

<b>Subject:</b> PORT OR DEALER INSTALLED AUTO-DIMMING (ELECTRO-CHROMIC) MIRROR, WITH ELECTRONIC COMPASS, AMBIENT TEMPERATURE	<b>Bulletin No:</b> 09-001/04
	<b>Last Issued:</b> 02/06/2004

## BULLETIN NOTE

This bulletin supersedes 09-001/04, issued 02/03/04. The REPAIR PROCEDURE has been revised.

## APPLICABLE MODEL(S)/VINS

2000 and later 626, Miata, Millenia, MPV, Protege, Protege5

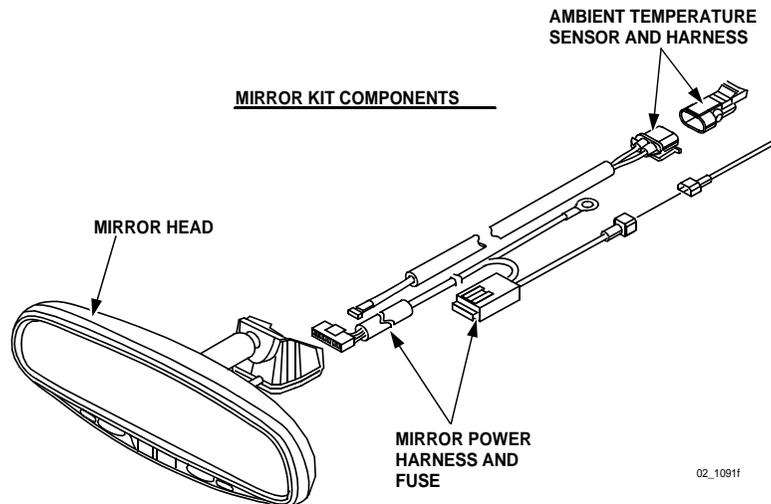
2002 and later Tribute

2000 and later Truck

2003 and later Mazda6

**NOTE:** The following information only applies to vehicles equipped with port or dealer installed auto-dimming accessory mirror w/electronic compass and ambient temperature. If vehicle is equipped with factory installed auto-dimming mirror w/electronic compass and ambient temperature, refer to the appropriate factory workshop manual for information.

## DESCRIPTION

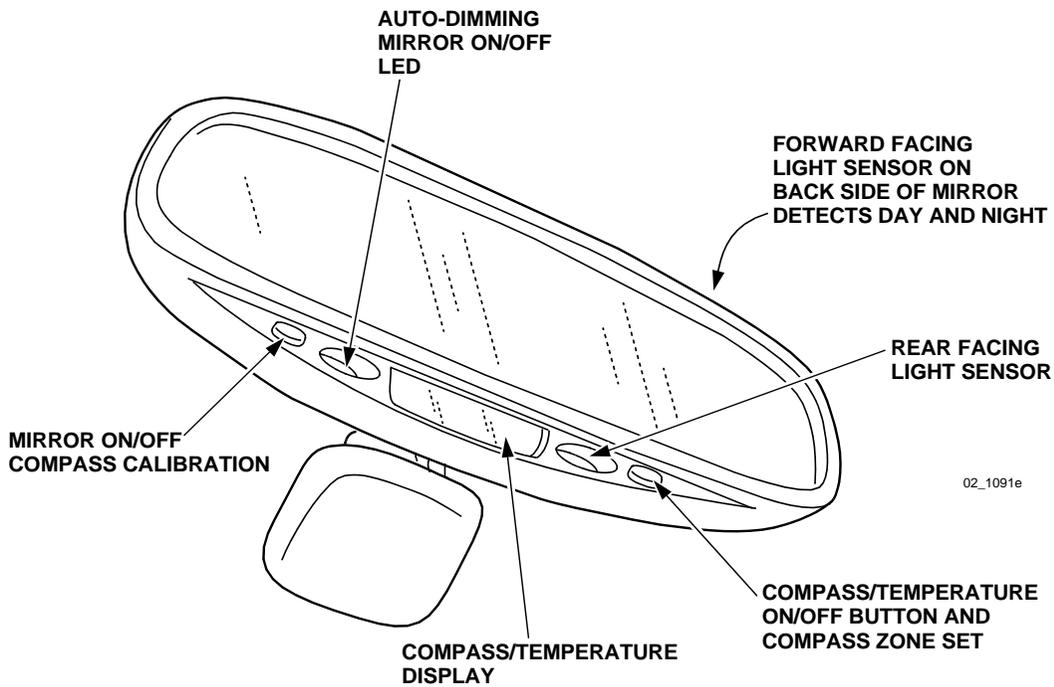
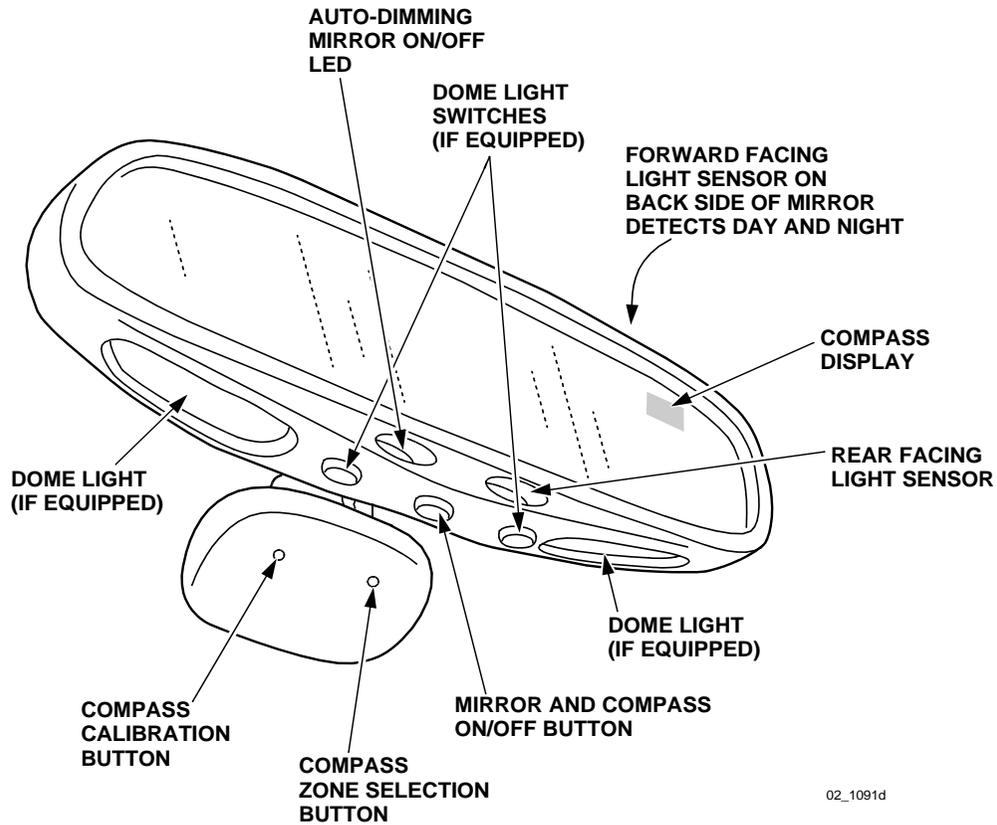


Starting in 2000 an accessory Auto Dimming Mirror was available. The mirror could come equipped with an electronic compass or an ambient temperature sensor or Homelink (Homelink allows you to program your garage remote to one of three buttons on the mirror assembly). This bulletin describes the mirror operation and diagnosis.

**NOTE:** Mazda6 may come with factory or accessory installed auto-dimming mirror. If the unit is factory

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installed, look in the wiring diagram for wiring information, if the unit is port or dealer installed, then the wiring information in this bulletin applies.



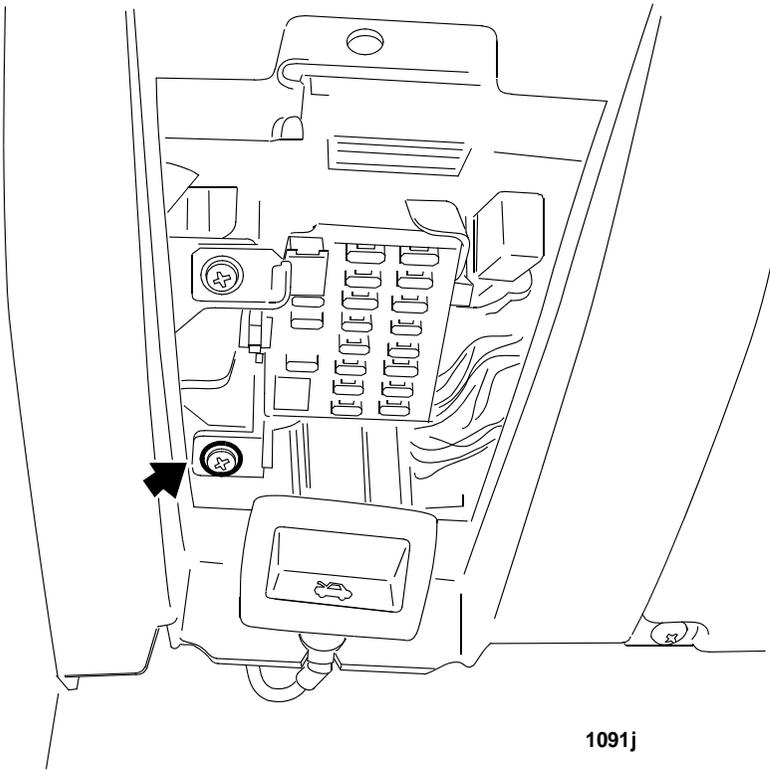
**Power Wire Locations (Ignition ON B+)**

Model	Connector #	Pin #	Spliced Wire Color	2000-2003 Wiring Diagram Connector Location / Pin Location Page#
Miata	X-07		Yellow	Z-87 / Z-88
Millenia	JB-10	F	Not Applicable	Z-149
MPV	JB-01	D	Not Applicable	Z-147
Protege	JB-03	I	Not Applicable	Z-123
Tribute	X-270a	3	Not Applicable	Z-155
Truck	X-135*	29	V/O Violet/Orange	Z-145 / Z-160
626	JB-04	F	Not Applicable	Z-117
Mazda6	JB-05	A	Red/White	156

**Battery Power Wire Locations (B+) with Homelink**

Model	Connector #	Pin #	Spliced Wire Color	2000-2003 Wiring Diagram Connector Location / Pin Location Page#
Mazda6	JB-05	E	Blue /Red	194-195

### Ground Wire Locations

Model	Description	Figure
Miata	Lower left mounting screw of in vehicle fuse box (JB Joint Box)	 <p>The diagram shows a top-down view of a vehicle fuse box. A black arrow points to a circular mounting screw on the lower left side of the fuse box housing. The fuse box contains several fuses and a battery terminal cover. The label '1091j' is located in the bottom right corner of the diagram area.</p>

Millenia

Bottom mounting  
nut of In vehicle  
fuse box (JB Joint  
Box)



1091m

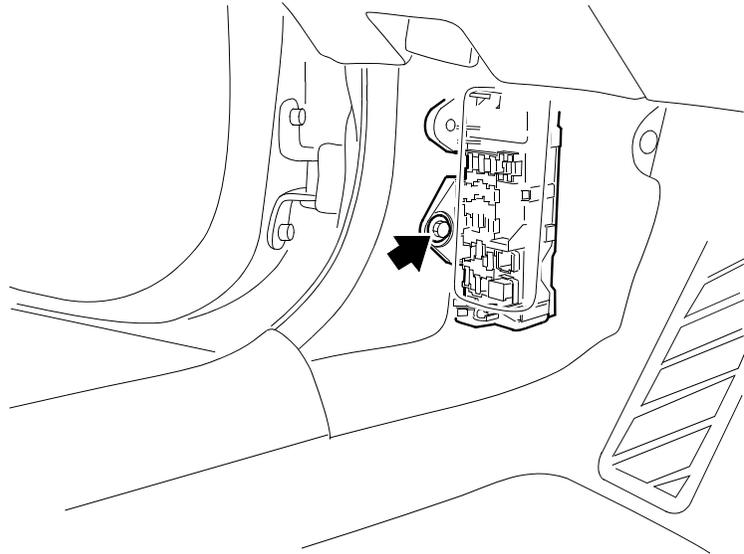
MPV

Nut behind dash  
above OBDII 16  
pin connector



Protege

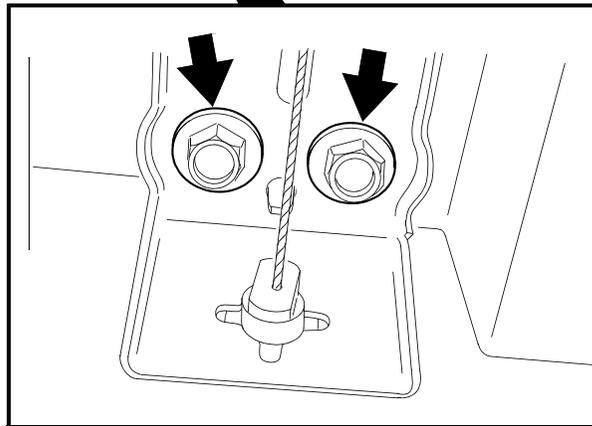
Bolt behind left kick panel



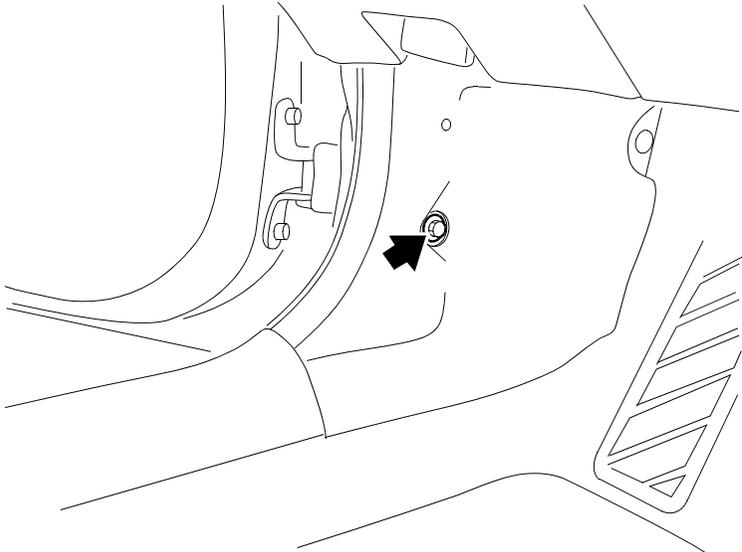
1091o

Tribute

Left bolt of hood  
release handle

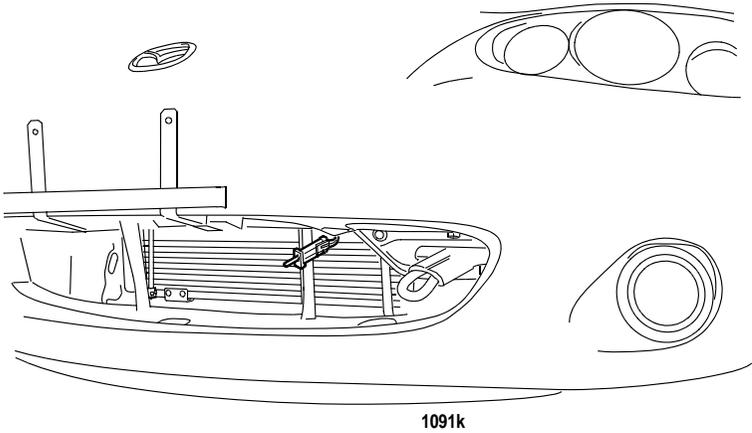
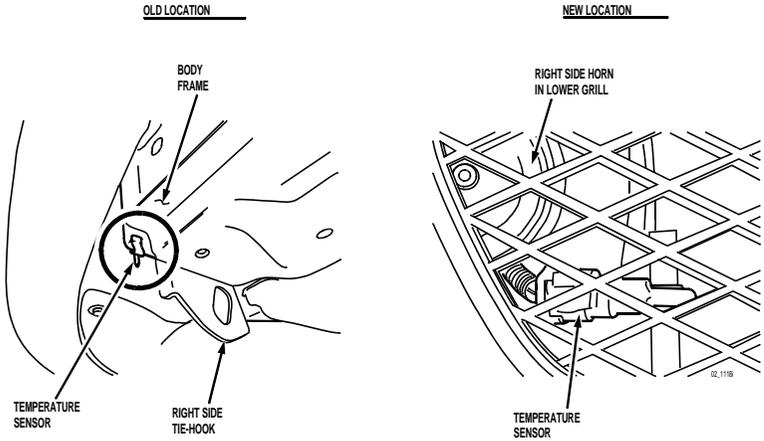


1091R2

<p>Truck &amp; 626</p>	<p>Bolt behind left kick panel</p>	 <p>1091p</p>
<p>Mazda 6</p>	<p>Ground #2 JC-02 above n vehicle fuse box. Page 16 in Wiring Diagram</p>	

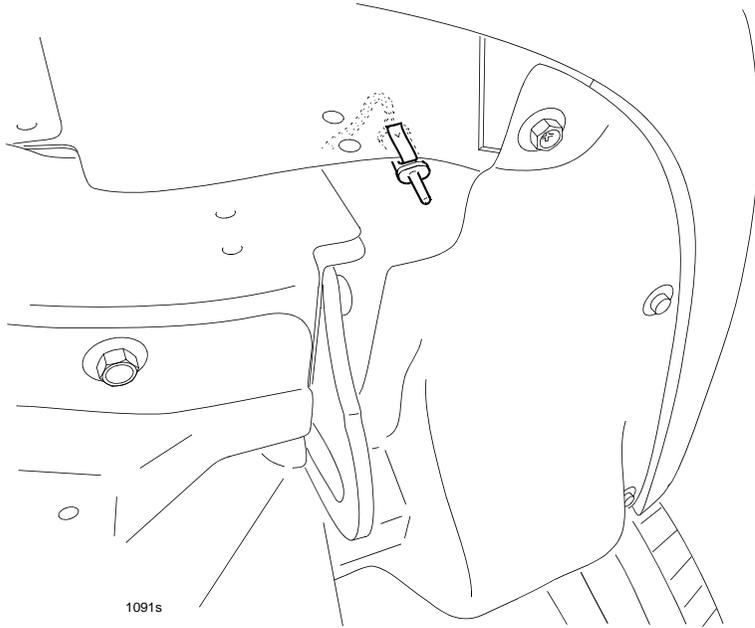


### Temperature Sensor Locations

Model	Description	Figure
Miata	Center front of vehicle, behind grill, on radiator core support, near top	 <p style="text-align: center;">1091k</p>
Millenia & Mazda 6	Not Applicable, Millenia and Mazda6 are factory equipped with an ambient temperature sensor for the AC system	
MPV	<p>Old location: behind passenger side of grill next to horn.</p> <p>New location for more accurate temperatures: attached to lower engine plastic shield behind horn.</p>	 <p style="text-align: center;">OLD LOCATION                      NEW LOCATION</p> <p style="text-align: center;">BODY FRAME                      RIGHT SIDE HORN IN LOWER GRILL</p> <p style="text-align: center;">TEMPERATURE SENSOR                      TEMPERATURE SENSOR</p> <p style="text-align: center;">RIGHT SIDE TIE-HOOK</p> <p style="text-align: right; font-size: small;">02.119B</p>

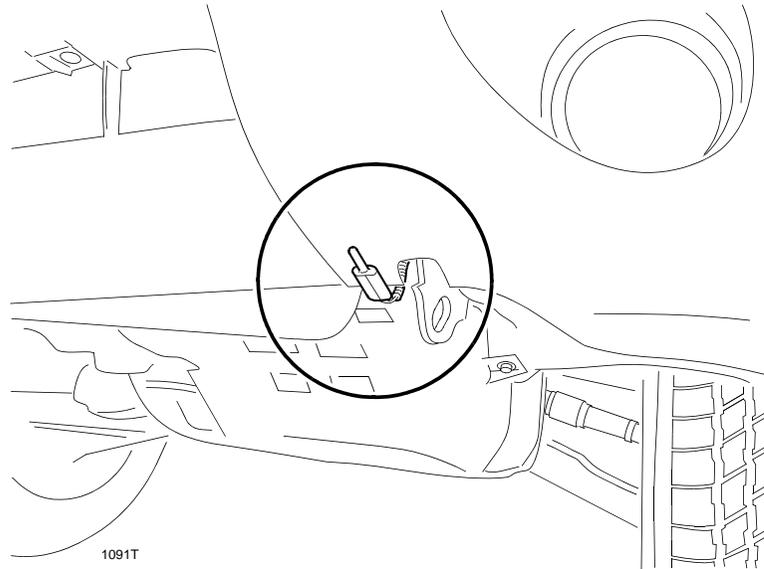
Protege

Front driver side,  
under bumper,  
above tow hook



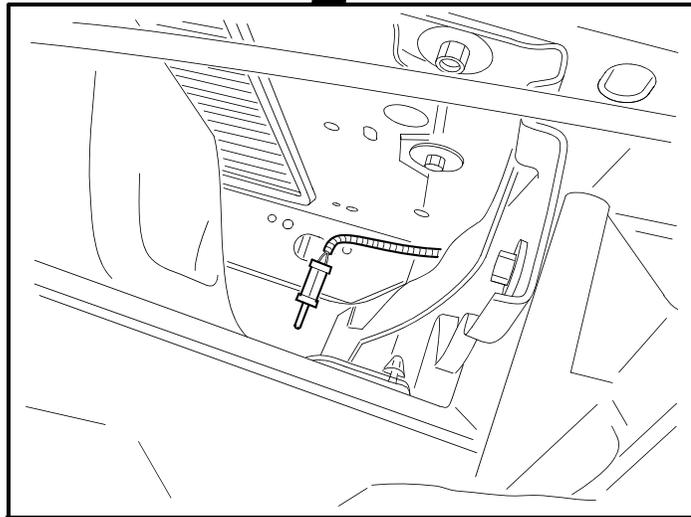
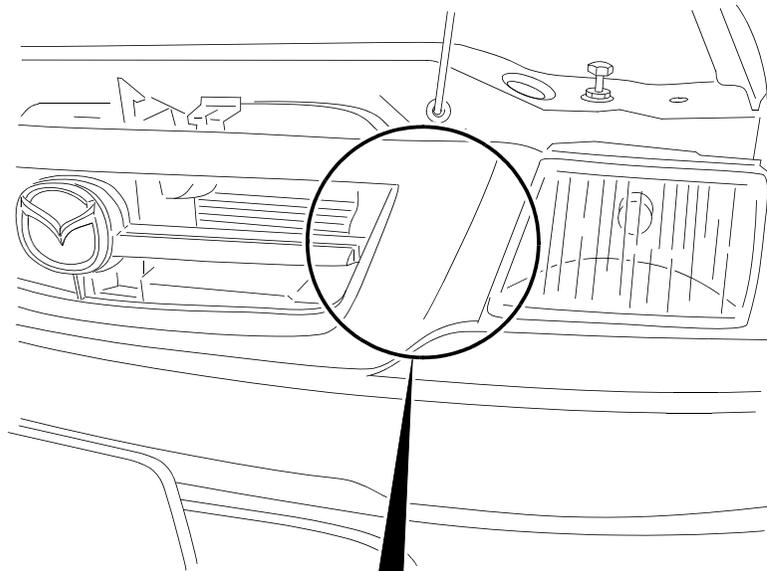
Tribute

Driver side, under  
front bumper, 2  
inches in-board of  
tow hook



Truck

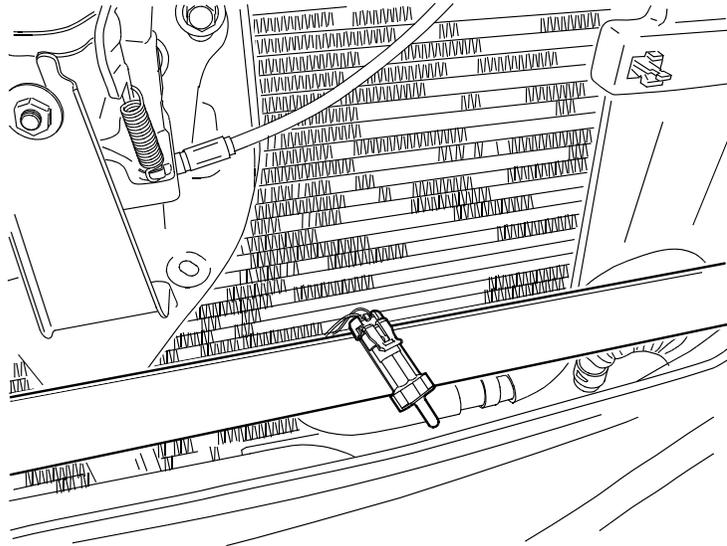
Mounted to hole  
near bottom driver  
side of radiator  
(between grill and  
radiator)



1091U2

626

Center front of vehicle, behind grill, on radiator core support



1091h

## Troubleshooting Guide

CONDITION	POSSIBLE CAUSE	ACTION
Mirror face does not dim or Mirror Inoperative or Loss of Power	<ul style="list-style-type: none"> <li>- Mirror is switched off.</li> <li>- Mirror has an open circuit in the Ignition power wire.</li> <li>- Mirror has an open circuit in the ground wire.</li> <li>- Mirror failed.</li> </ul>	PINPOINT TEST "A" MIRROR FACE DOES NOT DIM
Mirror face is always dim	<ul style="list-style-type: none"> <li>- The forward facing photo sensor is blocked.</li> <li>- Mirror failed.</li> </ul>	PINPOINT TEST "B" MIRROR FACE IS ALWAYS DIM
Compass display is inaccurate - Compass Zone Setting Procedure - Compass Calibration Procedure	<ul style="list-style-type: none"> <li>- External metallic or magnetic interference.</li> <li>- Incorrect zone setting.</li> <li>- Compass not calibrated.</li> <li>- Mirror failed.</li> </ul>	PINPOINT TEST "C" COMPASS DISPLAY IS INACCURATE
No compass display	<ul style="list-style-type: none"> <li>- Compass is switched off</li> <li>- Mirror has an open circuit in the Ignition power wire.</li> <li>- Mirror has an open circuit in the ground wire.</li> <li>- Mirror failed.</li> </ul>	PINPOINT TEST "D" NO COMPASS DISPLAY
"OC" is shown in temperature display	<ul style="list-style-type: none"> <li>- Temperature sensor is not connected.</li> <li>- Internal open circuit inside temperature sensor.</li> <li>- Open circuit in temperature sensor wires.</li> <li>- Mirror failed.</li> <li>- Short to B+ in the sensor signal wire (Black/Green).</li> </ul>	PINPOINT TEST "E" "OC" IS SHOWN ON TEMPERATURE DISPLAY
"SC" is shown in temperature display	<ul style="list-style-type: none"> <li>- Temperature sensor wires are shorted together.</li> <li>- Temperature sensor wire shorted to ground (B/G)</li> <li>- Internal short in temperature sensor.</li> <li>- Mirror failed.</li> </ul>	PINPOINT TEST "F" "SC" IS SHOWN ON TEMPERATURE DISPLAY
Temperature reading is inaccurate - Temperature Sensor Resistance/ Voltage Chart	<ul style="list-style-type: none"> <li>- User not familiar with temperature sensor filtering.</li> <li>- Sensor is mounted incorrectly.</li> <li>- Temperature sensor failed.</li> <li>- High resistance in temperature sensor wires.</li> <li>- Mirror failed.</li> </ul>	PINPOINT TEST "G" TEMPERATURE READING IS INACCURATE
Segments of display LEDs do not work	<ul style="list-style-type: none"> <li>- Compass / temperature display is switched off.</li> <li>- Mirror has an open circuit in the Ignition power wire.</li> <li>- Mirror has an open circuit in the ground wire.</li> <li>- Mirror failed.</li> </ul>	PINPOINT TEST "H" SOME LED SEGMENTS OF DISPLAY DO NOT WORK
Display is always dim	<ul style="list-style-type: none"> <li>- Forward facing photo sensor opening is blocked.</li> <li>- Mirror failed</li> </ul>	PINPOINT TEST "I" DISPLAY DOES NOT DIM AT NIGHT

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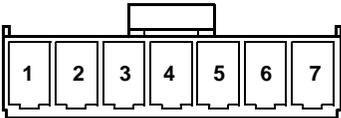
Homelink Inoperative	<ul style="list-style-type: none"> <li>- Loss of B+</li> <li>- Loss of ground</li> <li>- Remote not programmed correctly</li> <li>- Homelink button or unit failure</li> </ul>	PINPOINT TEST "J" HOMELINK INOPERATIVE
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### PINPOINT TEST "A" MIRROR FACE DOES NOT DIM

The forward facing sensor detects ambient light. This is to determine day or night time. This sensor will dim the mirror during night driving.

**NOTE:** The forward sensor dims in proportion to how dark it is. If the forward sensor is covered entirely, the mirror defaults to its darkest setting.

The rear facing sensor detects light coming from vehicle headlights from behind. The rear facing sensor is used to darken the mirror further when headlights are detected.

TEST STEP	RESULT	ACTION
<b>A1:</b> Turn the ignition ON. Is green LED on?	YES	Go to A3
	NO	Go to A2
<b>A2:</b> Turn auto dimming On: Is green LED on?	YES	Go to A3
	NO	Go to A4
<b>A3:</b> Cover forward facing light sensor in back of mirror. Does mirror face dim?	YES	Test finished, mirror functional
	NO	Replace mirror head
<b>A4:</b> Remove 7-pin connector from back of mirror. Turn ignition to ON. Use a DVOM to measure voltage between pins 1 and 2 .   02_1092a Is voltage between 9 and 16 Volts?	YES	Replace mirror head.
	NO	Go to A5
<b>A5:</b> Inspect 1-amp fuse.  Is fuse blown?	YES	Repair short to ground in ignition feed, then go to A1
	NO	Go to A6

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<p><b>A6:</b> Verify correct harness connections to vehicle ignition power supply and ground.</p> <p>Pin #1 of mirror head 7-pin connector, connects through a 1amp fuse to ignition ON from sub-connector in vehicle fuse panel.</p> <p>Pin#2 of mirror head 7-pin connector, connects to body ground at an eylet in the left kick panel area.</p> <p>Was a problem found?</p>	YES	Repair wiring harness concern, then go to A1
	NO	Go to A1

**PINPOINT TEST “B” MIRROR FACE IS ALWAYS DIM**

TEST STEP	RESULT	ACTION
<p><b>B1:</b> Is anything blocking the the photo-sensor opening on the front of the mirror?</p>	YES	Remove the obstruction and verify that the mirror no longer dims
	NO	Replace the mirror head

**PINPOINT TEST “C” COMPASS DISPLAY IS INACCURATE**

TEST STEP	RESULT	ACTION
<b>C1:</b> Is compass display switched on? Turn ignition on. Press compass on button. Does Compass turn on?	YES	Go to C2
	NO	Go to A1
<b>C2:</b> Is compass pod snapped onto mirror mount?	YES	Go to C3
	NO	Snap mirror pod into position, go to C3
<b>C3:</b> See <b>Compass Zone Selection:</b> below. Is correct Zone selected?	YES	Go to C4
	NO	Reset Zone, go to C4
<b>C4:</b> See Compass Calibration: below. Will compass calibrate?	YES	Calibrate compass, go to C5
	NO	Replace mirror head.
<b>C5:</b> Compare electronic compass to mechanical compass. Are electronic and mechanical compass readings similar?	YES	Return vehicle to customer
	NO	Go to C6
<b>C6:</b> Verify no large metallic objects, buildings, electrical power lines, or magnets are near the electronic compass or vehicle. Are any interferences nearby?	YES	Remove interference and go to C5
	NO	Replace mirror head

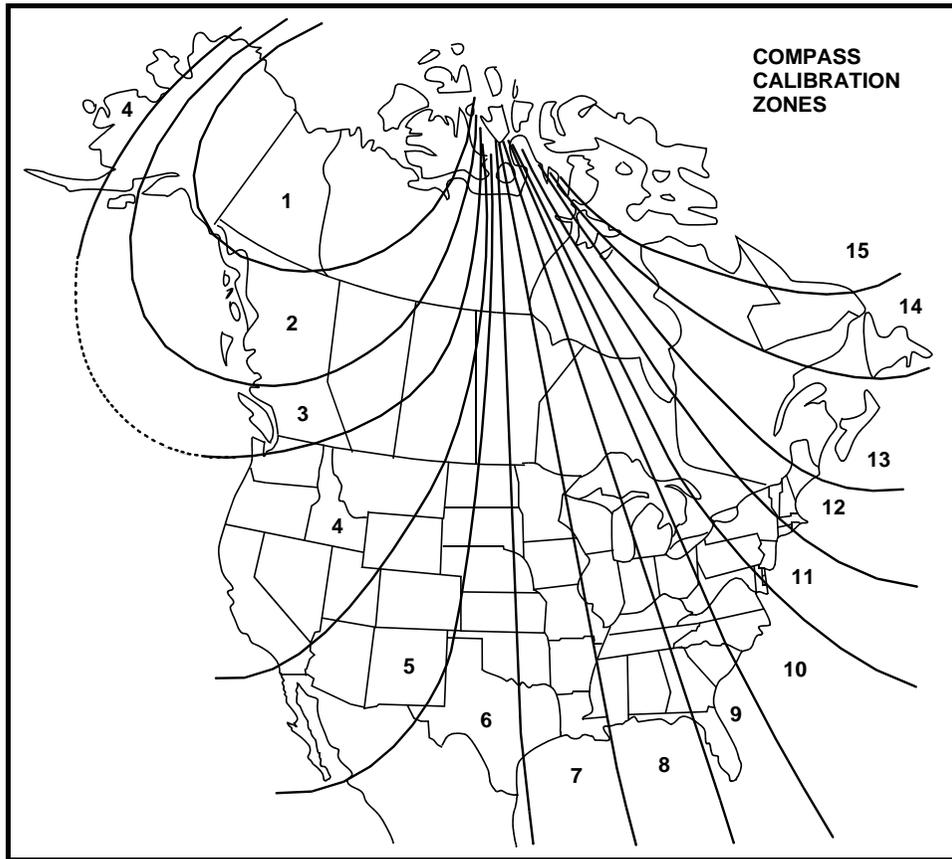
**- Compass Zone Selection:**

**NOTE:** There are 2- different types of mirror setting controls the first type is done by pressing and holding an external switch, the other type is done using a paperclip to press an internal switch.

- a. Press the switch on the right side of the mirror until “**ZONE**” is displayed.
- b. Now press and release the switch on the right side of the mirror until the correct zone for your region is displayed (**1** through **15**). Use the map below to select the correct zone.



**NOTE:** This setting must be adjusted every time a customer passes through 3 zones.



02\_1091a

- **Compass Calibration**

- a. Find a large open area with no overhead power lines or large metallic structures or objects.

**NOTE:** The area must be large enough to drive the vehicle in a circle several times.

- b. Press and hold the switch on the left side of the mirror until "**CAL**" appears.  
c. Drive the vehicle slowly in a circle until the word "**CAL**" disappears from the display, approximately two to four complete circles in the same direction.

**NOTE:** This calibration is necessary when the mirror with compass is initially installed in a vehicle and when a vehicle travels through 3 or more zones.

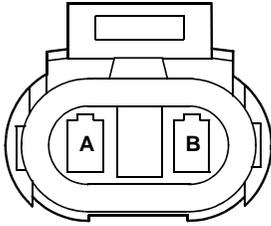
**CAUTION:** Magnets and large metal structures can interfere with the operation and accuracy of the compass.

**PINPOINT TEST “D” NO COMPASS DISPLAY**

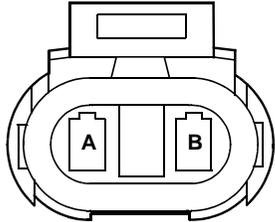
TEST STEP	RESULT	ACTION
<b>D1:</b> Is compass display switched on? Turn ignition on. Press compass on button. Does Compass turn on?	YES	Return vehicle to customer
	NO	Go to A4

**PINPOINT TEST “E” “OC” IS SHOWN ON TEMPERATURE DISPLAY**

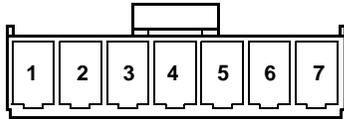
If the temperature display shows “OC”, the sensor is either internally an open circuit or there is an open in one of the sensor wires.

TEST STEP	RESULT	ACTION
<b>E1:</b> Ignition On. Temperature switched on. Unplug temperature sensor. Use DVOM, inspect voltage between sensor wires A (Black/Green) and B (Black).  02_1091c Is 5 Volts present?	YES	Go to E3
	NO	Go to E2
<b>E2:</b> Was 12-volts present in step E1?	YES	Repair the short to B+ in the temperature sensor harness (Black/Green)
	NO	Go to A1
<b>E3:</b> Measure the resistance of the temperature sensor and compare it to the Temperature Sensor Resistance/Voltage Values chart below. Is the temperature sensor resistance correct for ambient temperature?	YES	Go to E6
	NO	Replace temperature sensor

**E4:** Disconnect the 7-pin connector from the mirror.  
 Use a DVOM, inspect continuity between Pin A (Black/Green) at the temperature sensor and Pin 6 or 7 (Black/Green)-(varies depending on initial assembly, wires are not polarity specific).



02\_1091c

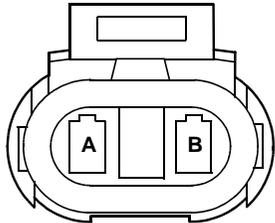


02\_1092a

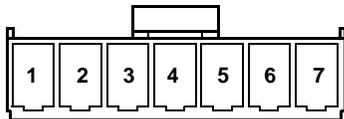
Was an open circuit found?

YES Repair the open circuit  
 NO Go to E5

**E5:** Use a DVOM, inspect continuity between Pin B (Black) at the temperature sensor and Pin 6 or 7 (Black)-(varies depending on initial assembly, wires are not polarity specific, verify wire color)



02\_1091c



02\_1092a

Was an open circuit found?

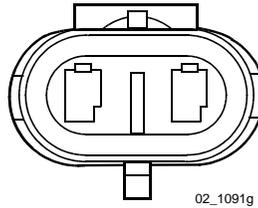
YES Repair the open circuit  
 NO Go to E6

**E6:** Inspect for damaged pin terminals at the sensor and the mirror assembly.

Was a problem found?

YES Repair the terminals.  
 NO Replace the mirror head

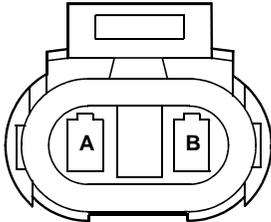
## Temperature Sensor Resistance/Voltage Values



Degrees Celsius, (Fahrenheit)	Resistance (Ohms) (+/- 150)	Volts (+/- 0.15)
0 C (32F)	27,000 - 30,000	3.0
4 C (40 F)	25,000	2.8
7 C (45 F)	22,000	2.6
10 C (50 F)	18,500	2.5
12 C (55 F)	16,500	2.3
15 C (60 F)	14,500	2.2
18 C (65 F)	13,000	2.0
21 C (70 F)	1100	1.8
23 C (75 F)	9800	1.6
26 C (80 F)	8700	1.5
29 C (85 F)	8000	1.4
32 C (90 F)	7300	1.3
35 C (95 F)	6300	1.2
37 C (100 F))	5500	1.1
40 C (105 F)	4900	1.0
43 C (110 F)	4200	0.9
46 C (115 F)	3900	0.85
49 C (120 F)	3500	0.77
51 C (125 F)	3100	0.7
54 C (130 F)	2800	0.65
57 C (135 F)	2500	0.6
60 C (140 F)	2000	0.5

**PINPOINT TEST “F” “SC” IS SHOWN ON TEMPERATURE DISPLAY**

If the temperature display shows “SC”, the sensor is either shorted internally, the sensor signal (+5) wire is shorted to B+, or the sensor wires are shorted together.

TEST STEP	RESULT	ACTION
<p><b>F1:</b> Ignition On. Temperature reading switched on. Unplug temperature sensor.</p> <p>(NOTE: Due to the temperature display smoothing feature, you may have to wait at least 30-seconds for the temperature display to change after the sensor is disconnected). Did the display change from SC to OC?</p>	<p>YES</p> <p>NO</p>	<p>Replace the temperature sensor.</p> <p>Go to F2</p>
<p><b>F2:</b> Ignition off. Disconnect the 7-pin connector from the mirror head. Measure continuity between pin A (Black/Green) and pin B (Black) of the temperature sensor connector.</p>  <p style="text-align: center;">02_1091c</p> <p>Is there continuity?</p>	<p>YES</p> <p>NO</p>	<p>Repair the short in the temperature sensor harness.</p> <p>Go to F3</p>
<p><b>F3:</b> Disconnect the negative battery cable. Measure continuity between pin A (Black/Green) of the temperature sensor connector and ground. Is there continuity?</p>	<p>YES</p> <p>NO</p>	<p>Repair the short to ground in the temperature sensor harness.</p> <p>Go to F4</p>
<p><b>F5:</b> Inspect for damaged pin terminals at the sensor and the mirror assembly. Was a problem found?</p>	<p>YES</p> <p>NO</p>	<p>Repair the terminals.</p> <p>Replace the mirror head</p>

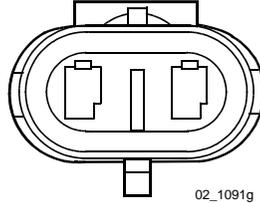
**PINPOINT TEST “G” TEMPERATURE READING IS INACCURATE**

The temperature sensor is mounted in front of the bumper area. Due to its location, the sensor can be affected by road or engine heat during idling or slow driving. Adaptation to ambient temperature takes place in steps through time filtering and depends on the prevailing driving conditions and amount of temperature change. Because of the filtering, the display will take up to 3 minutes to update to ambient temperature if the current ambient temperature is higher than the previous time the vehicle was turned on.

**NOTE:** Place the temperature sensor in a cup of Ice water or heated water to check its range of operation and compare it to an analog thermometer.

**CAUTION:** The outside temperature indicator is not designed to serve as an ice warning device and is not suitable for that purpose. Indicated temperatures just above freezing do not guarantee that the road surface is free of ice.

TEST STEP	RESULT	ACTION
<b>G1:</b> Is temperature reading of ambient temperature accurate while driving?	YES	Return vehicle to customer and explain operating characteristics from page 2-3 of this bulletin.
	NO	Go to G2
<b>G2:</b> Is temperature sensor correctly mounted see the Temperature Sensor Locations chart?	YES	Go to G3.
	NO	Mount sensor in correct location
<b>G3:</b> Remove the temperature sensor. Compare resistance value of temperature sensor with ambient temperature using the Temperature Sensor Resistance/Voltage Values chart below and a thermometer.  NOTE: Verify customer expectations about sensor operation are within the operating parameters explained above.  Is the sensor reading accurate.	YES	Replace mirror head
	NO	Replace temperature sensor

**Temperature Sensor Resistance/Voltage Values**

Degrees Celsius, (Fahrenheit)	Resistance (Ohms) (+/- 150)	Volts (+/- 0.15)
0 C (32F)	27,000 - 30,000	3.0
4 C (40 F)	25,000	2.8
7 C (45 F)	22,000	2.6
10 C (50 F)	18,500	2.5
12 C (55 F)	16,500	2.3
15 C (60 F)	14,500	2.2
18 C (65 F)	13,000	2.0
21 C (70 F)	1100	1.8
23 C (75 F)	9800	1.6
26 C (80 F)	8700	1.5
29 C (85 F)	8000	1.4
32 C (90 F)	7300	1.3
35 C (95 F)	6300	1.2
37 C (100 F))	5500	1.1
40 C (105 F)	4900	1.0
43 C (110 F)	4200	0.9
46 C (115 F)	3900	0.85
49 C (120 F)	3500	0.77
51 C (125 F)	3100	0.7
54 C (130 F)	2800	0.65
57 C (135 F)	2500	0.6
60 C (140 F)	2000	0.5

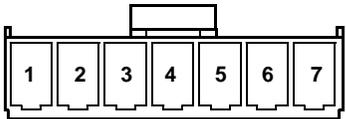
**PINPOINT TEST “H” SOME LED SEGMENTS OF DISPLAY DO NOT WORK**

TEST STEP	RESULT	ACTION
<b>H1:</b> Turn ignition to on position and watch display. Do all display segments light up?	YES	Return vehicle to customer
	NO	Replace mirror head

**PINPOINT TEST “I” DISPLAY DOES NOT DIM AT NIGHT**

TEST STEP	RESULT	ACTION
<b>I1:</b> Ignition on. Is green LED on?	YES	Go to I3
	NO	Go to I2
<b>I2:</b> Push left mirror button. Is green LED on?	YES	Go to I3
	NO	Go to A4
<b>I3:</b> Cover the front photosensor opening with your finger. Does the mirror dim after 10 seconds?	YES	Return vehicle to customer
	NO	Replace mirror head.

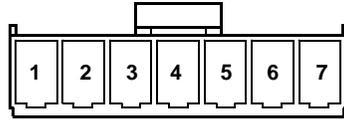
**PINPOINT TEST “J” HOMELINK INOPERATIVE**

TEST STEP	RESULT	ACTION
<b>J1:</b> Inspect B+ to pin 3.  <small>02_1092a</small> Is B+ present?	YES	Replace mirror head.
	NO	Inspect for open fuse, repair or replace as necessary?



**ELECTRICAL CONNECTOR**

## 7-Pin Connector to Mirror Head



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Pin # Harness Side	Color	Description	Notes
1	Black/ White or Black/Blue	Ignition on B+	
2	Black	Ground	Eyelet connects to ground in left kick panel
3	Black	B+	Homelink only
4	Not used		
5	Not used		
6	Black/Green or Black	Temperature Sensor	Pin 6 and 7 are not polarity specific and can be swapped
7	Black/Green or Black	Temperature Sensor	Pin 6 and 7 are not polarity specific and can be swapped

**PART(S) INFORMATION**

Part Number	Description	Qty.	Notes
0000-8C-A07C	Auto-Dimming Mirror Assembly With Compass and Temperature (Kit)	1	2000-2004 Miata, MPV, Protege, and 626:
0000-8C-A06A	Auto-Dimming Mirror Assembly With Compass (Kit)	1	2000-2004 Miata, Millenia, MPV, Protege, 626 and Mazda6
0000-8C-B06A	Auto-Dimming Mirror With Compass and Temperature (Kit)	1	2000-2004 Truck 2002-2004 Tribute
0000-8C-B07C	Auto-Dimming Mirror With Compass (Kit)	1	2000-2004 Truck 2002-2004 Tribute
0000-8C-B13A	Mirror with Compass	1	Truck, Tribute (Replacement Part)

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0000-8C-B14A	Mirror with Compass and Temperature	1	Truck, Tribute (Replacement Part)
0000-8C-A13A	Mirror with Compass	1	Miata, Millenia, MPV, Protege, and 626 (Replacement Part)
0000-8C-A14A	Mirror with Compass and Temperature	1	Miata, Millenia, MPV, Protege, and 626 (Replacement Part)
0000-8C-B10	Harness Assembly (Temperature Sensor)	1	All Models (Replacement Part)
0000-8C-B11	Harness Assembly (Power)	1	All Models (Replacement Part)
0000-8C-B12	Temperature Sensor	1	All Models (Replacement Part)