

**2000-01 SUSPENSION****Electronic - Automatic Level Control - Catera****DESCRIPTION**

Automatic Level Control (ALC) system automatically raises or lowers rear of vehicle to correct riding height (curb height), compensating for load added to or removed from vehicle. System consists of an air compressor, exhaust solenoid valve, compressor relay, Automatic Level Control (ALC) level sensor, air adjustable rear shock absorbers, and connecting air lines. ALC air compressor is controlled by ALC level sensor. A LEVELING warning indicator is located on instrument cluster.

**OPERATION****SYSTEM OPERATION**

Vehicle's rear vertical height is measured by ALC level sensor. ALC level sensor compares actual height with desired height programmed into sensor memory. Exhaust solenoid valve is energized if vehicle height is higher than desired. Compressor relay is energized and activates air compressor if vehicle is lower than desired.

LEVELING warning indicator illuminates for 4 seconds when ignition is turned on as a bulb check. LEVELING warning indicator illuminates when an extreme load condition exists, indicating a possible rear suspension clearance problem. Indicator will go out when leveling is complete. Indicator does not illuminate during normal leveling operation.

To ensure system is operating with at least minimum air pressure, an Air Replenishment Cycle (ARC) is commanded each time ignition is turned on. When ARC is commanded, ALC level sensor position is checked. An internal timer circuit in sensor is activated if sensor indicates the need to raise or lower vehicle. After a 35-40 second delay, compressor is activated for 4 seconds, ensuring adequate residual air pressure in shock absorbers. If weight is added to or removed from vehicle during delay, ARC will be overridden by normal leveling operation.

To reduce current draw during air compressor activation, an air compressor head relief sequence is performed before air compressor operation. Head relief sequence reduces air pressure in air compressor cylinder during start-up. Sequence involves the exhaust solenoid valve being energized 1.5 seconds before the air compressor activates.

**COMPONENT OPERATION****Air Adjustable Shock Absorbers**

Air adjustable shock absorber is a conventional shock absorber enclosed in an air chamber, which extends when air pressure is increased in chamber. When air pressure is reduced, weight of vehicle collapses shock absorber. A minimum residual air pressure of 8 psi (.56 kg/cm<sup>2</sup>) must be maintained at all times for proper operation.

**Air Compressor**

Air compressor, located in right front corner of engine compartment, provides air pressure for system operation. Air compressor head contains intake and exhaust valves, and an exhaust solenoid valve that releases air from ALC system when energized.

**Compressor Relay**

Compressor relay is located under instrument panel, to right of steering column, on relay block. When compressor relay is energized, voltage is supplied to air compressor.

**Exhaust Solenoid Valve**

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

#### **ALC Level Sensor**

ALC level sensor is mounted on right side of rear differential. Sensor actuator arm is linked to right rear lower control arm. ALC level sensor controls air compressor, exhaust solenoid valve, LEVELING warning indicator and serial communication. Sensor circuitry provides a 25 second delay to prevent false actuation of air compressor and exhaust solenoid valve during normal ride motions. Sensor limits air compressor and exhaust solenoid valve operation to 2.5 minutes to prevent continuous compressor operation in the event of a system leak or solenoid valve fault.

#### **Vehicle Speed Input**

ALC system utilizes vehicle speed input from Electronic Brake Traction Control Module/Brake Pressure Modulator Valve (EBTCM/BPMV) assembly to alter vehicle leveling response time. When vehicle is stationary, response time of intake and exhaust control is 3 seconds. When vehicle is moving faster than 62 MPH, response time of intake and exhaust control is 25 seconds.

#### **SELF-DIAGNOSTICS**

**NOTE: To diagnose ALC system, manufacturer recommends using Tech 1 scan tool and DVOM.**

The ALC system has self-diagnostic capability, which can detect system failures. Diagnostic trouble codes stored by ALC level sensor can be displayed using scan tool. See **RETRIEVING DIAGNOSTIC TROUBLE CODES** under DIAGNOSIS & TESTING. Begin ALC system diagnosis with **PRE-DIAGNOSTIC INSPECTION** procedure UNDER DIAGNOSIS & TESTING.

#### **TROUBLE SHOOTING**

If ALC system is not functioning properly and no codes are set, check the following:

- Check ALC level sensor electrical power supply and ground connections for poor connection.
- Check ALC actuator arm for disconnected or damaged link.
- Check ALC actuator arm for damage.
- If ride is rough, perform ALC system check. See **ALC DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING.

#### **DIAGNOSIS & TESTING**

##### **PRE-TEST INSPECTION**

If ALC system is not properly functioning, check ALC actuator arm for disconnected or damaged link, and perform ALC system check. See **ALC DIAGNOSTIC SYSTEM CHECK** . ALC system remains operational for a maximum of 5 minutes after ignition is turned off. This time allows for exhaust function after a load is removed from vehicle.

##### **PRE-DIAGNOSTIC INSPECTION**

When checking for potential ALC system faults, check the following before performing diagnostic trouble code testing:

1. Check ALC fuse and CLAMP 15 CRUISE fuse in instrument panel fuse block.

2. Check all ALC system wiring harness connectors for proper engagement, loose wires or terminals and/or corrosion.
3. Check ALC system ground circuit for clean tight connections. Ground is located in left front of engine compartment, in body and instrument panel wiring harness.
4. Always perform ALC system check before diagnosing DTCs. See **ALC DIAGNOSTIC SYSTEM CHECK** .

#### ALC DIAGNOSTIC SYSTEM CHECK

1. Install scan tool. If scan tool communicates with Automatic Level Control (ALC) sensor, go to next step. If scan tool does not communicate with ALC sensor, go to SCAN TOOL DOES NOT POWER UP in DATA LINK COMMUNICATIONS article.
2. Turn ignition on with engine off. Establish communication with ALC sensor. If scan tool communicates, go to next step. If scan tool does not communicate with ALC sensor, go to SCAN TOOL DOES NOT COMMUNICATE WITH ALC SENSOR in DATA LINK COMMUNICATIONS article.
3. Select leveling sensor DTCs function on scan tool. If scan tool displays any DTCs, go to **DIAGNOSTIC TROUBLE CODE DEFINITIONS** table. If DTCs are not displayed, select symptom diagnostic procedure in order to diagnose system. See **ALC SYMPTOM DIAGNOSIS** .

#### ALC HEIGHT SENSOR OPERATIONAL CHECK

1. Turn ignition switch to LOCK position, and then to RUN position to reset ALC level sensor internal timer circuit. Raise and support vehicle. Ensure rear of vehicle is supported at normal trim height. Disconnect link from actuator arm. Ensure ALC level sensor wiring harness connectors are secure.
2. Move ALC actuator arm up. Air compressor should activate and rear shock absorbers should begin to inflate. If compressor does not activate, perform ALC system check. See **ALC CONTROL SYSTEM OPERATIONAL CHECK** . Move ALC actuator arm down until compressor turns off. Move ALC actuator arm down past position where compressor turned off. Rear shock absorbers should deflate.
3. If shock absorbers do not deflate, check for Diagnostic Trouble Codes (DTCs). See **RETRIEVING DIAGNOSTIC TROUBLE CODES** . If no DTCs are set, replace exhaust solenoid valve. See **AIR COMPRESSOR HEAD** under REMOVAL & INSTALLATION. Reconnect link to actuator arm and lower vehicle.

#### ALC CONTROL SYSTEM OPERATIONAL CHECK

Before performing check, ensure all electrical connections are properly connected and terminals are not damaged. Ensure ALC sensor link is properly connected to actuator arm. Ensure actuator arm is not damaged.

1. If air compressor assembly and air lines have been replaced, go to step 7 . If air compressor assembly and air lines have not been replaced, go to next step.
2. Raise and support vehicle. Check air lines from air compressor to rear shock absorbers. Check air line connection at air drier. If air lines are damaged or disconnected, go to step 13 . If air lines and connection are okay, go to next step.
3. Squeeze middle of left rear shock absorber at air sleeve. If sleeve can be slightly compressed, go to step 5 . If sleeve cannot be compressed, go to next step.
4. Operate air compressor for 60 seconds. Using a soap and water solution, check air line connection for leaks at air drier. If leaks are present, go to step 20 . If leaks are not present, go to next step.
5. Disconnect air line from air drier. Connect pressure gauge to air drier. Close pressure gauge toggle valve. Operate air compressor. If pressure builds to 80 psi (5.6 kg/cm<sup>2</sup>), go to next step. If pressure does not build to 80 psi (5.6 kg/cm<sup>2</sup>), go to step 10 .

## 2001 Cadillac Catera

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

6. When pressure builds to 80 psi (5.6 kg/cm<sup>2</sup>), turn air compressor off. Monitor pressure gauge for one minute. If pressure leaks down, go to step 10 . If pressure does not leak down, go to next step.
7. Connect pressure gauge to right rear shock absorber. Pressure gauge toggle valve should be positioned on side away from shock absorber. Close pressure gauge toggle valve. Apply shop air into pressure gauge schrader valve until pressure gauge indicates 80 psi (5.6 kg/cm<sup>2</sup> ). Monitor pressure gauge for one minute. If pressure leaks down, go to step 11 . If pressure does not leak down, go to next step.
8. Slowly open pressure gauge toggle valve to release air pressure. Disconnect pressure gauge from right rear shock absorber. Connect pressure gauge to left rear shock absorber. Pressure gauge toggle valve should be positioned on side away from shock absorber. Close pressure gauge toggle valve. Apply shop air into pressure gauge schrader valve until pressure gauge indicates 80 psi (5.6 kg/cm<sup>2</sup> ). Monitor pressure gauge for one minute. If pressure leaks down, go to step 12 . If pressure does not leak down, go to next step.
9. Slowly open pressure gauge toggle valve to release air pressure. Disconnect pressure gauge from left rear shock absorber. Connect pressure gauge to left and right rear air line connections. Reconnect air line to air drier. Open pressure gauge toggle valve. Apply shop air to pressure gauge schrader valve until pressure gauge indicates 80 psi (5.6 kg/cm<sup>2</sup> ). Monitor pressure gauge for one minute. If pressure leaks down, go to step 14 . If pressure does not leak down, go to step 20 .
10. Replace air compressor assembly. Replace air lines. After repairs, go to step 20 .
11. Slowly open pressure gauge toggle valve to release air pressure. Replace right rear shock absorber. Reconnect all air lines. After repairs, go to step 20 .
12. Slowly open pressure gauge toggle valve to release air pressure. Replace left rear shock absorber. Reconnect all air lines. After repairs, go to step 20 .
13. If any air lines are damaged, go to next step. If air lines are okay, go to step 18 .
14. Replace air line from air drier to rear shock absorbers. After repairs, go to next step.
15. Remove air drier from air compressor assembly. With head-connection end down, shake air drier. If water/moisture comes out of air drier when shaken, go to next step. If water/moisture does not come out of air drier when shaken, go to step 17 .
16. Replace air drier. After repairs, go to next step.
17. Replace air compressor head. After repairs, go to next step.
18. Install air compressor assembly onto vehicle. Reconnect all air lines. After repairs, go to next step.
19. Repair air tube-to-air drier connection leak. Go to next step.
20. Reconnect all connectors and components previously removed. Clear all codes with ignition on and with engine off. Wait for 5 minutes. If rear of vehicle is at correct trim height, system is okay.

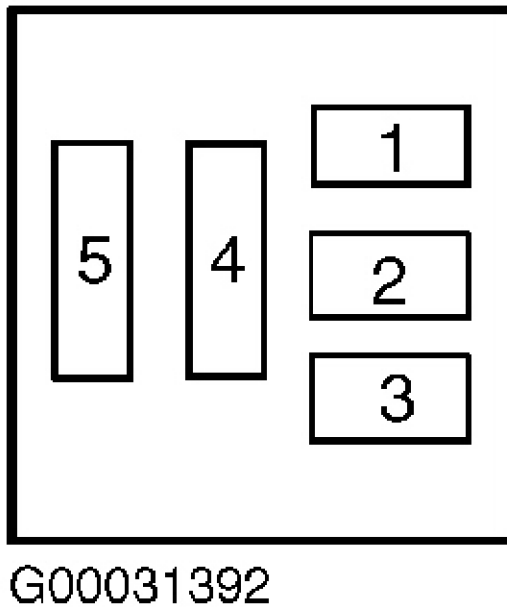
### ALC SYMPTOM DIAGNOSIS

Ensure there are no DTCs present and that the scan tool can communicate with the ALC module. Check for aftermarket devices that could affect ALC operation. Check system components for obvious damage. Check for poor electrical connections or wiring problems. If compressor motor is inoperative, go to **ALC COMPRESSOR MOTOR INOPERATIVE** . If control system is suspected, go to **ALC CONTROL SYSTEM OPERATIONAL CHECK** . If height sensor is suspected, go to **ALC HEIGHT SENSOR OPERATIONAL CHECK** . If LEVELING indicator is always on, flashes, or is never on, go to **ALC DIAGNOSTIC SYSTEM CHECK** .

### ALC COMPRESSOR MOTOR INOPERATIVE

1. Perform automatic level control (ALC) diagnostic system check. See **ALC DIAGNOSTIC SYSTEM CHECK** . Go to next step.
2. Remove ALC air compressor relay K19 from relay box. Relay box is located under instrument panel at right of steering column. Check for voltage between relay box connector terminal No. 5 (Red wire) and ground.

See **Fig. 1** . If voltage is about 12 volts, go to step 4 . If voltage is not about 12 volts, go to next step.



**Fig. 1: Identifying Air Compressor Relay Connector Terminals**  
Courtesy of GENERAL MOTORS CORP.

3. Repair open or high resistance in relay box connector terminal No. 5 (Red wire). Go to step 10 .
4. Connect fused jumper wire between ALC relay connector terminal No. 5 (Red wire) and battery feed circuit of air compressor (Brown wire). If air compressor activates, go to step [7](#) . If air compressor does not activate, go to next step.
5. Leave fused jumper wire connected. Disconnect air compressor connector. Check for voltage between air compressor harness connector Brown wire terminal and ground. If voltage is 12 volts, go to step 8 . If voltage is not 12 volts, go to next step.
6. Repair open or high resistance in Brown wire of air compressor. Go to step 10 .
7. Replace ALC air compressor relay. Go to step 10 .
8. Check air compressor ground circuit (Black wire) for open. If open is present, repair open and go to step 10 . If open is not present, go to next step.
9. Replace air compressor. See **AIR COMPRESSOR** under REMOVAL & INSTALLATION. Go to next step.
10. Operate system to verify repair. If condition is corrected, system is okay. If condition is not corrected, go to step 2 .

#### RETRIEVING DIAGNOSTIC TROUBLE CODES

Connect Tech 1 scan tool into Data Link Connector (DLC) located under left side of instrument panel. Follow scan tool manufacturer's instructions to retrieve stored fault codes.

If multiple codes are displayed, begin diagnosis with code that is displayed first. See **DIAGNOSTIC TROUBLE CODE DEFINITIONS** table. Diagnose all codes in the order displayed by Tech 1 scan tool.

## 2001 Cadillac Catera

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

Using Tech 1 function keys, select model year. After selecting model year, enter type of vehicle being tested. Pressing EXIT will return Tech 1 to previous screen.

### Selecting Test Mode

Five test modes are available for diagnosing ALC system. Test modes are:

- Mode F0 (Data List) - Mode continuously monitors ALC system inputs and outputs. Data list can not be read if any DTCs are set.
- Mode F1 (DTC History) - Mode displays diagnostic trouble code history data. Fault occurrence information is stored for first 5 trouble codes stored and very last trouble code stored. Fault occurrence information stored consists of trouble code number, number of failure occurrences and number of ignition cycles since fault first and last occurred.
- Mode F2 (Diagnostic Trouble Codes) - Mode displays ALC system diagnostic trouble codes. Both ignition cycle and history may be displayed or cleared.
- Mode F3 (Snapshot) - Mode will help isolate intermittent problems by capturing data before and after fault condition. Snapshots cannot be read until all stored DTCs are cleared.

If MANUAL TRIGGER is selected, Tech 1 will wait for ENTER to be pressed before storing data. Tech 1 stores data from 8 seconds before trigger and 8 seconds after trigger is activated. All stored information can be displayed and examined for conditions which might indicate a problem, but may not set a code.

If AUTOMATIC TRIGGER is selected, Tech 1 will capture data which deviates from normal conditions but may not set a DTC, such as driving over bumpy roads or railroad tracks. Condition may be caused by loose connections or intermittent wiring problems causing signal to drop out momentarily. While Tech 1 is waiting for a trigger, ENTER or F9 key may be used to force a trigger.

- Mode F4 (Misc. Test) - In this mode, Tech 1 performs various ALC system functional tests to help isolate problems during trouble shooting.

### DIAGNOSTIC TROUBLE CODE DEFINITIONS

DTC	Definition
<u>01</u>	Sensor General Malfunction
<u>02</u>	Battery Voltage Out Of Range
<u>03</u>	Battery Voltage Out Of Range
<u>04</u>	Compressor Relay Short To Ground/Open Circuit
<u>05</u>	Compressor Relay Short To Battery
<u>06</u>	Exhaust Valve Short To Ground/Open Circuit
<u>07</u>	Exhaust Valve Short To Battery
<u>08</u>	LEVELING Indicator Short To Ground/Open Circuit
<u>09</u>	LEVELING Indicator Short To Battery
<u>10</u>	Intake Accumulator Malfunction
<u>11</u>	Exhaust Accumulator Malfunction
<u>12</u>	Consecutive Intake Malfunction

### CLEARING DIAGNOSTIC TROUBLE CODES

**NOTE:** Use scan tool to clear DTCs. DTCs cannot be cleared by disconnecting ALC level sensor or negative battery cable, or by turning ignition off. DTCs will be erased automatically when ignition is cycled 100 times (through normal use) without fault reappearing. Ignition cycle counter in ALC level sensor will then be reset to zero.

1. Connect Tech 1 scan tool. See **RETRIEVING DIAGNOSTIC TROUBLE CODES** . Before clearing DTCs, check and note current DTC data. Select ALC system function. Select DTC function and then CLEAR CODES function.
2. Verify DTCs are cleared. If other DTCs are displayed, either DTCs were not cleared or ALC system fault still exists. Diagnose fault and repeat procedure.

### INTERMITTENTS & POOR CONNECTIONS

Failures in ALC system may be difficult to diagnose accurately. If an ALC system failure or fault occurs, LEVELING warning indicator will illuminate. If fault is an intermittent problem which has corrected itself (LEVELING warning indicator off), DTC will be stored.

ALC system self-diagnostic system can be used to help identify suspect circuit. Perform following procedure:

- Display and record DTC history data. Record any descriptive driving circumstances during failure occurrence. Clear any ALC system DTCs set in ALC level sensor.
- Test drive vehicle. Attempt to repeat failure under condition in which failure occurred. Use Tech 1 scan tool, mode F3 (snapshot), while test driving vehicle. See **RETRIEVING DIAGNOSTIC TROUBLE CODES** .
- After duplicating condition, stop vehicle and display any ALC system DTCs which may have been stored.
- If no trouble codes were stored, continue to check for intermittent problems.

Most intermittent problems are caused by faulty electrical connectors or wiring. When an intermittent failure is encountered, check suspect circuits for:

- Poor mating of connector halves, or terminals not fully seated in connector body (backed out).
- Improperly formed or damaged terminals. All connector terminals in a problem circuit should be carefully reformed to increase contact tension.
- Check for dirt or corrosion on terminals, which could impede proper terminal contact.
- Poor terminal-to-wire connection. This requires removing terminal from connector body to inspect.

### DIAGNOSTIC TESTS

**NOTE:** To identify terminals and circuits referenced in testing, see **WIRING DIAGRAMS** . After completing each repair, recheck system operation to verify problem has been repaired. See **ALC DIAGNOSTIC SYSTEM CHECK** under **DIAGNOSIS & TESTING**. To diagnose intermittent problems, see **INTERMITTENTS & POOR CONNECTIONS** under **DIAGNOSIS & TESTING**.

#### DTC 01: SENSOR GENERAL MALFUNCTION

1. DTC 01 sets when ALC level sensor detects an internal hardware or software error. Errors include:
  - Position data out of range.
  - History code block error.
  - Trim-set block error.
  - Calibration block error.
  - A/D conversion error.
  - Ram integrity error.
  - Read/write to EEPROM error.
2. LEVELING warning indicator will flash when DTC 01 is set. ALC system may be disabled or degraded depending on which error caused DTC to set. POSITION DATA OUT OF RANGE and A/D

CONVERSION ERROR are checked continuously and can be recovered during same ignition cycle. All other errors are checked during start up self test at each ignition cycle. DTC will clear when error is no longer detected and cause of error has been repaired.

3. Cycle ignition. Using scan tool, check for DTC 01. If DTC 01 is still set, replace ALC level sensor.

#### **DTC 02: BATTERY VOLTAGE OUT OF RANGE**

1. DTC 02 sets when vehicle battery voltage momentarily increases to more than 16 volts. To prevent false detection of malfunction conditions due to engine crank or unusual system voltage conditions, the detection of leveling output and position out of range errors are disabled.
2. DTC 02 will clear when battery voltage returns to nominal range, or by using scan tool. Check battery system for proper operation. If this DTC is set, the replacement of ALC level sensor is not required and LEVELING warning indicator will not flash. Ensure ALC level sensor is receiving correct voltage and has a good ground.

#### **DTC 03: BATTERY VOLTAGE OUT OF RANGE**

1. DTC 03 sets when vehicle battery voltage is continuously more than 16.5 volts, or less than 9 volts. To prevent false detection of malfunction conditions due to engine crank or unusual system voltage conditions, the following errors are all disabled:
  - Detection of leveling output.
  - Position out of range.
  - Air Replenishment Cycle (ARC).
  - Intake and exhaust activities.
2. DTC 03 will clear when battery voltage returns to nominal range, or by using scan tool. Check battery system for proper operation. If this DTC is set, the replacement of ALC level sensor is not required and LEVELING warning indicator will not flash. Ensure ALC level sensor is receiving correct voltage and has a good ground.

#### **DTC 04: COMPRESSOR RELAY SHORT TO GROUND/OPEN CIRCUIT**

##### **Conditions For Setting DTC**

The sensor detects that the relay output is not pulled up to B+ when the sensor output is deactivated and the ignition signal is active.

##### **Action Taken When DTC Sets**

- The sensor flashes the LEVELING warning indicator.
- The sensor's discrete low side output drive for the relay is disabled.
- The compressor is inoperative.
- The sensor continuously attempts to recover from the fault.
- DTC 04 is stored as a history code at the end of ignition cycle.

##### **Conditions For Clearing DTCs**

Current DTC becomes history when conditions for fault are no longer present and ignition switch cycles from OFF to ON. DTC will clear after 20 ignition cycles.

##### **Test Procedures**

1. Perform ALC system check. See **ALC DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. Go to next step.
2. Disconnect ALC relay from relay box. Turn ignition on with engine off. Check for voltage between relay



## 2001 Cadillac Catera

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

connector terminal No. 1 (Yellow wire) and ground. If battery voltage is present, go to step 4 . If battery voltage is not present, go to next step.

3. Repair open, high resistance or short to ground in Yellow wire. Go to step 9 .
4. Turn ignition off. Disconnect ALC sensor. Connect fused jumper wire between ALC relay connector terminal No. 1 (Yellow wire) and terminal No. 3 (Brown wire) at relay box. Turn ignition on with engine off. Measure voltage between Brown wire and ground. If voltage is 12 volts, go to step 6 . If voltage is not 12 volts, go to next step.
5. Repair open, high resistance or short to ground in Brown wire. Go to step 9 .
6. Measure resistance between ALC control relay connector terminal No. 1 (Yellow wire) and terminal No. 3 (Brown wire) at relay box. If resistance is 80-85 ohms, go to step 8 . If resistance is not 80-85 ohms, go to next step.
7. Replace ALC relay. Go to step 9 .
8. Replace ALC sensor. See **ALC LEVER SENSOR** under REMOVAL & INSTALLATION. Go to next step.
9. Operate system in order to verify repair. If condition is corrected, system is okay. If condition is not corrected, go to step 2 .

### DTC 05: COMPRESSOR RELAY SHORT TO BATTERY

#### Conditions For Setting DTC

The sensor detects that relay output is not pulled down to ground when sensor output is active.

#### Action Taken When DTC Sets

- The LEVELING warning indicator flashes.
- The sensor's discrete low side output drive for the relay is disabled.
- The sensor continuously attempts to recover from the fault.

#### Conditions For Clearing DTC

- A current DTC becomes history when conditions for the fault are no longer present and ignition switch cycles from OFF to ON.
- A history DTC will clear after 20 ignitions cycles.
- Using a scan tool.

#### Test Procedures

1. Perform ALC system check. See **ALC DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. After performing ALC system check, go to next step.
2. Disconnect ALC connector relay from relay box. Turn ignition on with engine off. Measure voltage between ALC relay connector terminal No. 1 (Yellow wire) and ground. If voltage is 12 volts, go to next step. If voltage is not 12 volts, go to step 4 .
3. Locate and repair short to voltage in Yellow wire. After repairs, go to step 5 .
4. Replace ALC level sensor. See **ALC LEVEL SENSOR** under REMOVAL & INSTALLATION. After repairs, go to next step.
5. Operate system in order to verify repair. If condition is corrected, system is okay. If condition is not corrected, go to step 2 .

### DTC 06: EXHAUST VALVE SHORT TO GROUND/OPEN CIRCUIT

#### Conditions For Setting DTC

The sensor detects a feedback voltage less than the present threshold during an exhaust valve OFF state.

## 2001 Cadillac Catera

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

### Action Taken When DTC Sets

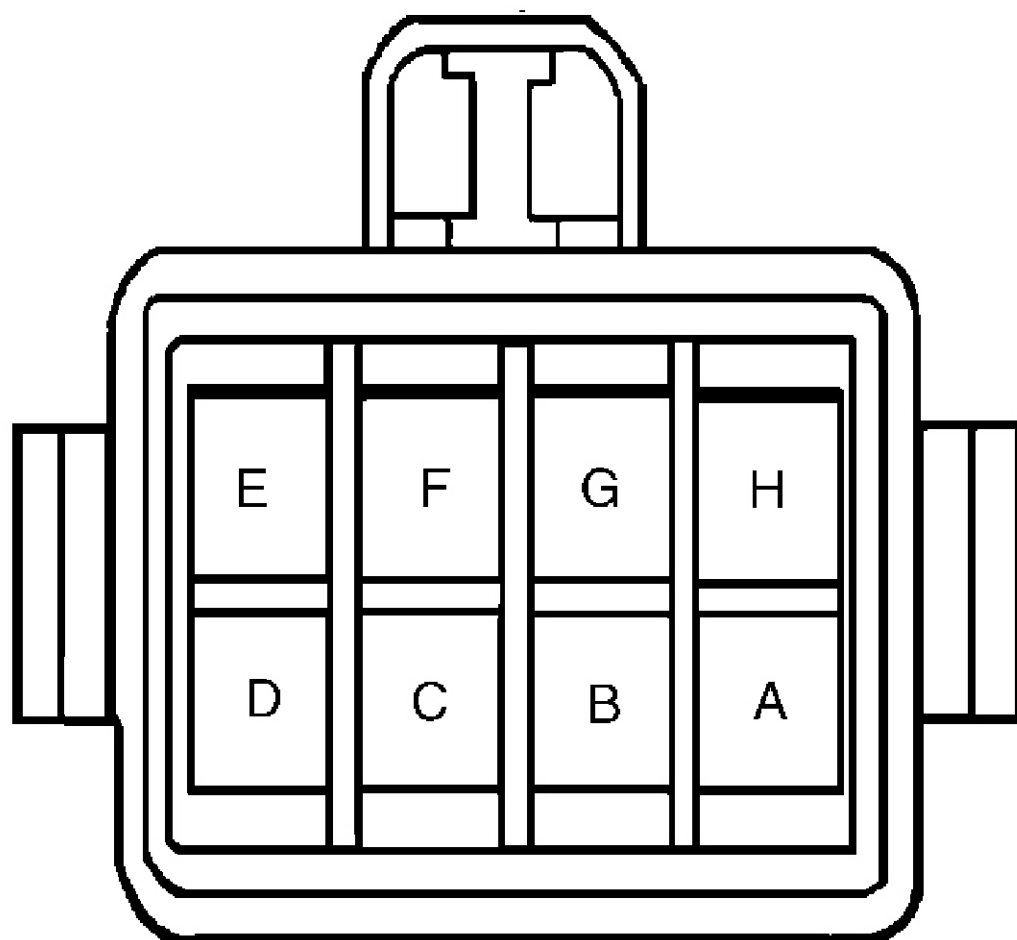
- LEVELING warning indicator flashes.
- Sensor's discrete low side output drive for the valve is disabled.
- Sensor continuously attempts to recover from the fault.

### Conditions For Clearing DTC

- A current DTC becomes history when conditions for the fault are no longer present and ignition switch cycles from OFF to ON.
- A history DTC will clear after 20 ignitions cycles.
- Using a scan tool.

### Test Procedures

1. Perform ALC system check. See **ALC DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. After performing ALC system check, go to next step.
2. Disconnect air compressor assembly connector. Using DVOM, measure voltage between terminal "C" (Red wire) of air compressor assembly harness connector and ground. If battery voltage is present, go to step 4 . If battery voltage is not present, go to next step.
3. Locate and repair open, high resistance or short to ground in Red wire. After repairs, go to step 10 .
4. Disconnect ALC level sensor connector. Connect a fused jumper between terminals "C" (Red wire) and "A" (White wire) of air compressor assembly harness connector. Measure voltage between terminal "D" (Black wire) of ALC level sensor harness connector and ground. See **Fig. 2** . If 12 volts are present, go to step 6 . If 12 volts are not present, go to next step.



G00031393

**Fig. 2: Locating Automatic Level Control Sensor Connector Terminals**  
 Courtesy of GENERAL MOTORS CORP.

5. Locate and repair open, high resistance or short to ground in White wire. After repairs, go to step 10 .
6. Using DVOM, measure resistance between terminals "A" (White wire) and "C" (Red wire) of air compressor assembly harness connector. If resistance is 25-35 ohms, go to next step. If resistance is not 25-35 ohms, go to step 8 .
7. Reconnect all connectors. Turn ignition on, with ignition off. Clear DTCs. Wait 5 minutes. If LEVELING warning indicator flashes, go to step 9 . If LEVELING warning indicator does not flash, go to step 10 .
8. Replace ALC level air compressor head. See **AIR COMPRESSOR HEAD** under REMOVAL & INSTALLATION. After repairs, go to step 10 .
9. Replace ALC sensor. See **ALC LEVEL SENSOR** under REMOVAL & INSTALLATION. Go to next step.
10. Operate system to ensure repair is completed. If condition is corrected, system is okay. If condition is not corrected, go to step 2 .

#### DTC 07: EXHAUST VALVE SHORT TO BATTERY

##### Conditions For Setting DTC

The sensor detects that the valve output is not pulling down to ground when the sensor output is activated.

##### Action Taken When DTC Sets

- LEVELING warning indicator flashes.

## 2001 Cadillac Catera

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

- Sensor's discrete low side output drive for the valve is disabled.
- Sensor continuously attempts to recover from the fault.

### Conditions For Clearing DTC

- A current DTC becomes history when conditions for the fault are no longer present and the ignition switch cycles from OFF to ON.
- A history DTC will clear after 20 ignitions cycles.
- Using a scan tool.

### Test Procedures

1. Perform ALC system check. See **ALC DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. After performing ALC system check, go to next step.
2. Disconnect air compressor assembly connector. Using DVOM, measure voltage between terminal "A" (White wire) of air compressor assembly harness connector and ground. If voltage is .1 volt, go to next step. If voltage is not .1 volt, go to step 4 .
3. Locate and repair short to voltage in White wire. After repairs, go to step 8 .
4. Measure resistance between terminals "A" (White wire) and "C" (Red wire) of air compressor assembly harness connector. If resistance is 25-35 ohms, go to next step. If resistance is not 25-35 ohms, go to step 7 .
5. Reconnect all connectors. Turn ignition on. Clear DTCs. Wait 5 minutes. If LEVELING warning indicator flashes, go to next step. If LEVELING warning indicator does not flash, go to step 8 .
6. Replace ALC level sensor. See **ALC LEVEL SENSOR** under REMOVAL & INSTALLATION. After repairs, go to next step.
7. Replace ALC level air compressor head. See **AIR COMPRESSOR HEAD** under REMOVAL & INSTALLATION. After repairs, go to next step.
8. Operate system in order to ensure repair is completed. If repair is completed, system is okay. If repair is not completed, go to step 2 .

## DTC 08: LEVELING INDICATOR SHORT TO GROUND/OPEN CIRCUIT

### Conditions For Setting DTC

DTC will set when sensor detects that indicator output is not externally pulled up to B+ when sensor output is not active and ignition signal is high.

### Action Taken When DTC Sets

- Sensor's discrete low side output drive for indicator is disabled.
- Sensor continuously attempts to recover from the fault.
- LEVELING warning indicator will not flash.

### Conditions For Clearing DTC

- A current DTC becomes history when conditions for the fault are no longer present and the ignition switch cycles from OFF to ON position.
- A history DTC will clear after 20 ignitions cycles.
- Using a scan tool.

### Test Procedures

1. Perform ALC system check. See **ALC DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. After performing ALC system check, go to next step.

## 2001 Cadillac Catera

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

2. Disconnect ALC level sensor connector. Turn ignition on, with ignition off. If LEVELING warning indicator illuminates, go to next step. If LEVELING warning indicator does not illuminate, go to step 4 ).
3. Locate and repair short to ground in Brown/Purple wire between indicator and ALC sensor. After repairs, go to step 7 .
4. Connect a 3-amp fused jumper wire between terminal "G" (Brown/Purple wire) of ALC level sensor harness connector and ground. If LEVELING warning indicator illuminates, go to step 6 . If LEVELING warning indicator does not illuminate, go to next step.
5. Locate and repair open in Brown/Purple wire. After repairs, go to step 7 .
6. Replace ALC level sensor. See **ALC LEVEL SENSOR** under REMOVAL & INSTALLATION. After repairs, go to next step.
7. Operate system in order to ensure repair. If condition is corrected, system is okay. If condition is not corrected, go to step 2 .

### DTC 09: LEVELING INDICATOR SHORT TO BATTERY

#### Conditions For Setting DTC

DTC will set when sensor detects that indicator output is not pulled down to ground when sensor output is active and ignition signal is high.

#### Action Taken When DTC Sets

- Sensor's discrete low side output drive for the lamp is disabled.
- Sensor continuously attempts to recover from the fault.
- LEVELING warning indicator will not flash.

#### Conditions For Clearing DTC

- A current DTC becomes history when conditions for the fault are no longer present and the ignition switch cycles from OFF to ON position.
- A history DTC will clear after 20 ignitions cycles.
- Using a scan tool.

#### Test Procedures

1. Perform ALC system check. See **ALC DIAGNOSTIC SYSTEM CHECK** under DIAGNOSIS & TESTING. After performing ALC system check, go to next step.
2. Disconnect ALC level sensor connector. Using DVOM, measure voltage between terminal "G" (Brown/Purple wire) of ALC level sensor harness connector and ground. If .1 volt is present, go to next step. If .1 volt is not present, go to step 4 .
3. Locate and repair short to voltage in Brown/Purple wire. After repairs, go to step 5 .
4. Replace ALC level sensor. **ALC LEVEL SENSOR** under REMOVAL & INSTALLATION. After repairs, go to next step.
5. Operate system in order to ensure repair. If condition is corrected, system is okay. If condition is not corrected, go to step 2 .

### DTC 10: INTAKE ACCUMULATOR MALFUNCTION

#### Conditions For Setting DTC

When compressor is active for more than 3 minutes before rear of vehicle reaches a trim position.

#### Action Taken When DTC Sets

- All compressor intake activity is disabled.
- LEVELING warning indicator flashes.

**Conditions For Clearing DTC**

- A current DTC becomes history when conditions for the fault are no longer present and the ignition switch cycles from OFF to ON position.
- A history DTC will clear after 20 ignitions cycles.
- Using a scan tool.

Perform ALC system diagnosis. See **ALC CONTROL SYSTEM OPERATIONAL CHECK** under DIAGNOSIS & TESTING.

**DTC 11: EXHAUST ACCUMULATOR MALFUNCTION****Conditions For Setting DTC**

If exhaust valve is active for more than 5 minutes and rear of vehicle remains above a trim position

**Actions Taken When the DTC Sets**

- All compressor exhaust activity is disabled.
- LEVELING warning indicator flashes.

**Conditions For Clearing DTC**

- A current DTC becomes history when conditions for the fault are no longer present and the ignition switch cycles from OFF to ON position.
- A history DTC will clear after 20 ignitions cycles.
- Using a scan tool.

**Test Procedures**

1. Perform ALC system diagnosis. See **ALC CONTROL SYSTEM OPERATIONAL CHECK** under DIAGNOSIS & TESTING. After performing ALC system diagnosis, go to next step.
2. Check ALC sensor link-rod and actuator arm for problems. If problems are found, go to step 5 . If no problems are found, go to next step.
3. Disconnect link rod. Turn on ignition with engine off. Push up on ALC sensor actuating arm until compressor activates. Operate compressor for 60 seconds. Push down on ALC sensor actuating arm until exhaust solenoid valve clicks. If exhaust solenoid valve clicks, go to next step. If exhaust solenoid does not click, go to step 6 .
4. Check air compressor air filter. If air is exhausting from air compressor air filter, go to next step. If air is not exhausting from air compressor air filter, go to step 7 .
5. Replace ALC sensor if actuating arm is damaged. See **ALC LEVEL SENSOR** under REMOVAL & INSTALLATION. Replace link rod if damaged. Go to step 8 .
6. Check for poor connections at ALC sensor. Check for intermittent and poor connections in wiring systems. If condition was found and repaired, go to step 8 . If condition is not present, go to step 5 .
7. Check air filter and all tubing for blockage. If condition is repaired, go to next step. If condition is not repaired, go to step 9 .
8. Operate system in order to verify repair. If condition is located and repaired, system is okay. If condition is not located and repaired, go to step 3 .
9. Replace ALC compressor. See **AIR COMPRESSOR** under REMOVAL & INSTALLATION. Go to step 8 .

**DTC 12: CONSECUTIVE INTAKE MALFUNCTION****Conditions For Setting DTC**

When the number of compressor sequences is more than 10, without an exhaust sequence.

**Actions Taken When the DTC Sets**

- All compressor intake activity is disabled.
- LEVELING warning indicator flashes.

**Conditions For Clearing DTC**

- Initiation of an exhaust sequence.
- Ignition switch cycles from OFF to ON position.
- Using a scan tool.

Perform ALC system diagnosis. See **ALC CONTROL SYSTEM OPERATIONAL CHECK** under **DIAGNOSIS & TESTING**.

**REMOVAL & INSTALLATION**

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

**AIR COMPRESSOR****Removal**

Disconnect negative battery cable. Raise and support vehicle. Disconnect air compressor electrical connector. Clean air compressor surrounding area to prevent dirt from entering ALC system. Disconnect air line from air drier. Remove intake air filter line from vehicle. Remove air compressor-to-bracket mounting bolts. Remove air compressor from vehicle.

**Installation**

To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** . Turn ignition on and wait 45 seconds. ALC system will perform an air replenishment cycle.

**AIR DRIER****Removal**

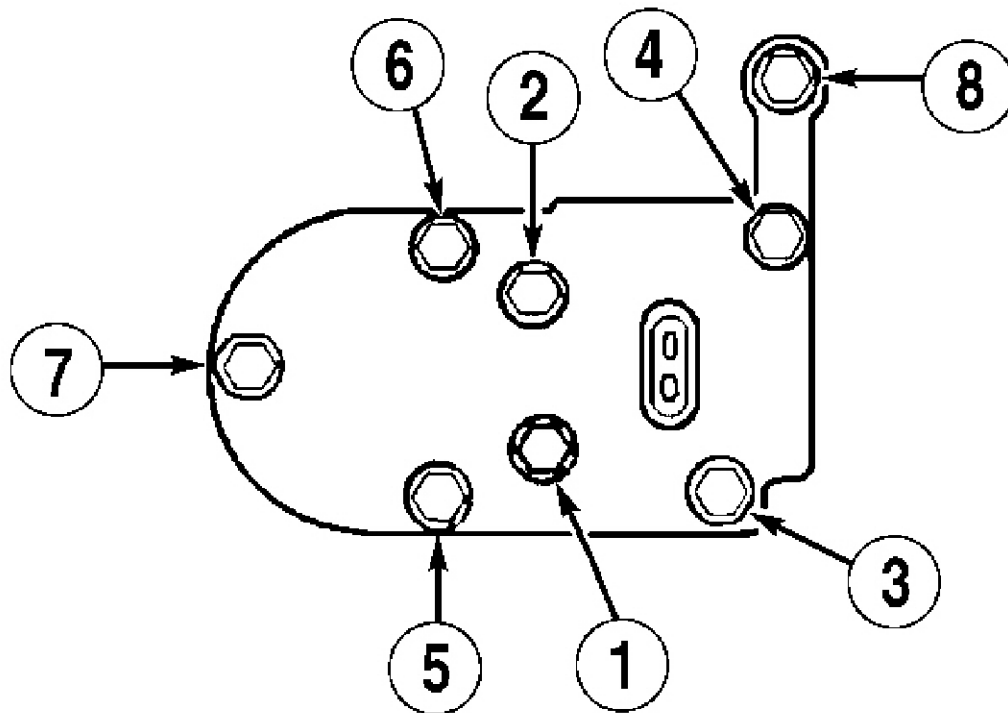
Remove bolts retaining air drier and bracket to air compressor. Remove release clip from air drier fitting. Rotate air drier and pull to remove from cylinder casting. Remove seal from cylinder casting.

**Installation**

Lubricate seal and install in cylinder casting. Slide air drier into cylinder casting and rotate into proper position. Install release clip on air drier fitting. Install and tighten air drier bracket bolts. See **TORQUE SPECIFICATIONS** .

**AIR COMPRESSOR HEAD****Removal & Installation**

1. Remove air drier. See **AIR DRIER** . Remove 3 air compressor head mounting bolts. Remove air compressor head from air compressor. Remove gasket.
2. To install, reverse removal procedure. Install NEW gasket. Tighten compressor head bolts to specification and in sequence. See **Fig. 3** . See **TORQUE SPECIFICATIONS** .



G95E14567

**Fig. 3: Air Compressor Head Bolt Tightening Sequence**  
 Courtesy of GENERAL MOTORS CORP.

**EXHAUST SOLENOID VALVE**

**Removal & Installation**

Exhaust solenoid valve is an integral of air compressor head. Exhaust solenoid valve cannot be serviced separately. Complete replacement of air compressor head is necessary. See **AIR COMPRESSOR HEAD** .

**ALC LEVEL SENSOR**

**Removal & Installation**

Disconnect negative battery cable. Raise and support vehicle. Disconnect ALC level sensor electrical connector. Remove sensor harness clips from vehicle. Disconnect sensor link from ball stud. Remove ALC level sensor bolts and remove sensor. To install, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** . Check for Diagnostic Trouble Codes (DTC). See **RETRIEVING DIAGNOSTIC TROUBLE CODES** under DIAGNOSIS & TESTING.

**TORQUE SPECIFICATIONS**

**TORQUE SPECIFICATIONS**

Application	INCH Lbs. (N.m)
Air Compressor Head Bolt	(1) 35 (4)



**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

Air Compressor-To-Bracket Bolt	124 (14)
Air Drier Bracket Bolt	35 (4)
ALC Level Sensor Bolt	44 (5)
(1) Tighten in sequence. See <b>Fig. 3</b> .	

**WIRING DIAGRAMS**

**Fig. 4: Automatic Level Control (ALC) System Wiring Diagram (Catera - 2000)**

**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

**Fig. 5: Automatic Level Control (ALC) System Wiring Diagram (Catera - 2001)**

**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera



**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera

**2001 Cadillac Catera**

2000-01 SUSPENSION Electronic - Automatic Level Control - Catera