Workshop Manual

924

Volume III
Chassis, Heating, Air Conditioning

DR. ING. h. c. F. PORSCHE Aktiengesellschaft

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FRONT WHEEL SUSPENSION, SHAFTS AND AXLE

TECHNICAL DATA

Front Axle

Wheel suspension	Independent on control arms and spring struts (McPherson type)	
Springs	One coil spring/shock absorber per wheel	
Shock absorbers	Double-action, hydraulic type	
Stabilizer bar dia.	Standard	Optional
to end of model 77	-	20 mm
model 78	-	22 mm
model 79	-	23 mm
model 80	21 mm	23 mm *
model 81 partially model 82 to end of Sept. 81	21 mm	23 mm **
model 82 from Oct. 81	20 mm	21.5 mm

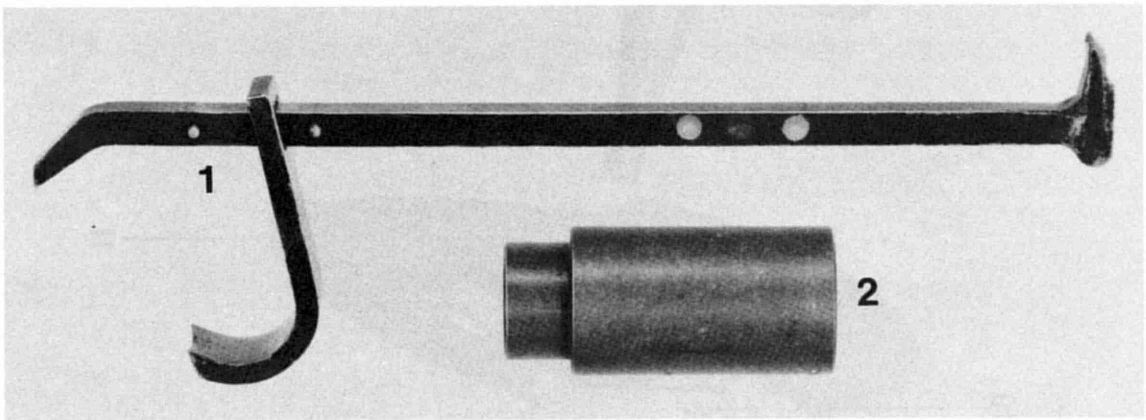
* Not as separate option M 404.
** Only for export together with option M 471.

FRONT AXLE TORQUE SPECIFICATIONS

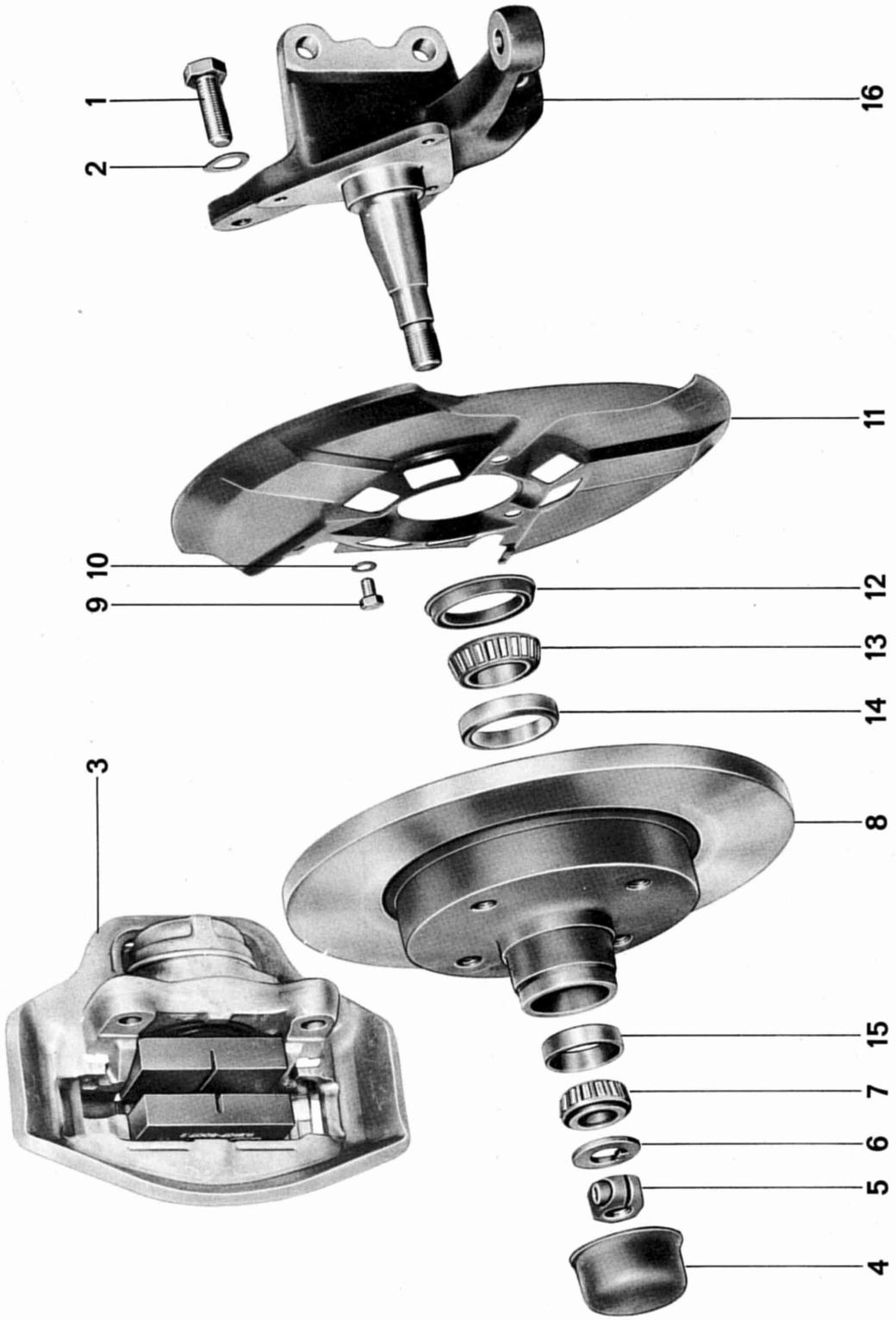
Location	Description	Threads	Material	Torque in Nm (ft lb)
Control arm to cross member	Self-locking nut	M 12 x 1.5	8.8	65 ± 10 (47 + 7)
Clamp to cross member	Bolt	M 10	8.8	42 (30)
Control arm to steering knuckle	Self-locking nut	M 10	10.9	50 + 10 (36 + 7)
Control arm to body	Nut	M 10	8.8	42 (30)
Tie rod to steering knuckle	Castle nut	M 12 x 1.5	8	30 + 20 (22 + 14)
Stabilizer clamp to body up to Oct., 1981	Bolt Lock nut	M 8 M 8	8.8 8	13 (9) 20 (14)
Stabilizer suspension to control arm up to Oct., 1981	Nut	M 10	8	20 ± 5 (14 + 4)
Spring strut mount to spring strut	Self-locking nut	M 14 x 1.5	10	77 + 3 (55 + 2)
Clamp bolt to wheel bearing nut	Socket head screw	M 7	10.9	13 + 3 (9 + 2)
Cover to steering knuckle	Bolt	M 7	8.8	10 (7)
Caliper to steering knuckle	Bolt	M 12 x 1.5	8.8	85 (61)
Spring strut to steering knuckle	Nut	M 12 x 1.5	10	100 (72)
Spring strut to body	Nut	M 8	8	25 ± 4 (18 + 3)
Spoked wheel to brake disc (aluminum rim)	Wheel bolt	M 14 x 1.5	8.8	130 (94)
Spoked wheel to brake disc (steel rim)	Wheel bolt	M 14 x 1.5	8.8	110 (80)
Ball joint to control arm	Bolt	M 7	10.9	25 (18)

Location	Description	Threads	Material	Torque Nm (ft lb)
Stabilizer bar suspension to body	Bolt	M 8	8.8	23 (17)
Stabilizer bar clamp to suspension	Locknut	M 8	8	23 (17)
Stabilizer bar mount to control arm	Locknut	M 8	8	23 (17)

TOOLS



No.	Description	Special Tool	Notes
1	Lever	VW 637/2	
2	Pressure pad	VW 432	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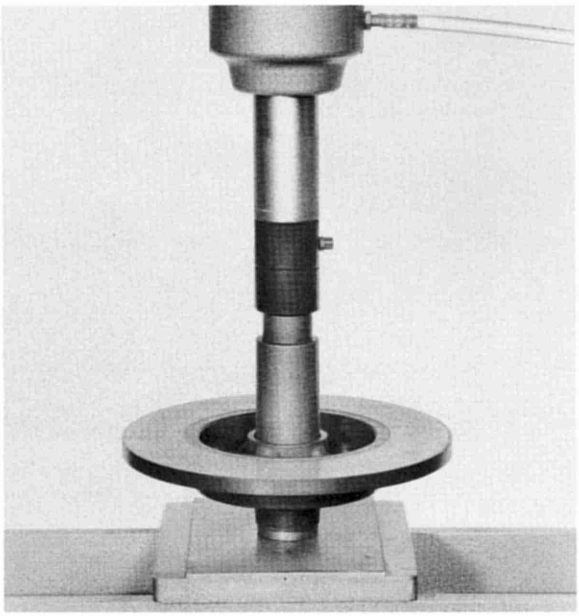
No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Bolt	2		Tighten to specified torque	
2	Spring washer	2		If necessary replace	
3	Caliper	1	Do not detach brake hose for jobs on front suspension, hang from suitable point with wire		
4	Grease cap	1	Pry off with VW 637/2		
5	Clamp with Allen head bolt	1	Loosen bolt and remove clamp. Right side has right-hand threads and left side has left-hand threads.	Adjust wheel bearing play. Finger pressure on a screwdriver without leverage must move thrust washer (6). After adjustments tighten Allen head bolt to specified torque.	
6	Thrust washer	1			
7	Wheel bearing, outer	1			
8	Brake disc	1		Fill cavity in wheel hub and wheel bearings with about 30 grams of heavy duty wheel bearing grease.	
9	Bolt	3		Tighten to specified torque	
10	Spring washer	3		If necessary replace	
11	Guard	1			
12	Seal	1	Pry out with screwdriver	Replace. Fill hub with heavy duty wheel bearing grease and lubricate seal lips	
13	Wheel bearing, inner	1			

No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
14	Bearing outer race	1	Drive out with soft drift	Press in with VW 432	
15	Bearing outer race	1	Drive out with soft drift	Press in with VW 432	
16	Steering knuckle	1		Check front wheel bearing seats for wear	

REMOVING AND INSTALLING WHEEL BEARINGS

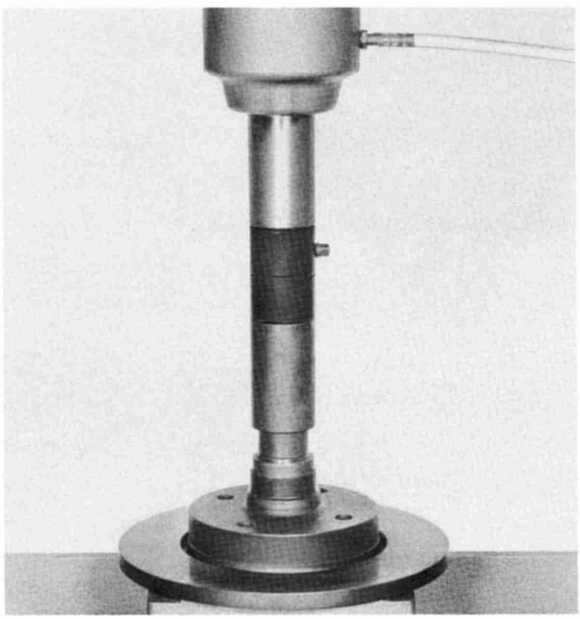
Disassembling

1. Pry off grease cap with VW 637/2.



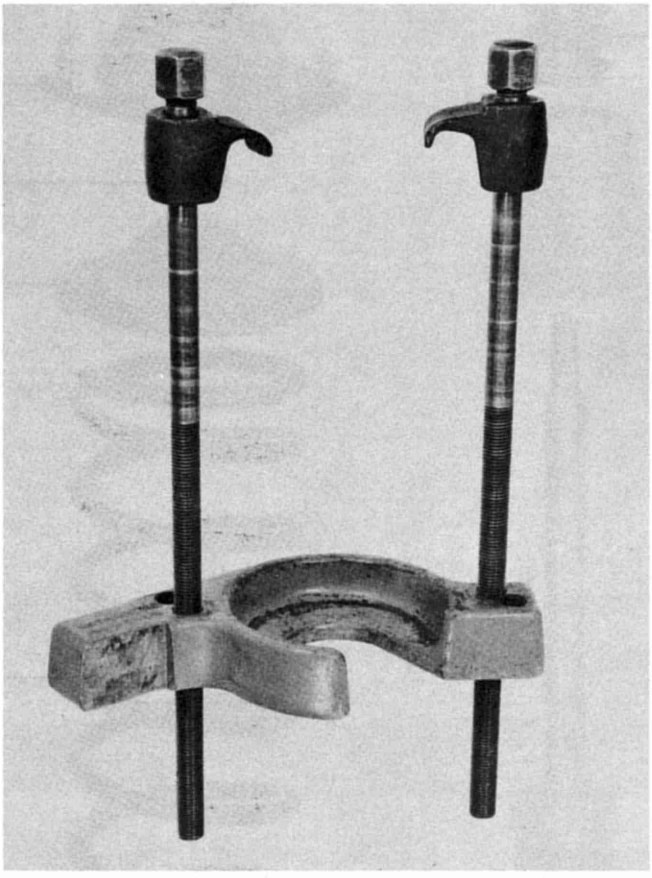
Assembling

1. Press in bearing outer races with VW 432.

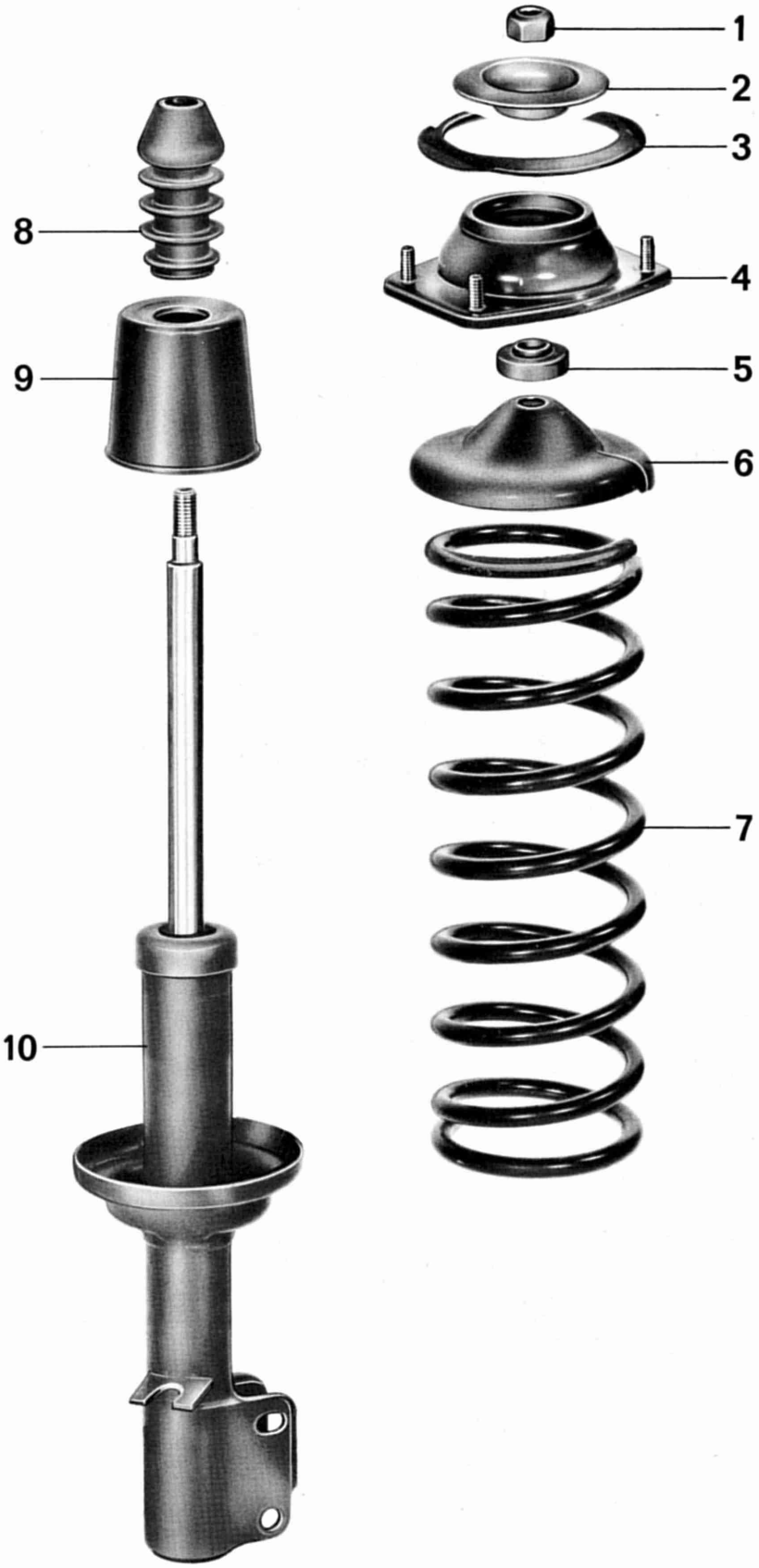


2. Adjust wheel bearing play.
   First lightly tighten clamp while turning wheel or hub. The wheel bearing play adjustment is correct when the thrust washer can still be moved by exerting finger pressure on a screwdriver (never turn or apply leverage) - see figure below.

TOOLS



No.	Description	Special Tool	Remarks
1	Clamp	VW 340	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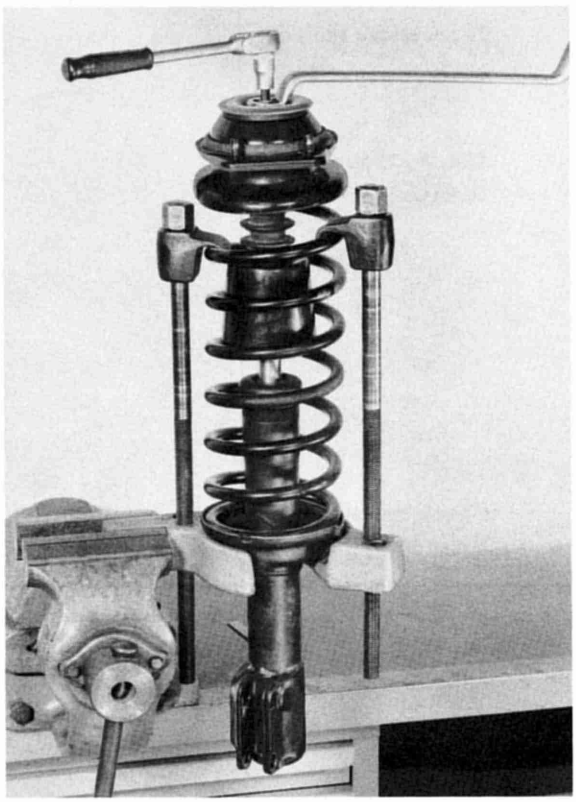
No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Nut, self-locking	1	Compress coil spring with VW 340	Replace and tighten to specified torque	
2	Stop	1			
3	Seal	1		If necessary replace	
4	Bearing flange	1			
5	Ball bearing	1		Check. If necessary replace	
6	Spring retainer	1			
7	Coil spring	1			
8	Rubber buffer	1			
9	Protective sleeve	1			
10	Shock absorber	1		Check operation. If necessary replace	

DISASSEMBLING AND ASSEMBLING SUSPENSION STRUT

Disassembling

1. Compress coil spring with VW 340, loosen self-locking hex nut, remove stop and bearing flange.



2. Release coil spring and take all parts off of of the piston rod.

Checking Shock Absorber

Check shock absorber by pulling it out and pushing it in by hand. Before performing this check, be sure shock absorber is right side up. The shock absorber must move evenly hard over its entire stroke without sticking. If necessary compare with a new shock absorber. You must be able to feel the damping pressure up to the very end of piston rod travel in both directions. On shock absorbers which have been stored for long periods of time, pump several times. Defective shock absorbers make a rumbling noise while driving.

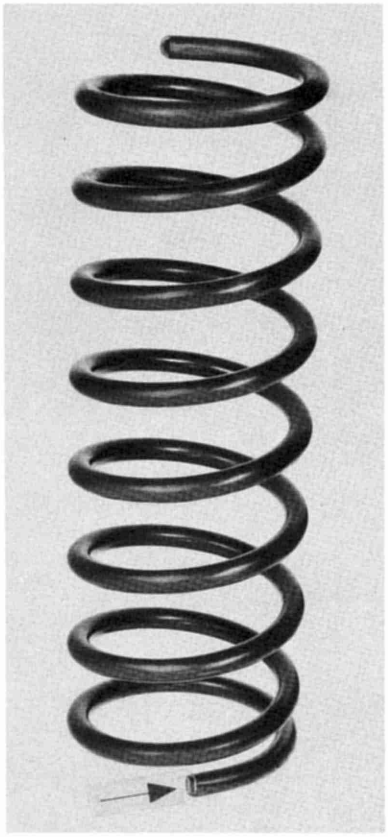
Small traces of shock absorber oil are no reason for replacement.

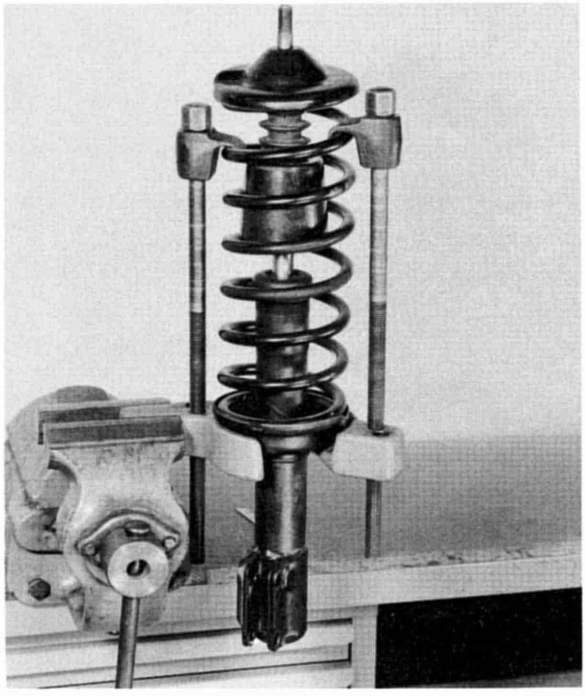
Assembling

Note

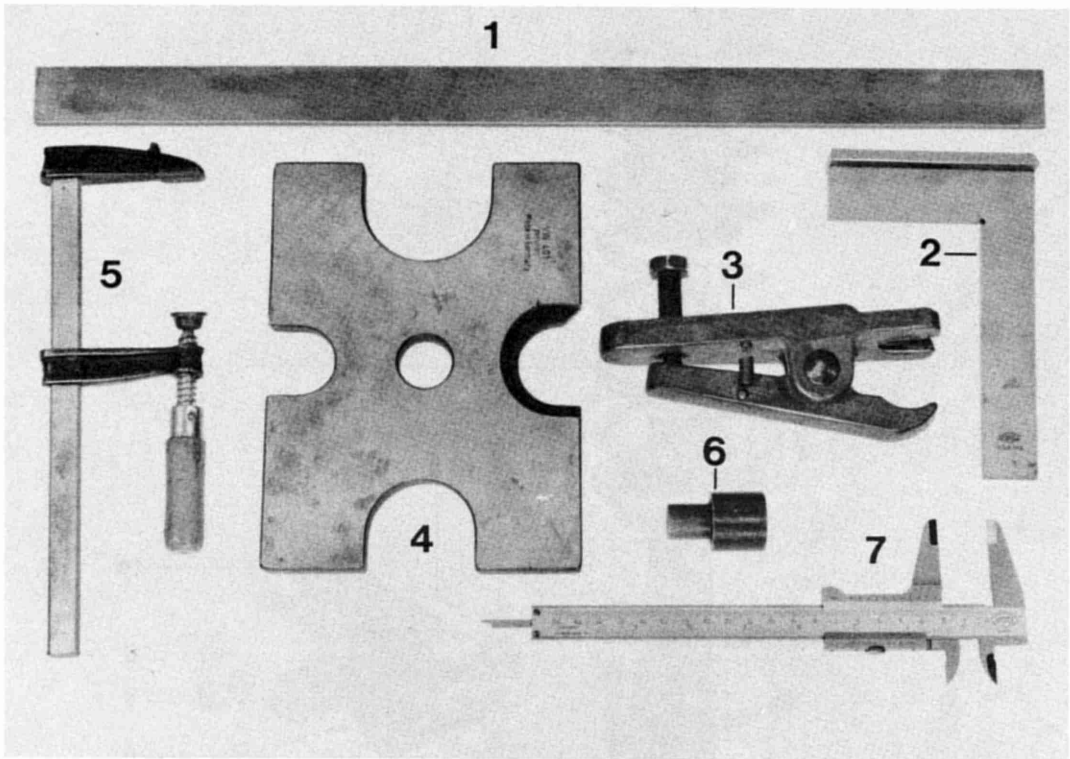
Coil springs are assigned to three tolerance groups and marked with red stripes of paint. Always install springs with the same color marks.

1. Install coil spring with straight wire end (arrow) facing down and compress with VW 340.

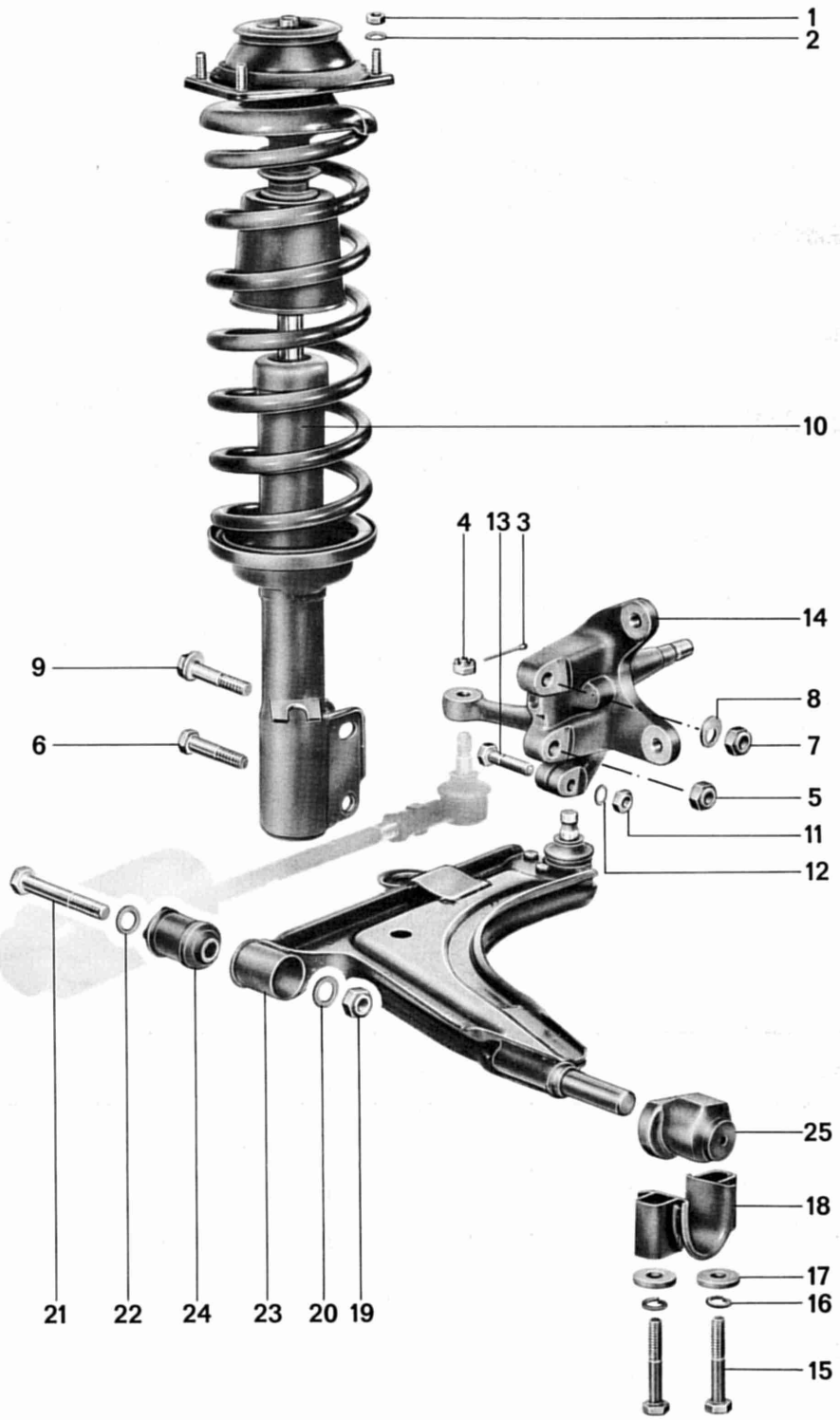




TOOLS



No.	Description	Special Tool	Notes
1	Ruler		Standard
2	Square		Standard, bearing surface chamfered
3	Tie rod extractor	VW 266 h	Standard
4	Press tool	VW 401	
5	Screw clamp		Standard
6	Pressure pad	VW 431	
7	Vernier caliper		Standard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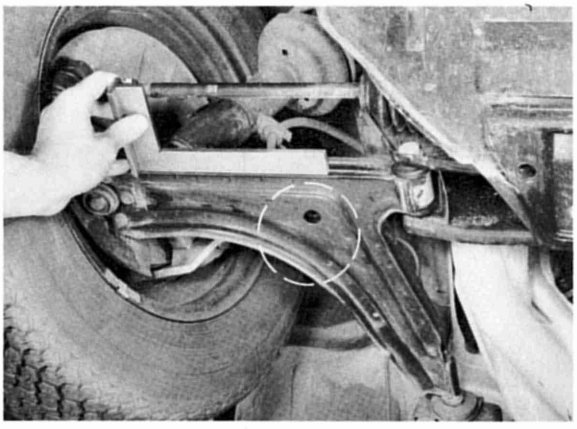
No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Nut	4			
2	Washer	4		Replace, if necessary	
3	Cotter pin	1		Replace	
4	Castle nut	1		Tighten to specified torque	
5	Self-locking nut	1		Replace and tighten to specified torque	
6	Bolt	1			
7	Self-locking nut	1		Tighten to specified torque	
8	Eccentric washer	1			
9	Eccentric bolt	1			
10	Shock absorber	1			Page 40 - 16
11	Self-locking nut	1		Was normal nut	
12	Lockwasher	1		Not required with self-locking nut (no. 11)	
13	Bolt	1			
14	Steering knuckle	1		Check for damage	Page 40 - 16
15	Bolt	2		Tighten to specified torque	
16	Lockwasher	2		Replace if necessary	
17	Plain washer	2			
18	Clamp	1			

No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
19	Self-locking nut	1		Tighten to specified torque	
20	Washer	1			
21	Bolt	1			
22	Washer	1			
23	Control arm	1		Check for damage	
24	Rubber/metal bushing, front	1		Note installation direction. Beads on rubber must face forward	
25	Rubber/metal bushing, rear	1		Press in to stop	

CHECKING CONTROL ARMS (INSTALLED)

Check face and profile end with square. Check circled area for bends and creases. If necessary remove control arm and place it on a new control arm for comparison.

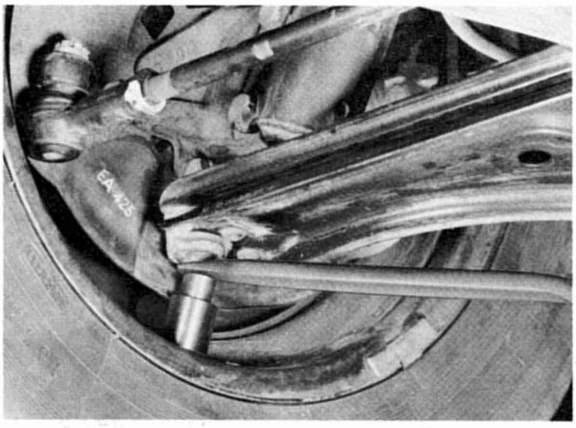


Note

If it can be assumed that wheel suspension parts are damaged (accident), check perforated section of steering column (only up to end of 1980 models) for deformation and cracks.

CHECKING BALL JOINTS INSTALLED IN CAR

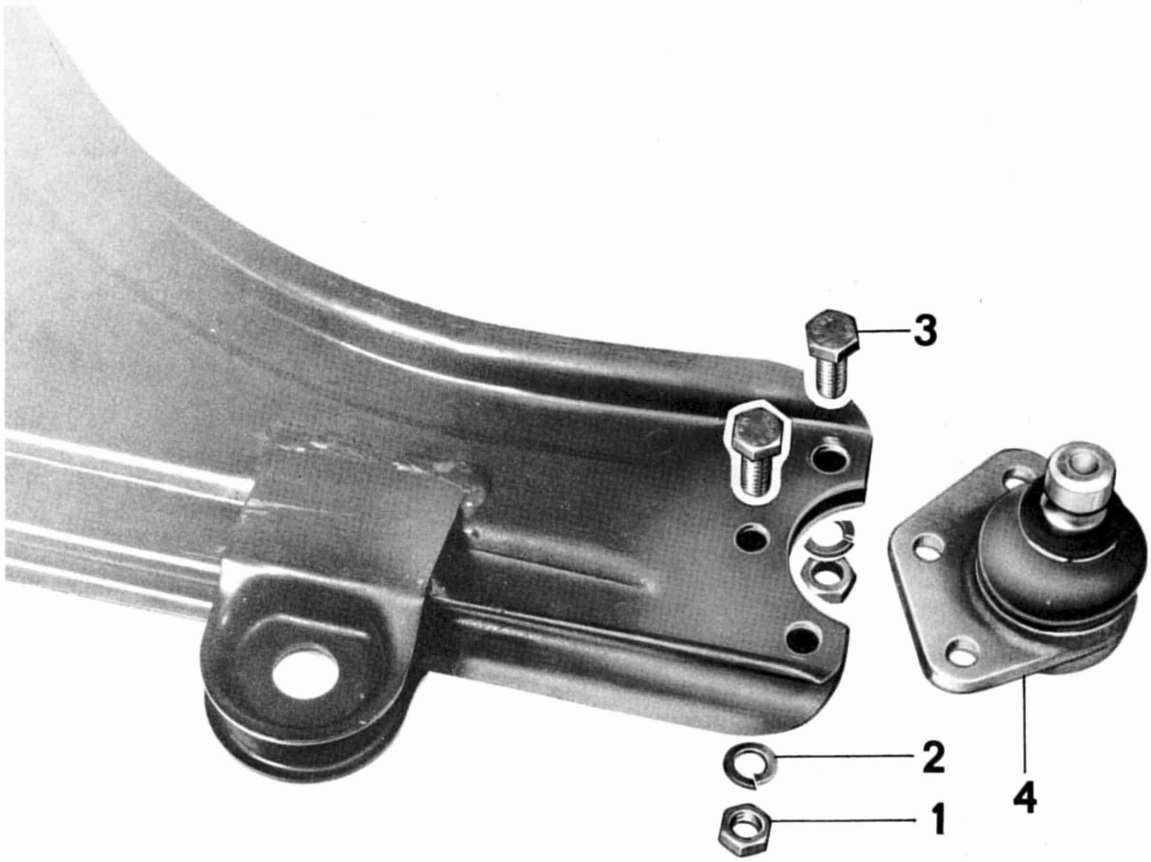
1. With the wheels pointing straight ahead insert tire iron and VW 431 between the control arm and wheel rim.



2. Insert a vernier caliper between the upper edge of the control arm and lower edge of the steering knuckle mounting bolt, and measure distance.

   Leave the caliper here and lever out the play by pressing down on the tire iron. Move in caliper and measure play.

   New joints: no play
   Wear limit: 1.5 mm



No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Nut	3		Tighten to specified torque	
2	Lock washer	3		If necessary, replace	
3	Bolt M 7 x 20	3		Insert from top down. Be sure flats of bolt heads face ball joints	
4	Ball joint	1		Check, if necessary replace	

REPLACING BALL JOINT

Ball joints are riveted to control arm in standard production. To replace, drill out rivets and secure joint with bolts.

Removing

1. Drill through rivets with 6 mm drill.

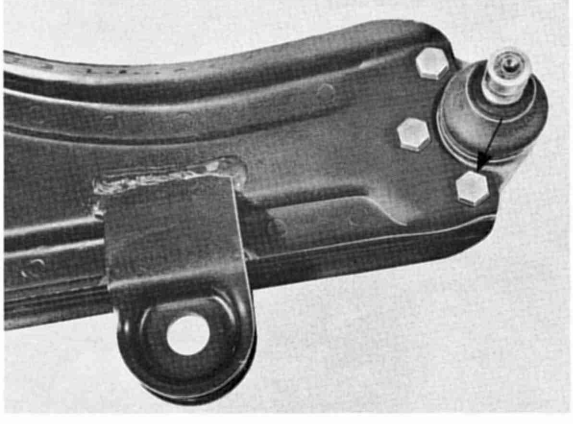
2. Chisel rivet heads off.

Installing

1. Insert ball joint nuts from top down and tighten to specified torque.

Note

Be sure flats of nuts face ball joint (arrow).

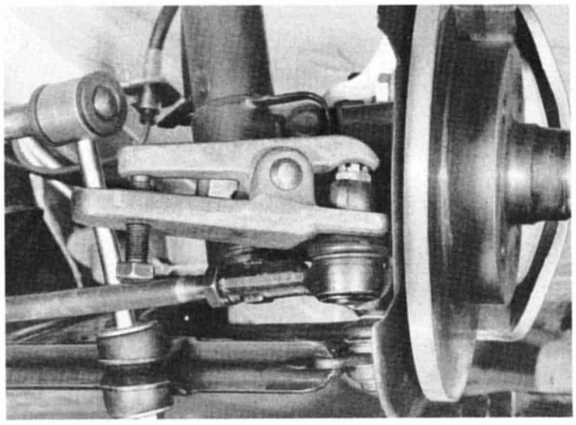


2. If only ball joint is replaced it is not necessary to adjust camber and toe.

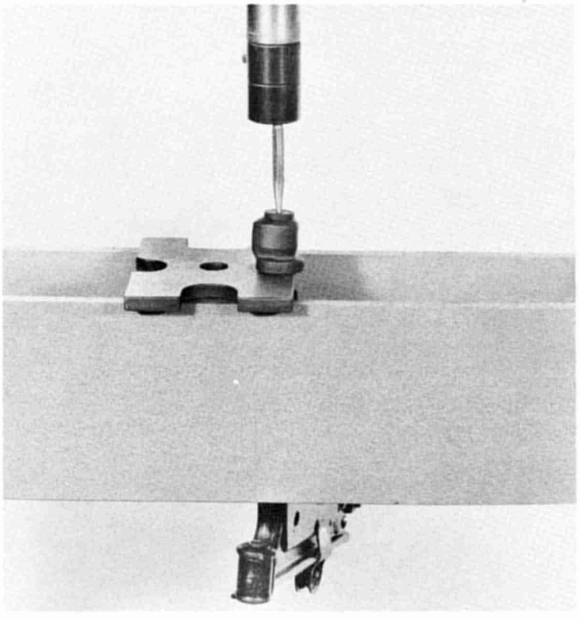
DISASSEMBLING AND ASSEMBLING FRONT SUSPENSION

Disassembling

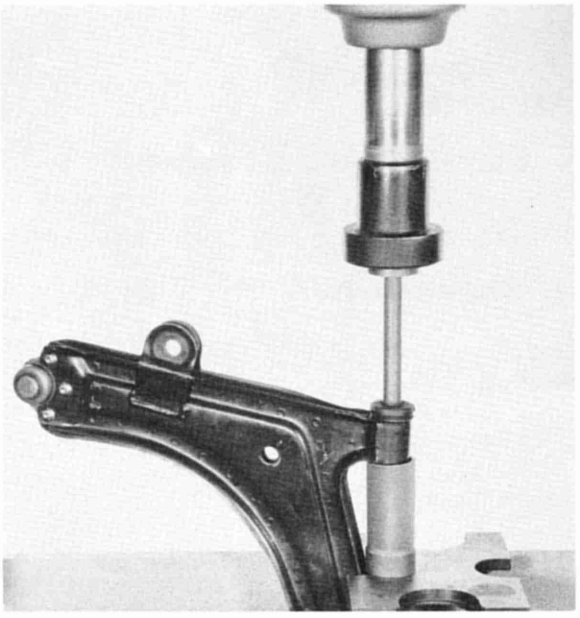
1. Press tie rod off.



2. Press rear control arm rubber/metal mount out.

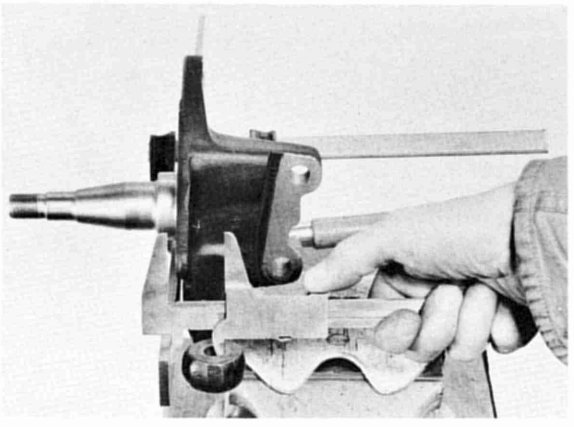


3. Press front control arm rubber/metal mount out with an appropriate piece of pipe.

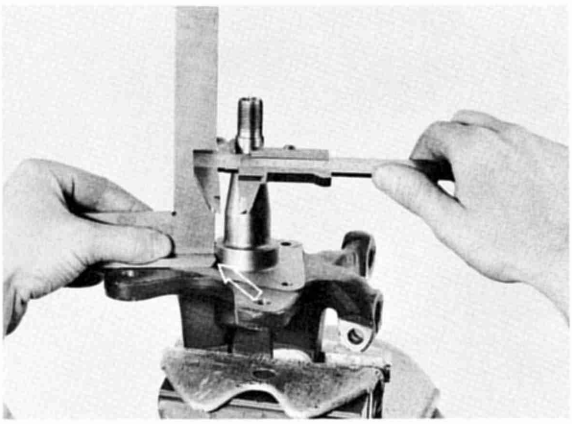


Assembling

1. Check steering arm of steering knuckle. Check that distance is 30.2 - 30.7 mm (1.19 - 1.21 in.)



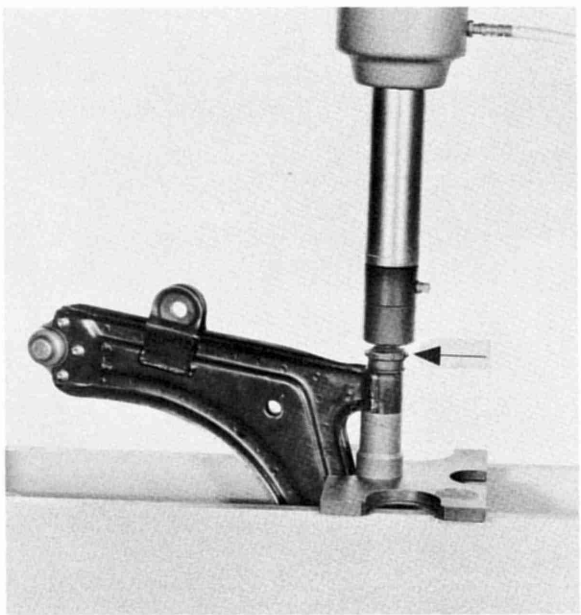
2. Check wheel bearing journal by measuring at least three points on circumference of outer wheel bearing seat.
   Replace steering knuckle if difference between readings is more than 0.25 mm (0.009 in.).



Note

For this measurement the square must be chamfered on the bearing surface (arrow).

3. Press front control arm rubber/metal bushing in to proper position with an appropriate piece of pipe. Beads on rubber (arrow) must face upward.



4. Tighten the mounting bolts for the control arm to the body and platform only when the control arm is in horizontal position.

REAR WHEEL SUSPENSION , SHAFTS AND AXLE

TECHNICAL DATA

Rear Axle

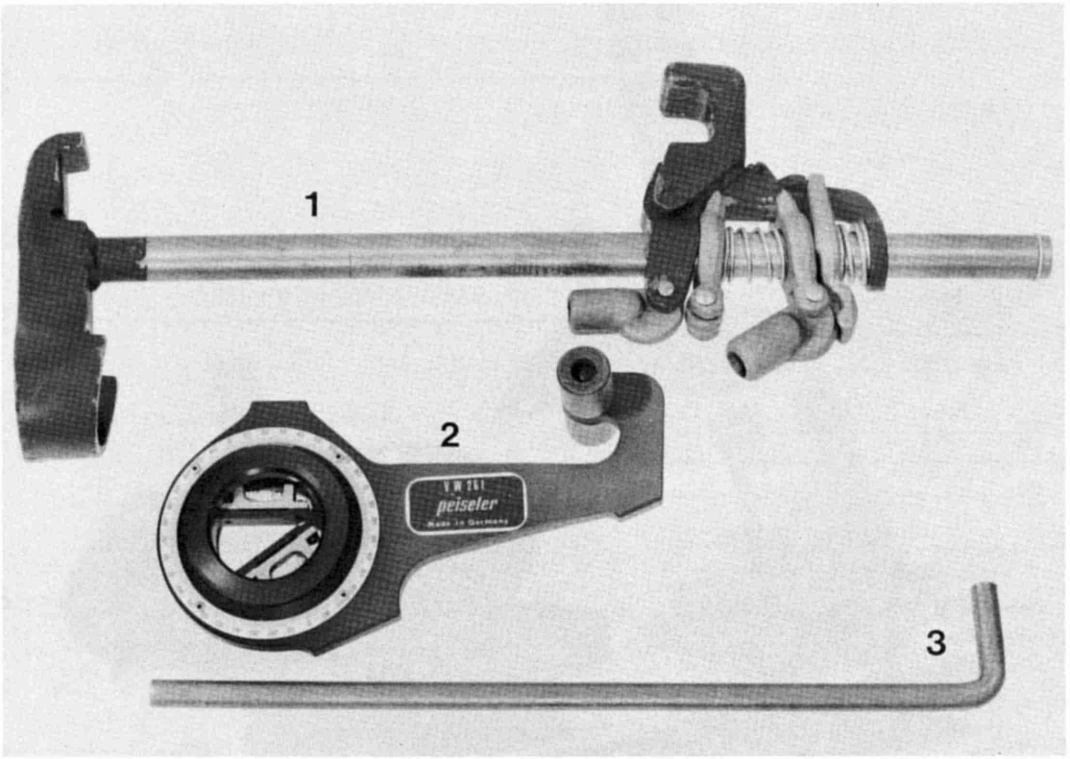
Wheel suspension	Independent on trailing arms	
Springs	One transversely installed torsion bar per wheel	
Torsion bar	22 mm dia. 23.5 mm dia. in conjunction with 14 mm dia. stabilizer bar 23.5 mm dia. from 1981 models	
Shock absorbers	Double-action, hydraulic type	
Stabilizer bar		
up to end of model 77	standard	optional 18 mm dia.
from model 78	standard	optional 14 mm dia.*
Spring strut setting (inclination of spring strut)		
up to end of model 77	23^{o}	
from model 78		
with 22 mm dia. torsion bar	23^{o} 40'	
with 23.5 mm dia. torsion bar (layout as above)	19^{o}	

* 1980 models not as separate option (M 404).
1981 models and part of 1982 (up to end of Sept. 1981) only export in conjunction with M 471.

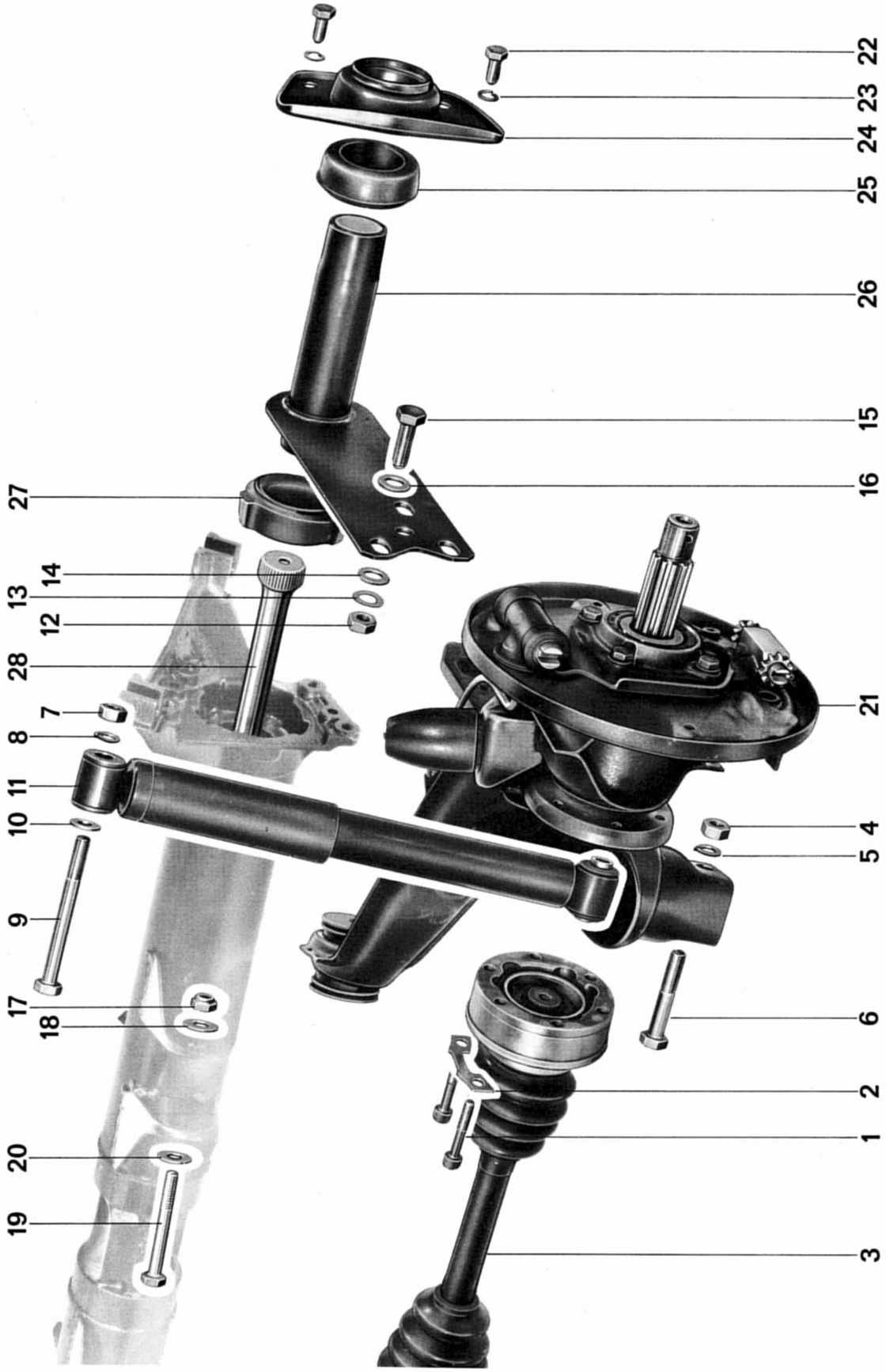
REAR AXLE TORQUE SPECIFICATIONS

Location	Description	Threads	Material	Torque Nm	Torque ft lb
Torsion bar tube to body	Bolt	M 12 x 1.5	8.8	75	54
Cover to torsion bar tube	Bolt	M 10	8.8	35	25
Trailing arm to torsion bar tube	Nut	M 12 x 1.5	8	61	44
Trailing arm to torsion plate	Nut	M 12 x 1.5	10	105 - 125	76-90
Shock absorber trailing arm	Nut	M 12 x 1.5	8	61	44
Shock absorber to body	Nut	M 12 x 1.5	8	61	44
Axle shaft to transmission and wheel shaft	Socket head bolt	M 8	12.9	42	30
Bearing cover (wheel bearing) to diagonal arm	Bolt	M 10	34 GR 4	58	42
Brake drum to wheel shaft	Castle nut	M 24 x 1.5	C 45	300 - 400	217-289
Wheel to brake drum (steel)	Wheel bolt	M 14 x 1.5	8.8	110	80
Wheel to brake drum (alloy)	Wheel bolt	M 14 x 1.5	10.9	130	94

TOOLS



No.	Description	Special Tool	Note
1	Clamp	VW 655/3	
2	Protractor	VW 261	
3	Lever		for clamp VW 655/3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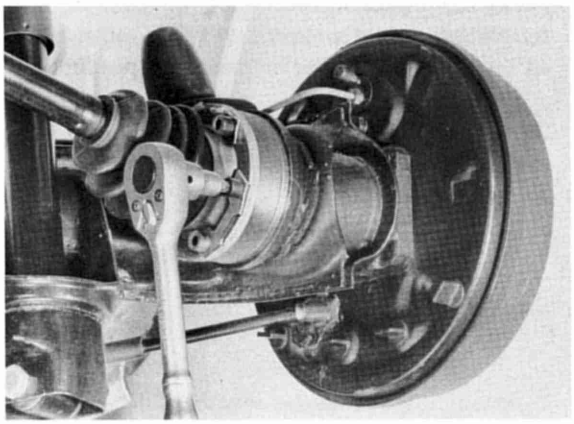
No.	Description	Qty.	Removing	Installing	Special Instructions
1	Allen head bolt	6		Torque to specifications	
2	Plate	3			
3	Axle shaft	1			
4	Nut	1		Torque to specifications	
5	Lockwasher	1		Replace if necessary	
6	Bolt	1	Lift trailing arm with VW 655/3		
7	Nut	1		Torque to specifications	
8	Lockwasher	1		Replace if necessary	
9	Bolt	1		Coat bolt shank with multi-purpose grease	
10	Washer	1			
11	Shock absorber	1		Check, replace if necessary	
12	Nut	3		Torque to specifications. Watch inclination of torsion plate and trailing arm flange.	
13	Washer	3		Replace if necessary	
14	Plain washer	3			
15	Bolt	3			
16	Plain washer	3			

No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
17	Nut, self-locking	1		Replace and torque to specifications only when car is resting on its wheels.	
18	Plain washer	1			
19	Bolt	1			
20	Plain washer	1			
21	Trailing arm	1	Mark location of trailing flange to spring plate	Check for damage	
22	Bolt	4		Torque to specifications	
23	Lockwasher	4		Replace if necessary	
24	Cover	1		Hold in place with 2 long bolts	
25	Rubber mount, outer	1		Install with Silicon grease	
26	Torsion plate	1	Mark position relative to trailing arm. Lever off stop with tire iron.	Check torsion plate angle with VW 261. Install cover and position with VW 655/3	
27	Rubber mount, inner	1		Install with Silicon grease	
28	Torsion bar	1	Pull out broken bar with conical shaped pipe, or remove opposite torsion bar and drive out with a rod	Coat spline with multi-purpose grease	

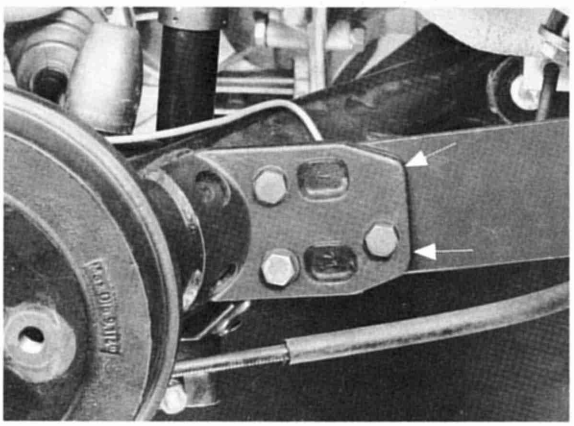
DISASSEMBLING AND ASSEMBLING WHEEL SUSPENSION

Disassembling

1. Loosen constant velocity joint mounting bolts. Cover constant velocity joint with plastic cap.



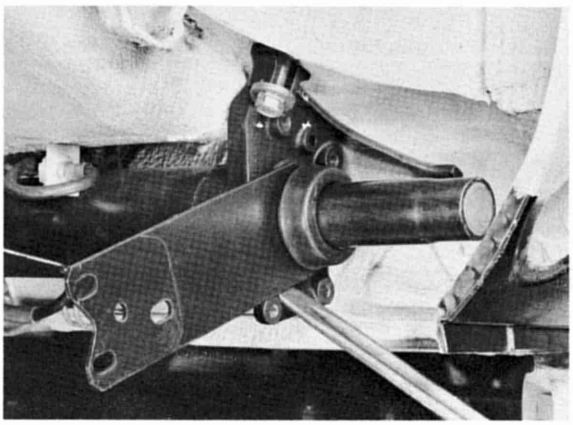
2. Mark location of torsion plate / trailing arm flange with a scribe.



3. Lever off torsion plate.

WARNING

Torsion plate under extreme tension.

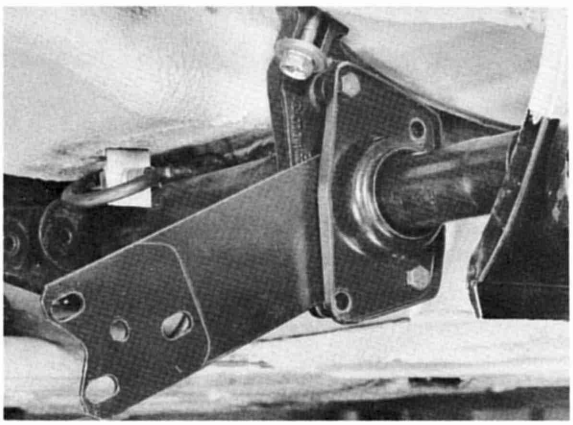


Assembling

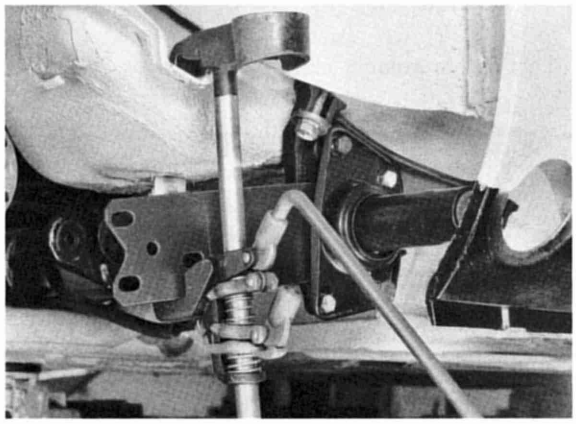
Note

Torsion bars are under tension and may not be mixed up. Their face is marked with L (left) or R (right).

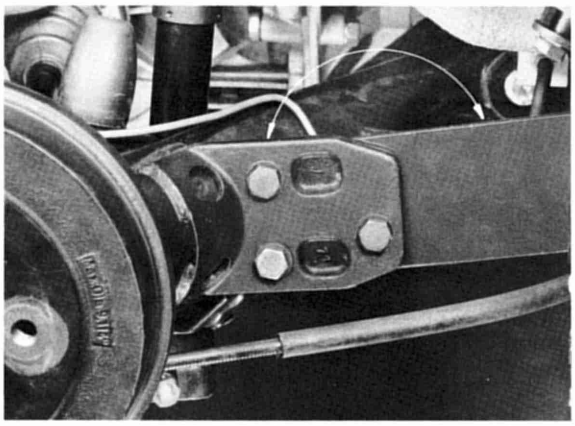
1. Hold spring plate cover in place with two long bolts.



2. Position torsion plate with Special Tool VW 655/3.



3. Note relationship of torsion plate/trailing arm flangeangle less than 180° (arrows).



4. Be sure car is on its wheels before tightening the trailing arm to torsion bar bolt/nut otherwise torsion range of silent block will be exceeded.

Adjusting Torsion Bar

CAUTION

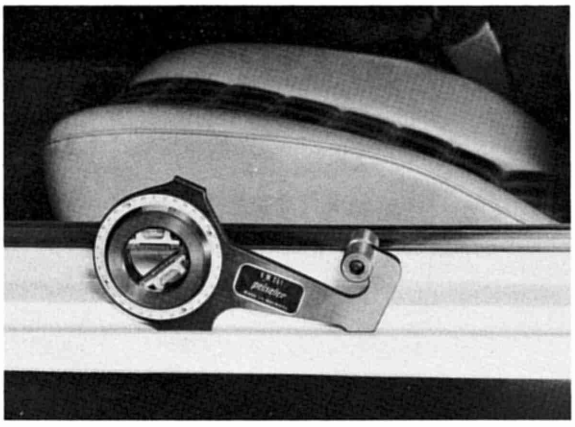
On high mileage vehicles, always adjust both torsion bars.

Note

Because of the different number of teeth on the torsion bar's splines (inside 40 teeth, outside 44 teeth) very small adjustments are possible.

Rotating the bar by one internal tooth (= 9°) and rotating torsion plate in opposite direction by one external tooth (= 8° 10'), torsion plate angle can be changed by 50'.

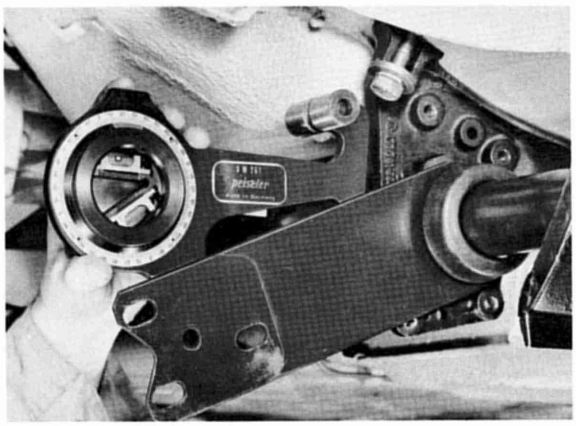
1. Mount VW 261 on the outside of door sill and adjust protractor until the bubble is in the center of the bubble level glass marked, "Achskörper/Winkel".
Note this reading which is the vehicle deviation from horizontal. Rotate bubble level carrier on VW 261 by the specified value for torsion plate angle.



2. With torsion plate cover removed place VW 261 on torsion plate. Lift torsion plate just enough to remove play from splines.

Note

According to angle measurement at doorsill, if the front of the vehicle is lower than the rear, add doorsill measurement to torsion plate value. If rear of the vehicle is lower than the front, subtract doorsill measurement from torsion plate value.



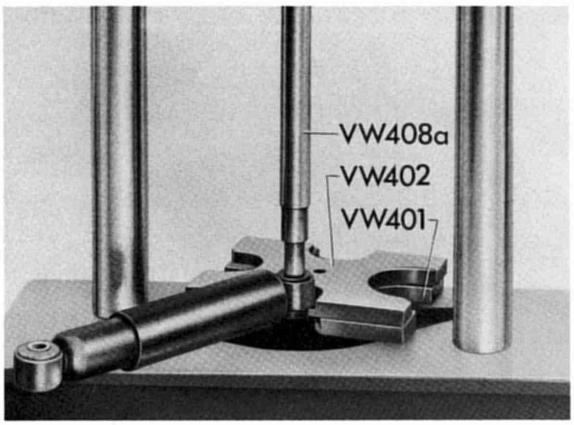
Correct the torsion plate angle if measured value differs from specified value by more than 50'.

Note

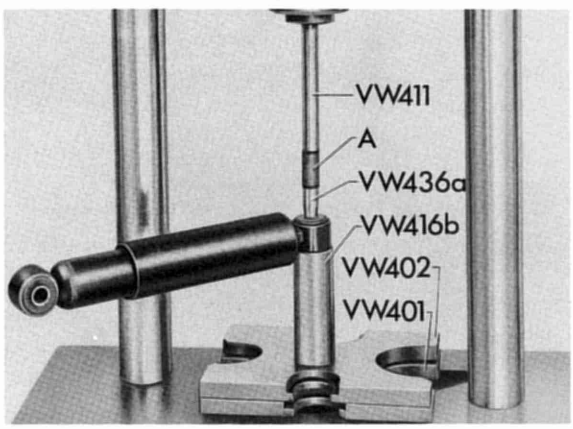
A deviation of air bubble from center by one graduation equals a torsion plate angle deviation of 50'. The torsion bar must be rotated in the direction that the bubble level carrier has to be turned, so that the bubble floats in center position.

Replacing Rubber Mount and Bushing for Shock Absorber

1. Press out bushing and rubber mount.

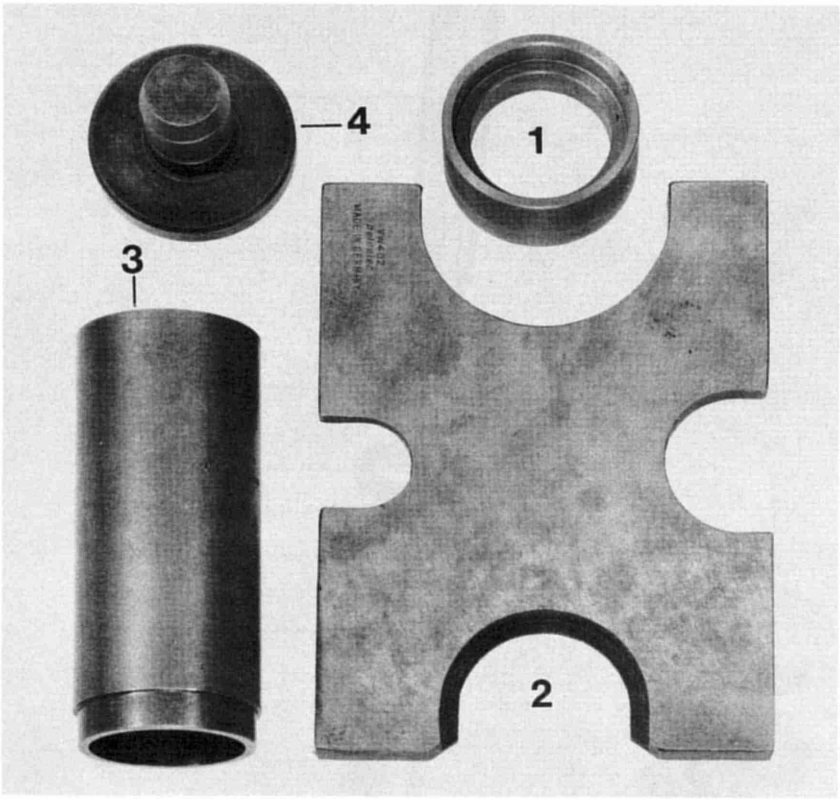


2. Press in bushing.

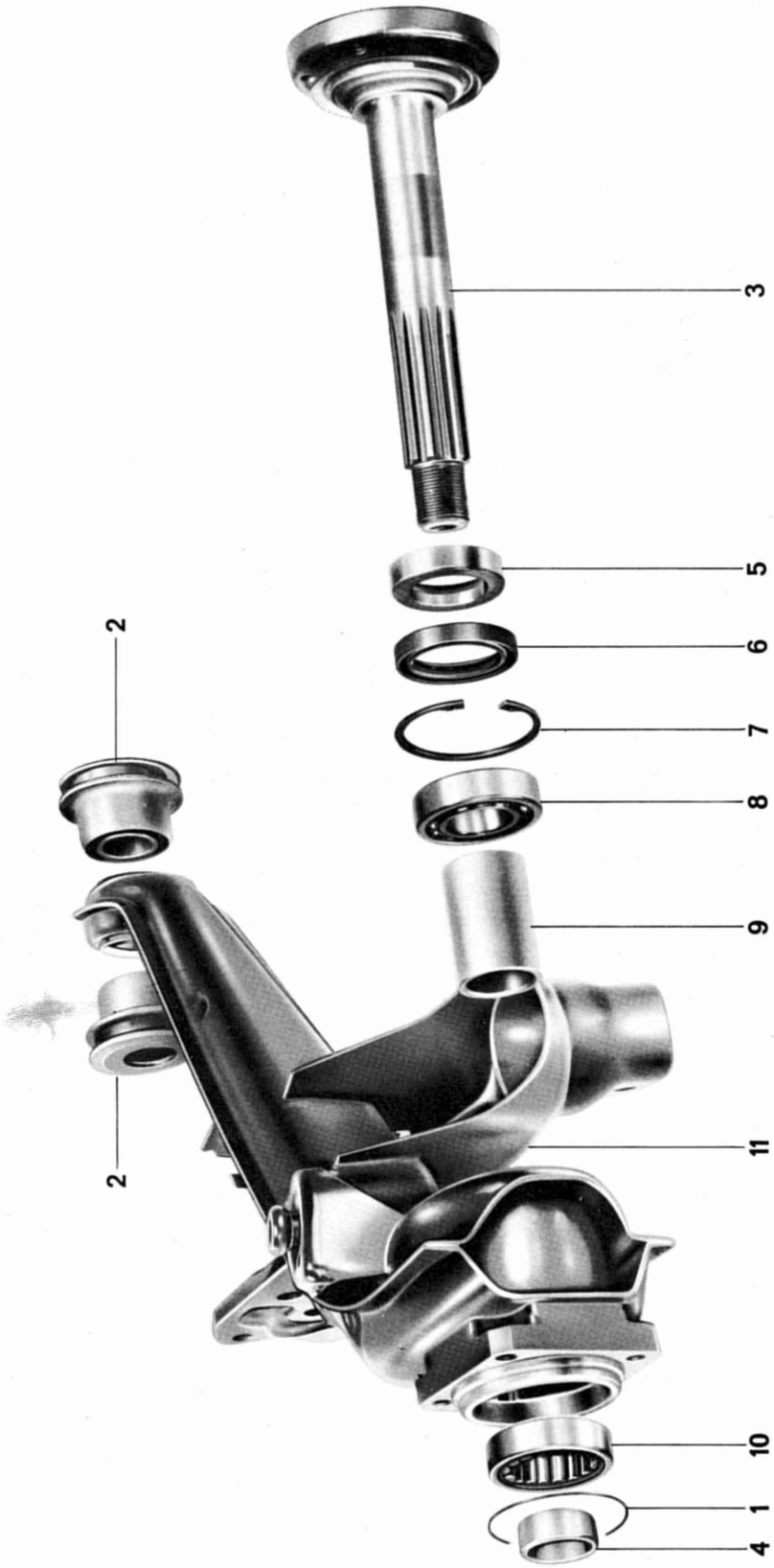


A - Bushing

TOOLS



No.	Description	Special Tool	Remarks
1	Holder	VW 441	
2	Pressure plate	VW 402	
3	Pipe	VW 415 a	
4	Pressure pad	VW 412	


3
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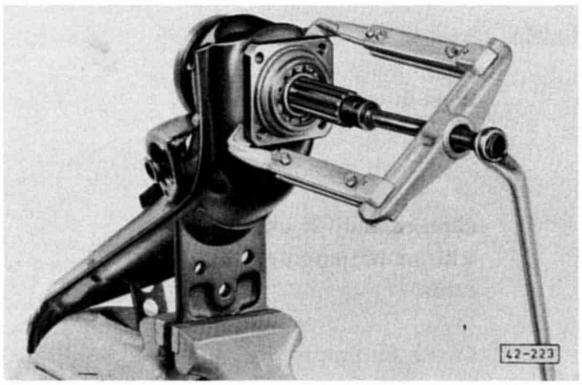
4

No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	O-ring	1		Replace	
2	Rubber bushings	2	Drive out alternately with a chisel	Replace and press in	
3	Rear wheel shaft	1	Remove with double arm extractor	Press in	
4	Bearing inner race	1		Press in with VW 415a	
5	Spacer, inner	1			
6	Seal	1	Lever out	Replace and fill cavity with multi-purpose grease	
7	Circlip	1		Check for proper fit	
8	Grooved ball bearing	1	Drive out with soft drift	Press in	
9	Spacer	1			
10	Roller bearing	1	Drive out with soft drift		
11	Trailing arm	1		Fill cavity in wheel hub and ball bearings with about 80 grams of multi-purpose grease	

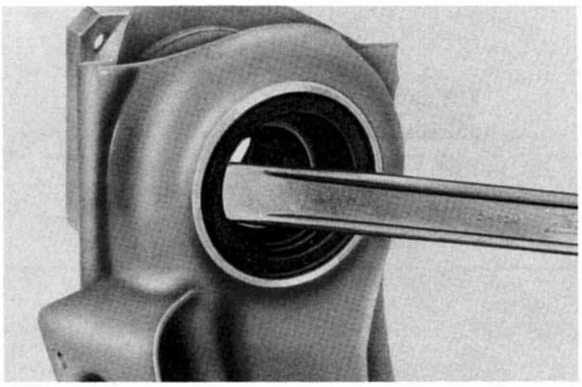
DISASSEMBLING AND ASSEMBLING TRAILING ARM

Disassembling

1. Press out rear wheel shaft.

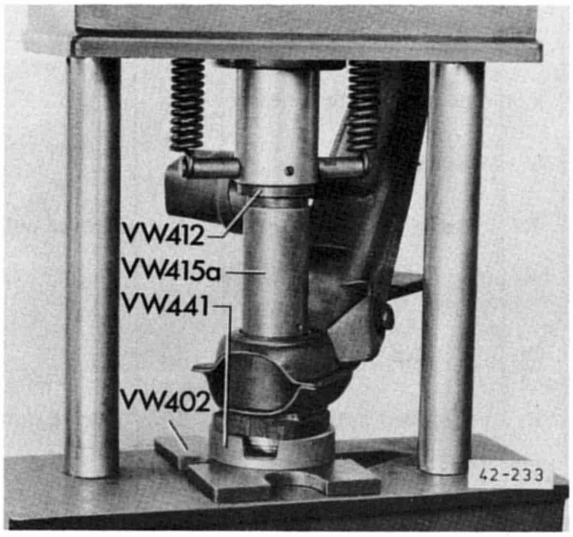


2. Lever out seal with tire iron.

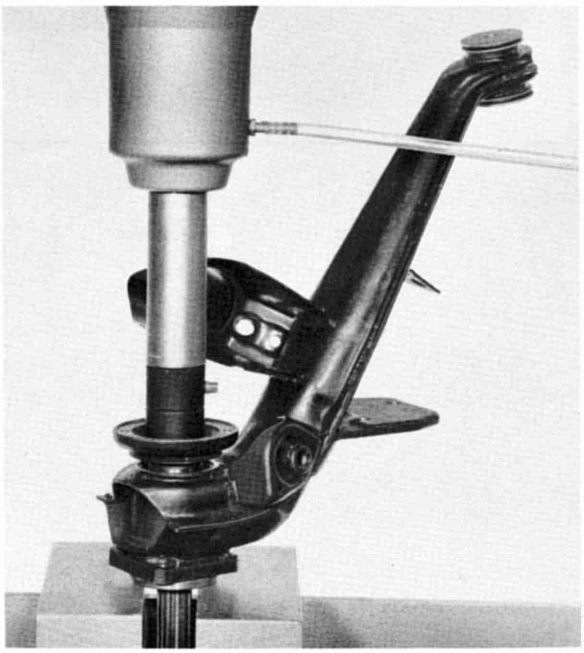


Assembling

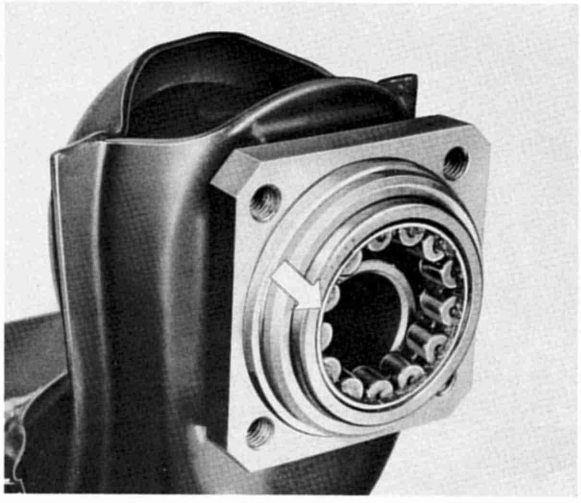
1. Press grooved ball bearing in.



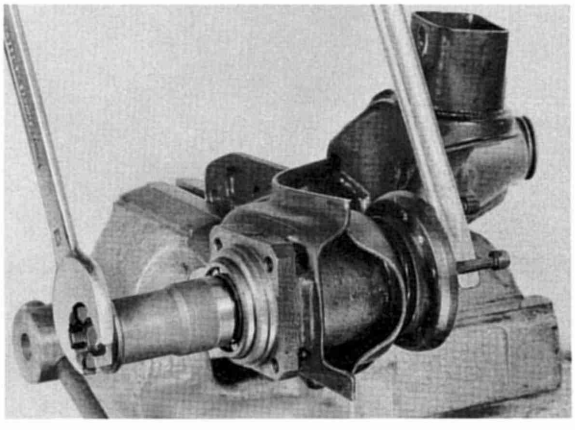
2. Press rear wheel shaft in.



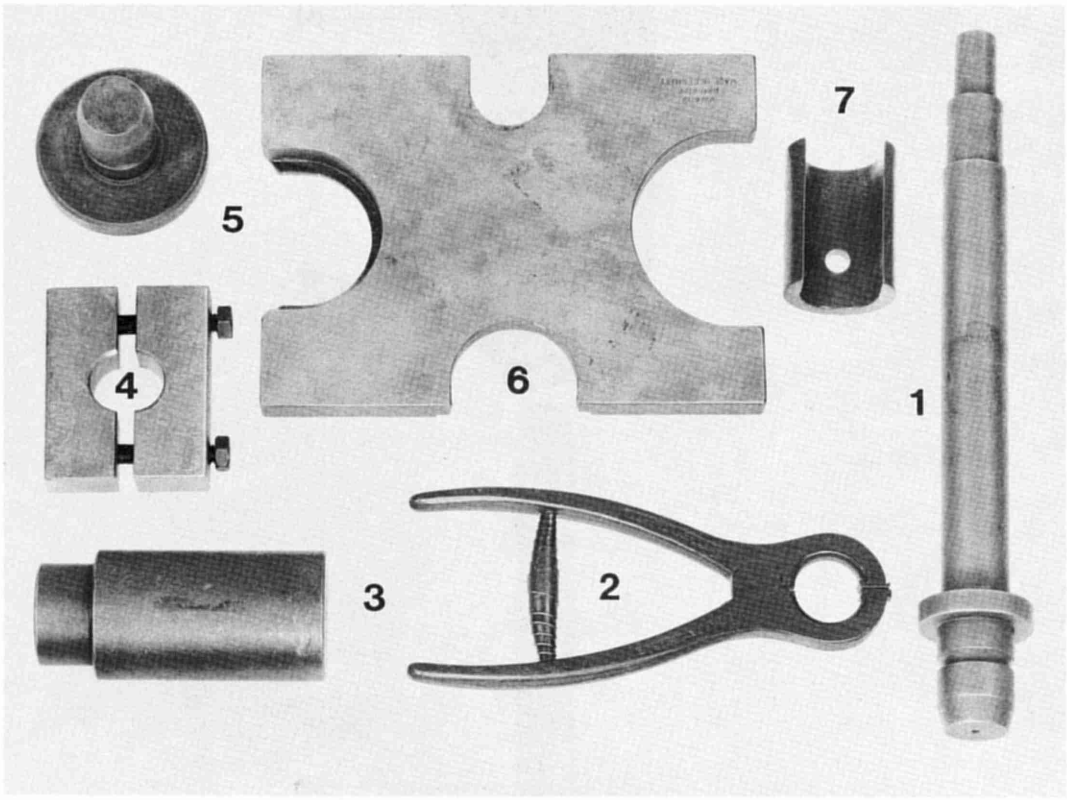
3. Drive roller bearing outer race in with VW 415 A. Flanged edge must face out (arrow).



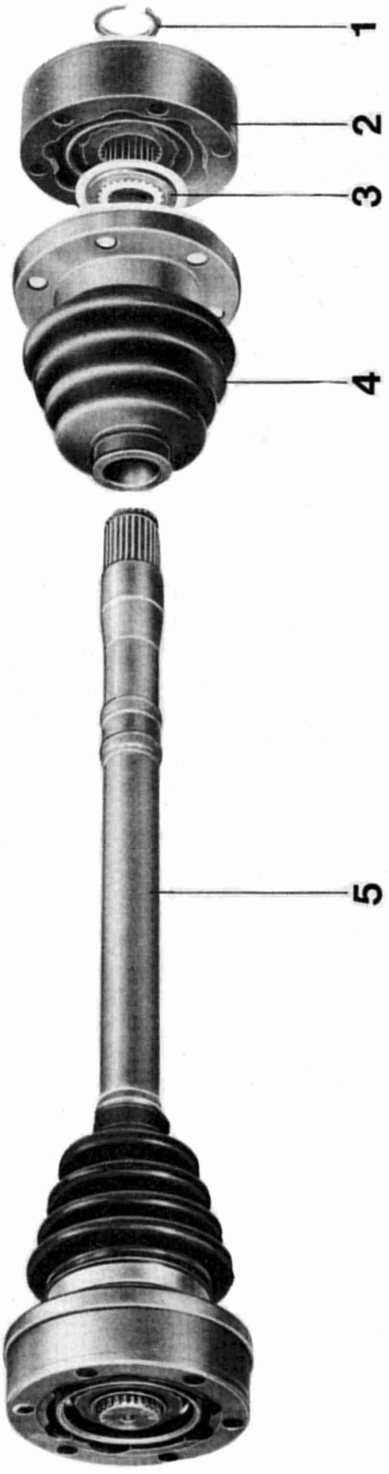
4. Press in roller bearing inner race and outer spacer with VW 454, and castellated nut.



TOOLS



No.	Description	Special Tool	Remarks
1	Pressure pad	VW 408 a	
2	Circlip pliers	VW 161 a	
3	Pressure disc	VW 432	
4	Tensioner	40 - 204	
5	Pressure pad	VW 412	
6	Pressure plate	VW 402	
7	Sleeve	VW 522	


1
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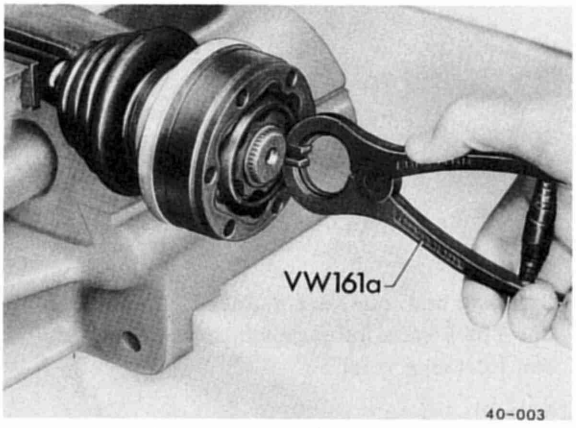
No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Circlip	1	Remove with VW 161 a	Replace and check for proper fit	
2	Constant velocity joint	1	Press off with VW 408 a and VW 402	Check for wear, replace if necessary	
3	Diaphragm spring	2		Replace; inside curved surface faces joint	
4	Joint sleeve	2	Knock off of joint with mandrel		
5	Shaft				

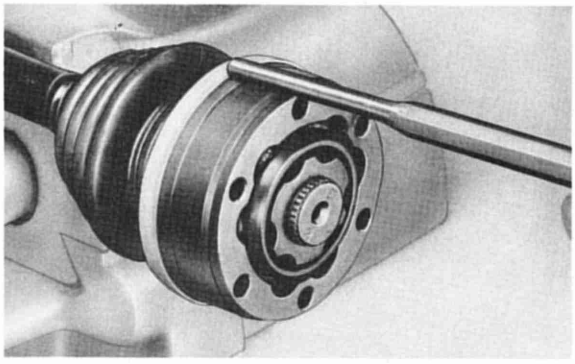
DISASSEMBLING AND ASSEMBLING AXLE SHAFT

Disassembling

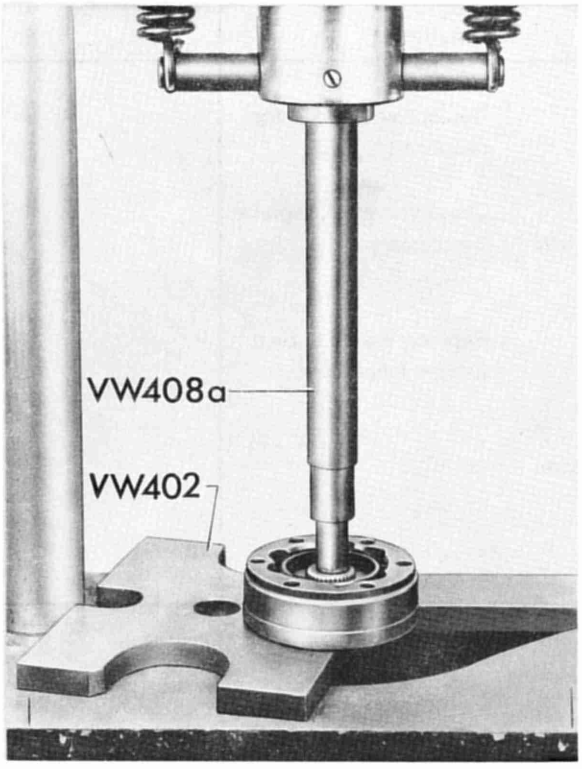
1. Remove circlip.



2. Knock protective cap off of constant velocity joint.

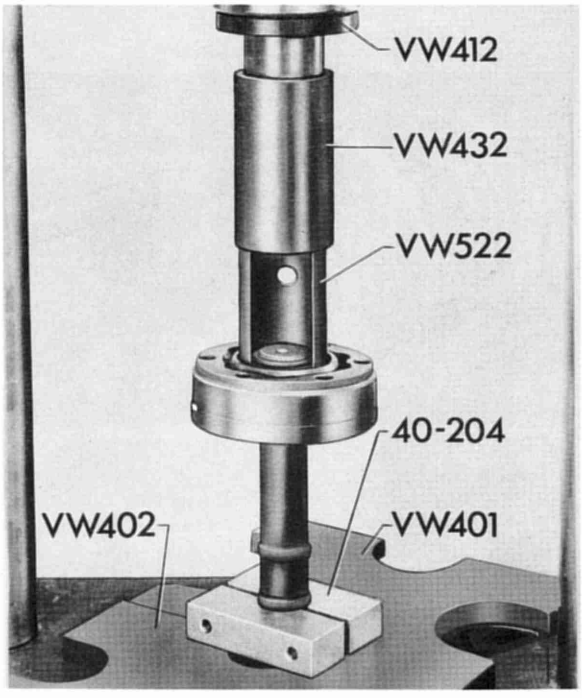


3. Press constant velocity joint off shaft.



Assembling

1. Press constant velocity joint on shaft, inserting the circlip in its groove at the same time. If necessary adjust circlip with special pliers.

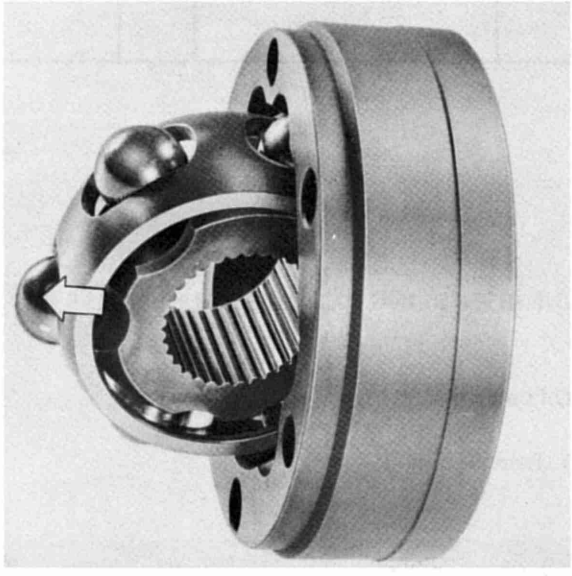


Disassembling and Assembling Constant Velocity Joint

Disassembling

The joint must be disassembled to replace the grease when excessively contaminated or to inspect the bearing surface and balls for wear and damage.

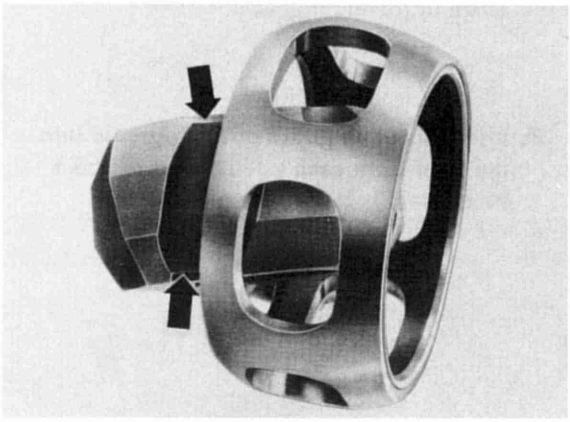
1. Swing ball hub and ball cage out of joint and press out in direction of arrow.



Note

Ball hubs and joints are matched. Do not mix up. The 6 balls for each joint also belong to one tolerance group.

2. Tilt ball hub out of the ball cage via the ball runway (arrow).



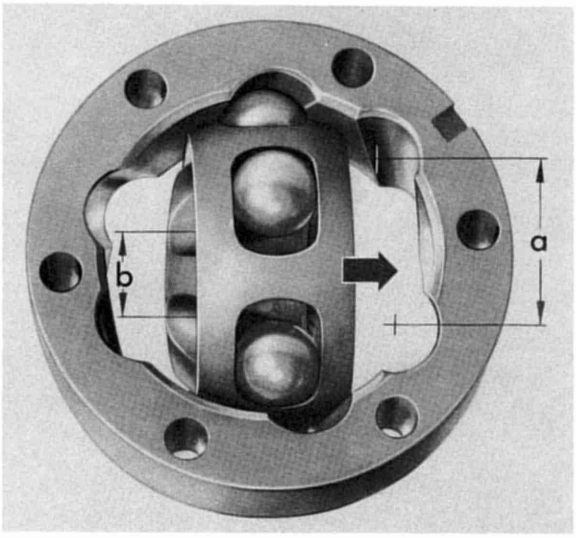
Assembling

1. Check joint, ball hub, ball cage and balls for pitting and seizure spots,. Too much radial play in the joint is identified by knocking noises when accelerating/decelerating. Replace the joint in such cases. Slight wear spots and tracks from the balls are not reason enough for replacement of the joint. Thoroughly coat all parts with molybdenum grease.

2. Place ball hub over both chamfers in the ball cage. Any position is acceptable.

3. Press balls into cage.

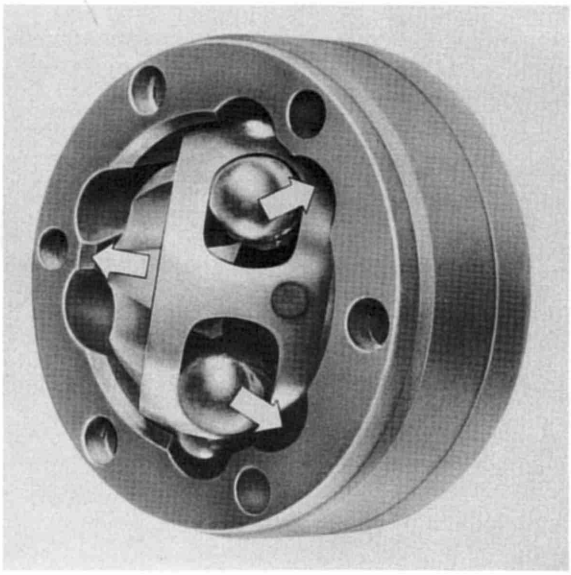
4. Install hub with cage and balls in joint at a 90^{o} angle. Make sure one wide groove " a " of the joint is on the same side with one narrow groove " b " of the hub.



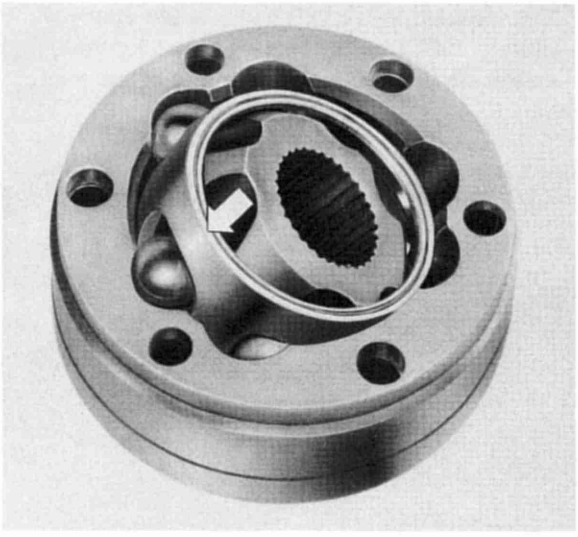
Note

The chamfer on the ball hub's inside diameter (spline) must face the bearing collar for the axle shaft and the largest diameter of the joint.

5. Install ball hub with cage. Push hub out of the cage (direction of arrows) so that the balls are aligned with grooves.



6. Press hub with balls into joint (arrow).



7. Check joint operation. The constant velocity joint is assembled correctly, if the ball hub is able to turn smoothly throughout the entire range of travel.

8. Inject about 45 grams of MoS_2 grease into the joint from each side (a total of about 90 grams).

WHEELS ,
TIRES ,
AXLE ALIGNMENT

Wheels and Tires

Standard Tires

Rim size (front and rear)	
up to 1979 models	5 1/2 J x 14
from 1979 models	6 J x 14 (aluminum)
Tire size (front and rear)	
up to 1979 models	165 R 14 84 H (165 HR 14)
from 1979 models	185/70 R 14 86 H (185/70 HR 14)

Optional Tires

Rim size (front and rear)	
up to 1979 models	6 J x 14 (aluminum)
from 1979 models	6 J x 15 (aluminum)
Tire size (front and rear)	
up to 1979 models	185/70 R 14 86 H (185/70 HR 14)
from 1979 models	205/60 R 15 89 H (205/60 HR 15)

Winter Tires *

Rim size (front and rear)	5 1/2 J x 14 (steel)
Tire size (front + rear)	165 R 14 M+S 84 (165 R 14 M+S) or 185/70 R 14 M+S 86 (185/70 R 14 M+S)
Rim size (front and rear)	6 J x 14 (aluminum)
Tire size (front and rear)	185/70 R 14 M+S 86 (185/70 R 14 M+S)
Rim size (front and rear)	6 J x 15 (aluminum)
Tire size (front + rear)	185/65 R 15 M+S 86 (185/65 R 15 M+S)

Tire inflation pressure (for all road speeds) measured on cold tires	
front and rear	2.0 bar/29 psi
collapsible wheel	2.2 bar/32 psi

* Tires in Q or T version (SR or HR) with top speed of 160 or 190 km/h (100 or 120 mph) may be used.

AXLE ALIGNMENT SPECIFICATIONS

The following specifications apply to a car at curb weight according to DIN 70020 (car with full fuel tank, spare wheel and tools).

	Specification and Tolerance	Max. Difference between Left and Right
Front Axle		
Toe (pressed with 150 N/ 33 lb	0° + 5' − 15'	
Steering difference angle (wheels turned 20°)	$-1^{\circ} \pm 20'$	can only be altered by replacing steering arm
Camber	$-20' \pm 15'$	10'
Caster	$2^{\circ}\ 30' + 30'$ − 15'	30'
Rear Axle		
Toe per wheel	$0^{\circ} \pm 5'$	10'
Camber	$-1^{\circ} \pm 20'$	30'
Spring plate angle* (spring strut inclination) to end of 1977 models	23°	0.5°
from 1978 models with 22 mm dia. torsion bar	$23^{\circ}\ 40'$	0.5°
with 23.5 mm dia. torsion bar (availability of 23.5 mm dia. torsion bar: in conjunction with 14 mm dia. stabilizer bar from 1981 models)	19°	0.5°
Height adjustment** (from 1978 models) center of torsion bar to center of wheel	8 ± 10 mm	10 mm

* 1° change in spring strut inclination equals
6 mm change in car height with 22 mm dia. torsion bar or
5 mm change in car height with 23.5 mm dia. torsion bar.

** Bumper height is important in this case. Distance from measuring point on road or level surface to upper edge of bumper must be 522 ± 20 mm.

AXLE ALIGNMENT

Check the axle alignment with optical equipment. Consult manufacturer's instructions for proper test procedures.
Requirements for checking axle alignment.

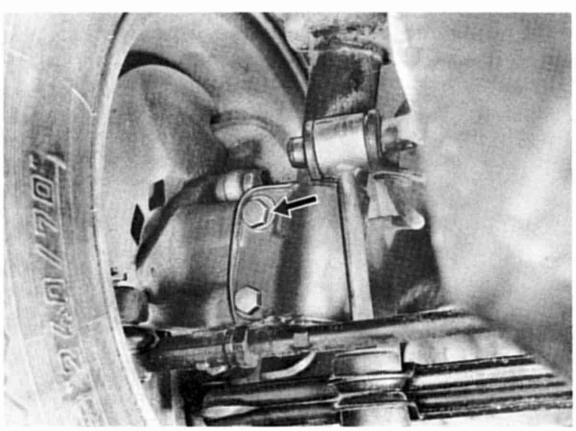
- Car at curb weight acc. DIN 70020 (car with full fuel tank and spare wheel)
- Joint and bearing play correct
- Specified tire inflation pressure
- Uniform tire treads

If front and rear axle alignment has to be checked, first check and adjust the rear axle alignment.
Steering wheel and steering gear must be in center position when adjusting camber and toe.

FRONT AXLE

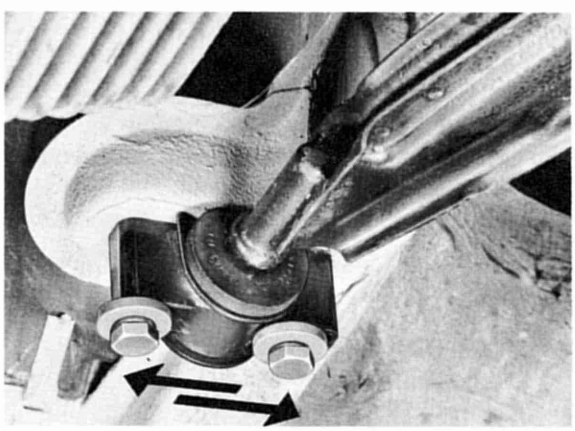
Adjusting Camber

Adjust camber by turning eccentric bolt (arrow).



Adjusting Caster

Adjust caster by moving the rear of suspension control arm from side to side.



Adjusting Toe

Center steering gear with special tool 9116 and adjust toe at tie rods.

Steering Difference Angle

Steering difference angle cannot be adjusted. It can only be affected by replacing steering arm.

REAR AXLE (up to 1978 Models)

Adjusting Camber

Rear wheel camber is not adjustable. It is given by design. Very small corrections are possible within tight limits as follows.

Changing Camber Towards Positive

With car resting on its wheels, loosen bolts attaching torsion plate to trailing arm. This will raise the trailing arm and move camber in positive direction.

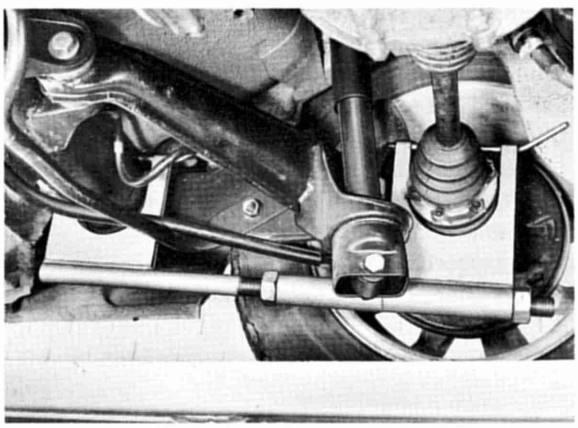
Changing Camber Towards Negative

With car on hoist (wheels unsupported), loosen bolts attaching torsion plate to trailing arm. This will lower trailing arm and move camber in negative direction.

Adjusting Toe

Rear wheel toe can be adjusted by moving trailing arm (within slots) with respect to torsion plate.

Adjust toe angle using special tool US 4437 A. When tightening mounting bolts of trailing arm watch angle of torsion plate (see page 42 - 6).



REAR AXLE (from 1978 Models)

Height Adjustment

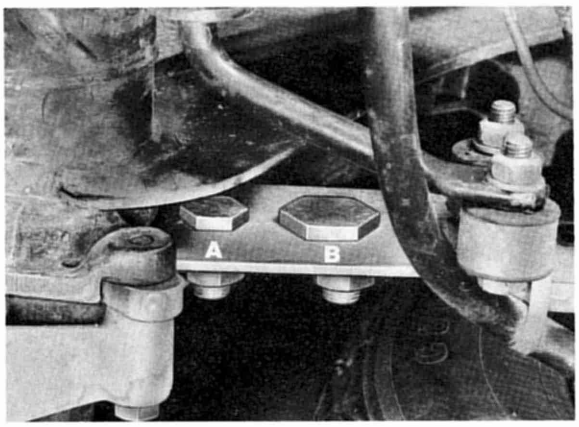
Rear car height can be adjusted on two-piece spring plate, without removal of torsion bars.

If spring plate angle is as specified, car height will be correct.

If the height adjustment value drops below specifications after operation of car for a long time, correct vehicle height with eccentric bolt B after loosening mounting bolt A.

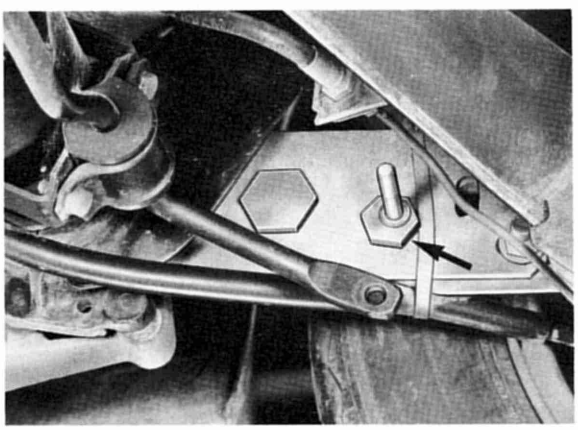
Note

To make sure that axle loads are distributed evenly to both rear wheels, lift car at front cross member when making height adjustment so that both front wheels just clear ground.



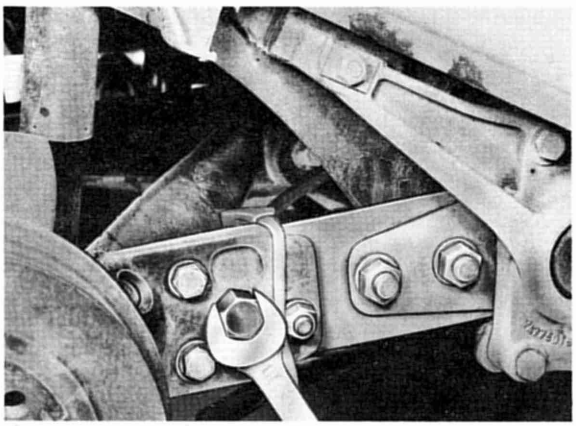
Adjusting Camber

Loosen bolts between spring plate and diagonal arm flange, and adjust to specifications by turning camber eccentric.



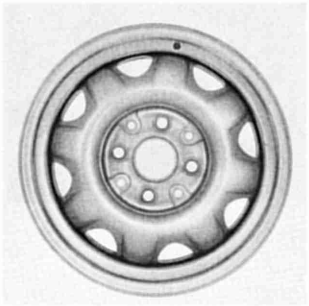
Adjusting Toe

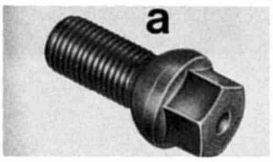
Adjust toe by repositioning diagonal arm flange in slots of spring plate, using special tool 9171.



WHEEL RIMS/WHEEL BOLTS AND WHEEL NUTS - ARRANGEMENT FOR 924, 944, 924 Turbo

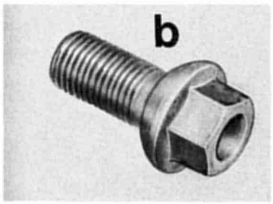
Several different wheel bolts and wheel nuts are required because of the different design of wheel bolt or wheel nut bearing surfaces depending on type of wheel rim.





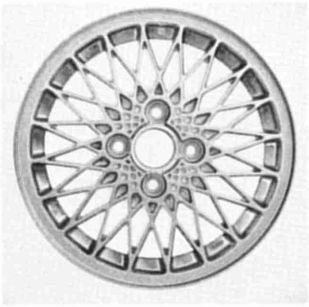
I. Steel wheel rim 5 1/2 J x 14

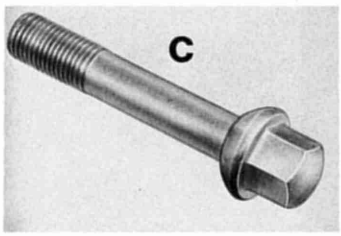
Wheel bolts M 14 x 1.5; 25.5 mm long,
24 mm diameter



II. Cast aluminum wheel rim 6 J x 14

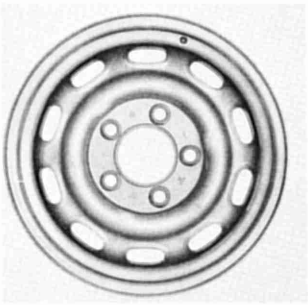
Wheel bolts M 14 x 1.5; 25 mm long,
28 mm diameter





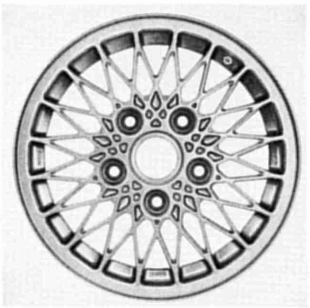
III. Cast aluminum wheel rim 6 J x 15

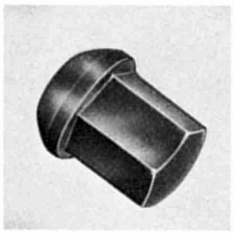
Wheel bolts M 14 x 1.5; 70 mm long,
28 mm diameter



IV. Steel wheel rim 5 1/2 J x 15

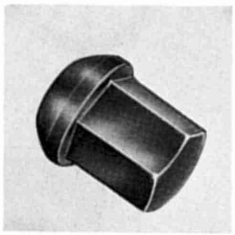
Steel wheel nuts





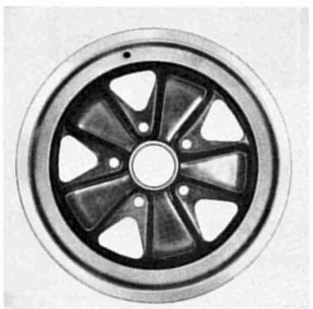
V. Cast aluminum wheel rim
6 J x 15

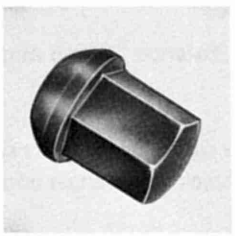
Aluminum wheel nuts



VI. Forged aluminum wheel rim
6 J x 16

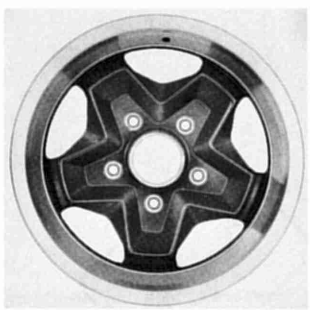
Aluminum wheel nuts

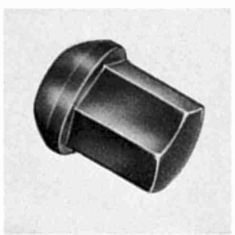




VII. Forged aluminum wheel rim
8 J x 15, 7 J x 15, 7 J x 16, 8 J x 16

Aluminum wheel nuts





VIII. Cast aluminum wheel rim
7 J x 15

Aluminum wheel nuts

When converting from aluminum to steel wheel rims for longer operations (e.g. winter), it is important that correct wheel bolts or nuts for type of wheel rim are used.
In contradiction to this the standard wheel bolts or wheel nuts for aluminum wheel rims can be used for installation of the collapsible spare tire with a steel rim. However, it must be remembered to drive only a short distance with the collapsible tire and not to exceed the top speed limit (see collapsible tire on page 44 - 11).
Wheel bolts of version c, 70 mm long, can only be used for 6 J x 15 aluminum wheel rims (4-hole wheel). On these cars the collapsible tire will have to be mounted with wheel bolts of version a or b.
Additional wheel bolts for the collapsible tire are supplied in cars leaving the plant with 4-hole aluminum wheel rims 6 J x 15 (optional for 924, standard for 924 Turbo up to end of 1980 models).

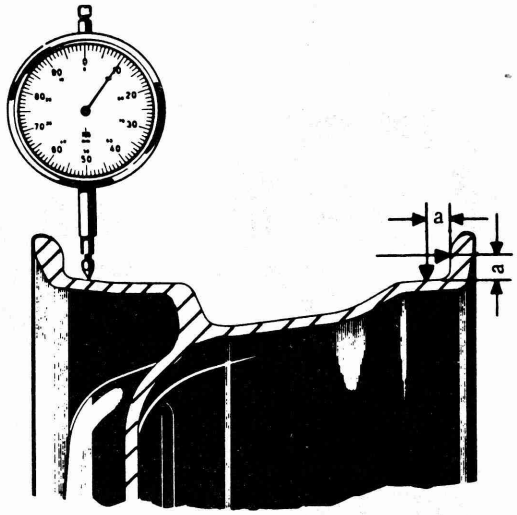
CHECKING WHEEL RIMS

Refer to drawing for lateral and radial runout measuring points on inside of rim.

Max. permissible lateral and radial runout on steel rims = 1.25 mm

Max. permissible lateral and radial runout on aluminum rims = 1.0 mm

Max. permissible lateral and radial runout for rim + tire = 1.25 mm
Also refer to page 44 - 8.



Distance "a" = 8 mm

Note

Damaged rims should never be straightened.

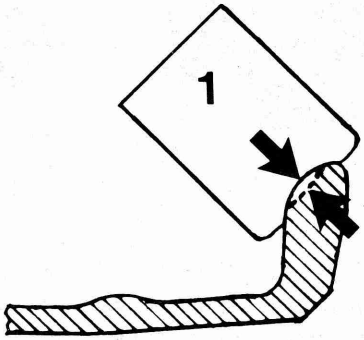
Check flanges of aluminum wheel rims for wear. The inside rim flange is more subject to wear. Check wear with standard 8 or 10 mm radius gauge. First break sharp edges and remove burrs. Wear limit = 1 mm. If necessary replace wheel rim.

Checking Rim Flange Contour

——— New condition
- - - - - - - - Worn condition
➔ ➔ Max. wear = 1 mm
1 Radius gauge

8 mm radius gauge for wheel rim versions VII and VIII (page 44 - 5)

10 mm radius gauge for wheel rim versions II, III, V, VI (page 44 - 4 and 44 - 5)

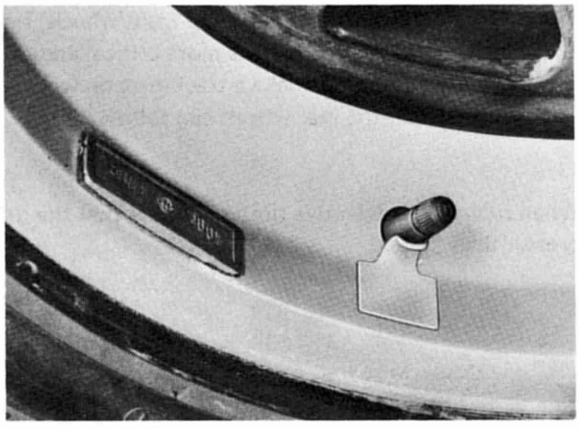


GENERAL TIRE MOUNTING INFORMATION

Always also use new rubber valve stems each time tires are replaced!

"Tubeless" tires should not be repaired and only fitted with tubes in emergency situations. Tubes are not available for series 50 and 55 tires!

The 7" and 8" Porsche wheel rims must be fitted with valve supports, Part No. 911 361. 561.01, to avoid excessive alternating loads on rubber valve stem due to the designed location of the valve bore.



Check the sealing surface of tire and wheel rim for cleanliness as well as damage when mounting tubeless tires. In conjunction with this matter it is important to know that the bead base of a tubeless tire takes care of sealing. Air could escape when driving fast in tight bends were the bead wall used for sealing.

Check flange of aluminum wheel rims for wear (see page 44 - 6).

It is essential to coat tire beads with assembly lubricant when mounting. If applicable, match tires (see page 44 - 8).

Inflate tubeless tires to approx. 4 bar (60 psi) after mounting without valve core, to guarantee correct fit on rim. With 3.3 bar (48 psi) at the latest the tire bead coming from the wheel well base must spring over the hump of the rim shoulder to avoid breakage of the bead core. Screw in valve core and correct tire inflation pressure to specified value.

The maximum permissible radial and lateral runout of a wheel (tire + rim) is 1.25 mm (0.049 in.).
If necessary, reposition tire on rim by 180° (uncontrolled matching) to reach an acceptable value.
Controlled matching: matching highest point of rim with green dot on side wall of tire.
The highest point of a rim must be measured. However, in some cases this will be indicated by a recess or punch mark in the rim well base as well as a red dot pasted on the outside on new wheel rims.

New tires should be mounted on the front wheels, since
1. the stability of the rear axle is more critical and
2. the front wheels must make a track first on wet roads, in which the rear wheels can follow.

When replacing a defective tire, make sure that the difference in tread depth of tires on one axle is not greater than 30 %.

BALANCING WHEELS

General Information

Excessive wheel imbalance is not only the cause for vibration and steering wheel shake, but also excessive wear on wheel bearings, suspension joints and steering linkage.
Radial ply tires will react very sensitively to even slight residual imbalance because of their elastic side walls. Consequently extreme care and observance of the following information is important.
Balance wheels on a stationary balancing machine with suitable clamping provisions. It might be necessary to fine balance the front wheels on the car afterwards with a finish balancer, since possible residual imbalance of brake discs, wheel hubs as well as clamping error will not be considered in stationary balancing. Refer to the operating instructions supplied with the pertinent balancing machine for balancing procedures.

Balancing Information

- Joint and wheel bearing play must be correct.
- Old balance weights (adhesion no longer guaranteed), stones in treads and large pieces of dirt must be removed.
- Check radial and lateral runout of wheels without flat spots with a standard tester (see page 44 - 6 for specifications).

The imbalance caused by excessive radial and/or lateral runout can no longer be correctly eliminated by installation of balance weights.

Match (rotate tire on rim) when radial runout is excessiv
If this does not help, true (grind/cut) tire treads over entire surface.
This measure can only be performed when tread depth is sufficient due to the shortened service life.
Do not have hot tires cool off while resting on floor, but instead lift car to avoid flat spots and consequently incorrect test results.
Flat spots can be eliminated on a special machine or by running the tires until hot again (flexing of tires). Never match or true tires with flat spots!

- Never mount wheels off - center. Make sure of correct centering on both the balancing machine and car.

- Use adhesive weights or clip weights depending on wheel rim version.

  Adhesive weights for version II, VII, VIII
  (see page 44 - 4 and 44 - 5).

  Clip weights for version I, III, IV, V, VI
  (see page 44 - 4 and 44 - 5).

- Max. permissible dynamic and static imbalance 5 grams.

- Only install adhesive weights up to max. 40 g on 14" aluminum wheel rims (version II), due to limited space to tie rod end. Use 2 weights if necessary.

- The total weight of balance weights mounted per rim flange is max. 80 g.

- Never install weights in area of valve for version II.

- A wheel, which was balanced again with a finish balancer, must be remounted in the same position to the wheel hub or brake disc as before removal.

Adhesive Weight Installation Information

- Determine exact position of balance weights (temporarily hold balance weight with adhesive tape until correct location is determined).

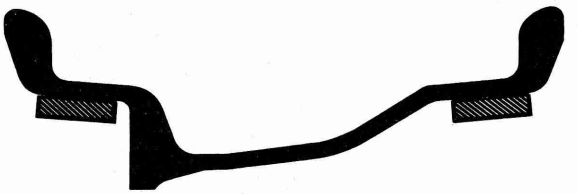
- Clean rim surface where weight will sit. Adhesive surface must be absolutely clean and free of grease.

- Pull paper off of weight 's adhesive surface and press weight on firmly.

Note

Since part of the adhesive strength will be lost when weight is left uncovered, pull paper off just before installing weight.

- The adhesive weight must be located exactly on the flat ring surface of the rim. It must rest evenly and contact on entire weight surface.



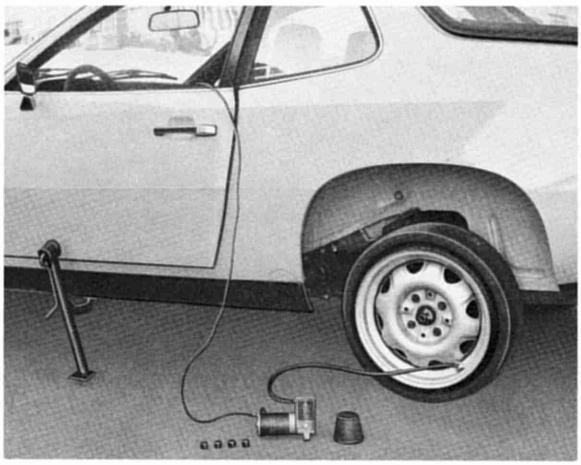
- Check tight fit of balance weight. A newly installed adhesive weight should not come loose by wheel rotation or side loads.

COLLAPSIBLE SPARE TIRE / WHEEL 924, 944, 924 Turbo

Steel rim 5 1/2 J x 14 with collapsible tire 165/14
(B 78 - 14 SST) 4 mounting holes
Steel rim 5 1/2 J x 15 with collapsible tire 165/15
5 mounting holes

If car has a collapsible spare tire/wheel, this spare (emergency) wheel can be used on the front or rear axle. This wheel can be mounted on a car with bolts or nuts for aluminum wheel rims in addition to wheel bolts or nuts for steel wheel rims.
In the case of 4-hole aluminum wheel rims 6 J x 15 with 70 mm long wheel bolts the collapsible tire/wheel requires 25 or 25.5 mm long wheel bolts.
Cars leaving the plant with such aluminum wheel rims are supplied with short wheel bolts for the collapsible tire/wheel.

The collapsible spare tire wheel is inflated to the specified pressure of 2.2 bar (32 psi) with an electric compressor after installation on the car.



The tubeless tire will return to its original flat shape when releasing the air.
Collapsible tire/wheels cannot be repaired or mounted with conventional workshop equipment. Only the manufacturer should carry out work on a collapsible tire/wheel.

The collapsible tire/wheel is only meant for use in an emergency situation and should not be used on car for a long time. The top permissible speed for cars up to 1980 models with this wheel is 50 mph (80 km/h).

BRAKES - MECHANICAL

SPECIFICATIONS

Description	Dimension	Wear Limit
Service (foot) brakes	Hydraulic dual-circuit diagonal brake system, brake booster, front axle with floating caliper disc brakes, rear axle with drum brakes	
Parking (hand) brake	Mechanical action on both rear wheels	
Brake disc dia.	257 mm	
Effective brake disc dia.	210 mm	
New brake disc thickness	13 mm	
Min. thickness after mach. *)	12 mm	11.5 mm
Eff. total brake disc area	470 cm^2	
Pad area of each front wheel	65 cm^2	
Lining area of each rear wheel	170 cm^2	
Caliper piston dia.	48 mm	
Front pad thickness	14 mm	2.0 mm
Brake drum dia.	230 mm	
Min. dia. after machining **)	231 mm	231.5 mm
Brake shoe width	38.6 mm	
Brake lining thickness	3.8 - 4.0 mm	2.5 mm
Oversize lining thickness	4.3 - 4.5 mm	2.5 mm
Rear wheel brake cylinder piston diameter	19.05 mm	
Master cylinder dia. (through 1979 model)	20.64 mm	
(from 1980 model)	23.81 mm	
Brake pressure booster (through 1979 model)	7 inch	
(from 1980 model)	9 inch	

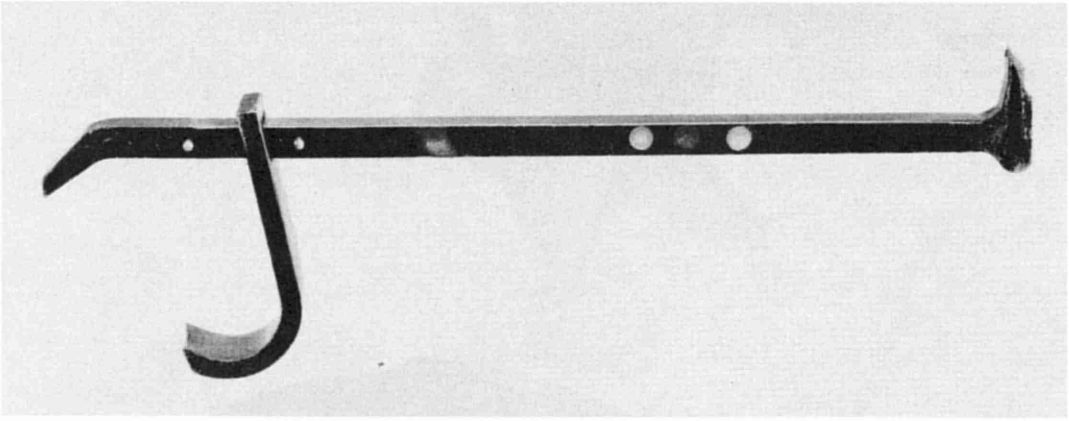
*) Only machine brake discs symmetrically, i.e. same amount off both sides

**) Use oversize brake linings

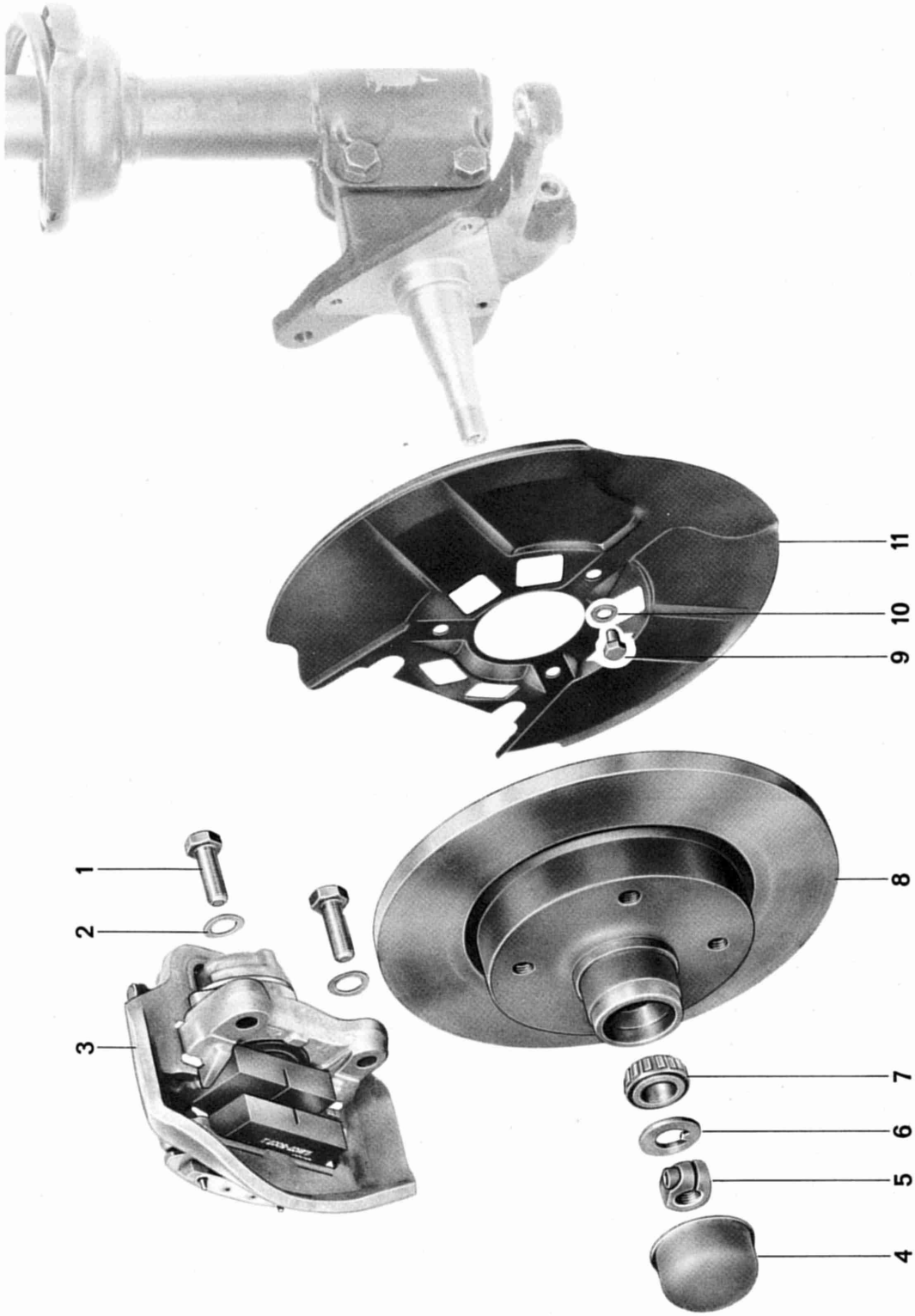
TORQUE SPECIFICATIONS FOR BRAKES, MECHANICAL

Location	Description	Threads	Material	Torque Nm	ft lb
Clamp bolt/wheel bearing adjusting nut	Socket head bolt	M 7	10.9	13 - 16	9-11
Caliper to steering knuckle	Bolt	M 12 x 1.5	8.8	85	60
Guard to steering knuckle	Bolt	M 7	8.8	10	7
Brake drum to rear wheel shaft	Castle nut	M 24 x 1.5	8.8	300 - 400	217 -289
Cable holder to brake backing plate	Bolt	M 8	8.8	21	15
Brake cylinder to brake backing plate	Bolt	M 8	8.8	21	15
Bearing cap to steering knuckle	Bolt	M 10	34 Cr 4	58	42
Parking brake lever to body	Bolt	M 8	8.8	21	15
Brake cable to yoke	Bolt	M 6	8.8	8.5	6
Parking brake cable to lock	Nut	M 6	8	8.5	6

TOOLS



No.	Description	Special Tool	Remarks
1	Lever	VW 637/2	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No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Hex nut	2		Torque to specifications	
2	Washer	2		Replace if necessary	
3	Floating caliper	1	Fasten to suitable point with wire. Only detach brake hose for repairs		
4	Hub cap	1	Press off alternately with VW 637/2		
5	Clamping nut with Allen head bolt	1	Loosen bolt and unscrew nut. Left-left-hand threads. Right-right-hand threads	Adjust wheel bearing play. Pressure disc must move under finger pressure on a screwdriver without leverage. After adjustments torque socket head bolt to specifications	
6	Thrust washer	1			
7	Wheel bearing, outer	1		Check and replace if necessary	
8	Brake disc	1		Check for wear and damage. Fill hub cavity with approx. 30 grams of high pressure grease	
9	Bolt	3		Torque to specifications	
10	Washer	3		Replace if necessary	
11	Guard	1			

DISASSEMBLING AND ASSEMBLING FRONT WHEEL BRAKES

Disassembling

1. Pry off hub cap alternately with VW 637/2.

Assembling

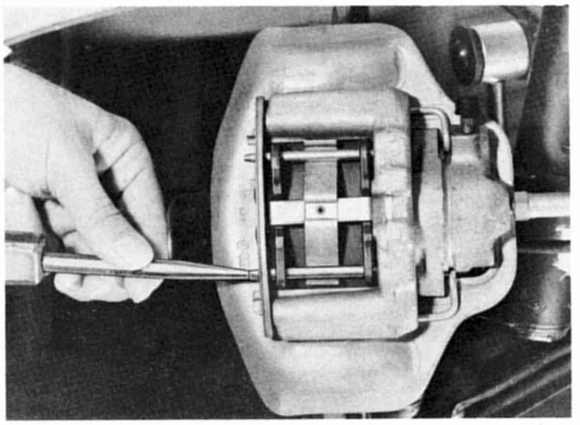
1. Adjust wheel bearing play. The wheel bearing play adjustment is correct when the pressure disc can be moved under finger pressure on a screwdriver (never with turning or leverage action) - see figure. Before adjusting, tighten clamping nut to seat bearing.

REMOVING AND INSTALLING FRONT BRAKE PADS

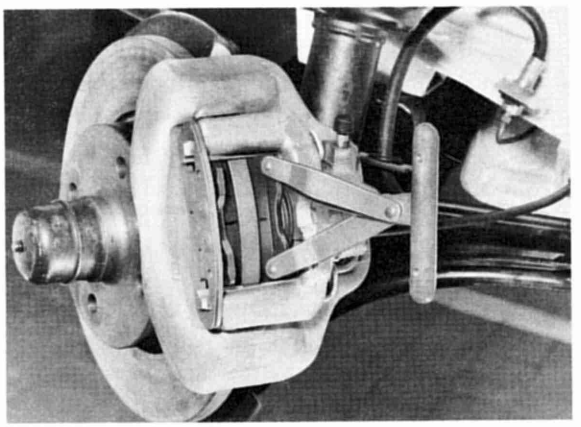
Removing

If the brake pads can be used again they must be marked for the housing half to which they belong. It is not permitted to move the pads from inboard to outboard position and vice versa or from the left to the right wheel and vice versa to avoid uneven braking.

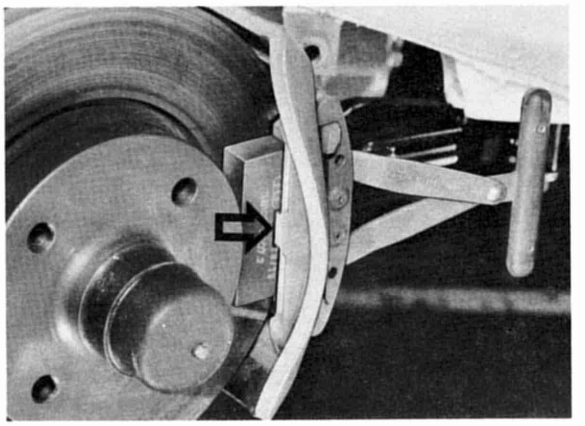
1. Drive out brake pad retaining pins with a drift.



2. Pull out inboard brake pad with a hook.



3. Pull out outboard brake pad.
   The outboard brake pad is guided by a tab on the floating caliper frame. Press out this frame to pull out the pad.

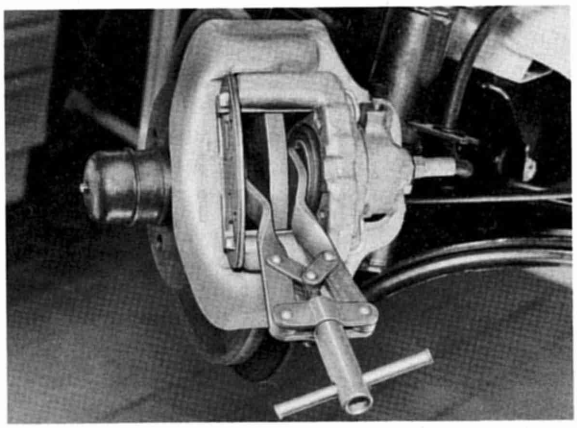


Installing

1. Replace oil splattered brake pads or pads showing deep cracks as well as loose pads.

   In this case all four pads must be exchanged with new pads.

2. Press piston back to basic position with a piston returning device.



Important

Some brake fluid must be drawn out of the brake fluid tank to avoid spilling the fluid when pressing back the piston. A siphon reserved exclusively for brake fluids is used for this purpose. Brake fluid is poisonous and must never be sucked out with a hose.

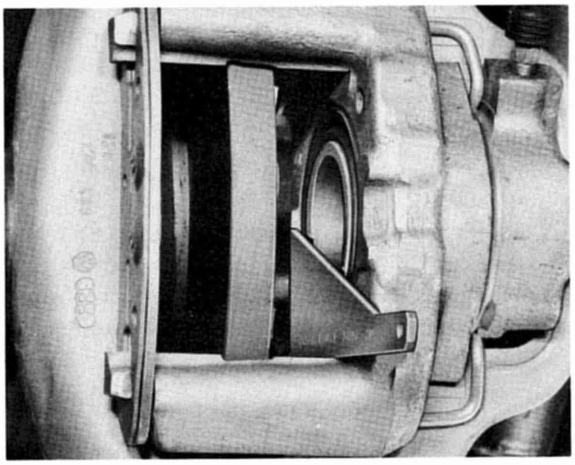
3. Clean brake pad seats and sliding surfaces in the brake caliper.

Important

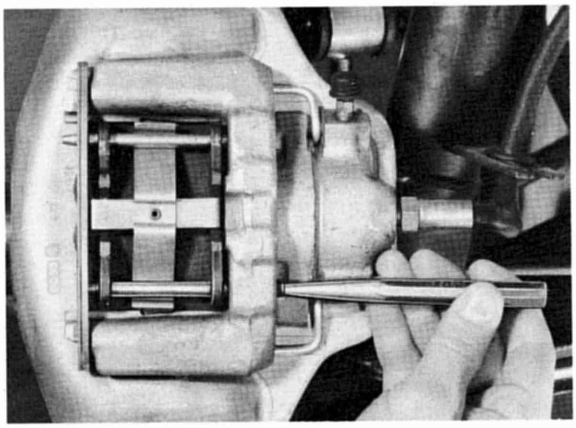
Only clean with spirits - never use cleaning solutions containing mineral oils.

4. Check 20^{o} piston position.
Hold piston gauge against lower sliding surface in brake caliper.

If necessary adjust piston with special pliers.



5. Install brake pads, new cross springs and new retaining pins, which must be driven in up to stop.



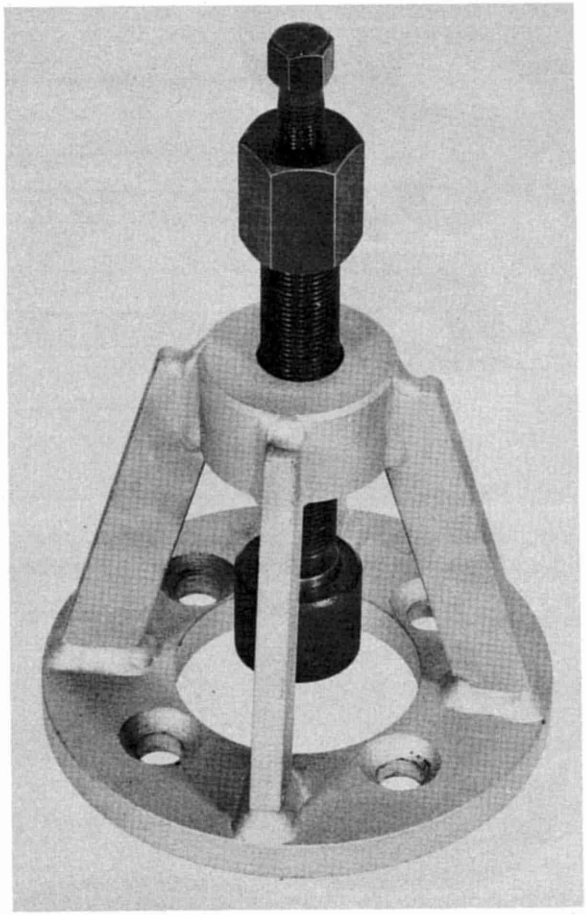
Important

Depress brake pedal firmly several times to move the brake pads into their normal operating position. Then check the brake fluid level in tank, adding more fluid if necessary.

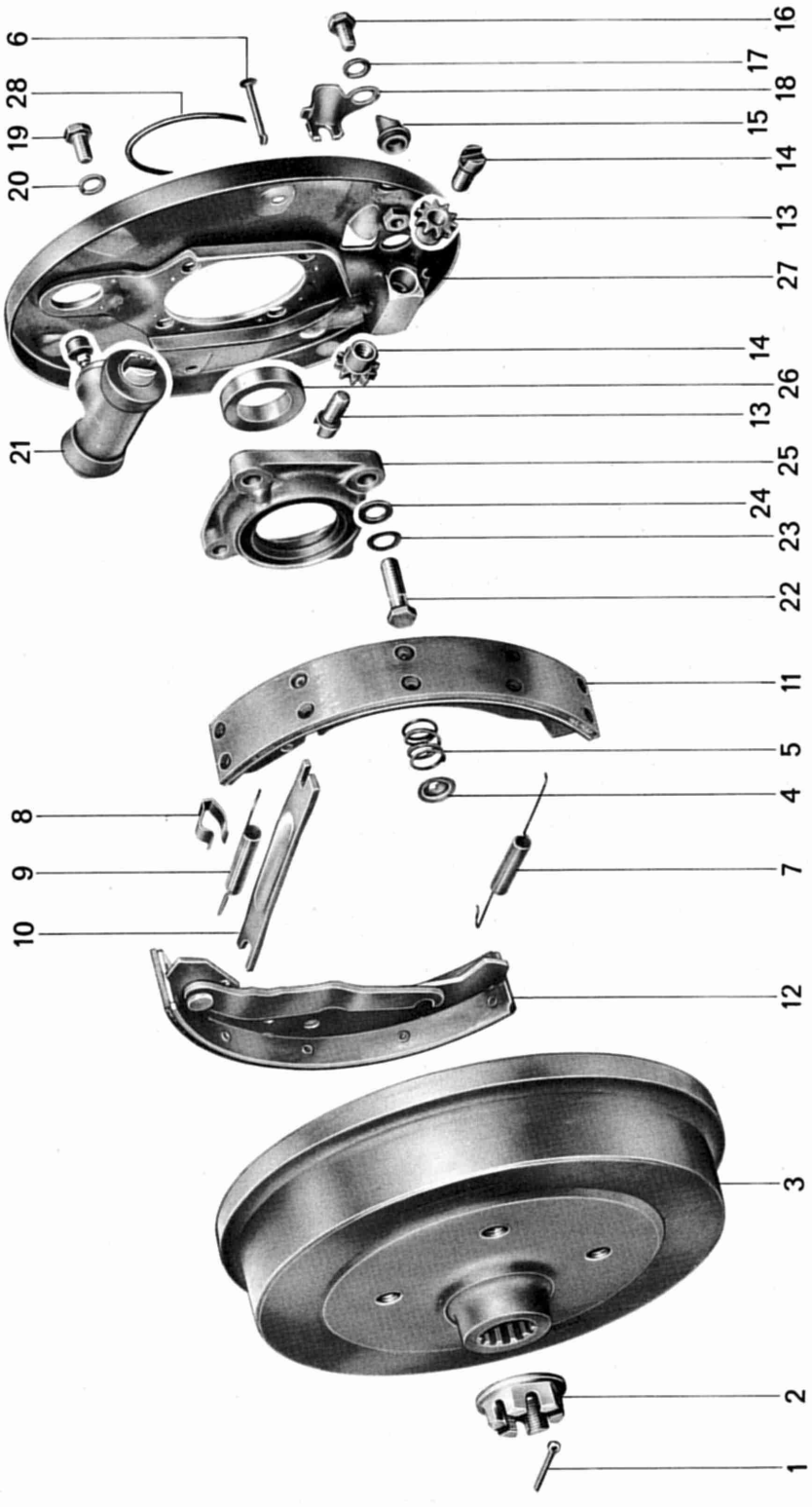
Breaking In Brake Pads

New brake pads do not have full efficiency until a break-in period of approximately 120 mi. (200 km). During this period the brakes should only be fully applied at high speeds in emergency cases. New pads must be broken in with average pedal pressure and at large intervals of time.

TOOLS



No.	Description	Special Tool	Remarks
1	Brake drum extractor	40 - 107	Standard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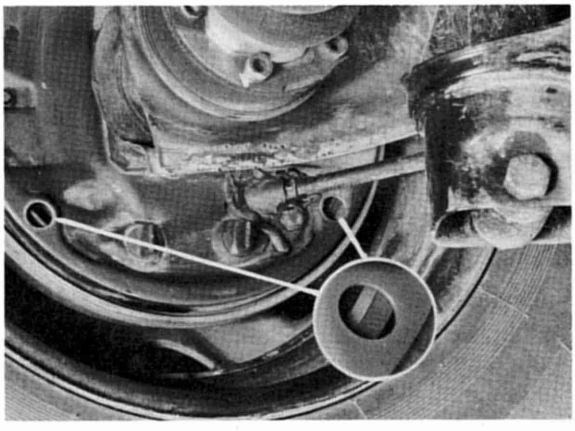
No.	Description	Qty.	Removing	Installing	Special Instructions
1	Cotter pin	1		Replace	
2	Castle nut	1	Car must be on its own wheels for loosening	Car must be on its own wheels for tightening. Lock with new cotter pin.	
3	Brake drum	1	Loosen brake adjusters. Remove with extractor.	Check for wear and damage, replace if necessary.	
4	Spring retainer	2		Check for proper fit	
5	Spring	2			
6	Pin	2			
7	Return spring	1			
8	Clip	1			
9	Return spring	1			
10	Pressure rod	1			
11	Brake shoe	1		Check brake linings for wear, replace if necessary (entire axle only). New liner thickness 3.8 - 4.0 mm; wear limit 2.5 mm.	
12	Brake lever	1		Position brake lever correctly. Check brake lining for wear, replace if necessary (entire axle only). New lining thickness 3.8-4.0 mm; wear limit 2.5 mm	
13	Adjusting screw	2			
14	Adjusting nut	2			
15	Plug	4			

No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
16	Bolt	1		Torque to specifications	
17	Lockwasher	1		Replace if necessary	
18	Holder	1			
19	Bolt	1		Torque to specifications	
20	Lockwasher	1		Replace if necessary	
21	Wheel brake cylinder	1		Check for leaks, replace if necessary	
22	Bolt	4		Torque to specifications	
23	Washer	4		Replace if necessary	
24	Plain washer	4			
25	Cover	1			
26	Spacer	1			
27	Brake carrier	1			
28	Seal	1		Replace	



Checking Brake Lining Thickness

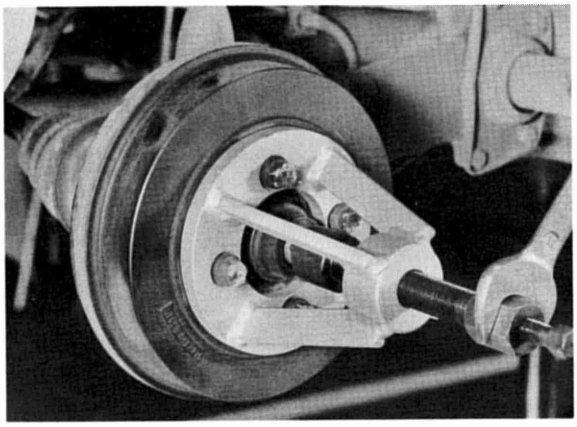
Check brake lining wear through inspection hole in brake carrier.

New lining thickness: 3.8 to 4.0 mm (0.15-0.16 in.)
Wear limit: 2.5 mm (0.1 in.)

DISASSEMBLING AND ASSEMBLING REAR WHEEL BRAKES

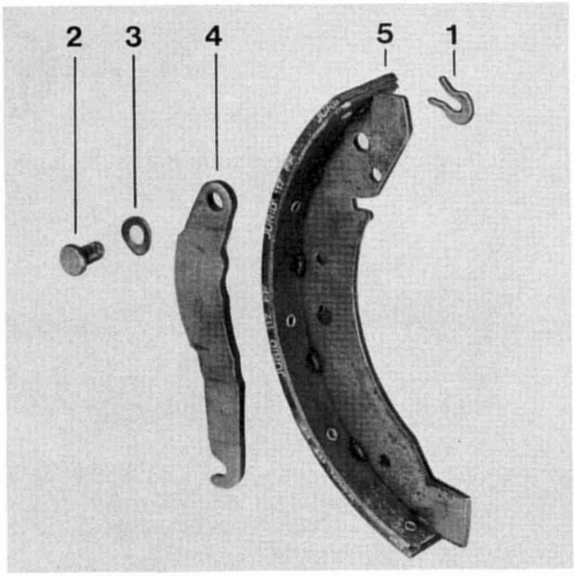
Disassembling

1. Pull brake drum off axle shaft spline with a standard extractor.

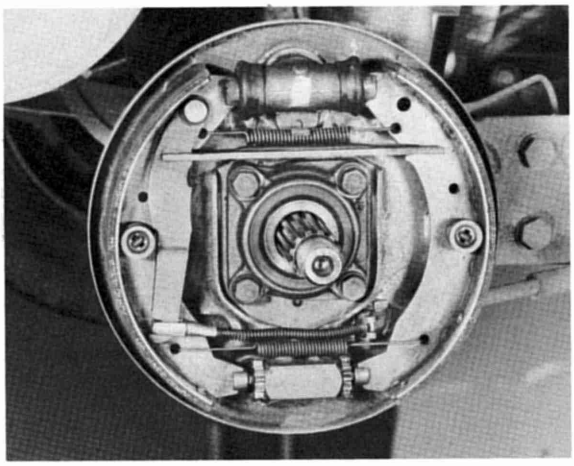


Assembling

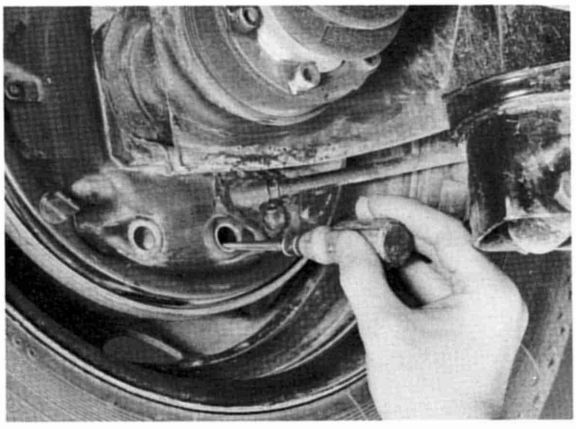
1. Mount brake lever in proper position with a new bearing pin.

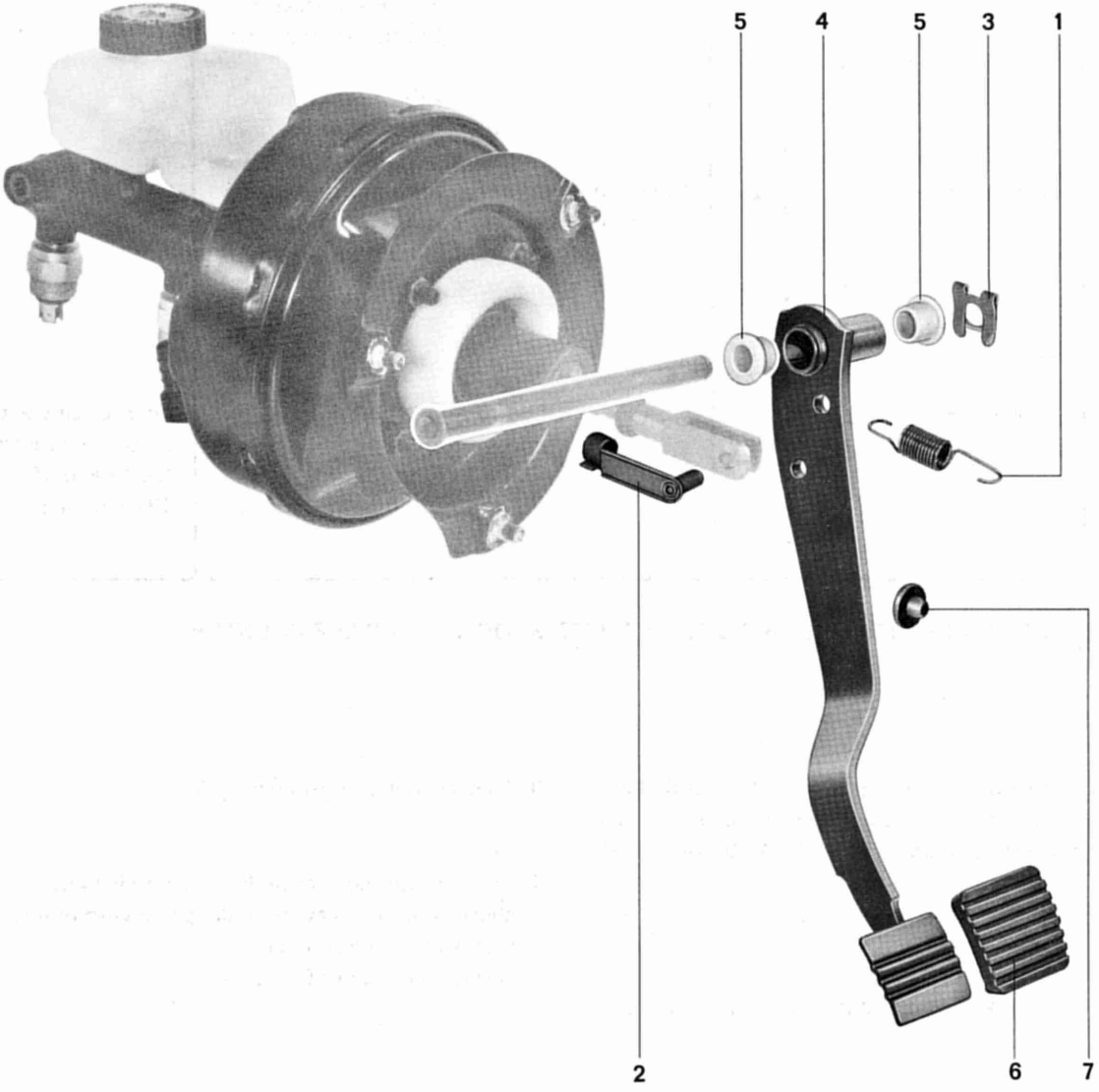


2. Install adjusting screws, brake shoes, return springs and pressure rod. Lubricate adjusting screws and sliding surfaces of brake shoes slightly.



3. Adjust brake shoes. Adjust the adjusting pinion until the brake shoes rest against the brake drum. Then turn back until the wheel can be rotated freely by hand.

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No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Return spring	1			
2	Lock pin	1			
3	Lock	1		Replace if necessary. Check for proper fit.	
4	Brake pedal	1		Adjust brake push rod if necessary	
5	Bearing sleeve	2	Knock out with correct size mandrel	Press in between vise jaws up to stop; lubricate bearings slightly	
6	Cap	1			
7	Rubber pad	1			only for cars with 7" brake booster (up to end of 1979 models)

ADJUSTING BRAKE PUSH ROD UP TO END OF 1979 MODELS (7" BRAKE BOOSTER)

Note

Push rod must be attached in rest position of brake pedal (no braking force being transmitted) since the permanently set clearances in the brake booster must not be altered.

1. Pull back brake pedal against stop on rubber pad.

2. Loosen lock nut on swivel joint and adjust push rod until lock pin (no. 2 in drawing) can be mounted without tension.

3. Tighten lock nut on swivel joint.

4. To guarantee correct brake booster clearances, check push rod play on brake pedal with brakes bled and engine stopped.
It should be about 6 to 8 mm.

ADJUSTING BRAKE PUSH ROD FROM 1980 MODELS (9" BRAKE BOOSTER)

Note

Brake push rod need only be adjusted when

- brake booster was replaced,
- swivel joint of brake push rod was detached and
- push rod or swivel joint had been turned.

The brake pedal does not have a stop. Its initial position is reached when the brake booster (brake booster + master cylinder) is in released position. The set clearances in the brake booster are guaranteed since there is no support for the brake pedal in initial position when brake push rod adjustment is correct. A push rod play of about 10 mm will be noticed on the brake pedal with the engine stopped and brakes bled.

Adjusting

1. Adjust length of brake push rod by turning the swivel joint.
   Length from bearing surface of brake booster on connector (mounting part) to center of swivel joint shaft pin must be 186 $\pm$ 1 mm.

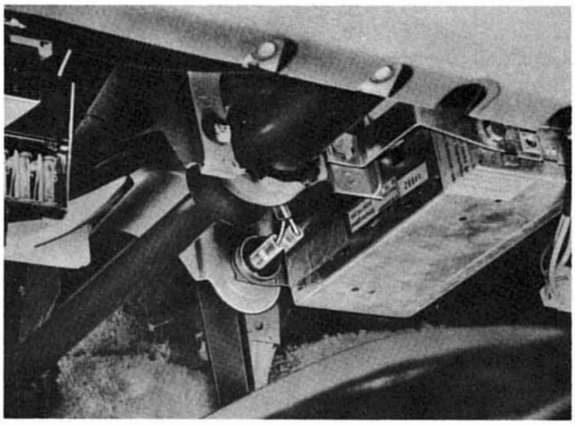
2. Tighten lock nut.

3. Check stop light switch adjustment on cars with a mechanically operated stop light switch (from 1981 models).

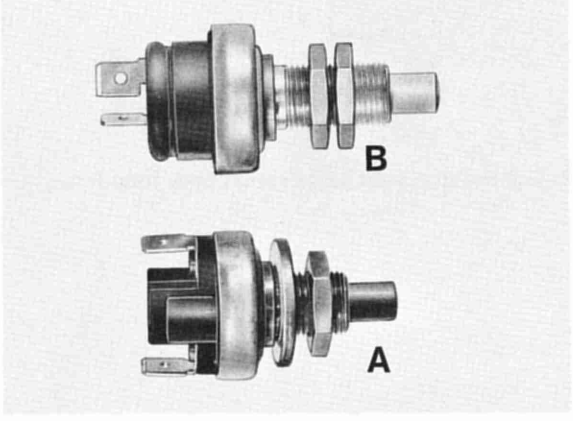
CHECKING STOP LIGHT SWITCH ADJUSTMENT (FROM 1981 MODELS)

Note

The stop light switch is operated mechanically and located on a bracket above the brake pedal.

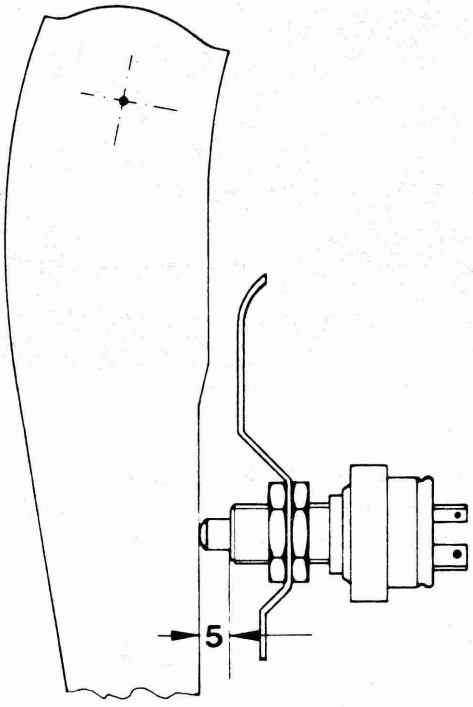


Since the beginning of 1981 models stop light switches of version A (short threads) have been installed, which were replaced by version B (long threads and two lock nuts).

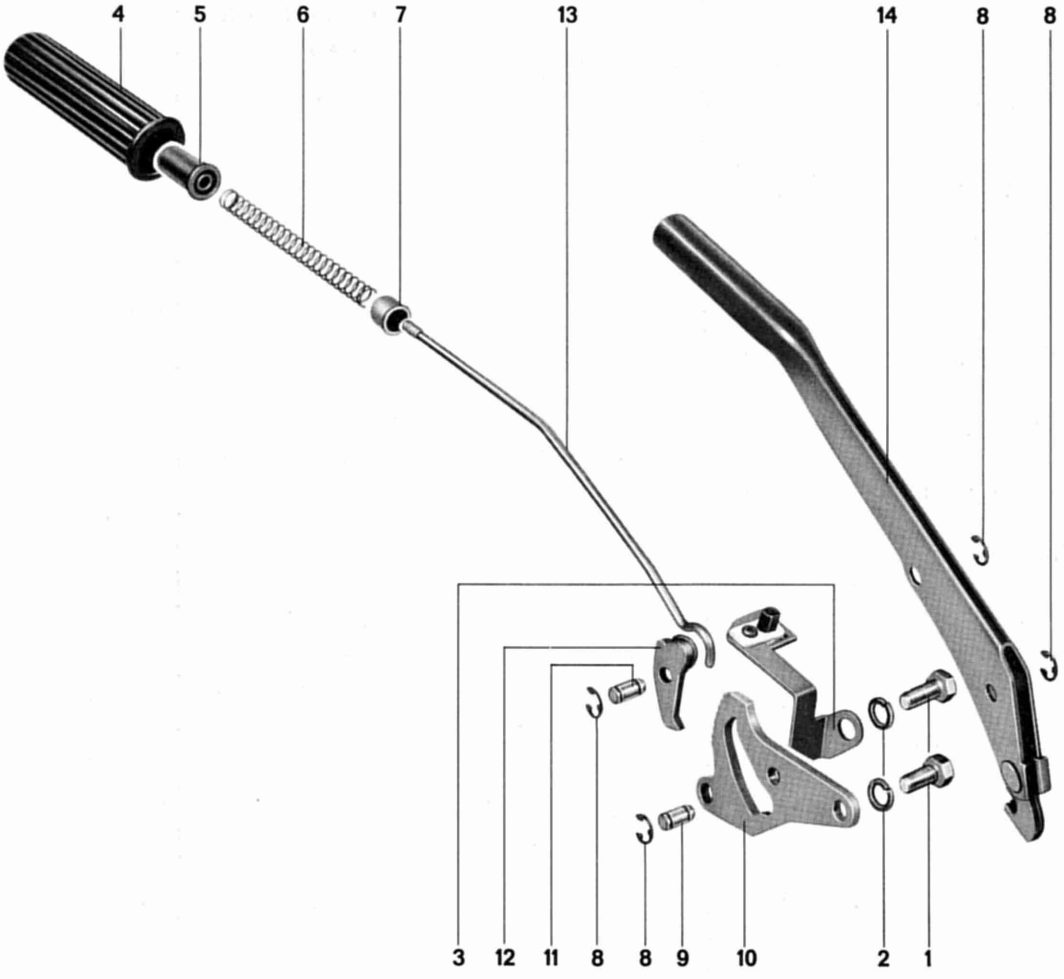


Adjusting

1. The distance between stop light switch and brake pedal, when brake pedal is in initial (off) position, should be 5 mm.
   If necessary change location of stop light switch until specified 5 mm distance is reached.



2. Tighten stop light switch and check function.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No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Bolt	2		Tighten to specified torque	
2	Lock washer	2		Replace if necessary	
3	Holder with contact switch	1		Switch must operate before 1st tooth catches, bend holder if necessary	
4	Grip	1			
5	Press button	1			
6	Pawl spring	1			
7	Key	1			
8	Lock washer	4			
9	Bearing pin	1			
10	Toothed segment	1			
11	Bearing pin	1			
12	Pawl	1			
13	Pawl rod	1			
14	Parking brake lever	1			

DISASSEMBLING AND ASSEMBLING PARKING BRAKE LEVER

Disassembling

Loosen mounting screws and take out entire parking brake lever.

Assembling

Note

Apply a multi-purpose grease to all sliding and bearing surfaces.

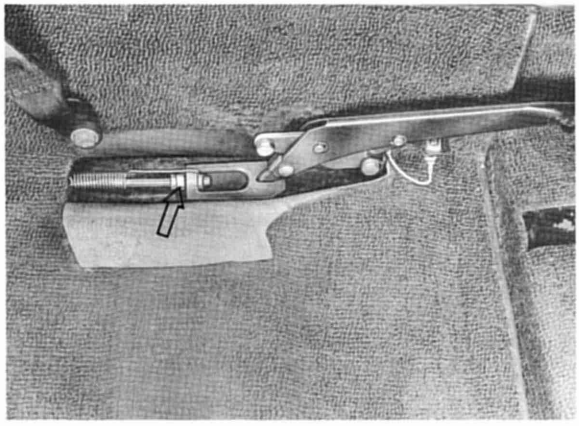
Install parking brake lever and check operation of contact switch. It must respond before the first catch. Adjust by bending holder if necessary.

Adjusting Parking Brake

1. Adjust service brake (see page 46-11).

2. Pull parking brake lever by two teeth.

3. Tighten adjusting nut until both wheels can just barely be turned by hand.



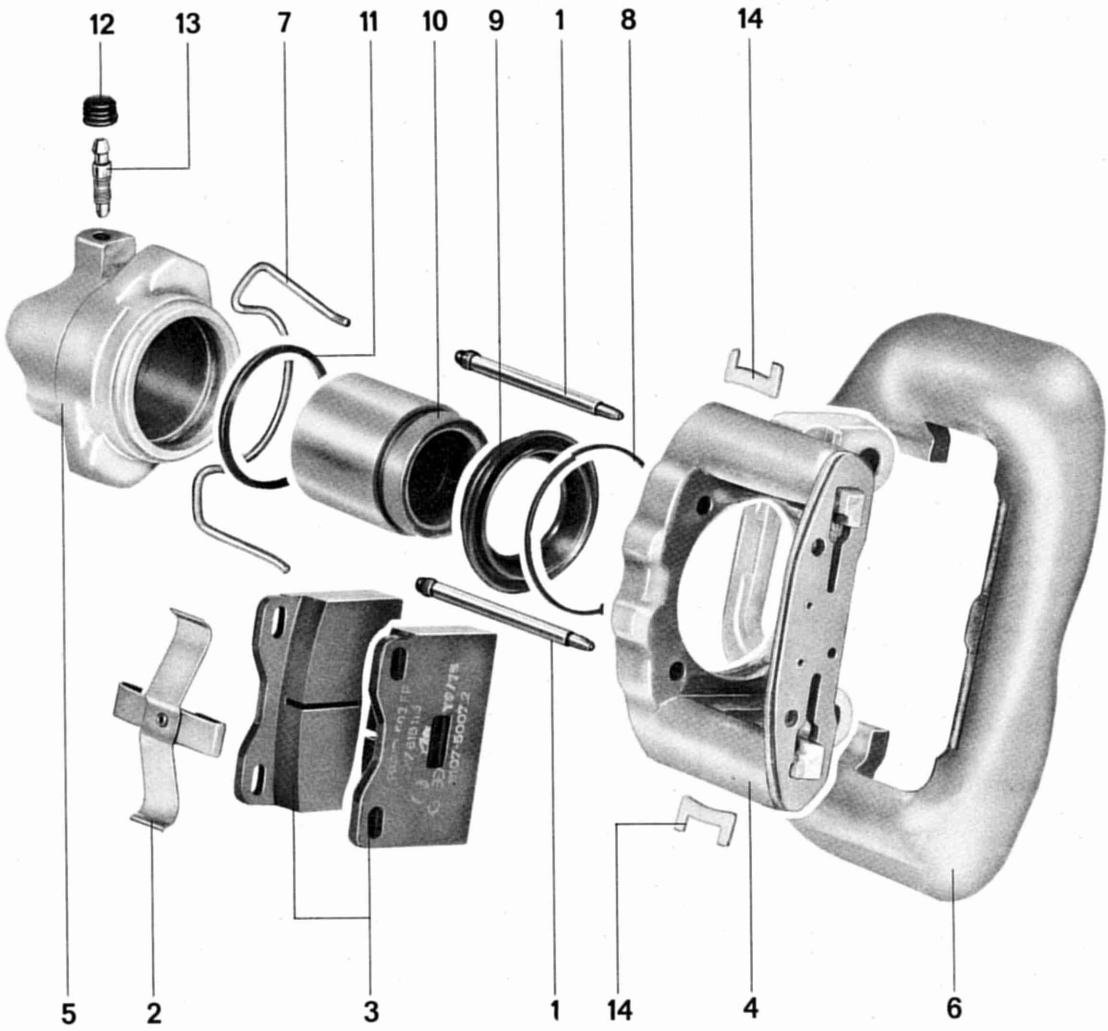
4. Release parking brake lever and check whether both wheels turn freely.

5. Tighten locknut.

BRAKES - HYDRAULICS

TORQUE SPECIFICATIONS FOR BRAKE HYDRAULIC COMPONENTS

Location	Description	Threads	Material	Torque	
				mkg	ft lb
Brake pressure line to Tandem master cylinder, brake hose and distributor	Pipe connection nut	M 10 x 1	9 S 20 K	1.4	10
Brake pressure line to wheel brake cylinder	Pipe connection nut	M 10 x 1	9 S 20 K	1.2	9
Bleeder screw to caliper	Bleeder screw	M 7	9 SMnPb 23K	0.4	3
Bleeder screw to wheel brake cylinder	Bleeder screw	M 6	9 SMnPb 23K	0.4	3
Hose to caliper	Brake hose	M 10 x 1	9 S 20 k	1.2	9
Stop light switch to Tandem master cylinder	Stop light switch	M 10 x 1 short taper DIN 158	CuZn40F42	2-3	14-22
Tandem master cylinder to brake pressure booster	Nut	M 8	8	1.3	9
Brake pressure booster to console	Nut	M 8	8	2.1	15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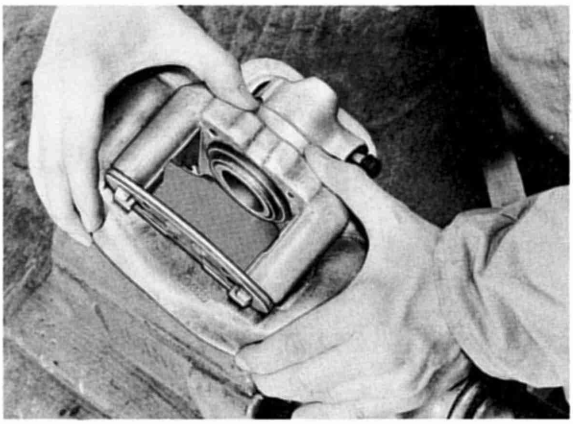
No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Retaining pin	2			
2	Cross spring	1			
3	Brake pads	2	Mark for reinstallation if applicable	Check, replace if necessary. Wear limit 2 mm. It is best to install pads after installation of caliper	
4	Mounting frame	1		Check slides for proper fit	
5	Brake cylinder	1	Drive off of caliper frame with soft mandrel. Place piece of wood in caliper frame.		
6	Caliper frame	1			
7	Guide spring	1			
8	Clamp	1		Check for proper fit	
9	Cap	1		Replace	
10	Piston	1	Press out of cylinder with compressed air. Support piston on piece of wood. Danger!	Install with brake cylinder paste. Adjust piston position with gauge.	
11	Seal	1	Remove with plastic rod	Replace, install with brake cylinder paste.	
12	Dust cap	1			
13	Bleeder screw	1			
14	Slide	2		Replace if necessary	

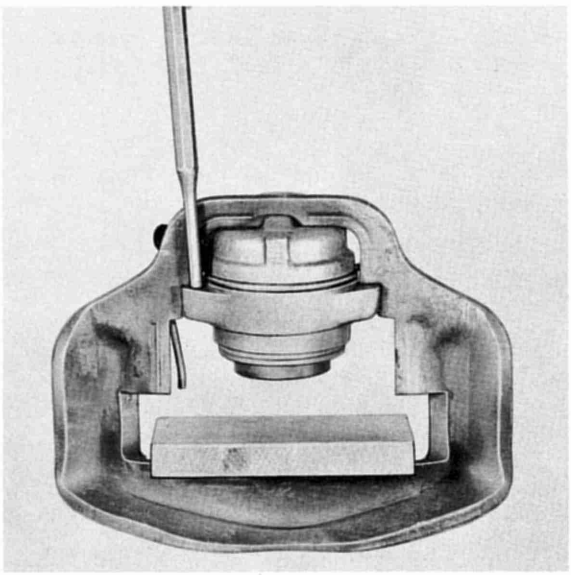
DISASSEMBLING AND ASSEMBLING BRAKE CALIPER

Disassembling

1. Press mounting frame off of caliper frame.



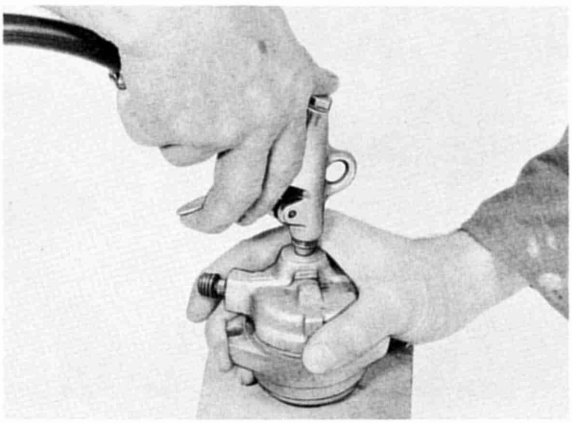
2. Drive brake cylinder off of caliper frame with a soft mandrel at different points all around. Place a piece of wood in caliper frame.



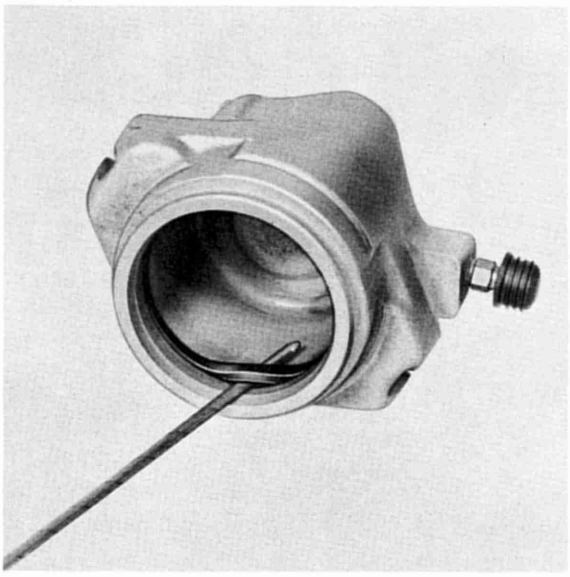
3. Press piston out of cylinder with compressed air.

WARNING

Support piston on piece of wood.

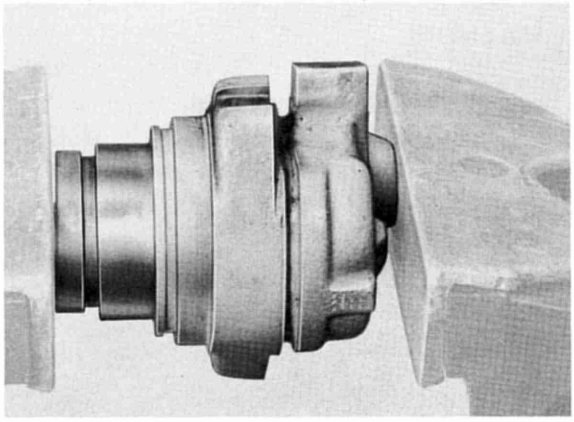


4. Remove seal with plastic rod.

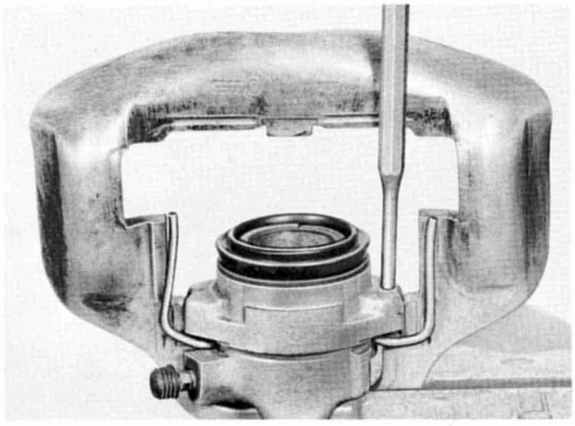


Assembling

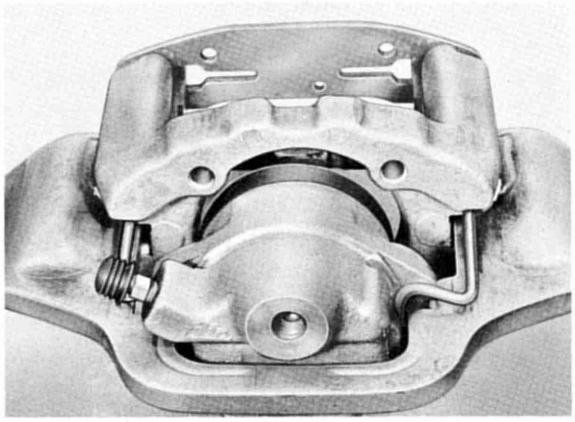
1. Apply thin coat of brake cylinder paste to piston and press it into cylinder.



2. Drive brake cylinder on to caliper frame with guide spring. Soft mandrel applied at points all around.



3. Install mounting frame. Be careful not do damage slides.



Note

It is best to install brake pads after installation of brake caliper.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No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Nut	2		Tighten to specified torque. Not too tight; Replace brake booster if stay bolts are too tight or damaged	
2	Lock washer	2		Replace if necessary	
3	Brake master cylinder	1		Replace if necessary	
4	Seal	1		Replace	
5	Gasket	1		Replace if necessary	
6	Nut	4		Tighten to specified torque	
7	Lock washer	4		Replace if necessary	
8	Console	1			
9	Brake booster	1		Replace if defect	

Note

Brake master cylinder and brake booster must be from same manufacturer

Checking Brake Pressure Booster

Push on brake pedal several times when engine is stopped. This uses up vacuum in brake booster.

Now hold brake pedal in braking position with medium force on brake pedal and start engine.

If brake pressure booster is functioning properly, the brake pedal will drop slightly (boosting takes place).

Troubleshooting Chart

Problem	Cause	Correction
1 - Pedal force unusually high, no boost	a - Vacuum line connections loose	Tighten connection
	b - Rubber diaphragm leaking	Replace brake booster
	c - Brake master cylinder seal defective	Replace large seal, replace brake master cylinder.
	d - Vacuum check valve in vacuum line defective (closed all the time)	Check function of vacuum check valve. Blow air in valve in direction of arrow. Leaf valve must lift off of its seat. In opposite direction of arrow valve must be tight.
2 - Pedal force becomes very large after a certain pedal position	Push rod piston is scored at one position. Once this position passes the secondary cup, outside air flows into booster via vent bore.	Replace brake master cylinder.
3 - Brake pedal can be depressed to stop without any braking effect - Brake fluid running out at vent bore	Cups leaking	Replace brake master cylinder

BLEEDING BRAKES AND CHANGING BRAKE FLUID

General Information

A pressure bleeder is recommended. The procedures described below were carried out with a unit from Alfred Teves GmbH. Operating instructions are provided with the equipment.

Brake Fluid

Brake fluid is hygroscopic, which means it will absorb moisture from the air. This causes a marked reduction in its boiling point.

Example: When brake fluid has a water content of 2 % the boiling point will drop by about 60° C/ 401° F (SAE J 1703 or DOT 3 specifies a boiling point of at least 205° C for brake fluid).

Contaminated or water-containing brake fluid could cause failure of hydraulic brake system. Never reuse drained brake fluid.

Brake fluid must be replaced at least every 2 years.

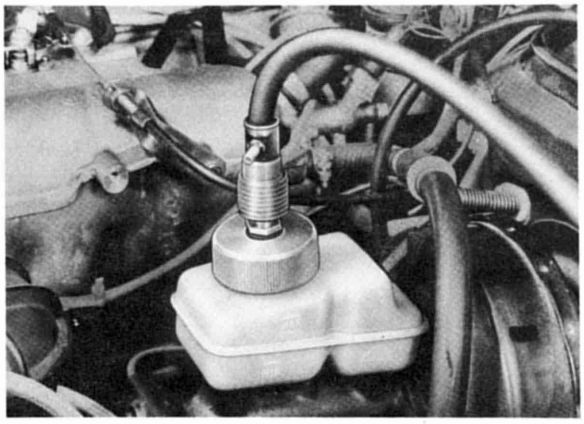
Never store brake fluid in beer, soft drink or other bottles, since there is danger of drinking the fluid unintentionally (approx. 100 cc would be fatal).

Be careful brake fluid does not contact body paint, which would be damaged.

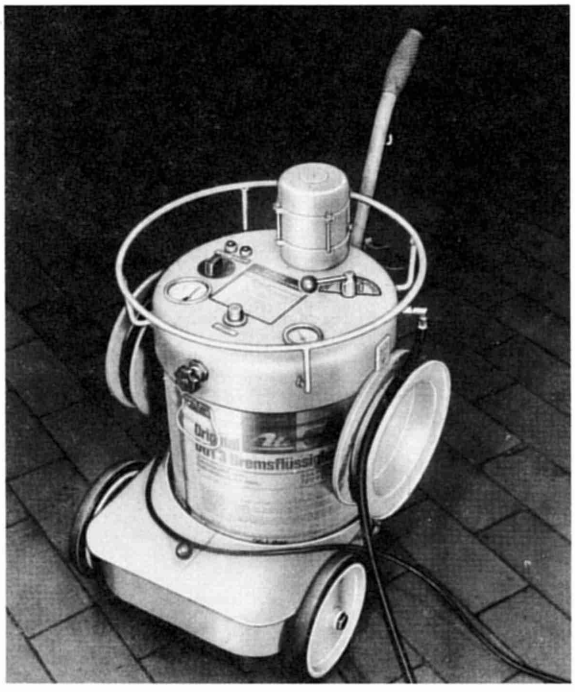
Bleeding Brakes/Changing Brake Fluid

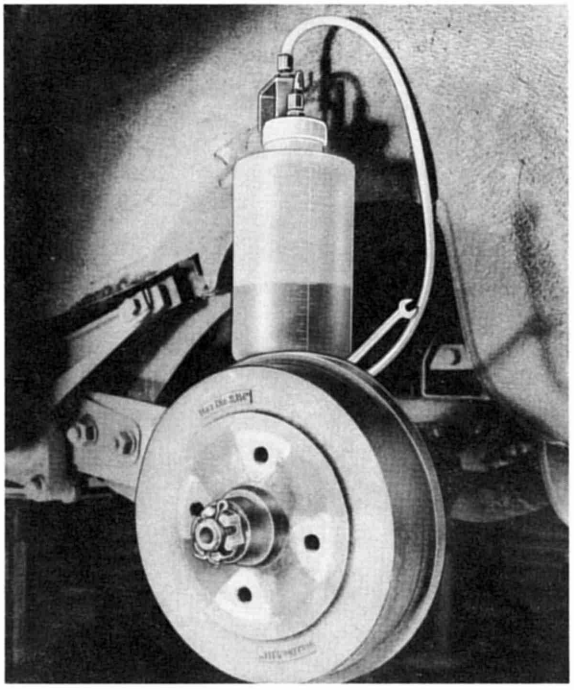
1. Fill tank with brake fluid to upper edge. Remove filter screen.

2. Mount bleeder adapter on brake fluid tank and connect coupling of filler hose on nipple of bleeder adapter.



3. Turn on unit. Move selector levers to filling and bleeding positions.





4. Open each bleeder valve long enough, until clear brake fluid without bubbles escapes. Order of bleeding: 1. rear right, 2. front left, 3. rear left, 4. front right. This is necessary because of diagonal division of brake circuits and since with tandem master brake cylinders bleeding procedures start at the intermediate piston circuit.

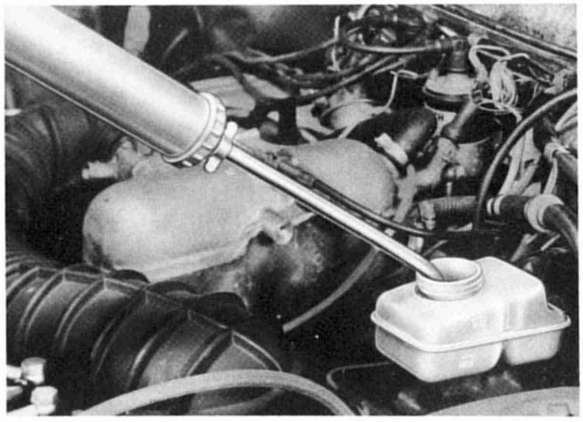
5. Use a special bottle to catch escaping brake fluid and inspect it for cleanliness and bubbles.

6. To be sure of removal of all air bubbles from master cylinders, depress brake pedal several times during bleeding procedures with the bleeder valves open.

7. After completion of bleeding and changing brake fluid it is recommended to make a low pressure leak test. Of course this will require that bleeding adapters and fill hose are connected 100 % tight. All bleeder valves of system must be closed. With the selector lever still at "filling and bleeding", take reading from working pressure gage.

8. Now move selector lever to leak test. Pressure shown on working pressure gauge must not drop for approx. 5 minutes. System has a leak if pressure drops during the testing time.

9. Place dust caps on bleeder valves. Draw off brake fluid exceeding MAX mark on brake fluid tank.
Install filter screen and screw on brake fluid reservoir cap.



STEERING

TECHNICAL DATA

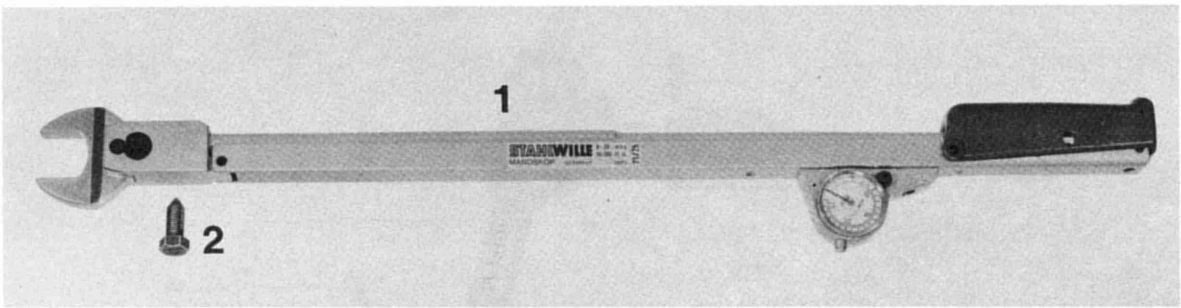
Steering

Steering wheel	2 spokes = 383 mm dia. up to end of 1981 models 3 spokes = 380 mm dia. from 1982 models Optional: 4 spokes = 362 mm dia. 3 spokes = 380 mm dia.
Steering wheel ratio at center	19.15 : 1
Turning circle dia. (wall-to-wall)	10.08 meters (33 ft)
Turning circle dia. (curb-to-curb)	9.21 meters (30.2 ft)
Steering wheel turns from lock to lock	4.02

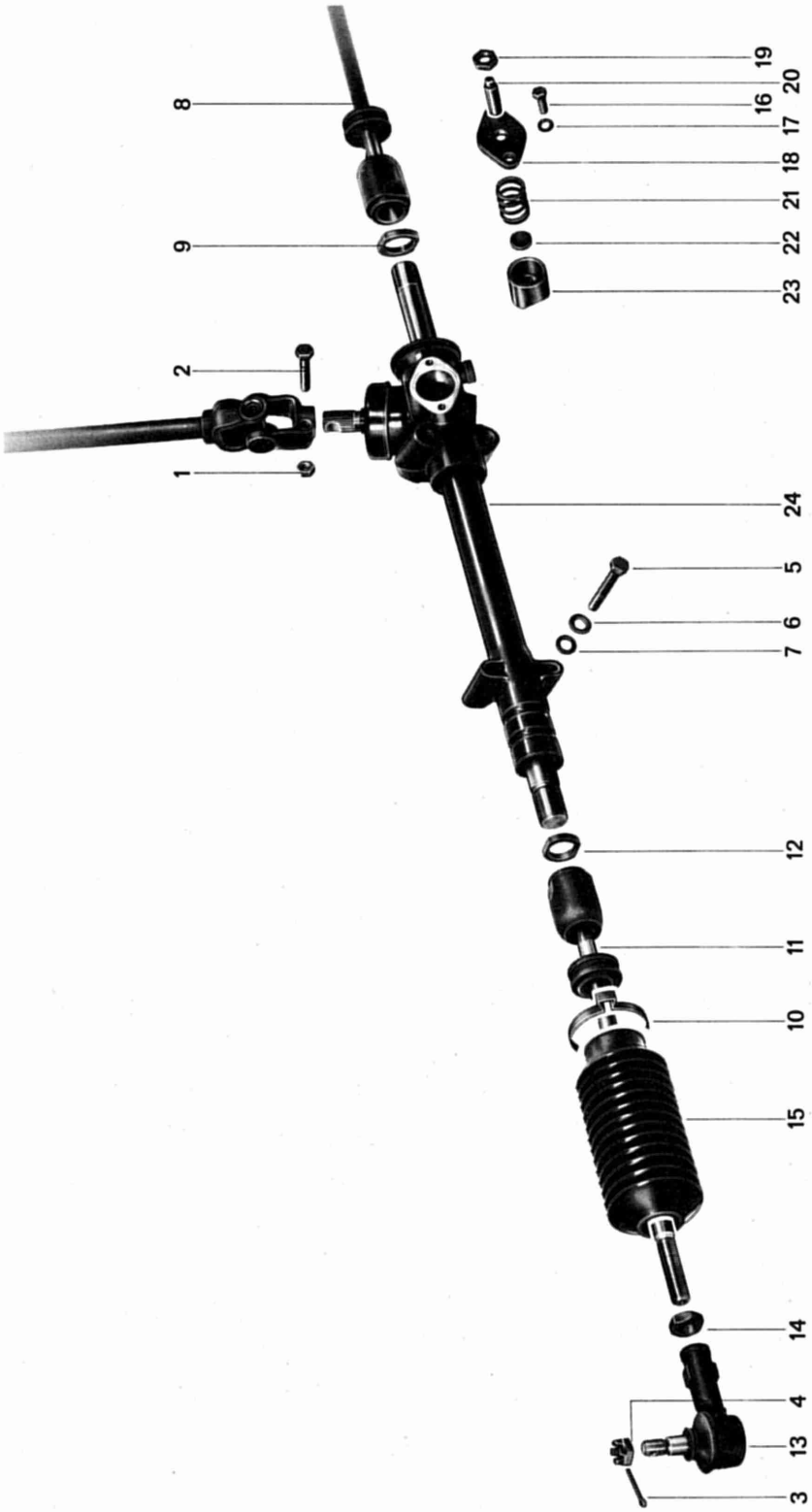
STEERING–TORQUE SPECIFICATIONS

Location	Description	Threads	Material	Torque Nm	Torque ft lb
Tie rod to steering knuckle	Castle nut	M 12 x 1.5	8	30 - 50	22-36
Steering column to steering rack	Self-locking nut	M 8	10	25 - 35	18-25
Steering rack to cross member	Bolt	M 8	8.8	20 - 24	14-17
Pinion bearing cover	Bolt	M 6	8.8	6 - 8	4-6
Pressure bearing cover	Bolt	M 6	8.8	6 - 8	4-6
Castle nut for adjusting screws	Nut	M 10 x 1	22 H	20 - 30	14-22
Tie rod to rack	Castle nut	M 22 x 1.5	9 SMn 28 K	43 - 57	31-41
Tie rod joint to tie rod	Nut	M 14 x 1.5	8.8	30 - 40	22-29
Steering wheel to steering column	Nut	M 16 x 1.5	6 G	35 - 55	25-40
Steering column switch to casing	Socket head bolt	M 8	8	11 - 19	8-14
Support to body	Bolt	M 6	5.6	5	4
Pinion (shaft) to steering column	Self-locking nut	M 8	10	25 - 35	18-25

TOOLS



No.	Description	Special Tool	Remarks
1	Torque wrench		Standard
2	Centering bolt	9116	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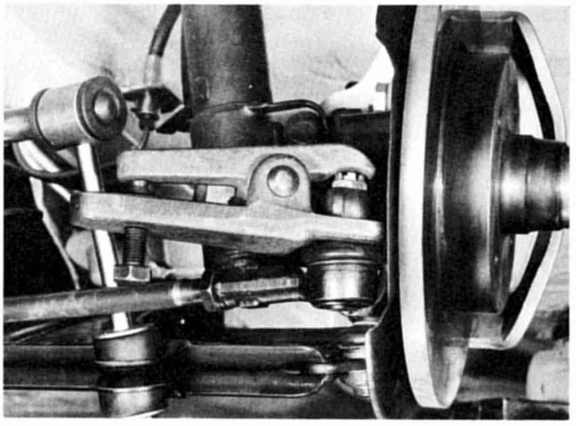
No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Nut, self-locking	1		Replace and tighten to specified torque	
2	Bolt	1		Install universal joint shaft free of tension. If necessary, reposition entire casing tube.	Page 48 - 10
3	Cotter pin	1		Replace	
4	Castle nut	1		Torque to specifications	
5	Bolt	4		Torque to specifications	
6	Washer	4		Replace if necessary	
7	Plain washer	4			
8	Tie rod assembly	1		Adjust with rack locked	
8a	Stop ring	1		Position correctly	
9	Nut	1		Torque to specifications	
10	Clamp	1		Replace	
11	Tie rod	1		Adjust with rack locked	
11a	Stop ring	1		Position correctly	
12	Nut	1		Torque to specifications	
13	Ball pivot	1			
14	Nut			Torque to specifications	
15	Protective sleeve right	1		Check, replace if necessary	
16	Bolt	2		Torque to specifications	
17	Lockwasher	2		Replace if necessary	

No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
18	Cover	1			
19	Nut	1		Torque to specifications	
20	Adjusting screw	1		Tighten until it just touches thrust washer. Then counterlock while holding the adjusting screw tight.	
21	Spring	1			
22	Thrust washer	1			
23	Pressure disc	1			
24	Steering gear	1		Check for wear and damage, replace if necessary	

REMOVING AND INSTALLING STEERING GEAR

Removing

1. Press out tie rod with VW 266 H extractor.

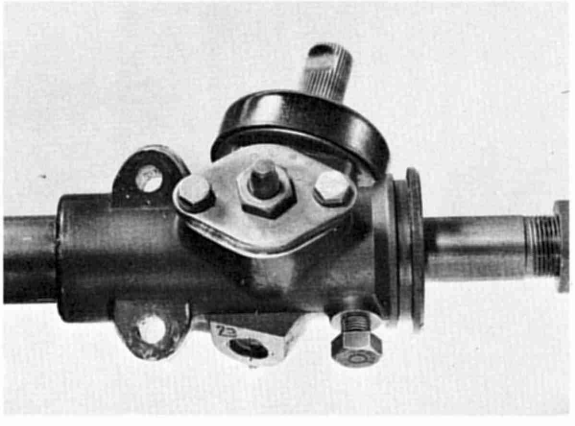


Installing

Note

The rack and pinion cannot be replaced separately, when damaged the entire steering gear must be replaced.

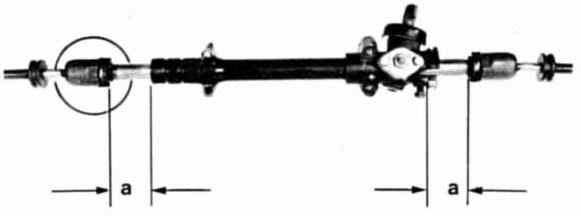
1. Center steering gear with Special Tool 9116.

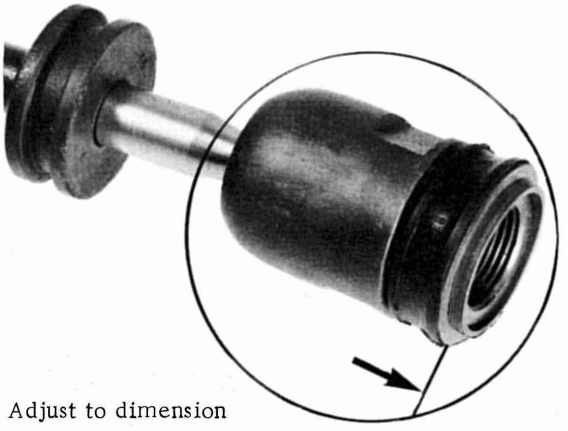


Note

There are two versions of steering tie rods. New version is machined for a distance of 13 mm (was 6 mm) on joint for rubber stop ring. Only the new version is available for replacement.

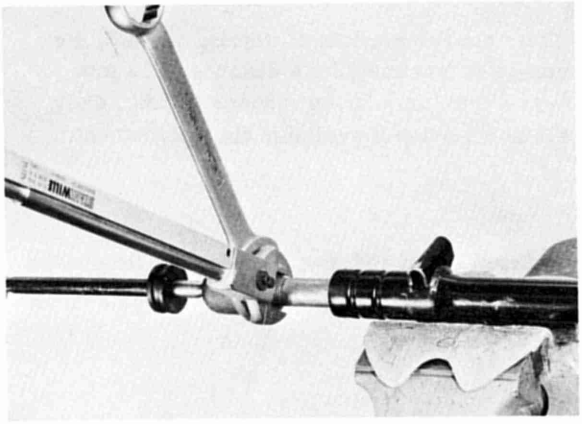
2. Screw on tie rods evenly. Measure from ridge (arrow) on rubber stop ring to steering housing.





Adjust to dimension
a = 64 - 1 mm
was 68 $^{+}$ 0.5 mm

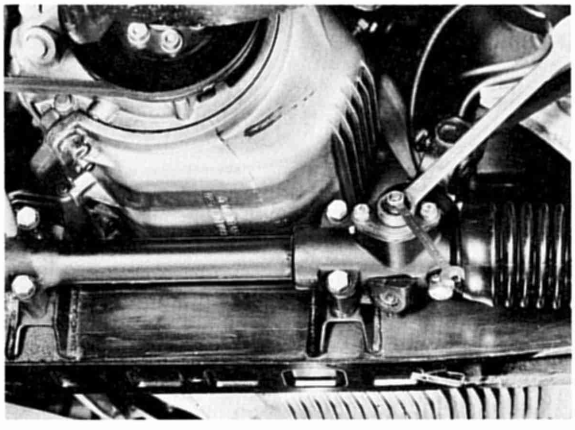
3. Tighten tie rod lock nuts to specified torque.



Note

When lock nuts are tightened, stop surface on rubber ring moves approx. 1 mm.
Recheck dimension a.

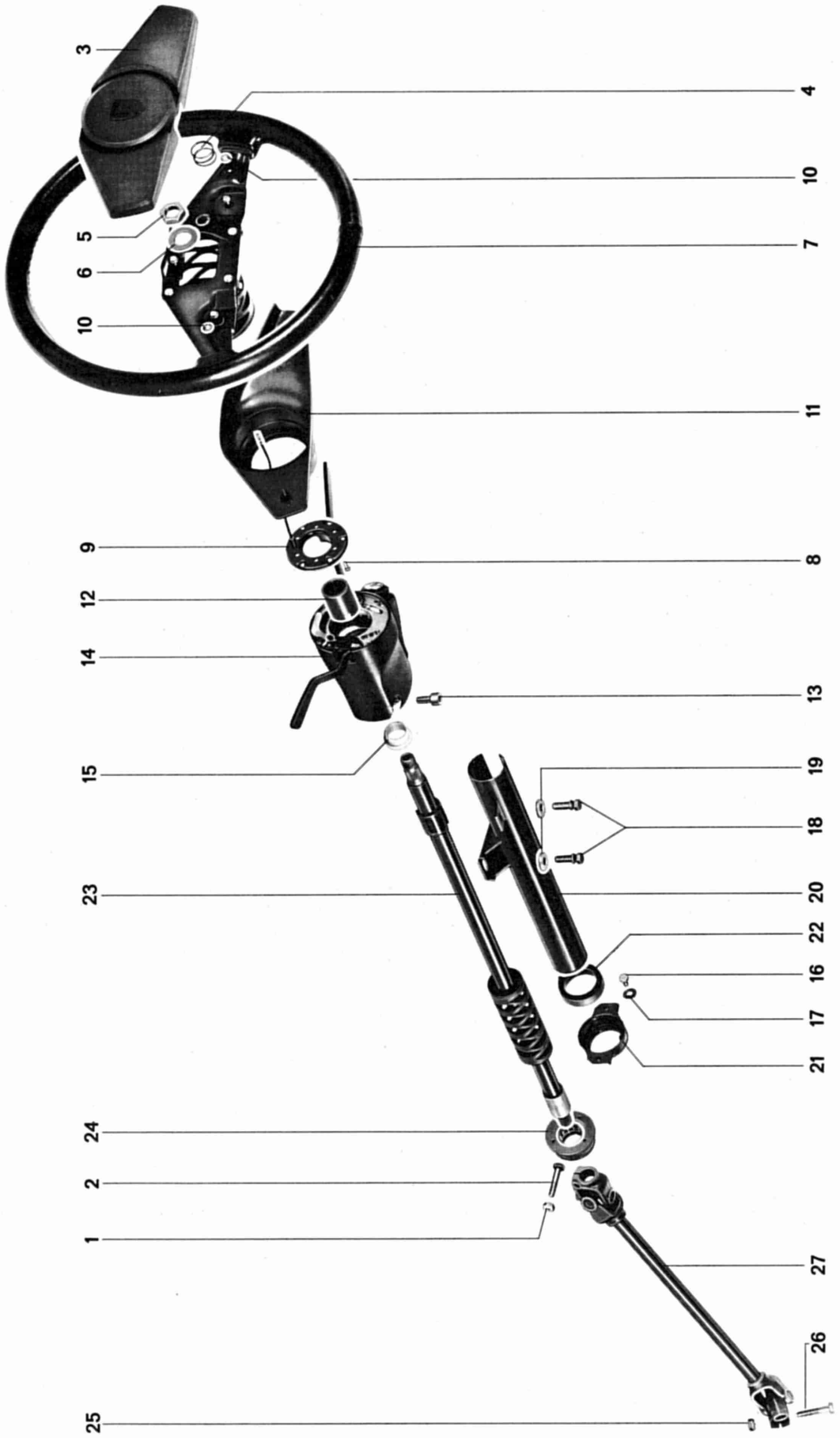
4. Adjusting steering.
   Tighten the adjusting screw until it just touches thrust washer, then counterlock while holding the adjusting screw tight.



Checking adjustment

Steering binds and does not return:
Steering adjustment too tight.

Steering rattles:
Steering adjustment too loose or other steering components loose or damaged.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No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Self-locking nut	1		Replace, tighten to specified torque	
2	Bolt	1			
3	Cap	1	Pull off by hand		
4	Spring	3			
5	Nut	1		Tighten to specified torque	
6	Washer	1		Replace if necessary	
7	Steering wheel	1		Center steering with special tool 9116. Lubricate hub with molycote A or equivalent and install. Spokes horizontal	
8	Screw	2			
9	Release ring	1		Tongue faces right	
10	Lockwasher	2		Replace	
11	Trim	1			
12	Spacer sleeve	1		Note installation distance	
13	Allen head bolt	1		Tighten to specified torque	
14	Steering column switch	1		Move on column only when switched off. Otherwise return cams could brake. Lubricate slip ring with light coat of universal grease	
15	Support ring	1		Install up to stop of locking shell	

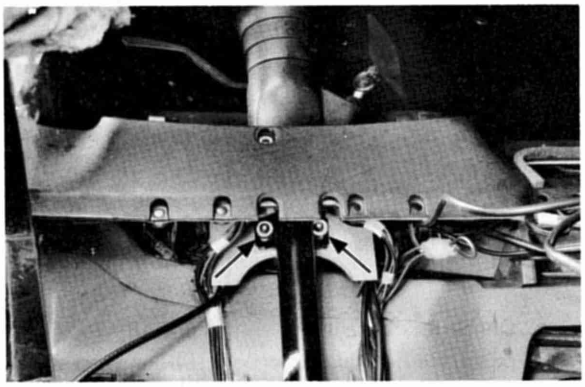
No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
16	Bolt	2		Torque to 5 Nm (3.5 ft lb)	
17	Washer	2		Replace if necessary	
18	Shear bolt	2	Drill out	Replace. Tighten until head shears off	
19	Plain washer	2			
20	Casing tube	1			
21	Bearing support	1			
22	Bearing ring	1			
23	Steering column	1		Check for damage in perforated metal section. Max. radial run out = 2 mm. Replace if necessary. Install free of tension	Page 48 - 10. From 1981 altered steering column, through shaft with support and without perforated metal section
24	Needle bearing	1		Lubricate with multi-purpose grease	
25	Self-locking bolt	1		Torque to 30 Nm (22 ft lb)	
26	Bolt	1			
27	Universal joint shaft	1	Unscrew steering gear at auxiliary frame for removal and installation	Install free of tension	

REMOVING AND INSTALLING STEERING COLUMN WITH CASING TUBE

Removing

1. Disconnect battery.

2. Drill out casing tube shear bolts.



Installing

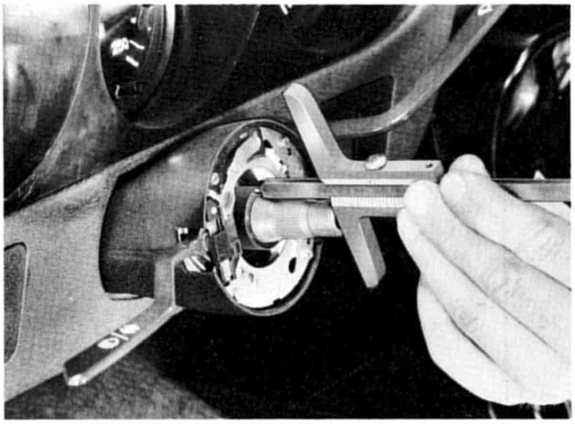
1. Apply light coat of silicone grease or talcum powder to rubber bearing and slide bearing support on to casing tube (approx. 20 mm)

2. Slide steering column switch on casing tube and tighten mounting screws slightly.

3. Slide casing tube with bearing support and steering column switch on to steering column.

4. Install mounting screws for bearing support and shear bolts for casing tube (do not tighten).

5. Drive spacer sleeve on to steering column until there is a distance of 42,5 mm from face of steering column to face of spacer. This adjusts the necessary distance between the steering wheel and steering column switch (2-4 mm).

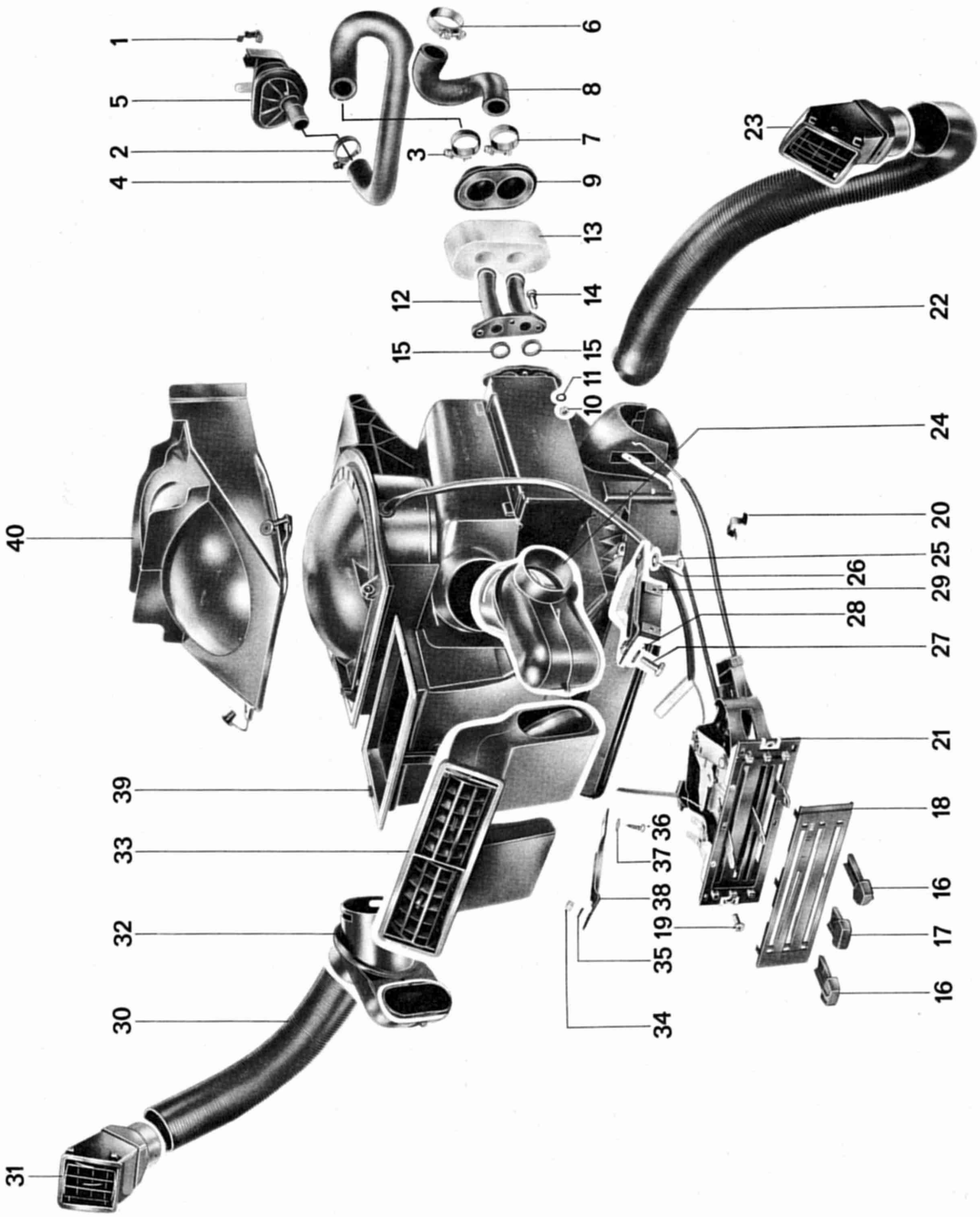


6. Tighten Allen head bolt for steering column switch and mounting screws for bearing support to specified torque.

7. Mount propeller shaft on steering gear free of tension. If necessary, reposition entire casing tube.

8. Check that play between the steering wheel and steering column switch is 2 - 4 mm. Tighten shear bolts until heads break off.

HEATER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No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Spring clip	1			
2	Clip	1			
3	Clip	1			
4	Heater hose	1		Mount with hose clamps, check for leaks	
5	Heater valve	1		Replace if hard to move	
6	Hose clamp	1			
7	Hose clamp	1			
8	Heater hose	1		Mount with hose clamps, check for leaks	
9	Double grommet	1			
10	Nut	3			
11	Washer	3			
12	Flange	1			
13	Damper	1			
14	Hex head screw	3			
15	Seal	2		Replace	
16	Button, upper and lower	2			
17	Button, center	1			
18	Mask	1			
19	Metal screw	2			
20	Clip	1			
21	Fresh air and heater controls	1			
22	Hose	1			

No.	Description	Qty.	Note When Removing / Installing	Special Instructions
23	Air outlet nozzle	1		
24	Air distributor with connector	1		
25	Metal screw	1		
26	Washer	1		
27	Oval head screw	1		
28	Washer	1		
29	Support	1		
30	Hose	1		
31	Air outlet nozzle	1		
32	Air distributor with connector	1		
33	Air jet	1	Pull out toward front, be careful not to break retaining tabs	
34	Nut	1		
35	Lockwasher	1		
36	Metal screw	1		
37	Washer	1		
38	Support	1		
39	Flap box assembly	1	Remove center console and detach right side of instrument panel. Pry off clamp	
40	Cover	1		

REMOVING / INSTALLING HEATER

Removing

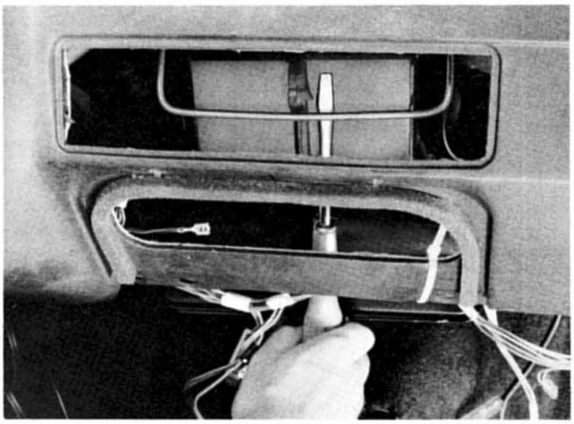
Note

To make removal of flap box easier, first remove the heat exchanger. This requires draining the coolant, pulling off cover and separating connection flange at heat exchanger.

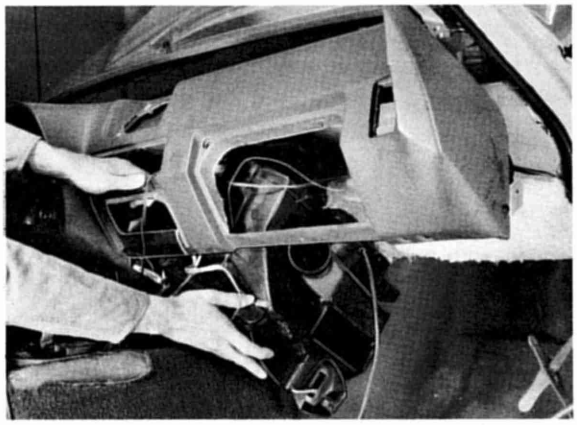
1. Disconnect battery.

2. Detach center console and instrument panel on right-hand side (see page 68 - 1)

3. Pry off clamp for flap box.



4. Pull off instrument panel on right-hand side and remove flap box.

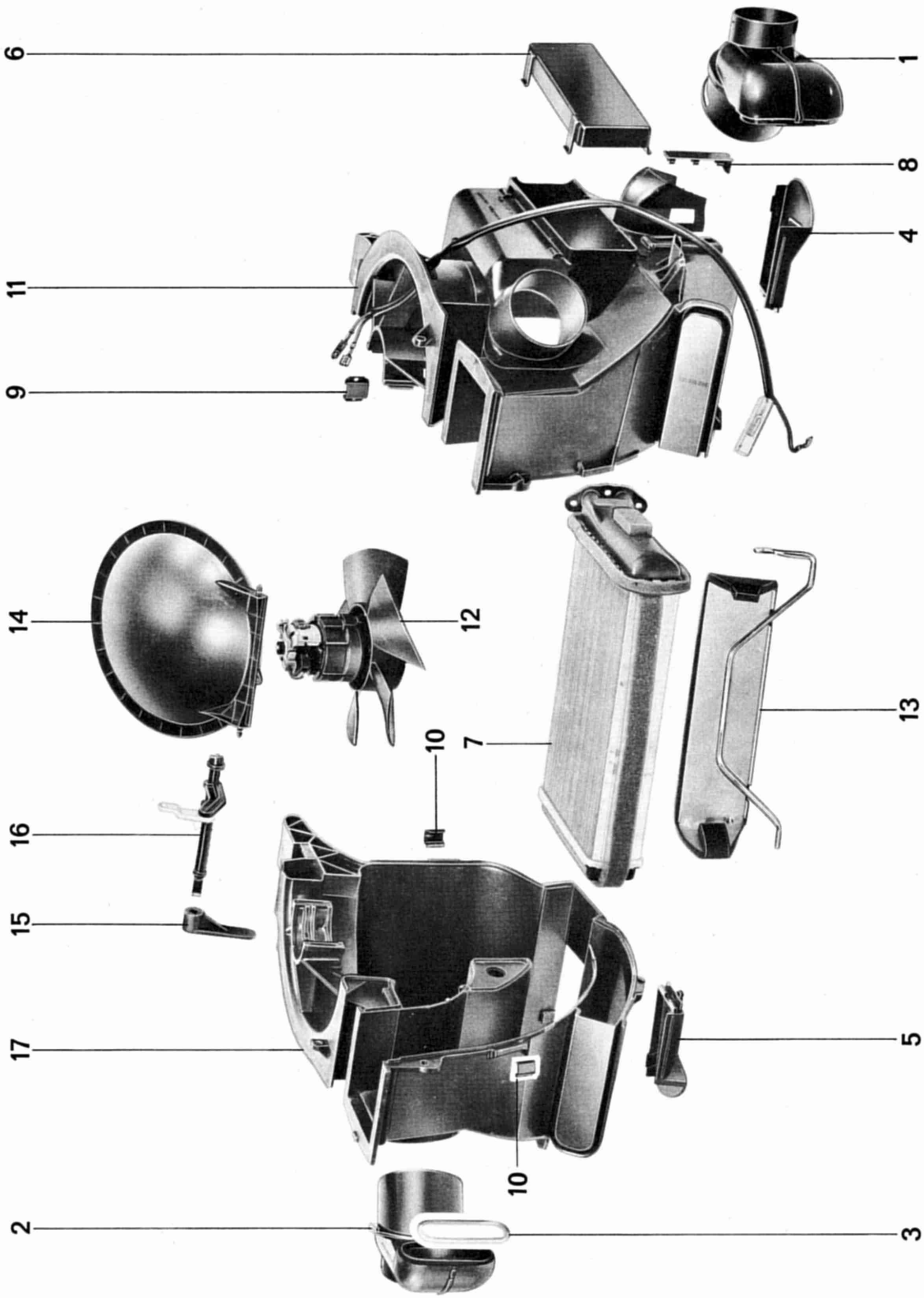


Installing

1. Insert flap box and secure with clamp.

2. Add coolant and bleed system (see page 10 - 7).

3. Check coolant hose connections and heat exchanger flange for leaks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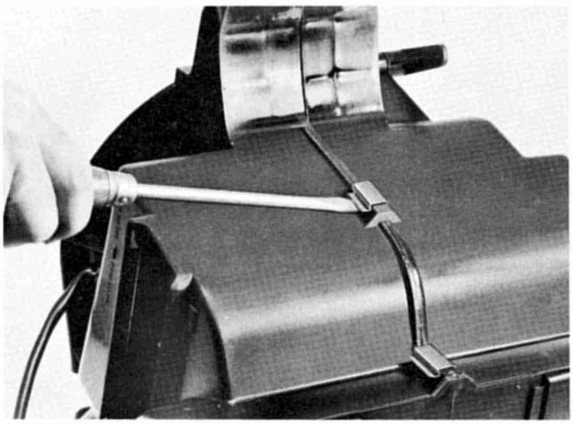
No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Air distributor with connector	1			
2	Air distributor with connector	1			
3	Gasket	2		Replace if necessary. Apply light adhesive to facilitate installation	
4	Air guide, right	1			
5	Air guide, left	1			
6	Cover	1	Pull off, be careful not to break retaining tabs		
7	Heat exchanger	1	Pull out, first disassemble housing		
8	Bearing clip	1			
9	Clip	2	Remove with screwdriver		
10	Clip	7	Remove with screwdriver		
11	Housing half, right	1			
12	Blower	1		Insert in bearing shell of right housing half. Must not have end play after housing is assembled	
13	Control flap	1			
14	Shut-off flap	1			
15	Lever, shut-off flap	1		Must face down	
16	Shaft, shut-off flap	1			
17	Housing half, left	1		Pace on right housing half from above	

DISASSEMBLING / ASSEMBLING FLAP BOX

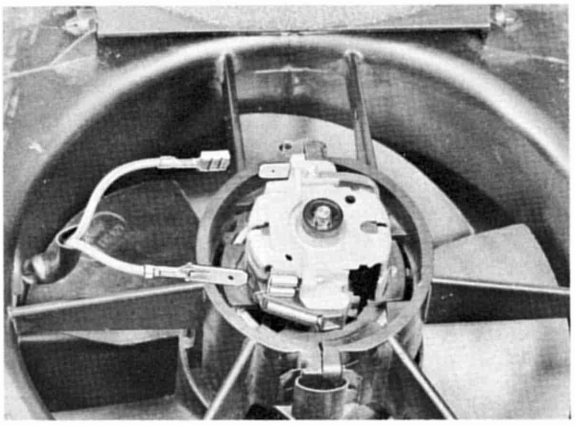
Disassembling

Lever off clips with screwdriver.



Assembling

Wire connections of housing must face wire harness



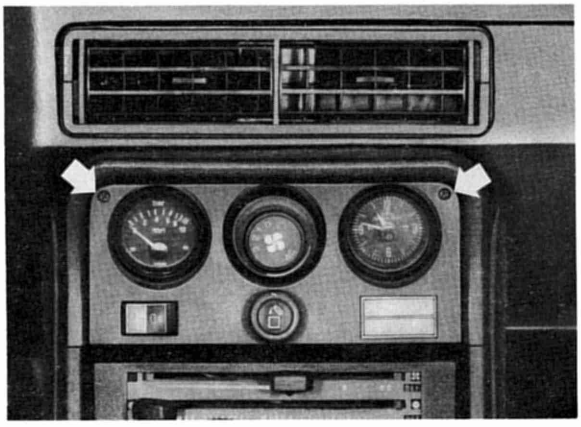
Note

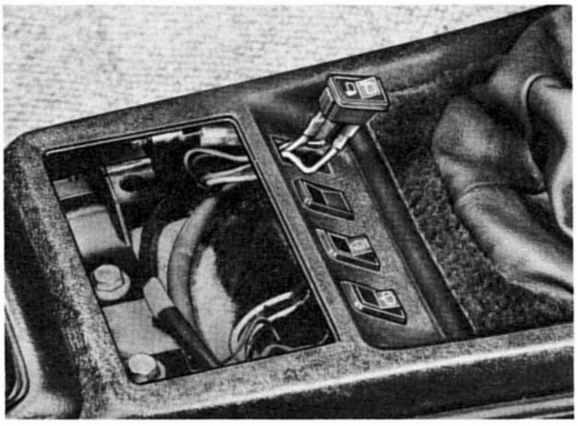
Blower should not have any end play after housing is assembled.

REMOVING AND INSTALLING CONTROL SWITCH FOR FRESH AIR AND HEATING

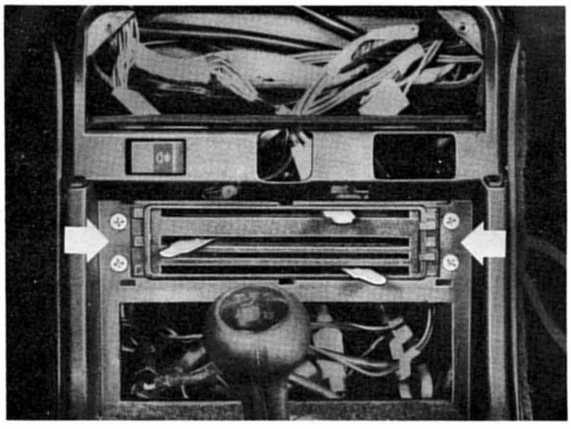
1. Disconnect battery.

2. Remove instrument cluster and pull off wires.





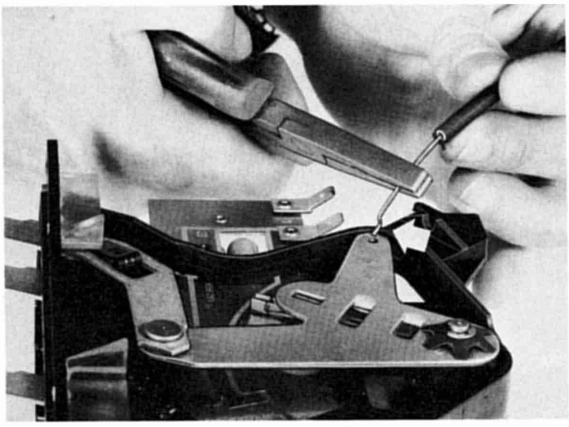
5. Pull off knobs on control switch and take off ornamental plate. Loosen mounting screws on control switch.



6. Push up shift lever dust cover. Loosen mounting screws of center console and lift out center console over the shift lever.

3. Remove radio.

4. Remove ashtray and disconnect switches.

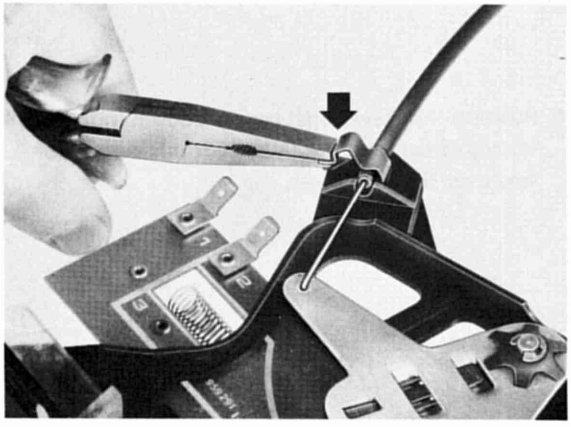


7. Pull off wires on control switch.

Note

The control switch is supplied as a spare part complete with cables.
To facilitate installation the cables could be left in the car, if they are in good condition.

8. Disconnect cables on control switch.



AIR CONDITIONING

AIR CONDITIONER SPECIFICATIONS

1. Refrigerant charge

850 g (30 oz) refrigerant R 12

2. Refrigerant oil (in compressor)

175 cc (6 oz) Suniso No. 5 GS
or Texaco Capella " E "
or similar

3. Safety seal on receiver-drier

Seal ruptures at 103° to 110° C (217° to 230° F)
corresponding to pressure of 35 to 40 bar (500 to 570 psi)

4. Thread sizes on air conditioner equipment

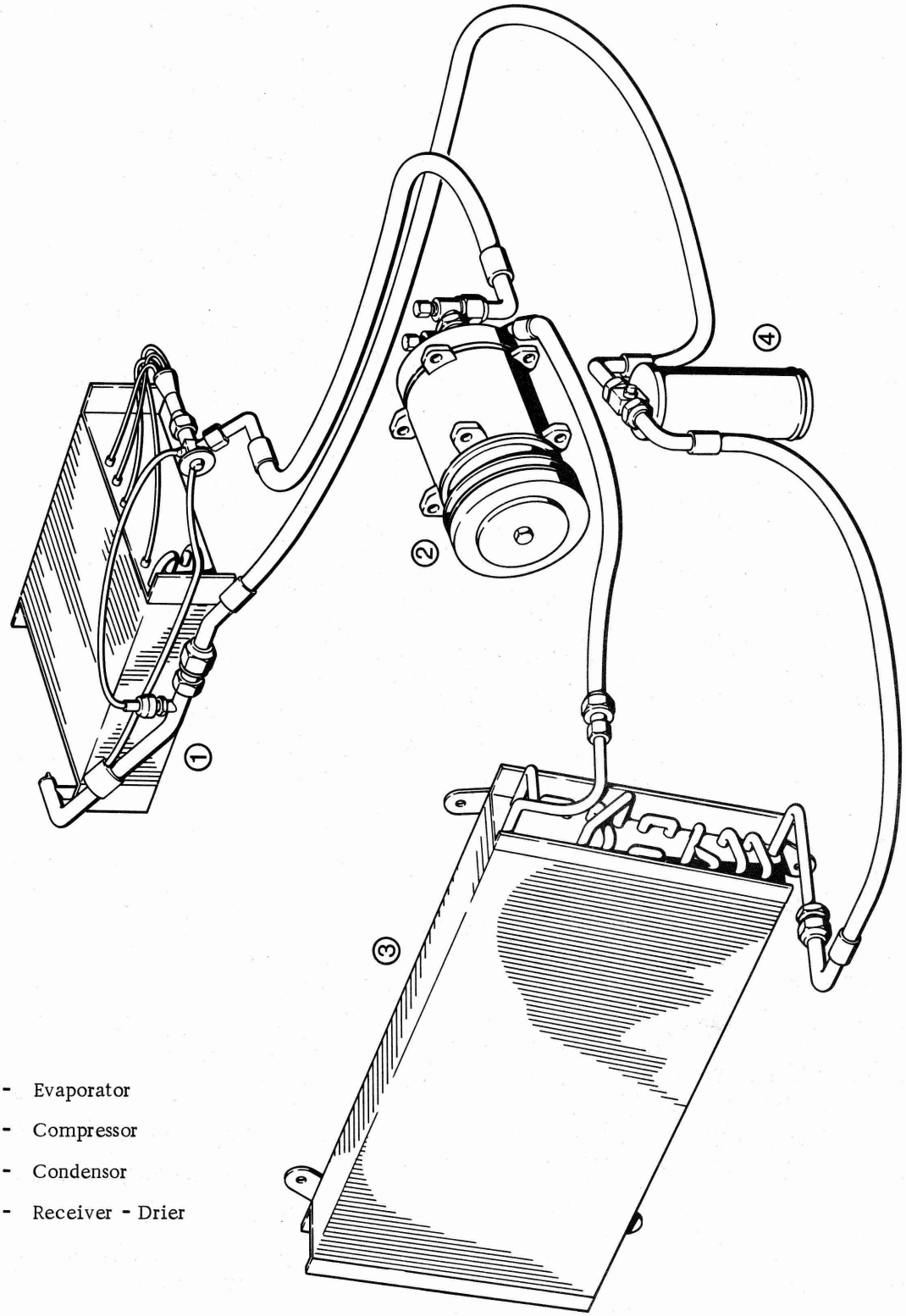
Equipment	Threads in inches (UNF) Inlet	Outlet	Test connections
Compressor	7/8	3/4	7/16
Condenser	3/4	5/8	
Receiver-drier	5/8	5/8	
Evaporator	3/4	7/8	
Expansion valve	5/8	3/4	

5. Torque specifications
(refrigerant system)

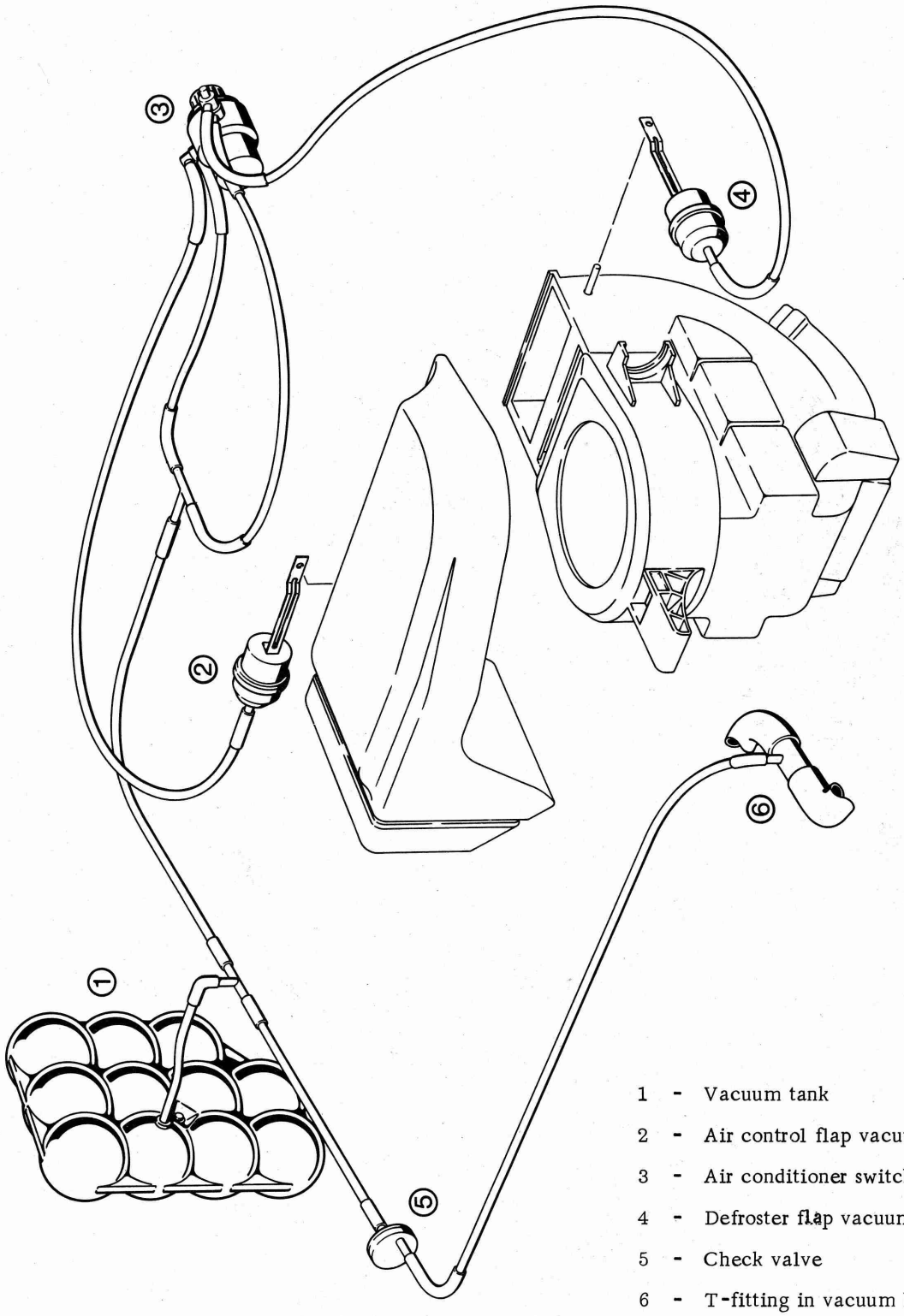
Threads in inches	Torque	Remarks
3/4	4.0 mkg (29 ft lb)	Except compressor
7/8	4.0 mkg (29 ft lb)	Except compressor
5/8	3.5 mkg (25 ft lb)	

Torque of coolant hoses on compressor:
6.5 mkg $\pm$ 10 % (47 ft lb $\pm$ 10 %)

AIR CONDITIONING SYSTEM



1 - Evaporator
2 - Compressor
3 - Condensor
4 - Receiver - Drier



1 - Vacuum tank

2 - Air control flap vacuum unit

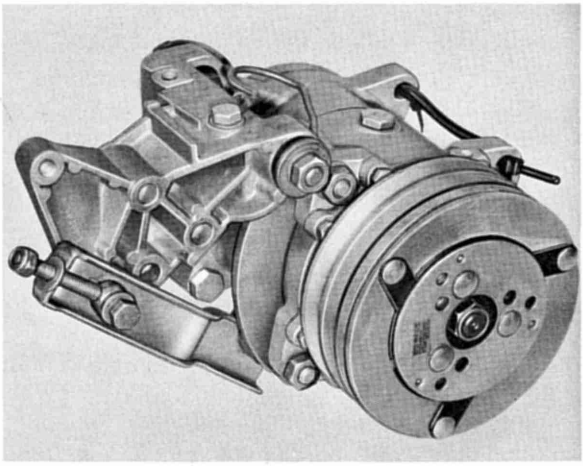
3 - Air conditioner switch

4 - Defroster flap vacuum unit

5 - Check valve

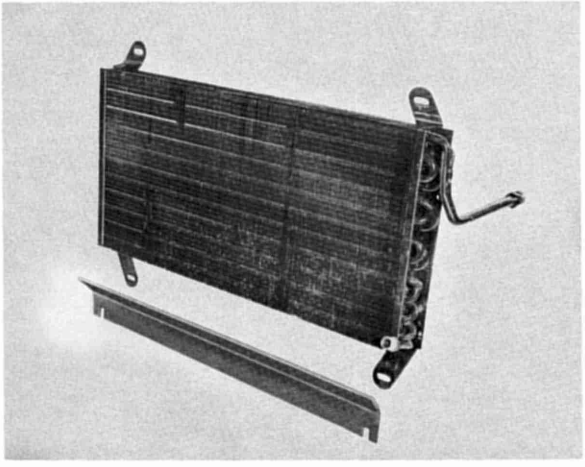
6 - T-fitting in vacuum hose to brake booster

1. Compressor



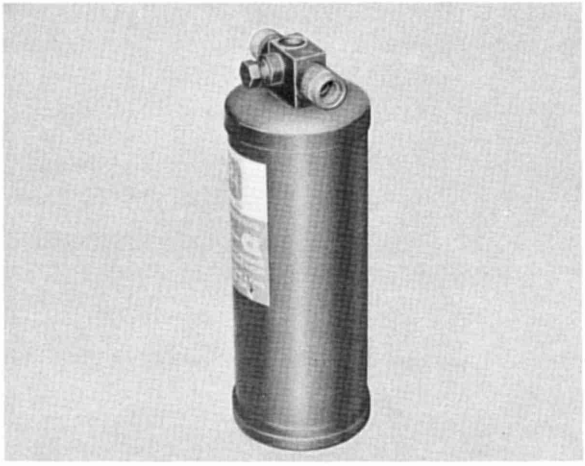
Driven by a V-belt from the engine through an electromagnetic clutch.
It draws in refrigerant vapor from the evaporator and pressurizes it (at the same time raising the refrigerant temperature) for circulation to the condenser.

2. Condenser



Receives the hot, high pressure vapor from the compressor. As the refrigerant vapor circulates through the condenser, it is cooled and condensed to a warm high pressure liquid.

3. Receiver-drier

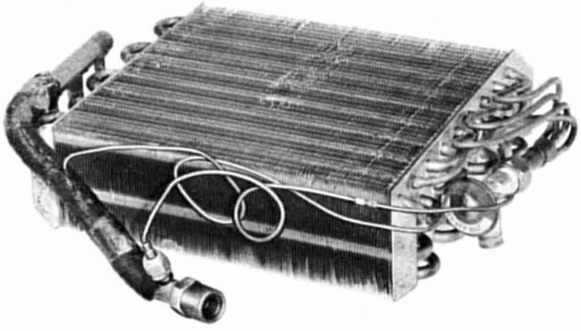


Receives warm high pressure liquid from condenser. Stores, filters and removes moisture from liquid refrigerant before delivery to the expansion valve. Provided with a sight glass (to monitor condition of refrigerant charge) and a safety seal (designed to rupture in the event of extremely high temperature).

4. Expansion valve

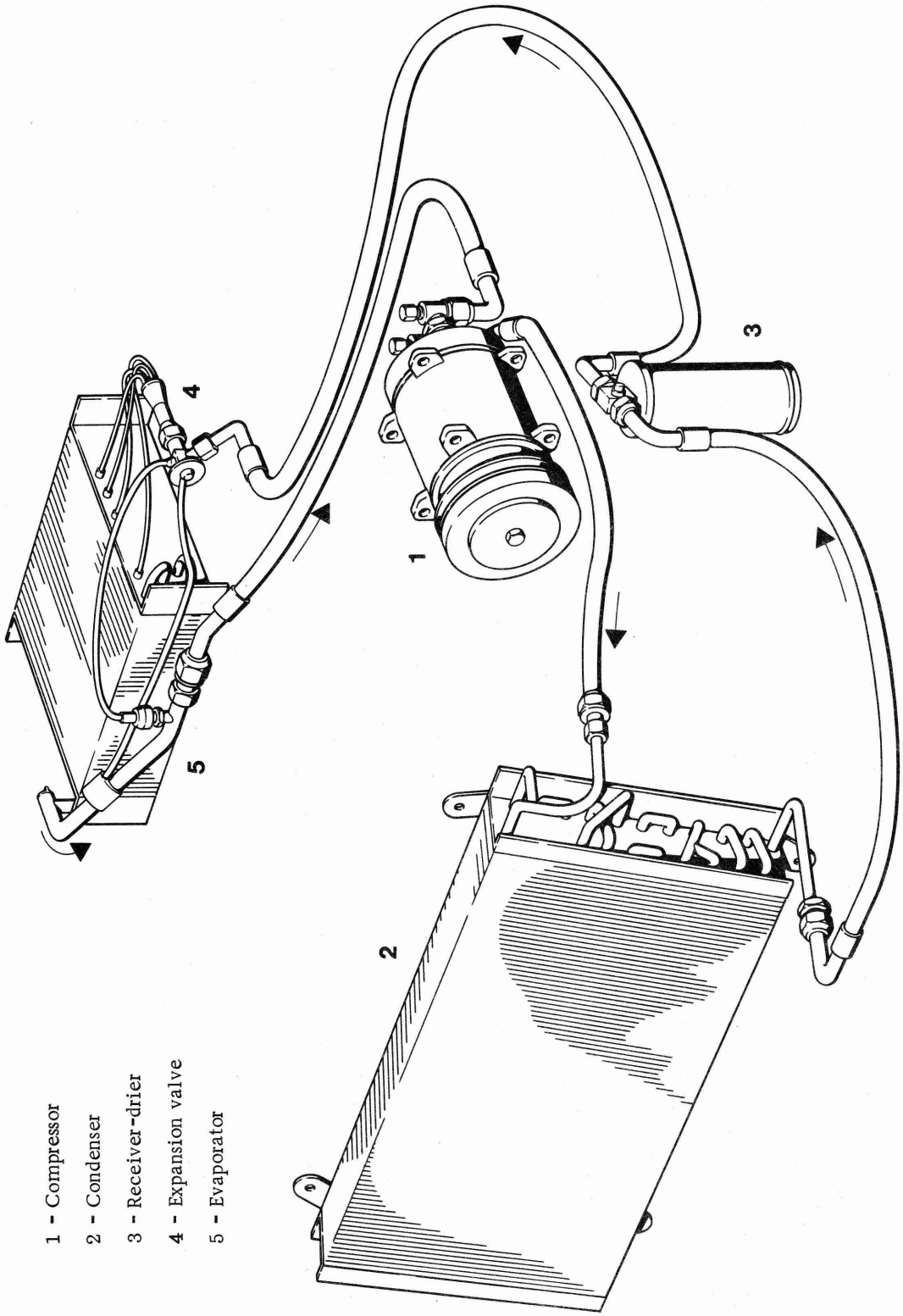
Reduces warm high pressure liquid from receiver-drier to a cold low pressure liquid for expansion in the evaporator. Together with temperature sensor coil (attached to outlet side of evaporator) expansion valve meters refrigerant flow in a continuous, automatic process.

5. Evaporator



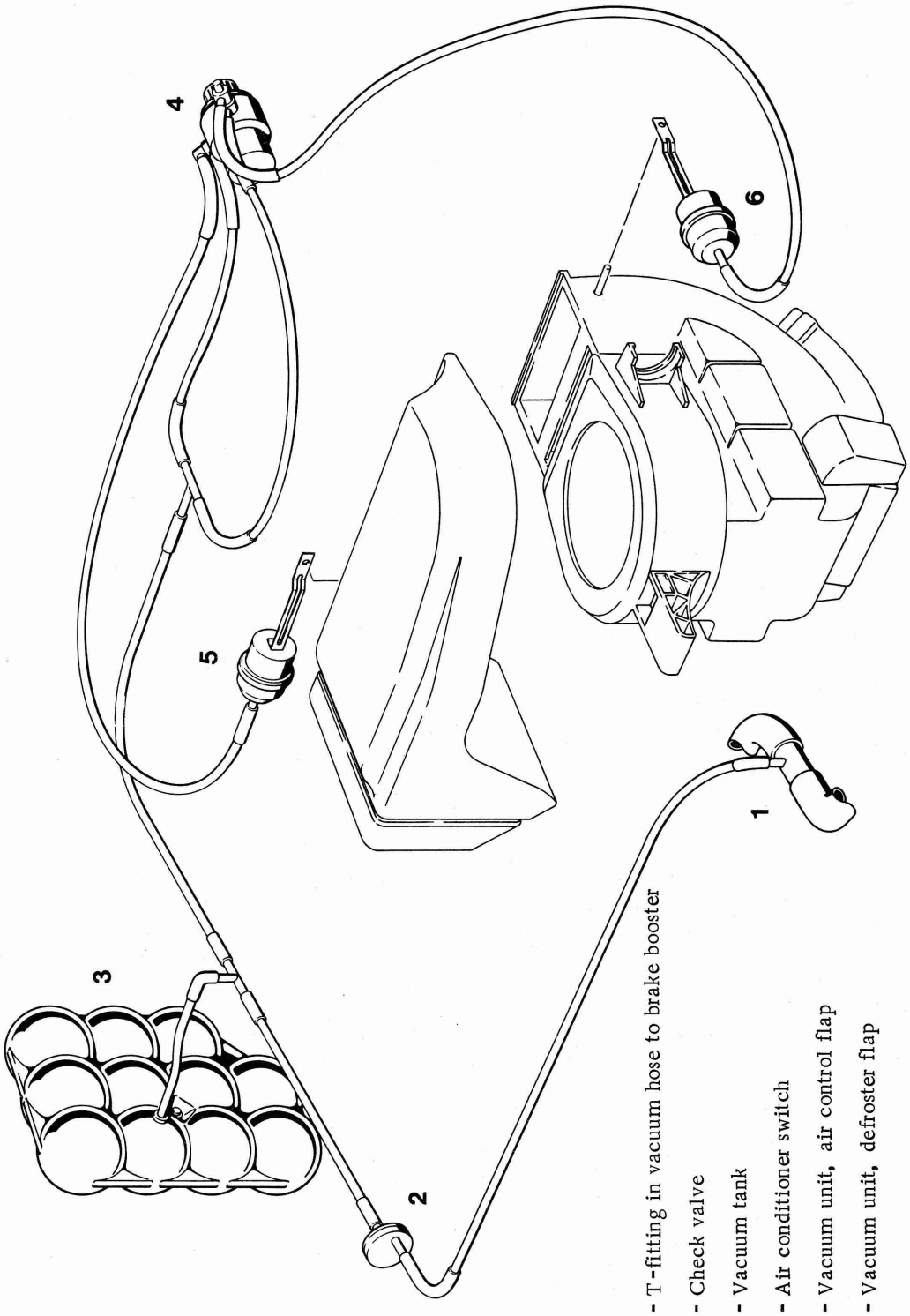
Receives cold, low pressure liquid from the expansion valve. As the refrigerant expands and circulates through the evaporator coils, it absorbs heat from the warm blower air in the passenger compartment. During this heat transfer, the refrigerant changes to a cool, low pressure vapor.

GENERAL LAYOUT



1 - Compressor
2 - Condenser
3 - Receiver-drier
4 - Expansion valve
5 - Evaporator

VACUUM HOSE LAYOUT



1 - T-fitting in vacuum hose to brake booster

2 - Check valve

3 - Vacuum tank

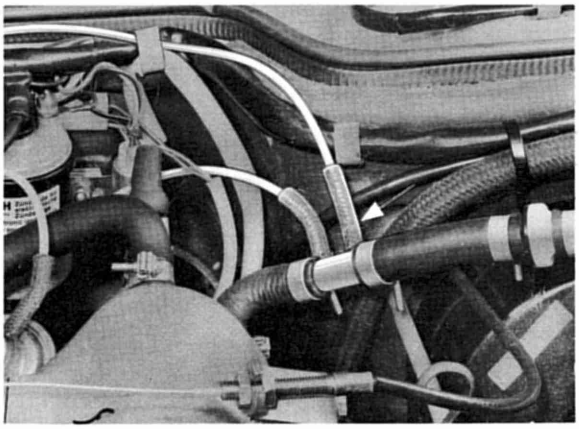
4 - Air conditioner switch

5 - Vacuum unit, air control flap

6 - Vacuum unit, defroster flap

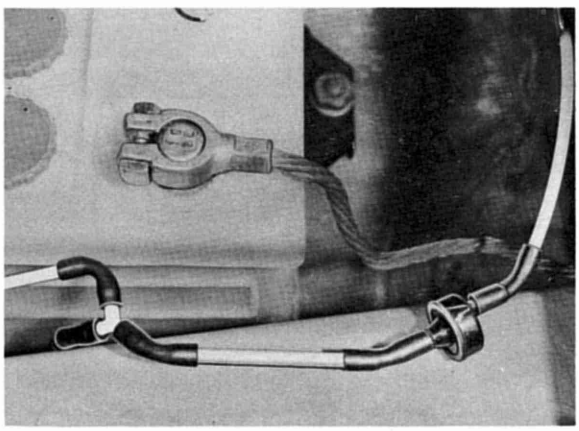
VACUUM SYSTEM

1. Vacuum hose connection



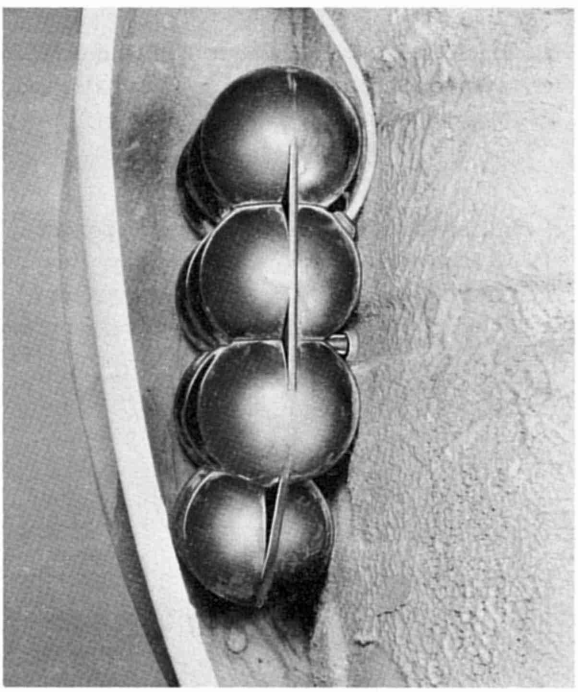
Vacuum hose connection for air conditioner switch is located between intake manifold and brake booster.

2. Valve check valve



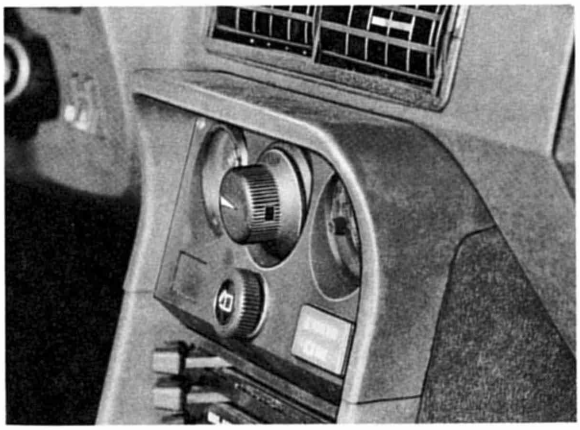
Check valve prevents loss of vacuum in vacuum tank, when vacuum in intake manifold is lower than that in vacuum tank.

3. Vacuum tank



Vacuum tank serves as reservoir and insures supply for vacuum control units.

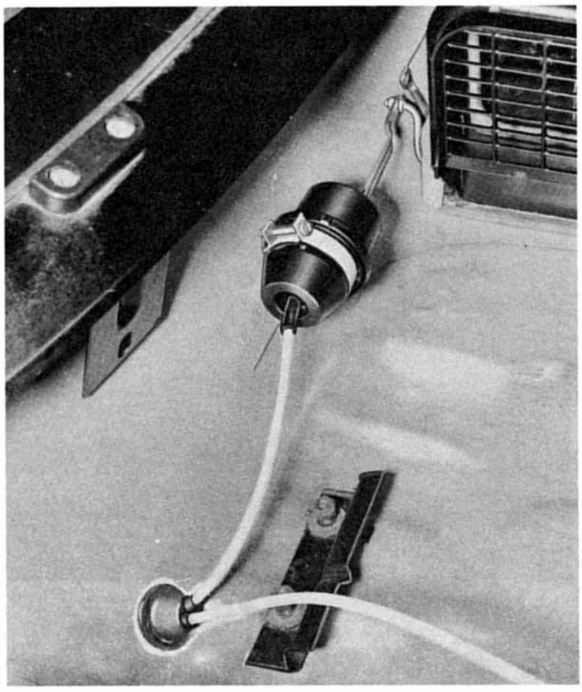
4. Air conditioner switch



Air conditioner switch is used to turn on compressor, evaporator blower, both fans on radiator and both vacuum units.

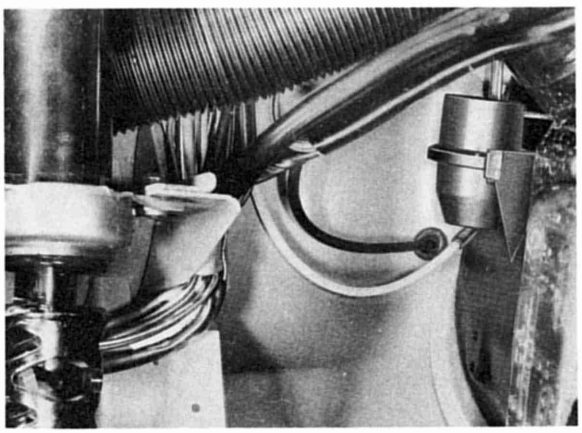
A capillary tube is inserted between evaporator fins and measures discharge temperature. This temperature, in conjunction with temperature setting of air conditioner switch, determines compressor operation.

5. Air control flap vacuum unit



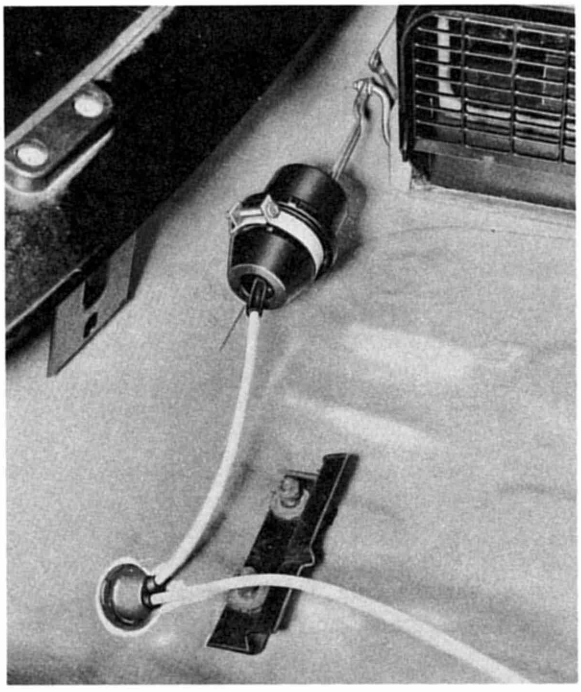
The air control flap, operated by a vacuum unit, opens an air distribution duct above the evaporator.

6. Defroster flap vacuum unit



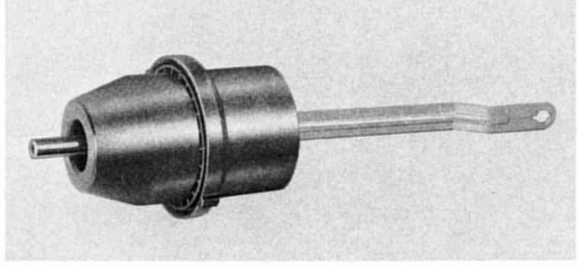
A defroster flap, operated by a vacuum unit, connects defroster duct with outlets along windshield.

Removing and installing air control flap vacuum unit

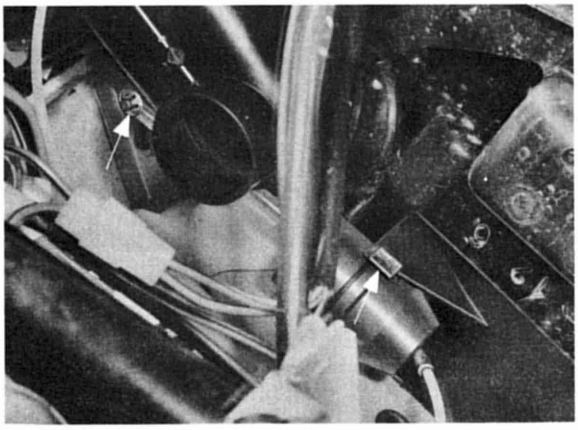


1. Detach vacuum hose at vacuum unit.

2. Loosen clamp, swing up vacuum unit about 90° and remove from air control flap lever.



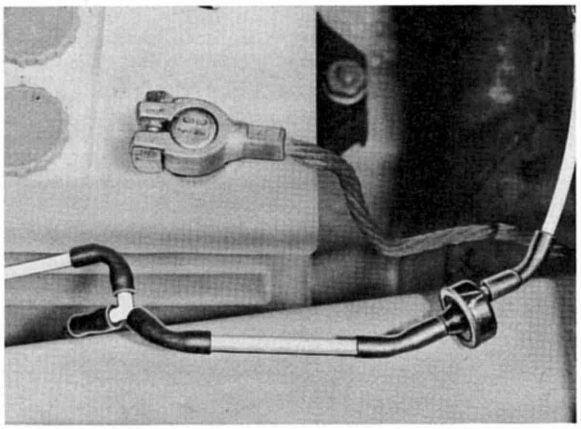
Removing and installing defroster flap vacuum unit



1. Detach vacuum hose at vacuum unit.

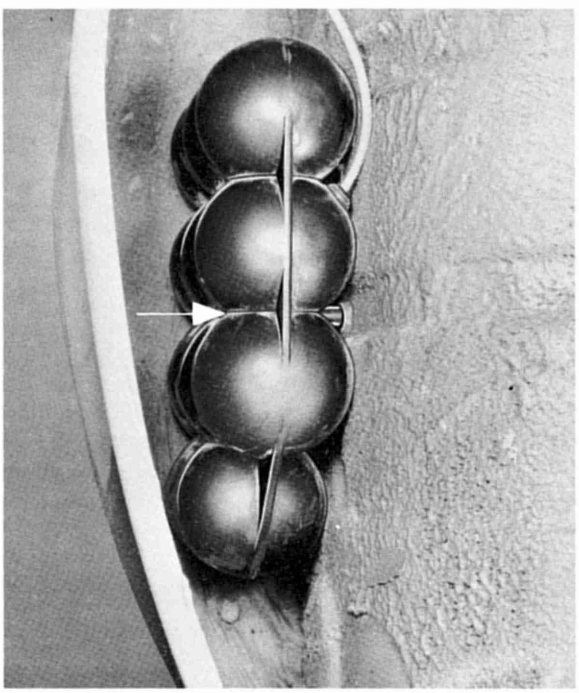
2. Remove lock washer and clips (arrows).

Removing and installing check valve



Detach vacuum hoses. Note correct connection when attaching (arrow on valve housing).

Removing and installing vacuum tank

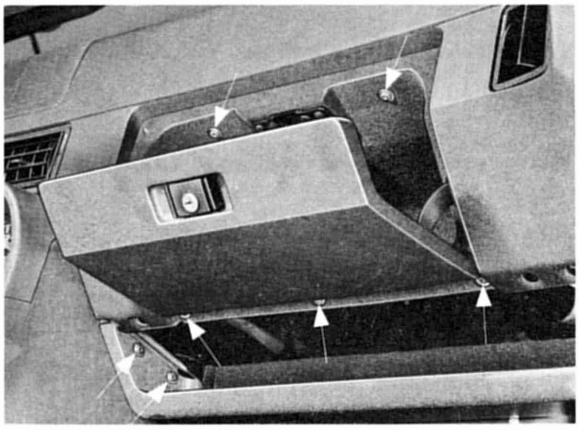


Detach vacuum hose. Loosen mounting nut (arrow) and remove tank.

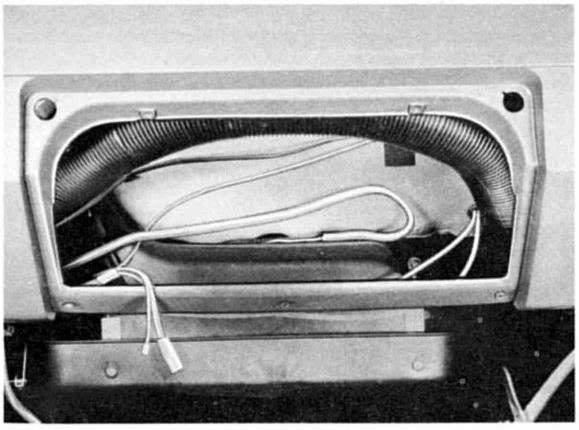
Removing and installing air conditioner switch

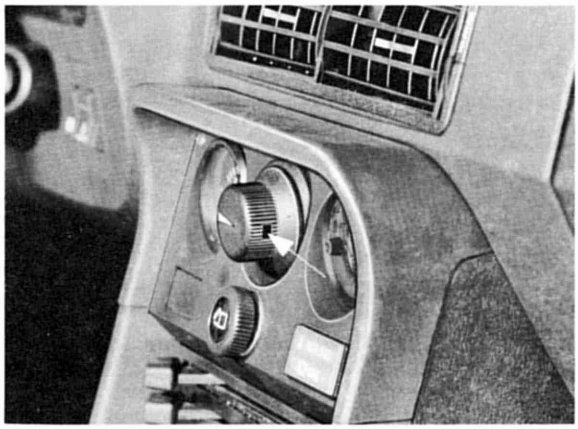
1. Disconnect battery.

2. Remove glove compartment and shelf (arrows) on passenger's side. Be careful of wires for glove compartment light.



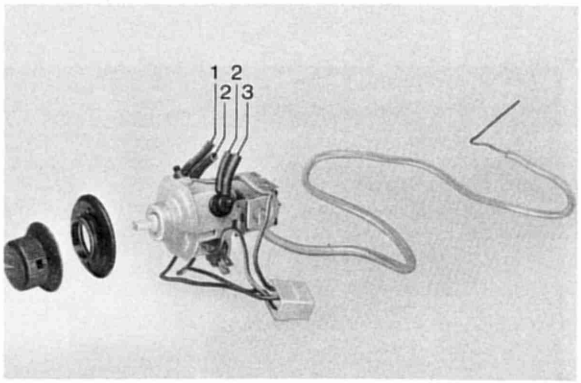
3. Pull capillary tube out of evaporator housing carefully.





4. Press in rotary knob lock with a small screwdriver (arrow), pull off knob and unscrew escutcheon. Remove two Phillips screws on instrument insert of center console. Press up and remove insert. Detach wires and vacuum hoses at switch or disconnect 4-pole plug and remove switch carefully. Do not bend capillary tube more then necessary.

5. Make sure that vacuum lines are connected correctly when installing switch.



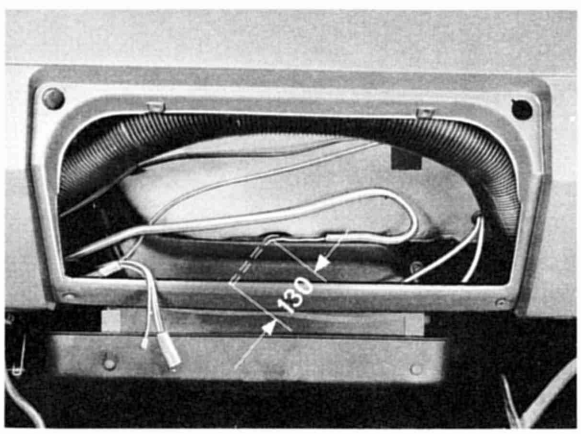
1 - To defroster flap (in passenger compartment, left)

2 - To T-connector (vacuum supply line)

3 - To air control flap (next to battery)

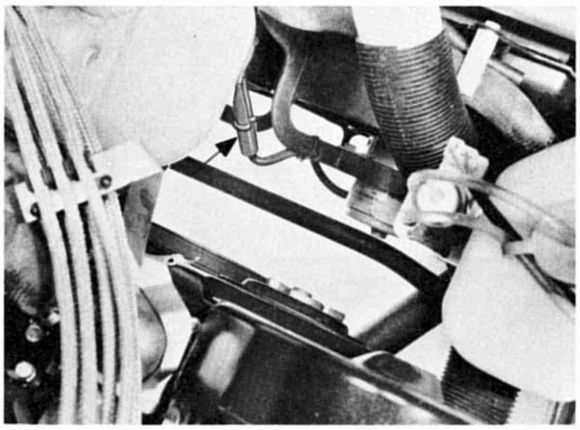
Connect electric wires according to wiring diagram.

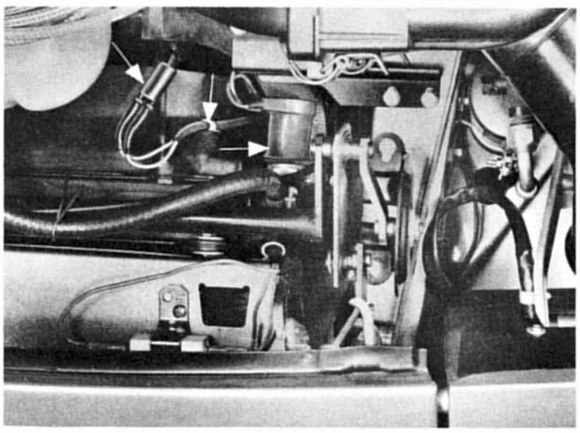
6. Install capillary tube carefully and slide it into evaporator housing about 130 mm (5 1/8 in.).



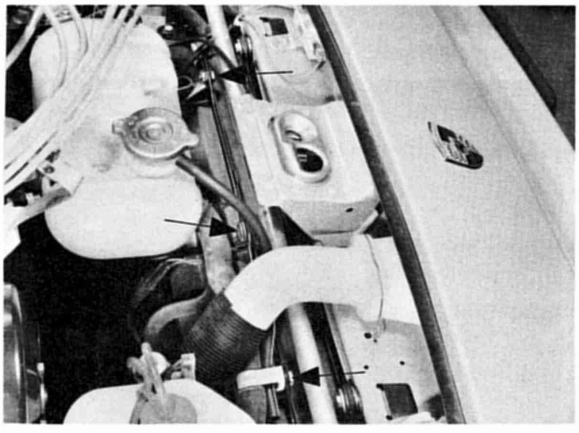
Removing and installing condenser fan

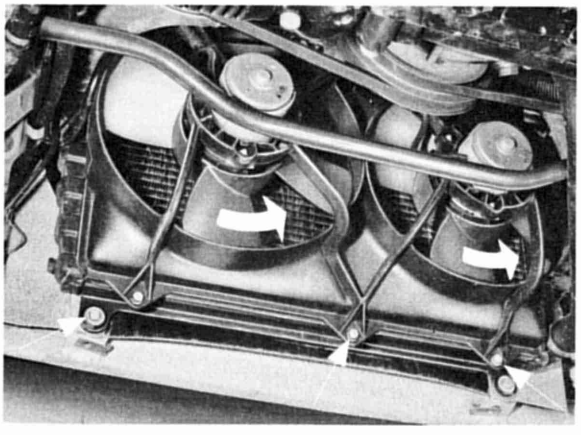
1. Disconnect plugs. Remove cable holders.





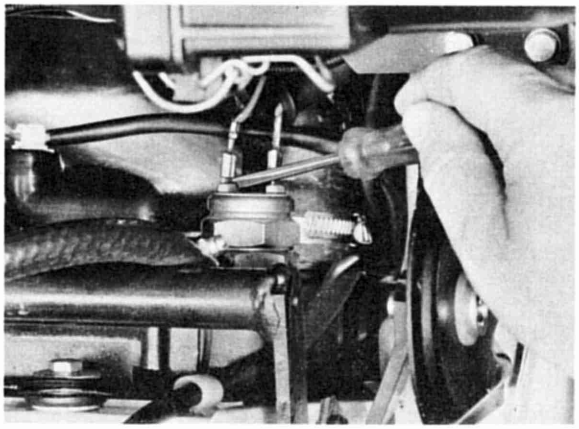
2. Loosen three each bolts (arrows) at top and bottom, and remove fan housing.





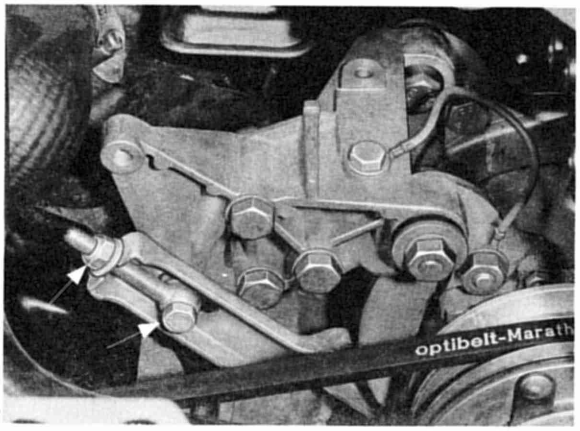
On models with a stabilizer radiator fan must be detached from housing while installed.

3. Install fans so that water drain hole on each fan motor faces down. Make sure that wires are connected correctly. After installation check direction of rotation of both fans. Slide back rubber cap on temperature switch and bridge both connections with a screwdriver or similar tool. Turn on ignition. Both fans must turn clockwise as seen from front.



Replace V-belt

Loosen bolt and unscrew nut until V-belt can be removed.



Tighten bolt after tightening V-belt.

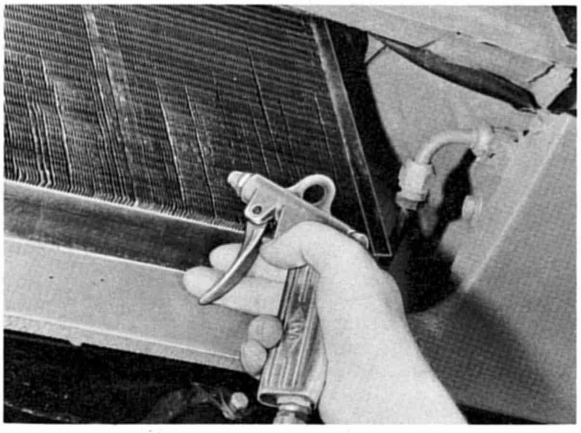
V-belt tighteness is correct if it will give about 5 mm (1/4 in.) under light thumb pressure at a point midway between both pulleys.

Cleaning condenser

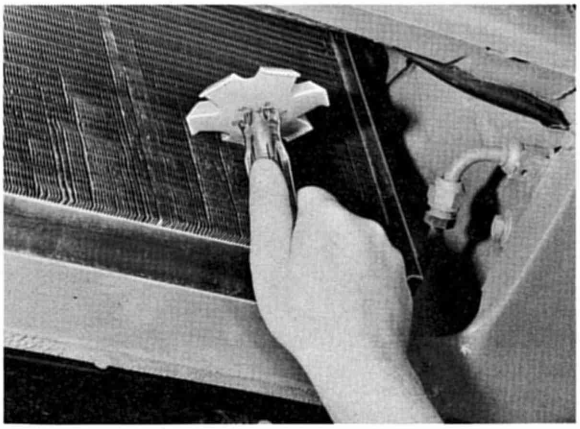
Under certain circumstances a very dirty or damaged condenser might not be capable of transferring sufficient heat into the ambient air. Therefore condenser must be cleaned occasionally.

1. Remove fan grill.

2. Blow through condenser with compressed air.



3. Remove particles caught between fins with a fin comb. This will also straighten bent fins again.



WARNING

Always wear safety goggles when charging or discharging system.

Be sure work area is well ventilated. R - 12 is heavier than air and can accumulate in areas of poor air circulation.

Avoid inhaling fumes when using flame type leak detector. R - 12 becomes poisonous gas after coming into contact with open flame.

CAUTION

Always discharge refrigerant from air conditioner system before loosening connections, hoses, etc.

Note

Plug all openings in system when removing/replacing parts.
This prevents entry of dirt and moisture which may contaminate system. Moisture may cause expansion valve to ice up, blocking refrigerant flow and stopping cooling action.

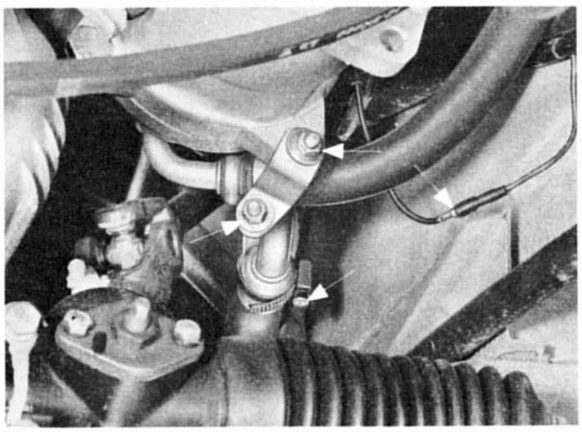
Removing and installing compressor

1. Remove coolant expansion tank.

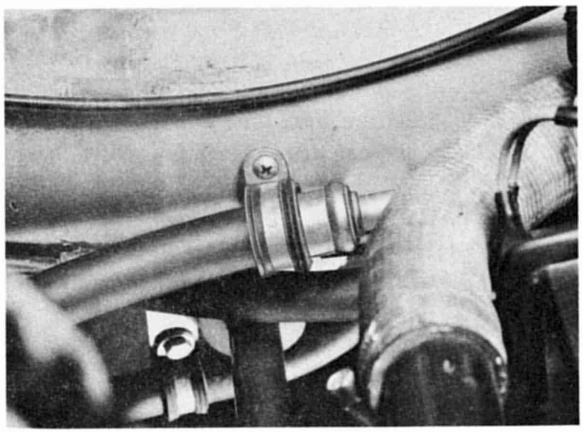
2. Remove mixture control unit (fuel lines remain connected) and move to one side.

3. Loosen and remove belt on compressor.

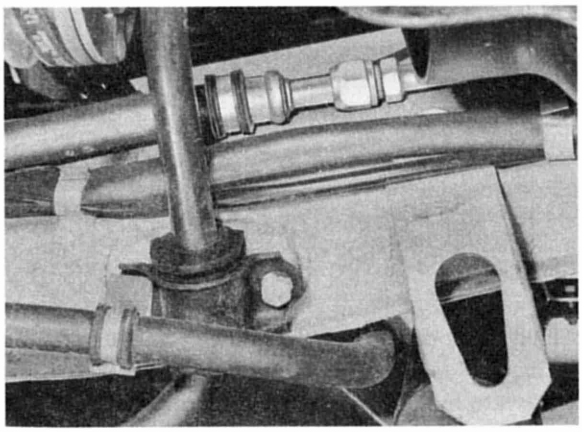
4. Unscrew refrigerant hose mounting bracket from compressor and disconnect electric plugs.



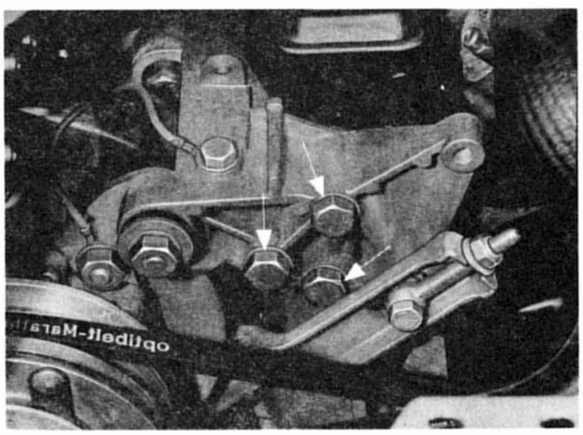
5. Unscrew hose clamp at condenser inlet.



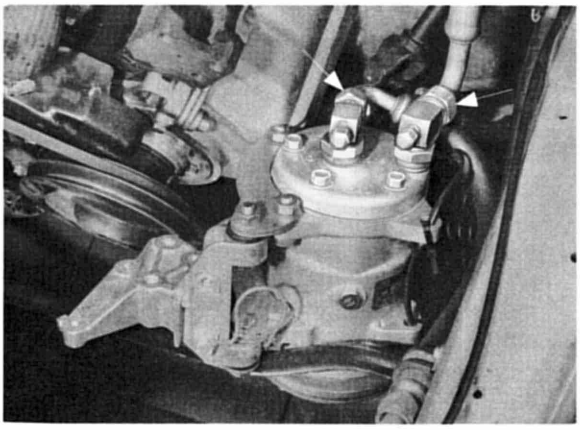
Detach hose at condenser connection.



6. Remove compressor mounting bolts.



7. Incline compressor forward.

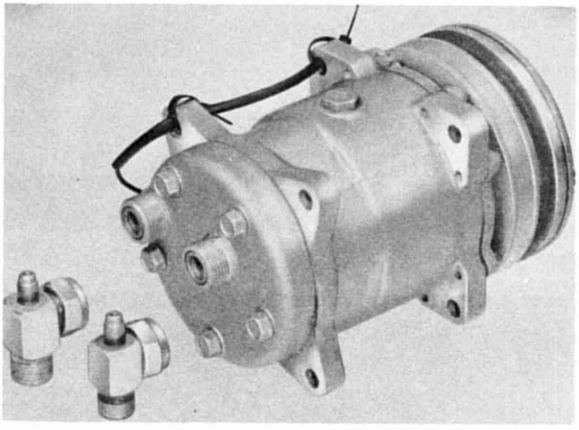


8. Unscrew refrigerant hoses at service valves of compressor.
Remove compressor from above. Be careful not to tilt service valve end of compressor downward since oil would escape from compressor.

9. When connecting hoses to compressor tighten couplings to torque of 6.5 mkg ± 10% (47 ft lb ± 10%). Do not counterhold hoses, but turn them to proper position by applying specified tightening torque.

Note

New compressors from parts department are supplied without service valves. Loosen caps on threaded necks carefully, since compressor is under refrigerant pressure. Fast removal of caps would force oil out of compressor. Install discharge service valve and suction service valve.

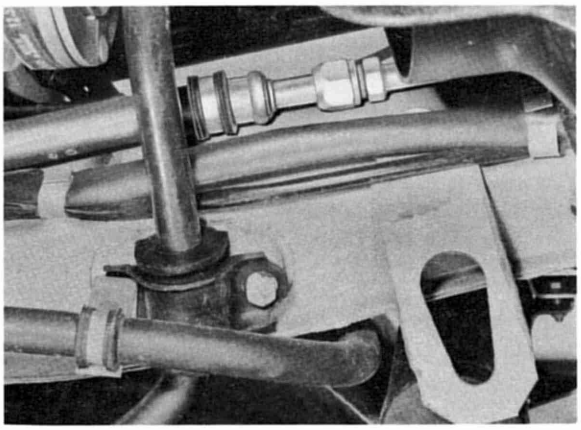


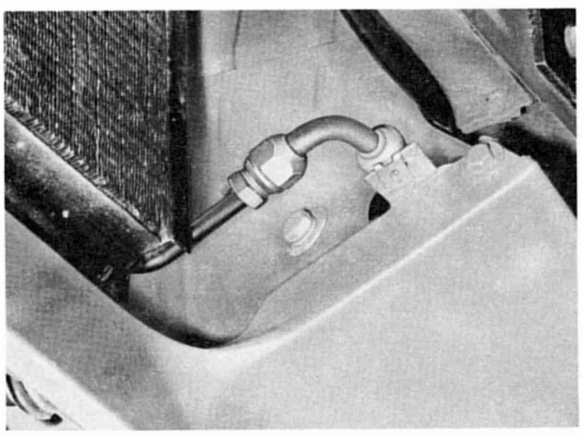
Removing and installing condenser

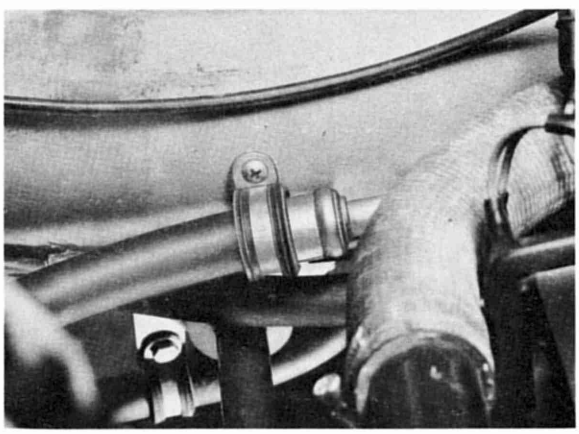
1. Remove radiator.

2. Remove radiator grill.

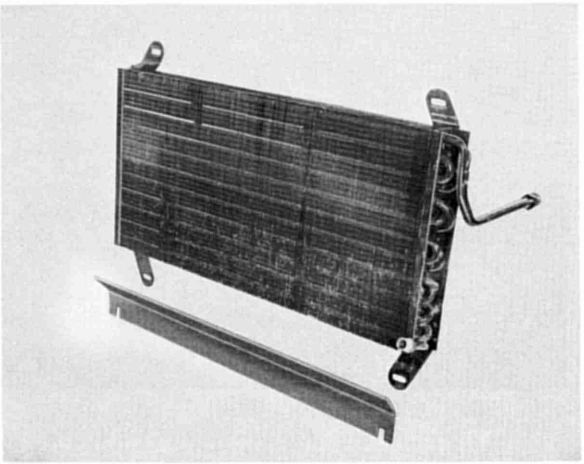
3. Unscrew refrigerant hoses and hose clamp on condenser inlet.





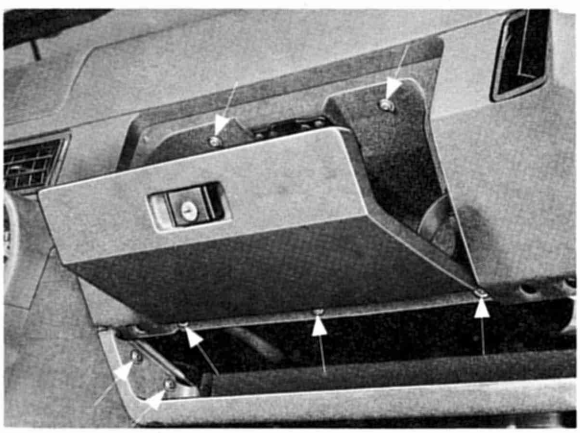


4. Remove condenser from above.

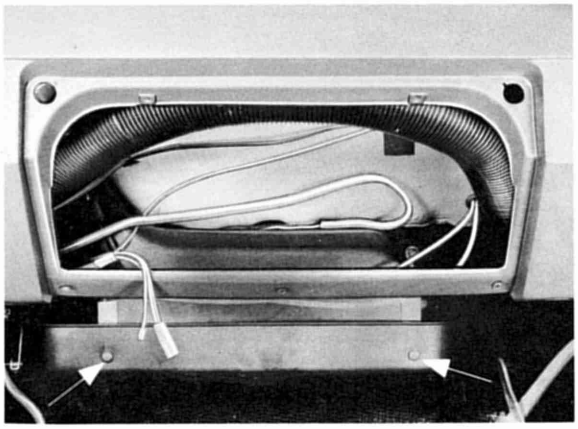


Removing and installing evaporator

1. Remove glove compartment and shelf on passenger's side. Be careful of wires for glove compartment light.

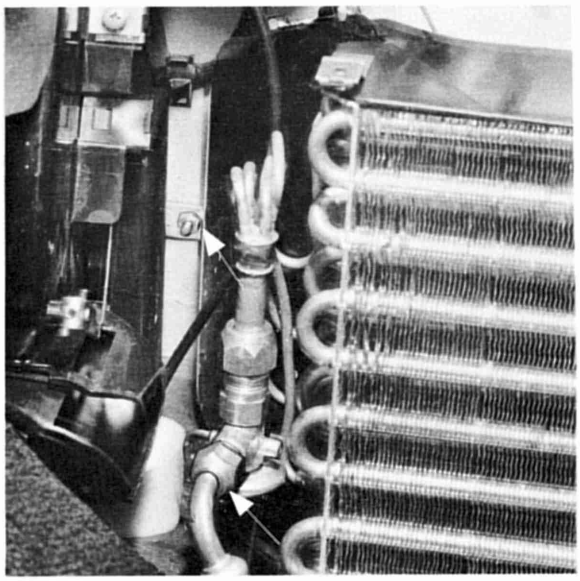


2. Pull capillary tube out of evaporator housing carefully.

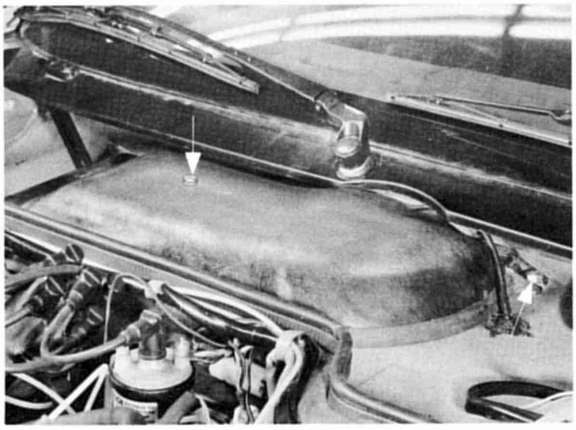


3. Take off water tray. This is done by removing two Phillips screws on face and detaching tray at back. Detach water drain hose at tray.

4. Detach high pressure hose at expansion valve. Remove upper mounting nut.

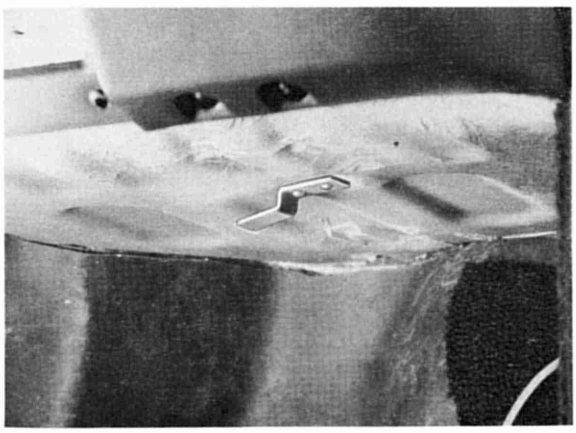


5. Remove battery and vacuum unit for air control flap. Remove blower cover. This is done by removing bolt and nut and taking off cover.



Pry off top of evaporator housing.

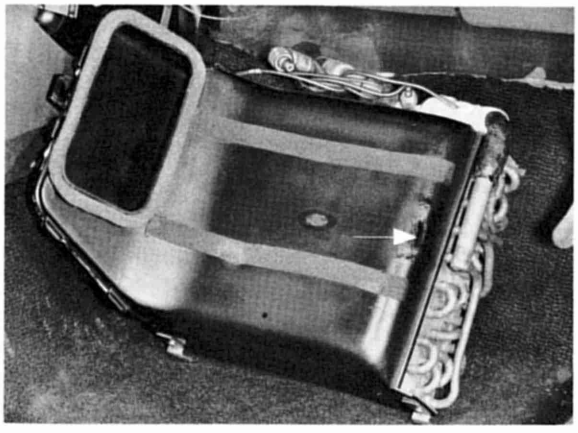
6. Slide evaporator housing to left until it can be taken off bracket.



7. Unscrew low pressure hose at evaporator outlet.

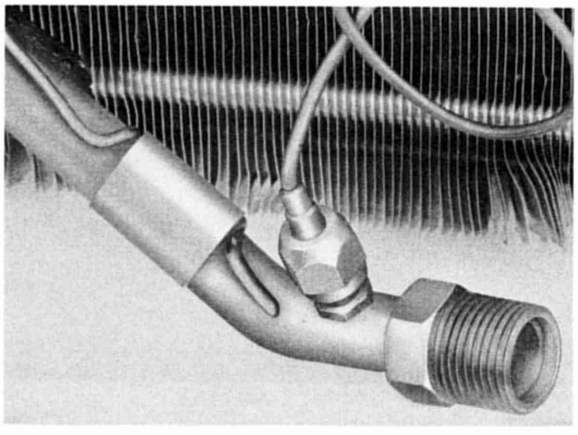
Note

Seal slot on evaporator housing, in which bracket engages, with a non-hardening sealing compound after installation of evaporator.

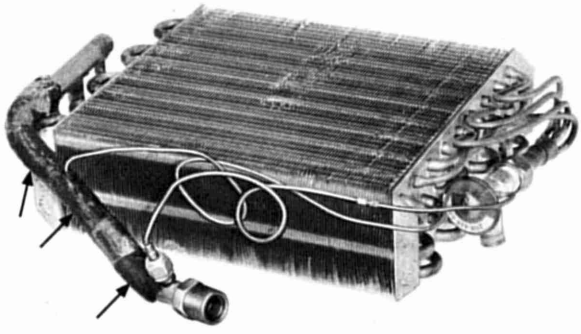


Assembly Note

Temperature sensor of expansion valve is held to evaporator line with a clip. Temperature sensor coil must have perfect metallic contact to evaporator line.



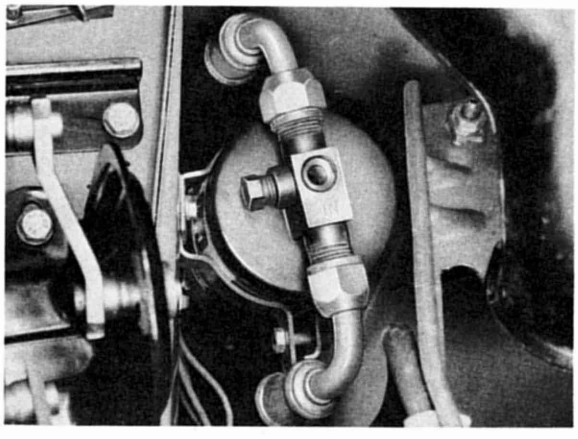
Wrap "No Drip Tape" around evaporator line carefully.



Removing and installing receiver-drier

1. Unscrew refrigerant hoses.

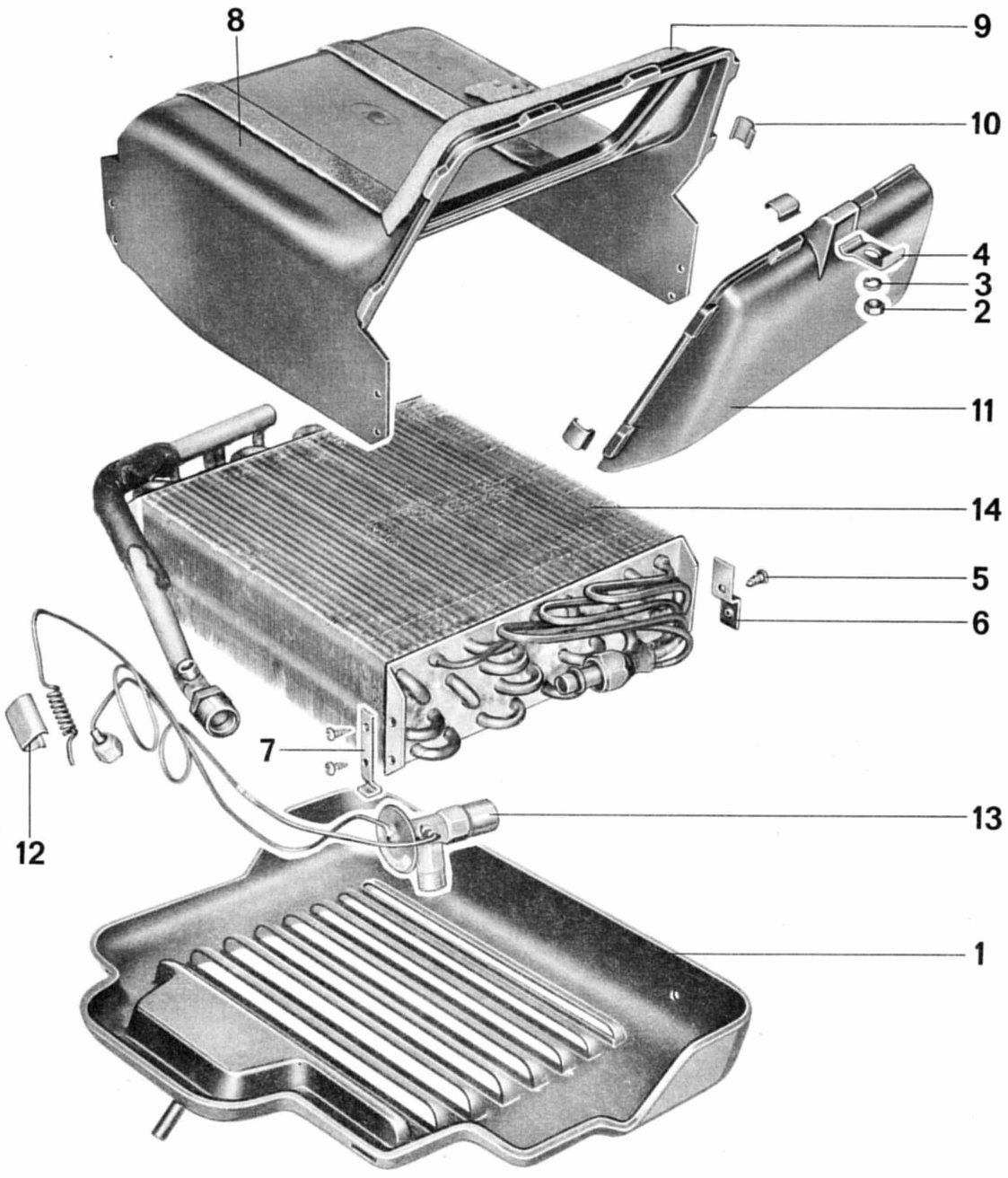
2. Loosen clamp and remove receiver-drier from above.



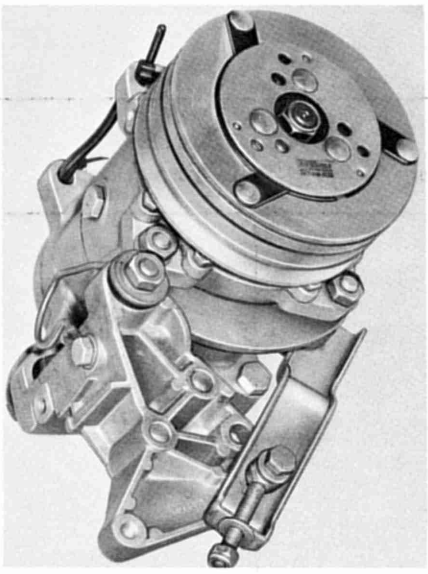
Note

When installing make sure that side marked "IN" faces forward.

DISASSEMBLING AND ASSEMBLING EVAPORATOR



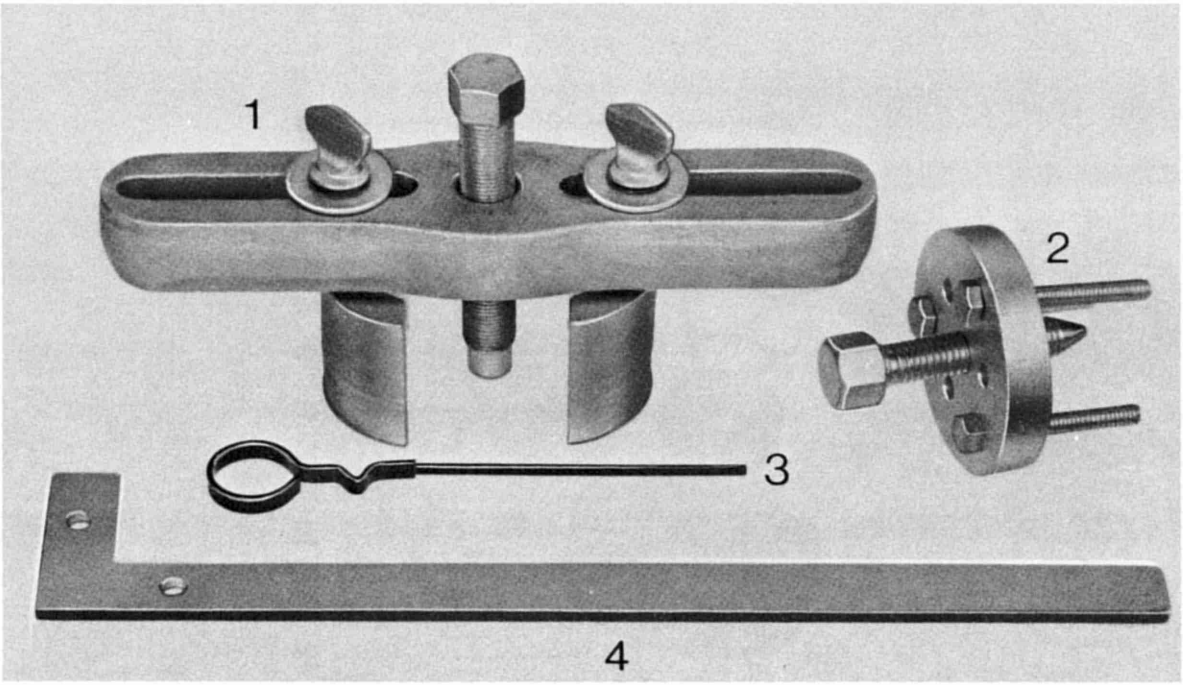
No.	Description	Qty.	Note when Removing	Note when Installing	Special Instructions
1	Water tray	1			see evaporator for removal and installation
2	Nut	1			
3	Washer	1			
4	Mounting clip	1			
5	Oval head countersunk screw	6			
6	Front bracket	2			
7	Rear bracket	2			
8	Evaporator housing	1			
9	Gasket	1			
10	Clip	6			
11	Cover	1			
12	Clip	1			
13	Expansion valve	1			
14	Evaporator	1			



DISASSEMBLING AND ASSEMBLING COMPRESSOR MOUNTING PARTS

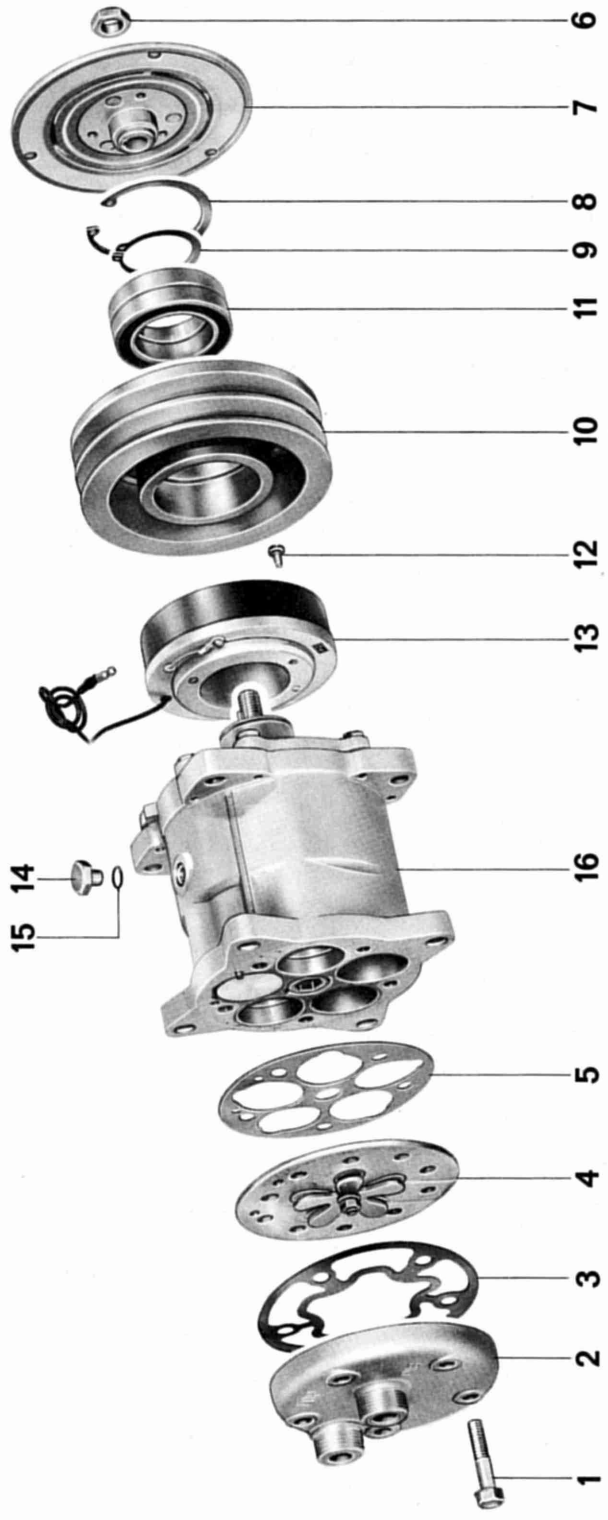
No.	Description	Qty.	Note when Removing	Note when Installing	Special Instructions
1	Nut	1			
2	Washer	2			
3	Bolt	1			
4	Eye bolt	1			
5	Nut	6			
6	Washer	6			
7	Rubber washer	1			
8	Ground wire	1			
9	Mounting bracket	1			
10	Bolt	2			
11	Clamping bracket	1			
12	Bolt	3			
13	Bracket	2			
14	Compressor	1			
15	Rubber bushing	3			
16	Bolt	1			

TOOLS



No.	Description	Special Tool	Remarks
1	Pulley puller		included in
2	Clutch plate puller		tool set
3	Oil dipstick		VPT-190 002
4	Holding wrench		locally made

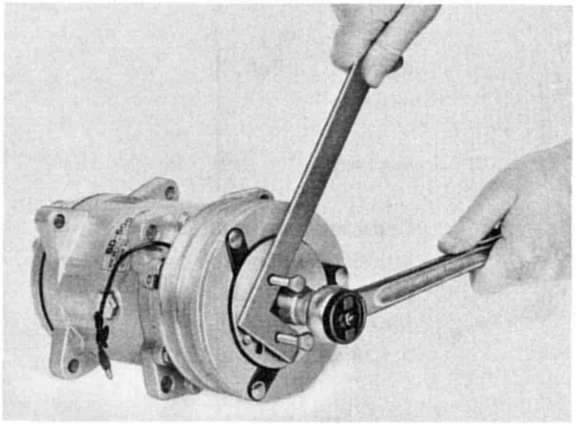
DISASSEMBLING AND ASSEMBLING COMPRESSOR



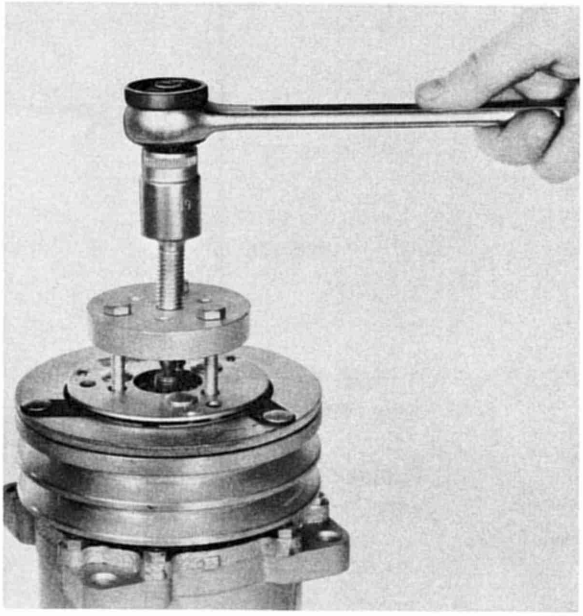
No.	Description	Qty.	Note when Removing	Note when Installing	Special Instructions
1	Bolt	5		Tighten diagonally to torque of 30 to 35 mkg (22 to 25 ft lb)	
2	Cylinder head	1	Loosen by applying light blows from plastic hammer		
3	Gasket	1		Replace	
4	Valve plate	1		Remove gasket residue	
5	Gasket	1		Replace	
6	Nut	1	Use puller	Clearance between clutch plate and pulley 0.4 to 0.75 mm (0.016 to 0.030 in.)	
7	Clutch plate	1		Replace if necessary	
8	Circlip	1		Replace if necessary	
9	Circlip	1		Replace if necessary	
10	Pulley	1	Use puller		
11	Ball hearing	2	Press out and in with appropriate sleeve		
12	Phillips screw	3			
13	Clutch coil	1			
14	Oil filler plug	1		Torque: 8 to 1.2 mkg (6 to 8 ft lb)	
15	Seal	1		Replace if necessary	
16	Compressor block	1			

DISASSEMBLING AND ASSEMBLING COMPRESSOR

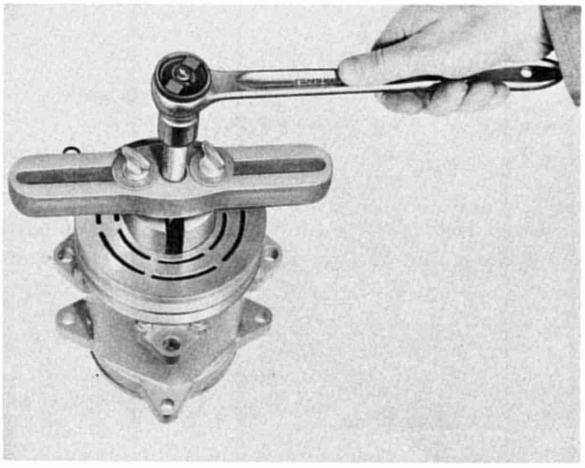
1. Use holding wrench to loosen or tighten nuts.



2. Remove clutch plate with puller.

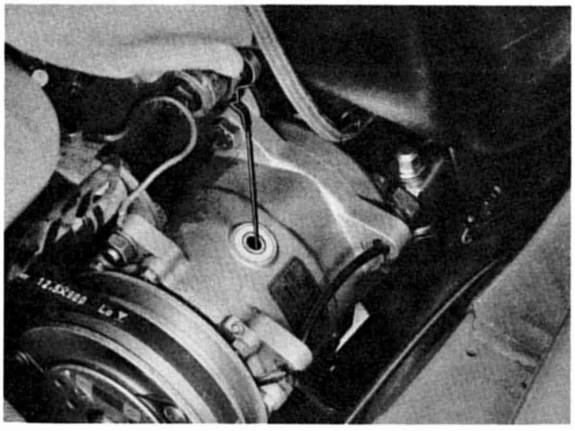


3. Remove pulley with puller.



CHECKING COMPRESSOR OIL LEVEL

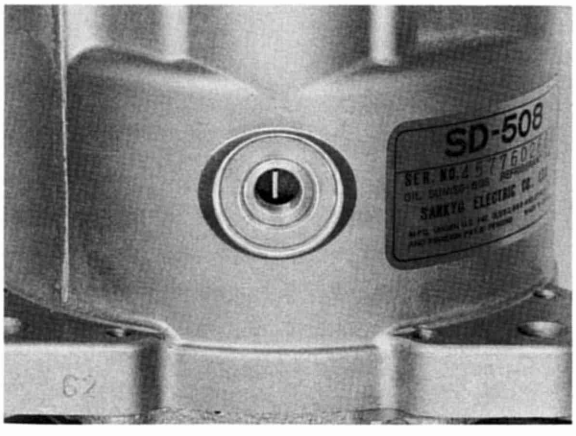
Always check and correct oil level in compressor when repairing or servicing air conditioner.

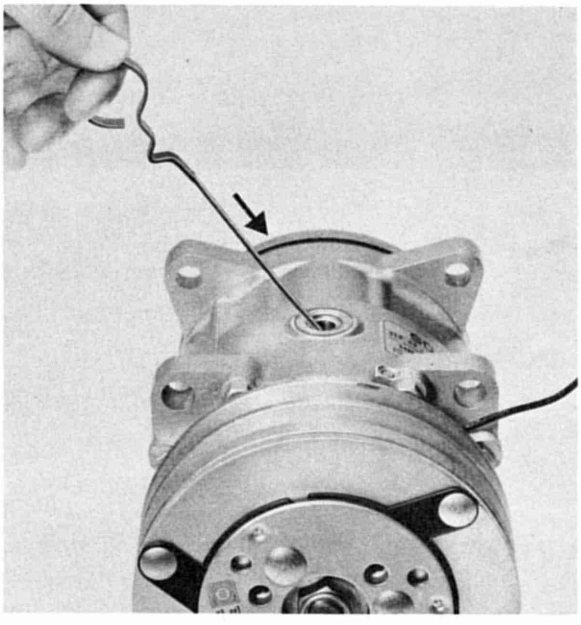


1. Turn on air conditioner and let it run several minutes (compressor clutch engaged).

2. Discharge air conditioner.

3. Remove oil filler plug and turn compressor rotor on clutch plate until top-dead-center mark is visible.





4. Turn clutch plate counterclockwise about 110° and then guide in oil dipstick at an angle up to stop.

5. Read oil level on dipstick. Correct oil level must be between 7th and 11th mark on oil dipstick.

MEASURING DISCHARGE AIR TEMPERATURE

Turn on air conditioner. Insert thermometer in center outlet. At an ambient temperature of about 20° C (68° F) the discharge air temperature at blower speed 1 must be about 5 to 6° C (41 to 43° F).

DETECTING LEAKS

Even minor leaks in an air conditioning system will lead to loss of refrigerant, which in the course of time will impair cooling efficiency and service life of system.

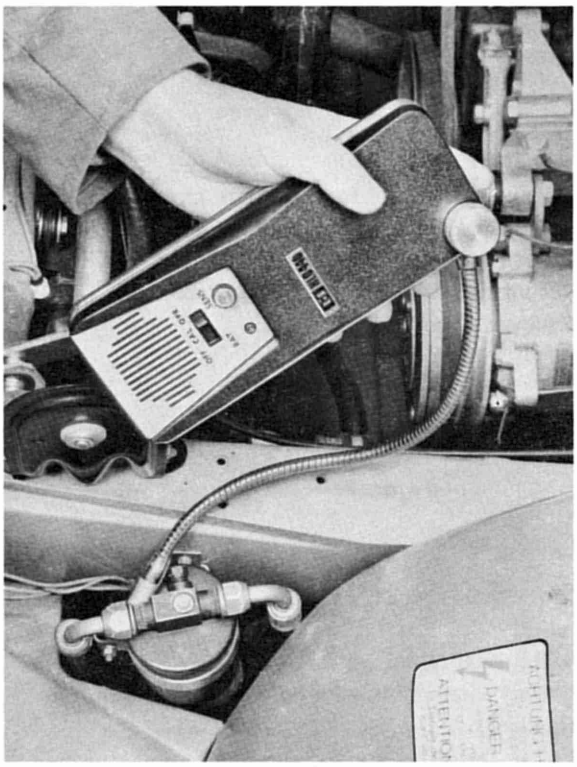
There are various ways of detecting leaks in a charged air conditioner system.

Liquid Leak Test

Apply a liquid to assumed point of leakage. If refrigerant gas is escaping at this point, gas bubbles will appear.

Electronic Leak Tester

Hold tester probe underneath assumed point of leakage. If refrigerant gas enters into probe, an audible tone will be heard or a light will become visible.



TROUBLESHOOTING

General testing condition:

Blower motor runs at all 3 speeds.
Both vacuum units disconnected.
Heater off.
Compressor V-belt tight.
All duct gaskets must be air tight (otherwise evaporator would ice up).
Condenser clean.

Note

For initial testing place hand on service valves of compressor with air conditioner switched on. After compressor has run just a short time, low pressure valve (suction side) must be cold and high pressure valve (discharge side) warm.

Preparations:

Connect high- and low- pressure gages.
Adjust engine speed to about 2500 rpm.
Insert thermometer in center outlet.
Set air conditioner at maximum cooling.
Shut car doors and windows.

No cooling at all

Safety seal ruptured?
(Safety seal will have a hole when fuse insert is ruptured)

yes → System has been overheated. Check direction of rotation of radiator and condenser fans. If condenser fan does not turn, replace relay or air conditioner switch.

No → Did compressor clutch engage?

Yes

No

Yes

Note pressure readings

1. Low pressure side reads low.
   High pressure side reads low.
   Discharge air temperature in center outlet:
   approx. ambient temperature.

   No refrigerant in system.
   Charge air conditioner.
   Find leak and eliminate.

2. Low pressure side reads high.
   High pressure side reads low.
   Discharge air temperature:
   approx. ambient temperature.

   Compressor is defective.

3. Low pressure side reads high .
   High pressure side reads high.
   Discharge air temperature:
   approx. ambient temperature.

   Expansion valve is defective.

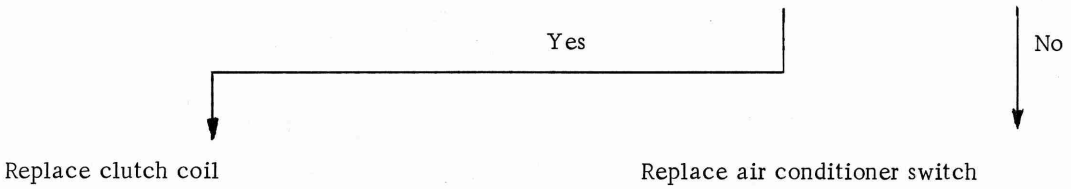
No

Measure voltage against ground at plug in supply line to compressor clutch.

Voltage?

Yes

No



Insufficient Cooling

Following pressure must be reached at an engine speed of about 2500 rpm, an ambient temperature of 20 to 30° C (68 to 86° F) and with compressor running.

Low pressure side: 0.5 to 1.5 bar (7 to 21 psi)
High pressure side: approx. 6 to 14 bar (85 to 200 psi)

1. Low pressure side too high
   High pressure side too high

   Expansion valve is defective.

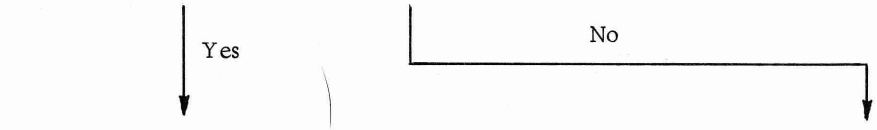
2. Low pressure side normal
   High pressure side too high

   System overcharged.
   Discharge and recharge air conditioner.

3. Low pressure side too high
   High pressure side too low

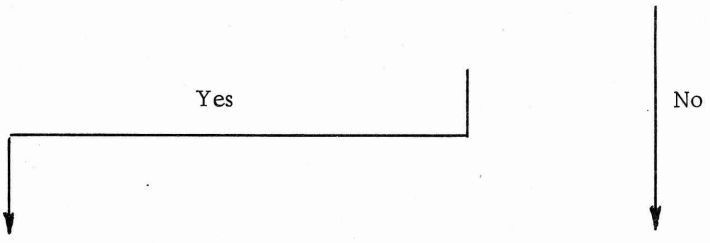
   Too little refrigerant in system.
   Observe sight glass on receiver-drier.

   Bubbles?



Find leak and eliminate.
Recharge or charge system.

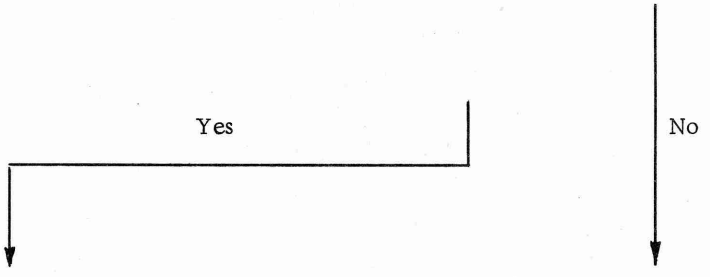
Pinched line between condenser outlet and expansion valve?



Replace line

Line plugged.
Feel line between condenser and expansion valve for cold spot with hand.

Cold spot found?



Clean and flush air conditioner

Expansion valve is defective.

4. Low pressure side too low
   High pressure side normal

   Observe sight glass on receiver-drier

   Bubbles?

   Yes → Find and eliminate leaks. Recharge or charge system.

   No → Compressor is defective. Check whether temperature sensor coil of expansion valve has good metallic contact.

5. Low pressure side normal
   High pressure side normal

   Turn off air conditioner and observe gauge readings. Have low and high pressure gauges balanced within one half minute?

   Yes → Compressor is defective.

   No → If capillary tube has been inserted in evaporator correctly (insertion depth 130 mm/5 1/8 in.), replace air conditioner switch.

Intermittent cooling

After running air conditioner about 10 minutes, check whether gage reading on low pressure side drops below 15 psi, although discharge air temperature increases to ambient temperature.

Heat expansion valve by hand. Does air conditioner deliver cool air again?

Yes

Moisture in refrigerant.
Discharge system.
Replace receiver-drier.
Evacuate system.
Recharge system.

No

If capillary tube is inserted in evaporator correctly, replace air conditioner switch.

AIR CONDITIONER SPECIFICATIONS - 1979 MODELS

1. Refrigerant Charge

850 g (30 oz.) refrigerant R 12

2. Refrigerant Oil in Compressor

230 ± 15 cc / 7.8 ± 0.5 oz.
Suniso No. 5 GS
or Texaco Capella "E"
or other oil having same specifications

3. Power Requirements

Evaporator fan 160 ± 20 W
Electromagnetic clutch 40 W

4. Temperature Control

On and off temperatures of electromagnetic clutch, air temperature measured at outlet of evaporator.

	Max. Cooling Capacity	Min. Cooling Capacity
ON	4 ± 1.5° C/39 ± 2.7° F	18 ± 1.5° C/64 ± 2.7° F
OFF	3 ± 1.5° C/37 ± 2.7° F	15 ± 1.5° C/59 ± 2.7° F

SERVICE INSTALLING AIR CONDITIONER

1. Disconnect battery.

2. Remove driver' s and passenger' s seats.

3. Remove tray and glove box.

Removing Center Console

1. Remove instrument assembly and pull off wires.

2. Remove radio.

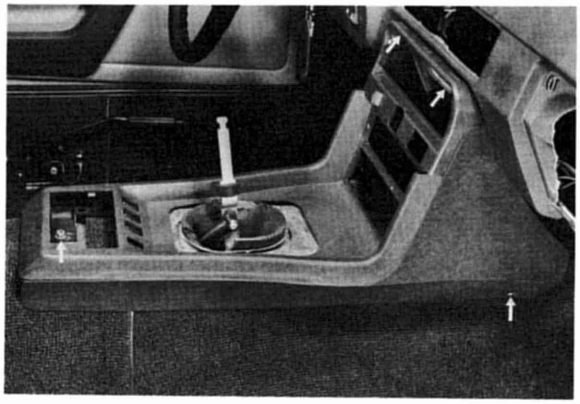
3. Pull knobs off of fresh air/heater control switches and remove plate.

4. Remove switch mounting screws.

5. Remove ashtray, push out rocker switch and pull off wires.

6. Take off shift lever sleeve and cover.

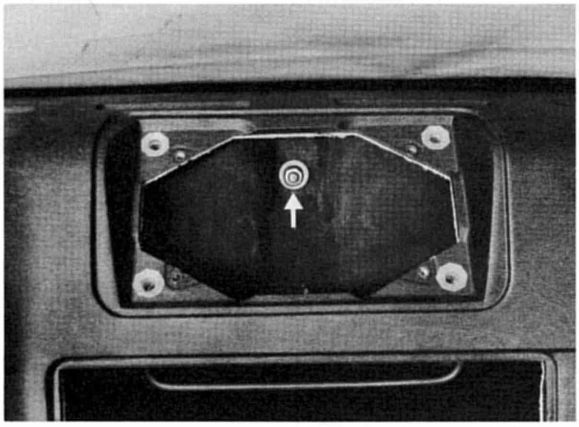
7. Remove mounting screws and lift center console over the shift lever.



Removing Heater

1. Remove glave compartment and shelf.

2. Remove speaker and center instrument panel mounting screws.



3. Remove instrument panel mounting screws on right side.

4. Drain coolant at plug in radiator.

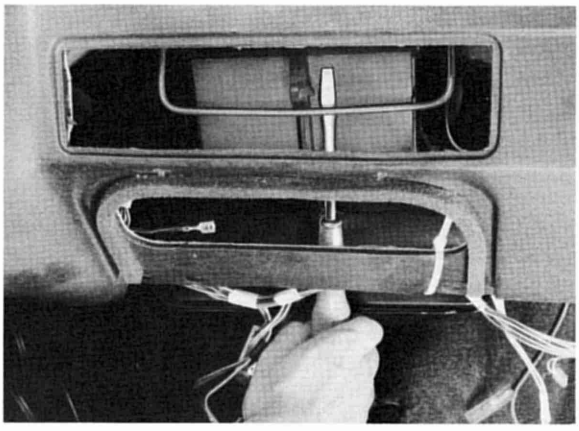
5. Remove ignition coil and place out of the way.

6. Disconnect cable on heater valve and pull in.

7. Disconnect and pull off heater hoses.

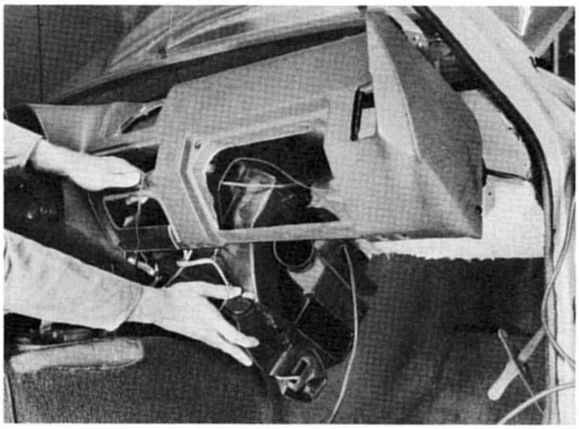
8. Remove left and right brackets for flap box on instrument panel.

9. Pry off holder for flap box upward.



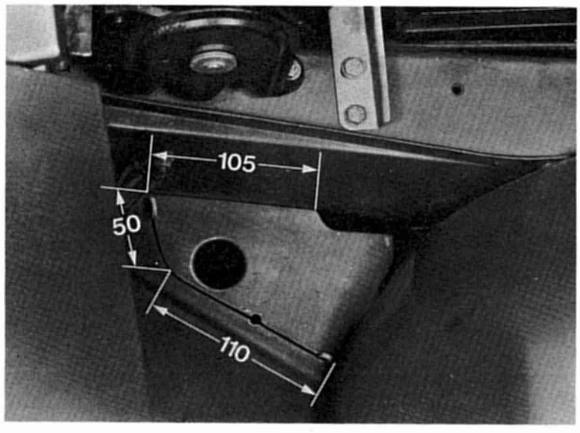
10. Pull off wires on fan switch.

11. Pull off instrument panel on right side and remove flap box with the fan switch.



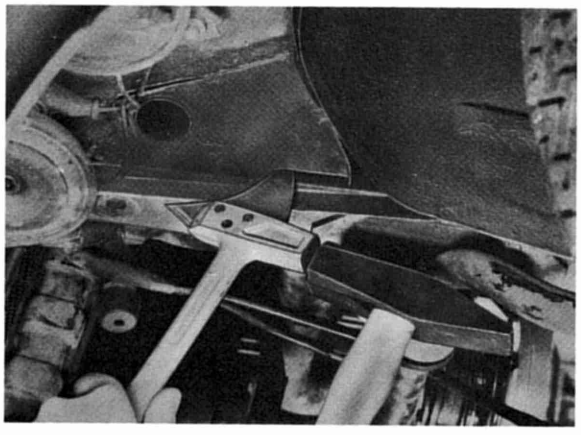
Installing Receiver-drier

1. Mark corner plate ahead of the left wheel house according to sketch.



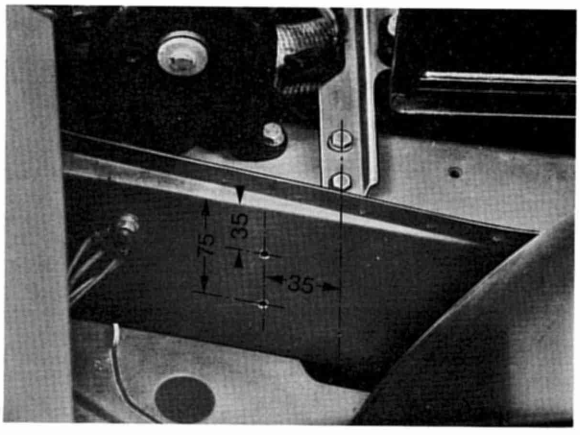
2. Cut off along marks with a nibbler and saw through the rest.

3. Chisel off along the side member and drill out the spot weld on the wheel house.



4. Deburr sharp edges and paint mating surfaces thoroughly. Install rubber edge guards on the corner plate.

5. Drill two holes with a 3,6 mm drill bit.



6. Mount bracket for receiver-drier with 4,8 x 13 hexagon head sheet metal screws and lockwashers.

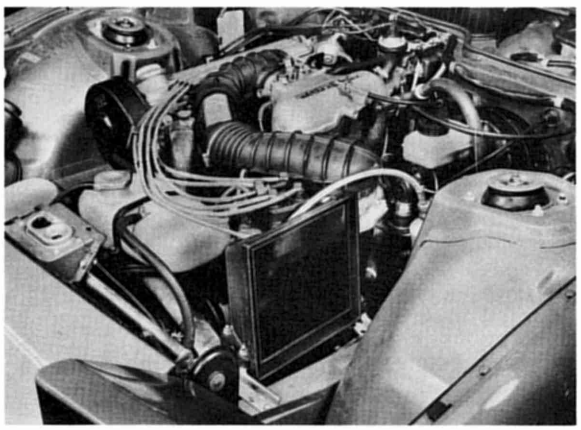
7. Mount receiver-drier on bracket, using M 5 x 20 screw, lockwasher and nut. Direction of flow is shown on the receiver-drier with the words IN and OUT. Inlet (IN) of receiver-drier faces forward.

Installing Condenser

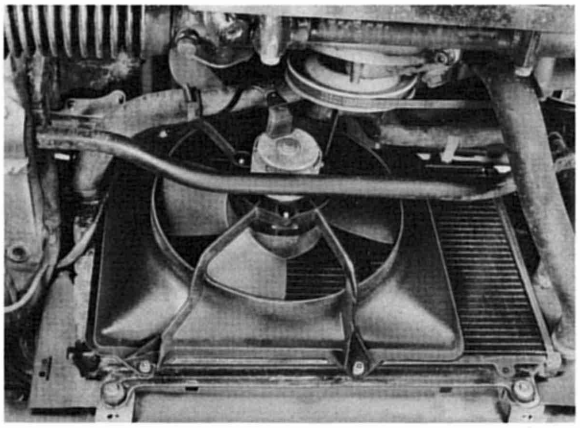
1. Remove engine protection plate.

2. Remove expansion tank and hoses.

3. Remove fuel feed line on filter. Disconnect mixture control unit complete with filter housing and place on top of engine.

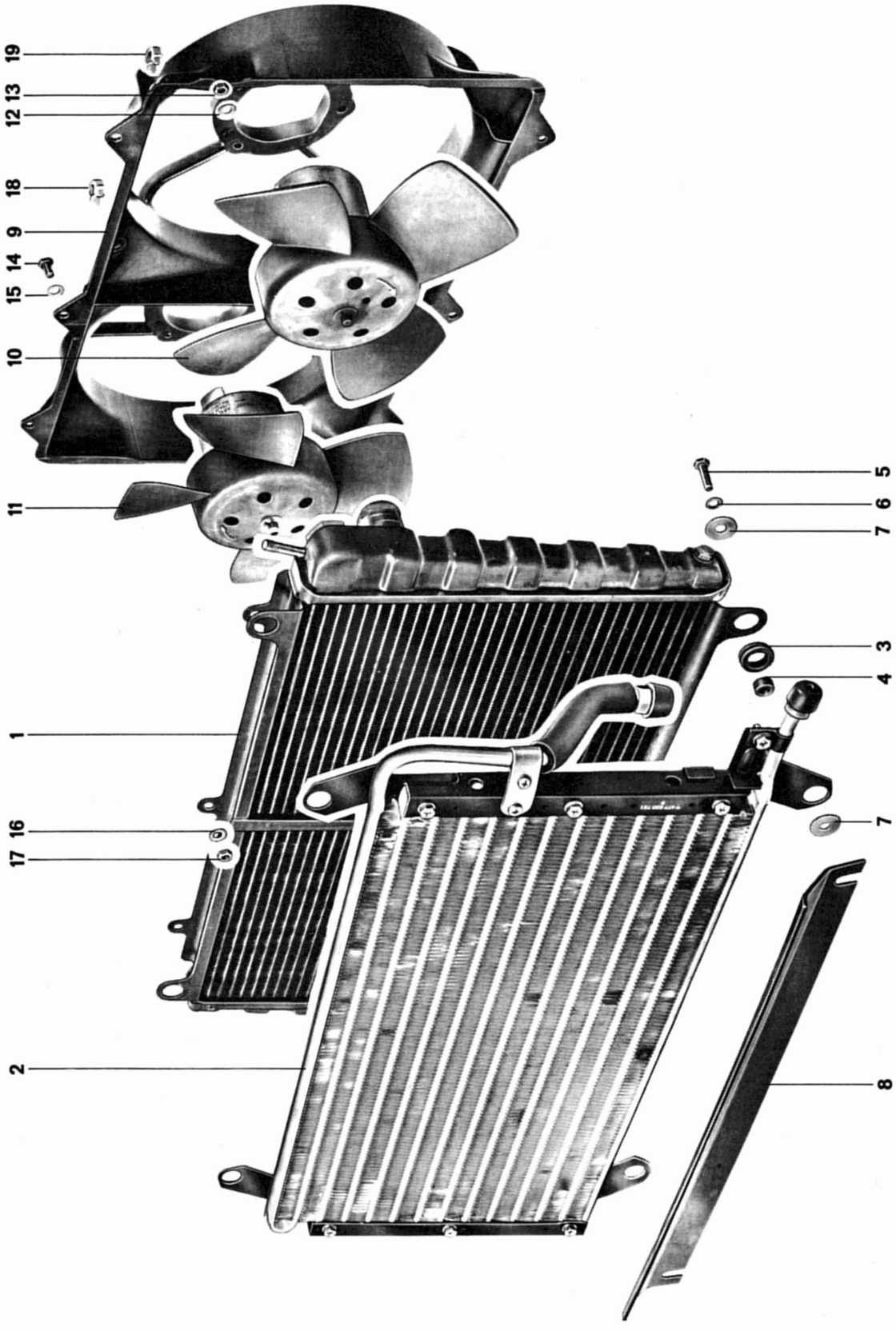


4. Loosen fan shroud on radiator at top and bottom. Disconnect fan and pull off wire plugs. Remove fan shroud and fan together downwards.



5. Disconnect coolant hoses on radiator. Pull wire plugs off of temperature switch and remove radiator.

6. Remove air inlet grill.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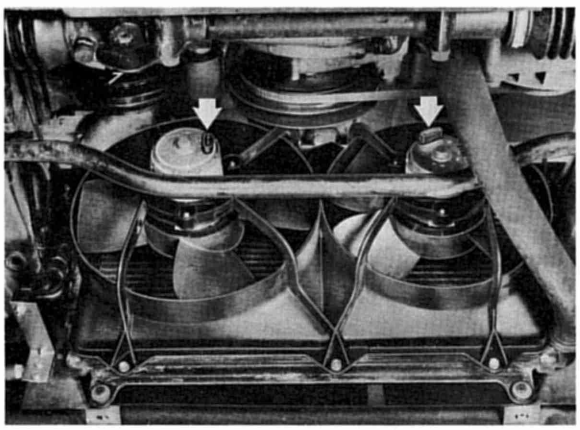
No.	Description	Qty.	Note When Removing / Installing	Special Instructions
1	Radiator	1		
2	Condenser	1		
3	Rubber grommet	4		
4	Spacer	4		
5	Bolt M 6 x 25	4		
6	Washer	4		
7	Washer	8		
8	Air guide	1		
9	Fan shroud	1		
10	Electric fan	1		
11	Electric fan (air conditioner)	1		
12	Washer	6		
13	Nut M 6	6		
14	Bolt M 6 x 12	6		
15	Washer	6		
16	Washer	6		
17	Nut M 6	6		
18	Wire clip	1		
19	Wire clip	1		

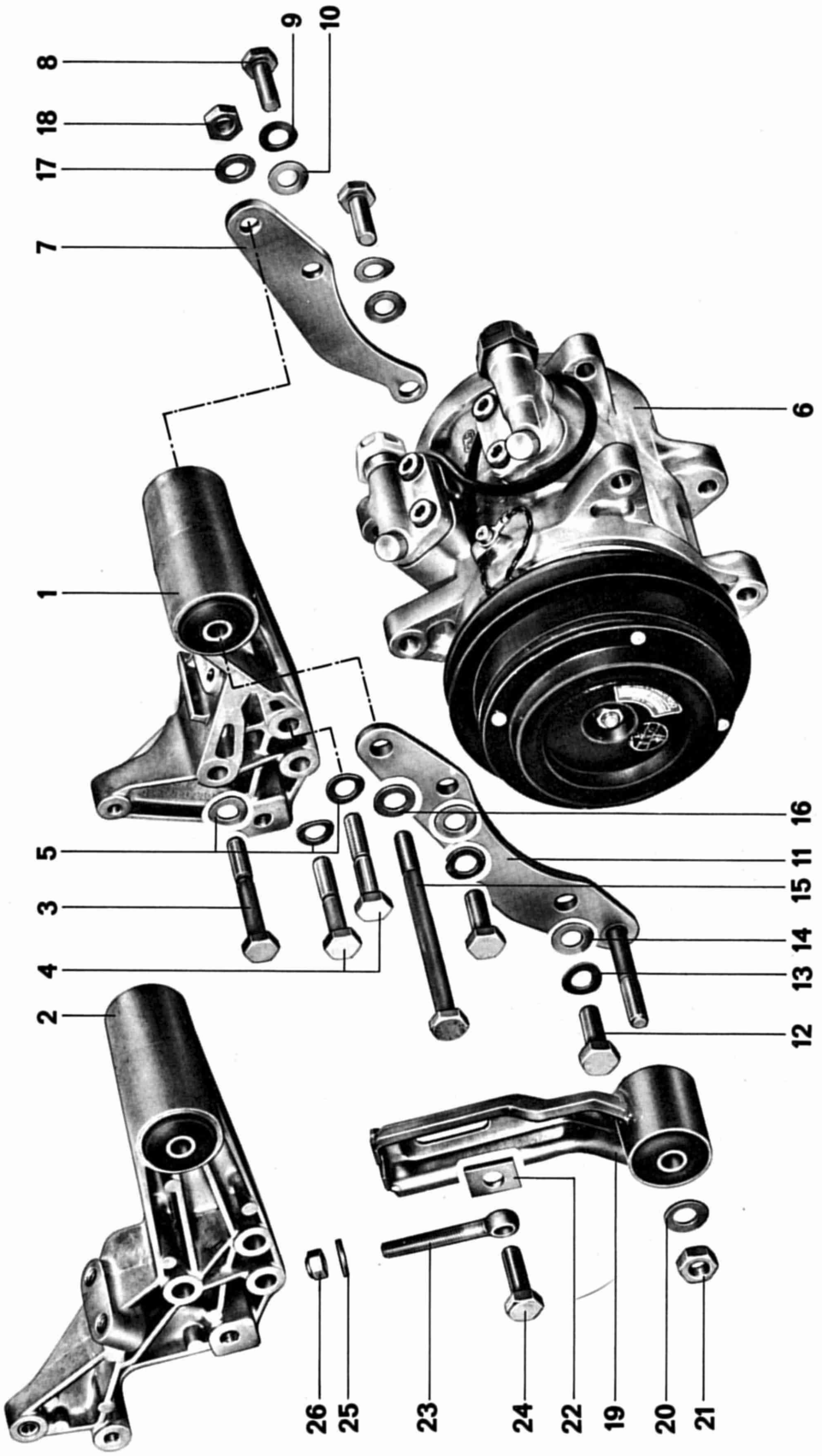
7. Assemble radiator and condenser with rubber grommets and install.

8. Push in air guide from front prior to tightening the lower mounting bolts.

9. Install air inlet grill.

10. Insert radiator fan in new air guide housing at left and air conditioner fan at right. Install from below. Install the fan motors so that the plug connections are positioned as illustrated.

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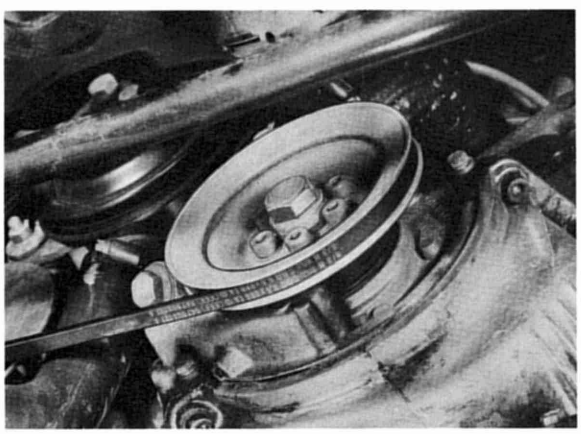
No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Support	1			
2	Support (turbo)	1			
3	Bolt M 10 x 70	1			
4	Bolt M 10 x 55	2			
5	Washer	3			
6	Compressor	1			
7	Bracket, compressor	1			
8	Bolt M 10 x 1.25 x 30	2			
9	Washer	2			
10	Washer	2			
11	Bracket, compressor	1			
12	Bolt M 10 x 1.25 x 30	2			
13	Washer	2			
14	Washer	2			
15	Bolt M 10 x 1.25	1			
16	Washer	1			
17	Washer	1			
18	Nut M 10	1			
19	Adjuster	1			
20	Washer	1			
21	Nut M 1o	1			
22	Washer	1			
23	Eyebolt	1			

No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
24	Bolt M 10 x 30	1			
25	Washer	1			
26	Nut M 8 (self-locking)	1			

Installing Air Conditioner Compressor

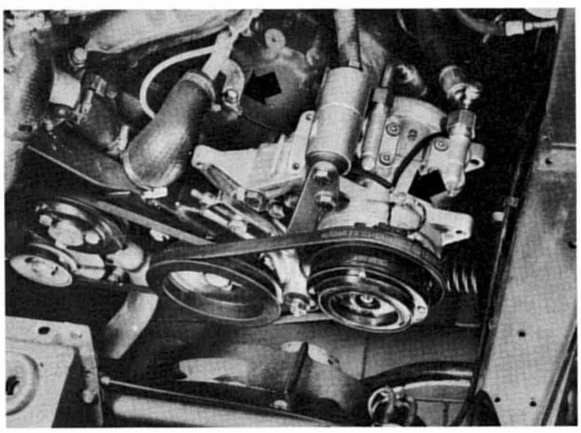
1. Loosen alternator and take off drive belt.
   Remove pulley.
   Install new pulley.
   (tightening torque: 20 Nm/14 ft.lb)



2. Bolt compressor support on engine block.

3. Mount left and right brackets on compressor. Attach compressor and install adjuster.

4. Install and tighten drive belts for alternator and compressor. Check belt tightness by applying thumb pressure on belt midway between two pulleys. Belt should deflect by about 5 to 10 mm.



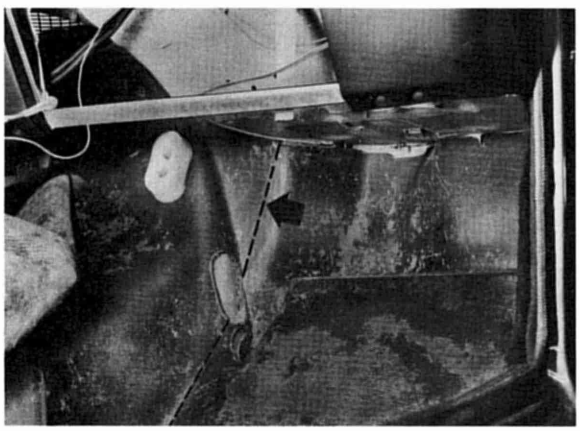
Installing Water Drain for Air Conditioner

Note

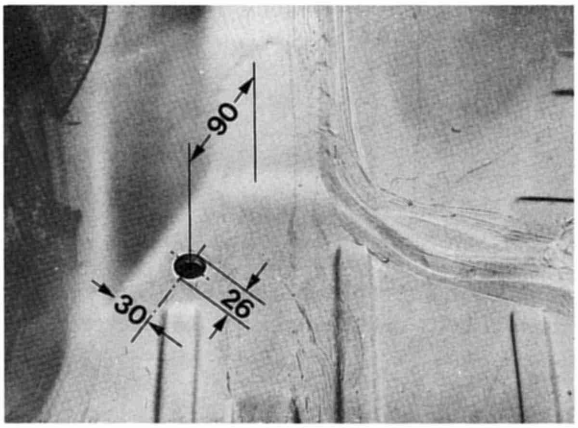
The insulation sheet in the front footwell must be replaced. To avoid having to remove the entire insulation sheet the right section in the passenger' s footwell can be cut off.

1. Disconnect and remove front floor mat.

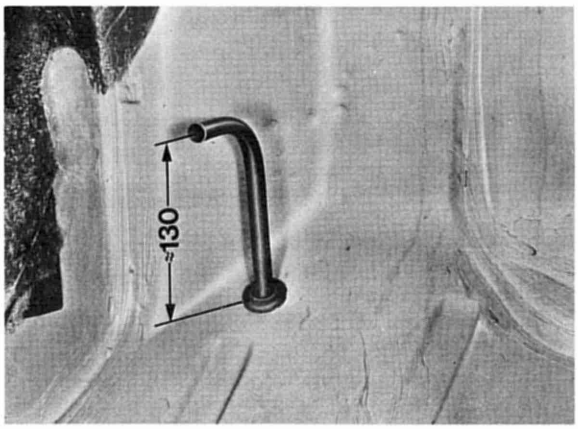
2. Cut off right section of insulation sheet in passenger' s footwell and remove.



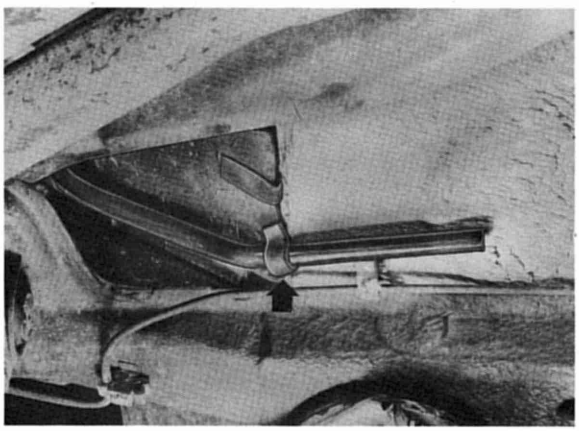
3. Mark hole for water drain on floor plate of front passenger' s footwell. Drill hole with a hole saw.



4. Push in rubber grommet and insert water drain tube.



5. Hold water drain tube on bottom of car with metal taps provided.

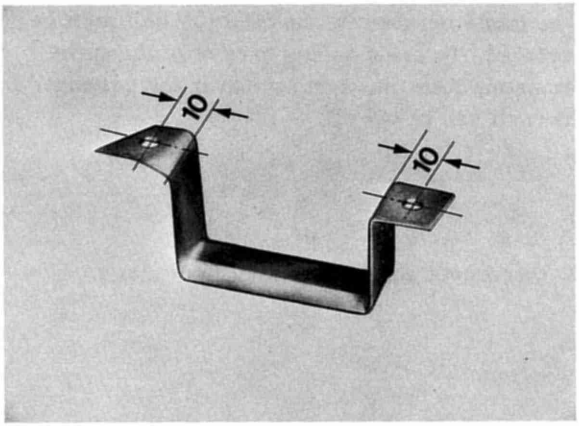


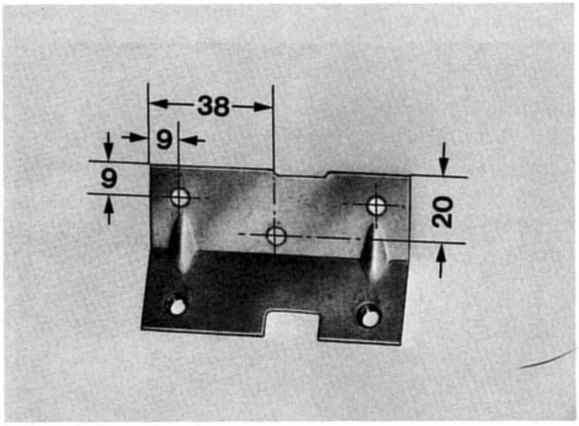
Installing Mounting Parts for Air Conditioner and Hoses

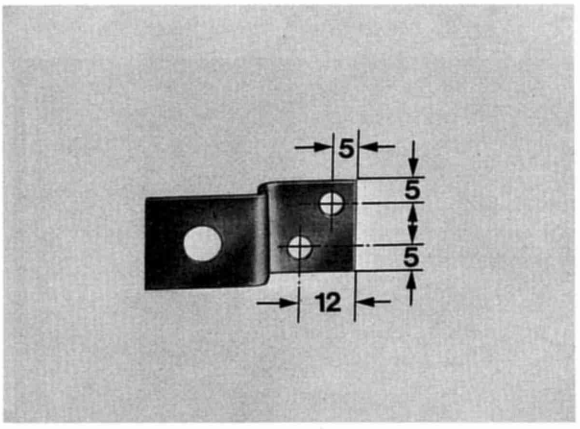
Note

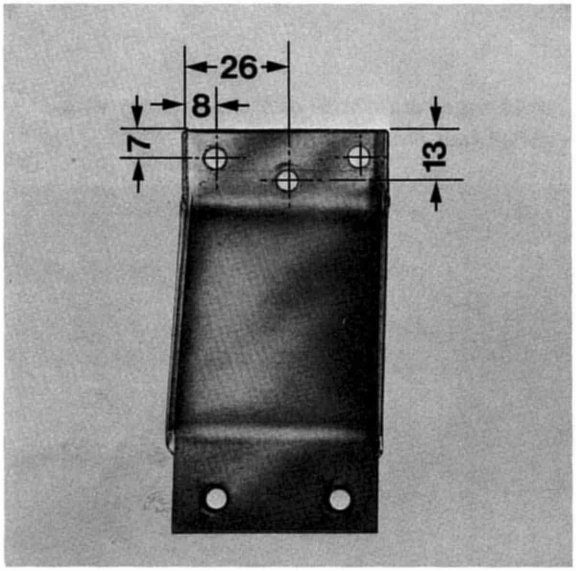
Use either 4,8 mm dia. blind rivets, sheet metal screws or bolts and nuts to mount the brackets.

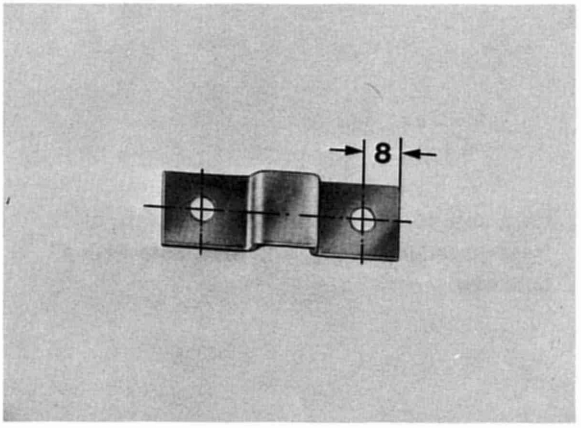
1. Mark position of holes on brackets and drill.





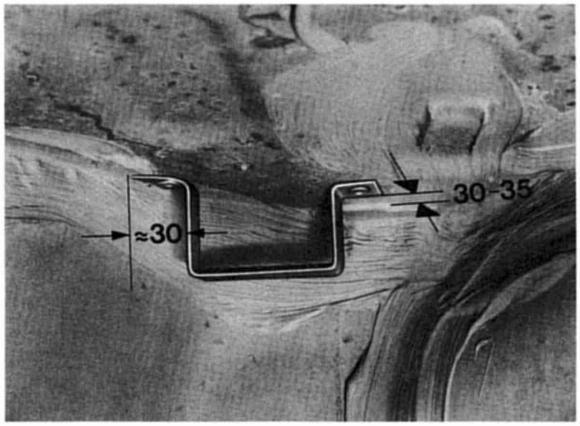




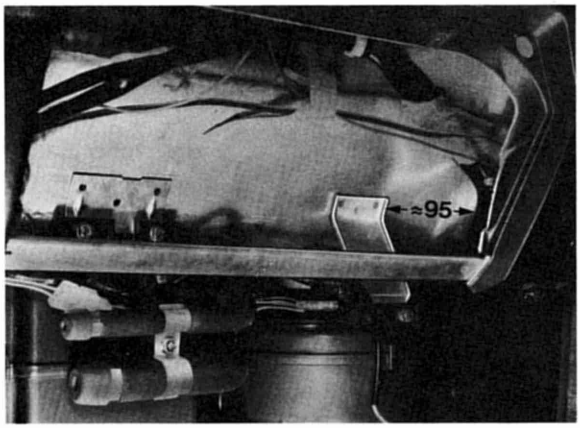


2. Remove insulation sheet above passenger's footwell.

3. First mark, drill and mount front air conditioner bracket.

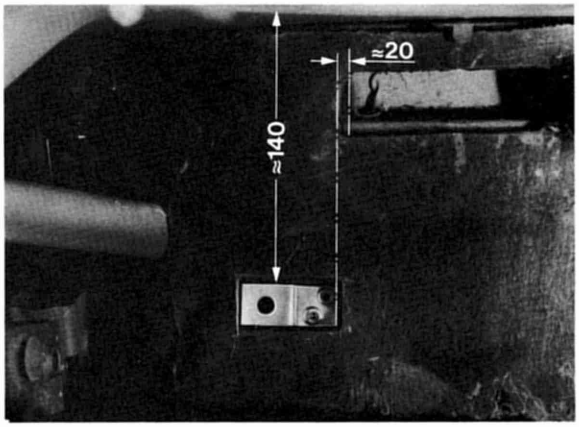


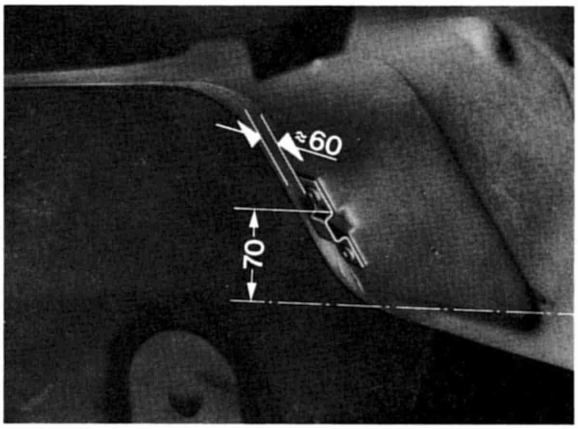
4. Bolt both rear brackets on air conditioner. Insert air conditioner on front bracket and push up. Right bracket must be about 95 mm/4 in. away from seam of outside panel of body.



5. Mark location of holes, drill and mount bracket.

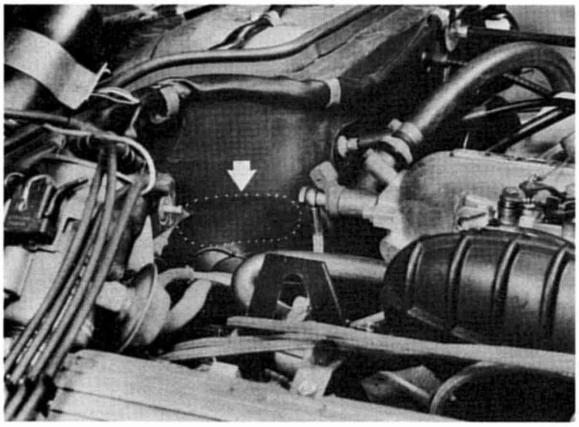
6. Install two additional brackets underneath the instrument panel for mounting of hoses.



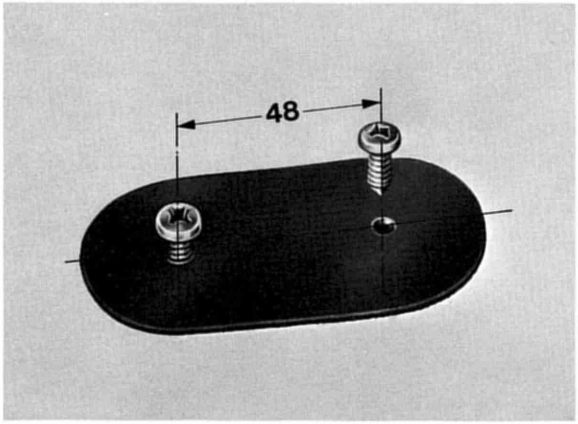


Drilling Holes for Hoses

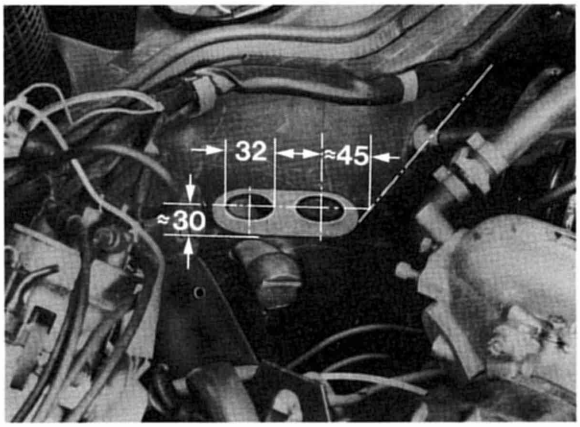
1. Cut out marked section in engine compartment insulation sheet.
   The insulation sheet opening is perforated from the inside and can be pulled off.



2. The removed section of insulation sheet can be used as a template together with 2 sheet metal screws to mark the location of both holes. The sheet metal screws must be pointed.
   Mark insulation sheet section as shown in sketch and screw in the sheet metal screws.
   To mark location of holes hold removed section in the opening and punch mark the locations by striking the heads of both screws with a hammer.



3. Rough drill punched locations with an angled drill and open up to 32 mm dia. with a reamer. Deburr both holes.

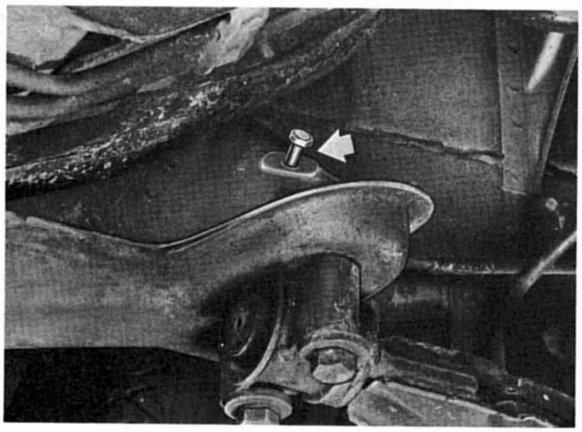


4. Insert rubber grommets for pressure and suction hoses in both holes.

Installing Hose Mounting Parts in Engine Compartment

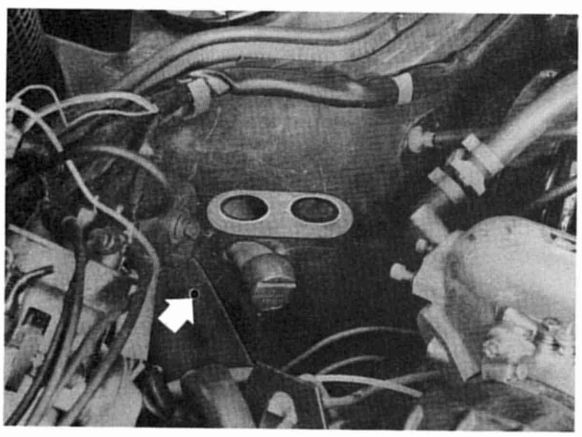
1. Open up hole above the left control arm mount so that a M 6 welding nut can be inserted.

2. Weld in nut.



3. Paint welded surface.

4. Drill a 5,5 mm dia. hole in the seam to the passenger compartment about 90 mm/3 1/2 in. below the openings for installation of the pressure hose. This hole can be drilled from the inside.

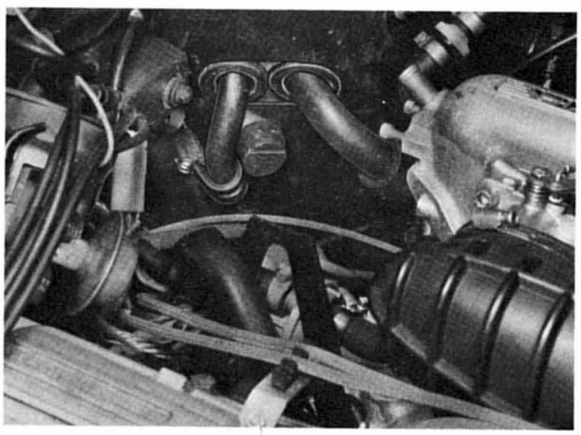


Installing Hoses

1. Insert suction hose (large diameter) with the long metal elbow through the outer grommet from the engine compartment.
   Coat hoses with an assembly paste prior to installing. Pull in suction hose so that about 54 cm /21 in. remains in the engine compartment.

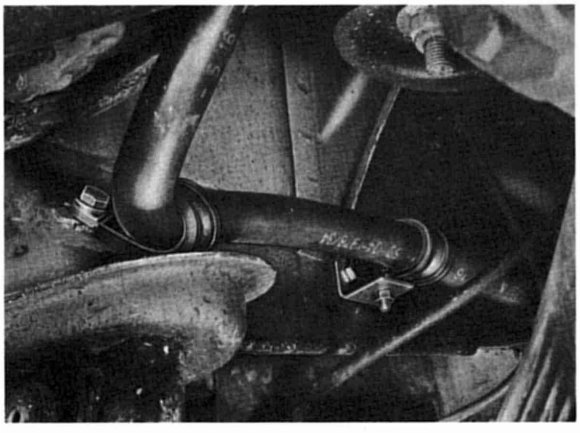
2. Insert the pressure hose in the same manner, so that 134 cm / 53 in. remains in the engine compartment.

3. Route pressure hose down along the body seam. Mount top with a 24 mm dia. hose clamp, M 5 x 20 screw, washers and nut.



4. Route suction hose forward between the brake booster and intake manifold, and connect to the compressor.
See Technical Data on page 87 - 39 for tightening torque values.

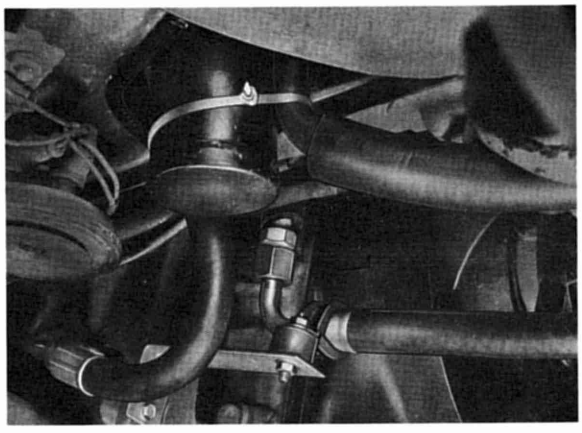
5. Mount bottom of pressure hose to the welded nut with a 21 mm hose clamp, M 6 x 16 screw, washer and lockwasher.



6. Mount pressure hose to the side member in the standard hole with a bracket, M 6 x 16 screw, washer, lockwasher, nut, 18 mm dia. hose clamp, M 5 x 15 screw, washer, lockwasher and nut.

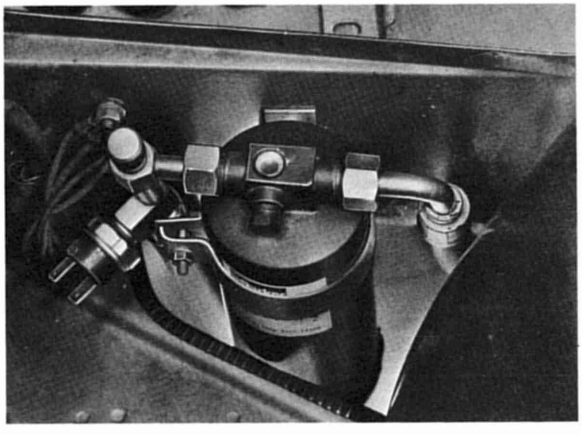
7. Mount bracket next to the radiator in the standard hole with a snap nut, 4.8 x 13 sheet metal screws and washers.

8. Connect pressure hose between compressor and condenser, and mount to front bracket with rubber/metal mount, M 6 nuts, lockwashers and 24 mm dia. hose clamp.

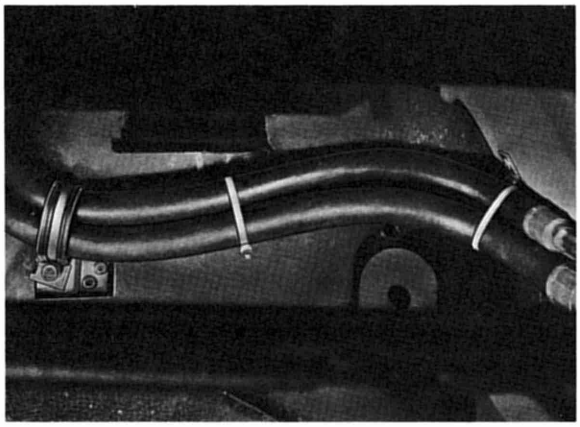


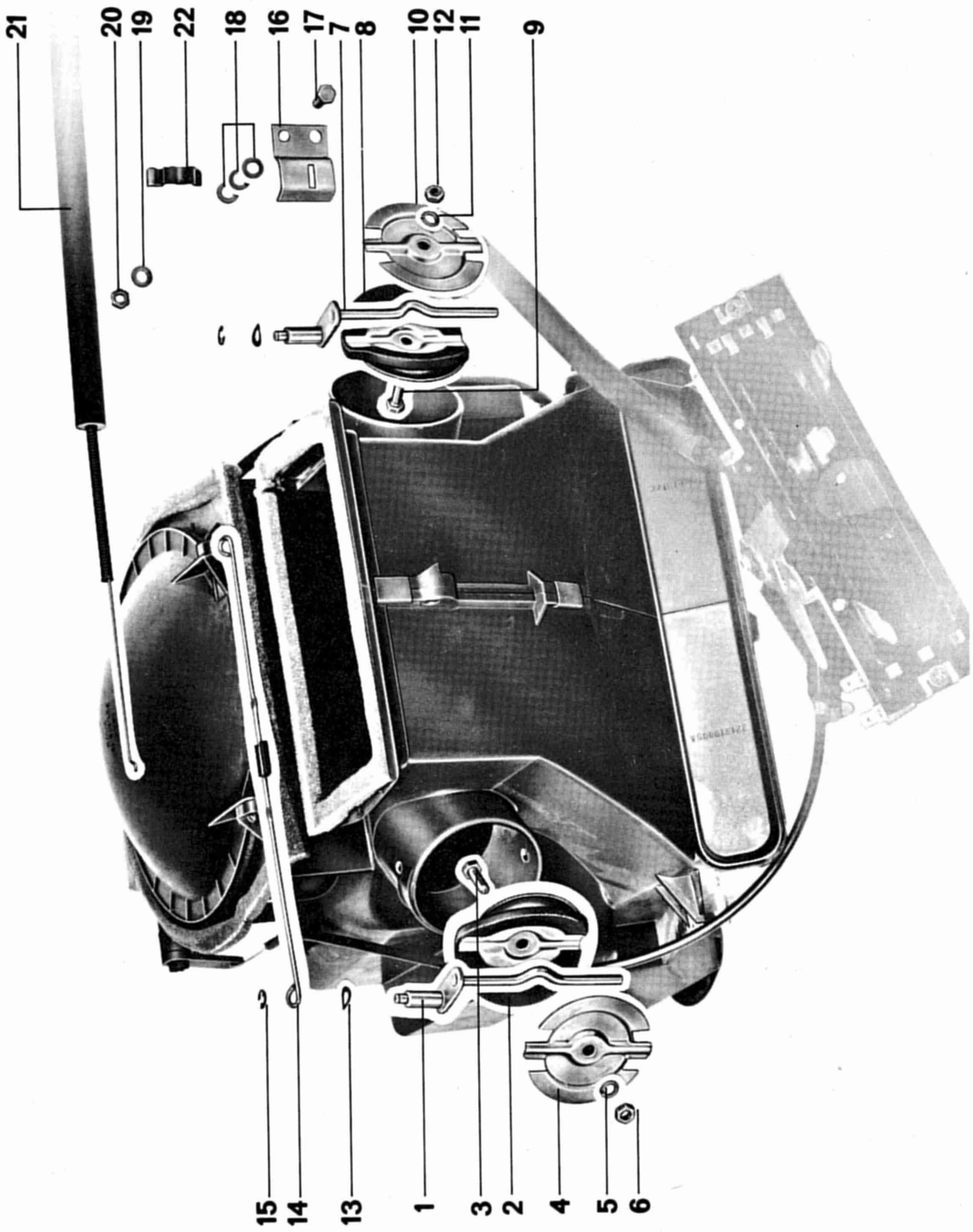
9. Connect pressure hose between condenser and receiver-drier and between receiver-drier and air conditioner. Screw in low pressure switch (tightening torque for low pressure switch: 10 Nm/87 in. lb).

10. Mount both hoses to receiver-drier at bottom end with a strap.



11. In the passenger compartment below the instrument panel mount the hoses to the left bracket with a hose clamp, snap nut, 4,8 x 13 sheet metal screw and washer.
Tie hoses together on right and in center with straps.

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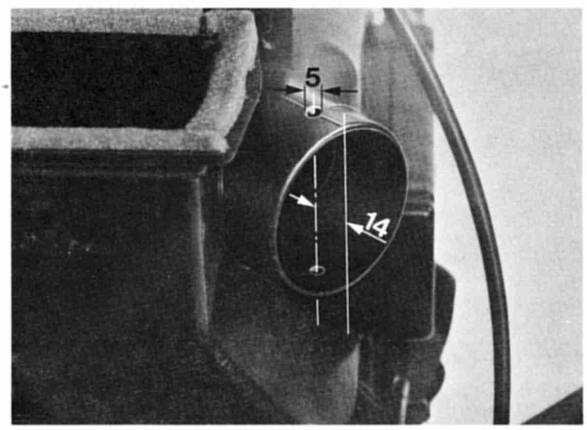
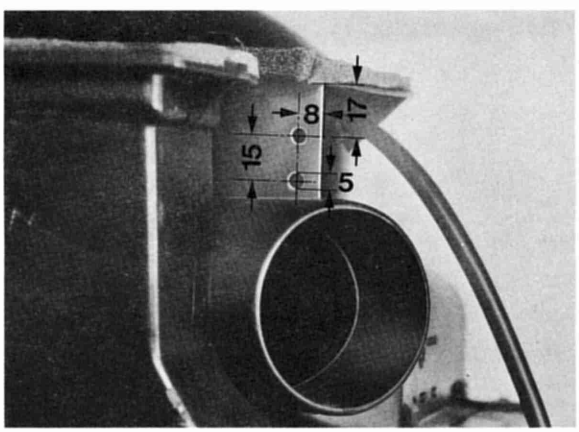
No.	Description	Qty.	Note When Removing / Installing	Special Instructions
1	Operating shaft, left	1		
2	Foam rubber seal with flap	1		
3	Bolt M 5 x 15	1		
4	Flap	1		
5	Lockwasher	1		
6	Nut M 5	1		
7	Operating shaft, right	1		
8	Foam rubber seal with flap	1		
9	Bolt M 5 x 15	1		
10	Flap	1		
11	Lockwasher	1		
12	Nut M 5	1		
13	Washer	2		
14	Connecting rod	1		Light coat of grease for eyes
15	Lockwasher	2		
16	Cable holder	1		
17	Bolt M 5 x 10	2		
18	Washer	6		Spacers
19	Washer	2		
20	Nut M 5	2		
21	Cable	1		
22	Spring clip	1		

Installing Shutoff Flaps in Flap Box

1. Mark and drill upper air outlet holes in seam at top and bottom.



2. Mark and drill cable holder.



3. Lubricate holes in air outlet openings with a light coat of grease and install shutoff flaps.

4. Bolt cable holder on flap box.

5. Install connecting rod.

6. Install new control switch in place of standard version. The additional cable is for operation of the shutoff flaps.

Note

Install cable sleeve in such a manner that shutoff flaps will be open when heater valve is closed (center lever of control switch at left stop).

Installing Heater and Air Conditioner

1. Cut off right side of new insulation sheet and fit in passenger's footwell. Make sure that the drain tube is not bent when re-gluing the insulation sheet.

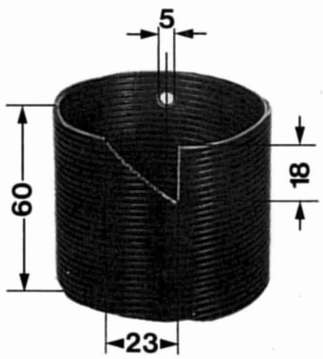
2. Glue in new floor mat.

3. Insert flap box and mount with cable holder.

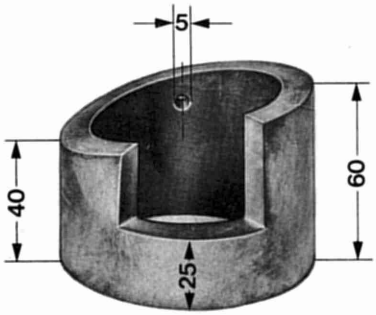
4. Connect heater hoses.

5. Push cable for heater valve into the engine compartment and connect.

6. Connect left air hose to upper outlet .



7. Connect right air outlet.



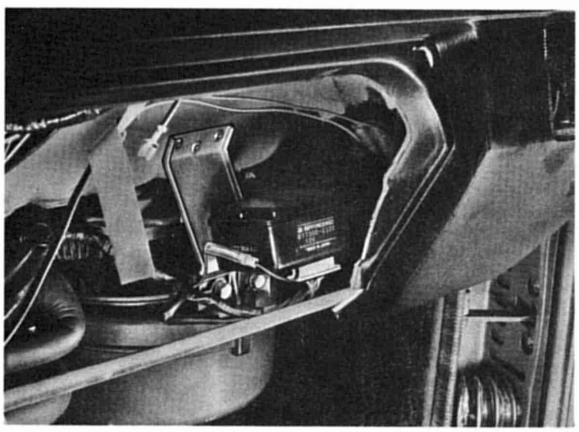
Note

If the supplied air guides are not same as those illustrated, they must be modified to conform with the specified dimensions.

8. Install distributor duct and connector (see page 87 - 52 of Repair Manual).

9. Install air conditioner, making sure distributor duct fits properly.

10. Connect amplifier with wire harness and mount on right bracket with the ground wire.



11. Attach instrument panel glove compartment and knee guard.

12. Route air conditioner wire harness to the fuse/relay panel underneath the instrument panel and secure.

13. Install center console, rocker switch and radio.

No.	Description	Qty.	Note When Removing	Note When Installing	Special Instructions
1	Control knob	1			
2	Control wheel	1			
3	Mounting plate	1			
4	Intermediate plate	1			
5	Air conditioner switch	1			

14. Install clock instead of voltmeter (voltmeter omitted).

15. Install air conditioner switch in center opening and connect with wire harness.

16. Install instrument assembly and center outlet.

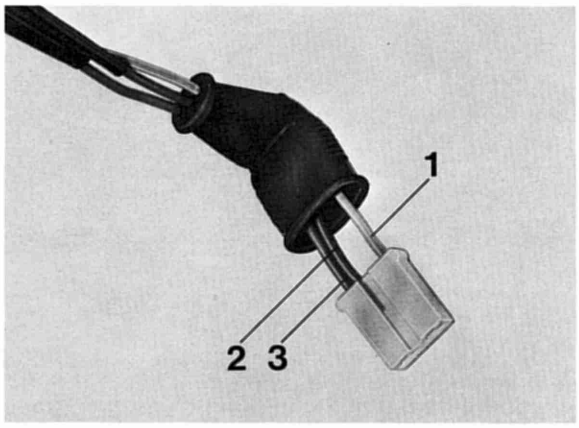
Installing Supplemental Wire Harness and Single Wires

1. Connect two-pin plug of supplemental wire harness on right fan motor.

2. Push out and cut off flat female plugs on standard two-pin plug.

3. Pull grommet off of wires and install new grommet (with 3 wire openings) on the wires.

4. Connect red/yellow wire with 6,3 x 1,5 flat female plug.
Insert brown single wire of supplemental wire harness through the grommet and connect together with the blue wire in one flat female plug 6,3 x 4.0.



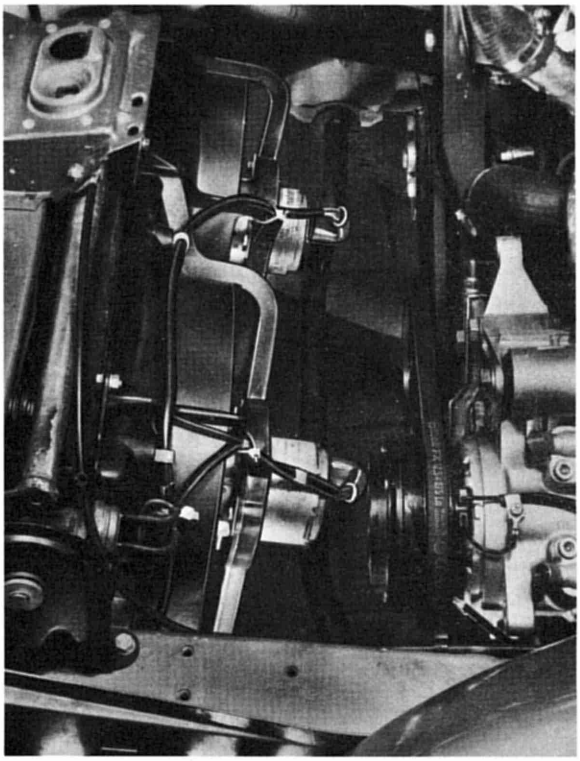
1 = red/yellow wire

2 = brown wire

3 = blue wire

5. Connect two-pin plug on left fan motor.

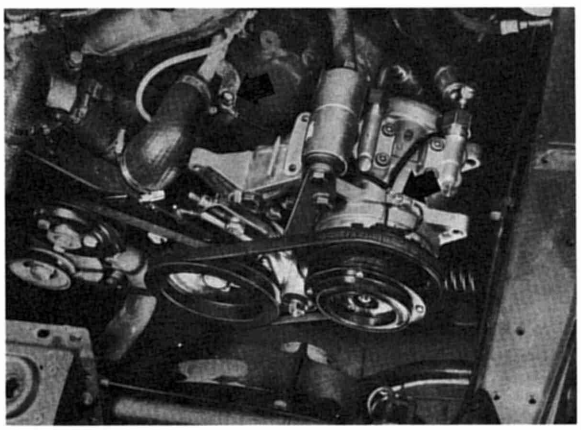
6. Mount supplemental wire harness on fan shroud with straps and clips.



7. Route both angled female plugs forward toward the headlights and connect on the low pressure switch.

8. Route supplemental wire harness along engine wire harness.
   Connect black single wire with plug of air conditioner compressor.

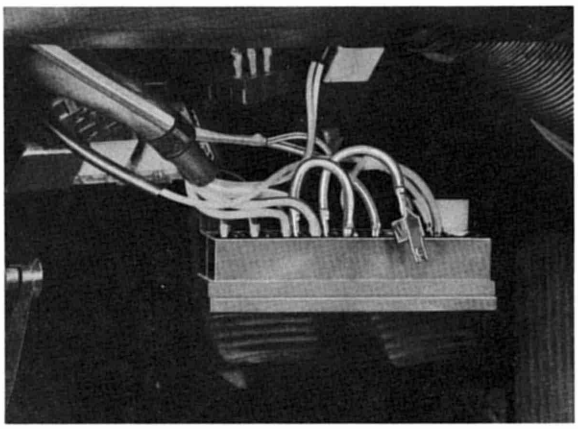
9. Mount brown ground wire to engine block and to A/C compressor.



10. Push supplemental wire harness through grommet into passenger compartment. Seal grommet with body sealing compound thoroughly.

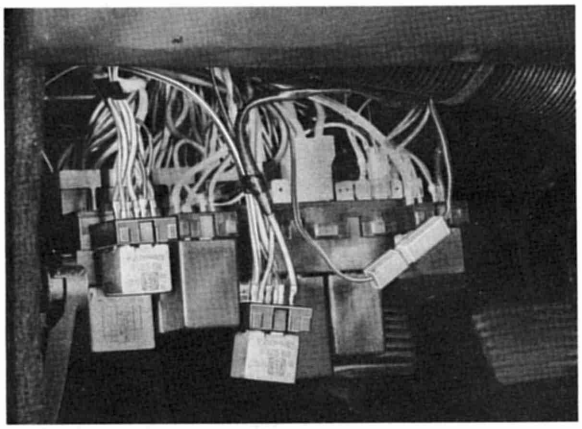
11. Disconnect fuse/relay plate and extra fuse holder, and pull down.

12. Press box contacts with the short red wires into the fuse installation points 5 and 6. Connect red wires with box contacts 3 and 4.



13. Push in box contacts of the small extra harness on the opposite side of the extra fuse holder.
   1,5 mm^2 white/black wire to fuse installation point 5 and
   2,5 mm^2 white/black wire to fuse installation point 6.

14. Remove relay for blower from the fuse/relay plate.



Blower Relay Socket

2 = term. 30 - red/brown

3 = term. 86 - brown

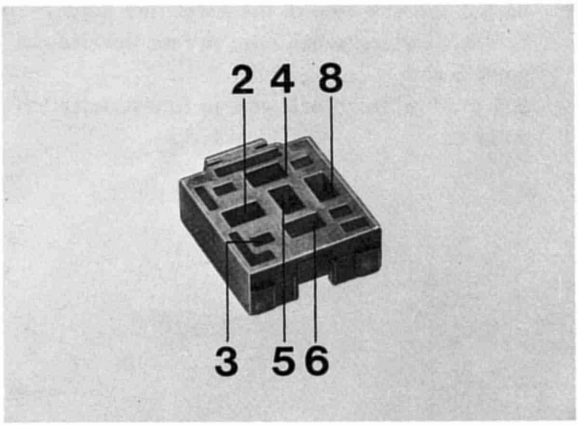
4 = term. A - black/white - 1,5 mm^2

5 = term. B - yellow/blue

6 = term. 85 - black/purple

8 = term. 87 - red/yellow

15. Remove and cut off flat female plug of brown wire on the relay socket. Install a new 2,8 x 1,0 mm flat female plug on the wire and connect on the blower relay socket according to plan.



16. Also remove and cut off flat female plug of black/purple wire. Install this wire together with the adjacent black/red wire in a 6,3 x 1,5 mm flat female plug. Reconnect the black/purple wire (term. 85).

17. Plug black/red wire in new air conditioner relay socket.

Air Conditioner Relay Socket

2 = term. 30 - black/white-2,5 mm^2

3 = term. 86 - blue/white

4 = term. A - brown

5 = term. B - brown/red

6 = term. 85 - black/red

8 = term. 87 - blue/red

18. Fit air conditioner/engine compartment supplemental wire harness with flat female plugs and flat male plugs:

yellow/blue wire - 6,3 x 1,5 mm flat female plug

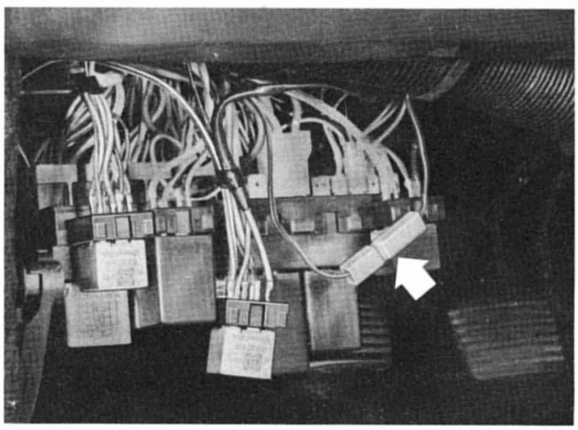
brown/red wire - 6,3 x 2,5 mm flat female plug

black/white wire - 6,3 x 1,5 mm flat male plug

Install harness and insert in flat plug receptacle.

19. Connect brown single wire on ground point above the fuse/relay plate and on air conditioner relay socket (term. A).

20. Connect black/white wire of A/C supplemental wire harness with flat male plug of black/white wire (air conditioner/engine compartment).



21. Connect remaining wires on relay sockets according to plan. It is recommended to recheck the wires against the air conditioner current flow diagram on page 97 - 53 of this Repair Manual.

Note

Relays for blower and air conditioner are identical.

22. Install relay sockets and insert both relays. Tighten screws of fuse/relay plate.

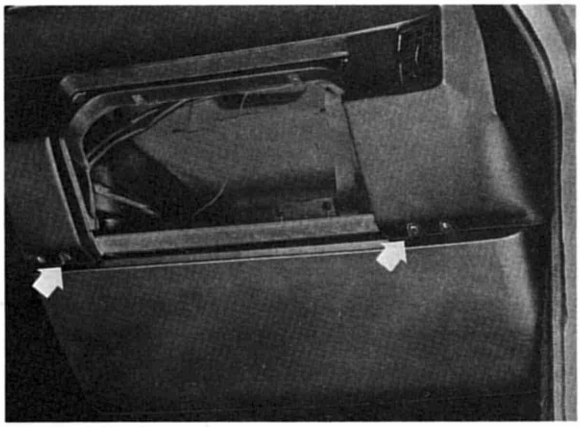
Evacuate, flush and charge air conditioner according to specifications.

Check operation of air conditioner and for leaks.

Seal grommets of hoses in engine compartment and bracket mountings with a body sealing compound thoroughly.

Installing Knee Guard

1. Drill out rivets to the left and right of the glove box opening.



2. Bolt top of knee guard to the instrument panel (snap nuts, 4,2 x 16 sheet metal screws and washers).

3. Mount bottom of knee guard on air conditioner (4,2 x 16 sheet metal screws and washers).

4. Install glove box.

Install or tighten all removed or loosened parts.

Break in compressor by running at idle speed with the clutch activated about 15 minutes.

To guarantee sufficient power for the air conditioner, the standard 45 Ah battery must be replaced by an optional 63 Ah battery.