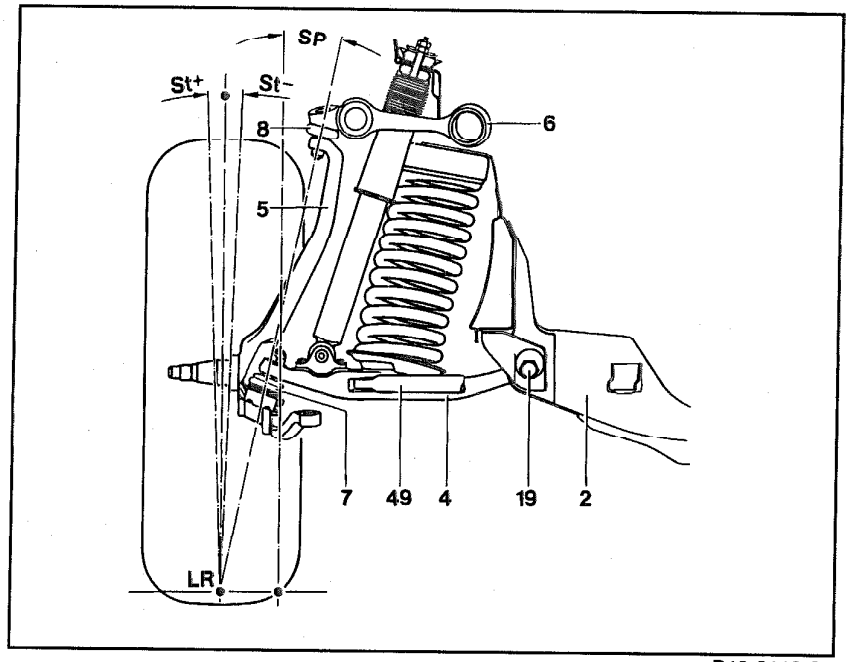
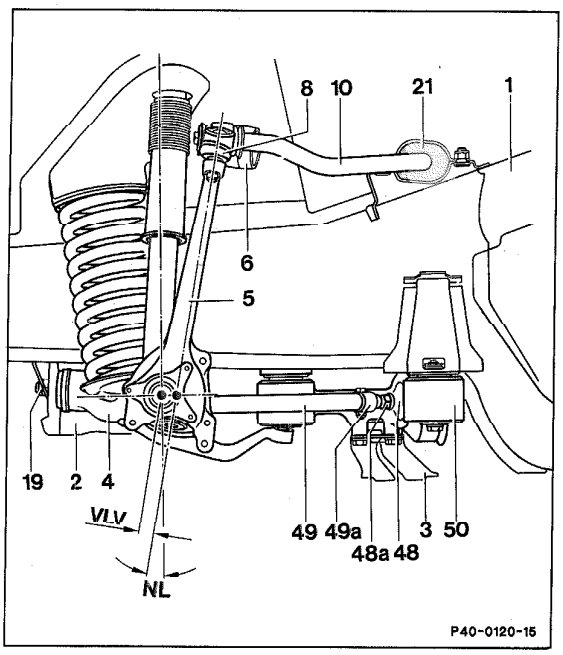
Preliminary work:
General checks and preliminary jobs for wheel alignment check (40–200)
Positioning of wheels (40–210)
Aligning vehicle over measuring pit or hoist (40–220)
Attachment of wheel mirrors (40–230)

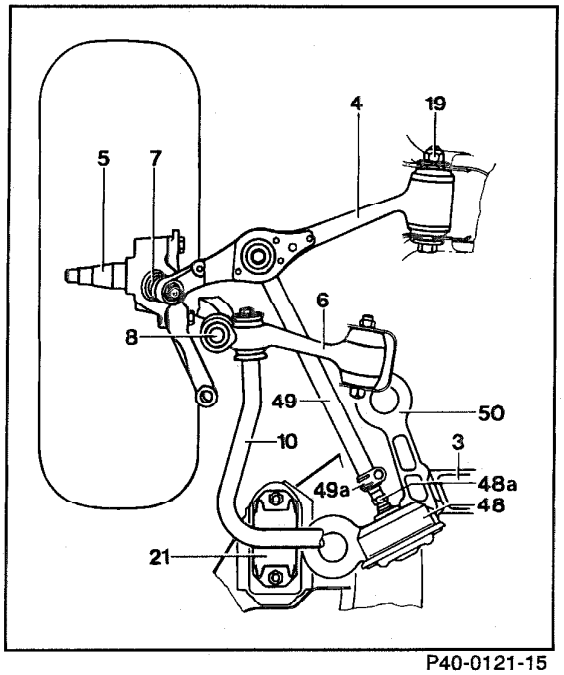


P40-0119-35



P40-0120-15

ST	Camber
NL	Caster
SP	Kingpin offset
LR	Roll radius
VLV	Toe-in offset
1	Frame side member
2	Frame cross member for front axle
3	Cross yoke center piece
4	Lower control arm
5	Steering knuckle
6	Upper control arm
7	Lower ball joint
8	Guide joint
10	Torsion bar
19	Eccentric bolt (camber adjustment)
21	Bushing of torsion bar on frame side member
48	Supporting joint
48a	Ball pin (caster adjustment)
49	Support tube
49a	Clamp
50	Pivot carrier for supporting joint and cross yoke center piece



P40-0121-15

Note
The following description comprises the most important information regarding the wheel adjustment on front axle.

A. Data

Values for wheel adjustment with vehicle at curb weight

Model		126 with steel suspension till 07/85	126 with steel suspension starting 08/85
Camber of front wheels	wheels in straight-ahead position (toe-in value 0)	$0°\ ^{+10'}_{-20}$ $(0.00°\ ^{+0.15°}_{-0.35°})$	$0°\ ^{+10'}_{-20}$ $(0.00°\ ^{+0.15°}_{-0.35°})$
	Permissible deviation between left and right side	0° 20´ (0.35°)	0° 20´ (0.35°)
Caster	measured in straight-ahead position	10° 15´ ±30´ (10.25° ±0.50°)	10° 15´ ±30´ (10.25° ±0.50°)
	Measured by way of wheel lock	9° 45´ ±30´ (9.75° ±0.50°)	10° ±30´ (10.25° ±0.50°)
	Permissible deviation between left and right side	0° 30´ (0.50°)	0° 30´ (0.50°)
Toe-in (wheels pried apart at front with 90 – 110 N)		0° 25´ ±10´ (0.40° ±0.5°)	0° 25´ ±10´ (0.40° ±0.15°)
Track difference angle at 20 ° lock of wheel nearest to curve		– 1° 10´ ±40´ [1] (– 1.00° ±0.67°)	– 0° 50´ ±40´ [1] (0.85° ±0.65°)
Max. permissible steering lock on wheel nearest to curve. Limitation by pitman arm or intermediate steering arm abutting against stop bracket of frame cross member.		43° – 2° (43.00° – 2.00°)	43° – 2° (43.00° – 2.00°)
Ball point position (measuring point) = difference in height "a" between axis of bushing bolt for lower control arm and bottom edge of ball pin of track rod (pitman arm or intermediate steering arm in straight-ahead position).		$114\ ^{+4.5}_{-2.5}$ mm	$114\ ^{+4.5}_{-2.5}$ mm
Permissible difference in height of ball point position between pitman arm and intermediate arm.		4 mm [2]	4 mm [2]

[1] Value without toe-in. Toe-in value included in measurement when determining actual track difference angle (without toe-in) must be taken into account.
[2] Corrections on intermediate steering arm in upward and downward direction by adding or removing a washer.

Note
Values in parenthesis are decimal degrees.

Values for wheel adjustment with vehicle at curb weight

Model		126.033/037 with hydropneumatic suspension till 05/86	126.035/037/039 with hydropneumatic suspension starting 06/86
Camber of front wheels	wheels in straight-ahead position (toe-in value 0)	$0°\ ^{+10'}_{-20'}$ $(0.00°\ ^{+0.15°}_{-0.35°})$	$0°\ ^{+10'}_{-20'}$ $(0.00°\ ^{+0.15°}_{-0.35°})$
	Permissible deviation between left and right side	0° 20´ (0.35°)	0° 20´ (0.35°)
Caster	measured in straight-ahead position	10° 30´ ±30´ (10.50° ±0.50°)	10° 30´ ±30´ (10.50° ±0.50°)
	Measured by way of wheel lock	10° 30´ ±30´ (10.50° ±0.50°)	10° 15´ ±30´ (10.25° ±0.50°)
	Permissible deviation between left and right side	0° 30´ (0.50°)	0° 30´ (0.50°)
Toe-in (wheels pried apart at front with 90 – 110 N)		0° 15´ ±10´ (0.25° ±0.15°)	0° 20´ ±10´ (0.35° ±0.15°)
Track difference angle angle at 20 ° lock of wheel nearest to curve		– 1° 10´ ±40´ [1] (– 1.15° ±0.65°)	– 1° ±40´ [1] (– 1.00° ±0.65°)
Max. permissible steering lock on wheel nearest to curve. Limitation by pitman arm or intermediate steering arm abutting against stop bracket of frame cross member.		43° – 2° (43.00° – 2.00°)	43° – 2° (43.00° – 2.00°)
Ball point position (measuring point) = difference in height "a" between axis of bushing bolt for lower control arm and bottom edge of ball pin of track rod (pitman arm or intermediate steering arm in straight-ahead position).		$114\ ^{+5.5}_{-2.5}$ mm	$114\ ^{+5.5}_{-2.5}$ mm
Permissible difference in height of ball point position between pitman arm and intermediate arm.		4 mm [2]	4 mm [2]

[1] Value without toe-in. Toe-in value included in measurement when determining actual track difference angle (with out toe-in) must be taken into account.
[2] Corrections on intermediate steering arm in upward and downward direction by adding or removing a washer.

Note
Values in parenthesis are decimal degrees.

Note

If the caster nominal value cannot be adjusted, check dimension "V5" (refer to 40–400).

Adjustment of camber on front wheels

Adjust eccentric bolt on bushing of lower control arm			
Camber adjustment range of eccentric bolt (theoretical) at nominal caster value		from –1° to +0° 45´ (–1.00° to +0.75°)	
Influence of camber adjustment on caster			
Camber adjustment with eccentric bolt		results in caster change	
0° 10´(0.17°)	in plus direction / in minus direction	approx. 0° 10´(0.17°)	in plus direction / in minus direction

Note
Values in parenthesis are decimal degrees.

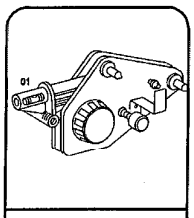
Adjustment of caster

Caster adjustment on pivot of brake support on frame floor by changing distance of lower control arm supporting joint			
Caster adjusting range of ball pin in supporting joint of supporting tube (theoretically) at nominal caster value		from 8° to +11° 30´ (8.00° to +11.50°)	
Influence of caster adjustment on front wheel camber			
Caster adjustment with ball pin of supporting joint		changes camber	
0° 30´(0.50°)	in plus direction / in minus direction	approx. 0° 10´(0.17°)	in minus direction / in plus direction

Note
Values in parenthesis in decimal degrees.

Tightening torques	Nm
Hex. nut of eccentric bolt on lower control arm bushing	180
Hex. screw of clamp for track rod and supporting tube of brake support	20
Hex. nut of threaded pins for steering lock	30

Special tools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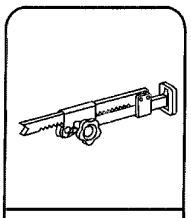
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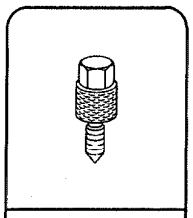
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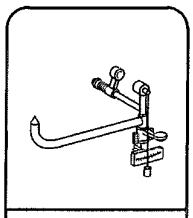
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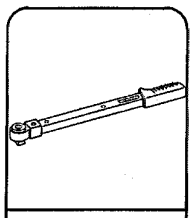
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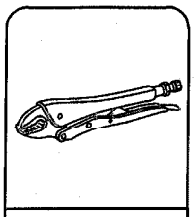

116 589 01 37 00

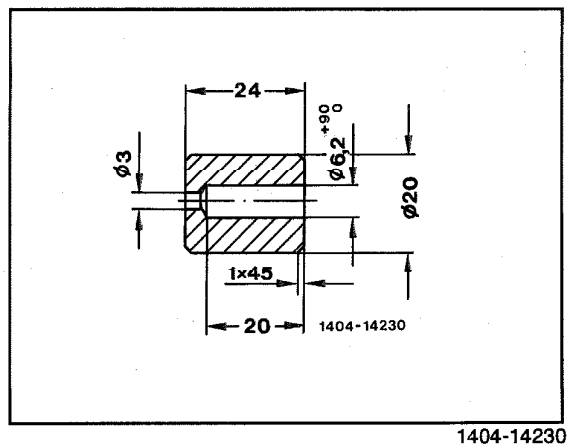
Conventional tools

Wheel spreading device	e.g.	Beissbarth Order no.: P8-74
Turntable	e.g.	Beissbarth Order no.: P11-59

Self-made tool

Aligning bolt

Aluminum sleeve, for revised cover plate of front wheel brake starting 08/85.



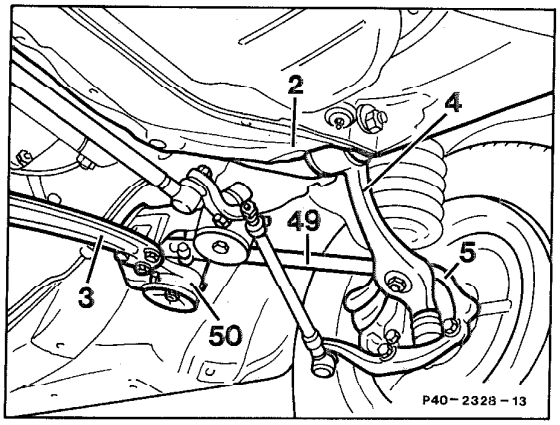
1404-14230

B. Camber and caster

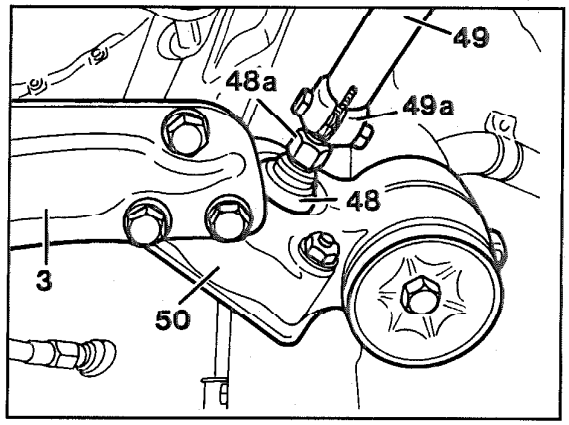
General information

The front axle is provided with a combined camber and caster adjustment, i.e., both wheel positions can be adjusted only together.

For this purpose, use eccentric bolt (19) on bushing of lower control arm (4) (predominantly for adjusting camber) and ball pin (48a) of supporting joint (48) of brake support (49) (predominantly for adjusting caster).



P40-2328-13



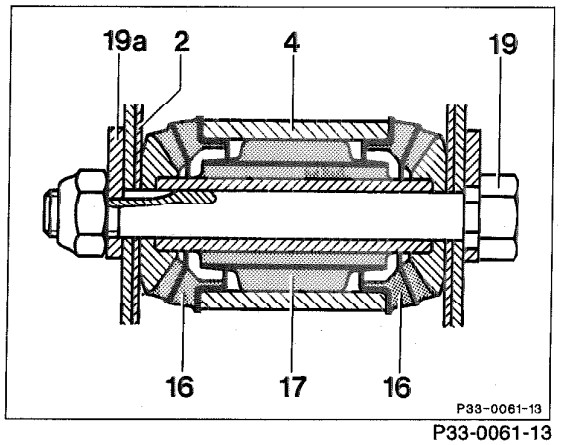
P40-2330-13

Adjustment references for camber and caster
When measuring caster, make sure that the front wheels are constantly in a straight-ahead position (toe-in value).

To adjust eccentric bolt (19) on bushing of lower control arm (4), loosen hex. nut, when tightening hex. nut, hold eccentric bolt (19) with torque wrench. Tightening torque for hex. nut of eccentric bolt 180 Nm.

When adjusting camber on eccentric bolt in plus direction, the caster will change in plus direction. When adjusting in minus direction, the caster will change in minus direction.

⚠ **CAUTION!**
The wheel-spreading device for adjusting toe-in should not be used while adjusting camber and caster.



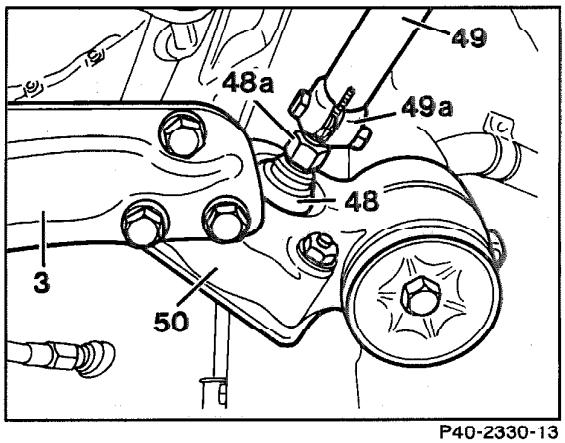
P33-0061-13

Bushing of lower control arm
2 Frame cross member
4 Lower control arm
16 Axial torsion rubber mount
17 Radial torsion rubber mount
19 Eccentric bolt (camber adjustment)
19a Eccentric washer

To adjust ball pin (48a) of supporting joint, turn ball pin in supporting tube (49) (right hand threads) after loosening clamp (49a).

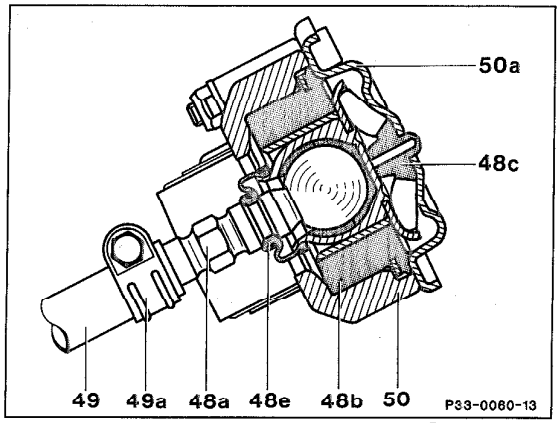
Turning screw out increases caster, turning screw in decreases caster.

When increasing caster, camber changes in minus direction, when decreasing caster the change is in plus direction. Tightening torque for hex. screw of clamp 30 Nm.



Supporting tube and supporting joint in pivot carrier for brake support and for cross yoke center piece

48a Ball pin (caster adjustment)
48b Thrust rubber mount front
48c Buffer stop
48e Sleeve
49 Supporting tube
49a Clamp
50 Pivot carrier
50a Pivot cup

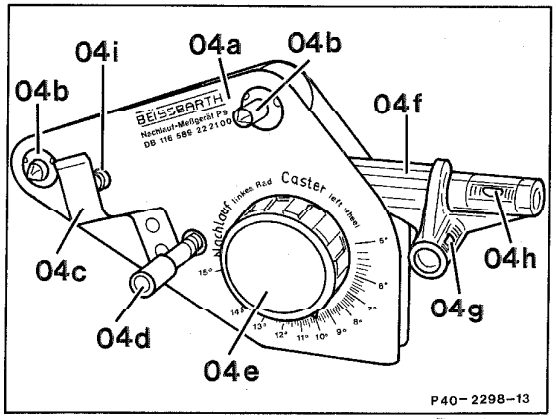


P33-0060-13

A caster measuring instrument is used to simplify combined camber and caster adjustment. The caster can be measured in straight-ahead position of front wheels, so that changes in caster can be directly read while adjusting camber and caster. This will considerably facilitate and shorten the entire adjusting procedure. Subsequent measuring of caster by way of the 20° wheel lock is no longer necessary if the caster measuring instrument is used. An additional caster measurement by way of the wheel lock is suitable only if the specified camber and caster values are not attained.

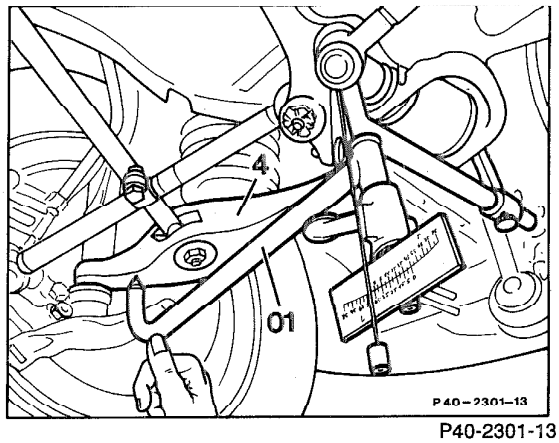
The caster measuring instrument 116 589 22 21 00 is a bubble-type instrument with a measuring range of 5° to 15°.

04 Caster measuring instrument
04a Housing with graduated scale
04b Locating bolt
04c Clamp
04d Aligning bolt
04e Rotary knob with indicator
04f Bubble carrier
04g Aligning bubble
04h Caster bubble
04i Adjusting screw



P40-2298-13

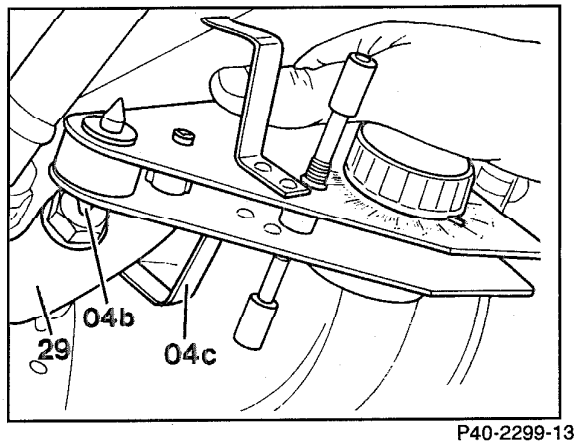
The instrument is located by means of the locating bolt (04b) and the centering bores of hex. head screws of steering knuckle arm on steering knuckle (5). Clamp (04c) surrounds the steering knuckle arm (29) and serves for holding assembly in place. Below, the instrument is supported against cover plate (35) by way of aligning bolt (04d).



P40-2301-13

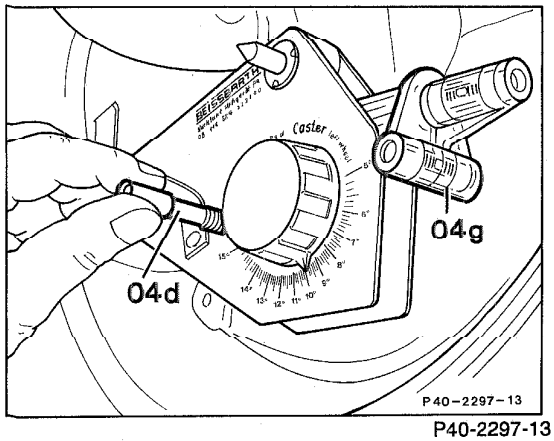
Note
Starting 08/85 the caster measuring instrument must be adapted to the altered cover plate on the front wheel brake by enlarging the contact area of the aligning bolt (refer to self-made tools).

Measuring caster in straight-ahead position of wheels
To mount instrument, position first with rear locating bolt (04b), introduce clamp (04c) behind steering knuckle arm (29), then let locating bolt engage. Removal is in vice versa sequence.



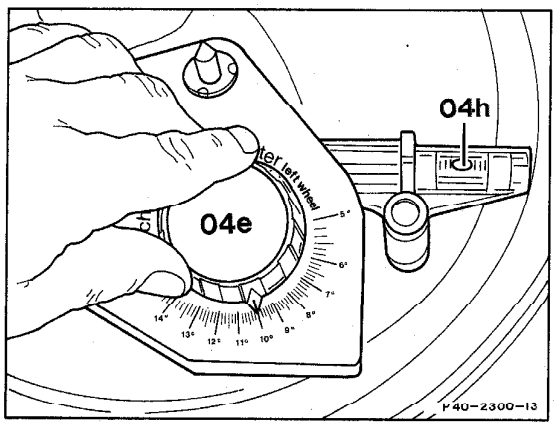
P40-2299-13

For alignment of instrument into vertical position, turn bolt (04d) in or out until the aligning bubble (04g) is centered.



P40-2297-13

For measuring caster with rotary knob (04e), move caster bubble (04h) to accurate center position. Then read indicated caster value on graduated scale on housing by means of pointer on rotary knob.
Set rotary knob to nominal value for adjusting caster. Then move bubble into center position by means of eccentric bolt, making sure that the correct camber value is also maintained.
For additional information on camber and caster adjustment refer to "Adjusting reference for camber and caster".



P40-2300-13

C. King pin inclination

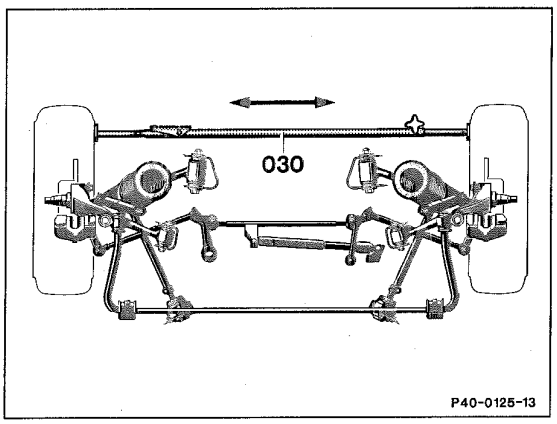
The kingpin inclination is determined by design of the steering knuckle. On passenger cars the kingpin inclination is not measured.

D. Toe-in

The toe-in value refers to the difference in distance when the front of the wheels are closer together than the rear of the wheels, measured at rim flanges of disk wheels at level of wheel center.

The elastic mounting of the control arms requires a pertinently high toe-in value, which reduces itself to the correct value when the vehicle is in a curb weight condition.

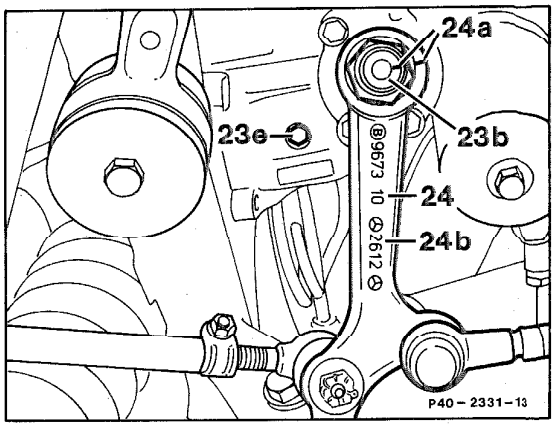
For measuring toe-in, press with wheel spreading device (030) the front of wheels apart. In this way the elasticities in steering linkage will be eliminated which, during vehicle operation, can cause toe angle changes in a minus direction.



P40-0125-13

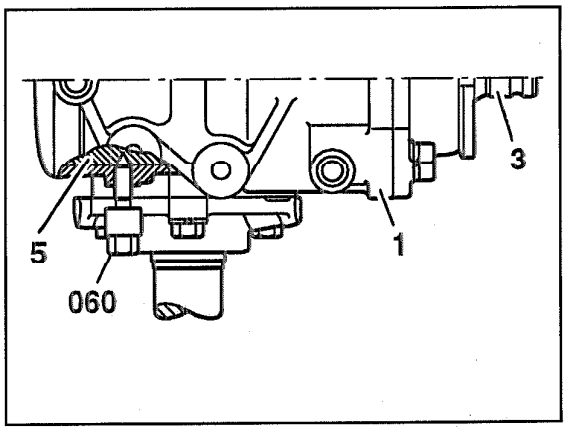
Center position of steering gear

For measuring or adjustment of toe-in, the steering gear must be in center position. For this purpose, remove closing plug (23e) on steering case below and locate power piston by inserting center position control screw (05).



P40-2331-13

23b Steering shaft
23e Closing plug in steering case
24 Pitman arm
24a Assembly mark for pitman arm
24b Code number for pitman arm



P46-0044-13

05 Center position check screw
23a Steering case
23c Steering worm
23d Power piston

⚠ CAUTION!

Do not turn steering wheel while center position check-screw is inserted.

Make sure that steering is already close to center position prior to loosening closing plug.

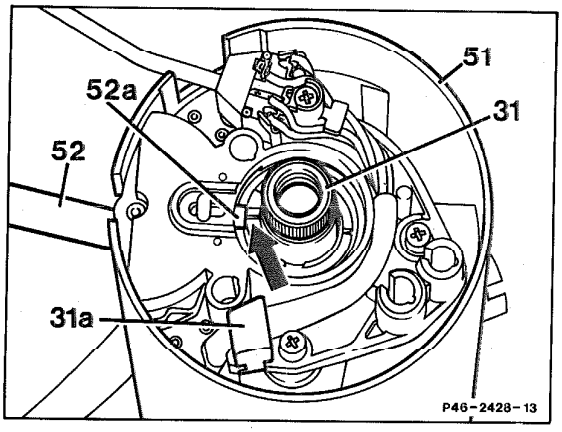
Checking position of steering wheel at straight-ahead position of wheels

When adjusting the wheels following repair jobs for which the steering has been removed, note that accurate checkup of steering shaft center position is only possible with steering wheel removed (refer to repair instructions "Steering" 46–610).

The steering shaft is in center position with the notch on supporting ring (31a) pointing in direction of return cam (52a) of combination switch (52) (arrow).

⚠ CAUTION!
Correct function of automatic return of turn signal switch depends on center position of steering shaft in straight-ahead position of wheels. An offset of steering wheel by two teeth from center position of steering shaft is permitted.

Check position of steering wheel during test drive.



P46-2428-13

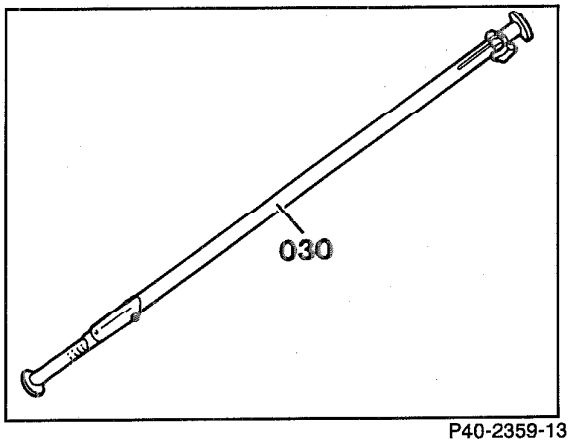
⚠ WARNING!
On vehicles with restraint system (airbag), be sure to pay attention to safety regulations prior to removing steering wheel or pad (refer to 91–610).

Measuring toe-in

In the following description it has to be observed that the specified pressure value of (9–11) 90 – 110 N will not be exceeded when using the wheel-spreading device from Bosch.

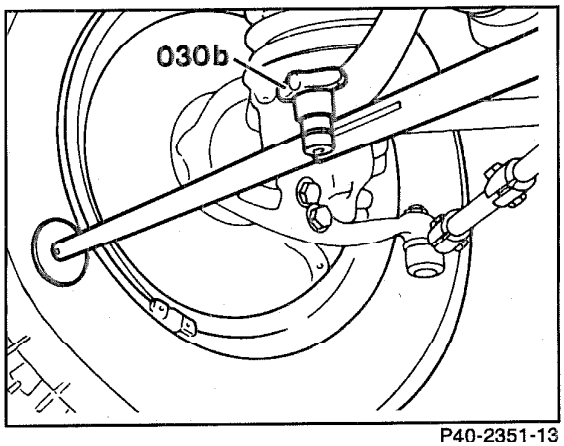
On all other wheel-spreading devices the pressure value is determined by design.

Preload wheel-spreading device (030) by compression.



P40-2359-13

Adjust device with clamping screws (030b) released lengthwise in such a manner that it can be located in between the inside flanks of the tires at a slight clearance, then tighten clamping screw.

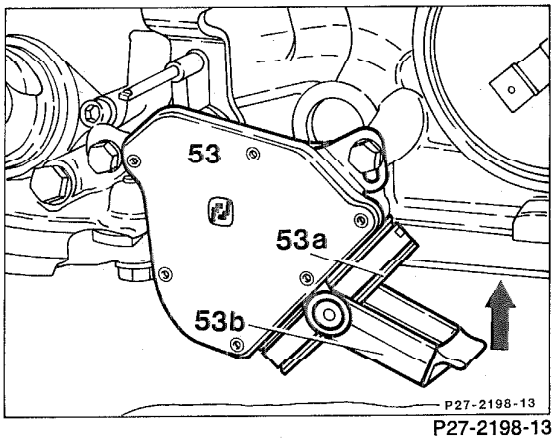


P40-2351-13

After aligning device in a vertical direction to the center of the wheel, actuate release lever (030c).

Read value on scale of thrust piece (030a).
Set value: 9 – 11 (90 – 110 N). If required, correct pressure at clamping screw (030b).

⚠ **CAUTION!**
The thrust piece (030a) should slide easily in its guides. If necessary, apply grease to slide surfaces.



P27-2198-13

Adjusting toe-in

1. Remove wheel-spreading device.

2. Set toe-in to approx. +0°40' in **unpressed** condition.

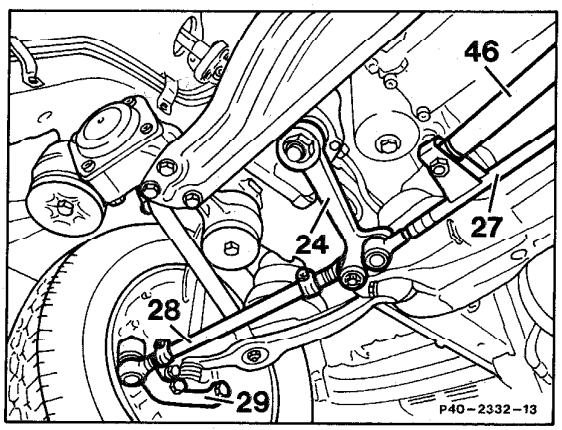
3. Insert wheel-spreading device at a pressure of 9–11 (90–110 N).

4. Set toe-in to specified value in **pressed** condition.

⚠ **CAUTION!**

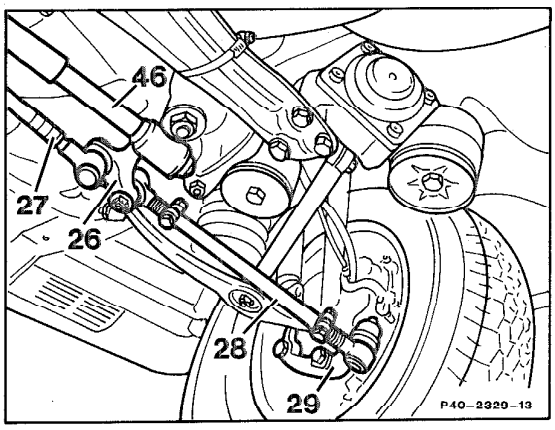
Do not use wheel-spreading device while adjusting camber and caster. Excessive toe-in results in increased wear of tire outboard shoulder of both tires; lack of toe-in results in wear of inboard shoulders. In both cases the tire tread can exhibit a certain roughness.

Toe-in is adjusted by altering the length of the two track rods. Prior to tightening screws for clamps 20 Nm, swivel both track rod heads each time in the same direction against stop. After tightening, check swivel range of track rods.



P40-2332-13

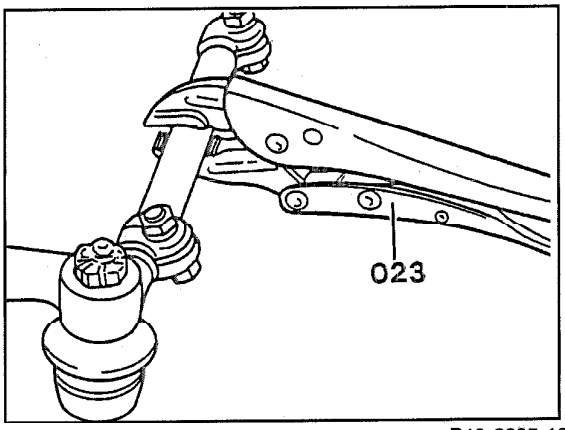
Steering linkage steering side
24 Pitman arm
27 Center link
28 Track rod
29 Steering knuckle arm



Steering linkage intermediate steering arm side
26 Intermediate steering arm
27 Center link
28 Track rod
29 Steering knuckle arm
46 Steering damper

P40-2329-13

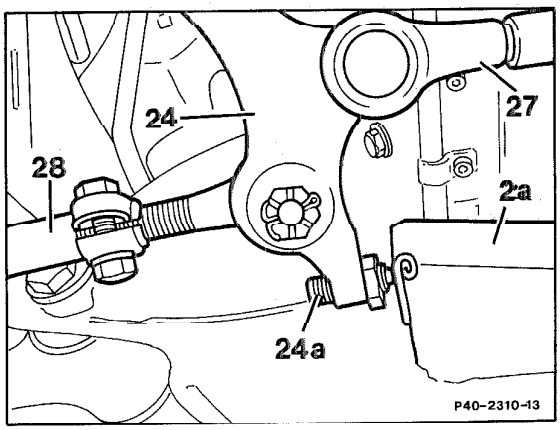
For turning track rods, use grippers (023) provided for this purpose only.



P40-2285-13

E. Max. permissible steering lock

At max. steering lock the respective lever rests against stop bracket (2a) of frame cross member. Adjustment is made by means of threaded pin with counter nut (24a) in pitman arm or in intermediate steering arm.



2a Stop bracket on frame cross member
24 Pitman arm
24a Threaded pin with counter nut
27 Center link
28 Track rod

P40-2310-13

Note

In special cases, e.g. if the steering lock toward one side is essentially insufficient or for a correction of track difference angle if the difference in track rod length left to right is too high,
the steering can be displaced from center when adjusting toe-in. However, displacement should be made only to the extent that approx. uniform track rod lengths will result. Displacing steering worm by one tooth (corresponds to approx. 6° 30') provides a change on pitman arm by approx. 1.4 mm. A total displacement by 3 teeth (corresponds to approx. 20° of steering worm) is permitted.

Displacement of steering

1 Unscrew both screws (13) from steering coupling (2).

2 Slide steering coupling (2) on profile of lower steering shaft (corrugated tubing) in upward direction until coupling is no longer entering splines of steering worm (1a).

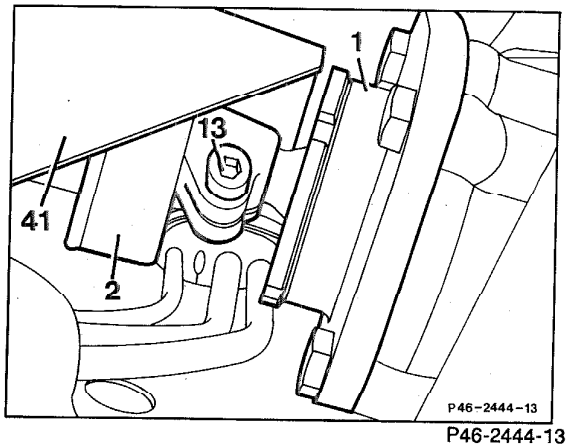
Note

On vehicles with electronic steering column unscrew only lower screw and push steering coupling together with lower steering shaft up. Beforehand, completely extend steering column.

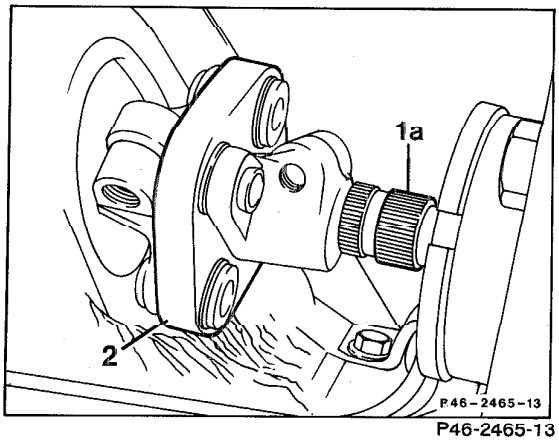
3 Slide the steering coupling (2) upon displacement into teeth of steering worm (1a) and fasten.

⚠ CAUTION!

Do not use force! If the steering coupling is hard to slide, force joint slightly apart with a screw driver.



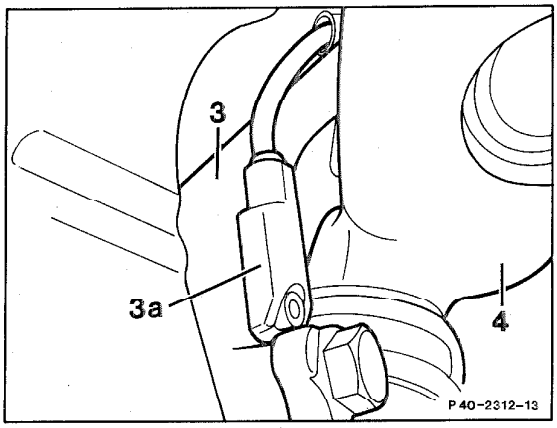
P46-2444-13



P46-2465-13

⚠ CAUTION!
On vehicles with ABS braking system never turn steering wheel beyond permissible value when adjusting max. steering lock, since otherwise the rpm sensor (3a) in steering knuckle on front wheel farthest from curve may be damaged by coming into contact with lower control arm.

3 Steering knuckle
3a Wheel speed sensor
4 Lower control arm



P40-2312-13

F. Track difference angle

To check steering geometry the track difference angle, that is, the wheel-lock difference between wheel farthest from curve and wheel nearest to curve is measured at a lock of 20° of wheel nearest to curve.

The starting position should always be in straight-ahead position of wheels with toe-in uniformly distributed on both wheels.

During optical measurement of track difference angle the toe-in value included in measuring results must be taken into account when determining the actual track difference angle, since the value named in data refers to straight-ahead position of both wheels without toe-in.

Example:

Toe-in as set:	+0°30´ (+0.50°)
Measured track difference angle at wheel farthest away from curve at 20° lock of wheel nearest to curve	– 0°40´ (– 0.67°)
Corresponds to actual track difference angle without toe-in	– 1°10´ (– 1.17°)

When measuring track difference angle with the aid of turntables the actual track difference angle is read directly, since the graduated scales of the turntables are previously set to straight-ahead position, that is, 0°.

Slight deviations from nominal value have no influence on driving characteristics and tire wear. Major deviations have the same effect on tire wear as an incorrect toe-in does.

In the event of excessive deviations the following causes may prevail, assuming caster and camber have been correctly adjusted:

1. Toe-in not set in straight-ahead position of steering, resulting in unequal length adjustments of track rods.

2. Wrong pitman arm, intermediate steering arm or steering knuckle installed.

3. Pitman arm incorrectly mounted on steering shaft.

4. Steering knuckle arm, pitman arm or intermediate steering arm bent.

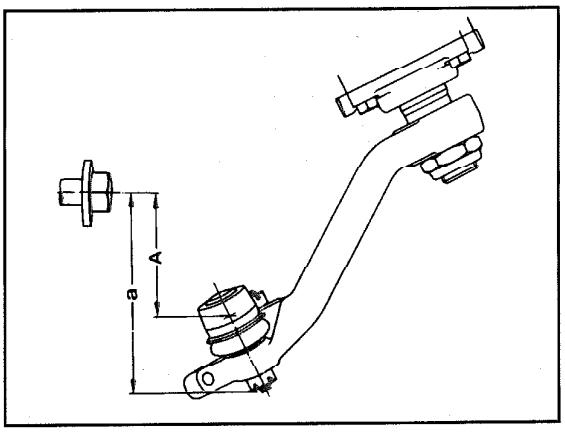
5. On vehicles following an accident excessive deviations at front end (frame side member, wheelhouse, fire wall) which have an unfavorable influence on adjusting range for camber and caster, so that excessive differences in track difference angle between left and right are showing up.

G. Ball point position

The correct position of steering linkage ball joints is decisive for the almost continuously constant toe-in during deflection of wheels.

Always check ball point position on vehicles following an accident. If in spite of correct ball point position and good condition of ball joints of steering linkage there is still an excessive change of toe-in, the fault is the result of a distorted steering knuckle arm on steering knuckle (33–420).

An incorrect ball point position may show up on tire wear pattern as a toe-in which may be too large or too small (refer to sections "toe-in" and "track difference angle").



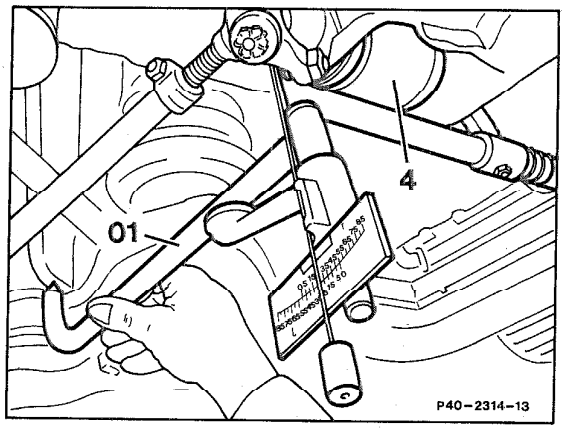
P40-0117-13

A Ball point position (practically not measurable)
a Ball point position (measuring point)

The difference in height "A" between the bushing of lower control arm and center of ball pin on inner joint of track rod serves to check the pivot point (ball point) position. The pivot point is not measured directly, but as dimension "a".

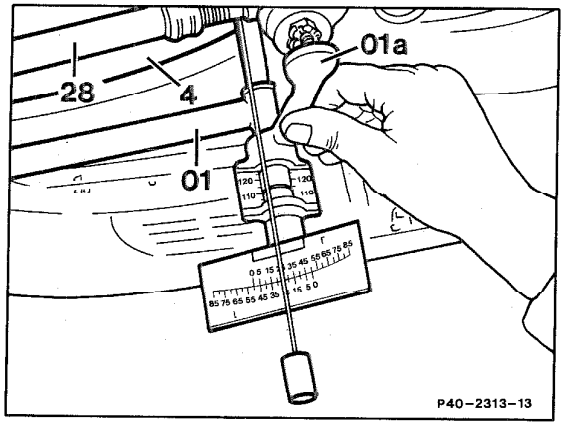
For measuring ball point position, move pitman arm or intermediate steering arm into a straight-ahead position. Insert measuring instrument for control arm position and ball point position (01) at eccentric bolt of lower control arm bushing (4).

Set measuring instrument in such a manner that graduated scale indicates a control arm position of 25 mm.



P40-2314-13

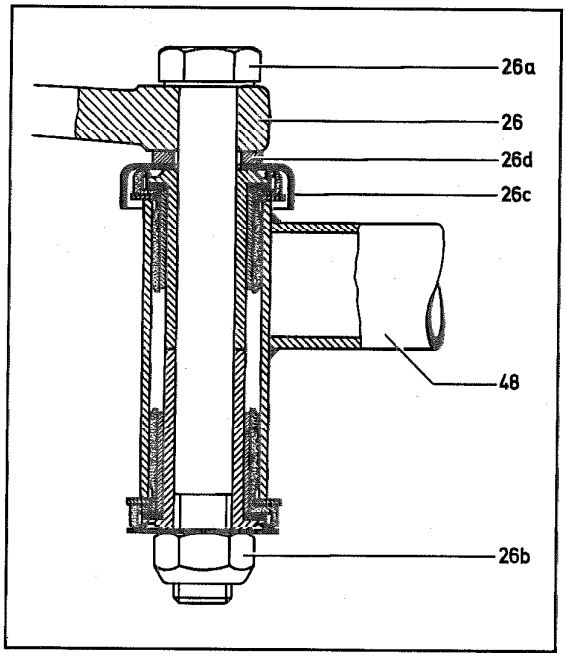
Feel ball point with slide (01a).



P40-2313-13

01 Measuring instrument for control arm- and ball point position
01a Slide with graduated scale for ball point position
4 Lower control arm
28 Track rod

The ball point position can be corrected at intermediate steering arm in upward direction by adding, and in downward direction by removing a spacing washer (26d) between intermediate steering arm and dust cap (26c) (46–520). However, washers may be used only up to a total height of 8 mm.



P46-0069-15

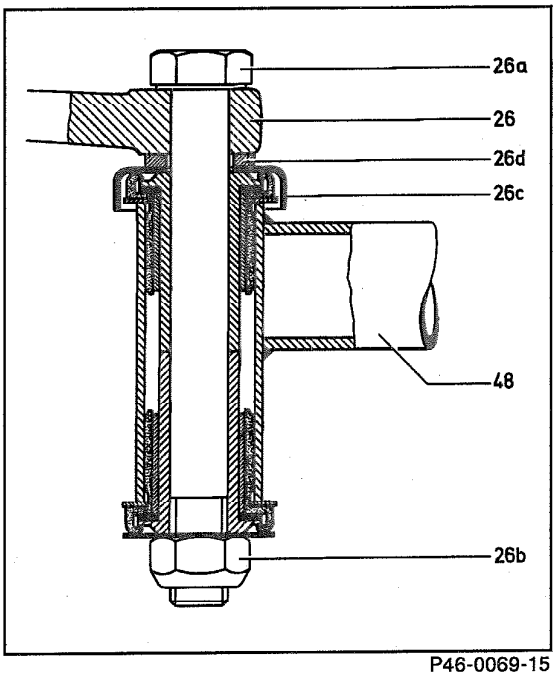
26 Intermediate steering arm
26a Hex. screw
26b Self-locking hex. nut with sealing washer
26c Dust cap
26d Washer
48 Journal

Disposition of washers for assembly line:
1 washer 3.5 mm thick

In case of repair the following washers are available:
2 mm thick part no. 123 463 01 52
3.5 mm thick part no. 115 463 00 52

Use only new self-locking nut. Tightening torque of hex. nut 120 Nm.

⚠ **CAUTION!**
After tightening self-locking hex. nut at least one full thread should extend beyond hex. nut.



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