

Four Winds FW221
Battery Control Center
Trouble Shooting Guide
2/12/07

General

The Battery Control Center provides six functions:

1. Connects and Disconnects both chassis and coach batteries from their loads.
2. Controls ignition switch loads.
3. Controls Accessory loads.
4. Controls fog lights.
5. Allows paralleling of chassis and coach batteries for auxiliary starting and charging.
6. Protects various circuits with fuses and circuit breakers.

Models

FW221 - Initial release.

FW221 rev. A - Changed connectors to allow keying.

FW221 rev. B - Added chassis disconnect lockout relay.

Battery Disconnect Function

The FW221 rev. B block diagram is included to aid in troubleshooting. Each battery disconnect is a magnetically latched relay. Power is applied to its coil only momentarily to latch or unlatch the relay. Unlatching is caused by reversing the direction of current through the relay coil. On a panel in 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 a switch engages its relay while pushing the bottom of the rocker switch disengages its relay. On rev. B and above, an ignition lockout relay is provided to prevent the chassis battery disconnect from being disengaged while the vehicle ignition switch is on.

Troubleshooting:

Both batteries must be charged and the ignition key turned off so that there is no voltage present on fuses F2-F6 and F21. If the ignition switch is on, pulling P6 will accomplish the ignition key off function. Test the disconnects using the coach switches. Possible failures are:

Chassis battery disconnect fails to operate:

Battery voltage (supplied by a wire on P14) must exist on P15-3. If not and fuse F43 is good, the lockout relay is defective and the board must be replaced. There must be a continuity of around 6.5 Ohms between P15-7 and P15-8. If not, check the terminals of the disconnect. Pressing the top of the chassis battery disconnect rocker switch should produce battery voltage on the PUR terminal of the disconnect and ground on the GREY terminal. Pressing the bottom of the chassis battery disconnect rocker switch should produce battery voltage on the GREY disconnect terminal and ground on the PUR terminal. If so, the relay is defective and can be replaced. If not, check and repair the coach wiring and/or switch panel.

Coach battery disconnect fails to operate:

Battery voltage must exist on P15-4. If not, replace F44. There must be a continuity of around 6.5 Ohms between P15-6 and P15-9. If not, check the terminals of the disconnect. Pressing the top of the coach battery disconnect rocker switch should produce battery voltage on the WHT disconnect terminal and ground on the BRN terminal. Pressing the bottom of the coach battery disconnect rocker switch should produce battery voltage on the BRN disconnect terminal and ground on the WHT terminal. If so, the relay is defective and can be replaced. If not, check and repair the coach wiring and/or switch panel.

Ignition Relay Functions

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

Troubleshooting:

With the chassis battery disconnect engaged (battery voltage on J9) and battery voltage on P6-5 (ignition key ON), there should be battery voltage on P6-1 to 4. If not, the ignition relay is defective and the board must be replaced. Fuses F2-F6 must be good, also.

Accessory Relay Functions

Certain coach loads are supplied through an accessory relay when the ignition key is in the ACCESSORY or ON position. The chassis battery disconnect must be engaged.

Troubleshooting:

With the chassis battery disconnect engaged (battery voltage on J9) and battery voltage on P5-1 (ignition key in ACCESSORY or ON position), there should be battery voltage on P5-2 through P5-6. This assumes that fuses F9-F15 are good. If not, the accessory relay is defective and the board must be replaced.

Fog Light Relay Functions

A dash mounted fog light switch controls power to the fog lamps through a fog light relay.

Troubleshooting:

With the chassis battery disconnect engaged (battery voltage on J9) and the fog light switch on the dash engaged, there should be voltage on P4-6. If not, check the vehicle circuits. If so, there must be battery voltage on P3-2 (assumes F20 is good). If not, the fog light relay is defective and the board must be replaced.

Auxiliary Start and Charging Relay Functions

The interconnect relay parallels the coach and chassis batteries in the event it is desired to start the vehicle with a dead chassis battery. In addition, the relay controls charging of the batteries as a set. When the auxiliary start button at the driver's console is pressed, a ground will appear at P1-1. When not pressed, P1-1 is approximately +12vdc, measured with a high impedance voltmeter. Pressing the auxiliary start switch pulls in

the interconnect relay immediately by way of the interconnect relay driver. Note that when the switch is released, the relay remains closed for about 15sec. This is the normal delay built into the relay driver.

Normal charging of chassis and coach batteries as a set depends upon which disconnect is closed. For example, if the coach is under way and the chassis battery disconnect is engaged, when the chassis battery charges to 13.2vdc from the engine alternator, the interconnect relay will pull in after a 15sec. delay. If the engine were to be turned off, when the chassis/coach battery set discharges to 12.6vdc, the interconnect relay disengages after the 15sec. delay. When the coach is on shore power and the coach battery disconnect is engaged, the converter will charge the coach battery until it reaches 13.2vdc, at which time the interconnect relay will close after the delay. As before, should shore power be disconnected, the coach/chassis battery set will discharge to 12.6vdc and the interconnect relay will release after the delay. The interconnect relay requires 0.5adc for its coil whenever it is engaged.

Troubleshooting:

One can hear the interconnect relay pull in when the auxiliary start switch is pressed (or a ground place on P1-1). Remember that either or both of the battery disconnects must be engaged. If the relay does not pull in, check the yellow wire to the relay for 12vdc. If 12vdc is there, the relay is defective and should be replaced. For lack of 12vdc to the relay when the P1-1 is grounded, the board needs to be replaced. Verify the coach circuitry is ok by observing a ground on P1-1 when the auxiliary start switch is pressed. A 15sec. delay to disengage the relay after releasing the switch is normal.

For battery charging problems, verify manual operation of the interconnect relay first as in the preceding paragraph. Then, raise the voltage of either battery (remember the corresponding disconnect must be closed) to over 13.2vdc. The interconnect relay must engage after a delay of 15sec. If not, replace the board. Also, reducing the voltage to below 12.6vdc, the relay must disengage after the delay. If not, replace the board.

Load Center Functions

Chassis battery disconnect circuits (power on J9):

P3-1	F21	Steps/awning (ignition switch on)
P3-2	F20	Fog Lights (fog light switch on)
P3-3	F23	Step Motor
P3-4	F24	Step Switch
P3-5	F25	Dock Lights
P3-6	CB3	Driver Seat
P4-1	CB1	Driver Shade
P4-2	CB2	Pass Shade
P4-3	F16	Map Lights
P4-4	F17	Power Point
P5-2	F9	HVAC Blower (acc'y relay on for P5 circuits)
P5-3	F11	Dash Fans
P5-4	F12	Mirror Heat
P5-5	F13	Jacks Power
P5-6	F15	Mirrors
P6-1	F2	Spare (ignition relay on for P6 circuits)
P6-2	F4	Jacks Down
P6-3	F5	TV Cutoff
P6-4	F6	Rear Vision

Coach Battery Circuits (power on J6):

P1-4	F39	Radio Memory
P2-1	F27	Solar Panel
P2-2	F28	Outside Radio Memory

Coach Battery Disconnect Circuits (power on J5):

P1-2	F35	Radio
P1-3	F36	Antenna Boost
P2-4	F30	Outside Radio
P2-5	F31	Cargo Lights
P2-6	F32	Cargo Lights

Troubleshooting:

Check the fuses/circuit breakers. If good, the trouble is in the coach wiring.