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   16V

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TRANSMISSION HALF-SHAFTS

   T. SPARK
16V


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(*): See engine  TD

(▲): See engine  T. SPARK
16V

DESCRIPTION

With the constant velocity joints the axleshafts form the set of devices which transmit motion from the gearbox to the driving wheels.

The assembly of these devices, commonly called "transmission" when in conjunction with the gearbox, comprises the following:

- right and left axle shafts;
 - constant velocity joints on wheel and gearbox side.
- The high-resistance steel axle shafts (11) have grooved ends to enable coupling with the constant velocity joints (12) and (13).

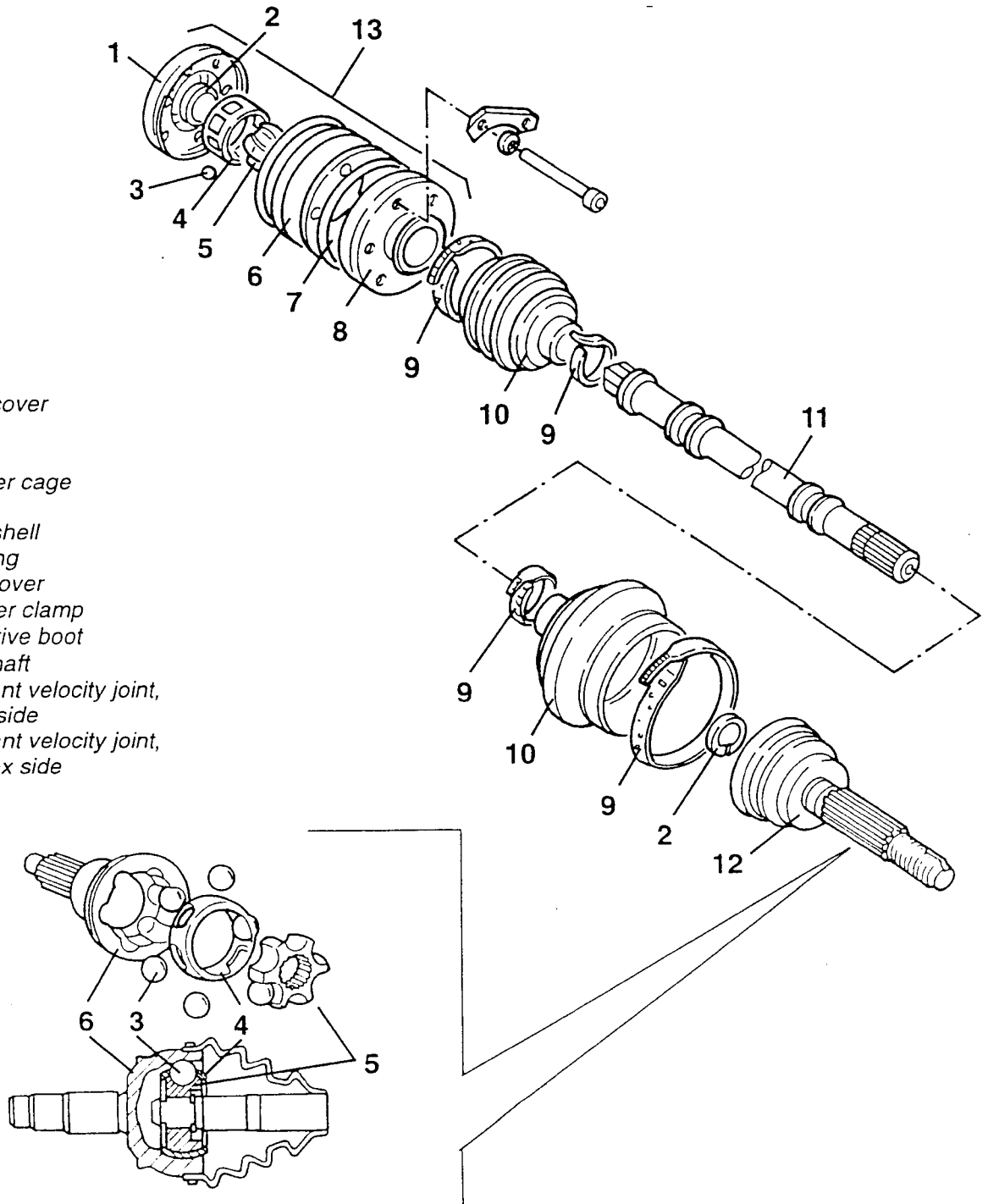
The housing for the flexible retainers rings (2) is made on these grooves.

The constant velocity joints are formed of an inner core (5) known as "drive", keyed onto the input shaft and an outer shell (6) called "driven", which forms the output element of the joint.

The inner core has six spherical grooves on its outer surface containing six balls (3), held in place by a cage (4).

These balls are the parts which actually transmit the motion and are also located in other grooves machined on the inner surface of the shell.

1. Outer cover
2. Circlip
3. Ball
4. Retainer cage
5. Core
6. Outer shell
7. Seal ring
8. Inner cover
9. Retainer clamp
10. Protective boot
11. Axle shaft
12. Constant velocity joint, wheel side
13. Constant velocity joint, gearbox side



REMOVAL/REFITTING

The following procedure refers to removal/refitting of the lefthand axle shaft.

However, it is possible to wholly follow this procedure also for removing the righthand axle shaft.

- Set the car on a lift.

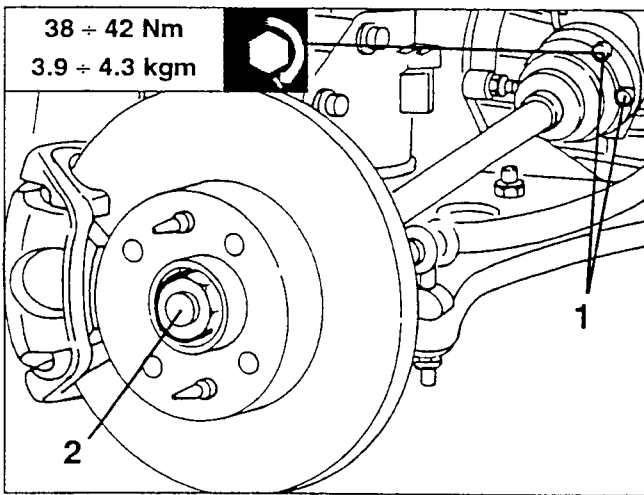
- Remove the left front wheel.

1. Slacken the screws fastening the left axle shaft to the differential support and disconnect it retrieving the safety plates.

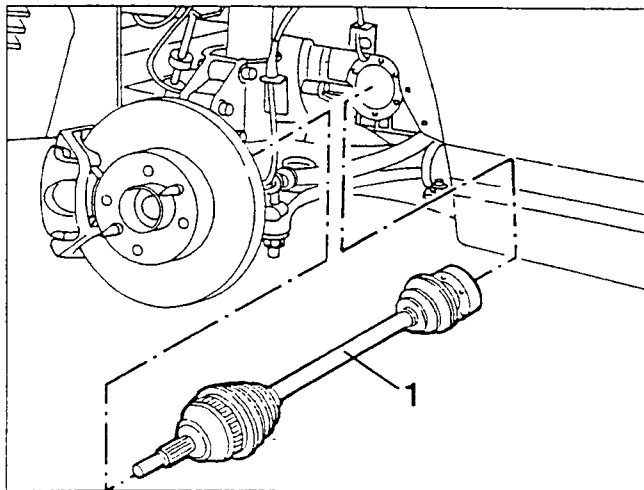
2. Remove the caulking and slacken the nut fastening the axle shaft constant velocity joint to the wheel hub.

When refitting, tighten the nut fastening the axle shaft to the wheel hub as described in GROUP 44

- Wheels and hubs - "Front wheel upright (Boxer versions)".



1. Pull out the axle shaft and remove it.



DIS-ASSEMBLY OF JOINT ON GEARBOX SIDE

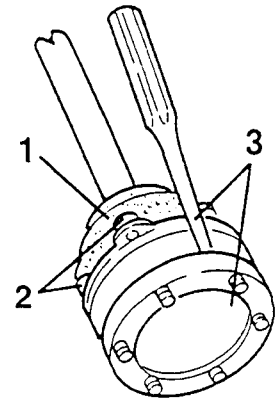
- Fasten the axle shaft in a vice fitted with protective jaws.

- Remove the clamps of the gearbox side boot.

1. Back off the boot on the axle shaft.

2. Remove the safety plates located on the inner cover after removing the corresponding screws.

3. Remove the outer cover using a punch.

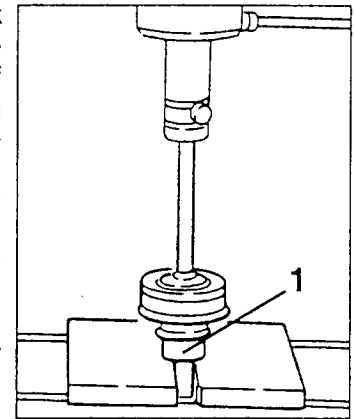


Change the boot and clamps when re-assembling.

- Make a reference mark on the outer ring, on the cage and on the core of the joint to reposition correctly when re-assembling.

- Remove the flexible retainer ring.

1. Working under the press with two half plates and a punch, remove the constant velocity joint from the axle shaft.

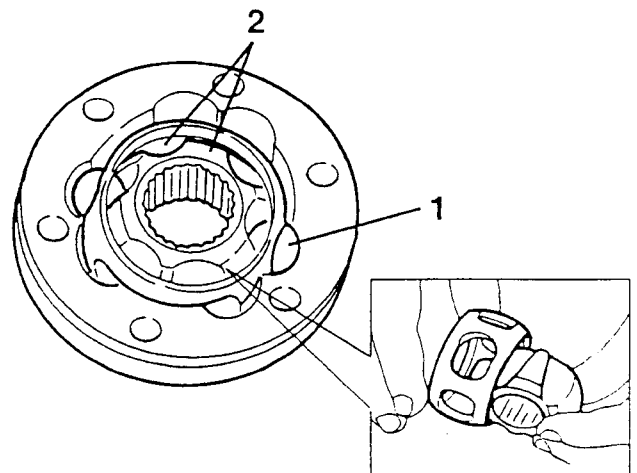


- Slide the protective boot off the axle shaft and remove the inner cover from the constant velocity joint.

- Remove the two seal rings from the joint outer ring.

1. Remove the balls from the joint.

2. Remove the core and cage turning them suitably in the outer ring and separate them.



CHECKS

Degrease the joint components with fuel oil and check the balls and their housings for traces of wear and cracks.

Check the shaft for distortion, cracks and signs of wear.

REFITTING THE JOINT ON THE GEARBOX SIDE

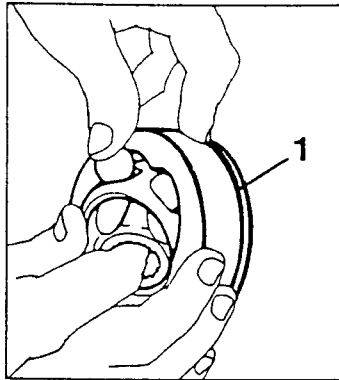
- Carefully grease the cage, core and balls with the specified grease and fill the inner chamber of the joint with 40 g of the specified grease.

- Fit the bellow on the axle shaft taking care not to scratch it on the teeth.

For this purpose it is wise to tape the tothing.

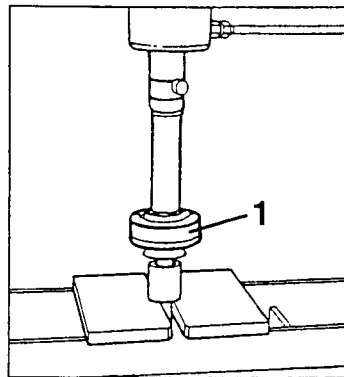
- Assemble the core and cage reversing the sequence followed for their removal.

1. Insert the balls working as illustrated and check that the joint works properly.



Do not mix the balls of this joint with the balls of the joint on the wheel side as their diameter is different.

1. Working under the press and using two half plates and a punch, insert the joint complete with inner cover on the axle shaft.

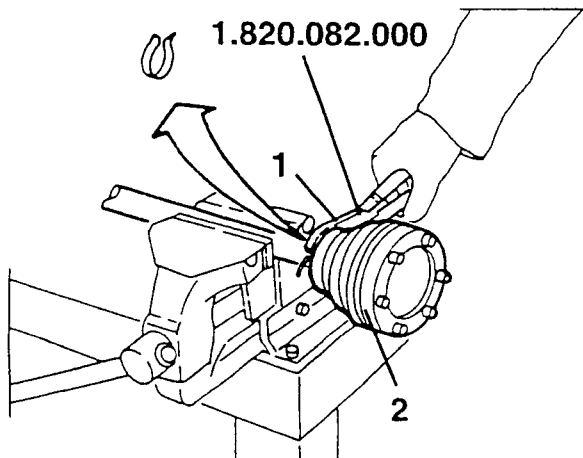


- Fill the joint with another 40 g of the specified grease.

- Fit the two seal rings on the outer ring of the joint.

1. Fit the bellow and using tool N° 1.820.082.000 install the inner clamp.

2. Using tool N° 1.820.084.000 install the outer clamp for fastening the boot.

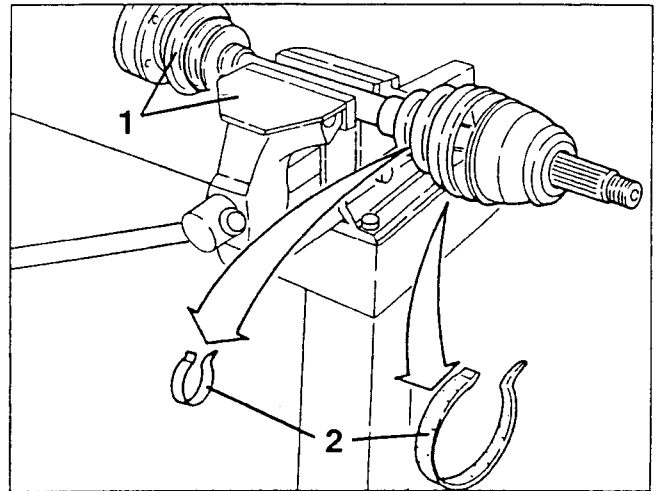


- Fit the safety plates on the inner cover using the corresponding screws, then fit the outer cover on the screws.

DIS-ASSEMBLY OF THE JOINT ON THE WHEEL SIDE

1. Fasten the axle shaft in a vice complete with protective jaws.

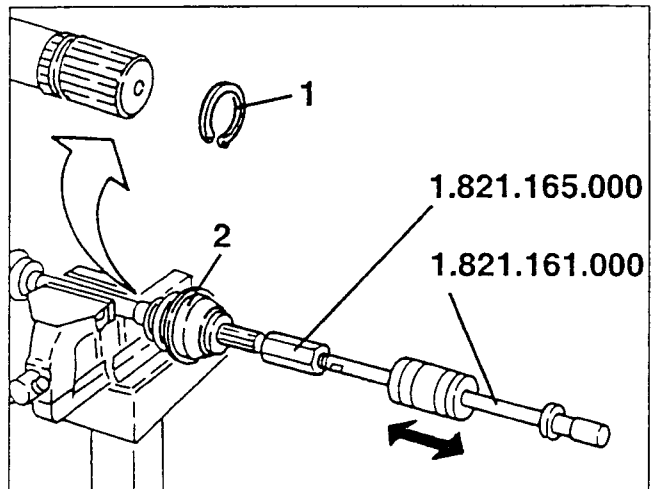
2. Remove the fastener clamps of the protective boot on the wheel side.



When refitting change the boot and clamps.

1. Remove the snap ring.

2. Using tools n° 1.821.165.000 and N° 1.821.161.000, remove the constant velocity joint from the axle shaft.



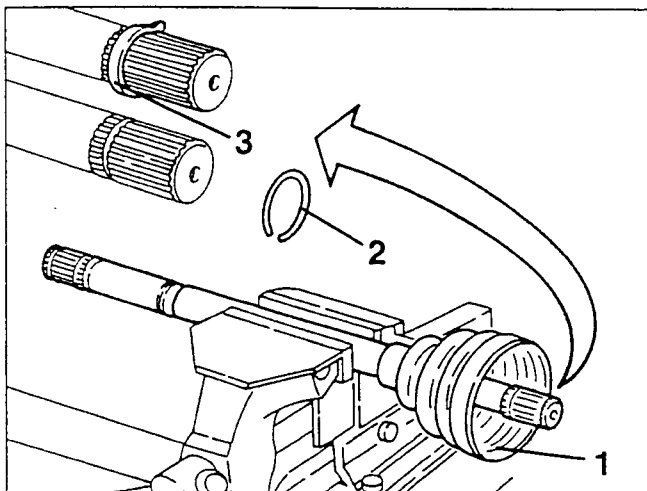
CHECKS

Degrease the joint components with fuel oil and check the balls and their housings for traces of wear and cracks.

Check the shaft for distortion, cracks and signs of wear.

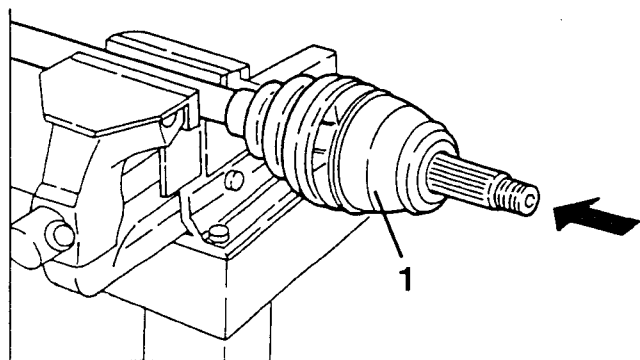
REFITTING THE JOINT ON THE WHEEL SIDE

1. Fit a new protective boot on the axle shaft.
2. Position the snap ring in its housing.
3. Compress the snap ring with the fastener clamp.

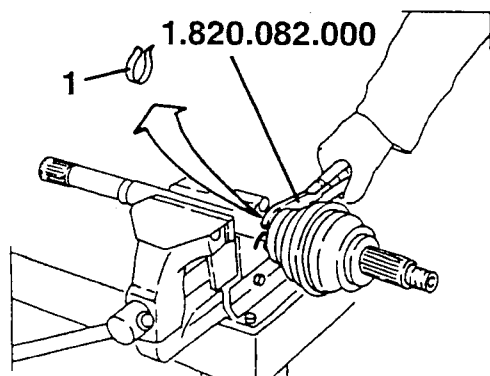


1. Position the joint on the axle shaft and push it into its housing using a soft hammer.

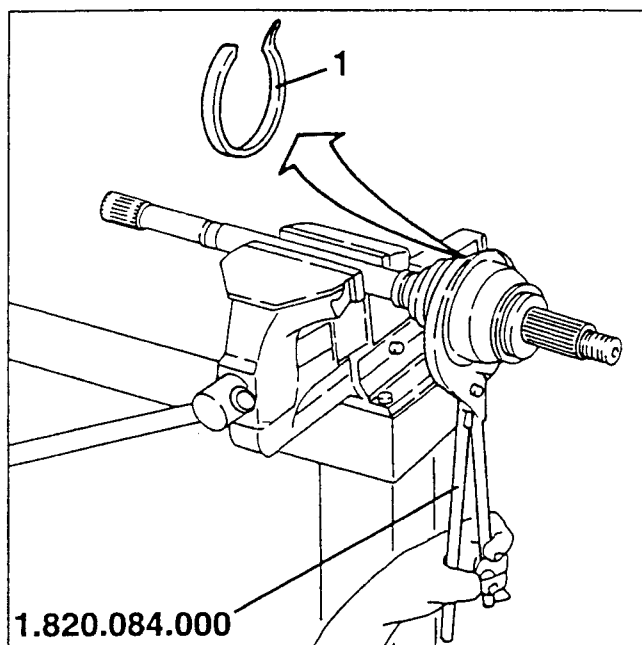
Fill the boot and grease the joint with appr. 120 g of the specified grease.



1. Using tool N° 1.820.082.000 fit the inner boot clamp.



1. Using tool N° 1.820.084.000 fit the outer boot clamp.



DESCRIPTION

With the constant velocity joints the axle shafts form the set of devices which transmit motion from the gearbox to the driving wheels.

The assembly of these devices, commonly called "transmission" when in conjunction with the gearbox, comprises the following:

- right and left axle shafts;
- constant velocity joints on wheel and gearbox side.
- intermediate shaft.

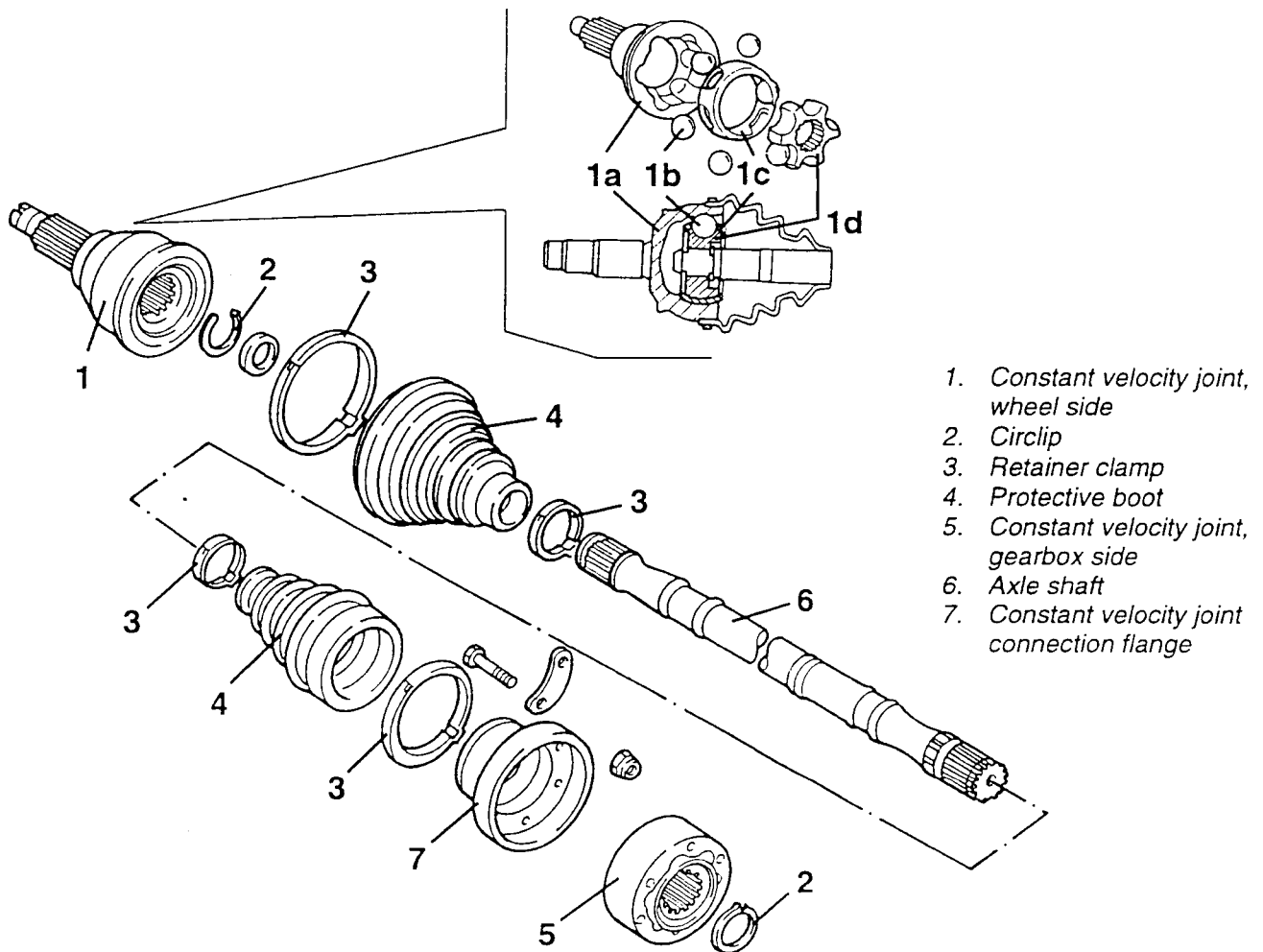
The high-resistance steel axle shafts (6) have grooved ends to enable coupling with the constant velocity joints (1) and (5).

The housing for the flexible retainer rings (2) is made on these grooves.

The constant velocity joints are formed of an inner core (1d) known as "drive", keyed onto the input shaft and an outer shell (1a) called "driven", which forms the output element of the joint.

The inner core has six spherical grooves on its outer surface containing six balls (1b), held in place by a cage (1c).

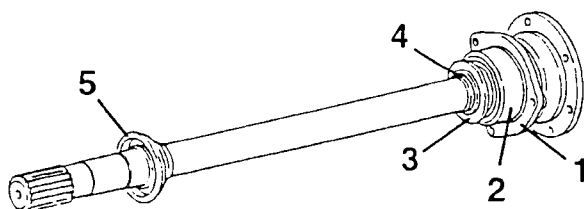
These balls are the parts which actually transmit the motion and are also located in other grooves machined on the inner surface of the shell.



1. Constant velocity joint, wheel side
2. Circlip
3. Retainer clamp
4. Protective boot
5. Constant velocity joint, gearbox side
6. Axle shaft
7. Constant velocity joint connection flange

The intermediate shaft, also with grooved ends and, like the axle shafts, made from high-resistance steel, has the purpose of connecting the differential output with the right axle shaft to which it is connected by a flange.

For this purpose, to limit the projection between the connection points, the intermediate shaft is supported by a housing machined especially on the gearbox.



1. Bearing retainer plate
2. Ball bearing
3. Flexible washer
4. Bearing retainer ring
5. Cup for bearing

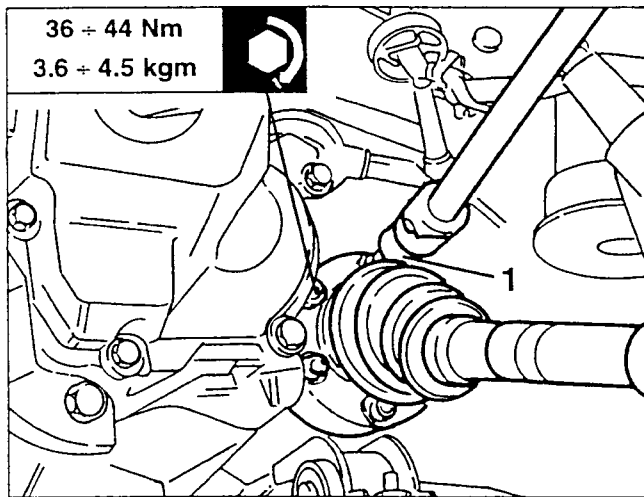
REMOVAL/REFITTING

The following procedure refers to removal/refitting of the lefthand axle shaft.

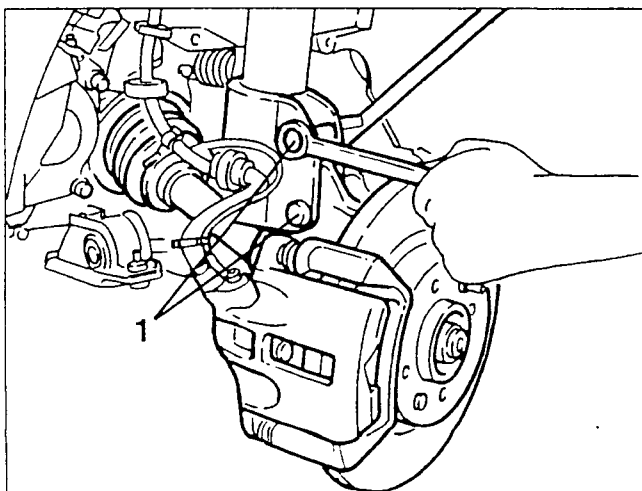
However, it is possible to wholly follow this procedure also for removing the righthand axle shaft.

- Set the car on a lift.
- Disconnect the battery (-) terminal.
- Raise the car.
- Remove the wheel and mudflap from the left front wheel house.
- Working from the left wheelhouse, disconnect the electrical connection of the brake pad wear sensor.
- Slacken the screw fastening the ABS inductive sensor support bracket.

1. Slacken the bolts fastening the left constant velocity joint from the differential flange retrieving the safety plates.



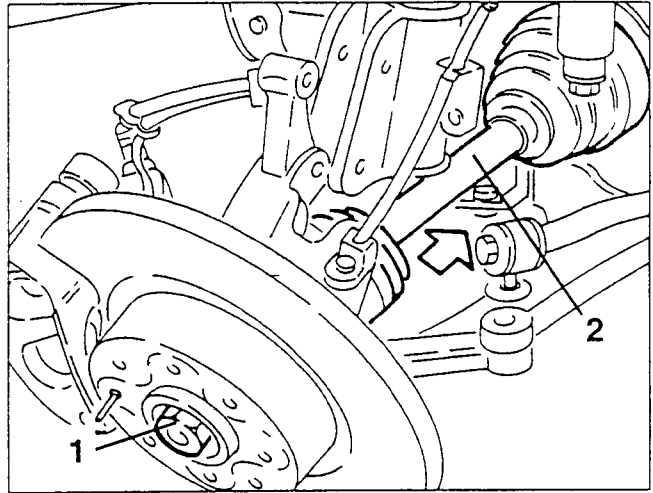
1. Slacken the two bolts fastening the left upright to the shock absorber, then remove the upper bolt only. This operation makes it possible to pull back the axle shaft just enough to disconnect the joint.



1. Remove the caulking and the nut fastening the joint to the wheel hub.

2. Pull the axle shaft and remove it.

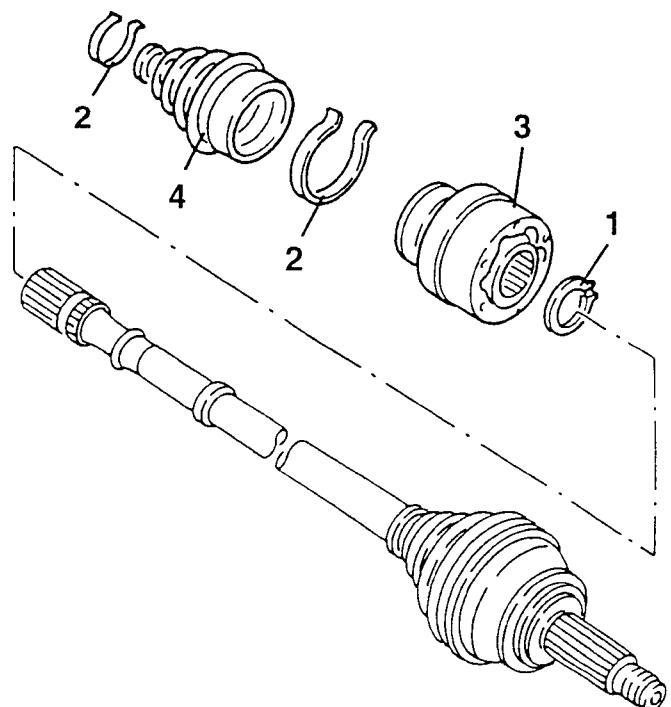
When refitting, tighten the nut fastening the axle shaft to the wheel hub as described in GROUP 44 - Wheels and hubs - "Front wheel upright (Boxer versions)".

DIS-ASSEMBLY OF JOINT
ON GEARBOX SIDE

1. Remove the retainer ring.
2. Remove the gearbox side boot fastening clamps.
3. Pull the joint on the gearbox side off the axle shaft.
4. Separate the protective boot from the C.V. joint.

CAUTION:

When refitting, change the boot and clamps.



CHECKS

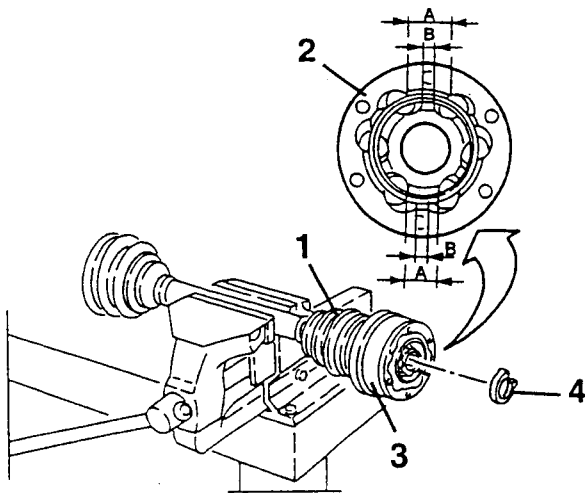
Degrease the joint components with fuel oil and check the balls and their housings for traces of wear and cracks.
Check the shaft for distortion, cracks and signs of wear.

REFITTING THE JOINT ON THE GEARBOX SIDE

1. Fit a new boot on the axle shaft.
2. If previously dis-assembled, re-assemble the joint components as illustrated.

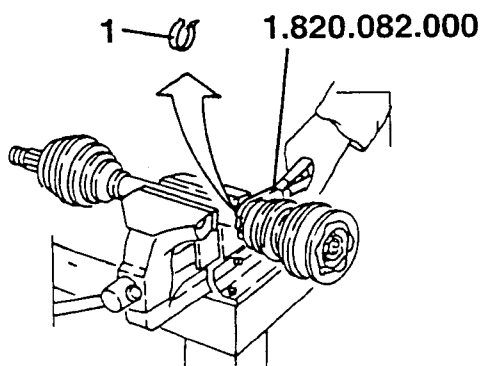
Fill the boot and grease the joint with 120 g of the specified grease.

3. Fit the joint on the gearbox side.
4. Fit the flexible retainer ring.

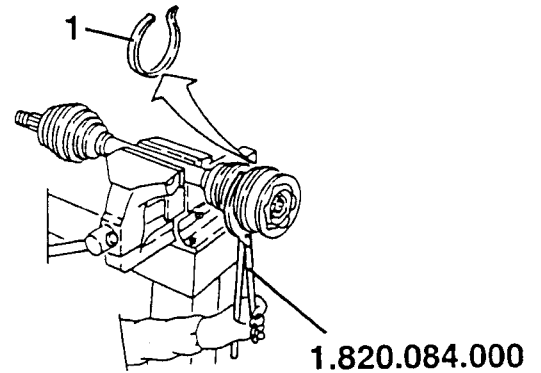


A = highest distance between ball housings
B = smallest distance between ball housings

1. Using tool n° 1.820.082.000 fit the inner boot clamp.



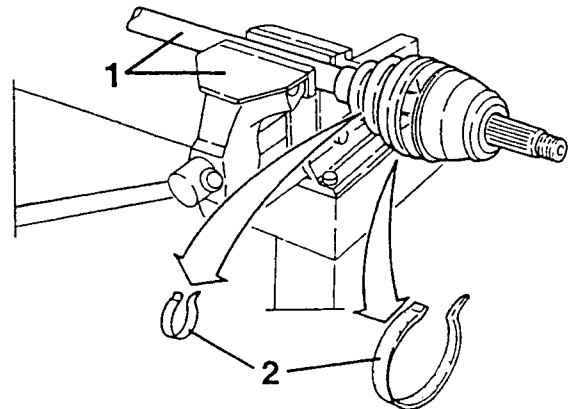
1. Using tool N° 1.820.084.000 fit the outer boot clamp.



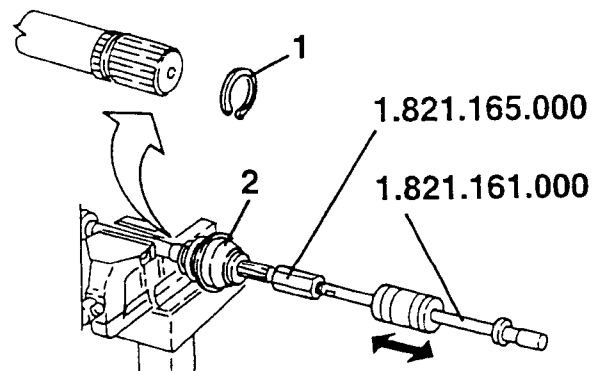
DIS-ASSEMBLY OF THE JOINT ON THE WHEEL SIDE

1. Fasten the axle shaft in a vice complete with protective jaws.
2. Remove the boot clamps on the wheel side.

When refitting, change the boot and clamps.



1. Remove the flexible retainer ring.
2. Using tools N° 1.821.165.000 and N° 1.821.161.000, remove the joint from the axle shaft.

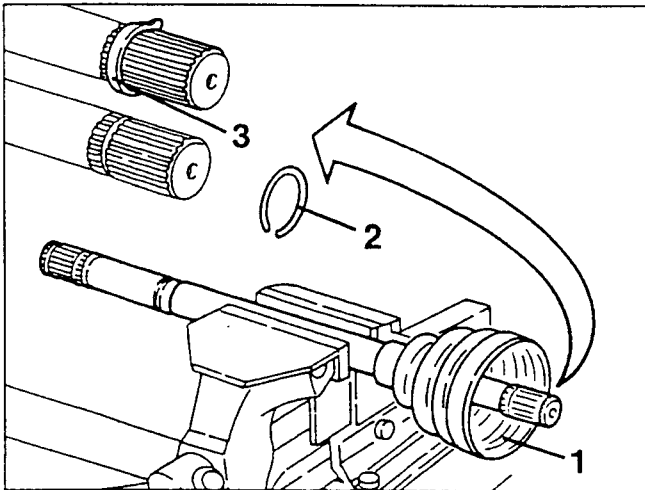


CHECKS

Degrease the joint components with fuel oil and check the balls and their housings for traces of wear and cracks.
Check the shaft for distorsion, cracks and signs of wear.

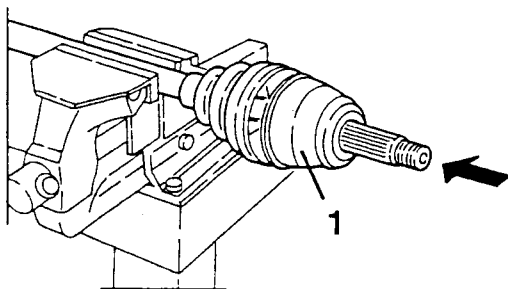
REFITTING THE JOINT ON THE WHEEL SIDE

1. Fit a new protective boot.
2. Position the flexible retainer ring.
3. Compress the flexible ring with the fastener clamp.

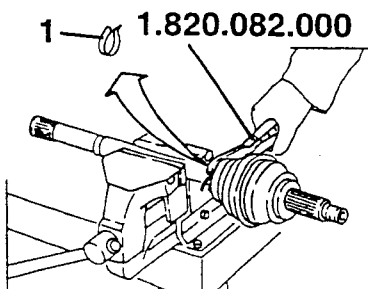


1. Position the C.V. joint on the axle shaft and push it into its housing using a soft mallet.

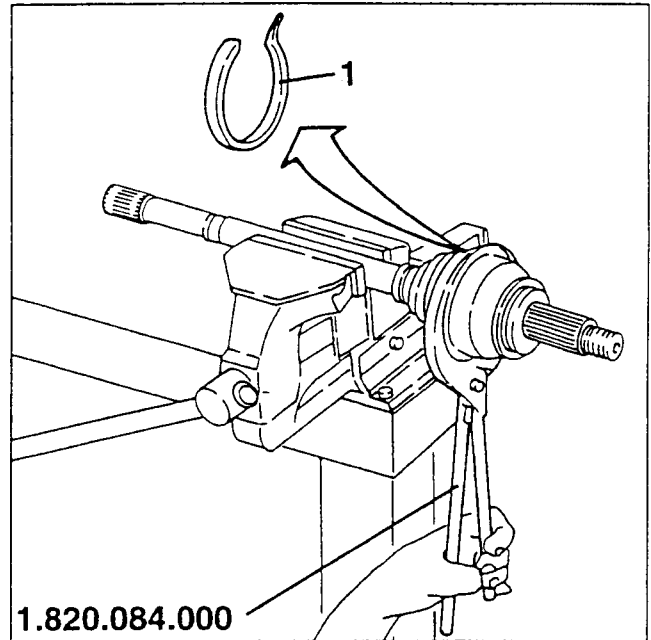
Fill the boot and grease the joint with appr. 120 g of the specified grease.



1. Using tool N° 1.820.082.000 fit the boot inner clamp.

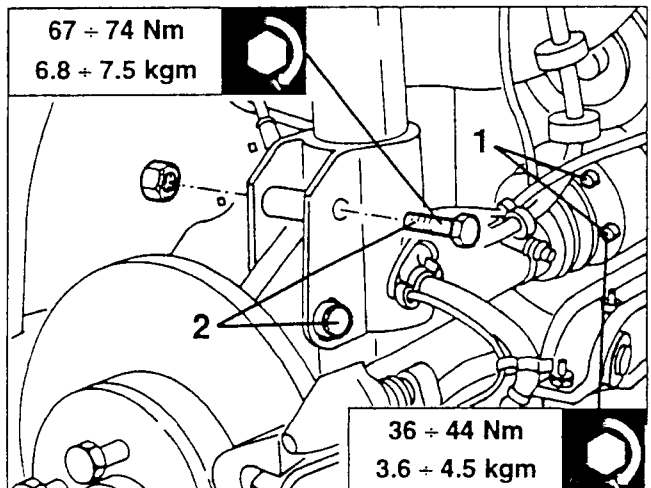


1. Using tool N° 1.820.084.000 fit the boot outer clamp.

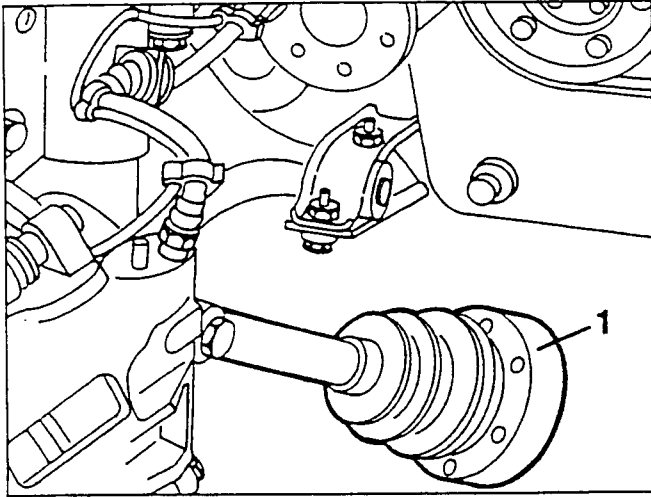


REMOVAL/REFITTING OF INTERMEDIATE SHAFT

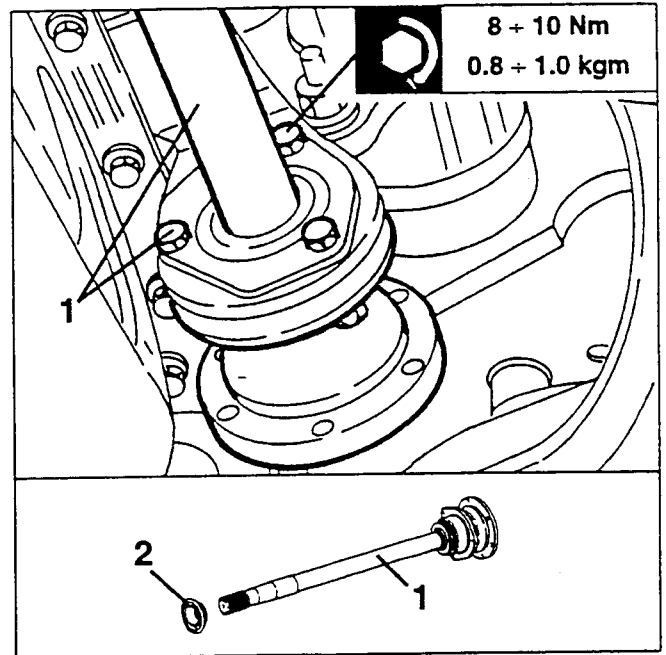
- Set the car on a lift.
- Disconnect the battery (-) terminal.
- Raise the car.
- Remove the wheel and mudflap from the right front wheel house.
- Working from the right wheelhouse, disconnect the electrical connection of the brake pad wear sensor.
- Slacken the screw fastening the ABS inductive sensor support bracket.
- 1. Slacken the two bolts fastening the left constant velocity joint from the intermediate shaft.
- 2. Slacken the two bolts fastening the right upright to the shock absorber, then remove the upper bolt only.



1. Pull back the axle shaft just enough to disconnect it from the intermediate shaft as illustrated.



1. Slacken the three fastening bolts and remove the intermediate shaft.
2. Retrieve the dust guard cup.



DESCRIPTION

With the constant velocity joints the axle shafts form the set of devices which transmit motion from the gearbox to the driving wheels.

The assembly of these devices, commonly called "transmission" when in conjunction with the gearbox, comprises the following:

- right and left axle shafts;
- constant velocity joints on wheel and gearbox side.
- intermediate shaft.

The high-resistance steel axle shafts (6) have grooved ends to enable coupling with the constant velocity joints (1) and (5).

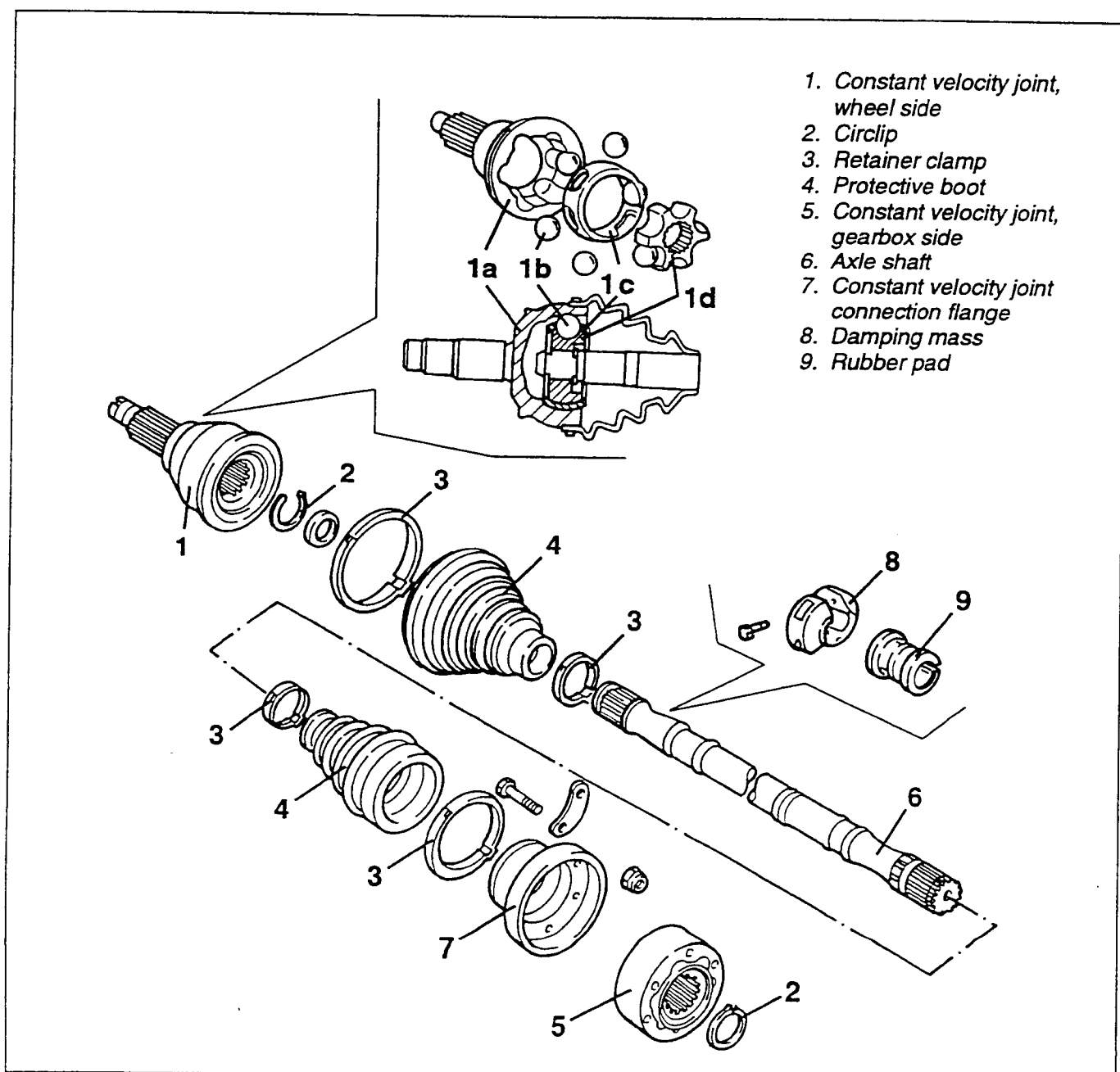
The housings for the joint retainer circlips (2) are on the ends.

The constant velocity joints are formed of an inner core (1d) known as "drive", keyed onto the input shaft and an outer shell (1a) called "driven", which forms the output element of the joint.

The inner core has six spherical grooves on its outer surface containing six balls (1b), held in place by a cage (1c).

These balls are the parts which actually transmit the motion and are also located in other grooves machined on the inner surface of the shell.

The left-hand axle shaft is fitted with a vibration damping mass (8) formed of two half shells and a rubber pad (9) for positioning.

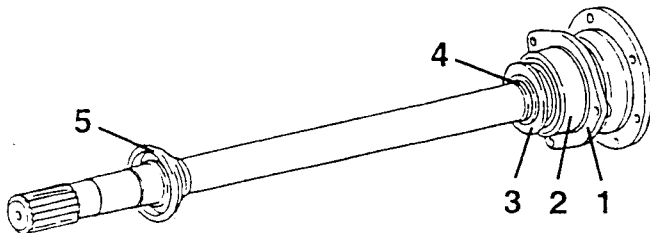


1. Constant velocity joint, wheel side
2. Circlip
3. Retainer clamp
4. Protective boot
5. Constant velocity joint, gearbox side
6. Axle shaft
7. Constant velocity joint connection flange
8. Damping mass
9. Rubber pad



The intermediate shaft, also with grooved ends and, like the axle shafts, made from high-resistance steel, has the purpose of connecting the differential output with the right axle shaft to which it is connected by a flange.

For this purpose, to limit the projection between the connection points, the intermediate shaft is supported by a housing machined especially on the gearbox.



1. Bearing retainer plate
2. Ball bearing
3. Flexible washer
4. Bearing retainer ring
5. Cup for bearing

REMOVAL/REFITTING

Refer to the instructions for the TD engine.

DIS-ASSEMBLY OF JOINT ON GEARBOX SIDE

Refer to the instructions for the TD engine.

REFITTING THE JOINT ON THE GEARBOX SIDE

Refer to the instructions for the TD engine.

DIS-ASSEMBLY OF THE JOINT ON THE WHEEL SIDE

Refer to the instructions for the TD engine.

REFITTING THE JOINT ON THE WHEEL SIDE

Refer to the instructions for the TD engine.

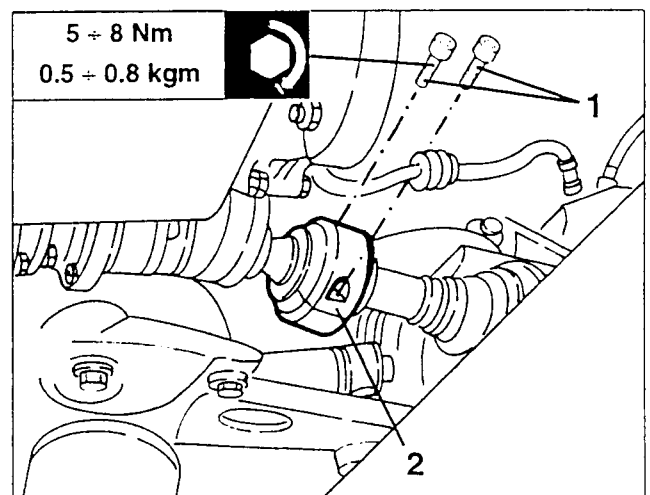
REMOVAL/REFITTING OF INTERMEDIATE SHAFT

Refer to the instructions for the TD engine.

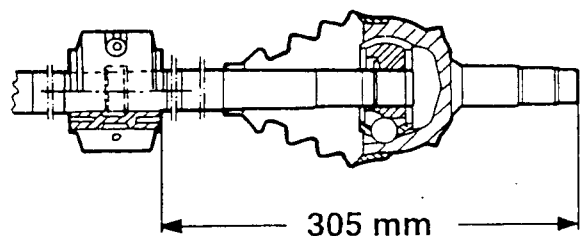
LEFT-HAND AXLE SHAFT DAMPING MASS

REMOVING/REFITTING

- On the left-hand-side of the car, proceed as follows:
- 1. Slacken the screws fastening the two half shells forming the damping mass.
- 2. Remove the mass together with the rubber pad below.



Refit reversing the sequence followed for removal taking care to position the damping mass observing the dimension on the diagram.



DESCRIPTION

The axle shafts, together with the constant velocity joints and the tripod joints, form the set of device which transmit motion from the gearbox to the driving wheels.

The assembly of these devices, in conjunction with the gearbox is commonly known as the "transmission" and it comprises the following:

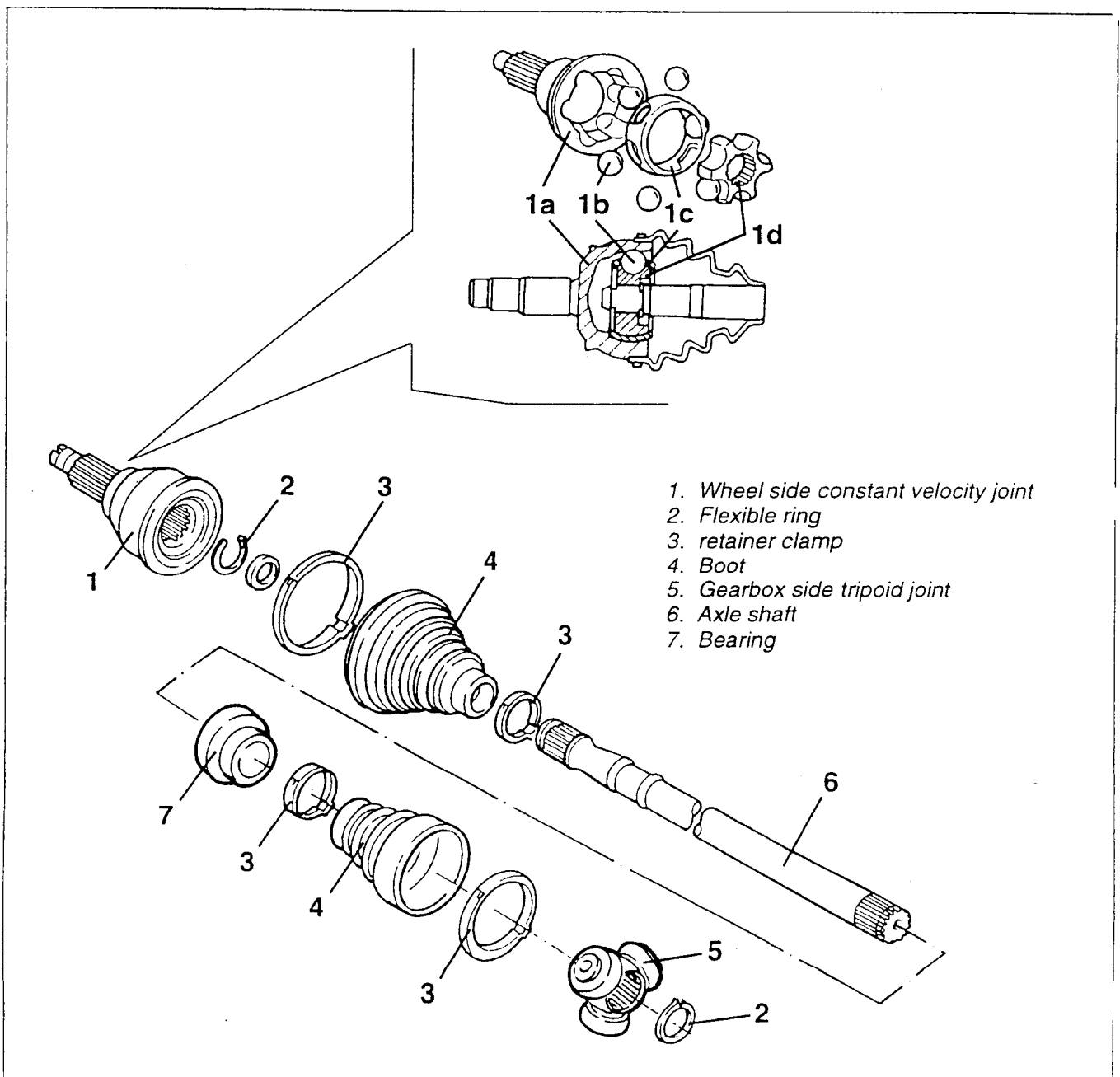
- right and left axle shafts;
- wheel side constant velocity joints;
- gearbox side tripod joints.

The axle shafts (6), made from very tough steel, have with grooved ends to enable coupling with the constant velocity joint (1) and tripod joint (5). On the ends there are the housings for the retainer circlips (2) of the joints themselves.

The constant velocity joints are formed of an inner core (1d) called "drive", shrunk onto the input shaft, and an outer shell (1a) called "driven", which forms the output of the joint.

The inner core has six spherical grooves on the outside containing the same number of balls (1b), held in place by a container cage (1c).

These balls, are the actual motion transmitting element, at the same time they are housed in the same number of grooves on the inner surface of the shell. The right axle shaft is fitted with a vibration damping mass (8) formed of two halves and a rubber plug (9) for positioning.





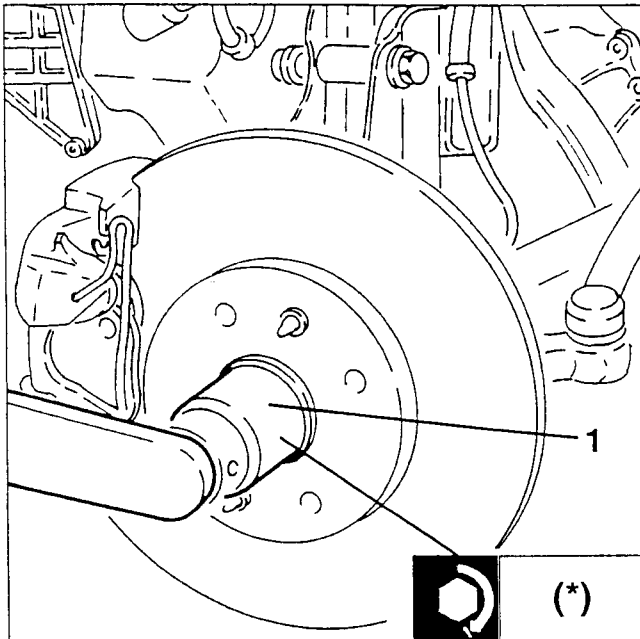
REMOVING/REFITTING

The following procedure refers to removing/refitting the left axle shaft.

E' it is however possible to use the whole procedure also for removing the right axle shaft.

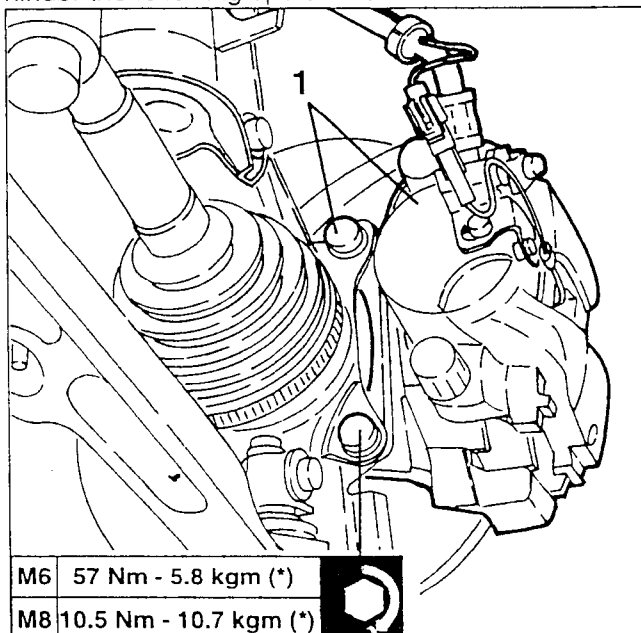
- Set the car on a lift.
- Remove the left front wheel.

1. Remove the caulking and slacken the nut fastening the constant velocity joint to the wheel hub.



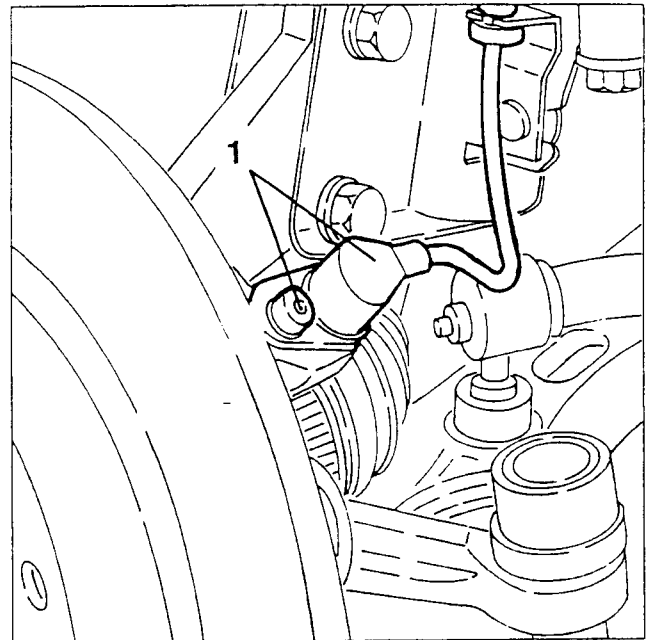
(*): When refitting tighten the fastening nut working as described in GROUP 44.

1. Slacken the two fastening screws and remove the brake caliper complete without disconnecting the hoses and fasten it on one side so that it does not hinder the following operations.

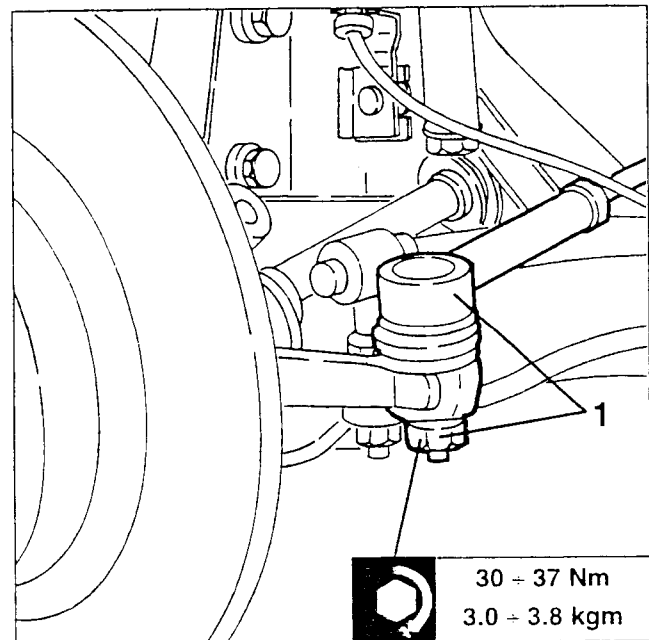


(*): Screws with "Drilloc"; must be changed every time they are tightened or loosened.

1. Slacken the fastening screw and remove the A.B.S. inductive sensor from the wheel upright.

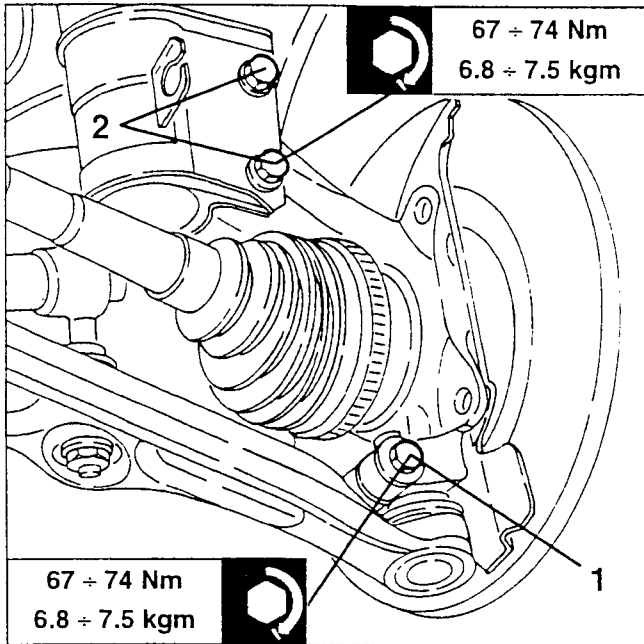


1. Slacken the fastening nut and disconnect the track rod from the wheel upright.

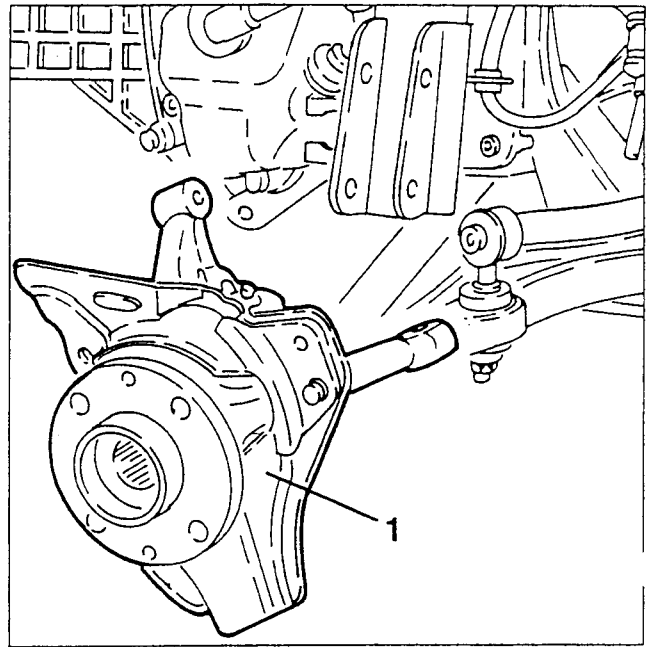




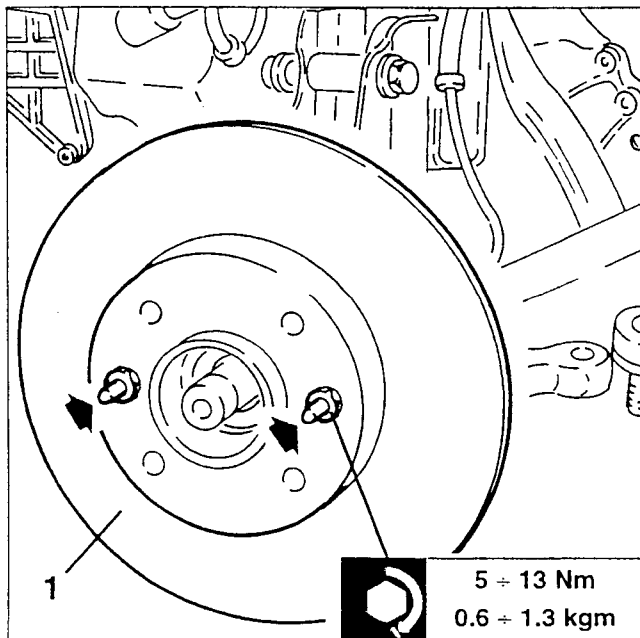
1. Slacken the bolt fastening the wishbone to the wheel upright.
2. Slacken the two bolts fastening the upright to the shock absorber.



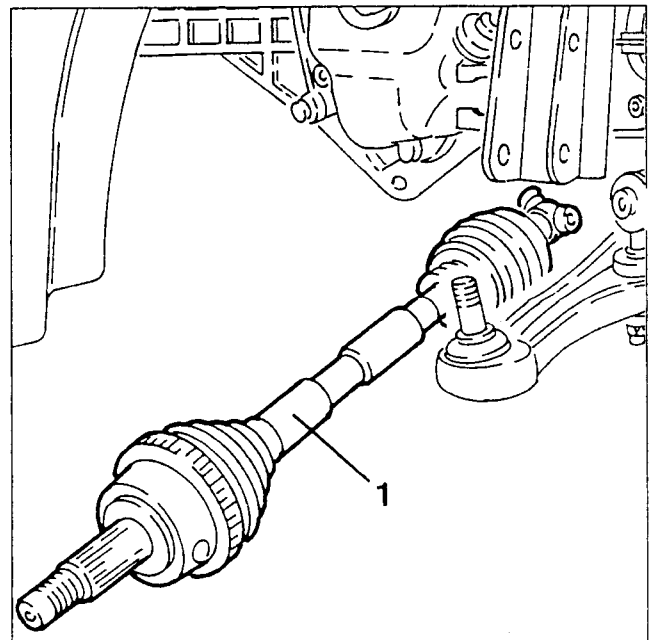
1. Withdraw and remove the wheel upright complete



1. Slacken the two fasteners and remove the brake disk.



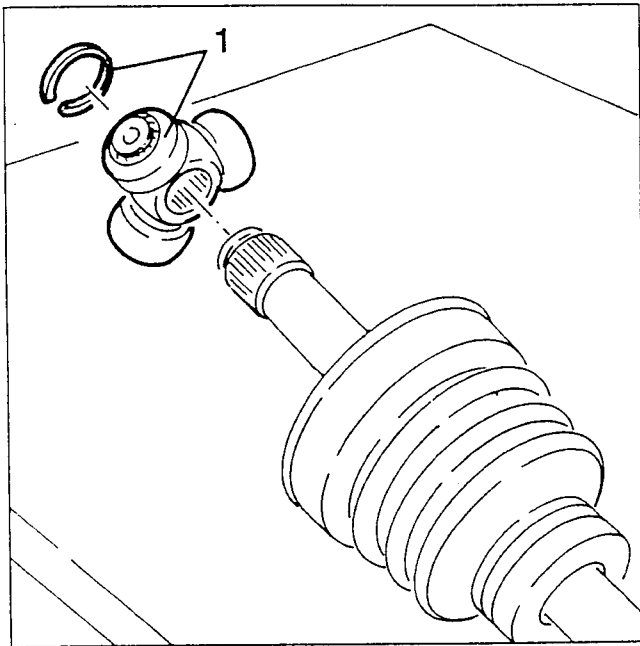
1. Slacken the clamp fastening the boot to the differential tripod joint, then withdraw and remove the axle shaft complete.



DISASSEMBLING THE GEARBOX SIDE CONSTANT VELOCITY JOINT

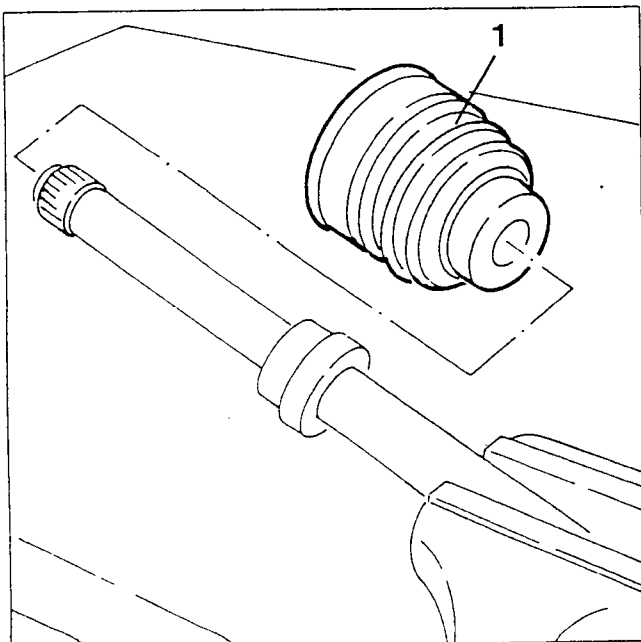
1. Remove the retainer circlip, then withdraw and remove the tripod joint.

WARNING: If any faults are found in the tripod joint it must be changed.

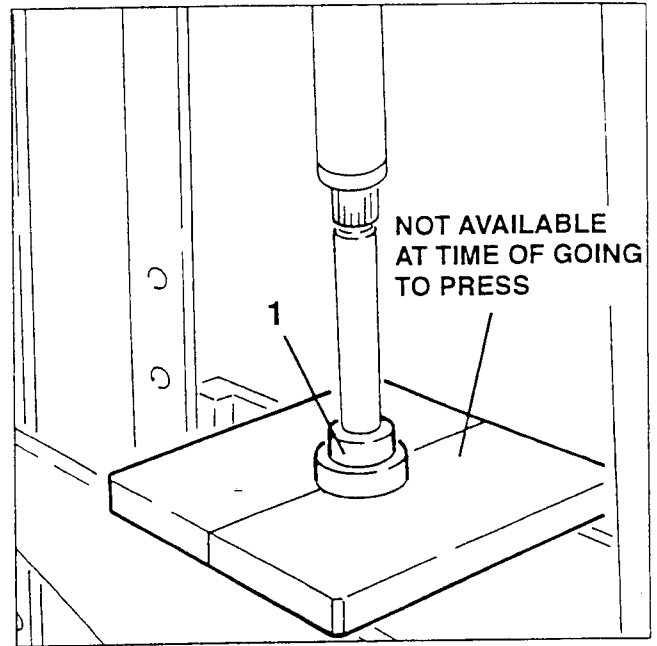


1. Slacken the fastening clamp and remove the boot.

WARNING: When reassembling replace the boot and its fastening clamps.

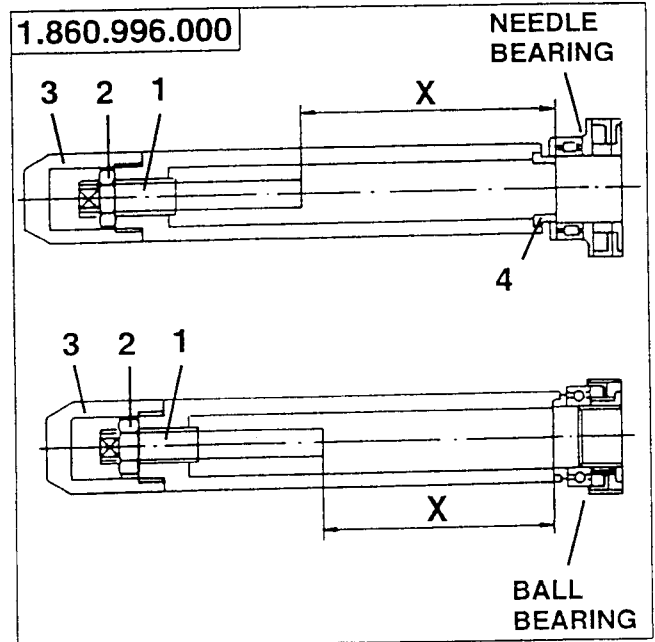


1. Working under the press and using half plates no., prise and remove the bearing from the axle shaft.



REFITTING THE GEARBOX SIDE CONSTANT VELOCITY JOINT

For assembling the bearing on the axle shaft use drift no. 1.860.996.000.



1. Screw for adjusting bearing force-fitting dimension
2. Screw locknut
3. Drift to be inserted when force the bearing
4. Adapter for force-fitting needle bearings

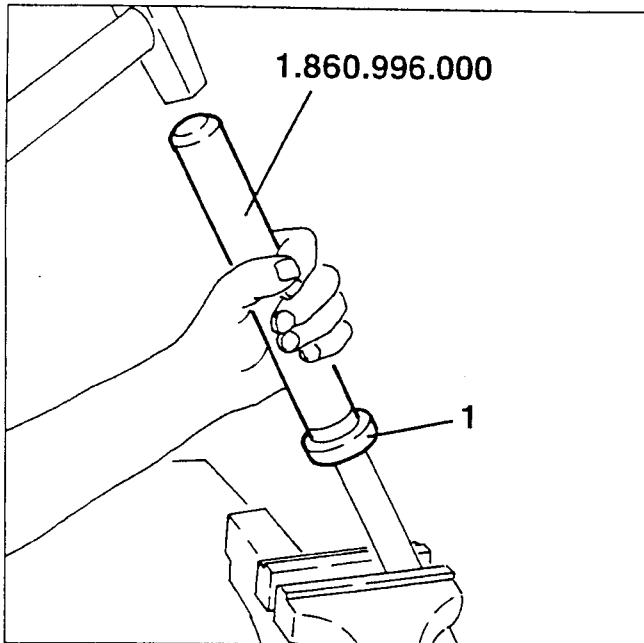
Adjust the above-mentioned tool so that dimension X for positioning the bearing is as specified.

Dimension "X" for positioning bearing (mm)		
Right axle shaft	108.8 (1)	107.7 (2)
Left axle shaft	143.8 (1)	142.7 (2)

(1): needle bearing

(2): ball bearing

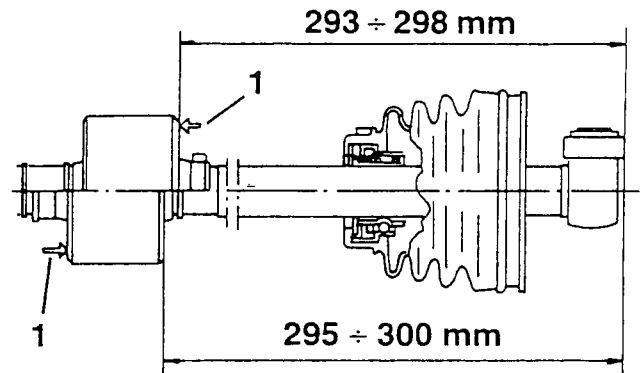
1. Using tool no. 1.860.996.000 adjusted as described previously, force fit the bearing on the shaft until the end contact screw of the tool contacts the axle shaft. This way correct positioning of the bearing is guaranteed.



RIGHT AXLE SHAFT DAMPING MASS

On the right axle shaft a vibration damping mass is installed.

When disassembling from the axle shaft it must be re-assembled at the specified position.




(1): Direction of assembly

- Fit the boot on the bearing and fasten it with its clamp.
Fit the tripod joint on the axle shaft and fasten it with the retainer circlip.

DISASSEMBLING THE WHEEL SIDE CONSTANT VELOCITY JOINT

See the instructions for  TD

REMOVING THE WHEEL SIDE CONSTANT VELOCITY JOINT

See the instructions for  TD