Usage beginning on select 2006 diesel products.*)

**Trik-L-Start Information Link:** <http://lslproducts.net/TLSPage.html>



**The BIM** [Battery Isolation Manager (Control and Relay) 225-Amp. Continuous] – This installation really has no equal. With the chassis battery disconnect and house battery disconnect switches in their 'connected' positions, the BIM module monitors the system voltage thresholds on both electrical systems. The BIM will automatically latch and unlatch the solenoid as necessary to manage battery charging and isolation, whether driving down the road or connected to shore power at your favorite campground. Additionally, for coaches not originally equipped with this device, the BIM can be easily retrofitted to a coach equipped with the basic isolation solenoid with a few wiring changes and a reasonable charge to the debit card!

(*Winnebago Industries P/N 174291-01-000 – Usage beginning on select 2011 diesel products.*)

**Link:** <http://www.precisioncircuitsinc.com/product/battery-isolation-manager-control-relay-225amp-continuous/>



**PRECISION CIRCUITS INC**

#### Operation:

The **BATTERY ISOLATION MANAGER (BIM)** monitors the Battery Voltage of both the Chassis and Coach Batteries over long periods of time. If it senses a charging voltage, it connects the two batteries together. If the charging system is drastically overburdened, the batteries will be isolated; however, if the **BIM** sees a long term charging of both batteries it will allow the

batteries to remain connected and allow the charging system to do its job. Once the batteries have reached a Float Charge state for one hour, the **BIM** will isolate the batteries to prevent overcharging, and will only reconnect the batteries for charging if one of the Battery drops to approximately 80% charge, and the other is being charged. This long term monitoring of the batteries prevents the annoying relay clicking that exists in simpler Isolation Modules today.