

# SUSPENSION - ELECTRONIC LEVEL CONTROL

## 1998 Pontiac Bonneville

1998-99 SUSPENSION  
Electronic - Level Control - "C", "G" & "H" Bodies  
GM

Aurora, Bonneville, Eighty Eight, LeSabre, LSS, Park Avenue,  
Riviera

### MODEL IDENTIFICATION

#### MODEL IDENTIFICATION

---

| Body Code (1) | Model  |
|---------------|--|
| "C" .....     | Park Avenue                                      |
| "G" .....     | Aurora & Riviera                                 |
| "H" .....     | Bonneville, Eighty Eight, LeSabre, LSS & Regency |

(1) - Vehicle body code is fourth character of VIN.

---

NOTE: Bonneville is also equipped with a Computer Command Ride/Real-Time Damping (CCR/RTD) electronic suspension. For information on this system, see ELECTRONIC - REAL TIME DAMPING - BONNEVILLE article. In some literature, Computer Command Ride/Real Time Damping (CCR/RTD) system may be referred to as simply CCR or RTD.

### DESCRIPTION

The Electronic Level Control (ELC) system automatically raises or lowers rear of vehicle to correct ride height (curb height), compensating for loads added to or removed from vehicle. System consists of a compressor, air drier (desiccant) exhaust (vent) solenoid, compressor relay, height sensor, air adjustable shocks, pressure limiter and connecting air lines. Air drier (mounted on compressor) contains moisture-absorbing dry chemical and valves that maintain minimum system air pressure at about 7-14 psi (.49-.98 kg/cm<sup>2</sup>).

### OPERATION

#### SYSTEM OPERATION

When ride height decreases due to weight being added to vehicle, height sensor arm assembly rotates upward in relation to height sensor. See Fig. 1. This activates a timing circuit in height sensor. After a delay of 17-27 seconds, height sensor grounds compressor relay, turning on compressor. Air is then pumped into the shock absorbers, raising vehicle. Delay prevents system from operating during normal changes in ride height that occur during driving. As vehicle rises, height sensor rotates downward. When vehicle rises to within one inch (25.4 mm) of curb height, height sensor opens ground circuit to compressor relay, turning compressor off.

When ride height increases due to weight being removed from vehicle, height sensor arm assembly rotates downward. This activates the timing circuit in height sensor. After a delay of 17-27 seconds, height sensor grounds exhaust solenoid valve circuit, causing air to be vented from shock absorbers, lowering vehicle. When vehicle lowers

to within 1" (25.4 mm) of curb height, height sensor opens exhaust solenoid valve circuit, causing exhaust solenoid valve to close.

To ensure system is operating with at least minimum air pressure, height sensor commands an air replenishment cycle each time ignition is turned on. An internal timer circuit is activated when ignition is turned on. After a delay of about 35-45 seconds, compressor turns on for 3-5 seconds to ensure residual system pressure exists. If weight is added to or removed from vehicle during 35-45 second delay, air replenishment cycle will be overridden and vehicle will rise or lower after normal time delay.

Voltage is applied to compressor, compressor relay, inflator timer and height sensor at all times. This allows system to vent if load is removed with ignition off. Height sensor limits compressor operation or exhaust solenoid energized time to about 4 1/2 and 7 1/2 minutes. Time limit is necessary to prevent continuous compressor operation in case of air leak or continuous exhaust solenoid operation. Turning ignition switch from OFF to ON position resets compressor operation or exhaust solenoid valve energized time.

## COMPONENT OPERATION

### Air Adjustable Shocks

Air adjustable shock absorber is a conventional shock enclosed in an air chamber that extends when air pressure in chamber increases.

### Air Drier

Air drier, attached to compressor outlet, absorbs moisture from air being delivered to air adjustable shock absorbers. Air drier contains a valve that maintains a minimum air pressure of 7-14 psi (.49-.98 kg/cm<sup>2</sup>) in shock absorbers.

### Compressor

Compressor provides air pressure for system operation. Compressor head casting contains intake and exhaust valves, and exhaust valve solenoid. Compressor is located on right rear underbody, behind wheelwell.

### Compressor Relay

When compressor relay is grounded by height sensor, voltage is supplied to compressor. Compressor relay is located in relay center under rear seat.

### Exhaust Solenoid Valve

Exhaust solenoid valve, located in compressor head assembly, exhausts air from system and limits compressor output pressure.

### Height Sensor

Height sensor, mounted to underbody frame in rear of vehicle, links body to right rear suspension arm. Sensor controls ground circuits of compressor relay and exhaust solenoid valve.

## ADJUSTMENTS

### HEIGHT SENSOR

NOTE: Optional Height Sensor Adjustment Tool (J-34825) can be used to adjust height sensor. Follow tool manufacturer's instructions.

1) Park vehicle on level surface. Ensure fuel tank is full. If necessary, simulate full tank by adding about 7 lbs. (3.2 kg) of

weight to rear of vehicle for each gallon of fuel that is not in tank. Ensure vehicle is unloaded and tire inflation pressure is correct. Move front seats rearward.

2) Turn ignition on to activate ELC system. Bounce rear of vehicle 3 times to normalize suspension. Measure 23 1/2" (600 mm) from center of rear wheel towards front of vehicle. See Fig. 2. Measure trim/rear ride height from this point.

3) If rear ride height varies by more than 3/4" (19 mm) from side to side or is lower than 9" (229 mm), repair suspension problem before continuing procedure. If rear ride height is within specification, height sensor is adjusted correctly.

NOTE: Height sensor can be adjusted a total of 5 degrees. One degree of change at height sensor results in a 1/4" (6 mm) change in height at rear bumper.

4) If rear ride height is not within specification, loosen lock bolt on sensor actuating arm. See Fig. 1. Move plastic arm upward or downward as necessary to increase or decrease rear ride height. To increase rear ride height, move plastic arm upward. To decrease rear ride height, move plastic arm downward. Tighten lock bolt.

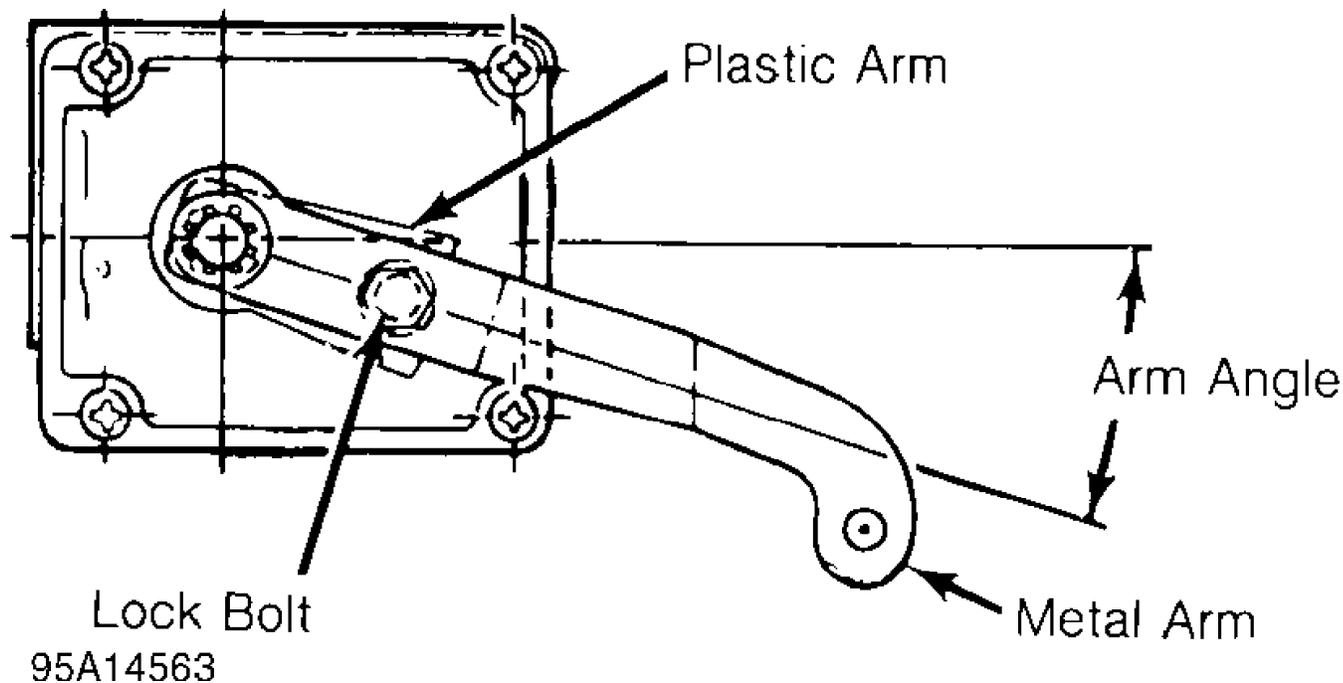


Fig. 1: Adjusting Height Sensor  
Courtesy of General Motors Corp.

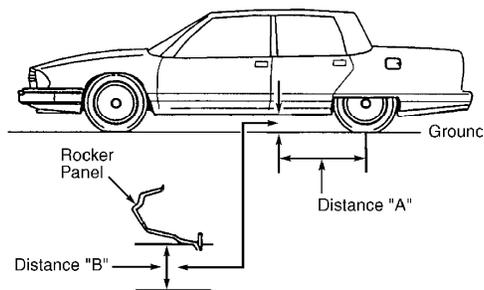


Fig. 2: Measuring Rear Ride Height  
Courtesy of General Motors Corp.

## RIDE HEIGHT

NOTE: See RIDE HEIGHT in WHEEL ALIGNMENT SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT section.

## TROUBLE SHOOTING

### SYSTEM OPERATION

Vehicle Loaded, Will Not Rise

Check for leaks in air lines, fittings or shock absorbers, pinched lines between compressor and shock absorbers, defective height sensor, inoperative compressor, and loose or damaged electrical connections to sensor or compressor.

Vehicle Rises When Loaded, Then Leaks Down

Check for severe leak in lines, fittings or shock absorbers, and internal leak in compressor.

Vehicle Rises Partially When Loaded

Check for out-of-adjustment height sensor and defective compressor wiring.

Vehicle Rises When Loaded, Leaks Down When Driving

Check for defective drier or compressor, pinched air lines, and/or leaks in fittings or air lines.

Vehicle Rides High

Check for out-of-adjustment height sensor, plugged air drier or pinched air lines, and poor electrical connections.

## DIAGNOSIS & TESTING

NOTE: Perform BASIC SYSTEM OPERATIONAL TEST before proceeding with ELC system testing. System is tested based upon symptoms. For ELC testing, see ELC SYSTEM SYMPTOM table.

### ELC SYSTEM SYMPTOM

---

| Symptom   | Test No. |
|---|----------|
| Rear Of Vehicle Low .....   | 1        |
| Rear Of Vehicle High .....  | 2        |
| Compressor Runs For Maximum Time (7 Mins.) Then Turns Off; Vehicle Does Not Reach Proper Height ..... | 3        |
| Compressor Cycles On And Off Frequently, No Air Leaks Present ....                                    | 3        |
| Compressor Does Not Run For 3-5 Seconds After Ignition On For 35-55 Seconds .....                     | 3        |
| Compressor Runs Excessively .....   | (1)      |

(1) - Check for disconnected/damaged air lines or shocks. Perform ELC SYSTEM CHECK under BASIC SYSTEM OPERATIONAL TEST.

---

## BASIC SYSTEM OPERATIONAL TEST

ELC System Check

1) Ensure height sensor and link assembly are in good condition before performing system operation test. Place vehicle on flat surface. Measure distance from ground to rocker panel in front of

rear wheelwell opening. See Fig. 2.

2) Turn ignition on. Add 300-350 lbs. (136-159 kg) of weight to rear of vehicle. After 17-27 second delay, compressor should turn on and vehicle should start to rise. Vehicle should rise to within 3/4" (19 mm) of measurement made in step 1).

3) Remove load from vehicle. After 17-27 second delay, vehicle should start to lower. Within 3 1/2 minutes, exhaust should stop and vehicle should be within 3/4" (19 mm) of measurement made in step 1). If ELC system does not function as specified, perform appropriate test. See ELC SYSTEM SYMPTOM table.

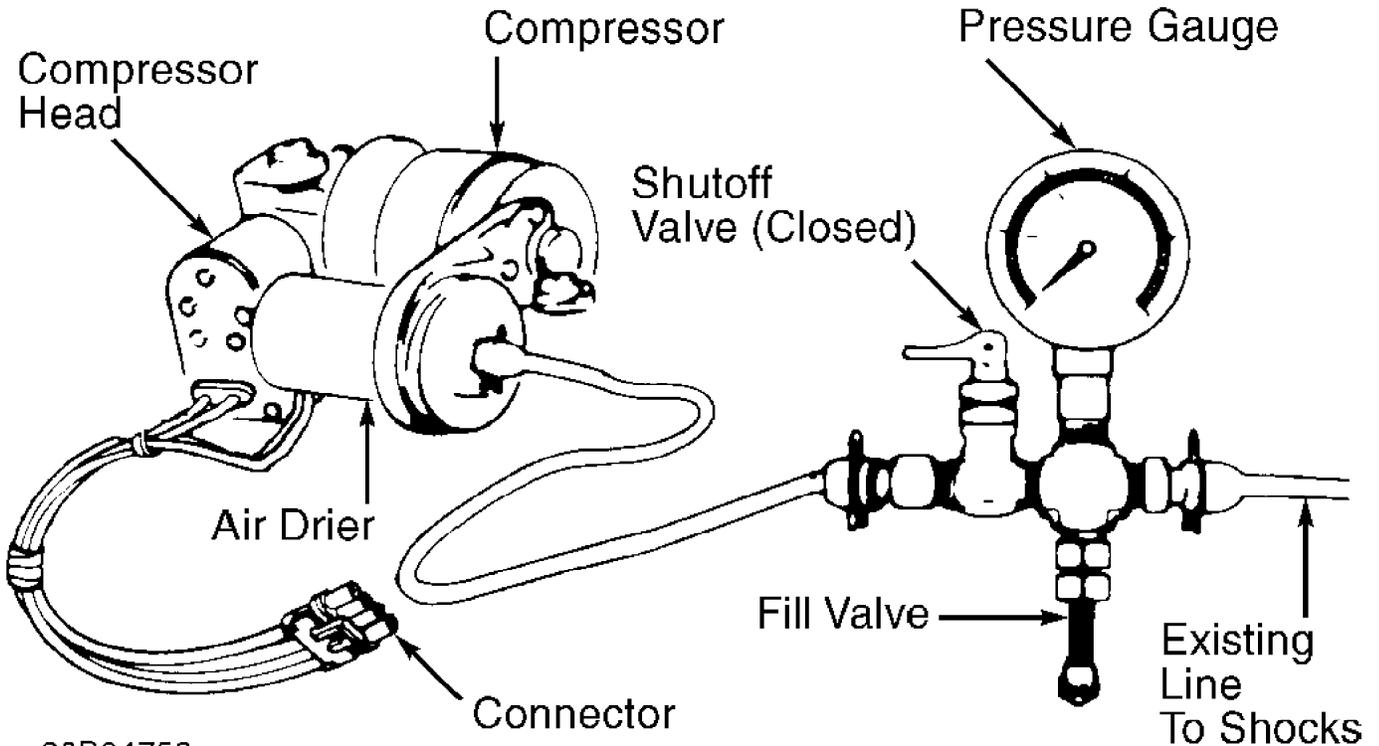
NOTE: System leak test determines if a leak exists, and if leak is internal or external to compressor.

#### Residual Air Pressure Test

1) Install Pressure Gauge (J-22124-B) and Adapter (J-22124-91) to air drier and shock absorber. See Fig. 3. Open shutoff/toggle valve.

2) Disconnect link from height sensor, and move sensor arm up. Air compressor should operate, inflating one shock absorber. Move sensor arm down. Air compressor should stop and air should escape. Allow vehicle to go down as far as possible.

3) Connect link to height sensor. Read pressure gauge. If pressure gauge reads less than 7 psi (.5 kg/cm<sup>2</sup>), replace air drier. Reconnect all air lines and check for leaks.



90B04758

Fig. 3: Checking System For Leakage  
Courtesy of General Motors Corp.

## SYMPTOM TESTS

\* PLEASE READ THIS FIRST \*

NOTE: To identify circuits and wire colors referenced in testing, see WIRING DIAGRAMS. After repairs are complete, recheck system operation. See ELC SYSTEM CHECK under BASIC SYSTEM OPERATIONAL TEST under DIAGNOSIS & TESTING.

## TEST 1: REAR OF VEHICLE LOW

1) Turn ignition on, with engine off. Add about 300 lbs. (136 kg) to rear of vehicle. Allow 27 seconds for air compressor to start and inflate shocks. If vehicle rear rises and does not leak, go to next step. If rear of vehicle does not rise or leaks down, go to step 4).

2) If vehicle rises to proper level within 30 seconds, ELC system is okay. If not, go to next step.

3) Adjust height sensor. See HEIGHT SENSOR under ADJUSTMENTS.

4) If air compressor operated when weight was added, go to step 20). If air compressor did not operate when weight was added, go to next step.

5) Turn ignition off. Disconnect height sensor harness connector. Turn ignition on, with engine off. Using a fused jumper wire, jumper height sensor harness terminal "B" (Yellow wire) to ground. If air compressor operates, go to TEST 3. If air compressor does not operate, go to next step.

6) Turn ignition off. Reconnect height sensor harness connector. Remove ELC relay. Relay is located under rear seat. Turn ignition on, with engine off. Check voltage between ground and relay terminal socket No. 85. If battery voltage is present, go to step 8). If battery voltage is not present, go to next step.

7) Check for open ELC fuse, located in fuse/relay block. Replace as necessary. If fuse is okay, repair open in circuit between fuse/relay block and rear electrical center.

8) Turn ignition off. Check voltage between ground and relay terminal socket No. 30. If battery voltage is present, go to step 10). If battery voltage is not present, go to next step.

9) Check for open ELC fuse or circuit breaker. Replace as necessary. If fuse or circuit breaker is okay, repair open in circuit to electrical center.

10) Turn ignition off. Connect voltmeter between ELC relay terminal sockets No. 85 and 86. Turn ignition on, with engine off. If battery is present after 17-27 seconds, go to step 12). If battery voltage is not present after 17-27 seconds, go to next step.

11) Check for poor connection at height sensor connector terminal "B" or open in circuit No. 321 (Yellow wire). Repair as necessary. If connection and circuit are okay, perform HEIGHT SENSOR under ADJUSTMENTS.

12) Using a fused (30-amp) jumper wire, jumper relay terminal sockets No. 30 and 87. If air compressor operates, go to next step. If air compressor does not operate, go to step 14).

13) Replace ELC relay.

14) Leave jumper wire connected. Disconnect air compressor harness connector. Check voltage between harness connector terminal "B" and ground. If battery voltage is present, go to step 16). If battery voltage is not present, go to next step.

15) Check for poor connection at rear of power distribution center connectors C1 and C2 or connector C4 at relay center. See WIRING DIAGRAMS. Repair as necessary. If connections are okay, repair open in circuit between ELC relay and air compressor motor.

16) Leave jumper wire connected. Check voltage at air compressor terminals "B" and "D". If battery voltage is present, go to step 18). If battery voltage is not present, go to next step.

17) Repair open in circuit between air compressor and ground.

18) Disconnect jumper wire. Install ELC relay. Connect jumper wire between air compressor terminal "D" and ground. Connect another

fused jumper wire between air compressor terminal "B" and battery voltage. If air compressor operates, repeat step 1). If air compressor does not operate, go to next step.

19) Replace air compressor.

20) Check rear shock absorbers for leaking air sleeve.

Perform RESIDUAL AIR PRESSURE TEST. Check kinked and pinched air lines. Check for disconnected air line to air compressor or shock absorbers. Check all fitting for leaks using a soap and water solution. Repair leak or damage. If leak or damage was not found, go to next step.

21) Disconnect air line from air drier. Connect Pressure Gauge (J-22124-91) and Adapter (J-22124-B) between air drier. Close toggle switch. Disconnect air compressor harness connector. Jumper compressor terminal "D" to ground. Jumper compressor terminal "B" to battery positive. Allow compressor to operate until air pressure reaches 100 psi (7 kg/cm<sup>2</sup>). Disconnect jumpers when pressure is reached. If pressure is reached, go to step 23). If pressure cannot be reached, go to next step.

22) Replace air compressor.

23) If air pressure holds at 100 psi (7 kg/cm<sup>2</sup>), go to next step. If air pressure does not hold, check air compressor for leak.

24) Check for binding rear shock absorber. Replace as necessary.

## TEST 2: REAR OF VEHICLE HIGH

1) Check height sensor adjustment. If height sensor has been adjusted, go to step 3). If height sensor needs to be adjusted, go to next step.

2) Adjust height sensor. See HEIGHT SENSOR under ADJUSTMENTS. If problem is not corrected, go to next step.

3) Raise vehicle. Vehicle must be raised on a drive-on hoist or supported under rear axle. Full vehicle weight must be on rear suspension. Disconnect air line from air drier. If air vents from line, go to step 5). If air does not vent from line, go to next step.

4) Check for binding in shock absorber. Replace as necessary. If shock absorber is okay, replace air line.

5) Reconnect air line to air drier. Disconnect link from height sensor. Raise height sensor lever. If air compressor operates, go to step 7). If air compressor does not operate, go to next step.

6) Check ELC fuse or circuit breaker. Replace as necessary. If fuse or circuit breaker is okay, check for open in circuit between fuse or circuit breaker to height sensor. See WIRING DIAGRAMS. If circuit is okay, go to TEST 3.

7) Raise rear of vehicle as much as possible by holding height sensor arm up. Reconnect height sensor link. Disconnect air compressor harness connector. Check voltage at air compressor harness connector terminal "A" and ground. If battery voltage is present, go to step 9). If battery voltage is not present, go to next step.

8) Check for poor connection at power distribution center connectors C1 and C2 and relay center connector C4. If connections are okay, repair open in circuit between power distribution center and relay center.

9) Cycle ignition switch. Check voltage between air compressor harness connector terminals "A" and "C". If battery voltage is present after 17-27 seconds (height sensor delay) after ignition was turned on, go to step 11). If battery voltage is still not present after 7 minutes, go to next step.

10) Check for open in circuit between air compressor and height sensor. Check for poor connection at power distribution center connectors C1 and C2. Repair as necessary. If circuit and connections are okay, go to TEST 3.

11) Replace air compressor head.

### TEST 3: HEIGHT SENSOR TEST

1) Disconnect ELC height sensor connector. Turn ignition on, with engine off. Check voltage between ground and ELC height sensor harness connector terminal "C". If battery voltage is present, go to step 3). If battery voltage is not present, go to next step.

2) Repair open in circuit (Orange wire) between power distribution and air compressor.

3) Check voltage between ELC height sensor terminals "A" and "C". If battery voltage is present, go to step 5). If battery voltage is not present, go to next step.

4) Repair open in circuit (Black wire) between air compressor and ground.

5) Check voltage between ELC height sensor harness connector terminals "A" and "D". If battery voltage is present, go to step 7). If battery voltage is not present, go to next step.

6) Repair open in circuit (Brown wire) between height sensor and power distribution center.

7) Check ELC height sensor harness connector contact. Repair as necessary. If terminal contact is okay, cycle ignition switch again and return to ON position. If air compressor operates for 3-5 seconds after a 35-55 second delay, go to step 9). If air compressor does not operate, go to next step.

8) Replace ELC height sensor.

9) Raise vehicle. Ensure rear wheels are supported as close as possible to trim height dimension. Disconnect link from ELC height sensor. Move height sensor arm upward. If air compressor operates after a 17-27 second delay, go to step 11). If not, go to next step.

10) Replace ELC height sensor.

11) Move height sensor arm down slightly until air compressor stops. If compressor stops, go to step 13). If compressor does not stop, go to next step.

12) Replace ELC height sensor.

13) Move height sensor arm downward. If air escapes from air compressor after a 17-27 delay (vehicle begins to lower), go step 15). If not, go to next step.

14) Replace ELC height sensor.

15) Adjust ELC height sensor. See ADJUSTMENTS.

### REMOVAL & INSTALLATION

**\* PLEASE READ THIS FIRST \***

**CAUTION:** When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problem may exist until computer systems have completed a relearn cycle. Before disconnecting battery, see COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION.

#### AIR DRIER

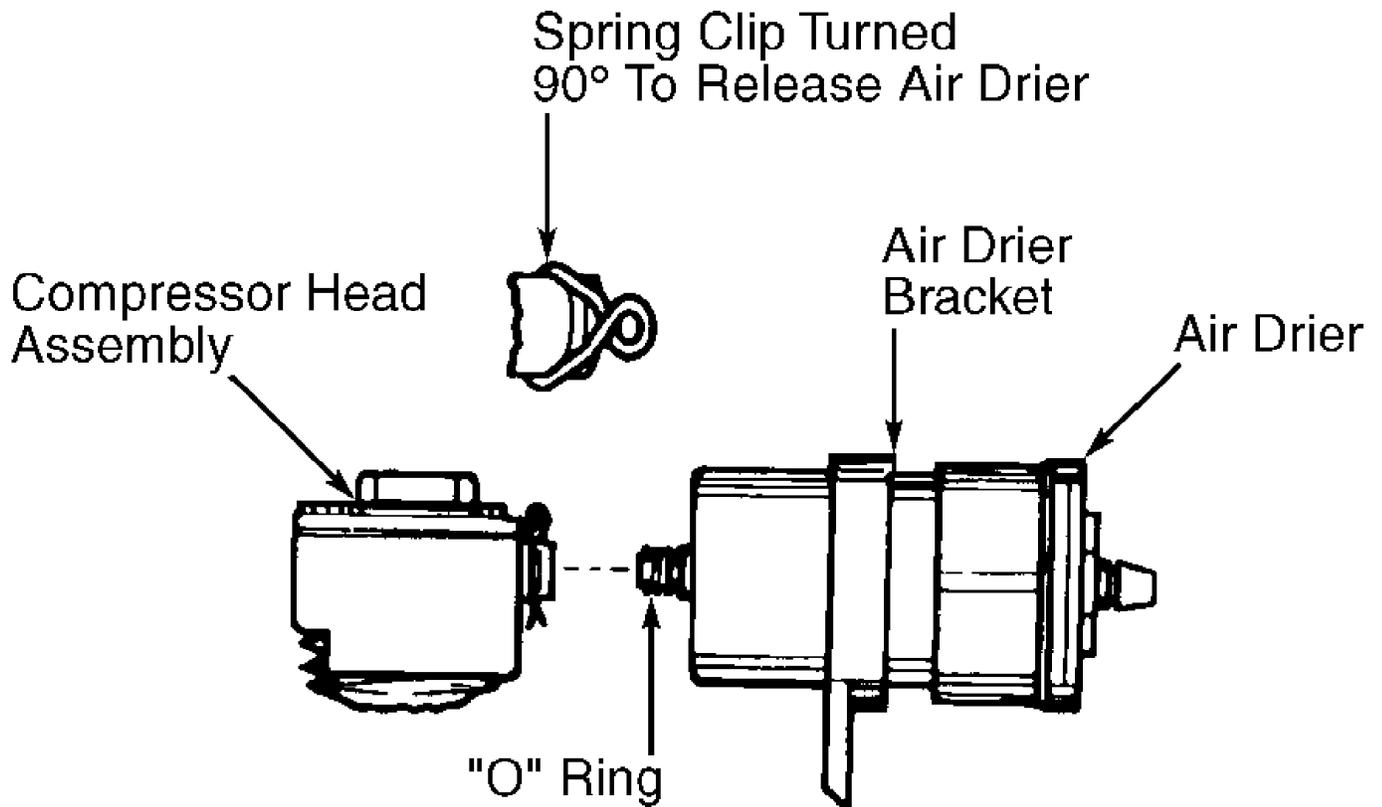
##### Removal

Disconnect high pressure line by turning spring clip 90 degrees and removing tube assembly. Disconnect air drier from compressor by turning spring clip and sliding drier and "O" ring from compressor head assembly. See Fig. 4.

##### Installation

Lubricate "O" ring, and install in port of compressor head. Install retainer spring to its original position. Install air drier on compressor head assembly. If difficulty arises when installing air

drier in compressor head assembly, rotate slightly while applying pressure. Install air line to drier. Check system for leaks.

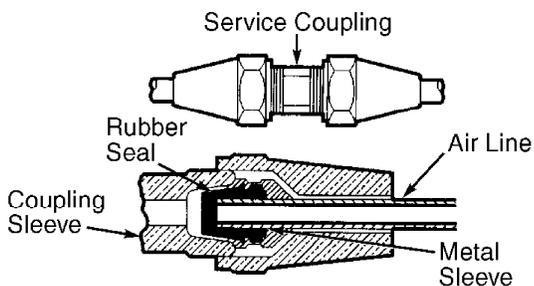


91J11329

Fig. 4: Exploded View Of Air Drier Assembly  
Courtesy of General Motors Corp.

### AIR LINE REPAIR

Repair air line by splicing in a coupling at leak area. Inflate system to 100 psi (7.0 kg/cm<sup>2</sup>). Use soap and water solution to locate leak. Deflate system through service valve, and cut out leaking area. Install coupling, and tighten line nuts to 72 INCH lbs. (8 N.m). See Fig. 5. Inflate system, and check for leaks using soap and water solution.



95D14566

Fig. 5: Assembling Air Line Repair Coupling  
Courtesy of General Motors Corp.

### COMPRESSOR

#### Removal

Disconnect negative battery cable. Disconnect compressor electrical connectors. Disconnect air lines as necessary. Remove compressor bracket mounting nuts or bolts. Remove compressor and bracket assembly from vehicle.

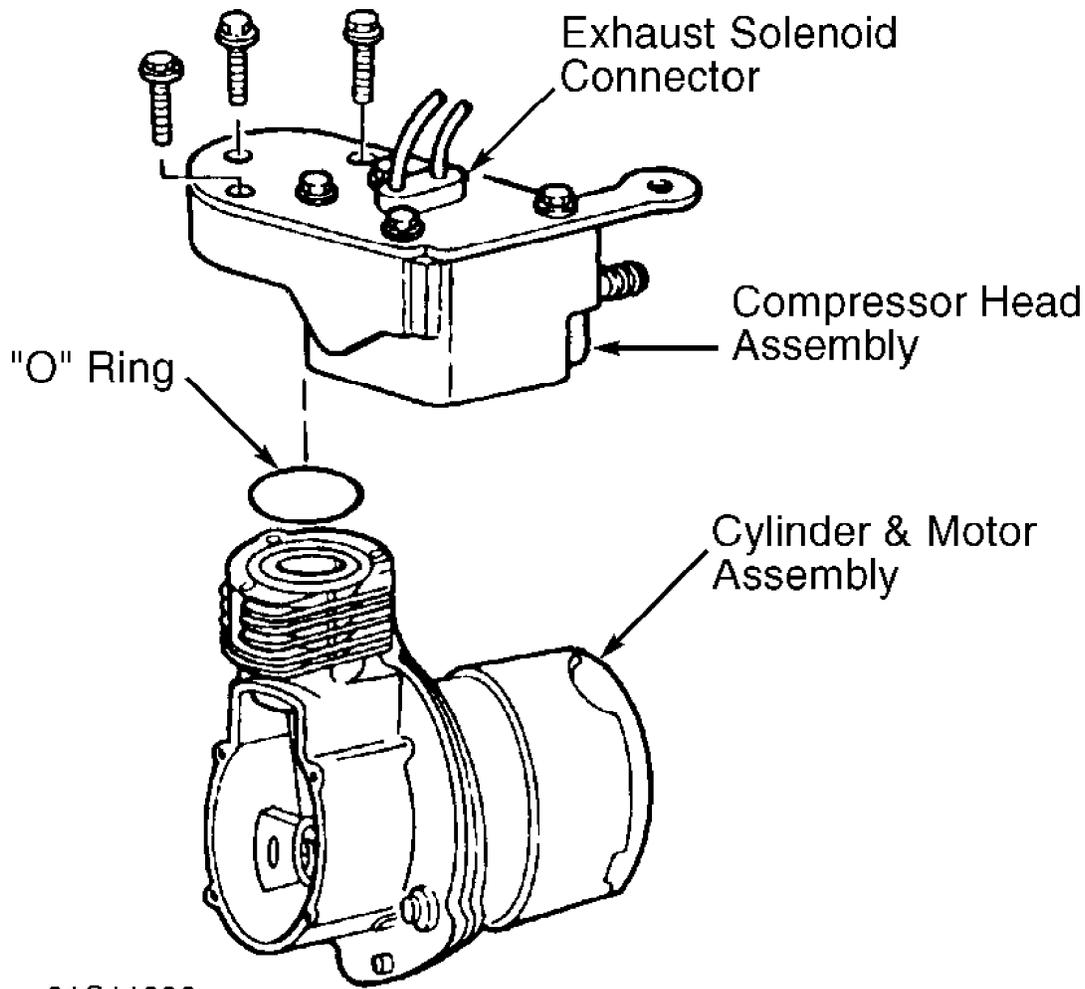
#### Installation

To install, reverse removal procedure. Tighten compressor bracket mounting nuts or bolts to specification. See TORQUE SPECIFICATIONS table. Turn ignition on and allow system to cycle. Check for leaks using soap and water solution.

### COMPRESSOR HEAD ASSEMBLY

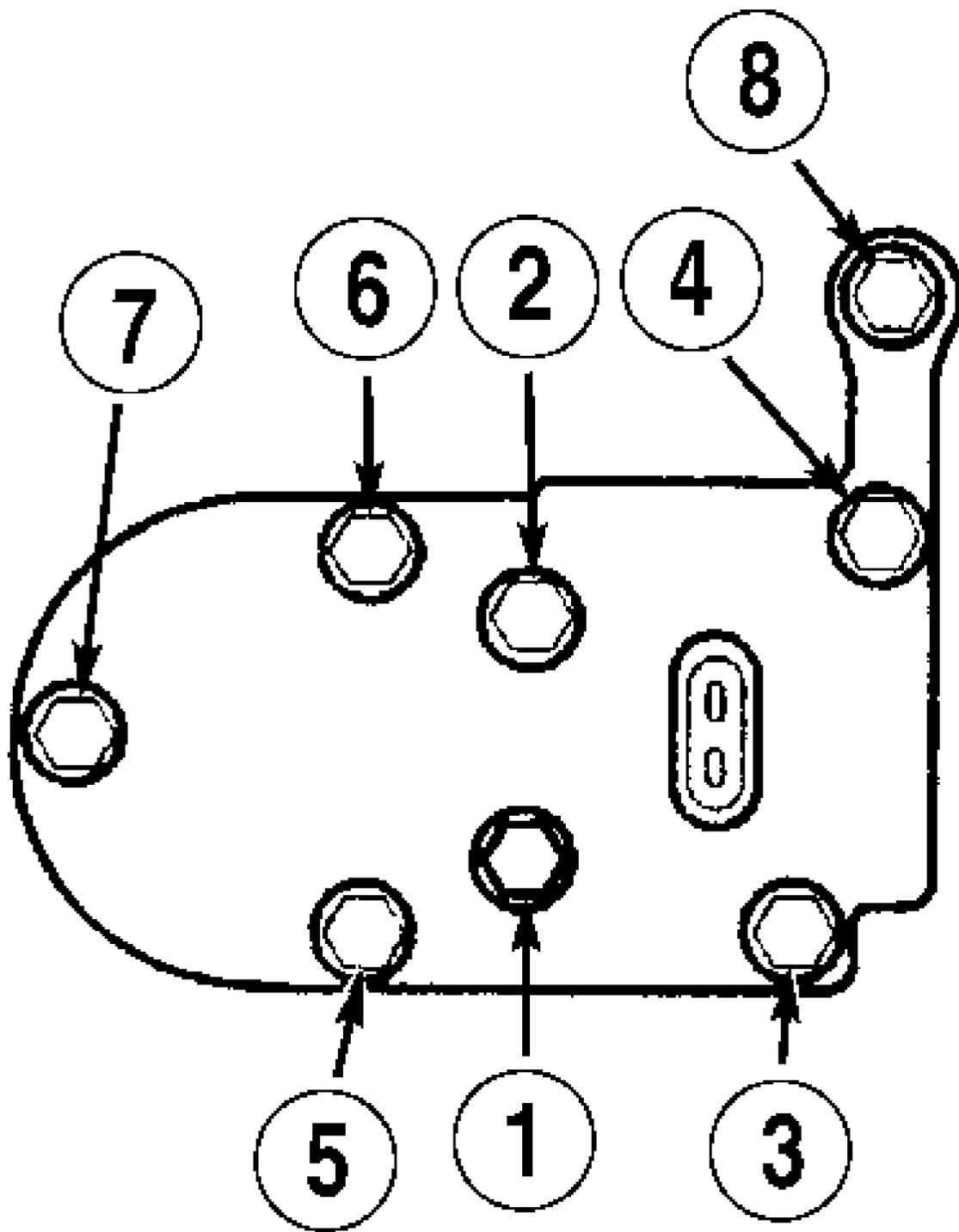
#### Removal & Installation

Remove air drier assembly. See AIR DRIER. Remove compressor head bolts. Remove compressor head assembly. See Fig. 6. To install, reverse removal procedure. Tighten compressor head bolts in sequence to specification. See Fig. 7. See TORQUE SPECIFICATIONS table.



91C11330

Fig. 6: Removing Compressor Head Assembly  
Courtesy of General Motors Corp.



**95E14567**

Fig. 7: Compressor Head Bolt Tightening Sequence  
Courtesy of General Motors Corp.

EXHAUST SOLENOID

Exhaust solenoid is replaced as an assembly with air compressor head. See COMPRESSOR HEAD ASSEMBLY.

## HEIGHT SENSOR

### Removal

Disconnect negative battery cable. Raise and support vehicle. Disconnect height sensor harness connector. Disconnect height sensor link from height sensor actuating arm. Remove height sensor screws and remove height sensor.

### Installation

To install, reverse removal procedure. Tighten height sensor screws to specification. See TORQUE SPECIFICATIONS table. Adjust height sensor. See HEIGHT SENSOR under ADJUSTMENTS.

## TORQUE SPECIFICATIONS

### TORQUE SPECIFICATIONS

---

| Application                                  | INCH Lbs. (N.m) |
|--|-----------------|
| Compressor Bracket Mounting Bolt             |                 |
| "G" Body .....                               | 62 (7)          |
| Compressor Bracket Mounting Nut              |                 |
| "C" & "H" Bodies .....                       | 89 (10)         |
| Compressor Head Bolt .....                   | (1) 53 (6)      |
| Compressor-To-Compressor Bracket Screw ..... | 26 (3)          |
| Height Sensor Link Nut                       |                 |
| "C" & "H" Bodies .....                       | 97 (11)         |
| "G" Body .....                               | 89 (10)         |
| Height Sensor Screw                          |                 |
| "C" & "H" Bodies .....                       | 22 (2.5)        |
| "G" Body .....                               | 22 (2.5)        |

(1) - Tighten in sequence. See Fig. 7.

---

## WIRING DIAGRAMS

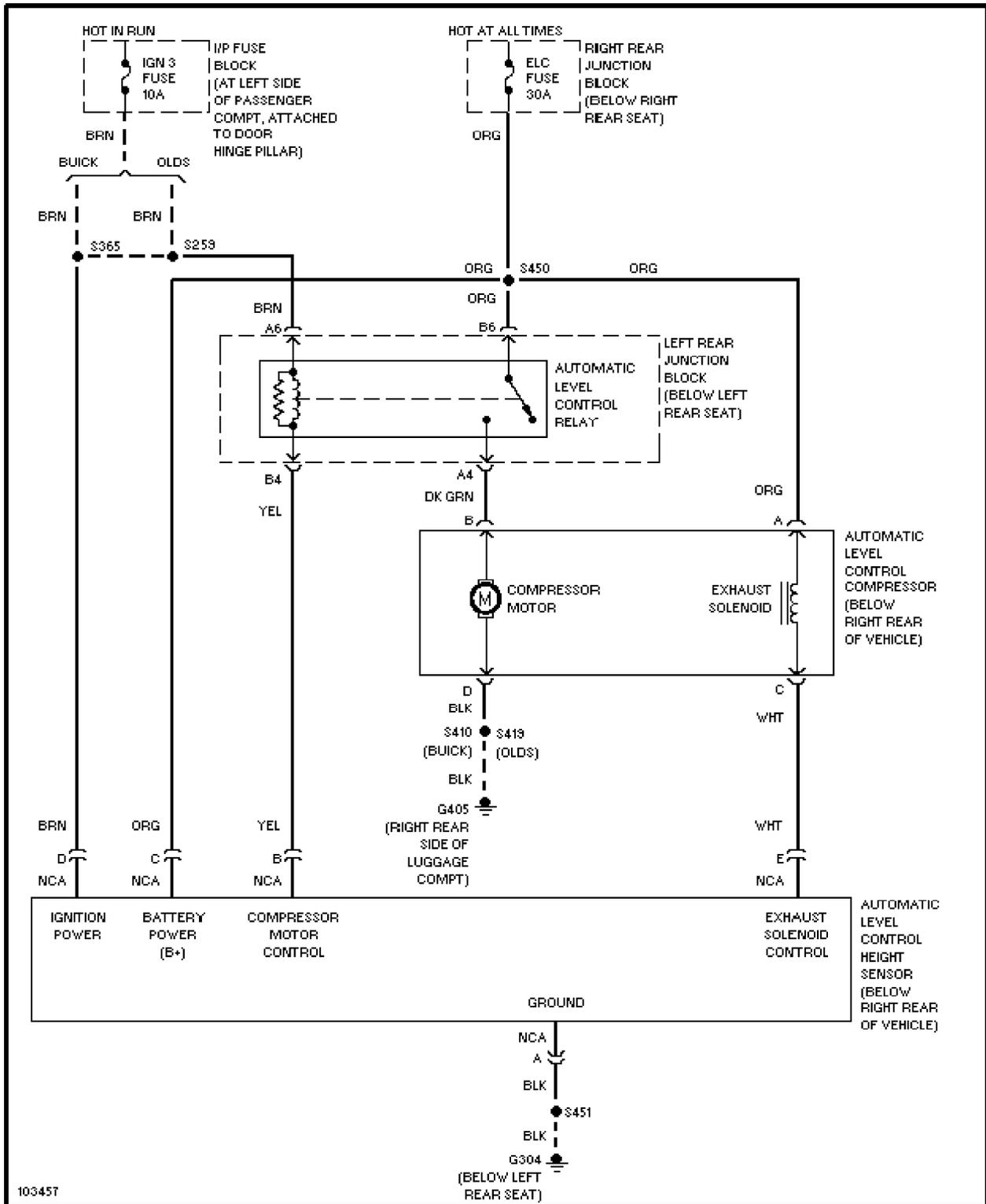


Fig. 8: Electronic Level Control (ELC) Wiring Diagram (Aurora & Riviera - 1998)

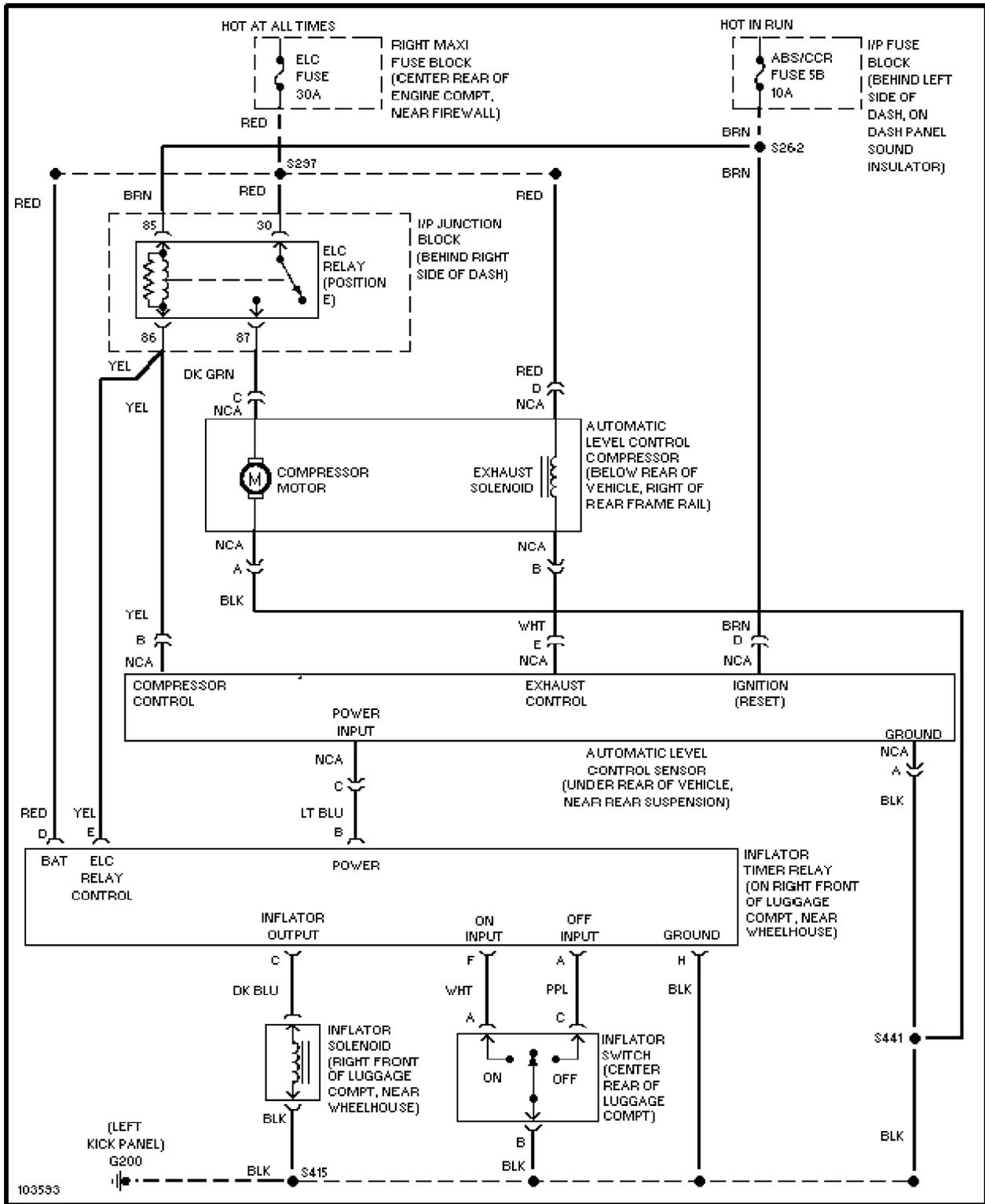


Fig. 9: Electronic Level Control (ELC) Wiring Diagram (Bonneville - 1998)

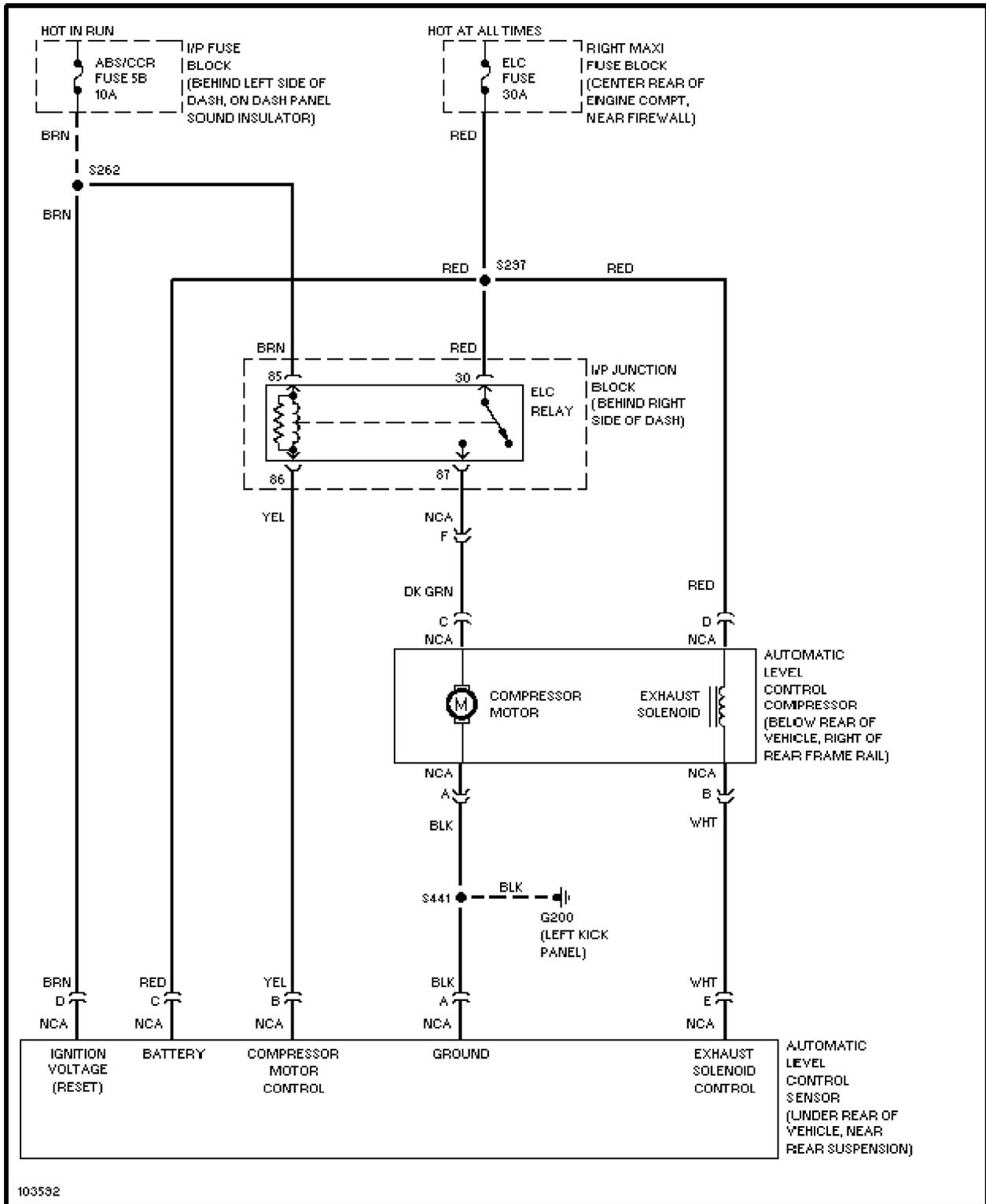


Fig. 10: Electronic Level Control (ELC) Wiring Diagram (Eighty Eight, LeSabre, LSS & Regency - 1998)

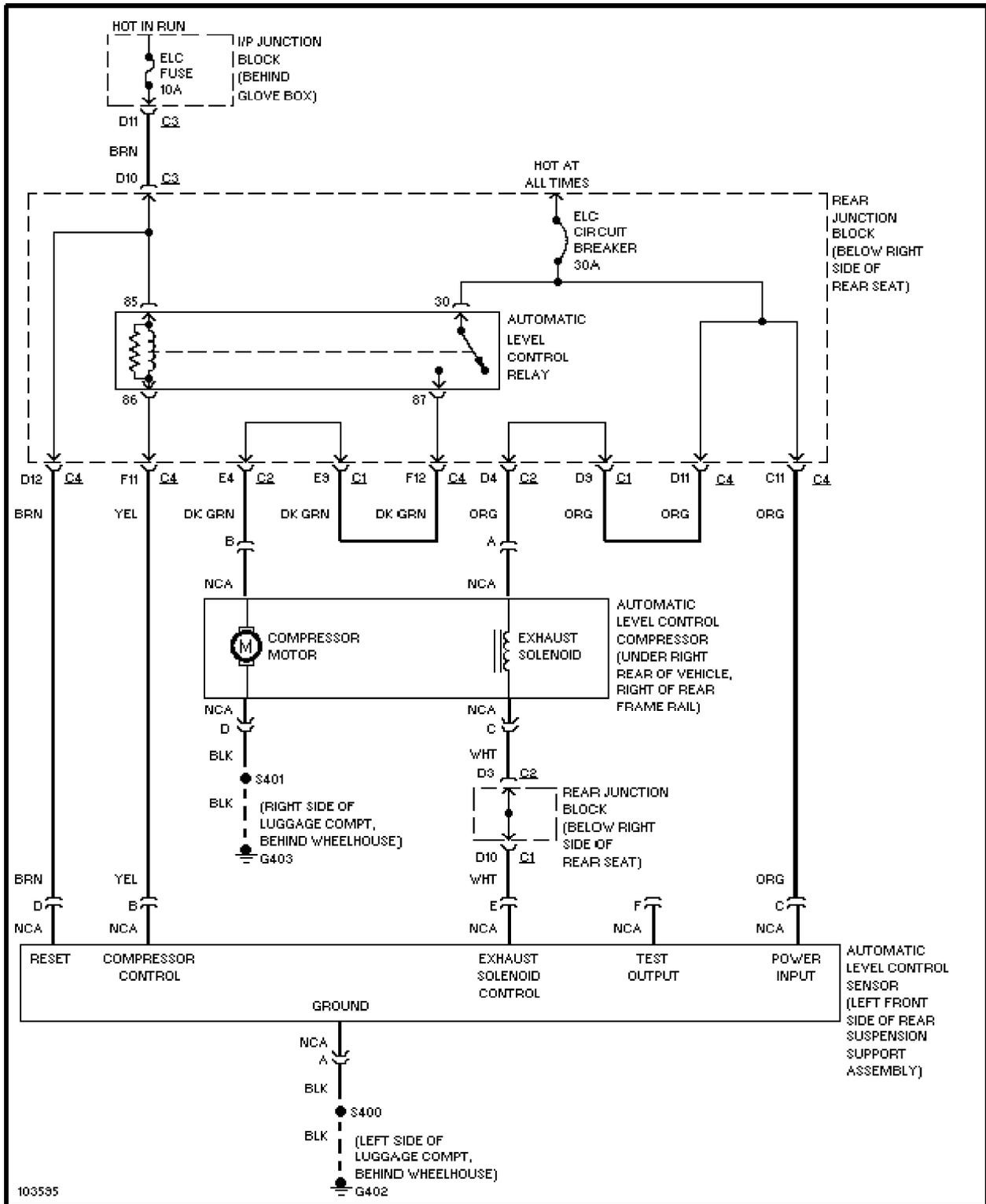


Fig. 11: Electronic Level Control (ELC) Wiring Diagram (Park Avenue - 1998)

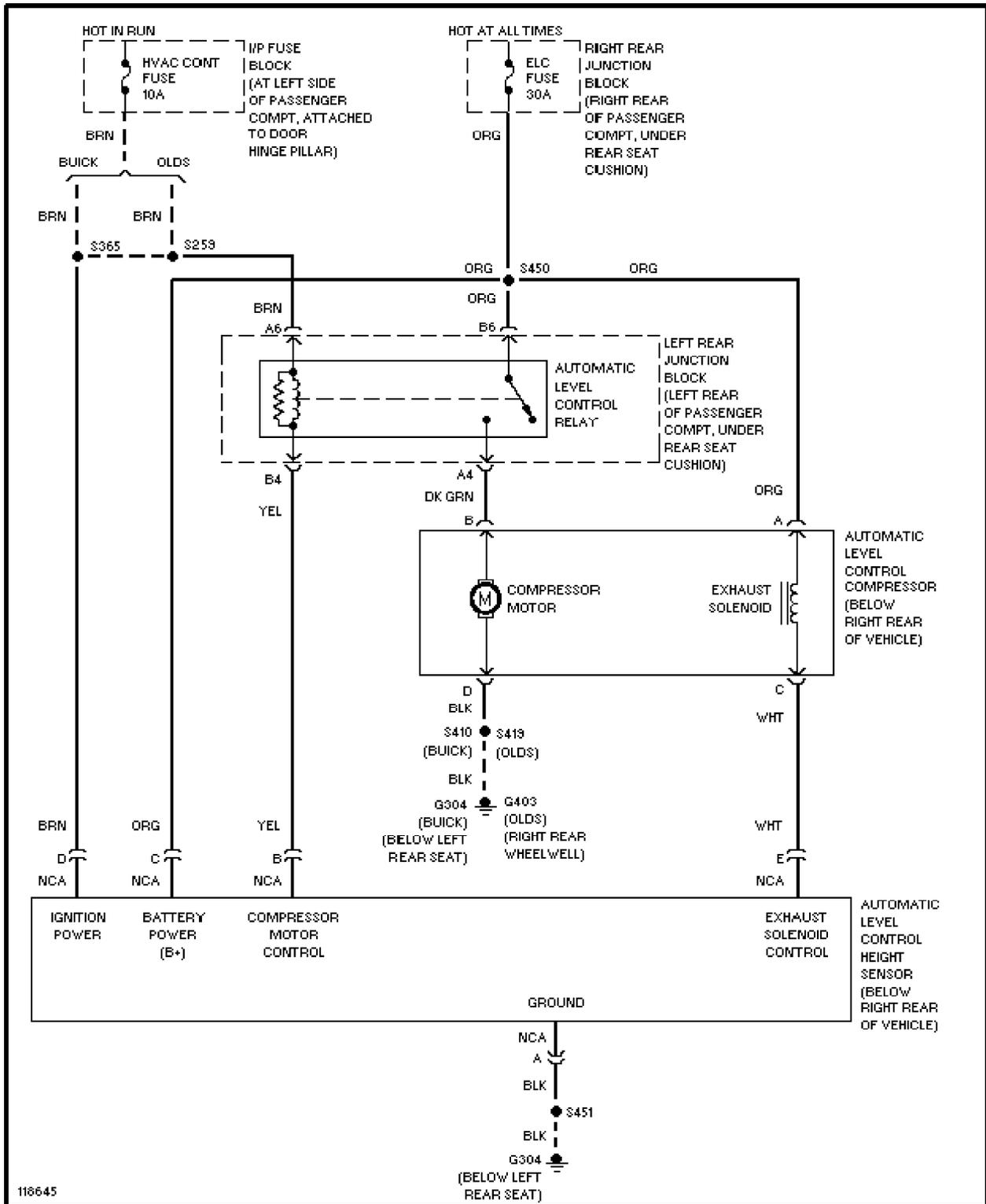


Fig. 12: Electronic Level Control (ELC) Wiring Diagram (Aurora & Riviera - 1999)

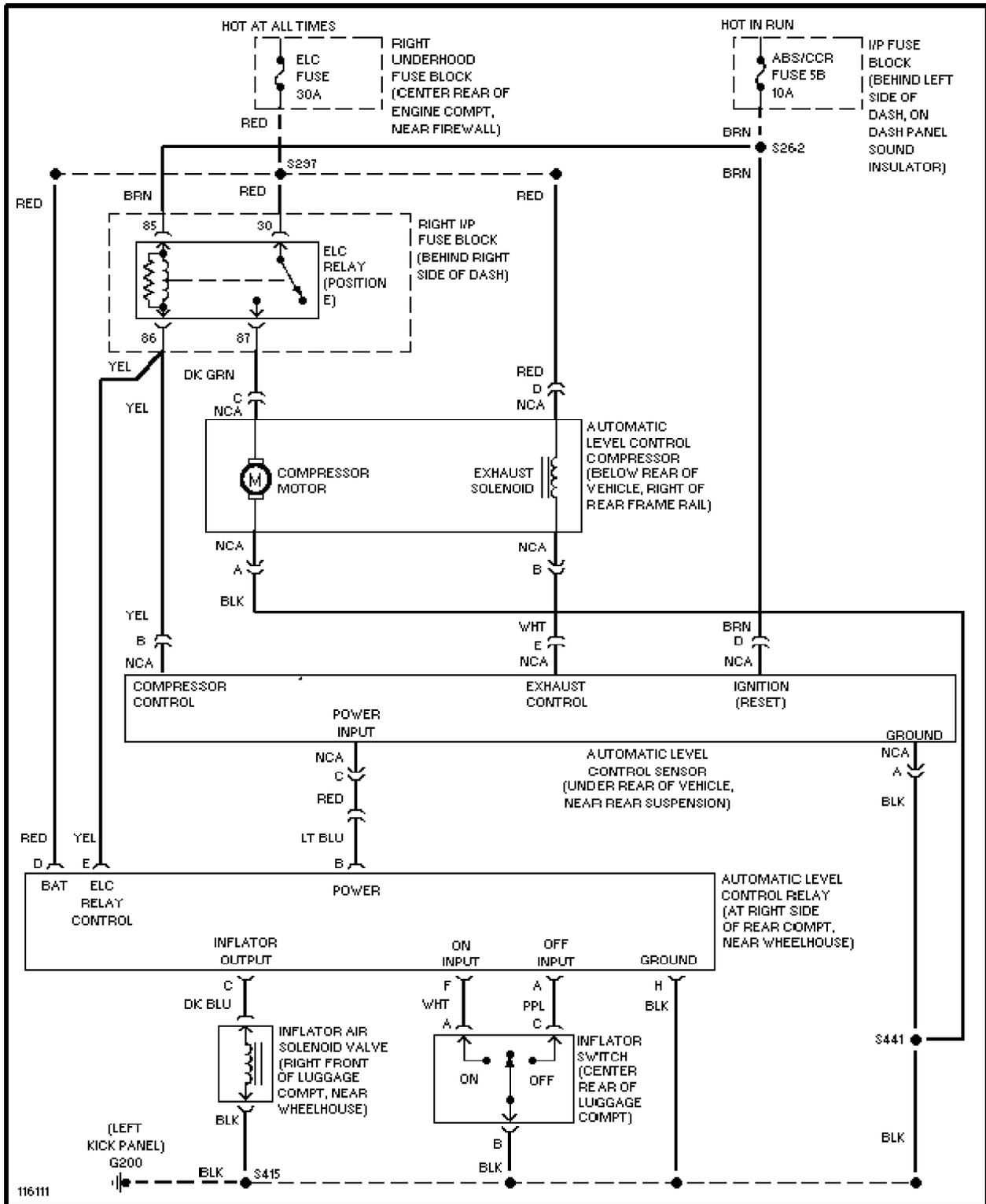
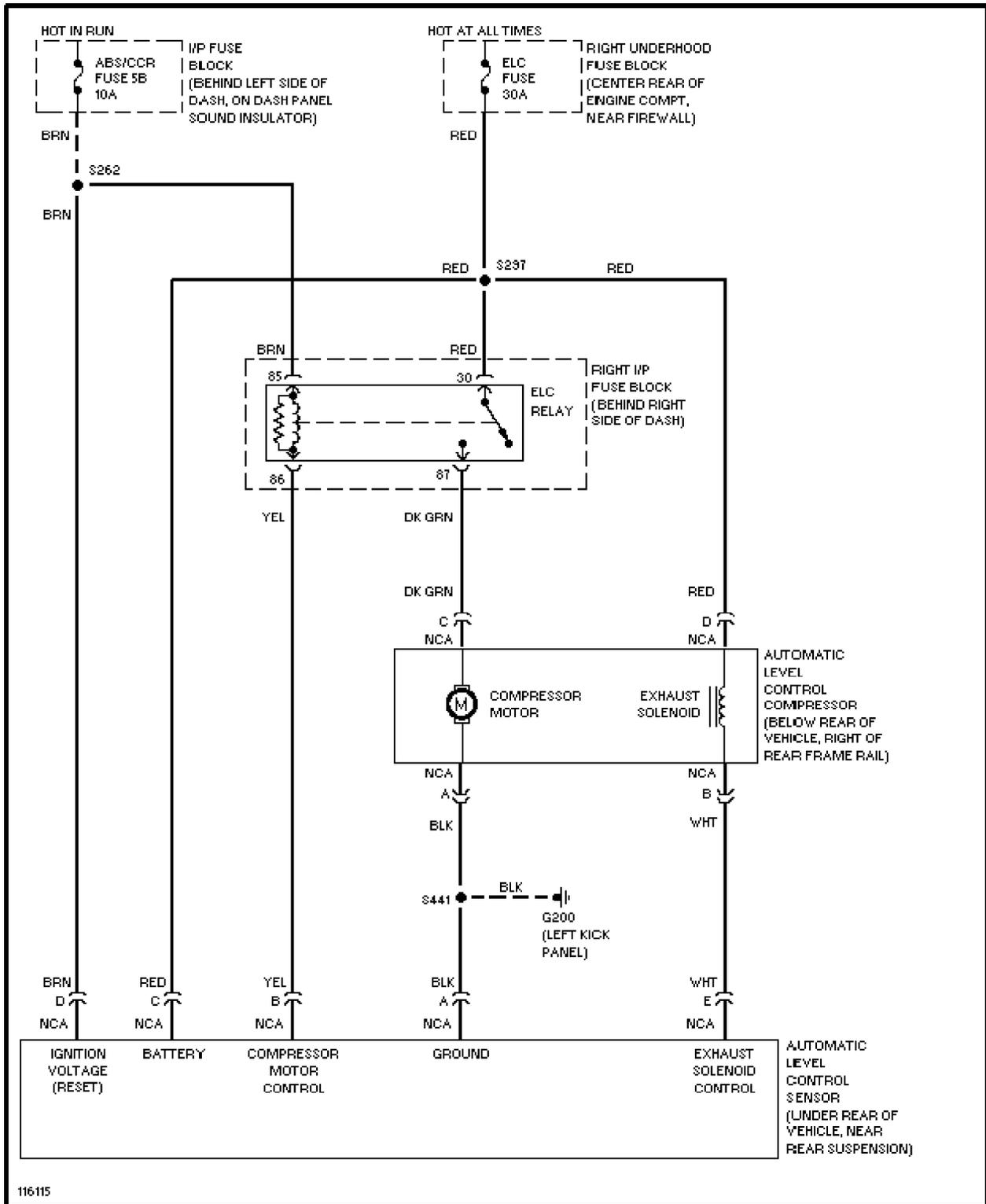


Fig. 13: Electronic Level Control (ELC) Wiring Diagram (Bonneville - 1999)



116115

Fig. 14: Electronic Level Control (ELC) Wiring Diagram (Eighty Eight, LeSabre & LSS - 1999)

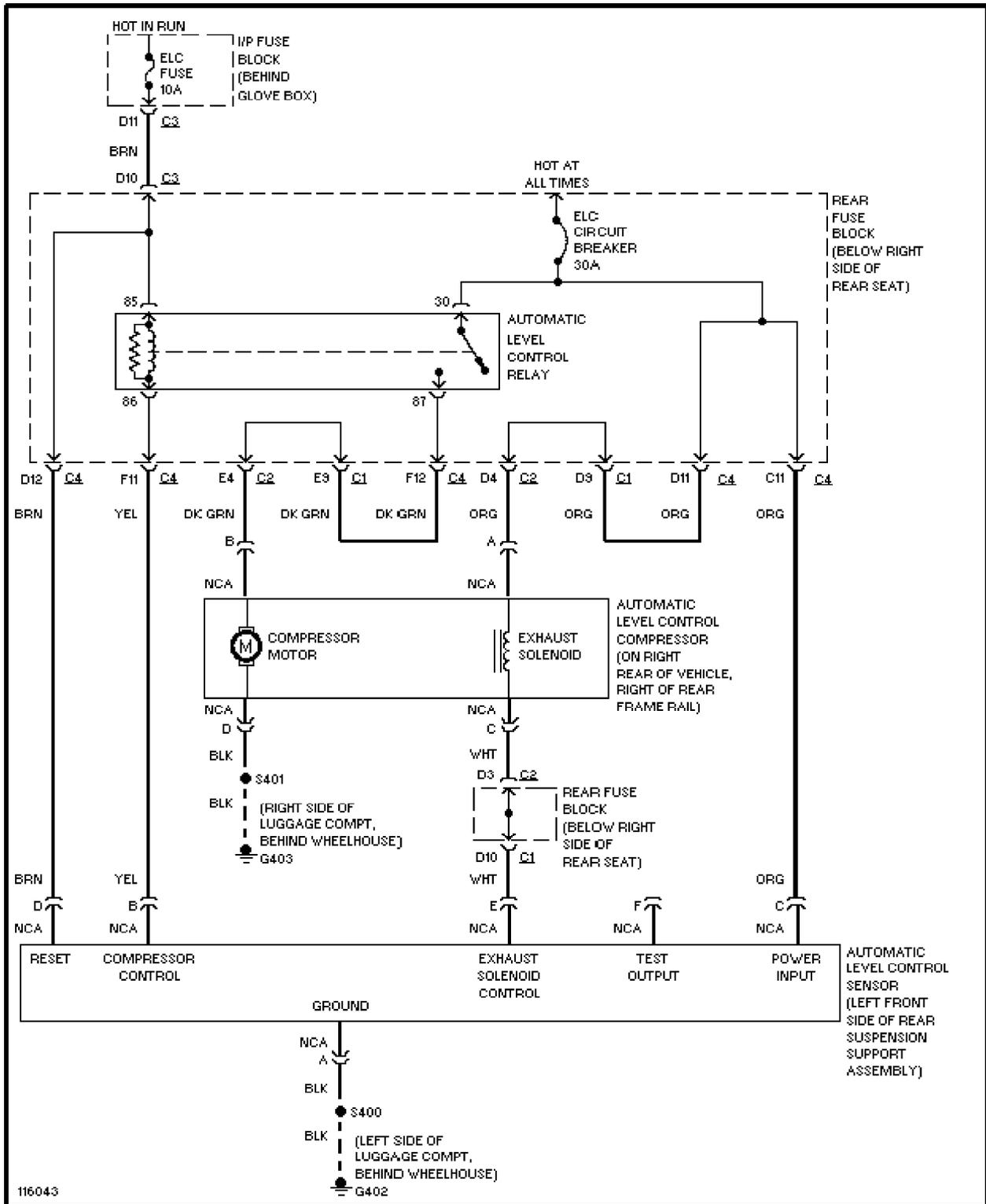


Fig. 15: Electronic Level Control (ELC) Wiring Diagram (Park Avenue - 1999)