

Active seat back width adjustment

E60, E61



Introduction

During cornering, lateral forces are exerted on the occupants in the upper body region.

The active seat back width adjustment counters these forces: The backrest side section on the outside moves inwards slightly. This provides the occupants with support in the upper body region. Active seat back width adjustment is available for the driver's seat and the front-passenger seat (option 4MF).

In contrast to the seat back width adjustment which has been familiar until now, the seat back width is now adjusted **actively**.

2 control units control the active seat back width adjustment:

- Active seat back width, driver's seat (ALBFA)
- Active seat back width, front-passenger seat (ALBBF)

[System overview ...]

Note: Option 4MF only available in conjunction with option 456, not option 455.

Option 4MF "Active seat back width adjustment" is only supplied together with option 456 "Front comfort seat". Option 4MF cannot be combined with option "455 Active seat" (installation area for the control unit).

Note: Active seat back width adjustment also in M5.

The active seat back width adjustment was developed by BMW M GmbH (component of option 4MA "M Multi-function seats for driver and front passenger").

From 09/2005, the "Sport" map has been changed to M5. Please refer to "system functions".

This change will also be incorporated into the E60/E61 at a later date.

Also new:

From 09/2005, the vehicle electrical system has been modified. The body gateway module (KGM) supersedes the safety and gateway module (SGM).

Brief description of components

The following components deliver signals for the active seat back width adjustment:

- **Centre console switch cluster**

2 buttons for active seat back width adjustment are located in the centre console switch cluster (SZM): 1 button for the driver's side, 1 button for the front-passenger side. These buttons have 3 positions. This means that 3 different characteristic maps can be selected: "Comfort", "Normal", "Sport".

[more ...]

- **Control panel for seat adjustment**

Each seat has a seat adjustment control panel. The width of the backrest can be adjusted individually using the "OPEN" and "CLOSE" buttons. The control panel is connected via a K-bus to the centre console switch cluster (SZM).

[more ...]

- **Sensors in the active seat back width adjustment drive**

The drive incorporates the following sensors:

- Limit-position switch
- 2 Hall sensors
- Temperature sensor

The temperature sensor protects against overheating.

The other sensors monitor the drive's position and direction of rotation.

[more ...]

Several control units are involved in the active seat back width adjustment:

- **ALBFA and ALBBF: Active driver seat back width (ALBFA) and active front-passenger seat back width (ALBBF)**

The ALBFA control unit and the ALBBF control unit activate the active seat back width adjustment drives (driver's seat or front-passenger seat). The signals are transmitted to the PT-CAN.

[more ...]

- **DSC: Dynamic Stability Control**

The DSC control unit sends the following signals for seat back width adjustment to the PT-CAN:

- Vehicle road speed

The DSC control unit calculates the car's road speed using the signals from the 4 wheel-speed sensors.

- Longitudinal acceleration

The DSC control unit calculates the longitudinal acceleration using the signal from the DSC sensor.

- Lateral acceleration

The DSC control unit calculates the lateral acceleration using the signal from the DSC sensor.

- Yaw rate

The DSC control unit calculates the rotation around the vertical axis using the signal from the DSC sensor.

- Steering angle

The steering angle sensor determines the steering angle in the steering column switch cluster (SZL). The SZL sends the signal to the DSC control unit via the F-CAN (chassis CAN).

- Steering-angle rate

The steering angle sensor also determines the steering-angle speed in the steering column switch cluster (SZL). The SZL sends the signal to the DSC control unit via the F-CAN (chassis CAN).

- **DME or DDE: Digital engine electronics or Digital diesel electronics**

The engine control unit delivers the "Engine running" signal.

The seat back width adjustment is only activated when the engine is running.

- **SGM or KGM: Safety and gateway module or body gateway module**

>up to 09/2005

The SGM is the gateway between the PT-CAN and the K-CAN. The diagnosis wire is connected to the SGM.

>from 09/2005

The KGM is the gateway between the PT-CAN and the K-CAN. The diagnosis wire is connected to the KGM.

- **SMFA and SMBF: Driver's seat module and front-passenger seat module**

The seat module controls the seat memory. The seat module sends a CAN message in order to set a specific seat back width (memory for seat back width adjustment).

Signal path: Seat module -> K-CAN -> Safety and gateway module (SGM) -> PT-CAN -> ALBFA or ALBBF

The following components are controlled:

- **Drive for active seat back width adjustment**

A drive for seat back width adjustment is located in the left- and right-hand seat backrests.

During cornering, the drive on the outside adjusts the seat back width.

The backrest side section is moved in the process.

[more ...]

- **LEDs in the centre console switch cluster**

3 LEDs are positioned above the button in the SZM. The LEDs are activated depending on which characteristic map is selected (Comfort, Normal, Sport).

[more ...]

System functions

The following system functions of active seat back width adjustment are described:

- Active seat back width adjustment
- Undervoltage and overvoltage
- Easy Entry facility for driver's seat and front-passenger seat
- Centring for setting of seat back width adjustment
- Soft start and soft stop of seat back width adjustment drive
- Memory for the seat back width
- Special feature of MDrive in M5

Active seat back width adjustment

If the active seat back width adjustment is activated, the outside backrest side section is activated during cornering. The drive adjusts the backrest side section during cornering until the lateral forces are supported. A stable seat position is thus maintained.

For actuation, the following signals are evaluated:

- Vehicle road speed
- Lateral acceleration
- Longitudinal acceleration
- Yaw rate (rotation around the vertical axis)
- Steering angle
- Steering-angle rate
- The engine must be running

> From 09/2005 in M5

On stretches of road with many bends, the two armrest side sections are incorporated into the "Sport" map. The winding stretch of road is detected by the changing lateral acceleration.

This change will also be incorporated into the E60/E61 at a later date.

Undervoltage and overvoltage

The active seat back width adjustment control unit detects undervoltage and overvoltage.

Undervoltage On-board supply voltage less than 9 volts

Overvoltage On-board supply voltage greater than 16 volts

Easy Entry facility for driver's seat and front-passenger seat

For ease of access, the seat back width adjustment is opened completely.

The Easy Entry facility for the driver's seat is activated under the following conditions:

- Driver's door is opened
- Terminal R is switched off when the driver's door is closed

The Easy Entry facility is deactivated at terminal 15 ON. The stored seat back width is approached.

The Easy Entry for the front-passenger seat is activated under the following conditions:

- Door on the passenger side is opened when the seat belt has not been fastened.

Centring for setting the seat back width adjustment

Following every manual adjustment, the position of the backrest side section is tracked. During this process, compensation is made for any difference between the left and right position. Compensation is made if the signals from the Hall sensors vary by at least 5 Hall pulses.

Centring begins 1 second after a seat back width adjustment has been made. If one attempt fails, the centring process is repeated 2 seconds later.

Active centring is interrupted by manual adjustments.

If the active seat back width adjustment is activated, the seat back width is not tracked.

Soft start and soft stop of drive for seat back width adjustment

The start and stop for the drive is specially controlled.

Soft start and stop of the seat back width adjustment drive leads to a:

- Decrease in power consumption (no voltage peaks)
- Decrease in noise during adjustment

The soft stop also prevents overrun of the drive.

Memory for the seat back widths

The following positions for the seat back width can be stored in the seat memory:

- 2 positions for each personalised key: Memory button 1 and 2 (on control panel for seat adjustment)
- The last setting selected for the key which is currently used (only for the seat back width memory on the driver's seat)

The last setting selected is stored for the key which is currently in use as follows:

- 10 seconds after a manual seat back width adjustment
- A memory key or the memory button is pressed (triggered by the seat module)
- Terminal change from terminal 15 to terminal R

The seat module sends a CAN message to the seat back width adjustment control unit. The control unit activates the stored seat back width position.

Special feature of MDrive in M5

The "MDrive" button can be found on the steering wheel of the M5. If MDrive is selected, a message is sent from the engine control unit via the PT-CAN. This message causes specific adjustments in the vehicle to be made.

The required settings are selected by the user via iDrive at the Central Information Display (CID).

Settings can be selected for the following systems:

- Sequential manual transmission
- Engine control
- Chassis
- Dynamic Stability Control
- Active seat back width adjustment
- Head-up display

If the seat back width adjustment control unit receives the message, the characteristic curve set in CID is selected.

The LED in the centre console switch cluster (SZM) which corresponds with the selected setting lights up.

If another characteristic curve is subsequently selected at the SZM, the setting in CID is not overwritten.

Operation

The maximum adjustment range depends on the seat back width which has been set manually.

- "Comfort" characteristic curve: maximum range of adjustment - 80% (with 50% pulse width modulation)
- "Normal" characteristic curve: maximum range of adjustment - 100% (with 65% pulse width modulation)
- "Sport" characteristic curve: maximum range of adjustment - 100% (with 80% pulse width modulation; 85% for M5)

Preconditions for activation

The active seat back width adjustment is deactivated if the engine is switched off.

The control unit retains the characteristic map selected if the ignition is switched back on again 15 minutes after terminal 15 OFF (run-on time).

Notes for service staff

The following information is available for service staff:

- General note: [more ...]
- Diagnosis: [more ...]
- Encoding/programming: ---

Subject to change.