

Windshield Wiper System

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Windshield wiper system

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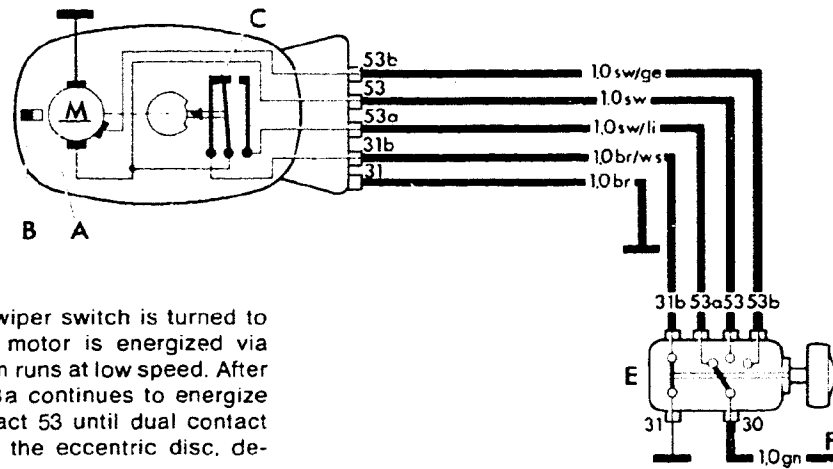
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Windshield Wiper System **E5.1**

Type 1 up to July 1969



When the windshield wiper switch is turned to the first position the motor is energized via terminal 53. The system runs at low speed. After turning off, contact 53a continues to energize the armature via contact 53 until dual contact 53a-53, controlled by the eccentric disc, de-energizes the circuit.

At this moment the armature circuit is short circuited via contact 31 b-53. The windshield wiper motor is brought to a standstill very quickly by the short circuit current (induction brake) and remains in the end position.

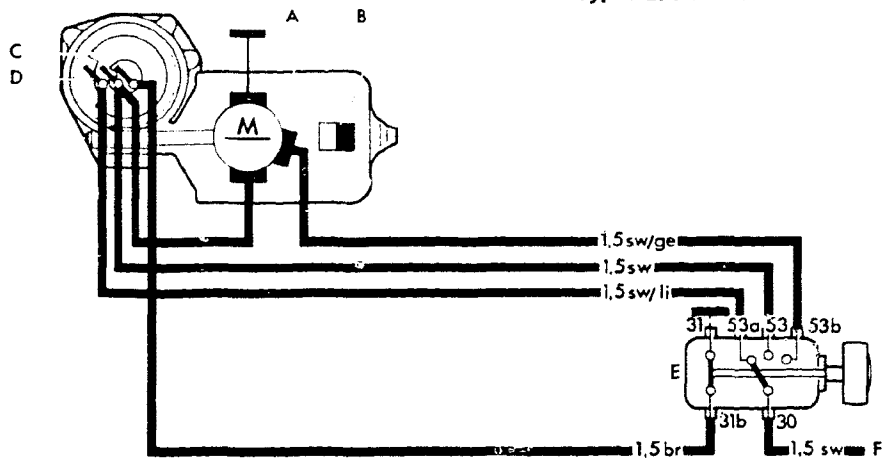
There are three carbon brushes fitted to the brush holder, whereby one brush is installed offset to the ground brush. It is via this brush that the high speed is turned on directly with the switch (53b).

- A - Motor
- B - Permanent magnet
- C - Contacts
- E - Switch
- F - from fuse box, terminal 15

E5.1

Windshield Wiper System

Type 1 from August 1969
Types 2, 3 and 4



- A - Motor
- B - Permanent magnet
- C - Contact plate
- D - Contacts
- E - Switch
- F - from fuse box, terminal 15

When the windshield wiper switch is turned to the first position, the motor and the contact plate on the worm gear are energized via terminal 53 of the switch. The wipers run at low speed. After turning off, contact (53a) still supplies the motor with current via the contact plate until the wiper arms have reached their end position. The contact then switches the current off. At the same time, the armature winding is connected to ground via contact 31b of switch and the small segment of the contact plate. By this means the armature brakes itself (induction brake). There are three carbon brushes fitted to the brush holder, whereby one brush is installed offset to the ground brush. It is via this brush that the high speed is turned on directly with the switch (terminal 53b).

Note

From August 1969, Type 1 vehicles have wiper motors with worm gear drive instead of spur gears.

Water container with pressure hose

The fluid container holds approx 3.4 pts./1.6 liter.

When the washer button in the windshield wiper switch is depressed, water is forced to the twin jets by the excess pressure in the fluid container.

Type 2 vehicles have one jet under each windshield wiper arm.

The spare tire provides the pressure for the windshield washer. A cut-off valve in the fluid container cap prevents the pressure in the spare tire dropping below 1.8 kg/cm² (26 psi) or 2.8 kg/cm² (40 psi) on Squareback Sedan models.

On these models the plate is marked with "max. 4 atü, max. 56 psi".

To differentiate between the two types (different cut-off pressures) the housing and union nut are different colors. Furthermore the tolerances for the cut-off and opening pressures have been revised from January 1970.

Pressure (hose) for	Color	Cut-off pressure kg/cm ²	
Sedan	black	1.5-2.0	21-28
Squareback	red	2.5-3.0	35-43

Note

The following points must be noted to ensure that the washer system works properly. As the valve only opens at a pressure of 2.5 kg/cm² (35 psi) (Sedan) and 3.5 kg/cm² (50 psi) (Squareback Sedan) the spare tire must always be inflated to 3 kg/cm² (43 psi) (Sedan) and 4 kg/cm² (56 psi) (Squareback Sedan).

The pressures and the symbol as used on the washer operating knob are listed on the sticker.

The pressures are 3 kg/cm² (43 psi) or 4 kg/cm² (56 psi) according to types and models.

Note

To prevent water in the container from freezing during cold weather a suitable quantity of windshield washer antifreeze and solvent can be added.

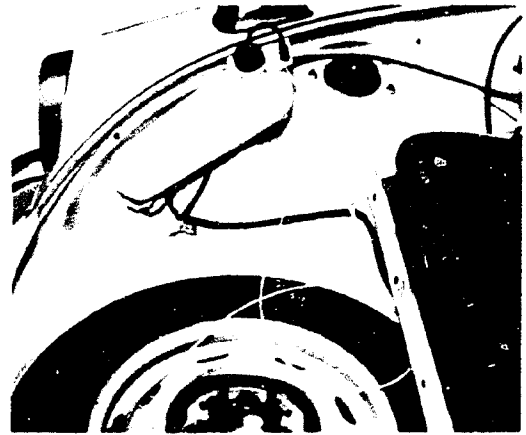
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Windshield Wiper System

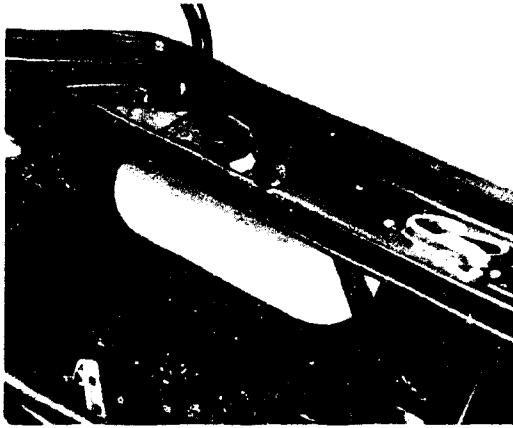
Type 1



Sedan 111

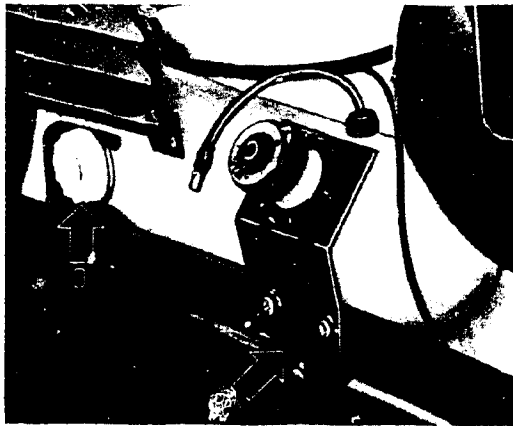


Sedan 113

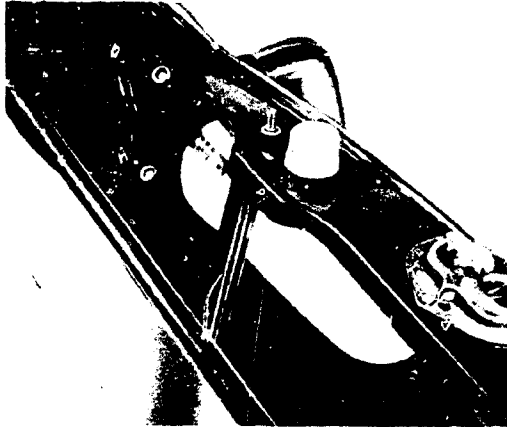


Model 181

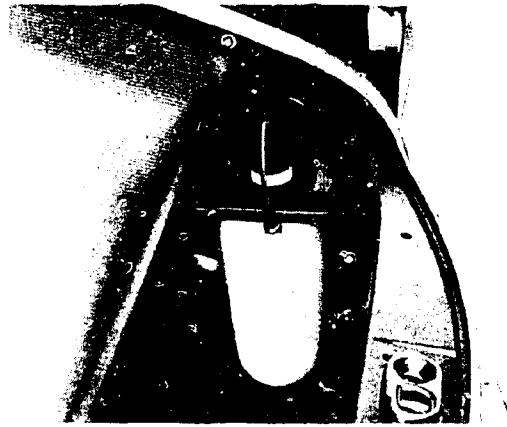
Type 2



Type 3

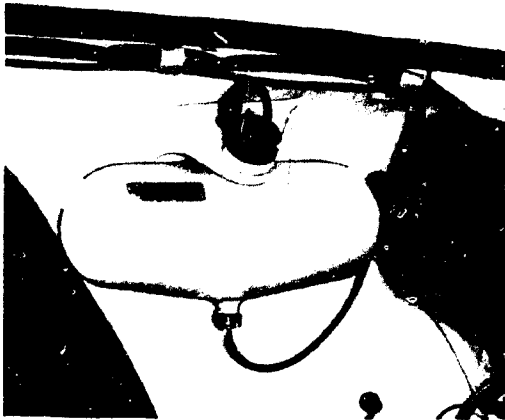


up to July 1969



from August 1969

Type 4



List of windshield wiper motors 1 - 1

Type	Chassis No.		Wiper motor		Type of drive	Crank length mm (in.)	Pin diameter mm (in.)	Voltage	Remarks
	from	to	installed in new car	spare part No.					
1	118 000 001 - 118 1016 100		111 955 113 D	111 955 113 F	spur gear	21 (0.827)	7 (0.275)	12	2 stage
	119 000 001 -		111 955 113 F						2 stage with ground terminal
	110 2000 001 - 111 3200 000		113 955 113 E						with ground terminal
	112 2000 001 -		113 955 113 G			wiring modification			
	113 2000 001 -		133 955 113			43 (1.692)	ball pin		
	148 000 001 - 148 760 152		141 955 113 C	141 955 113 D		21 (0.827)	7 (0.275)		
	148 760 153 - 141 3200 000		141 955 113 E			32.5 (1.275)	7 (0.275)		with ground terminal
	142 2000 001 -		141 955 113 H						
2	218 000 001 - 218 220 000		211 955 113 E		worm gear	54 (2.126)	ball pin	with ground terminal	
	219 000 001 -		211 955 113 H						

Type	Chassis No.		Wiper motor		Type of drive	Crank length mm (in.)	Pin diameter mm (in.)	Voltage	Remarks
	from	to	installed in new car	spare part No.					
3	318000001-318500000		311955113 E	343955113 E	worm gear	42 (1.653)	7 (0.275)	12	
	319000001-		311955113 G	343955113 E					with ground terminal
	3122000001-		311955113 P						wiring modification
4	419000001-4112100000		111955113			47 (1.850)	ball pin	12	with ground terminal
	4122000001-		411955113 C						wiring modification

Testing installed windshield wipers

Check windshield wiper operating condition by checking the current draw (at terminal 30) at low and high speed.

At low speed the current draw is about 2.5 amp. and at high speed 3.5 amp. These readings are attained with the wipers turned on and the blades pulled away from the windshield. Readings are inaccurate when the wipers press against the windshield due to the created friction.

If the wipers run slower and squeaking noises occur, along with a high current draw, the probable cause is a lack of bearing lubrication. If there is **no** squeaking noise but still a high current draw then there is a short in the armature winding.

Testing disassembled wiper motor

Testing armature:

- 1 – If the commutator is oily or dirty, it can be cleaned with a clean cloth moistened with cleaning solvent. If the commutator shows signs of wear or burning, it must be repaired. The commutator may be turned down to a minimum diameter of 21.5 mm (.846 in.). The insulation between the segments must afterwards be reworked with a commutator saw. When doing this, ensure that no metal chips remain between the segments and so cause a short circuit between the armature windings. The permissible runout of the armature is 0.03 mm (.001 in.).
- 2 – Often, armature damage cannot be seen. The armature, commutator and field windings are tested in the same way as a D.C. generator.

Wiper blades

Care

For good visibility and safety, the windshield wipers should always be in good operating condition.

During long, dry periods the wiper blades become clogged with road tar, oil droplets and dead insects. In this condition the wiper blades cannot completely remove the water film from the windshield.

To clean the blades thoroughly it is necessary to take them off and scrub them with a hard nylon brush and alcohol or a strong detergent solution. If the blades show cracks or signs of deterioration and the edges are no longer sharp, they should be ~~removed~~
replaced.

Notes:

Often the quality of the wiped area cannot be improved simply by replacing the wiper blades (see chart "Wiper Blade Troubles – Causes and Remedies"). In such cases the windshield must be treated with silicone remover. The following solvents can be used for cleaning the windshield:

- 1 – Windshield clearer (VW part no. 000 096 105).
- 2 – Clean windshield with benzine and then treat it with an acid solution consisting of 1 part hydrochloric acid and 9 parts water. Afterward, rinse thoroughly with clean water.

Note:

- 1 – When cleaners containing silicones are used, the brushes, sponges, leathers and rags used to clean the paintwork should not be used for the windshield.
- 2 – The wiper blades are subject to a certain amount of natural wear even if given the best of care. It is advisable, in the interest of road safety, to replace blades about every 12 months or earlier if necessary.

Park position

To ensure that the wiper motor always moves to its park position, note the following:

- 1 – Blades which have frozen to the windshield should be freed before operating the wiper switch. If this is not done, the blades may move slightly when turned on and then stop again. Should this occur at the turned on position, the current supply to the motor will continue as long as ignition is on, despite the fact that the switch has been turned off. This will cause the armature winding to burn out and make the motor unserviceable.
- 2 -- When snow is falling, ensure that it does not build up on the windshield and prevent the blades from reaching the park position.

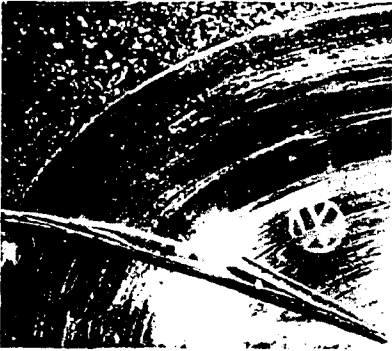
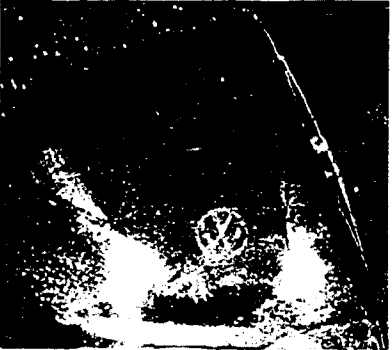

Symptoms	Cause	Remedy
Windshield wiper motor runs too slowly, cuts out or stops completely	<ul style="list-style-type: none"> a – Brushes worn b – Brush spring tension too weak c – Brush levers not free on their pivots d – Commutator dirty e – Moving pivots of windshield wiper linkage without grease or jammed f – Battery voltage too low 	<ul style="list-style-type: none"> a – Install new brushes b – Install new spring c – Free up brush levers d – Clean commutator e – Thoroughly lubricate all moving pivots with universal grease; eliminate jamming f – Charge battery, check cables and connections
Windshield wiper motor continues to run after switch is turned off or blades do not return to park position	<ul style="list-style-type: none"> a – Contacts in housing damaged b – Contact spring bent c – Contact bracket (insulation plate) broken d – Spring contact terminal 31 b does not make contact with spring contact terminal 53 e – Contacts dirty f – Windshield wiper motor cannot be turned off g – Poor connection from terminal 31 b via wiper switch to ground 	<ul style="list-style-type: none"> a – Replace contacts b – Replace contacts c – Replace contacts d – Adjust contact gap to 0.8 mm (0.03 in.) or replace contacts e – Clean contacts f – Back off switch button slightly, bend contacts g – Check connection, replace switch if necessary
Squeaking noise when motor operates. In some cases motor runs slowly	<ul style="list-style-type: none"> a – Moving pivots of windshield wiper linkage without grease b – Point of armature spindle rests against stop of brush holder c – Motor cover not correctly positioned on housing d – Armature spindle without grease 	<ul style="list-style-type: none"> a – Thoroughly grease all moving pivots with universal grease b – Bend stop into shape c – Seal cover properly d – Lubricate with molybdenum disulfide grease
Windshield wiper motor inoperative	<ul style="list-style-type: none"> a – Armature burnt by winding or ground short circuits b – "On" position of switch not correct. No connection between terminals 30 and 53. Faulty connection from terminal 53 of switch to terminal 53 of motor c – As under "Motor runs too slowly, cut out or stops completely" 	<ul style="list-style-type: none"> a – Replace motor or armature b – Replace switch Repair faulty connection (loose contacts)

E 5.4

Windshield Wiper System

Symptoms	Cause	Remedy
Motor runs too slowly, cuts out or stops completely	a – Ground connection or feed wire making poor contact b – Brushes worn or sticking c – Brush springs weak d – Commutator dirty e – Wiper bearings and linkage joints dry or jamming f – Battery voltage too low	a – Provide good contact to ground or for feed wire b – Replace or free brushes c – Replace brush springs d – Clean commutator e – Lubricate bearings and linkage joints with universal grease f – Charge battery, check wires and connections
Motor does not stop exactly in end position when turned off	a – Contacts in wiper gear cover dirty, bent or broken b – Open circuit in cable to terminal 53a of motor c – Crank moved on spindle d – No circuit between switch terminal 31–31 b e – Contact 31 b broken or bent	a – Clean contacts or replace gear cover b – Check wires connections for contact c – Let motor run to end position, loosen crank, move to correct position and re-tighten d – Replace switch e – Straighten contacts or replace cover and contacts
Motor continues to run when turned off	a – Contacts in wiper gear cover bent b – Contacts in switch burnt	a – Check contacts, if necessary replace cover and contacts b – Replace switch
Motor will not run or stops	a – Armature burnt by winding or ground short circuit b – Switch contacts burnt c – As for "Motor runs too slowly, cuts out or stops completely"	a – Replace motor or armature b – Replace switch
Squeaking noise when motor operates and in some cases motor runs slowly	a – Wiper shafts or drive bearing without grease b – Gear housing not correctly located on body c – Armature or worm gear bearing stiff	a – Lubricate with universal grease b – Correct location of gear housing c – Set axial play, if necessary lubricate with molybdenum disulfide grease

The following table contains various wiper blade troubles with probable causes and remedies.

Symptoms	Cause	Remedy
<p>1 – Smearing</p> 	<p>a – Blade dirty</p> <p>b – Frayed blades lips, rubber damaged or worn out</p> <p>c – Old blades, edges cracked</p>	<p>a – Clean rubber with hard nylon brush and soap solution or methylated spirits</p> <p>b – Install new blades</p> <p>c – Install new blades</p>
<p>2 – Traces of water left in blade range form beads</p> 	<p>a – Glass soiled by polish, oil or diesel exhaust deposits</p>	<p>a – Clean windshield with clean cloth and grease-oil-silicone remover (E 5.3/1-2)</p>
<p>3 – Blade wipes well on one side and badly on other, judders</p> 	<p>a – Blade distorted to one side, no longer "flips"</p> <p>b – Wiper arm distorted, blade not vertical on windshield</p> <p>c – Glass dirty, thin film of water on it</p>	<p>a – Clean blade with hard nylon brush and soap solution or methylated spirits or fit new rubber</p> <p>b – Twist arm carefully until it is vertical</p> <p>c – Add glass cleaner to washer fluid</p>
<p>4 – Blade misses parts of windshield</p>	<p>a – Blade torn out of retainer</p> <p>b – Blade not contacting glass uniformly due to distorted spring or retainer</p> <p>c – Pressure exerted by wiper insufficient</p>	<p>a – Push blade back into retainer</p> <p>b – Install new blade. This defect is often caused by careless fitting of blades</p> <p>c – Oil arm linkage and spring sparingly or install new arm</p>



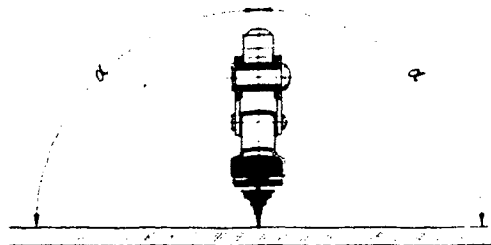
Subject: <u>Windshield wiper blades squeak and rattle</u>	Type/Model: 1/Sedan 113
----------------------------------------------------------------------	--------------------------------

see
workshop
manual

Wiper blades sometimes tend to squeak and rattle.

If careful cleaning of the windshield and blades or replacing damaged blades do not eliminate the trouble, proceed as follows:

Twist wiper arm near where it connects to the blade so that blade is vertical to the glass in all positions within the wiping range.



$$\alpha = 90^\circ$$

Troubleshooting chart

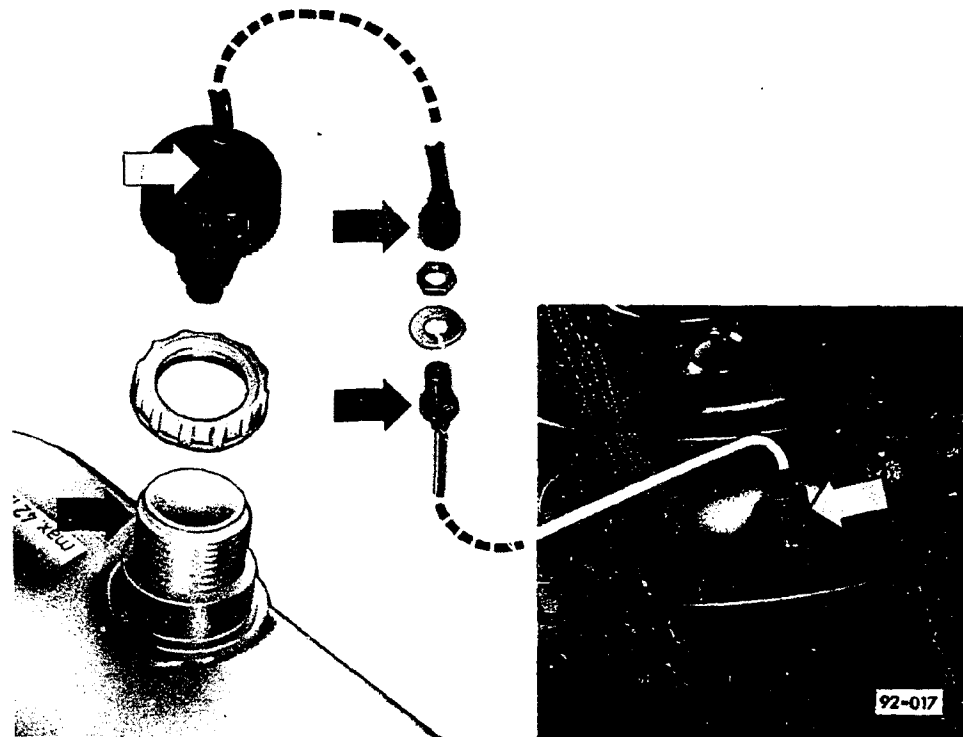
The following failures on the windshield washer system could have the following reasons:

- 1 - Pressure hoses with valves for the Sedans are being interchanged with those for the Squareback Sedan or Type 4 Wagon.

To help you to match the right parts with each model, follow the chart

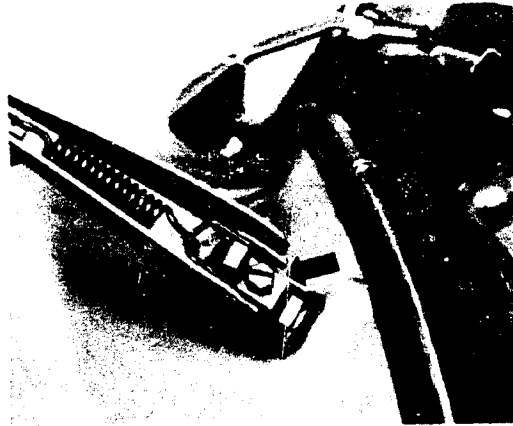
Hose for Type/Model	Part No.	Valve housing and union	Spare wheel pressure
Type 1/Sedan 113 /Model 15	113955979	black	42 psi
Type 1/Sedan 111 /Model 14 /Model 181 Type 3/Sedans Type 4/Sedans	311955979 B		
Type 3/Squareback Sedan Type 4/Wagon	361955979	red	56 psi

- 2 - The spare tires are not inflated to the correct pressure.
- 3 - The pressure hose with valve is not being tightened enough. The valve then opens although the connection between water container and hose is not properly sealed.
- 4 - Leakage in the hoses between spare tire and water container can be detected by applying soapy water to the connections indicated with arrows.



Removing

- 1 - Disconnect battery ground strap.
- 2 - Back off clamping screw on bracket of wiper arms (arrow) and take wiper arms off. From August 1969 the wiper arms are secured with cap nuts.
- 3 - Remove seals for wiper shafts, nuts and washers and outer bearing seal.
- 4 - Remove fresh air control box, glove box and fresh air vent on right.



- 5 - Disconnect wires from wiper motor.
- 6 - Remove bolt on windshield wiper frame (arrow).
- 7 - Take wiper frame out complete with motor and linkage.



Note

From August 1969, a motor with worm gear drive is used in place of the motor with spur gears.

In addition, the wiper arms are secured with a splined tapered shaft and cap nut.

The new wiper system is mounted on the body by a bracket on the drive gear cover and not with the brackets on the wiper frame. A rubber mounting is installed between bracket and support on body.



Windshield wiper frame and motor

Installing

- 1 – Insert wiper frame and motor.
Make sure that wiper arms are vertical to the windshield (adjust by moving wiper frame at elongated hole).

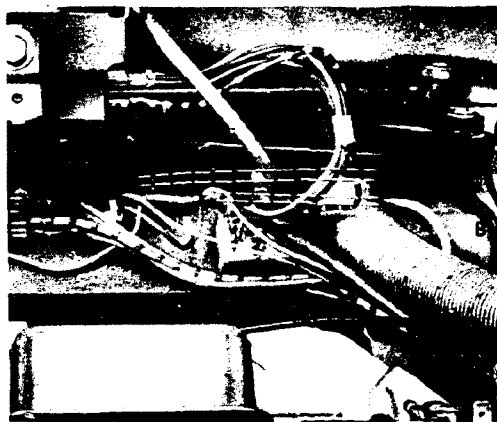
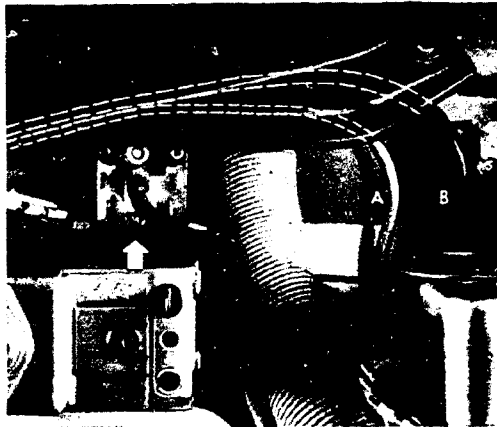
Note

On the Sedan 113 make sure that the retaining clamp for the expansion chamber is supported on the wiper motor.

- 2 – Pay attention to correct arrangement of seals and washers. Torque clamping screw to 30–40 cmkg (26–32 in.lb). Use box wrench.
On vehicles with cap nuts, tighten the nuts to 40–60 cmkg (32–52 in.lb). (See E 5 5/11 for installation position of wiper blades.)

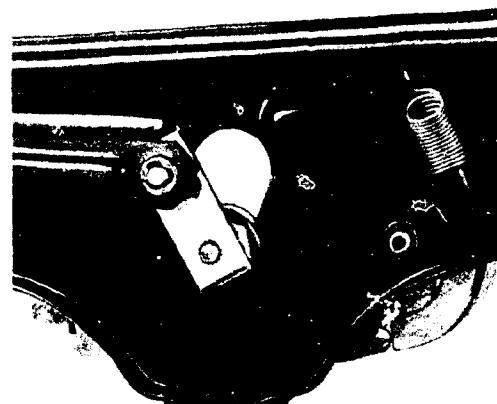
Note

On vehicles with radio installed, make sure that the wires leading to the switches in the instrument panel do not contact the wiper linkage.



The wires must be routed as shown in the illustrations.

- A – Wire from light switch to turn signal switch.
- B – Battery wire to light switch.



Removing windshield wiper motor from frame

- 1 – Remove wiper frame complete with motor.
- 2 – Take lock washer and spring washer off drive shaft, detach connecting rod.
- 3 – Remove nut for motor shaft, mounting nut of motor and take motor out of wiper frame.

Installing

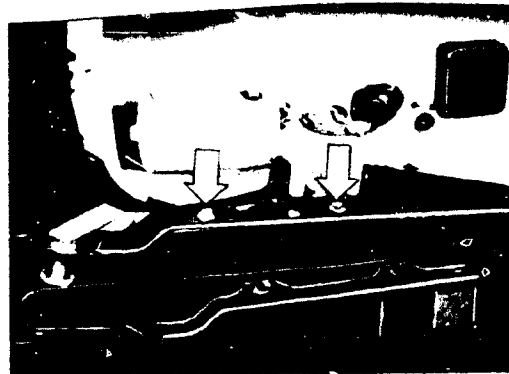
When installing make sure that the spring washer is located between wiper motor shaft and frame.

From August 1972

With the new instrument panel and the larger windshield, the Sedan 113 is equipped with a new windshield wiper system which is installed in the fresh air box and accessible from the front luggage compartment.

Repair instructions

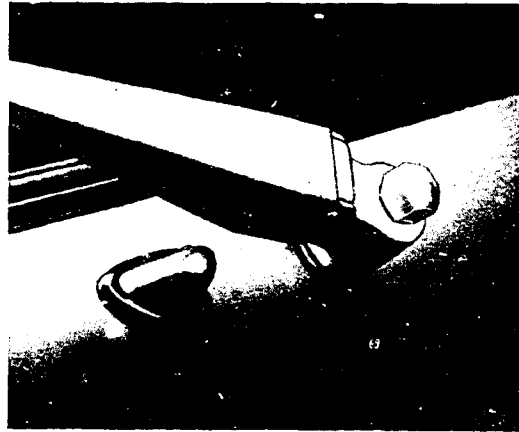
- 1 - The hose to the jet, the wires to the windshield wiper motor and the wires to the fan motor must be routed so that they cannot come into contact with the windshield wiper linkage.
- 2 - Make sure that the grommets for the wiper motor and fan motor wires seal properly.
- 3 - The wiper motor is protected against water by a plastic cover. The cover is attached to the wiper frame by two sheet metal screws (arrows).



Windshield wiper frame and motor

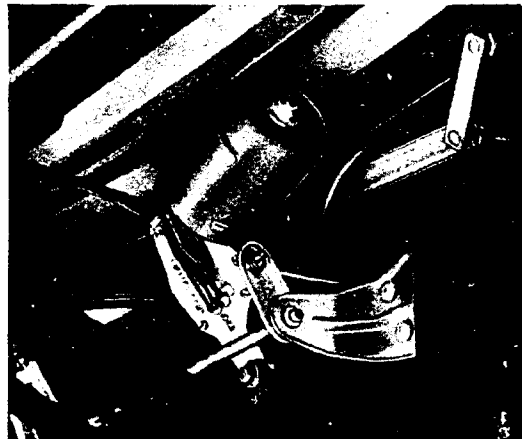
Removing

- 1 – Disconnect battery ground cable.
- 2 – Remove clamping screw on bracket of both wiper arms and take wiper arms off. From Chassis No. 218 000 001 the wiper arms are secured by a cap nut.
- 3 – Take bearing cover off and remove hexagon nut.
- 4 – Remove heater branch connections under instrument panel.
- 5 – Disconnect wiring harness to wiper motor at switch.
- 6 – Remove securing screw for wiper motor at cover of drive housing and take wiper motor and frame out downward and toward right.



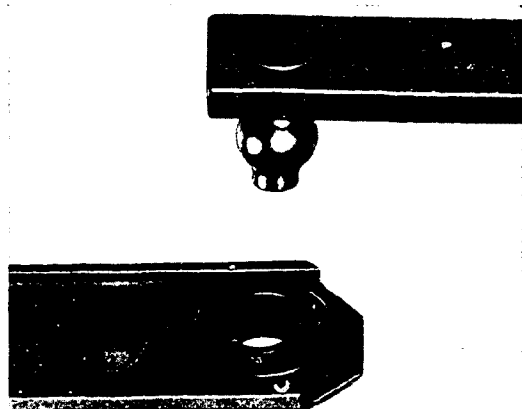
Installing

- 1 – Insert wiper frame and motor and secure. Ensure that the wiper shafts are vertical to the windshield.
Torque wiper arm clamping screws to 40–45 cmkg. Use box wrench.
- 2 – Connect wires according to wiring diagram.
- 3 – Install heater branch connections.
- 4 – Connect battery and check operation of windshield wipers.



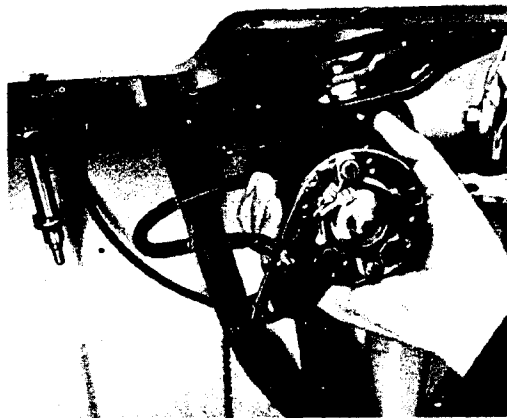
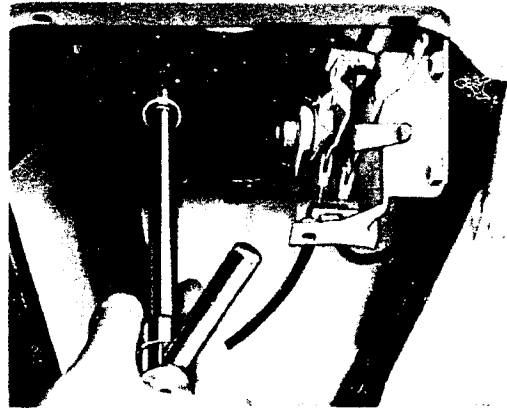
Detaching wiper motor from frame

- 1 – Remove wiper frame complete with motor.
- 2 – Press connecting rods off ball pins of cranks with a screwdriver.
- 3 – Mark installation position of the motor on frame, loosen securing screws and take motor off.
- 4 – Lubricate ball pin and spherical seats when installing.



Removing

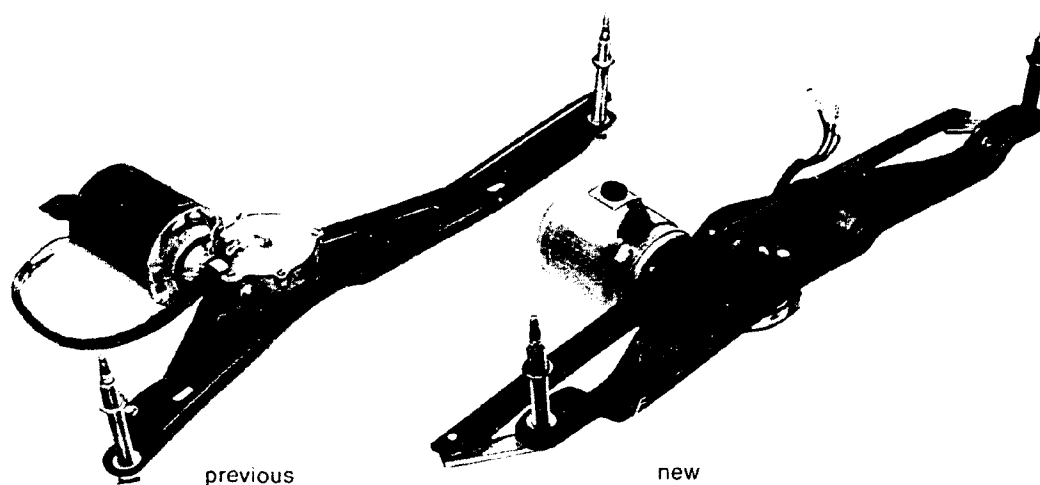
- 1 – Remove ashtray.
- 2 – Remove glove box.
- 3 – Remove fresh air controls.
- 4 – Remove cover for heater and water drainage hoses.
- 5 – Disconnect three wires at connector.
- 6 – Back off clamping screws on both wiper arms and take wiper arms off.
From Chassis No. 310200001 the wiper arms are secured on the shafts with cap nuts.
- 7 – Remove bearing cover and nuts of both wiper bearings. Remove washers and outer bearing seals.
- 8 – Remove mounting bolt of wiper motor.
- 9 – Lift wiper motor, frame and linkage out.

**Installing**

- 1 – Adjust wiper frame and motor by moving in elongated hole so that both wiper shafts are vertical to the windscreen. Tighten clamping screws with box wrench (40–45 cmkg/32–36 in.lb).
The cap nuts should be tightened to 40–60 cmkg/32–52 in.lb. (Note position of wiper arms – see E 5.5/13).
- 2 – Be sure installation of seals and washers is correct.
- 3 – The ground strap of the wiper motor must make good contact.

Note

From August 1968 Chassis No. 319000001 the motor has a ground terminal.



From August 1970

With the modified fresh air system the wipers have been altered as follows:

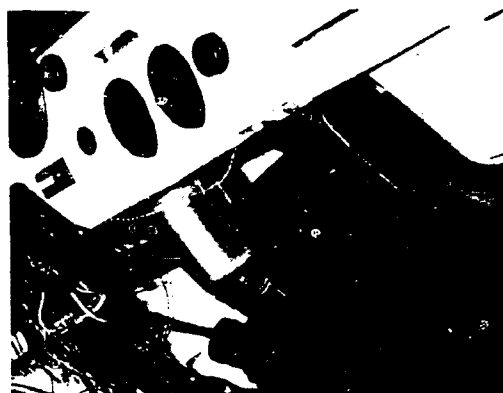
The wiper motor is now in front of the wiper frame. The bracket for the motor has been lengthened accordingly.

The pins on the wiper shafts and cranks have been replaced by ball joints.

Due to the increased angle in the frame, the wiper shafts and bearings are shortened by 10 mm (3/8 in.).

Removing

- 1 - Remove wiper arms, bearing covers and nuts and washers holding the wiper shafts.
- 2 - Disconnect battery ground strap.
- 3 - Remove connecting hoses for the round fresh air vents in the instrument panel, vents and housing for ashtray.
- 4 - Remove wiper switch and wires to motor and motor ground wire.
- 5 - Remove bolts holding motor and take complete assembly out to the right.



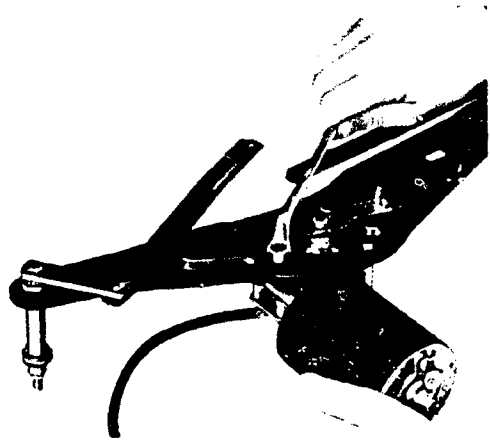
When installing make sure that the Bowden cable to the left flap in the fresh air control box and the hose to the washer jet are routed under the wiper frame in order to prevent them from being damaged by the linkage. Coat the seal between shaft bearing and body lightly with glycerine so that the seal is not pushed out of the hole in the body when installing the wipers.

(Note position of wiper blades E 5.5/13).
Tighten cap nuts to 40-60 cmkg (32-52 in.lb).

Removing and installing wiper motor from frame

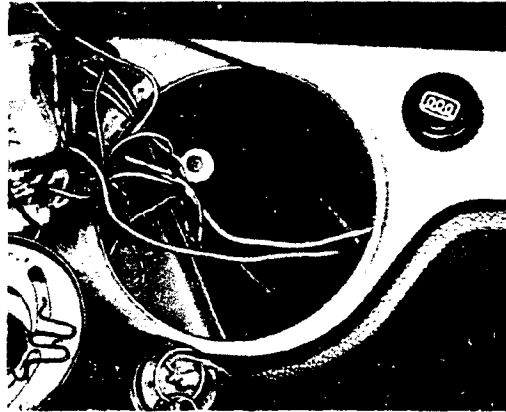
- 1 - Remove wiper frame complete with motor and linkage.
- 2 - Take lock washer and spring washer off drive shaft, detach connecting rods.
- 3 - Remove three bolts and take wiper motor off frame.

When installing make sure that the short connecting rod is installed on the crank of the wiper motor first and then the long connecting rod.



Removing

- 1 – Disconnect battery ground strap.
- 2 – Remove cap nut on bracket of both wiper arms and take wiper arms off.
- 3 – Remove bearing cover and nut.
- 4 – Take off steering column cover and hoses between fresh air control box and vents.
- 5 – Remove clock (do not disconnect clock wires).
- 6 – Remove fresh air box.
- 7 – Disconnect wiring harness for windshield wiper motor at windshield wiper switch and disconnect ground wire at motor gear cover.



- 8 – Remove windshield wiper motor screw (arrow).
- 9 – Take out wiper frame and motor downward toward the right.

**Installing**

- 1 – Install windshield wiper frame and motor. Make sure that the wiper shafts are vertical to the windshield.
- 2 – Connect wires according to wiring diagram.
- 3 – Install fresh air box.
- 4 – Install clock and steering column cover.
- 5 – Connect battery and check operation of windshield wipers.



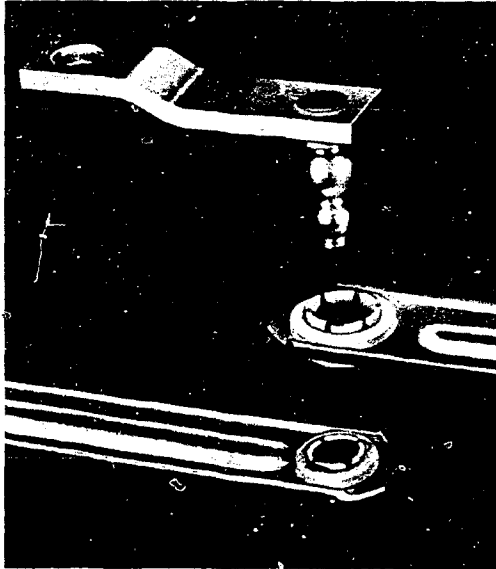
E 5.5

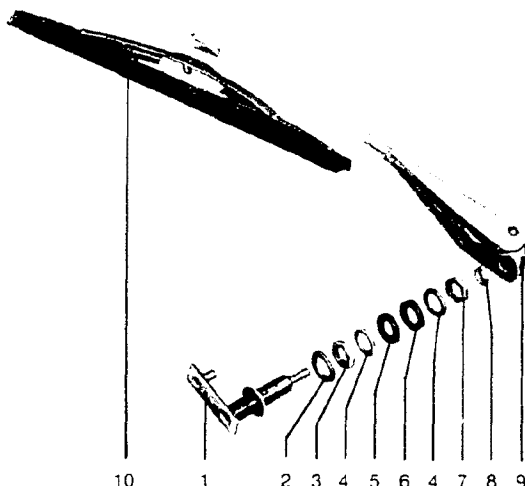
Windshield Wiper System

Windshield wiper motor

Removing and installing

- 1 – Remove frame complete with motor
- 2 – Press connecting rods of ball pin on drive crank with a screwdriver.
- 3 – Mark installation position of motor on frame, remove screws and take motor off
- 4 – Lubricate ball pin and spherical seats with universal grease on installation.



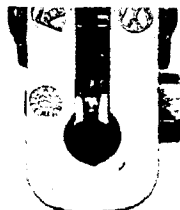


No.	Description	Qty.	Note when		Special instructions see
			removing	installing	
1	Wiper shaft crank	1	check plastic bushings of connecting rods for wear	lubricate with multi-purpose grease, check axial play of 0.2 mm (0.008 in.)	
2	Spring washer	1			
3	Brass nut	1			
4	Washer	1			
5	Rubber seal	1		shoulder of rubber profile faces wiper arm	
6	Rubber seal	1			
7	Nut	1			
8	Wiper shaft seal	1			
9	Wiper arm	1		see Note	
10	Windshield wiper blade	1			E 5.3/1

Note



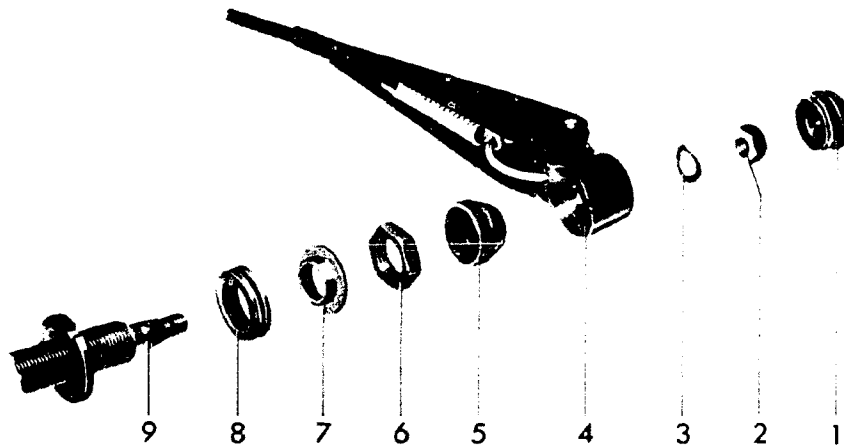
Set screw tighten to 35 - 39 in. lb



Clamp screw tighten to 65 in. lb

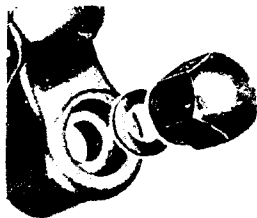
E 5.5

Windshield Wiper System



No.	Description	Qty.	Note when		Special instructions see
			removing	installing	
1	Cap	1			
2	Nut M 6	1		see Note	
3	Spring washer A 6	1			
4	Wiper arm	1	The wiper arms on the new models are painted black and are marked "L" and "R" (left and right).		
5	Bearing cap	1			
6	Nut M 12 x 1	1			
7	Guide	1			
8	Seal	1			
9	Wiper shaft and bearing	1			

Note



Cap nut tighten
to: 37 - 52 in. lb



Nut M 6 tighten
to: 37 - 52 in. lb

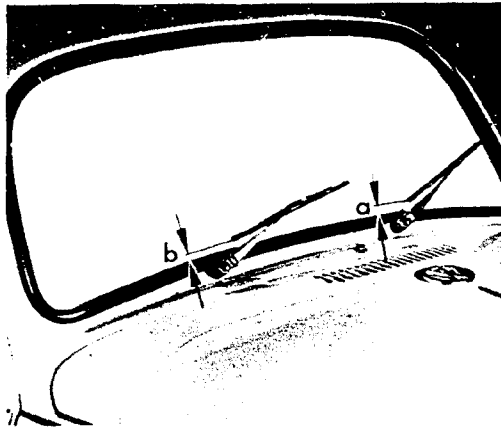
Repair instructions

To suit the larger wiper bearings, the holes in the cowl panel for the wiper bearings were enlarged on all models from 13 to 15 mm (0.511–0.590 in.) from **August 1969**. Only the new roofs are available. When stocks of the old type are used up the following should be noted when installing new roof panels on vehicles built up to July 1969:

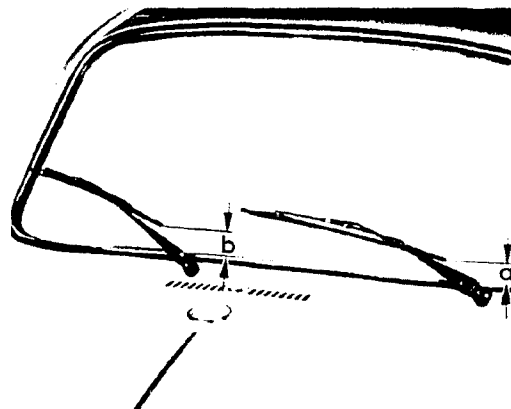
The wiper motor can only be used again if the following parts are used as well:

- a – Bracket for wiper frame
- b – Wiper frame
- c – Wiper shafts, right and left, with mounting parts.

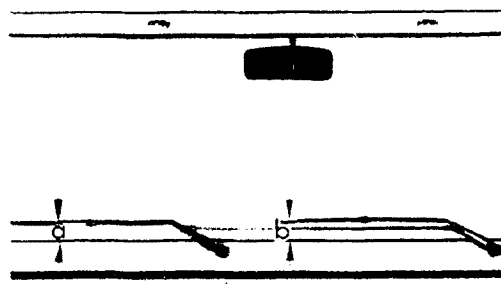
Before tightening the screws or nuts, check the position of the wiper arms and blades and adjust to the following measurements:



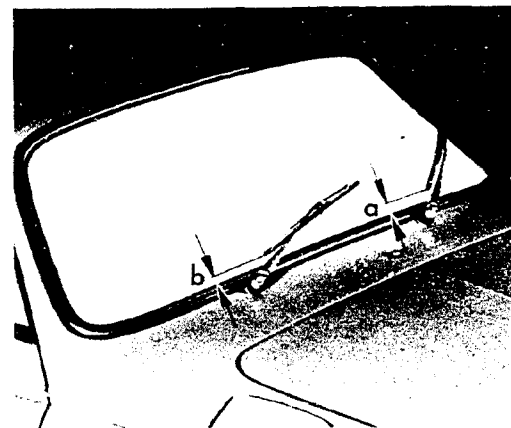
Sedan 111
Sedan 113 up to July 1972
 Wiper blade to upper edge of weatherstrip:
 a – 15 mm ($19/32$ in.)
 b – 12 mm ($15/32$ in.)



Sedan 113 from August 1972
 Wiper blade to upper edge of weatherstrip:
 a – 34 mm ($1\frac{11}{32}$ in.)
 b – 40 mm ($1\frac{19}{32}$ in.)

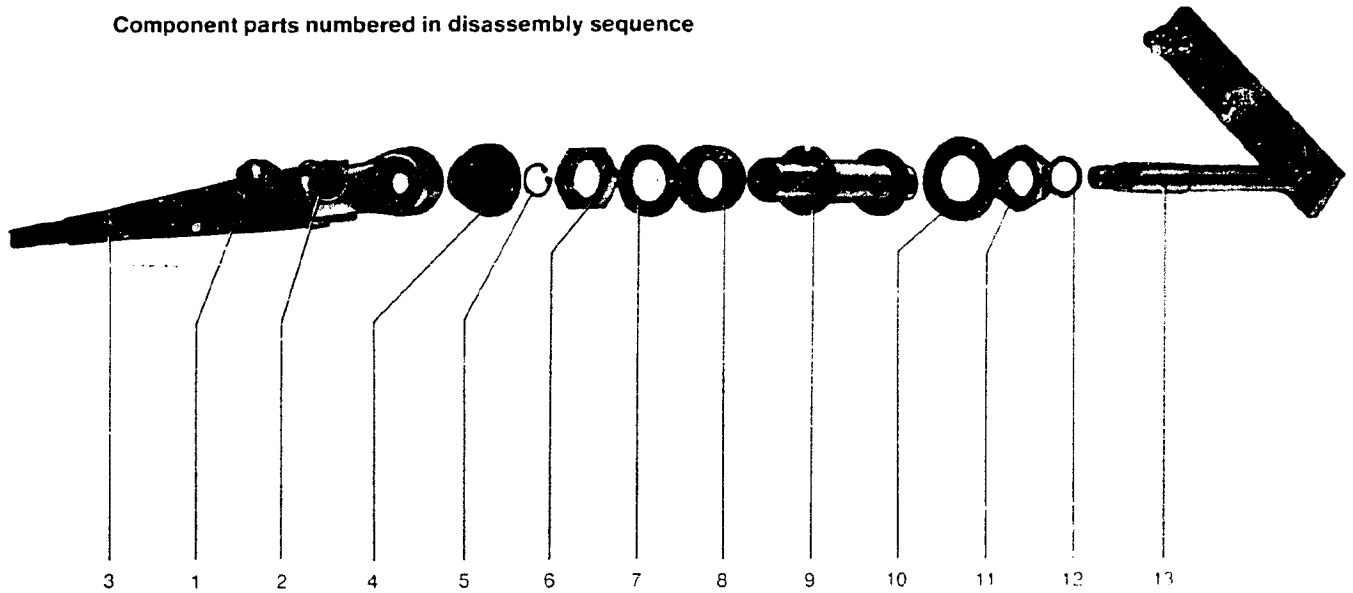


Model 181
 Wiper blade to upper edge of weatherstrip:
 a – 35 mm ($1\frac{3}{8}$ in.)
 b – 35 mm ($1\frac{3}{8}$ in.)

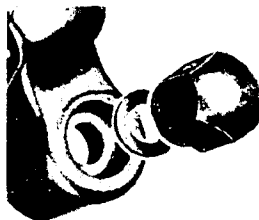


Karmann Ghia
 Wiper blade to upper edge of weatherstrip:
 a – 23 mm ($\frac{29}{32}$ in.)
 b – 15 mm ($\frac{19}{32}$ in.)

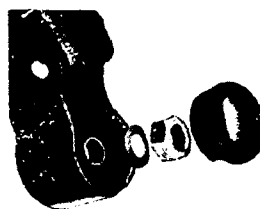
Component parts numbered in disassembly sequence



No.	Description	Qty.	Note when		Special instructions see
			removing	installing	
1	Cap nut	1		see Note	
2	Lock washer	1			
3	Wiper arm	1		lubricate joint	
4	Bearing cover	1		replace if damaged	
5	Circlip	1	use circlip pliers	use circlip pliers	
6	Nut	1			
7	Washer	1			
8	Seal	1		install with talc	
9	Shaft bearing	1		play between bearing and shaft 0.04 mm (0.016 in.)	
10	Spring washer	1			
11	Brass nut	1			
12	Spring washer	1			
13	Wiper shaft	1		lubricate axial play 0.4 mm (0.016 in.)	

Note

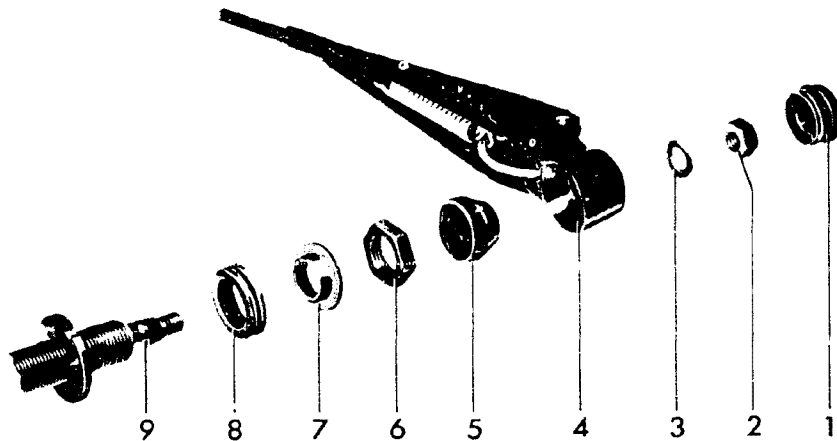
Cap nut tighten to: 37 - 52 in. lb



Nut M 6 tighten to: 37 - 52 in. lb

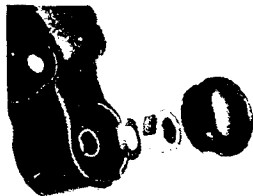
E5.5

Windshield Wiper System



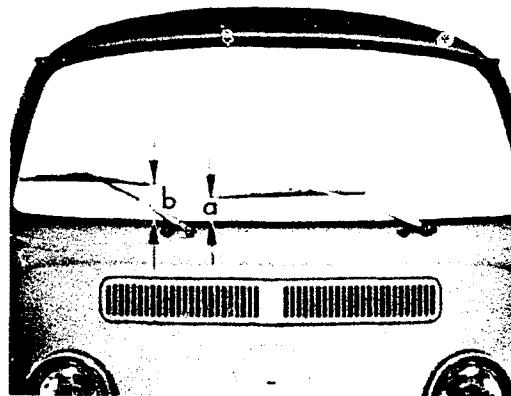
No.	Description	Qty.	Note when		Special instructions see
			removing	installing	
1	Cap	1			
2	Nut M 6	1		see Note	
3	Spring washer A 6	1			
4	Wiper arm	1	The wiper arms on the new models are painted black and are marked "L" and "R" (left and right).		
5	Bearing cap	1			
6	Nut M 12 x 1	1			
7	Guide	1			
8	Seal	1			
9	Wiper shaft and bearing	1			

Note



Nut M 6 tighten
to: 37 - 52 in. lb

Before tightening the screws or nuts, check the position of the wiper arms and blades and adjust to the following measurements:

**Type 2**

Wiper blade to upper edge of weatherstrip

a – 80 mm ($3\frac{5}{16}$ in.)

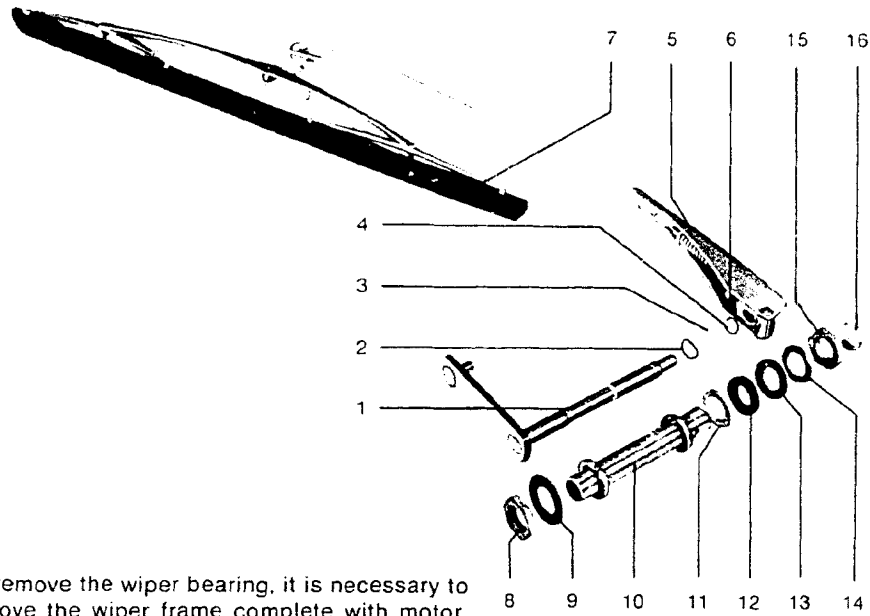
b – 100 mm ($3\frac{1}{16}$ in.)

**Type 4**

Wiper blade to upper edge of weatherstrip:

a – 35 mm ($1\frac{3}{8}$ in.)

b – 55 mm ($2\frac{3}{16}$ in.)

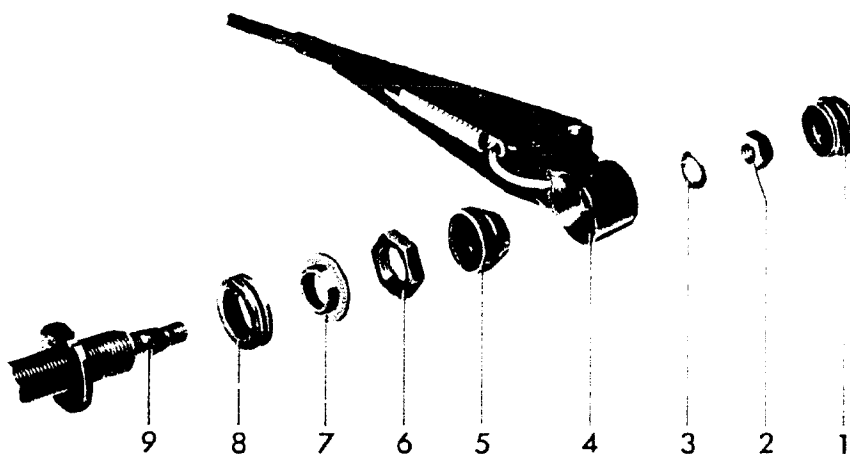


To remove the wiper bearing, it is necessary to remove the wiper frame complete with motor.

No.	Description	Qty.	Note when		Special instructions see
			removing	installing	
1	Wiper shaft	1		lubricate. The connecting rods must be installed so that the rounded end faces the wiper motor and short angled parts face bearings	
2	Spring washer	1		install on wiper shaft and assemble, push in the spindle with shaft	
3	Spacer	1		check axial play of 0.2 mm (0.008 in.)	
4	Spring ring	1			
5	Bracket and wiper arm	1			
6	Clamping screw	1		tighten to 40–45 cmkg (32–52 in. lb)	
7	Wiper blade	1			
8	Brass nut	1			
9	Spring washer	1			
10	Wiper bearing	1		play between bearing and shaft max. 0.2 mm (0.008 in.). Lubricate	
11	Washer	1			
12	Inner bearing seal	1		shoulder of rubber profile faces wiper arm	
13	Outer bearing seal	1			
14	Washer	1			
15	Nut	1			
16	Bearing cap				

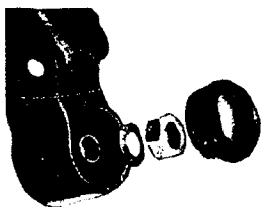
E5.5

Windshield Wiper System



No.	Description	Qty.	Note when		Special instructions see
			removing	installing	
1	Cap	1			
2	Nut M 6	1		see Note	
3	Spring washer A 6	1			
4	Wiper arm	1		The wiper arms on the new models are painted black and are marked "L" and "R" (left and right).	
5	Bearing cap	1			
6	Nut M 12 x 1	1			
7	Guide	1			
8	Seal	1			
9	Wiper shaft and bearing	1			

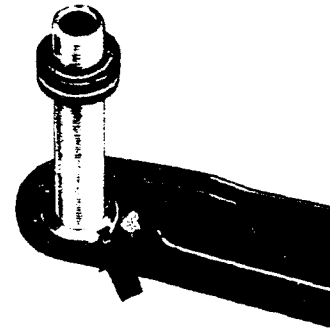
Note



Nut M 6 tighten
to: 37 - 52 in. lb

Removing and installing

- 1 - Insert wiper bearing into frame so that the projection on the wiper frame engages the groove (arrow) of the wiper bearing.
- 2 - Check plastic bushing of connecting rods for wear and, if necessary replace complete connecting rods.
- 3 - Install connecting rods so that the rounded end faces wiper motor and shorter angled part of rods face wiper bearing.

**From August 1970**

The wiped area on the windshield was enlarged by lengthening the blades 30 mm ($1\frac{3}{16}$ in.) and changing the parking position from left to right. The new blades cannot be installed in vehicles built up to July 1970.

The pins on the wiper shafts and on the crank have been replaced by ball joints.

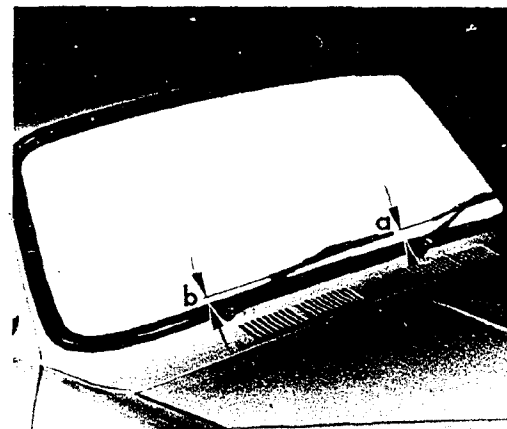
Due to the increased angle in the frame, the wiper shafts and bearings are shorter by 10 mm (0.393 in.).

To facilitate installation of the shaft bearings, the seal between bearing and body should be coated lightly with glycerine so that the seal is not pushed out of the hole in the body when inserting the shafts.

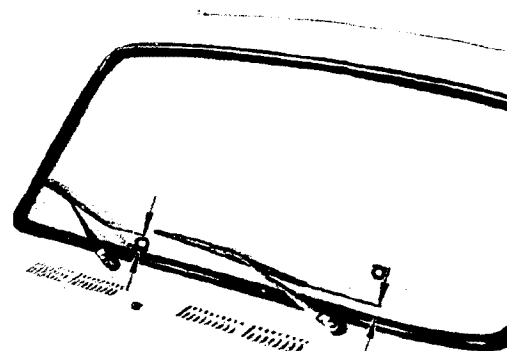
Before tightening the screws or nuts, check the position of the wiper arms and blades and adjust to the following measurements:

Wiper blade to upper edge of weatherstrip:

- a - 30 mm ($\frac{7}{16}$ in.)
- b - 10 mm ($\frac{25}{64}$ in.)



Up to July 1970



From August 1970

B-19

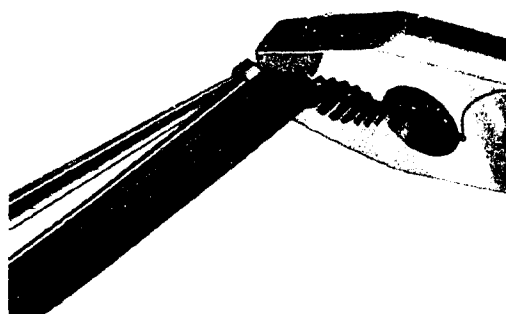
Removing and installing windshield wiper shaft bearing/adjusting position of wiper arm/blades Type 3**13-3**

Replacing wiper blades

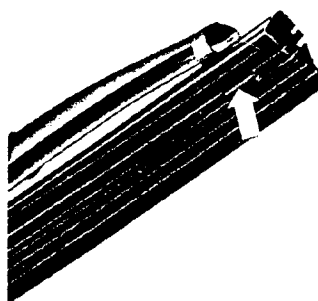
- 1 – Fold arm forward.
- 2 – Turn blade 90°, lift retaining spring, push blade toward bracket slightly and take off upward.
- 3 – Pass wiper arm through small opening in wiper blade. Pull blade forward so that retaining spring engages properly.

Replacing rubber filler for wiper blade

- 1 – Remove wiper blade.
- 2 – At the open end of the rubber filler, squeeze the two steel inserts together with pliers and pull out of the retainer laterally.
- 3 – Pull inserts out of rubber filler.
- 4 – Remove the rubber filler.

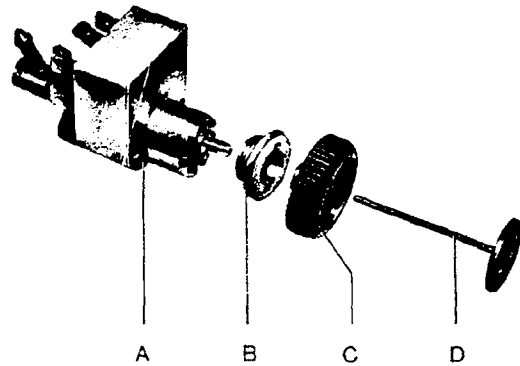


- 5 – Install new rubber filler into wiper blade. Make sure that the retainers engage in the recesses in the second grooves (arrow) of the rubber filler.
- 6 – Slide steel inserts into upper grooves of rubber filler (so that the notch in the insert faces the rubber filler) and engage the projections in the grooves.



Removing

- 1 – Disconnect battery ground strap and relieve pressure of windshield washer container.
- 2 – Remove switch knob and pull out windshield washer push button.
- 3 – Remove escutcheon with special wrench.
- 4 – Remove the two hoses from fresh air control box to fresh air outlets.
- 5 – Pull switch out downward and disconnect wires and water hoses.



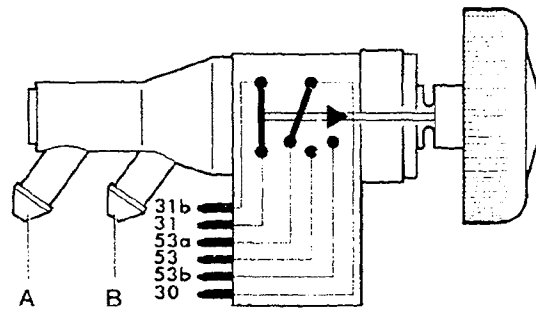
- A – Switch
 B – Escutcheon
 C – Rotary knob
 D – Push button

Installing

- 1 – Connect wires according to wiring diagram and install water hoses.
- 2 – Install switch.
- 3 – Fill windshield washer container, then connect battery. Check system for proper operation.

Note

The hoses must not be interchanged as this will damage the valve in the switch.



- 30 – from fuse box, terminal 15
 31 – ground terminal
 31b – ground connection
 53 – low speed
 53a – park position
 53b – high speed
 A – from container
 B – to jet

From August 1970

The shape of the switch knobs on Types 1, 3 and 4 vehicles was changed. The shoulder on the back of the knob makes it easier to grip.

From August 1971

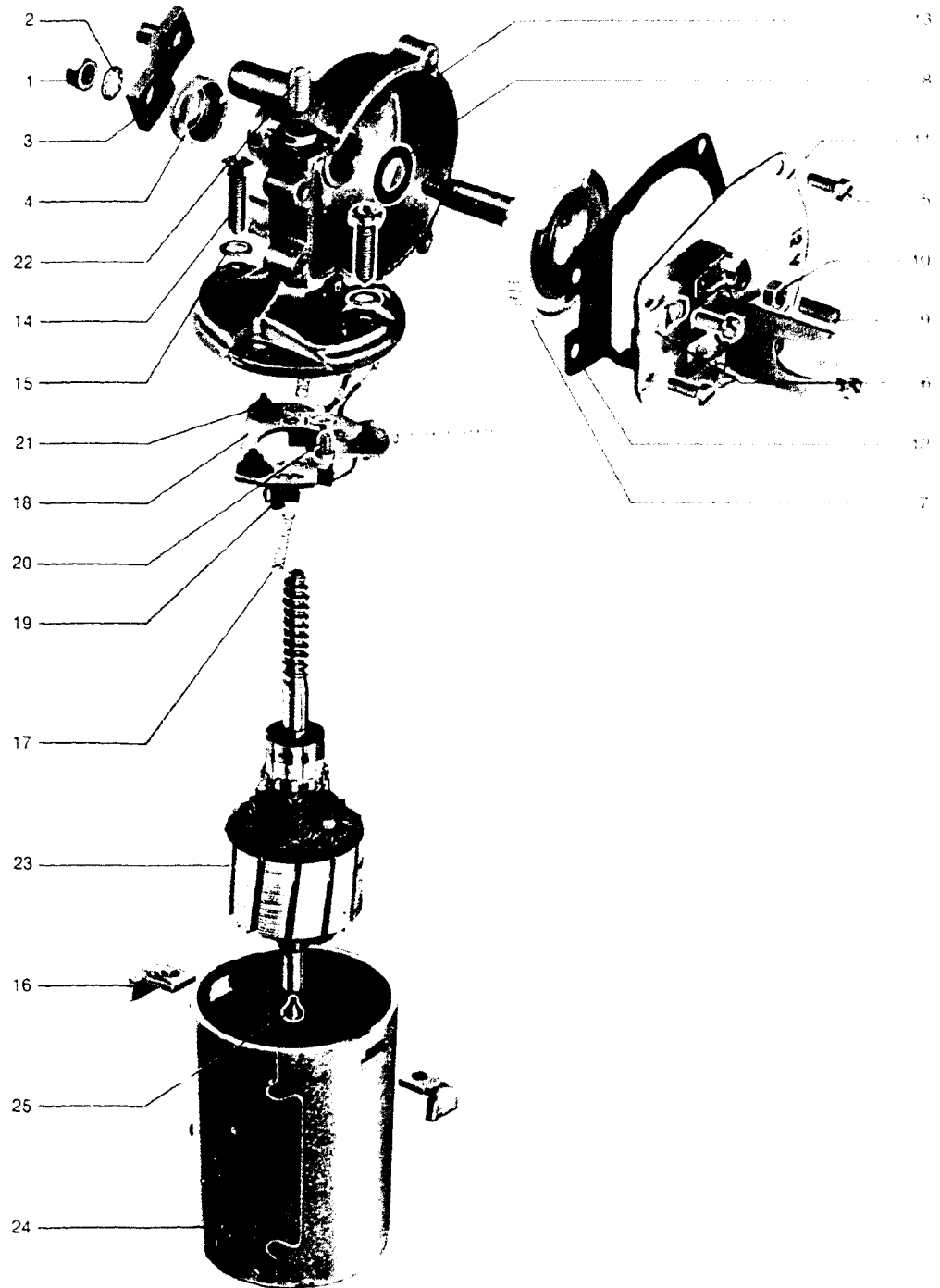
The Types 1 (except Model 181), 3 and 4 models have a windshield wiper switch with a windshield washer valve in the steering column combination switch (see E 4.6).

From August 1972: Type 2

The wiper switch is on the steering column as on the passenger cars. See E 4.6 for further instructions.

From August 1969

SWF and Bosch motors are used.



wiper motor from Messrs. SWF

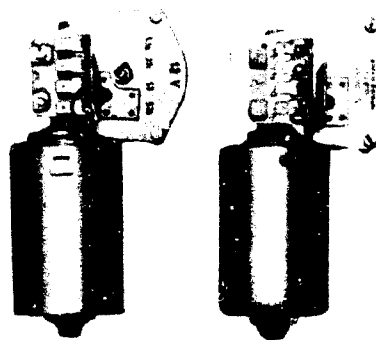
E 5.6

Windshield Wiper System

No	Description	Qty	Note when		Special instructions see
			disassembling	assembling	
1	Nut	1			
2	Lock washer	1			
3	Crank	1		first let motor run to park position	
4	Plastic cap	1		replace if damaged	
5	Fillister head screw	5			
6	Ground connection	1			
7	Worm gear with drive shaft	1		check for wear, replace if necessary, insert with special grease	
8	Thrust washer	1			
9	Adjusting screw	1		axial play 0.2–0.3 mm (0.008–0.012 in.)	
10	Nut	1		adjust, seal with paint	
11	Cover with contacts	1		check for broken or bent contacts straighten and clean or replace if necessary	
12	Seal	1		check, replace if necessary	
13	Drive bearing	1			
14	Screw	2			
15	Lock washer	2			
16	Bracket	2		install so that outer arm faces magnet	
17	Spring	3			
18	Brush holder	1		check positive brushes for wear, if worn, replace complete holder	
19	Ground brush	1		check for wear replace if necessary	
20	Screw	1		ground connection	
21	Rubber mounting	3		insert from pole housing end	
22	Adjusting screw	1		replace screw in as far as it will go, then back off half a turn and seal with paint	
23	Armature	1		check commutator for wear and test windings for open circuit or ground short	
24	Pole housing with permanent magnet	1		clean if bearings are damaged, replace complete unit	
25	Thrust cone	1		install with high melting point grease	

Note

Parts of the SWF and Bosch wiper motors are not interchangeable.



SWF motor

Bosch motor



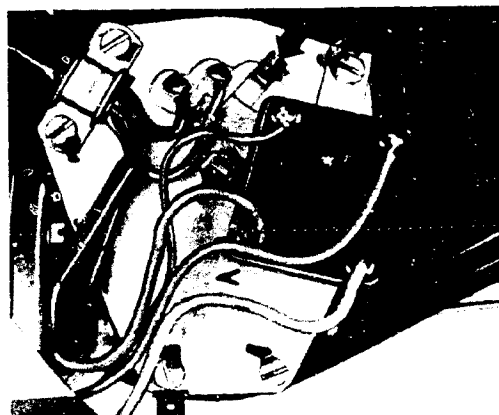
up to July 1971

From August 1971

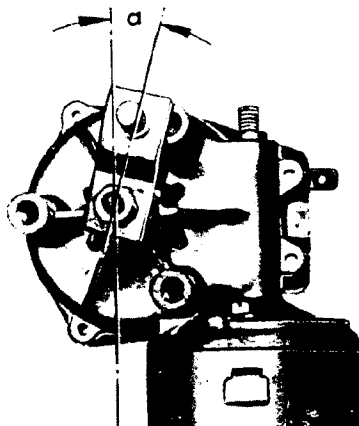
The internal wiring of the wiper motors has been changed. Due to the wiring of the new wiper switch, the parking connection from switch to drive gear cover on motor (cable 31b, arrow A) could be discontinued. The contact however is retained and soldered directly to the drive gear cover (arrow B).

Note

The new wiper motor **cannot** be installed in vehicles built up to July 1971.



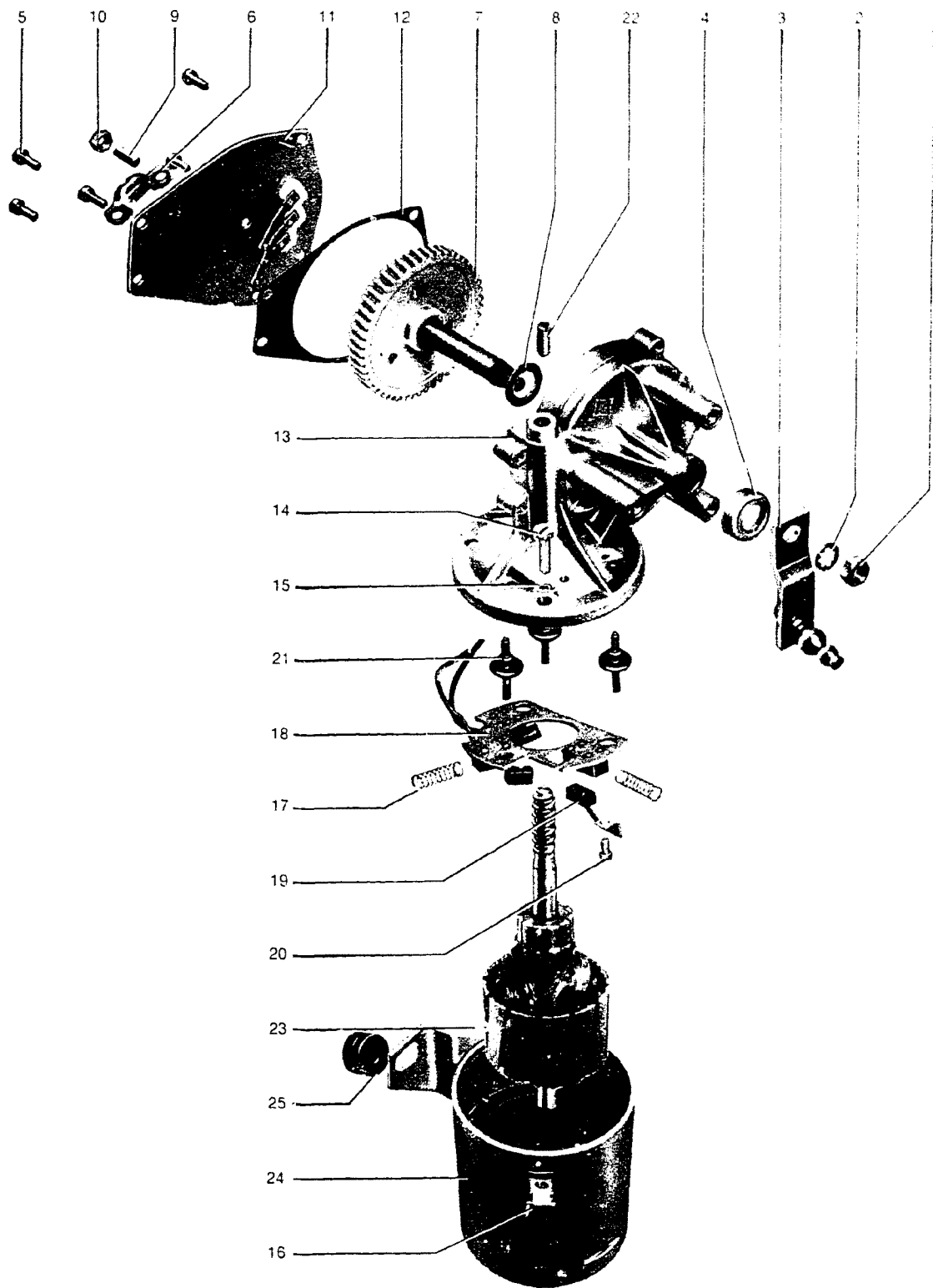
from August 1971



SWF and Bosch motors

If the wiper motor has been disassembled, the following operations are necessary before the crank is installed:

- 1 - Connect wiper switch (Part No. 141955517) to the motor as shown by the terminal designations. The motor ground connection and terminal 31 of the switch (important for park position brake) should be connected to battery negative and terminal 30 of the switch to battery positive. Let motor run for several minutes and then turn off. The motor should stop exactly in the park position.
- 2 - The crank is then installed so that there is an angle of 15° (a) between an imaginary line extended from the pole housing and the center of the crank.



E 5.6

Windshield Wiper System

No.	Description	Qty.	Note when		Special instructions see
			disassembling	assembling	
1	Nut	1			
2	Lock washer	1			
3	Crank	1		let motor run to park position	
4	Plastic cap	1		replace if damaged	
5	Fillister head screw	5			
6	Clamp	1			
7	Worm gear with drive shaft	1		check for wear insert with special grease	
8	Thrust washer	1			
9	Adjusting screw	1		set axial play to 0.2–0.3 mm (0.008–0.012 in.)	
10	Nut	1		adjust, seal with paint	
11	Cover with contacts	1		check for broken or bent contacts straighten and clean or replace if necessary	
12	Seal	1		check, replace if necessary	
13	Drive bearing	1			
14	Screw	2			
15	Lock washer	2			
16	Bracket	2		install so that outer arm faces magnet	
17	Spring	3			
18	Brush holder	1		check positive brushes for wear, if brushes are worn, replace complete holder	
19	Ground brush	1	check for wear	replace if necessary	
20	Screw	1			
21	Rubber mounting	3		insert from pole housing end	
22	Adjusting screw	1		replace screw in as far as it will go. then back off half a turn and seal with paint	
23	Armature	1		check commutator for wear and test windings for open circuit or short to ground	
24	Pole housing with permanent magnet	1		clean if bearings are damaged, replace complete unit	
25	Rubber grommet	1		wide end faces body	

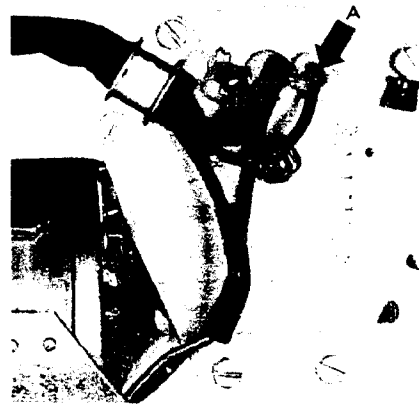
Type 4 from August 1971

The internal wiring of the wiper motors has been changed. Due to the wiring of the new wiper switch, the parking connection from switch to drive gear cover on motor (cable 31 b. arrow A) could be discontinued.

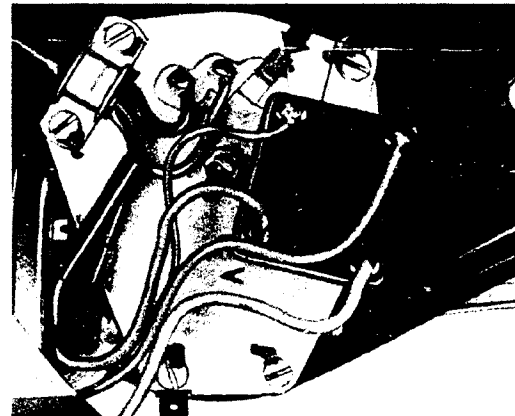
The contact however is retained and soldered directly to the drive gear cover (arrow B).

Note

The new wiper motor **cannot** be installed in vehicles built up to July 1971.



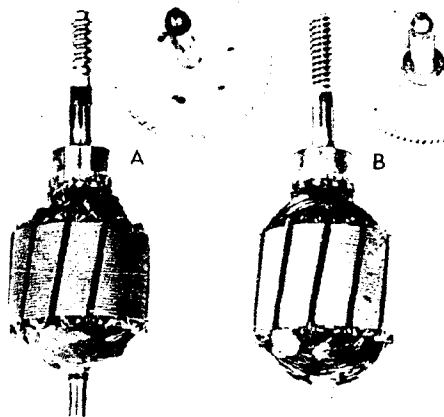
up to July 1971



from August 1971

E 5.6

Windshield Wiper System



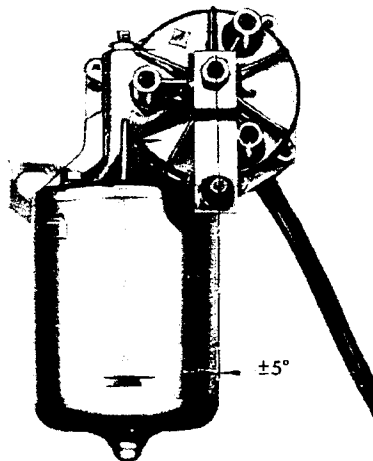
Type 2
Type 4 up to Chassis No. 4112100000

Armatures of Windshield wiper motors manufactured by SWF

Windshield wiper motors with two different sets of armatures and drive shafts are manufactured by SWF. Both versions have the same part number. The illustration shows the difference.

Only the armatures of both versions are available as spare parts. Should the drive shafts be damaged, replace the complete wiper motor.

Version	Armature	Drive shaft	Part Number
A	Worm gear with single thread	Plastic, 49 teeth	411955813
B	Worm gear with double thread	Fiber, 75 teeth	411955813 A



Type 4 adjusting park position

- 1 - Connect windshield wiper switch to the motor as shown by the terminal markings. Connect the ground terminal on the motor and terminal 31 on the switch (important because of park position braking) to the battery negative and terminal 30 on switch to battery positive. Run motor for several minutes, then turn it off. The motor should stop exactly at the park position.
- 2 - Install drive crank parallel to pole housing and tighten nut. The park position of the crank can deviate $\pm 5^\circ$.

From August 1967

The washer container is held in position by two pins which pass through the bolt holes in the spare tire and are retained by two small wedges.

The valve has an extension hose.

The spare tire supplies the pressure for the washer. The valve in the cap of the container cuts the air off when the pressure in the spare tire drops below 1.8 kg/cm^2 (26 psi).

Note

To ensure that the washer system works properly note the following: The spare tire must be inflated to 3.0 kg/cm^2 (42 psi) because the valve requires a pressure of 2.5 kg/cm^2 (35 psi) to open.

A sticker showing the pressures also has a washer symbol as used on the knob of the washer. The pressure is listed as 3 kg/cm^2 (42 psi).



Karmann Ghia from August 1969

The container for Karmann Ghia was modified. The valve which was formerly on the container is now located separately in an extension hose as on the Sedan.

The new container can be used to replace the previous one if the hose with valve and the securing nut from the Sedan washer are used as well.

Sedan 113

The container is mounted to the right side panel. It cannot be installed on the spare wheel as on the other Type 1 models.



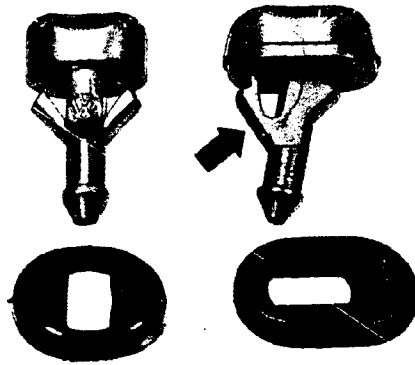
E5.7

Windshield Wiper System

From August 1970

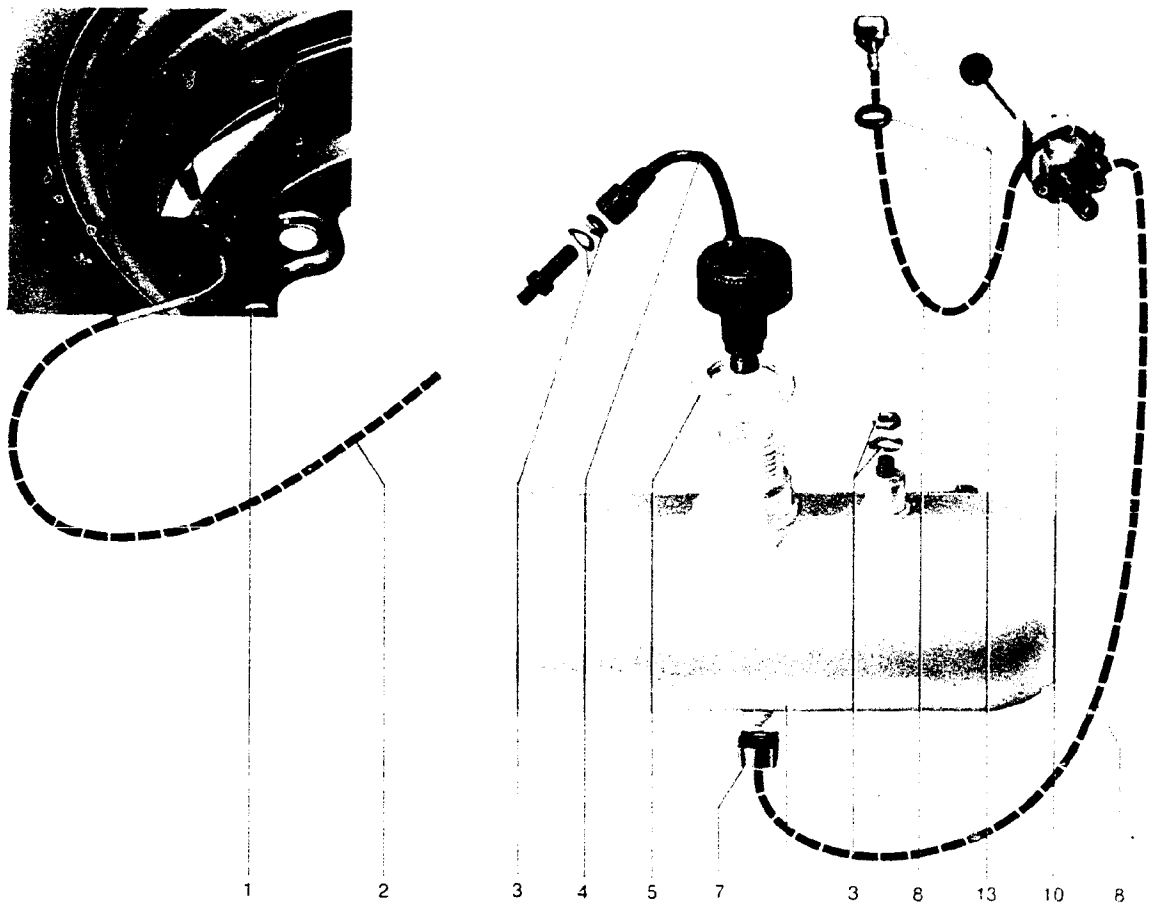
The new jet has only one retainer (arrow) so that it is easier to remove without damage.

The new jet can also be installed into vehicles produced up to July 1970.



previous

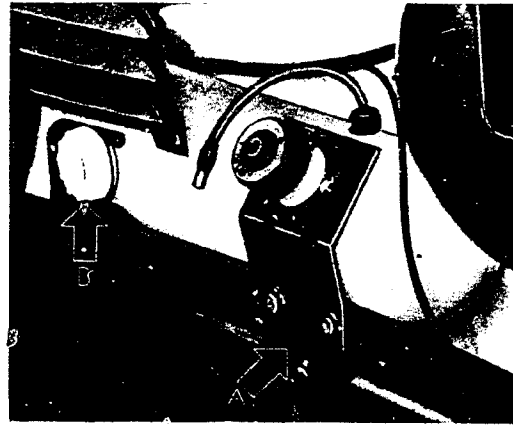
new



No.	Description	Qty.	Note when		Special instructions see
			removing	installing	
1	Spare tire	1			
2	Plastic connecting hose with valve	1		make sure caps are properly seated: check valve	
3	Nut with spring washer	1			
4	Pressure hose with cap and valve	1	remove carefully until air pressure has been released		
5	Nut	1			
6	Water container	1		check for leaks	
7	Union nut	1		make sure nut is tight	
8	Hose	1		make sure that hose is correctly routed	
9	Grommet	1			
10	Switch with valve	1	if valve damaged, replace complete switch		
11	Push button	1		check for free operation	
12	Hose between switch and jet	1		route along underside of windshield wiper frame	
13	Twin jet with seal	1	pull out with pliers	use new twin jet, adjust jet position with a needle. Make sure seal is properly seated	

The container is located behind the right front trim panel. The cap and valve are accessible when a cover has been removed.

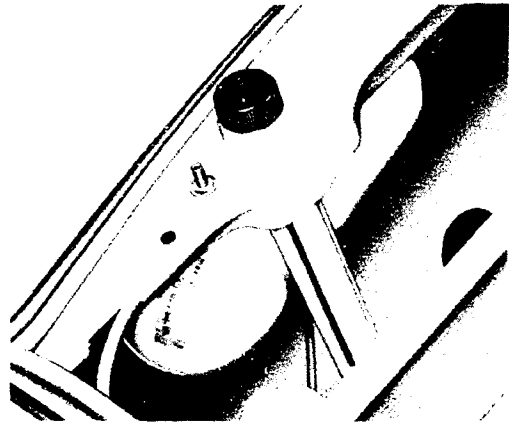
To remove the container, the bracket (arrow A) and the plastic retaining nut (arrow B) must be removed.



Removing and installing container

- 1 – Release air pressure by depressing valve core or unscrewing cap slowly.
- 2 – Remove cap and union nut on neck.
- 3 – Remove union nut on air valve and take container off.
- 4 – Detach hose from underside of container.

Install in reverse order. Check valve core and seal in cap for leaks. Replace parts where necessary.

**From August 1969**

All models are equipped with a different container. The valve which was formerly on the container is on the extension hose.

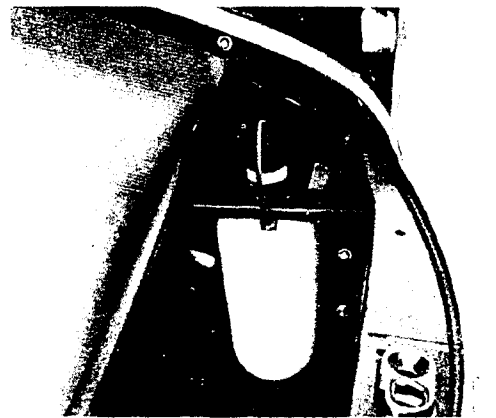
The container is attached to a plate on the left in the spare wheel well.

The operation of the system has not changed.

The cut-off pressure of the valve in the container cap has been increased from 2.6 to 2.8 kg/cm² (37–40 psi). The sticker on this vehicle is marked: Maximum pressure 4 kg/cm² (56 psi).

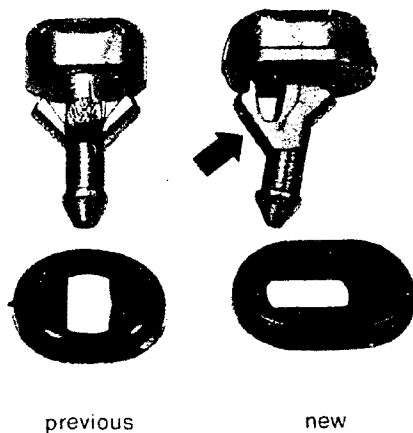
Note

The new container cannot be installed in vehicles built up to July 1970.



E5.7

Windshield Wiper System



From August 1970

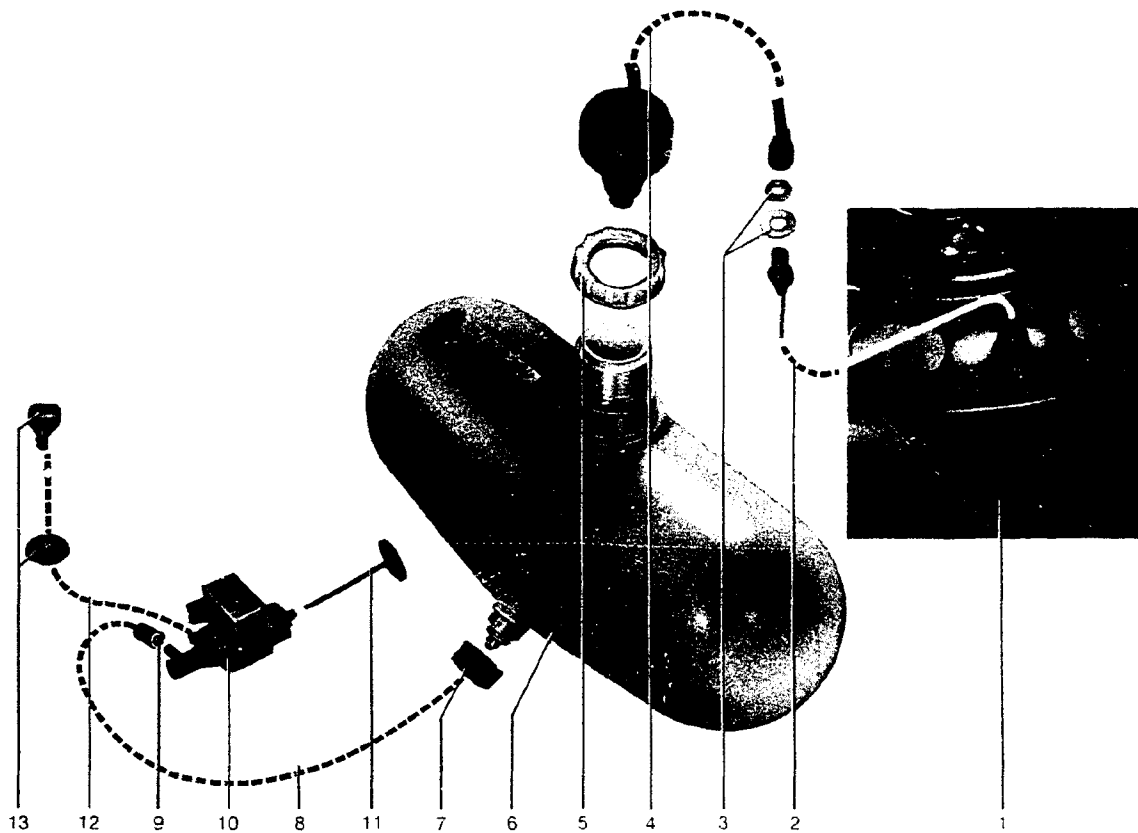
The new jet has only one retainer (arrow) so that it is easier to remove without damage.

The new jet can also be installed into vehicles produced up to July 1970.

Removing and installing

The jet and seal can be pressed out of panel from underneath.

When installing, ensure that the seal fits properly. The two holes in the jet can be set with a suitably ground piece of steel wire so that the water strikes the screen at the correct point.



No.	Description	Qty.	Note when		Special instructions see
			removing	installing	
1	Spare wheel	1		inflate to maximum pressure	
2	Plastic connecting hose with valve	1		check valve	
3	Nut and spring washer	1			
4	Pressure hose with cap and valve	1	remove carefully	ensure good sealing	
5	Nut	1			
6	Fluid container	1		check for leaks	
7	Union nut	1		ensure nut is tight	
8	Hose from water container to switch*)	1		ensure that hose is correctly routed	
9	Grommet	1			
10	Switch with valve insert*)	1		if valve damaged, replace complete switch	
11	Push button	1		check for free operation	
12	Hose between switch and jet*)	1		route along underside of windshield wiper frame	
13	Twin jet with seal	1	pull out with pliers	replace twin jet, set jet position with a needle. Ensure that seal is properly seated	

*) from August 1971 see E 4.6/4-22

E 5.7

Windshield Wiper System

Valve with connecting hose

To differentiate between the valve for the Sedan and Wagon the housing and the union nut are different colors.

Model	Color of valve housing and union nut	Cut-off pressure kg/cm ² (psi)	Opening pressure kg/cm ² (psi)
Sedan	Black	1.5–2.0 (21–28)	2.5 (36)
Wagon	Red	2.5–3.0 (36–42)	3.5 (50)

Note

To ensure that the washer system works properly note the following: The spare tire must be inflated to 3.0 kg/cm² (42 psi) – Sedan – or 4 kg/cm² (56 psi) – Wagon – because the valve requires a pressure of 2.5 kg/cm² (36 psi) – Sedan – or 3.5 kg/cm² (50 psi) – Wagon – to open.

The sticker listing the pressures, also has a washer symbol as used on the washer knob. The specified pressures are 3 kg/cm² (42 psi) – Sedan – or 4 kg/cm² (56 psi) – Wagon.

Setting windshield washer jets

Set water jet direction by adjusting the jets so that the water sprays onto the locations shown.

- a – 150–200 mm (6– 8 in.)
- b – 380–480 mm (15–19 in.)

