

# Battery Disconnect

Meet the remote battery disconnect that makes sure a RV's batteries are alive, well and ready for the road.

**Battery Disconnect** is an easy-to-install system that will allow RV owners to disconnect coach and chassis batteries with just the touch of a switch. With **Battery Disconnect**, the owner can be sure the batteries are disconnected when his RV is not in use or being stored off-season. It is conveniently located inside the RV, and it's all remote.

The heart of the **Battery Disconnect** system is another Intellitec invention. A latching relay, capable of carrying heavy coach currents, draws power only when switched on or off; yet, it requires no power to stay open or closed. This sturdy relay is sealed against the environment and is designed for the toughest use.

Unwanted battery drain during storage, or when the RV is not in use, is not the only customer benefit of **Battery Disconnect**. Batteries are protected from overcharging when the RV is plugged in for an extended time. Battery Disconnect also prevents shorts or fire hazard while working on the 12 Volt electrical system.

## Easy Installation

Installation detail is straightforward, easy-to-follow, and is simple enough that your customers can install it themselves. (Shown on the reverse side of this sheet.)

If help is needed, there is a toll-free number that you can call for assistance from Intellitec.



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## Models and Specifications

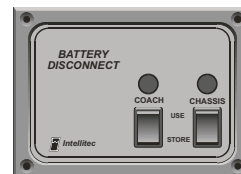
There are four Battery Disconnect models in the product line. There is one that's right for every RV and every customer. **See model choices with part numbers as listed.**



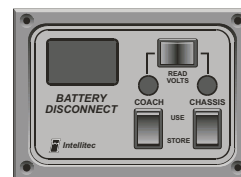
Intended for remote disconnect of a single battery. Requires a relay, 20 ft. of cable, and a monitor panel with ON/OFF indicator.



Intended for remote disconnect of a single battery. Requires a relay, 20 ft. of cable, a monitor panel with ON/OFF indicator, and digital voltmeter.



Intended for remote disconnect of both coach and chassis batteries of motor homes. The BD2 system requires two relay, 25 ft. of cable, monitor panel with two ON/OFF indicators, and ignition interlock to prevent disconnection while engine is running.



Intended for remote disconnect of both coach and chassis batteries of motor homes. The BD3 requires two relays, 25 ft. of cable, and monitor panel with two ON/OFF indicators, digital voltmeter and ignition interlock to prevent disconnection while engine is running.

P/N 53-00066-000 Rev. B 111504

# Battery Disconnect

## BATTERY DISCONNECT SYSTEM

### BD0 FOR COACH - NO VOLTMETER

QTY 1 BDO BEZEL ASSY (BRN/GLD)	01-00066-000
(BLK/SLV)	01-00066-004
QTY 1 BD RELAY, 100 AMP, 12V	01-00055-000
QTY 1 CABLE, BDO/1 20 FEET	11-00063-000

### BD2 FOR COACH & CHASSIS - NO VOLTMETER

QTY 1 BD2 BEZEL ASSY (BRN/GLD)	01-00066-002
(BLK/SLV)	01-00066-006
QTY 1 BD RELAY, 100 AMP, 12V	01-00055-000
QTY 1 CABLE, BD2/3 25 FEET	11-00139-000

### BD1 FOR COACH - WITH VOLTMETER

QTY 1 BD1 BEZEL ASSY (BRN/GLD)	01-00066-001
(BLK/SLV)	01-00066-005
QTY 1 BD RELAY, 100 AMP, 12V	01-00055-000
QTY 1 CABLE, BDO/1 20 FEET	11-00063-000

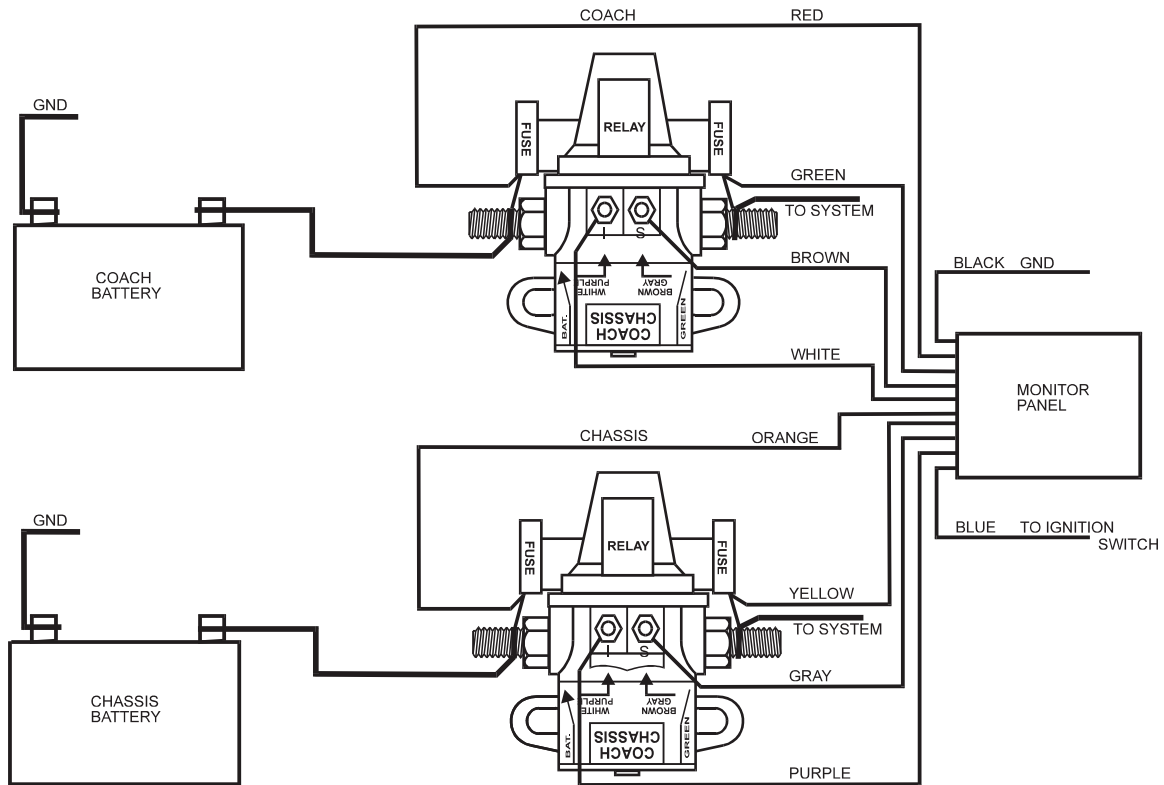
### BD3 FOR COACH & CHASSIS - WITH VOLTMETER

QTY 1 BD3 BEZEL ASSY (BRN/GLD)	01-00066-003
(BLK/SLV)	01-00066-007
QTY 1 BD RELAY, 100 AMP, 12V	01-00055-000
QTY 1 CABLE, BD2/3 25 FEET	11-00139-000

## SPECIFICATIONS

Relay Actuation Voltage	10.5 Volts minimum
Continuous carry current	100 Amps maximum
Short term carry current	500 Amps - 30 seconds maximum

## Typical Battery Disconnect Installation

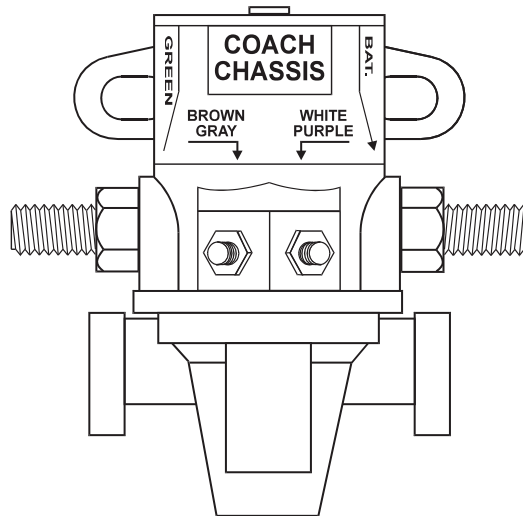


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P/N 53-00066-000 Rev. B 111504

# 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.

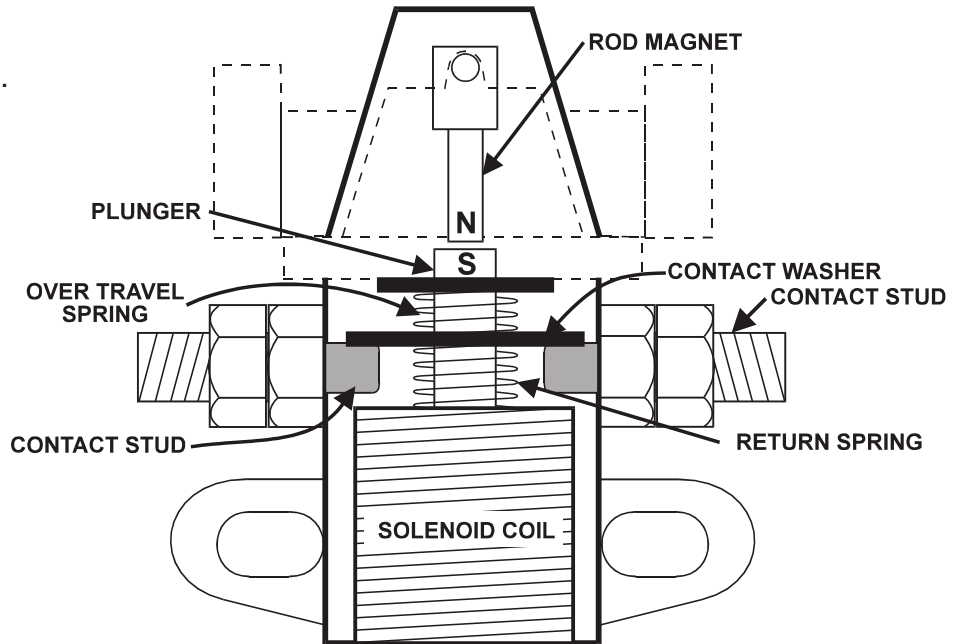


FIGURE 1

### Relay Closed

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

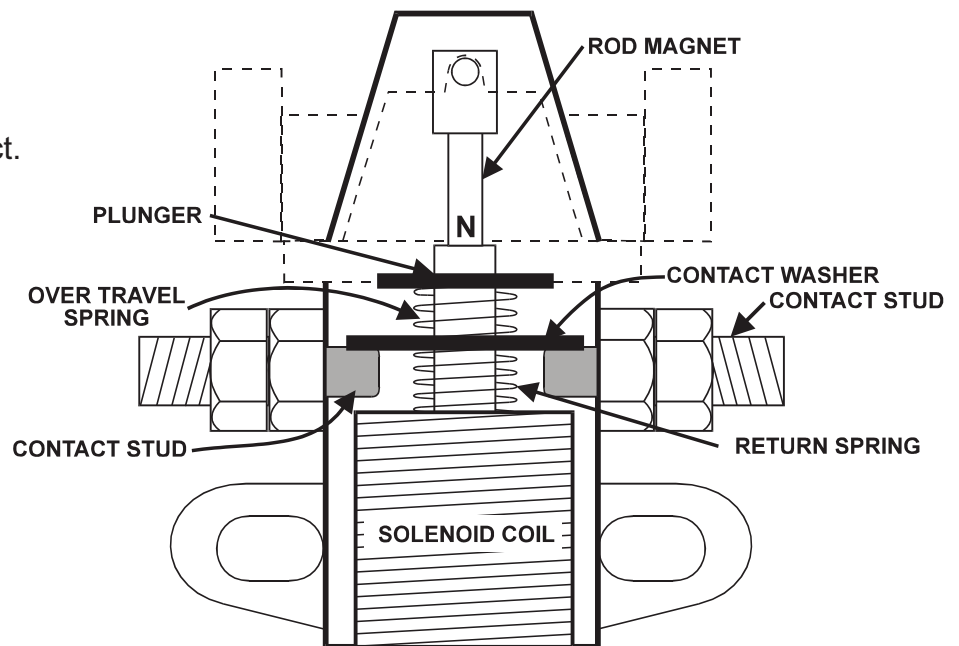


FIGURE 2

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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.

# 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.

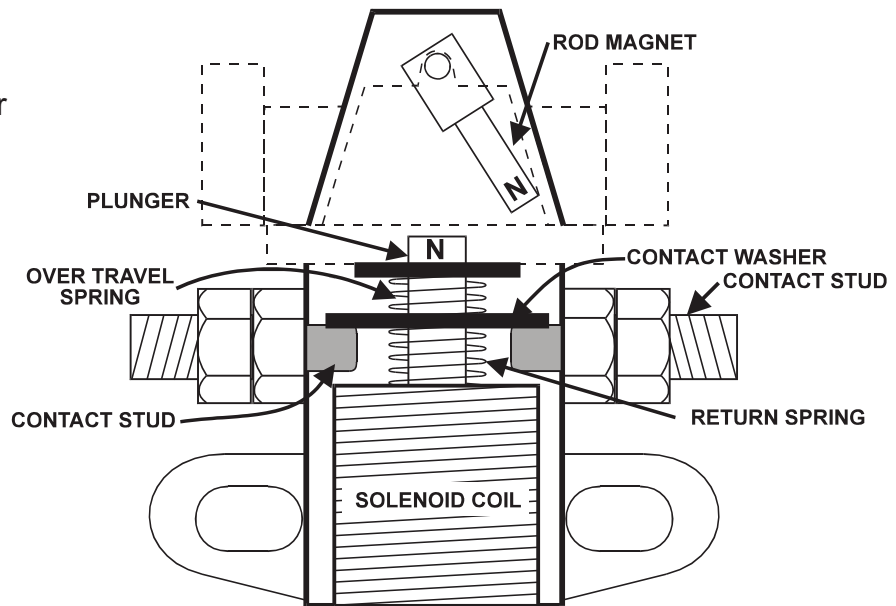


FIGURE 3

### 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.

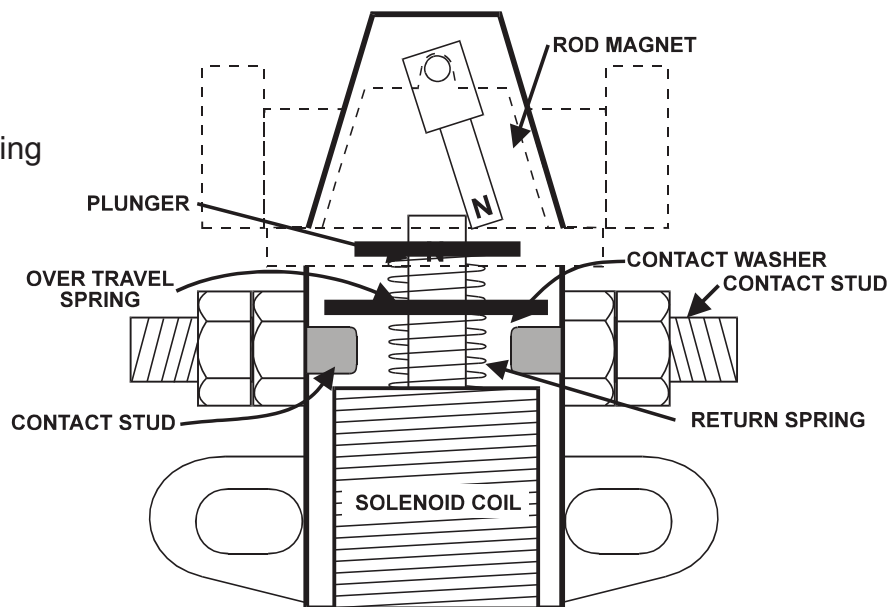


FIGURE 4

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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

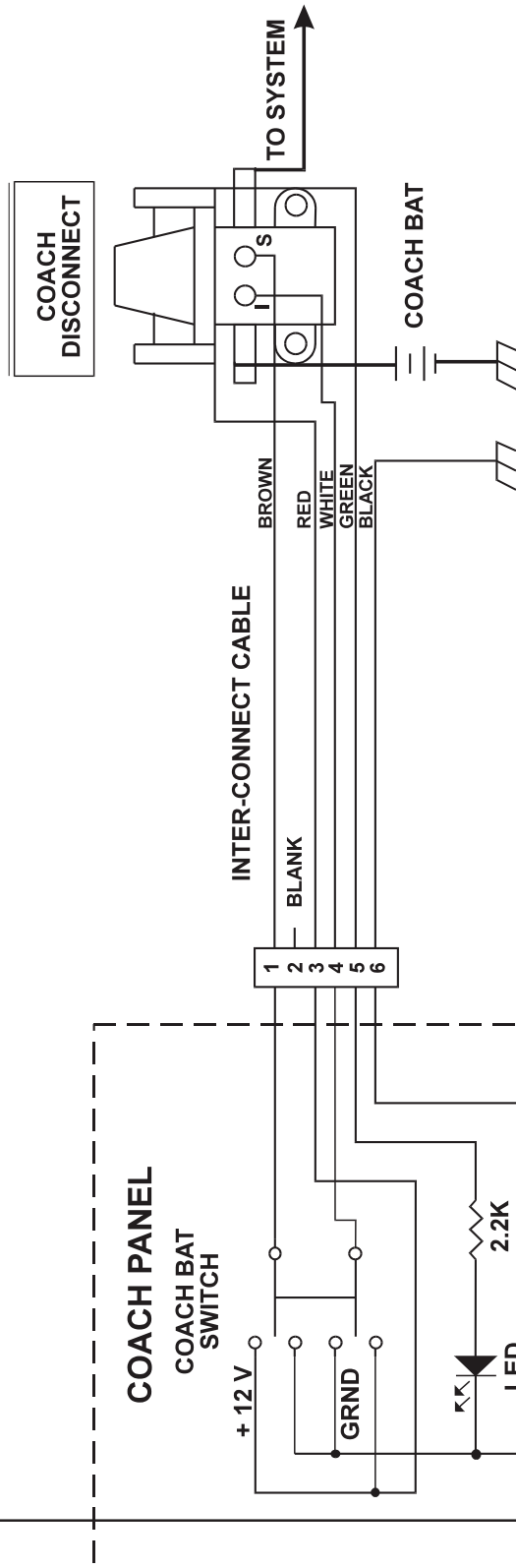
## SERVICE MANUAL

<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



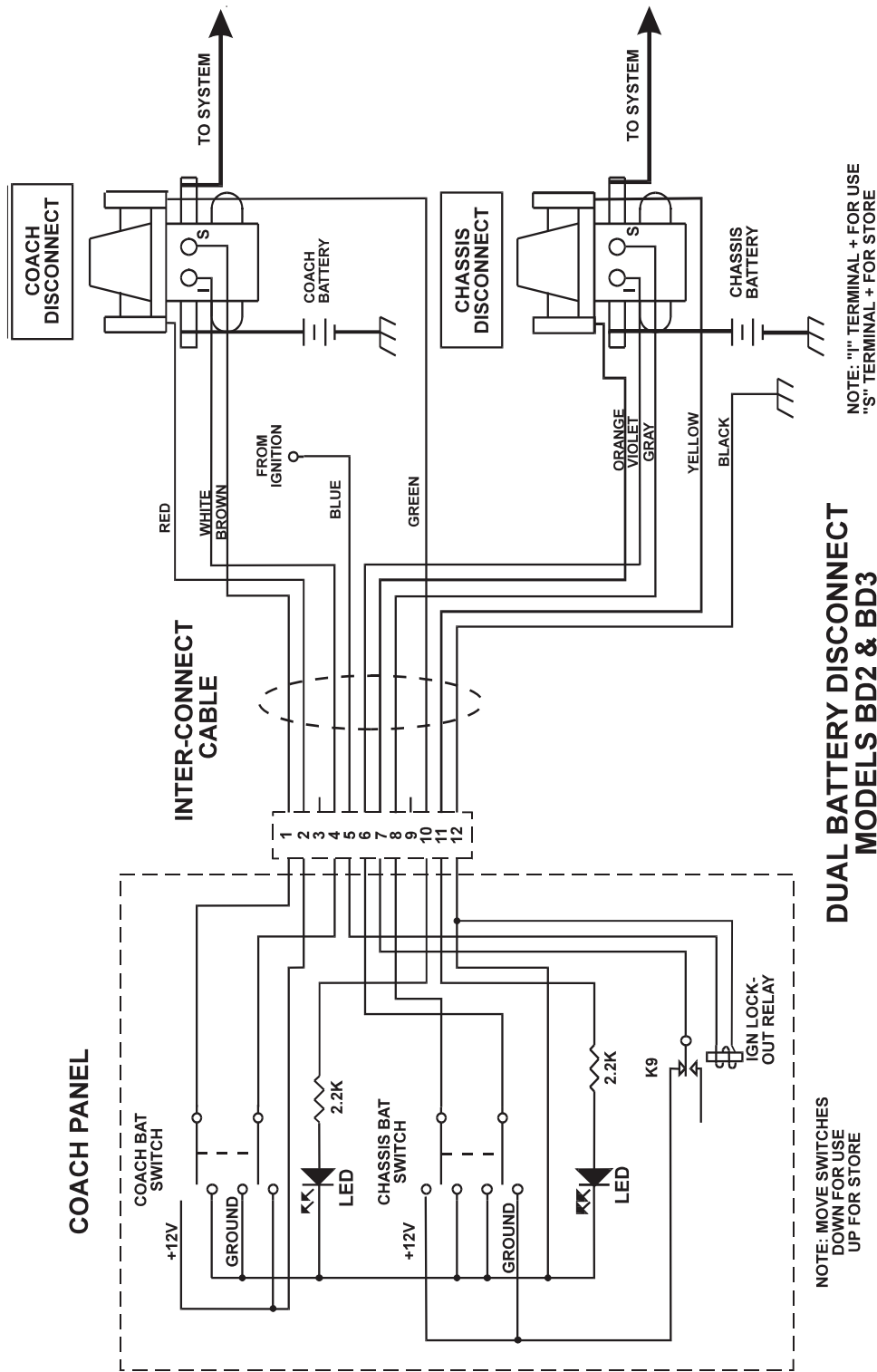
NOTE: "I" TERMINAL + FOR USE  
"S" TERMINAL + FOR STORE

NOTE: MOVE SWITCH  
DOWN FOR USE  
UP FOR STORE

**SINGLE BATTERY DISCONNECT  
MODELS BD0 & BD1**

# BATTERY DISCONNECT

## SERVICE MANUAL



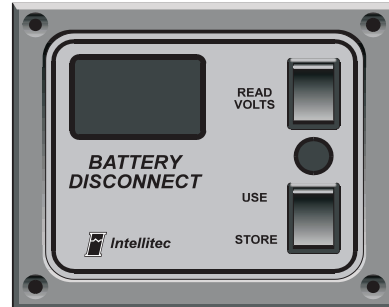
# BATTERY DISCONNECT

## INSTALLATION MANUAL



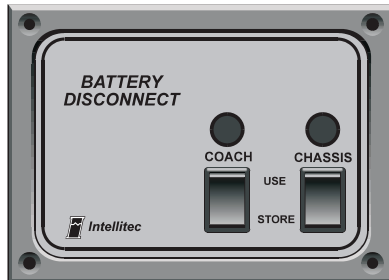
**BD0**

P/N 01-00066-000



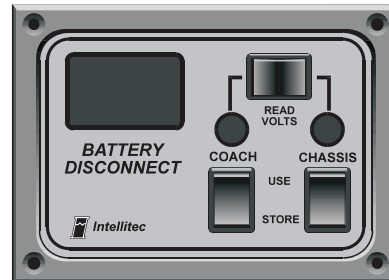
**BD1**

P/N 01-00066-001



**BD2**

P/N 01-00066-002



**BD3**

P/N 01-00066-003

**BATTERY DISCONNECT** provides a simple and safe means of disconnecting the coach and chassis battery(s) of an RV. With just the touch of a switch on the monitor panel conveniently located inside the RV, the battery(s) will be completely disconnected. Since the 12 Volt battery system plays such a vital role in the use and enjoyment of your RV, Battery Disconnect can give you peace of mind.

Through its correct use you may:

- Prevent unwanted discharging of batteries during extended periods of storage
- Prevents shorts or fire hazard while storing on the 12 Volt electrical system
- Prevent overcharging of batteries if RV is plugged into shore power (120 Vac) for extended periods.

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# **BATTERY DISCONNECT**

## **INSTALLATION MANUAL**

### **HOW AND WHEN TO USE BATTERY DISCONNECT**

There are four Battery Disconnect models; two with a single "STORE/USE" switch and two with a dual "STORE/USE" switch. Single switch units control the coach or "house" batteries only. Dual switch units control the coach or "house" batteries and the chassis or "motor" batteries.

#### **TO USE RV**

Press the "USE/STORE" switch to the "USE" position momentarily. The indicator light for that battery will glow, indicating the presence of 12 Volts on the system. Repeat this step for the second "STORE/USE" switch if your unit is so equipped.

#### **TO STORE RV**

To prevent the discharge of your batteries, press the "STORE/USE" switch to the "STORE" position momentarily. Repeat this step for the second "STORE/USE" switch, if your unit is so equipped. If no external power (shore power or generator) is applied to the system, the indicator light(s) should be extinguished.

#### **EXTENDED PLUG-IN** *(A week or more)*

If you plan to leave your RV plugged into 120 Vac at your home or campsite, it is advisable to disconnect your batteries according to the procedures described under the "TO STORE RV". This procedure prevents overcharging to the batteries.

**NOTE:** If you are plugged into any 120 Vac source, the "IN USE" indicator light may remain lighted.

#### **INITIAL INSTALLATION**

It is suggested that all wires from the monitor panel be inserted or attached to the relay(s) prior to final relay installation.

#### **FOR MOTORIZED RV's**

When equipped with dual Battery Disconnect controls, an interlocking feature presents disconnection of the CHASSIS battery while the ignition switch is on. To disconnect CHASSIS Battery, be sure the ignition switch is off. The CHASSIS battery can, however, be connected with the ignition switch on.

#### **TO WORK ON 12 VOLT SYSTEM**

Disconnect battery(s) as described in "TO STORE RV" above to prevent accidental shorts or fire hazard when servicing the 12 Volt system.

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# **BATTERY DISCONNECT**

## **INSTALLATION MANUAL**

These instructions contain all the information needed to help you install the Battery Disconnect. It is assumed the installer has basic skills in electrical wiring, mechanics and carpentry. If you have any doubts about these techniques or instructions, consult with someone **BEFORE** you connect a wire or cut a hole.

It is best to read **EVERYTHING** before doing **ANYTHING**. These instructions are written for a typical travel coach, not for any specific make or model. You should devote some thought and ingenuity to finding the best way to accomplish each step, so that the finished job will be a worthy addition to the coach in which it is installed.

### **UNPACKING**

As you read these instructions, unpack each part and become familiar with it. Be sure that you have all the parts and that you can identify each one.

### **BATTERY DISCONNECT FOR A ONE BATTERY SYSTEM (BD-0 OR BD-1):**

- 1 Monitor Panel
- 1 Disconnect Relay
- 1 five wire cable (length marked on box)
- 2 5 Amp fuses
- 4 Phillip head screws
- Installation Manual

### **ADDITIONAL PARTS**

Since this kit is for many different types of vehicles, not everything you need can be included. The parts required are listed below and can be purchased at any RV or automotive store.

- 1) Crimp on battery cable lugs. Two (2) for each relay. Must fit copper studs on relay.
- 2) Relay Mounting bolts, 1/4"-20, length to suit with nut, flat washer and lockwasher for each. Two (2) per relay.
- 3) If the battery cables are too short to reach where the relays will be mounted, additional cable will be needed.

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# BATTERY DISCONNECT

## INSTALLATION MANUAL

### CHOOSE THE LOCATION

The Monitor Panel is the small lighted display which is installed in the living area of the coach. It should be visible and reachable by occupants. One typical location is on an interior wall near the entrance door of the coach. It should be noticeable as you enter and leave the coach to remind you to connect/disconnect the battery(s).

Be sure there are no structural members or other obstructions at the location; there must be at least 3/4 inch of clear space behind the panel. When selecting the location, bear in mind that a cable must be routed from this panel to the battery compartment.

### MARK AND CUT THE OPENING

**IMPORTANT:** If your kit is for a one battery system (BD-0 or BD-1), use the template for the smaller panel.  
The outside edge of the template should be the same size as the Monitor Panel.

Tape the Template for the Monitor Panel over the chosen location. Mark the centers of the four mounting holes using an awl or punch and mark the outline of the large hole. Carefully cut out the hole along the dotted line. Cut only as deeply as necessary, being careful not to cut anything which may be behind the wall such as wiring.

### ROUTE THE CONTROL CABLE

The Control Cable connects the Monitor Panel to the Disconnect Relay(s) and to the vehicle ground. On BD-2/BD-3 Models it also connects to the ignition. Locate where the relays will be mounted (see Install the Battery Disconnect Relay(s).) Make a path for the cable and put it through. Be sure the PC board (flat) connector is at the Monitor Panel cut out. Leave a foot of slack at the panel end so that it can be plugged in and secure the cable to the inside of the wall. It is not necessary to run this cable inside conduit, or take other special precautions, because it carries only low voltages.

### INSTALL THE MONITOR PANEL

Plug the Monitor Panel connector end of the Control Cable onto the Monitor Panel. Note that the connector end only fits one way on the Monitor Panel circuit board. Arrange the Control Cable in the wall while inserting the Monitor Panel in thru hole. Attach the Monitor Panel with four Phillips-head wood screws in the locations previously marked.

### INSTALLING THE DISCONNECT RELAY(S)

The relay is the electro mechanical switch that actually disconnects the battery. It should be located near the battery for wiring simplicity. When installed, the relay will be inserted "in-line" with the cable coming from the positive (+) terminal of the battery. *Keep this in mind when choosing a location.*

#### **WARNING:**

*Batteries contain sulfuric acid that can cause severe burns. Avoid contact with skin, eyes and clothing. In case of contact, flush with large amounts of cool clean water and contact a physician. Batteries also produce explosive gases that can cause blindness or other serious injury. Keep all sparks, flames and smoking materials away from batteries and always shield eyes when near batteries. Keep area well ventilated.*

**Before proceeding, disconnect all sources of power. Unplug the coach and turn off the generator. Disconnect the battery(s) negative (-) terminal.**

# BATTERY DISCONNECT

## INSTALLATION MANUAL

### **MOUNT THE CHASSIS RELAY**

While holding the relay in place near the chassis battery, mark the location of the two holes for the relay mounting bolts. Set the relay aside, and drill two mounting holes. Before bolting the relay in place, route the Control Cable near the mounting place, locate the two wires with the fuse connectors (orange and yellow) and insert the connectors in the relay (see the wiring diagram on the next page). Follow the color code on the relay label using the wire colors printed in red for the chassis. Install the 5 Amp fuses in the relay.

The wires connecting to the "S" and "I" terminals on the relay (purple and grey) should also be connected at this time, again following the color code. The relay can now be bolted into place.

### **CONNECTING THE BATTERY CABLE**

Locate the positive battery cable for the chassis battery and if possible route it across the relay. If it is not long enough you will need to purchase a piece of cable of the same size and type to lengthen it. Carefully cut the cable near the relay. Strip the cable insulation back about 1/2" on each end and crimp on the battery cable terminals. Connect the terminals to the copper studs on the relay according to the label. It is important that the cable going to the battery be connected to the side of the relay indicated on the label as "BATTERY" and the cable going to the electrical circuits be connected to the side labeled "LOAD".

**You must use two wrenches to tighten the nuts on the stud, one to turn the outside nut and one to hold the nut on the inside from turning. The copper stud must not turn or relay operation may be affected.**

If your BATTERY DISCONNECT is for a two battery system repeat the relay mounting and battery cable instructions for the coach (auxiliary) battery. If the relays cannot be mounted close enough together for the Control Cable to reach, an 18 gage wire may be spliced into the cable to lengthen it. This time use the wire colors printed on the label in black.

Connect the black wire from the Control Cable to a good chassis ground. Connect the blue wire from the control cable to a fused 12 Volt source that is only hot when the ignition is on such as the power lead for the radio.

The installation is now complete. Reconnect the negative cable(s) to the battery(s).

### **SYSTEM CHECK**

Press the CHASSIS USE/STORE switch on the control panel to the "USE" position. The chassis indicating LED should glow to indicate the battery is connected to the system. Turn on something connected to the chassis battery such as the headlamps to verify the connection. Press the switch to the STORE position. The headlamps as well as the LED should go out. Turn the headlamp switch off. Repeat with an interior light and the COACH battery switch.

**NOTE:** If there is another 12 Volt source on the coach other than the battery (some coaches have built in charger), the COACH LED may glow even when the battery is disconnected .

# BATTERY DISCONNECT

## INSTALLATION MANUAL

### Troubleshooting

#### SYMPTOM

#### CAUSE/REMEDY

Relay won't connect/disconnect

Battery voltage below 10.5Volts - recharge battery.

Control Cable connected improperly - check wiring.

Fuses on relay blown -replace

The chassis relay on Bd2 and BD3 cannot be disconnected when the ignition is on

Relay connectors for store and disconnects for use

Wires on S and I terminals of relay are reversed - check wiring.

Pressing "USE/STORE" switch will not connect the battery.

Battery may be fully discharged. Recharge battery or "jump" with direct connections.

Check fuses on LATCHING RELAYS and replace if blown with same type and rating (5 Amp).

12 Volt RV power operates normally, but indicator lights/voltmeter will not illuminate.

Check fuses on LATCHING RELAYS and replace if blown with same type and rating (5 Amp).

Battery switched to "STORE" position, but indicator light remains on.

RV is plugged into 120 Vac shore power or operating on Gen-set.

Gen-set will not crank.

Check that COACH battery is switched to "USE".

RV engine will not crank or chassis accessories will not operate.

Check that CHASSIS battery is switched to "USE".

In the event a battery cannot be connected due to any difficulty with the BATTERY DISCONNECT, simply move the LOAD battery cable to the same relay stud as the BATTERY battery cable and the relay will be out of the circuit.

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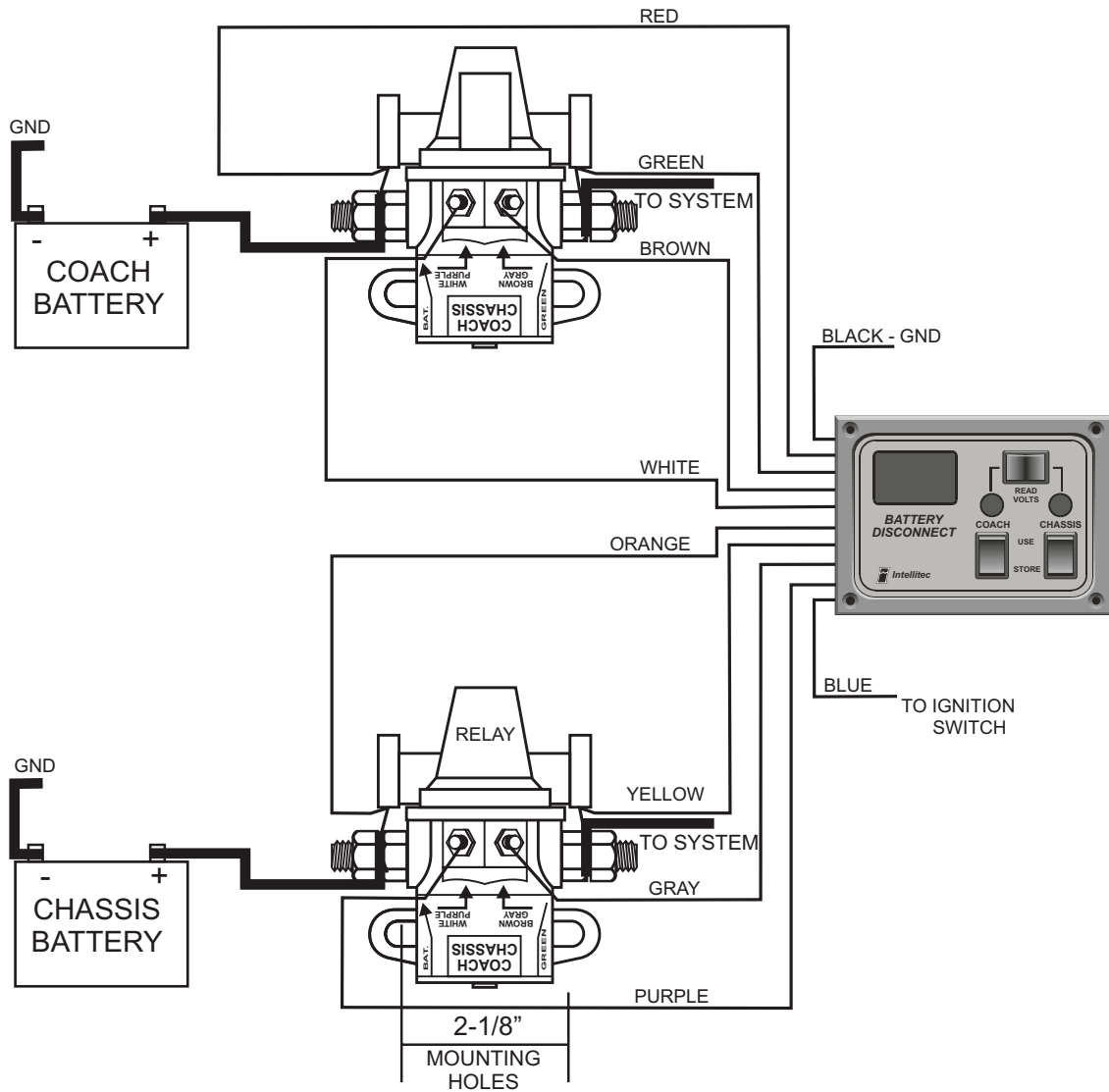


# BATTERY DISCONNECT

## INSTALLATION MANUAL

### SUGGESTED WIRING DIAGRAM FOR BD2 & BD3

(FOR BD AND BD1 - USE COACH WIRING ONLY)



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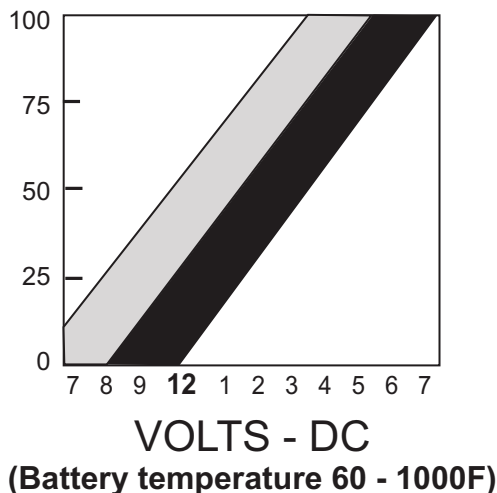
## INSTALLATION MANUAL

If your Battery Disconnect is equipped with a Voltmeter you can determine the state of charge of your battery(s).

### HOW TO USE THE VOLTMETER-

The voltage on the battery is a reliable indication of the amount of charge in the battery when the battery is “at rest”. The best time to read the voltage is when the battery has not been charged or discharged for several hours. The reason for this is to allow the internal chemistry of the battery to stabilize.

If the battery has just been charged, it should be loaded to remove the “surface charge” from the plates which would give a higher than normal reading. This can be done for the coach battery by turning on some lights in the coach for a few minutes, or for the chassis battery by turning on the headlights for a few minutes. After any loading, disconnect the battery with the “STORE/USE” switch and allow at least ten minutes for the voltage to stabilize. Then reconnect the battery with the “USE/STORE” switch, press the VOLTAGE CHECK switch and read the amount of charge from the chart below.



A charge of 50% means that a new battery could deliver one half of its rated amp-hour capacity. Since a battery loses its ability to store charge as it ages, a two year old battery at 50% charge would not provide as much service as a new battery of the same amp-hour rating would at 50% charge.

### SOME POINTS TO REMEMBER:

Batteries should be stored at least 75% charged.

A fully discharged battery can freeze at 15 degrees F.

See your RV owners manual for battery service and charging information.

A properly operating charging system should read between 14 and 15 Volts when charging. When the RV is plugged into 120 Vac (or the gen-set is running) and the COACH battery is in the “USE” position, it is being charged. When the RV engine is running the CHASSIS battery is being charged.

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