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Window replacing, general information

To replace windshield, rear window or side windows, the following tools and materials are required.

Tool kit VW 1474

- 1 — Reel
- 2 — Relay roller with holder
- 3 — Awl
- 4 — Guide rail
- 5 — Protective sheeting
- 6 — Wedge

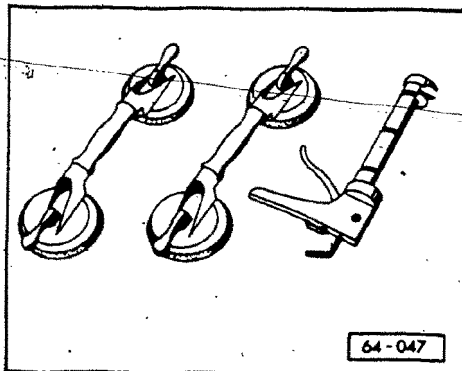
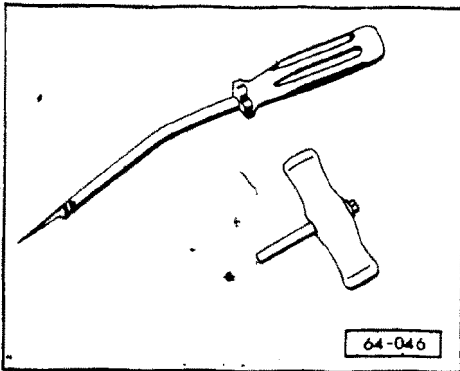
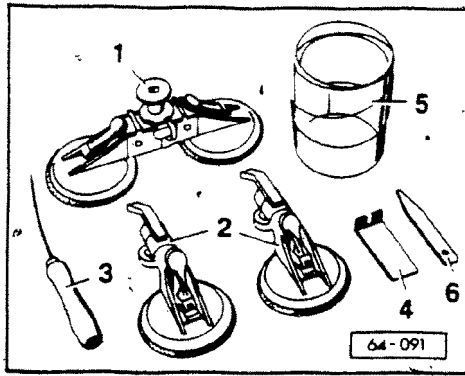
Use protective sheeting **VW 1474/7** to protect instrument panel.

Tool kit VW 1351

- for removing broken windshields, rear windows and **broken** or **unbroken** side windows

CAUTION

To prevent paint damage, mask perimeter of windshield, rear and side windows with cloth duct tape.



- caulking gun
- double suction pad (only for rear window, windshield)
- protective goggles
- utility knife
- protective gloves (leather)
- cloth or duct tape

Parts required

CAUTION

Part numbers are listed for reference only. Always consult with the Parts Department for latest information.

Description	Part number	Quantity
center spacers for windshield	893 845 631	1
adjusting wedges for rear window	893 845 631A	2
cutting wire 50m (150 ft) roll	893 845 515A	-1
adhesive kit (vehicles with airbag)	443 845 955	-1
adhesive kit (vehicles with airbag)	D 004 300 03	1
adhesive kit (vehicles without airbag)	D 004 300 04	1
Mixing rod (For use with adhesive kit D 004 300 04)	D 009 700	1

Hardening of adhesive sealing compound

Vehicles without airbag

- vehicle **must** stand at least one hour, at room temperature of 20°C (68°F) and relative humidity of 65-70% before allowing vehicle to be driven

Vehicles with airbag

- vehicle **must** stand at least three hours, at room temperature of 20°C (68°F) and relative humidity of 65-70% before allowing vehicle to be driven
- keeping the sealed/bonded area wet forms a skin that promotes hardening process

Surplus bonding/sealing compound, removing

CAUTION

When using any cleaning agent, follow all cautions and warnings listed on the containers.

- first use dry cloth to clean off painted areas
- excess adhesive sealing compound can be removed using a cleaning solvent such as supplied in repair kit
 - do not use cleaners which contain alcohol
- to clean plastic trim, let adhesive sealing compound harden two to three hours, then scrape off excess with plastic wedge

Sealing leaks

CAUTION

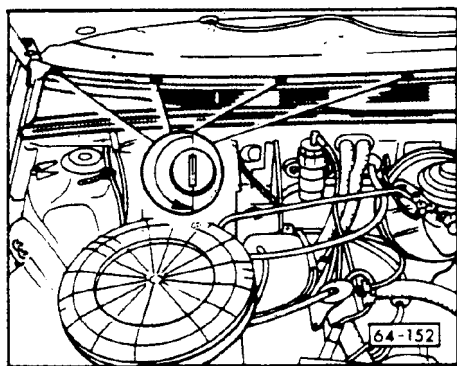
While adhesive sealant is hardening, avoid putting pressure on glass from inside car when cleaning around glass.

- water test window area before reinstalling moldings, trim or lip or rubber molding
- dry area around leaks with compressed air and clean
- apply adhesive sealant from outside to leak area between glass and flange then smooth over
- retest area for water leaks

Note

The small adhesive sealant cartridge D 009 100 03 is recommended for resealing.

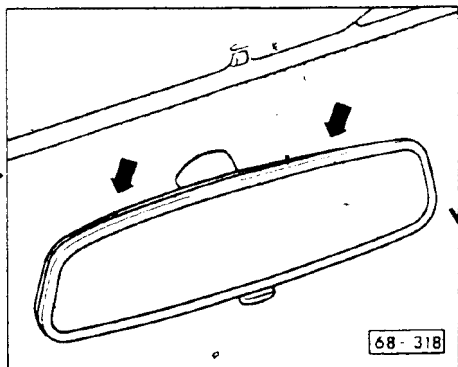
Windshield, removing



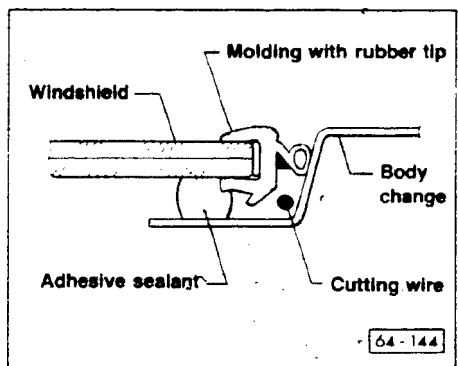
- remove A-pillar trim (see Repair Group 70)
- remove beading from headliner
- remove windshield wipers
- remove plenum chamber cover (as shown)
- disconnect wiring for front antenna

WARNING

Always wear protective goggles and leather gloves when removing and installing windows.



- remove inner rear-view mirror
 - press downward (**arrows**) at angle (spring clips in mirror mounting)

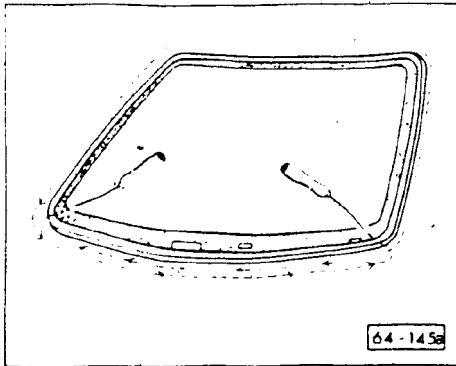


- cut off 6.5m (21 ft) cutting wire
- locate center of cutting wire
- on the outside, starting at top center of windshield, press cutting wire under rubber molding so wire runs completely around perimeter of windshield ending at bottom center

CAUTION

Do not bend or twist wire, otherwise wire will break when under tension.

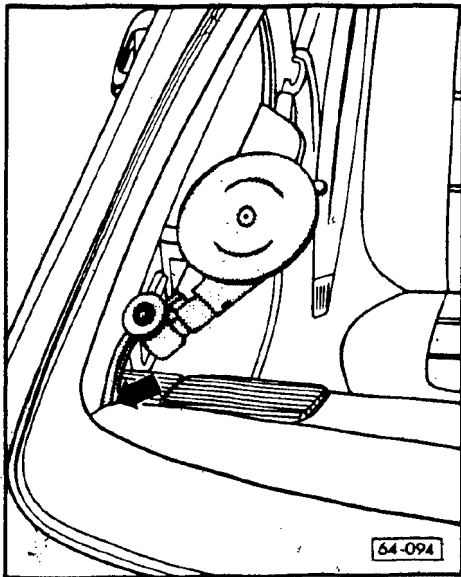
Glass, Window Regulators



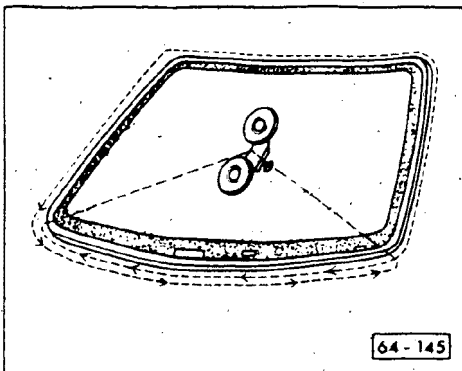
- from inside push awl through adhesive sealant at lower right corner (as shown) until awl eye is visible from outside
- turn awl slightly and thread in one end of wire
- bend over wire and pull through to inside of vehicle
- do same at lower left corner with other end of wire
- remove guide rail

CAUTION

Ends of wire must be in adhesive sealant as close together as possible, but must not overlap, otherwise glass will break or wire will bend or twist.



- attach relay roller with holder into left and right lower corner of windshield
 - holder must support on dashboard (arrow)



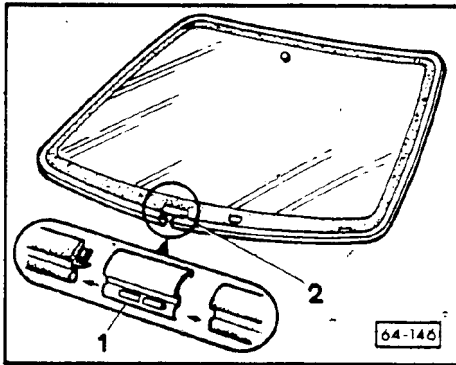
- attach reel (as shown) to center of windshield
- guide wire up from base of windshield and around relay rollers then thread ends into reel
- slightly tension cutting wire with reel and ratchet
- check that wire is placed correctly around corners and molding before cutting
- start cutting and continue cutting operation until relay rollers are clear
- remove relay rollers
- cut out windshield completely

CAUTION

Depending on extent of paint damage in removing windshield, touch-up or repaint as required.

Note

If cutting wire breaks several times (wire gets caught on the windshield flange) and can no longer be fitted on the reel (wire too short), cut remaining area with tool **VW 1351** (pulling handle and mounting).

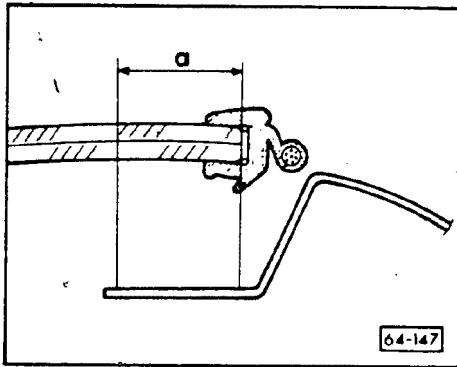


Windshield, installing

If windshield is to be reused, cut away enough old adhesive sealant with utility knife around glass and body flange to give smooth uniform surface.

If body repair has been done, body flange must be cleaned and primed with primer from adhesive kit.

- attach molding around windshield
- install joiner 1 into recess 2
- clean edge of glass approximately 30mm (1-11/64 in) wide with cleaning solvent and wipe dry with lint-free cloth



Ceramic black-out band around windshield is not primer. Before applying adhesive sealant prime this area with primer D 009 200.

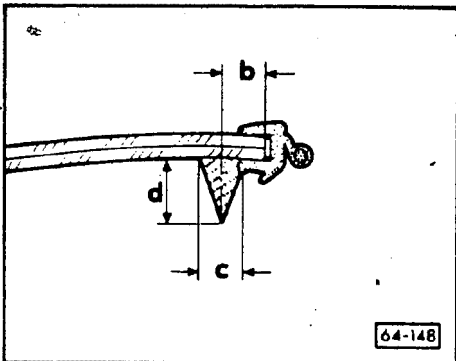
- cut applicator head
- insert felt into applicator head
- thoroughly shake bottle of primer (approximately 30 seconds) and fill applicator bottle
- attach application head onto bottle
- apply primer a = 20mm (7/8 in) wide evenly all around edge of windshield in **one** continuous operation. Ensure applicator head is always completely saturated
 - drying time approximately 10 minutes

WARNING

Adhesive used in bonded window glass installations, original or replacement, may give off toxic fumes when heated. Read container labels. **Ensure adequate ventilation.**

Note

Do not retouch strip of primer until it has dried completely.

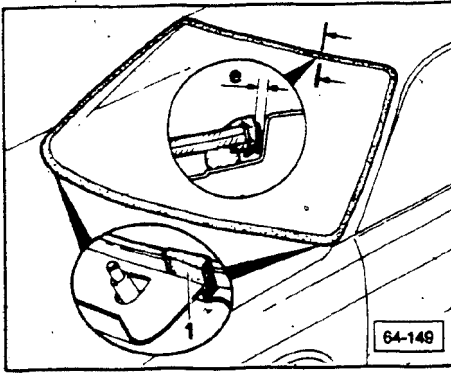


- apply adhesive sealant around windshield, making sure that the adhesive sealant touches the edge of the windshield

- b = 8mm (5/16 in)
- c = 8mm (5/16 in)
- d = 12mm (15/32 in)

Note

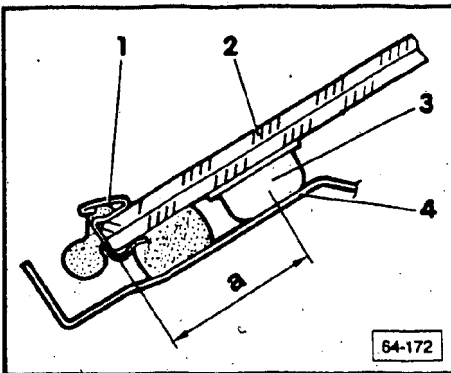
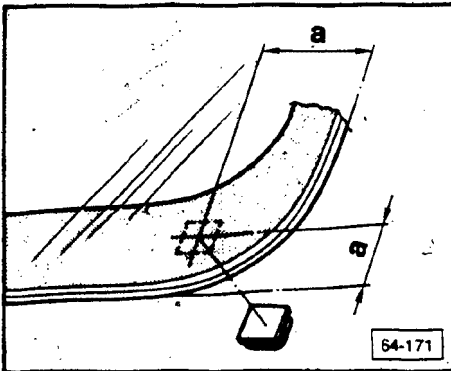
Reduce the height of adhesive by the thickness of the adhesive remaining on the windshield or the windshield body flange.



CAUTION

Vehicles **with** airbags **must** stand at least three hours, at room temperature of 20°C (68°F) and a relative humidity of 65-70% before allowing vehicle to be driven.

Vehicles **without** airbags **must** stand for at least one hour.



- place windshield into position using two double suction pad holders
- align windshield at the sides
- insert adjusting wedges 1 into corners of windshield (as shown)
 - wedges do not have to be removed
- align windshield gap *e* at top to 3-4 mm (1/8-5/32 in.)
- lightly press windshield into place
- press windshield at top until windshield molding is flush with roof
- test for leaks
- clean off surplus adhesive sealant from body and glass
- reinstall trim piece

Windshield height spacers

Audi 90 only

Note

In order to maintain proper spacing between windshield glass and body flange, three spacers must be installed near the lower windshield edge when replacing the windshield.

All dimensions are ± 2.0 mm ($\pm 5/64$ in.).

Side spacers, installing

- remove paper backing from spacers (self adhesive)
- apply spacer next to adhesive strip (as shown)
 - $a = 25$ mm (1.0 in.)

Center spacer, installing

- remove paper backing from spacer (self adhesive)
- apply spacer in center of glass (as shown)
 - 1 — trim strip
 - 2 — windshield
 - 3 — spacer
 - 4 — body flange
 - $a = 25$ mm (1.0 in.)

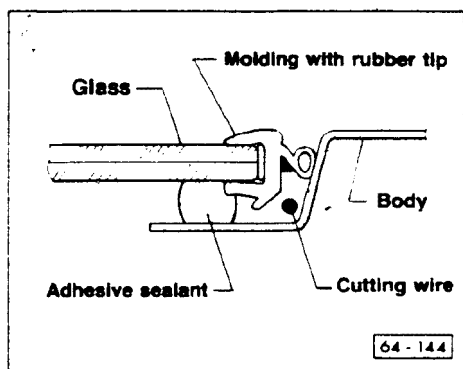
WARNING

Wear protective goggles and leather gloves when removing and installing glass.

Rear window, removing

Note

When removing a **broken** rear window, cut adhesive on glass and body flange while removing pieces of broken glass. Do not remove all of adhesive.

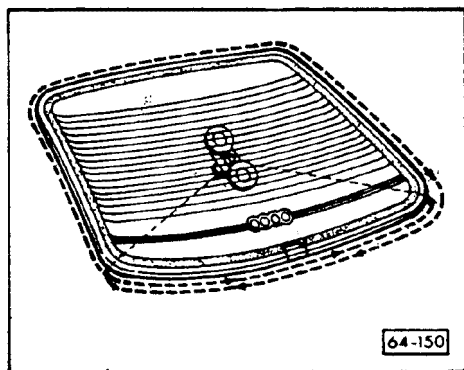


- remove D-pillar trim
- unplug, unscrew connectors for heatable glass and rear window antenna
- tape connections out of way (in center of glass)
- remove high mounted brake light assembly
- cut off 6.5m (21 ft) cutting wire

- find center of cutting wire
- starting at top center of glass, press cutting wire under rubber molding so wire runs completely around perimeter of window ending at bottom center

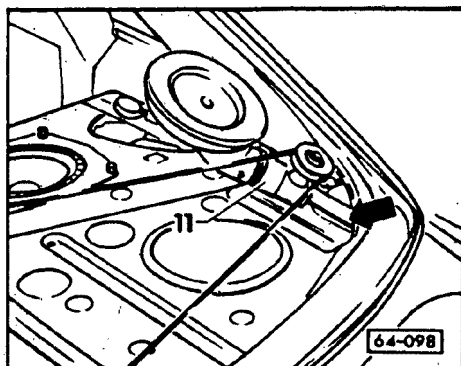
Note

Do not bend or twist wire, otherwise wire will break when under tension.



- insert ends of cutting wire separately into lower corners of glass and guide inwards into corners (as shown)
 - do **NOT** twist

- push awl through adhesive sealant until awl eye is visible from outside
- turn awl slightly and thread in one end of wire
- bend over wire and pull through to inside of vehicle
- do same with other end of wire
- remove guide rail



- attach relay roller with holder into left and right lower corner of glass (as shown)
 - holder must support on rear panel
- attach reel (as shown) to center of glass
- guide wire up from base of glass and around relay rollers

CAUTION

Ends of wire must be in adhesive sealant as close as possible together, but must not overlap, otherwise glass will break or wire will bend and/or twist.

- thread ends into reel
- slightly tension cutting wire with reel and ratchet
- check that wire is correctly around corners and molding before cutting
- start cutting and continue cutting operation until relay rollers are clean
- remove relay rollers
- continue to cut out rear glass

Note

If the cutting wire breaks several times (wire gets caught on the window flange) and can no longer be fitted on the reel (wire too short) this area can be cut through with tool 1351 (pulling handle and mounting).

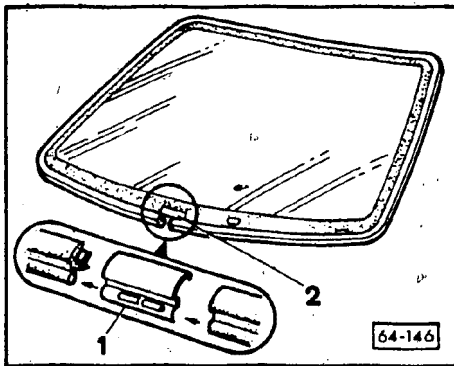
Rear window, installing

CAUTION

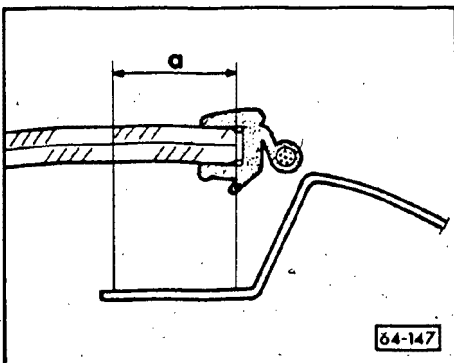
Depending on extent of paint damage in removing rear window, touch-up or repaint as required.

If rear window is being reused, cut away enough old adhesive sealant with utility knife around glass and body flange to give smooth uniform surface.

If body repair has been done, body flange must be cleaned and primed with primer from adhesive kit.



- attach molding around glass
- install joiner 1 into recess 2



- clean edge of glass approximately 30mm (1-11/64 in) wide with cleaning solvent and wipe dry with lint-free dry cloth

Note

Ceramic black-out band around window is **not** primer. Before applying adhesive sealant prime this area with primer D 009 200.

- cut applicator head
- insert felt into applicator head
- thoroughly shake bottle of primer (approximately 30 seconds) and fill applicator bottle
- attach applicator head onto bottle
- apply primer a = 20mm (7/8 in) wide evenly all around edge of glass in **one** continuous operation. Ensure applicator head is always completely saturated
 - drying time approximately 10 minutes

Note

Do not retouch strip of primer until it has dried completely.

- bend open connections for window aerial, heated window glass
 - bend 90° to glass
- apply adhesive sealant around rear window making sure that the adhesive sealant touches the edge of the glass

b = 8mm (5/16 in)

c = 8mm (5/16 in)

d = 12mm (15/32 in)

- remove protective backing from wedges Part No. 893 845 515A
- bond wedges 2, on body flange A, between adhesive 1 and edge of defroster/antenna element 3

Note

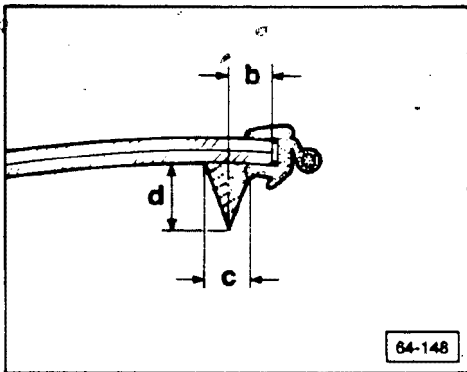
Reduce the height of adhesive by the thickness of the adhesive remaining on the rear window or rear window flange.

CAUTION

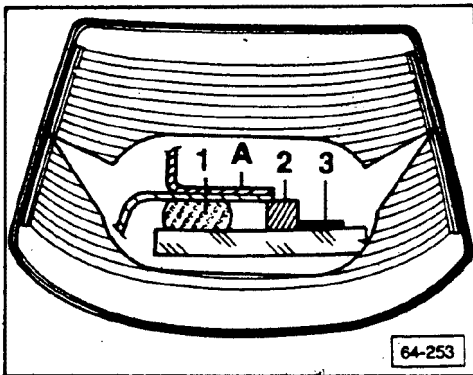
The distance between the adhesive and the bus (heated rear window and window antenna) should be at least 10mm (25/64 in).

When window is installed, the spacing over the entire length must be at least 3mm (1/8 in).

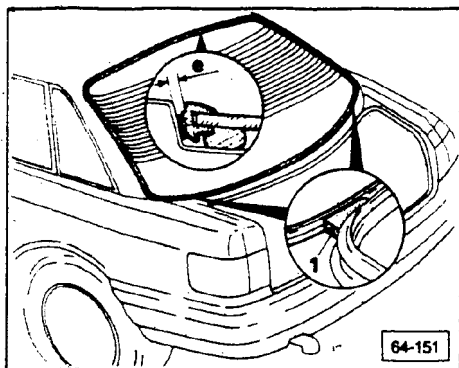
If the adhesive makes contact with the bus, there will be no radio reception with the window antenna.



64-148



64-253



- place rear window into position using two double suction pad holders
- align rear window at sides
- insert adjusting wedges 1
Part No. **893 845 631A** into corners of rear glass (as shown)
 - wedges do not have to be removed

CAUTION

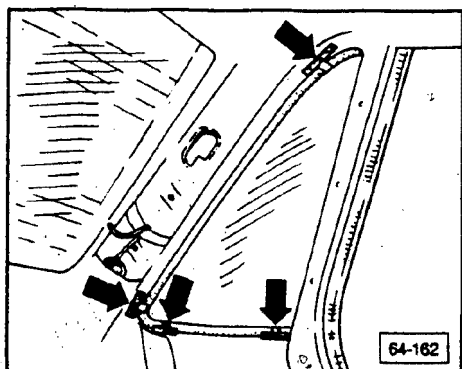
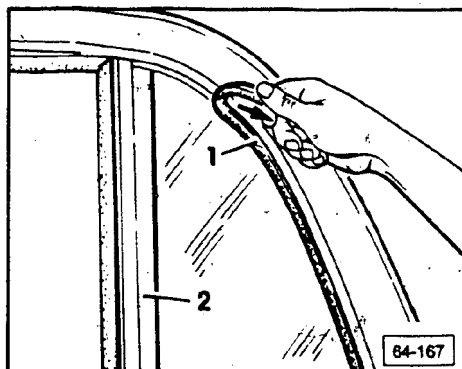
Vehicle must stand at least three hours, at room temperature of 20°C (68°F) and a relative humidity of 65-70% before allowing vehicle to be driven.

- align window glass gap *e* at top to 3-4mm (1/8-5/32 in)
- lightly press in rear window
- test for leaks
- clean off surplus adhesive sealant from glass or body
- reinstall trim

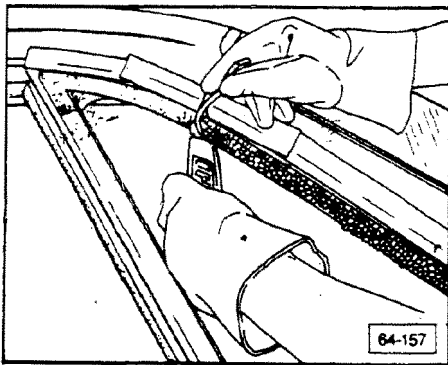
Side windows, removing

Removing

- remove D-pillar trim (see Repair Group-70)
- remove rear bench and backrest (see Repair Group 72)
- remove C-pillar trim (see Repair Group 70)
- pull out rubber gap cover 1 (as shown)
- cut panel 2 from window with utility knife
 - only on **unbroken** windows.



- bend retaining plates away from frame (arrows)
- mask window opening at bottom (side section) and D-pillar with duct tape

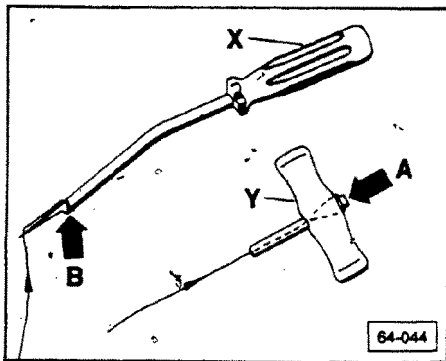


Removing broken window

- remove pieces of glass up to the adhesive sealant,
- remove remains of glass and adhesive sealant from body flange using cutting tool **VW 1351** and knife

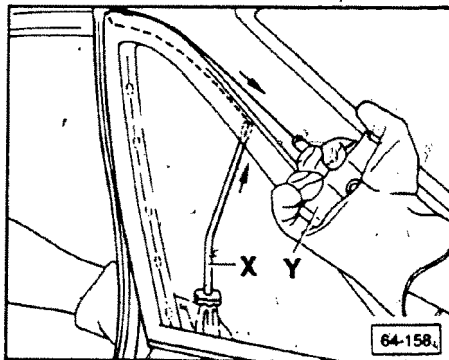
Note

If gap between glass and flange is less than 5mm (1/4 in) use **only** a utility knife to remove pieces of broken glass (as shown)



Unbroken window, removing

- working from interior of vehicle, use pliers to push cutting wire (approximate length 350-400mm, 14-16 in) through adhesive sealant between window and body flange
- secure cutting wire with the wire ends at **X** and **Y** of the cutting tools
 - part **X** goes in the interior of the vehicle
 - part **Y** goes on the outside of the vehicle
- thread wire in direction of arrow, **A** clamp on, or **B** screw on
- insert cutting tool **X** into adhesive sealant and secure
- using handle **Y**, pull wire evenly in direction of arrow (as shown) until retaining lug is reached
- pull wire with cutting tool **X** inwards, insert into adhesive sealant approximately 100-150mm (4-6 in) further on and secure
- continue pulling until next retaining lug is reached and then repeat procedure until completely cut out



Side windows, installing

If an unbroken window is to be reused, use a utility knife to cut any remaining adhesive sealant on the glass and metal flange back until smooth.

- do not remove completely

The remaining sealant acts as a base for application of new adhesive sealant. Keep surfaces free of dirt and grease.

Note

If body repair has been done, body flange must be cleaned and primed with primer from adhesive kit.

Note

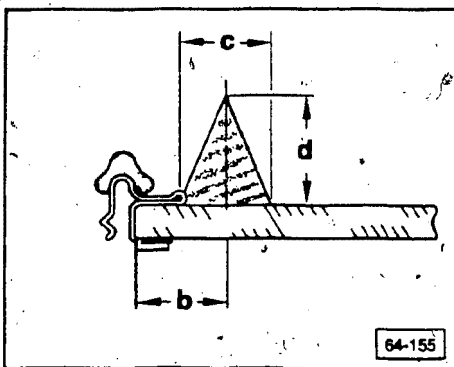
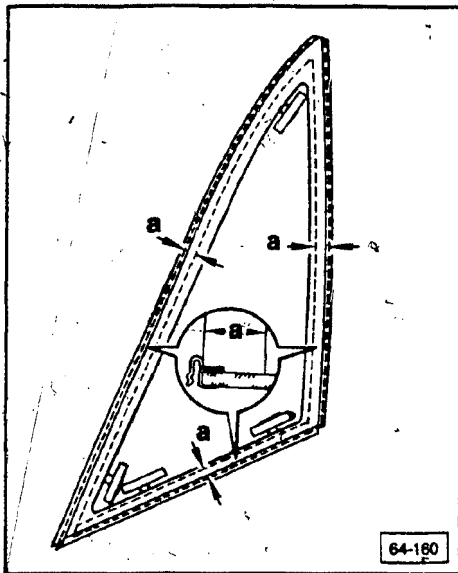
The ceramic black-out band around glass is not primer. Before applying adhesive sealant, prime this area with primer **D 009 200**.

- apply primer **a** = 20mm (7/8 in) wide evenly all around edge of glass in one continuous operation. Ensure applicator head is always completely saturated.
 - drying time approximately 10 minutes

CAUTION

Do not retouch strip of primer until it has completely dried.

CAUTION
Depending on extent of paint damage in removing side window, touch-up or repaint as required.



- apply adhesive sealant all around window, making sure that the adhesive sealant touches the edge of the window molding

- b** = 8mm (5/16 in)
- c** = 8mm (5/16 in)
- d** = 12mm (15/32 in)

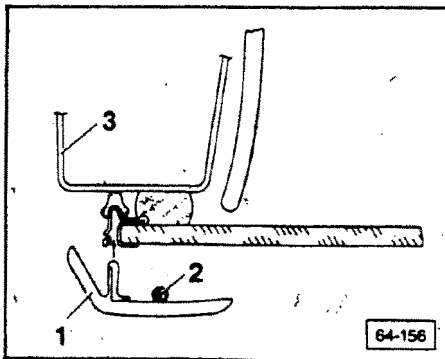
Glass, Window Regulators

- reduce the height of adhesive by the thickness of the adhesive remaining on the glass or body flange

Note

A mounting kit is available when reinstalling glass.

- remove backing off adhesive strips of retaining plates
 - retaining plates only on replacement parts
- insert window into place
- align window, ensure rubber gap cover fits evenly around
- bend retaining plates so that adhesive strips are supported
- clean outside of window around trim plate 1 in adhesive area with cleaning solution from adhesive kit
- apply primer on trim plate 1, C-pillar 3
 - bead thickness 4.0mm (5/32 in) diameter

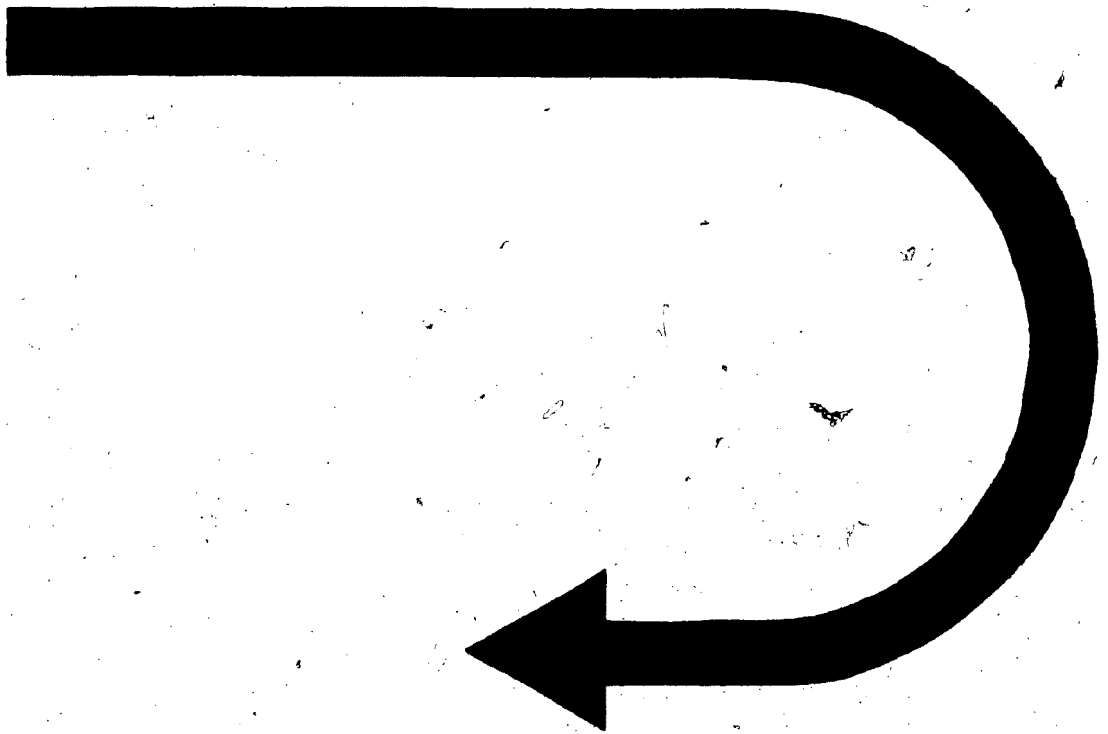


CAUTION

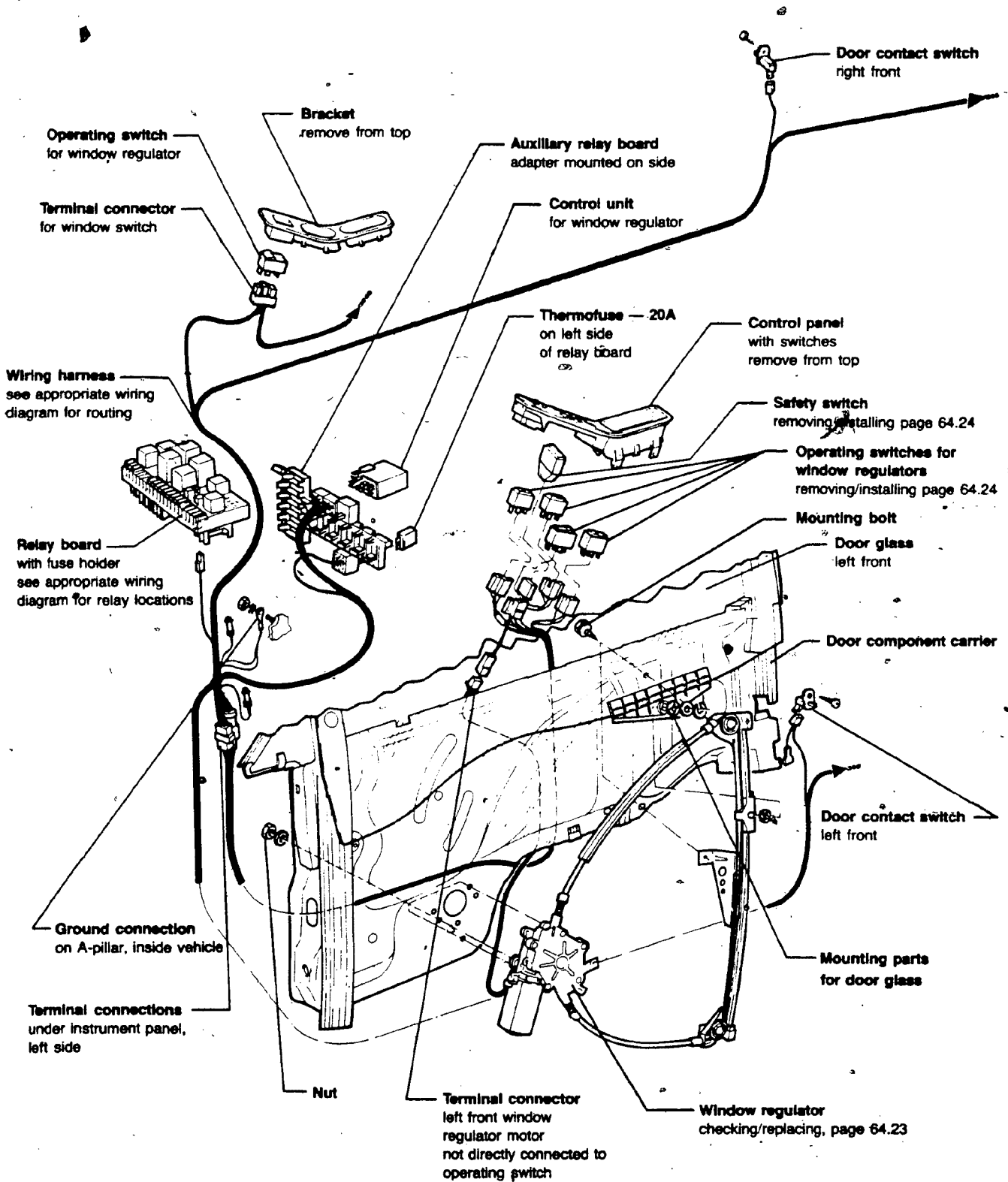
The rear door (contact area between the door seal and the newly bonded window) must remain closed during the curing period. After three hours vehicle may be driven.

- secure window glass and trim plate with cloth tape
- test for leaks
- clean off surplus adhesive sealant from glass and body

**CONTINUED IN THE
BEGINNING OF NEXT ROW**



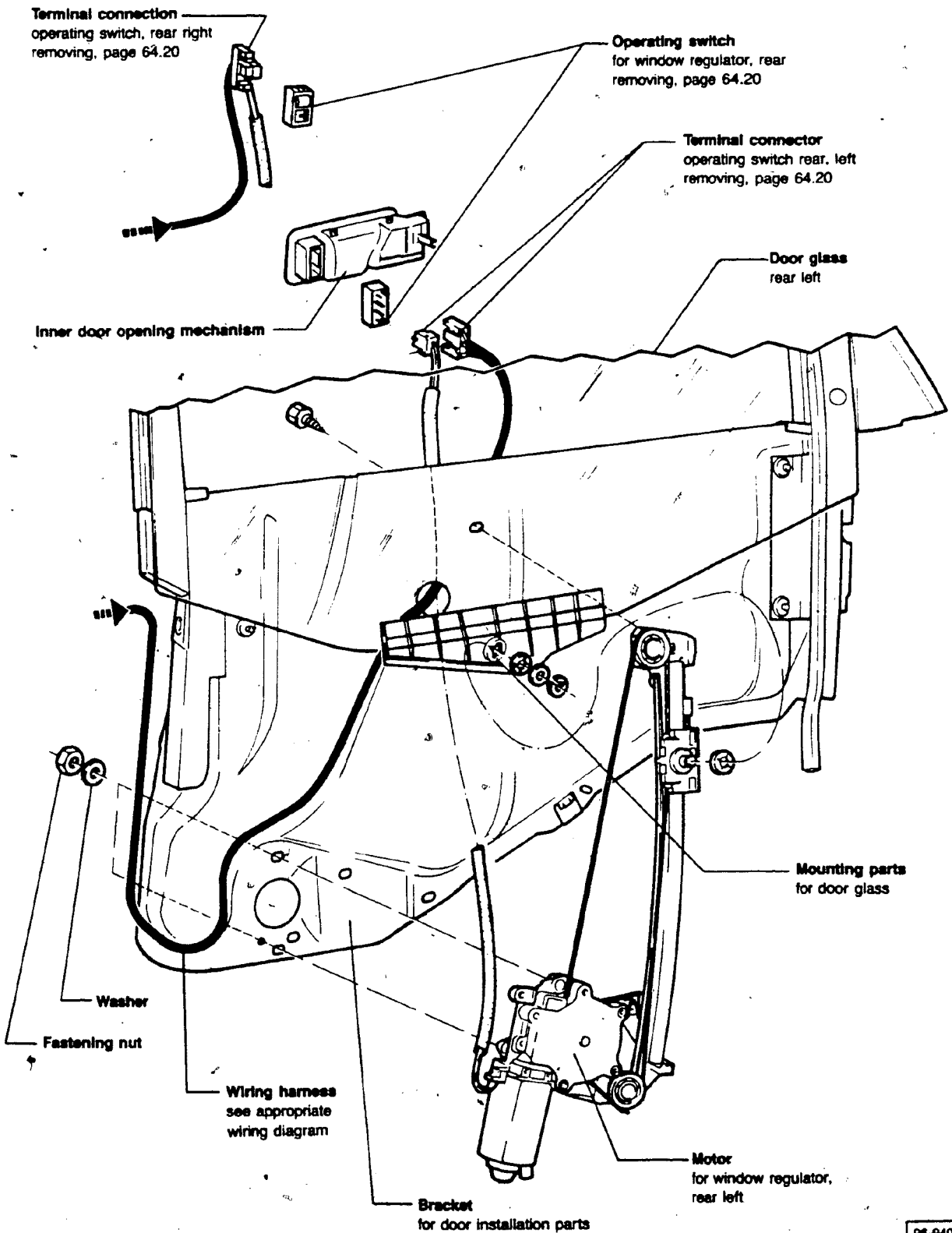
Glass, Window Regulators



96-939

B-2

Glass, Window Regulators



96-940

B-3

Troubleshooting — power window regulators

Note

Refer always to appropriate wiring diagram.

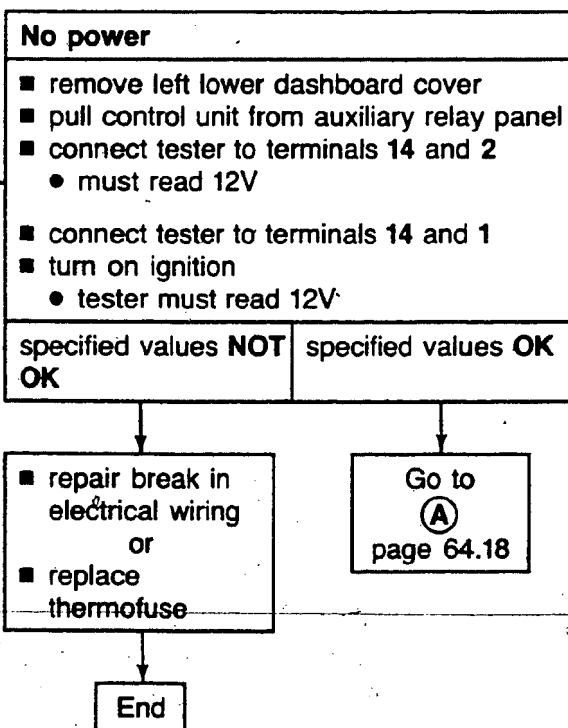
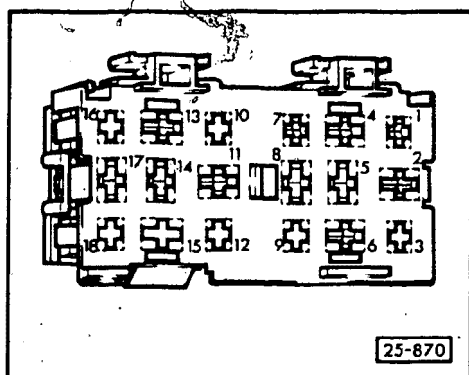
Test conditions

- battery OK
- rear window safety switch disengaged
- with ignition on, control unit “clicks” when drivers window switch activated

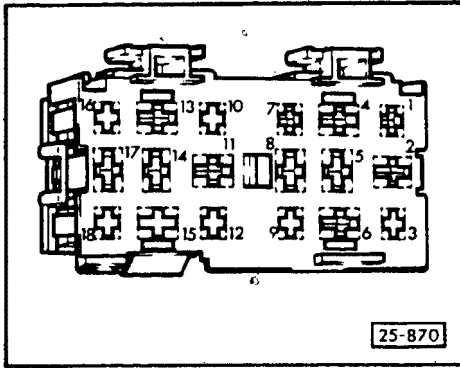
Tools required

- multimeter US 1119
- LED tester US 1115
- test adapter VW 1594
- sun VAT 40 or VAT 60 or equivalent with current test lamp

No window operates



(A)



Checking front door contact switches

- connect tester to terminals 14 and 3
 - specified value 0 ohms
- press right front door contact switch
 - specified value ∞ ohms
- connect test device between terminals 14 and 6
 - specified value 0 ohms
- press left front door contact switch
 - specified value ∞ ohms

specified values **NOT**
OK

specified values **OK**

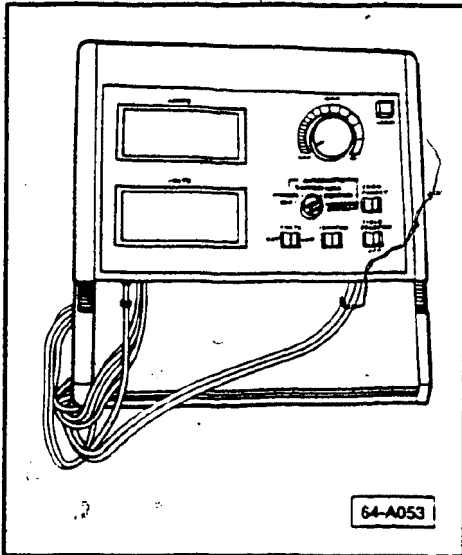
■ repair break in
electrical wiring

End

■ reinstall control
unit

Go to
(C)
page 64.20

One front, or rear door window not working



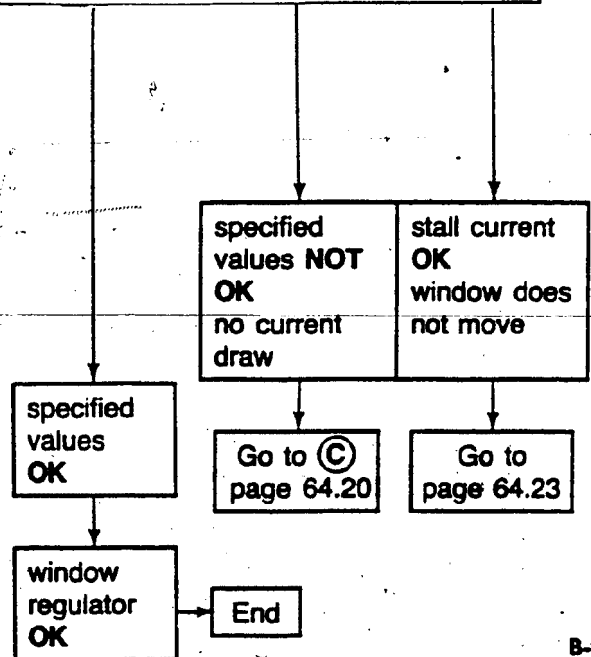
Checking window regulator current draw (installed)

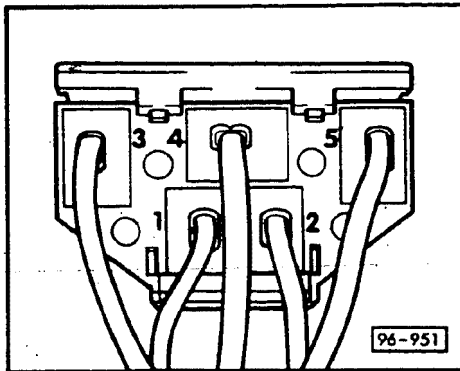
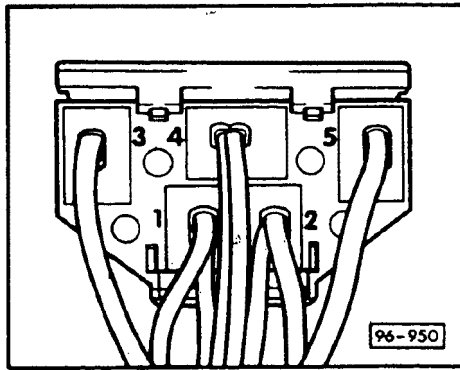
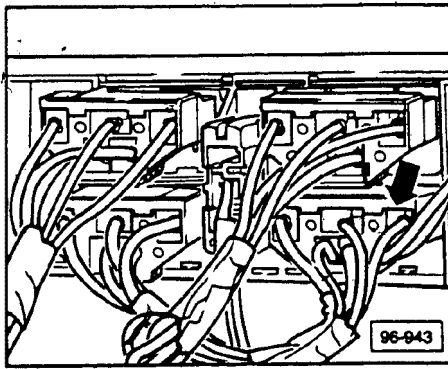
- connect volt/amperage tester
Sun VAT 40, or VAT 60 or equivalent
 - Sun VAT 60 shown
- connect inductive pick-up to battery ground strap
- switch ignition ON
- press operating switches for window regulators one after the other (open or close)
- measure current draw during window switch operation
 - must be 6-12A (during window travel)

Note

The tester will always indicate a certain current reading when the ignition is switched on; this reading will vary according to operating conditions and the type of model and equipment, to correct:

- zero tester to compensate for other electrical consumers
- after glass is at top or bottom and switch depressed, current must be between 15-20A (stall current)





Driver's window operating switch, checking

- remove control unit from door trim panel
 - wire to left front window regulator motor routed through terminal T2
- turn on ignition
- measure voltage between terminals 3 and 4, 5 and 4
 - must read approximately 12V
- connect tester to terminals 3 and 2
- lower window
 - must read approximately 12V

Note

Voltage can only be measured while door glass is being lowered.

- connect tester to terminals 3 and 1
- raise window
 - must read approximately 12V

Operating switches for right front, rear window, checking

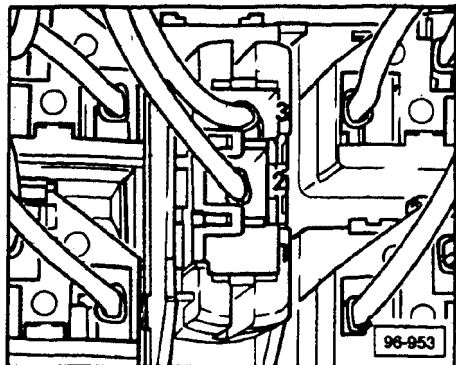
Note

Do not disconnect terminals from control panel.

- turn on ignition
- measure voltage between terminals 3 and 4, 5 and 4
 - must read approximately 12V
- connect tester to terminals 3 and 2
- lower window
 - must read approximately 12V
- connect tester to terminals 3 and 1
- raise window
 - must read approximately 12V

Go to
Ⓧ
page 64.21

D



Rear window safety switch, checking

Note

Switch must not be depressed. Do not disconnect terminals.

- turn on ignition
- connect tester to ground and terminal 2
 - must read 12V
- connect tester to ground and terminal 1
 - must read 0V
- depress safety switch
- connect tester to ground and terminal 1
 - must read approximately 12V

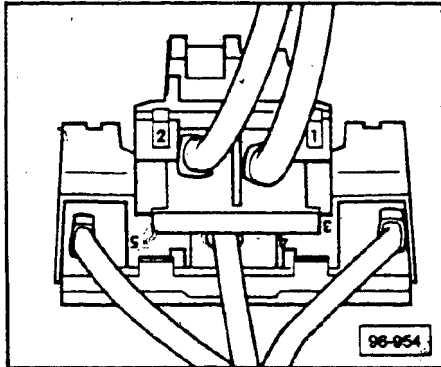
specified values **NOT**
OK

specified values **OK**

- repair break in electrical wiring or
- check operating switches, safety switch for continuity. Go to Page 64.25

Go to Page
64.22

Window operating switches in doors



Right front window switch, checking

- remove switch from door trim panel
 - do not disconnect wiring
- turn on ignition
- measure voltage between terminals 3 and 4, 5 and 4
 - must be approximately 12V
- connect tester to terminals 3 and 2
- lower window
 - must read approximately 12V
- connect tester to terminals 3 and 1
- raise window
 - must read approximately 12V
- test rear window switches in same way
 - safety switch in control panel must be depressed

specified values **NOT**
OK

specified values **OK**
window does not
move

- repair break in electrical wiring
or
- check switches for continuity. Go to Page 64.25

- repair wiring to window regulator motor, or replace window regulator. Go to Page 64.23

End

Glass, Window Regulators

Window regulator, checking

- remove door trim panel
- reconnect window operating switch
- loosen regulator mounting bolts
- start engine
- depress switch to lower window
 - use second mechanic to push glass down

window moves down

window does not
move down

- unplug operating switch
- set window in half-open position
- adjust end stop

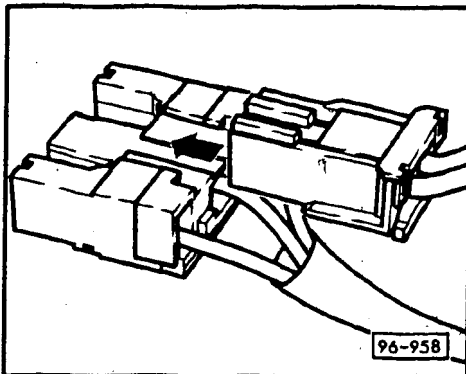
End

- replace window glass regulator

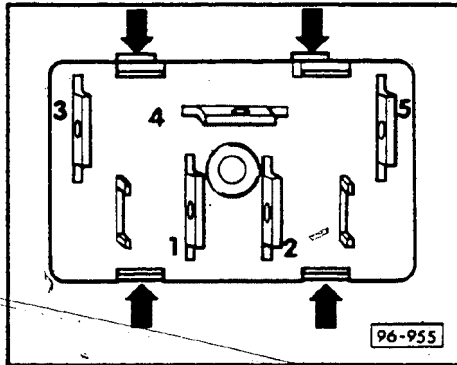
Window regulator, replacing

- remove regulator mounting bolts
 - door trim panel removed
- remove mounting bolts for regulator
- pull off terminal connector for window regulator motor (arrow)
- withdraw regulator from bottom
- reinstall regulator in reverse order
- with ignition off, set glass at half way up position and adjust end stop

End



Window regulator operating switches, replacing



- pry out from door trim panel
- pull off terminal connector

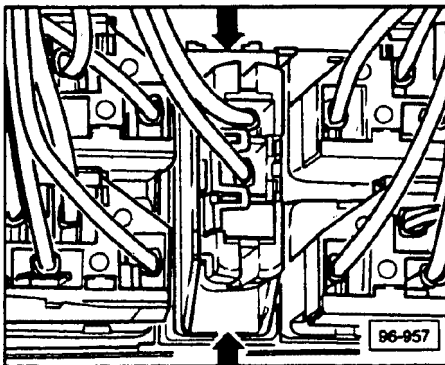
Driver's door control panel switches

- pry switch from panel at points shown (arrows)
- push switch out of panel from bottom

Right front, rear window operating switches

- pry out of door trim panel
- reinstall in reverse order, noting:
 - switches are pressed in until "click" is heard

Safety switch, removing/installing



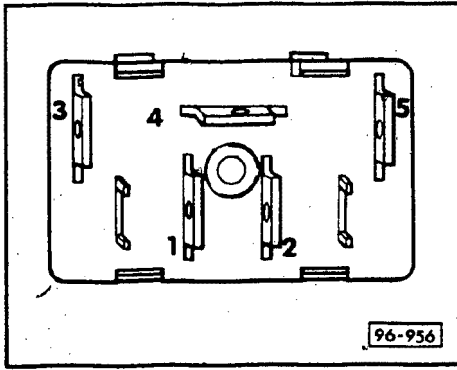
Removing

- remove control panel from door
- pull off terminal connector
- insert small screwdriver at **arrows** and twist slightly
 - press switch out at same time

Installing

- install in reverse order, noting:
 - push switch in until "click" is heard

Glass, Window Regulators



Window regulator operating switches, checking continuity

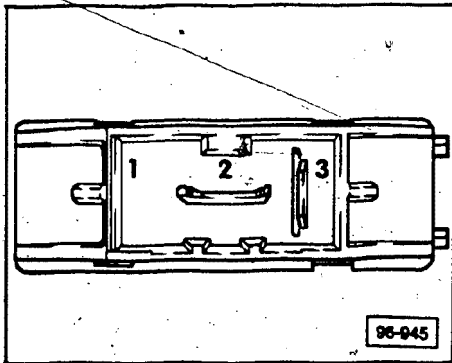
- remove switch
 - pry out
- pull off terminal connector
- connect tester to terminals 5 and 2, then 3 and 1
 - specified value 0 ohms
- connect tester to terminals 4 and 2
 - specified value ∞ ohms
- operate switch to lower window
 - specified value 0 ohms
- connect tester to terminals 4 and 1
 - specified value ∞ ohms
- operate switch to raise window
 - specified value 0 ohms

specified values NOT OK	specified values OK
-----------------------------------	----------------------------

■ replace operating switch

End

End



Safety switch, checking continuity

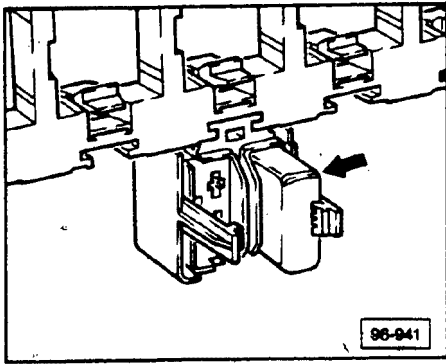
- remove driver's door control panel
- connect tester to terminals 2 and 3
 - specified value ∞ ohms
- push button in
 - specified value 0 ohms

specified values NOT OK	specified values OK
-----------------------------------	----------------------------

■ replace safety switch

End

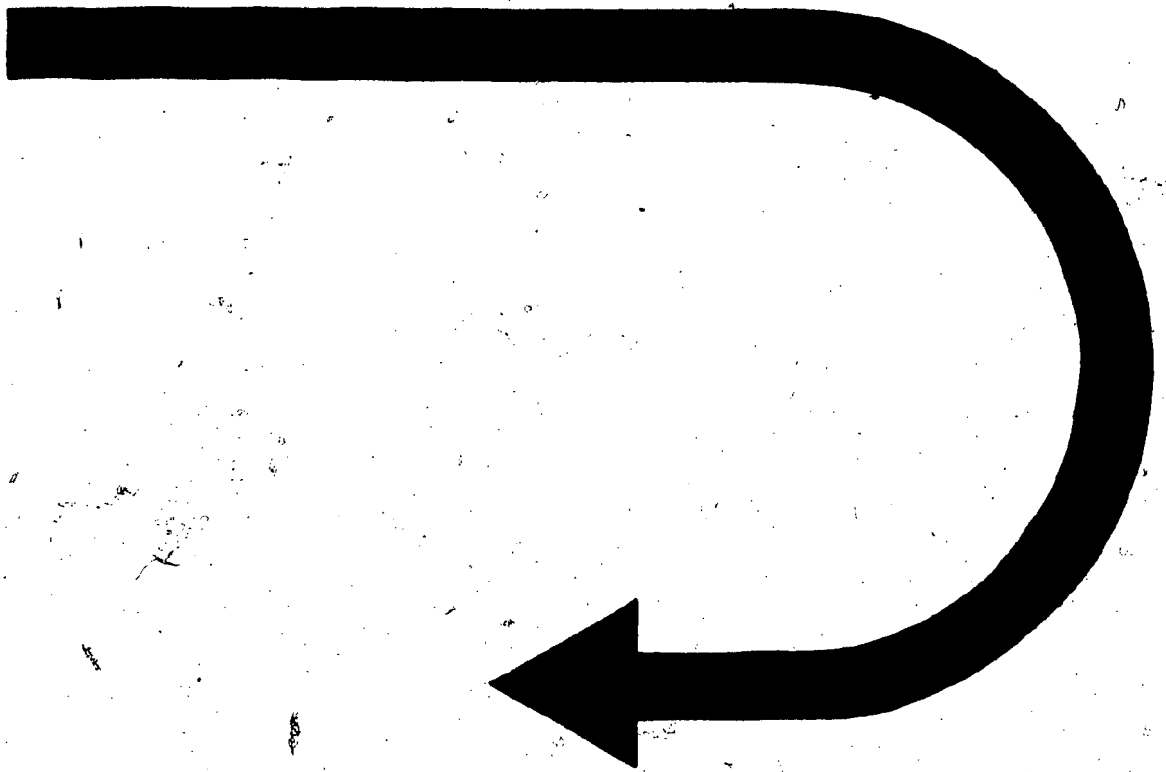
End



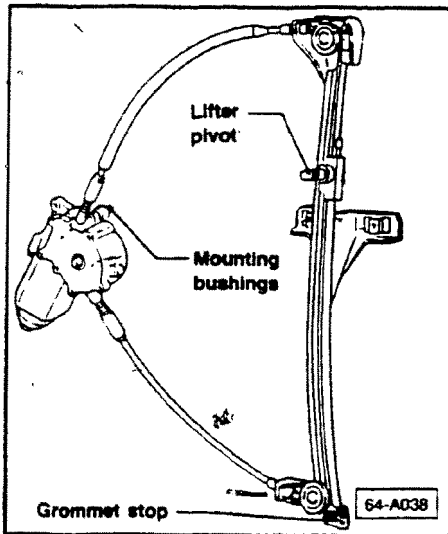
Thermofuse, location

On left side of auxiliary relay panel (arrow).

**CONTINUED IN THE
BEGINNING OF NEXT ROW**



Window regulator assembly, inspecting



Note

Before replacing/repairing window regulator components, check window switch, electrical wiring for proper function.

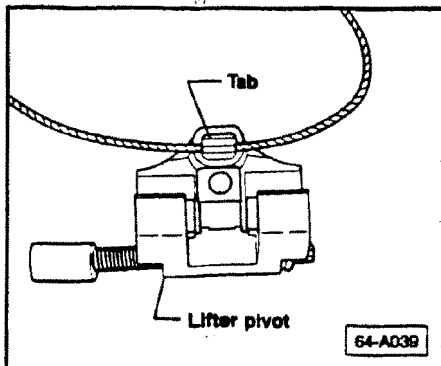
- remove door trim panel
- inspect the following

Regulator drive cable

If cable broken or frayed, window regulator drive cable assembly must be replaced. Go to page 64.39

CAUTION

Part numbers are for reference only. Always check with your Parts Department for latest parts information.



Lifter pivot

If tab broken or loose, reattach with modified swivel pins. Go to page 64.38

Grommet stop

Replace if missing or cracked, Part Number 443 837 486

Electric motor mounting bushing

Replace if split or broken, Part Number 431 133 741

CAUTION

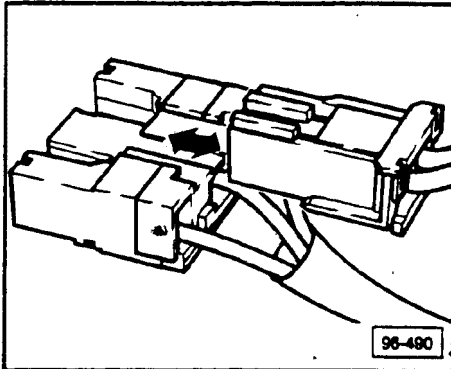
Part numbers are for reference only. Always check with your Parts Department for latest parts information.

CAUTION

Disassemble window regulator motor on clean work surface.

NO dirt or dust must enter motor.

Relubricate with grease
G 000 450 02 or
equivalent as required.

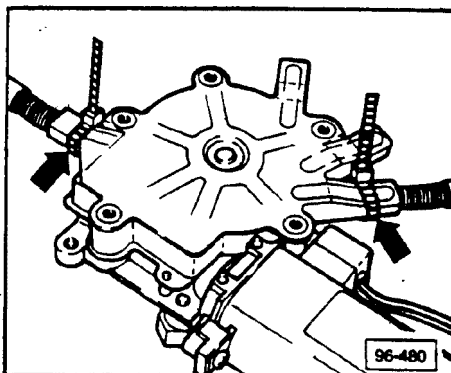


Window regulator motor/ disassembling

Note

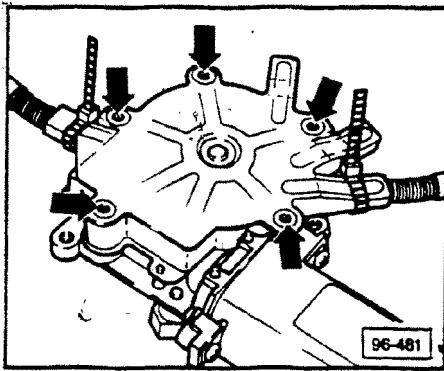
Before disassembling window regulator motor, check window switch, electrical wiring and mechanical portion of regulator assembly for proper operation.

- remove door trim panel
- remove inner door panel
- remove regulator mounting bolts, and remove regulator from inner door panel
- pull off terminal connector for regulator motor (arrow)

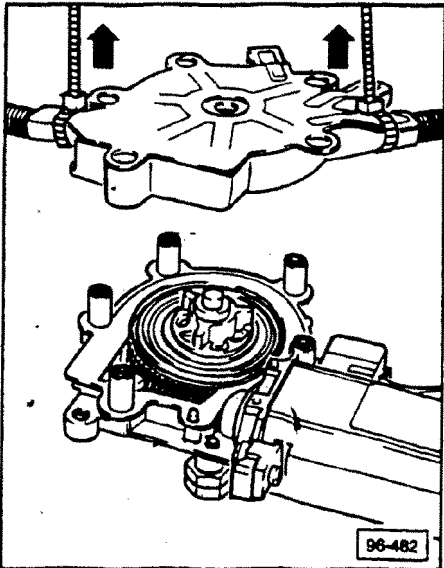


- with regulator removed from door assembly
- clamp housing cover and plastic bearing cover together with tie-wraps as shown (arrows)

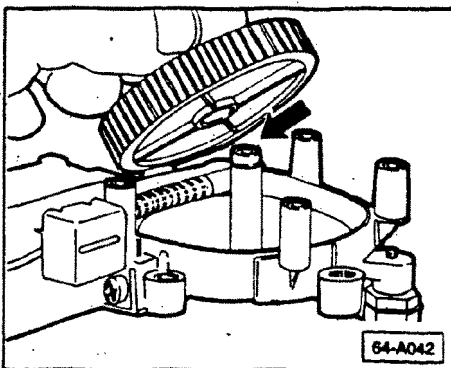
Glass, Window Regulators



- remove mounting bolts securing motor to drive cable housing (**arrows**)

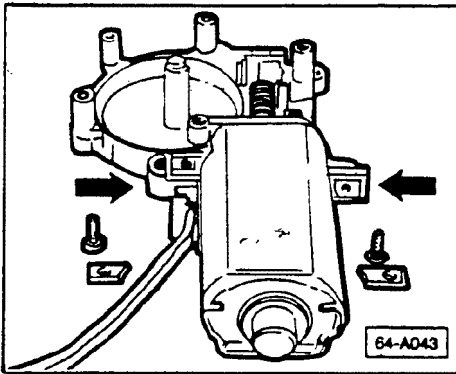


- using a rocking motion, carefully separate drive cable and cable spool from motor
 - do not damage mating surface

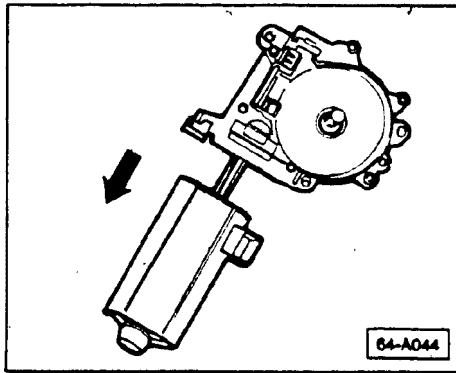


- lift out vaned drive gear and set aside
- clean any corrosion from shaft (**arrow**) with fine grit (400) sandpaper
- lubricate shaft with small amount of water repellent grease G 000 450 02 or equivalent

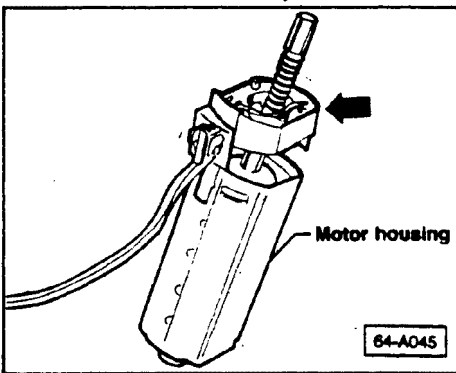
Glass, Window Regulators



- remove two screws and square washers (arrows)



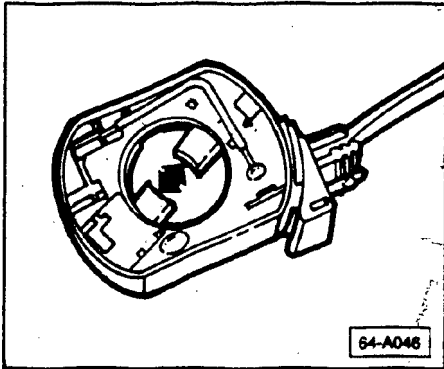
- carefully pry apart motor and gear housing (arrows)
 - use thin blade screwdriver, if necessary



- remove white plastic carbon brush holder from motor housing (arrow)

CAUTION

Do not scrape or use any abrasives to clean carbon brushes.



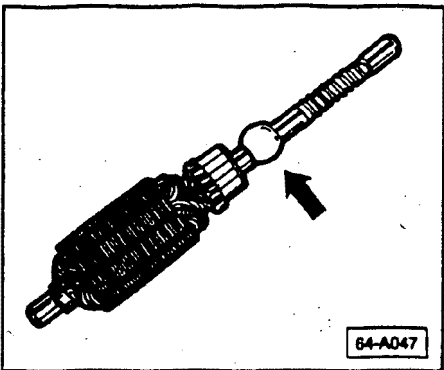
Window regulator motor, inspecting/cleaning

- clean contact surfaces on carbon brushes (**arrow**) with electrical contact cleaner spray
 - commercially available
- dry with compressed air
- remove armature from motor housing and inspect armature

Note

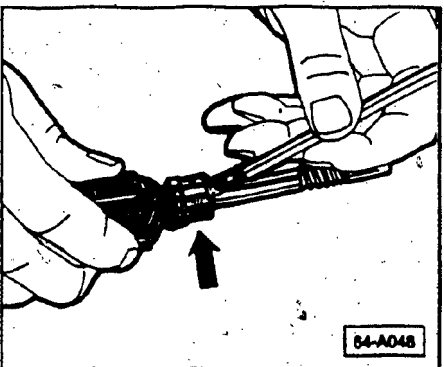
If front armature bushing is seized to armature (**arrow**), proceed as follows:

- carefully remove bushing
- remove any burrs from armature shaft and inside of bushing
- reinstall bushing into gear housing

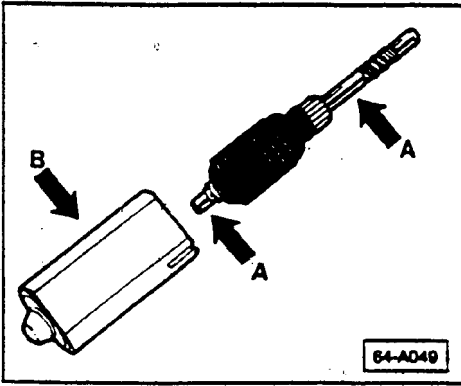


CAUTION

Do not use any abrasive materials on commutator or brushes.



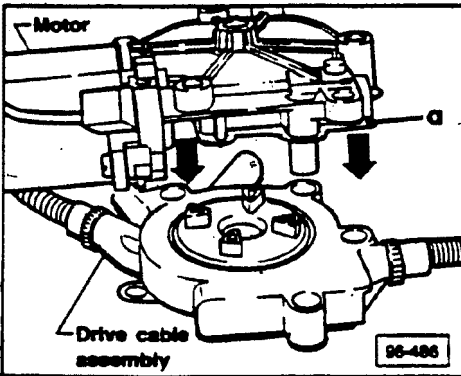
- clean commutator (**arrow**) with pencil eraser
- clean between commutator segments with a wooden toothpick



- lubricate shaft at A with G 000 450 02 or equivalent
- clean inside of motor case B with Brakleen® or equivalent
- blow dry with compressed air

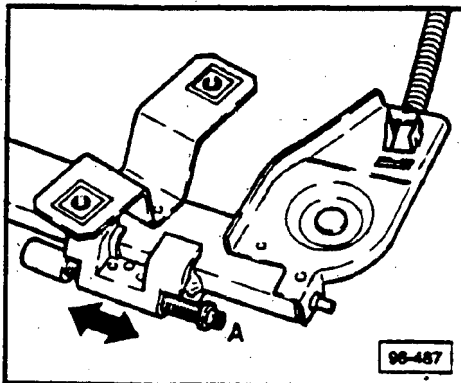
Window regulator motor, reassembling

Reinstall all window regulator motor components in reverse order of removal, noting the following:

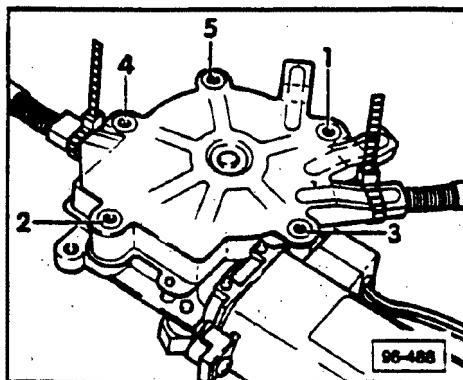


- install brush assembly on commutator
- slide armature with brush assembly into motor housing
- attach motor to gear housing and install vaned drive gear

- reinstall regulator motor to drive cable assembly
 - apply slight amount of grease to secure gasket a when installing

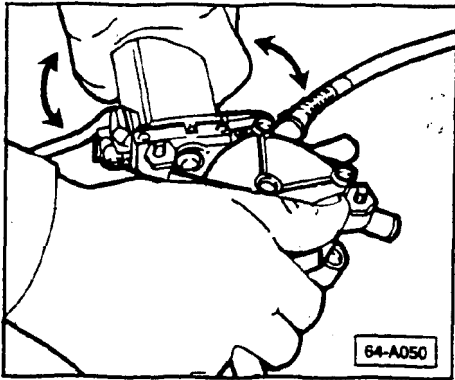


- if regulator motor and cable drive assembly cannot be fitted together move cable carrier slightly (arrow)
- do not turn screw A for upper window stop



- reinstall and tighten mounting bolts diagonally in numerical order as shown
 - 3 Nm (2.2 ft lb)

Glass, Window Regulators



- connect regulator assembly to power supply
- operate motor in both directions
- if motor is noisy in one or both directions, proceed as follows:
 - loosen two screws securing motor to gear housing
 - gently twist motor housing back and forth while operating motor
 - retighten screws when motor is operating the quietest
- cut off excess length of tie-wraps to prevent getting caught in window regulator
- reinstall window regulator and door panel
- test window for proper function

CAUTION

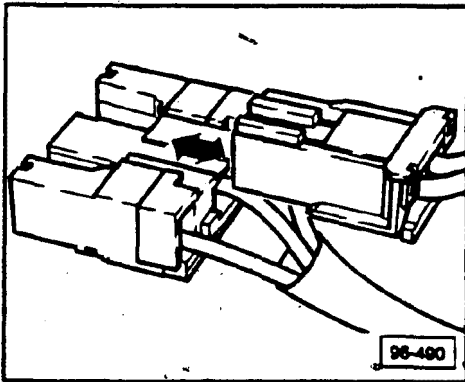
Part numbers are for reference only. Always check with your Parts Department for latest parts information.

CAUTION

Disassemble window regulator on clean work surface.

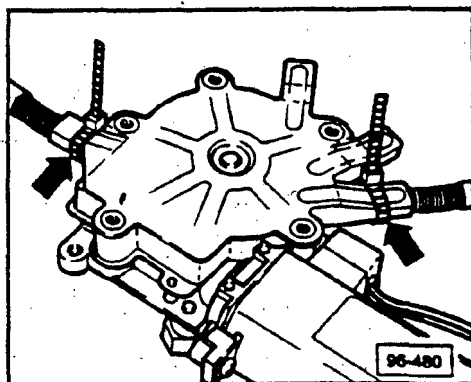
NO dirt or dust must enter motor.

Relubricate with grease G 000 450 02 or equivalent as required.



CAUTION

Do not remove tie-wraps after completing repair.



Window regulator motor/replacing

Note

Before replacing window regulator motor, check window switch, electrical wiring and mechanical portion of regulator assembly for proper operation.

Parts required

Audi 80/90

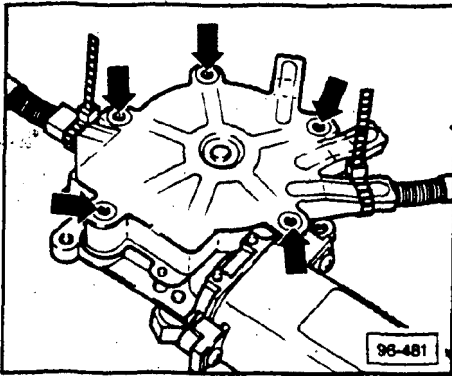
Description	m.y.	Part number	Quantity
Regulator motors *			
Front left	1988-	893 959 801 D	1
Front right	1988-	893 959 802 D	1

* Rear left/right window regulator motors cannot be replaced.

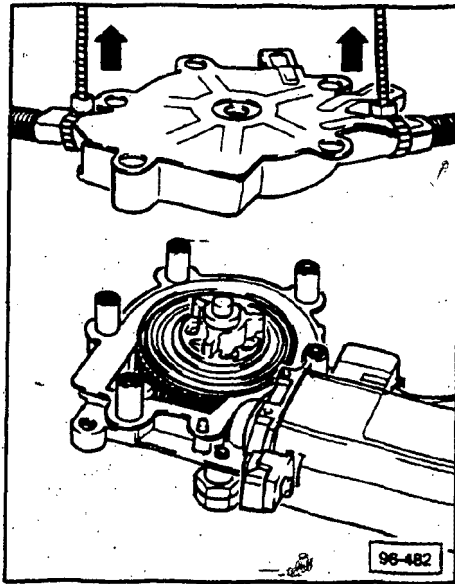
- remove door trim panel
- remove inner door panel
- remove regulator mounting bolts, and remove regulator from inner door panel
- pull off terminal connector for regulator motor (arrow)

- with regulator removed from door assembly clamp housing cover and plastic bearing cover together with tie-wraps as shown (arrows)

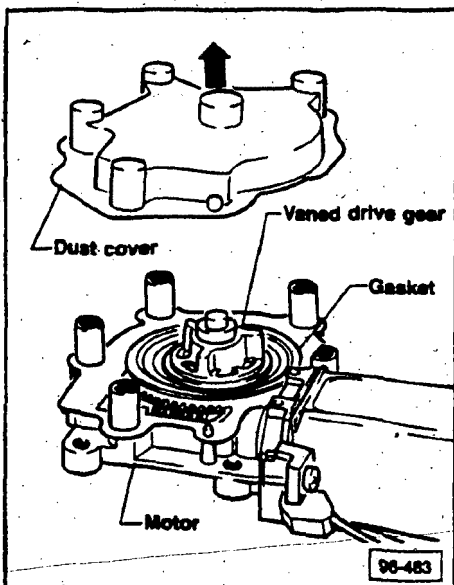
Glass, Window Regulators



- remove mounting bolts securing motor to drive cable housing (arrows)

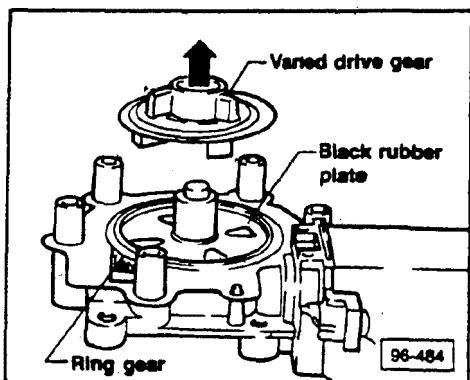


- using a rocking motion, carefully separate drive cable and cable spool from motor
 - do not damage mating surface



- remove plastic dust cover from new regulator motor.
 - three vaned plastic drive gear and gasket remain on motor

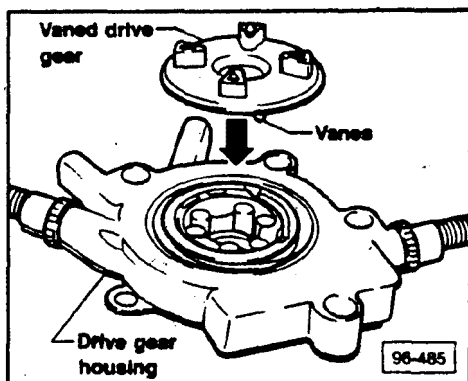
Glass, Window Regulators



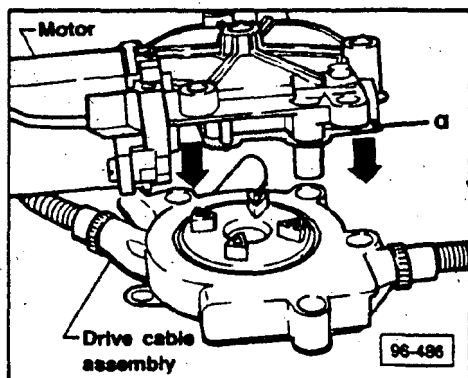
- carefully lift vaned drive gear from new regulator motor (**arrow**)
- black rubber plate and ring gear **stay** inside motor housing

CAUTION

Vanes must fit securely into drive cable housing.

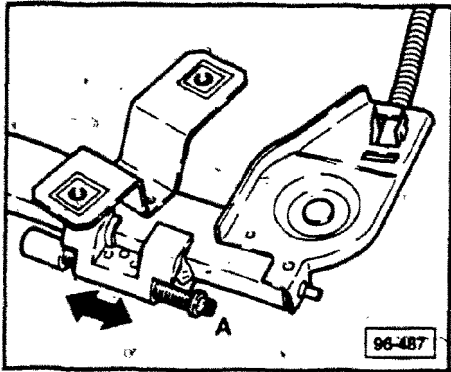


- insert vaned drive gear into drive cable housing (**arrow**) as shown

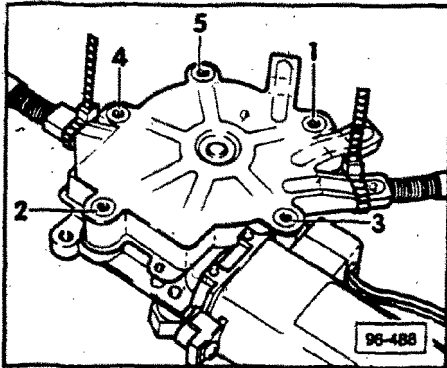


- reinstall new regulator motor to drive cable assembly
- apply slight amount of grease to secure gasket **a** when installing

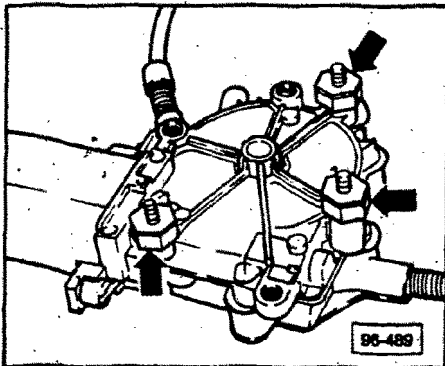
Glass, Window Regulators



- if regulator motor and cable drive cannot be fitted together move cable carrier slightly (**arrow**)
- do not turn screw **A** for upper window stop

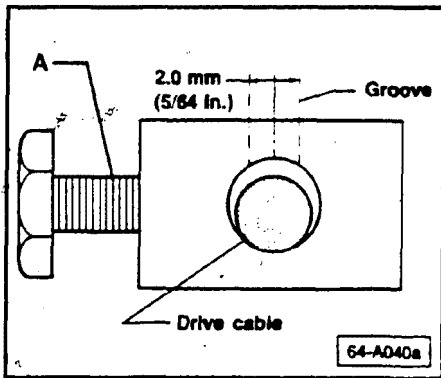


- reinstall and tighten mounting bolts diagonally in numerical order as shown
 - 3-Nm (2.2 ft lb)
- cut off excess length of tie-wraps to prevent getting caught in window regulator

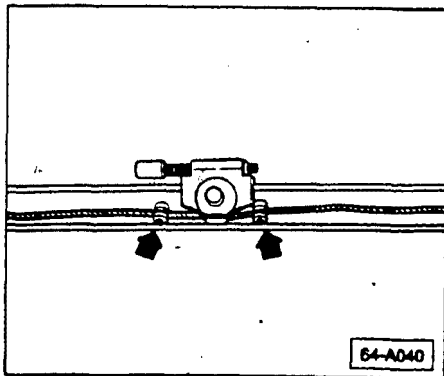


- remove rubber hex bushings from old motor (**arrow**) and reinstall on new motor
- reinstall window regulator and door panel
- test window for proper function

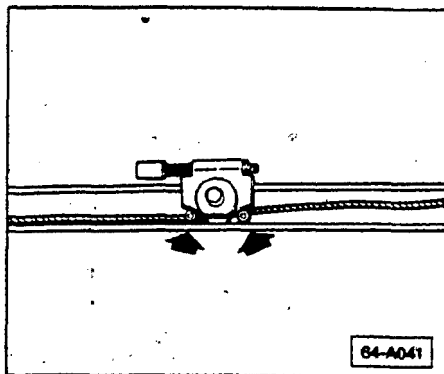
Window lifter pivot, repairing



- modify two swivel pins, Part Number 111 129 921 by cutting a 2.0 mm (5/64 in.) groove in middle (as shown) with a tungsten carbide rod saw or equivalent
 - coat screw A with Loctite



- install lug in cable guide
- insert modified swivel pins on both sides of cable guide (arrows)



- move pins (arrows) up to cable guide, and tighten screws
- check window regulator for proper function

CAUTION

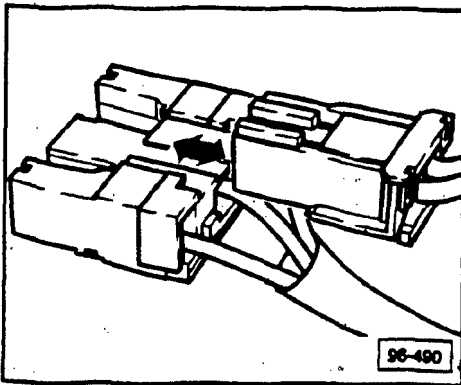
Part numbers are for reference only. Always check with your Parts Department for latest parts information.

CAUTION

Disassemble window regulator assembly on clean work surface.

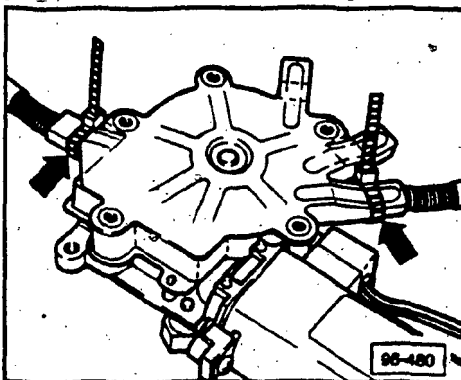
NO dirt or dust must enter motor.

Relubricate with grease
G 000 450 02 or
equivalent as required.



CAUTION

Do not remove tie-wraps after completing repair.



Window regulator drive cable assembly, replacing

Note

Before replacing window regulator motor, check window switch, electrical wiring and mechanical portion of regulator assembly for proper operation.

Parts required

Audi 80/90

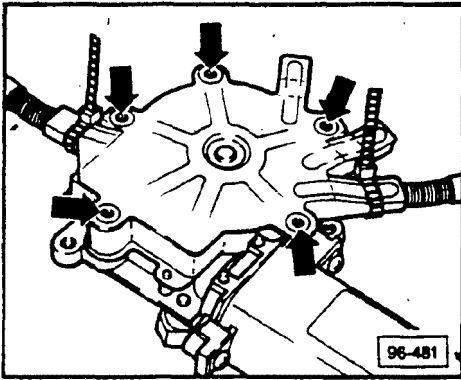
Description	m.y.	Part number	Quantity
Regulator drive cable assembly*			
Front left	1988-	893 837 397B	1
Front right	1988-	893 837 398B	1

* Rear left/right window regulator motor drive cable assembly cannot be replaced.

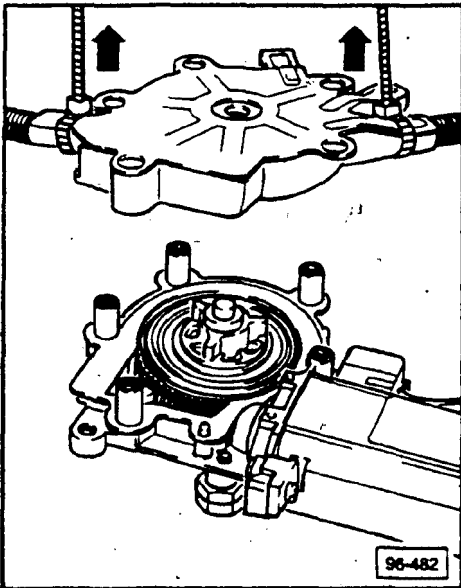
- remove door trim panel
- remove inner door panel
- remove regulator mounting bolts, and remove regulator from inner door panel
- pull off terminal connector for regulator motor (arrow)

- with regulator removed from door assembly
- clamp housing cover and plastic bearing cover together with tie-wraps as shown (arrows)

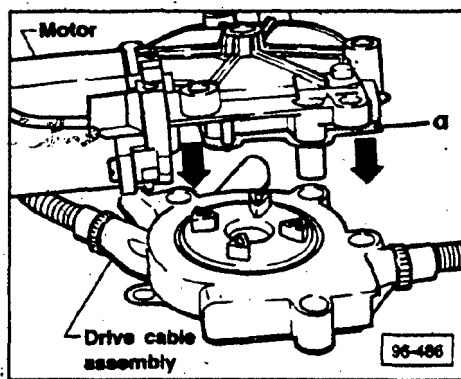
Glass, Window Regulators



- remove mounting bolts securing motor to drive cable housing (arrows)

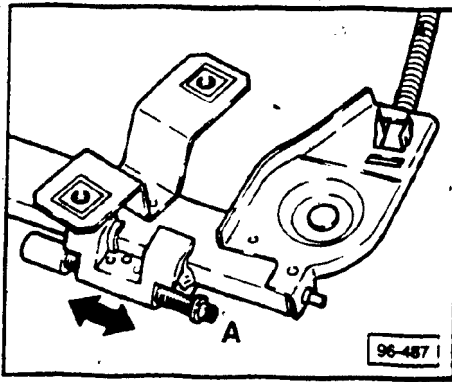


- using a rocking motion, carefully separate drive cable and cable spool from motor
 - do not damage mating surface

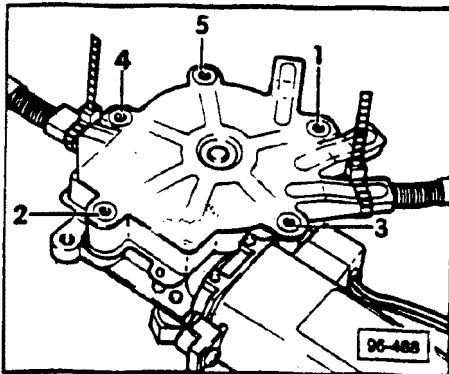


- reinstall replacement window regulator drive cable assembly onto motor
 - apply slight amount of grease to secure gasket a when installing

Glass, Window Regulators



- if regulator motor and cable drive cannot be fitted together move cable carrier slightly (arrow)
- measure stop screw A on old regulator assembly and adjust stop screw on replacement regulator to same length



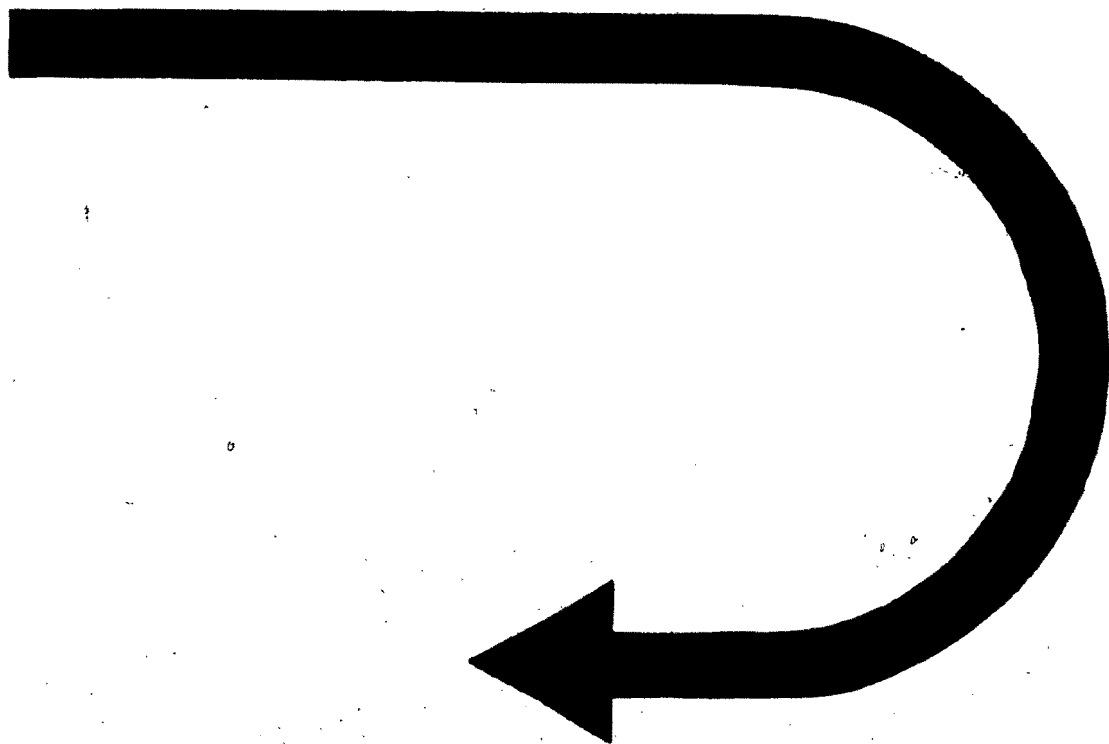
- reinstall and tighten mounting bolts diagonally in numerical order as shown
 - 3 Nm (2.2 ft lb)
- cut off excess length of tie-wraps to prevent getting caught in window regulator

Note

Before installing window regulator into vehicle, test function by connecting window regulator to 12V power supply, and operate in both directions.

- reinstall window regulator and door panel
- test window for proper function

**CONTINUED IN THE
BEGINNING OF NEXT ROW**



Window replacing, general information

To replace windshield, rear window or side windows, the following tools and materials are required.

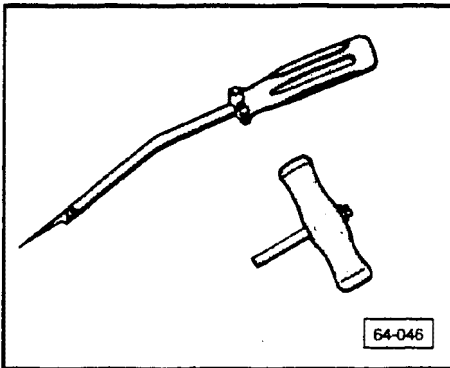
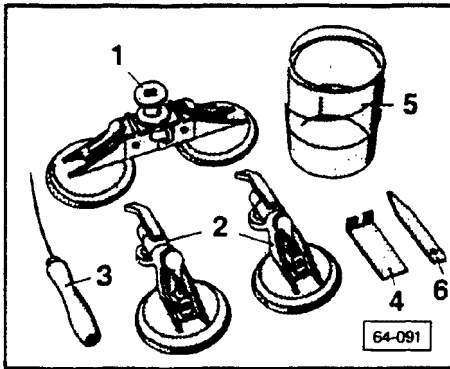
Tool Kit VW 1474

- 1 — Reel
- 2 — Relay roller with holder
- 3 — Awl
- 4 — Guide rail
- 5 — Protective sheeting
- 6 — Wedge

Use protective sheeting **VW 1474/7** to protect instrument panel.

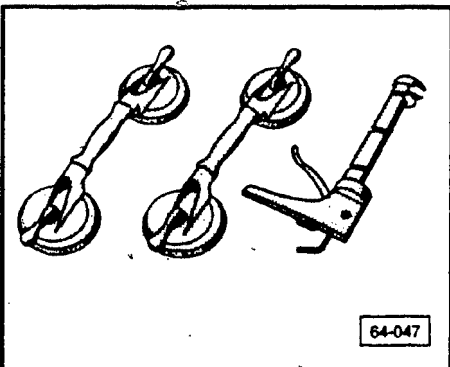
Tool kit VW 1351

- for removing broken windshields, rear windows and **broken** or **unbroken** side windows



CAUTION

To prevent paint damage, mask perimeter of windshield, rear and side windows with cloth duct tape.



- caulking gun
- double suction pad (only for rear window, windshield)
- protective goggles
- utility knife
- protective gloves (leather)
- cloth or duct tape

Glass, Window Regulators

Parts required

CAUTION

Part numbers are listed for reference only. Always consult with the Parts Department for latest information.

Description	Part number	Quantity
center spacers for windshield	895 845 237	1
adjusting wedges for rear window	443 845 237D	2
cutting wire 50m (150 ft) roll	839 845 631A	1
adhesive kit (vehicles with airbag)	443 845 955	1
adhesive kit (vehicles without airbag)	D 004 300 03	1
Mixing rod (For use with adhesive kit D 004 300 04)	D 004 300 04	1
	D 009 700	1

Hardening of adhesive sealing compound

Vehicles without airbag

- vehicle **must** stand at least one hour, at room temperature of 20°C (68°F) and relative humidity of 65-70% before allowing vehicle to be driven

Vehicles with airbag

- vehicle must stand at least three hours, at room temperature of 20°C (68°F) and relative humidity of 65-70% before allowing vehicle to be driven
- keeping the sealed/bonded area wet forms a skin that promotes hardening process

Surplus bonding/sealing compound, removing

CAUTION

When using any cleaning agent, follow all cautions and warnings listed on the containers.

- first use dry cloth to clean off painted areas
- excess adhesive sealing compound can be removed using a cleaning solvent such as supplied in repair kit
 - do not use cleaners which contain alcohol
- to clean plastic trim, let adhesive sealing compound harden two to three hours, then scrape off excess with plastic wedge

Sealing leaks

CAUTION

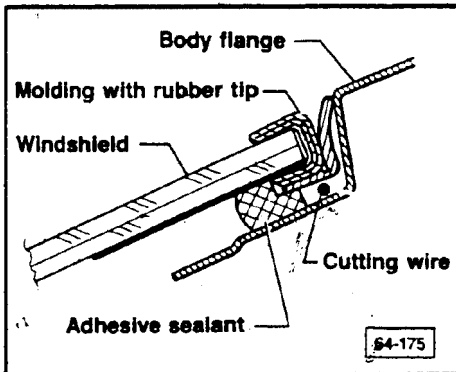
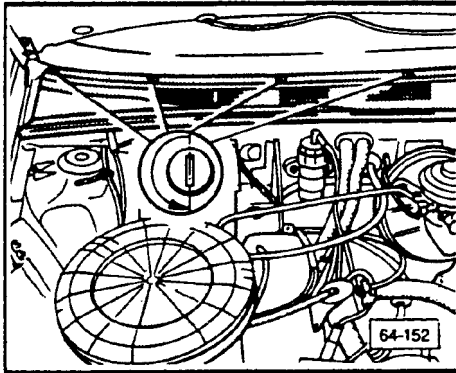
While adhesive sealant is hardening, avoid putting pressure on glass from inside car when cleaning around glass.

- water test window area before reinstalling moldings, trim or lip or rubber molding
- dry area around leaks with compressed air and clean
- apply adhesive sealant from outside to leak area between glass and flange then smooth over
- retest area for water leaks

Note

The small adhesive sealant cartridge **D 009 100 03** is recommended for resealing.

Windshield, removing



- remove outer/interior A-pillar trim (see Repair Group 70)
- remove beading from headliner
- remove windshield wipers
- remove plenum chamber cover (as shown)
 - turn clips 180°
- disconnect wiring for front antenna

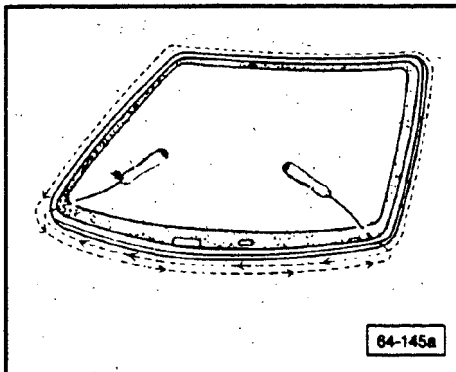
WARNING

Always wear protective goggles and leather gloves when removing and installing windows.

- remove inner rear-view mirror (see Repair Group 68)
- cut off approximately 8m (26 ft) cutting wire
- locate center of cutting wire
- on the outside, starting at top center of windshield, press cutting wire under rubber molding so wire runs completely around perimeter of windshield ending at bottom center

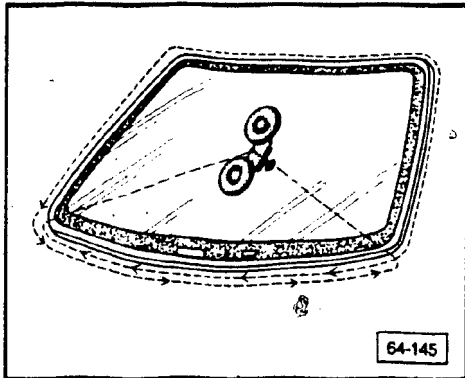
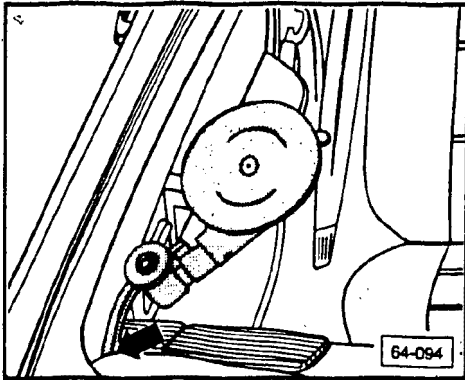
CAUTION

Do not bend or twist wire, otherwise wire will break when under tension.



- from inside push awl through adhesive sealant at lower right corner (as shown) until awl eye is visible from outside
- turn awl slightly and thread in one end of wire
- bend over wire and pull through to inside of vehicle
- do same at lower left corner with other end of wire
- remove guide rail

Glass, Window Regulators



CAUTION

Ends of wire must be in adhesive sealant as close together as possible, but must not overlap, otherwise glass will break or wire will bend or twist.

- attach relay roller with holder into left and right lower corner of windshield
 - holder must support on dashboard (arrow)
- attach reel (as shown) to center of windshield
- guide wire up from base of windshield and around relay rollers then thread ends into reel
- slightly tension cutting wire with reel and ratchet
- check that wire is placed correctly around corners and molding before cutting
- start cutting and continue cutting operation until relay rollers are clear

Note

If wire breaks in lower area, turn roller so there is a sharper cutting angle. Continue cutting with one wire up to A-pillar. In middle, if there still is approximately 30 mm (12 in.) adhesive compound left, turn roller and continue cutting until all adhesive is removed.

- remove relay rollers
- cut out windshield completely

Note

If cutting wire breaks several times (wire gets caught on the windshield flange) and can no longer be fitted on the reel (wire too short), cut remaining area with tool **VW 1351** (pulling handle and mounting).

CAUTION

Depending on extent of paint damage in removing windshield, touch-up or repaint as required.

Windshield, installing

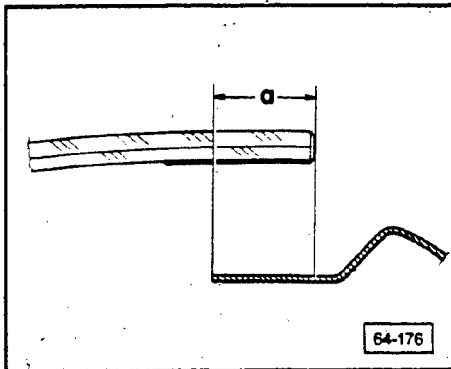
If windshield is to be reused, cut away enough old adhesive sealant with utility knife around glass and body flange to give smooth uniform surface.

If body repair has been done, body flange must be cleaned and primed with primer from adhesive kit.

- attach molding around windshield
- clean edge of glass approximately 30mm (1-11/64 in) wide with cleaning solvent and wipe dry with lint-free cloth

Ceramic black-out band around windshield is not primer. Before applying adhesive sealant prime this area with primer **D 009 200**.

- cut applicator head
- insert felt into applicator head
- thoroughly shake bottle of primer (approximately 30 seconds) and fill applicator bottle
- attach application head onto bottle
- apply primer $a = 17\text{mm}$ (43/64 in) wide evenly all around edge of windshield in **one** continuous operation. Ensure applicator head is always completely saturated
 - drying time approximately 10 minutes



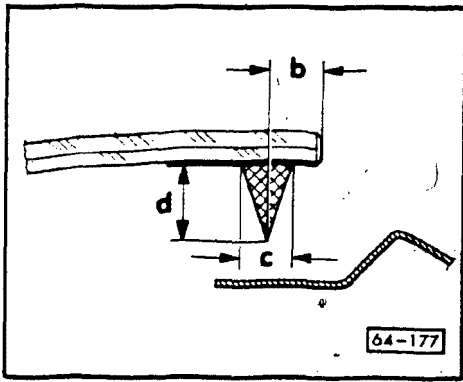
Note

Do not retouch strip of primer until it has dried completely.

WARNING

Adhesive used in bonded window glass installations, original or replacement, may give off toxic fumes when heated. Read container labels. **Ensure adequate ventilation.**

Glass, Window Regulators



- apply adhesive sealant around windshield, making sure that the adhesive sealant touches the edge of the windshield

b = 8 mm (5/16 in)

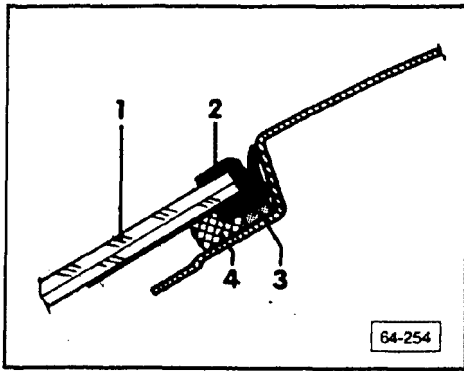
c = 8 mm (5/16 in)

d = 12 mm (15/32 in)

Note

Reduce the height-of adhesive by the thickness of the adhesive remaining on the windshield or the windshield body flange.

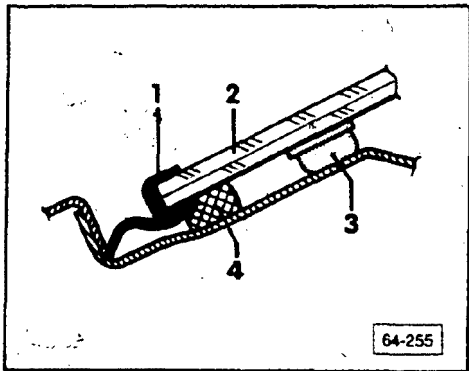
Glass, Window Regulators



Center spacers, installing

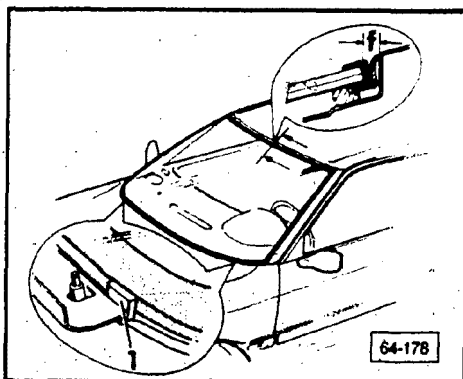
Top

- remove paper backing from spacer (self adhesive)
- apply spacer in center of trim strip (as shown)
 - 1 — windshield
 - 2 — trim strip
 - 3 — spacer
 - 4 — adhesive bead



Bottom

- remove paper backing from spacer (self adhesive)
- apply spacer on center of windshield, 25 mm (1.0 in.) from lower edge of glass
 - 1 — trim strip
 - 2 — windshield
 - 3 — spacer
 - 4 — adhesive

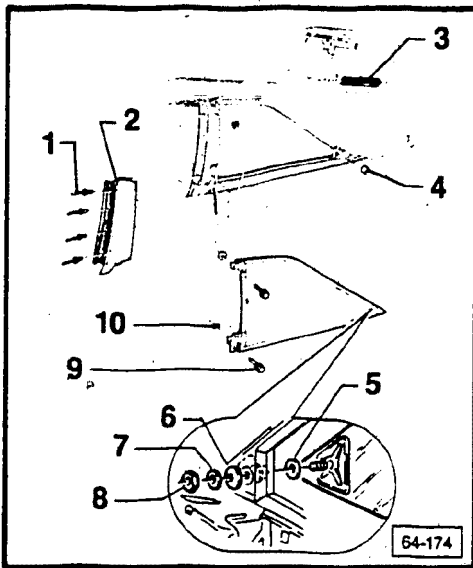


- place windshield into position using two double suction pad holders
- align windshield at the sides
- insert adjusting wedges 1 into corners of windshield (as shown).
 - wedges do not have to be removed
- align windshield gap f at top to 4-5 mm (5/32-13/64 in.)
- lightly press windshield into place
- press windshield at top until windshield molding is flush with roof
- test for leaks
- clean off surplus adhesive sealant from body and glass
- reinstall trim piece

CAUTION

Vehicles **with** airbags **must** stand at least three hours, at room temperature of 20°C (68°F) and a relative humidity of 65-70% before allowing vehicle to be driven.

Vehicles **without** airbags **must** stand for at least one hour.



Side window, removing

- remove C-pillar trim, automatic seat mounting, see Repair Group 70
- remove door weatherstrip in area of B-pillar trim
- remove outer B-pillar trim 2, see Repair Group 66

- 1 — pop-rivet
- 2 — B-pillar trim, outer
- 3 — support
- 4 — sleeve
- 5 — washer
- 6 — seal
- 7 — washer
- 8 — lock nut
5 Nm (3.7 ft lb)
- 9 — screw/washer
- 10 — support
 - remove protective covering prior to installing

Side window, installing

Install window in reverse order of removal, noting the following:

- test window for water leaks

THIS FRAME INTENTIONALLY LEFT

BLANK

Power window, troubleshooting

Note

Refer always to appropriate wiring diagram.

Test conditions

- battery OK

Tools required

- multimeter US 1119
- LED tester US 1115
- test adaptor VW 1594
- sun VAT 40 or VAT 60 or equivalent with current test lamp

No window operates

- switch ignition ON
- operate driver window switch
- listen for "click" sound from control unit
 - indicates wires, relay, power supply to control unit OK

click audible

no "click" audible

Go to

(A)

page 64.52

No power to control unit

- remove left lower instrument panel cover
- pull control unit from auxiliary relay panel
- set multimeter to volt scale and connect to terminals 14 and 2
 - must be 12V
- connect and read between terminals 14 and 1
- turn ignition ON
 - must be 12V minimum

NOT OK

OK window does not operate

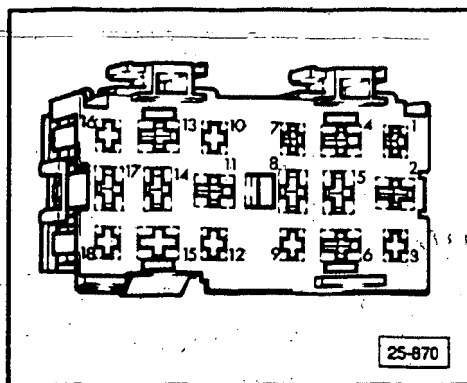
- repair break in electrical wiring or
- replace circuit breaker (see 64.59)

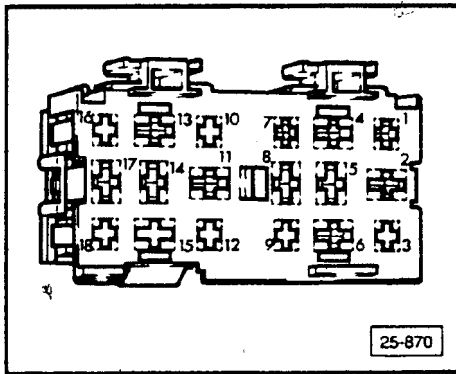
Go to

(A)

page 64.52

End





(A)

Checking front door contact switches

- switch ignition OFF
- passenger door open
- multimeter US 1119 set to ohms scale
- connect multimeter to terminals 14 and 3
 - must be 0 ohms
- press right front door contact switch
 - must be ∞ ohms (infinite)
- driver door open
- connect multimeter between terminals 14 and 6
 - must be 0 ohms
- press left front door contact switch
 - must be ∞ ohms (infinite)

NOT OK

OK

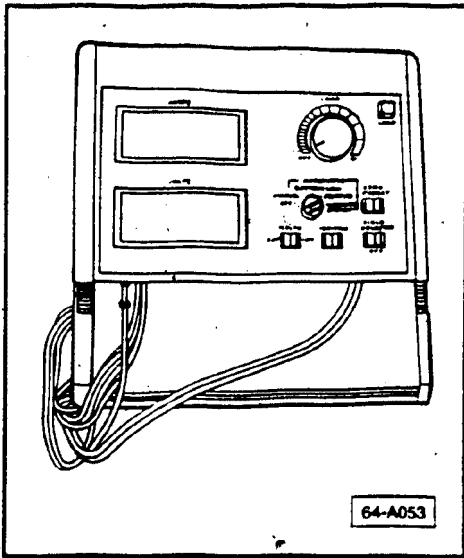
- repair break in electrical circuit

- reinstall control unit

End

Go to
(B)
page 64.54

One window not working



Window regulator current draw, checking (installed)

- connect volt/amperage tester
 - Sun VAT 40, or VAT 60 or equivalent
 - Sun VAT 60 shown
- connect inductive pick-up to battery ground strap
- switch ignition ON
- press operating switches for window regulators one after the other (open or close)
- measure current draw during window switch operation
 - must be 6-12A (during window travel)

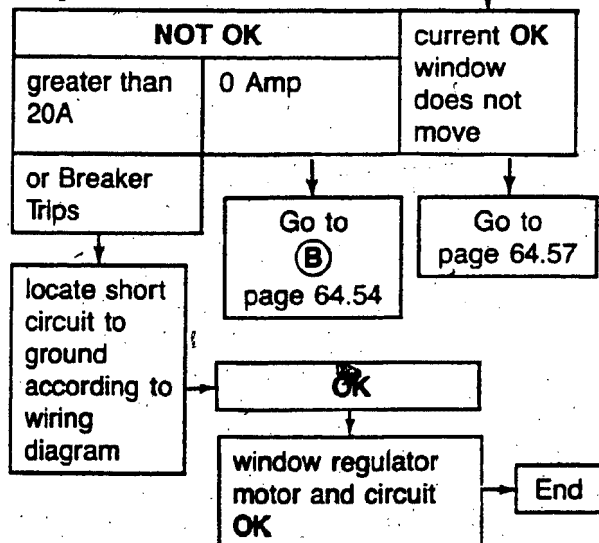
Note

The tester will always indicate a certain current reading when the ignition is switched on; this reading will vary according to operating conditions and the type of model and equipment, to correct:

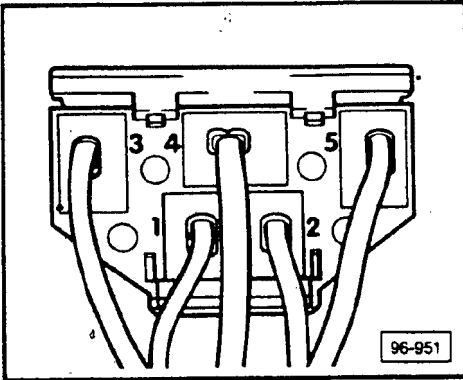
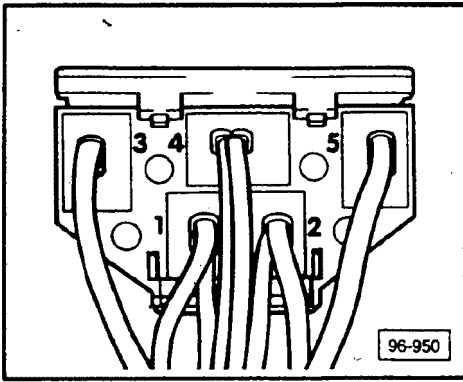
- zero tester to compensate for other electrical consumers
- after glass is at top or bottom and switch depressed, current must be between 15-20A (stall current)

specified readings NOT obtained; window motor not drawing current

tester registers stall current and window glass does not move



B



Window switch, checking

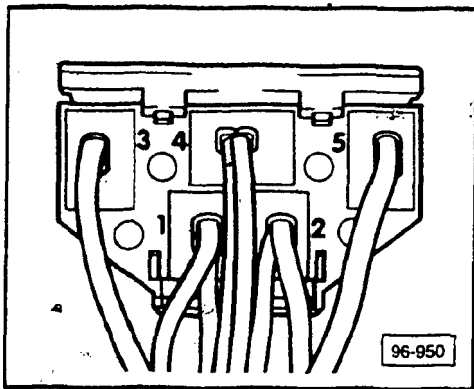
- see illustration 96-950 for driver door window switch, for passenger door switch see 96-951
- remove switch panel from door trim panel
- switch ignition **ON**
- set multimeter **US 1119** to volts scale
- connect and read multimeter between terminals 4 (+) and 3 (-); then terminals 4 (+) and 5 (-)
- must read approximately **12V**

NOT OK

OK, window inoperative

check power and ground wires of switch according to current flow diagram

Go to **C**
window switch **ON**, checking page 64.55



Ⓒ

Window switch ON, checking

- see illustration 96-950 for driver door window switch, for passenger door windows see 96-951
 - ignition ON
 - window switch panel removed from door trim panel
 - multimeter US 1119 set to volts
- connect and read multimeter between terminals 3 (-) and 2 (+) while lowering window (holding switch in window down position)
 - must be approximately 12V
 - connect and read multimeter between terminals 5(-) and 1 (+) while raising window (hold switch in window raising position)
 - must be approximately 12V

Note

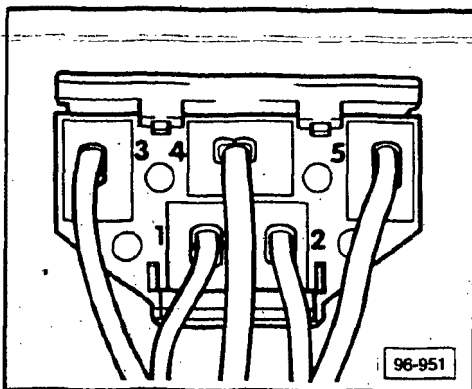
Window travel time should be approximately 8-10 seconds.

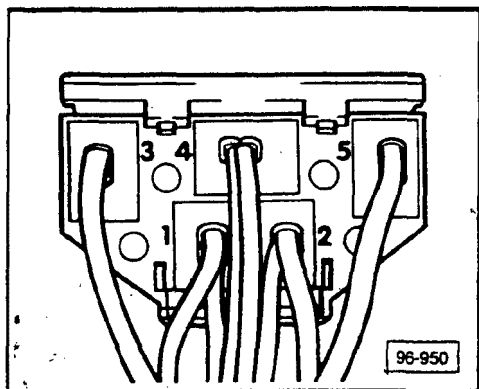
OK

NOT OK

Go to
Ⓓ
page 64.57

Go to
Ⓔ
page 64.59





Driver's window switch, one-touch down function, (driver's door only)

- door window in up position
- turn ignition **ON**
- set multimeter **US 1119** to volts scale
- connect multimeter **US 1119** between terminals 3 (⊖) and 2 (⊕)
- touch window switch for driver's door and release, while observing multimeter
 - must be approximately **12V** as window lowers

Note

Window travel time should be approximately 8 to 10 seconds.

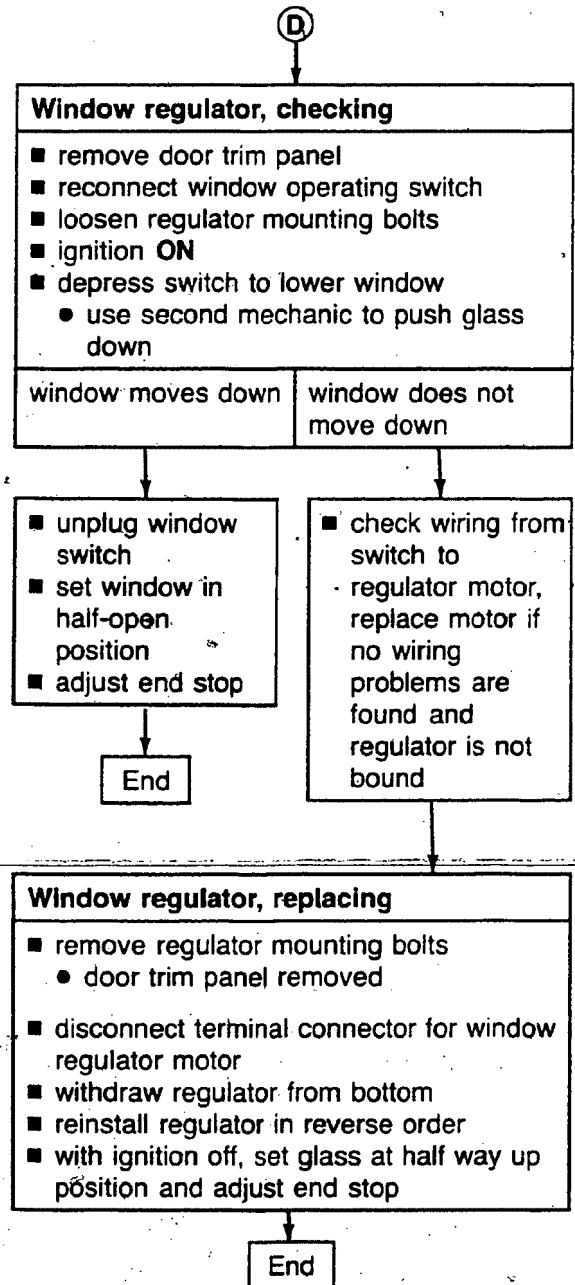
NOT OK

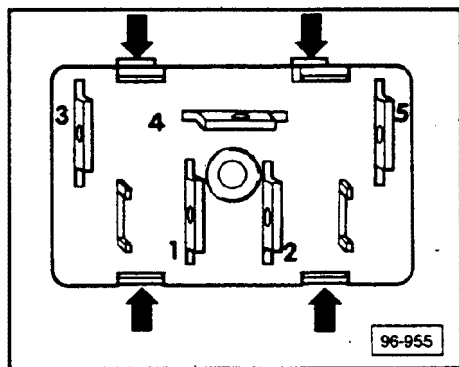
OK but window does not move

Go to
page 64.51

Go to
Ⓑ
page 64.54

Glass, Window Regulators





Window switches, replacing

- pry out from door trim panel
- pull off terminal connector

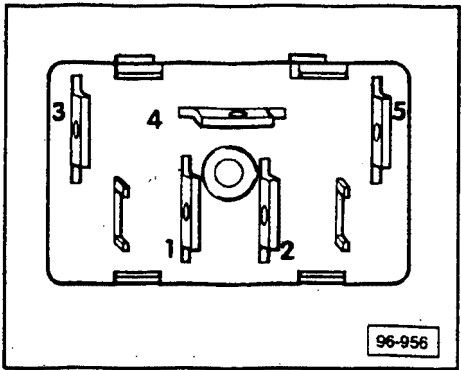
Driver's door control panel switches

- pry switch from panel at points shown (arrows)
- push switch out of panel from bottom

Right front, window switch

- pry out of door trim panel
- reinstall in reverse order, noting:
 - switches are pressed in until "click" is heard

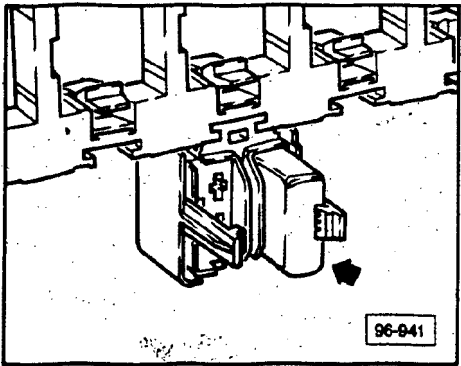
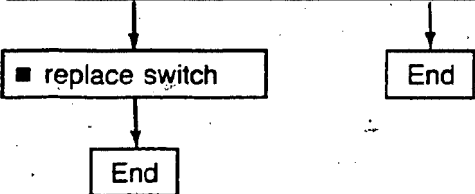
(E)



Window regulator switches, checking continuity

- remove switch
 - pry out
- disconnect terminal connector from switch
- set multimeter **US 1119** to ohm scale and read between terminals 5 and 2, then 3 and 1
 - must be **0 ohms**
- connect multimeter to terminals 4 and 2
 - must be **∞ ohms** (infinite)
- operate switch to lower window
 - must be **0 ohms**
- connect multimeter to terminals 4 and 1
 - must be **∞ ohms** (infinite)
- operate switch to raise window
 - must be **0 ohms**

NOT OK	OK
---------------	-----------



Circuit breaker, location

On left side of auxiliary relay panel (arrow).

CAUTION

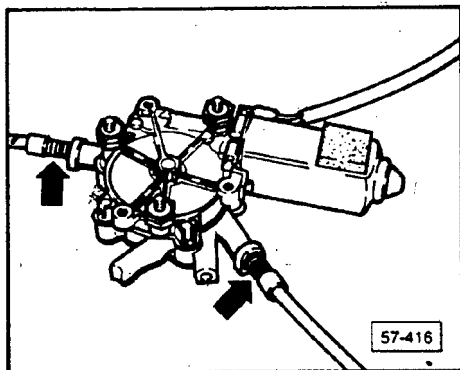
Part numbers are for reference only. Always check with your Parts Department for latest parts information.

CAUTION

Disassemble window regulator on clean work surface.

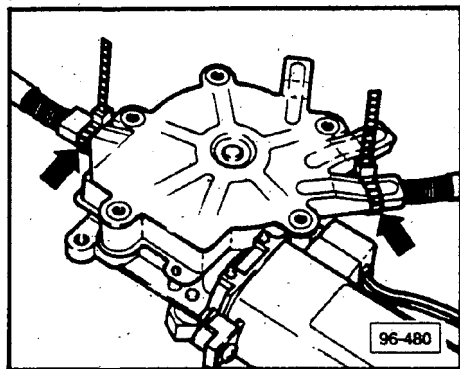
NO dirt or dust must enter motor.

Relubricate with grease
G 000 450 02 or equivalent as required.



CAUTION

Do not remove tie-wraps after completing repair.



Window regulator motor, replacing

Note

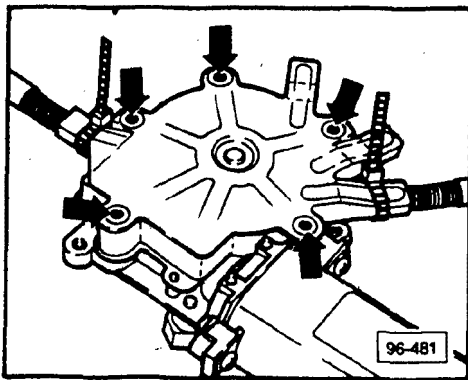
Before replacing window regulator motor, check window switch, electrical wiring and mechanical portion of regulator assembly for proper operation.

- remove door trim panel
- raise door glass almost to top
- remove regulator mounting bolts

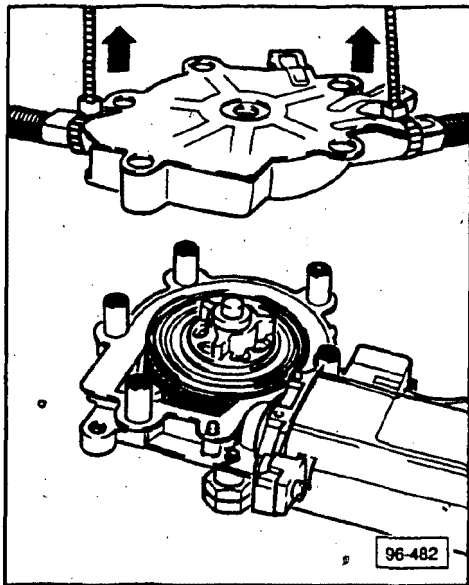
- check and adjust window regulator drive cable for equal tension on both sides of motor
 - check tension of springs (**arrows**)
- cut off tie wraps for mounting cables, wiring harness
- remove regulator motor from drive cable
- pull motor downward and turn 180°

- clamp housing cover and plastic bearing cover together with tie-wraps as shown (**arrows**)

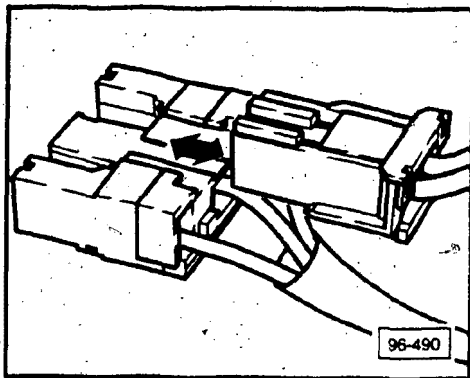
Glass, Window Regulators



- remove mounting bolts securing motor to drive cable housing (arrows)

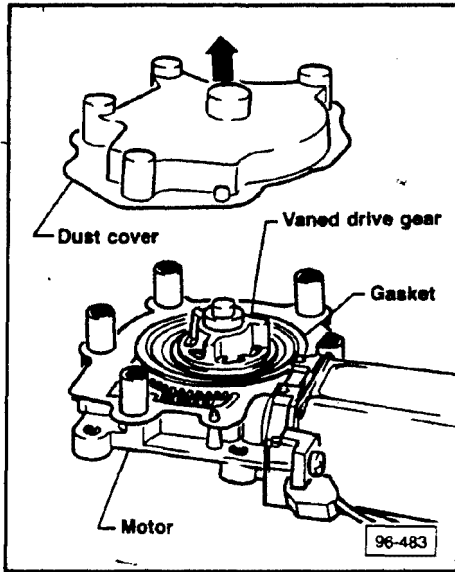


- using a rocking motion, carefully separate drive cable and cable spool from motor
 - do not damage mating surface
 - do not remove cable spool from drive cable housing

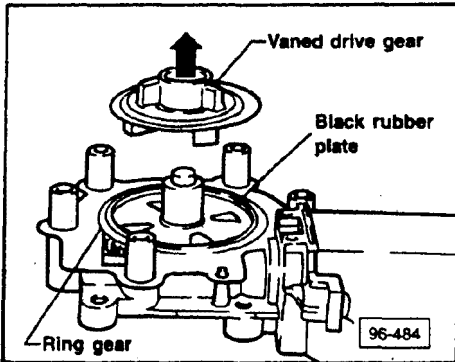


- pull off terminal connector for regulator motor (arrow)
- remove regulator motor from door assembly

Glass, Window Regulators

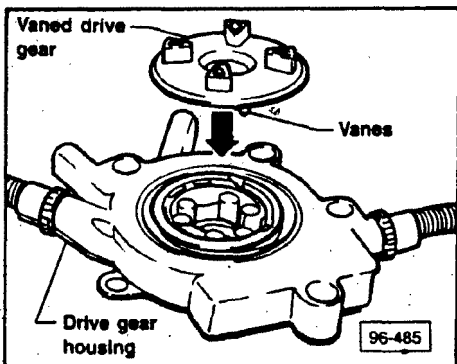


- remove plastic dust cover from new regulator motor
 - three vaned plastic drive gear and gasket remain on motor



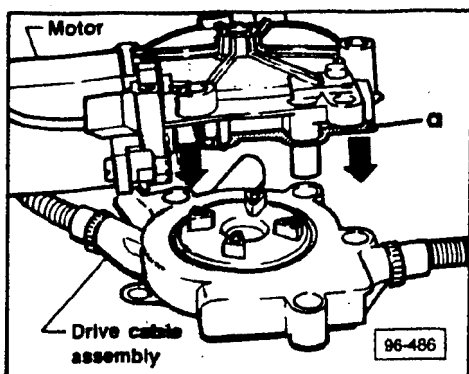
- carefully lift vaned drive gear from new regulator motor (**arrow**)
 - black rubber plate and ring gear **stay** inside motor housing

CAUTION
Vaness must fit securely into drive cable housing.

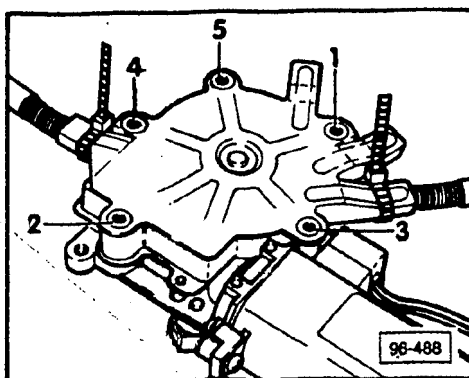


- insert vaned drive gear into drive cable housing (**arrow**) as shown

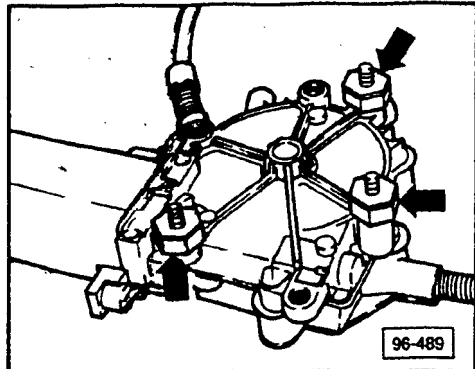
Glass, Window Regulators



- reinstall new regulator motor to drive cable assembly
 - apply slight amount of grease to secure gasket **a** when installing
 - 4 tabs on vaned drive gear must engage openings in motor
- if regulator motor and cable drive cannot be fitted together move door glass up and down
 - 2 mechanics may be necessary



- reinstall and tighten mounting bolts diagonally in numerical order as shown
 - 3 Nm (2.2 ft lb)



- remove rubber hex bushings from old motor (**arrow**) and reinstall on new motor
- cut off excess length of tie-wraps to prevent getting caught in window regulator
- reinstall window regulator
- secure mounting cables and wiring harnesses with new tie-wraps
- reconnect electrical connector
- reinstall door panel trim
- test window for proper function