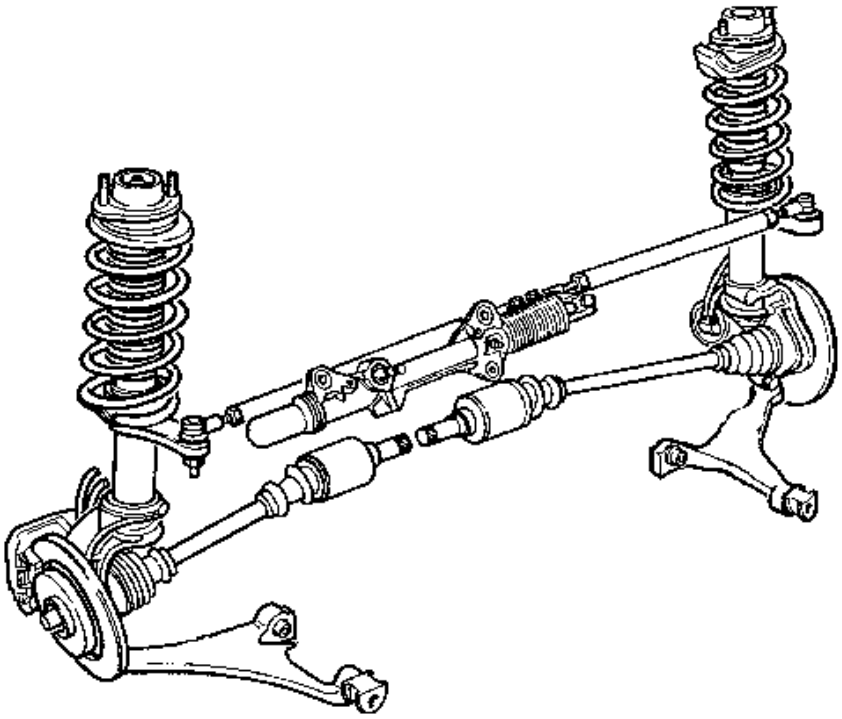
Chapter D

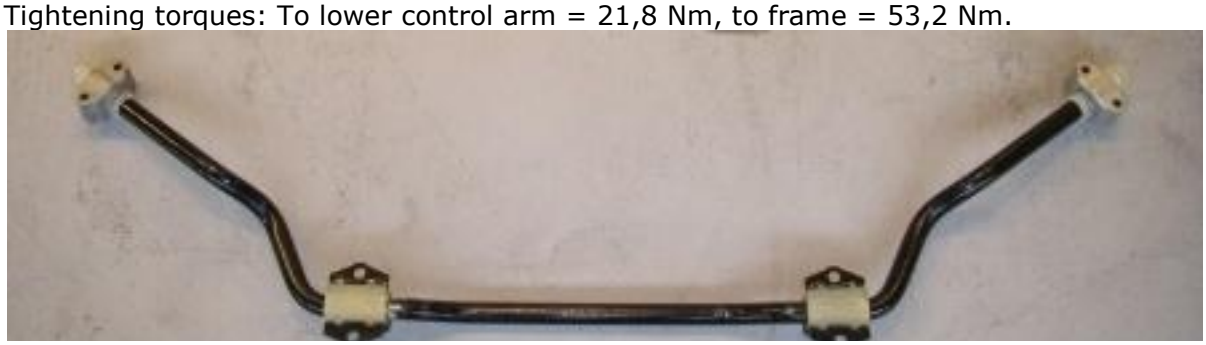
Suspension and steering

D.1 Front suspension



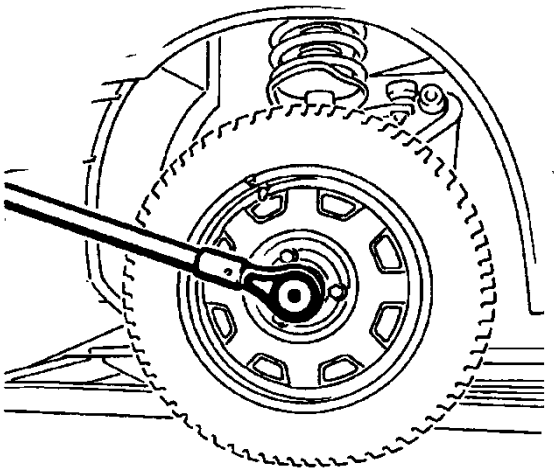
D.1.1 Stabilizer bar

The front suspension also has a stabilizer bar. This is fastened with 4 x 2 bolts and nuts. Tightening torques: To lower control arm = 21,8 Nm, to frame = 53,2 Nm.



D.1.2 Front suspension parameters

- Camber: -0,62° ± 0,5°
- Caster manual steering: 2,2° ± 0,5°
- Caster power steering: 3,2° ± 0,5°
- Toe in: 0 ± 0,09° / 0,0 mm ± 1,0 mm.
- KPI: 12,61°

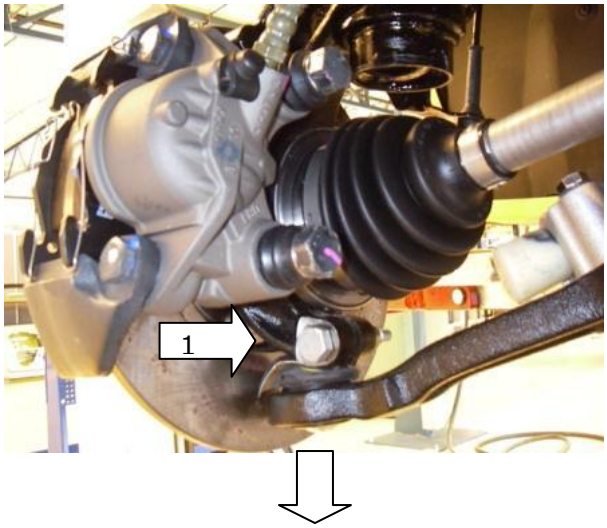


D.2 Complete strut

D.2.1 Disassembling

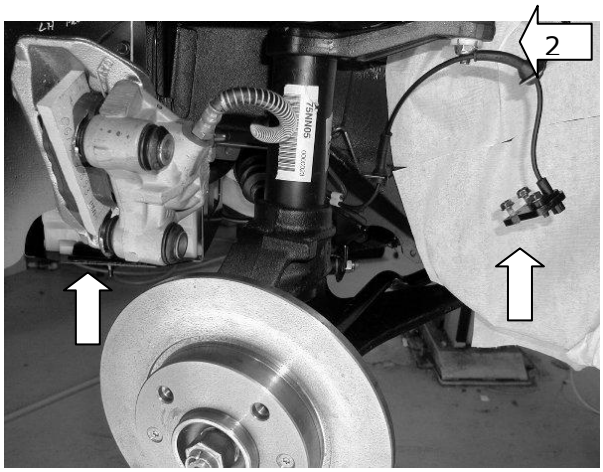
Driveshaft nut and wheel nuts are loosened before the wheel is lifted from the ground, and the vehicle is secured with ramps. Remove the wheel.

OBS:
Do not hold the wheel hub with the brakes when the driveshaft nut is loosened/fastened. The brake disc fastening bolt can be cut or damaged.



Unscrew fastener for lower control arm (1) and pull the arm slightly down, just enough for the ball joint to be released.

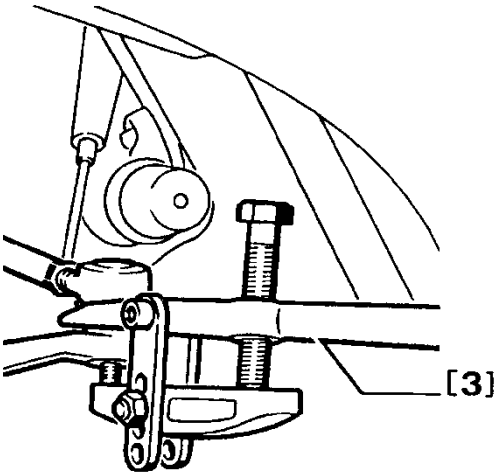
Do not pull the lower control arm too far down. The inner bushings can be damaged or loosen.



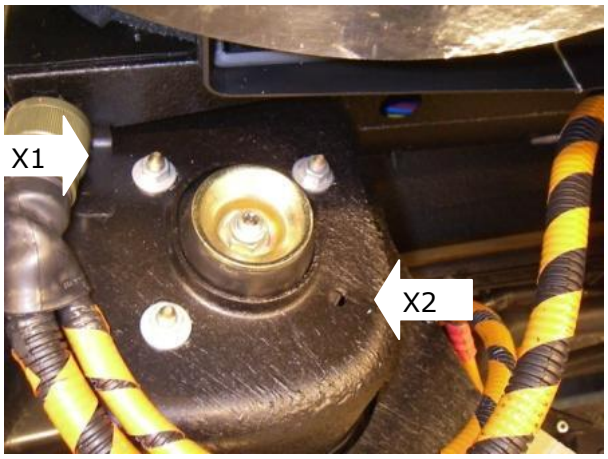
Loosen the brake caliper and press the pistons inwards making it possible to remove the caliper without taking out the brake pads. Attach the caliper in the wheel opening to avoid damages to the caliper or the brake pipes. Also make sure the brake pipes are not twisted or stretched.

TIP: Insert a suitable piece of wood between the brake pads to avoid the pistons are forced too far out.

- Loosen the ABS sensor (two fasteners)
- Loosen the ABS cable bracket and hang the cable out of the way.
- Loosen the nut (2) on the track rod.



- Press the track rod out with a suitable tool (3).
- Pull the driveshaft away from the wheel hub.



NOTE: The strut position before disassembling.
The bolt's position (X):
X1: Manual steering
X2: Power steering

- Remove the headlamp to access upper fasteners. On the passenger side it is practical to also remove the air duct above the strut.
- Unscrew the upper fasteners.
- Take out the complete strut.

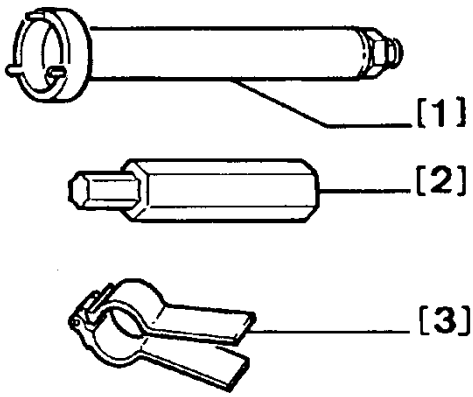
D.2.2Assembling

Assemble in reverse order.

New nuts are used on track rods, ball joint/lower control arm and driveshaft.

D.2.3Tightening torques

Upper fasteners:	21 Nm
Track rod (2):	35 Nm
Ball joint (1):	40 Nm
Driveshaft nut:	245 Nm
Brake caliper:	120 Nm
Wheel bolts, steel rim:	82,5 Nm
Wheel bolts, alu rim:	110 Nm



D.3 Spring and shock absorber replacement

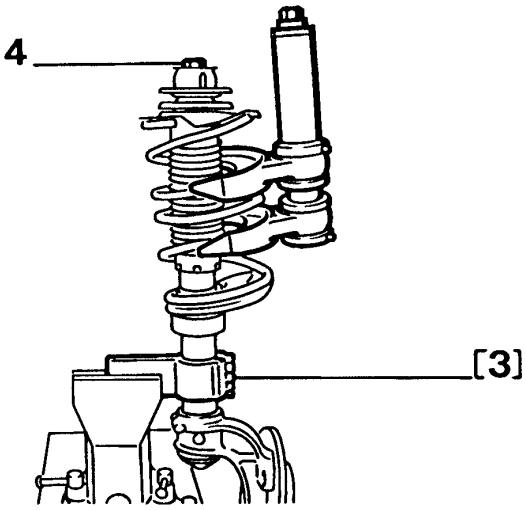
D.3.1 Special tools

[1] Pin tool for lock nut on damper.

[2] Adapter for holding the damper bar (TORX 40)

[3] Clamp for holding the strut tube in a vise.

NOTE: This job can also be done with other suitable tools.



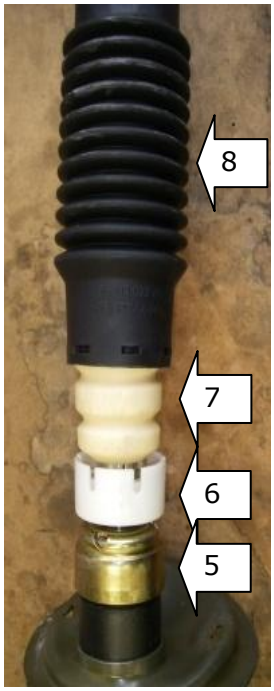
D.3.2 Disassembling

Remove the complete strut and fasten it in a vise with the clamp [3].

- Loosen the top nut (4), hold the damper rod with the TORX 40 adapter [2] **OBS: see further down!**
- Compress the spring with a spring clamp.
- Dismount upper fitting with rubber bellow, stop ring and upper spring plate.
- Carefulle decompress the spring and remove the spring clamp.

The compressed spring must be handled with caution and must not be placed so it can hit a person if the tool breaks loose.

- Remove the protection bellow.
- Use the pin tool [1] for unscrewing the lock nut (5).
- Remove the pin tool [1], the lock nut (5) and the damper.
- Pull the damper out of the damper tube.



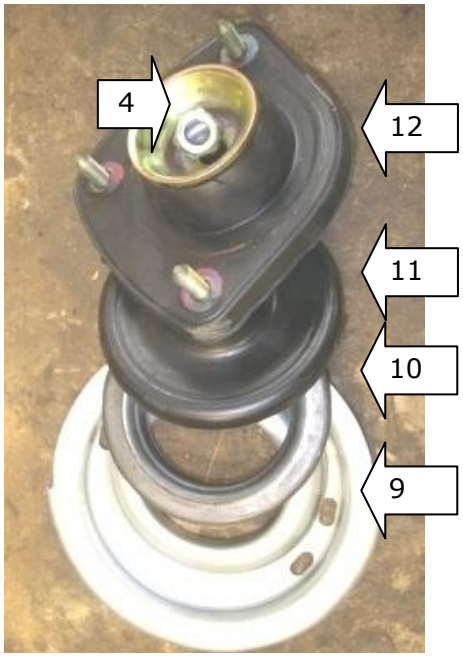
D.3.3Assembling

Install the damper with lock nut and tool in the damper tube.

The lock nut (5) is tightened with 150 Nm with the pin tool [1].

Install the damper in correct order:

- plastic stop ring (6)
- rubber damper (7)
- protective bellow (8)



Assemble the compressed spring with the spring clamp attached.

Install in correct order on the top of the spring:

- upper spring plate (9)
- thrust bearing (10)
- support plate (11)
- upper fastener with support plate (12)

Install new nut on the damper rod (4). Tightening torque = 70 Nm.

Remove the spring clamp from the spring.

Verify that the spring is correctly installed both on lower and upper spring plate.

D.4 Driveshafts

D.4.1 Disassembling

- Remove the front wheel
- Loosen driveshaft nut
- Loosen lower ball joint
- Pull the control arm slightly down to release the ball joint

NOTE: Inner bushings can be damaged if the lower control arm is pulled too far down.

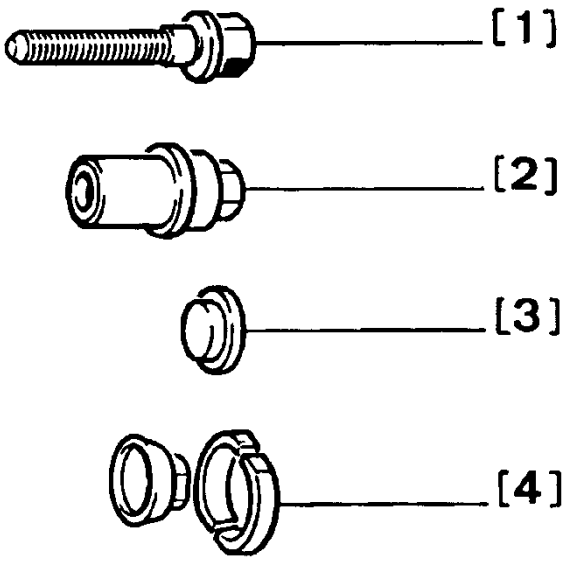
- Pull the driveshaft out of the hub

NOTE: It is important that the inner joint follows the driveshaft when this is removed. Use for example a screwdriver to release the joint together with the driveshaft.

Make sure the driveshaft locking spring is still located on the driveshaft.

D.4.2 Assembling

Assemble in reverse order. Make sure the locking ring is installed correctly.
Tightening torques:
Ball joint = 40 Nm
Driveshaft nut = 245Nm



D.5 Front wheel bearing

D.5.1 Bearing replacement without removing the strut

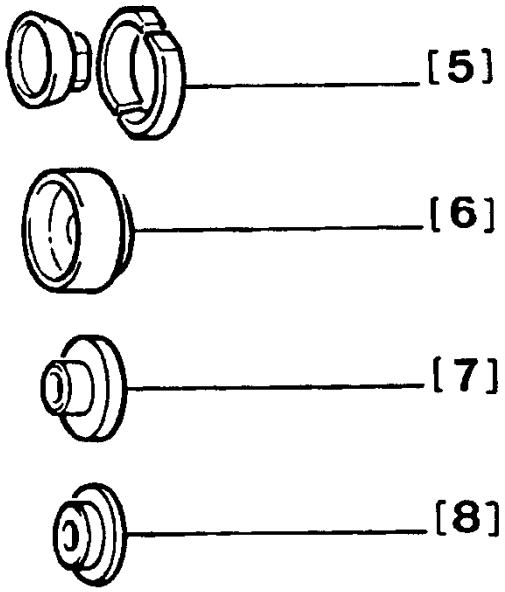
D.5.2 Special tools

[1] Bolt (-).0613 B1

[2] Nut (-).0613 B2Z

[3] Press washer (-).0613 B3

[4] Bearing remover with cone and shims (ø 66 mm) (-).0613 B8

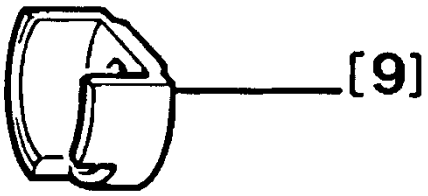


[5] Bearing remover with cone and shims (ø72 mm) (-).0613 B4

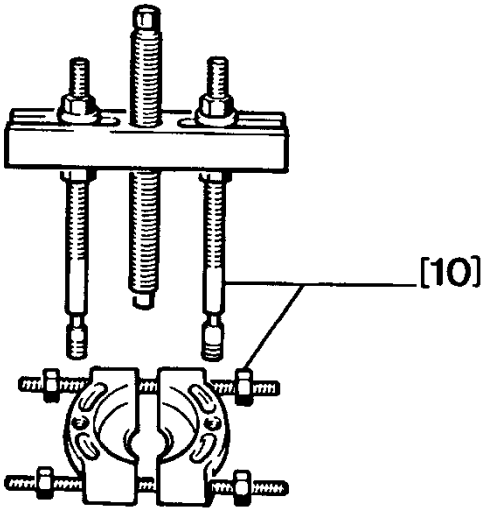
[6] Holding on tool/cup (-).0613 B5Z

[7] End piece for bearing installation (ø66 mm) (-).0613 B9

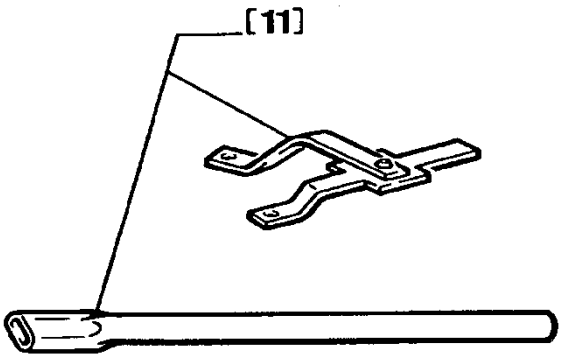
[8] End piece for bearing installation (ø72 mm) (-).0613 B6Z



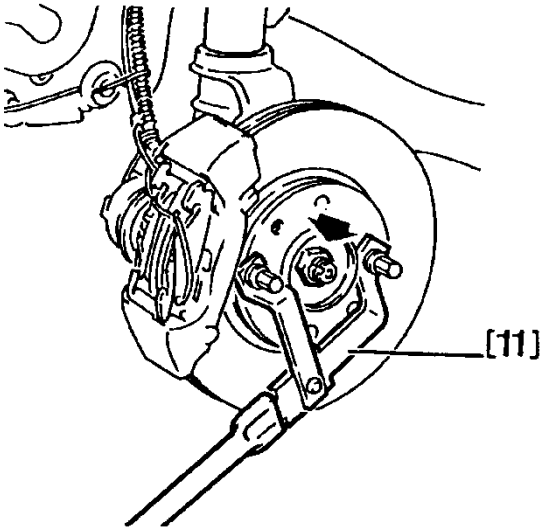
[9] Holding on tool for removing the bearing (-).0615 EY



[10] Bearing pull out tool (universal) or U53 (K2+T2)



[11] Lever for wheel hub (-).0606 A1Y/A2

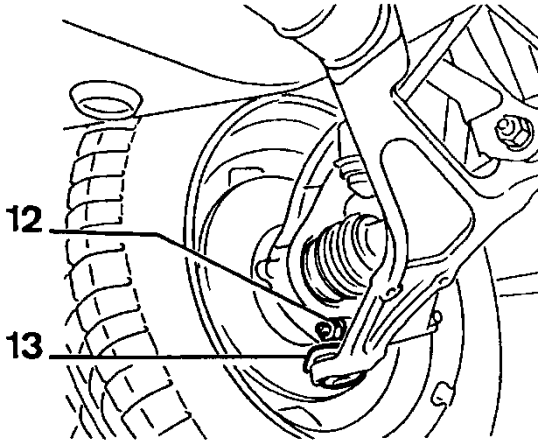


D.5.3Disassembling

The tool [11] is used for holding the hub when the driveshaft nut is loosened.

OBS:
Do not hold the wheel hub with the brakes when the driveshaft nut is loosened/fastened. The brake disc fastening bolt can be cut or damaged.

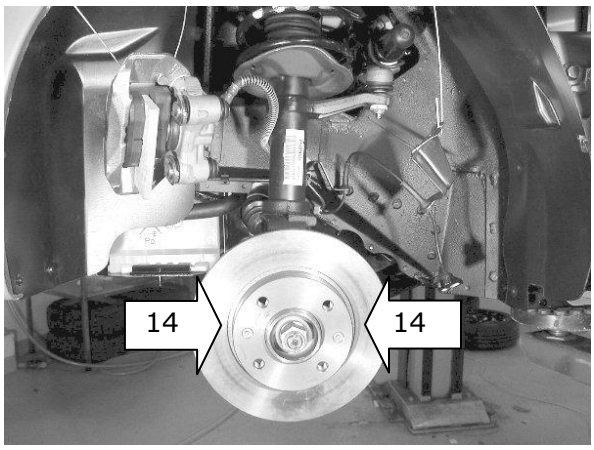
Remove the locking nut (12).



Pull the lower control arm down to release the ball joint (13).

OBS:
Do not pull the lower control arm too far down. The inner bushings can be damaged or loosen.

Pull the driveshaft out from the hub and forward. Ensure joint and gaiters are not stretched and damaged.



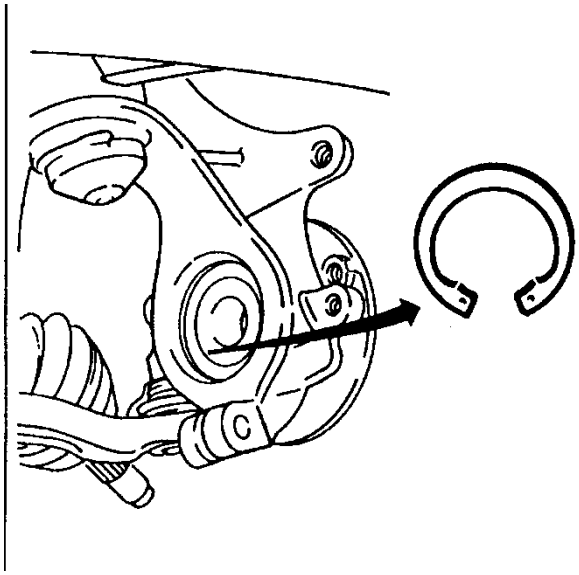
Hang the released end of the driveshaft in the wheel opening.

Remove the brake pads, loosen the brake caliper and hang it in the wheel opening. Make sure the brake line is not stretched or damaged.

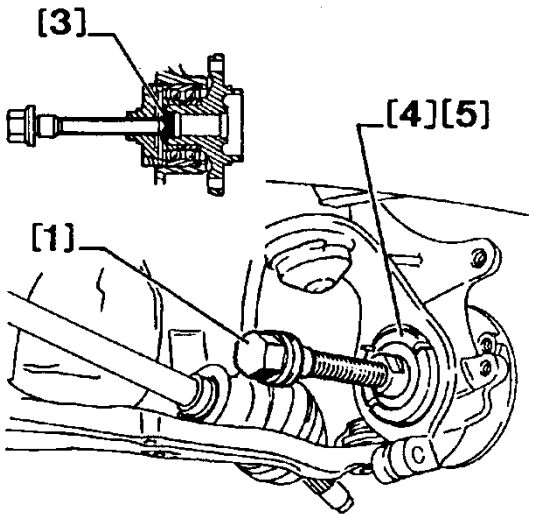
Use a suitable piece of wood between the brake pads.

Loosen the ABS sensor and hang it out of the way.

Loosen fixing bolts on the brake disc (14).



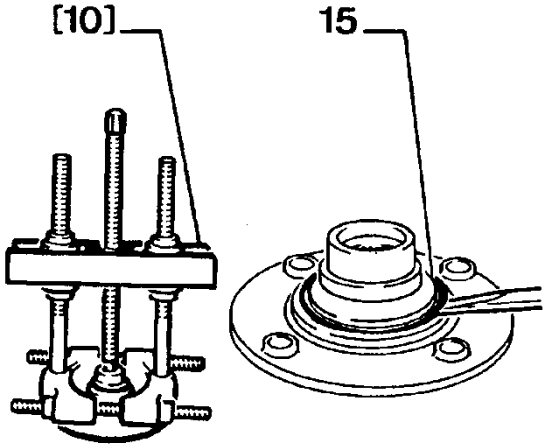
Remove the lock ring for the wheel bearing.



Assemble the pull out tool for the wheel bearing of the following parts:

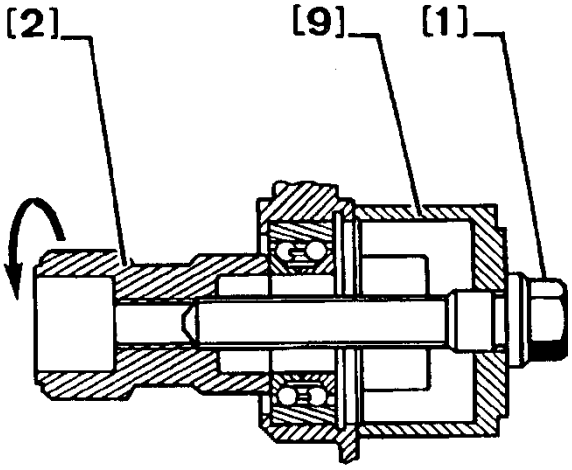
- [1] bolt
- [3] press ring
- [4] Cone and shims for ø66 mm.

Press the hub out. The bearing's outer inner ring will follow the hub and stay on the hub.



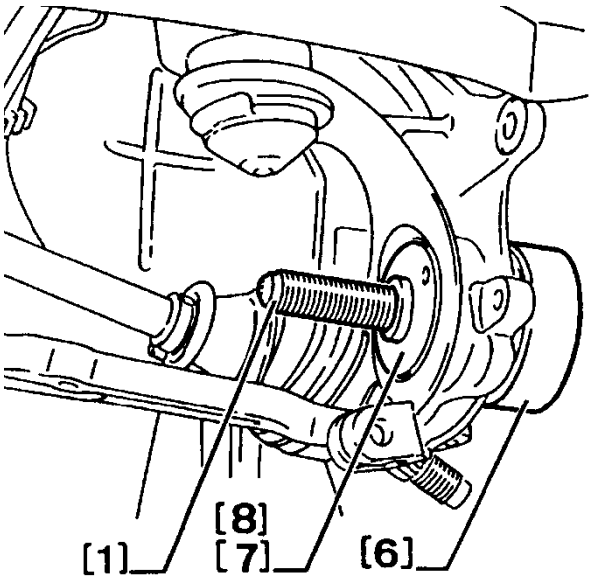
Pull the inner ring off with the pull out tool [10].

Remove the stop ring (15) with a screwdriver.



Install the inner ring on the bearing and press the bearing out with the following tools:

- [1] bolt
- [2] nut
- [9] holding on tool

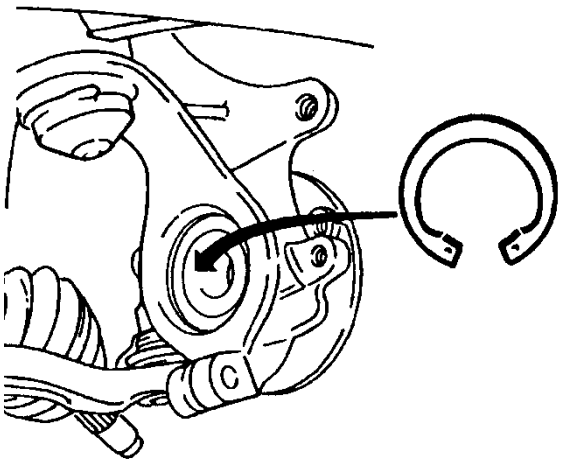


D.5.4Assembling

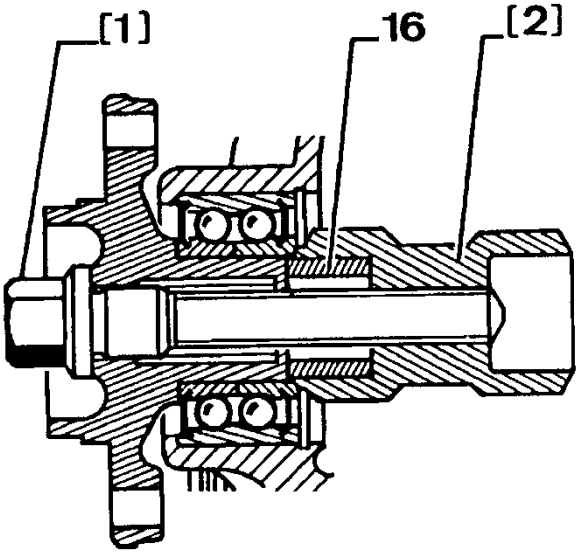
OBS:
Install new bearing and lock ring. Ensure the surfaces are clean and have no irregular wear.

Install the new bearing with the following tool:

- [1] bolt
- [6] holding on tool
- [7] end piece for bearing installation



Install new lock ring in the track.

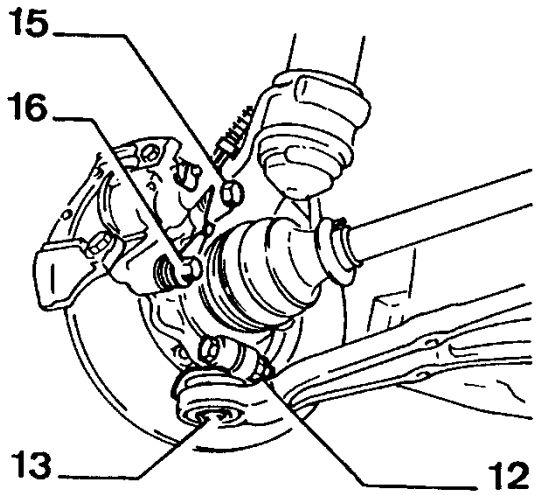


Install the hub with the following tool:

- [1] bolt
- [2] nut

Make sure the plastic ring (16) is installed when the bearing is assembled. The ring must not be removed before the hub is installed.

Press the hub completely in.

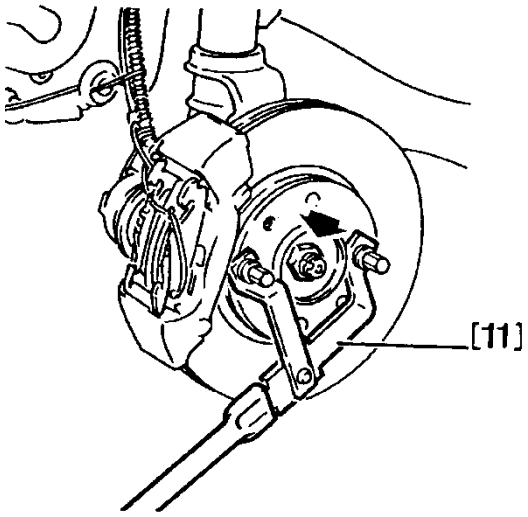


Install the driveshaft in the hub.

Attach lower control arm (13).
Make sure the protector is installed.

OBS:
Do not pull the lower control arm too far down. The inner bushings can be damaged or loosen.

Install the fastener (12) with new nut.
Tightening torque = 40 Nm.



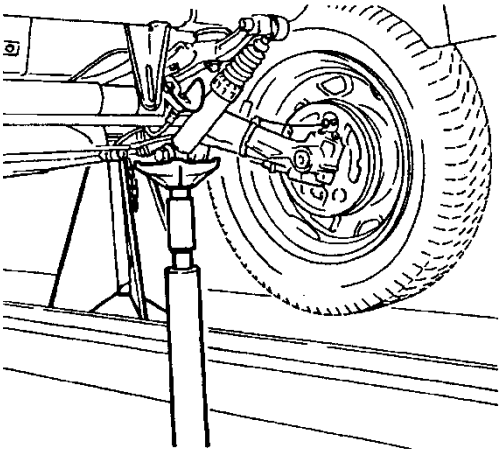
Install brake caliper.
Tightening torque = 120 Nm.

Install new driveshaft nut.
Tightening torque = 245 Nm.

Use the tool [11] holding the hub when tightening.

OBS:
Do not hold the wheel hub with the brakes when the driveshaft nut is loosened/fastened. The brake disc fastening bolt can be cut or damaged.

Install the wheel.
Tightening torque wheel fasteners =
Steel rim: 82,5 Nm
Aluminium rim: 110 Nm.



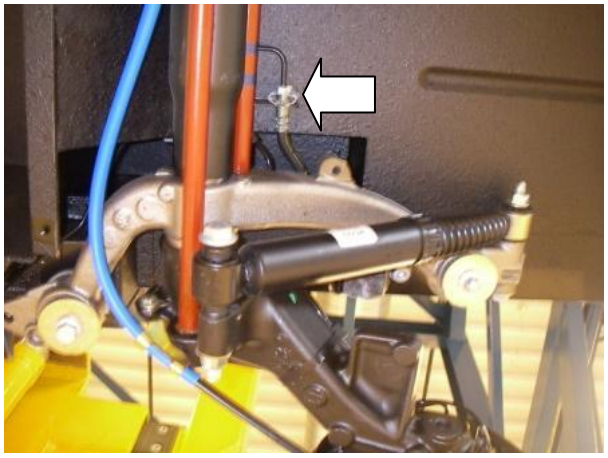
D.6 Rear suspension complete

D.6.1 Disassembling

The vehicle is preferably placed on a four column car ramp.

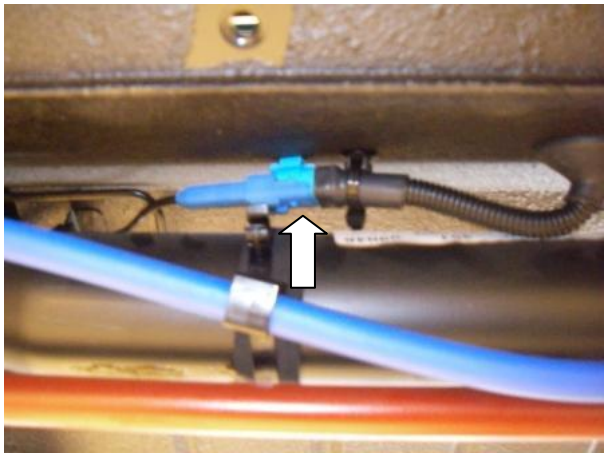
The rear part of the car is lifted and supported with ramps.

Remove the wheels.

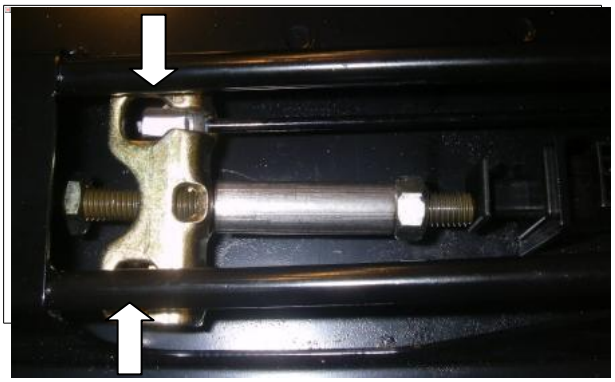


Loosen the brake pipes and plug them.

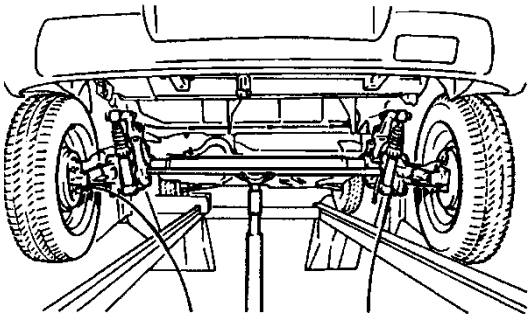
Loosen the ABS sensors.



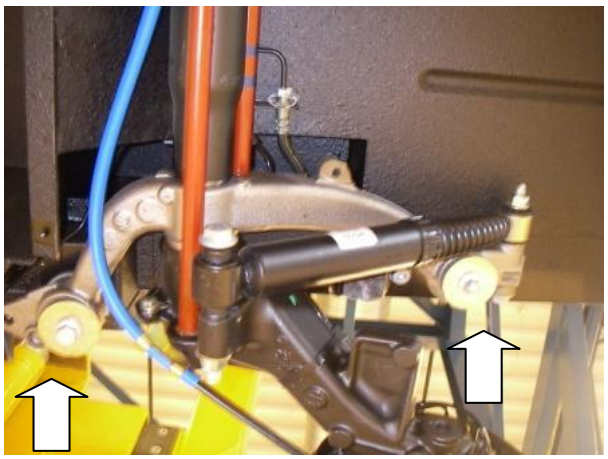
Disconnect the ABS harness and remove the complete harness with ABS sensors.



Loosen handbrake cables from the handbrake compensator.



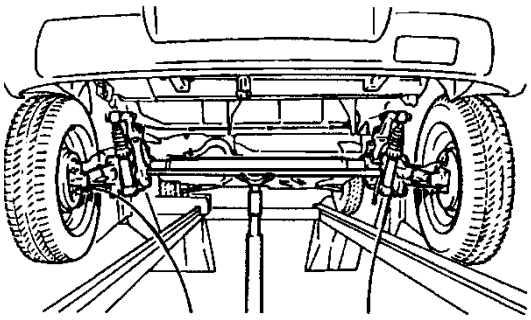
Support the rear suspension with a hydraulic jack.



Remove the four fasteners. The picture is from RH side; you'll find corresponding fasteners on LH side.

Carefully lower the jack.

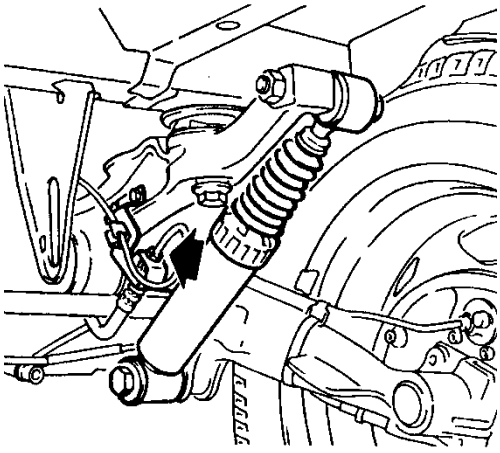
Carefully pull the complete rear suspension backwards.



D.6.2Assembling

Assemble in reverse order.
The rear suspension is lifted with a hydraulic jack at the same time as the four points of fixation are adjusted according to the fixings in the lower frame.

Install the bolts with necessary washers without fastening. Then fasten all four bolts. Tightening torque = 110 N.



OBS: Make sure the brake lines are not bent or squeezed between the rear axle and lower frame during assembling.

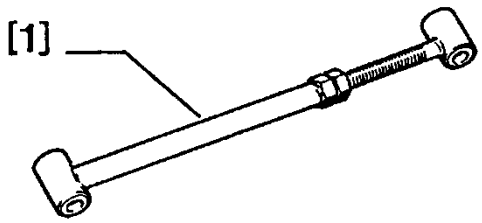
Assemble the brake lines and bleed the brakes.
Tightening torque, brake lines = 14 Nm
Tightening torque, nipple = 6 Nm

Attach the ABS sensor.

Connect hand brake cables and adjust.

Adjusting hand brake cables: see separate section in chapter E.

D.7 Rear suspension; springs and arms



D.7.1 Special tools

[1] Control tool for ride height.

D.7.2 Disassembling – shock absorber

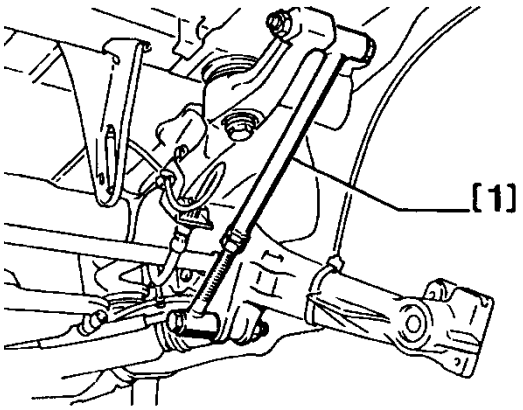
The rear of the vehicle is lifted and secured on ramps.

Loosen the damper fasteners and remove the shock absorber.

D.7.3 Assembling – shock absorber

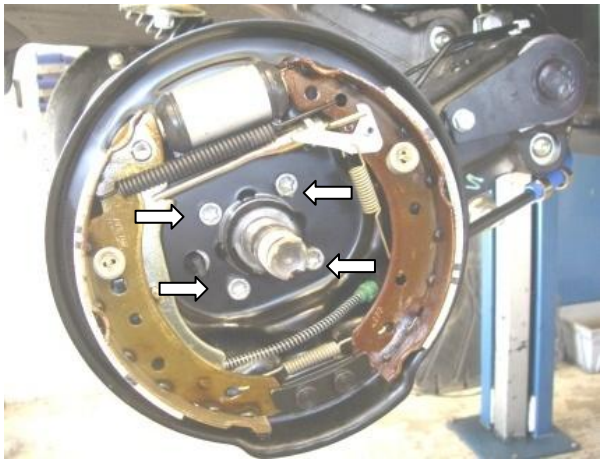
Assemble in reverse order.

Tightening torques:
Upper damper fastener = 90 Nm
Lower damper fastener = 110 Nm

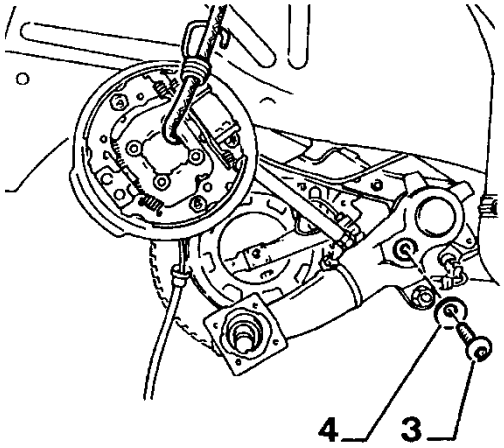


D.7.4 Disassembling – suspension arm

- The rear of the vehicle is lifted and secured on ramps before the wheel is taken off.
- Remove the shock absorber.
- Adjust the special tool [1] fitting the gap between the damper fixings and install it with the damper fasteners.



- Loosen the ABS sensor.
- Remove the bracket for the brake hose.
- Loosen the hub nut and washer and remove the brake drum.
- Disconnect the handbrake cable from the handbrake compensator and remove it from the suspension arm.
- Loosen the four bolts (see picture) holding the brake shield and hang it up in the wheel opening.

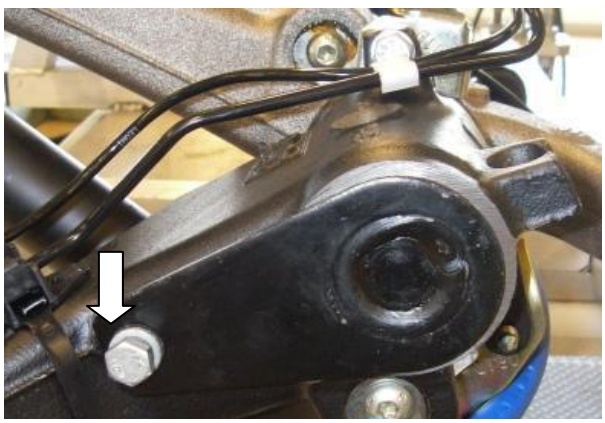


Loosen the bolt (3) and remove it from the end of the torsion bar together with the washer (4).

Remove the special tool [1].
Make sure the lock nuts are locked so setting is not altered.
(This is used as interpreter when the torsion bar is reinstalled to check that the ride height is as earlier).

Pull the suspension arm out.

TIP:
If it is difficult to loosen the suspension arm it may be easer if the stabilizer bar is loosend first.
Loosen the nut…



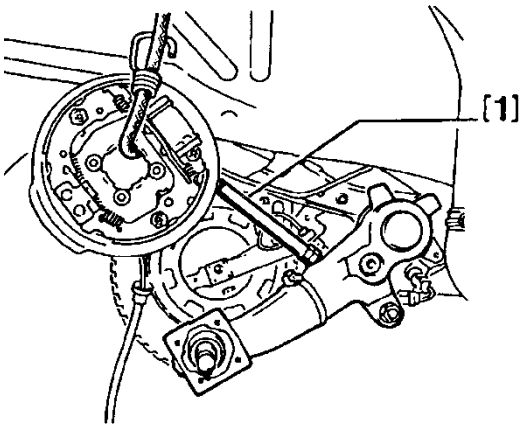
…and the plastic fastener. Tilt the metal plate out and the bar will probably follow; you can also press the bar out from this side.

D.7.5Assembling – suspension arm

Clean the parts before assembling. Also inspect the parts for damages:

- The surfaces for the seal must be without scratches and damages.
- The bearing and bearing housing must be without damages.

Use new seal and grease the gap between the ”seal lips” before assembling.



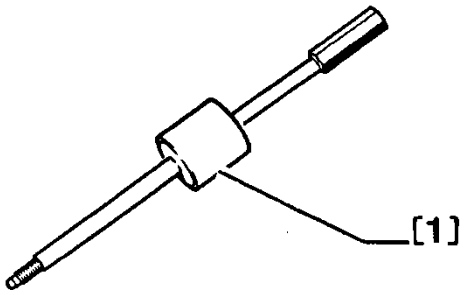
The suspension arm is installed in correct position with the aid of the special tool [1]. The torsion bar is entered at the same time as the arm is pushed into the correct position on the transverse tube.

Install the shock absorber.

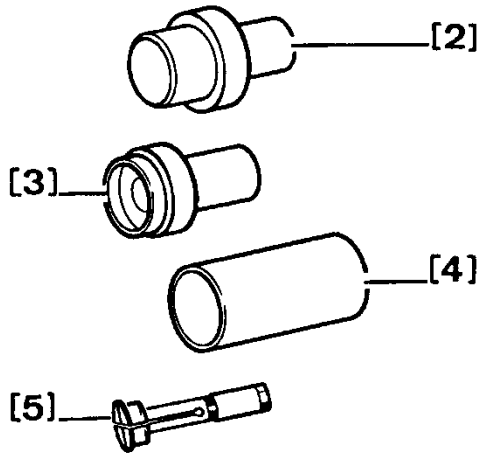
Install brake shield with brake lining, ABS sensor, bracket with brake lining, brake drum and wheel.

D.8 Reconditioning rear suspension arm

D.8.1Special tool



[1] Slide hammer (-).03116A

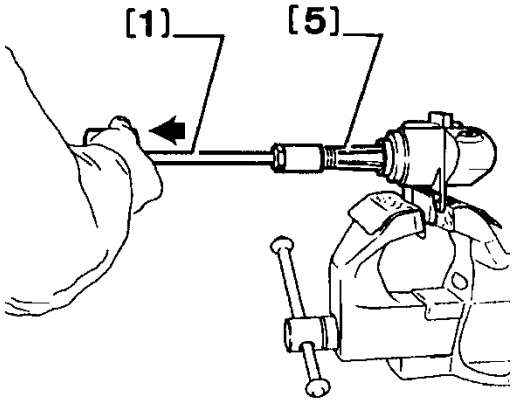


[2] Installation puch for inner bearing (-).0533C1

[3] Installation punch for outer bearing (-).0533C2

[4] Distance tube (-).0533G

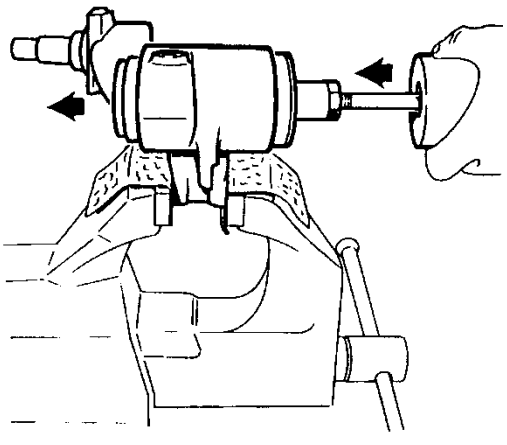
[5] Bearing extractor (-).0533E



D.8.2Disassembling bearing and shaft extension

The inner bearing is pulled out by attaching the bearing extractor [5] to the slide hammer [1]. Strike carefully.

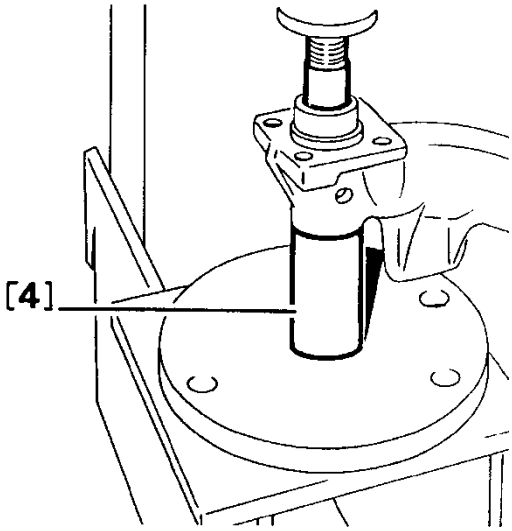
NOTE: The inner bearing usually loosens and stays on the suspension when the suspension arm is removed. If so the part left on the suspension can be withdrawn. The bearing housing left inside the suspension arm must be striked out.



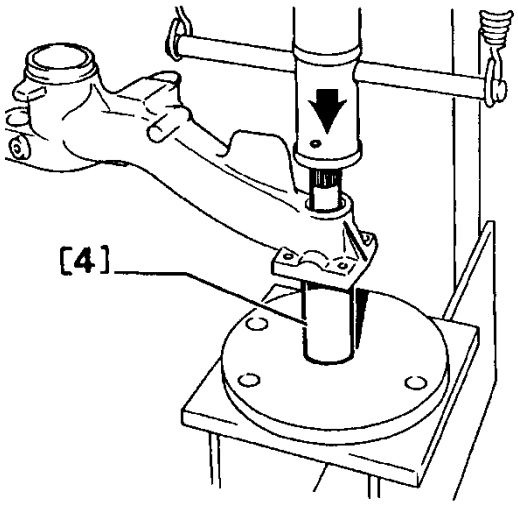
The outer bearing is removed by striking outwards.

Disassemble the bearing.

Here you can see the suspension arm (top of the picture) and both bearings disassembled. The four parts at the bottom left are house, seal, inner bearing and inner house bearing. The two parts at the right are the outer bearing with housing and seal.



The shaft extension can be removed by installing the arm on the distance tube [4] and pressing the extension inwards.

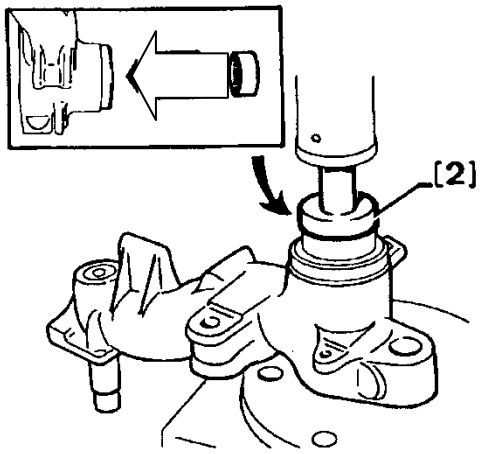


D.8.3Assembling

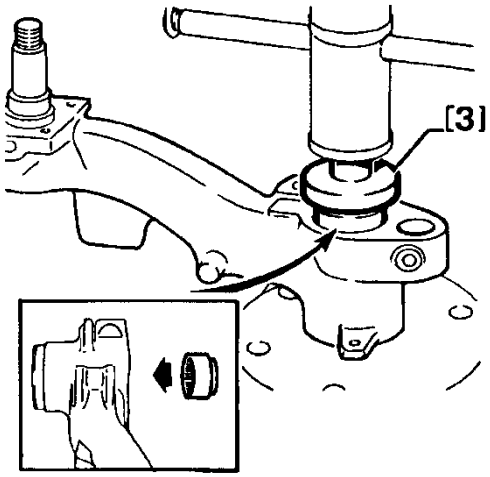
Clean the bearing liners and surfaces for the shaft extension.

Use new shaft extension and bearings.

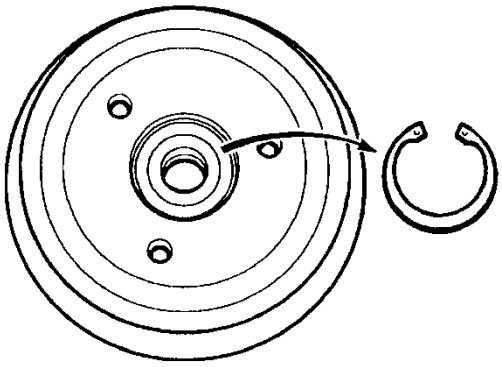
Install the arm on the distance tube [4]. Install the new shaft extension and press it in completely.



Press the inner bearing in.
Use the installation punch [2] to ensure the bearing is correctly installed in the liner.



Press the outer bearing in using the installation punch [3].

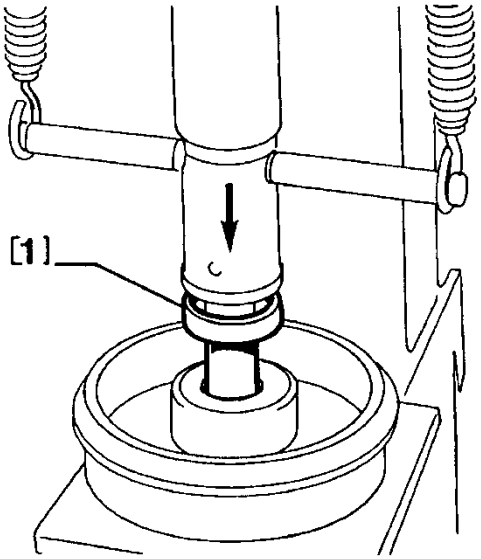


D.9 Rear wheel bearing

D.9.1Disassembling

Remove the lock ring.

Press the bearing out with a suitable punch or special tool [1] (-).0533B



D.9.2Assembling

The bearing is installed with same tool the other way, with the bigger diameter towards the bearing.

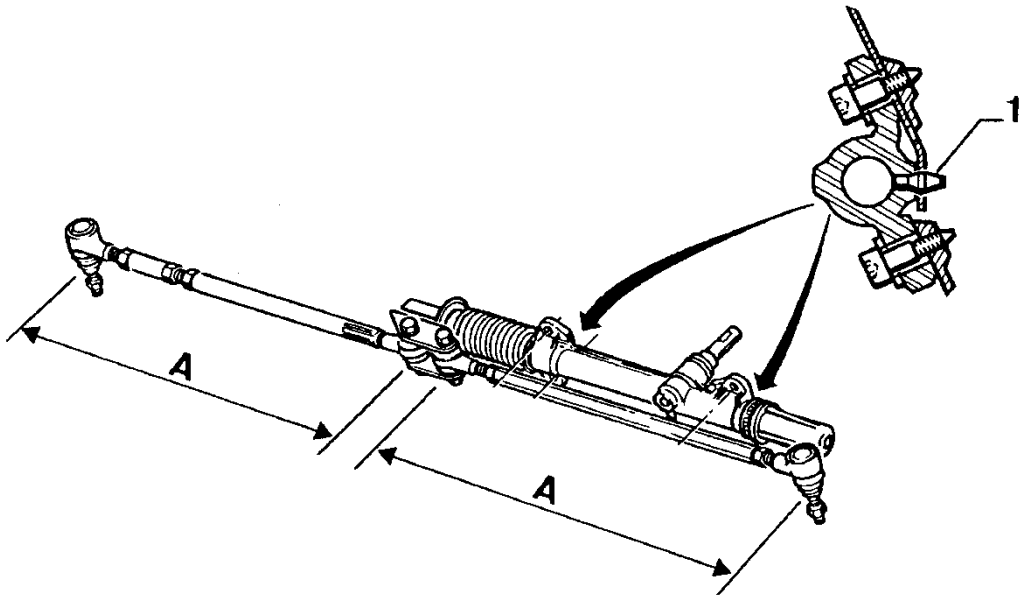
OBS:
To avoid damages to the bearing it is important to use a tool that only is in contact with the bearing's outer ring when the new bearing is installed.

D.10 Steering rack

D.10.1 Description

The steering rack is fastened to the lower frame by three bolts.

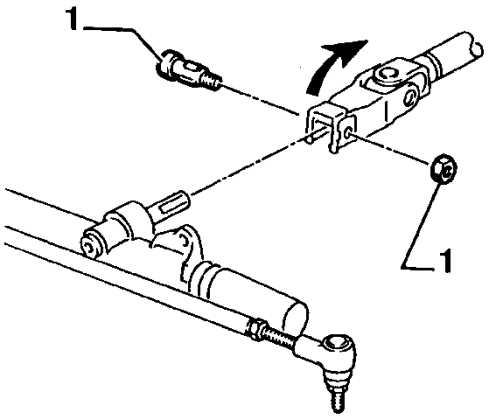
It is fixated by two guide pins (1) which also ventilate the gaiter.



Track rod length: (basic setting)
A = 520 mm.

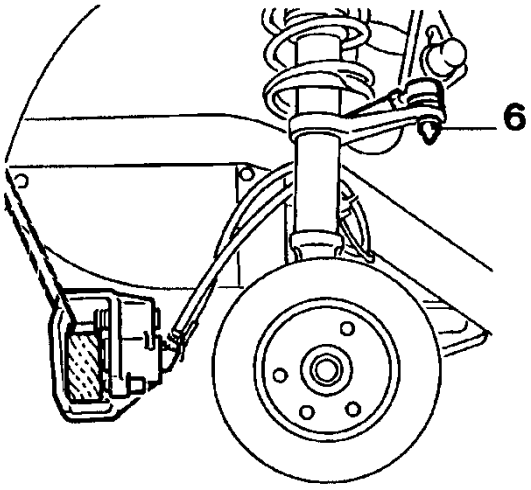
D.10.2 Tightening torques

Track rod end nuts:	35Nm
Lower frame fasteners:	38 Nm
Lock nuts on track rods:	60 Nm
Inner track rod fasteners:	35 Nm
Track rods to steering rack:	35 Nm
Universal joint to pinion:	22,5 Nm
Steering column nut to bracket:	18 Nm
Steering column screw to bracket:	22,3Nm
Steering wheel to steering column:	47,5Nm

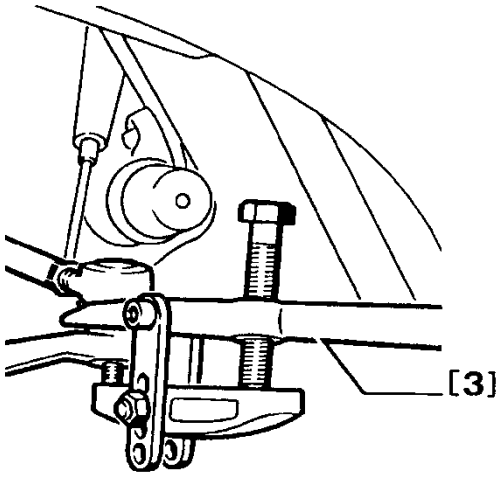


D.10.3 Disassembling

Remove the locking bolt (1) in the steering column's universal joint and pull the joint off the crown wheel.



Loosen nut on the track rod end.

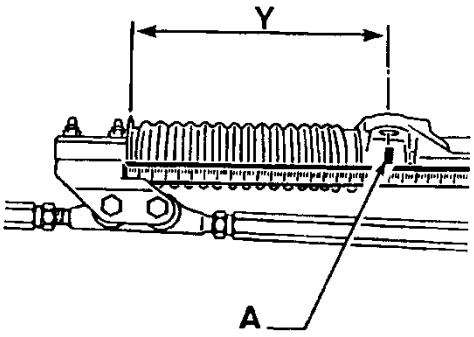


Press the track rod end out with a suitable puller [3].

D.10.4 Assembling

Assemble in reverse order.

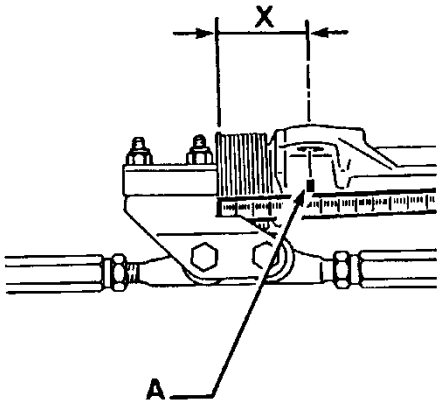
D.11 Steering rack centre position



D.11.1 Inspection

The steering rack should be in centre position when the wheels are in straight ahead position.
When doing wheel alignment, replacing track rods, track rod ends or steering wheel, the steering rack's centre position must be controlled.
Centre position is controlled with the steering rack out of the car or with disconnected track rods.

- Mark the steering gear house (A). Measure the distance (Y) by max turn (steering rack as far as it goes).

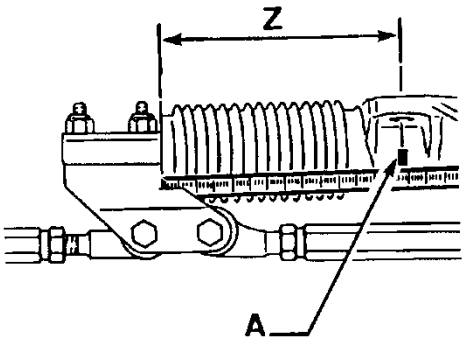


- Measure the distance (X) by max turn to the other side.

Measure (Z) is the steering rack centre position and can be calculated this way:
Y minus X = steering rack movement.
Z = half of the steering rack movement + X.
You can also set it up mathematically:
Z=X+(Y-X)/2

Alternatively

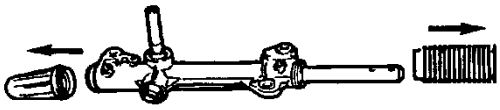
An easier way to find the steering rack centre position is to count the number of steering wheel turns from completely turning one side and to the other side. The track rods should be disconnected.



The precise centre position is found by placing the steering wheel in the middle of the outer positions.

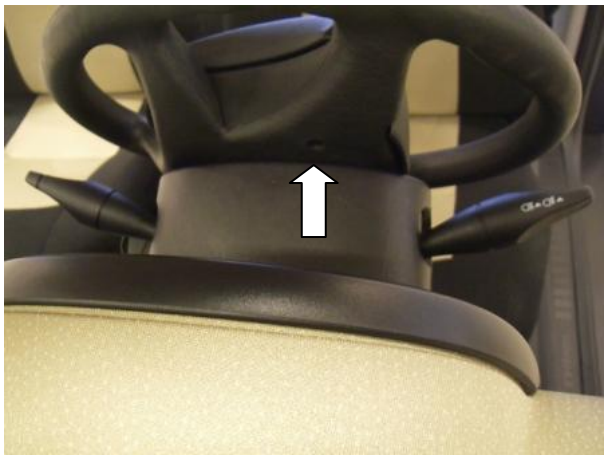
If the steering wheel is not in straight ahead position after the centre position is defined, the steering wheel is moved on the steering column to correct position.

Then the steering wheel is locked in centre position and the track rods are adjusted to correct toe in.



D.11.2 Gaiter replacement

The gaiters can be dismounted and replaced individually after the steering rack is disconnected from the steering column.



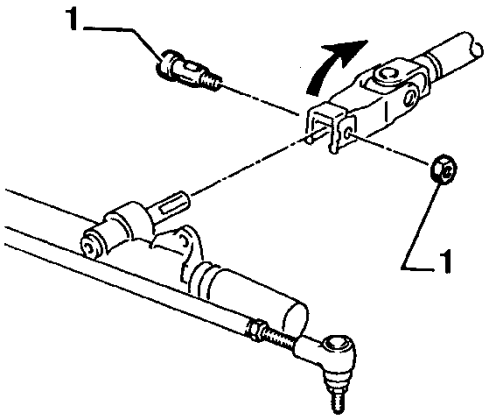
D.12 Steering rack

D.12.1 Disassembling

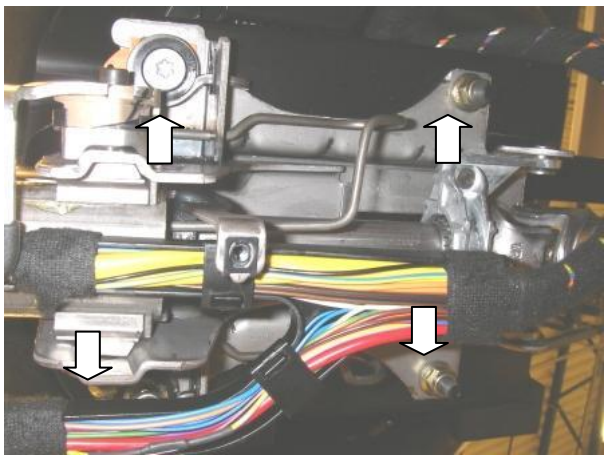
Turn ignition off and disconnect the 12 V battery.

Remove two fasteners (arrow) on the steering wheel, disconnect the harness and carefully remove the airbag.

NB: The airbag is charged with explosives. Do not sit in front of the airbag when it is dismounted. If possible stay outside the car when working on the airbag.



Remove the locking bolt (1) in the steering column's universal joint and pull the joint off the crown wheel.



Remove the wheel and the lower shround (three fasteners).

Disconnect harnesses for stalks (2 x grey, ignition (black), immobiliser tranceiver (green) og clock spring (black).

MARK THE CLOCK SPRING POSITION
Remove the clock spring.

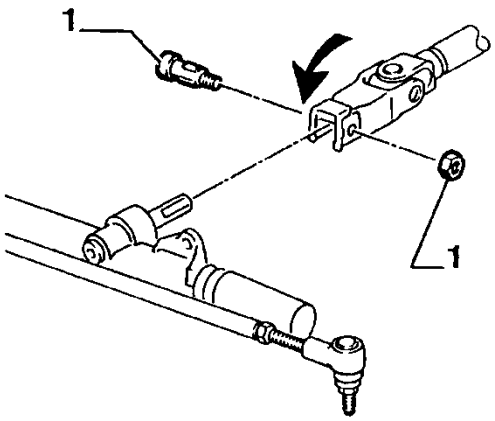
Remove three nuts and one bolt fastening the steering column to the bracket and remove the steering column.

D.12.2 Assembling

Install the steering column and the nuts and bolt for the bracket.

Connect harnesses and secure the cables to avoid rattle.
Make sure the harness is bent outwards from the steering column as shown in the picture.

Fasten the nuts.
Tightening torque = 18 Nm
and 22,3 Nm for the screw.



Assemble the universal joint to the steering rack's crown wheel according to the parallel surfaces.

Use new locking bolt (1) and fasten.
Tightening torque = 22,5 Nm.

Install the clock spring and steering wheel.
Use new nut.
Steering wheel tightening torque = 47,5 Nm.

Make sure the clock spring and steering wheel are installed correctly according to the wheels' straight ahead position.

Install the airbag.
Airbag tightening torque = 4,1 Nm.

Stay outside the car when installing the airbag.

Assemble the steering column shroud.

Connect the 12 V battery. Verify the functions.