

512 Door Windows

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GENERAL

This repair group covers door glass and window regulator repair information. The windshield, rear window and fixed rear door glass are bonded using special adhesives and tools. For bonded glass replacement, see an authorized BMW service facility or an automotive glass installer.

See also:

- **411 Doors** for door trim panel
- **515 Central Locking and Anti-theft**
- **612 Switches** for electric window switch replacement
- **721 Airbag System (SRS)** for side-impact airbag information

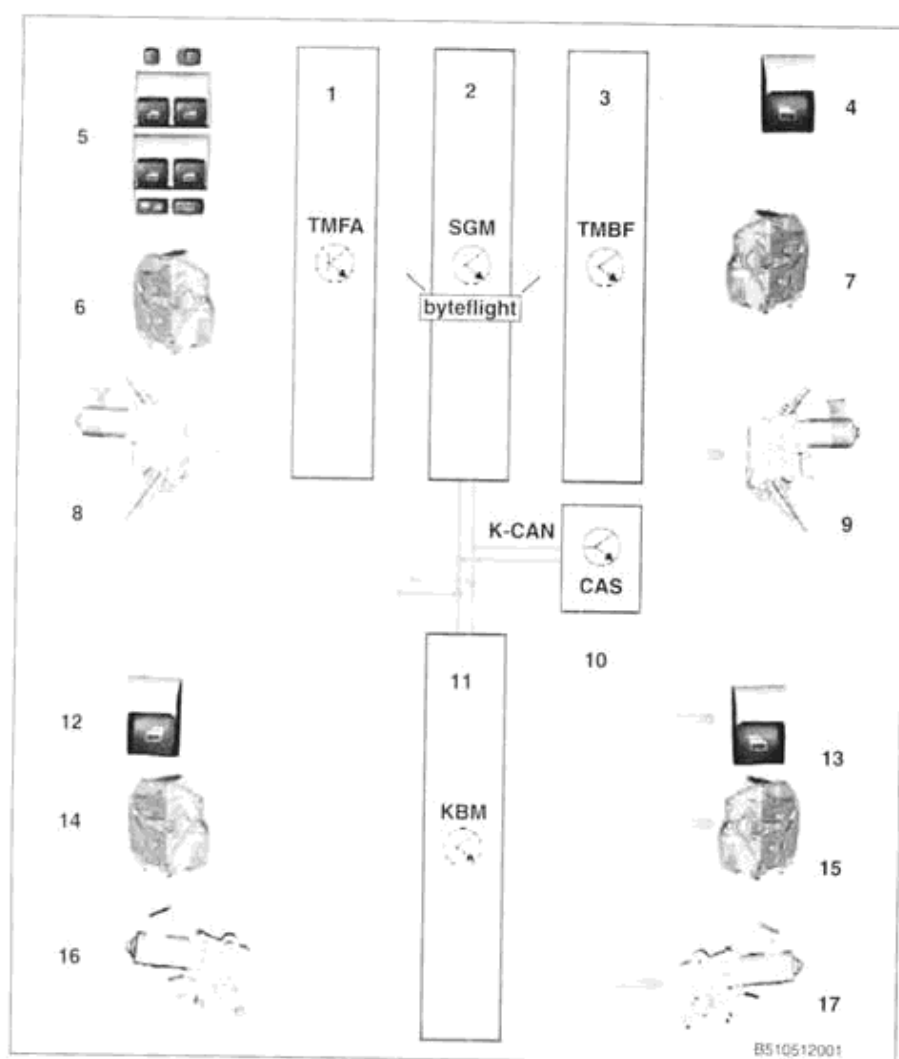
Power window features

- **To 09 / 2005:** Front door window motor activated by door module.
- **From 09 / 2005:** Front door window motors activated by body gateway module (KGM).
- Rear door window motors activated by body base module (KBM).
- Convenience operations controlled by car access system (CAS).
- One-touch operation in both directions on all four windows.
- Cable-type window regulator used for all door windows.
- Anti-trap protection monitors window motor torque.
- Convenience opening / closing from driver's lock cylinder and from remote key.
- Window operation customized by owner with Car Memory function. See **515 Central Locking and Anti-theft**.
- After ignition is switched OFF, electric windows can be operated until a door is opened, or until 16 minutes has elapsed.

512-2 Door Windows

Power window control modules to 09 / 2005

Power window control modules to 09 / 2005



1. Left front door module (TMFA)
2. Safety gateway module (SGM)
3. Right front door module (TMBF)
4. Right front window switch
5. Left front window master switch
6. Left front door latch
7. Right front door latch
8. Left front window motor
9. Right front window motor
10. Car access system (CAS)
11. Basic body module (KBM)
12. Left rear window switch
13. Right rear window switch
14. Left rear door latch
15. Right rear door latch
16. Left rear window motor
17. Right rear window motor

Car access system (CAS) is the master control module for lowering and raising the windows.

Door modules (TMFA, TMBF) contain separate modules for door electronics and advanced safety electronics (ASE).

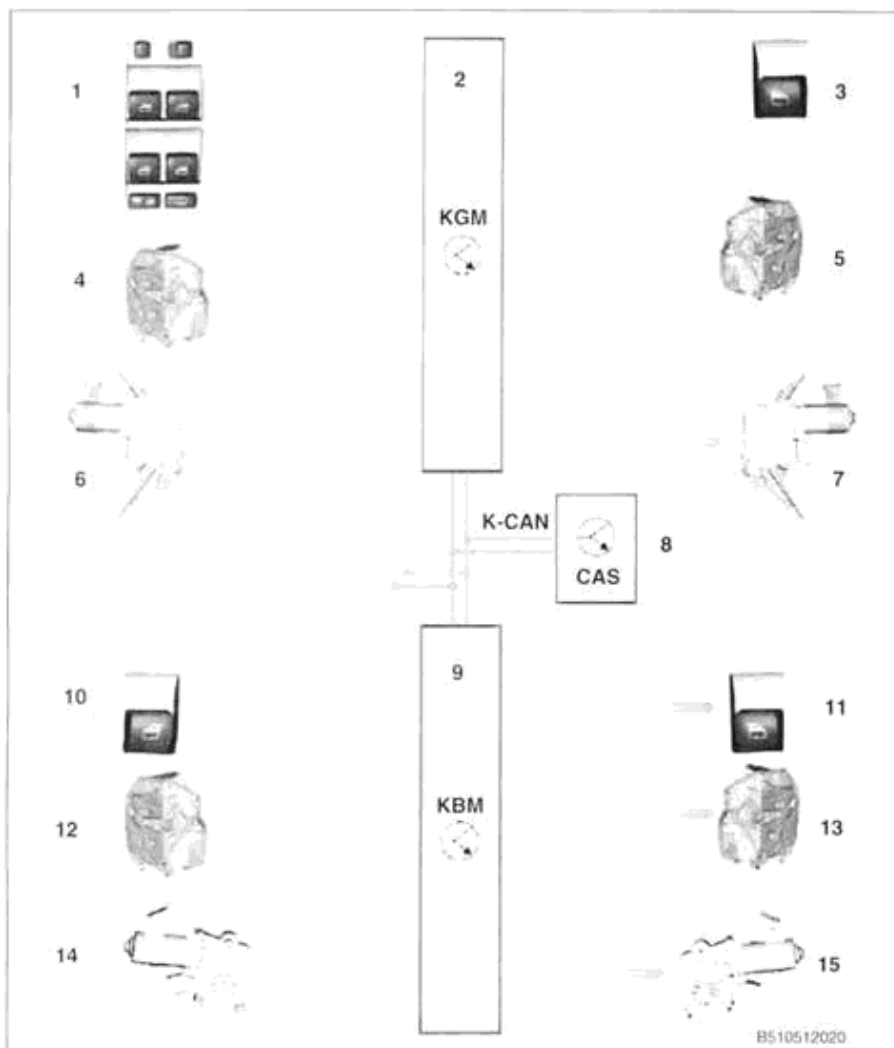
Door modules are the interface between:

- Left front window master switch
- Right front window switch
- Power-window motor
- Door contacts

Safety gateway module (SGM) converts and forwards messages to and from the byteflight and K-CAN.

Basic body module (KBM) receives signal from the rear door window switches via CAN bus through SGM and provides power and ground to the rear window motors.

Power window control modules from 09 / 2005



1. Left front window master switch
2. Body gateway module (KGM)
3. Right front window switch
4. Left front door latch
5. Right front door latch
6. Left front window motor
7. Right front window motor
8. Car access system (CAS)
9. Basic body module (KBM)
10. Left rear window switch
11. Right rear window switch
12. Left rear door latch
13. Right rear door latch
14. Left rear window motor
15. Right rear window motor

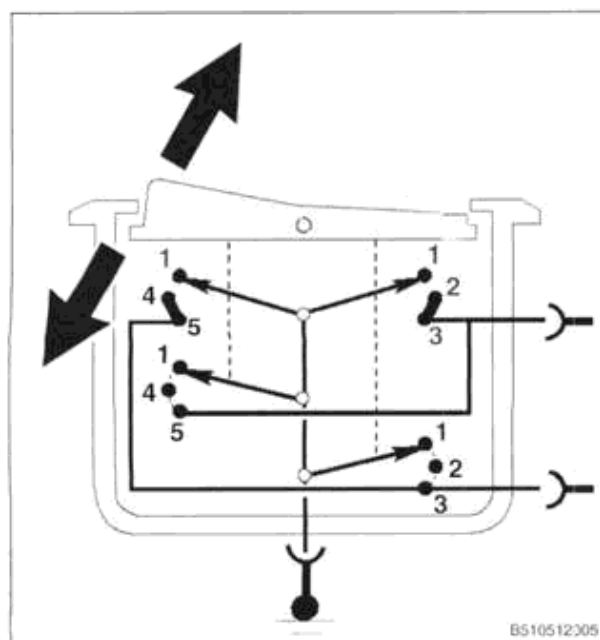
Car access system (CAS) is the master control module for lowering and raising the windows.

Body gateway module (KGM) receives signal from the front door window switches and provides power and ground to the rear window motors.

Basic body module (KBM) receives signal from the rear door window switches via CAN bus through SGM and provides power and ground to the rear window motors.

512-4 Door Windows

Window switches



Window switches

Front window switches

➤ **To 09 / 2005:** When the power window switch for the window in the driver door or front passenger door is operated the driver window switch cluster sends a signal via the LIN-bus to left front door module (TMFA). TMFA then actuates the corresponding power window motor.

From 09 / 2005: When the power window switch for the window in the driver's door or front passenger's door is operated, the driver window switch cluster sends a signal via the LIN-bus to KGM. KGM then actuates the corresponding window motor.

To 09 / 2005: When the power window switch for the window in a rear door is operated, the driver window switch cluster sends a signal via LIN-bus to TMFA. TMFA sends the signal via byteflight to the SGM. SGM converts the signal and sends it on K-CAN to CAS. CAS evaluates the signal and sends a command to SGM on K-CAN. SGM forwards the command signal via the byteflight to right front door module (TMBF). TMBF receives the command for window movement, and the window motor is then moved.

From 09 / 2005: When the power window switch for the window in a rear door is operated, the driver window switch cluster sends a signal via LIN-bus to KGM. KGM then sends a signal to KBM and KBM actuates the corresponding window motor.

Rear window switches

➤ When the power window switches in the rear doors are operated a signal is sent to KBM and KBM then actuates the corresponding window motor.

➤ Window switch positions:

1. Off
2. Open
3. One touch open
4. Close
5. One touch close

The window toggle switch provides the corresponding control module with a coded ground signal. Holding a switch at the first detent provides a single ground signal on one wire requesting the module to open the window. When released, the ground signal is removed and the window motor stops.

Momentarily pushing the switch to the second detent and releasing provides an additional ground signal on the second wire requesting one touch mode. The corresponding module lowers the window automatically until it reaches the end position.



Rear window child lockout switch

✦ The rear window child lockout switch (**arrow**) is incorporated in the driver's window switch block.

To 09 / 2005: When activated, lock out switch provides a signal via LIN-bus to TMFA. TMFA sends the signal via byteflight to the SGM. SGM converts the signal and sends it on K-CAN to CAS. CAS prevents windows from being operated from the rear door switches.

From 09 / 2005: When activated, lock out switch provides a signal via LIN-bus to the KGM. KGM sends the signal via K-CAN to CAS. CAS prevents windows from being operated from the rear door switches.

The lockout switch signal is overridden if a multiple restraint system (MRS) crash signal is received.

Power window motors

The window motors are mounted on cable regulators. The window motor control circuit consists of two wires for operating the motor in both directions.

To 09 / 2005: The motors are activated by relays in the TMFA, TMBF and KBM. The relays provide either power or ground depending on the direction of window travel. TMFA, TMBF and KBM controls the polarity based on a request to run the window from a window switch or a convenience opening / closing signal.

From 09 / 2005: The motors are activated by relays in the KGM. The relays provide either power or ground depending on the direction of window travel. KGM controls the polarity based on a request to run the window from a window switch or a convenience opening / closing signal.

Convenience opening / closing

The CAS module provides the convenience open / close feature, providing control of the power windows (and sunroof) from outside the vehicle using the key in the driver's door lock, or with the remote key.

Anti-trap protection is active during convenience closing from the driver's door lock.

If the CAS module receives a request to operate convenience closing or opening for more than 110 seconds, the function is deactivated and a fault code is stored.

Window anti-trap protection

Anti-trapping function does not prevent an object being trapped but rather limits the trapping force to maximum 80 Nm. The power window motor is reversed when this force is exceeded.

Anti-trapping function is based on the evaluation of power window motor Hall sensor pulses. During initialization, the speed of Hall sensor pulses is learned. Speed fluctuations within a certain range triggers the anti-trapping function.

512-6 Door Windows

Panic mode

If window is not initialized or a faulty hall sensor is detected the window will only move in small increments.

Panic mode

Panic mode can be used to close a window in the event of an emergency. It is triggered by overpulling - releasing - overpulling (overpulling means pulling the switch beyond its limit stop) the power window switch. It is necessary to release and overpull the switch again in order to deactivate the anti-trapping protection function, which is still active the first time the switch is overpulled.

Overpulling the power window switch the second time within 4 seconds closes the window with maximum force.

Anti-trapping function is not active during panic mode. The window closes at the maximum closing force and does not reverse.

Warnings and Cautions

WARNING—

- *5 Series models are fitted with side-impact airbags in the front door trim panel. When servicing the door windows on cars with side-impact airbags, disconnect the negative (-) battery cable. See 721 Airbag System (SRS) for cautions and procedures relating to the airbag system.*
- *Wear hand and eye protection when working with broken glass.*
- *If a window is broken, vacuum all of the glass bits out of the door cavity. Use a blunt screwdriver to clean out any remaining glass pieces from the window guide rails.*
- *When servicing the door windows, the harness connector to the window regulator should always be disconnected to prevent pinching fingers in the moving window mechanism.*

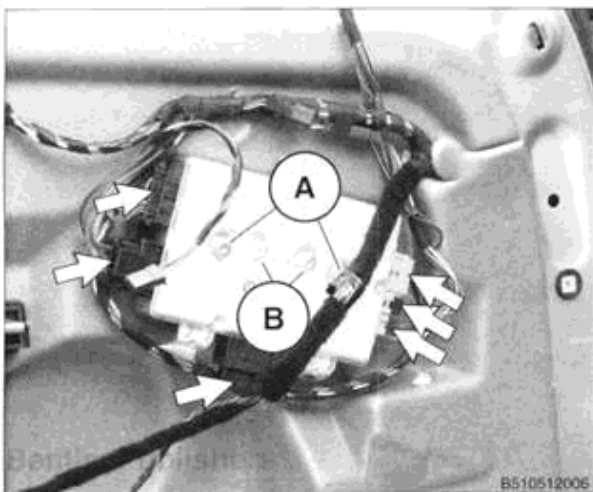
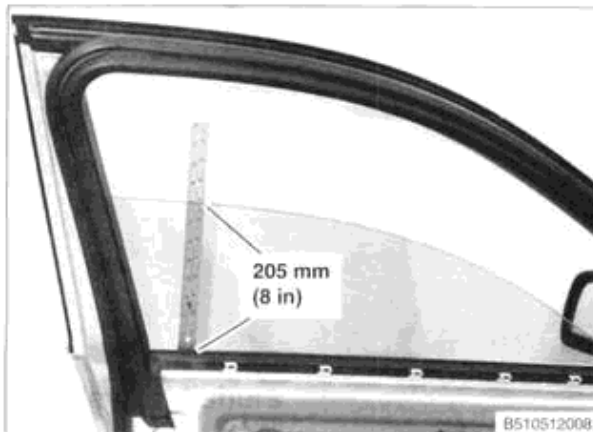
CAUTION—

- *Prior to disconnecting the battery, read the battery disconnection cautions given in 001 Warnings and Cautions.*

WINDOW SERVICE

Front door window, removing and installing

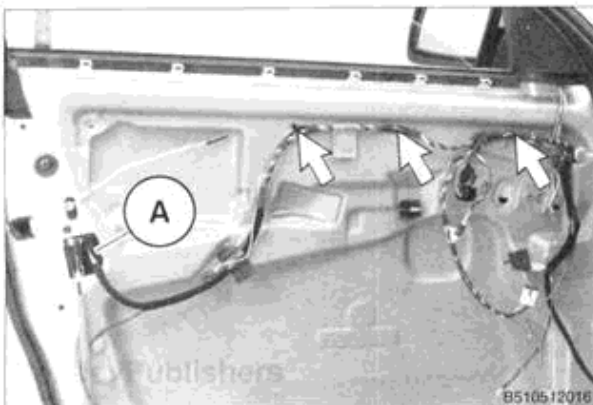
- Remove door panel. See **411 Doors**.
- Using BMW scan tool, print or note Car and Key Memory settings.
- ◀ Lower window to 205 mm (8 in.).



- ◀ To 09 / 2005: Detach door module electrical connectors (**arrows**), remove fasteners (**A**) and remove door module from door.

CAUTION—

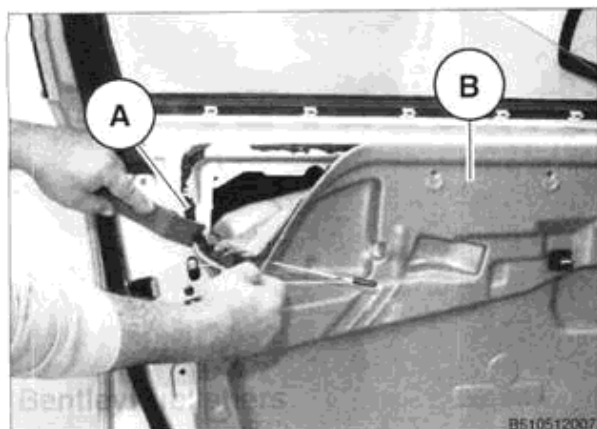
- Do not remove center door module fasteners (**B**). Doing so will damage door module.



- ◀ Detach wire mount brackets (**arrows**). Disconnect door latch electrical connector (**A**) and lay wire harness aside.

512-8 Door Windows

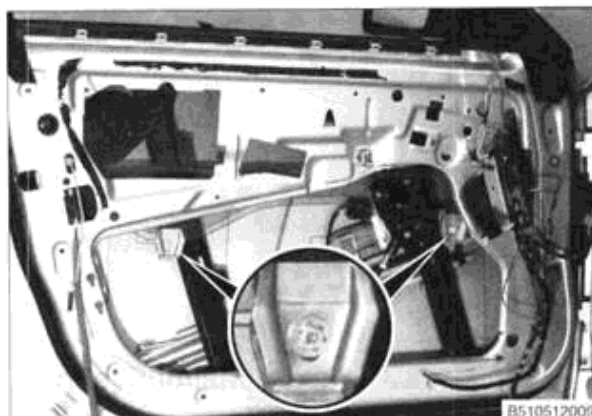
Front door window, removing and installing



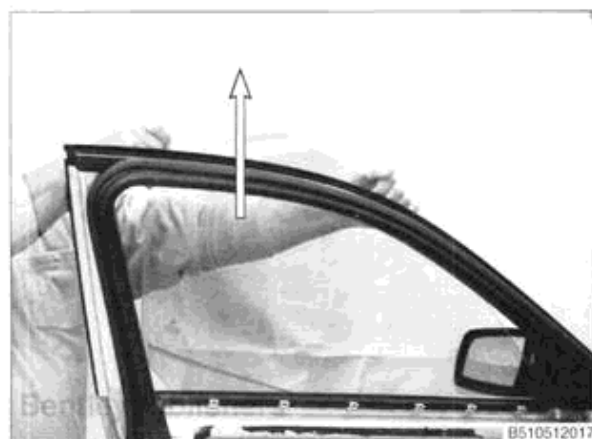
- Using a sharp plastic scraper, lever sealing bead (A) off vapor barrier (B).

CAUTION—

- Use care when peeling back vapor barrier. Replace a damaged vapor barrier to prevent possible water leaks and insure proper operation of side impact airbags.



- Loosen window glass mount fasteners (inset).



- Tilt and lift glass out of door in direction of arrow.

— Installation is reverse of removal, noting the following:

- Adjust door window if necessary. See **Front door window, adjusting**, in this repair group.
- Initialize power window. See **Initializing windows** in this repair group.

Tightening torques

Door window glass mount	8 Nm (5.9 ft-lb)
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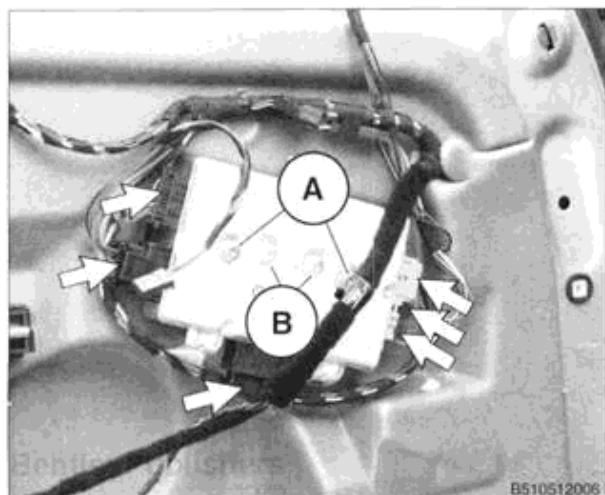
Front door window, adjusting

- Using BMW scan tool, print or note Car and Key Memory settings.
- Fully close door window to be adjusted.
- Remove front door panel. See **411 Doors**.

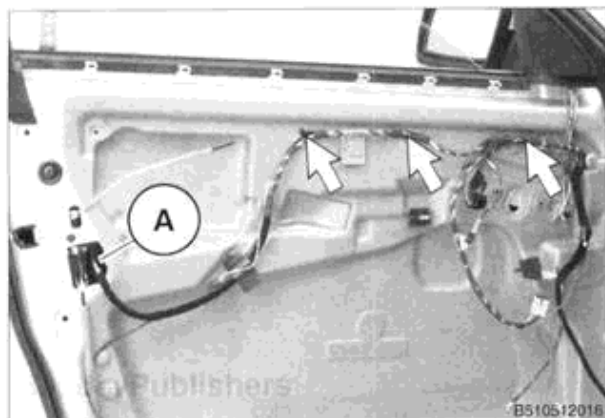
⚠ **To 09/2005:** Detach door module electrical connectors (**arrows**), remove fasteners (**A**) and remove door module from door.

CAUTION—

- Do not remove center door module fasteners (**B**). Doing so will damage door module.



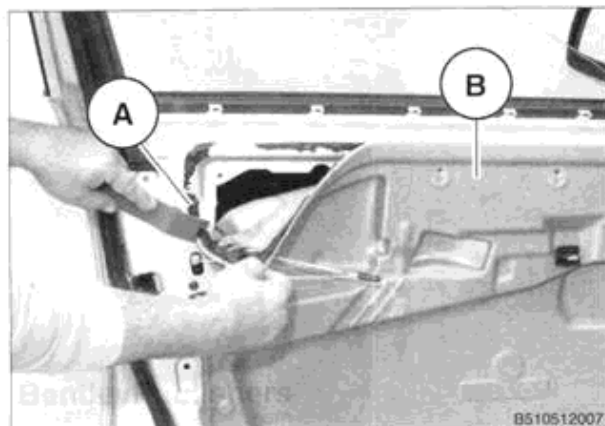
⚠ Detach wire mount brackets (**arrows**). Disconnect door latch electrical connector (**A**) and lay wire harness aside.



⚠ Using a sharp plastic scraper, lever sealing bead (**A**) off vapor barrier (**B**).

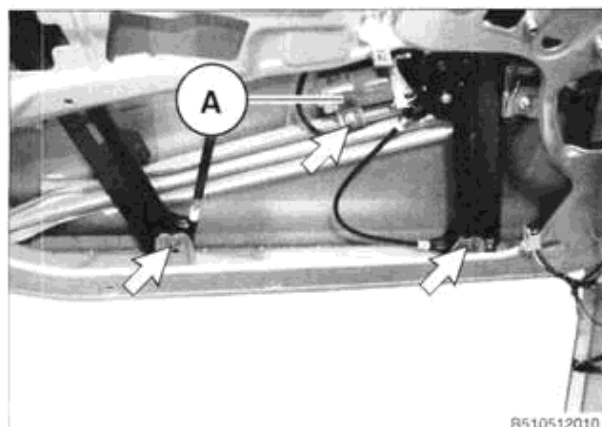
CAUTION—

- Use care when peeling back vapor barrier. Replace damaged vapor barrier to prevent possible water leaks and insure proper operation of side impact airbags.



512-10 Door Windows

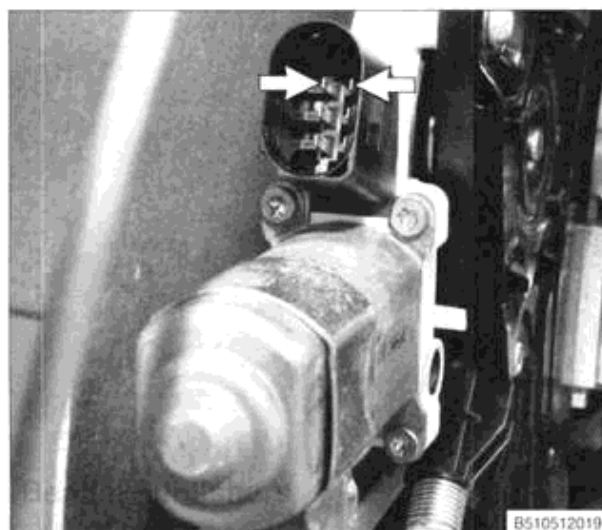
Front door window, adjusting



- Loosen window regulator fasteners (**arrows**). Do not remove window motor mount (**A**). Disconnect power window motor electrical connector.

CAUTION—

- Do not loosen fasteners at top of window regulator.



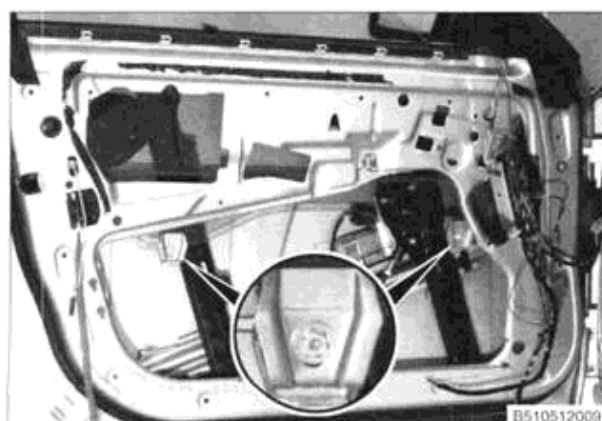
- Connect fused jumper leads to power window motor terminals (**arrows**). Open window approximately 100 mm (4 in) by connecting jumper leads to an external 12 volts power source.

CAUTION—

- Do not activate power window motor in excess of 0.5 seconds once limit position is reached.

NOTE—

- Reversing polarity of jumper leads reverses direction of power window motor.



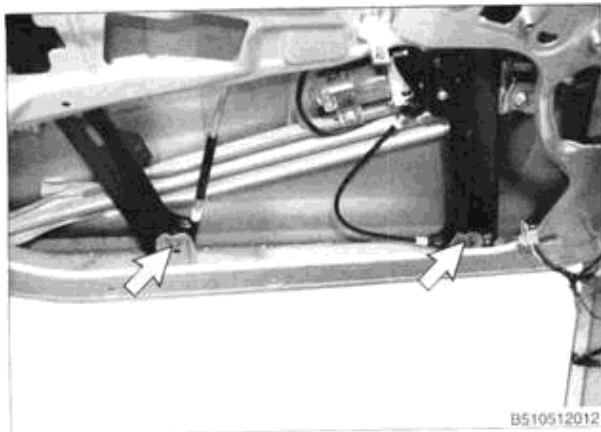
- Loosen window glass fasteners (**A**).
- Close window and tighten window glass fasteners (**inset**).

Tightening torques

Door window glass mount	8 Nm (5.9 ft-lb)
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Door Windows 512-11

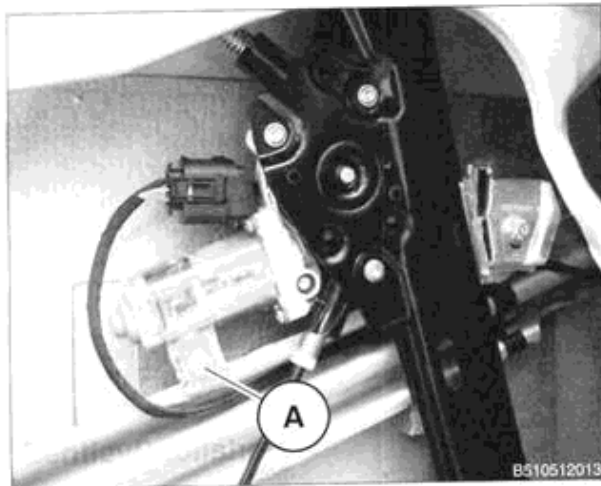
Front door window, adjusting



- Open window approximately 40 mm (1.5 in.) then tighten window regulator fasteners (A).

Tightening torques

Regulator to door	8 Nm (5.9 ft-lb)
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- Close door window until fastener (A) is accessible and tighten fastener (A).

- Close door window completely and check adjustment.
- Once adjustment is complete:
 - Using BMW scan tool, check Car and Key Memory settings against previously made notes.
 - Initialize power window. See **Initializing windows** in this repair group.

Tightening torques

Door window glass mount	8 Nm (5.9 ft-lb)
Window motor mount	8 Nm (5.9 ft-lb)
Regulator to door	8 Nm (5.9 ft-lb)

512-12 Door Windows

Front window regulator, removing and installing

WINDOW REGULATOR SERVICE

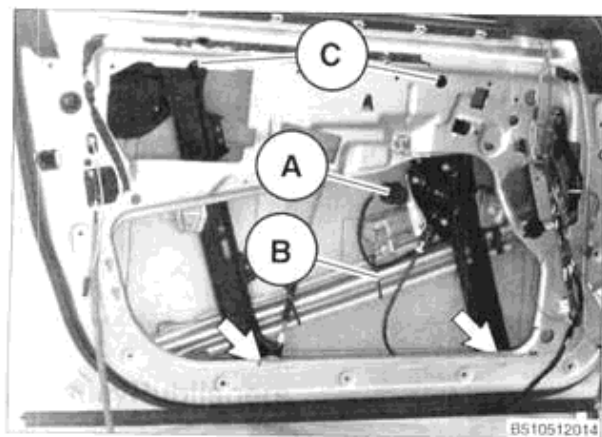
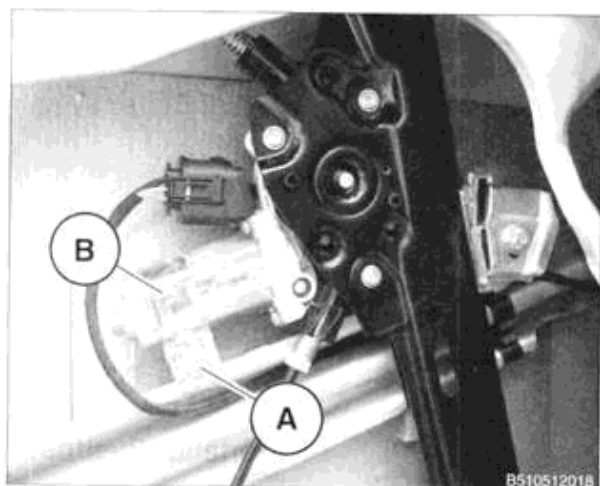
The electronically-controlled window motor does not have mechanical end positions. For this reason the motor can be removed and installed with the window in any position.

Front window regulator, removing and installing

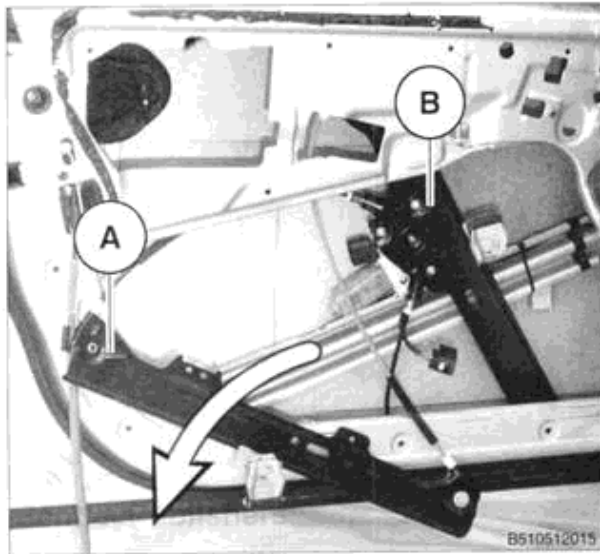
Remove window regulator and motor as one unit. If necessary, separate the two on the bench.

There are two window rails in each front window regulator, only one in the rear window regulator. Otherwise the front and rear regulators are similar.

- Remove front door panel. See **411 Doors**.
- Remove window glass. See **Front door window, removing and installing** in this repair group.
- Loosen window motor mount fastener (A) and remove mount (B) from window motor.



- Disconnect window motor electrical connector (A) and cut wire tie (B). Loosen window regulator fasteners (arrows) and remove window regulator fasteners (C).



➤ Lift rear window regulator rear rail (A) out of door then front rail (B).

- Installation is reverse of removal, noting the following:
 - Route wiring harnesses to keep them away from moving window mechanism. Use new wire ties as necessary.
 - Initialize power window. See **Initializing windows** in this repair group.

Tightening torques

Door window glass mount	8 Nm (5.9 ft-lb)
Window motor mount to redulator	8 Nm (5.9 ft-lb)
Window regulator to door	8 Nm (5.9 ft-lb)
Window motor to regulator	4 Nm (4.4 ft-lb)

INITIALIZING WINDOWS

Window control module learns two parameters during initialization:

- Upper end stop (normalization of the power windows).
- Power characteristic curve for opening and closing (learning the characteristic curve).

Initialization can be carried out using the control switch in each door or the power-window switch block in the driver's door.

Initialization prerequisites

- Vehicle stationary.
- Adequate battery voltage present (12.4 volts), connect vehicle power supply if necessary.
- Terminal R (radio readiness) or terminal 15 switched ON (ignition ON) See **020 Maintenance** for vehicle key states.
- All doors closed.

Performing initialization

- Fully close window by pulling the switch so that top end stop is reached (normalization).
- Open window completely so that lower end stop is reached.
- Pull control switch into one touch operation mode, then pull to close (one touch operation, close) position and hold it there until the window has reached the top end stop (learning the characteristic curve).

Initialization is successful if the window can be opened and closed without faults in one touch operation mode.

Window moves in small increments if not initialized.



The first part of the paper discusses the importance of understanding the cultural context of the research. It highlights the need for researchers to be sensitive to the values and beliefs of the communities they are studying. This is particularly important in the field of education, where cultural differences can significantly impact learning outcomes and classroom management.

The second part of the paper focuses on the methodology used in the study. It describes the qualitative approach adopted, which involves in-depth interviews and focus group discussions with participants. The researchers emphasize the importance of triangulating data from different sources to ensure the reliability and validity of the findings.

The third part of the paper presents the results of the study. It discusses the themes that emerged from the data, such as the role of family in education and the challenges faced by students from low-income backgrounds. The researchers provide a detailed analysis of these themes, supported by quotes from the participants.

The final part of the paper discusses the implications of the findings for practice and policy. It suggests that educators and policymakers should take into account the cultural context of their students when designing educational programs and interventions. The researchers also highlight the need for further research in this area to better understand the complex interplay between culture and education.