Chassis suspension system 32

Job No.

Damper struts - shock absorbers	
Removal and rnstallatron of damper strut	
Removal and rnstallatron of rear shock absorber	110
Checking damper strut (front axle)	
Checking shock absorber (rear axle) .	121
Springs	
Removal and rnstallatron of front spring .	
Torsion bars	
Removal and rnstallatron of torsion bar on front axle	
Removal and Installation of torsion bar on rear axle	

Tightening torque	Nm
Hex. nut (self-locking) of upper damper strut suspension	60
Hex. screw for lower fastening of damper strut to steering knuckle	100
Hex. screw of clamp connection of damper strut on steering knuckle	75

Special tools

Spring tensioner for front spring	1004-7107	201 589 00 31 00
Hex. socket wrench element 32 mm $1/2$ " square 284 mm long for spring tensioner	11004-8954	201 589 01 09 00

Note

Damper struts are simultaneously serving as deflection stop for front wheels. For this reason, loosen damper strut suspension only when the vehicle is resting on its wheels or when the control arm is supported or the spring tensioner is applied.

Always renew self-locking screws and nuts on principle!

In the event of repairs, damper struts can be individually replaced, independent of make. Only the version of damper struts according to color code e.g. 1 lengthwise line red or 2 lengthwise lines red must be in agreement.

Removal

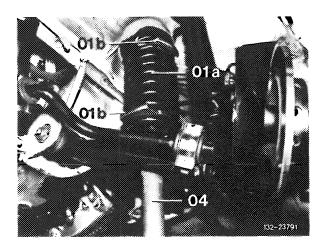
1 Jack up vehicle at the front, remove front wheel.

2 Insert spring tensioner (01) for front spring and tension spring until control arm is free of load (32-200).

Note: Insert tensioning plates of spring tensioner offset by 90" into front spring in such a manner that 7 1/2 coils are engaged.

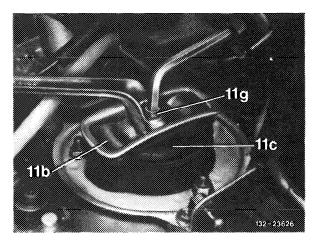
Attention!

Webs of tensioning screw and guide sleeve must be correctly seated in grooves of the two tensioning plates. Danger!



01 a Tensioning screw 01 b Tensioning plates 04 Tubular socket wrench

3 Loosen upper suspension of damper strut while supporting control arm.



11 b Spring release limit1 lc Rubber mount1 lg Piston rod

Attention!

When loosening upper damper strut suspension, pay attention to the following items:

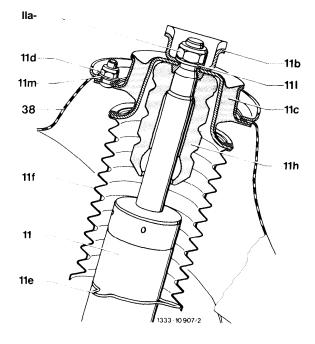
- Apply counterhold to piston rod (hex. socket wrench 8 mm)
- Do not use percussion wrench
- Do not unscrew hex. nut with axle half fully • unsprung
- Control arm must be supported.

11	Damper strut
1 12	Hoy nut

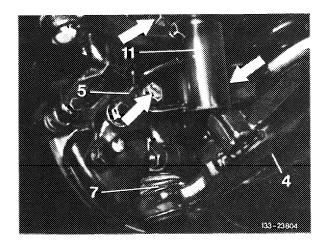
- 11b Spring release stop 1 lc Rubber mount 11d Hex. nuts

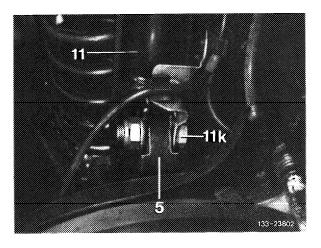
11 e Stop ring 11f Sleeve

- 11 h PU auxiliary spring 11 Washer B 15 11 m Washer
- - 38 Front end



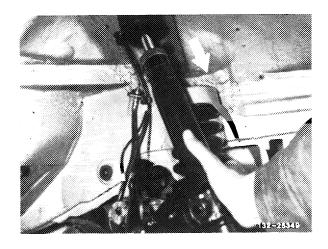
4 Unscrew hex. screws (arrows) and hex. nut (11k) of lower damper strut (11) suspension on steer ing knuckle (5).





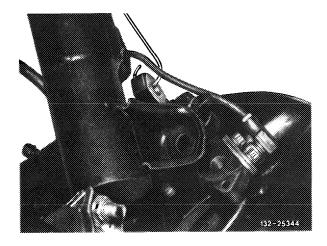
5 Steering knuckle 11 Damper strut 11 k Hex. screw with washers and self-locking hex. nut

5 Remove damper strut downwards in driving direction.



6 Protect steering knuckle with a hook against tilting.

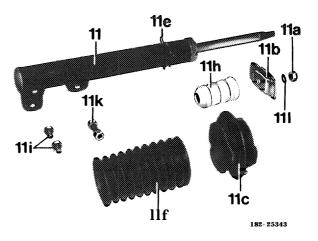
Do not expose brake hose, brake lining wear indicator and cable of rpm sensor for ABS to tensile stress.



7 Remove suspension members: PU auxiliary spring (11h) and stop ring (11e).

Note: The auxiliary spring (1 lh) is made of polyethane foam (PU) and is located between damper strut tube and rubber mount (1 lc) on piston rod.

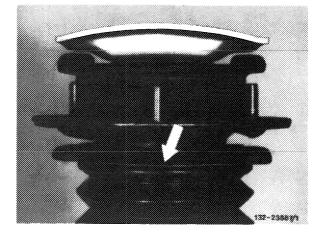
> 11 Damper strut
> 11 a Hex. nut
> 11 b Spring release stop
> 1 c Rubber mount
> 11 e Stop ring
> 11 f Sleeve
> 11 h PU auxiliary spring
> 11 i Hex. screw
> 11 k Hex. screw with washers and self-locking hex. nut
> 11 Washer



Installation

Note: If the rubber mount (1 lc) has been removed, mount with new self-locking hex. nuts (tightening torque 20 Nm).

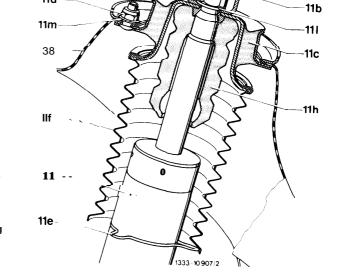
Prior to installing damper strut, connect sleeve on the two shorter collars to rubber mount (arrows).



8 Check suspension members. Clean steering knuckle on contact surface of lower damper strut suspension.

9 Mount suspension members: Place stop ring **(1** le) over damper strut tube, hook to each other and slide up to thicker section or into ring bead. Slide poly-ethane foam PU auxiliary spring **(11** h) onto piston rod.

Note: The PU auxiliary spring is the same on vehicles with standard suspension as well as on vehicles with harder suspension for countries with poor road conditions.



11 Damper strut 1 la Hex. nut 1 b Spring release stop 1 lc Rubber mount 11 d Hex. nuts 11 e Stop ring 11 f Sleeve lla

11d

- 11 h PU auxiliary spring
- 11 h PU auxiliary
- 11 m Washer
- 38 Front end

10 Introduce damper strut into rubber mount in front end.

Attention!

Locate steering knuckle and damper strut in relation to each other in longitudinal direction (caster) via centering bolt (5c) and in transverse direction (camber) via flats (arrows).

11 Mount lower damper strut suspension, inserting the two lower new self-locking hex. screws (arrows) and abut.

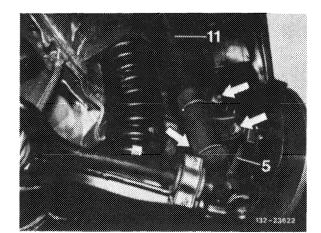
> 4 Control arm 5 Steering knuckle 7 Supporting joint 11 Damper strut

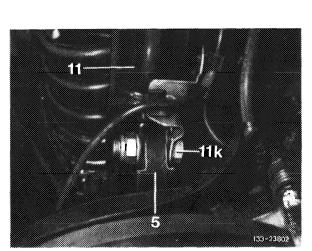
12 Push damper strut (11) at top to abut against steering knuckle (5), mount upper hex. screw with washers and new self-locking hex. nut (11 k) and tighten slightly, with face of steering knuckle resting inside against damper strut.

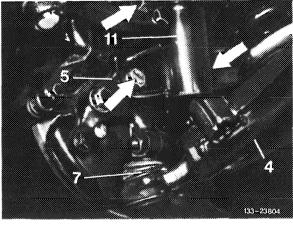
13 After inserting screws, tighten the two lower hex. screws first to 100 Nm and only then the hex. screw of upper clamping connection to 75 Nm (arrows).

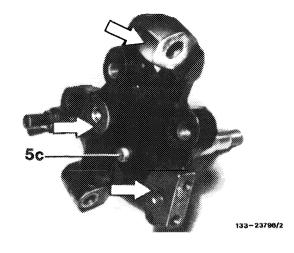
Attention!

When assembling damper strut to steering knuckle, maintain specified sequence when tightening screws, since correct location in relation to steering knuckle by way of the three contact surfaces and thereby maintenance of camber tolerances depends on that sequence.



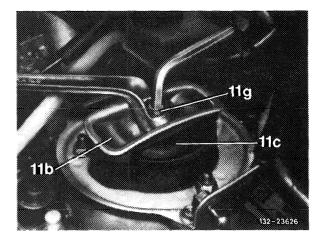






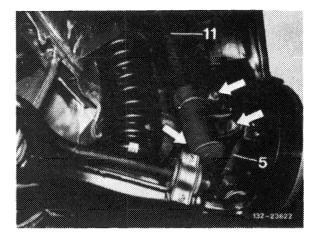
14 Lift front axle half with vehicle jack and mount upper damper strut suspension. Use new self-locking hex. nuts and washers and tighten to 60 Nm.

Do not use percussion wrench!

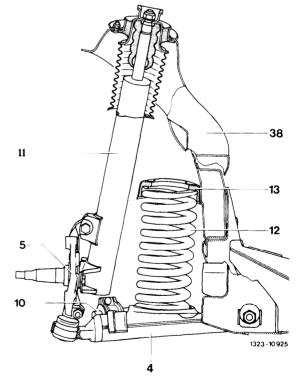


11 b Spring release limit 11 c Rubber mount 11 g Piston rod

15 Slacken front spring, while paying attention to correct seat of rubber mount in frame floor and to coil runout of spring in control arm (arrows) (32-200)



16 Mount front wheel (40-I 10), lower vehicle.



- Control arm Steering knuckle Torsion bar 4 5
- 10
- 11 Damper strut
 - Front spring
- 12 13 38 Spring-rubber mount Front end

Tightening torques	Nm
Hex. nut of lower shock absorber suspension	
Hex. nuts of upper shock absorber suspension	tighten up to thread runout

Note

The rear shock absorbers are simultaneously serving as a spring release stop for rear wheels. For this reason, loosen shock absorber suspension only when the vehicle rests on its wheels or when the spring link is supported. In the event of repairs and independent of make, the shock absorbers can be **individually** exchanged. Only the shock absorber version identified by color code e.g. **1** lengthwise line red or 2 lengthwise lines red must be in agreement.

Renew self-locking hex. nuts.

Attention!

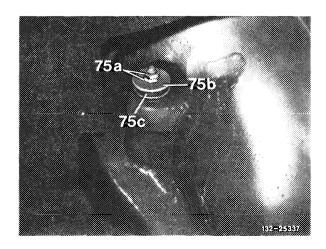
When removing shock absorbers on jacked-up vehicle with axle half relieved, make sure that the shock absorber tube is not turning along while loosening the upper suspension, Since in this condition the spring release stop in shock absorber rests against power piston, the fastening of the power piston to piston rod might become loose. The gas pressure would then result in a sudden extension of piston rod and a loss of the oil in shock absorber (danger).

Removal

1 Remove trunk lining,

2 Unscrew hex. nuts (75a) of upper suspension, remove washer (75b) and rubber ring (75c).

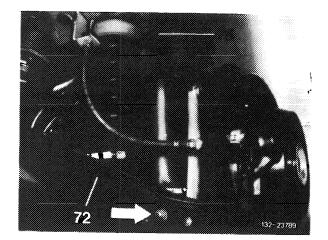
Note: If the shock absorber tube is turning along when the hex. nuts are unscrewed, hold tube manually in wheelhouse. Loosening of counternut requires a flat open-end wrench **(17** mm width between flats) and grind to thickness of 5 mm, if required.

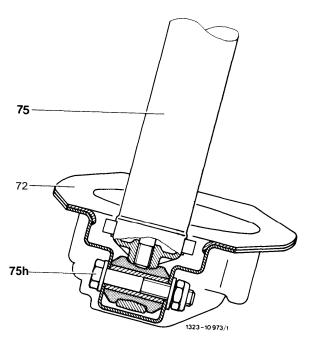


3 Jack up vehicle on rear axle.

4 Remove holding clamps of spring link cover and remove cover.

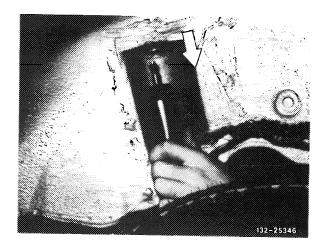
5 Loosen hex. nut of lower suspension on spring link (72) and remove hex. screw (arrow).

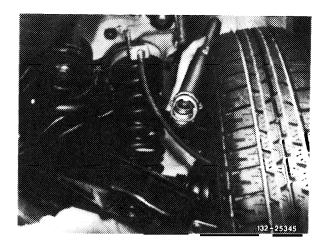




72 Spring link 75 Shock absorber 75h Hex. screw with washers and self-locking nut

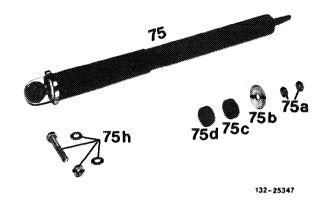
6 Push shock absorber in downward direction out of mounting bore in frame floor, remove shock absorber from spring link and take off in rearward direction.





Installation

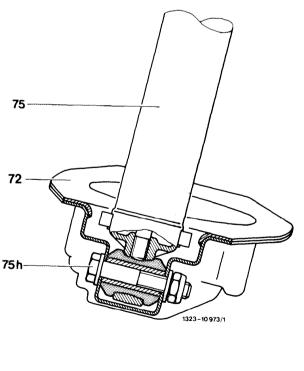
7 Check suspension members.



75 Shock absorber 75a Hex. nuts 75b Washer 75c Rubber ring, upper 75d Rubber ring, lower 75h Hex. screw with washers and self-locking nut

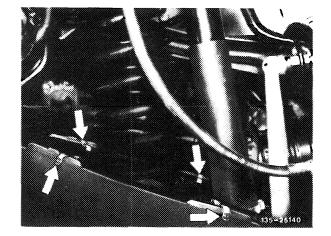
8 Place rubber ring (75d) on shock absorber.

9 Insert shock absorber and mount lower suspension. Tightening torque of self-locking hex. nut 65 Nm.



72 Spring link 75 Shock absorber 75h Hex. screw with washers and self-locking nut 10 Fasten spring link cover with 4 spring clamps (arrows).

11 Lower vehicle.



75 a

75b

75c

75d 76

75

71

0

1323-11037

1324 - 10 937

74

ര

72

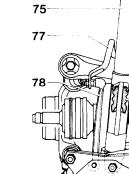
12 Mount upper suspension, making sure that parts are correctly seated. Tighten lower of the two hex. nuts up to end of threads, then counterlock with upper nut.

> 75 Shock absorber 75a Hex. nuts 75b Washer 75c Rubber mount, upper 75d Rubber mount, lower 76 Frame floor

13 Install trunk lining.

- Rear axle carrier 71 72 73 74 75 76 77 78 95
- Spring link
- Rear spring Rubber mount rear spring
- Shock absorber Mandrel on frame floor Torsion bar

- Connecting rod for torsion bar PU auxiliary spring



W)

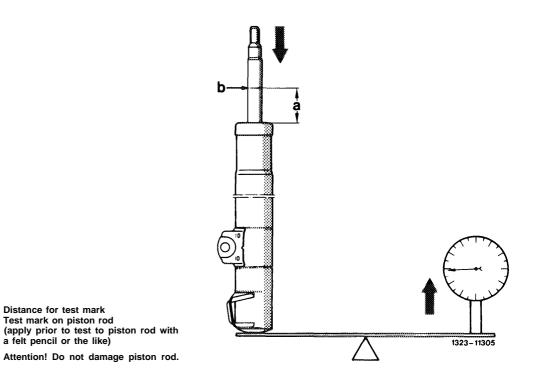
95 73

76

Designation	Part No.	Color code on damper strut tube	values in and 50 m	Adjustment reference values in N at 100/min and 50 mm stroke for new damper struts		Checkup of oil reserve in damper strut ¹) Gas extension force on piston rod including weight of damper strut (piston rod pushed in to test dimension a = 84)	
		Pull	Push	Value when new	Minimum value		
Bilstein 201 320 02 30 F & S 201 320 05 30	201 320 02 30	1 lengthwise line red	740	320		(70 N	
	201 320 05 30	2 lengthwise lines red	1150	450	280 ± 30 №	170 N	

Test values of damper struts

1) For measuring oil reserve, temperature of damper strut should amount to approx. 20 $^\circ\text{C}.$



Note

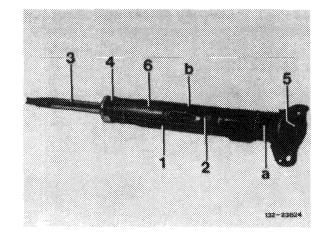
When testing and evaluating damper struts, always proceed on basis of design.

а

b

The damper strut is designed as a double tube gas pressure shock absorber without separating piston (installation position with piston rod in upward direction).

With shock absorber on rear axle, the oil and gas chamber is separated by a separating piston.



- 1 Damper strut tube
- 2 Power piston 3
- Piston rod Closing assembly with piston rod seal and piston rod guide 4
- 5 Floor valve
- 6 Power cylinder
- a Working chamber b Compensating chamber

Visual checkup

Carefully inspect piston rod for surface damage.

Check piston rod for distortion. A distorted piston rod shows up by binding during insertion into guide bushing.

Note: For lubrication of piston rod guide outside piston rod seal the design provides for a slight oil film on piston rod.

Checking oil reserve

The oil reserve is checked by means of extending force of piston rod in installation position of damper strut. During checkup, temperature of damper strut should amount to approx. 20 °C.

Checking requires a scale (for weighing material or persons) with a weighing range of O-40 kg.

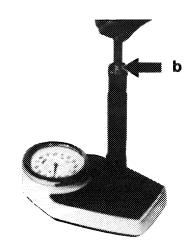
Test procedure

Prior to evaluation, push down piston rod in installation position (piston rod pointing upwards) several times for at least 100 mm. Damper strut can be evaluated when hissing sound is no longer heard while pushing down piston rod.

Write distance "a" = 84 mm onto piston rod by means of a felt pencil or the like.

Place damper strut on scale and push in piston rod up to test mark "b".

Following a short stabilization period, read value on scale and compare with value in table. (The dead weight of the damper strut is taken into consideration in table values.)



132 - 25312

In the event of a gas or oil leak, the extension force of piston rod will be reduced. If the minimum value is exceeded, the damping force effect will be impaired and replacement is required.

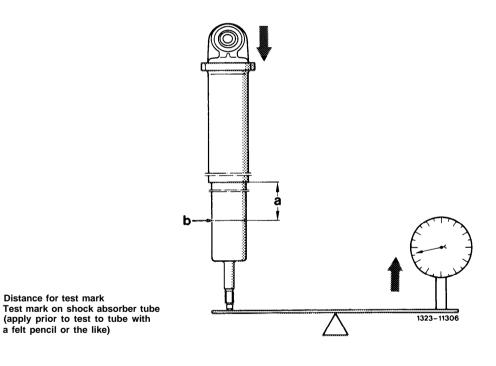
Attention!

In the event of repairs, damper struts can be individually exchanged, independent of make. Only those damper strut versions which are identified according to color code e.g. 1 lengthwise line red or 2 lengthwise lines red must be in agreement.

Designation	Part No.	Color code (mount shock absorber so that color code on tube can be seen from outside)	Adjustment reference values in N at 100/min and 50 mm stroke for new shock absorbers		rod including	r ¹⁾ force on piston weight of shock on rod pushed in
			Puli	Push	Value when new	Minimum value
Bilstein	201 326 05 00	1 lengthwise line red	930	360		450 N
F & S	201 326 06 00	2 lengthwise lines red	1150	450	260 ± 25 N	150 N

Test values of shock absorbers

 $^{1})$ For measuring oil reserve, temperature of shock absorber should amount to approx. 20 $^{\circ}\text{C}.$



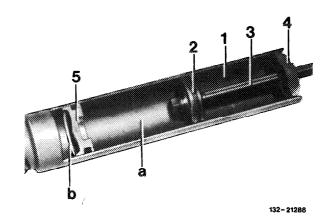
Note

Owing to the auxiliary spring made of polyethane foam (PU) integrated on piston rod between shock absorber tube and suspension rod, the conventional method for checking the oil reserve of single-tube gas pressure shock absorbers with separating piston by measuring piston rod extension is not possible.

a b

For this reason, oil reserve is checked similar to front damper struts by way of piston rod extension force.

The difference with regard to damper strut is the spatial separation of oil and gas chamber by separating piston.



- Cvlinder Power piston with spring washers
- 2 3 Piston rod
- 4 Closing assembly with piston rod seal
- and piston rod guide
- 5 Separating piston
- Oil chamber а
- b Gas chamber

Visual checkup

Carefully inspect piston rod for surface damage.

Check piston rod for distortion. A distorted piston rod shows up by binding during insertion into guide bushing.

Note: For lubrication of piston rod guide outside piston rod seal the design provides for a slight oil film on piston rod.

Checking oil reserve

The oil reserve is checked by means of extending force of piston rod.

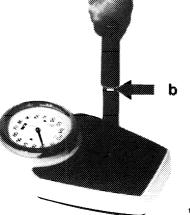
During checkup, temperature of shock absorber should amount to approx. 20 $^{\circ}$ C.

Checking requires a scale (for weighing material or persons) with a weighing range of O-40 kg.

Test procedure

Measure distance for test mark "a" = 84 mm (refer to table) on shock absorber tube starting from edge of rubber sleeve and write down with a felt pencil or the like.

Place shock absorber with piston rod in upward direction (i.e. fastening eye pointing upwards) on scale and push in up to test mark "b". Compare indicated value with that in table. (The dead weight of the shock absorber is taken into consideration in table values.)



132 - 25311

In the event of a gas or oil leak, the extension force of piston rod will be reduced. If the minimum value is exceeded, the damping force effect will be impaired and replacement is required.

Attention!

In the event of repairs, shock absorbers can be individually exchanged, independent of make. Only those shock absorber versions which are identified according to color code e.g. 1 lengthwise line red or 2 lengthwise lines red must be in agreement.

Rumbling and knocking noises

Check upper suspension for correct assembly, lower suspension for tight seat of rubber mount in housing lug.

Determine oil reserve. If oil losses are high, shock absorbers with separating piston will develop a trend for knocking, since the piston rod may knock against separating piston during deflection.

A loose power piston may also be responsible for knocking noises.

To check, push in piston rod in installation position of shock absorber, release and push in again. A loose power piston will be noticed by a knocking noise during interchange of push and pull.

Hissing noises

In a leaking separating piston, shock absorbers with separating piston are showing a tendency toward hissing noises, whenever gas is entering the oil system and foaming will result. Such shock absorbers may very well be still functioning, but should nevertheless be replaced.

Tightening torque		Nm
Hex. nut (self-locking) of upper damper strut fastening		60
Special tools		
Spring tensioner for front spring	11004-7197 L.	201 589 00 31 00
Socket wrench element 32 mm 1/2" square 284 mm long for spring tensioner	11004-8984	201 589 01 09 00

Note

Damper struts are simultaneously serving as defelction stop for front wheels. For this reason, loosen damper strut suspension only when the vehicle is resting on its wheels or when the control arm is supported or the spring tensioner is applied.

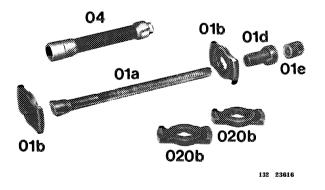
Always renew self-locking screws and nuts on principle!

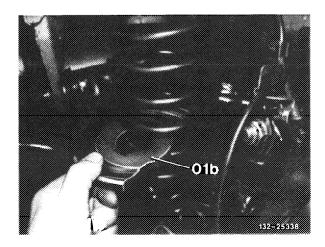
- 01a Tensioning screw
- 01 b 01 d Tensioning plates for front springs
- Guide sleeve
- 01e Nut
- 04 Tubular socket wrench 020b Tensioning plates for rear springs
- Removal

1 Jack up vehicle at the front, remove front wheel.

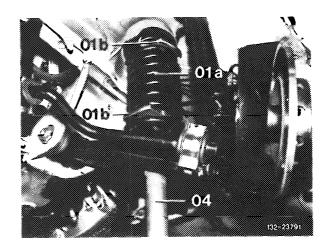
2 Remove engine compartment lining below, if installed.

3 Insert tensioning plates of spring tensioner offset by 90" into front spring in such a manner that 7 1/2coils are engaged.



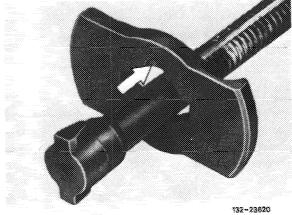


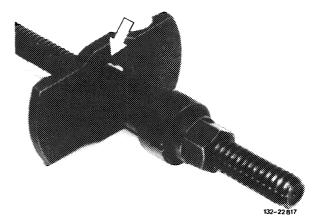
4 Insert tensioning screw (Ola) through opening in control arm.



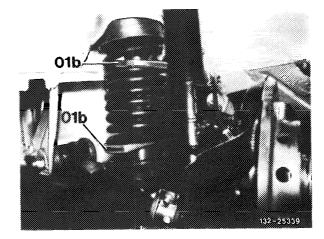
Attention!

Webs of tensioning screw and guide sleeve must be correctly seated in grooves of the two tensioning plates. Danger!





5 Tension front spring.

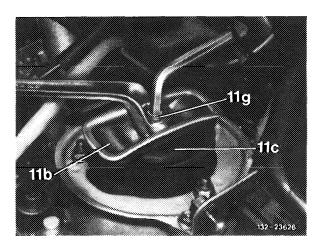


6 Loosen upper suspension damper strut while supporting control arm.

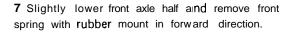
Attention!

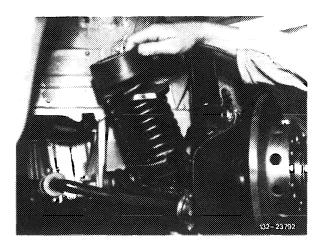
When loosening upper damper strut suspension, pay attention to the following items:

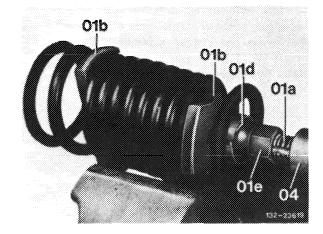
- Apply counterhold to piston rod (hex. socket wrench 8 mm)
- Do not use percussion wrench •
- Do not unscrew hex. nut with axle half fully . unsprung
- Control arm must be supported. ٠



Spring release limit Rubber mount llb llc 11g Piston rod







8 Slacken front spring in vise.

- 01a Tensioning screw 01b Tensioning plates Old Guide sleeve 01e Nut 04 Tubular socket wrench

Installation

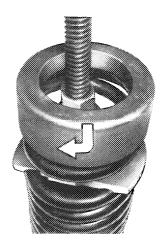
Note: Prior to installing front spring, make sure that the control arm in range of spring contact surface is free of dirt.

9 Tension front spring along 7 1/2 coils, while positioning tensioning plates offset by 90° .

Attention!

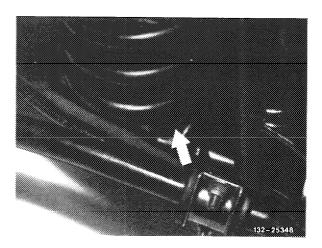
Webs of tensioning screw and guide sleeve must be correctly seated in grooves of the two tensioning plates. Danger!

10 Place rubber mount with a screwing motion to front spring.



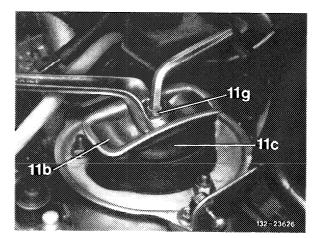
132-21283

11 Introduce front spring so that the coil runout is located in impression of control arm.

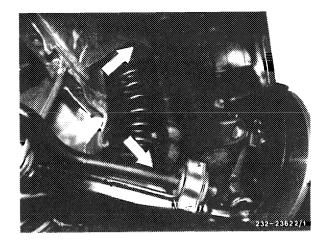


12 Lift front axle half with vehicle jack and mount upper suspension of damper strut with new selflocking hex. nut. Tightening torque 60 Nm.

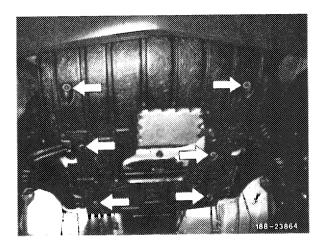
Note: Do not use percussion wrench!



13 Slacken front spring while paying attention to correct seat of rubber mount in frame floor and of spring coils in control arm (arrows).



14 Mount engine compartment lining below.



- 38 11 13 12 5 10 [0] 1323 10925 4
- 16 Check vehicle level at front axle (40-300).

15 Mount front wheel, lower vehicle.

17 Check adjustment of headlamps.

- 4 Control arm
 5 Steering knuckle
 10 Torsion bar
 11 Damper strut
 12 Front spring
 13 Spring rubber mount
 38 Front end

Data			
Torsion bar	Dia.	Rubber mount of to	orsion bar bearing
Part No.		Part No.	Bore dia.
201 323 47 65			
201 323 52 65 ¹)	22	201 323 48 85	22
1) Vehicles with air cond	litioning		
Tightening torques			Nm
Hex. nuts of torsion bar bearing on control arm			20
Hex. bolts and nuts of torsion bar bearing on spring leaf rocker			20
Hex. bolts of spring leaf rocker for torsion bar on frame			60

Note

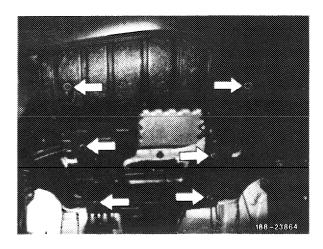
Mount and tighten torsion bar bearing on control arm and on spring leaf rocker only in the position corresponding to a condition ready for driving.

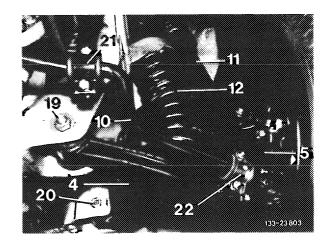
Always replace self-locking screws and nuts on principle!

Removal

1 Remove engine compartment lining below, if installed.

2 Loosen and remove holding clamp of torsion **ba** bearing (22) at left and right on control arm (4).



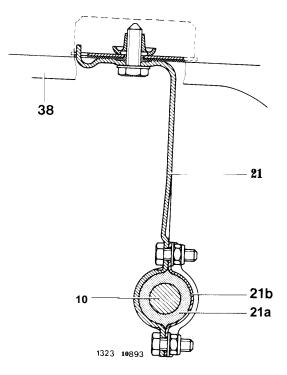


3 Loosen bearing on spring leaf rockers and remove torsion bar.

Note: Rubber mounts of torsion bar have no slot, for this reason use a rubber lubricant (e.g. sliding paste A 000 989 01 60) for removal and installation.

10 Torsion bar 21 Spring leaf rocker 21a Rubber mount 21 b Holding clamp

38 Front end



Installation

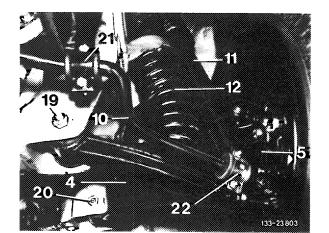
4 Check rubber mount of torsion bar bearing as well as suspension members.

5 Mount rubber mount on torsion bar while coating inside of rubber mounts with rubber lubricant.

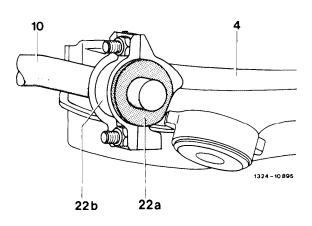


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6 Mount torsion bar (10) on both spring leaf rockers (21), Tightening torque of new self-locking hex. nuts 20 Nm.



7 Fasten torsion bar suspension on control arm left and right. Tightening torque of new self-locking hex. screws is 20 Nm.



4	Control	arm
10	Torsion	bar
	Rubber	
22b	Holding	clamp

8 Mount engine compartment lining, below.

Data

Torsion bar Part No.	Dia	Rubber mount of torsion bar bearing Part No. Bore dia	9
201 3262265	- 10	004 0004004 40	
201 3261765	- 13	201 3261081 13	
ques		Nm	
torsion bar bearing on	frame floor	20	
Ball joints of connecting rod between torsion bar and spring link of rear axle		on torsion bar 30	
		on spring link 20	
(self-locking) for fasteni to frame floor	ng front	70	
Hex. screws for fastening propeller shaft intermediate bearing to frame floor		25	
Self-locking hex. nuts for fastening companion plate		45	
	•	8	
	Part No. 201 3262265 201 3261765 ques torsion bar bearing on connecting rod betweer of rear axle (self-locking) for fasteni to frame floor for fastening propeller searing to frame floor ex. nuts for fastening ate	Part No. 201 3262265 13 201 3261765 13 ques 13 torsion bar bearing on frame floor 13 connecting rod between torsion bar 14 connecting rod between torsion bar 15 connecting to frame floor 15 cor fastening propeller shaft 15 earing to frame floor 15 ex. nuts for fastening 15	Part No.Part No.Bore dia201 3262265 201 326176513201 326108113quesNmtorsion bar bearing on frame floor20connecting rod between torsion bar to frame flooron torsion bar30connecting for fastening front to frame floor70(self-locking) for fastening front to frame floor70cor fastening propeller shaft earing to frame floor25ex. nuts for fastening ate45ex. socket screw for fastening8

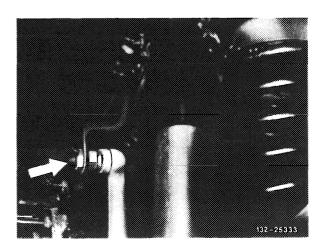
Note

Always renew self-locking screws and nuts on principle!

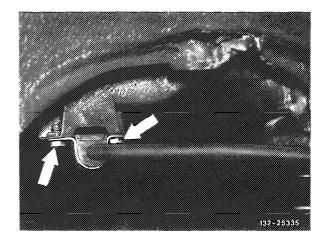
Removal

1 Jack up vehicle at rear, remove rear wheels.

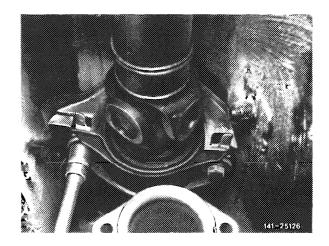
2 Unscrew both hex. nuts (arrow) of connecting rod left and right.



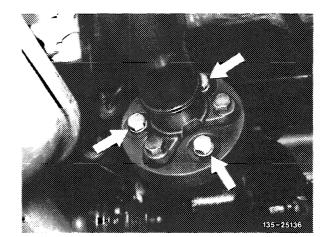
3 Unscrew hex. screws of torsion bar bearing on frame floor, remove rubber mounts.



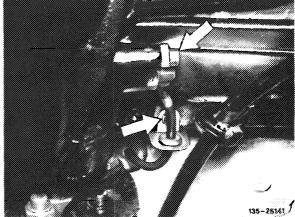
4 Loosen propeller shaft intermediate bearing.



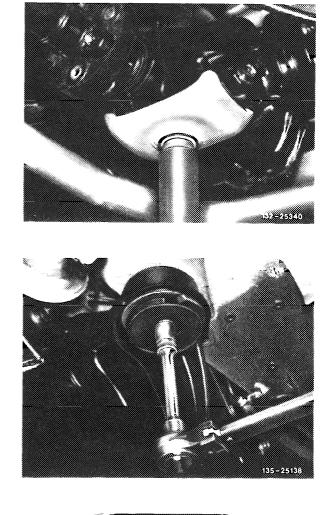
5 Separate propeller shaft at rear axle center piece.

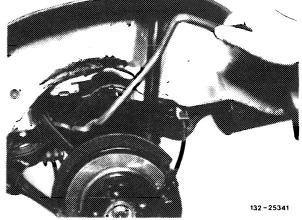


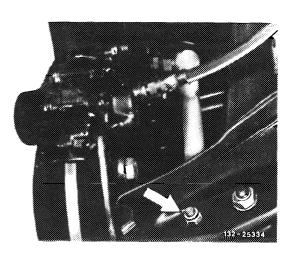
6 On vehicles with ABS, remove rpm sensor after loosening hex. socket screw with cable (arrows) (42-714).



7 Unscrew both hex. screws of front rear axle bearing on frame floor, while supporting rear axle center piece with vehicle jack.







8 Slightly lower rear axle and remove torsion bar after turning pertinently to the left.

9 If the connecting rod is additionally removed, remove rod after unscrewing hex. screw with nut (arrow) (spring link cover removed).

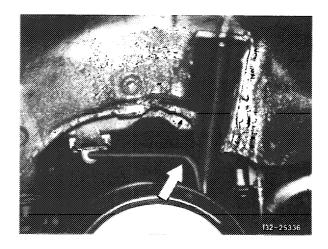
Installation

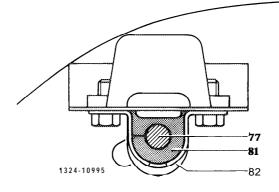
10 Check rubber mounts of torsion bar bearings and connecting rods and renew, if required.

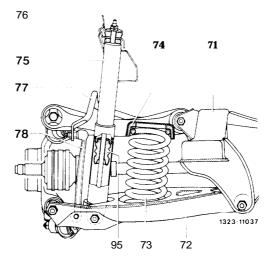
11 Introduce torsion bar in such a manner that the offset of torsion bar arms points in downward direction and in driving direction toward the rear (arrow).

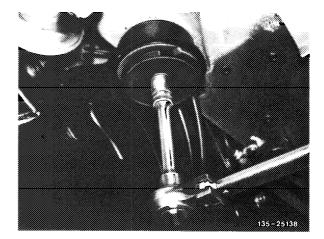
Slip on rubber mounts at left and right (slot in forward direction).

12 Fasten torsion bar with holding clamps left and right to frame floor. Tightening torque of new selflocking hex. screws 20 Nm.









- Rear axle carrier 71
- Spring link Rear spring
- 72 73 74 75 76 77 78 95 Rubber mount - rear spring Shock absorber Mandrel on frame floor Torsion bar

- Connecting rod for torsion bar PU auxiliary spring

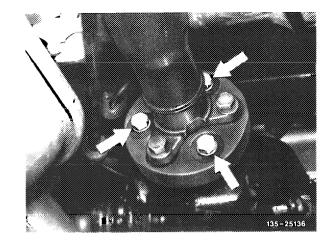
77 Torsion bar

81 Rubber mount 82 Holding clamp

13 Fasten front bearing of rear axle with new selflocking hex. screws and tighten to 70 Nm.

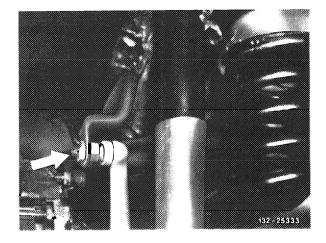
14 Mount companion plate with new self-locking hex. nuts on rear axle shaft flange. Tightening torque 45 Nm.

15 Tighten joint intermediate bearing to 25 Nm.



16 On vehicles with ABS fasten rpm sensor with new self-locking hex. socket screw to rear axle center piece (tightening torque 8Nm).

17 Fasten connecting rod left and right to torsion bar (arrow), tighten to 30 Nm.



Note: If connecting rods on spring link have been released, use new micro-encapsulated hex. nut (tightening torque 20 Nm) for installation. Then fasten spring link cover with 4 spring clamps (arrows).

18 Mount rear wheel (40-I 10), lower vehicle.

