

**2001 ACCESSORIES & EQUIPMENT****Automatic Day/Night Mirrors - Catera****DESCRIPTION**

Electrochromatic day/night rearview mirror automatically changes reflectance to reduce glare from headlights. At night, as glare of headlights from behind increases, mirror will gradually become darker to absorb glare. During daylight or when gearshift lever is in Reverse, mirror will be clear and fully reflective.

The rearview mirror contains two reversible DC motors and two position sensors. One motor adjusts the mirror to the UP/DOWN or vertical position. The other motor adjusts the mirror to LEFT/RIGHT or horizontal position. The Memory Seat Module (MSM) controls the mirror direction by changing polarity of voltage applied to motors. The MSM monitors signal circuits of position sensors to determine position of mirror. When a memory function is requested, the MSM stores position of mirror into memory. For additional testing information not included in this article, see appropriate POWER MIRRORS article.

**OPERATION**

Day/night mirror(s) use a thin layer of electrochromatic material between 2 plates of conductive glass. Two photocell sensors signal levels of light to a logic circuit. A forward-facing photocell sensor measures ambient light levels. A rear-facing photocell sensor measures glare from approaching vehicle headlights. When logic circuit senses more light from the headlight sensor than the ambient light sensor, the electrochromatic drive circuit applies voltage to mirror(s). Approximately 1.15 volts is applied to mirror(s) when a large amount of glare is present, causing mirror(s) to darken. Voltage will be reduced to 0.01 volt when both photocells indicate the same light level.

When gearshift lever is shifted into Reverse, battery voltage is applied to mirror reset terminal. Mirror will gradually change to a clear state for better vision when backing up.

**TROUBLE SHOOTING****PRELIMINARY INSPECTION**

Verify customer complaint by operating suspected system. Visually inspect for obvious signs of mechanical and electrical damage. Inspect for blown fuses. Inspect for loose or corroded connections, damaged wiring harnesses and/or switches. Check for a broken or partially broken wire inside insulation, which could cause system malfunction but prove good in a continuity/voltage check with system disconnected. Ensure any aftermarket electronic equipment is properly installed. If fault is found, repair as necessary. If no fault is found, perform **AUTOMATIC DAY/NIGHT MIRROR SYSTEM CHECK**.

**AUTOMATIC DAY/NIGHT MIRROR SYSTEM CHECK**

1. Turn ignition switch to RUN position. Move gearshift lever into Park. Move mirror switch to MAXIMUM, ON or MIRROR position, if necessary. Cover ambient light sensor (windshield side of mirror) with a dark cloth. Shine light on headlight sensor (on mirror side). Mirror should gradually darken.
2. Move gearshift lever into Reverse. Mirror should gradually lighten to a clear state. Move gearshift lever into Park. Mirror should gradually darken. Remove cloth and light. Mirror should gradually lighten to a clear state. If vehicle is equipped with compass, turn on compass. Compass direction display should be on. If mirror does not operate as specified, go to **STATIONARY WINDOWS DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM.

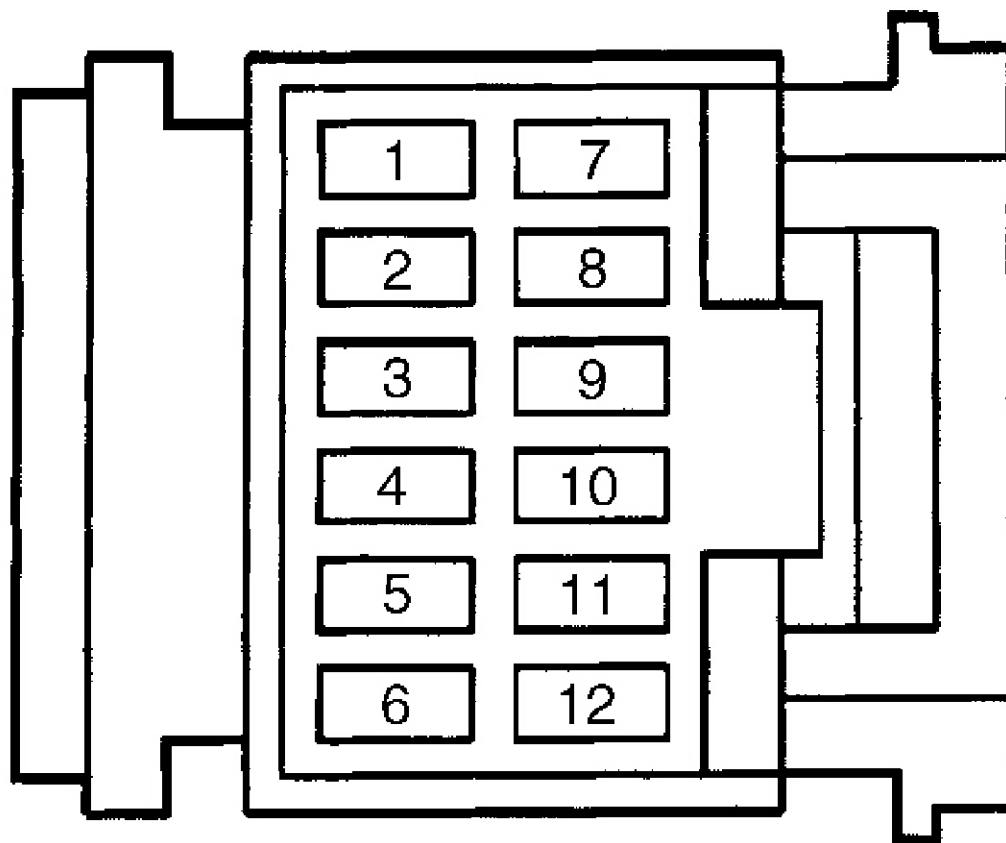
**SELF-DIAGNOSTIC SYSTEM**

**NOTE:** To retrieve Diagnostic Trouble Codes (DTC), see STATIONARY WINDOWS DIAGNOSTIC SYSTEM CHECK.

#### STATIONARY WINDOWS DIAGNOSTIC SYSTEM CHECK

1. Connect scan tool to Data Link Connector (DLC). DLC is located below left side of instrument panel. If scan tool powers up, go to next step. If scan tool does not power up, perform TEST A: SCAN TOOL DOES NOT POWER UP under SYSTEM TESTS in appropriate BODY CONTROL MODULES article.
2. Turn ignition on. Using scan tool, attempt to communicate with MSM. If scan tool communicates with MSM, go to next step. If scan tool does not communicate with MSM, perform TEST B: SCAN TOOL DOES NOT COMMUNICATE WITH CLASS 2 DEVICE under SYSTEM TESTS in appropriate BODY CONTROL MODULES article.
3. Using scan tool, select DISPLAY DTCs functions for MSM. If scan tool displays DTC 19, go to **DTC 19: INSIDE REARVIEW MIRROR CIRCUIT** under DIAGNOSTIC TESTS. If scan tool does not display any DTCs, repair inside rearview mirror by symptom. See SYMPTOM INDEX table SYSTEM TESTS.

#### CONNECTOR IDENTIFICATION



G00013327

**Fig. 1: Identifying Inside Rearview Mirror Harness Connector Terminals**  
Courtesy of GENERAL MOTORS CORP.

#### DIAGNOSTIC TESTS

**NOTE:** For testing information on DTCs not listed below, see appropriate BODY CONTROL MODULES article.

**DTC 19: INSIDE REARVIEW MIRROR CIRCUIT****Circuit Description**

MSM supplies 5 volts and low reference to inside rearview mirror. The MSM monitors voltage of horizontal and vertical signal circuits of rearview mirror to determine position of mirror. Normal voltage range is 0.16-4.6 volts.

**Conditions For Setting DTC**

The following must occur for DTC to be stored in memory;

- No mirror movement detected by MSM during a memory recall command.
- Voltage on horizontal or vertical signal circuit of inside rearview mirror is less than 0.16 volt or 4.6 volts or more.

**Action Taken When DTC Sets**

Automatic adjustment of inside rearview mirror is disabled.

**Diagnostic Procedure**

1. Perform **STATIONARY WINDOWS DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. Go to next step.
2. Install scan tool. Turn ignition switch to ON position. Using scan tool, select INSIDE MIRROR CONTROL from MSM output controls. Command inside rearview mirror up and down. If mirror moves up and down, go to next step. If mirror does not move up and down, go to step 4 .
3. Using scan tool, command inside rearview mirror left and right. If mirror moves left and right, go to step 8 . If mirror does not move left and right, go to step 6 .
4. Turn ignition switch off. Disconnect inside rearview mirror connector. Connect test light between ground and terminal No. 1 on inside rearview mirror harness connector. See **Fig. 1** . Turn ignition on. Command inside rearview mirror up. If test light illuminates, go to next step. If test light does not illuminate, go to step 16 .
5. Connect test light between terminals No. 1 and 3 on inside rearview mirror harness connector. See **Fig. 1** . Using scan tool, command inside rearview mirror down. If test light illuminates, go to step 24 . If test light does not illuminate, go to step 18 .
6. Turn ignition switch off. Disconnect inside rearview mirror connector. Connect a test light between ground and terminal No. 2 on inside rearview mirror harness connector. See **Fig. 1** . Using scan tool, command inside rearview mirror right. If test light illuminates, go to next step. If test light does not illuminate, go to step 17 .
7. Connect test light between terminals No. 2 and 3 on inside rearview mirror harness connector. See **Fig. 1** . Using scan tool, command inside rearview mirror left. If test light illuminates, go to step 24 . If test light does not illuminate, go to step 18 .
8. Using scan tool, observe inside rearview mirror horizontal position data parameter in MSM data list. If voltage is 0.16-4.60 volts, go to next step. If voltage is not 0.16-4.60 volts, go to step 10 .
9. Using scan tool, observe inside rearview mirror vertical position data parameter in MSM data list. If voltage is 0.16-4.60 volts, test rearview mirror system for intermittent malfunction and poor connections. If voltage is not 0.16-4.60 volts, go to step 13 .
10. Turn ignition switch off. Disconnect inside rearview mirror connector. Turn ignition switch on. Observe inside rearview mirror horizontal position data parameter. If voltage is greater than 4.60 volts, go to next step. If voltage is not greater than 4.60 volts, go to step 21 .
11. Turn ignition switch off. Connect fused jumper (3-amp) between terminals No. 5 and 8 on inside rearview mirror harness connector. Turn ignition switch on. Observe horizontal position data parameter. If voltage is less than 0.16 volt, go to next step. If voltage is not less than 0.16 volt, go to step 22 .
12. Turn ignition switch off. Move fused jumper to terminals No. 5 and 8 on inside rearview mirror harness

connector. Turn ignition switch on. Observe horizontal position data parameter. If voltage is greater than 4.60 volts, go to step 20 . If voltage is not greater than 4.60 volts, go to step 19 .

13. Turn ignition switch off. Disconnect inside rearview mirror connector. Turn ignition switch on. Observe inside rearview mirror vertical position data parameter. If voltage is greater than 4.60 volts, go to next step. If voltage is not greater than 4.60 volts, go to step 21 .
14. Turn ignition switch off. Connect fused jumper (3-amp) between terminals No. 4 and 9 on inside rearview mirror harness connector. See **Fig. 1** . Turn ignition switch on. Observe vertical position data parameter. If voltage is less than 0.16 volt, go to next step. If voltage is not less than 0.16 volt, go to step 22 .
15. Turn ignition switch off. Move fused jumper (3-amp) to terminals No. 5 and 8 on inside rearview mirror harness connector. Turn ignition switch on. Using scan tool, observe vertical position data parameter. If voltage is greater than 4.60 volts, go to step 20 . If voltage is not greater than 4.60 volts, go to step 19 .
16. Check for open or short to ground on mirror up circuit at terminal No. 1 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step 28 . If no problem was found, go to step 25 .
17. Check for open or short to ground on mirror right circuit at terminal No. 2 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step 28 . If no problem was found, go to step 25 .
18. Check for open or short to ground on mirror control circuit at terminal No. 3 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step 28 . If no problem was found, go to step 25 .
19. Check for short to ground on mirror 5 volt reference circuit at terminal No. 4 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step 28 . If no problem was found, go to step 25 .
20. Check for open or short to voltage on mirror 5 volt reference circuit at terminal No. 4 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step [28](#) . If no problem was found, go to step 24 .
21. Check for short to ground on mirror signal circuits at terminals No. 6 and 7 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step 28 . If no problem was found, go to step 25 .
22. Check for open or short to voltage on mirror signal circuits at terminals No. 6 and 7 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step [28](#) . If no problem was found, go to next step.
23. Check for high resistance on mirror low reference circuit at terminal No. 5 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step 28 . If no problem was found, go to step 25 .
24. Check for poor connection at harness connector of inside rearview mirror. Ensure connector terminals are clean and tight. Repair as necessary. After repair, go to step 28 . If no problem is found, go to step 26 .
25. Check for poor connection at harness connector of MSM. MSM is located under driver's seat. Ensure connector terminals are clean and tight. Repair as necessary. After repair, go to step 28 . If no problem is found, go to step 27 .
26. Replace inside rearview mirror. See **INSIDE REARVIEW MIRROR** under REMOVAL & INSTALLATION. After repair, go to step 28 .
27. Replace MSM. See appropriate POWER SEATS article. After repair, go to next step.
28. Using scan tool, clear DTCs. Turn ignition on and operate inside rearview mirror. If DTC 19 sets, go to step 2 . If DTC 19 does not set, repair is complete.

## SYSTEM TESTS

**NOTE:** For connector terminal and wire color information, see **WIRING DIAGRAMS** .

## SYMPTOM INDEX

Symptom	Perform Test
Automatic Day/Night Mirror Inoperative	<a href="#">A</a>
Inside Rearview Mirror Function Inoperative	<a href="#">B</a>

**NOTE:** System tests are written specifically for GM Tech 2 scan tool. A generic scan tool

**may not be capable of performing all necessary test functions.**

#### TEST A: AUTOMATIC DAY/NIGHT MIRROR INOPERATIVE

1. Perform **AUTOMATIC DAY/NIGHT MIRROR SYSTEM CHECK** under TROUBLE SHOOTING. Go to next step.
2. Ensure all doors are closed. Cover sensor on back of inside rearview mirror (facing front window). Shine a bright light into sensor on mirror face. If rearview mirror darkens, go to **DIAGNOSTIC AIDS** . If rearview mirror does not darken, go to next step.
3. Turn ignition off. Disconnect inside rearview mirror connector. Using DVOM, measure resistance between ground and terminal No. 8 on inside rearview mirror harness connector. See **Fig. 1** . If resistance is less than 3 ohm, go to next step. If resistance is more than 3 ohm, go to step 9 .
4. Turn ignition switch on. Using DVOM, measure voltage between terminals No. 8 and No. 11 on inside rearview mirror harness connector. If battery voltage exists, go to next step. If battery voltage does not exist, go to step **10** .
5. Place transmission in Park. Measure voltage between terminals No. 8 and No. 10 on inside rearview mirror connector. See **Fig. 1** . If voltage is less than 0.5 volt, go to next step. If voltage is more than 0.5 volt, diagnose and repair short to voltage in backup lights circuit. See appropriate EXTERIOR LIGHTS article.
6. Place transmission in Reverse. Measure voltage between terminals No. 8 and No. 10 on inside rearview mirror connector. If battery voltage is present, go to step 8 . If battery voltage does not exist, go to next step.
7. Check for open in White/Black wire between inside rearview mirror and backup lights. Repair as necessary. After repair, go to step 12 . If no problem was found, check backup lights circuit for short to ground. See appropriate EXTERIOR LIGHTS article.
8. Inspect inside rearview mirror harness connector for poor connection. Ensure connector terminals are clean and tight. Repair as necessary. After repairs, go to step 12 . If no problem was found, go to step 11 .
9. Repair high resistance or open in ground circuit (Black wire) at terminal No. 8 on inside rearview mirror harness connector. See **WIRING DIAGRAMS** . After repairs, go to step 12 .
10. Repair high resistance or open in ignition voltage circuit (Brown wire) at terminal No. 11 on inside rearview mirror harness connector. See **WIRING DIAGRAMS** . After repairs, go to step 12 .
11. Replace inside rearview mirror. See **INSIDE REARVIEW MIRROR** under REMOVAL & INSTALLATION. After repairs, go to next step.
12. Perform **AUTOMATIC DAY/NIGHT MIRROR SYSTEM CHECK** under TROUBLE SHOOTING. If rearview mirror functions correctly, repair is complete. If rearview mirror does not function correctly, go to step 2 .

#### Diagnostic Aids

Automatic day-night feature of inside rearview mirror may not operate properly or become inoperative due to an intermittent short to battery positive voltage in backup light supply voltage circuit.

#### TEST B: INSIDE REARVIEW MIRROR FUNCTION INOPERATIVE

1. Perform **STATIONARY WINDOWS DIAGNOSTIC SYSTEM CHECK** under SELF-DIAGNOSTIC SYSTEM. Go to next step.
2. Install scan tool. Turn ignition switch to ON position. Using scan tool, select INSIDE MIRROR CONTROL from MSM output controls. Command inside rearview mirror up and down. If mirror moves up and down, go to next step. If mirror does not move up and down, go to step 4 .
3. Using scan tool, command inside rearview mirror left and right. If mirror moves left and right, check for poor connection causing intermittent problem at harness connector of inside rearview mirror. Ensure connector terminals are clean and tight. Repair as necessary. If mirror does not move left and right, go to step 5 .
4. Turn ignition switch off. Disconnect inside rearview mirror connector. Connect test light between ground and

terminal No. 1 on inside rearview mirror harness connector. See **Fig. 1** . Turn ignition on. If test light illuminates, go to step 7 . If test light does not illuminate, go to step 6 .

5. Connect test light between ground and terminal No. 2 on inside rearview mirror harness connector. See **Fig. 1** . Turn ignition on. If test light illuminates, go to step 8 . If test light does not illuminate, go to next step.
6. Connect a test light between ground and terminal No. 3 on inside rearview mirror harness connector. If test light illuminates, go to step 9 . If test light does not illuminate, go to step 10 .
7. Check for short to voltage on mirror up circuit at terminal No. 1 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step 14 . If no problem was found, go to step 11 .
8. Check for short to voltage on mirror right circuit at terminal No. 2 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step 14 . If no problem was found, go to step 11 .
9. Check for short to voltage on mirror control circuit at terminal No. 3 on inside rearview mirror harness connector. Repair as necessary. After repair, go to step 14 . If no problem was found, go to step 11 .
10. Check for poor connection at harness connector of inside rearview mirror. Ensure connector terminals are clean and tight. Repair as necessary. After repair, go to step 14 . If no problem is found, go to step 12 .
11. Check for poor connection at harness connector of MSM. MSM is located under driver's seat. Ensure connector terminals are clean and tight. Repair as necessary. After repair, go to step 14 . If no problem is found, go to step 13 .
12. Replace inside rearview mirror. See **INSIDE REARVIEW MIRROR** under REMOVAL & INSTALLATION. After repair, go to step 14 .
13. Replace MSM. See appropriate POWER SEATS article. After repair, go to next step.
14. Perform **AUTOMATIC DAY/NIGHT MIRROR SYSTEM CHECK** under TROUBLE SHOOTING. If rearview mirror functions correctly, repair is complete. If rearview mirror does not function correctly, go to step 2 .

## REMOVAL & INSTALLATION

**WARNING:** Electrochromatic material may irritate eyes and skin. In case of eye contact, rinse thoroughly with water. In case of skin contact, wash thoroughly with soap and water. If material is ingested, consult a physician or poison control center immediately.

**NOTE:** Electrochromatic mirror cannot be repaired. Mirror must be replaced as an assembly. DO NOT use ammonia-based cleansers on electrochromatic day/night mirrors. Spraying cleansers directly on mirror is not recommended.

**NOTE:** For removal and installation procedure for outside mirror assemblies, see appropriate POWER MIRRORS article.

### INSIDE REARVIEW MIRROR

**NOTE:** It is not necessary to use tools or other objects to pry mirror mount or mirror away from windshield. Use of tools may damage mirror, mirror mount or windshield.

#### Removal & Installation

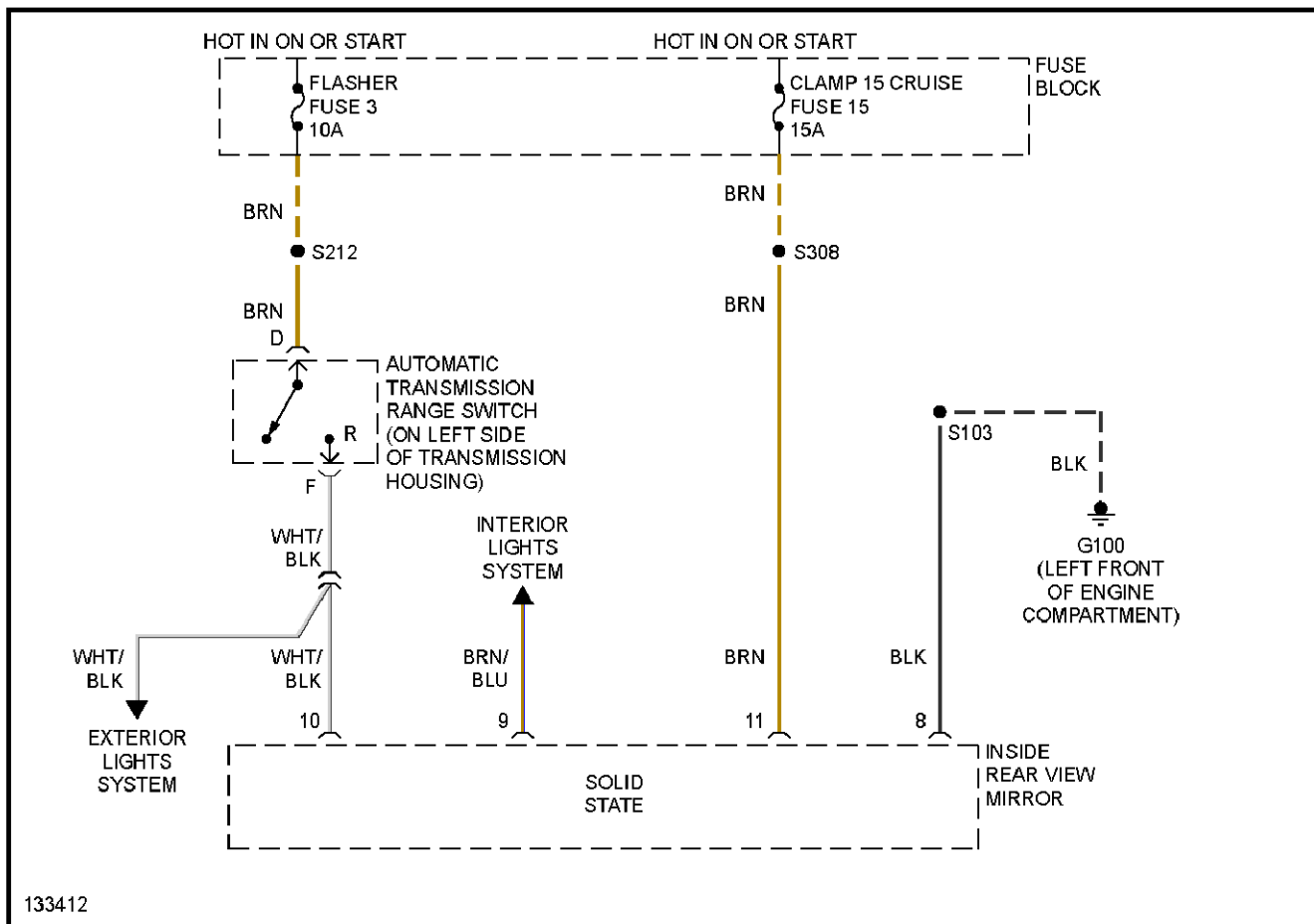
**NOTE:** Mirror cover cannot be removed from mirror until mirror is removed from windshield support.

1. Rock mirror from side to side, and pull mirror down firmly. DO NOT pull rearward on mirror, or mirror

support or windshield may be damaged. Disconnect electrical connector. Remove inside rearview mirror support. Unsnap mirror base cover.

2. Install base cover. Connect mirror electrical connector. Center bottom of mirror to lower part of support. Rock mirror from side to side while pushing upward firmly. When mirror is fully seated, a click should be heard.

## WIRING DIAGRAMS



**Fig. 2: Automatic Day/Night Mirror System Wiring Diagram (Catera)**

**2001 Cadillac Catera**

2001 ACCESSORIES & EQUIPMENT Automatic Day/Night Mirrors - Catera



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