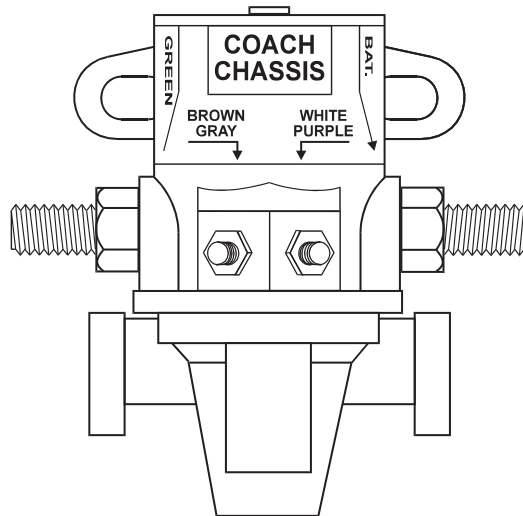


# BATTERY DISCONNECT

## 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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### Relay Closing

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

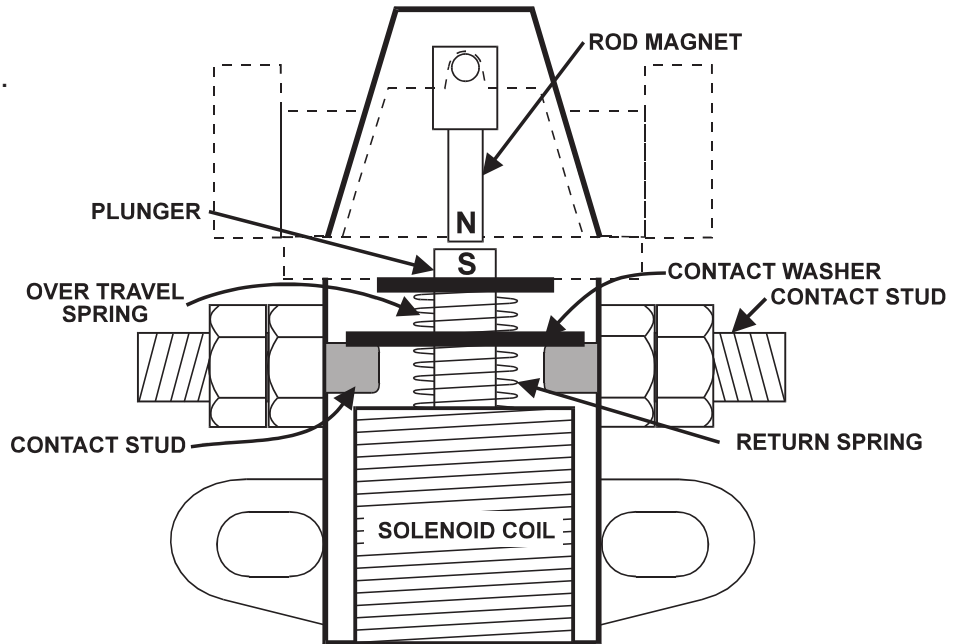


FIGURE 1

### Relay Closed

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

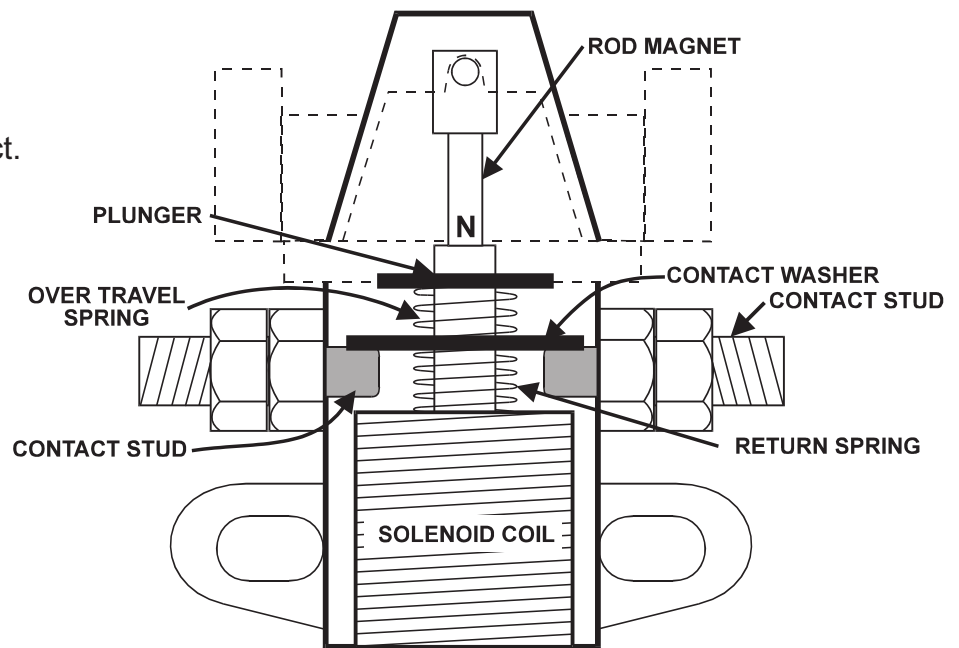


FIGURE 2

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# **BATTERY DISCONNECT**

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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.

# 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.

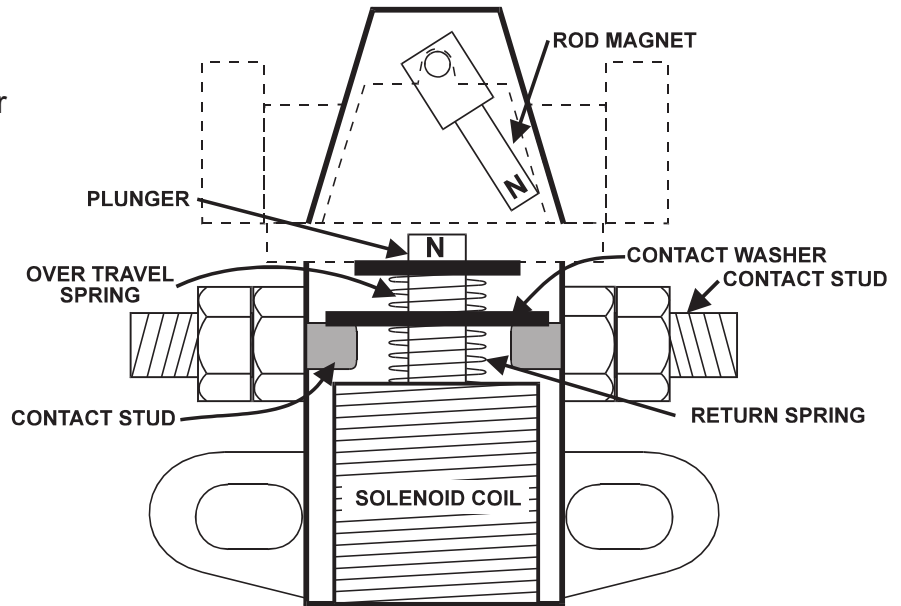


FIGURE 3

### 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.

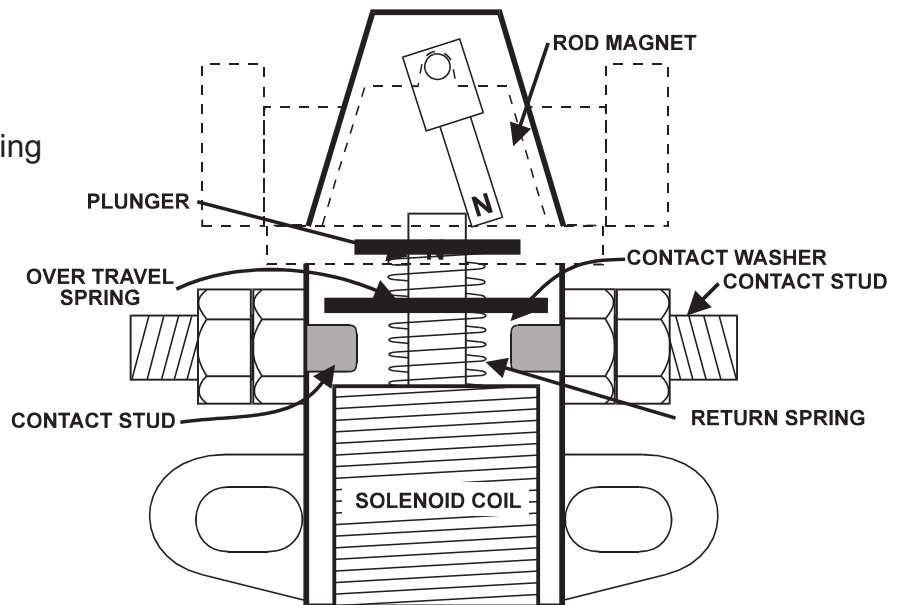


FIGURE 4

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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.

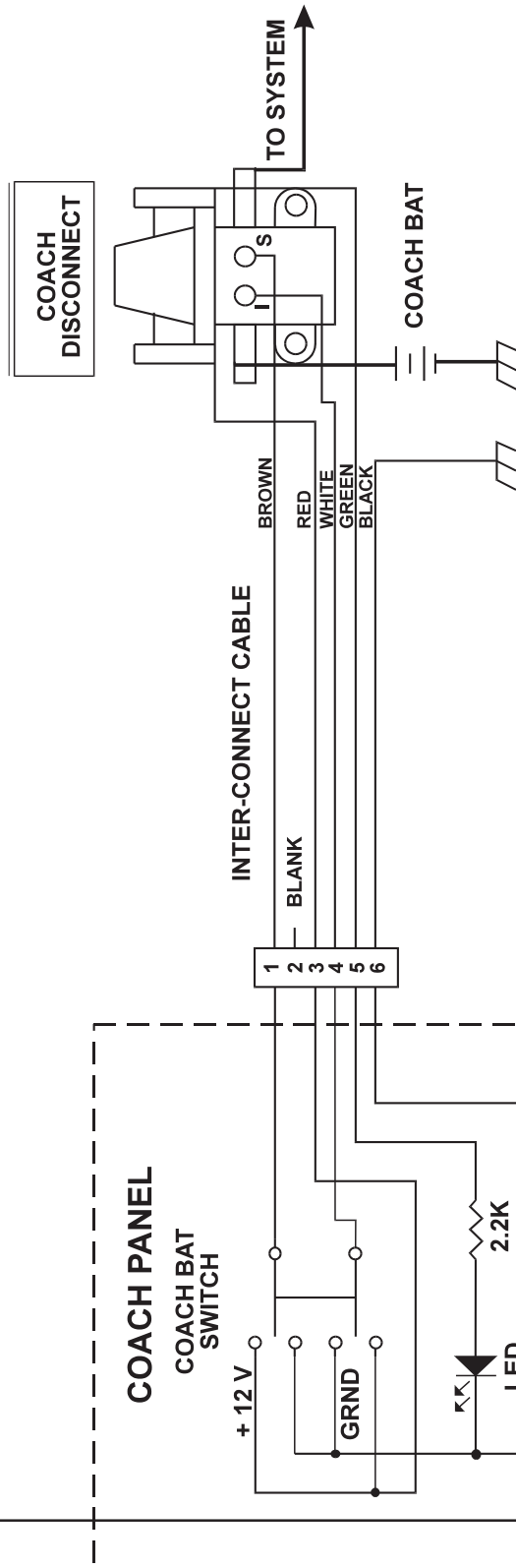
# BATTERY DISCONNECT

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<b>Problem</b>	<b>Possible Cause/Solution</b>
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>

# BATTERY DISCONNECT

## SERVICE MANUAL



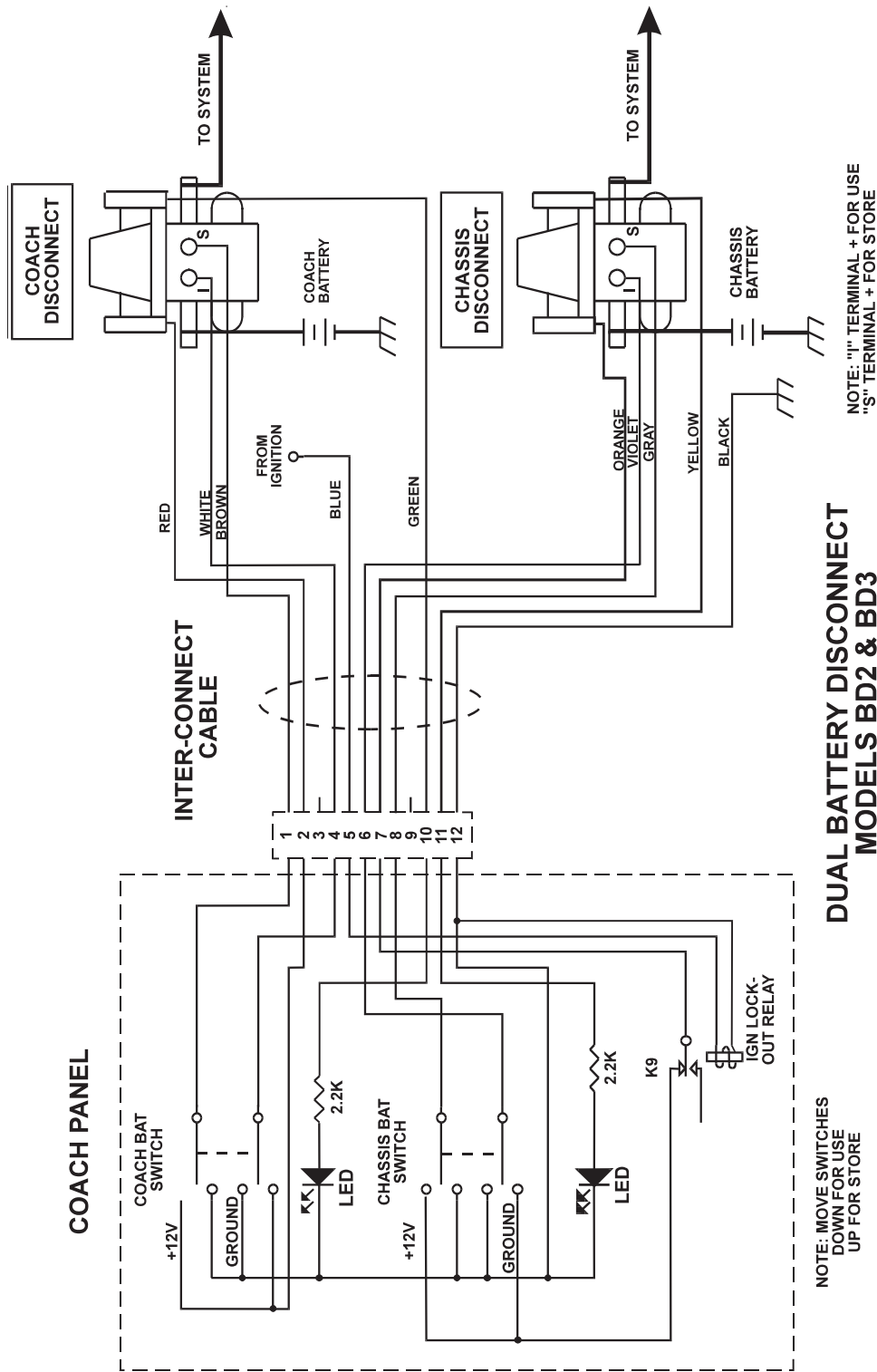
NOTE: "I" TERMINAL + FOR USE  
"S" TERMINAL + FOR STORE

NOTE: MOVE SWITCH  
DOWN FOR USE  
UP FOR STORE

**SINGLE BATTERY DISCONNECT  
MODELS BD0 & BD1**

# BATTERY DISCONNECT

## SERVICE MANUAL



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

DUAL BATTERY DISCONNECT  
MODELS BD2 & BD3

NOTE: MOVE SWITCHES  
DOWN FOR USE  
UP FOR STORE