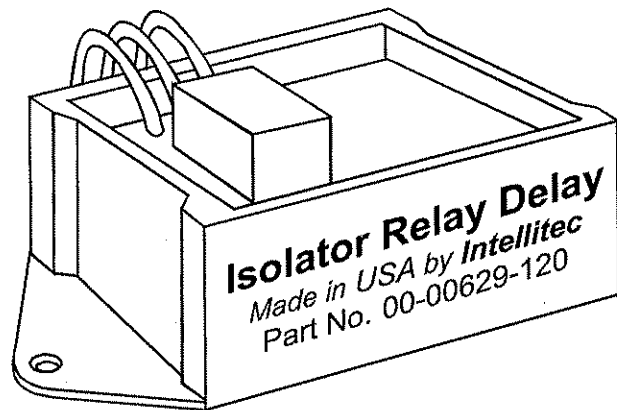


# ISOLATOR RELAY DELAY/E

## SERVICE MANUAL



Isolator Relay Delay/E P/N 00-00629-120 (12V)  
P/N 00-00629-240 (24V)

### CAUTION:

The Isolator Relay Delay/E controls the Isolator Relay which is connected directly to the chassis and coach batteries. Power from both the batteries is fed into the module. The full power of the battery is available at this module. Inadvertant shorts at this box could result in damage and/or injury.

**All servicing of this module should be done only by a qualified Service Technician.**

Tools required: Low current Test Light, Accurate Voltmeter (digital read-out preferred)

### Product Description

The Battery Isolator Relay Delay/E is a reliable approach to charging multiple batteries on a vehicle. It provides a delay to allow the engine to briefly "warm up" and to recharge the main battery before placing the heavy load of a discharged auxiliary battery on the alternator. It also allows the use of self-exciting alternators.

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# ISOLATOR RELAY DELAY/E

## SERVICE MANUAL

### How It Works

#### Isolator Function

The unit operates as an isolator by sensing the level of voltage on the chassis 12 volt system. When this voltage goes *above* 13.3 volts for approximately 12 seconds, as happens when the engine is running normally (normal alternator output voltage is approximately 14.4 volts), it will close the isolator relay providing charging current to the coach battery. When the ignition switch is turned off, the relay will open immediately.

If the voltage should fall *below* 12 volts for more than two seconds while the ignition is on, the relay will drop out to feed all the alternators available output to the chassis battery to keep the engine running. This might happen when the alternator is not able to supply sufficient current to all of the loads. When the chassis voltage goes *above* 13.3 volts again, the relay will again close in about two seconds to retry and charge the coach battery. The resultant flickering of lights would alert the driver of the system overload.

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# ISOLATOR RELAY DELAY/E

## SERVICE MANUAL

### Trouble Shooting

#### Problem

#### Possible Cause / Solution

Coach battery not charging

With engine running, chassis voltage must be above 13.5 volts (Blue wire) If less 13.3 volts, check vehicle's charging system

Check ground on module (Black wire)

Check for voltage on coil of isolator relay after engine has been running for at least 20 seconds. (Red wire). Voltage should be approximately 12 volts. If no voltage, replace IRD/E.

If 12 volts is applied to isolator relay coil, check for voltage drop across the isolator relay contacts. If the drop is greater than 0.3 volts, replace relay.

Chassis battery continues to drain

Check voltage on module with ignition off. (Red and Blue wire) should be 0 volts. If not, check wiring.

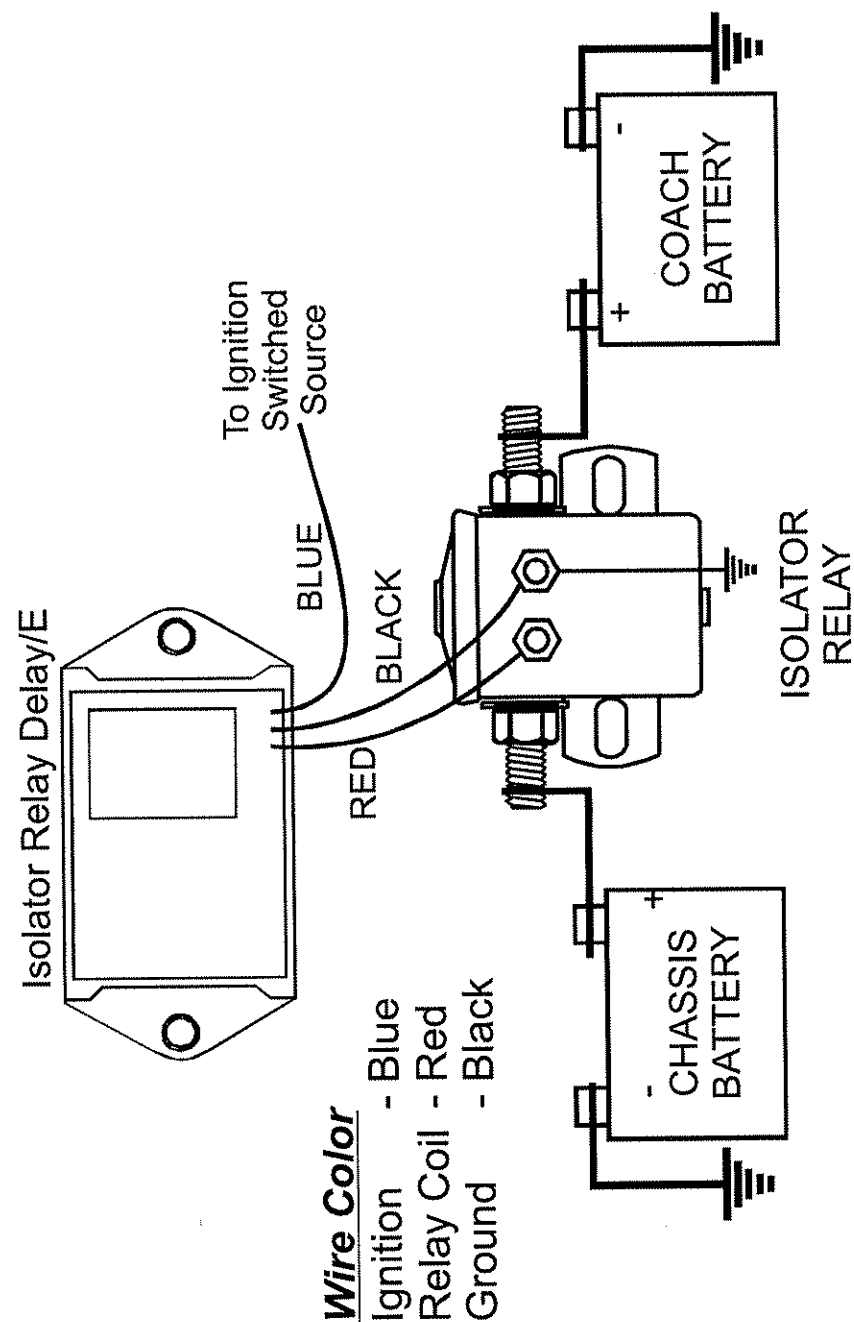
Check for continuity across the isolator relay contacts, the relay should be open with no voltage applied to coil.

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# ISOLATOR RELAY DELAY/E

## SERVICE MANUAL



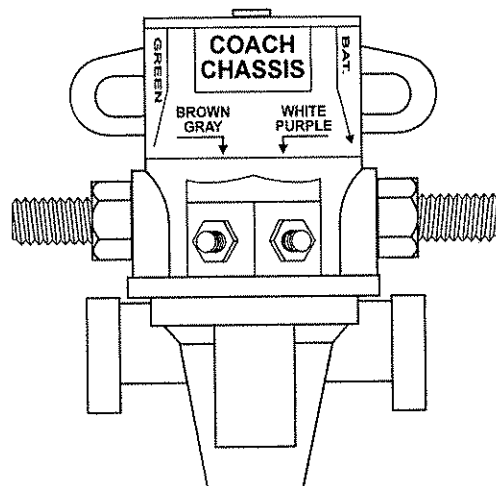
*Typical Installation Diagram:*

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# BATTERY DISCONNECT

## SERVICE MANUAL



**Battery Disconnect** provides a simple and safe means of remotely disconnecting batteries of an RV or boat. With a touch of a remote switch, the batteries will be completely disconnected, preventing unwanted drain when the RV or boat are put into storage.

The heart of the system is a unique latching relay developed specifically for this purpose. While this relay is capable of carrying heavy currents, it requires **NO** power to stay open or closed. It only draws power during activation. The relay is sealed against the environments and is designed to withstand the shock and vibration experienced in the most severe RV or boat applications.

### THE RELAY - How It Works

The Battery Disconnect Relay is a mechanically latching switch that operates by the momentary application of battery voltage to the coil terminals in one direction for latching (closed) or the other direction for unlatching (open).

To close the relay, +12 volts is applied to the "I" terminal and ground to the "S" terminal of the relay. When this is done, the plunger is pulled into the coil and the contacts are connected. While this happens, the rod magnet suspended above the plunger is attracted (opposite poles attract) to the top of the plunger by the magnetic field. See FIGURE 1

When the voltage is removed from the coil, the plunger gets pushed upward by the return spring, but cannot move because the rod magnet is in the way. See FIGURE 2

**Warning:** The Battery Disconnect system connects directly to the vehicle's positive battery terminal. Inadvertent shorts across the battery or to ground, may cause severe damage and injury. Use extreme caution when working with these wires. Always wear safety glasses when working with the battery connections.

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# BATTERY DISCONNECT

## SERVICE MANUAL

### Relay Closing

Positive polarity applied to coil.  
Current flowing in coil.  
Plunger pulled in to coil.  
Rod magnet attracted to plunger by opposite polarity.

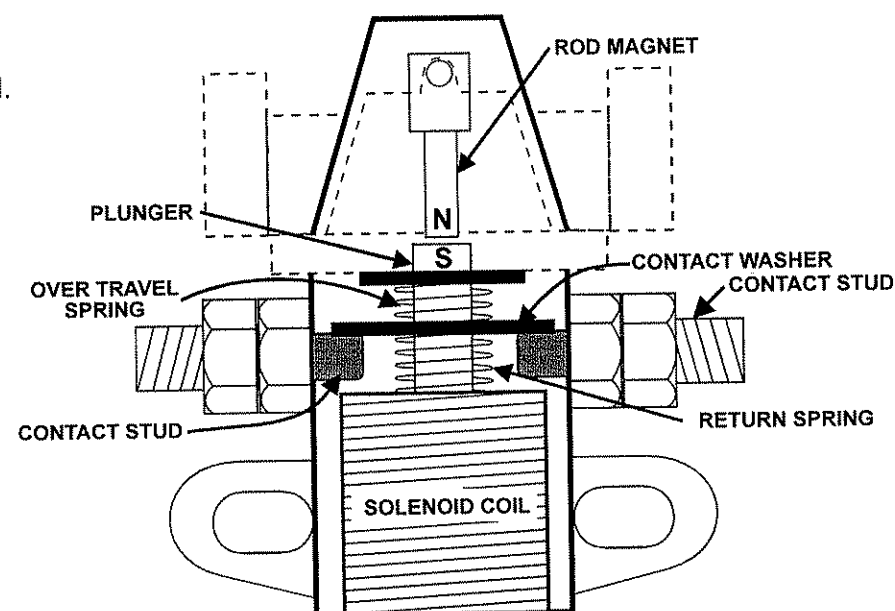


FIGURE 1

### Relay Closed

Power removed from coil.  
Magnet blocks plunger from coming up, maintaining contact.

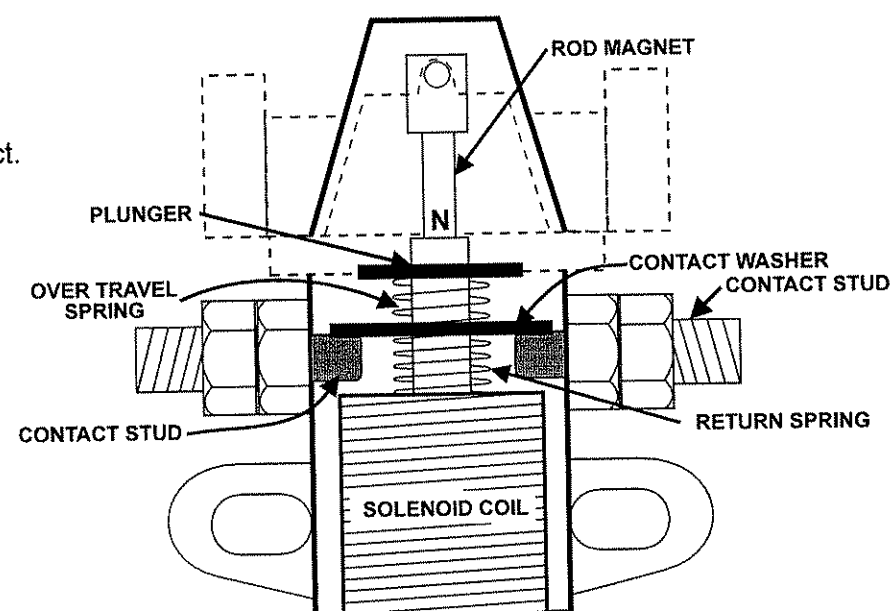


FIGURE 2

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## **BATTERY DISCONNECT**

### **SERVICE MANUAL**

To open the relay, +12 volts is applied to the "S" terminal and ground on the "I" terminal. When this is done, the plunger is again pulled into the coil. However, since the magnetic polarity of the coil is reversed, the rod magnet is repelled (like poles oppose), and swings out of the way. See FIGURE 3

When the voltage is removed from the coil, the plunger gets pushed upwards by the return spring, breaking the connection between the two large terminals. See FIGURE 4.

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# BATTERY DISCONNECT

## SERVICE MANUAL

### Relay Opening

Negative polarity applied to coil.  
Current flowing in coil.  
Plunger pulled in.  
Rod magnet opposed by plunger  
same polarity magnetic field,  
swings out to side of housing.

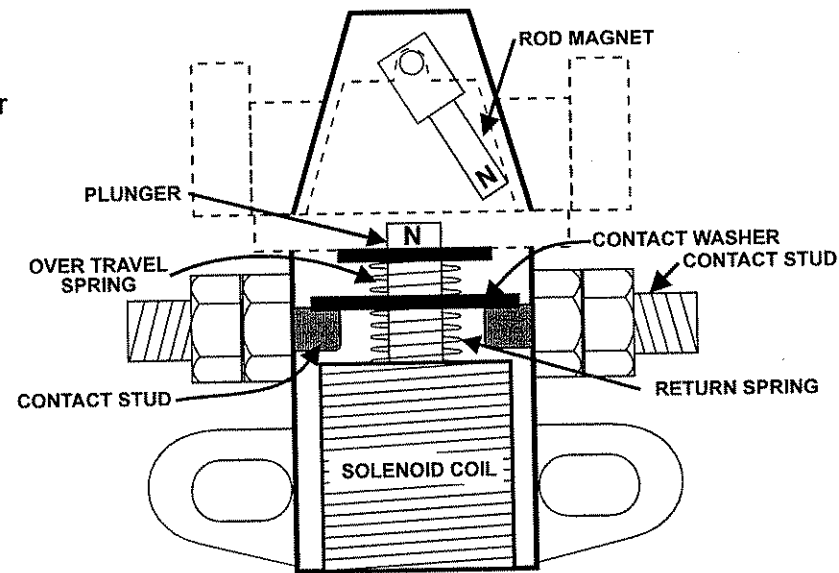


FIGURE 3

### Relay Open

Power removed.  
No current flowing in coil.  
Plunger pushed up by return spring  
while magnet is off to the side.  
Contacts open. Magnet comes  
to rest at side of plunger.

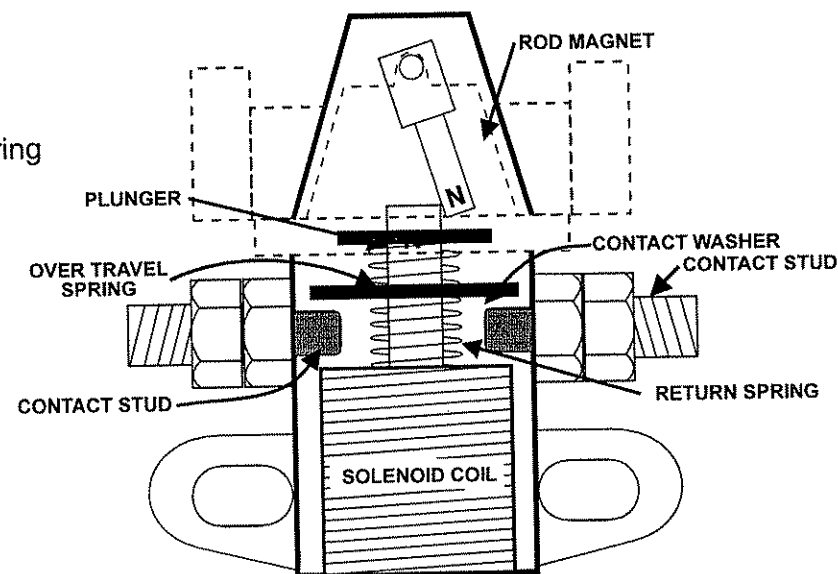


FIGURE 4

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# BATTERY DISCONNECT

## SERVICE MANUAL

### THE SYSTEM

A typical motor home may use one or two relays to disconnect the batteries. These relays are usually independent and operate from a switch panel located inside the coach. A harness is used to connect from the panel to the relays. The Intellitec/Nuvatec panels are offered in four models. They are:

BD0 - Single battery system, with a cable and monitor panel with an on/off indicator

BD1 - Single battery system, with a cable and monitor panel with an on/off indicator and digital voltmeter

BD2 - Dual battery system, with cable and monitor panel with two on/off indicators and ignition interlock relay.

BD3 - Dual battery system, with cable and monitor panel with two on/off indicators, digital voltmeter, and ignition interlock relay.

*Note: BD1 panel can be interchanged with BD0, and BD3 and be interchanged with BD2*

The dual relay panels include an ignition interlock relay that opens the power circuit to the chassis battery relay when the ignition is turned on, to prevent the battery from being accidentally opened when the engine is running.

A typical circuits is shown in FIGURE 5 and FIGURE 6. The switches are each double pole, double throw, momentary, center off. Operating the switch in either direction will cause the relays to open or close, depending on the polarity of the voltage applied.

### FUSES

There are two 5 Amp fuses for the system, mounted on each relay. Looking at the relay with cap at the top, the fuse on the right feeds the LED indicator and if so equipped, the digital voltmeter. The fuse on the left feeds the power to the switch that operates the solenoid.

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# BATTERY DISCONNECT

## SERVICE MANUAL

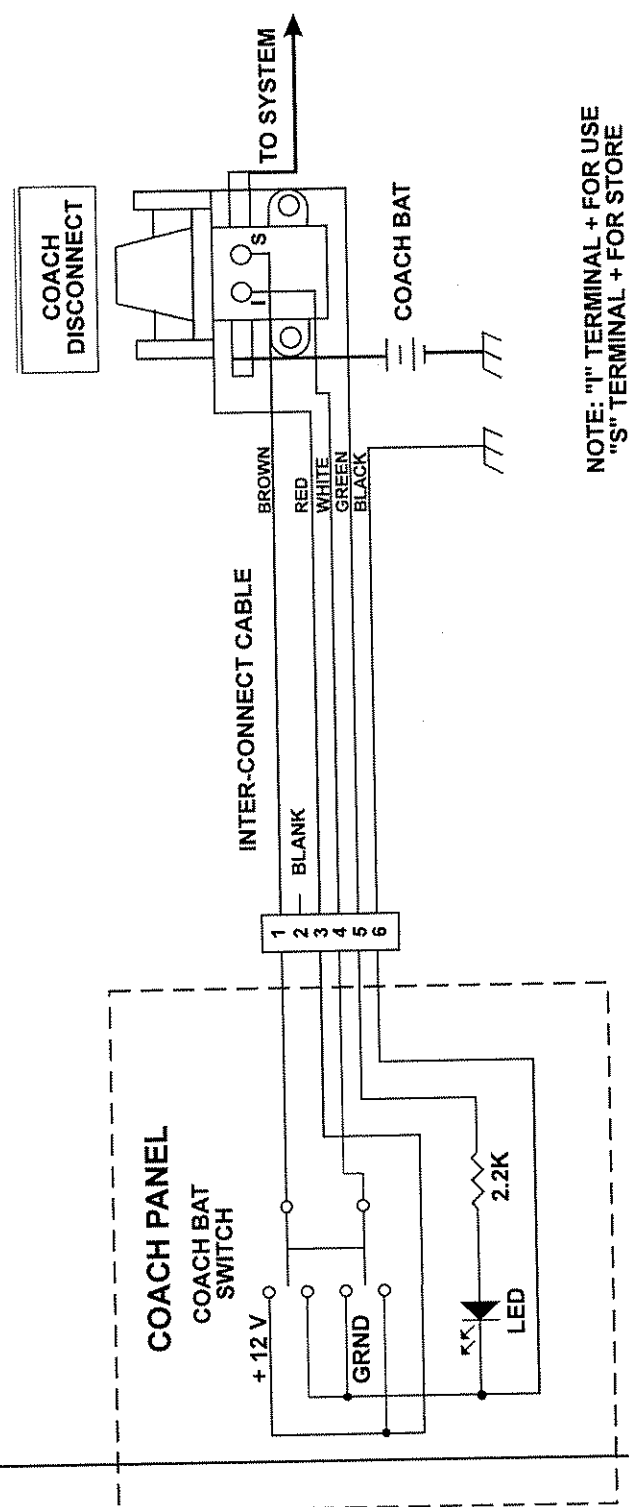
Problem	Possible Cause/Solution
Relay won't engage	<p>Check fuses on relay</p> <p>Check battery voltage, must be greater than 10.5 volts.</p> <p>While switch is engaged, check for voltage across the coil terminals (+ on the "I" terminal and ground on the "S" terminal), If 0 volts, replace panel, if + voltage, replace relay.</p> <p>Check wiring</p>
Relay won't disengage	<p>Check fuses on relay</p> <p>Check battery voltage, must be greater than 10.5 volts</p> <p>While switch is engaged, check voltage across the coil terminals (+ on the "S" terminal and ground on the "I" terminal) If 0 volts, replace panel, if + voltage, replace relay.</p>
Light on panel remains on although relay is off.	<p>Check wiring</p> <p>Is coach plugged in, unplug coach</p> <p>Is engine running, turn engine off</p> <p>Check wiring</p> <p>Check fuses on relay</p>
Light is off although relay is on	<p>Check wiring</p> <p>Replace panel assembly</p> <p>Check fuses on relay</p>
BD1 or BD3 No voltmeter reading	<p>Check wiring</p> <p>Check voltage on yellow/green wire, If + voltage, replace panel</p>

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## BATTERY DISCONNECT

# SERVICE MANUAL



NOTE: "I" TERMINAL + FOR USE  
"S" TERMINAL + FOR STORE

**NOTE: MOVE SWITCH  
DOWN FOR USE  
UP FOR STORE**

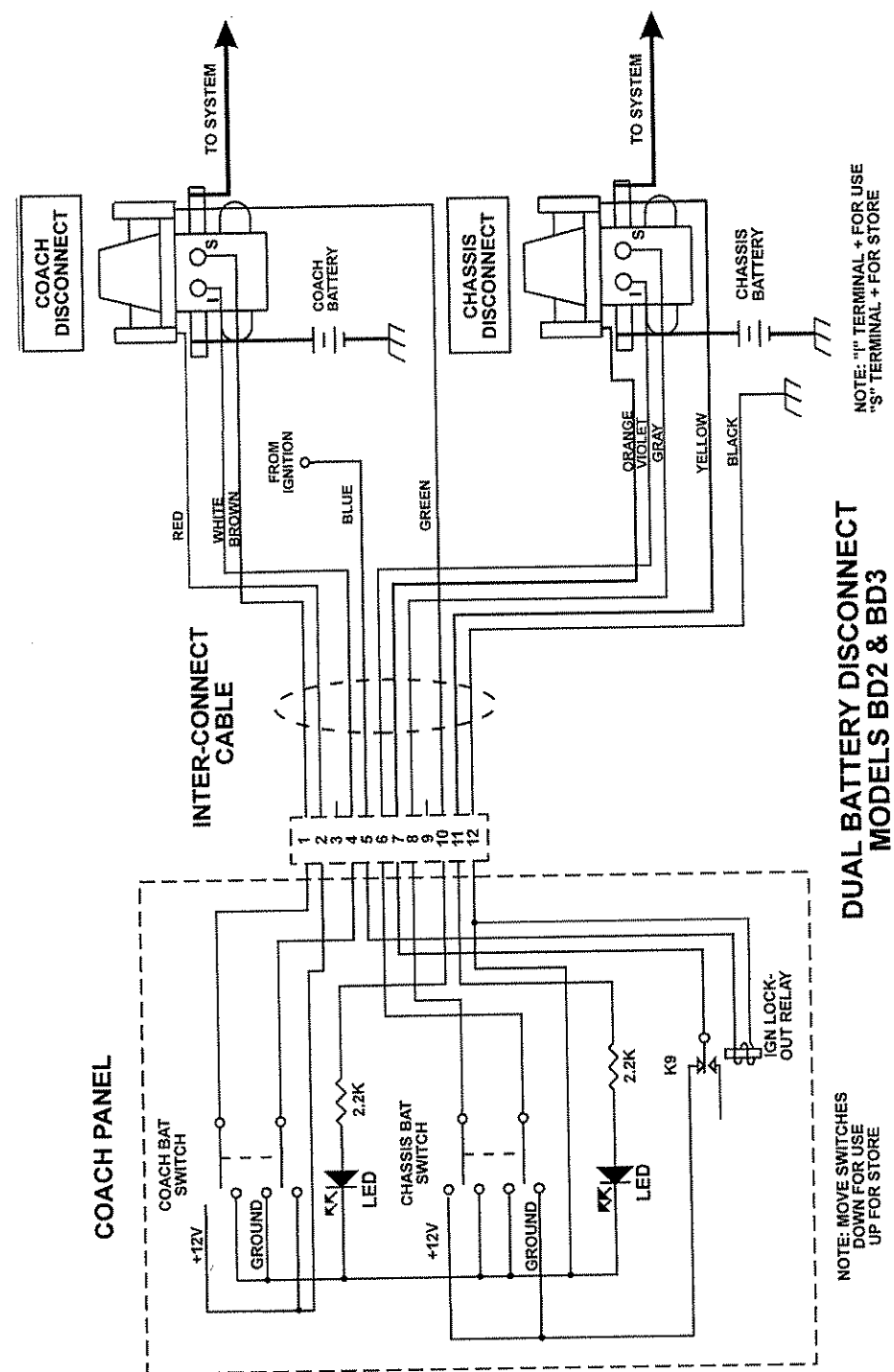
## SINGLE BATTERY DISCONNECT MODELS BD0 & BD1

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# BATTERY DISCONNECT

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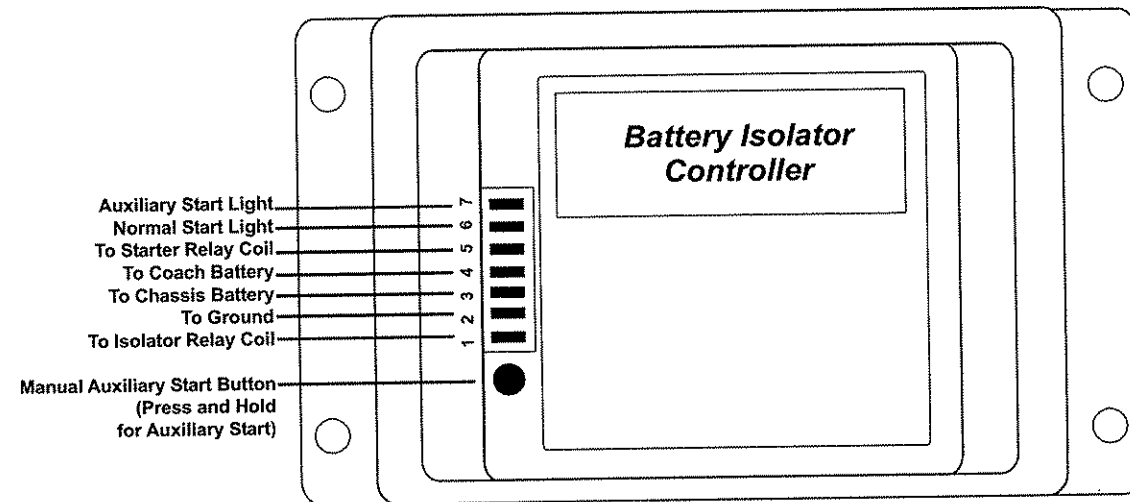
### DUAL BATTERY DISCONNECT MODELS BD2 & BD3

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# BATTERY ISOLATOR CONTROLLER

## SERVICE MANUAL



P/N 00-00131-000

### CAUTION:

The Battery Isolator Controller controls the Isolator Relay which is connected directly to the chassis and coach batteries. Power from both the batteries is fed into the module. The full power of the battery is available at this module. Inadvertent shorts at this box could result in damage and/or injury.

***All servicing of this module should be done only by a qualified Service Technician.***

Tools required: Low current Test Light, Accurate Voltmeter (digital read-out preferred)

### Product Description

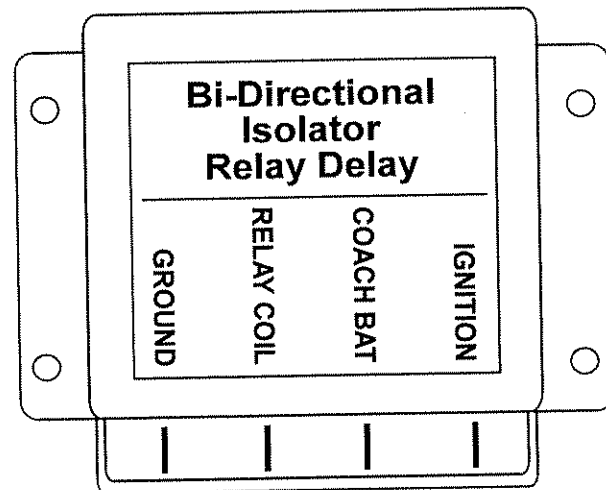
The Battery Isolator Controller performs two important functions. First it provides a method of charging and isolating dual batteries in an RV. It also provides automatic auxiliary starting from the house batteries when the chassis battery is unable to provide sufficient starting power. Indicator lamp drivers are included to signal the driver of both normal and auxiliary start. The unit combines the functions of the isolator and manually operated auxiliary start functions. 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.

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# BI-DIRECTIONAL ISOLATOR RELAY DELAY

## SERVICE MANUAL



00-00362-000 BIRD GAS  
00-00366-000 BIRD DIESEL

### Product Description

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.

**Note:** The BI-DIRECTIONAL ISOLATOR RELAY DELAY controls the Isolator Relay which is connected directly to the chassis and coach batteries. Power from both the batteries is fed into the module. The full power of the battery may be available at this module. Inadvertent shorts at this box could result in damage and/or injury. All servicing of this module should be done only by a qualified Service Technician.

Tools required: Low current Test Light, Accurate Voltmeter (digital read-out preferred)

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# BI-DIRECTIONAL ISOLATOR RELAY DELAY

## SERVICE MANUAL

### How It Works

The BIRD operates in conjunction with a continuous duty solenoid to provide the isolator/battery charging functions of a motorhome. It senses voltage on the coach and chassis batteries. If the voltage on either one is above 13.3 volts, indicating the battery is being charged, it closes the isolator relay, paralleling the batteries, charging both. It operates in two directions, charging the batteries from the engine alternator and charging the batteries from the converter. These functions are similar but operate at different thresholds.

### Engine Alternator Charging the Batteries

When the ignition switch is turned on and the engine is running, the system senses the level of voltage on the chassis 12 volt system. When this voltage goes *above* 13.3 volts for approximately 12 seconds, as happens when the engine is running normally (normal alternator output voltage of a cold engine is approximately 14.4 volts), it will close the isolator relay providing charging current to the coach battery. This delay allows a cold engine an opportunity to start and warm up before having the heavy load of a discharged coach battery placed on it.

If the voltage should fall *below* 12 volts for more than about four seconds, the relay will drop out to feed all the alternators available output to the chassis battery to keep the engine running. This might happen when the alternator is not able to supply sufficient current to all of the loads and charge the coach battery at the same time. When the chassis voltage goes *above* 13.3 volts again, the relay will again close in about four seconds to retry to charge the coach battery. The resultant flickering of lights would alert the driver of the system overload.

### Converter Charging the Batteries

When the coach is plugged into shore power and the ignition is off, the unit senses the voltage on the coach batteries. When this voltage goes *above* 13.3 volts for approximately 12 seconds, as happens when the converter isn't heavily loaded, it will close the isolator relay providing charging current to the chassis battery.

If the voltage should fall *below* 12.8 volts for more than about four seconds, the relay will drop out to prevent the coach loads from discharging the chassis battery. This might happen when the converter is heavily loaded by coach loads. When the coach battery voltage goes *above* 13.3 volts again, the relay will again close in about four seconds to retry to charge the chassis battery.

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# BI-DIRECTIONAL ISOLATOR RELAY DELAY

## SERVICE MANUAL

### Trouble Shooting

Problem	Possible Cause/Solution
Coach battery not charging from engine.	<p>Check for open circuit breaker to coach battery.</p> <p>With engine running, chassis voltage must be above 13.5 volts. If less than 13.3 volts, check vehicles charging system.</p> <p>Check ground on module.</p> <p>Check for voltage on coil of isolator relay after engine has been running for at least 20 seconds. Voltage should be approximately 12 Volts. If no voltage, replace BIRD.</p> <p>If 12 volts is applied to isolator relay coil, check for voltage drop across the isolator relay contacts. If the drop is greater than 0.2 volts, replace relay.</p>
Chassis battery drains into coach	<p>Check for ignition voltage on module with ignition off. Should be 0 volts. If not check wiring.</p> <p>Check for continuity across the isolator relay contacts, the relay should be open with no voltage applied to coil.</p>
Isolator relay "clicking" on and off.	<p>Battery voltage falling below 12.8 when plugged in or 12.0 when engine is running. This is normal with heavy loads or low batteries.</p>

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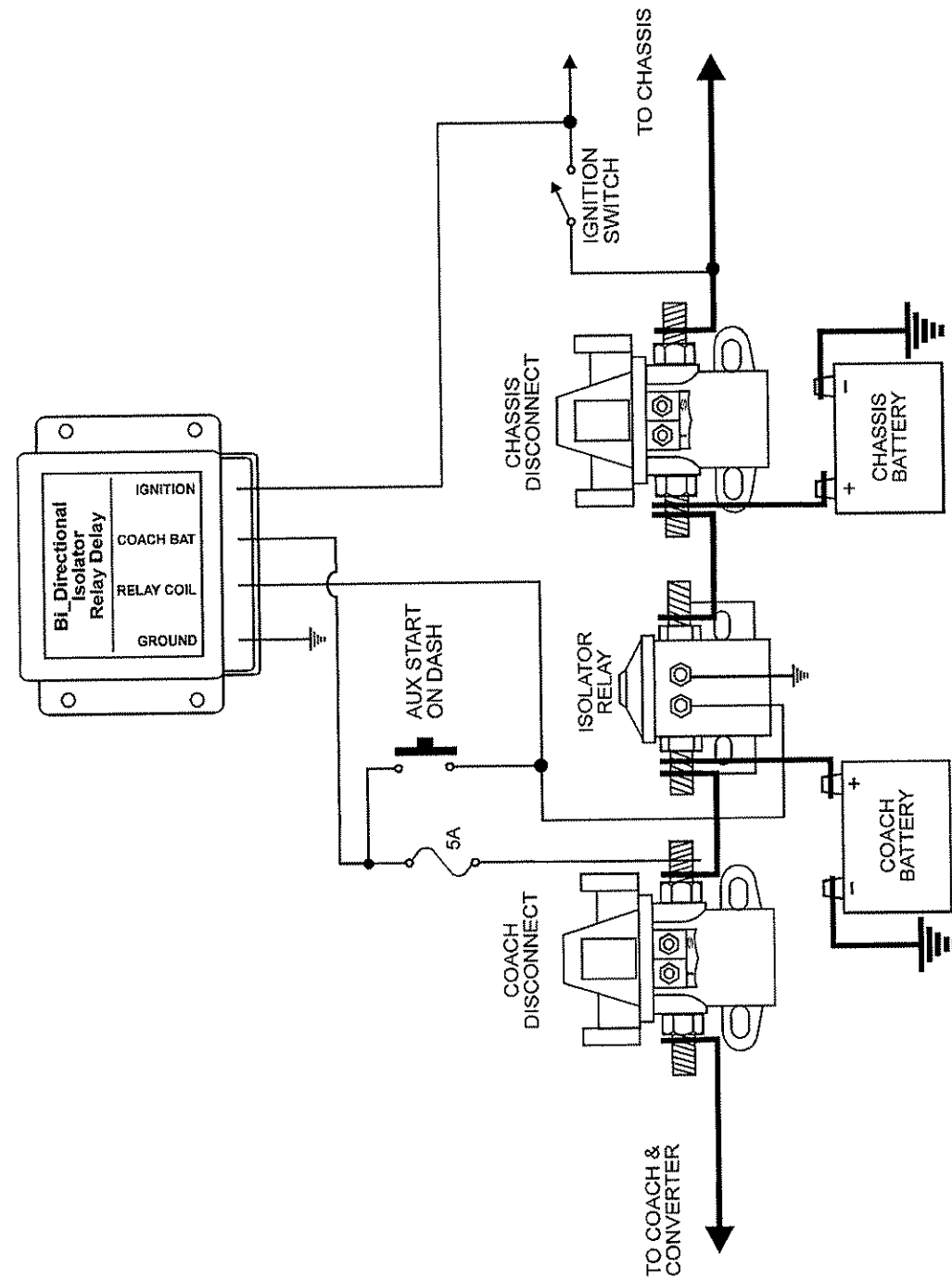
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# BI-DIRECTIONAL ISOLATOR RELAY DELAY

## SERVICE MANUAL

TYPICAL INSTALLATION DIAGRAM



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