Battery Control Center
Troubleshooting Guide

RV Custom Products
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General

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 exist: gasoline powered coaches and diesel powered coaches. The basic difference is that the diesel coaches have their auxiliary starting relay mounted externally 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 disconnect switches from both chassis and coach batteries
CB-200 rev C - Added dual voltage dropout of charging relay - improved relay driver circuits - added charging of chassis battery from shore power
CB-200 rev D - Improved voltage sensing accuracy - mechanical changes
CB-200 rev E - Part value changes - corrected silk screen
CB-200 rev F - Moved ignition relay onto circuit board
CB-115 rev A - Added 2 circuits on auxiliary BD - mechanical changes to fit smaller box - removed P1 and pigtailed relay wires directly to board
CB-115 rev B - Minor silk screen change
CB-115 rev C - revised fuse use description (F12, F14, F21)
CB-115 rev D - Added electronic disconnect driver to turn on disconnects when ignition key is turned on - changed F19 to 7.5A
CB-115 rev E - Added P18 and F23 - minor silk screen changes
CB-115 rev F - Does not exist

CB-115 rev G - Changed F23 from 7.5A to 10A - added diodes D71 and D81
CB-115 rev H and I - Does not exist
CB-115 rev J - F19 changed to 5A
CB-115 rev K - Removed wire from drain of Q3 to relay side of F22 to protect transistor - F1 and F2 changed to circuit breaker - F23 changed to 15A
CB-115 rev L - Added missing trace from anode of D15 to ground
CB-115 rev M - Replaced electronic disconnect driver with pilot relay for transient immunity
CB-115 rev N - 15 second delay added to the auxiliary start circuit

Diesel (electronic board)

CB-300 rev A - Initial release
CB-300 rev B - Added coach battery as second power source
CB-300 rev C - Incorporated gasoline board changes
1. Dual voltage dropout of charging relay
2. Charging of chassis battery from shore power
3. Ignition relay moved to electronic board

CB-300 rev D - Revised fuse use description
CB-300 rev E - Minor silk screen changes
CB-300 rev F - Added electronic disconnect driver to turn on disconnects when ignition key is turned on - changed F19 to 7A
CB-300 rev G - added F18 and F23 - minor silk screen changes
CB-300 rev H - Changed F23 from 7.5A to 10A
CB-300 rev I - Does not exist
CB-300 rev J - Added D71 and D81
CB-300 rev K - Moved wire from drain of Q3 to relay side of F22 to protect transistor - F1 and F2 hanged to circuit breakers
CB-300 rev L - Added missing trace form anode of D15 to ground
CB-300 rev M - Replace electronic disconnect driver with pilot relay for transient immunity
CB-300 rev N - 15 second delay added to auxiliary start circuit

Battery Disconnect Function

Refer to figure 1 - Battery Disconnects partial schematic to aid in troubleshooting. Each battery disconnect is a magnetically latched relay. Hence, power is applied to it's coil only momentarily to actuate the relay Unlatching is caused by reversing the direction of current through the coil. On a panel over the coach door 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 it's relay while pushing the bottom of the rocker disengages the relay. An ignition lockout relay is provided on the circuit board to prevent the chassis battery disconnect from being disengaged while the vehicle ignition switch is on.

For CB-115 rev D CB-300 rev F and above (models with electronic disconnect driver), both disconnects are engaged when the ignition switch is turned on. (see figure 2) The electronic driver is not used to disengage the disconnects. Hence, the ignition lockout relay is still functional.

Troubleshooting

Both batteries must be charged and the ignition key turned off so that there is no voltage on fuses F6 through F12. First, test the unit using the operator switches. (applies to all models)

Neither relay operates:

Check and replace fuse F19 if necessary. If fuse F19 is good and there is no voltage present on it, replace the board.

Chassis battery disconnect fails to operate:

Battery voltage must exist on P2 #8. If not and fuse F19 is good, replace the board. There should be continuity between P2 #1 and the purple wire terminal on the disconnect relay and continuity between P2 #2 and the grey wire relay terminal. If not, check wiring and connectors P1 and P2. Pressing the top of the chassis battery disconnect switch should produce battery voltage on the purple wire terminal of the chassis battery relay and ground on the other. Pressing the bottom of the disconnect switch should produce voltage on the grey wire terminal and ground on the other. If so the relay is defective. If not, check and repair coach wiring and/or switch panel.

Coach battery disconnect fails to operate

Battery voltage must exist on P2 #7. If not and fuse F19 is good, replace the board. There should be continuity between P2 #3 and the brown wire terminal on the disconnect relay and continuity between P2 #6 and the other relay terminal. If not, check wiring and connectors P1 and P2. Pressing the top of the disconnect switch should produce battery power on the brown wire terminal of the coach battery relay and ground on the other. Pressing the bottom of the switch should produce battery power on the white wire terminal and ground on the other. If so, the relay is defective. If not, check and repair coach wiring and/or switch panel.

For CB-115 rev D, CB-300 rev F and above models 9electronic disconnect driver) make sure that the disconnects operate properly with the manual switches as above. (see figure 2) Leave the disconnects disengage. Turn on the vehicle ignition switch. Both disconnects should engage, If not, replace the circuit board.

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 chassis battery disconnect relay engaged) is provided to supply the necessary current. (refer to figure 2 for gasoline and figure 3 for diesel ignition relay partial schematics for details) There are 2 cases: Ignition relay mounted on the box and relay mounted on the board.

Troubleshooting

No voltage on fuses F6 through F12

It is assumed that the chassis battery disconnect relay is engaged and the ignition switch is on.

Box mounted relay:
There must be battery voltage on P4 #1, P1 #7, and one terminal of the ignition relay. There should be ground on P1 #8 and the other terminal of the relay. If so, the relay is defective. If not, check wiring.

Board mounted relay:
There must be battery voltage on P4 #11 and P13. If so, replace the board.

Fog Light Relay Function

The fog light relay allows heavy amp loads to be controlled by a small dash mounted switch. (refer to figure 4 fog light relay - partial schematic for details) The dash mounted fog light switch applies power to the coil of the fog light relay, closing it's contacts. This allows power to from P14 through fuse F13 to P4 #9.

Troubleshooting Fog Lights

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 fog light vehicle 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 F13 is good, replace the circuit board.

Auxiliary Start and Charging Relay Functions

The auxiliary start 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. (refer to figure 5 gasoline and figure 6 diesel - auxiliary start relay - partial schematic for details)

The relay is actuated from the driver's console by pushing the auxiliary start button. Coach battery power appears at P4 #2 after passing through fuse F17 and is applied to the dash mounted auxilairy start switch. The other side of the switch is connected to P4 #10. On gasoline models P4 #10 is wired to P1 #5 and then through fuse F20 (F22 for rev C) to P3 #1 before being wired to the auxiliary start relay. The relay is mounted externally from the battery control center on diesel coaches.

For battery charging service, relay behavior depends upon revision level and coach type:

	Gas Rev A, B Diesel Rev A, B	Gas Rev C & up Diesel Rev C & up
Relay pull-in	13.2VDC	13.2VDC
Relay drop out (ignition on)	12.2VDC	12.2VDC
Relay drop out (ignition off)	12.2VDC	12.6VDC

Thus, with later revision boards and with ignition off, the auxiliary start/charging relay will drop out sooner (12.6VDC) 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 1/2A for both models. The diesel model has a heavier, intermittent duty coil. To enable the coil to be continuously energized, full voltage is applied for 1/2 second and then the coil is pulsed at approximately 50% duty cycle. Thus, a voltmeter will read about 6VDC when the diesel relay is operating normally in closed position.

Gasoline and diesel models of Rev B and alter sense voltage from both the ignition terminal and coach battery disconnect terminal. This allows the chassis battery to be charged from the converter when on shore power. Necessary conditions are : coach battery disconnect engaged, shore power on, converter operating, and coach battery charged above 13.2VDC. When these conditions are met the auxiliary charging relay will pull in and both 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 button is pressed. Battery voltage must appear on P4 #2. If not, replace fuse F17. Pressing the auxiliary start switch energizes P4 #10. If so, check for a faulty switch or wiring in the coach. For diesel coaches check fuse F20 (F22 for rev C). Also, by removing the plug from P3 (diesel) one can measure coil resistance between pins 1 and 2 to ensure that the coach wiring and relay coil are not damaged. With the relay pulled in, there should be zero volts across the load (large) terminals on the relay. On diesel coaches, this checks that the relay is making contact under charging conditions (relay coil being pulsed).

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

Load Center Functions

Chassis battery disconnect functions:

P9	F1	Power seat
P10	F2	Pass power seat
P5 #1	F3	Step motor
P5 #2	F4	Step switch
P5 #3	F5	LP Det (chassis)

Ignition functions:

P5 #4	F6	Ignition signal
P5 #5	F7	Power seat
P5 #6	F8	Rear heater (spare Cb-12125 rev E, CB-300 rev G
P5 #7	F9	Power window (power mirror CB-115 rev E, CB300 rev G
P5 #8	F10	Horn
P11	F11	Leveling jacks
P12	F12	Dash fan

Coach (auxiliary battery) functions:

P4 #2	F17	Auxiliary start switch
P4 #3	F18	Solar panel
F18	F23	Memory keep alive

2 ea 30A circuit breakers to coach panel (total 60A)

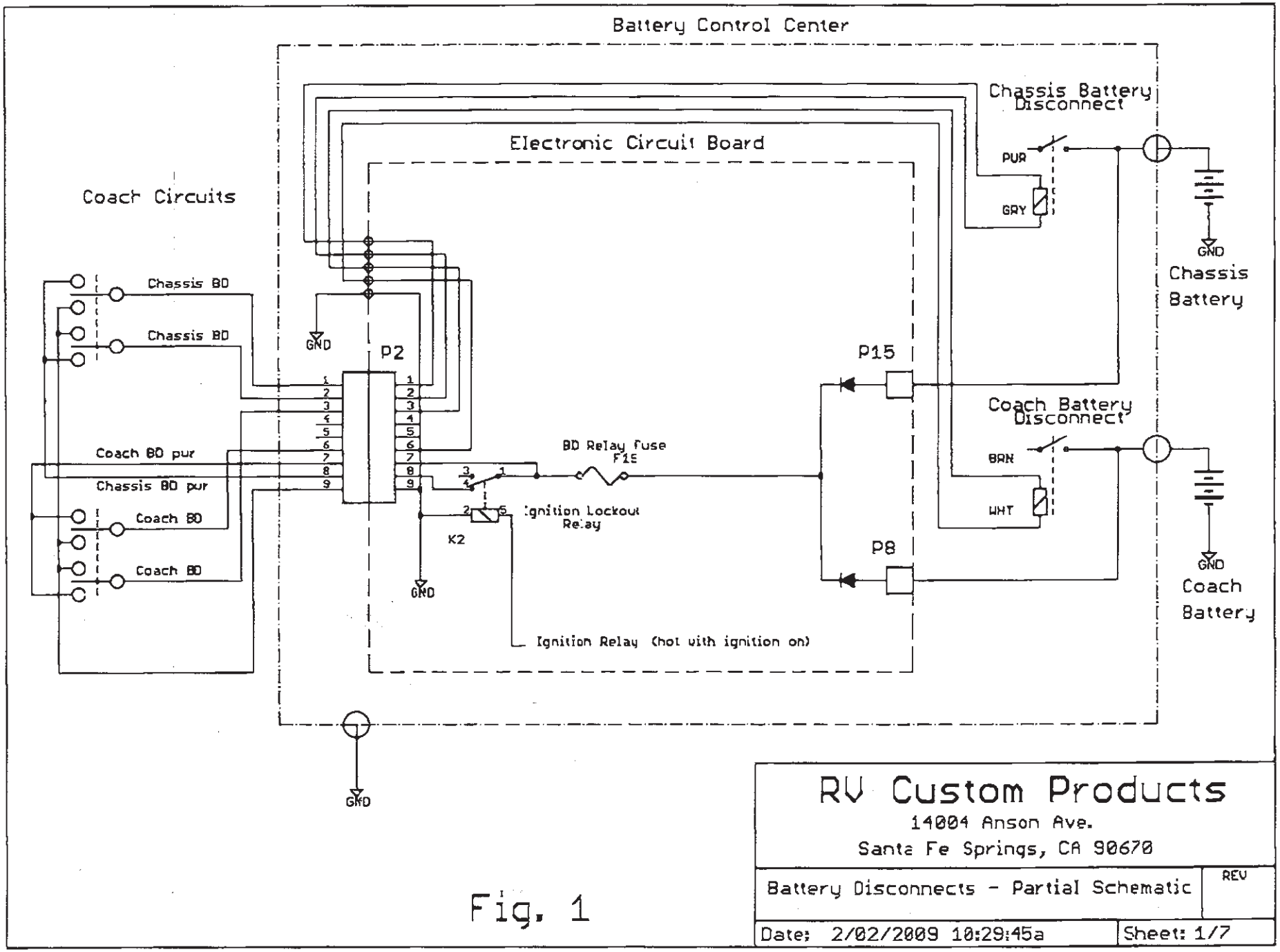
Coach battery disconnect functions:

P4 #1	F16	Radio switch
P6	F14	Luggage lights
P16	F20	Spare
P17	F21	Utility light/spare

Troubleshooting

Check the fuse of the affected curcuit. If good, the coach wiring must be checked.

Rev 8/01/05


Battery Control Center
Electronic Circuit Board
Coach Circuits
Chassis Battery Disconnect
PUR
GRY
GND
Chassis Battery
Chassis BD
Chassis BD
P2
P15
Coach Battery Disconnect
BRN
WHT
Coach BD pur
Chassis BD pur
BD Relay Fuse F1E
Coach BD
Coach BD
Ignition Lockout Relay
K2
P8
Coach Battery
Ignition Relay (hot with ignition on)
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Battery Disconnects - Partial Schematic
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Fig. 1

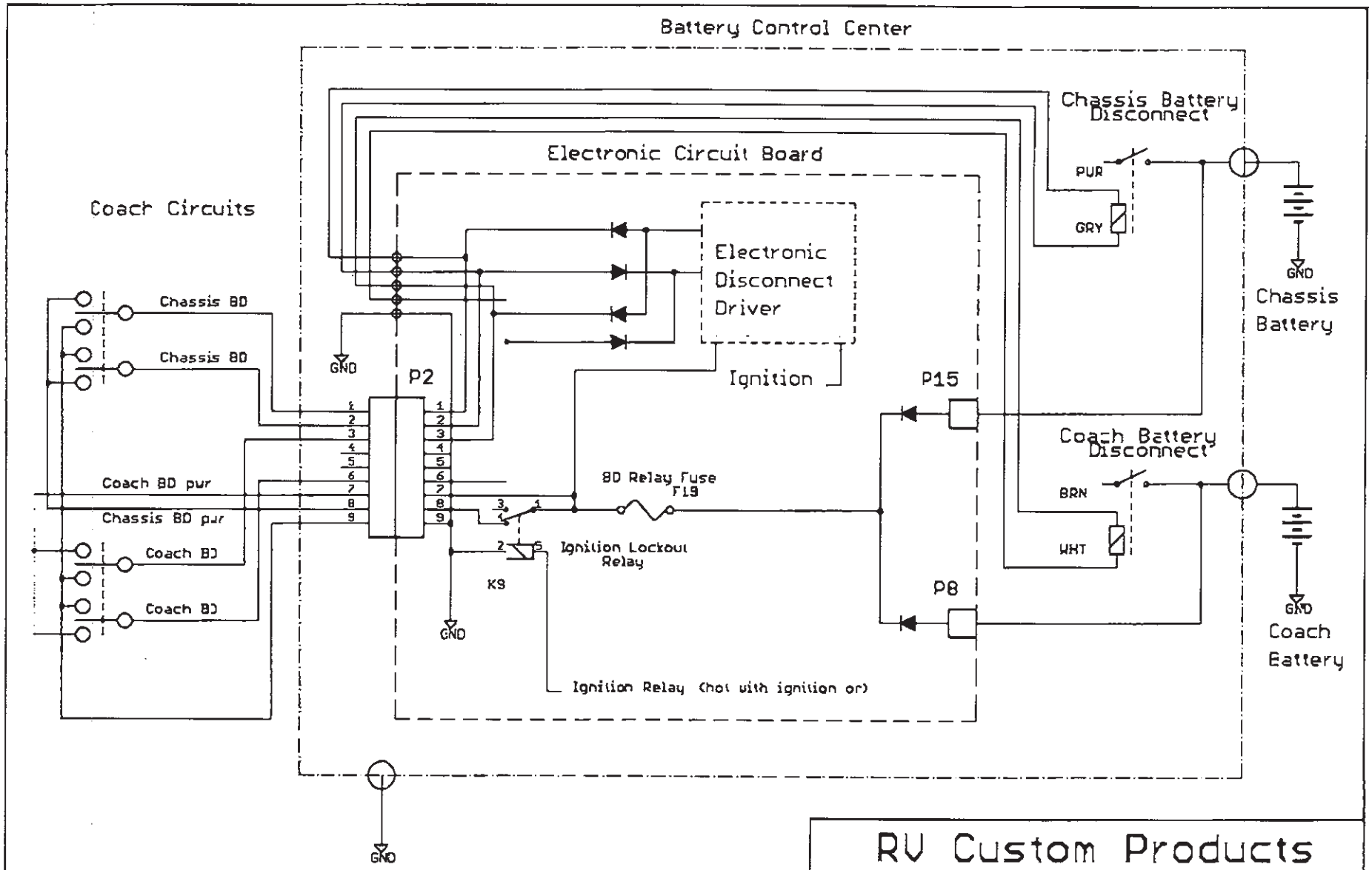

Fig. 2

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Battery Disconnects-partial schematic	REV
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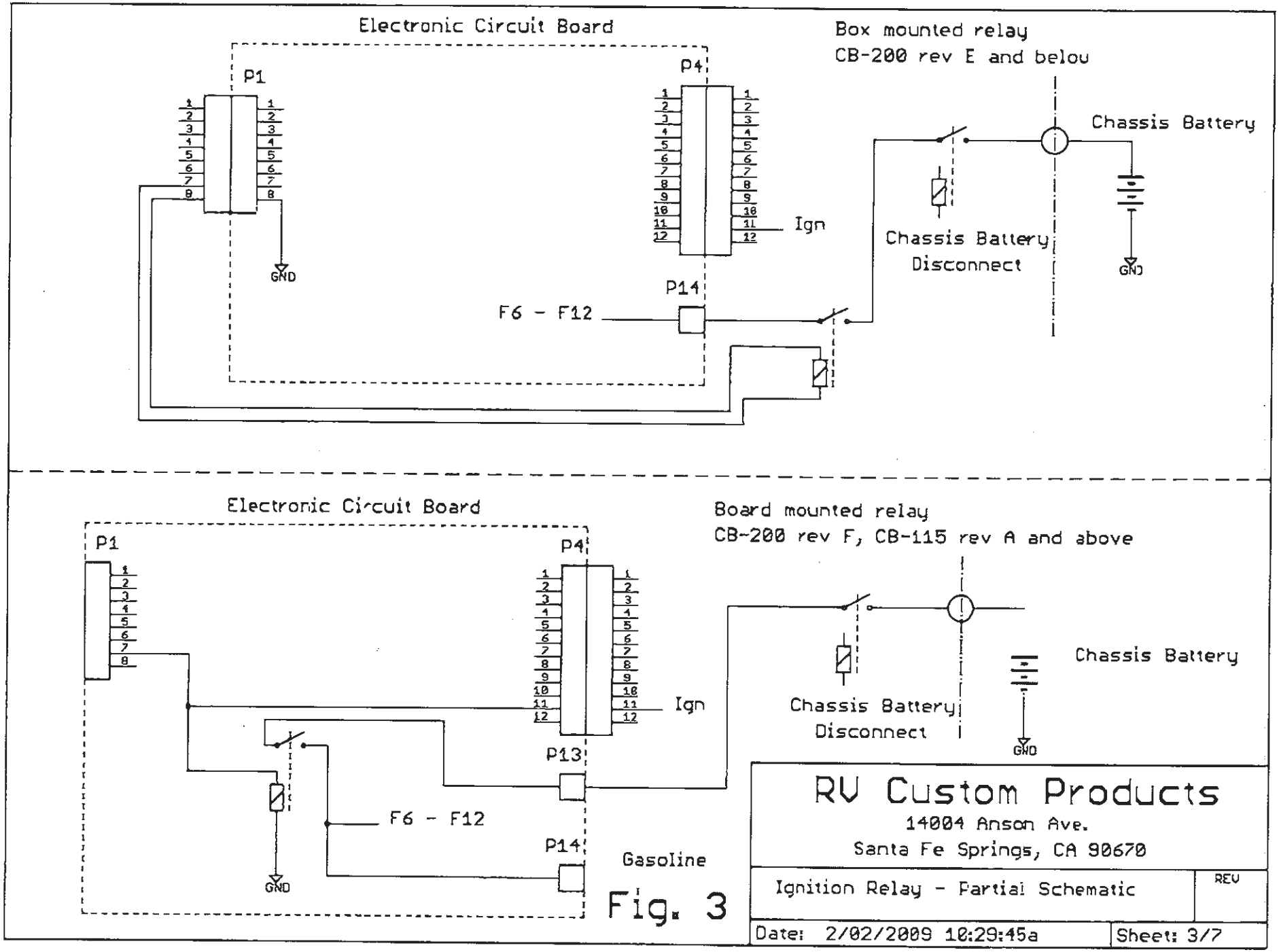

Fig. 3

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Ignition Relay - Partial Schematic

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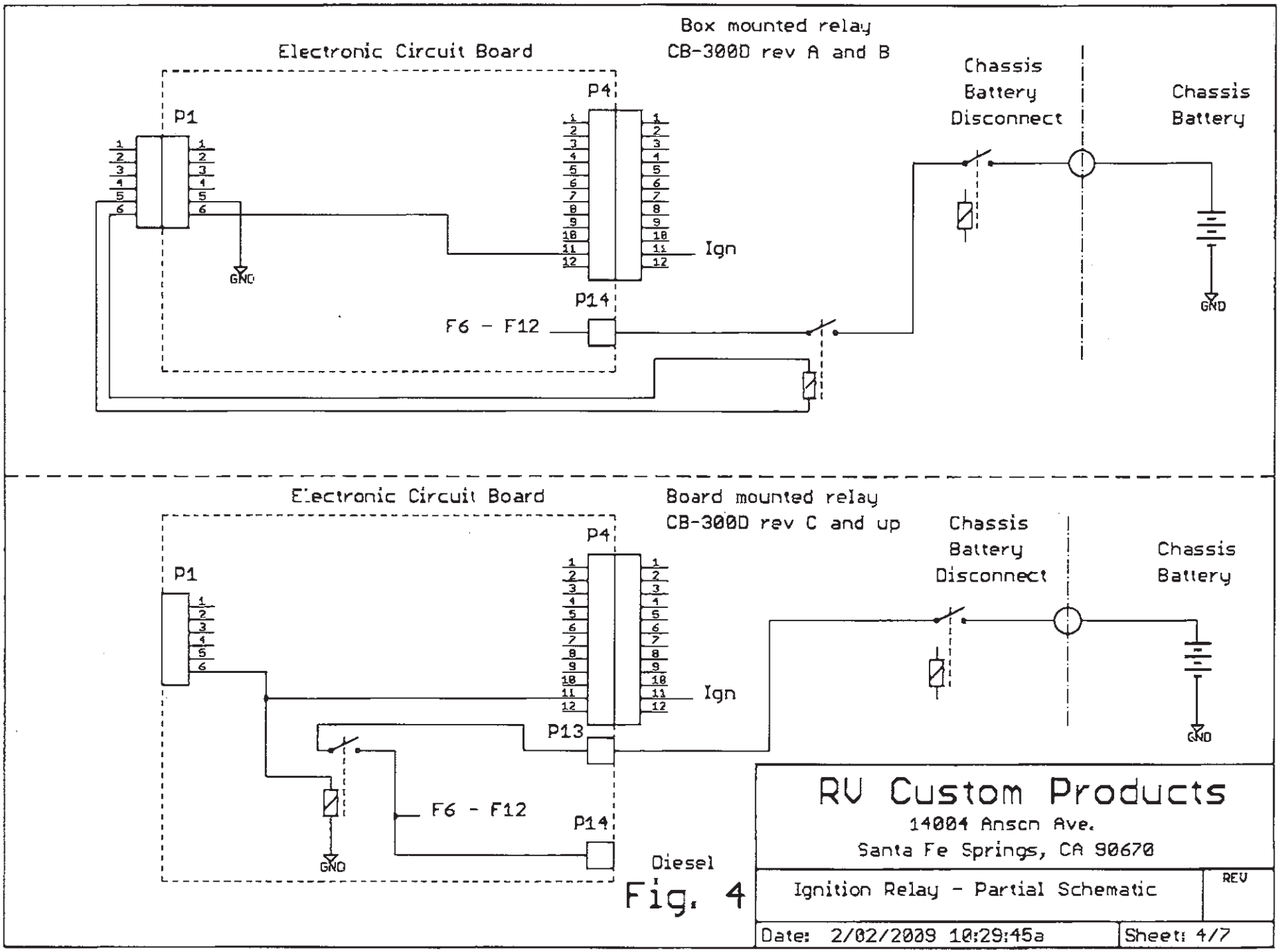
Box mounted relay
CB-300D rev A and B
Electronic Circuit Board
P1
P4
GND
Ign
P14
F6 - F12
Chassis Battery Disconnect
Chassis Battery
GND
Board mounted relay
CB-300D rev C and up
Electronic Circuit Board
P1
P4
Ign
P13
F6 - F12
P14
GND
Chassis Battery Disconnect
Chassis Battery
GND
Diesel
Fig. 4
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Ignition Relay - Partial Schematic
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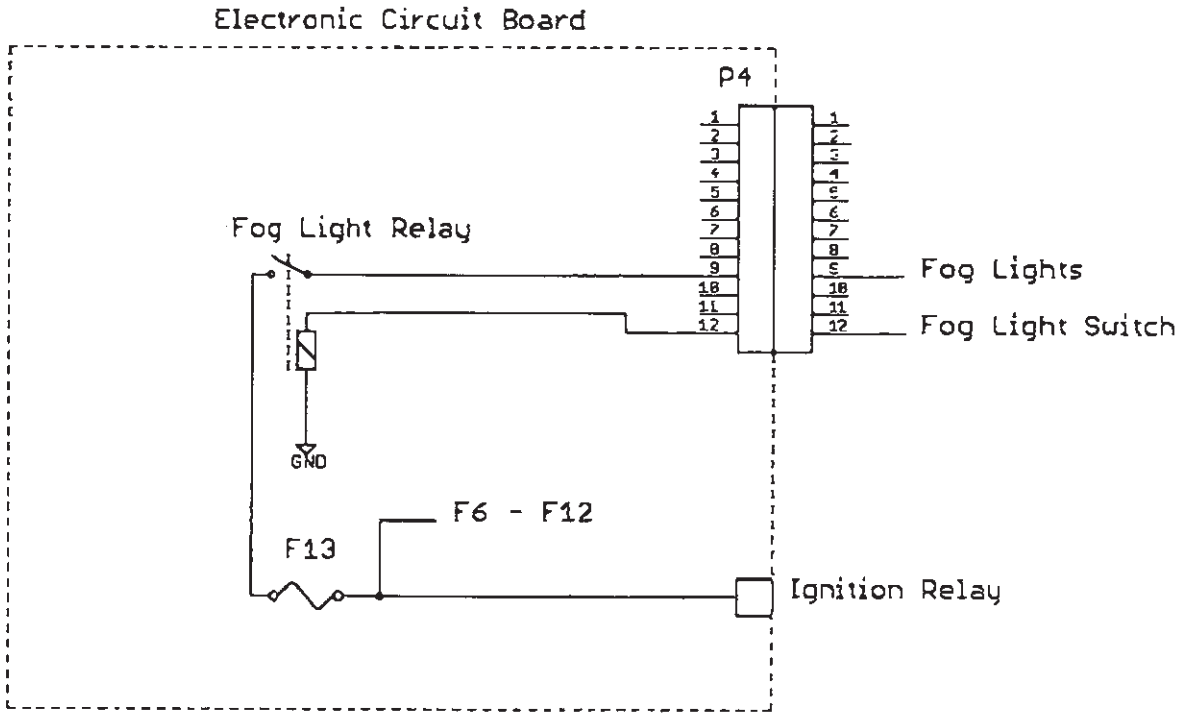

Fig. 5

RV Custom Products 14004 Anson Ave. Santa Fe Springs, CA 90670	
Fog Light Relay - Partial Schematic	REV
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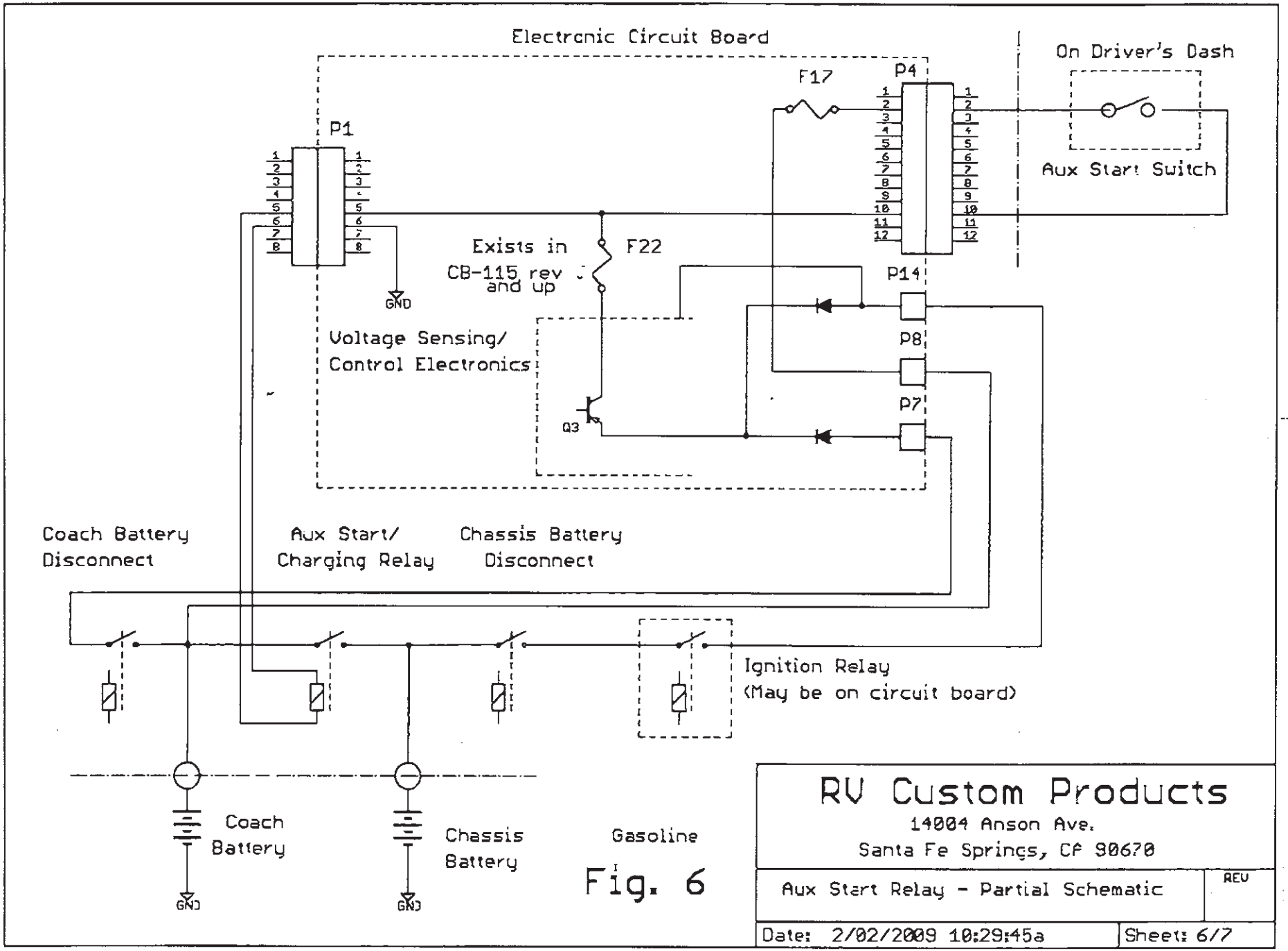

Fig. 6

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Aux Start Relay - Partial Schematic

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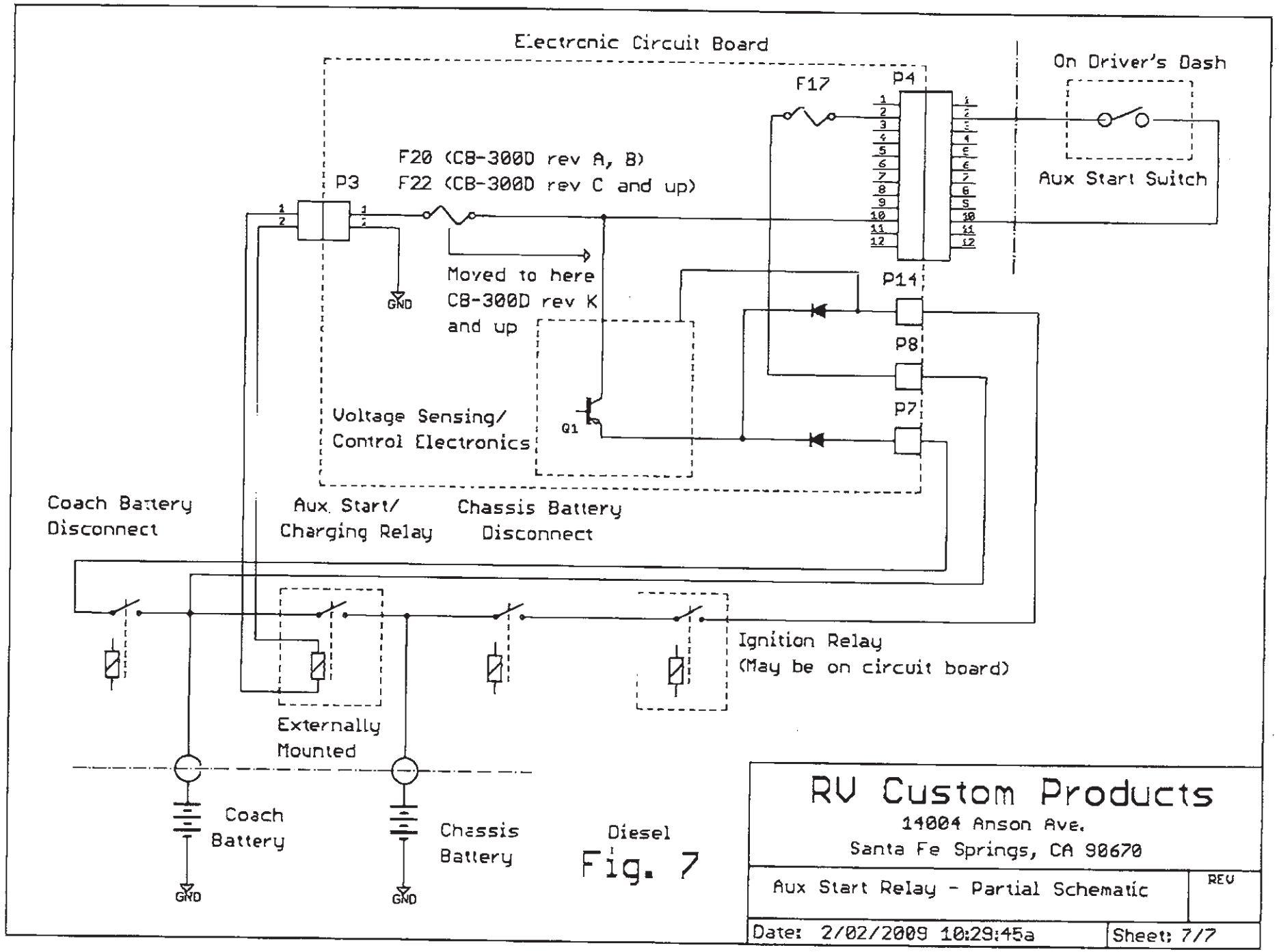
Electronic Circuit Board
F17
P4
On Driver's Dash
F20 (CB-300D rev A, B)
F22 (CB-300D rev C and up)
P3
Aux Start Switch
Moved to here
CB-300D rev K
and up
GND
P14
P8
P7
Q1
Voltage Sensing/
Control Electronics
Coach Battery
Disconnect
Aux Start/
Charging Relay
Chassis Battery
Disconnect
Ignition Relay
(May be on circuit board)
Externally
Mounted
Coach
Battery
Chassis
Battery
GND
GND
Diesel
Fig. 7
RV Custom Products
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Aux Start Relay - Partial Schematic
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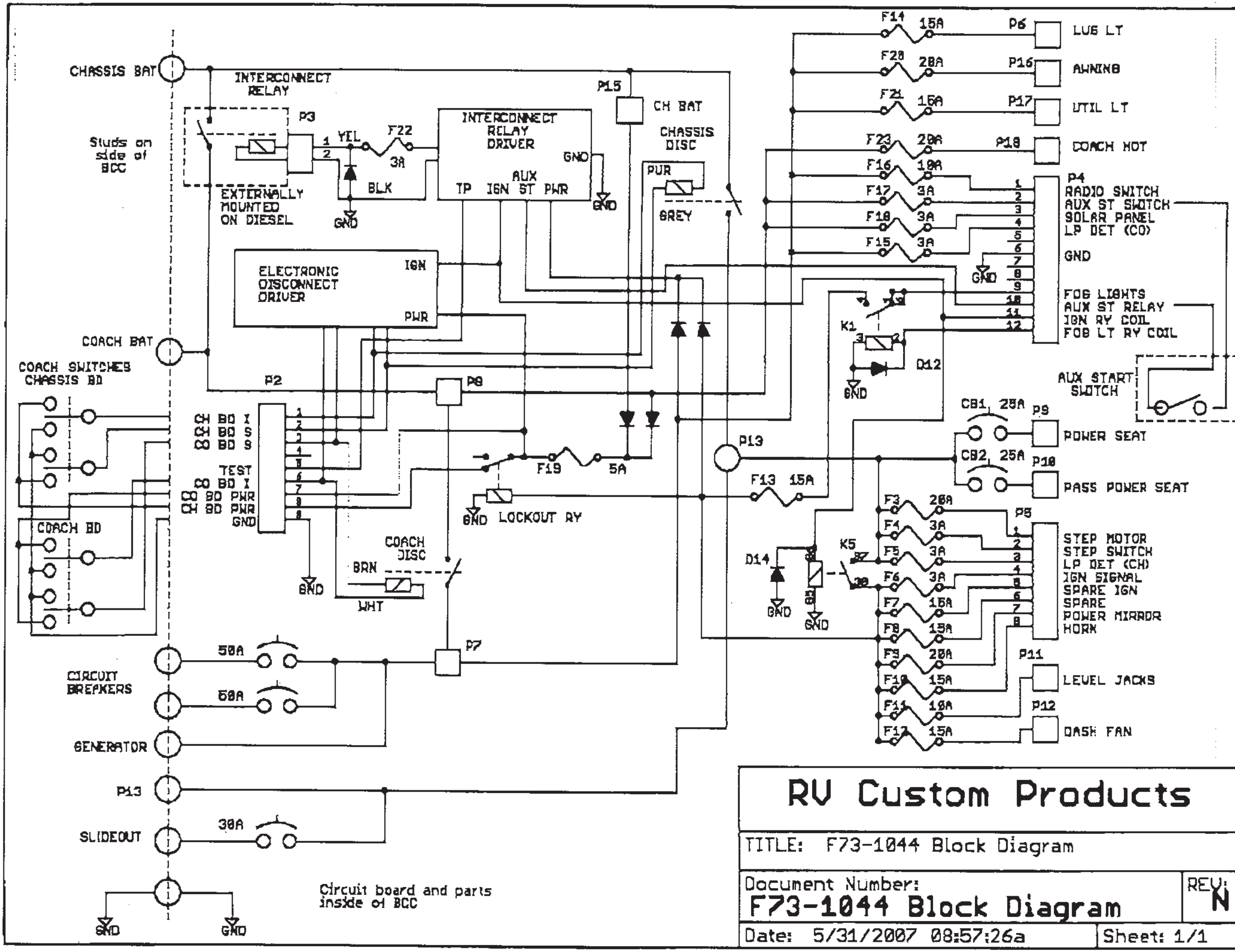
CHASSIS BAT
INTERCONNECT RELAY
P3
Studs on side of BCC
EXTERNALLY MOUNTED ON DIESEL
YEL
BLK
F22 3A
GND
INTERCONNECT RELAY DRIVER
TP IGN AUX ST PWR
P15
CH BAT
CHASSIS DISC
PUR
GREY
ELECTRONIC DISCONNECT DRIVER
IGN
PWR
COACH BAT
COACH SWITCHES CHASSIS BD
COACH BD
P2
P8
CH BD I
CH BD S
CO BD S
TEST
CO BD I
CO BD PWR
CH BD PWR
GND
F19 5A
LOCKOUT RY
COACH DISC
BRN
WHT
P7
P13
CIRCUIT BREAKERS
50A
GENERATOR
SLIDEOUT
30A
Circuit board and parts inside of BCC
F14 15A P6 LUG LT
F20 20A P16 AWNING
F21 15A P17 UTIL LT
F23 20A P18 COACH HOT
F16 10A
F17 3A
F18 3A
F15 3A
P4
RADIO SWITCH
AUX ST SWITCH
SOLAR PANEL
LP DET (CO)
GND
FOG LIGHTS
AUX ST RELAY
IGN RY COIL
FOG LT RY COIL
K1
D12
AUX START SWITCH
CB1 25A P9 POWER SEAT
CB2 25A P10 PASS POWER SEAT
F13 15A
F3 20A
F4 3A
F5 3A
F6 3A
F7 15A
F8 15A
F9 20A
F10 15A
F11 10A
F12 15A
P5
STEP MOTOR
STEP SWITCH
LP DET (CH)
IGN SIGNAL
SPARE IGN
SPARE
POWER MIRROR
HORN
K5
D14
P11 LEVEL JACKS
P12 DASH FAN

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TITLE: F73-1044 Block Diagram

Document Number: **F73-1044 Block Diagram**

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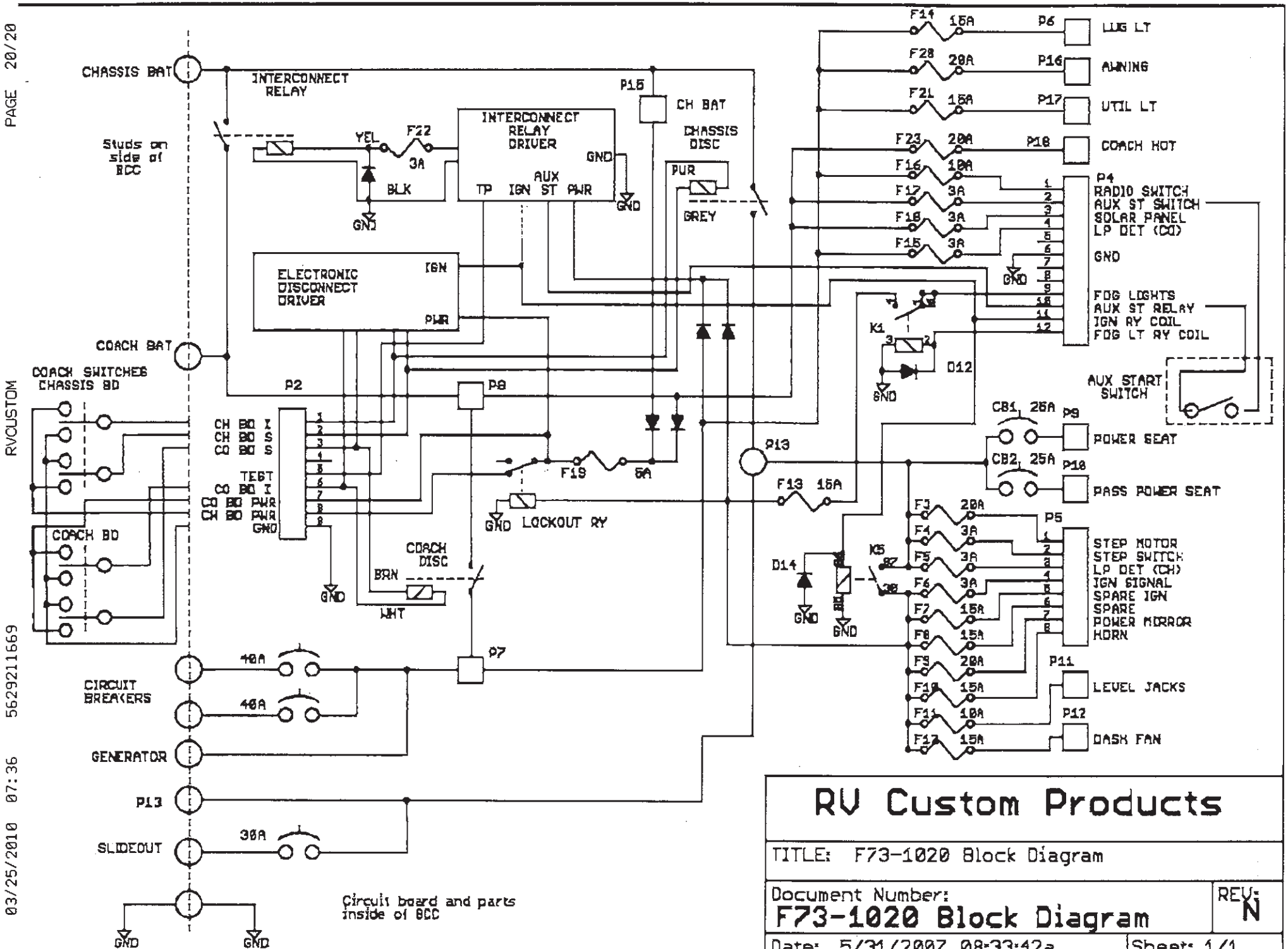

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TITLE: F73-1020 Block Diagram

Document Number:
F73-1020 Block Diagram

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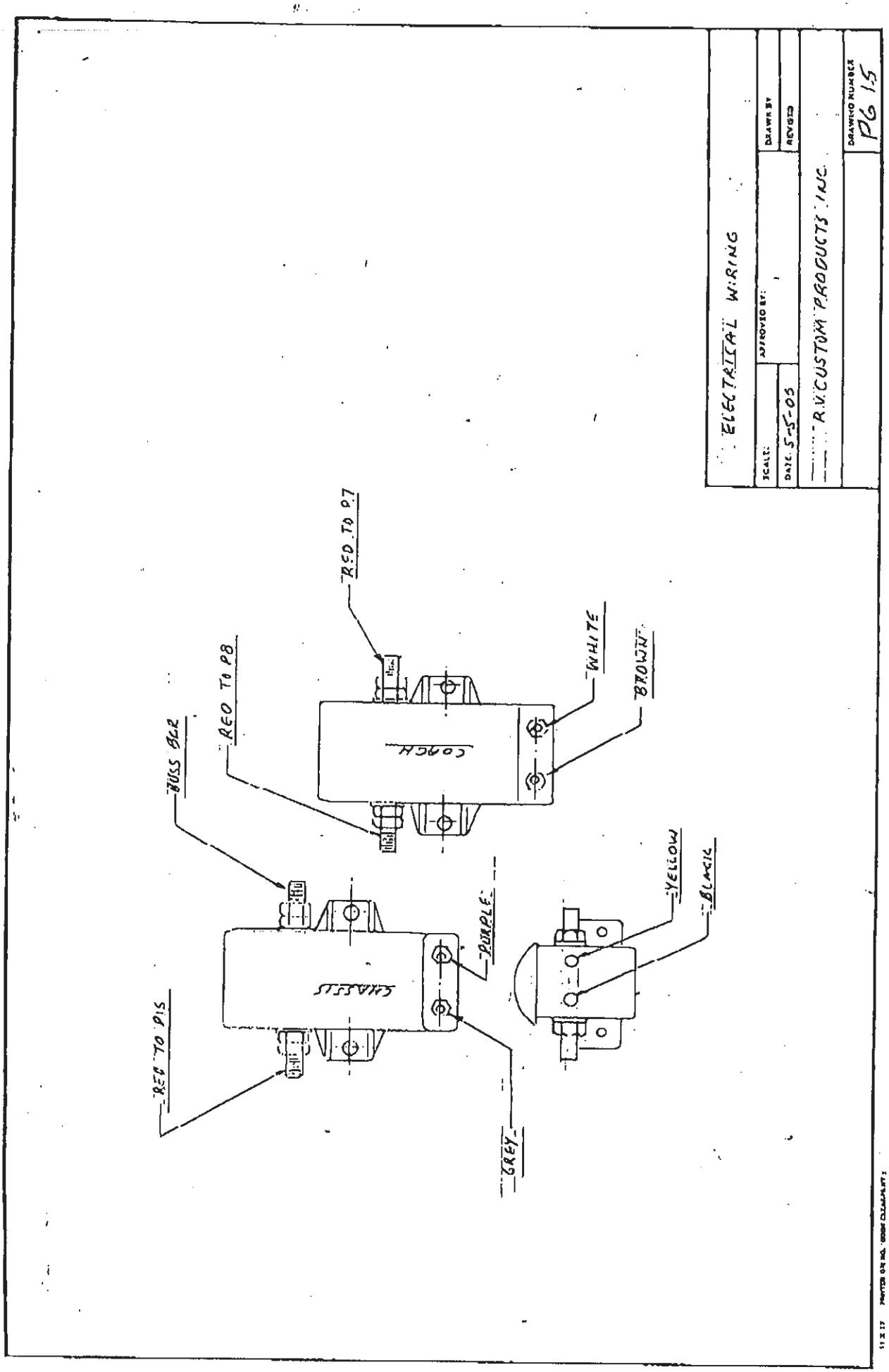
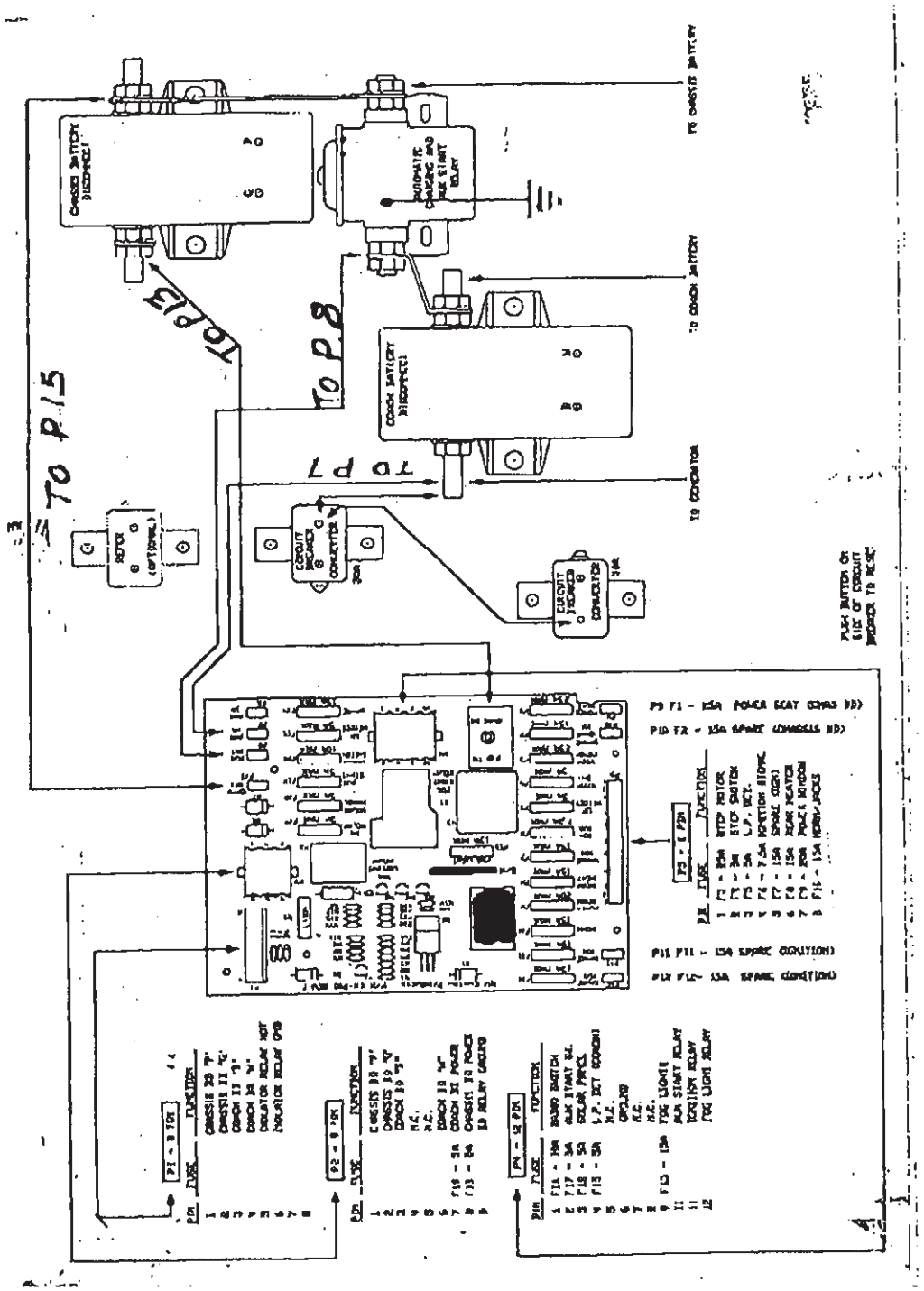

ELECTRICAL WIRING
SCALE:
DATE: 5-5-05
APPROVED BY:
DRAWN BY
REVISED
R.V. CUSTOM PRODUCTS INC.
DRAWING NUMBER
PG 15
RED TO P7
RED TO P8
WHITE
BROWN
BUSS BLK
RED TO P15
PURPLE
GREY
YELLOW
BLACK
CHASSIS
COACH

Attn: All Fleetwood Parts & Service
CB-115 REv P is a replacement for RV Custom Products PC boards CB-200 Rev A thur P. CB-115 REv P has circuit board mounted ignition relay.. When installing REV P board it is unnecessary to connect the ignition relay mounted in breaker box.
do not remove relay and the orange wire is no longer needed.
Connect one black wire of AUX start relay to breaker box.



ATTN: ALL FLEETWOOD PARTS & SERVICE

CB-300 REV. P IS A REPLACEMENT FOR RV CUSTOM PRODUCTS PC BOARDS REV. A,B,C,D,& E.& F. G H J K L N P

CB-300 REV P HAS CIRCUIT BOARD MOUNTED IGNITION RELAY. WHEN INSTALLING REV. P BOARD IT IS UNNECESSARY TO CONNECT THE IGNITION RELAY MOUNTED IN BREAKER BOX.

SHORT BLACK WIRE IS GROUND AND SHOULD BE ATTACHED TO BREAKER BOX.