

Battery Control Center  
Trouble Shooting Guide

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General

The Battery Control Center provides 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 exist: gasoline powered coaches and diesel powered coaches. The basic difference is that 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. C - revised fuse use description (f12,f14,f21)
- CB-115 rev. D - added electronics 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 - added changed F23 from 7.5A to 10A

CB-115 rev. H and I - does not exist  
CB-115 rev. J - added diodes D71 and D81 F23 changed from 10amp to 20 amp

#### Diesel (electronic board)

CB-300D rev. A - initial release

CB-300D rev. B - added coach battery as second power source

CB-300D 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-300D rev. D - revised fuse use description

CB-300D rev. E - minor silk screed changes

CB 300D rev. F - added electronic disconnect driver to turn

On disconnects when ignition key is turned on - change

F19 to 7.5A

CB-300D rev. G - added F18 and FF23, minor silk screen

Changes

CB-300D rev H - changed F23 from 7.5A to 10A

CB-300D rev I - does not exist

CB-300D rev J - added D71 and D81 F23 changed from 10 amp to 20 amp

It is necessary to keep these differences in mind when troubleshooting the various models of battery control center. The various revisions of the electronic circuit boards are backward compatible. For example, a rev. D board will replace revs. A through D boards. 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 Fig. 1, Battery Disconnects partial schematic to aid in troubleshooting. Each battery disconnect is a magnetically latched relay. Hence power is applied to its 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 a 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

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

**Neither relay operates:**

Check and replace fuse F19 if necessary. If fuse F19 is good and there is no voltage 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 board.  
There should be continuity between P2 #1 and the purple wire terminal on the disconnect relay and continuity between P2 #2 and the gray wire relay terminal. If not, check wiring and connectors P1 and P2.  
Pressing the top of the chassis battery disconnect rocker 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 rocker produces battery voltage on the gray wire terminal and ground on the first. 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 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 coach battery disconnect rocker switch should produce battery voltage on the brown wire terminal of the coach battery relay 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, the relay is defective. If not, check and repair 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 chassis battery disconnect relay engaged), is provide to supply the necessary current. Refer to fig. 2 (Gasoline) and fig. 3 (Diesel), Ignition Relay-partial schematic, 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 #11, 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 lamp loads to be controlled by a small dash mounted switch. Refer to fig. 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 its contacts. This allows power to flow 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 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 f13 is good and no voltage on p4 #9, 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 fig. 5 (Gasoline) and fig. 6 (Diesel), Auxiliary Start Relay-partial schematic, for particulars.

The relay is actuated manually from the drivers console by pushing the auxiliary start switch button. Coach battery power appears at P4 #2 after passing through fuse 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 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
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 (at 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 approx. 1/4 amp 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 1/4 second and then the coil is pulsed at approx. 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 later 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 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 wiring in the coach if not. 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 is undamaged. With the relay pulled in, there should be zero volts across the load (large) terminals of 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	Spare
P10	F2	Spare
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
P5 #7	F9	Power Window
P5 #8	F10	Horn
P11	F11	Spare
P12	F12	Dash Fan/Spare Ign.

Coach (Auxiliary) Battery Functions:

P4 #2	F17	Auxiliary Start Switch
P4 #3	F18	Solar Panel

2-30a circuit breakers to coach panel (total 60a)

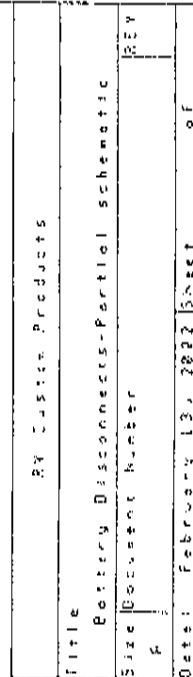
Coach Battery Disconnect Functions:

P4 #1	F16	Radio Switch
P6	F14	Lug Light/Spare Aux BD
P16	F20	Spare (Gas CB-115 Rev A and Diesel Rev C only)
P17	F21	Spare (Gas CB-115 Rev A and Diesel Rev C only) Utility ("Lights/Spare Aux. BD" for Gas CB115 rev C and Diesel CB300D rev. E)

### Troubleshooting

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

Rev.10/03



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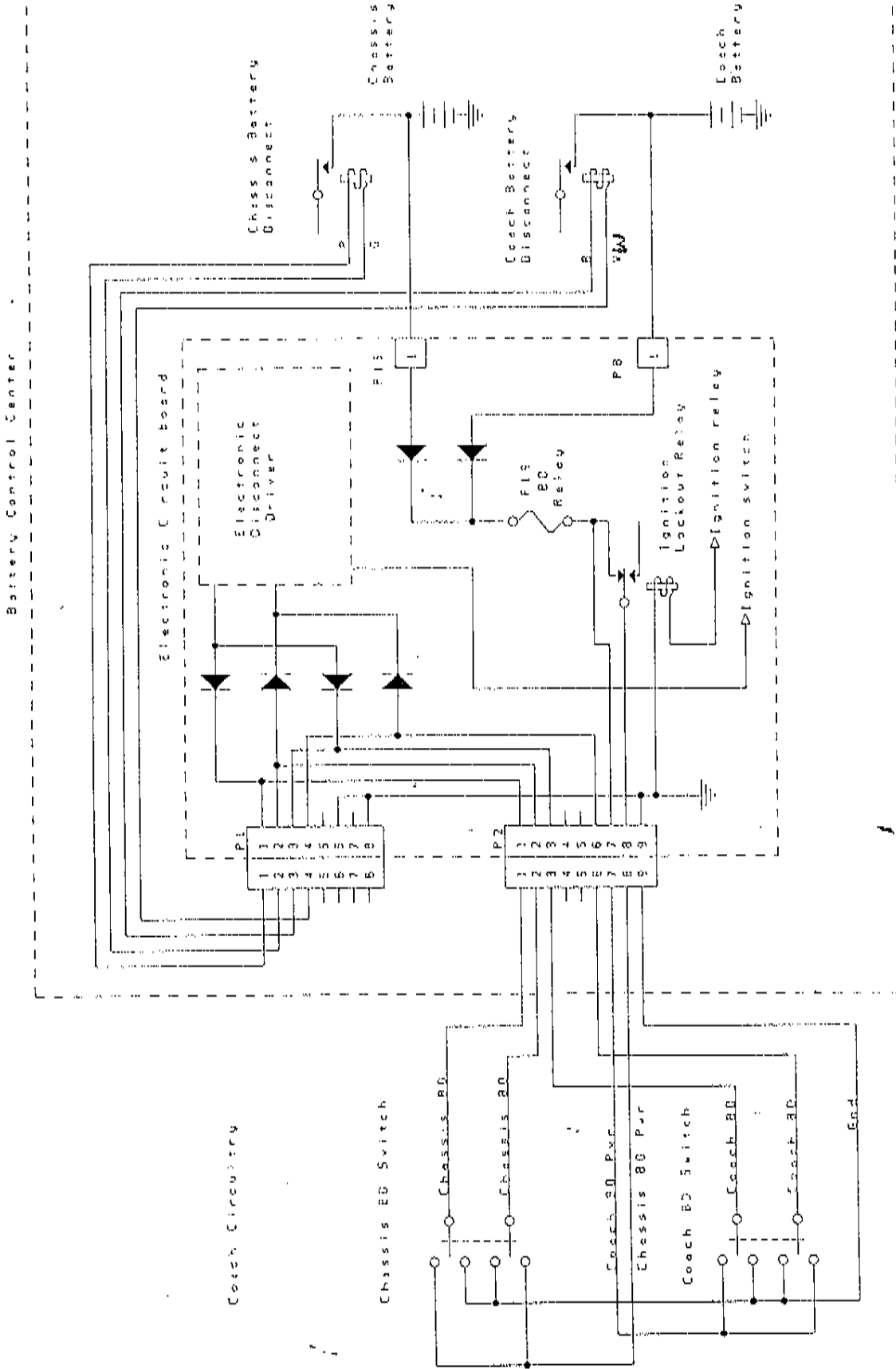


FIG. 2

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Battery Disconnects-Selected Schematic

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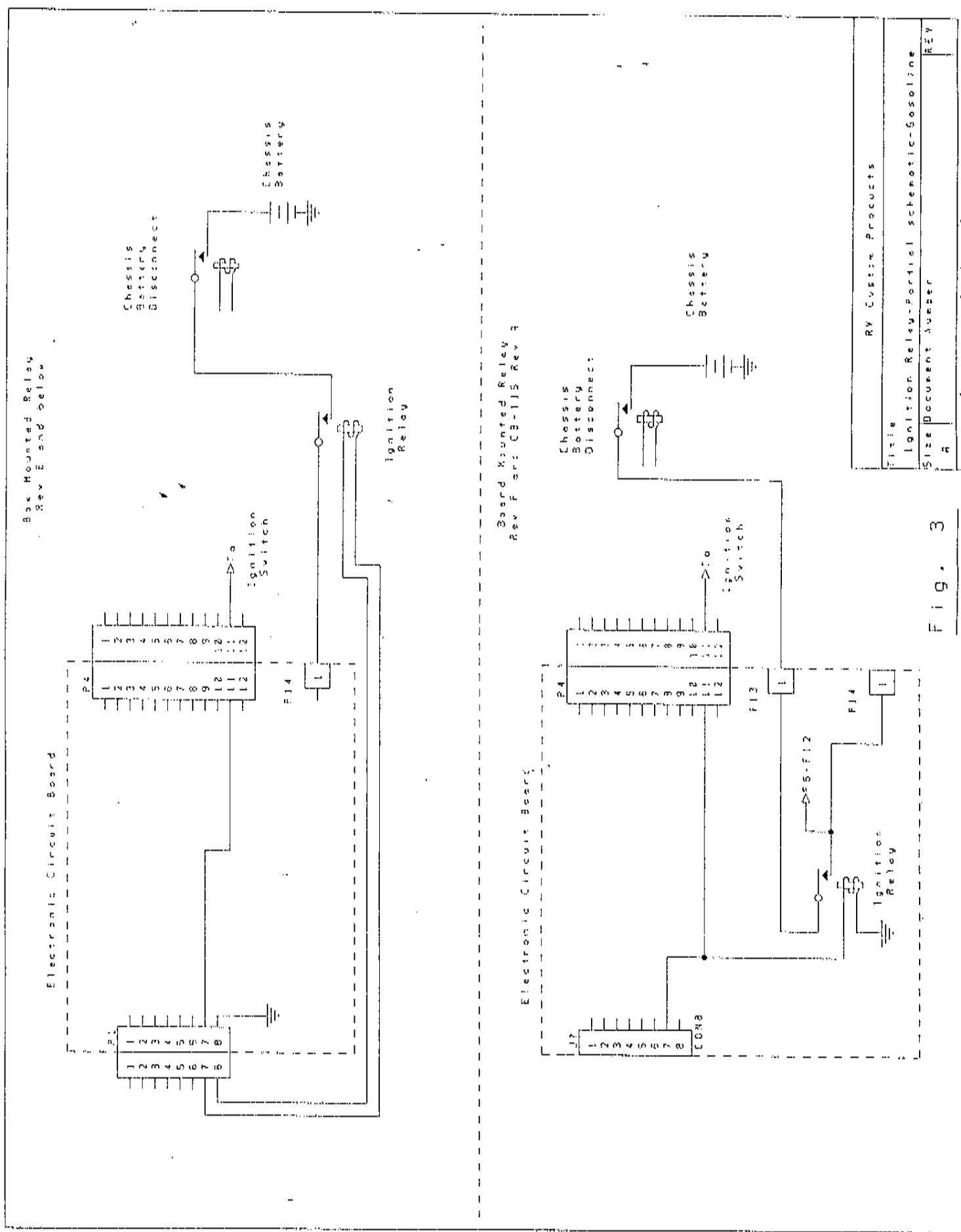
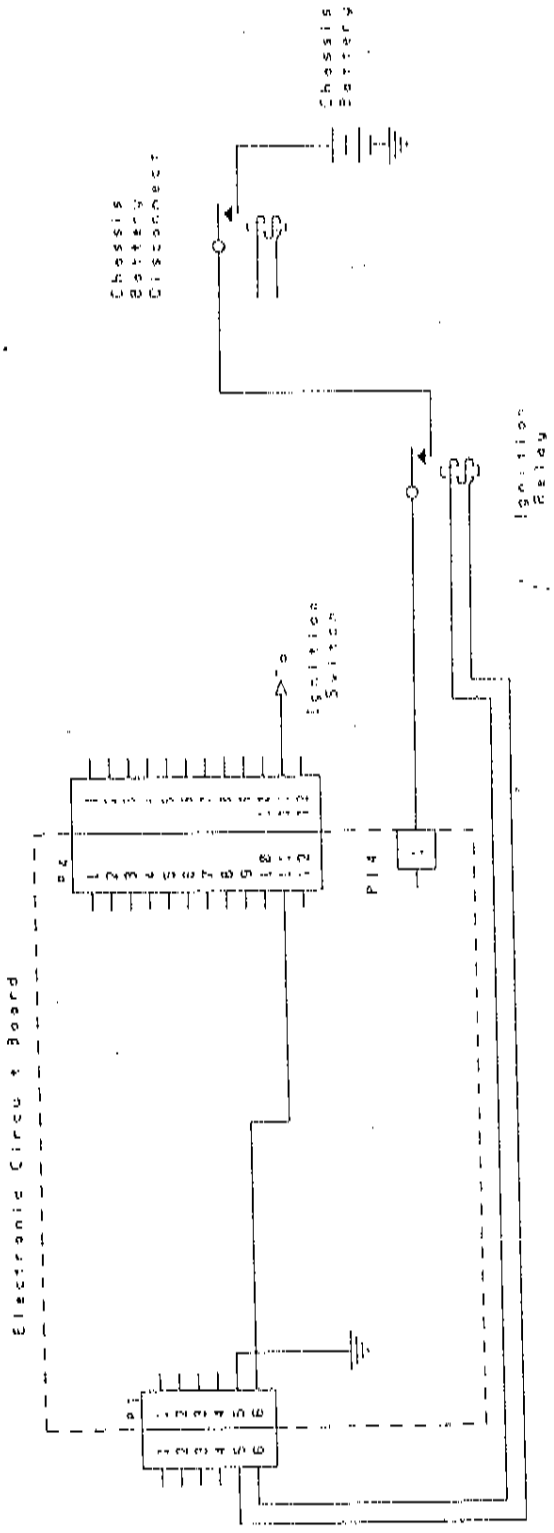


Fig. 3

Box Mounted Relay  
Rev A and B



Board Mounted Relay  
Rev C

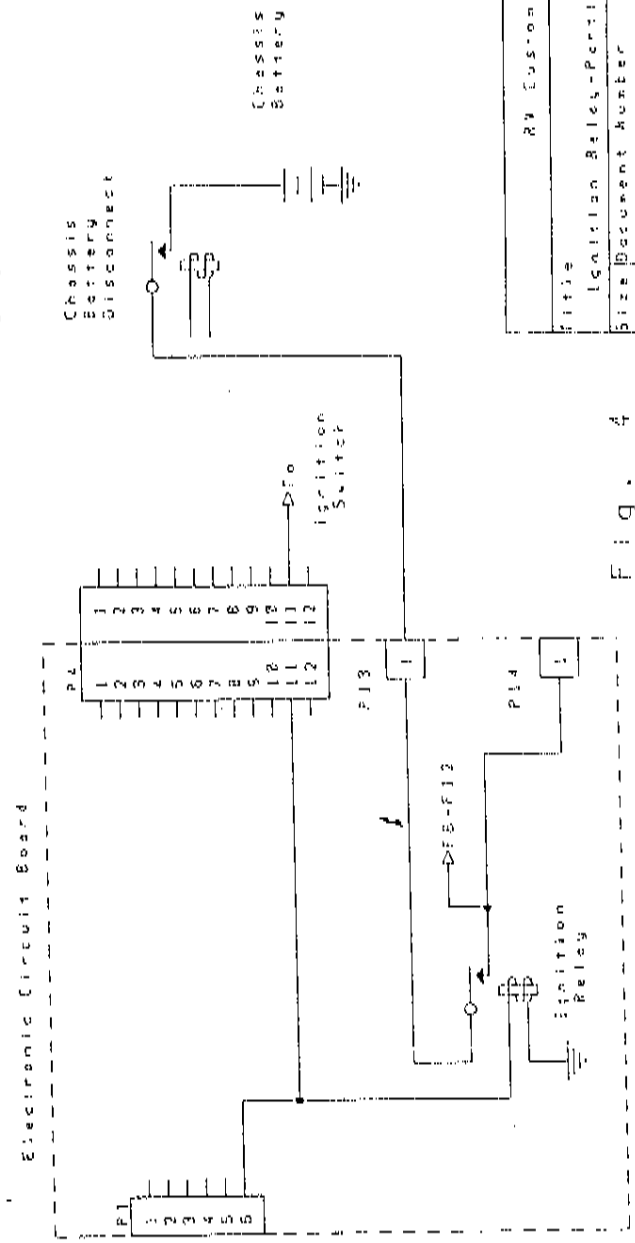


Fig. 4

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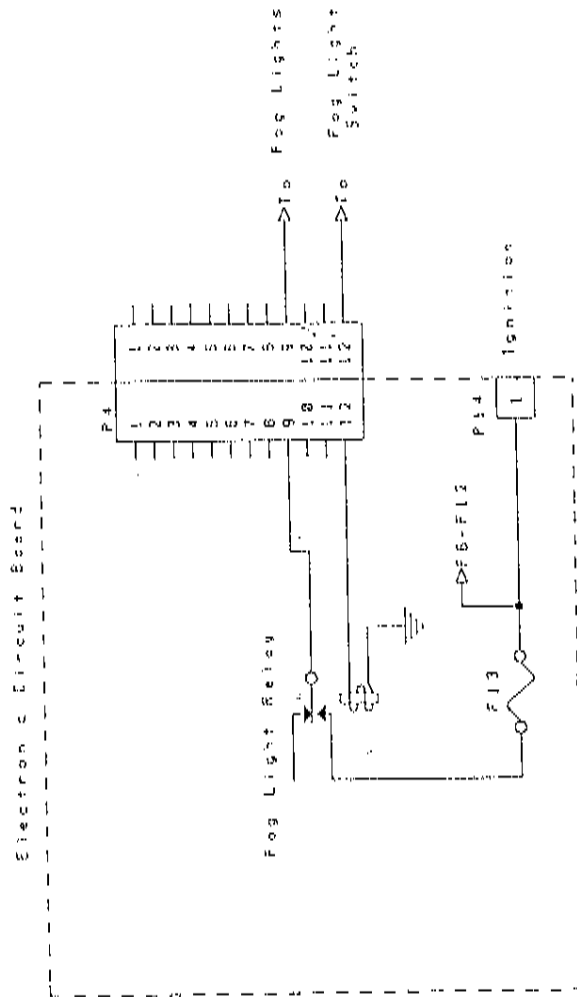


Fig. 5

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Fog Light Relay-Part of schematic	
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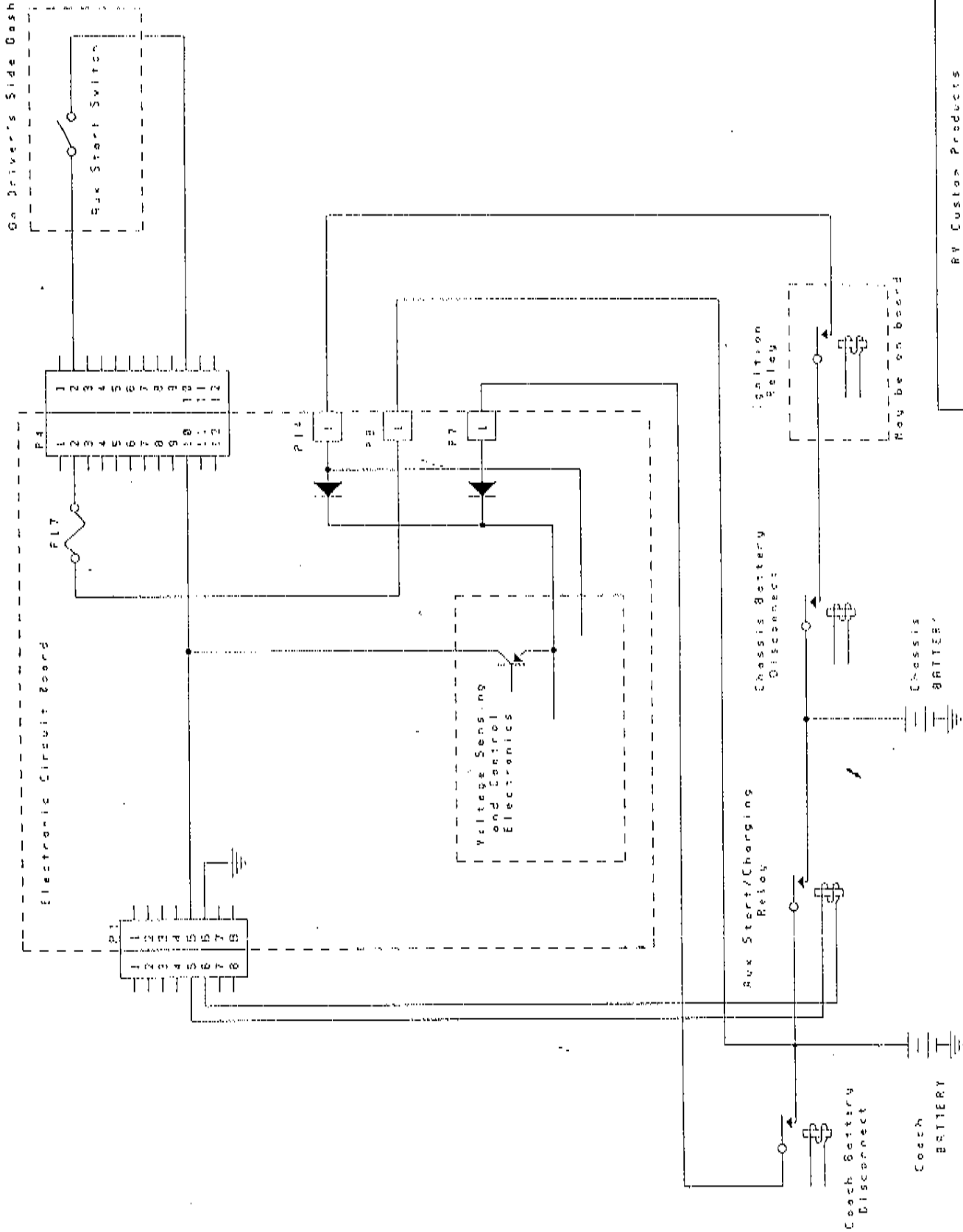


FIG. 6

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Aux Start Relay-Periodic schemat c-Gasoline

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Date: February 13, 2002 Sheet 9 of



24 Customer Profiles

Date	Time	Place	Remarks	Temperature		Wind	Sea	Weather	Visibility	Barometer	Compass	Log
				Air	Water							
1900	0000	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	0100	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	0200	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	0300	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	0400	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	0500	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	0600	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	0700	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	0800	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	0900	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1000	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1100	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1200	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1300	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1400	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1500	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1600	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1700	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1800	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	1900	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2000	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2100	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2200	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2300	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2400	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2500	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2600	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2700	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2800	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	2900	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0
1900	3000	10° 15' N	155° 00' W	75	72	0	0	0	0	30.0	0	0