
Table of Contents

| Subject | Page |
|------------------------------------|------|
| Introduction | 3 |
| Technical Data | 4 |
| Body | |
| Body Shell..... | 7 |
| Interior Features | 12 |
| Instrument Cluster | 13 |
| Front Seats | 15 |
| Seat Belt Assembly..... | 16 |
| Comfort Entry Aid | 17 |
| Seat Memory System..... | 18 |
| Component Locations..... | 21 |
| Mirror Memory System..... | 23 |
| Rear Seats | 25 |
| Top Storage Compartment Floor..... | 26 |

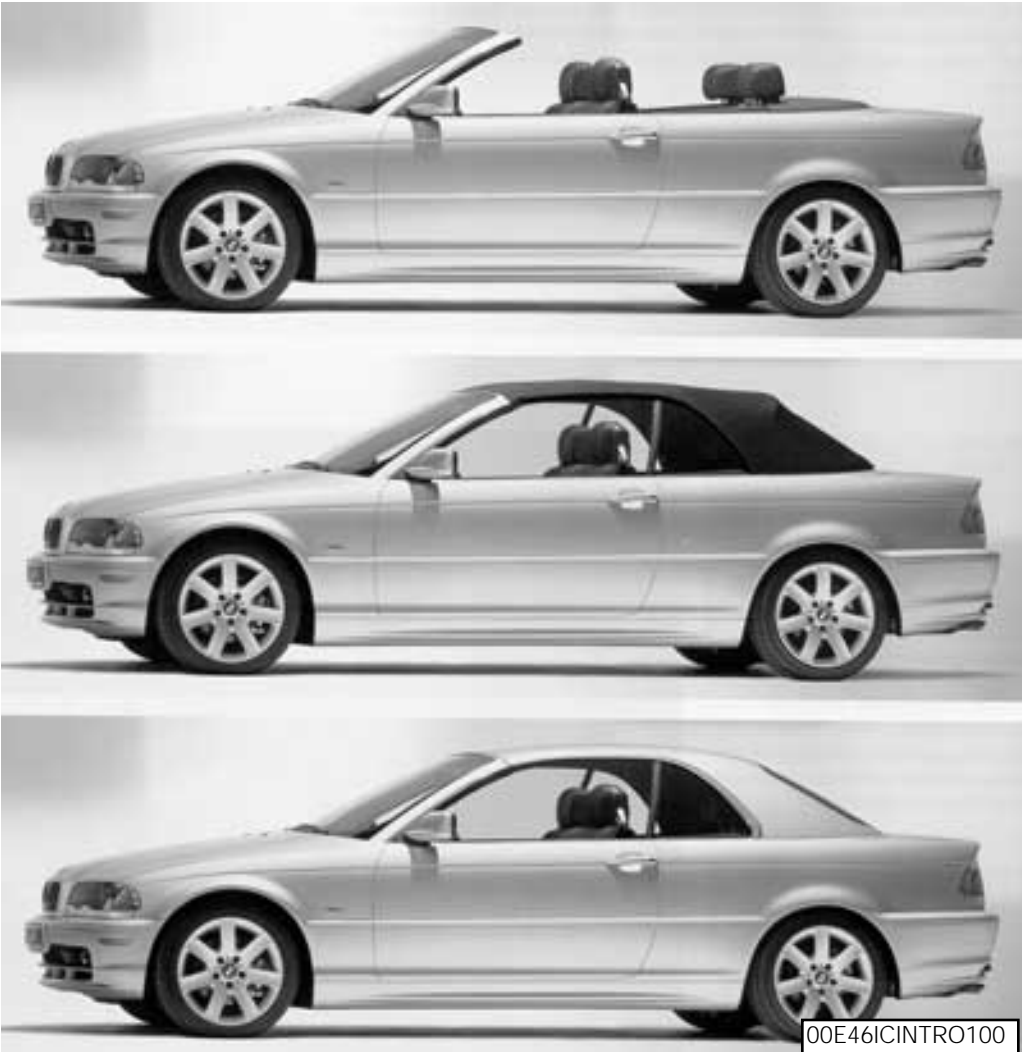
INTRODUCTION

The E46 Convertible is the replacement for the E36 Convertible and is based on the E46 Coupe. It is initially being introduced in March 2000, as a 323 Model only with the M52 TU 2.5 liter engine. The 3 liter version of the E46iC will begin production starting in 6/2000.

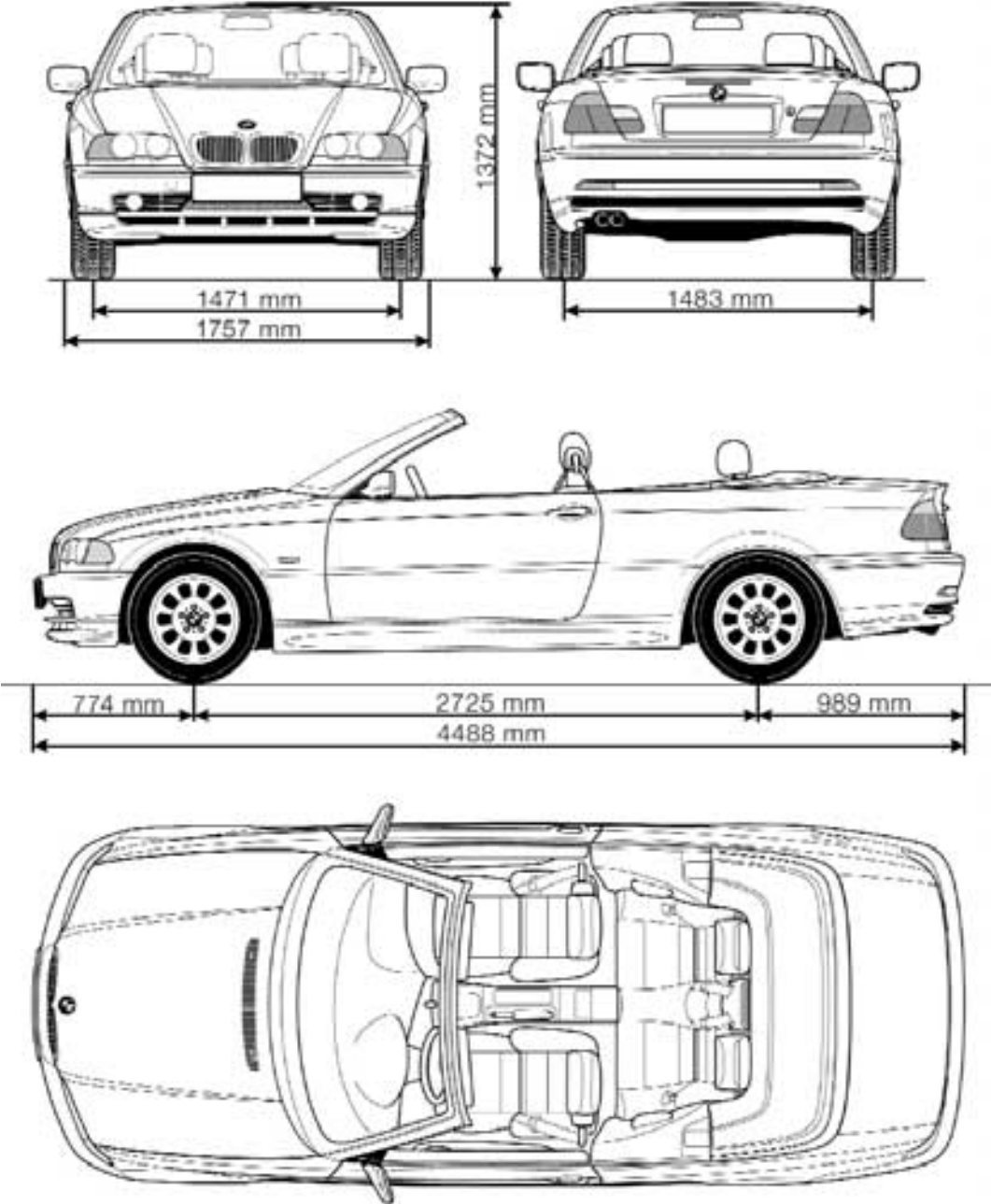
The E46 323 features a new design top that consists of a three layer top and all glass rear window. The 323 comes with a manual top as standard equipment. The new fully automatic electro-hydraulic top is available as an option. The 330 E46iC will come with the fully automatic top as standard equipment.

The roll over protection system is standard equipment and is similar in design to the E36 system. The roll over protection bars are hidden by the rear headrest and deployed under the same criteria as the E36 system.

The front seats of the E46iC are a new design with the seat integrated belt (SGS) system similar to the system introduced on the E31 - 8 series vehicles.



TECHNICAL DATA



TECHNICAL DATA

| | E36 Convertible (323l) | E46 Convertible (323l) |
|--|------------------------------|------------------------------|
|--|------------------------------|------------------------------|

Outside Car Dimensions

| | | |
|---------------------------|-------------|-------------|
| Length (mm) | 4433 | 4488 |
| Width (mm) (With Mirrors) | 1710 (1875) | 1757 (1947) |
| Height (mm) | 1648 | 1372 |

Inside Car Dimensions

| | | |
|--------------------------------|------|------|
| Shoulder Room, front (mm) | 1352 | 1384 |
| Shoulder Room, rear (mm) | 1108 | 1165 |
| Elbow Room, front (mm) | 1412 | 1443 |
| Elbow Room, rear (mm) | 1120 | 1208 |
| Effective headroom, front (mm) | 968 | 974 |
| Effective headroom, rear (mm) | 921 | 937 |

General Information

| | | |
|---|---------------------|---------------------|
| Cd | 0.36 | 3.36 |
| Unladen weight | 3319 (3396 auto) | 3516 (3649 auto) |
| Total Weight | 4035 (4112 auto) | 4322 (4410 auto) |
| Luggage Comp. Volume (L) (Comp Floor Extended) | 230 | 260 (300) |

Speed Rating

| | | |
|------------------------------|-----------------|--------------------------------|
| Top Speed (MPH) | 128 governed | 128 governed |
| Acceleration 0-60 MPH (Sec.) | 7.7 8.8 auto | 8.8 9.7 auto preliminary |

BODY

Body Shell

Model: E46 Convertible
Production Date: 01/00

Objective of the Module:

After completing this module, you should be able to:

- Describe how the body shell is reinforced to improve Torsion Rigidity
- Identify the floor pan reinforcements for energy absorption on the SGS seats.
- Identify the body shell reinforcements necessary for the addition of the Variable Convertible Top Storage Compartment Floor.
- Describe how the windshield frame is reinforced.
- Identify and describe the functions of the tension strut.
- Identify and describe the function of the Aluminum plate.

Purpose of the System:

The body shell of the E46iC has been developed specifically for the convertible to improve crash performance which is similar to the E46 Coupe. This was achieved by the use of reinforcements on the body shell that improved torsional rigidity (body twisting). In the main body floor pan, reinforcements were necessary to accommodate the new SGS (Seat Integrated Belt System) seat system. In the rear floor pan, reinforcements were necessary to account for the variable convertible top storage. compartment floor.



ART-E46BODY3

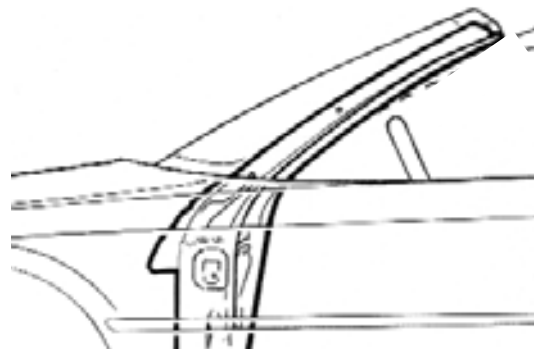
Components of the System

Floor Pan

The floor pan is reinforced to support the SGS seat by heavier cross brace members, reinforced tunnel/floor pan and reinforced engine support brackets. During a collision all forces occurring on the seat are channeled to be absorbed by the floor pan.

Windshield Frame

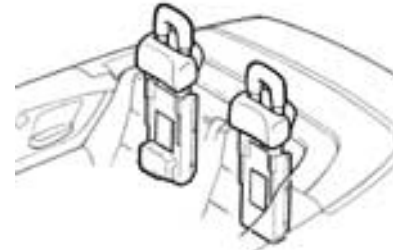
The windshield frame is reinforced with stepped reinforcing tubes to allow it to act as a roll-over protection. During the rollover all of the forces exerted on the A-pillar of the windshield frame are transmitted as a Moment (Torque) to the bottom of the A-pillar where stepped reinforced tubes are reinforced.



ART-E46BODY4

Rear Bulkheads

The rear bulkheads are redesigned to support the roll-over protection and seat belts. They are welded to increase structural rigidity and to secure rear seat, rear seat belts and the mounting point for the ISO child seat.



ART-E46BODY5

Variable Top Storage Compartment

The variable top storage compartment is reinforced to make the top storage compartment rigid and stronger, not to allow twisting moments when the soft top is in its compartment or when the compartment is opened to enlarge the storage area.



Tension Strut

Tension struts are integrated into the rear of the body shell to improve the torsional rigidity by not allowing body twist in the rear. It also keeps the rear end of the car intact with the middle floor pan.

Aluminum Support Plate

An aluminum support plate is incorporated into the front suspension carrier to achieve a high degree of rigidity combined with low weight.



All of these design improvements increased the E46iC torsional rigidity by 50% compared to the E36iC:

- E36 Convertible Torsional Rigidity 6000Nm/degree
- E46 Convertible Torsional Rigidity 9000 Nm/degree

REVIEW QUESTIONS:

1. How is the floor pan on the E46iC improved for structural rigidity?

2. Why was it necessary to reinforce the floor pan on the E46iC?

3. What allows the windshield frame to act as a roll over protection device?

4. Why is the Tension strut integrated at the rear of the body shell?

5. How much is the torsional rigidity improved on the E46iC as compared to the E36iC?

BODY

Interior Features

Model: E46 Convertible
Production Date: 01/00

Objective of the Module:

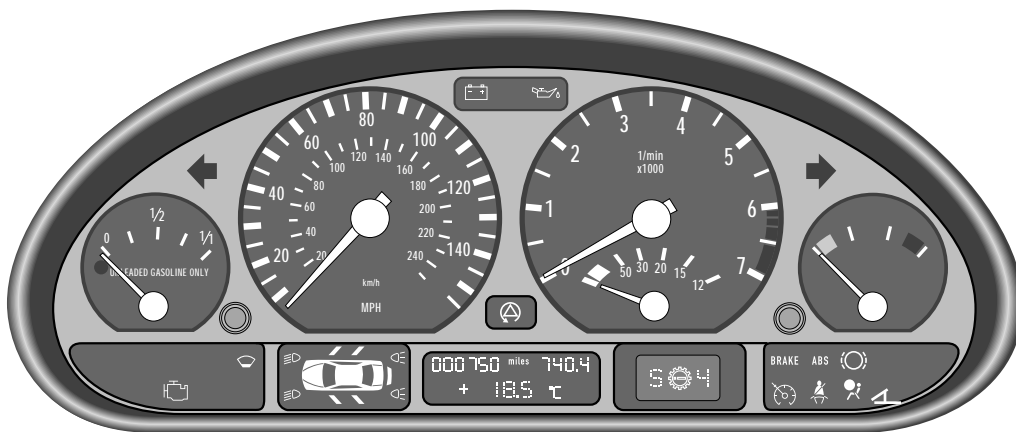
After completing this module, you should be able to:

- Describe how the seat back rest activates the warning lamp in the Instrument cluster.
- Understand the Roll Over Protection warning lamp in the instrument Cluster.
- Describe the operation of the SGS seat system.
- Describe the operation of the Inertia Reel locking mechanism.
- Describe the operation of the "Comfort Entry Aid" system.
- Explain how the two control modules on each seat operates the seat functions.
- Explain the memory function for the "Comfort Entry Aid" System.
- Identify the control modules used for mirror memory.
- Explain how the mirror memory positions are stored and recalled.
- Identify the ISO child seat brackets.
- Describe the operation of the Variable Convertible Top Storage Compartment Floor.

INSTRUMENT CLUSTER

Purpose of the System:

The instrument cluster displays the information about the status of different operating systems in the vehicle. The information is received in the form of dial gauges, LCD display, warning LEDs and Gong sound. Switches are also integrated in the instrument cluster to reset the trip mileage, perform BC functions and to change over some units of measurement e.g. degree F to degree C.



ART-E46BODY8.EPS

Components of the System:

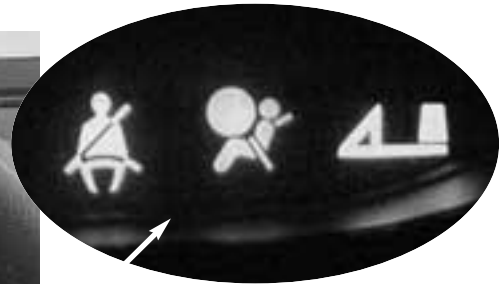
The instrument cluster layout in the E46iC is the same configuration as the E46 Coupe and Sedan. The cluster continues to use five analog gauges to display engine RPM, engine temperature, fuel level and economy display.

There are three LCD blocks to display:

- Check control pictogram
- Service Interval, mileage and outside temperature
- Transmission range program and failure display

Warning indicators and lamps are arranged to the right and left of the LCD blocks. The ASC, charge indicator, high beam and oil pressure lamps are located between the speedometer and tachometer.

INSTRUMENT CLUSTER



62E46ROLLBARSIGNAL0600

New warning indicators are:

Seat Belt warning lamp:

The seat belt warning lamp is illuminated when the seat belt is not fastened and FLASHES when the seat back rest is not locked into position.

Roll Over Protection warning lamp:

Roll over protection warning lamp is illuminated when there is a fault in the Roll over Protection System (RPS).

System Operation:

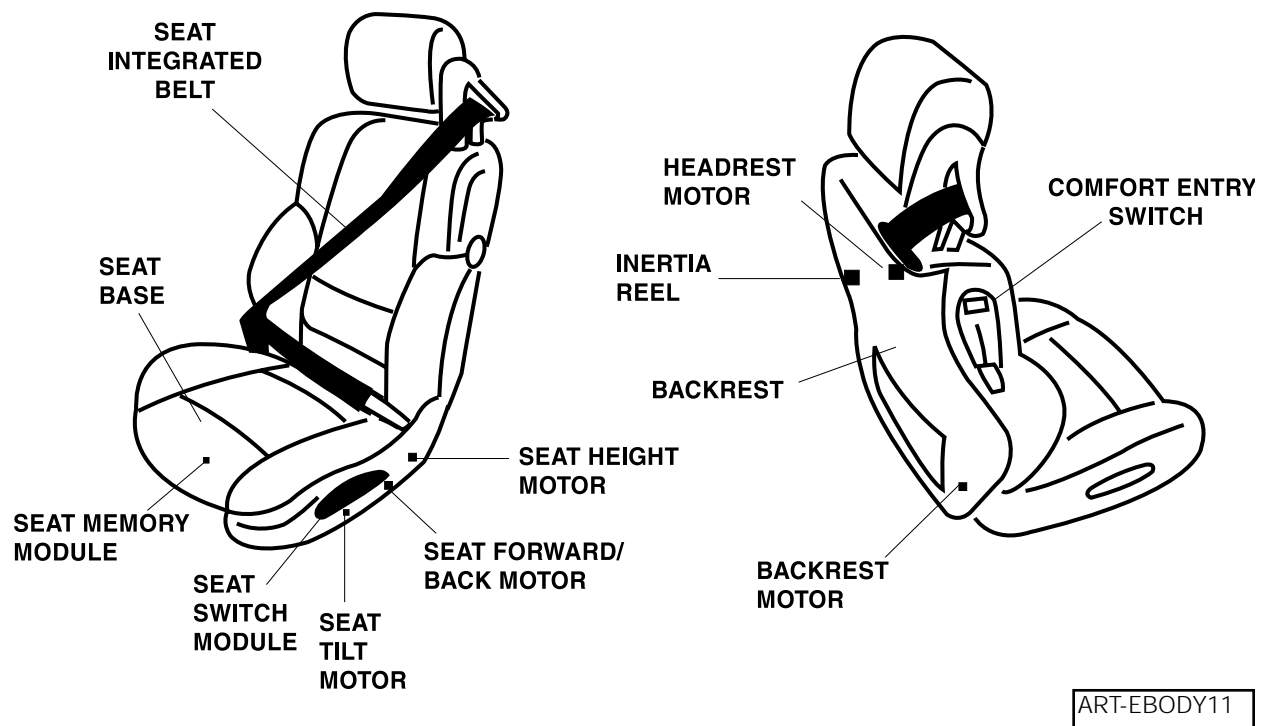
Refer to ST034 handout for the details on the Instrument Cluster operation.

FRONT SEATS

Purpose of the System:

The front seats of the E46iC are designed in such a way that all forces acting on the occupants during collision are reduced to the floor pan by the defined design characteristics of the seat. The front seat also incorporate the Seat Integrated belt System (SGS) and the "Comfort Entry Aid System".

Components of the System:



Seat Integrated Belt System (SGS)

The SGS seat is similar in design to the SGS in the E31. The backrest and seat frame are reinforced to allow the belt system and deflection points to be integrated into the seat. All of the belt fastening points move with the seat as it is adjusted. This ensures the best possible body strapping irrespective of the seat position or body size. With the short free belt lengths, the occupants are held quicker with any vehicle deceleration. The SGS design will cause all forces occurring during a collision to be channeled into the reinforced floor pan.

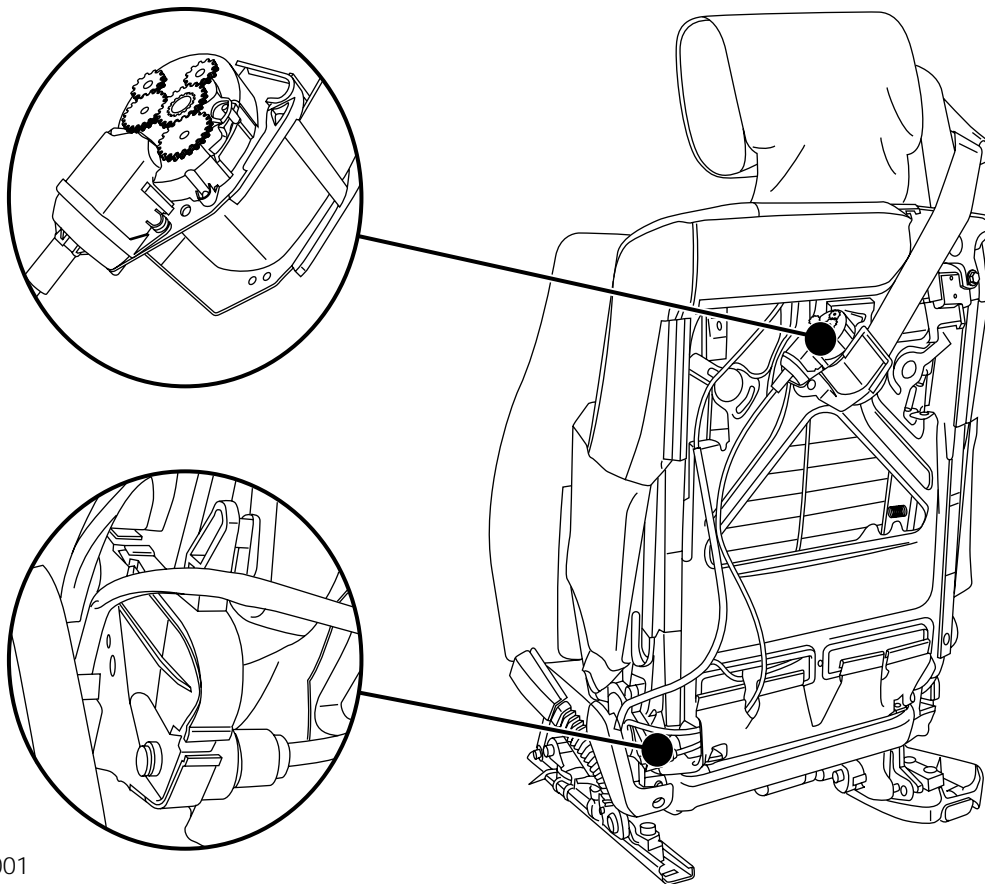
Seat Belt Assembly

The fixed anchor point and seat belt tensioner are mounted on the seat frame. The upper deflection point of the belt is attached to the head rest which causes the belt to be optimally positioned when the head rest is moved.

The inertia reel locking mechanism is attached to the backrest frame of the seat. It consists of two independent triggering devices which act on the inertia reel.

- The first triggering device locks the belt during fast cornering, heavy braking, roll over or during impact.
- The second triggering device serves as an auxiliary safety lock and is controlled by the "Mass Moment of Inertia". The position of the mass moment of inertia is a decisive factor for the belt to lock.

The inertia reel locking mechanism is connected through a lever and a cable drive to a gear assembly on the seat back hinge. As the angle of the backrest is adjusted, the gear assembly and cable drive will change the angle of the inertia lock. This ensures that the lock is in



52460001

Comfort Entry Aid

The switch for the comfort entry aid feature is positioned at the top of the seat back. The switch provides an input to the seat module which activates the seat forward/backward motor.

When pressed forward, the motor rapidly moves the seat to its most forward position.

When the switch is pressed rearward, the seat returns to the previous set position.

When the lever for the backrest is raised and the back rest is pulled forward, the back rest lock switch provides an input to the seat module. The module activates the head rest motor and it moves down to its lowest position. When the seat back rest is relocked, the module activates the head rest motor to return to its previous set position. This feature will only activate when the seat is moved forward far enough to cause the head rest to interfere with the sun visor as the back rest is pulled forward. The seat module recognizes the position of the seat base for activation of this feature.



SEAT MEMORY SYSTEM

Purpose of the System:

The seat memory system uses two control modules on each front seat (driver and passenger). One processor is incorporated into the seat adjusting switch and a second processor is mounted under the seat. The functions of the two control modules is to process the following inputs and outputs to control the seat:

- Seat adjustments
- Comfort entry aid switch
- Seat back rest lock micro switch
- Seat belt fastened
- K-bus communication with the GM V and Instrument Cluster

As with previous systems, the Driver seat memory feature stores three seat positions for recall. The positions are stored in the non-volatile memory preventing loss of positions in case the SM or the battery is disconnected.

Components of the System:

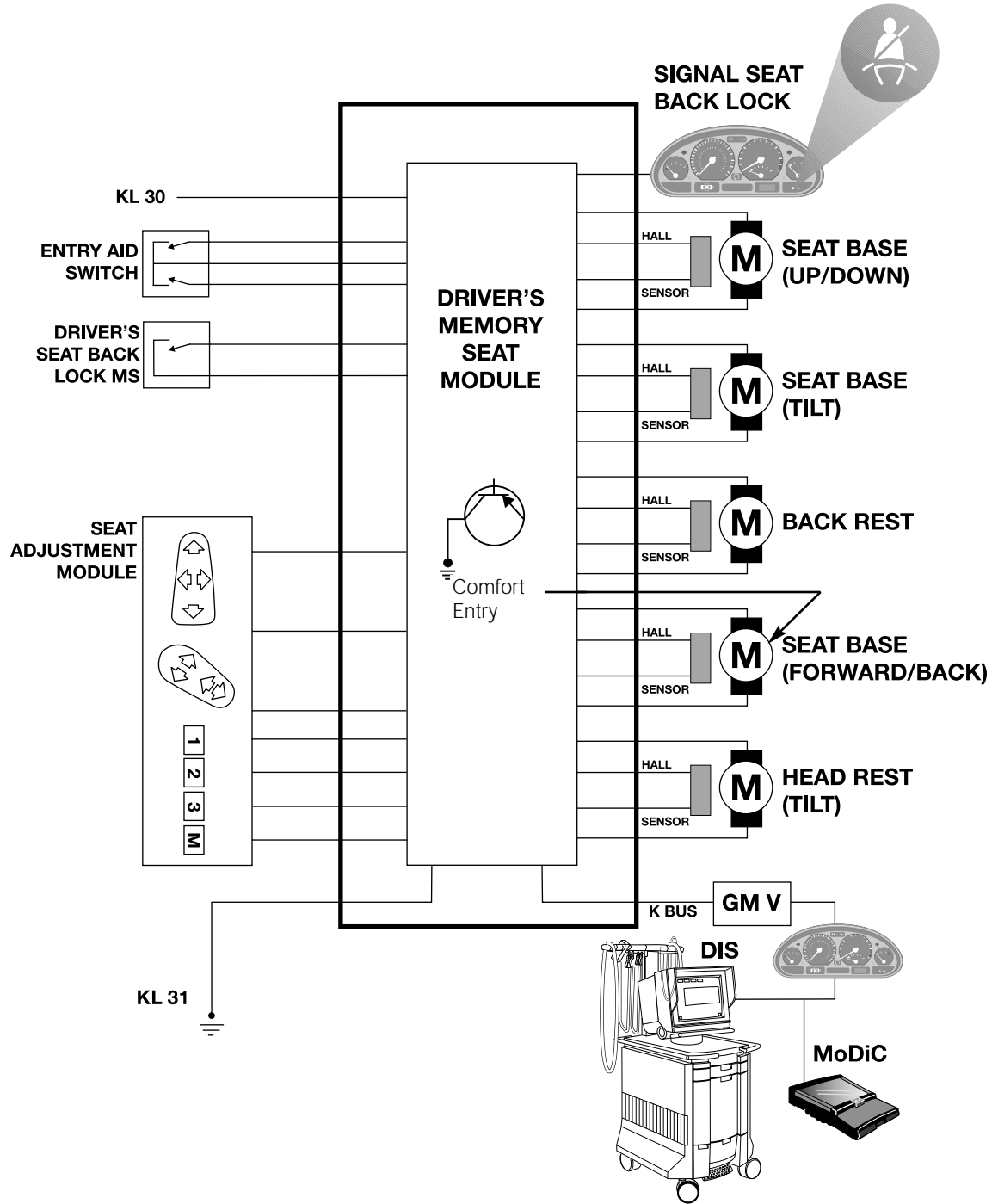
Refer to the Driver's and Passenger's memory seat IPO.

System Operation:

The seat adjusting switch block communicates with the control module over dedicated lines. The output stages for seat motor movement are in the control module. The seat positions are recognized through the use of hall sensors on the motors. All components of the seat memory system are monitored for faults.

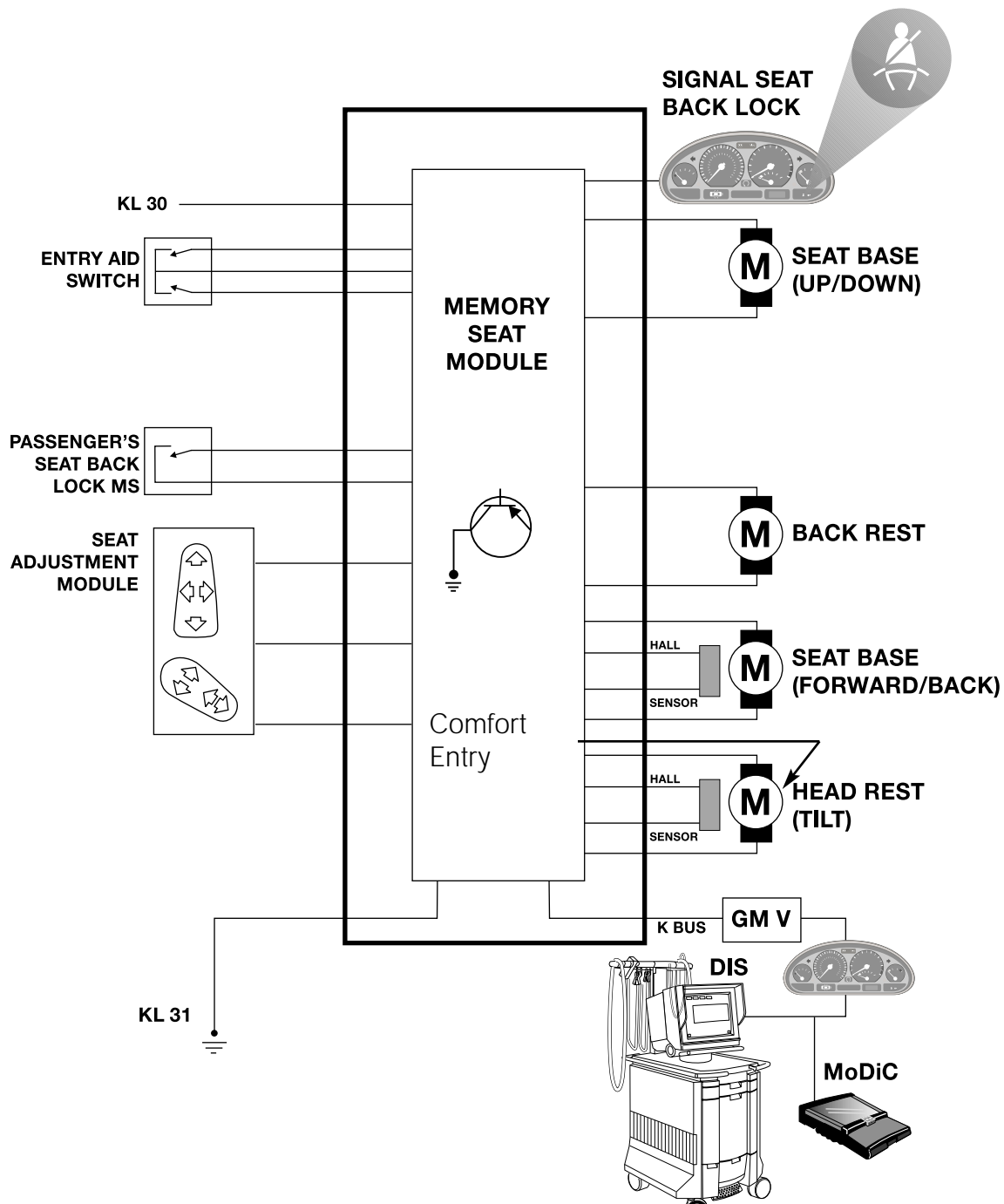
Additional functions of the memory system include memorizing the position of the seat and headrest when the entry aid feature is activated. The seat will return to its previous set position when the entry aid switch is pressed rearward or the seat back rest is locked.

MEMORY SEAT I P O

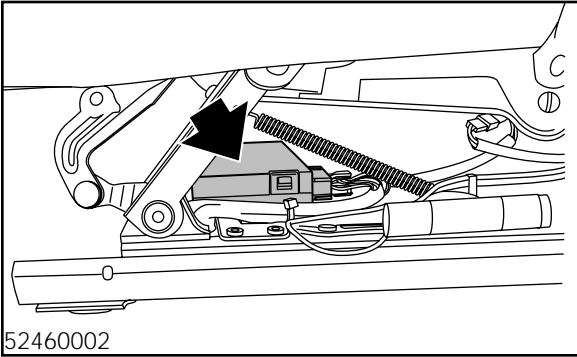


PASSENGER'S SEAT MEMORY IPO

The passenger's front seat incorporates a control module for seat adjustment and the entry aid features. Only the seat forward/back and head rest adjustment motors incorporate hall sensors for position recognition.

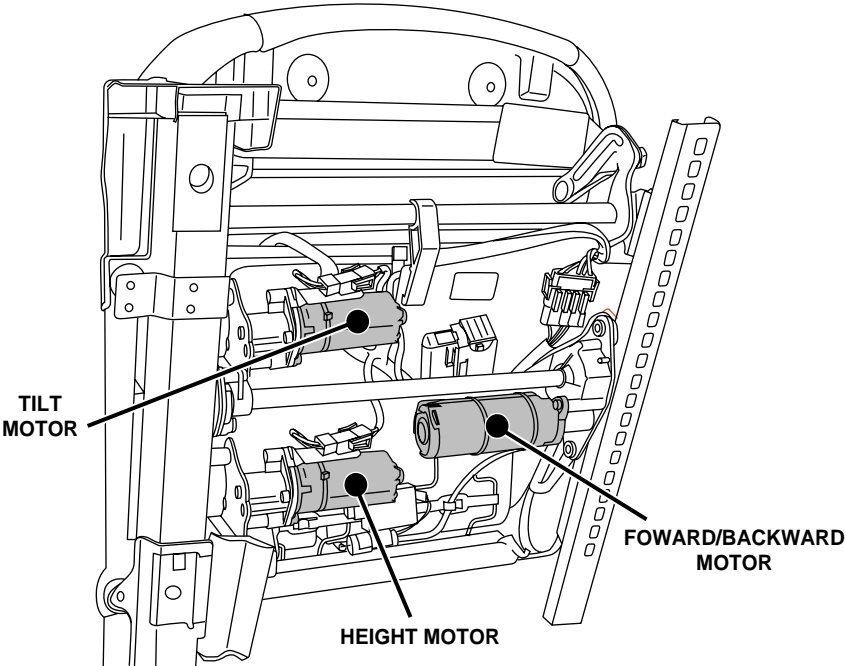


COMPONENT LOCATIONS:



The memory control module for the seat is mounted under the seat base on the seat frame.

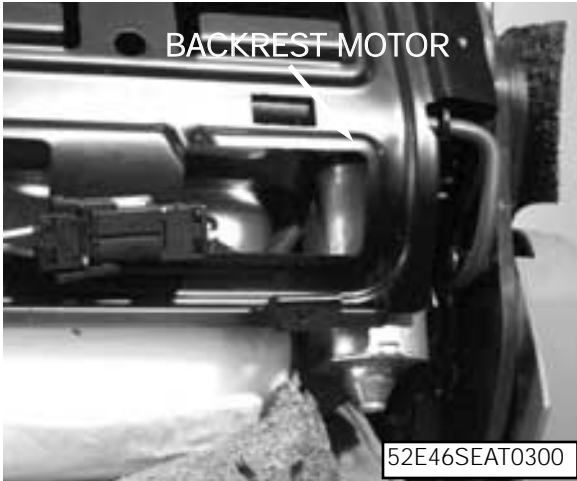
Three seat adjustment motors are mounted under the seat base on the seat frame as follows:



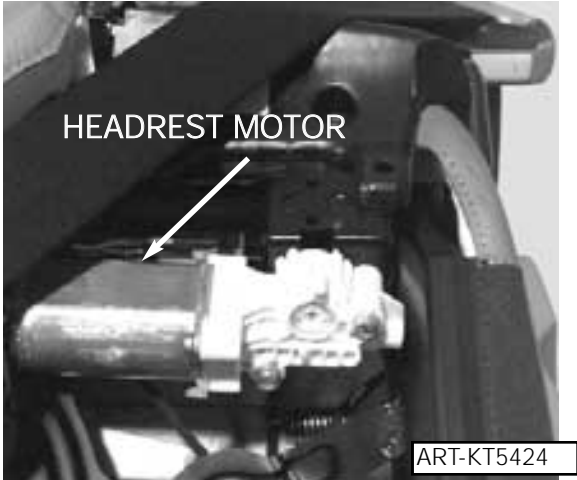
52460003

COMPONENT LOCATIONS:

The backrest adjustment motor is mounted on the lower edge of the backrest frame.



The headrest adjustment motor is mounted at the upper edge of the backrest frame.



MIRROR MEMORY SYSTEM

Purpose of the System:

The function of the mirror memory system is to:

- Memorize mirror positions,
- Adjust mirrors,
- Control heaters for the outside mirrors and windshield spray nozzle
- Communicate with the Driver's seat memory module to recall mirror positions.

Components of the System

The mirror memory system consists of the following components:

- Mirror adjusting switch
- Driver's mirror memory module
- Passenger's mirror memory module
- Driver's seat memory module
- Mirrors with adjusting motors and feedback potentiometer



The mirrors are hinged mechanically to swing up instead of in as on previous mirror systems.

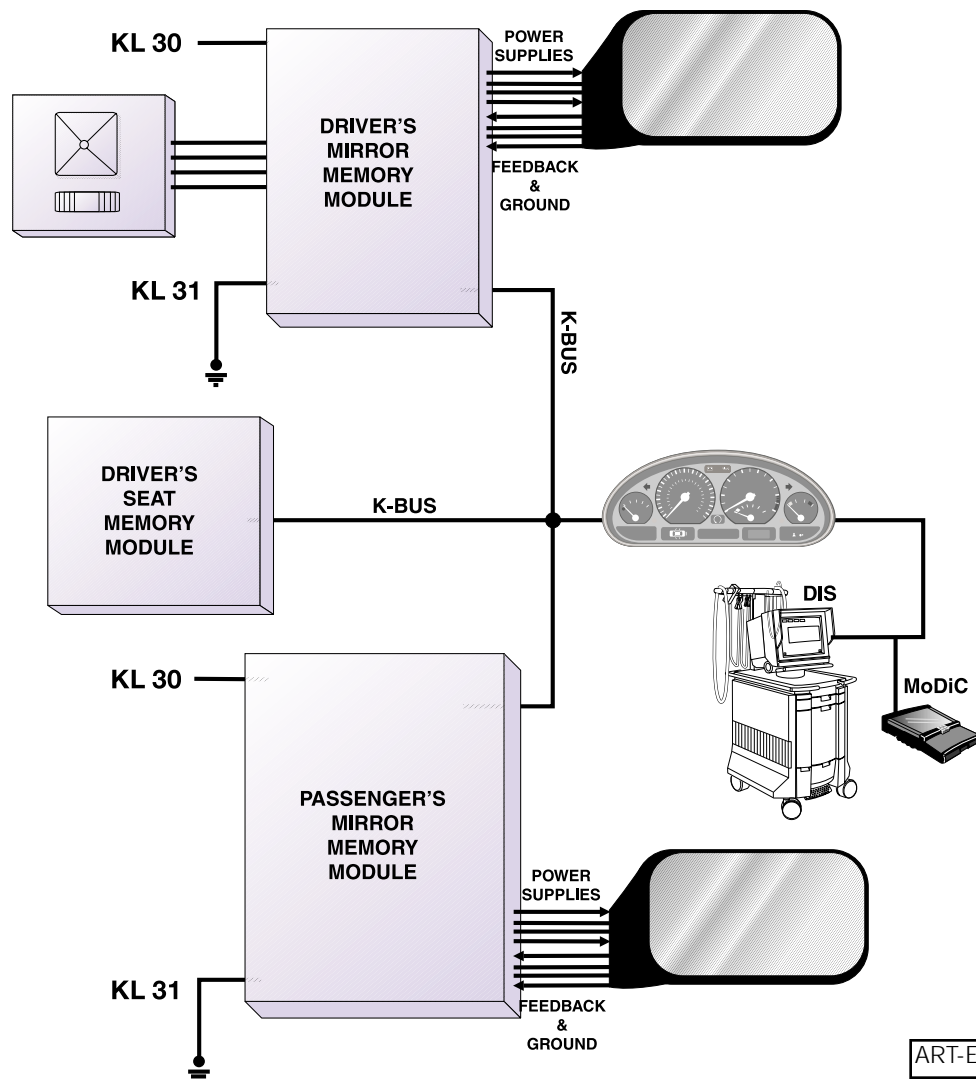


System Operation:

Each mirror module is responsible for mirror adjustment, storage of the mirror positions and mirror heating. Operation of the mirror adjusting switch remains the same for initial setting of the mirror positions. Feedback potentiometers are used for mirror position recognition for memory storage purposes. The driver's mirror module communicates with the passenger's mirror module and the seat module over the K-bus.

When a memory position is set with the seat module, a signal is sent to the mirror modules over the K-bus and the current positions are stored in memory locations 1, 2 or 3 in the respective modules.

When a memory button is pressed for recall of a stored position, the seat module signals the mirror modules over the K-bus to return the mirrors to the stored settings.



ART-E46BODY28

REAR SEATS

The E46iC is designed as a four passenger vehicle. Only two seat belts are installed in the rear that correspond to the seat belt system of the E36iC.



52E46BACKSEAT0200



52E46BACKHEADREST0300

The E46iC is equipped with child seat mounting brackets on the left and right sides below the seat base. The brackets conform to ISO (International Organization of Standardization) for placement on the rear floor pan. Any ISO child seat can be installed by simply sliding the seat into position between the seat base and backrest and locking it into place.



ART-E46BODY30

VARIABLE CONVERTIBLE TOP STORAGE COMPARTMENT FLOOR

Purpose of the System:

The trunk of the E46 convertible offers a new feature called the "Variable Convertible Top Storage Compartment Floor". This feature allows the luggage storage area to be enlarged by approximately 40 liters when the soft top is raised or removed for hard top installation.



MEDIAPOOL-A0020768

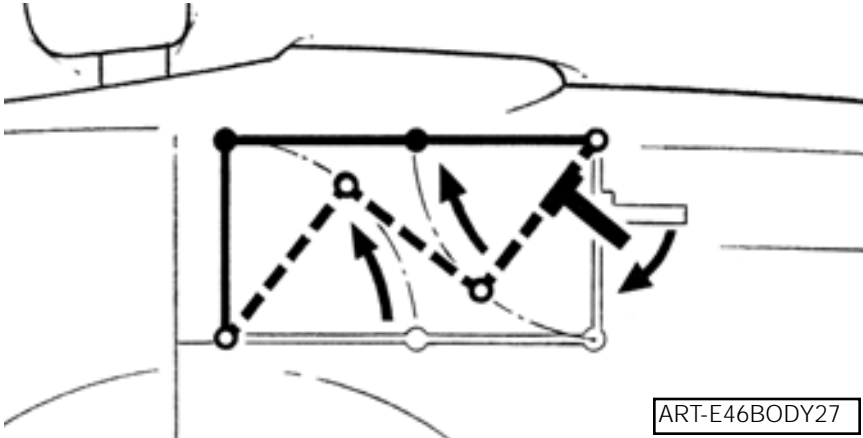


MEDIAPOOL-A0020768

Components of the system:

Variable Compartment Floor

The variable compartment floor is constructed of plastic with fabric covering. It is hinged mechanically so that it can be rotated up into the top storage area providing additional luggage storage space in the trunk. The floor is hinged at four points to allow it to articulate and fold upwards:



ART-E46BODY27

Actuating Lever

An actuating lever is integrated in the variable compartment floor on the right side. It allows the compartment floor to be opened and closed using the actuating lever. It also locks the compartment floor into position.



Dampening Piston

A dampening piston is also integrated in the variable compartment floor on the right side. It assists in the movement of the variable compartment floor to either position and keep it fixed in that set position (retracted or extended). The lower dampening piston hinge switches the micro switch integrated on the right side of the compartment floor when the variable compartment floor is in the raised position. This signal is provided to the CVM to lock out the operation of the convertible-top.



System Operation:

Opening the variable compartment floor

- The convertible top must be raised or removed from the storage compartment.
- Pull the actuating lever rear wards and push it down and toward the rear bulkhead.

Closing the variable compartment floor

- Pull the actuating lever down.
- Pull the compartment floor rear wards to close the floor.

REVIEW QUESTIONS:

1. What has changed with the seat belt warning indicator, and why?

2. What is the purpose of the "Comfort Entry Aid" system?

3. What are the new components integrated into the inertia reel locking mechanism?

4. How is the seat position recognized for the memory storage function on the driver's seat?

5. Which motors on the passenger's seat require position recognition?

6. Which control modules are used for the mirror memory storage/recall function?

7. Where are the memory positions for the mirror adjustment stored?

8. Explain the function of the damping piston on the variable compartment floor?

9. Explain the function of the micro switch on the variable compartment floor?
