

# **RV Custom Products Battery Control Center Trouble Shooting Guide**

## **General**

The Battery Control Center has five functions:

1. Disconnects both chassis and coach batteries from their loads.
2. Controls Ignition switch loads
3. Controls Fog Lights
4. Allows paralleling of chassis and coach batteries for auxiliary starting and charging
5. Protects various circuits with fuses and Circuit breakers

Two basic applications of the RV-CP exist: gasoline-powered coaches and diesel-powered coaches. The basic difference is that diesel coaches have their auxiliary starting relay mounted external from the disconnects. This is because of the heavier cranking current required for the diesel engines.

For each class, several revisions have been made:

## **Gas (Electronic Board)**

CB-200 rev. A – Initial release

CB-200 rev. B – Added source power to the disconnect switches from both chassis and coach batteries

CB-200 rev. C – Added dual voltage dropout of charging relay

Added charging of chassis battery from shore or Generator power

CB-200 rev. D – Improved voltage sensing accuracy plus mechanical changes

CB-200 rev. E – misc. changes

CB-200 rev. F – Added (moved) Ignition relay to the board

CB-115 rev. A – Mechanical changes to make board smaller and removed P1

CB-115 rev. B – Does not exist

CB-115 rev. C – Revised fuse use description (F12, F14, F21)

CB-115 rev. D – Add circuitry to turn on disconnects when ignition key is turned on

Changed F19 to 7.5amp

CB-115 rev. E – Added P18 and F23

CB-115 rev. F – Does not exist

CB-115 rev G – Changes F23 from 7.5 to 10amp

CB-115 rev.H and I – Does not exist

CB-115 rev. J – Added diodes D71 & D81

Changed F23 from 10 to 20amp.

## **Diesel (Electronic Board)**

CB-300 rev. A – Initial release

CB-300 rev. B – Added source power to the disconnect switches from both chassis and coach batteries

CB-300 rev. C – Added dual voltage dropout of charging relay  
Added charging of chassis battery from shore or Generator power  
Moved Ignition relay to the board

CB-300 rev. D – Revised fuse use description (F12, F14, F21)  
Improved voltage sensing accuracy plus mechanical changes

CB-300 rev. E – misc. changes

CB-300 rev. F – Add circuitry to turn on disconnects when ignition key is turned on  
Changed F19 to 7.5amp

CB-300 rev. G - Added P18 and F23

CB-300 rev. H – Changes F23 from 7.5 to 10amp

CB-300 rev. I – Does not exist

CB-300 rev. J – Added diodes D71 & D81  
Changed F23 from 10 to 20amp

It is necessary to keep these differences in mind when troubleshooting the various models of the battery control center.

The various revisions of the electronic circuit boards are backward compatible. For example, a rev. D board will replace revision levels A through D. However, the revision levels are *not* upward compatible. In the preceding example, a rev. D board will not directly replace a rev. E or later board.

## **Battery Disconnect Function**

Refer to circuit diagram Fig. 1, to aid in troubleshooting. Each battery disconnect relay is a mechanically latched relay (solenoid). Hence power is applied to its coil only temporarily to actuate the relay. Unlatching is achieved by reversing the current direction through the coil. On a panel over the coach are two battery disconnect control switches. Each switch is double pole, double throw (DPDT) with center off (momentary action).

Pushing the top of the switch engages its relay while pushing the bottom of the rocker disengages the relay. An ignition lock out relay is provided on the circuit board to prevent the chassis battery disconnect from being disengaged while the vehicle ignition switch is on.

## **Troubleshooting Disconnects**

Both batteries must be charged and the ignition key turned to the off position so that there is no voltage present on fuses F6 through F12.

### **Neither disconnect relay operates:**

Check and replace F19 if necessary. If F19 is good and there is no voltage on it, circuit board is defective. NOTE: RV CP makes no provision for obtaining parts or repairing the board.

### **Chassis battery disconnect fails to operate:**

Battery voltage should appear on P2 #8. If not and fuse F19 is good, replace board.

There should be continuity between P2 #1 and the purple wire terminal on the disconnect relay and continuity from P2 #2 and the gray wire relay terminal. If not, check wiring and connectors P1 and P2.

Pressing the top of the chassis disconnect rocker switch should produce battery voltage on the purple wire terminal and ground on the other. Pressing the bottom of the rocker produces battery voltage on the gray wire terminal and ground on the first.

If so, and the relay still does not operate, the relay is defective.  
If not, check and repair coach wiring or switch panel.

### **Coach battery disconnect fails to operate:**

Battery voltage should appear on P2 #7. If not and fuse F19 is good, replace board.

There should be continuity between P2 #3 and the brown wire terminal on the disconnect relay and continuity from P2 #6 and the white wire relay terminal. If not, check wiring and connectors P1 and P2.

Pressing the top of the chassis disconnect rocker switch should produce battery voltage on the brown wire terminal and ground on the other. Pressing the bottom of the rocker produces battery voltage on the white wire terminal and ground on the first.

If so, and the relay still does not operate, the relay is defective.  
If not, check and repair coach wiring or switch panel.

## **Ignition Relay Functions**

The vehicle ignition switch cannot carry the additional current required by the loads added by the coach. An ignition relay, actuated by turning on the ignition key (with the chassis battery disconnect relay engaged), is provided to supply the necessary current.

### **Troubleshooting**

**No voltage on fuses F6 through F12.** (Ignition relay not picked)

Ensure that the chassis battery disconnect relay is energized and the ignition key is on.

There must be battery voltage on P4 #11 and P13. If so, and the ignition relay will not pick, circuit board is defective.

## **Fog Light Relay Function**

The fog light relay allows heavy lamp loads to be controlled by a small dash mounted switch. If present, the dash mounted switch applies power to the coil of the fog light relay, closing its contacts. This allows power to flow from P14 through F13 to P4 #9.

### **Troubleshooting Fog Lights**

(Fog lights inoperative)

It is assumed that the chassis battery disconnect is engaged, the ignition switch is on, the fog light switch is on and the headlight switch is on low beam.

If battery voltage is present on P4 #9, check the vehicle fog light wiring and lamps.

If no voltage is present on P4 #12, check wiring to the dash mounted fog light switch.

If battery voltage is present on P4 #12 and fuse 13 is good and no voltage on P4 #9, circuit board is defective.

## **Auxiliary Start and Charging Relay Functions**

The auxiliary start relay parallels the coach and chassis battery in the event it is desired to start the vehicle with a dead chassis battery. In addition, the relay controls the charging of the batteries as a set.

### Auxiliary Start Functions

The relay is actuated from the drivers console by pressing (and holding) the auxiliary start switch button. Coach battery power appears at P4 #2 after passing through F17 and is applied to the dash mounted auxiliary start switch . The other side of the switch is connected to P4 #10. On gasoline models, P4 #10 is wired to P1 #5 and thence to the auxiliary start relay.

For diesel models P4 #10 is routed through F20 (F22 for rev. C) to P3 #1 before being wired to the externally mounted auxiliary start relay.

### Battery Charging Functions

For battery charging services, relay behavior depends upon revision level and coach type.

	Gas rev. A, B Diesel rev. A, B	Gas rev. C & up Diesel rev. C
Relay pull-in	13.2vdc	13.2vdc
Relay drop-out (ignition on)	13.2vdc	13.2vdc
Relay drop-out (ignition off)	13.2vdc	13.6vdc

Thus, with later revision boards and with ignition off, the auxiliary start/charging relay will drop out sooner (at 13.6vdc) to retain a greater amount of charge in the chassis battery. It is normal for the charging relay to remain pulled in after the engine is turned off. Coil current is approximately 1/2amp for both models. The Diesel model has a heavier, intermittent duty coil. To effectively enable the coil to be continuously energized, full voltage is applied for 1/2 second and then the coil is pulsed at approximate 50% duty cycle. Thus a voltmeter will read about 6vdc when the Diesel relay is operating normally in the closed position.

Gasoline and Diesel models of rev. B and later *sense* voltage from both the ignition relay (chassis battery voltage) and the coach battery disconnect terminal. This allows the chassis batteries to be charged from the converter when on shore power.

Necessary conditions are: coach batteries disconnect engaged, shore power on, converter operating and coach batteries charged above 13.2vdc. When these conditions are met, the auxiliary charging relay will be pulled in and both sets of batteries will be charged in parallel.

All revision levels for both gasoline and diesel coaches provide charging of the coach batteries from the engine alternator. Necessary conditions are: Ignition on, engine running, alternator operational and the chassis battery charged above 13.2vdc. When these conditions are met, the auxiliary charging relay will be pulled in and both sets of batteries will be charged in parallel.

## **Troubleshooting Auxiliary Start/Charging Relay**

Normally, one can hear the auxiliary start/charging relay pull in when the auxiliary start switch is pressed. Battery voltage must appear at P4 #2. If not, replace fuse F17.

Pressing the auxiliary start switch energizes P4 #10. Check for a faulty switch or switch wiring if not. For Diesel coaches check fuse F20 (F22 for rev. C) With the relay pulled in, there should be zero volts across the load (large) terminals of the relay. (coach and chassis batteries effectively bridged together.)

Once the auxiliary start function is verified, any deviation from proper charging operation requires replacement of the electronic circuit board.

### **Auxiliary Battery Not Charging from Engine Alternator**

The aux start/charge relay contacts may not be closing. Operate the engine at high idle for at least twenty seconds and check the chassis battery voltage. The voltage must be at least 13.2vdc before the start/charge relay will pull in. Check the alternator if the voltage is less than 13.2vdc.

Check for voltage on the coil of the start/charge relay. This voltage is available on P1 #5. If there is **no** voltage on the coil, replace the printed circuit board. If there **is** voltage on the coil, check for voltage between the chassis and coach battery (large) terminals of the relay. If the voltage difference is more than 0.1vdc, replace or repair the relay.

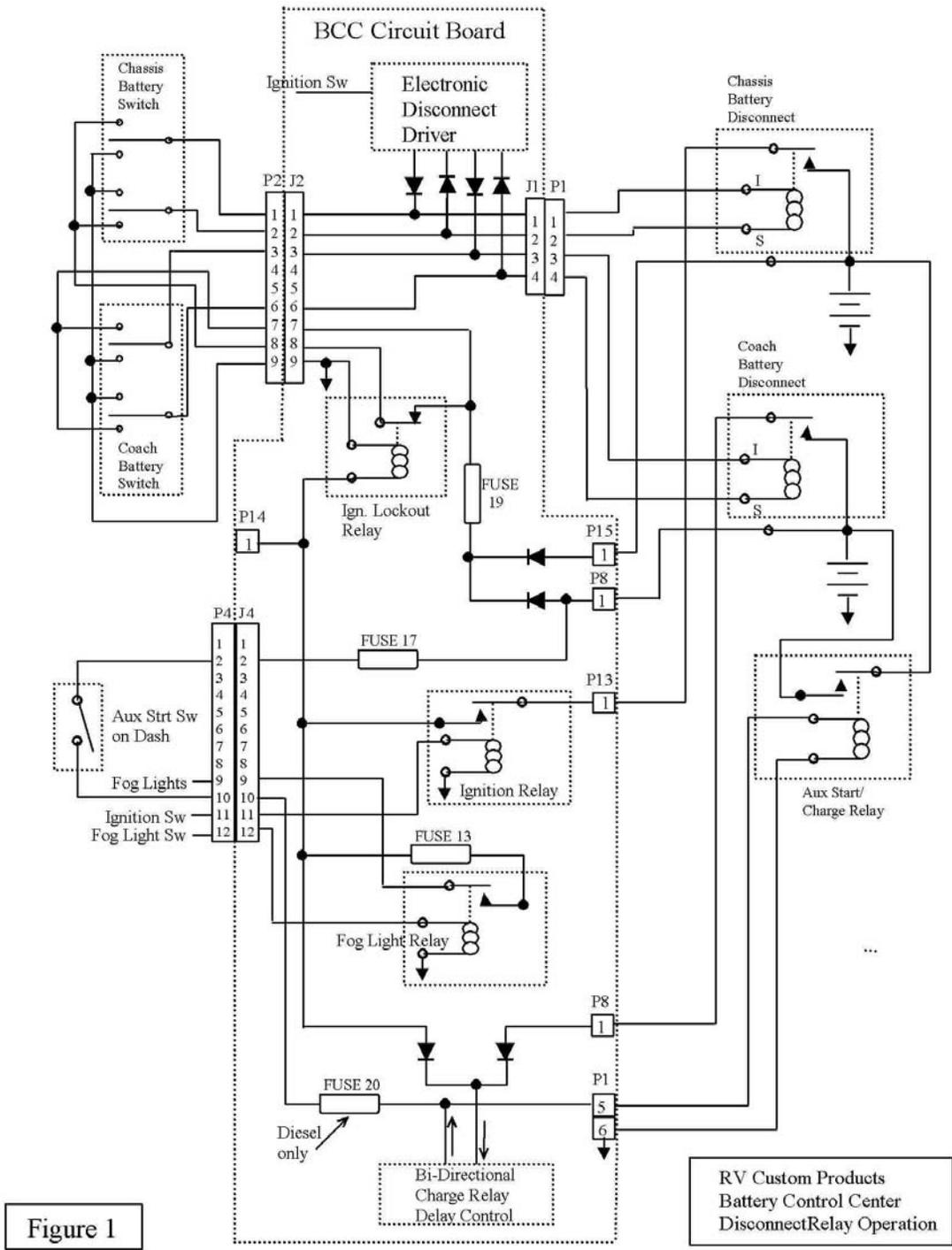
### **Chassis and Coach batteries constantly connected together**

Aux start/charge relay contacts may be tacked (welded). Check for voltage on the coil of the start/charge relay. This voltage is available on P1 #5. If there **is** voltage on the coil, the Aux Start switch may be shorted. If there is **no** voltage on the coil, replace or repair the relay.

### **Chassis (or Coach) Battery Not Charging from Converter**

Check that the converter is putting out at least 13.2vdc.

Check that the converter circuit breakers within the BCC are not tripped. Reset as necessary.



**Figure 1**

