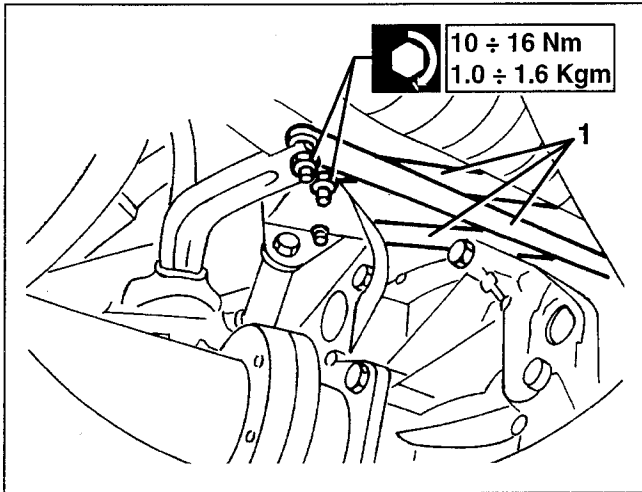


## CONTROL WITH RODS AND TIE-RODS

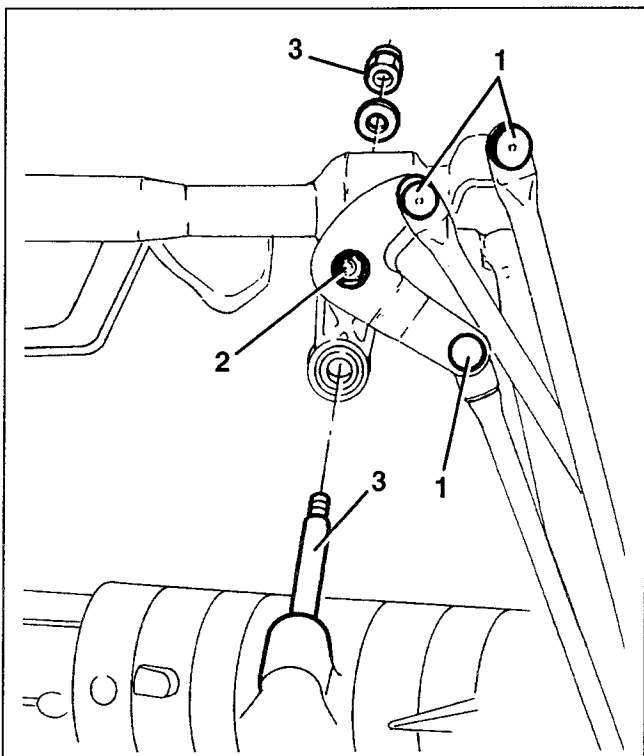
### GEARSHIFT CONTROL TIE-RODS

#### Removing / Refitting

- Set the car on a lift.
- 1. Work from under the car, disconnect the three tie-rods slackening the nuts fastening them to the bracket on the gearbox.



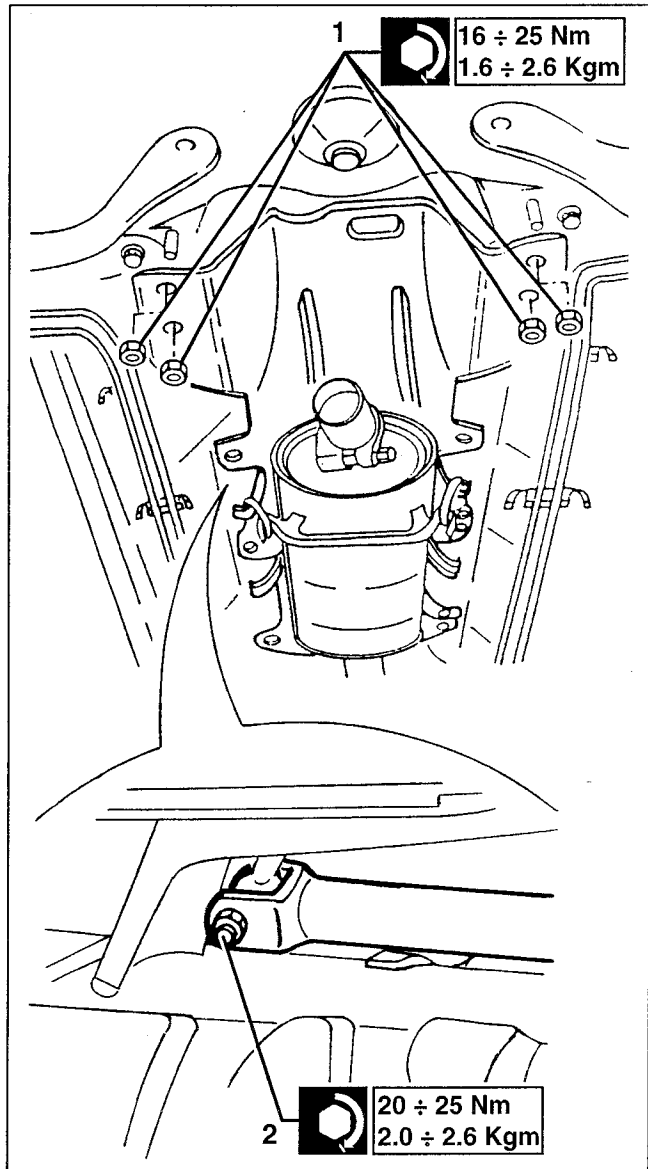
1. Disconnect the three tie-rods of the support fastened to the power steering, and then retrieve them.
2. If necessary remove the support, slacken the nut fastening it to the control rod.
3. Remove the support from the fastening pin on the steering box.



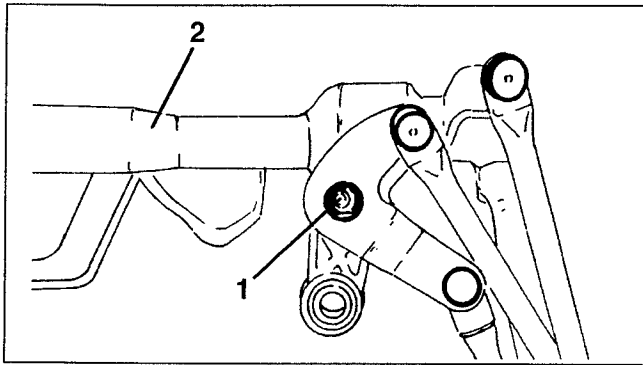
### GEARSHIFT CONTROL ROD

#### Removing / Refitting

- Set the car on a lift.
- Remove the exhaust piping, front section (see GROUP 10).
- 1. Slacken the four front nuts and loosen the other screws of the gearbox controls support, to lower the gearbox and gain access to the control rod.
- 2. Disconnect the gearshift control rod from the gearshift lever slackening the fastening bolt.



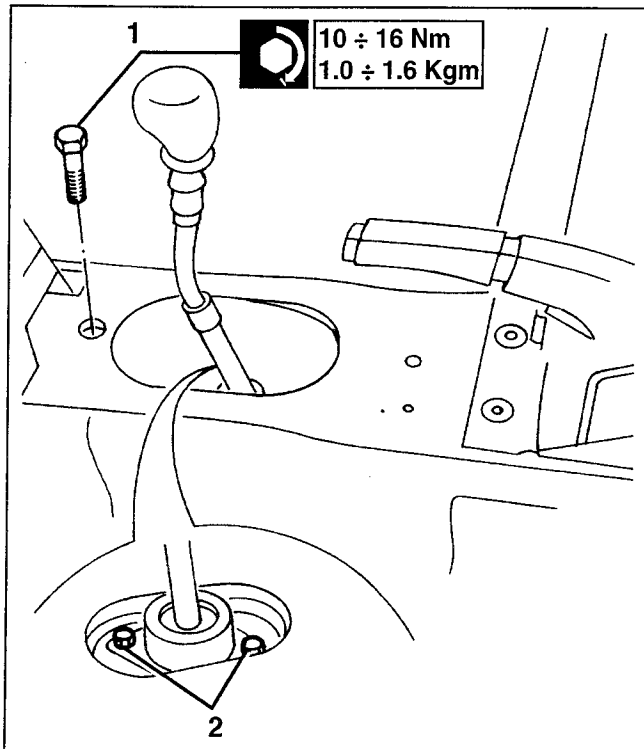
1. Disconnect the gearshift control rod from the support on the power steering box.
2. Retrieve the rod.



**GEARSHIFT LEVER**

**Removing / Refitting**

- Set the car on a lift.
  - Working from inside the car, remove the tunnel console (see GROUP 70).
1. Slacken the bolt fastening the gearshift controls support on the body.
  2. Slacken the two screws fastening the lever to the support, after eliminating the caulking.

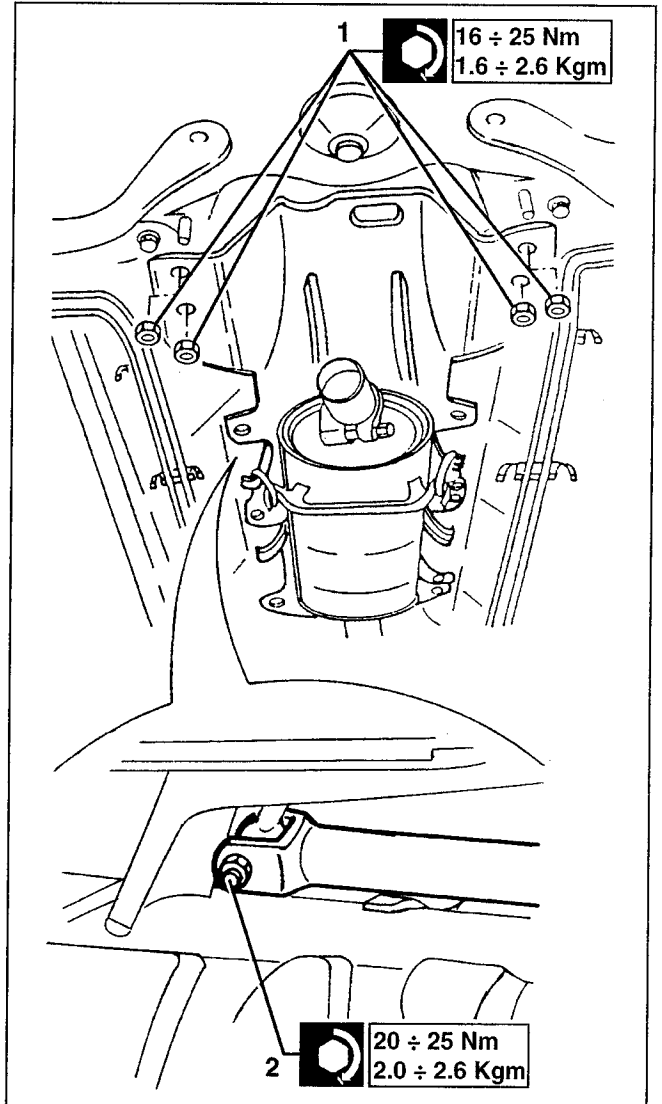


- Raise the car and remove the exhaust piping, front section (see GROUP 10).

1. Loosen the rear fastenings and unscrew all the other fastenings of the gearbox controls support, to lower it.

2. Disconnect the gearshift control rod from the gearshift lever slackening the fastening bolt.

- Retrieve the gearshift lever complete with ball joint.

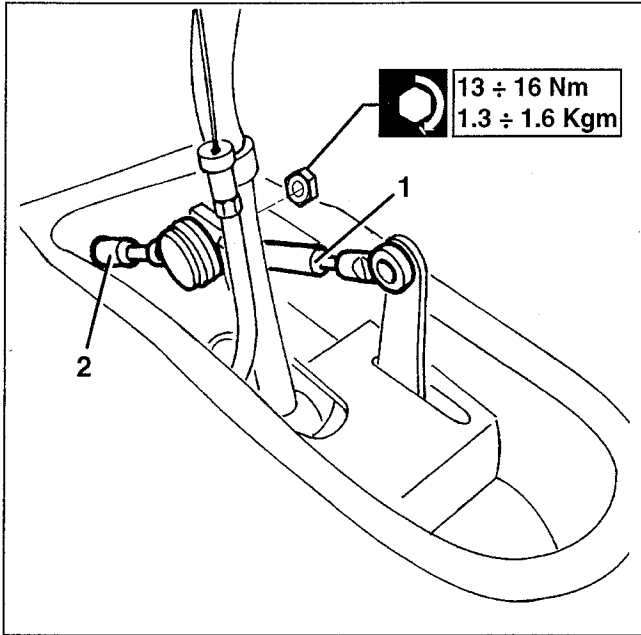


**CABLE CONTROL**

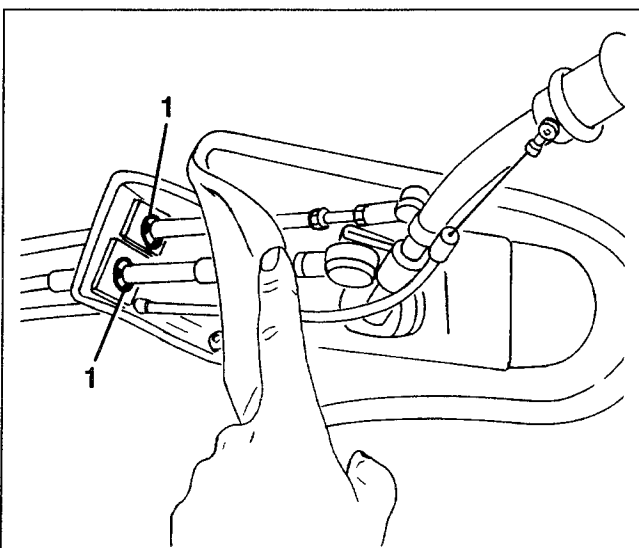
**GEAR ENGAGEMENT AND SELECTION CABLES**

**Removing / Refitting**

- Set the car on a lift.
- Remove the tunnel console (see GROUP 70).
- 1. Disconnect the gear engagement cable from its fastening pin.
- 2. Disconnect the gear selection cable from the lever.



- 1. Raise the mat and remove the cable fastening clamps.

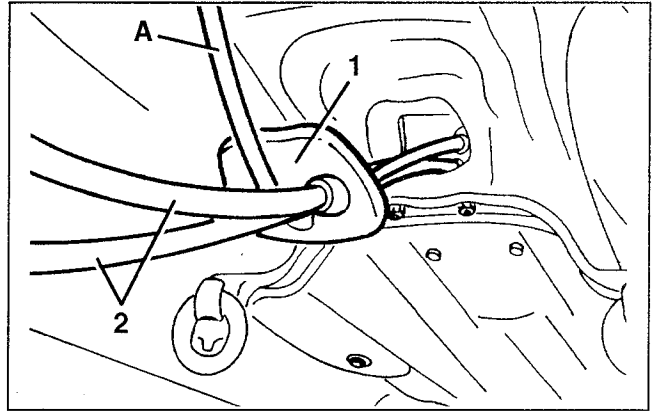


- Working under the car, remove the front and centre section of the exhaust piping (see GROUP 10).
- Remove the heat shield of the catalyst.

- 1. Withdraw the cable lead grommet from the body pulling the cables downwards.

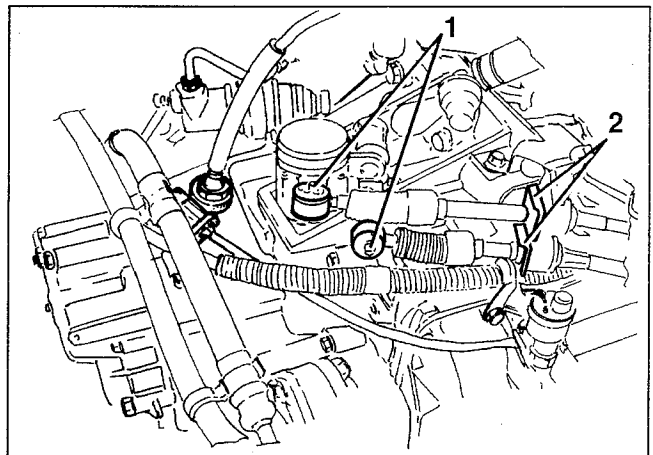
NOTE: Take care not to damage the reverse gear release cable (A) which is fastened to the gearshift lever.

- 2. Retrieve the cables pulling them from below. If necessary cut the cable lead grommet.



- Working in the engine compartment, remove the air cleaner complete with inlet sleeve (see GROUP 10).

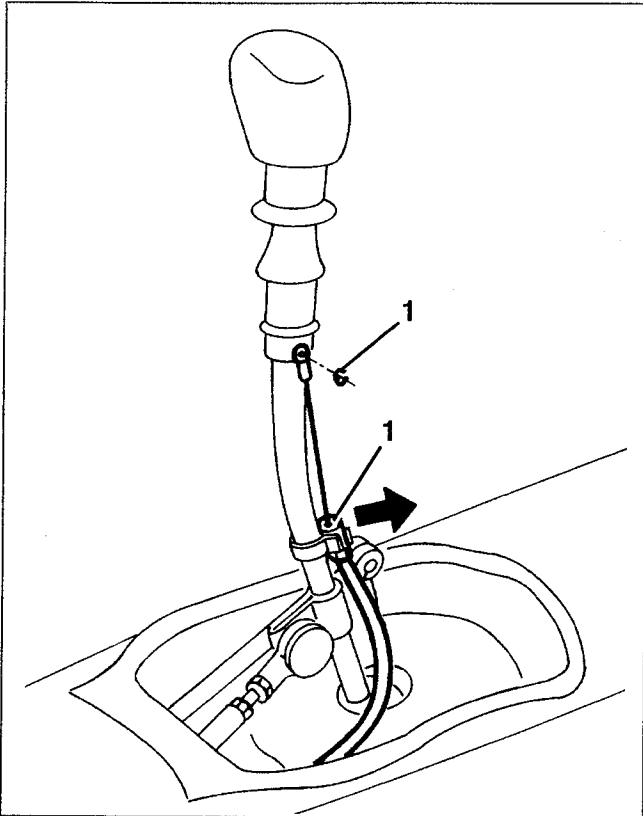
- 1. Disconnect the cables from the gear engagement device.
- 2. Remove the clamps fastening the cable to the bracket on the gearbox.
- Retrieve the cables.



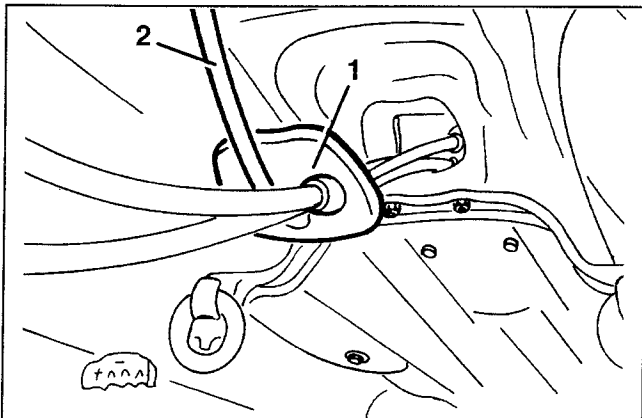
**REVERSING GEAR RELEASE CABLE**

**Removing / refitting**

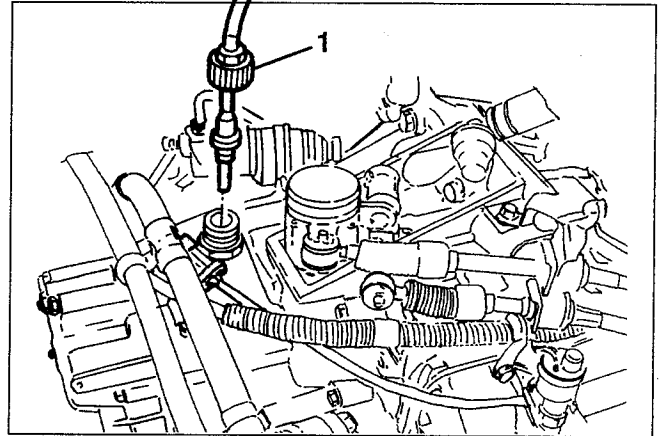
- Set the car on a lift.
- Remove the tunnel console (see GROUP 70).
- 1. Remove the retainer ring and disconnect the reverse gear cable releasing it from the fastening clamps.



- Working under the car, remove the front and centre section of the exhaust (see GROUP 10).
- Remove the catalyst heat shield.
- 1. Withdraw the cable lead grommet from the body pulling the cables downwards.
- 2. Retrieve the cable pulling from below. If necessary cut the cable lead rubber.



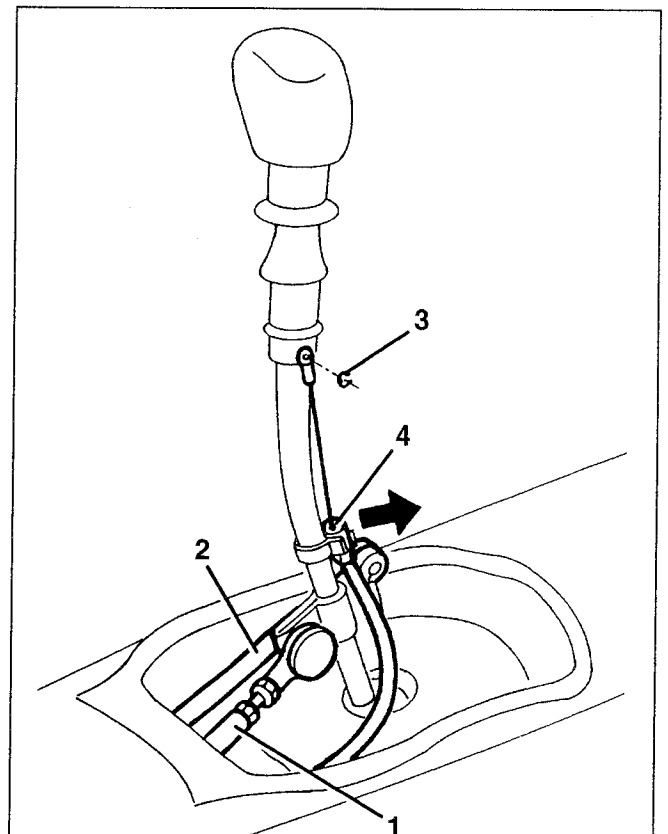
- Working in the engine compartment, remove the air cleaner complete with inlet sleeve (see GROUP 10).
- 1. Disconnect reverse gear release cable from the gearbox slackening the pin.
- Retrieve the cable.



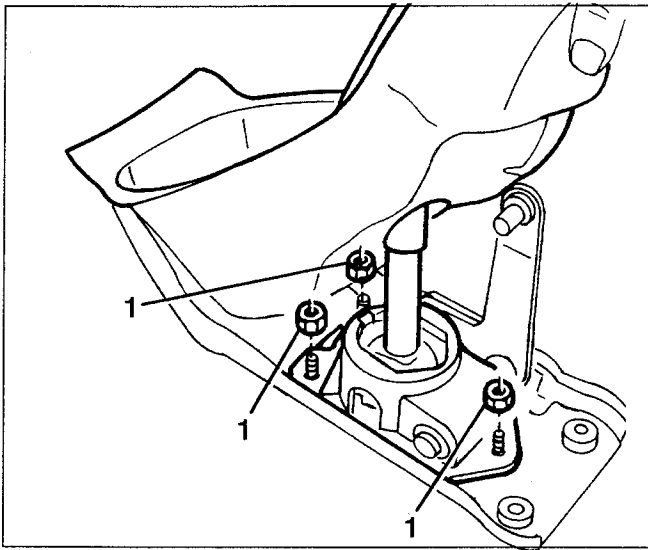
**GEARSHIFT LEVER**

**Removing / Refitting**

- Remove the tunnel console (see GROUP 70).
- 1. Disconnect the the gear selection lever from the cable.
- 2. Remove the retainer ring and disconnect the gear engagement cable.
- 3. Remove the retainer ring and disconnect the reverse gear cable from the lever.
- 4. Separate the reverse gear cable from the lever releasing it from the fastening clamps.



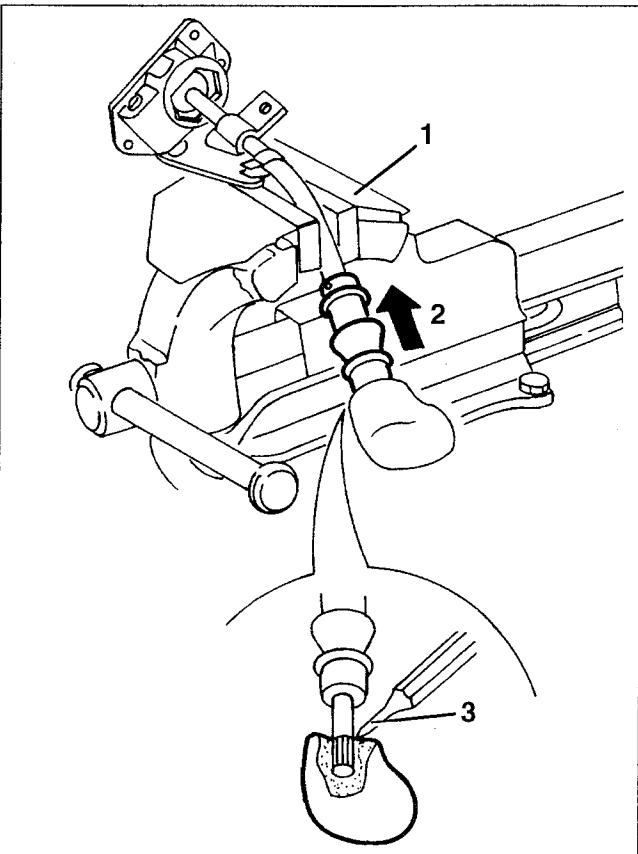
1. Raising the sound deadener mat remove the three fastening nuts and remove the lever complete with ball joint.



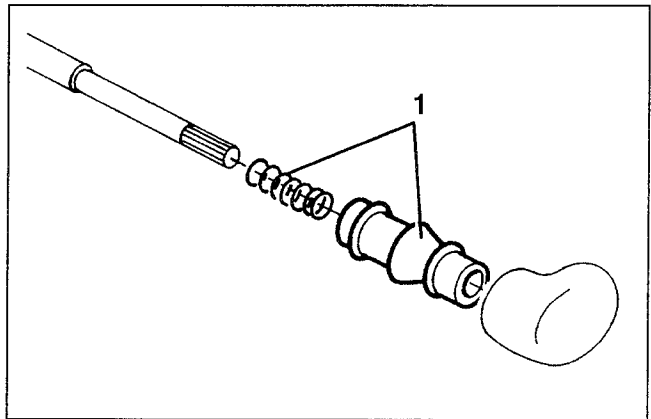
**GEARSHIFT LEVER KNOB**

**Replacement**

- Remove the gearshift lever (see previous paragraph).
- 1. Clamp the lever in a vice (with plastic jaws).
- 2. Compress the sliding sleeve moving it away from the knob.
- 3. Withdraw the knob using a flat-headed punch.



1. Withdraw the sliding sleeve and the spring.



When refitting use a press, forcing the knob to prevent it from turning.

To prevent damage to the knob, interpose a suitable plastic spacer between the press and the knob.

NOTE: If the knob can be re-used re-assemble it using LOCTITE.

The presence of drops of LOCTITE on the stem will not adversely affect operation of the mobile guide.

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**AXLE SHAFTS**

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(only 4-cylinder) ..... 7
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## AXLE SHAFTS

### DESCRIPTION

The axle shafts, constant velocity joints and the intermediate shaft form the assembly of the devices which transmit motion from the gearbox to the drive wheels. This set of devices, commonly called "transmission" when allied with the gearbox, is composed of:

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

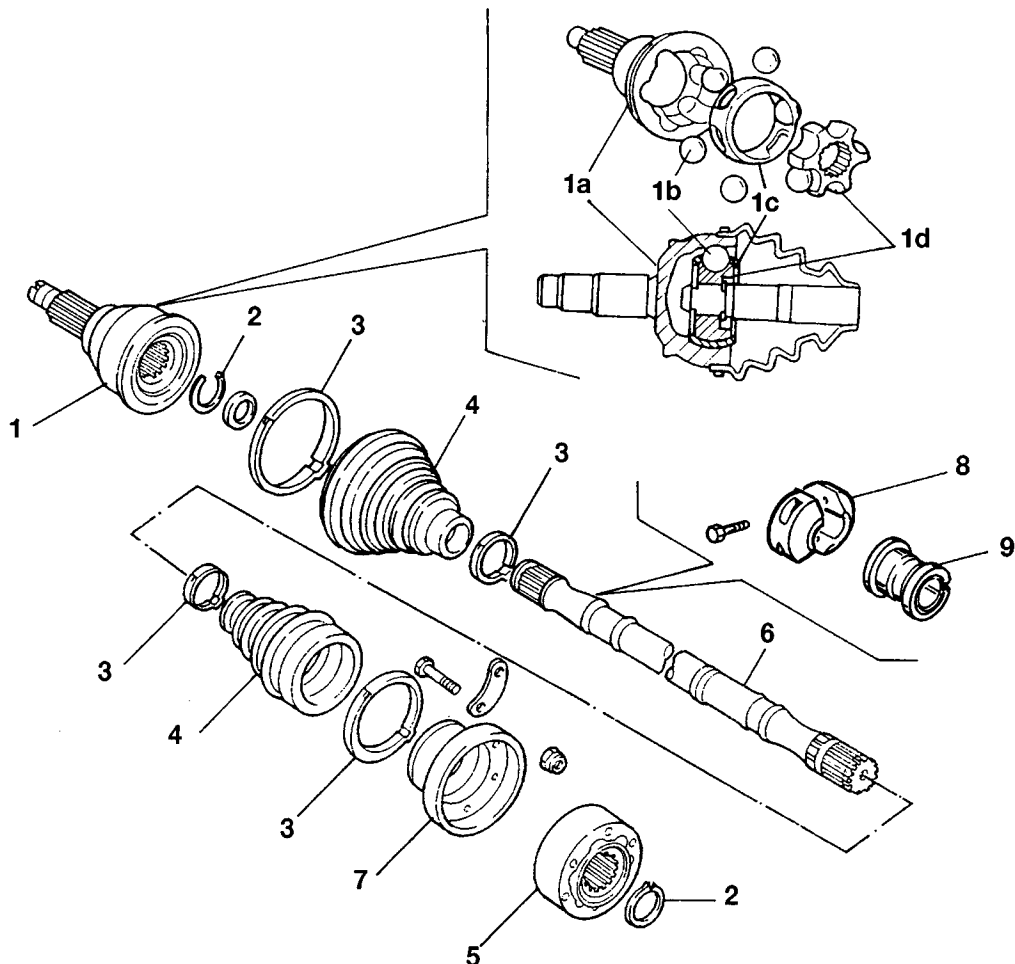
The axle shafts (6), made from high strength steel, have grooved ends for coupling with the constant velocity joints (1) and (5), which contain the housing for the flexible rings (2) which secure the joints themselves.

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

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

These balls are the parts which actually transmit the motion and they are contemporaneously housed in grooves machined on the inner surface of the shell.

On the versions with 4-cylinder engine, the left-hand axle shaft is fitted with a vibration damper (8) formed of two half shells and a rubber pad (9) for positioning.

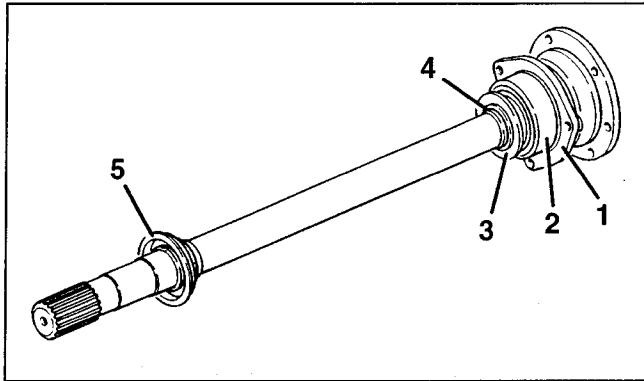


1. Wheel side constant velocity joint
2. Flexible ring
3. Retainer clamp
4. Protection boot
5. Retainer clamp

6. Axle shaft
7. Constant velocity joint coupling flange
8. Damper
9. Rubber pad

The intermediate shaft is also grooved and, like the axle shafts, it is made from high strength steel. Its purpose is to connect the output of the differential with the right hand axle shaft to which it is connected by a flange.

For this reason, to limit the overhang between the connection points, the intermediate shaft is supported by a seat machined especially on the gearbox.



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

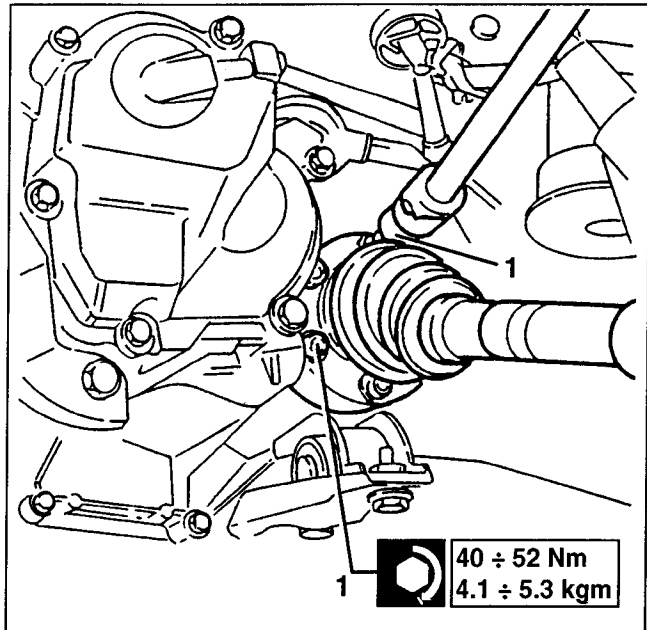
**REMOVAL / REFITTING**

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

It is however possible to follow the whole procedure also for removing the right-hand axle shaft.

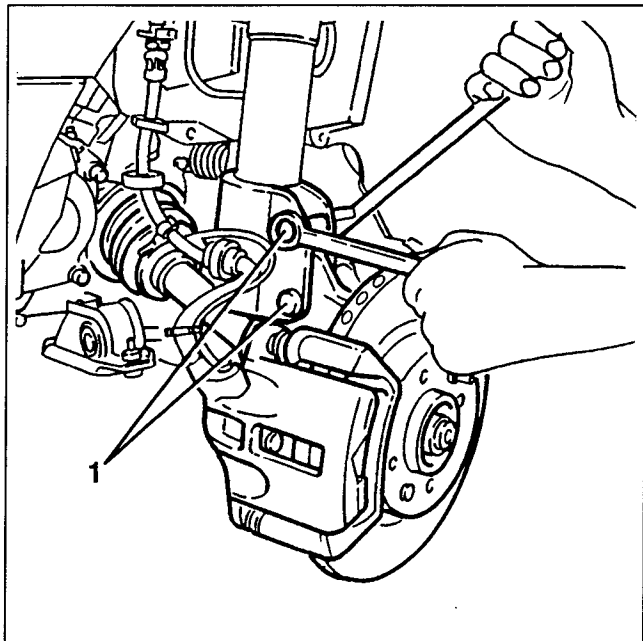
- Set the car on a lift.
- Disconnect the battery.
- Raise the car.
- Remove the wheel and mud flap from the left-hand wheel house.
- Working from the left-hand wheelhouse, disconnect the brake pad wear sensor electrical connection.
- Release the ABS inductive sensor from the support bracket.

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



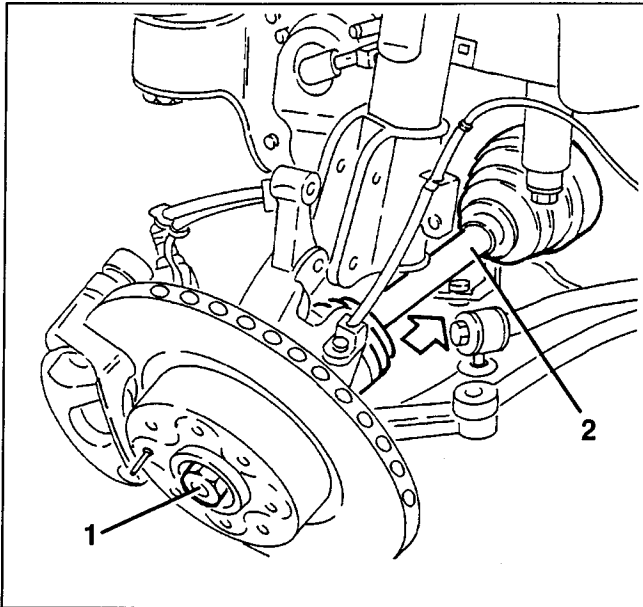
1. Slacken the two bolts fastening the left wheel upright to the shock absorber, then withdraw only the upper bolt.

This operation makes it possible to move back the axle shaft just enough to disconnect the constant velocity joint.





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

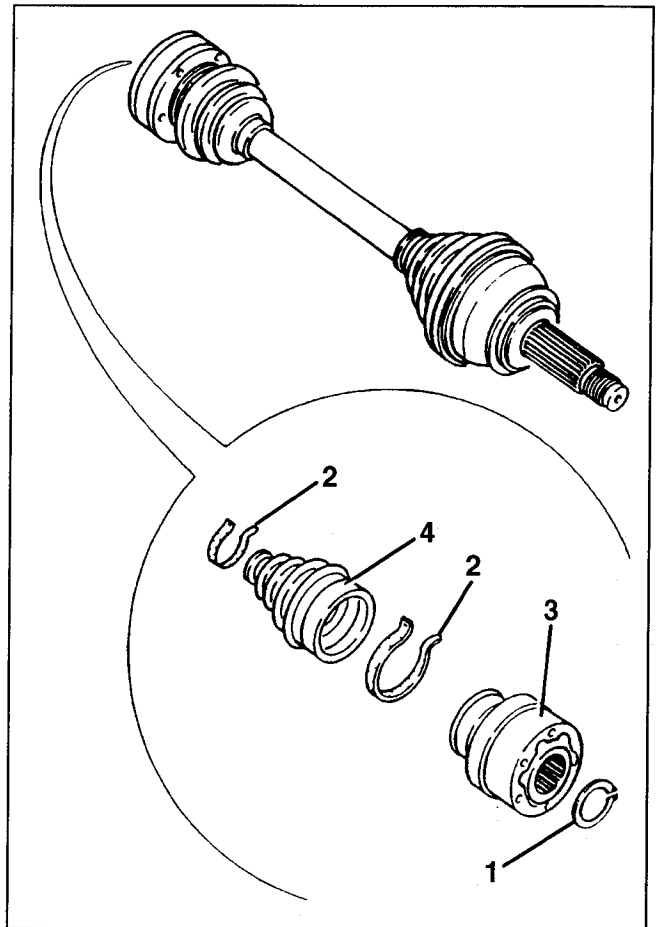


When refitting tighten the nut fastening the axle shaft to the hub and the bolts fastening the upright to the shock absorber as described in GROUP 44 - Wheels and Hubs.

## GEARBOX SIDE COSTANT VELOCITY JOINT

### DIS-ASSEMBLY

1. Remove the flexible retainer ring.
2. Remove the the gearbox side boot fastening clamps.
3. Withdraw the gearbox side constant velocity joint from the axle shaft.
4. Separate the protective boot from the constant velocity joint.



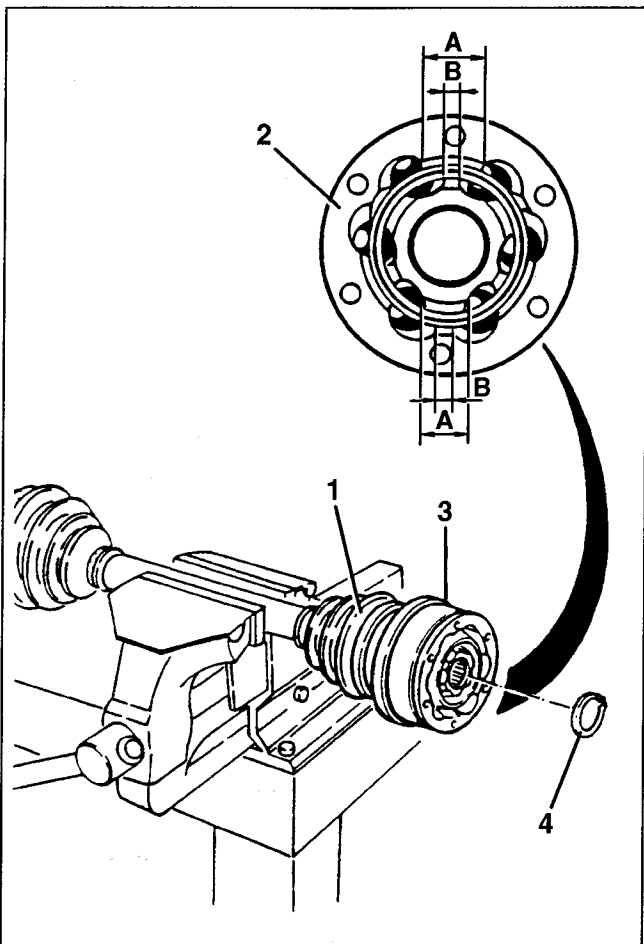
**WARNING:**  
When refitting change the boot and its clamps.

### INSPECTIONS

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.

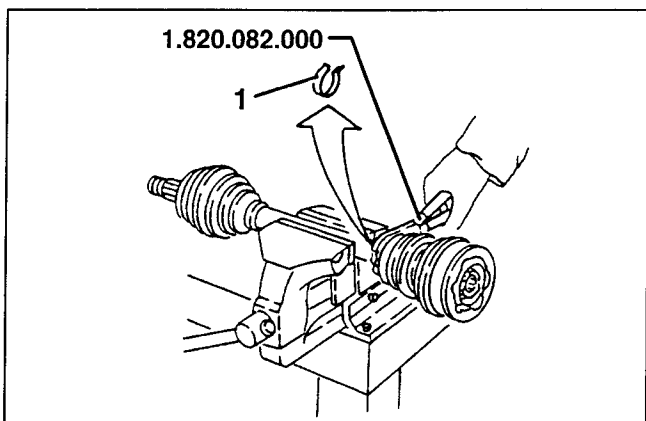
**RE-ASSEMBLY**

1. Fit a new boot on the axle shaft.
2. If disassembled previously, re-assemble the components of the constant velocity joint as illustrated.  
**Fill the boot and grease the joint with appr. 120 g of the specified grease.**
3. Assemble the gearbox side constant velocity joint.
4. Fit the flexible retainer ring.

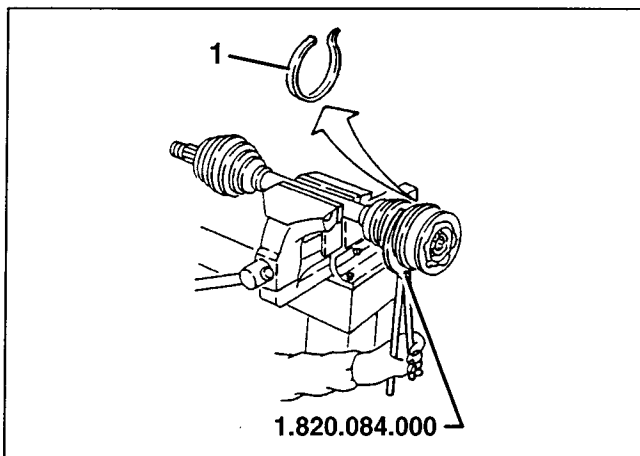


A = Greater distance between balls  
B = Smallest distance between balls

1. Using tool no. 1.820.082.000 install the inner boot fastening clamp.



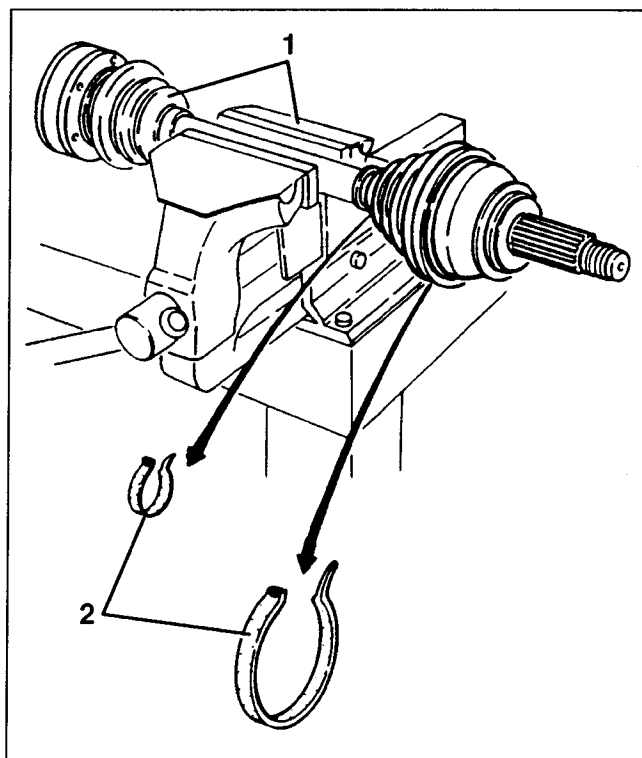
1. Using tool no. 1.820.084.000 install the outer boot fastening clamp.



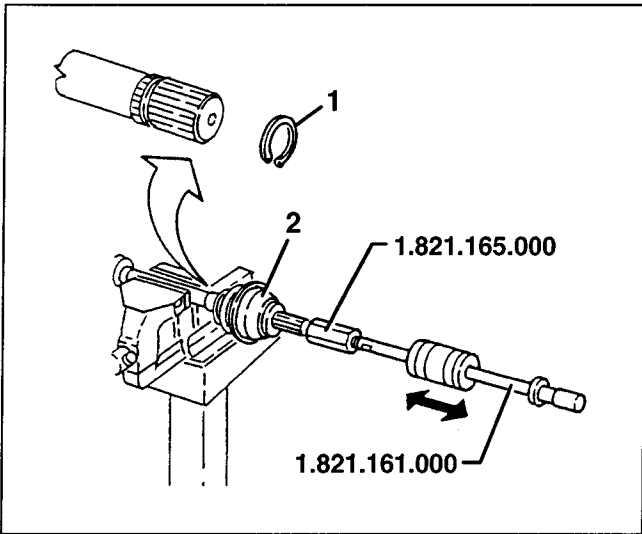
**WHEEL SIDE CONSTANT VELOCITY JOINT**

**DIS-ASSEMBLY**

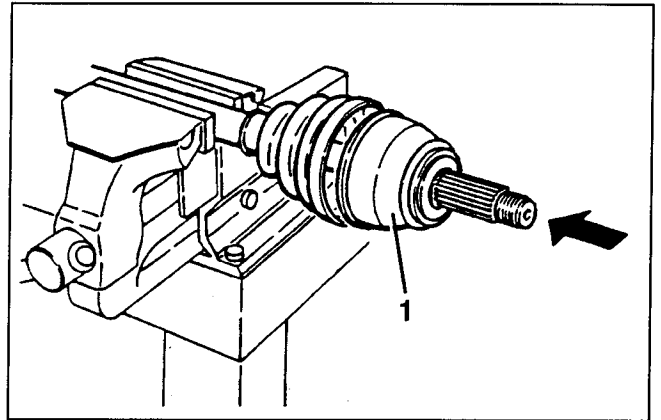
1. Clamp the axle shaft in a vice with protective jaws.
2. Remove the wheel side boot fastening clamps.  
**When refitting change the boot and its fastening clamps.**



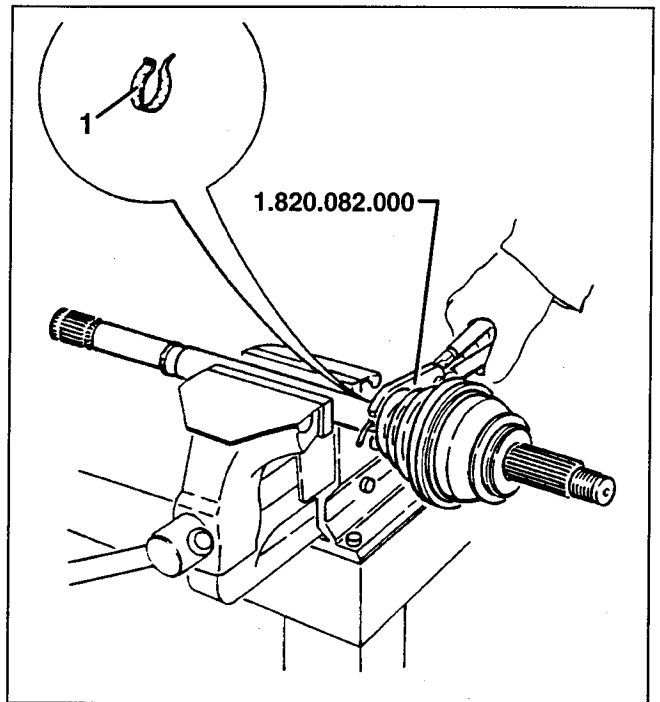
1. Remove the flexible retainer ring.
2. Using tools no. 1.821.165.000 and no. 1.821.161.000, remove the constant velocity joint from the axle shaft.



1. Position the constant velocity joint on the axle shaft and using a soft hammer, push it into its housing.  
**Fill the boot and grease the joint with appr. 120 g of the specified grease.**



1. Using tool no. 1.820.082.000 install the inner boot fastening clamp.

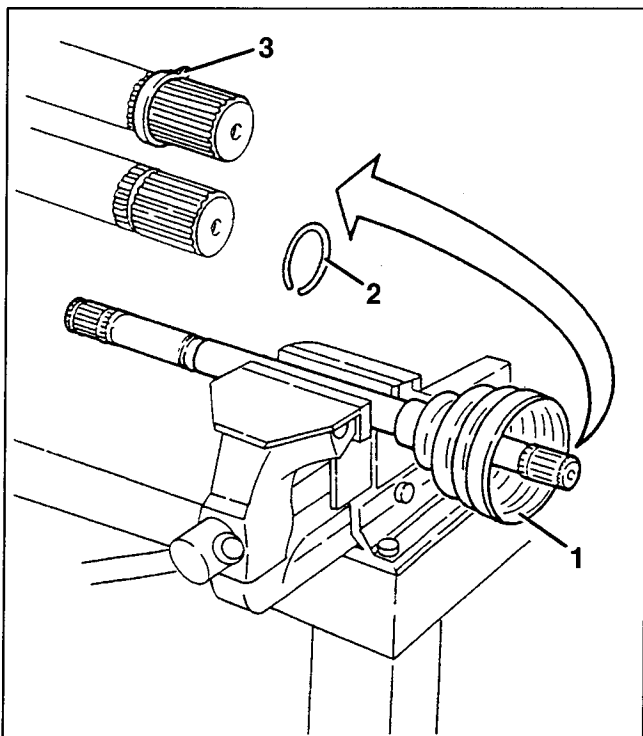


### INSPECTIONS

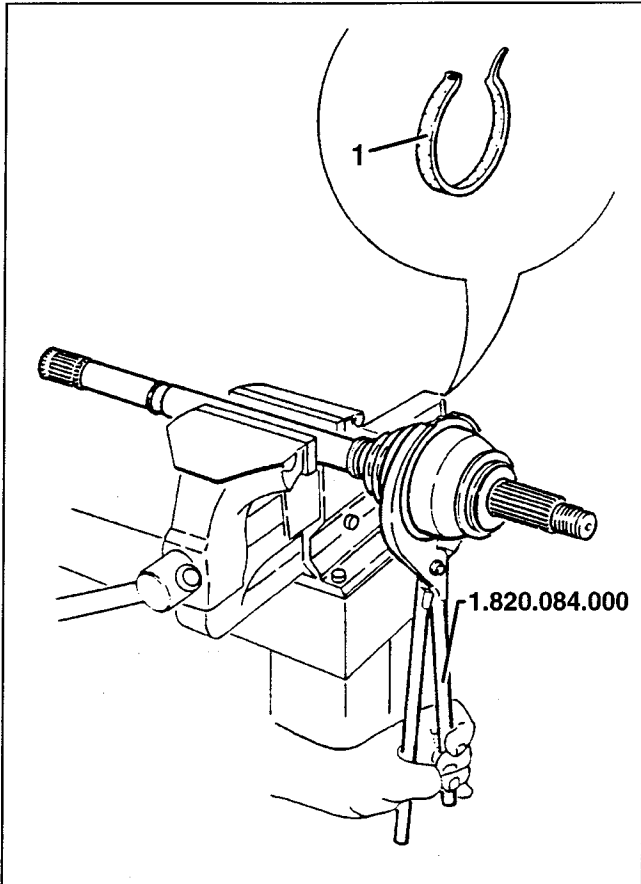
Degrease the joint components with fuel oil and check the balls and their housings for signs of wear and cracks. Check the shaft for distortion, cracks and signs of wear.

### RE-ASSEMBLY

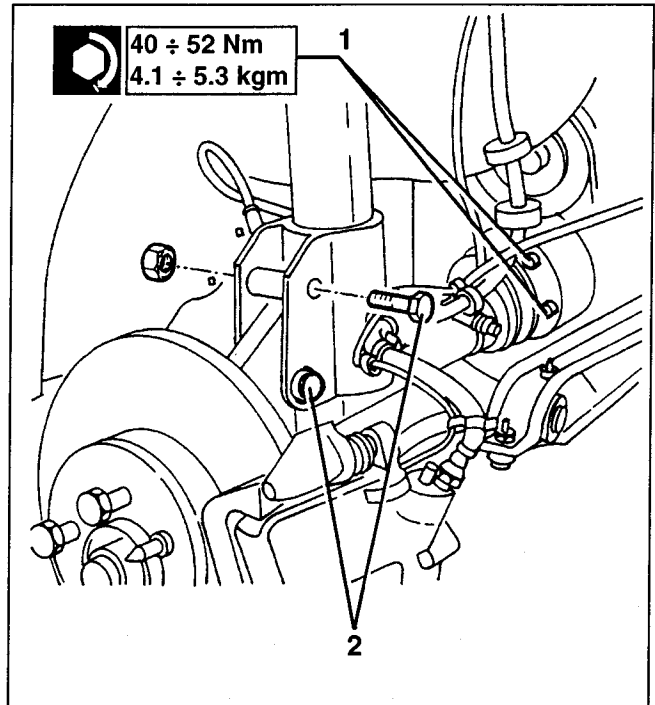
1. Install a new protection boot.
2. Position the flexible retainer ring in its housing.
3. Compress the ring with the fastening clamp.



1. Using tool no. 1.820.084.000 install the outer boot fastening clamp.



1. Slacken the six fastening bolts and disconnect the constant velocity joint from the intermediate shaft.  
 2. Slacken the two bolts fastening the right upright to the shock absorber then withdraw only the upper bolt.

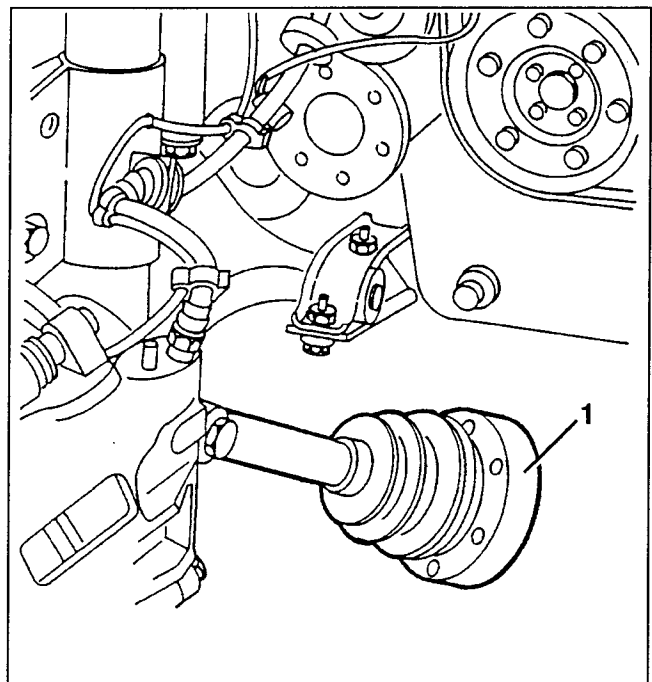


1. Move the axle shaft back just enough to disconnect it from the intermediate shaft and set it as illustrated.

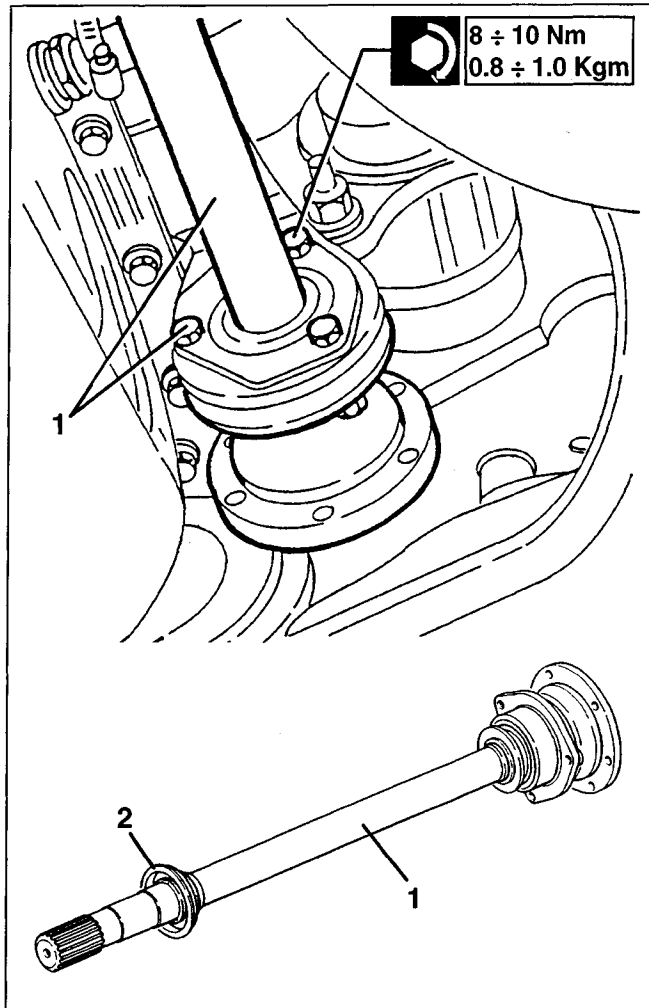
## INTERMEDIATE SHAFT

### REMOVAL / REFITTING

- Set the car on a lift.
- Disconnect the battery.
- Raise the car.
- Remove the wheel and mud flap from the right-hand wheel house.
- Working from the right wheelhouse, disconnect the electrical connection of the brake pad wear sensor.
- Release the ABS inductive sensor cable from the support bracket.



1. Slacken the three fastening bolts and withdraw the intermediate shaft
2. Remove the dust guard.

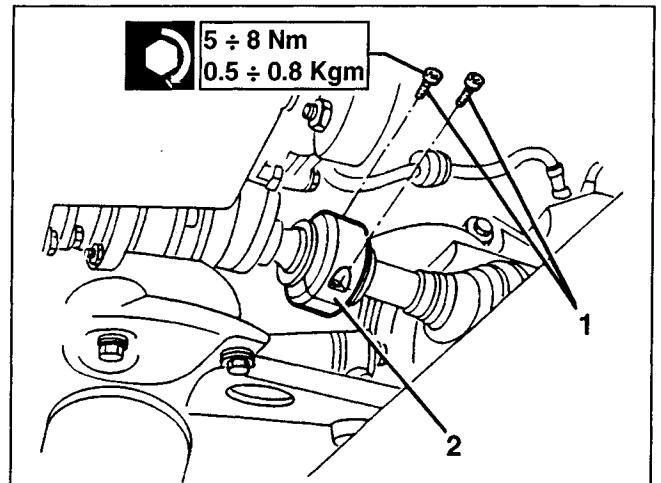


Refit the intermediate shaft reversing the sequence followed for removal. Tighten the bolts fastening the upright to the shock absorber as described in GROUP 44 - Wheels ad Hubs.

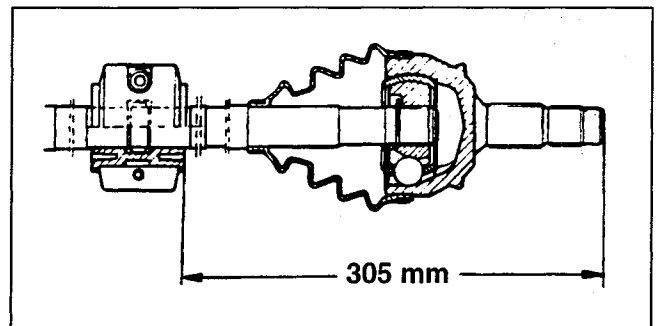
## LEFT AXLE SHAFT DAMPING MASS (Only 4-cylinder)

### REMOVAL / REFITTING

- On the left-hand side of the car, proceed as follows:
  1. Slacken the screws fastening the two half shell 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 mass according to the dimensions illustrated.



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## HYDRAULIC BRAKE SYSTEM

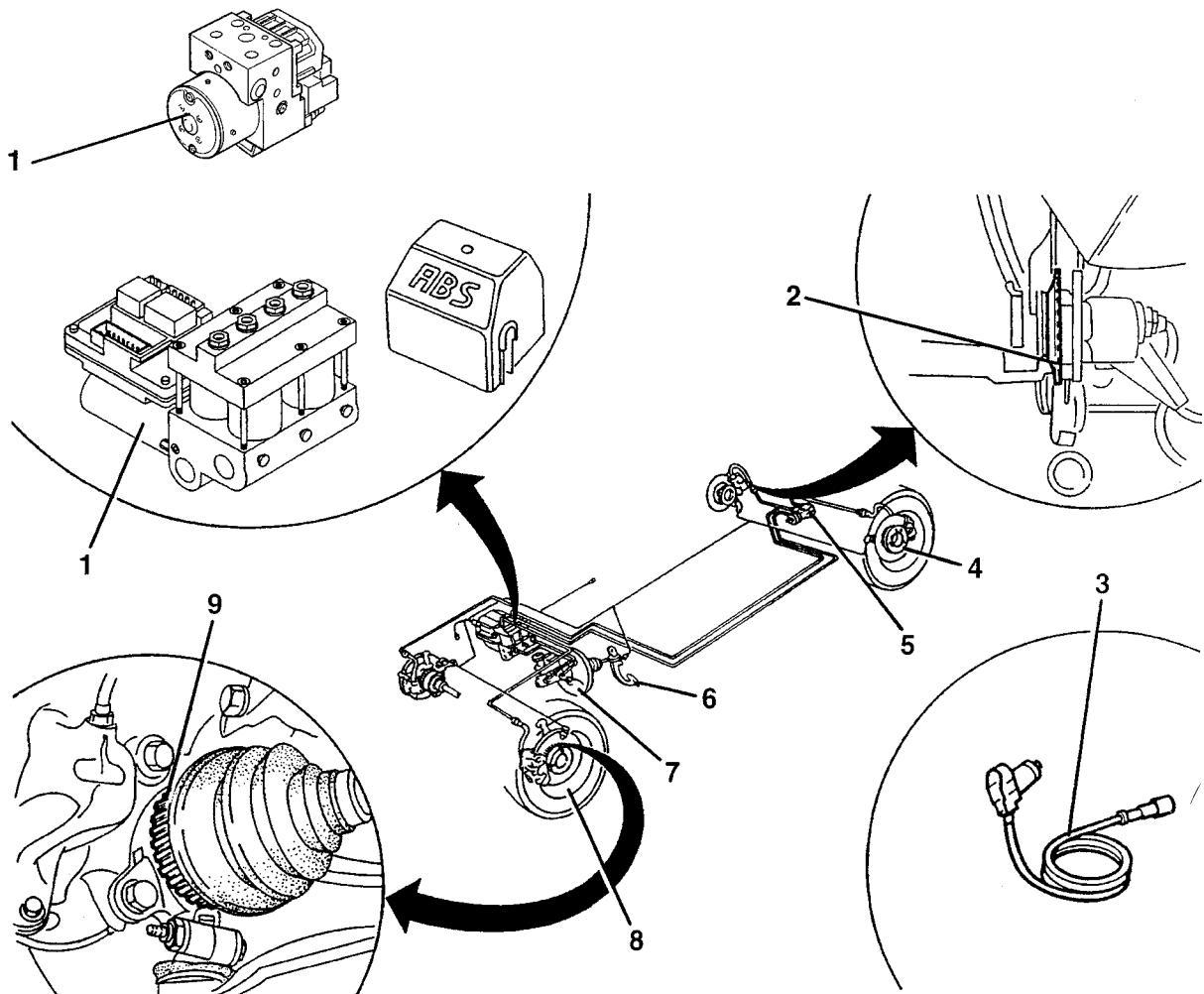
### DESCRIPTION

For the braking system particular solutions have been adopted in all the components to ensure **stable and powerful braking** suited to the high performance of the car.

The main features of the system are the following:

- **BOSCH 2Si ABS** (up to chassis no. \_\_\_\_).
- **BOSCH 5.3 ABS** with EBD (from chassis no. \_\_\_\_).
- Large disk diameter (front ventilated): ensure high heat dispersion thus effectiveness also during prolonged braking.

- **Crossed circuit with braking load proportioning valve**: ensuring high levels of safety in the event of a failure and preventing the rear wheels from locking.
- **Servobrake with reduced loadless stroke**: limits the pedal stroke and warrants quicker accurate braking.
- **Brake linings in ecological material**: in keeping with current environmental regulations.



### Hydraulic brake circuit

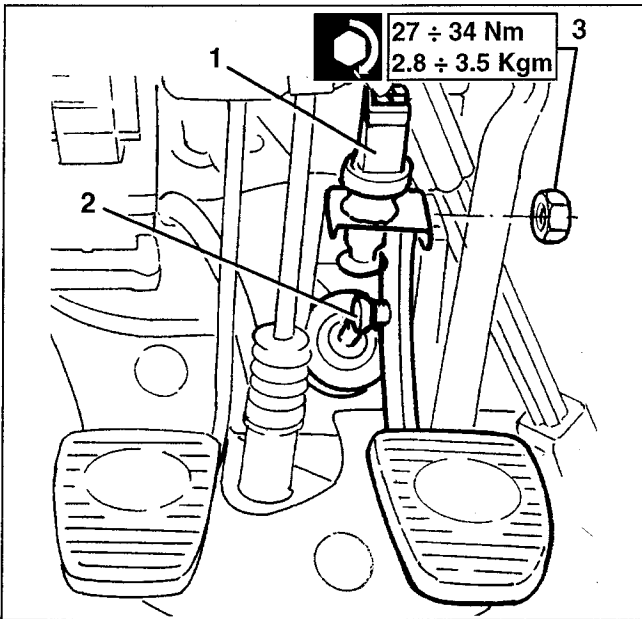
- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>1. ABS hydraulic unit/electronic control unit</li> <li>2. Rear phonic wheel</li> <li>3. Inductive sensor</li> <li>4. Rear disk</li> <li>5. Braking load proportioning valve (up to chassis no. ____)</li> </ul> | <ul style="list-style-type: none"> <li>6. Brake pedal</li> <li>7. Servobrake</li> <li>8. Ventilated front disk</li> <li>9. Front phonic wheel</li> </ul> |
|--|--|



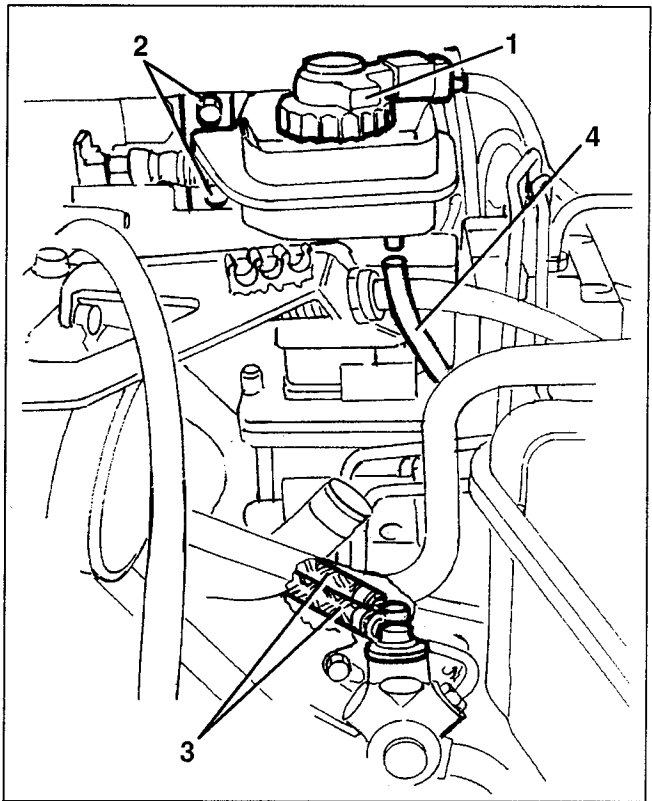
## BRAKE PEDAL

### REMOVAL/REFITTING

1. Twist and remove the stop light switch from its housing.
2. Remove the pin fastening the brake pedal to the servobrake.
3. Slacken the fastening nut and remove the brake pedal.



4. Disconnect the clutch circuit pipe from the reservoir

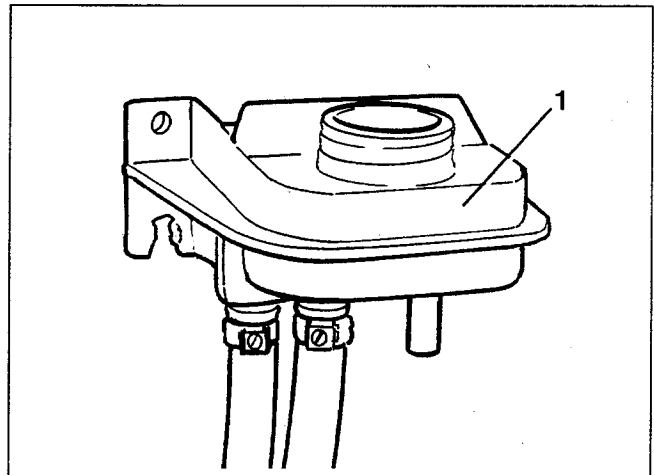


1. Remove the reservoir

## BRAKE-CLUTCH FLUID RESERVOIR

### REMOVAL/REFITTING

- Disconnect the battery negative terminal.
  - Remove the air inlet corrugated pipe (see GROUP 10).
1. Disconnect the low fluid level warning device.
    - Empty the reservoir using a syringe.
  2. Disconnect the reservoir from the services tray slackening the two screws; remove the clip.
  3. Disconnect the two pipes leading from the reservoir from the pump.



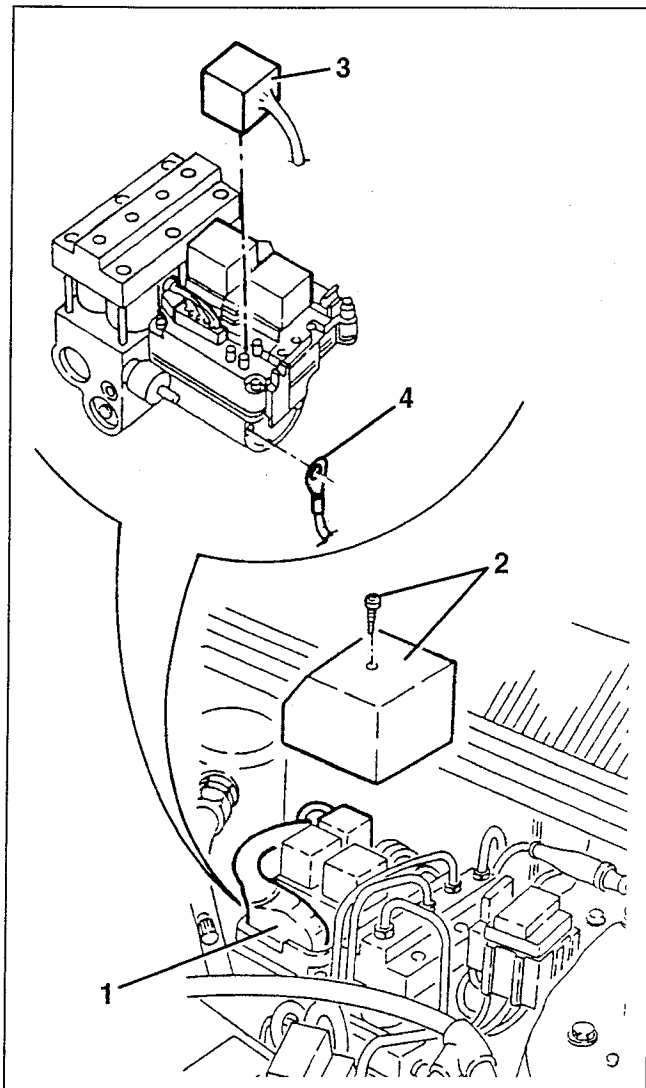
When refitting bleed the air from the system; then top up the level in the reservoir.

**BRAKE - CLUTCH FLUID MINIMUM LEVEL SENSOR**

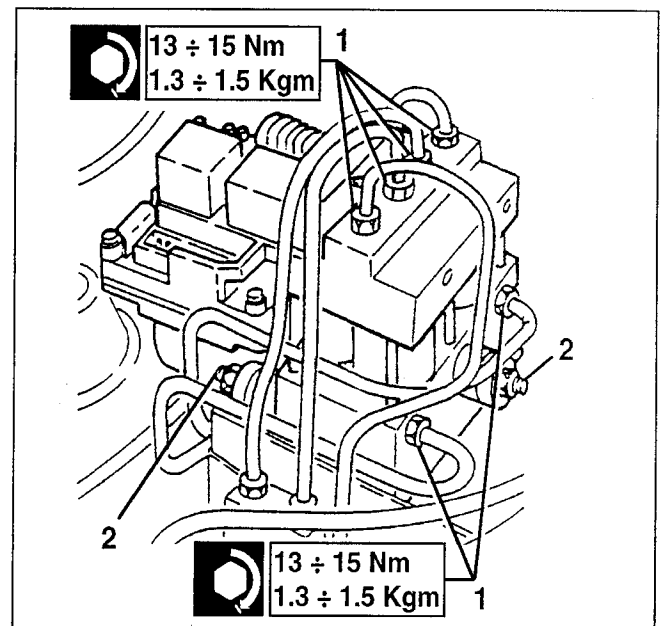
(See GROUP 18).

**ABS BOSCH 2Si (up to chassis no.\_\_\_\_) HYDRAULIC UNIT/  
ELECTRONIC CONTROL UNIT****REMOVAL / REFITTING**

- Disconnect the battery negative terminal.
  - Remove the corrugated air inlet pipe (see GROUP 10).
  - Empty and then remove the brake - clutch fluid reservoir (see specific paragraph).
1. Disconnect the connection of the ABS control unit
  2. Remove the protective cover.
  3. Disconnect the connection of the relays.
  4. Disconnect the earth cable.



1. Disconnect the four stiff pipes from the valve unit (grey) and the two pipes from the pump (black).
2. Slacken the two screws and remove the unit from the bracket



When refitting relieve the air from the braking system (see specific paragraph)

**NOTE:** For further details about operation and system diagnosis see "GROUP 55 - ELECTRIC SYSTEM DIAGNOSIS".

**Diagnosis for fault-finding should be carried out using the ALFA ROMEO TESTER.**

**BOSCH 5.3 ABS WITH EBD**

(from chassis no. ...)

**DESCRIPTION**

The BOSCH 5.3 ABS optimises the compactness (ease of assembly), lightness and reliability of the previous versions of anti-lock systems.

The use of new micro-hybrid electronic components, optimisation of the flows owing to the study of new more compact shapes of the valve bodies and the reduction of the number of hydraulic components, have made it possible to improve the characteristics of the solenoid valves.

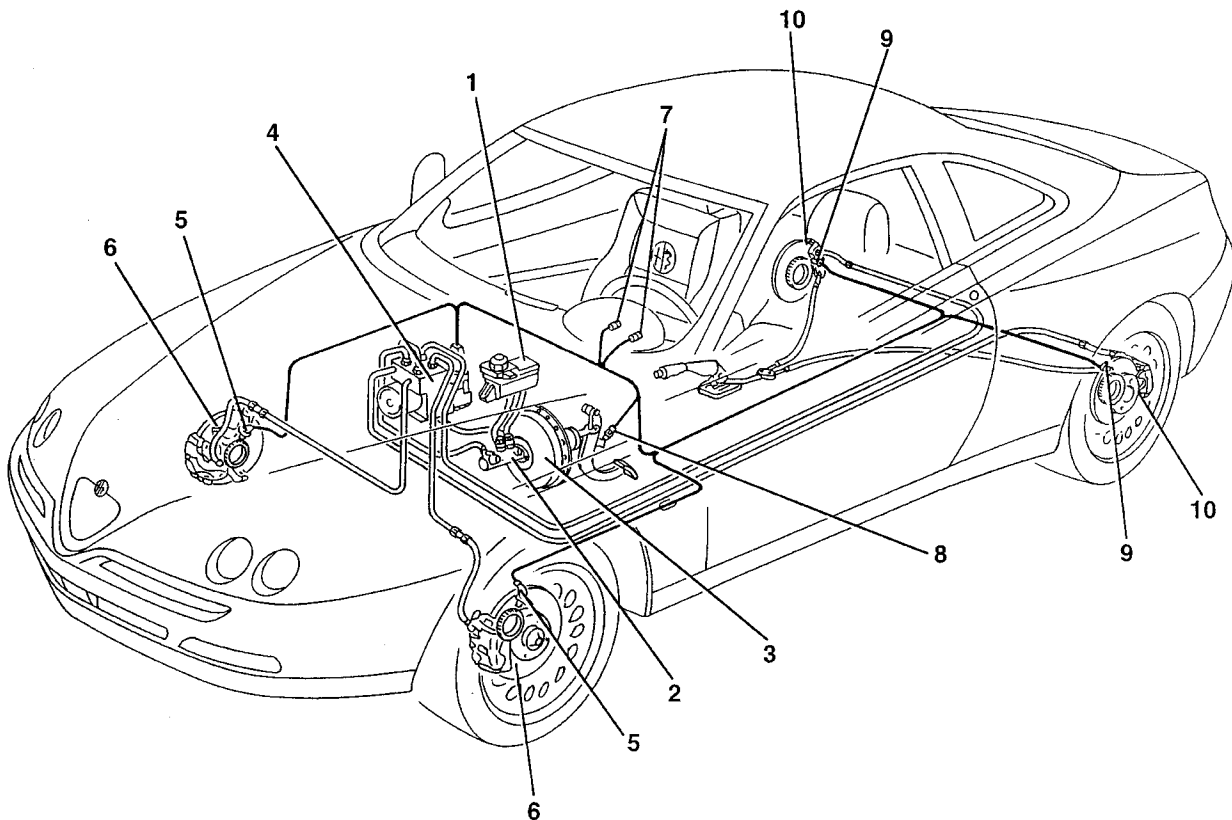
An EBD (Electronic Braking force Distribution) function has also been implemented in the system which makes adjustment of the braking force at the rear wheels directly by the electronic control unit, eliminating the mechanical pressure regulator.

The main components of the system are:

- new electronic control unit which is more powerful and versatile than the previous models, integrated in the electrohydraulic control unit;
- electrohydraulic control unit which modulates the braking pressure at the brake calipers through eight solenoid valves, two per wheel.
- four sensors, one per wheel, which detect the angular rotation speed of the wheels themselves.

The system is completed by:

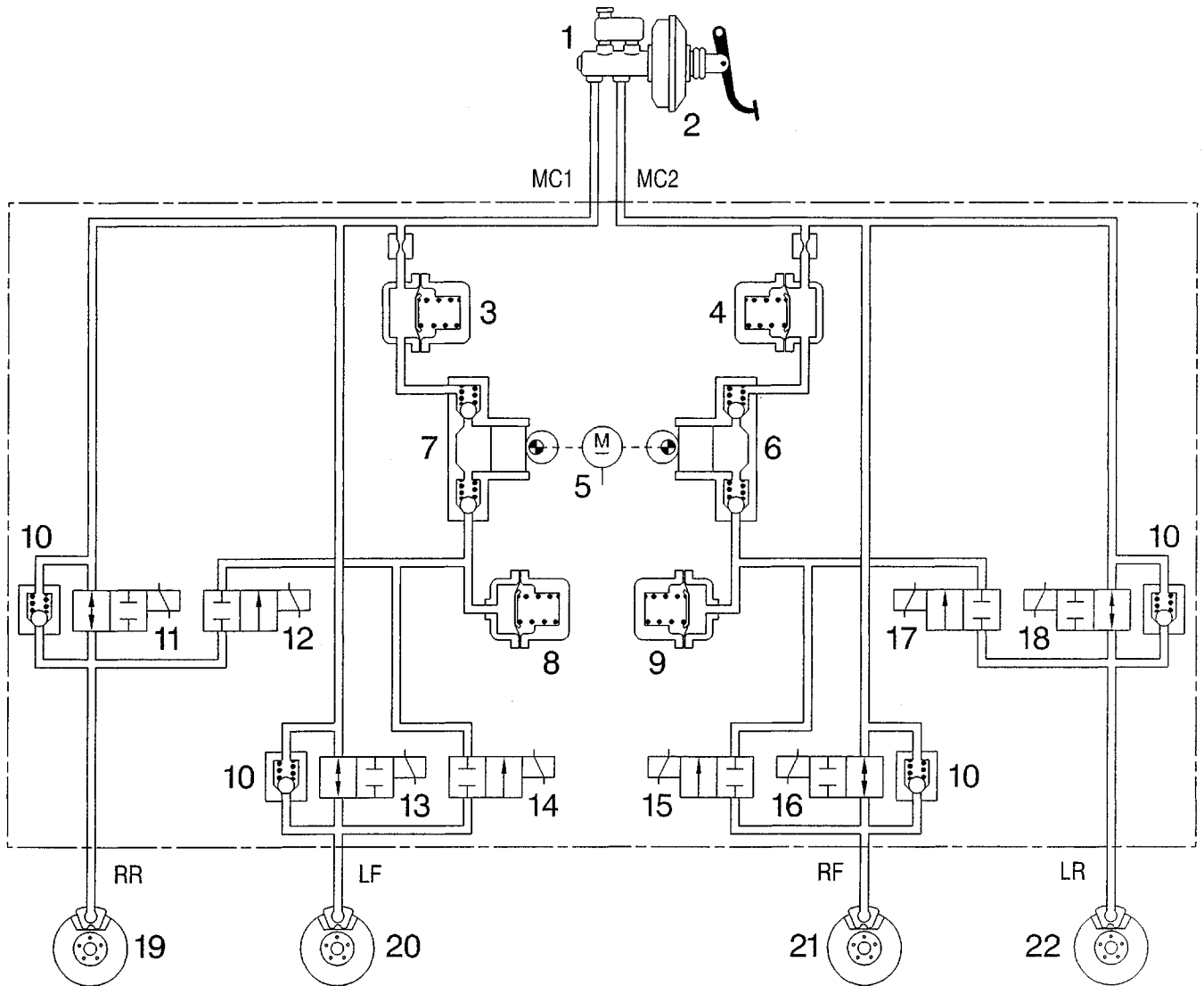
- hydraulic system piping;
- a specific wiring loom;
- a switch on the brake pedal to detect the braking condition;
- two warning lights on the check panel.



*Layout of the Bosch 5.3 A.B.S. anti-lock system*

- |  |                                 |
|--|---------------------------------|
| 1. Brake fluid reservoir   | 6. Front brakes                 |
| 2. Brake pump  | 7. Failure warning lights       |
| 3. Vacuum servobrake   | 8. Stop lights control switch   |
| 4. Electrohydraulic control unit with incorporated electronic control unit | 9. Rear wheel revolution sensor |
| 5. Front wheel revolution sensor   | 10. Rear brakes                 |

**Hydraulic layout of BOSCH 5.3 A.B.S. System**



*Braking system with double crossed circuit*

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Brake control pump</li> <li>2. Servobrake</li> <li>3. High pressure accumulator (damping chamber)</li> <li>4. High pressure accumulator (damping chamber)</li> <li>5. Recovery pump drive motor</li> <li>6. Recovery pump</li> <li>7. Recovery pump</li> <li>8. Low pressure accumulator (reservoir)</li> <li>9. Low pressure accumulator (reservoir)</li> <li>10. Fast pressure reduction valve</li> <li>11. Right rear charge solenoid valve</li> <li>12. Right rear discharge solenoid valve</li> <li>13. Left front charge solenoid valve</li> <li>14. Left front discharge solenoid valve</li> <li>15. Right front charge solenoid valve</li> <li>16. Right front discharge solenoid valve</li> </ul> | <ul style="list-style-type: none"> <li>17. Left rear charge solenoid valve</li> <li>18. Left rear discharge solenoid valve</li> <li>19. Right rear drum brake</li> <li>20. Left front disk brake</li> <li>21. Right front disk brake</li> <li>22. Left rear drum brake</li> </ul><br><ul style="list-style-type: none"> <li>MC1. Supply union for brake pump 1st stage</li> <li>MC2. Supply union for brake pump 2nd stage</li> <li>RR. Delivery union to right rear cylinder</li> <li>FL. Delivery union to left front caliper</li> <li>FR. Delivery union to right front caliper</li> <li>RL. Delivery union to left rear cylinder</li> </ul> |
|--|---|

**COMPONENTS**

**Electrohydraulic control unit**

The electrohydraulic control unit comprises two sections fastened to one another: an electronic control unit and an electrohydraulic control unit.

On the basis of the signals received from the sensors and with the help of characteristic programmes mapped in its memories, the electronic control unit commands the electrohydraulic control unit.

The electrohydraulic control unit is connected to the brake pump and to the A.B.S. system components through the pipes of the braking system.

The main change with respect to the previous versions is the replacement of the three-way valves with two 2-way solenoid valves for each wheel.

**Electronic control unit**

The electronic control unit is formed of hybrid circuits with resistances, diodes, transistors and integrated logic circuits. The heart of the system are two CMOS microprocessors with 12K ROM which autonomously carry out the same programme and monitor one another mutually. Both receive the same input signals which each processes individually and only when the results obtained are identical, the control unit sends the operative command to the electrohydraulic control unit.

Conversely, if for example there is a fault in the wheel anti-lock system, the device cuts itself out and braking takes place conventionally: simultaneously, the fault warning light on the check panel comes on.

**Operating logic**

The signals (alternate or analogue) sent by the rpm sensors to the electronic control unit are transformed by the input amplifier into square wave signals.

The frequency of these signals gives the control unit the corresponding values of speed, acceleration or deceleration of the single wheels.

From the combination of the single wheel peripheral speeds, a reference speed is processed which is continuously updated and indicates the speed of the car at all times.

When the driver presses the brake pedal the wheels can each decelerate to a different extent: comparison of the peripheral speed of each wheel with the reference speed keeps the skidding of each wheel constantly under control.

If the braking force causes a wheel to skid with respect to the others, the electronic control unit sends the command to the solenoid valves of the electrohydraulic control unit to reduce the braking force on the wheel that has lost grip. This way the wheel concerned regains speed.

The memory of the electronic control unit also contains threshold acceleration and deceleration values that none of the wheels may ever exceed.

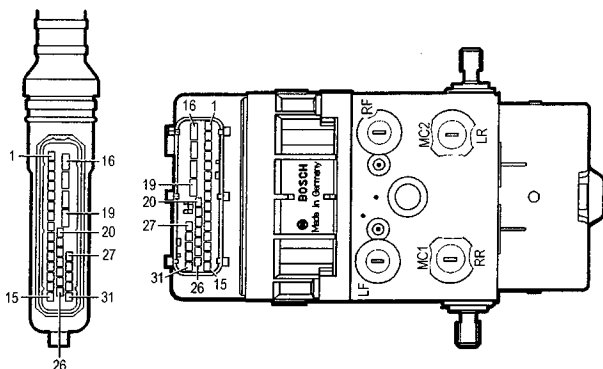
Therefore, through systematic, very rapid comparison of the wheel skidding, deceleration and acceleration values, rolling of the tyre during braking is kept under control.

As soon as the foreseen combined acceleration/deceleration and skid values are exceeded, the electronic control unit intervenes with commands to the solenoid valves of the electrohydraulic control unit, in the three adjustment phases to lower, maintain or return the pressure generated by the driver on the brake pedal to the brake calipers, bringing the braking condition to the optimum values set by the system.

These phases determine an intermittent but extremely fast adjustment cycle which is repeated until the car stops. The electronic control unit commands the different phases supplying the solenoid valves pulses with different current intensities. It also makes sure that both rear wheels are given the same braking force applicable to the rear wheel that is more subjected to locking, i.e. the one with lower grip (to ensure stability).

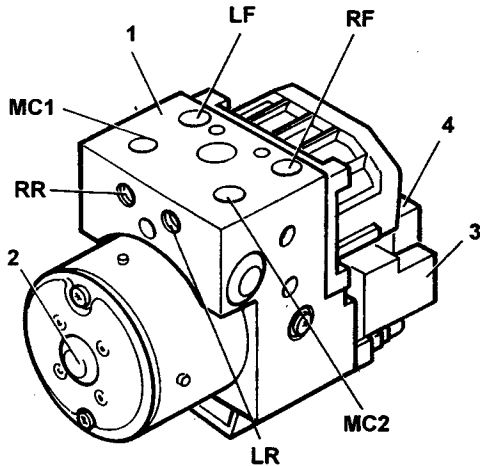
If a fault is detected, the wheel anti-lock device cuts out and alerts the driver by turning on the warning light on the check panel, while however ensuring operation of the conventional braking system.

The electronic control unit is informed that the driver is braking by the signal from the switch on the brake pedal. Besides controlling braking, this information is also helpful under certain particular conditions, such as for example if a sharp acceleration that makes the wheels skid is followed by heavy braking, or in the case of irregular road surfaces (humps, steps) that can involve changes in speed of the wheel due to causes not linked with the braking in progress.



In these conditions the microprocessors process a strategy connected with the changes of speed of the wheels of these particular moments, bringing braking back to the correct parameters. Since these are particular conditions of braking control, the lack of connection of the switch on the brake pedal to the control unit does not compromise the efficiency of the system. For this reason it is not signalled by the warning light, nor is the A.B.S. system disabled.

**Electrohydraulic control unit**



- 1. Electrohydraulic control unit
- 2. Electric recovery pump
- 3. Electronic control unit
- 4. Control unit connector

The electrohydraulic control unit is connected to the brake pump and to the brake caliper cylinders through the brake system lines and together with the electronic control unit it forms the electrohydraulic control unit. Its task is to change the pressure of the brake fluid in the brake caliper cylinders according to the command signals leading from the electronic control unit.

It comprises eight two-way solenoid valves (two for each hydraulic circuit) and an electric recovery pump (2) with double circuit. The eight solenoid valves and the electric recovery pump are driven by the electronic control unit depending on the signals of the four rpm sensors. The pump makes it possible to recover the brake fluid during the pressure reduction phase making it available again upstream of the solenoid valves for the next pressure increase phase.

The accumulators absorb the brake fluid during pressure reduction.

The unit is connected to the braking system through unions identified by the codes stamped on them as illustrated.

**Pipe outlets**

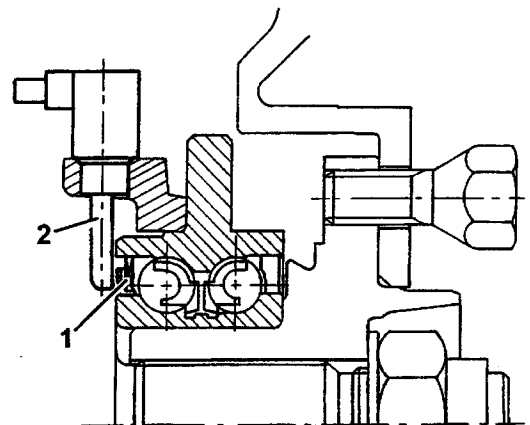
- MC1 Supply union from brake pump- circuit 1
- MC2 Supply union from brake pump - circuit 2
- LF Delivery union to left front brake caliper
- LR Delivery union to left rear brake caliper
- RF Delivery union to right front brake caliper
- RR Delivery union to right rear brake caliper

**Inductive sensors (up to October '99)**

These are quite the same as those used for the previous versions.

**Active sensors (from November '99)**

- These are made up of two basic elements:
- a multipolar magnetic codifier (1) integrated in the wheel hub bearing;
  - a Hall effect receiver (2) facing the codifier.
- Active sensors offer the following advantages:
- reducing sensitivity to electro-magnetic interference;
  - resistance to interference produced by the heating of the road surface;
  - savings in weight and size;
  - simplifying the transmission couplings to eliminate flywheels.



**EBD Function**

The EBD function (Electronic braking force Distribution) in the system logic also integrates the function of reducing the pressure at the rear brakes to prevent the wheels from locking when the load is transferred to the front axle as the vehicle is braked in the typical ABS braking control strategy.

This way the conventional pressure regulator (braking distributor) has been eliminated which, depending on the types, reduced the pressure at the rear brakes

either depending on braking pressure (fixed cut) or according to the elongation of the rear suspension.

As a result of this new strategy the control unit controls the tendency of the rear wheels to skid through the ABS sensors, reducing the braking pressure only when this is needed.

The result is better adaptation of the braking force to the conditions of the road surface and maximised efficiency of braking at the rear.

Any fault on the EBD system is shown by the turning on of the "low brake fluid level/handbrake on" warning light on the instrument cluster.

In these conditions the pressure reduction function at the rear wheels is not active. Use the vehicle with extreme caution (see Group 55 - Electric System Diagnosis).

## REPAIR OPERATIONS ON THE UNIT



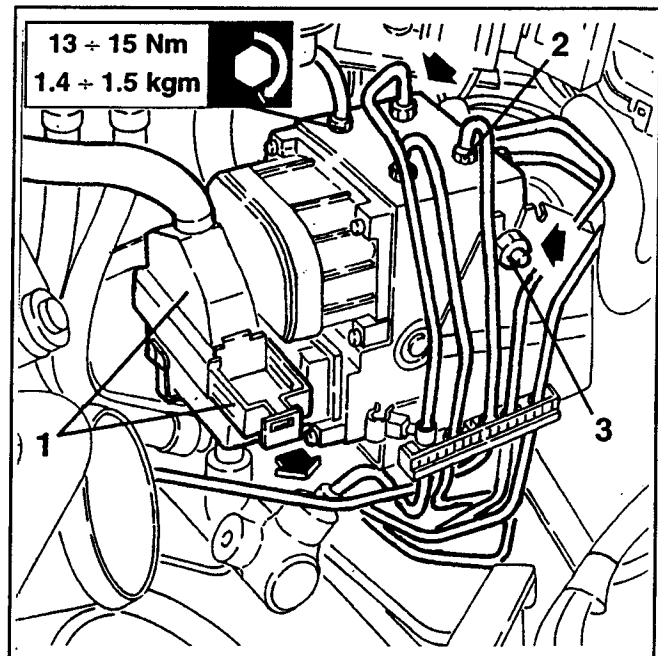
### Instructions for correct repairing

- To replace the electronic control unit it is necessary to disassemble the whole hydraulic unit, owing to reasons of space and to avoid damaging the internal connector.
- The electrohydraulic control unit cannot be overhauled and it is fault-proof until it is tampered with. It must be replaced if found to be faulty.
- After each replacement of a hydraulic unit, rpm sensor, electronic control unit or wiring (especially if after an accident) the entire A.B.S. system must be checked with the Tester.
- After all operations on the hydraulic system of the A.B.S. or brake system, it is necessary to fill with DOT 4 brake fluid, relieve the air, and check the tightness of all the connection points.
- The electrohydraulic control unit is supplied filled with DOT 4 brake fluid and with the solenoid valves not supplied. The operation for filling with fluid and relieving the air is the same as for a conventional system, but requires more time.
- During removal of the electrohydraulic unit avoid overturning it to prevent spilling the oil contained in the hydraulic part.
- When refitting pay attention to the unions: to prevent mistakes in connecting the various parts of the braking circuit during repair operations, the connections of the hydraulic modulator unit are of different sizes (M10x1 and M12x1), the unions are also identified by the codes stamped on them.

## ABS HYDRAULIC UNIT/ELECTRONIC CONTROL UNIT

### Removing/Refitting

- Disconnect the battery
  - Remove the corrugated air intake pipe (see group 10).
  - Drain the brake-clutch fluid.
  - Remove the components that prevent free access to the hydraulic unit.
1. Pull control unit comb locking device forward, then remove it from its housing.
  2. Disconnect the pipe fittings from the hydraulic aggregate.
  3. Slacken the two fastening nuts and remove the hydraulic aggregate.



When refitting relieve the air from the braking system (see specific paragraph).

NOTE: For further details about system operation and diagnosis, see "GROUP 55 - ELECTRIC SYSTEM DIAGNOSIS".

Diagnosis for seeking any faults must be carried out using the ALFA ROMEO TESTER.

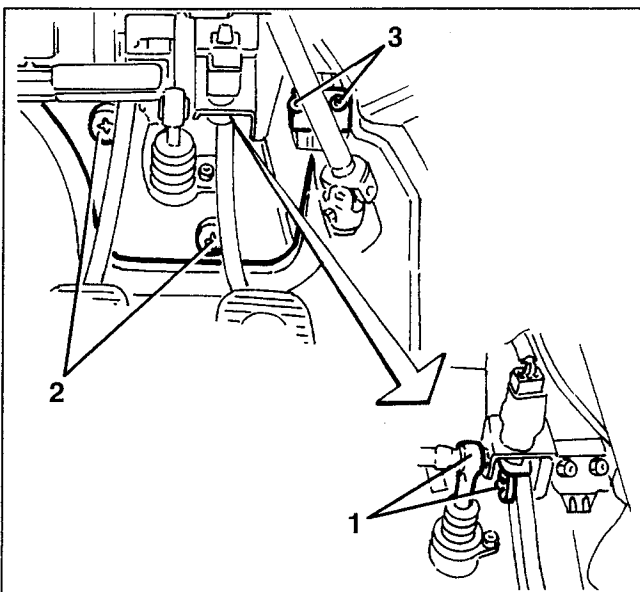
## SERVOBRAKE

### REMOVAL / REFITTING

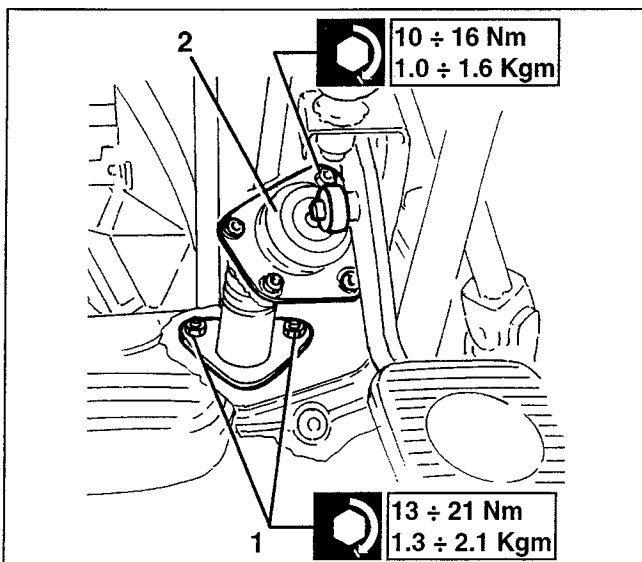
- Empty and remove the brake - clutch fluid reservoir (see specific paragraph).
- Remove the il ABS hydraulic unit/electronic control unit(see specific paragraph).

#### Working in the car:

1. Remove the brake pedal fastening clamp, releasing it from the servobrake control rod.
2. Remove the lower part of the pedal protection detaching the two rubber fastening plugs.
3. Slacken the two nuts and remove the accelerator pedal bracket.

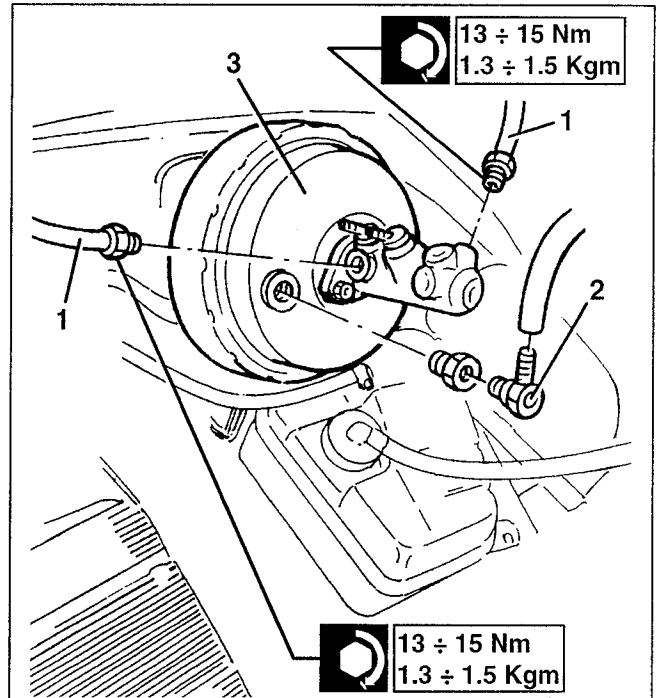


1. Slacken the two nuts fastening the clutch pump, to gain access to the nut below.
2. Slacken the four fastening nuts and free the servobrake pump.



#### Working in the engine compartment

- Remove the right-hand engine compartment protection
  - Disconnect the engine coolant fluid reservoir from the side panel (N.B. do NOT disconnect the pipes: it is not necessary to empty the system).
1. Disconnect the two stiff delivery pipes from the brake pump.
  2. Disconnect the servobrake vacuum takeoff pipe
  3. Retrieve the servobrake together with the brake pump



- If necessary, separate the unit disconnecting the pump from the servobrake; Spares however supply a single servobrake-pump unit.



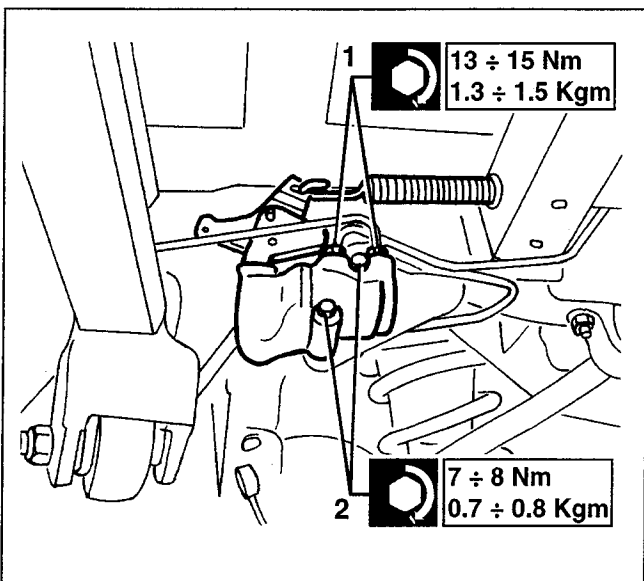
When refitting bleed the air from the system; after bleeding the air, restore the correct level in the reservoir.



## BRAKING LOAD PROPORTIONING VALVE (up to chassis no.6023215)

### REMOVAL / REFITTING

- Set the car on a lift.
  - Empty the brake-clutch fluid reservoir.
  - Remove the exhaust pipe rear section (see Group 10).
1. Slacken the fittings of the stiff pipes from the braking load proportioning valve.
  2. Slacken the two fastening screws and remove the il braking load proportioning valve after disconnecting the spring.

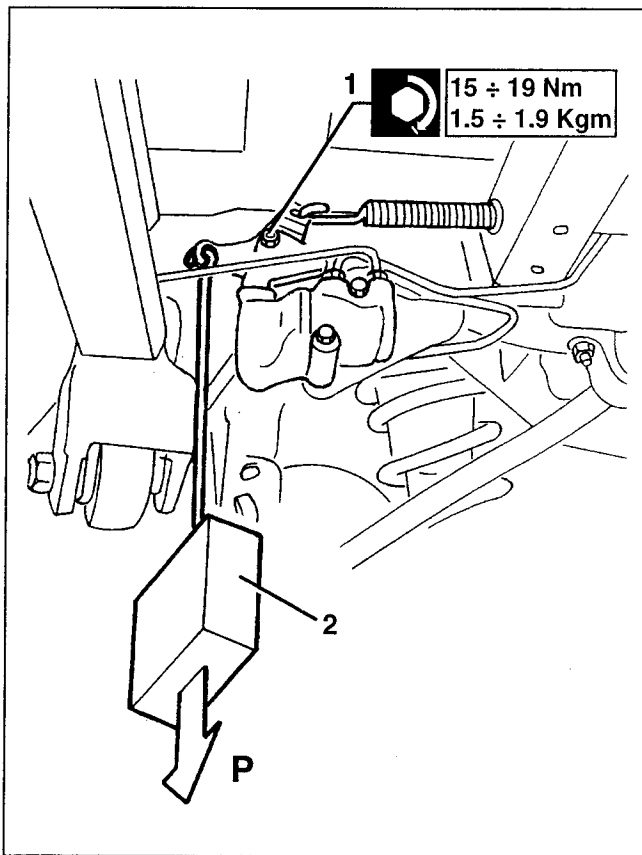


When refitting bleed the air from the braking system (see specific paragraph).

### ADJUSTMENT

- Set the car in running order with driver) and set it on a horizontal surface with the wheels on the ground, in order to settle the suspensions.
1. Slacken the screw fastening the braking load proportioning valve bracket.
  2. On the eyelet of the bracket apply a weight **P** of 4.5 kg.

- Keeping the bracket in this position, lock the fastening screw to the specified torque.



## BRAKING LOAD PROPORTIONING VALVE

(from chassis no.6023216 to chassis no.\_\_\_\_)

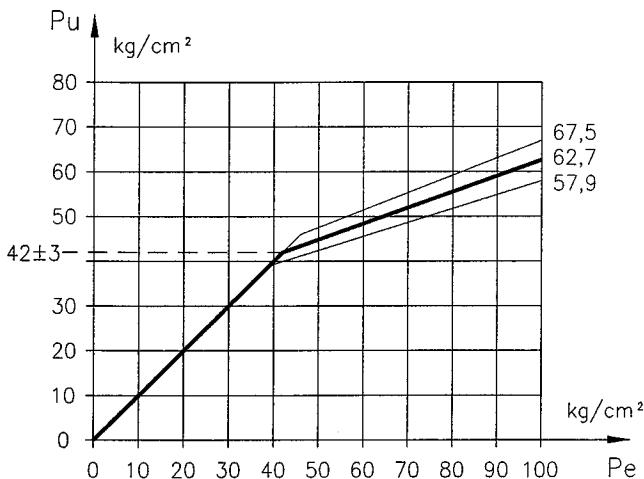
### DESCRIPTION

The braking load proportioning valve is assembled in the same way as the previous one, but it is without the control spring; since the operating procedure depends on the pressure in the braking circuit and not on the position of the suspension.

In fact, up to a pressure in the circuit of 42 kg/cm, the output pressure (Pu) equals the inlet pressure (Pe).

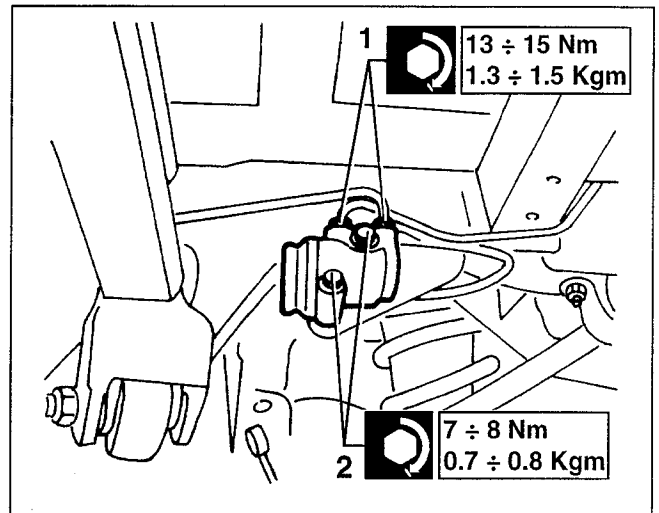
The further increase of inlet pressure, acting on the surfaces of the piston inside the proportioning valve, determines a reduction in the growth of the outlet pressure as shown below.

Therefore the proportioning valve needs no adjustment and it is fastened by two screws in the same housing as the previous version.



### REMOVING/REFITTING

- Set the car on a lift.
  - Drain the brake/clutch fluid reservoir.
  - Remove the rear section of the exhaust piping (see Group 10).
1. Slacken the stiff pipe fittings from the braking load proportioning valve.
  2. Slacken the two fastening screws and remove the braking load proportioning valve.



When refitting, relieve the air from the braking system (see specific paragraph).



#### WARNING:

From chassis no. ... the braking load proportioning valve is NOT present on cars fitted with BOSCH 5.3 ABS system with EBD as the rear axle brake distributing function is controlled by the ABS system itself.

## BRAKE SYSTEM PIPES

### CHECKS AND INSPECTIONS

- Check the stiff pipes and hoses for cracks, swellings, rust and fluid leaks.
- When changing the pipes, empty the brake-clutch fluid reservoir using a syringe and plug the ends of the actual pipes to prevent foreign substances from getting in.
- When refitting fill the brake-clutch fluid reservoir and bleed the air from the brake system (see specific paragraph).

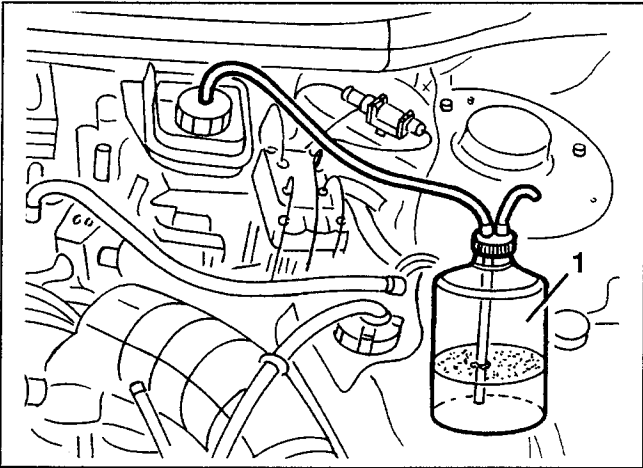
The stiff pipes must never be bent or twisted.

**BLEEDING THE AIR FROM THE SYSTEM**

When filling the hydraulic circuit or doing any work on it, proceed as described below.

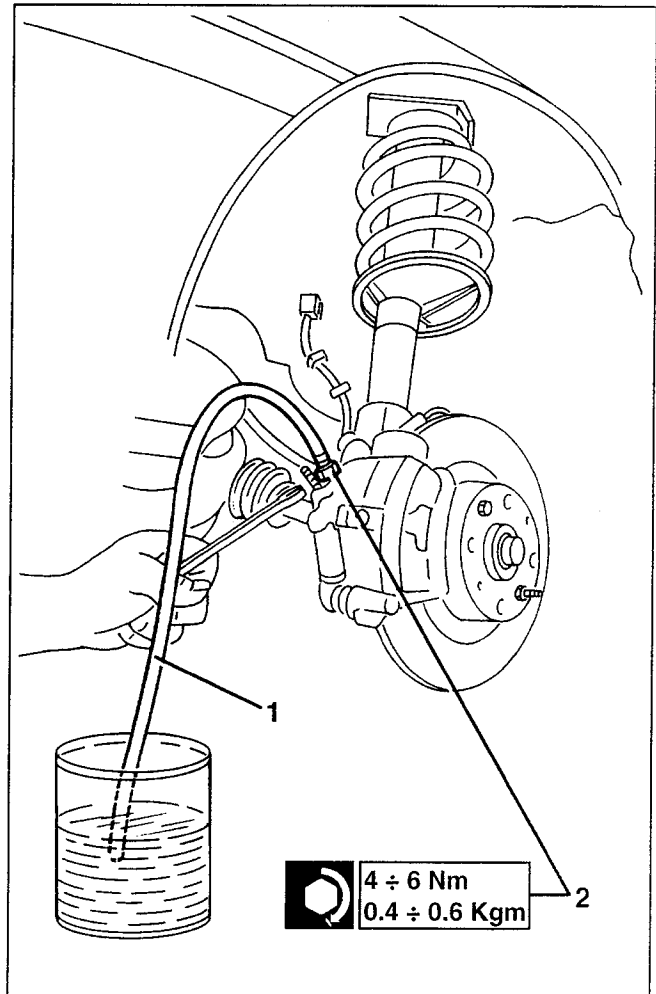
1. Using the special air relief device fitted on the brake fluid reservoir bleed the air in the following sequence:

1. LH front wheel
2. RH front wheel
3. LH rear wheel
4. RH rear wheel

**For each wheel proceed as follows:**

- Fill the brake-clutch fluid reservoir up to the "MAX" level with the specified fluid.
- If necessary, remove the wheel concerned.

1. Fit a tube on the bleed screw. Dip the end of the tube in a recipient containing the specified fluid.
2. Slacken the bleed screw and repeatedly depress the brake pedal (wait a few seconds between one press and the next). When fluid free of bubbles goes into the recipient, depress the pedal completely and lock the bleed screw to the specified torque.



**NOTE:** The air should be relieved separately on each wheel.

**WARNING:**

When relieving the air check that the fluid does not fall below the minimum level. Never re-use the fluid discharged during this operation. Prevent the fluid from contacting painted parts and damaging them.

**NOTE:** If the above procedure is not followed, air might get into the piston leading to lengthening of the brake pedal stroke, in which case proceed as follows. Air may also get into the ABS hydraulic unit from which any kind of air bleeding is impossible.

**RECOVERY IN THE CASE OF AIR IN THE PISTON**

Should air enter the brake control cylinder as a result of an incorrect air bleeding procedure, proceed as follows:

- Press the brake pedal quickly and repeatedly and bleed the air in the following sequence:
  1. RH rear wheel
  2. LH rear wheel
  3. LH front wheel
  4. RH front wheel



**WARNING**

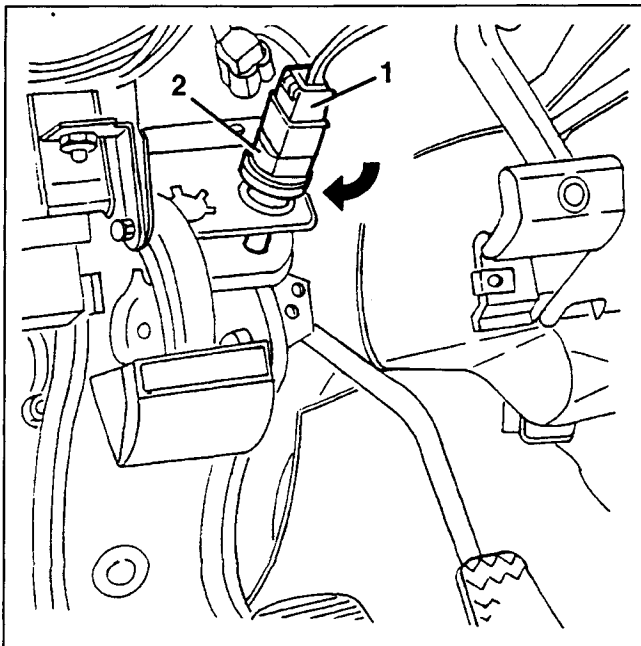
The operation should be repeated five times for each wheel before going on to the next.

- Lastly carry out the normal air bleed procedure in the following sequence.
  1. LH front wheel
  2. RH front wheel
  3. LH rear wheel
  4. RH rear wheel

**STOP LIGHTS SWITCH**

**REMOVAL / REFITTING**

- Disconnect the battery (-) terminal.
  1. Disconnect the electrical connection from the switch.
  2. Turn the switch 45° clockwise and remove it.

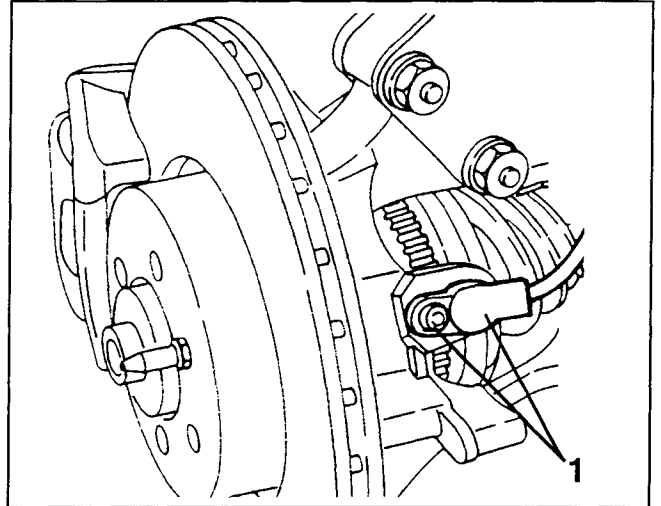


When refitting adjust the stroke of the "mobile part" using the special locking.

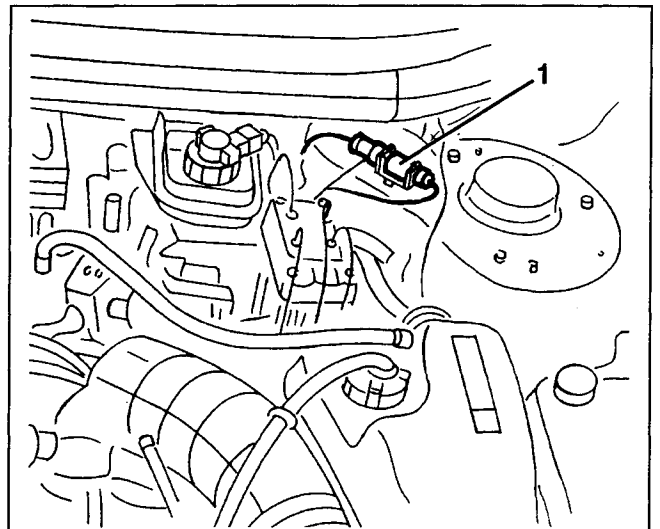
**FRONT INDUCTIVE SENSORS**

**REMOVAL / REFITTING**

1. Slacken the inductive sensor fastening screw from the wheel upright.



1. Disconnect the electrical connection next to the shock absorber dome and remove the inductive sensor together with the wiring, after releasing from the fastenings.

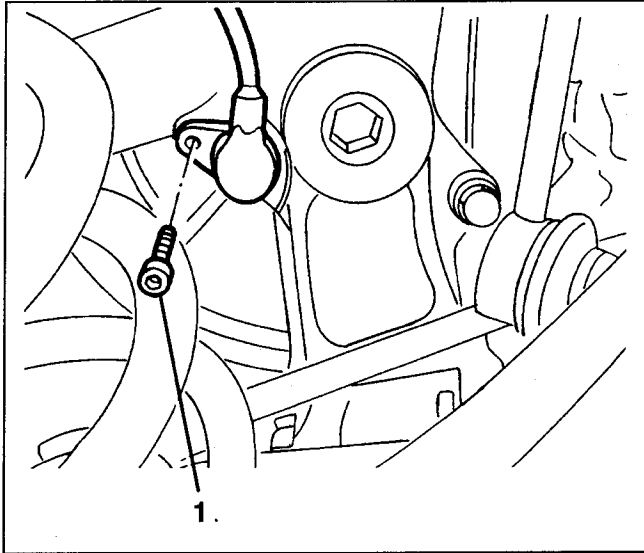


When refitting grease the inductive sensor seat with the specified grease.

**REAR INDUCTIVE SENSORS**

**REMOVAL / REFITTING**

1. Slacken the screw fastening the inductive sensor to the brake disk boot.



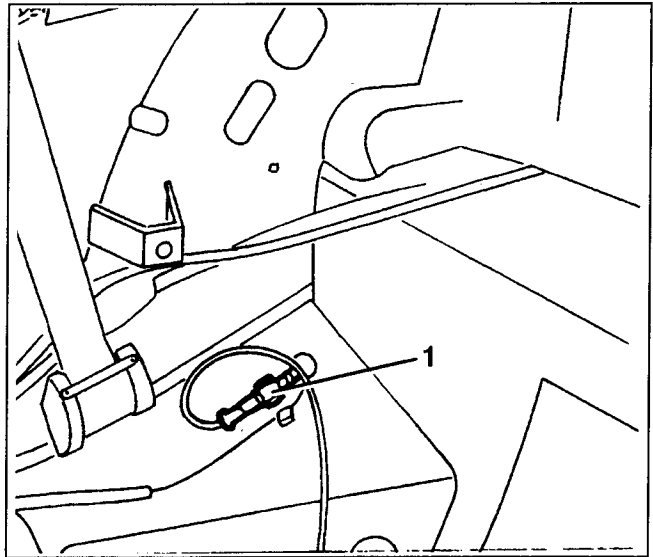
**Spider**

- Open the boot, raise and gain access to the connector.

**Gtv**

- Remove the side panel (see GROUP 70).

1. Disconnect the electrical connection of the inductive sensor and remove it.



When refitting grease the seat of the inductive sensor with the specified grease.

**CHECKING THE GAP**

- Using a thickness gauge, check the gap between the inductive sensor and the corresponding phonic wheel

Front gap	Rear gap
0.3 ÷ 1.05 mm	0.37 ÷ 0.9 mm

**WARNING:**

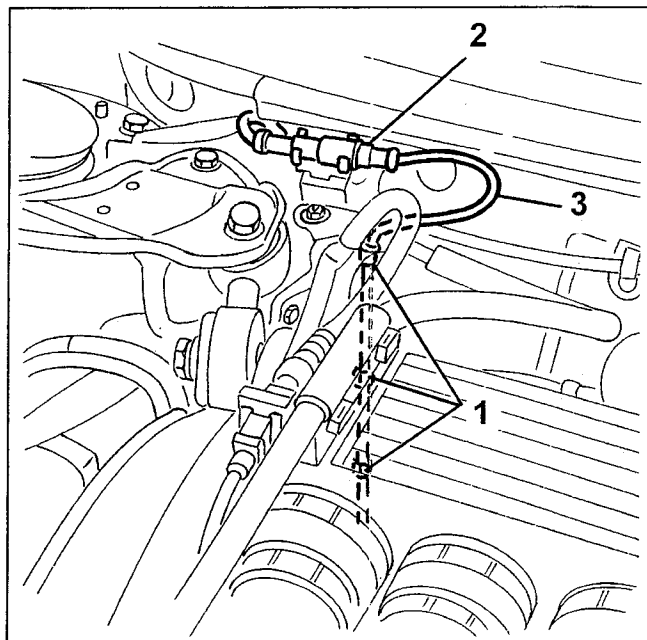
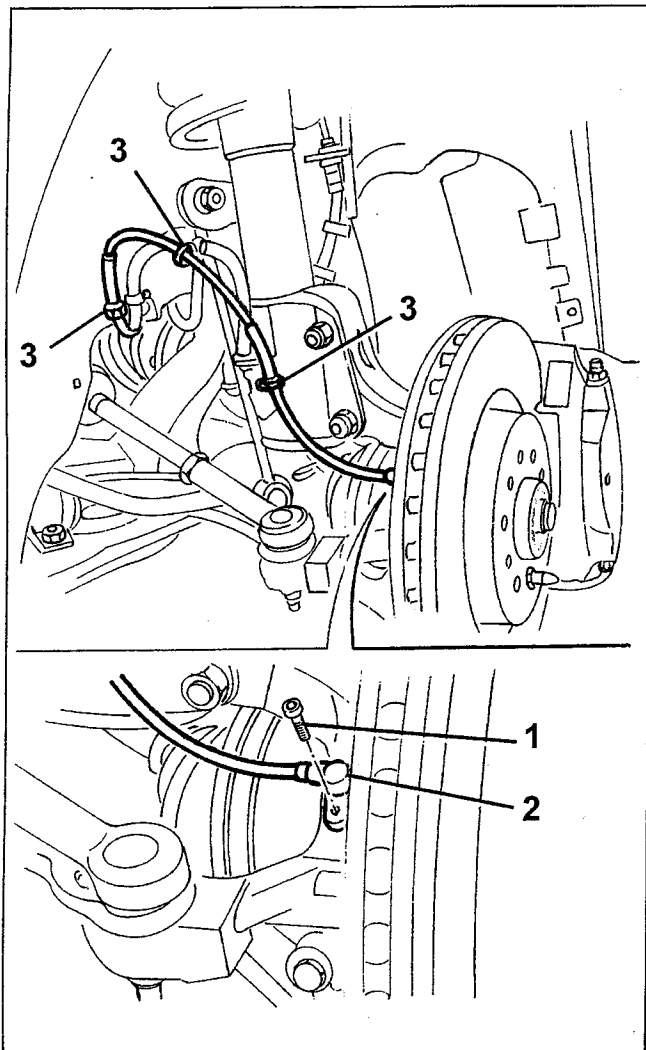
The gap is not adjustable as no thicknesses are supplied for this purpose. Check that the sensor and the phonic wheel teeth are intact and if they are not within the specified tolerance.

**RIGHT FRONT ACTIVE SENSOR  
(6 Cylinder Version)**

**REMOVING / REFITTING**

- Remove the wheel.
- 1. Undo the bolt fixing the active sensor.
- 2. Remove the active sensor from the housing.
- 3. Disconnect the wiring for the active sensor from the retainers.

- Open the bonnet lid.
- 1. Disconnect the wiring from the retainers.
- 2. Disconnect the electrical connection for the sensor.
- 3. Remove the sensor with the wiring.

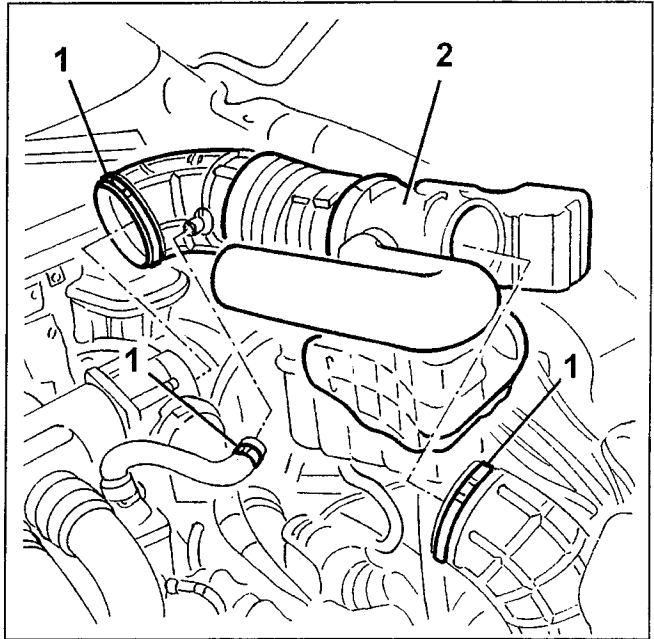


Proceed with the refitting, reversing the order of the operations carried out for the removal.

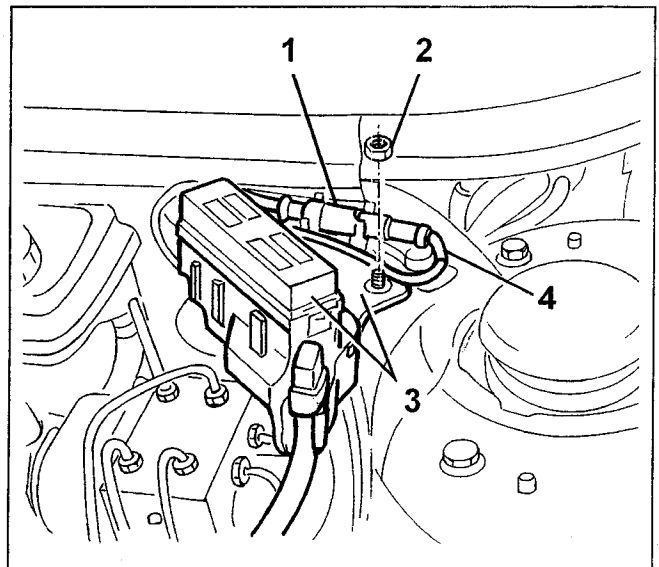
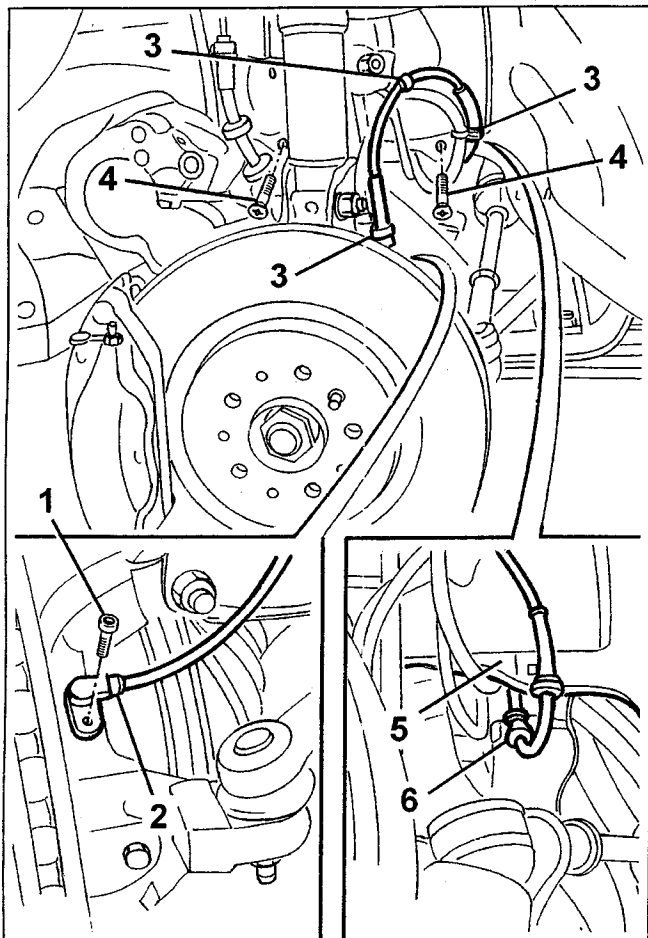
**LEFT FRONT ACTIVE SENSOR  
(6 Cylinder Version)**

**REMOVING / REFITTING**

- Remove the wheel.
- 1. Undo the bolt fixing the active sensor.
- 2. Remove the active sensor from the housing.
- 3. Disconnect the wiring for the active sensor from the retainers.
- 4. Undo the bolts
- 5. Move the protection.
- 6. Disconnect the wiring for the sensor from the inner retainer.



- 1. Disconnect the electrical connection for the sensor after having released it from the retainers.
- 2. Undo the nut.
- 3. Move the support with the fuse carrier.
- 4. Remove the sensor with the wiring.

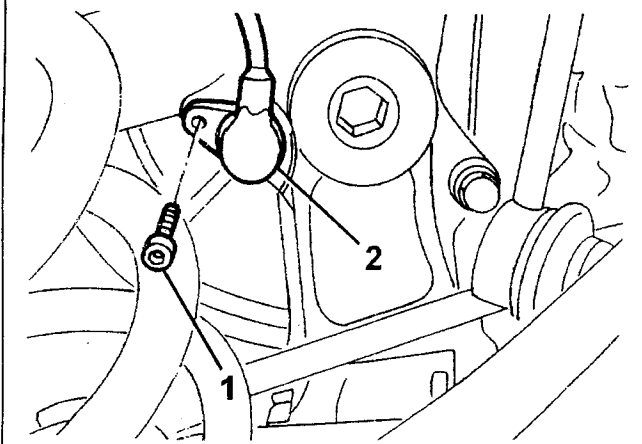
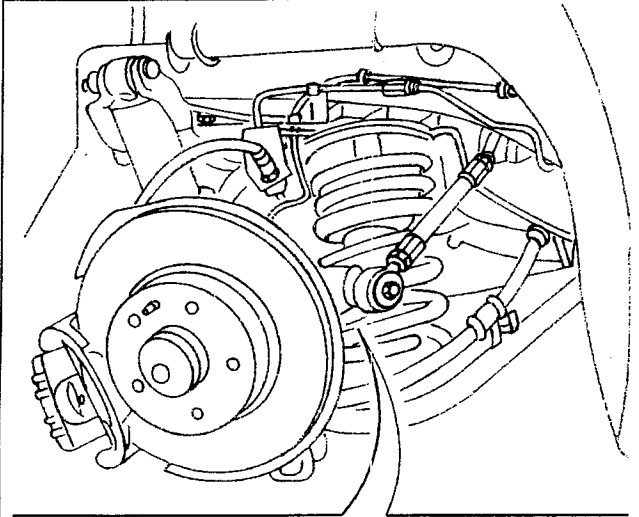


Proceed with the refitting, reversing the order of the operations carried out for the removal.

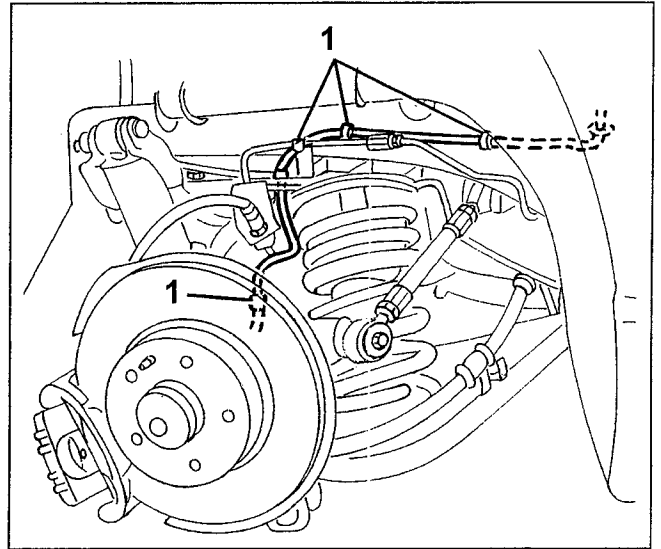
- Open the bonnet lid.
- 1. Open the retaining bands.
- 2. Remove the corrugate pipe connecting the chamber with the flow meter, complete with resonator.

**REAR ACTIVE SENSORS  
(6 Cylinder Version)****REMOVING / REFITTING**

- Remove the wheel.
- 1. Undo the bolt fixing the active sensor.
- 2. Remove the active sensor from the housing.



1. Disconnect the wiring for the active sensor from the retainers.

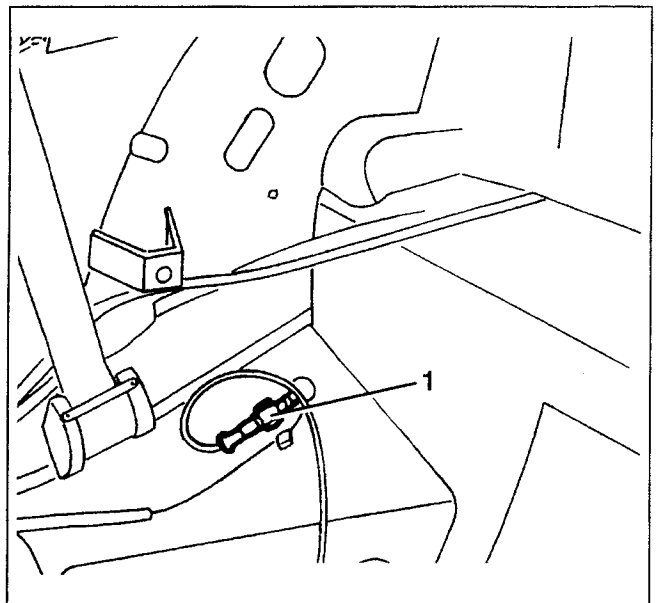
**Spider**

- Open the rear lid, lift up the side cover and gain access to the connector.

**Gtv**

- Remove the side panel (see GROUP 70)

1. Disconnect the electrical connection for the sensor. Remove the sensor, extracting the connector from the lower side of the vehicle.



Proceed with the refitting, reversing the order of the operations carried out for the removal.



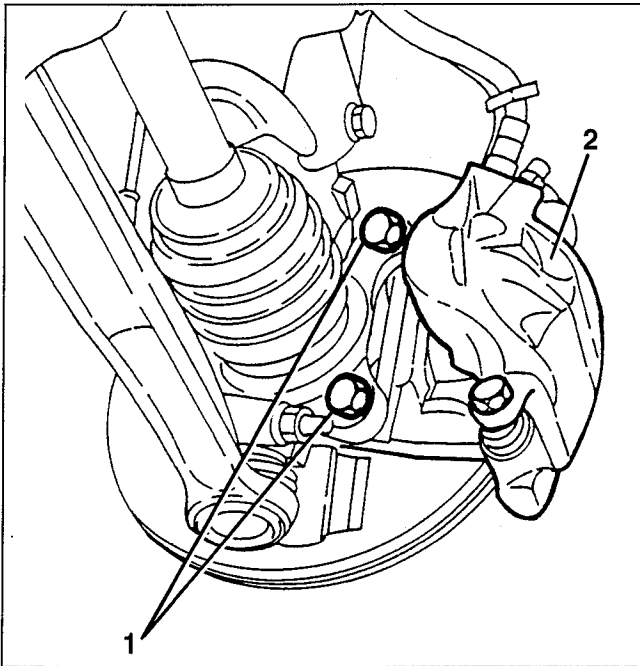


## BRAKE GROUPS

### FRONT BRAKE DISK

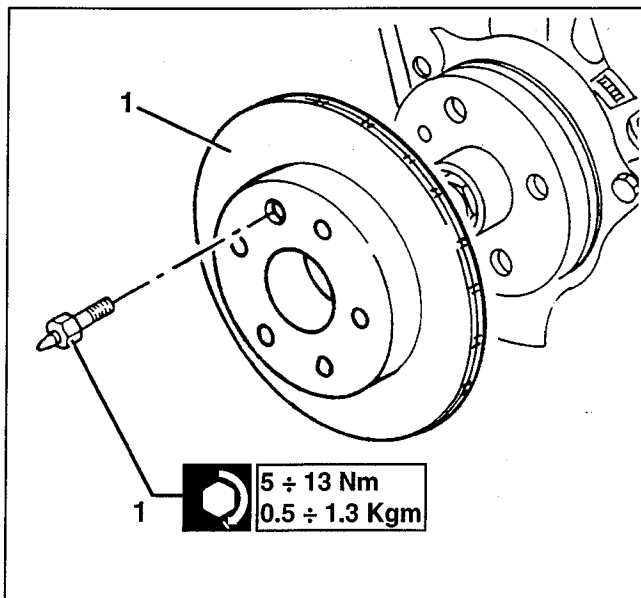
#### REMOVAL / REFITTING

- Set the car on a lift.
- Remove the wheel on the side concerned.
- 1. Slacken the two screws fastening the brake caliper support plate.
- 2. Remove and move aside the complete brake caliper without removing the piping and wiring.



When refitting change the screws and tighten them to the specified torque (see GROUP 00).

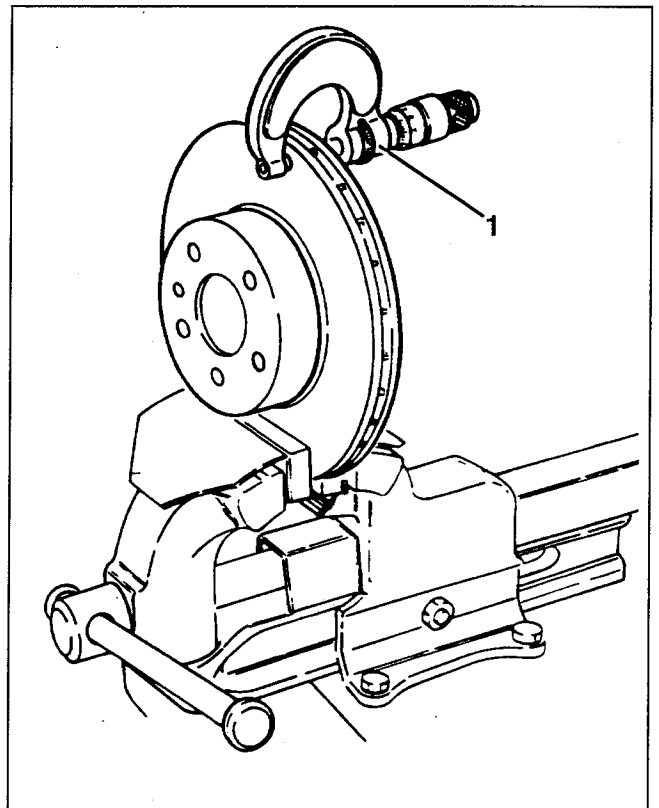
1. Slacken the fastening pin and remove the brake disk.



#### CHECKS AND INSPECTIONS

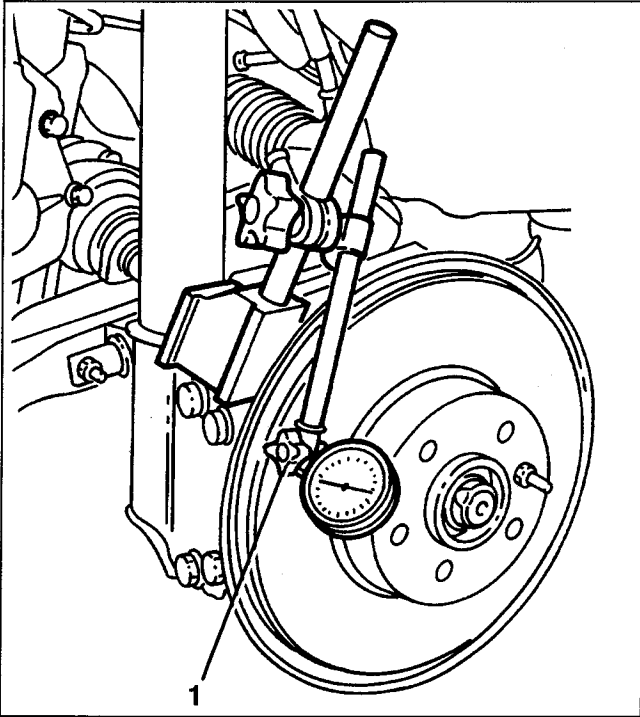
1. Check the thickness of the disks and check that the working surfaces have no deep scores or porosity. If necessary, grind respecting the specified tolerances.

Disk thickness	At use limit	Minimum after grinding
<b>Spider 4 cyl.</b>	18.2 mm	19.2 mm
<b>Other versions</b>	20.2 mm	21.9 mm



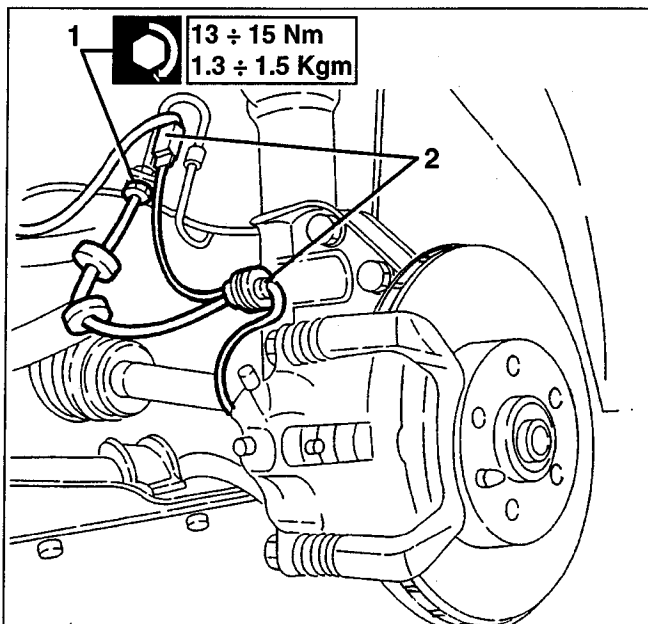
1. When changing the brake pads only, check that the oscillation of the disk, in relation to the axis of rotation, is within the specified limits (0.15 mm max).

**NOTE:** The value must be measured 2 mm from the outside diameter of the disk.



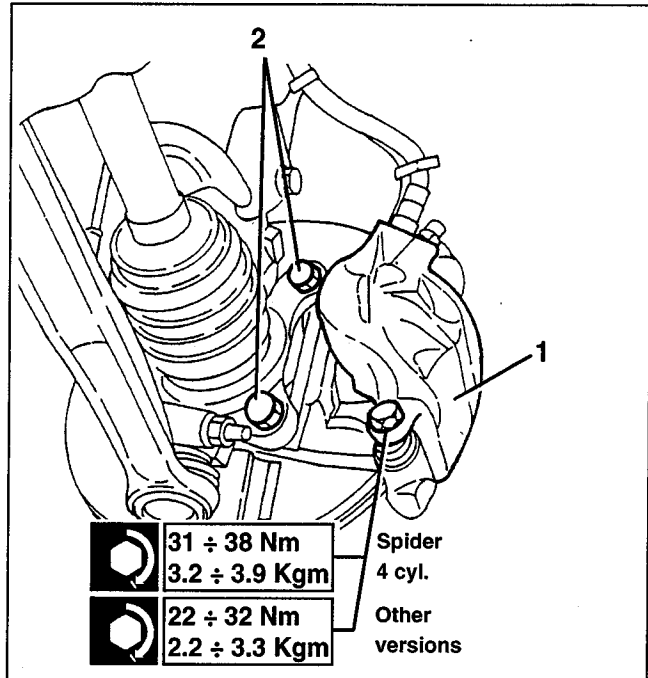
**FRONT BRAKE CALIPER  
 REMOVAL / REFITTING**

- Set the car on a lift.
- Disconnect the battery (-) terminal.
- Remove the wheel on the side concerned.
- 1. Disconnect the intermediate union between the stiff pipe and the fluid delivery hose to the brake caliper.
- 2. Disconnect the electrical connection of the brake pad wear sensor, then free them from the fastening on the shock absorber.



- 1. Slacken the two fastening screws and remove the brake caliper and pads.
- 2. If necessary also remove the caliper body, slackening the two hub fastening screws.

**NOTE:** When refitting replace the caliper body fastening screws, tightening them to the specified torque.



**WARNING:**

When refitting check that the rubber protection bellows of the fastening pin threads are intact, otherwise replace them.

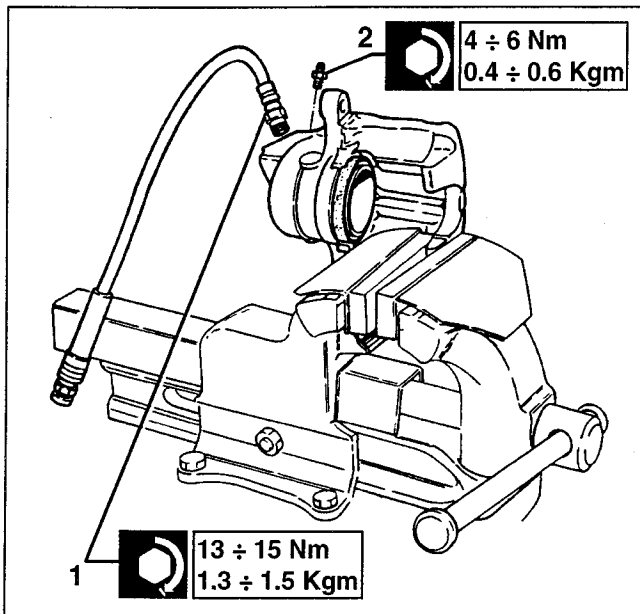
When refitting the brake pad, with the wear sensor, it must be installed on the inner side of the disk (brake caliper piston side): at the same time check that the relief, machined on the outer side of the pad, is positioned at the rear with respect to the direction of travel.



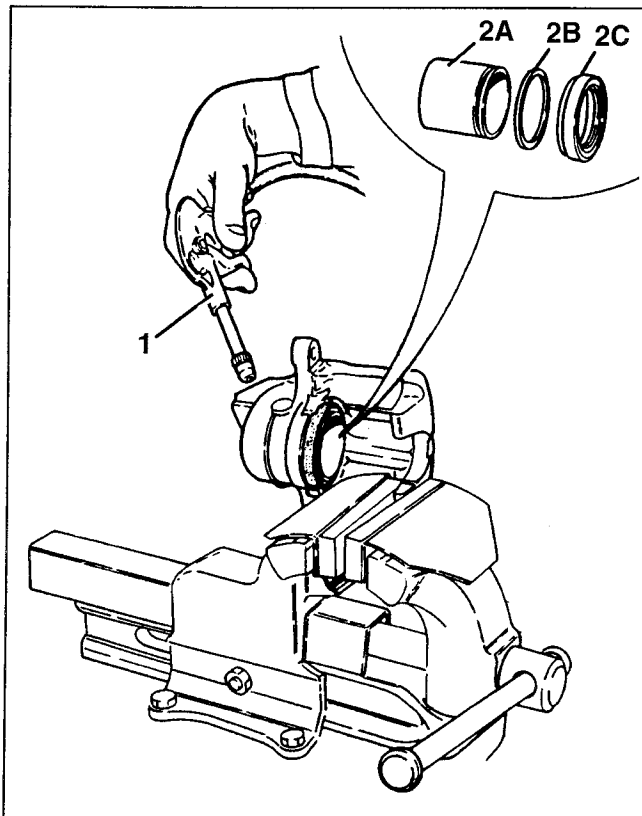
When refitting bleed the air from the braking system (see specific paragraph).

**DISASSEMBLY / REASSEMBLY**

1. Disconnect the hose fitting from the caliper.
2. Remove the bleed screw.



1. Blow a jet of compressed air in the brake fluid filler hole to make the piston come out.
2. Remove the piston (2A), the seal (2B) and the protective boot (2C).

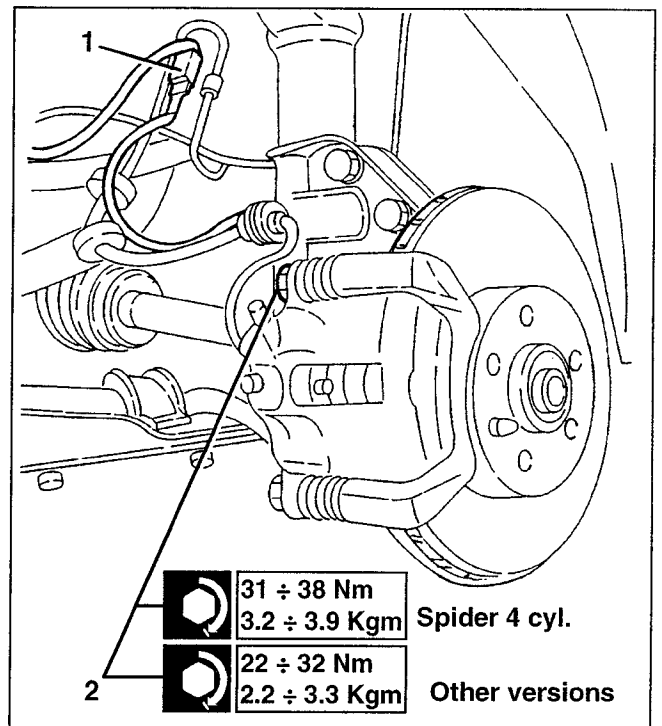


**CHECKS AND INSPECTIONS**

- The piston and body should not show signs of scrapes or seizure; otherwise replace the caliper complete with piston.
- Always replace the protection boot and the seal.
- Make sure the bleed screw is not clogged.
- Make sure that the hose is not swollen or cracked.
- Change the brake pads if the thickness of the friction material turns on the instrument cluster warning light.
- Check the brake caliper support bracket for cracks and distortion.

**CHANGING THE FRONT BRAKE PADS**

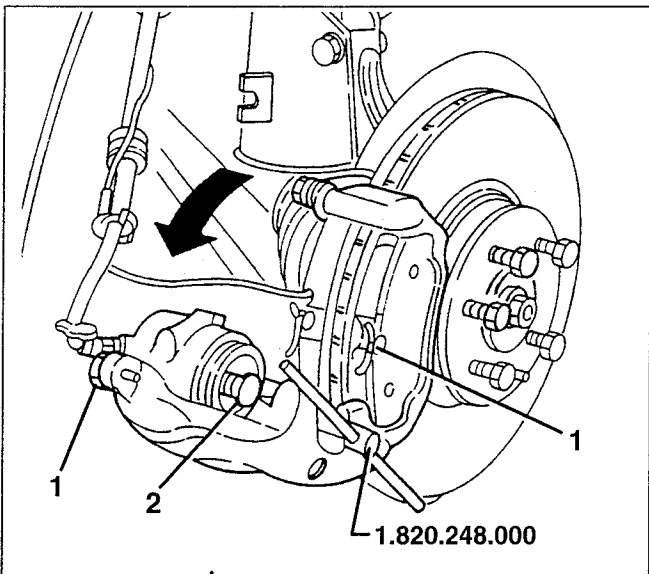
- Remove the front wheel.
1. Disconnect the electrical connection of the brake pad wear sensor.
  2. Slacken the caliper body upper fastening screw.



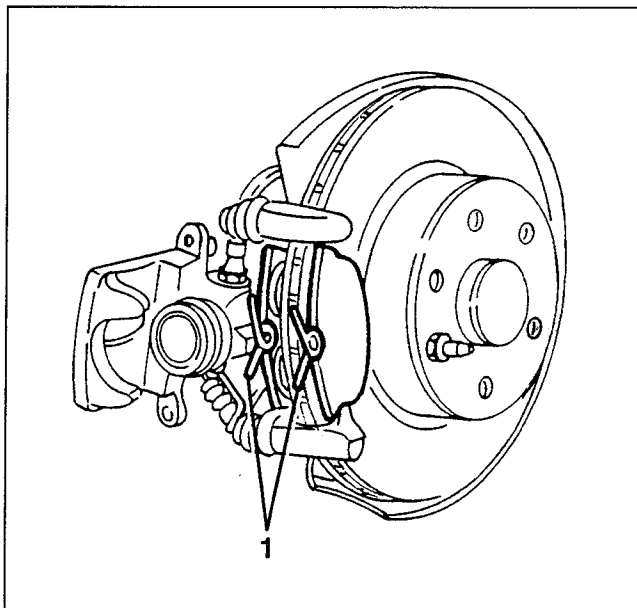
1. Turn the caliper as illustrated and change the brake pads.

**NOTE:** The brake pad, with the wear sensorn must be fitted on the inner side of the disk (brake caliper piston side); at the same time, check the relief machined on the outer part of the pad, which should be positioned at the rear with respect to the direction of travel.

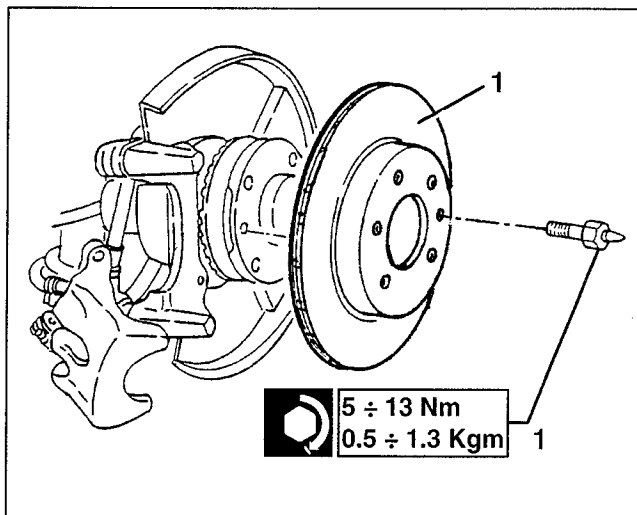
2. When refitting the caliper adjust the position of the piston using tool no. 1.820.248.000.



1. Remove the brake pads.



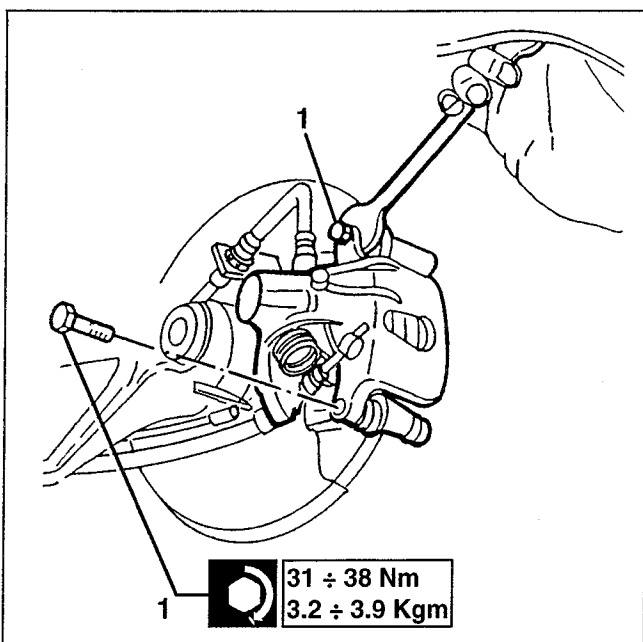
1. Slacken the fastening pin and remove the brake disk.



## REAR BRAKE DISK

### REMOVAL / REFITTING

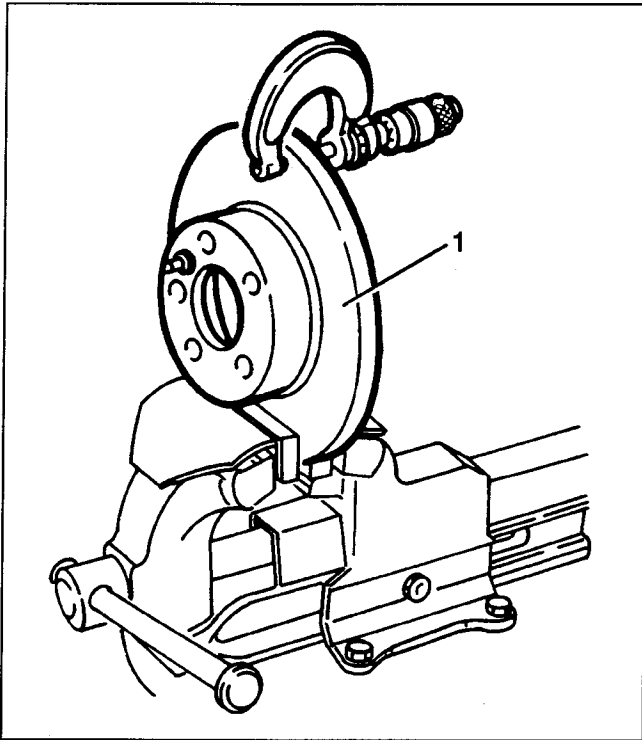
- Set the car on a lift.
  - Remove the wheel on the side concerned.
1. Slacken the two screws fastening the brake caliper to its support and move it to one side without disconnecting the piping and the handbrake cable.



## CHECKS AND INSPECTIONS

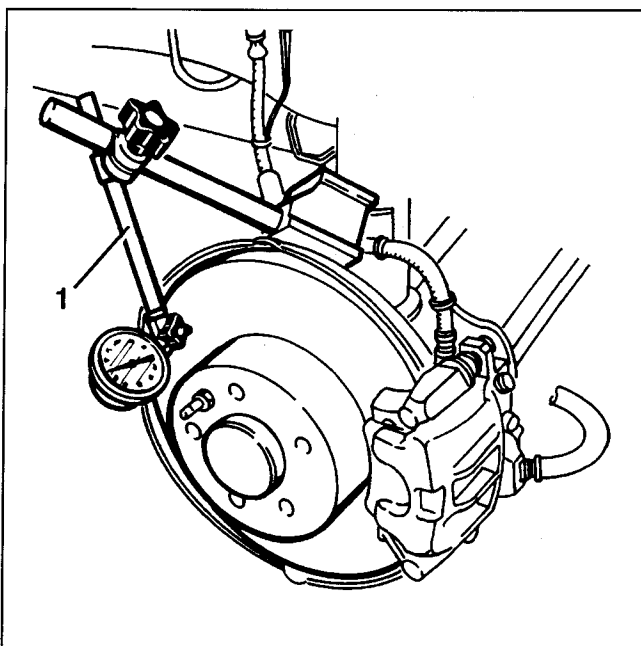
1. Check the thickness of the disks and check that the working surfaces have no deep scores or porosity. If necessary grind within the specified tolerances.

At use limit	At grinding limit
9.2 mm	10.65 mm

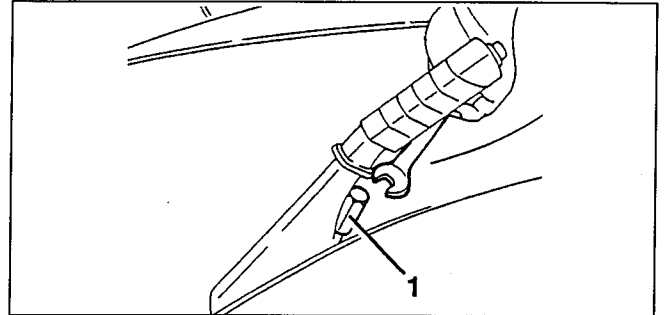


1. When changing the brake pads only, check that disk oscillation, with respect to the axis of rotation, is within the specified limits (0.15 mm max.).

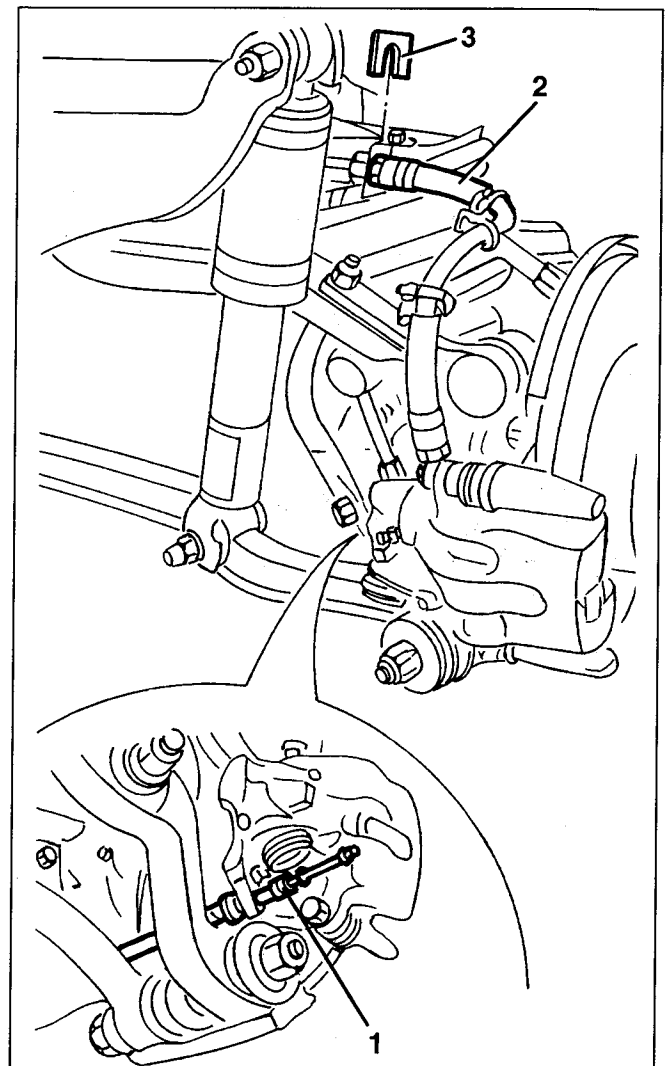
**NOTE:** The value must be measured 2 mm from the outside diameter of the disk.

REAR BRAKE CALIPER  
REMOVAL / REFITTING

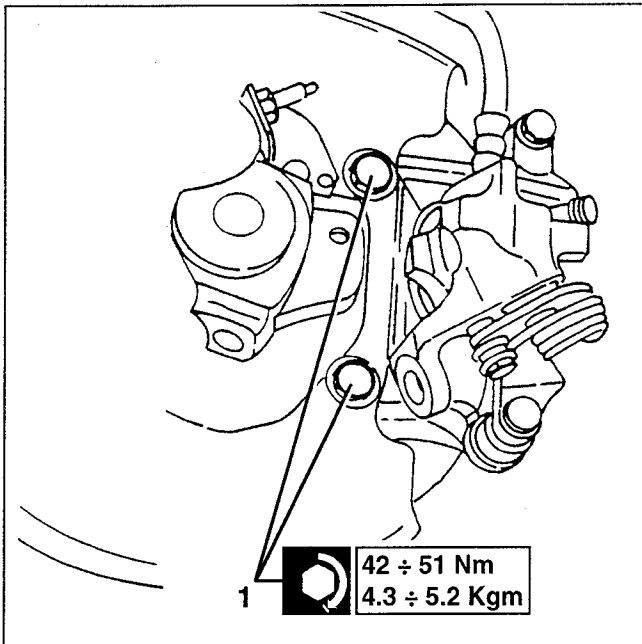
- Set the car on a lift.
  - Empty the brake - clutch fluid reservoir.
  - Remove the wheel on the side concerned.
  - Remove the handbrake lever cover.
1. Working on the special adjustment nut on the handbrake lever, loosen the tension of the cables.



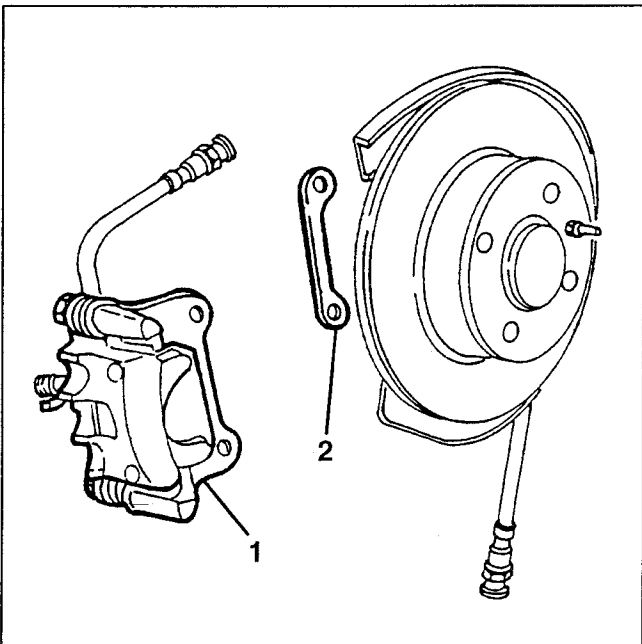
1. Disconnect the handbrake cable from the brake caliper.
2. Slacken the hose fitting.
3. Prise the brake and withdraw the hose fitting.



1. Slacken the two screws fastening the complete brake caliper.

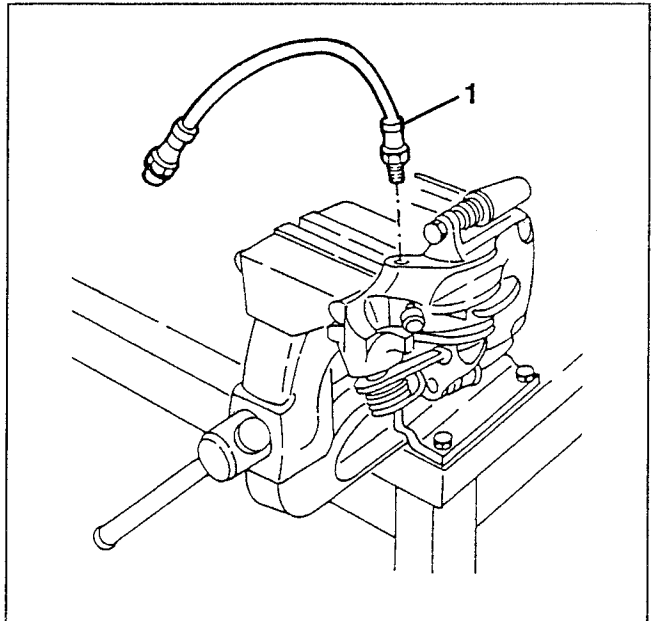


1. Remove the complete brake caliper.
2. Retrieve the thickness.

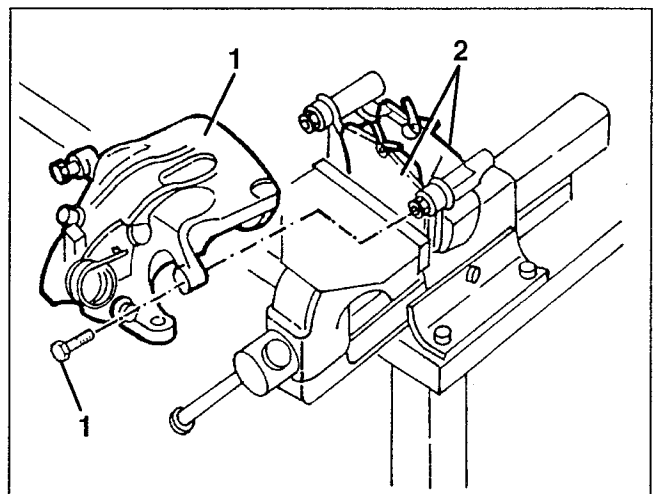


**DIS-ASSEMBLY**

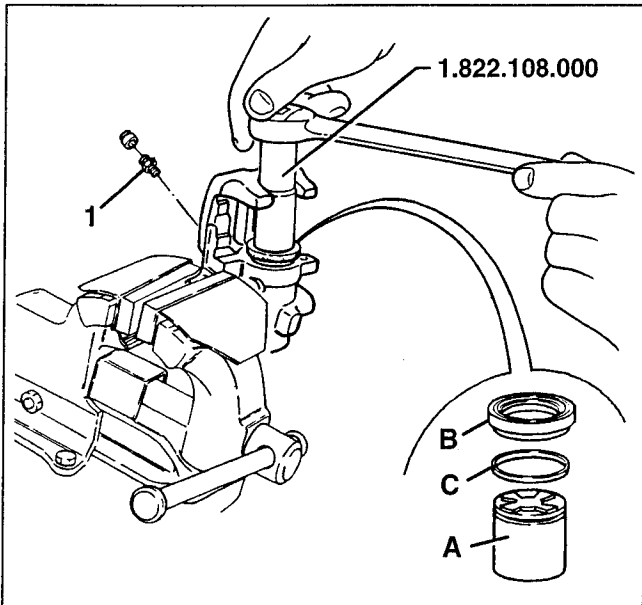
1. Disconnect the brake caliper hose fitting.



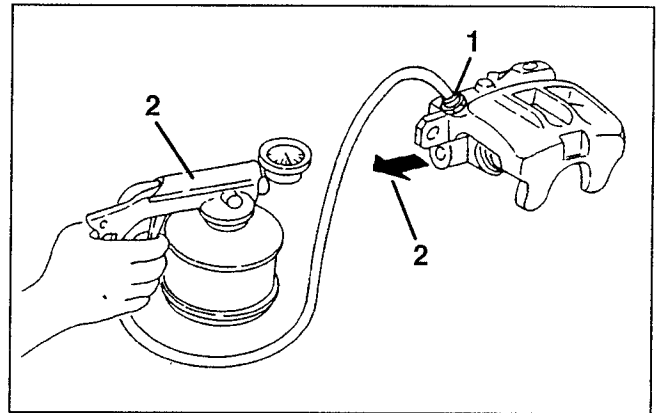
1. Slacken the two screws fastening the brake caliper to the support bracket and remove it.
2. Retrieve the brake pads.



1. Remove the bleed screw.  
 - Using tool no. 1.822.108.000, remove the piston (A), protection boot (B) and seal ring (C).



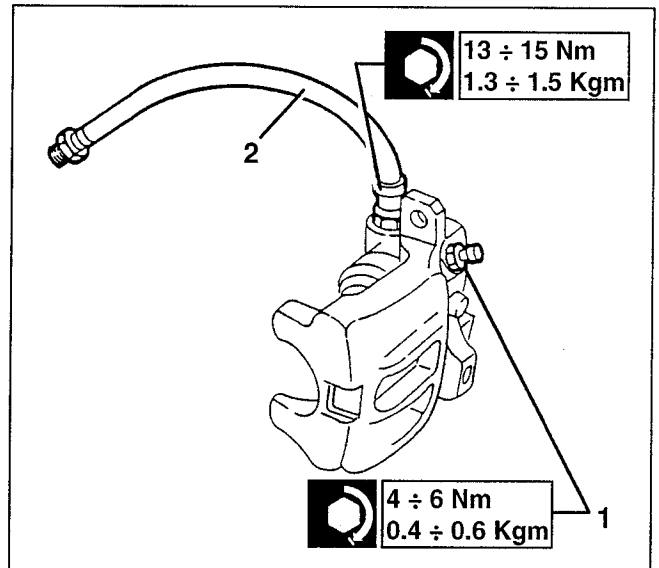
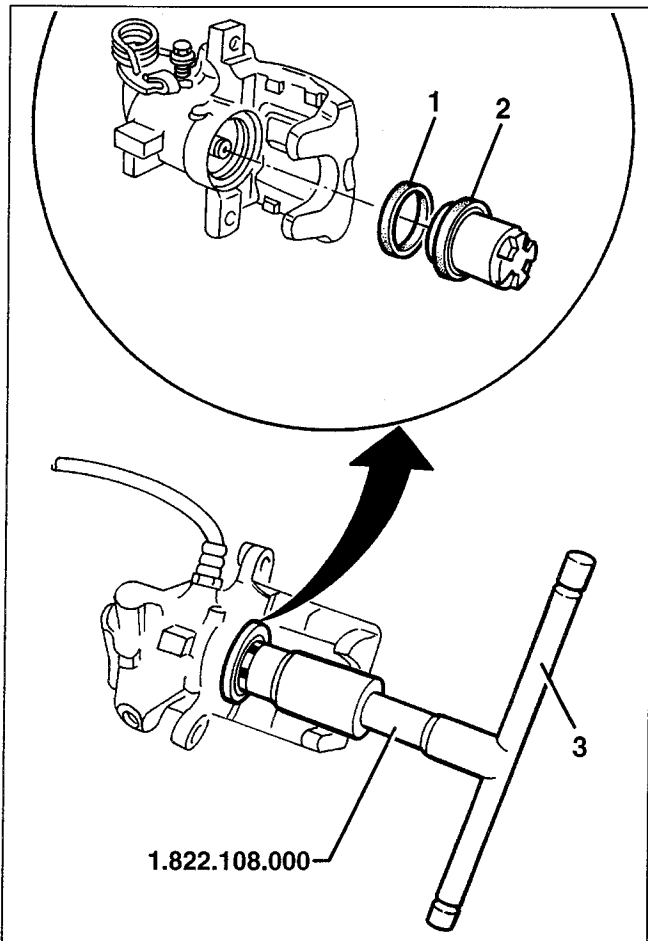
1. Partially tighten the bleed screw.
2. Fill the caliper with the specified brake fluid until fluid without air bubbles comes out of the connection hole of the hose.



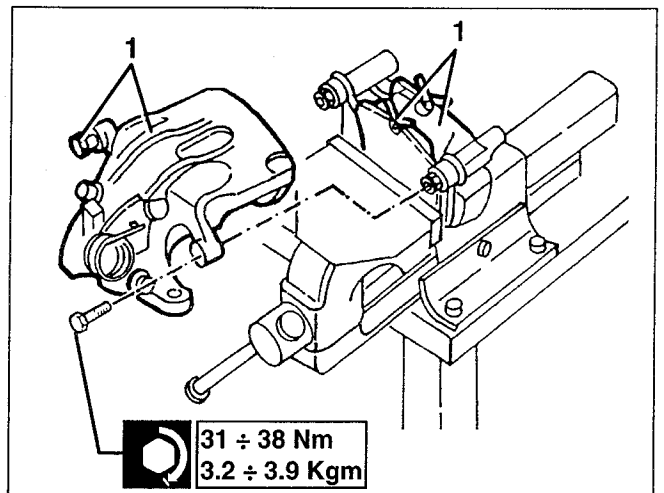
1. Tighten the bleed screw to the specified torque.
2. Assemble the hose and lock the fitting to the specified torque.

**REASSEMBLY**

1. Fit the seal ring in the caliper body.
2. Position the protection boot on the rear of the piston.
3. Assemble the piston and adjust its position using tool no. 1.822.108.000.



1. Position the brake pads, then assemble the brake caliper on the support tightening the new fastening screws to the specified torque.



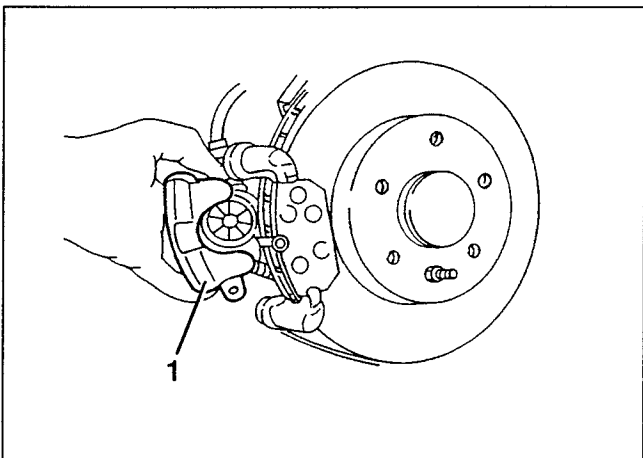


**CHECKS AND INSPECTIONS**

- The piston and caliper body should show no signs of scrapes or seizing; otherwise replace the caliper complete with piston.
- Always replace the protection boot and the seal.
- Make sure the bleed screw is not clogged.
- Make sure that the hose is not swollen or cracked.
- Change the brake pads if the thickness of the friction material is below 1.5 mm.
- Check the brake caliper support bracket for cracks and distorsion.
- If the handbrake cable automatic stroke adjustment device is not working properly replace the complete caliper.

**CHANGING THE REAR BRAKE PADS**

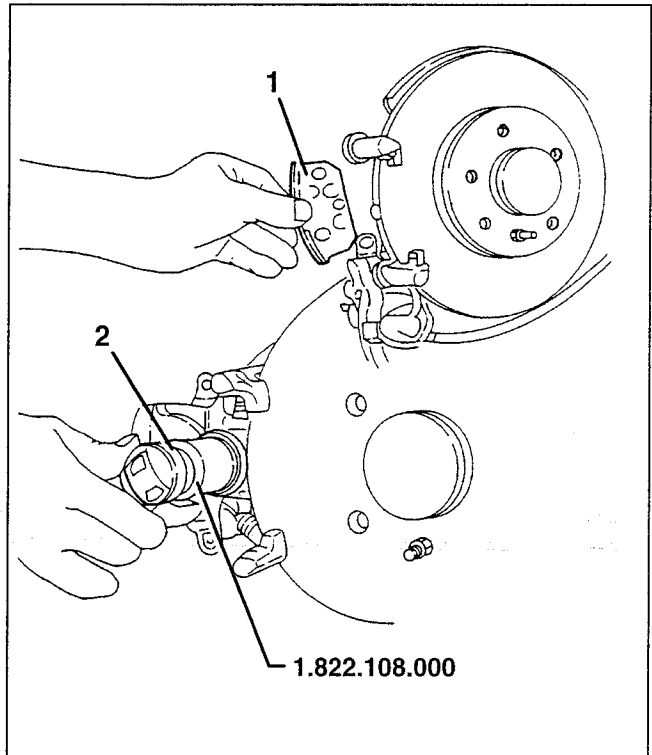
- Remove the rear wheel.
- 1. Slacken the two screws fastening the caliper body and move it to facilitate replacement of the pads.



- 1. Change the brake pads.

**NOTE:** There is no particular direction of assembly for the rear brake pads.

- 2. Using tool no.1.822.108.000 move back the piston to simplify assembly of the caliper, then refit the caliper.

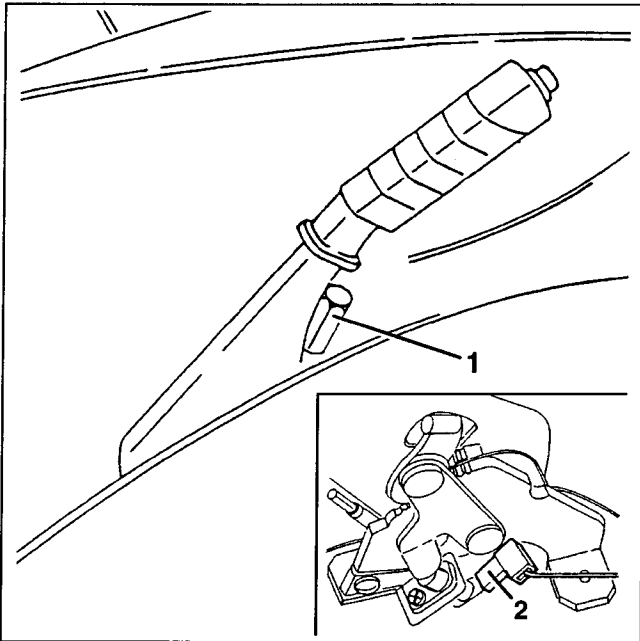


## PARKING BRAKE

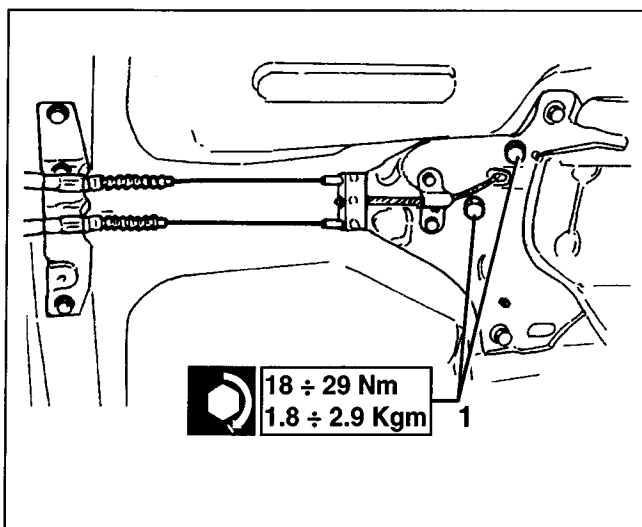
### CONTROL LEVER

#### REMOVAL/REFITTING

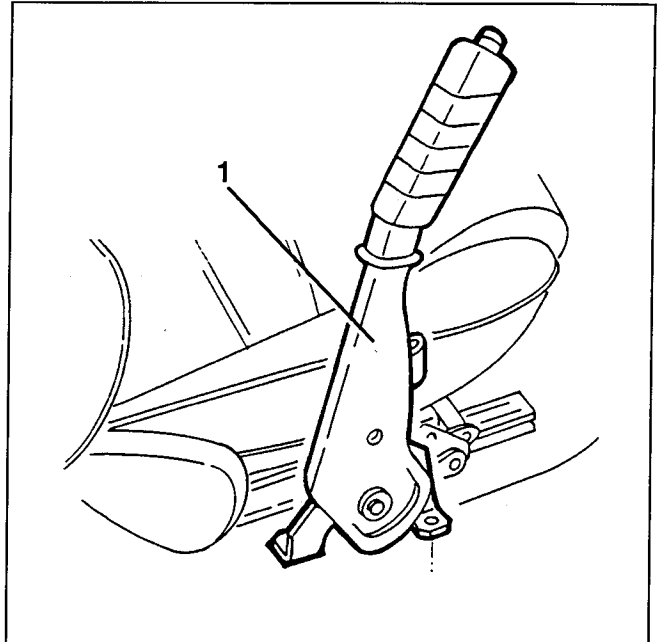
- Set the car on a lift.
- Remove the lever cover (see GROUP 70).
- 1. Completely slacken the parking brake lever adjustment nut and release the control cable.
- 2. Disconnect the electrical connection from the parking brake switch.



- Raise the car.
- Slacken the fastenings of the exhaust pipe heat guards. (If necessary remove them see GROUP 10).
- 1. Slacken the two screws fastening the parking brake lever.



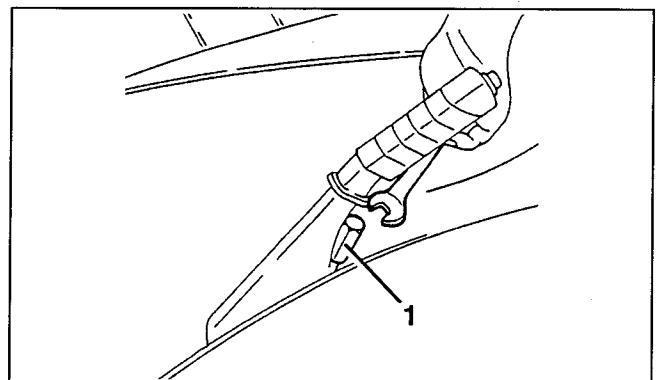
- Lower the car and work from inside.
- 1. Remove the parking brake control lever.



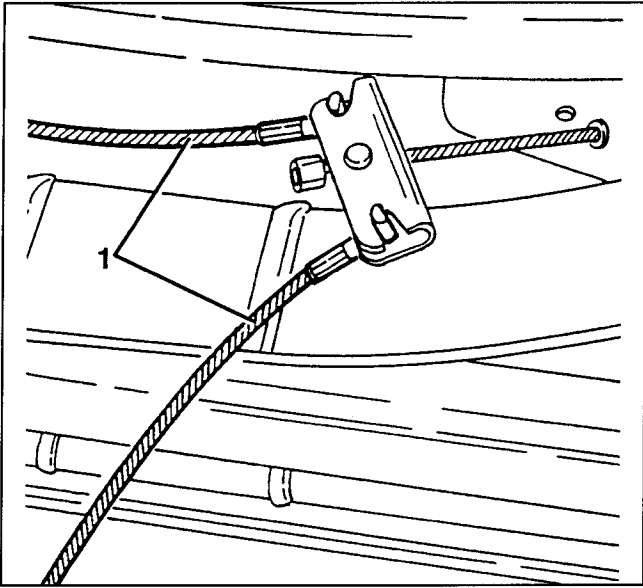
### FRONT CONTROL CABLE

#### REMOVAL/REFITTING

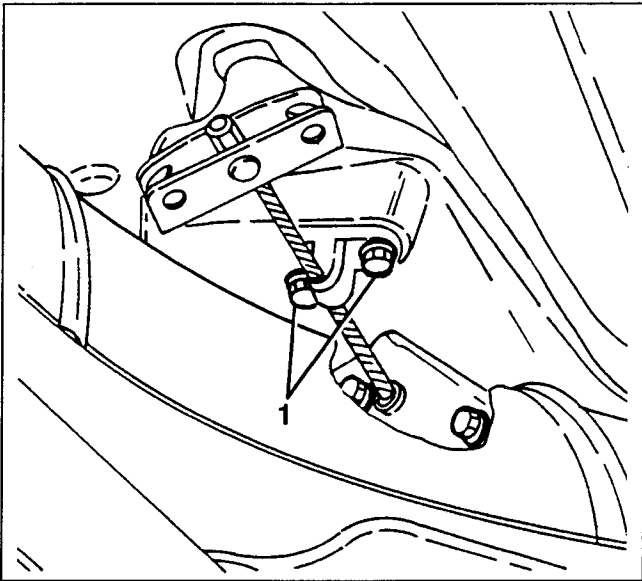
- Set the car on a lift.
- Remove the parking brake control lever cover.
- 1. Slacken completely the parking brake lever adjustment nut and free the control cable.



- Raise the car.
- 1. Disconnect the parking brake cables from the clamping bracket.



- Slacken the fastenings of the exhaust pipe heat guards. (If necessary remove them, see GROUP 10).
- 1. Slacken the two screws fastening the front parking brake cable support.



- Retrieve the front parking brake cable withdrawing it from the cable lead grommet.

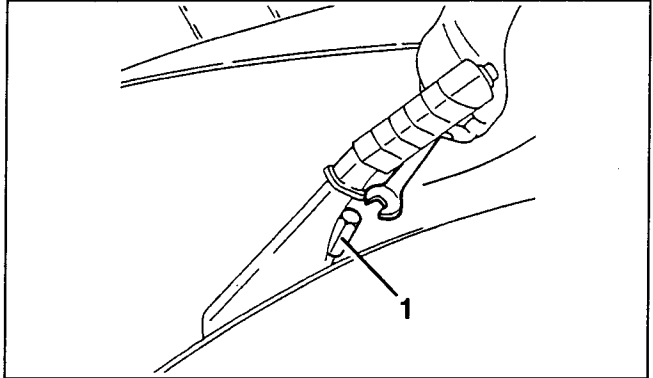


**When refitting, make sure of the presence and correct positioning of the cable lead grommet.**

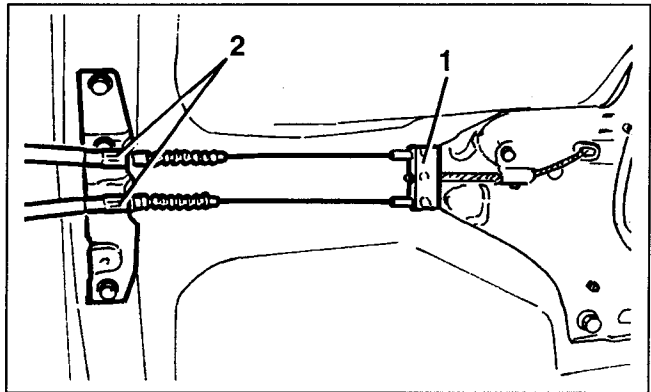
## REAR CONTROL CABLES

### REMOVAL / REFITTING

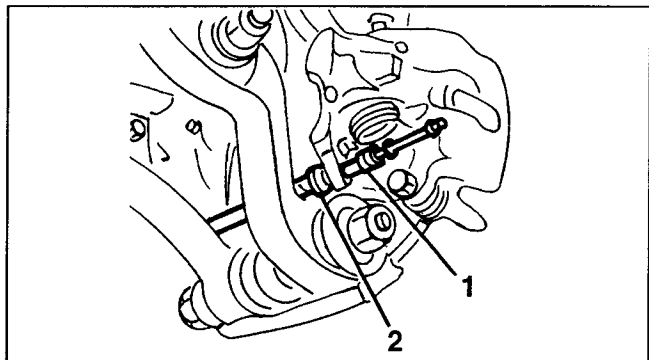
- Remove the lever cover (see GROUP 70).
- 1. Working on the adjustment nut loosen the tension of the parking brake cables.



- Raise the car.
- 1. Disconnect the parking brake cables from the clamping bracket.
- 2. Disconnect the cables from the body fastening bracket.



1. Disconnect the parking brake rear cables from the brake calipers.
2. Release the rear parking brake cables.

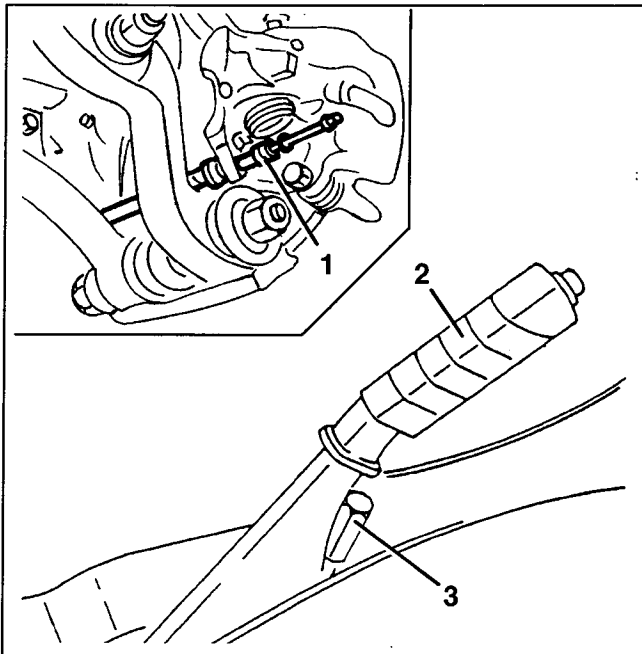


## ADJUSTING THE CONTROL CABLES

The parking brake should only be adjusted after changing the brake pads, or the control cables or the brake caliper, as play takeup due to wear is automatic.

1. Disconnect the parking brake cables from the brake calipers and operate the brake pedal forcefully at least ten times.
  - Reconnect the parking brake cables to the calipers.
2. Move the parking brake control lever to the third notch on the toothed sector.
3. Tighten the adjustment nut until the rear wheels are braked.

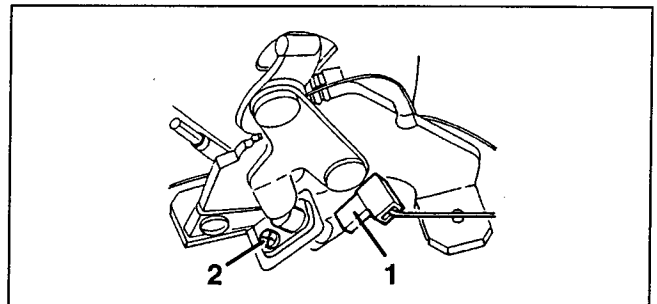
With the lever in the rest position, check that the wheels are free.



## HANDBRAKE ON WARNING SWITCH

### REMOVAL/REFITTING

- Disconnect the battery (-) terminal.
  - Remove the parking brake lever cover (see GROUP 70).
1. Disconnect the electrical connection from the switch.
  2. Slacken the fastening screw and remove the switch.



**INDEX****STEERING CONTROL**

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  - Removing / refitting ..... 2
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**POWER STEERING**

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(1.8 - 2.0 TS engines - '98 versions) ..... 11
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## STEERING CONTROL

### DESCRIPTION

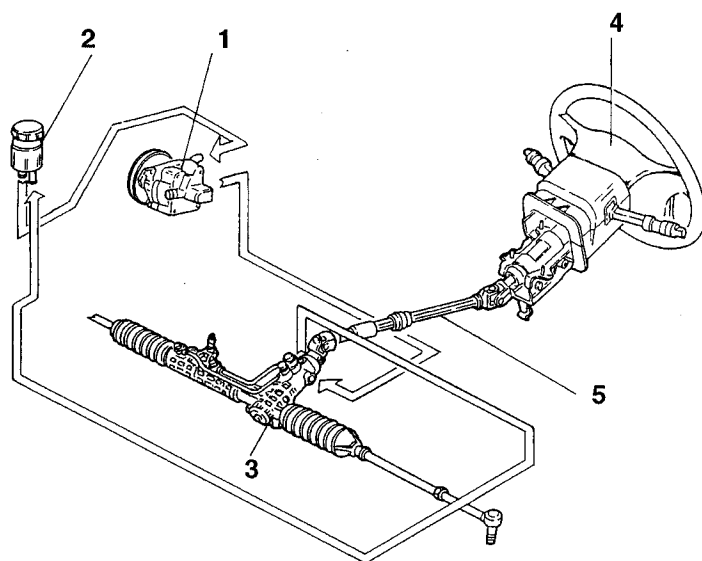
The power-assisted steering system enables the effort required to turn the steering wheel to be reduced when manoeuvring at low speeds and keeps the steering steady at high speeds.

The system comprises a pump (1) operated directly by the engine through a belt. The pump draws fluid through the inlet pipe from the reservoir (2) located in

the engine compartment and sends it under pressure through the delivery hose to the distribution valve located on the power steering box (3).

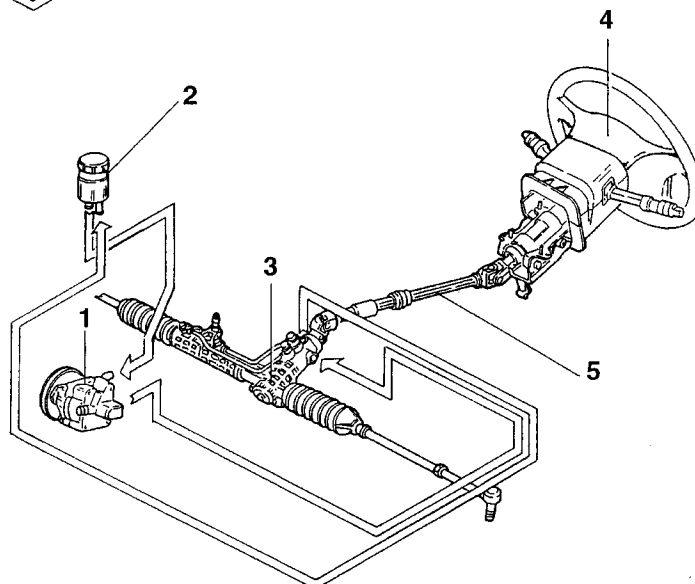
The distribution valve, operated by the rotation of the steering wheel, sends the oil under pressure from one side or the other of the hydraulic cylinder which is integral with the rack and pinion inside the steering box.

A hose allows the fluid to return to the reservoir, thereby closing the circuit.



4-CYLINDER ENGINE

6-CYLINDER ENGINE



- 1 Power steering pump
- 2 Reservoir
- 3 Power steering box
- 4 Steering wheel
- 5 Steering column

## STEERING WHEEL

### REMOVING / REFITTING

**NOTE:** From chassis no. \_\_\_ the steering wheel is of the type with three spokes, but the procedure remains unchanged.

– Remove the Air Bag module (see GROUP 55).



**WARNING:**

Before doing any work on the system closely adhere to the SAFETY INSTRUCTIONS concerning the Air Bag system described in Group "55 - ELECTRIC SYSTEM DIAGNOSIS", Section "Air Bag and Pre-tensioners".

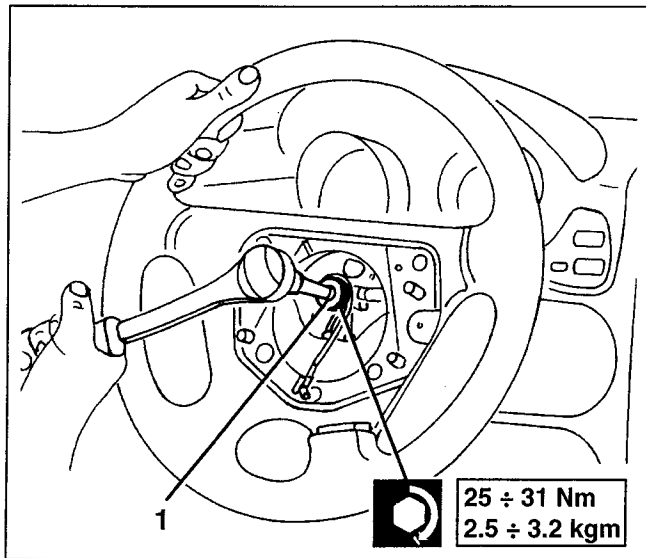
Disconnect both the battery terminals, isolate them accurately and wait for 10 minutes before doing any work.

1. Remove the steering wheel fastening nut.

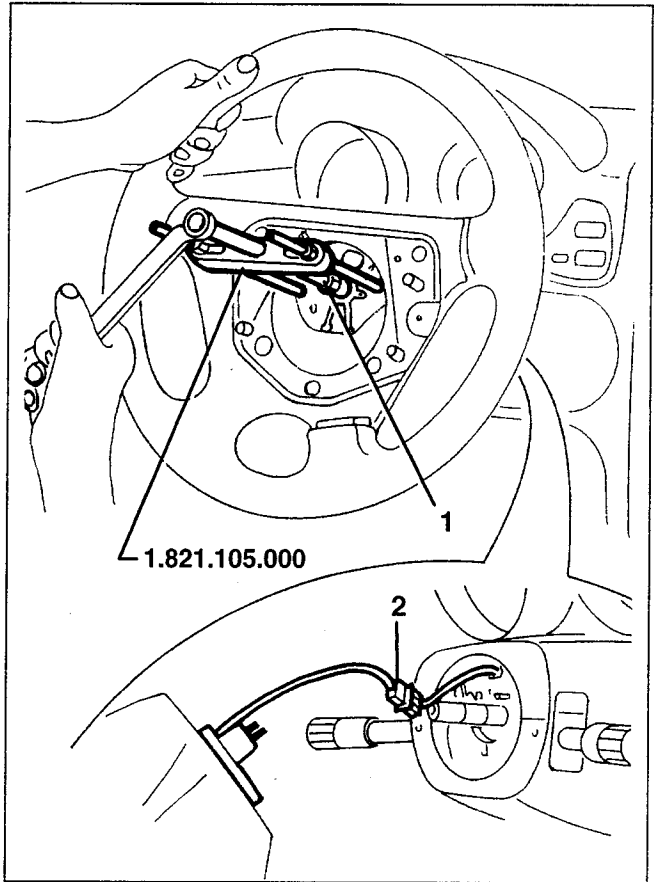


**CAUTION:**

Before carrying out this operation make sure that the wheels are perfectly straight ("spoked" steering wheel).



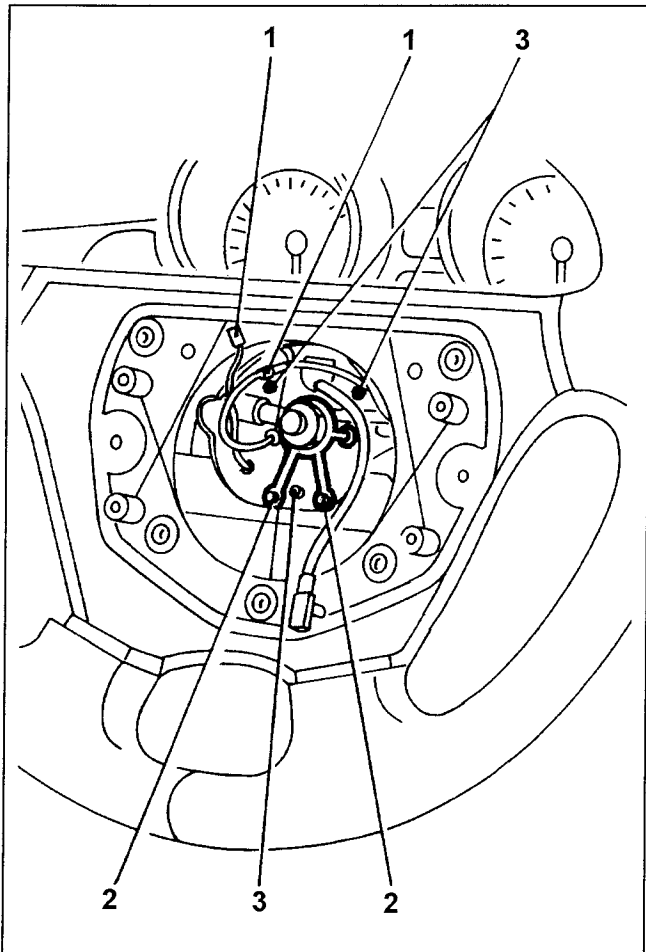
1. Using tool no. 1.821.105.000 remove the steering wheel from the steering column.
2. Disconnect the clock spring connection.



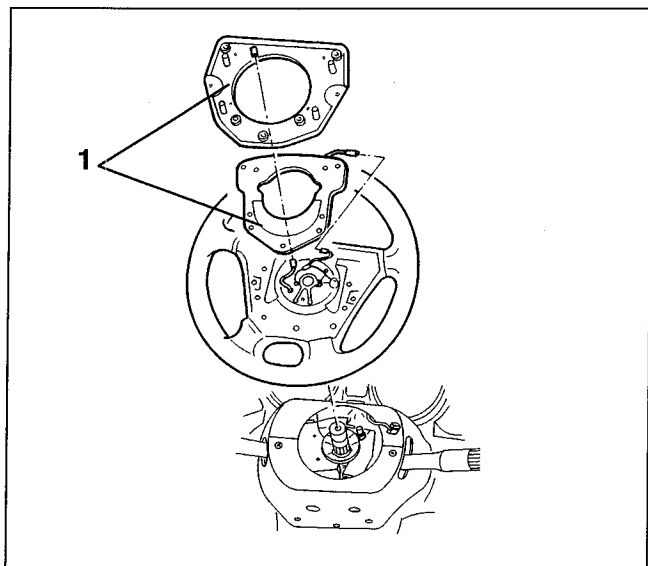
**CAUTION:**

Take care at this stage not to turn the clock spring with respect to the steering wheel, as the device is locked only when separated from the steering wheel (see next step). Therefore, you are advised to fix the clock spring to the steering wheel, for example using adhesive tape

1. Disconnect the connections of the horns.
2. Slacken the two screws and remove the safety spring.
3. Slacken the three screws and separate the clock spring from the steering wheel.



1. Slacken the three screws and separate the horn control from the steering wheel.



## STEERING COLUMN

### DESCRIPTION

In order to higher the degree of passive safety of the vehicle, a new "collapsible" steering column has been designed which considerably improves behaviour in all types of front crashes.

This sophisticated project involves splitting the control shaft in two trunks. The lower section is by telescopic sliding sleeve (collapse stroke: max 80 mm) with absorption of the movements leading from the steering box.

The upper section is supported by a corrugated sleeve which absorbs energy.

In fact, in the event of a crash the impact of the driver's head and chest against the steering wheel results in distortion of the coils of the corrugated sleeve, thus the steering column "gives in" upon impact.

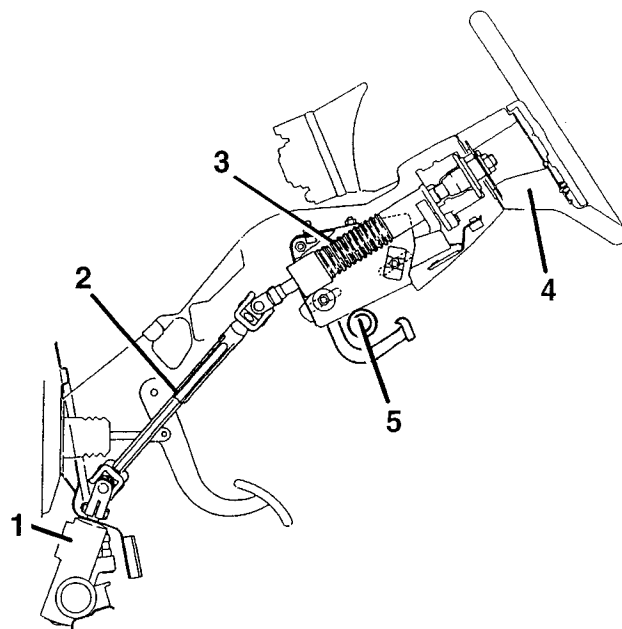
#### To '97 versions

Next to the steering column there is a reaction rod which also has an easily deformable section.

The purpose of this rod is to make the fastening of the steering column more rigid in the event of impact.

#### '98 versions

The steering column is supported by a specific cross-member.

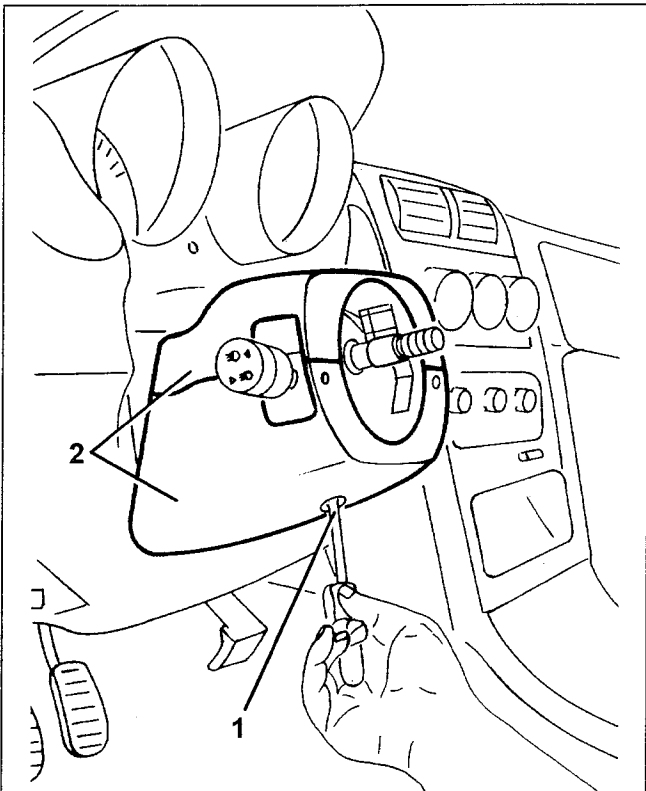


1. *Steering box*
2. *Sliding sleeve*
3. *Corrugated sleeve*
4. *Steering wheel*
5. *Steering column crossmember*

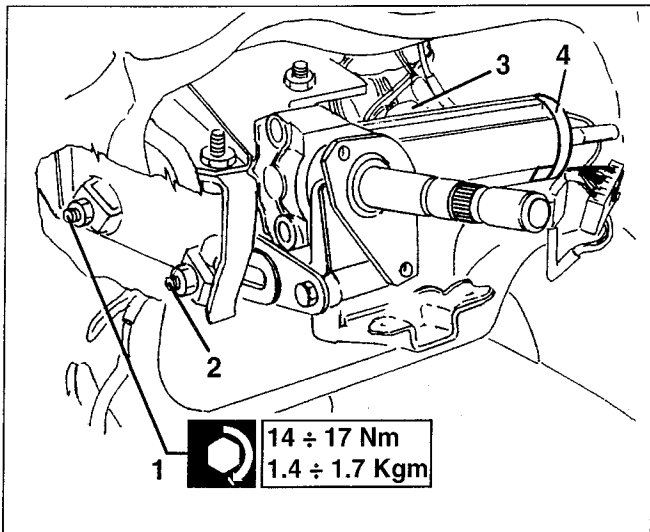


**REMOVING/REFITTING (to '97 versions)**

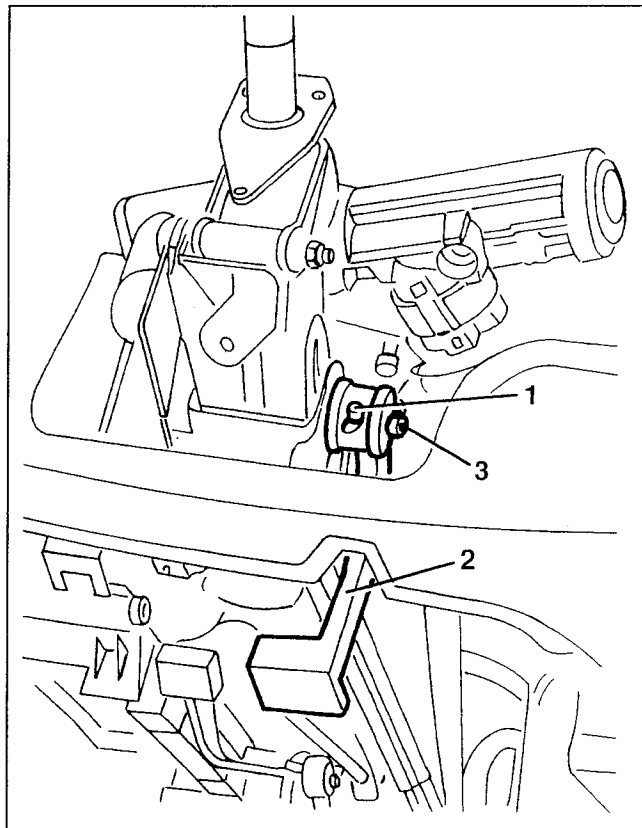
- Remove the steering wheel (see specific paragraph).
- 1. Slacken from below the screws fastening the steering column cover halves.
- 2. Remove the steering column cover halves.



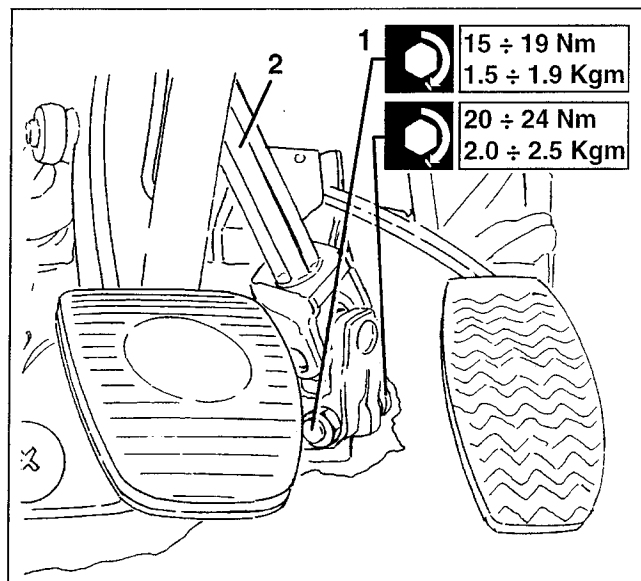
- Remove the steering column lever unit (see GROUP 55).
- Remove the fusebox cover from the dashboard lower panel (see GROUP 70).
- 1. Slacken and remove the bolt of the lower slotted bracket for axial steering column adjustment.
- 2. Slacken the nut of the upper bracket.
- 3. Disconnect the connection of the ignition switch.
- 4. Withdraw the aerial of the "ALFA ROMEO CODE" system.



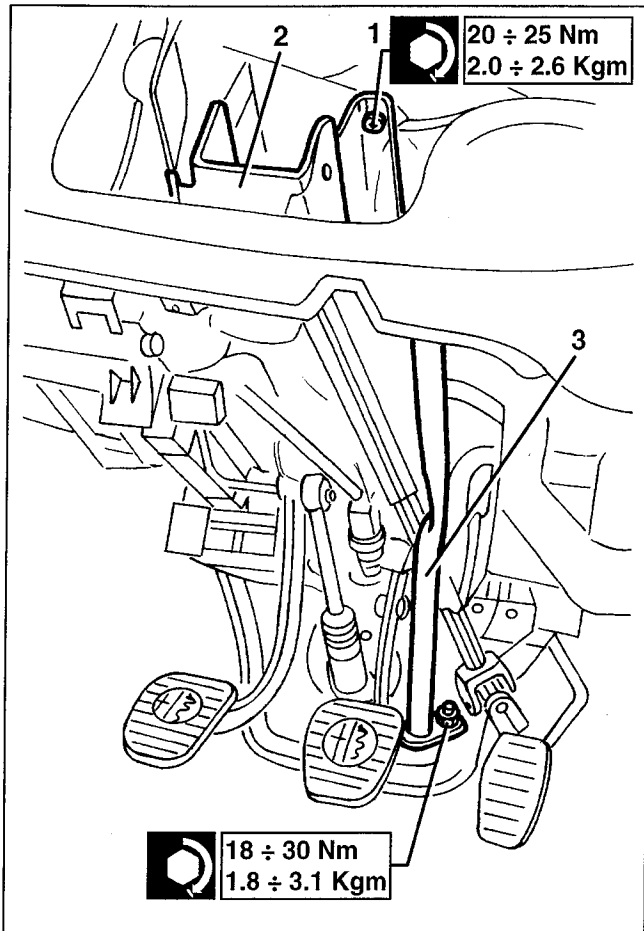
1. Withdraw the retainer pin.
2. Withdraw the steering wheel adjustment lever.
3. Remove the pin from the upper slotted bracket.



1. Slacken the bolt fastening the lower cardan joint to the steering box shaft.
2. Remove the complete steering column.

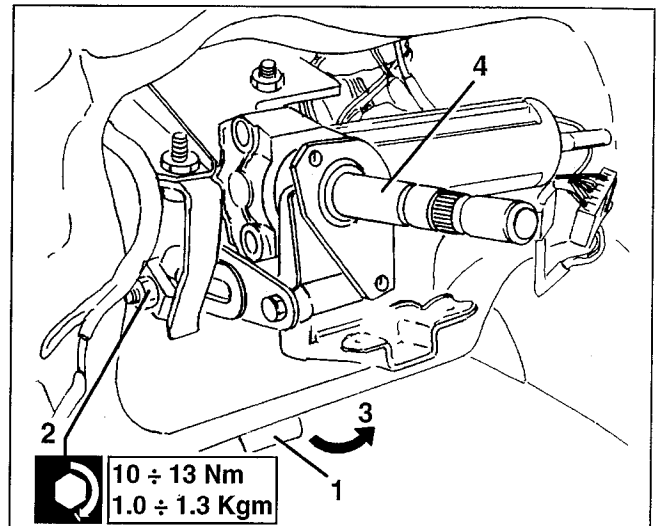


1. If necessary, slacken the four bolts connecting the steering column support.
2. Retrieve the steering column support.
3. Slacken the lower nut and remove the reaction rod.



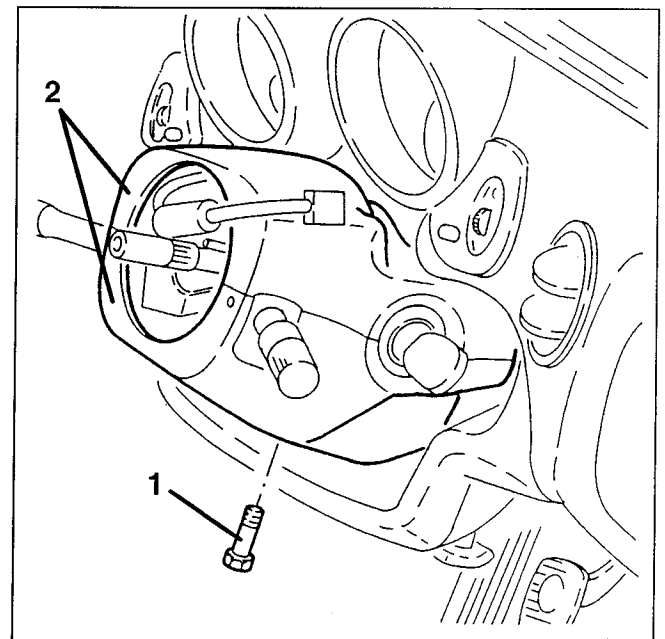
Refit reversing the sequence followed for removal and observing the following instructions.

- Check the steering wheel adjustment device as follows:
  1. Move the lever to the locked position.
  2. Screw the nut and tighten it to the specified torque.
  3. Move the lever to the release position.
  4. Check that steering column adjustment takes place correctly.
- Move the lever back to the locked position.

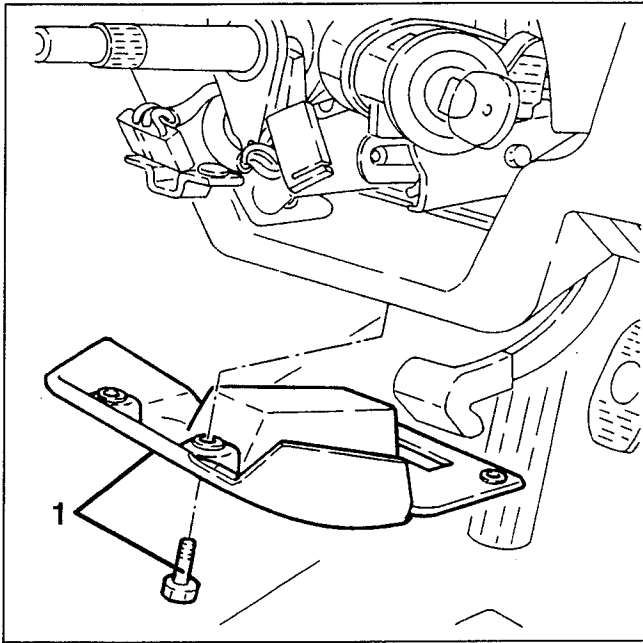


### REMOVAL/REFITTING ('98 versions)

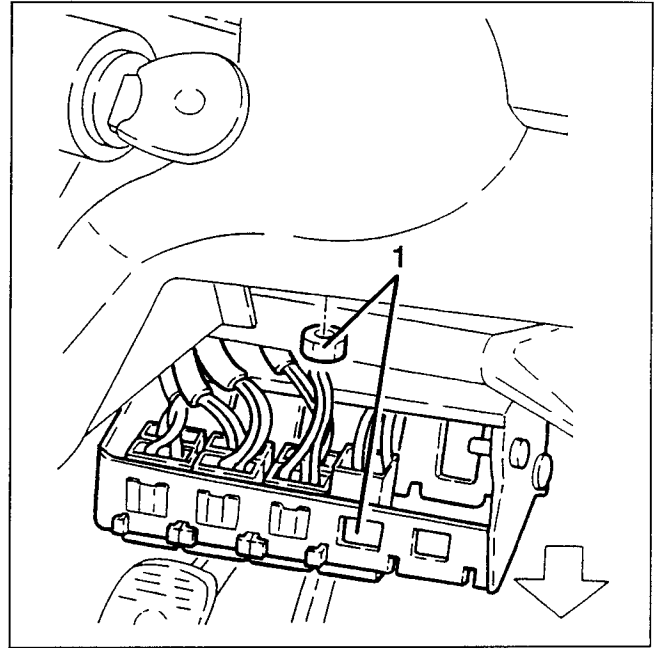
- Remove the steering wheel (see specific paragraph).
- 1. Loosen the steering column half casings lower side fastening screws.
- 2. Take the half casings.



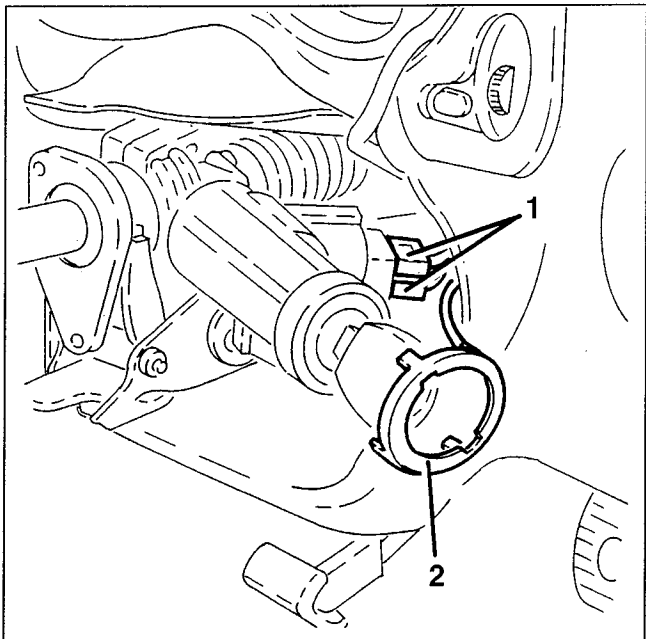
- Remove the steering column stalk assembly (see ASSEMBLY 55).
- Remove the valve guard from the panel under the dashboard (see ASSEMBLY 70).
- 1. Loosen the screws and remove the panel under the dashboard.



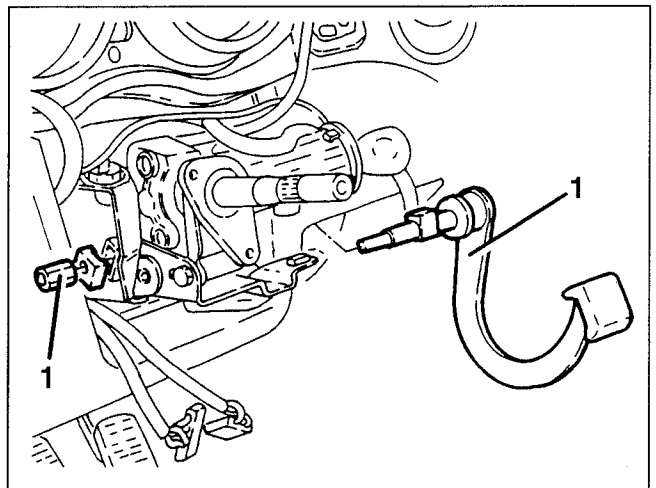
1. Disconnect the ignition switch electrical connections.
2. Remove the Alfa Romeo CODE system aerial.



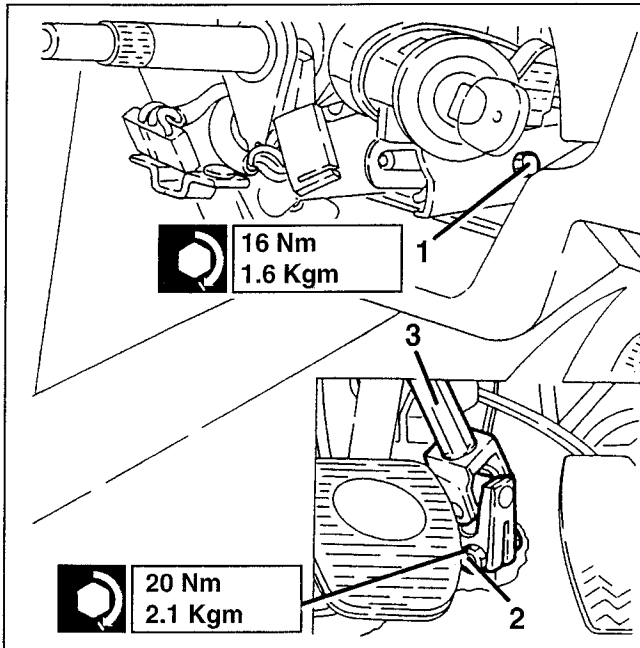
1. Loosen the nut and remove the steering wheel adjustment lever and pin.



1. Loosen the fastening nut and lower the fuse bracket.

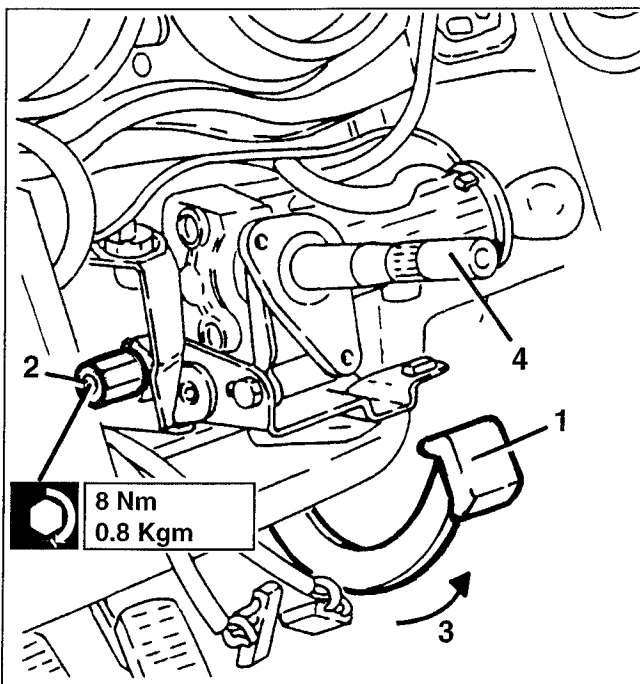


1. Loosen the steering column fastening bolt from the bracket.
2. Loosen the bolt fastening the lower CV joint to the steering unit pinion.
3. Extract the complete steering column.



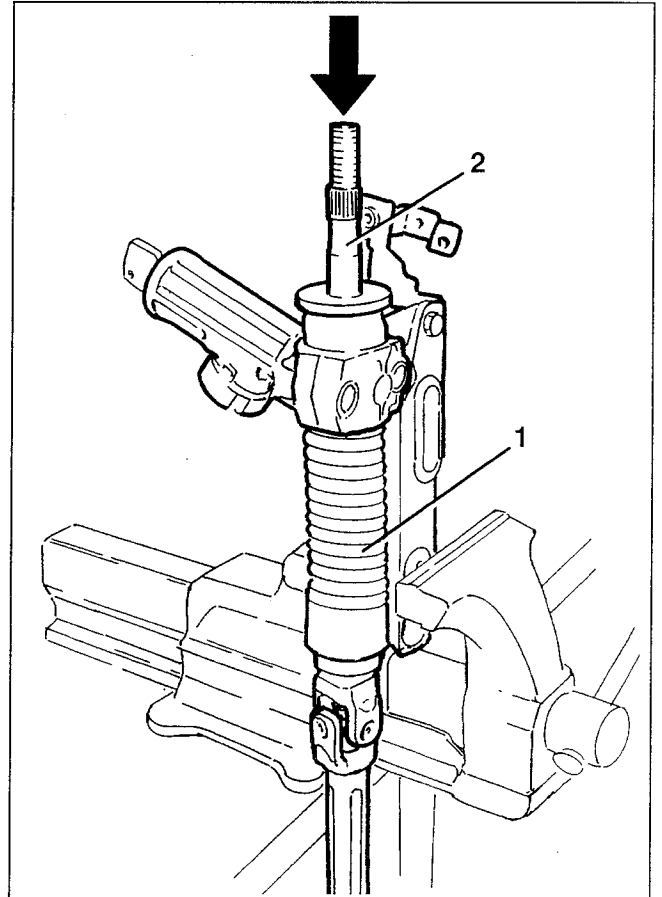
– Check the steering wheel adjustment device as follows:

1. Move the lever to the locked position.
  2. Screw the nut and tighten it to the specified torque.
  3. Move the lever to the release position.
  4. Check that steering column adjustment takes place correctly.
- Move the lever back to the locked position.

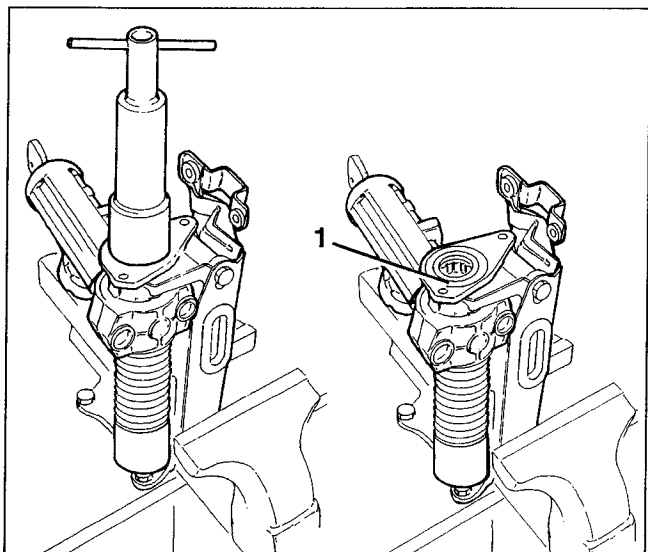


### DIS-ASSEMBLY/REASSEMBLY

1. Clamp the steering column in a vice.
2. Using a resin hammer, remove the steering column shaft.



1. If necessary, using a suitable puller tool, remove the steering column upper bearing.



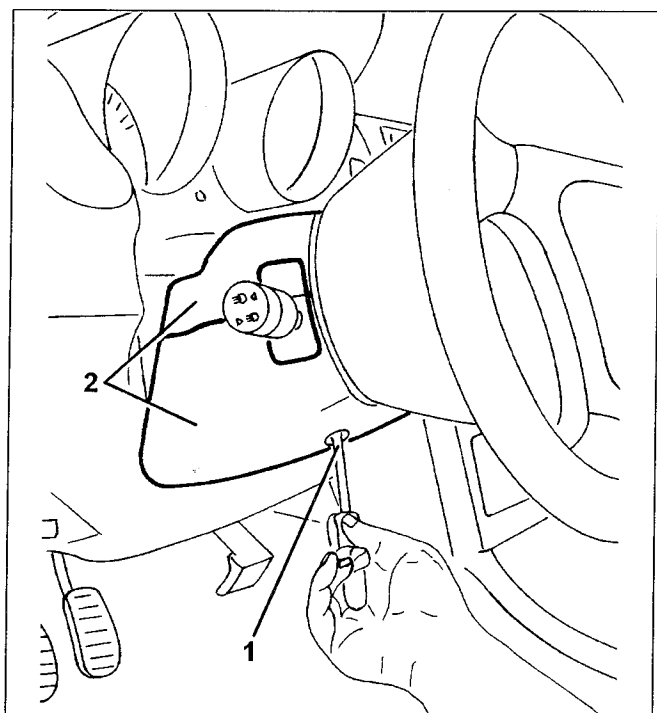
Re-assemble reversing the sequence followed for dis-assembly.

## STEERING LOCK

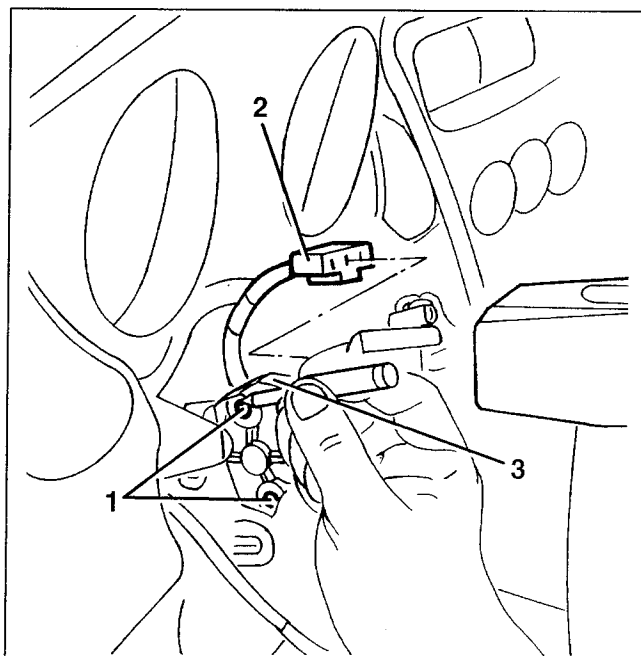
### REMOVING/REFITTING

- Insert the key in the ignition switch and check that the steering wheel is released.
- Move the steering wheel as near as possible to the driver and lock the steering column in this position.
- Disconnect the battery.

1. Slacken from below the screws fastening the steering column half covers.
2. Remove the cover halves.



1. Using a punch, slacken the two safety screws and remove the collar.
2. Disconnect the steering lock electrical connection and remove the aerial of the "ALFA ROMEO CODE" system.
3. Remove the steering lock.



When refitting the steering lock, preverse the procedure followed for removal. Fasten the steering lock with the special safety screws supplied as spares, tightened until the head breaks.

## POWER STEERING

### POWER STEERING BOX

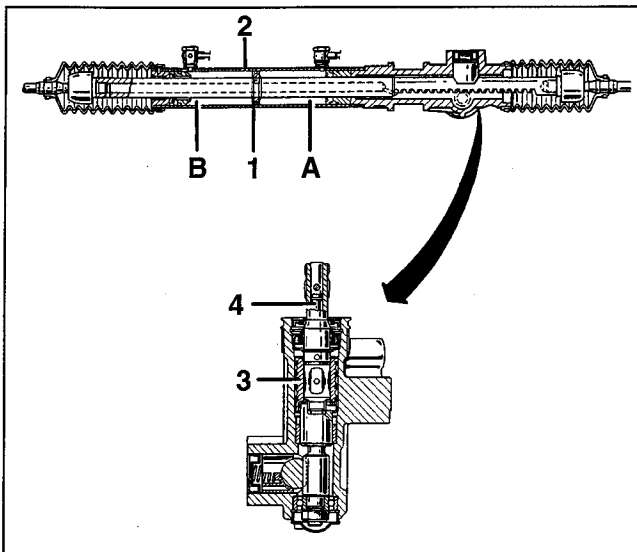
#### DESCRIPTION

The steering box assembly comprises a rack and pinion steering box assisted by the hydraulic oil under pressure supplied by a special pump operated by the engine.

In the steering box there is an operating cylinder (2) in which a double-acting piston (1) runs which is integral with the rack and pinion rod.

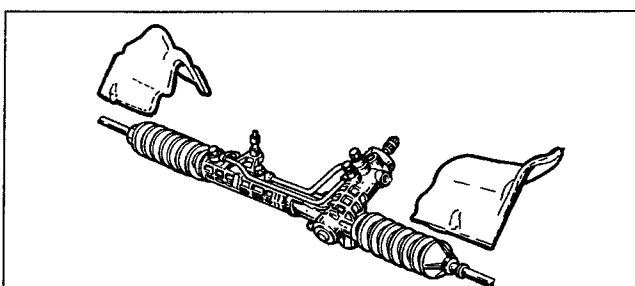
In the seat of the worm screw there is a distributor valve (3) with the corresponding ducts which is controlled by a torsion device (4) on the end of the worm screw.

Depending on the torsion transmitted to the device by the steering wheel, the pump oil is sent to the tank or to one of the two chambers A or B of the operating cylinder. The thrust generated by the pressure of the oil on the side surface of the piston causes it to move, thus also the rack and pinion.



1. Double-acting piston
2. Operating cylinder
3. Distributor valve
4. Torsion device
- A. Operating cylinder right chamber
- B. Operating cylinder left chamber

Two guards made of sound deadening material are fitted at the ends of the power steering box as illustrated.

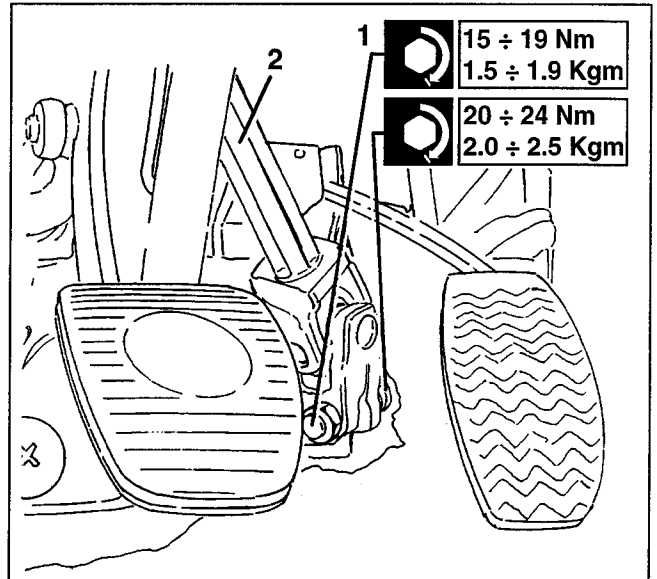


#### REMOVING/REFITTING

– Using a suitable syringe, empty the power steering system tank.

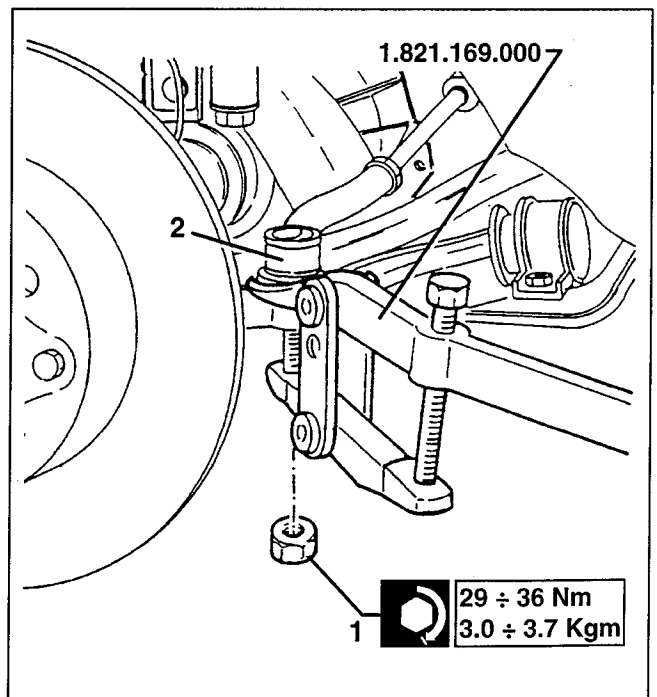
– Remove the front wheels.

1. Working from inside the car, slacken the bolt fastening the steering column to the power steering box pinion.

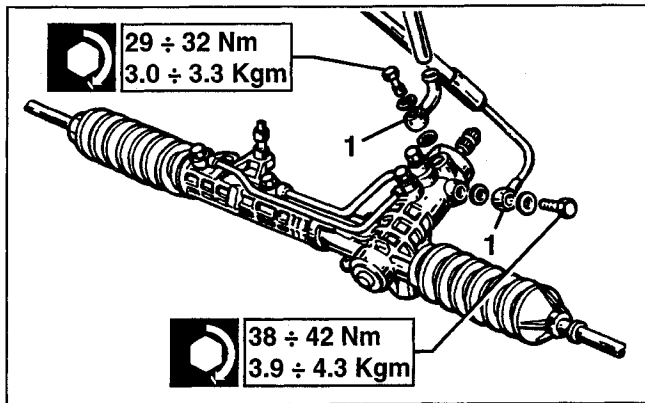


1. Slacken the nuts fastening the track ball joints to the wheel hubs.

2. Using tool no. 1.821.169.000 disconnect the track rod joints from the hubs.

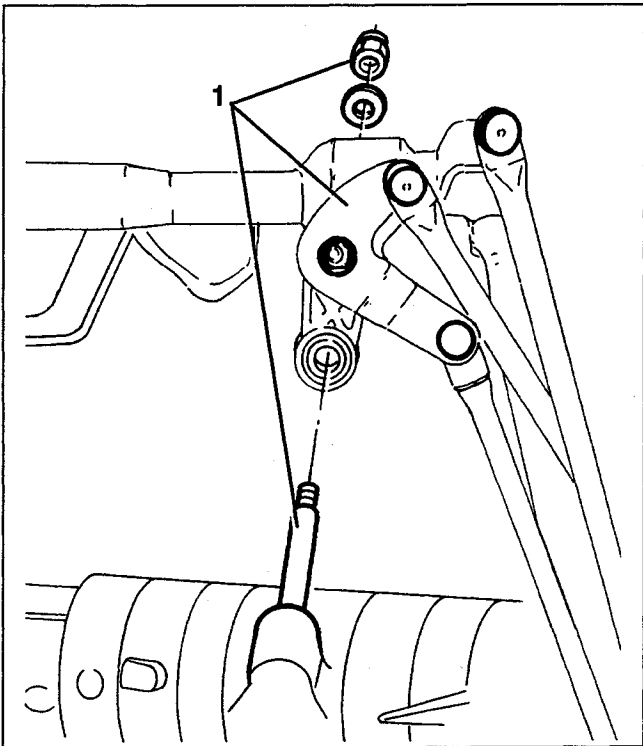


1. Disconnect the unions of the oil inlet and outlet pipes from the power steering box.

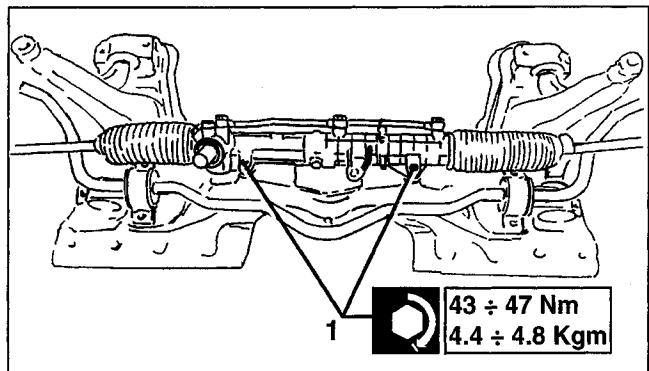


Only for version with 4-cylinder engine

1. Disconnect the relay rod of the gear engagement rods from the pin on the steering box.
  - Remove the front crossmember (see GROUP 44).



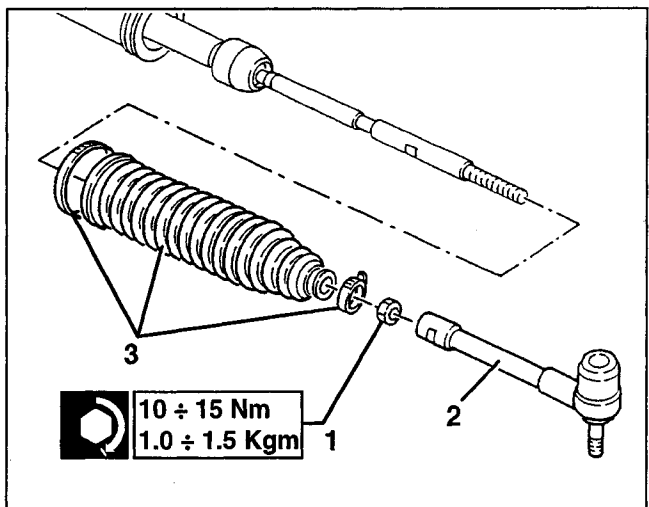
1. Slacken the two screws and separate the steering box from the crossmember.



When refitting, if necessary, adjust the track rods to the correct toe-in value as described in GROUP 44.

### DIS-ASSEMBLY/REASSEMBLY

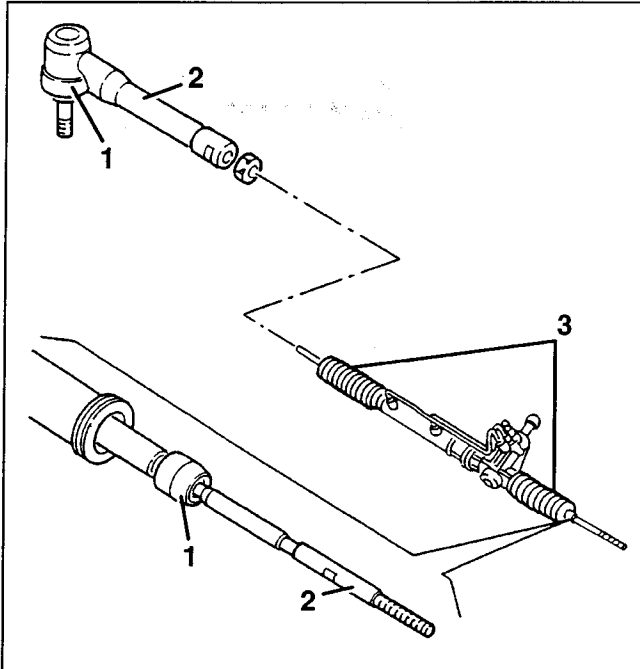
1. Slacken the track rod locknut.
2. Slacken the track rods and remove them from the arm.
3. Slacken the clamps and remove the bellows.



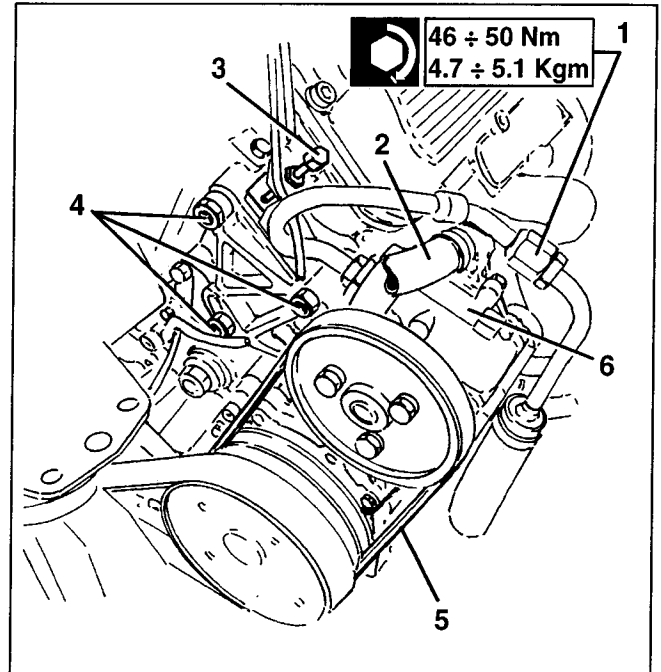
When reassembling lubricate the contact area between the bellows and the shaft with silicone grease so that with the clamp installed and closed at the next to last or third to last tooth, the side arm turns freely inside the bellows.

**CHECKS AND INSPECTIONS**

1. Check the ball joints for damage or wear and that they turn in their housings without jamming or excessive play.
2. Check the track rods for damage or distortion.
3. Make sure the bellows are intact.



1. Disconnect the oil delivery intermediate union.
2. Disconnect the oil suction pipe from the pump.
3. Slacken the belt tensioner prod.
4. Slacken the three pump support fastening screws.
5. Prise off the belt.
6. Remove the pump complete with support.



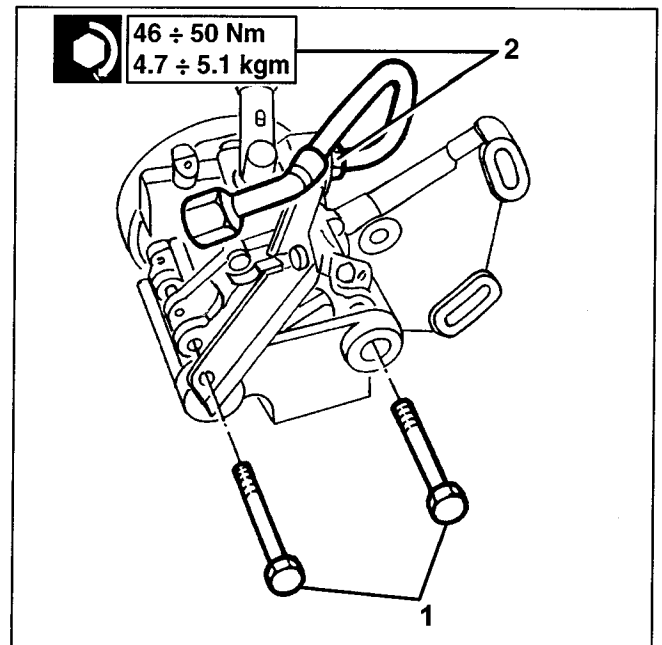
**POWER STEERING PUMP**

**REMOVAL / REFITTING**

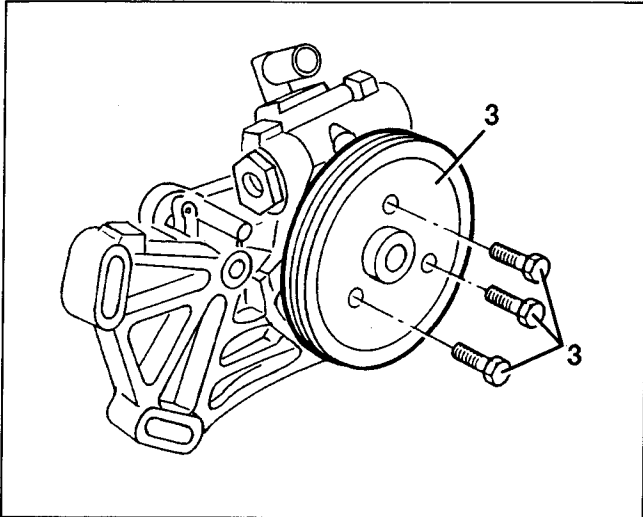
**(6-CYLINDER ENGINE)**

- Set the car on a lift.
- Remove the right front wheel with gravel guard (see GROUP 70).
- Remove the engine compartment protection, right-hand side.
- Using a syringe, withdraw the oil from the power steering tank
- Remove the upper radiator crossmember and engine cooling fans (see GROUP 10).

1. Slacken the screws and separate the pump from the support.
2. Slacken the oil delivery union.
3. If necessary, slacken the three screws and separate the pulley.







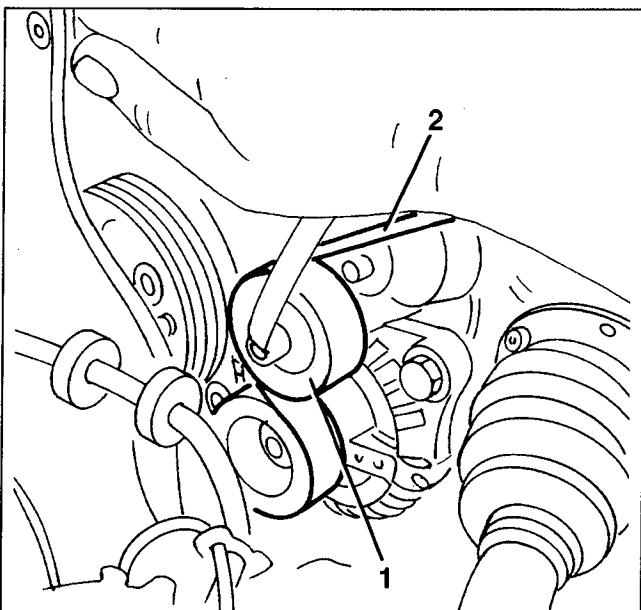
Refit the pump reversing the sequence followed for removal. Tension the belt as described in GROUP 00.  
Fill the hydraulic circuit and bleed the air (see specific paragraph).

**POWER STEERING PUMP**

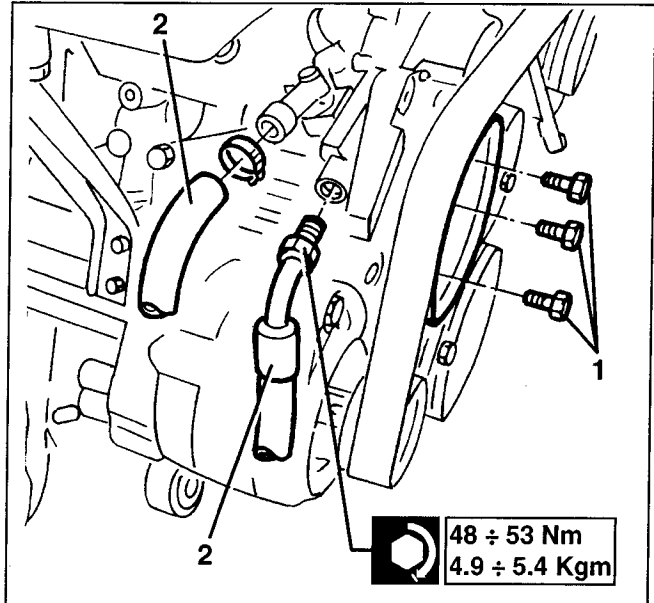
**REMOVING/REFITTING**

**(4-CYLINDER ENGINE)**

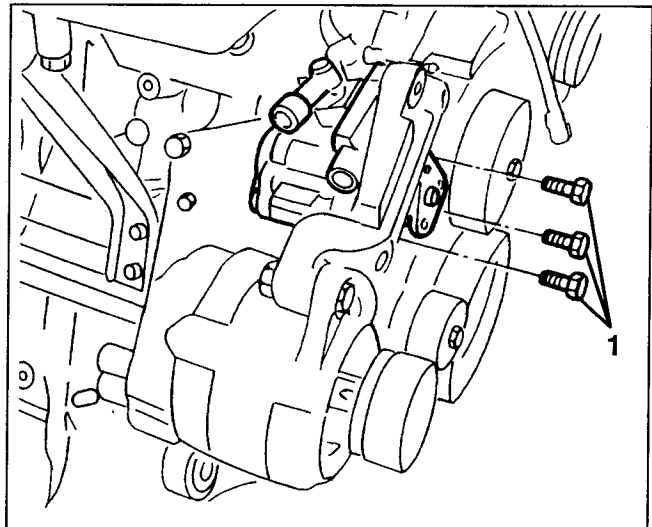
- Set the car on a lift.
  - Remove the right front wheel with gravel guard (see GROUP 70).
  - Remove the engine compartment protection, right-hand side.
  - Using a syringe, withdraw the oil from the power steering tank
1. Slacken the belt tensioner and remove the guide pulley
  2. Remove the services drive belt.



1. Holding the pump shaft still, slacken the three screws fastening the power steering pump pulley and remove it.
2. Working from above, disconnect the two pump suction and delivery pipes.



1. Slacken the three fastening screws and remove the power steering pump.



Refit the pump reversing the sequence followed for removal. Tension the belt as described in GROUP 00.  
Fill the hydraulic circuit and bleed the air (see specific paragraph).

## CHECKS AND INSPECTIONS

### WARNING:

The power steering pump, like the steering box, should never be dis-assembled for any reason whatsoever, they must be sent to the Manufacturer for overhauling.

Check the steering wheel rolling torque with the car stationary and the engine running. The torque should be between 0.6 daN with the engine running at idle speed and 0.75 daN with the engine at top speed: if this value is exceeded check the pressure of the system with the wheels completely steered.

For this purpose, insert a pressure gauge using a suitable "Tee" union on the pressurised oil delivery pipe to the power steering leading from the pump, and steer completely to one side. Further forcing the steering wheel to turn, the pressure reading on the gauge should rise to approx. 85 bar. If this fails to occur there is an operating failure in the pump or in the distributor valve from the power steering box

## FILLING THE POWER STEERING CIRCUIT AND BLEEDING AIR

- Remove the plug and fill the tank with the specified oil.
- With the engine at idle speed, making sure that the tank does not empty, turn the steering wheel a few complete turns to bleed the air. Then top up the tank to the maximum level mark.

### WARNING:

The power steering tank is self-relieving; this is obtained by completely turning the steering wheel to the right and to the left with the engine running and the vehicle stationary. This operation should be carried out each time the connection pipes are removed and refitted.

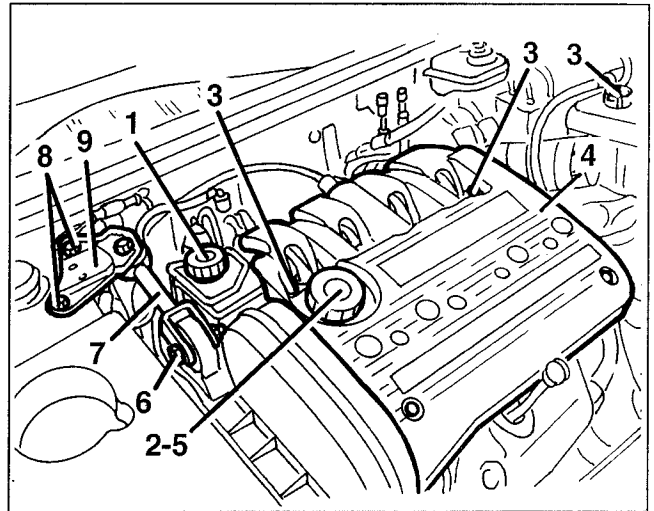
Steering stiffness may be due to slipping of the pump pulley belt or low oil level. In the event of an operating failure on the pump, operating cylinder or distributor valve, the power steering system will operate as a normal mechanical steering box.

## POWER STEERING OIL RESERVOIR (1.8 - 2.0 TS engines - '98 versions)

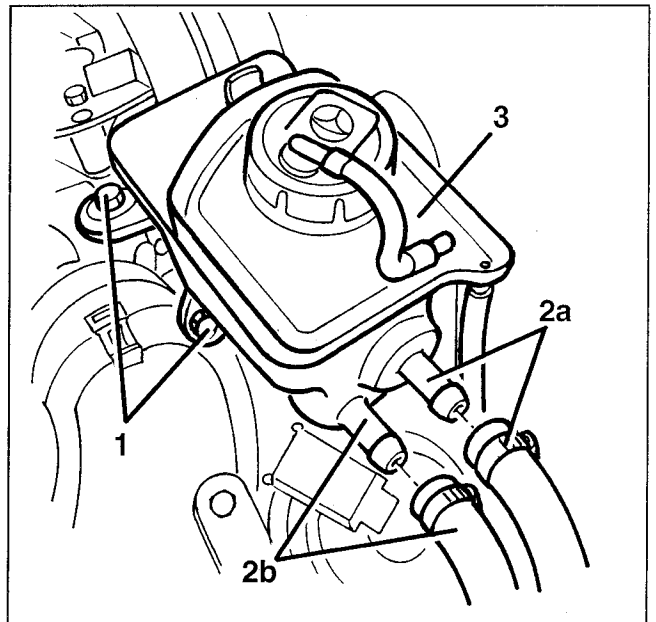
### REMOVAL/REFITTING

- Open the bonnet.
- 1. Remove the power steering reservoir cap and suck the oil with a suitable syringe. Refit the cap.
- 2. Remove the engine oil filler cap.
- 3. Loosen the engine cover fastening screws.
- 4. Remove the cover.
- 5. Refit the engine oil filler cap.
- 6. Loosen the engine tie-rod fastening screws.
- 7. Remove the tie-rod.

- 8. Loosen the upper bracket fastening screws.
- 9. Remove the bracket.



- 1. Loosen the power steering reservoir fastening screws.
- 2. Open the clips and disconnect the reservoir-pump return (2a) and delivery (2b) pipes.
- 3. Take the reservoir.



Refit the power steering oil reservoir by reversing the removal sequence.



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**FRONT SUSPENSION****DESCRIPTION**

The front suspension is Mc Pherson type, independent with telescopic struts.

The front suspension can be mainly knocked down into the following components:

- The front crossmember (3) which is fastened rigidly to the body and, in addition to reinforcing the bearing structure, supports the steering box and cast iron wishbones of the suspension.
- The telescopic struts which comprise the helical springs (6) and the shock absorbers (5). This way, the offset, tapered springs reduce the thrust on the shock absorber stem and simplify steering.

This solution also eliminates any shock absorber noise when the car is travelling, thereby improving comfort.

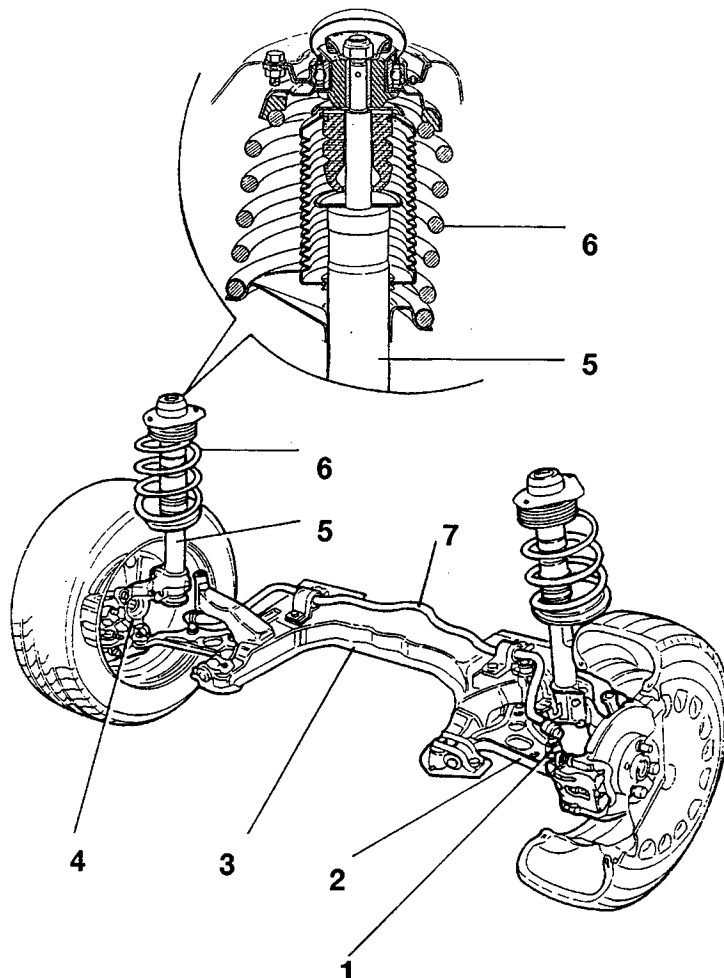
The pressurised shock absorbers with lamellar disc-type inlet valves with particularly fine tolerances, enable excellent results in terms of comfort and noiselessness on the various types of road surfaces, while maintaining the necessary damping action.

- The cast iron wishbones (2), support the ball joints connecting the wheel upright (4) and the silent-blocks with the sheet metal reinforcement for fastening the wishbones to the crossmember (3).

The rotation of the wishbones on silent blocks gives the suspension high crosswise rigidity and low longitudinal rigidity, thereby enabling:

- improved behaviour of the car even under particularly critical roadholding conditions (the former);
- improved riding comfort (the latter).

The stabilizer bar (7) increases the rigidity of the suspension of one side of the car and lowers it proportionately on the other side. Its purpose is to limit the crosswise lean of the bearing body. This makes it possible to increase the speed limits when cornering as it counters the increase of roll of the car body caused by centrifugal stresses, which occur with the increase of speed.

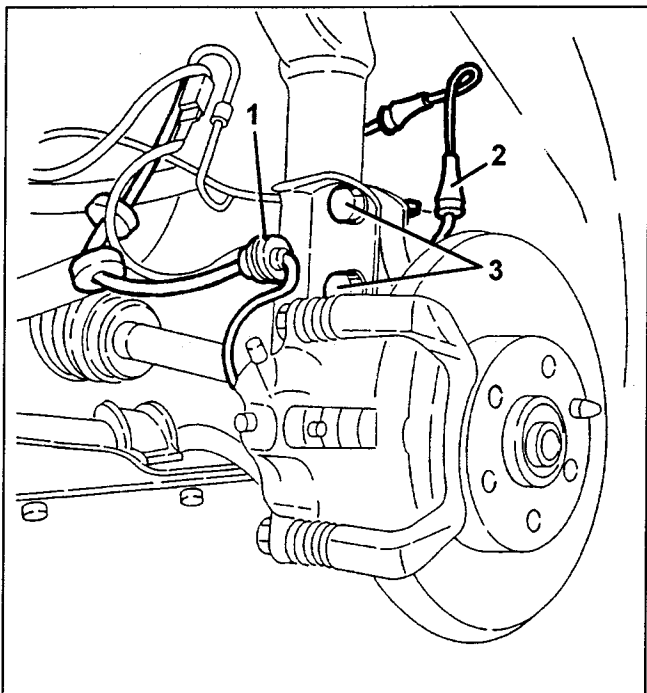


1. Stabilizer bar - wishbone connecting rod
2. Wishbone
3. Front crossmember
4. Wheel upright
5. Shock absorber
6. Spring
7. Stabilizer bar

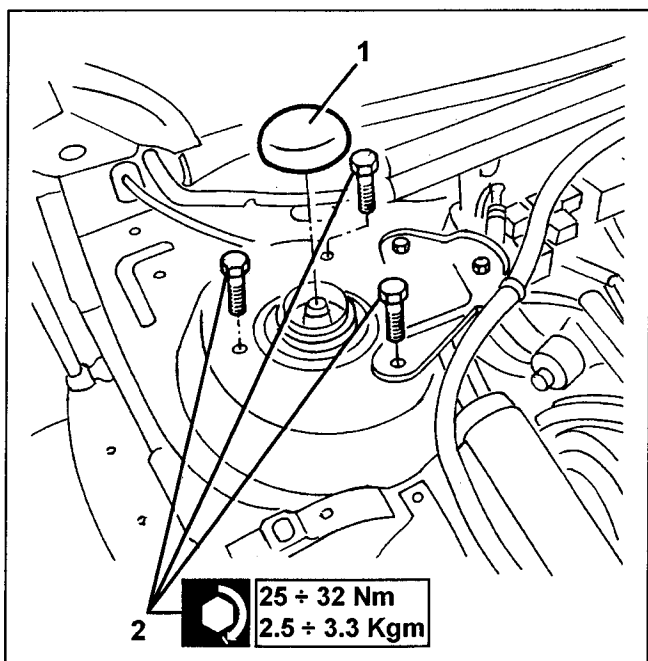
**COIL SPRING AND SHOCK ABSORBER ASSEMBLY**

**REMOVING/REFITTING**

- Remove the front wheel on the side concerned.
- 1. Disconnect, from the vertical guide with shock absorber, the brake pipe retainer grommet.
- 2. Disconnect the ABS inductive sensor from its clamp.
- 3. Slacken the the two bolts fastening the shock absorber guide to the wheel upright.

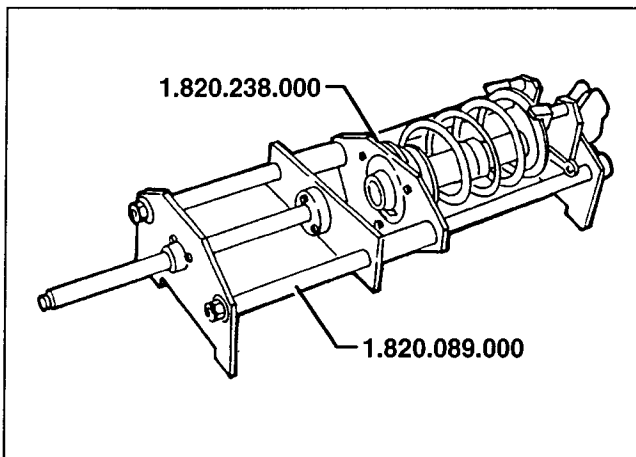


- 1. Remove the protective boot.
- 2. Slacken the three screws fastening the shock absorber to the dome and remove the coil spring and shock absorber assembly.

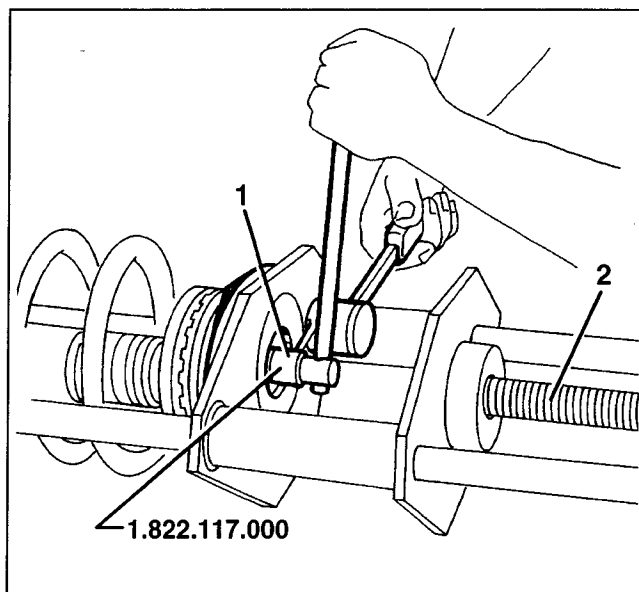


**DIS-ASSEMBLY/REASSEMBLY**

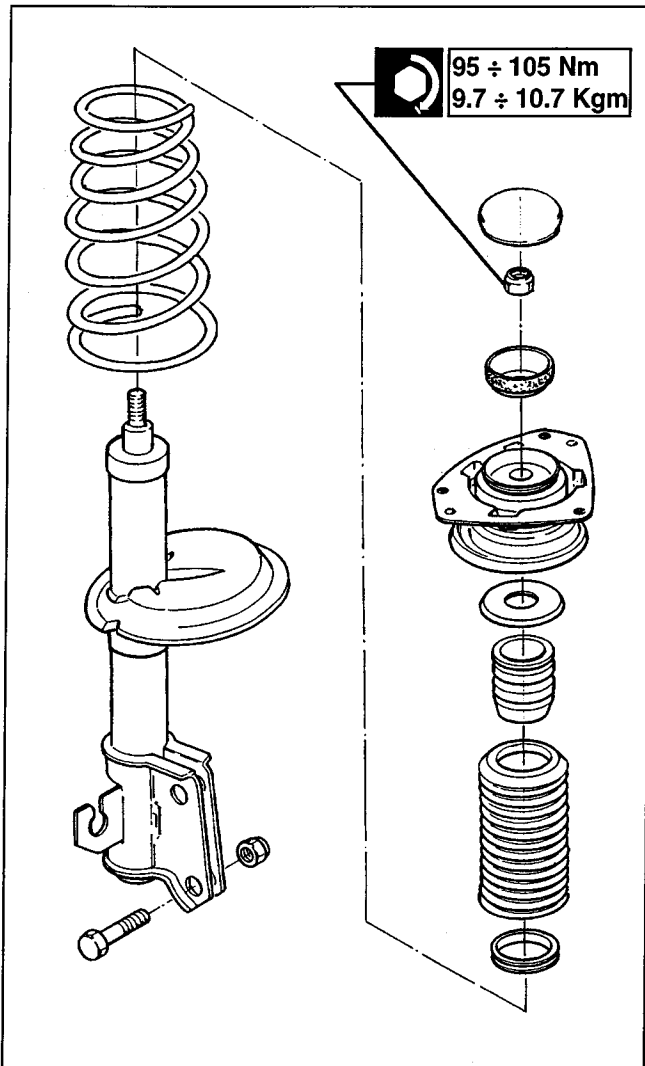
- 1. Position the coil spring-shock absorber assembly on tool no. 1.820.089.000 fitted with rest plates no. 1.820.238.000 and compress it.




- 1. Insert a 6 mm Allen wrench in the shock absorber stem centre pin.
- 2. Using the extension for wrench no. 1.822.117.000, and levering with the Allen wrench, slacken the spring-shock absorber upper nut.



Decompress the spring-shock absorber assembly and dis-assemble the different parts.



 Refit the spring-shock absorber assembly reversing the sequence followed for dis-assembly and tightening the centre nut to the specified torque.

**CHECKS AND INSPECTIONS**

- Check that the fastening components of the coil spring shock absorber assembly have no abnormalities that might adversely affect operation.
- Check that the shock absorber is functional and for oil leaks, in which case change the whole shock absorber.
- Visually check the springs for cracks, distorsion and abnormalities in general, that might adversely affect operation.

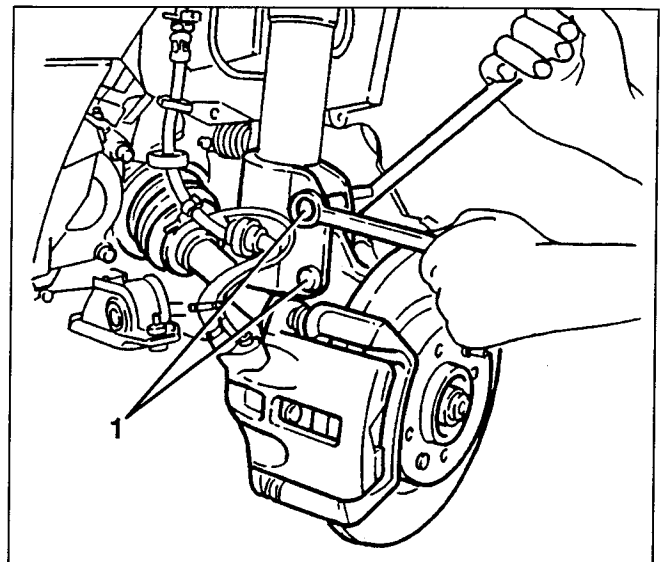
**The coil springs are subdivided into classes of rigidity and marked with paint of different colours to simplify their identification. When changing one or both springs, always make sure that the new springs are distinguished by paint of the same colour as the ones replaced.**

- Check that the rubber parts are intact, and change them if they are distorted or excessively worn.

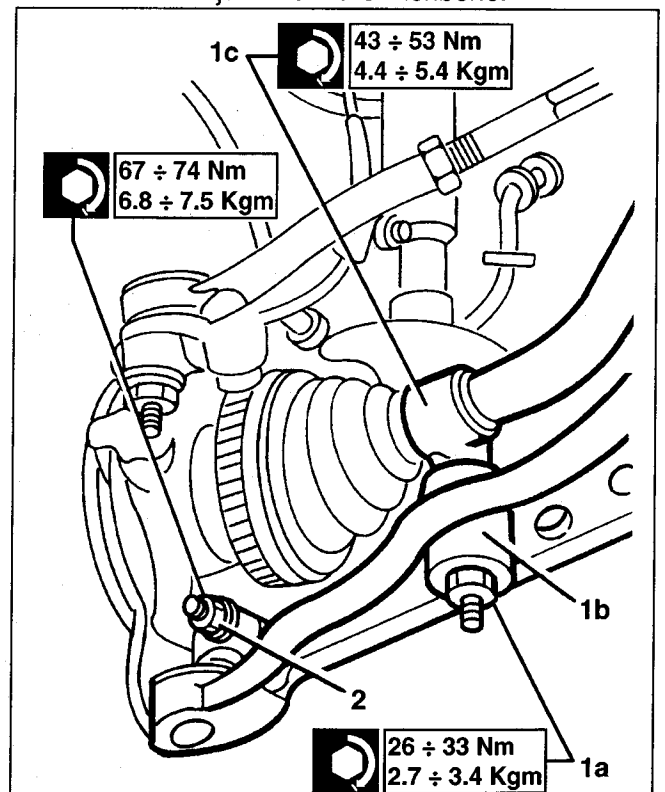
**WISHBONE**

**REMOVING/REFITTING**

- Remove the front wheel on the side concerned.
- 1. Slacken the two bolts fastening the wheel upright to the shock absorber stem.

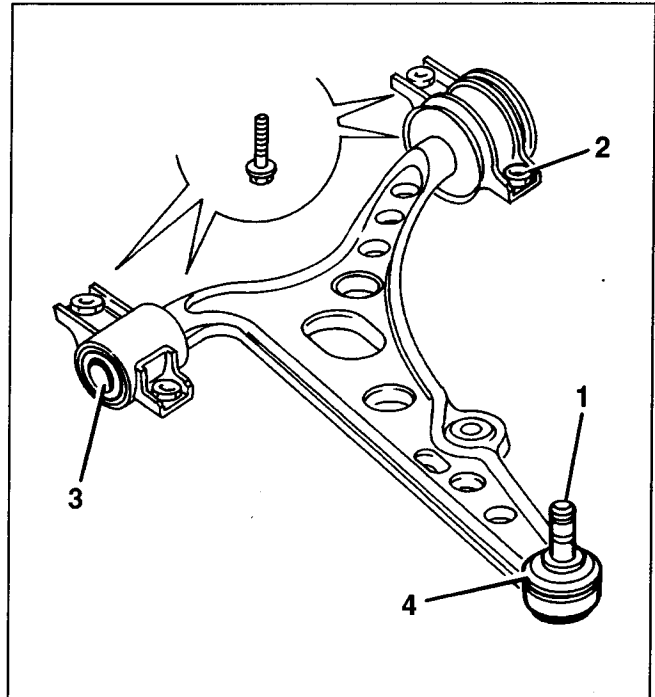
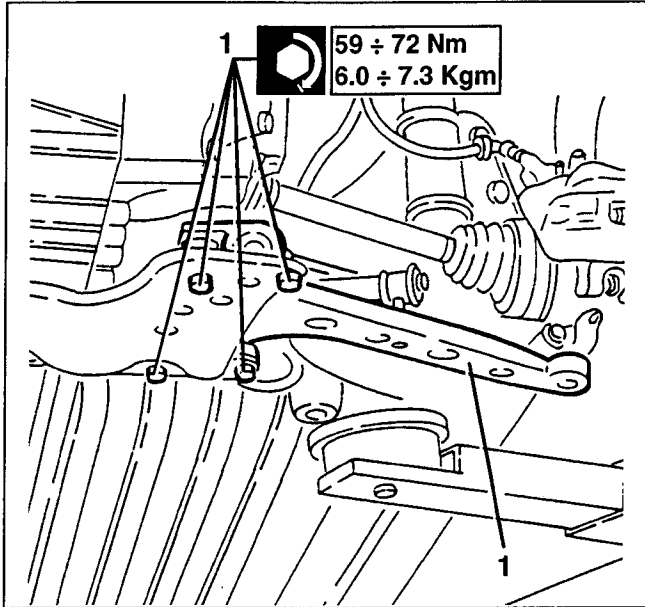


1. Slacken the nut fastening the connecting rod to the wishbone (1a) and remove it together with the rubber pad (1b) then slacken the connecting rod-stabilizer bar fastening nut (1c), and remove it.
2. Slacken the bolt fastening the connection ball pin between the wishbone and wheel upright, then, disconnect the ball joint from the wishbone.





1. Slacken the screws fastening the wishbone U-bolts to the front crossmember and remove the wishbone.



Refit the wishbone reversing the sequence followed for removal.

## FRONT CROSSMEMBER AND ANTIROLL BAR

### REMOVING/REFITTING

When needing to replace only the antiroll bar or the front crossmember, it is still necessary to remove the whole crossmember proceeding as follows:

- remove the front section of the exhaust pipe (see GROUP 10).

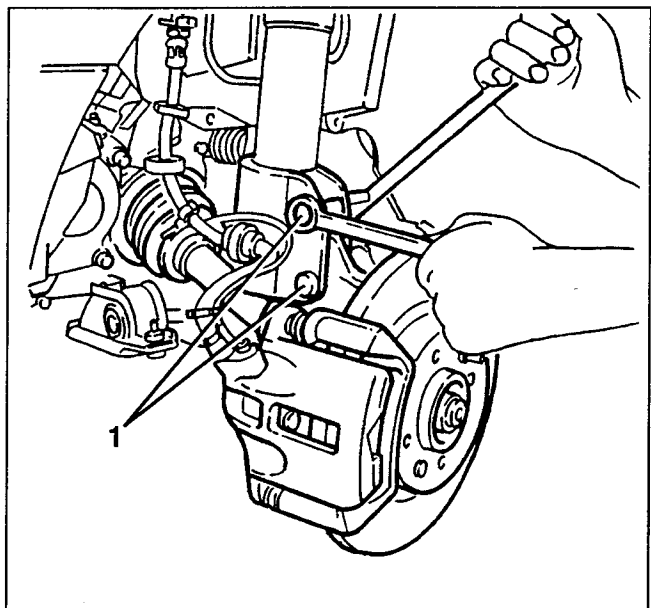
Working from both sides:

- Remove the front wheel.

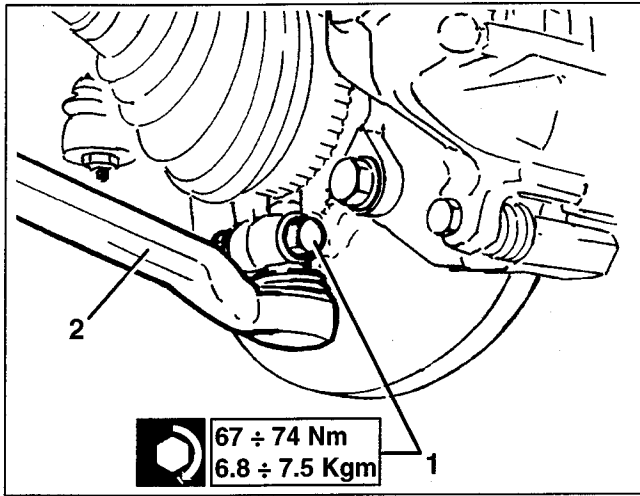
1. Slacken the bolts fastening the wheel upright to the shock absorber stem.

### CHECKS AND INSPECTIONS

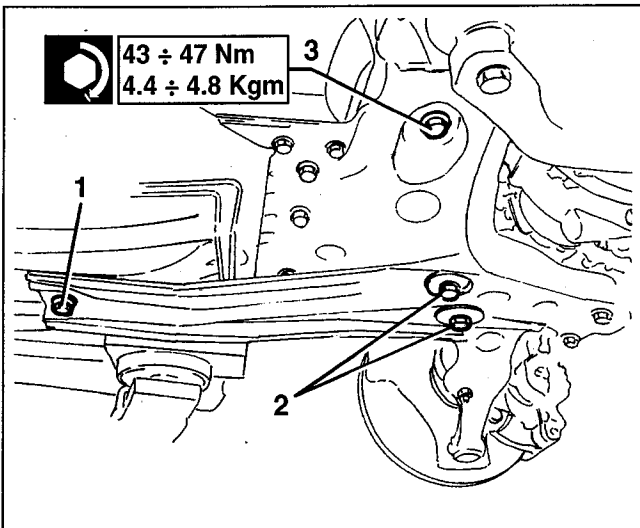
1. Check the intactness and wear conditions of the ball pin between the wishbone and wheel upright and, if necessary, change it.
2. Check the intactness and wear conditions of the U-bolts between the wishbone and front crossmember, and, if necessary, replace.
3. Check the intactness and wear conditions of the bushes of the U-bolts between the wishbone and front crossmember and, if necessary, replace.
4. Check the intactness and wear conditions of the rubber boots of the ball pin between the wishbone and the wheel upright and, if necessary, replace.



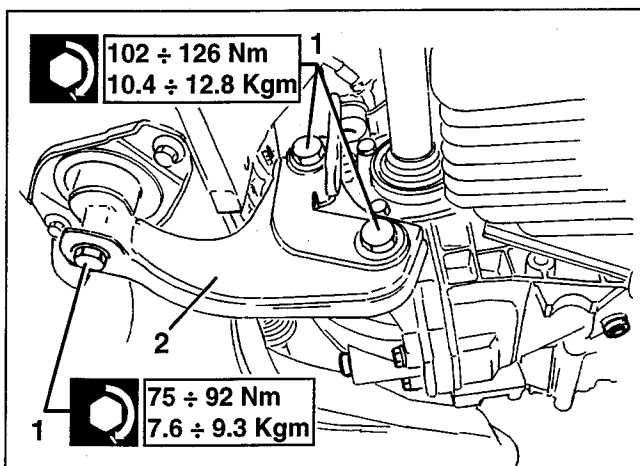
1. Slacken the bolt fastening the ball pin connecting the wishbone to the wheel upright.
2. Remove the wishbone ball joint.



1. Working from under the car, slacken the four screws fastening each of the front crossmember reinforcement struts.
2. Remove the reinforcement struts.
3. Slacken the screws fastening the steering box to the crossmember.

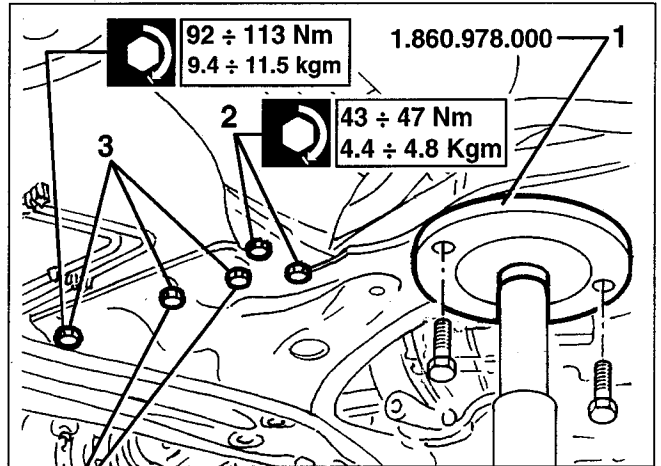


1. Slacken the three fastening screws.
2. Remove the rear engine mount.

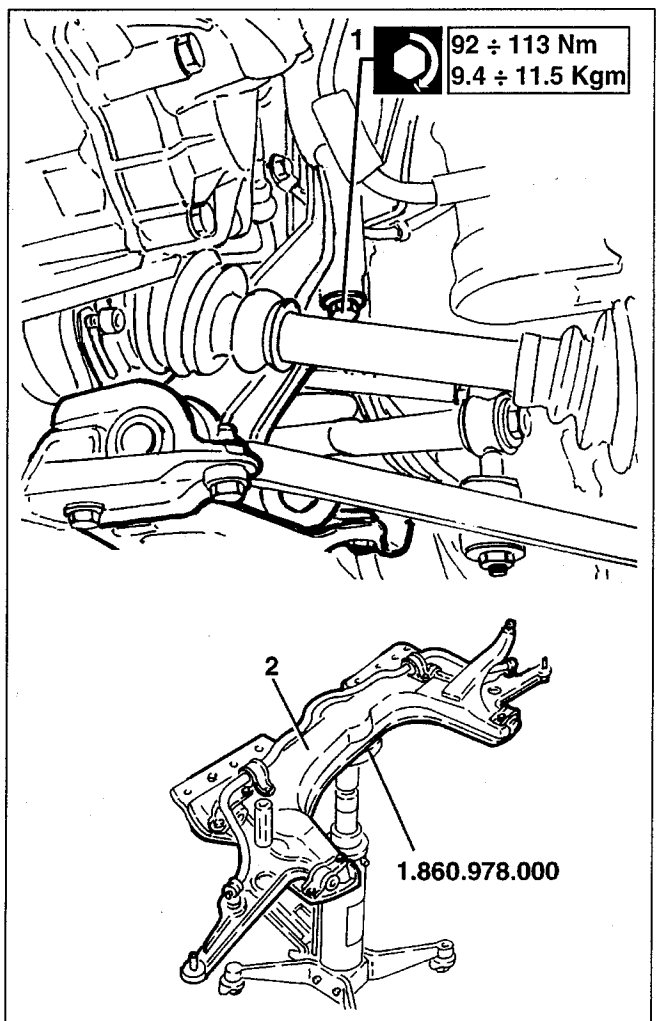


- Install tool 1.860.978.000 on a hydraulic jack.

  1. Fasten the tool to the centre of the crossmember
  2. Slacken the nuts fastening the crossmember to the gearbox controls support.
  3. Slacken the screws fastening the crossmember to the body.

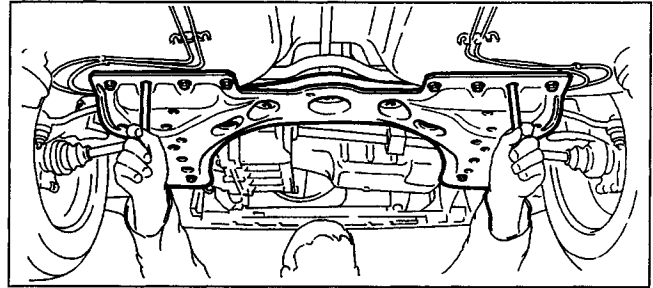
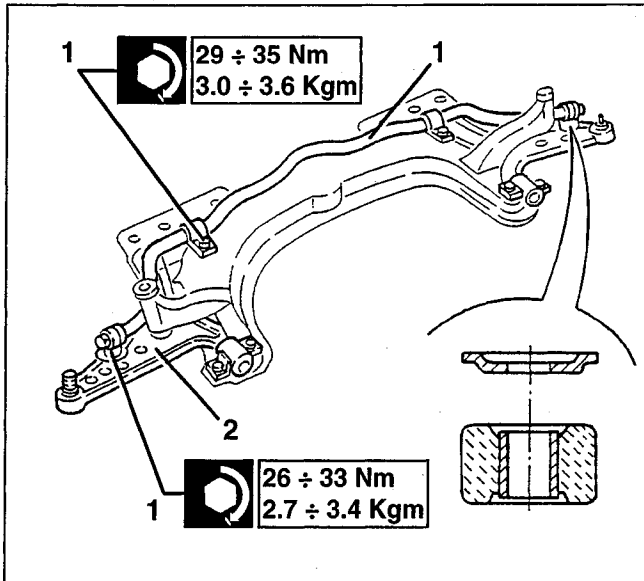


1. Slacken on each side the crossmember upper fastening screw.
2. Slowly lower the hydraulic jack and remove the crossmember complete with wishbones and stabilizer bar.



1. If necessary, remove the stabilizer bar slackening the nuts fastening the U-bolts supporting the bar itself to the crossmember and the nuts fastening the stabilizer bar connecting rod to the wishbones.
2. If necessary, remove the wishbones.

Tighten the bolts fastening the wheel upright to the shock absorber stem as described in the specific paragraph (Front Wheel Upright).



### CHECKS AND INSPECTIONS

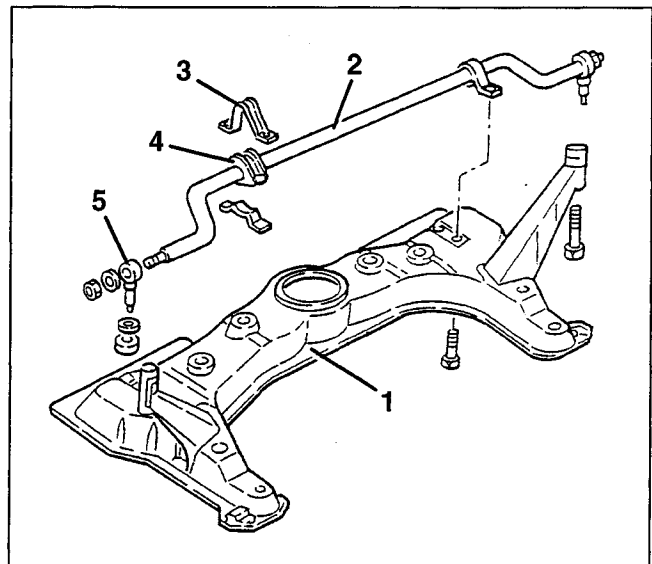
1. Visually check the crossmember making sure there are no cracks or distortions that might adversely affect operation, if so, change it.
2. Visually check the stabilizer bar for cracks and distortion, if so change it.
3. Check that the U-bolts connecting the stabilizer bar to the crossmember are intact without signs of distortion or rust, if so, change them.
4. Check the conditions of the rubber pads and change them if they are not satisfactory.
5. Check that the ball pins between the stabilizer bar and the wishbones are intact and free of distortion or signs of rust, in which case, change them.



When refitting the stabilizer bar on the crossmember check that the washers face towards the rubber pad, as incorrect assembly could adversely affect the life of the pad itself.



When refitting the front crossmember it is necessary temporarily fasten it, then, using two 17.5 mm diameter pins, centre it with the holes on the body and lastly fasten it definitively tightening the screws to the specified torque.

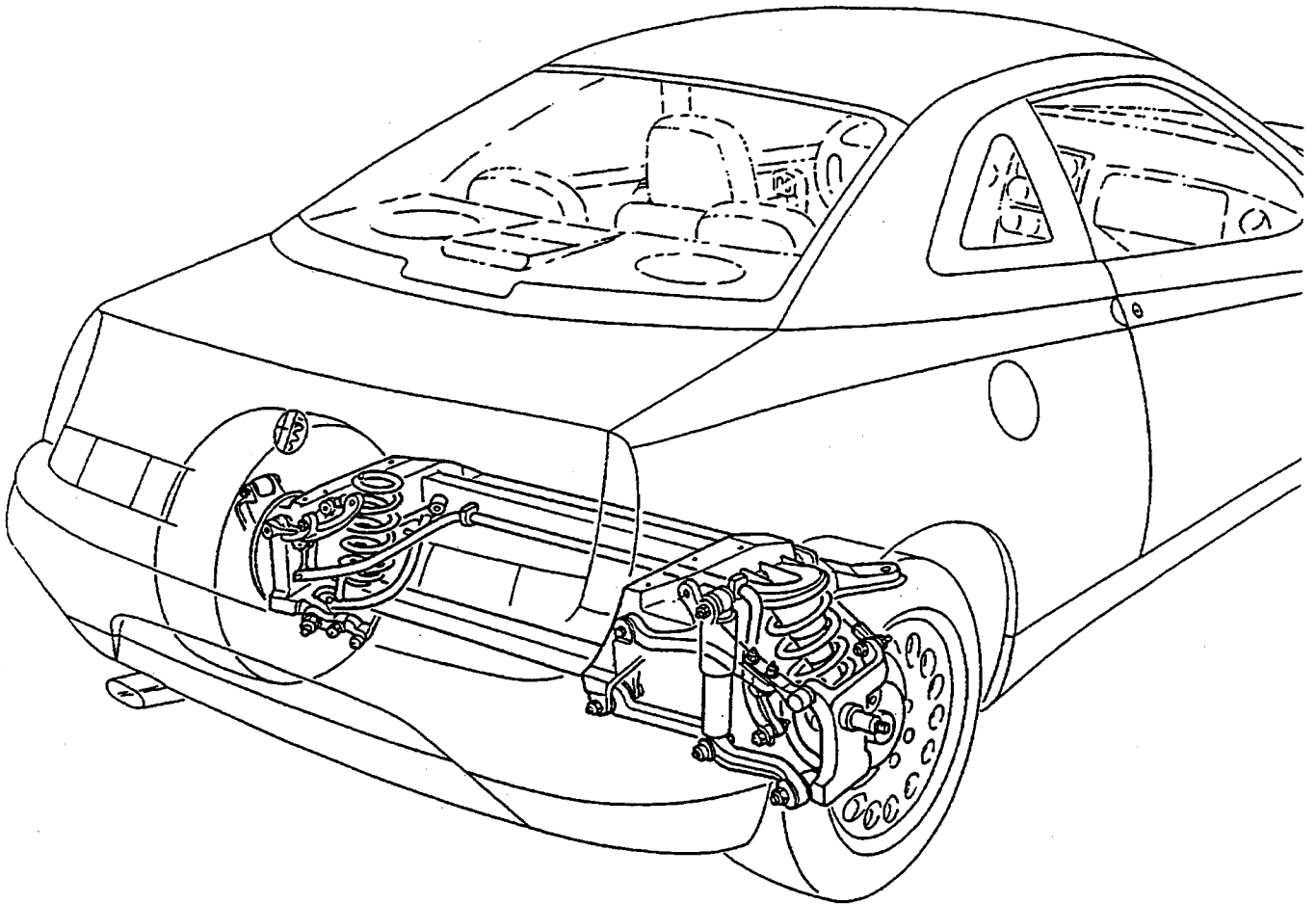


## REAR "MULTILINK" SUSPENSION

### DESCRIPTION

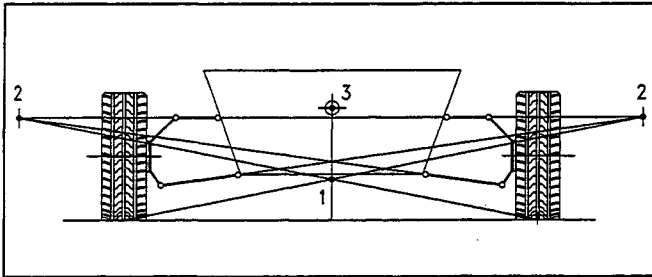
Multilink suspensions are the most advanced in the specific field.

On the Alfa Romeo SPIDER and GTV multilink suspension has been adopted on the rear axle.



Through a suitable arrangement of the links, it is possible to set the centre of roll (1) near the centre of gravity (3); this means that when lateral forces are applied, it is possible to **limit the extent of roll and changes of camber**.

The movement of the suspension caused by roll of the car also ensures that the wheels are kept vertical also when cornering: this way the **entire tyre tread is exploited to develop lateral adherence**.

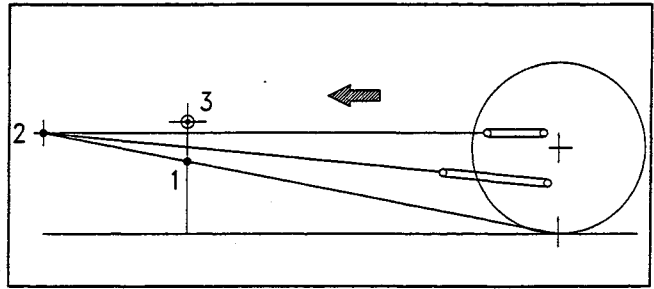


1. Centre of roll
2. Centre of instantaneous rotation
3. Centre of gravity of the car

Multilink suspension also **limits pitching movement**; therefore, in addition to improving comfort, during acceleration the weight on the front wheels is reduced less, thus the **traction force that can be transmitted to the ground is not limited**.

The position of the centre of instantaneous rotation (2) of the car depends on the position of the connection points to the body of the suspension arms.

**Also during braking, the multilink system, even though it has only been adopted on the rear suspension, makes it possible to keep the car parallel to the ground.**



1. Centre of pitching
2. Centre of instantaneous rotation
3. Centre of gravity of the car

Multilink suspensions involve the use of a number of links between the wheel hub and the body. The trajectories of the points of anchorage are of different radius and they are arranged on planes that are not parallel with one another.

The resulting complex geometrical system which is the outcome of extensive experiments, makes it possible to maintain the centre of instantaneous rotation (2) in such a position as to allow a reduced distance between the centre of pitching (1) and the centre of gravity of the car (3); thus it is possible to minimise the pitching movement.

**It is a known fact that a car with front wheel drive, tends to understeer when cornering, due to the prevalence of drift on the driving wheels.**

**Multilink suspension systems, have better control over the wheel angles (camber and toe-in) and make it possible to recover the understeering effect with better performance when entering a bend, therefore it is not necessary to carry out a series of corrections of the steering angle.**

In fact, these suspensions make it possible to control (and optimise both in the project and experimentally) the wheel angles under the effect of lateral and vertical loads developed when cornering and in changes of direction and also the longitudinal ones induced by braking independently.

On the Alfa Romeo SPIDER and GTV a light alloy frame has been fitted in correspondence of the rear suspension which is hooked to the floor panel of the car in the anchorage points provided for conventional suspension.

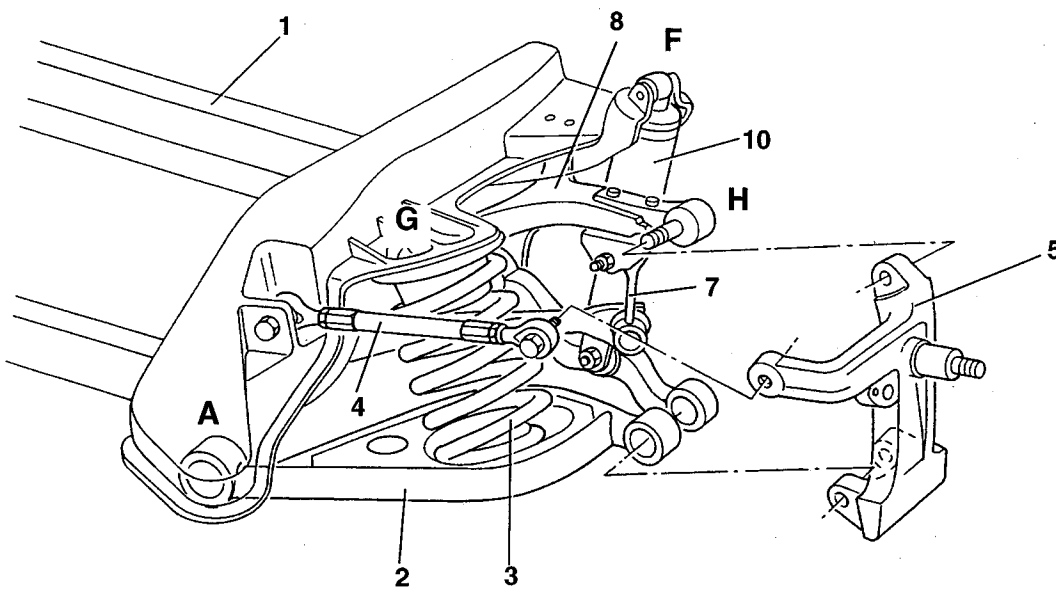
This frame has the supports needed for the installation of the multilink suspension.

**Fastening of the components to the frame:**

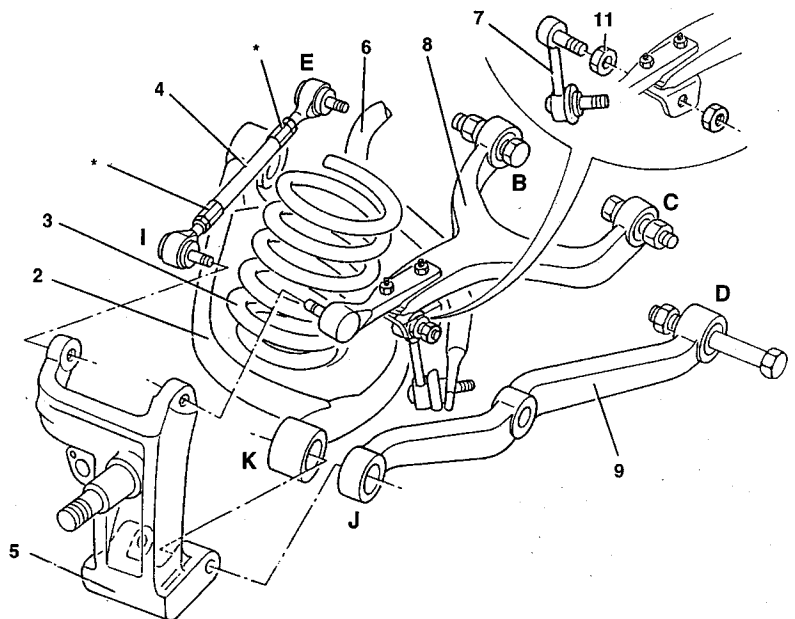
The spring carrier arm (2) is in position A; in B and C the fork (8) is coupled, to which also the stabilizer bar (6) is connected by link (7) with the spacer (11); in D there is the coupling of the arm (9) on which the shock absorber (10) is fitted; in E there is the adjustment arm (4).

En el chasis (1) también se fija la parte superior del amortiguador (10) en F y el muelle (3) en G.

En el montante de la rueda se engancha la horquilla (8) en H, el brazo con el tornillo de reglaje (4) en I, el brazo porta-amortiguador (9) en J y el brazo porta-muelle (2) en K.



1. Rear suspension frame
2. Spring holder arm
3. Spring
4. Adjustment tierod
5. Wheel upright
6. Stabilizer bar
7. Stabilizer bar connecting rod
8. Fork
9. Shock absorber carrier arm
10. Shock absorber
11. Spacer



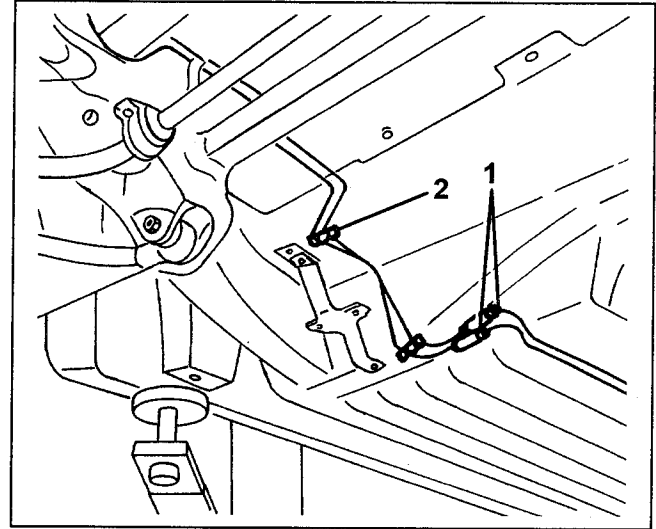
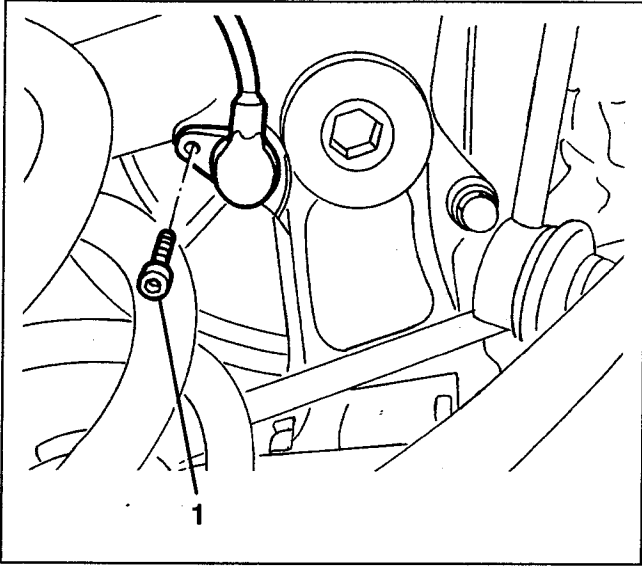
NOTE : the adjustment tierod (4) enables correct toe- in adjustment of the rear wheels through the two lock nuts (\*) (see paragraph "GEOMETRIES").

**COMPLETE SUSPENSION FRAME**

**REMOVAL / REFITTING**

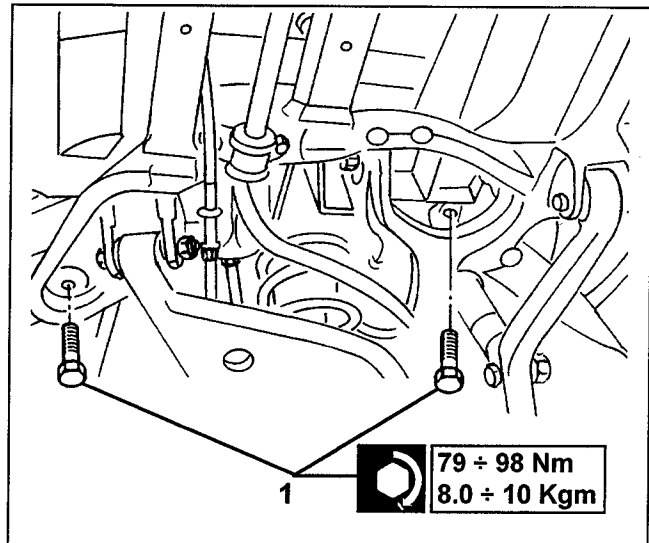
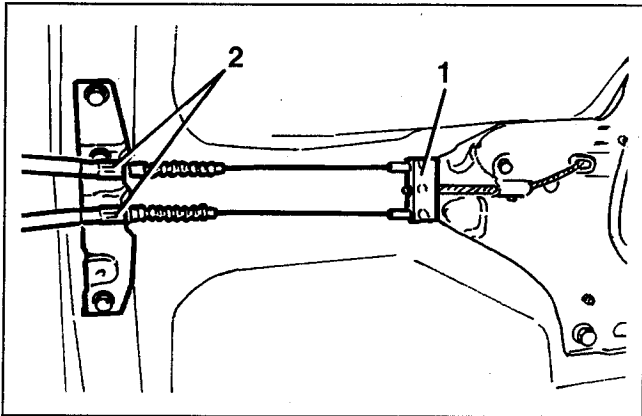
- Set the car on a lift.
  - Working inside the car, loosen the handbrake lever adjustment nut. (see GROUP 33).
  - Raise the car.
  - Remove the rear section of the exhaust, including the heat shields (see GROUP 10).
1. Disconnect the ABS sensor connections.

1. Disconnect the brake pipes, suitably plugging the holes.
2. Disconnect the pipes from the fastenings to the body.

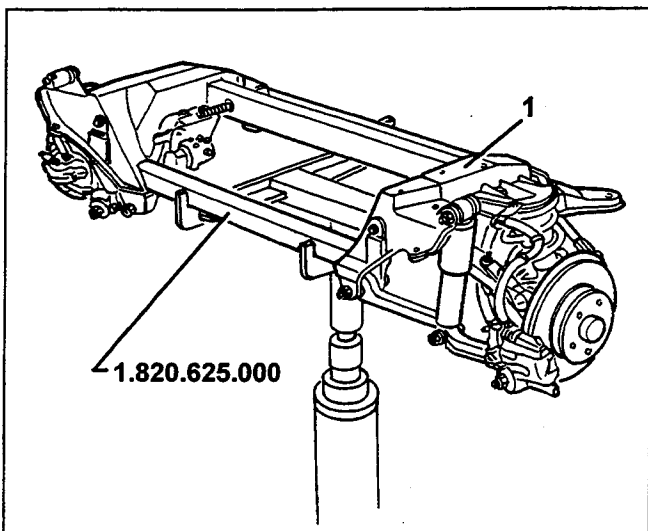


1. Prepare a hydraulic jack with support 1.820.625.000 and set it under the suspension unit, and slacken the four screws fastening the frame to the body (two per side).

1. Disconnect the two handbrake cables from their clamp.
2. Disconnect them from the rear fastening.



1. Lower the complete suspension frame.

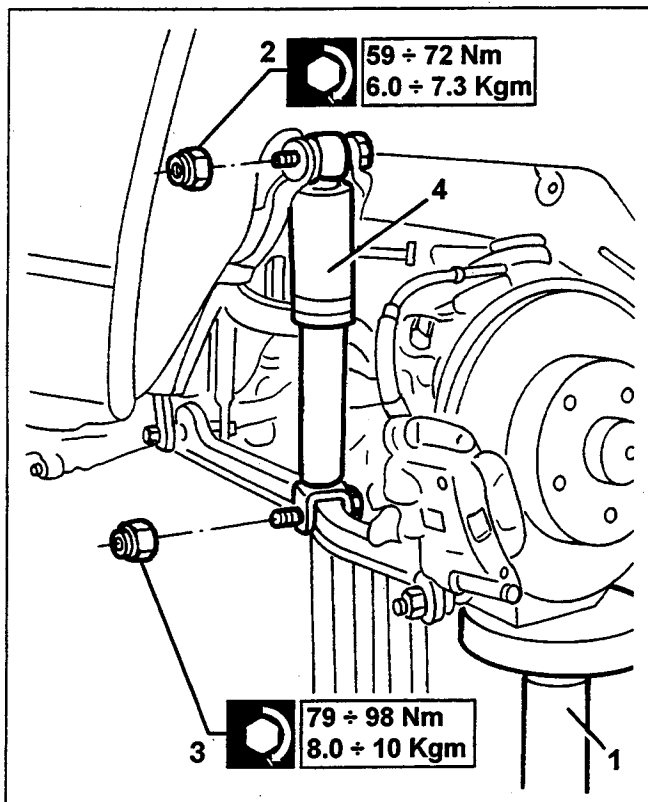


### SHOCK ABSORBER

#### REMOVAL / REFITTING

– Set the car on a lift and remove the wheel on the side concerned.

1. Position a hydraulic jack with plastic plate under the spring carrier arm to lightly compress the spring.
2. Remove the shock absorber upper fastening bolt.
3. Remove the shock absorber lower fastening bolt.
4. Remove the shock absorber.



### CHECKS AND INSPECTIONS

– Check the conditions of the shock absorber for functionality and oil leaks; if necessary change the shock absorber.

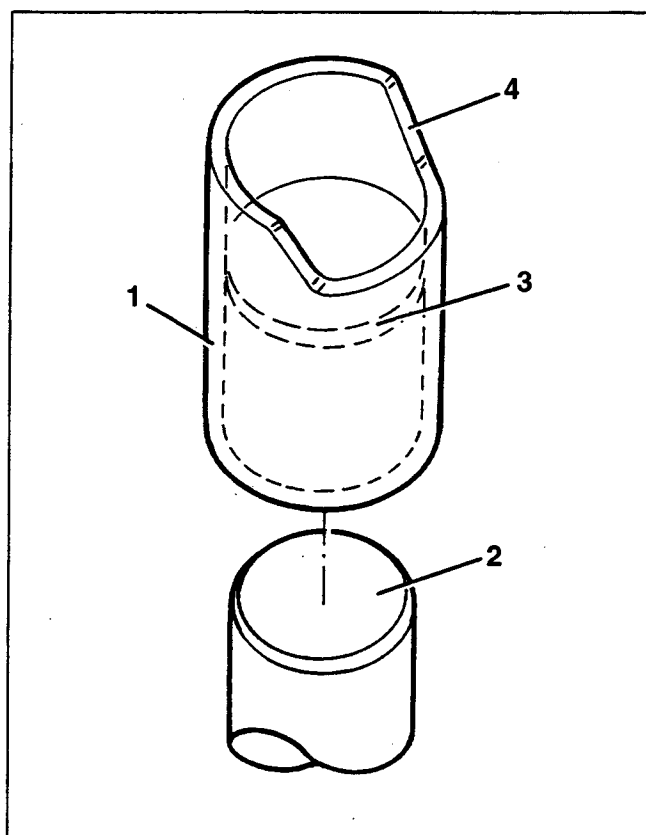
### COIL SPRING

#### REMOVAL / REFITTING

– Set the car on a lift and remove the wheel on the side concerned.

#### NOTE:

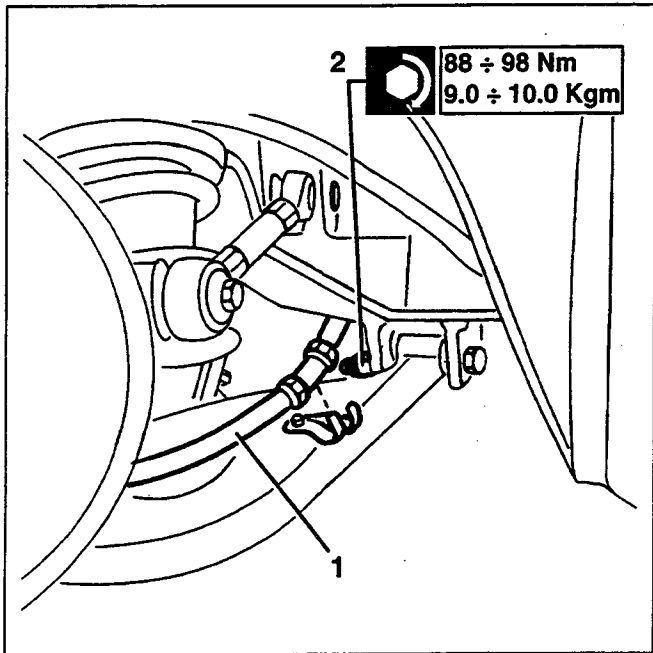
When removing the spring, a special end piece, to be made as illustrated, should be installed on the hydraulic jack.



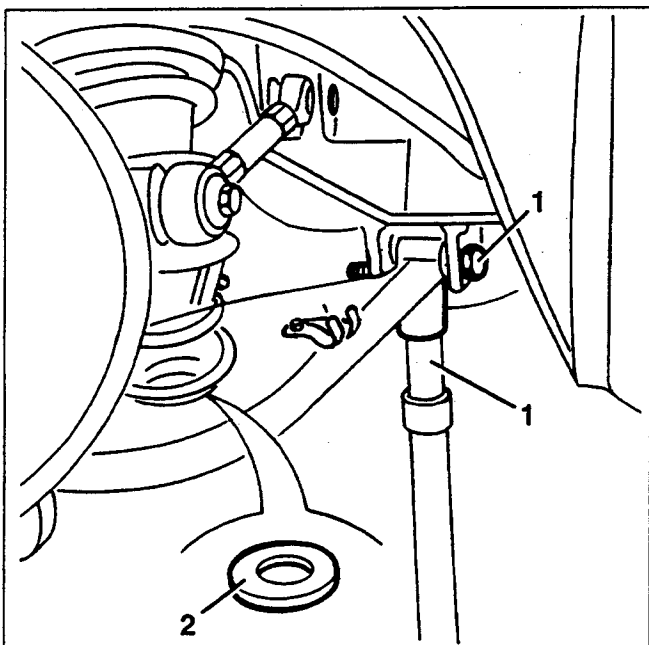
1. Piece of pipe
2. Hydraulic jack stem
3. Contact cap (welded)
4. Rest seat for spring carrier arm



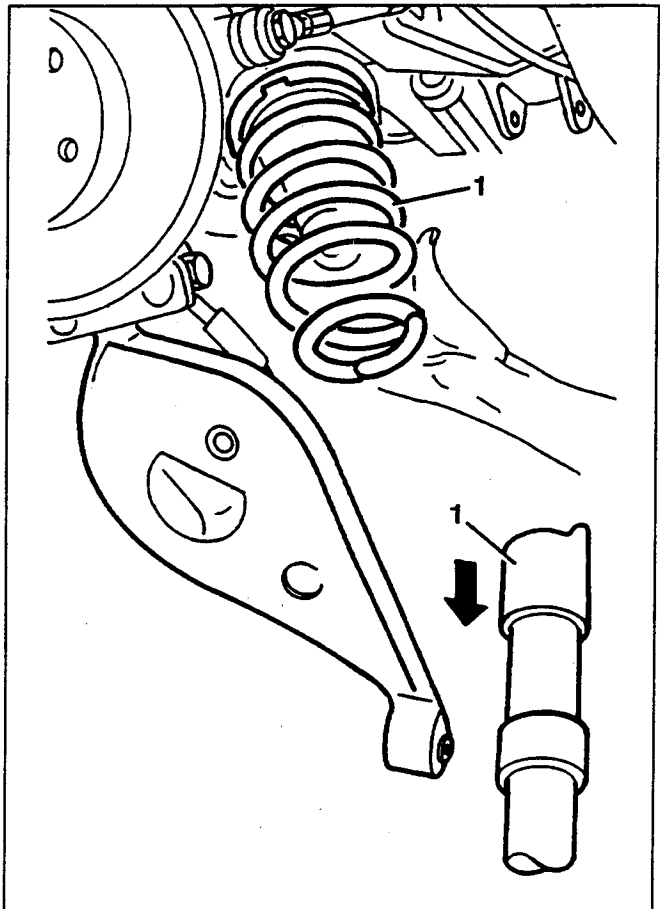
1. Remove the handbrake cable.
2. Slacken the nut fastening the spring carrier arm to the frame.



1. Set a hydraulic jack - with the support described previously - under the spring carrier arm and remove the fastening screw
2. Remove the lower spring rebound buffer



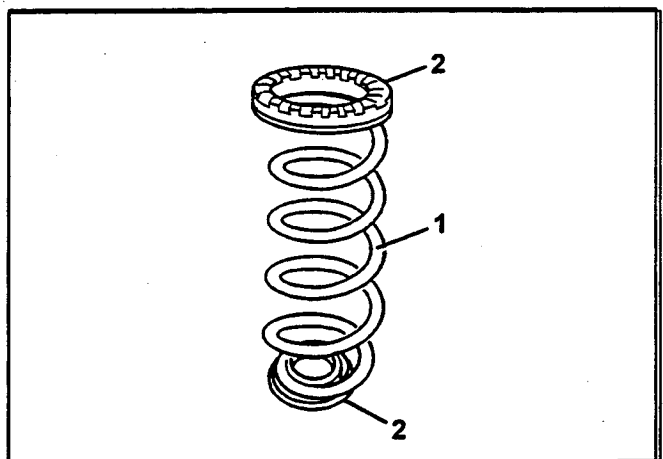
1. Lower the jack and remove the spring



### CHECKS AND INSPECTIONS

1. Visually check the springs for cracks, distortion and faults in general that might adversely affect their operation.
2. Check that the rubber parts are intact and change them if they are damaged, distorted or heavily worn.

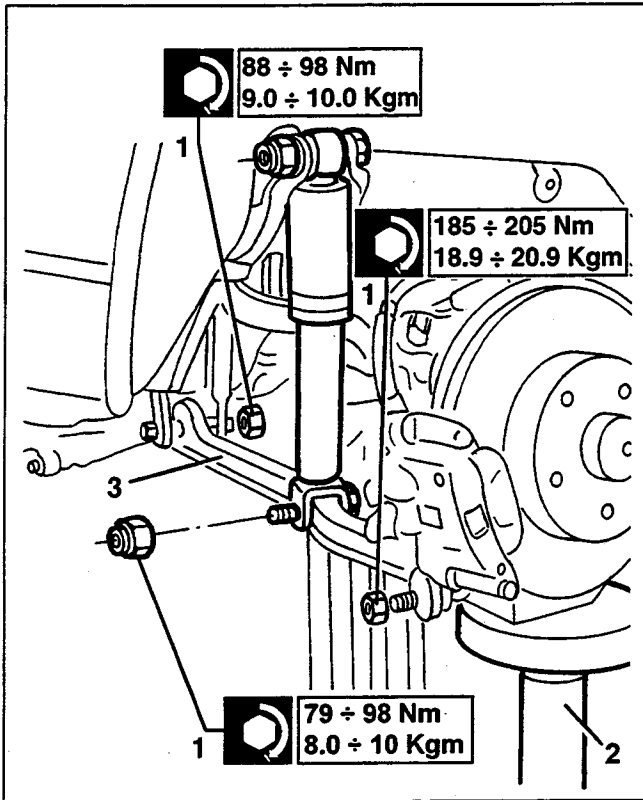
**NOTE:** Coil springs are subdivided into classes of rigidity and distinguished by spots of paint of different colours. When replacing one or both springs, check that the new springs are marked with the same colour as the old ones



**SHOCK ABSORBER CARRIER ARM**

**REMOVAL / REFITTING**

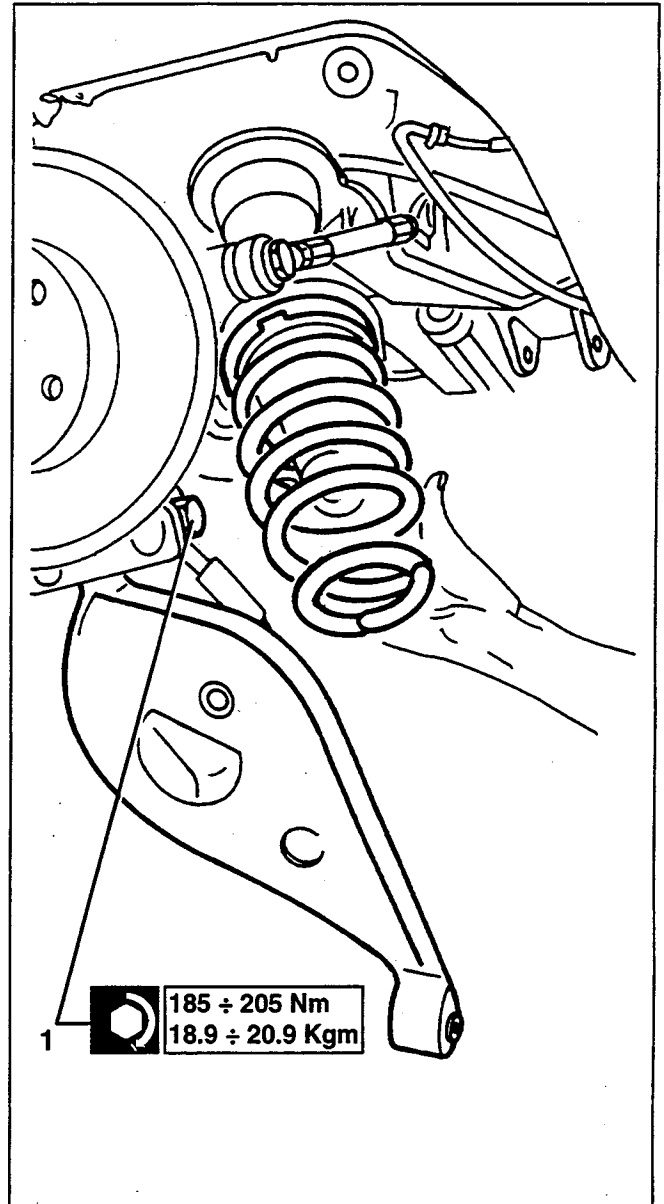
- Set the car on a lift and remove the wheel on the side concerned.
- 1. Remove the three nuts fastening the arm
- 2. Position a hydraulic jack with plastic plate under the wheel upright.
- 3. Remove the screws and retrieve the shock absorber carrier arm.



**SPRING CARRIER ARM**

**REMOVAL / REFITTING**

- Set the car on a lift and remove the wheel on the side concerned
- Remove the spring (see specific paragraph)
- 1. Slacken the bolt fastening the spring carrier arm to the wheel upright and retrieve the arm



**CHECKS AND INSPECTIONS**

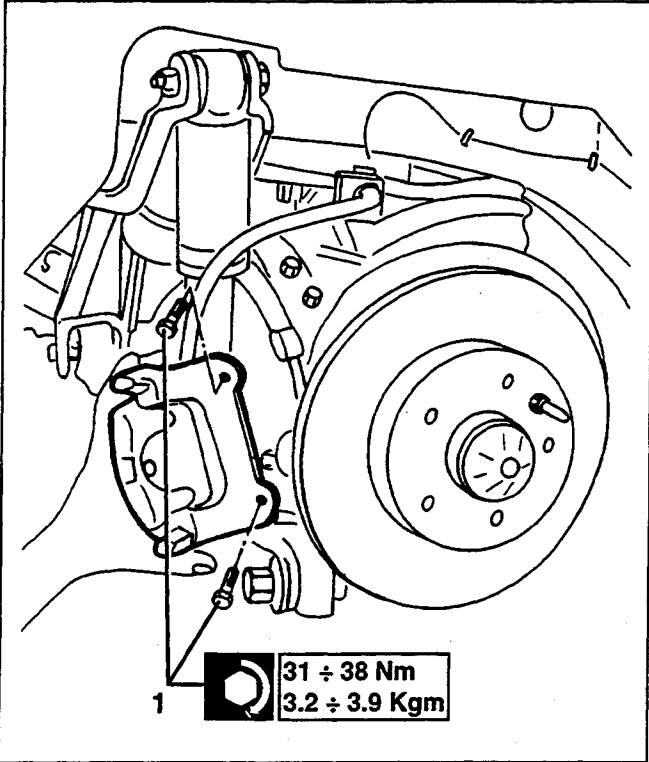
- Visually check the arm for cracks, signs of wear on the wheel side surface and distortion.
- Check the condition of the flexible parts; if excessive noise or play is noted, replace the arm.

**WHEEL UPRIGHT**

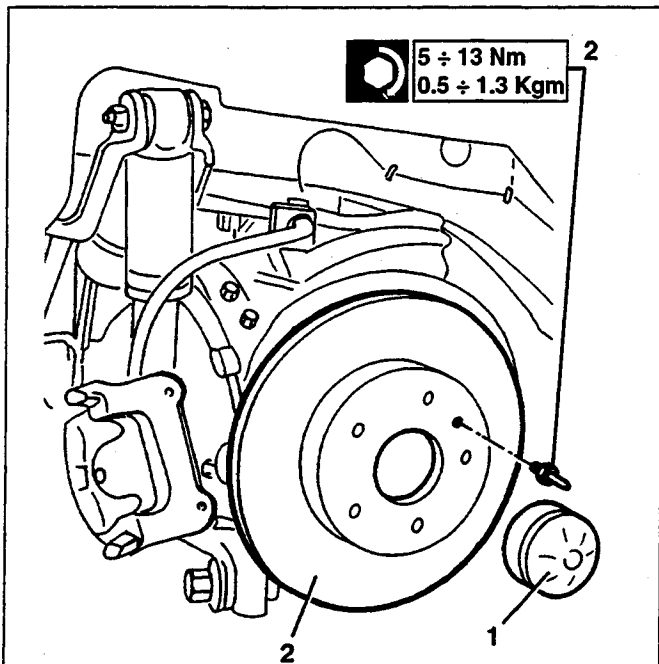
**REMOVAL / REFITTING**

- Set the car on a lift and remove the wheel on the side concerned

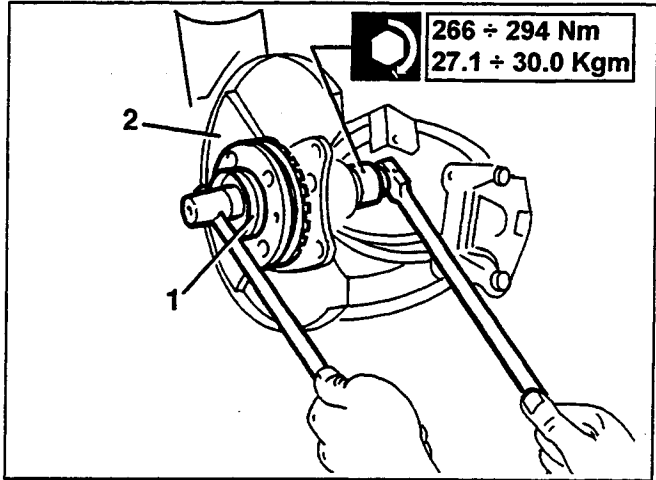
1. Slacken the two screws fastening the brake caliper to the support and move it aside without disconnecting the pipe and the handbrake cable.



1. Remove the hub cover plate.  
2. Slacken the fastening pin and remove the brake disk.

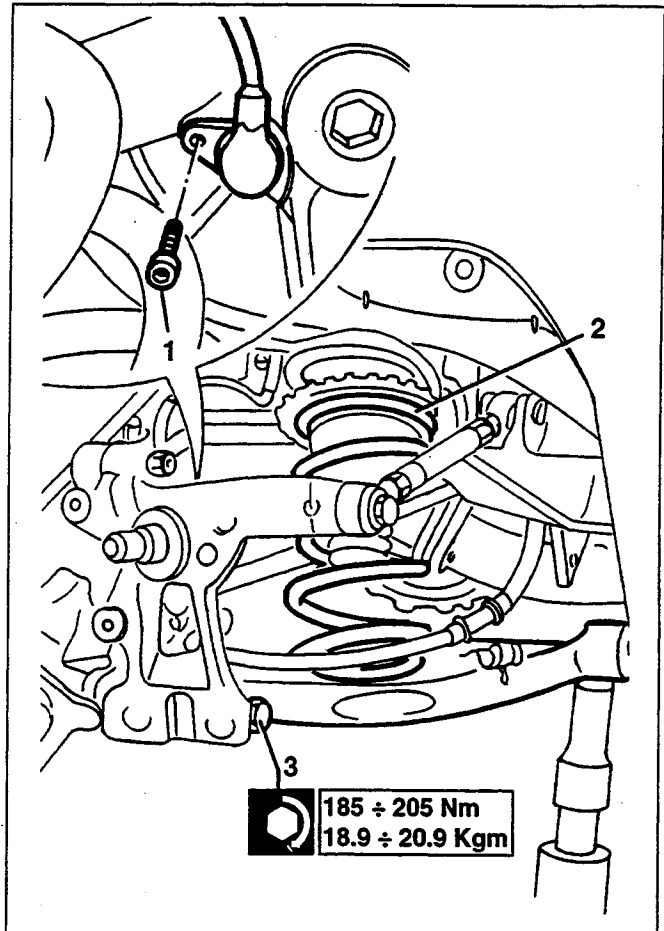


1. Slacken the hub fastening nut and remove the hub complete with phonic wheel.  
2. Remove the brake disk guard.

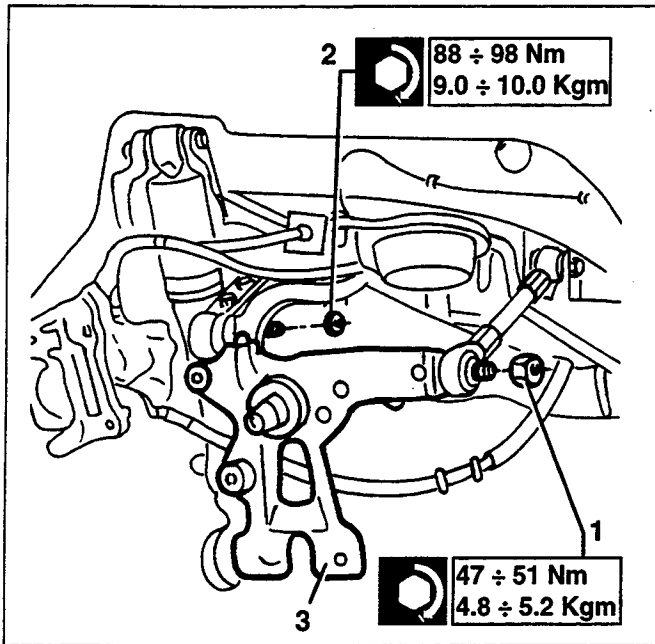


N.B.: it is absolutely necessary to replace the nut when refitting.

1. Remove the ABS sensor.  
2. Remove the spring (see specific paragraph)  
3. Remove the lower fastening bolt and retrieve the spring carrier arm.



1. Remove the adjustment tie-rod fastening screw.
2. Remove the nut fastening the fork.
3. Retrieve the wheel upright complete with hub fastening pin. (If necessary remove the hub and use a press because the upright is force-fitted on the pin).

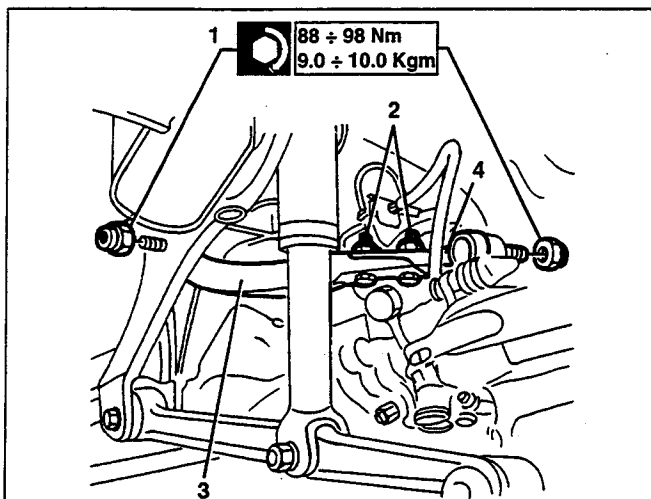


## FORK

### REMOVAL / REFITTING

- Set the car on a lift and remove the wheel on the side concerned.

  1. Remove the two nuts fastening the fork to the frame.
  2. Remove the two nuts fastening the fork to the stabilizer bar connecting rod bracket.
  3. Remove the corresponding screws and retrieve the front section of the fork.
  4. If necessary also remove the rear section of the fork slackening the nut fastening to the wheel upright.



## CHECKS AND INSPECTIONS

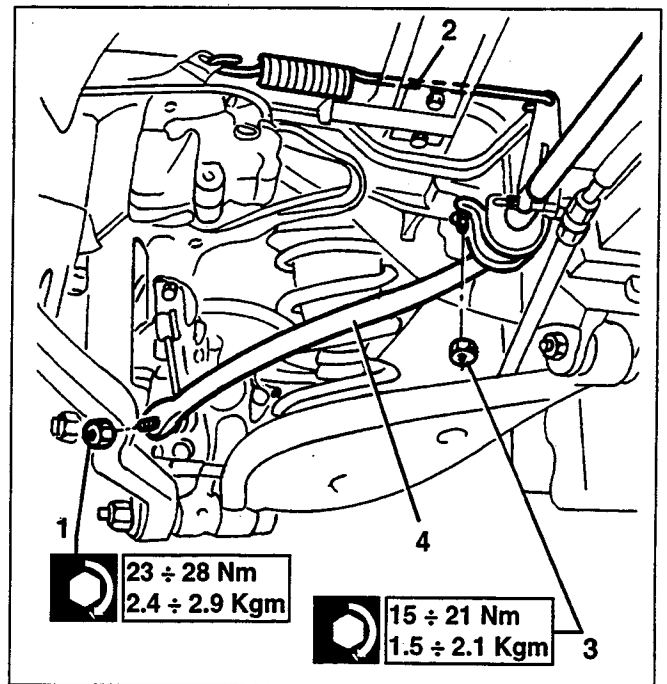
- Visually check the fork for cracks, signs of wear and distortion.
- Check the conditions of the flexible parts; if excessive noise or play is noted replace the fork.

## STABILIZER BAR

### REMOVAL / REFITTING

- Set the car on a lift and remove both wheels.
- Remove the rear section of the exhaust pipe (see GROUP 10).

  1. Remove the nuts fastening the connecting rods to the stabilizer bar.
  2. Remove the braking load proportioning valve spring.
  3. Slacken and remove the two supports.
  4. Retrieve the stabilizer bar.



### WARNING

When refitting adjust the braking load proportioning valve (see GROUP 33)

## CHECKS AND INSPECTIONS

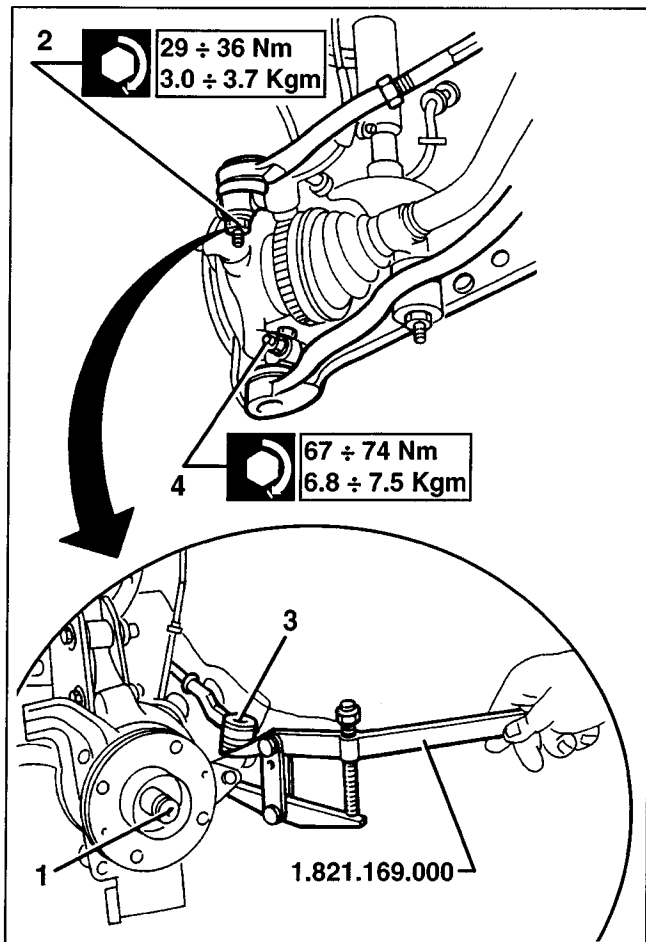
- Visually check the stabilizer bar for cracks and distortion, if so, replace it.
- Check that the connection supports between the stabilizer bar and chassis are intact and do not show signs of distortion or rust, otherwise, change them.
- Check the flexible pads for traces of ageing, if so, replace them.

## WHEELS AND HUBS

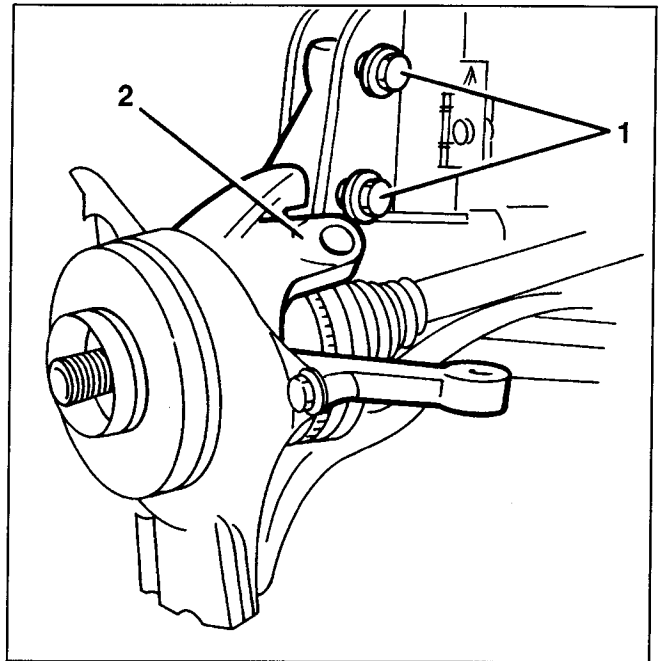
### FRONT WHEEL UPRIGHT

#### REMOVING/REFITTING

- Remove the wheel.
- 1. Eliminate the caulking and slacken the nut fastening the wheel hub to the constant velocity joint.
- Remove the complete caliper and move it aside, without disconnecting the pipes from the braking system (see GROUP 33).
- 2. Slacken the steering knuckle nut connecting the side track rod to the wheel upright.
- 3. Using tool no. 1.821.169.000 disconnect the knuckle from the wheel upright.
- 4. Disconect the bolt connecting the wishbone to the upright and remove it from the ball pin.



1. Slacken the two bolts.
2. Remove the upright/wheel hub assembly..

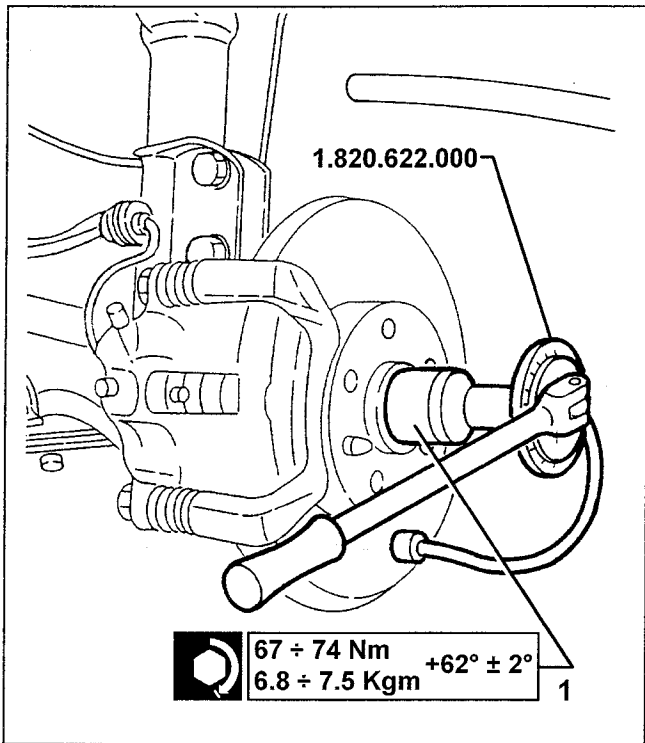


Refit, reversing the sequence followed for removal, tightening the nuts and screws to the specified torque and following the instructions for caulking the wheel hub fastening nut and the caulking procedures for the wheel hub fastening nut and adjustment of the position of the wheel upright.

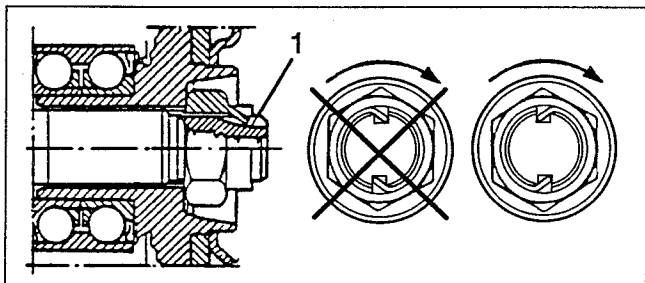
#### CAULKING THE FRONT WHEEL HUB FASTENING NUT

- Always use a new nut.
- Accurately clean the thread and tang of the axle shaft using a metal brush and then blow with compressed air.
- Clean the nut and tang thread with ethyl spirits or ethane.

1. Tighten the new nut to the specified torque and then turn it further as specified, using tool no. 1.820.622.000.



1. Using a scalpel, caulk the collar of the nut with two caulks (restore the condition of the removable nut).



**NOTE:** The cuts of the collar must be made on the notch of the hub from the opposite side from nut tightening: this way the safety tang is more resistant to accidental slackening.

### ADJUSTING THE POSITION OF THE FRONT SUSPENSION UPRIGHT

**NOTE** The operation described below, to be carried out each time it is necessary to slacken or remove the two bolts fastening the wheel upright to the shock absorber stem, is to eliminate the clearance between the fastening screws and the screw holes, to maintain the wheel camber angle within the specified limits (see: specific paragraph).

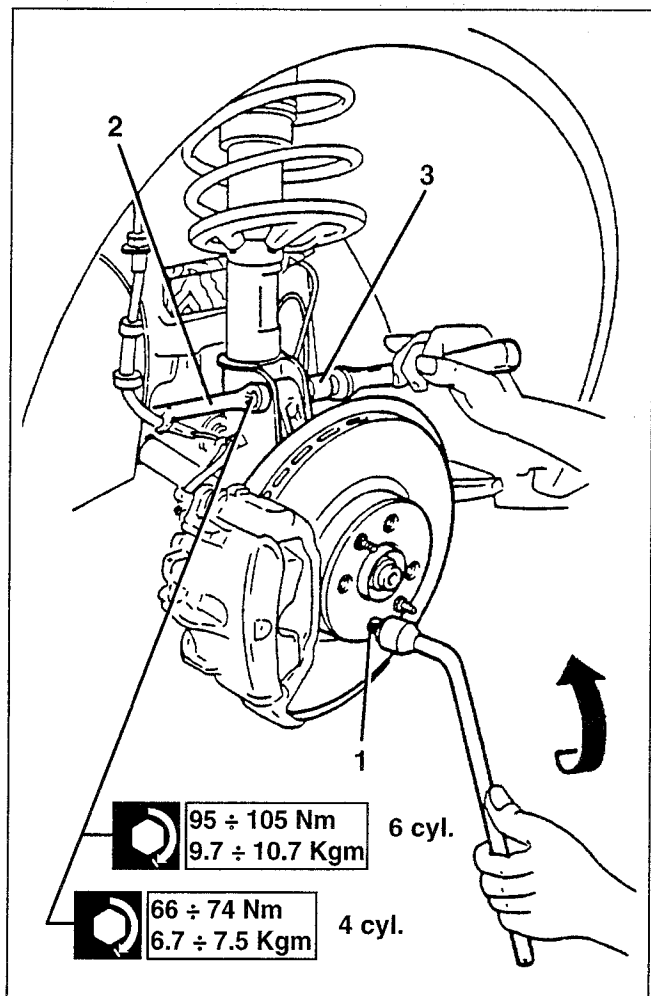
– Position a suitable wooden reaction piece between the spring plate and the body.



**CAUTION:**

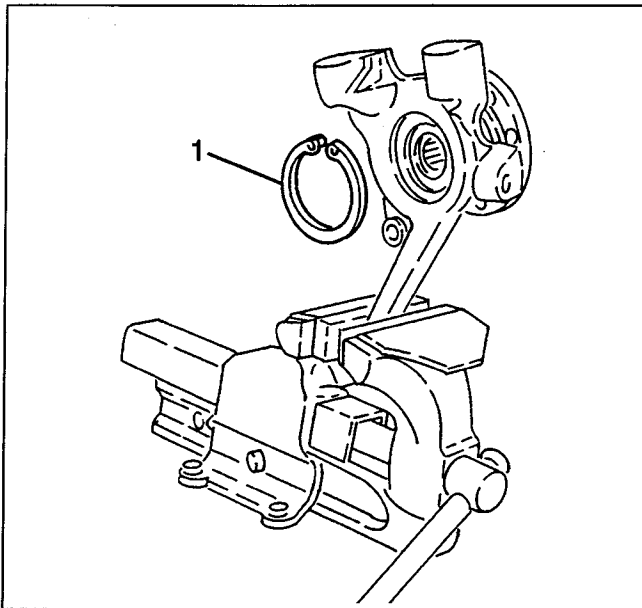
Make sure that the rest point of the reaction piece is in correspondence with the plate and not with the spring coils, which could cause accidental movements and/or distortion during the operation of the spring itself.

1. Temporarily position one of the wheel studs and work on it in the direction illustrated using a wrench.
2. Position a fixed wrench to hold the nut of the fastening bolt.
3. Tighten the fastening bolt screws to the specified torque.

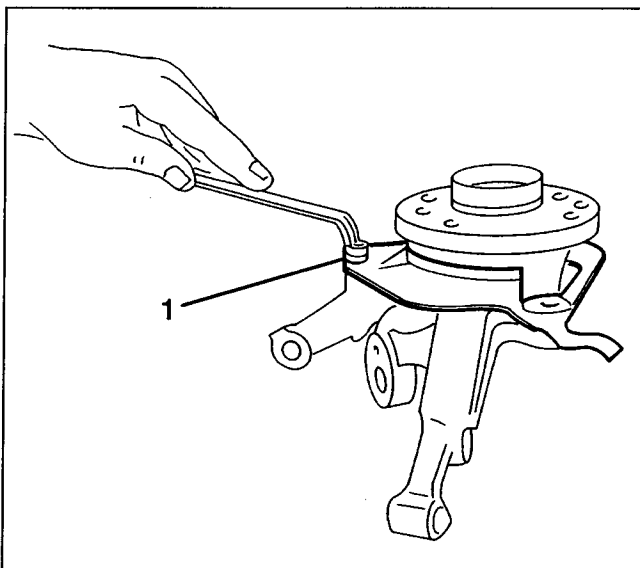


**DIS-ASSEMBLY**

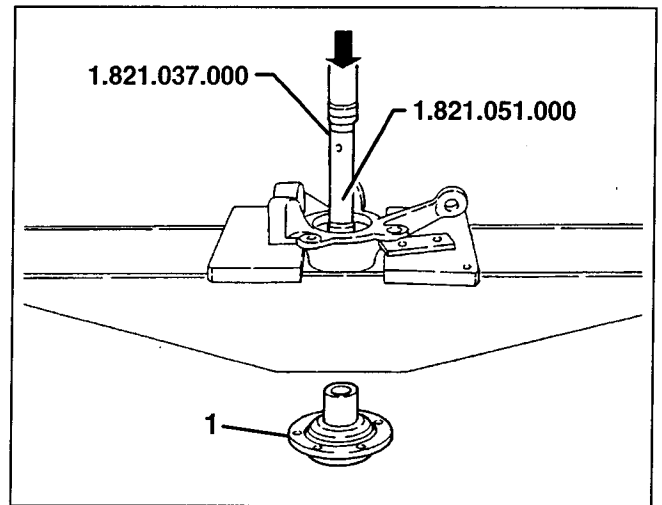
1. Clamp the upright/wheel hub assembly in a vice and remove the flexible hub retainer ring.



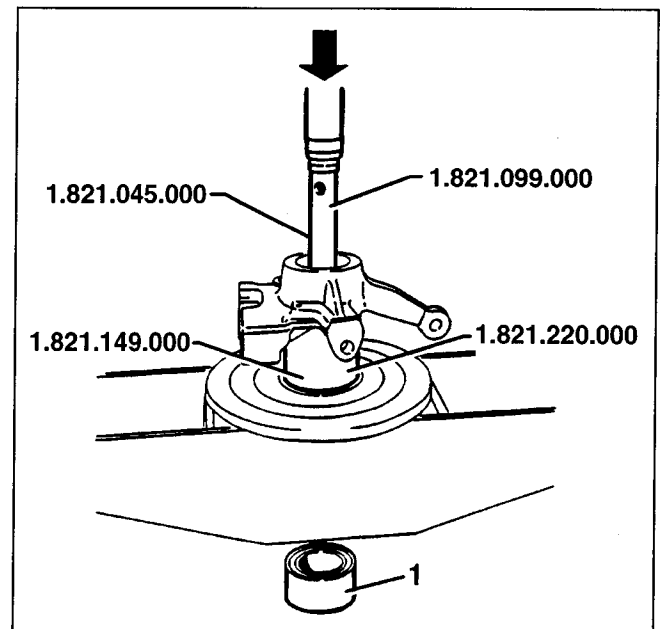
1. Slacken the screw fastening the brake disk protection.



1. Working under the press, withdraw the wheel hub from the upright using:  
 - (for 4-cylinder only) puller tool no, 1.821.051.000  
 - (only for 6-cylinder) puller tool no, 1.821.037.000

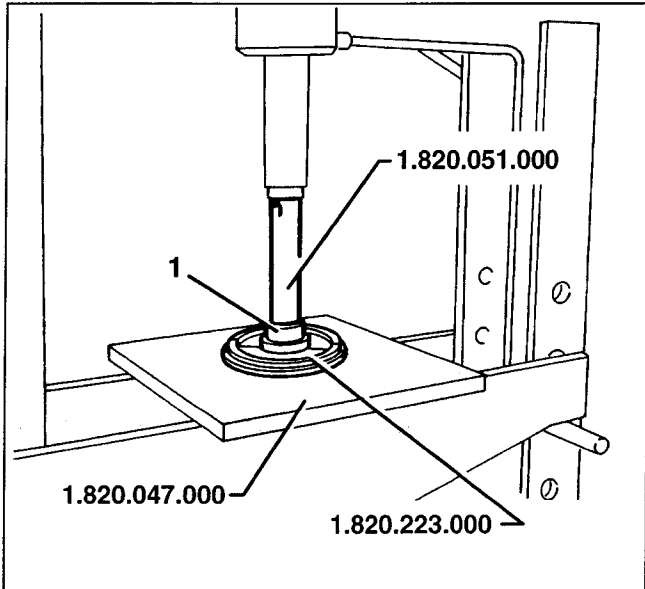


1. Working under the press, remove the outer bearing ring from the upright using:  
 - (for 4-cylinder only) support no. 1.821.149.000 and puller tool no, 1.821.045.000  
 - (only for 6-cylinder) support 1.821.220.000 and puller tool no, 1.821.099.000.



– Move aside, using a suitable tool, the bearing inner race from the contact area of the wheel hub.

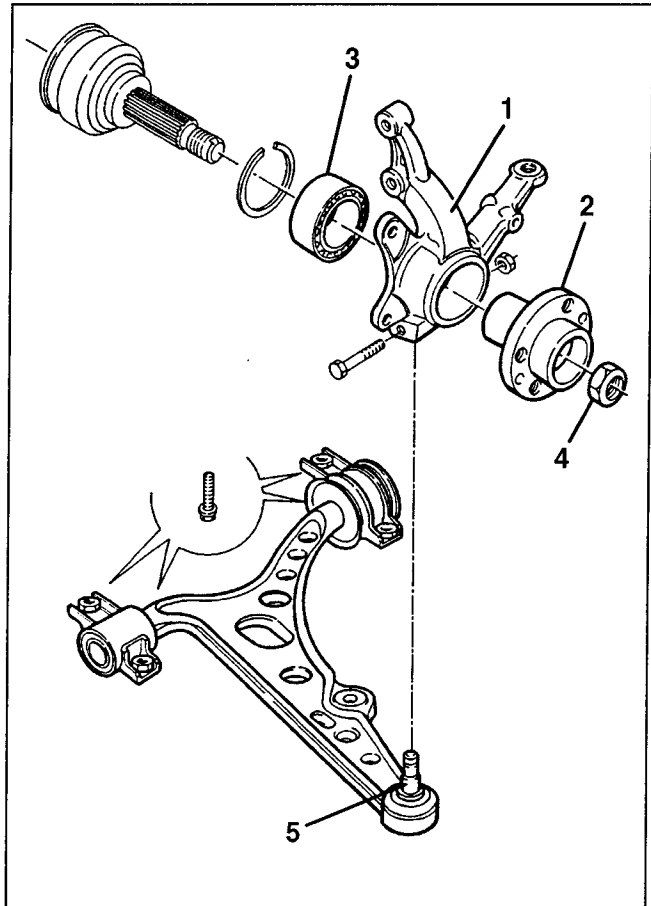
1. Working under the press, and using plate no. 1.820.047.002, half rings no. 1.820.223.000 and pul-  
ler tool no. 1.821.051.000, withdraw the bearing inner race from the wheel hub.



**CHECKS AND INSPECTIONS**

1. Check that the inner surfaces of the wheel upright show no signs of seizure, that the arms are not damaged or reveal clear signs of shocks, distortion or traces of breakage, if so change the upright.
2. Check that the surfaces of the wheel hub are not damaged or reveal clear signs of impact or signs of wear, if so change the wheel hub.
3. Check the conditions of the rolling bearing for cracks, seizing or jamming, cracks, seizure or sticking, if necessary replace the bearing.
4. Always, in any case, change the nut locking the constant velocity joint before refitting.

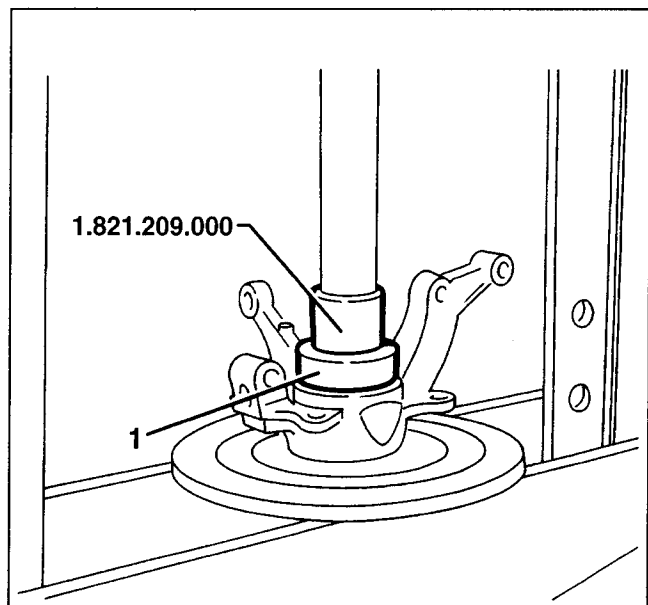
5. Check the conditions of the ball pin fastening the wheel upright to the wishbone, for distortion, excessive wear, cracks, sticking or signs of rust and, if necessary, replace the ball pin.



**REASSEMBLY**

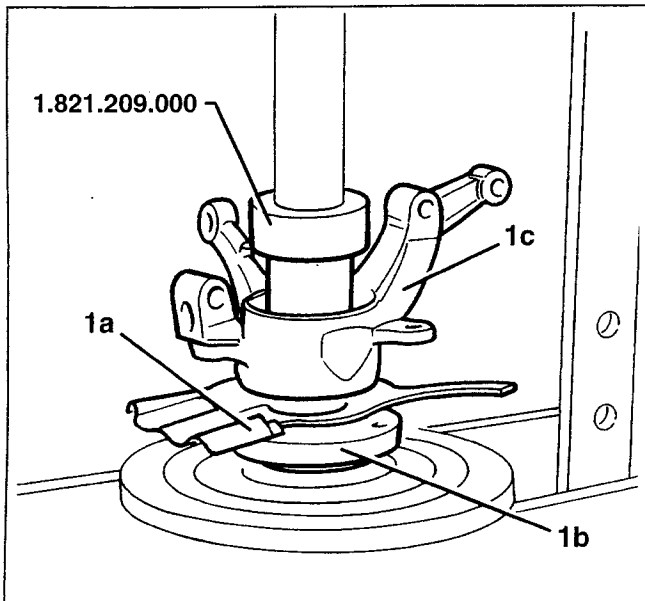
**Only for 4-cylinder vehicles**

1. Working under the press and using installing tool no. 1.821.209.000, insert the bearing in the wheel upright.

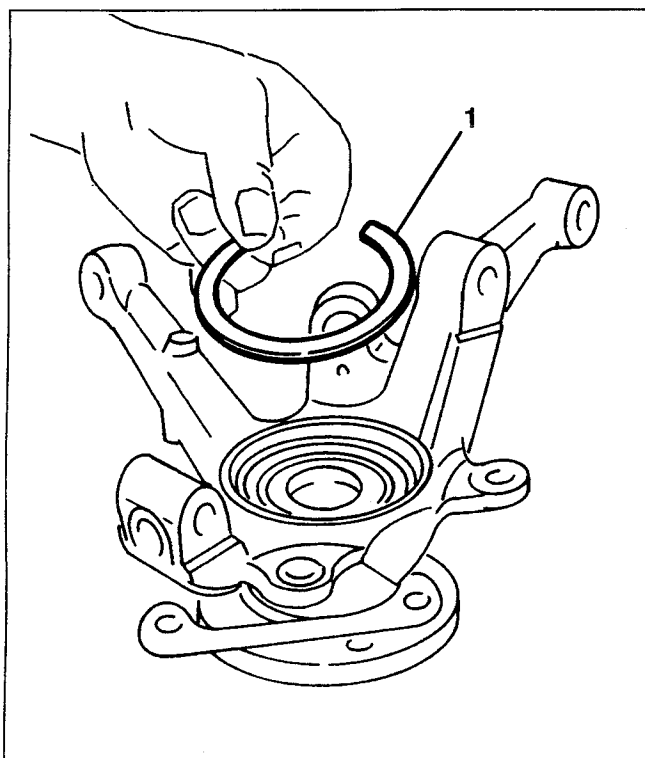




1. Arrange the brake disk protection (1a) on the wheel hub (1b) then, working under the press and overturning installing tool no. 821.209.000 compared with the previous step, insert the hub in the wheel upright (1c).

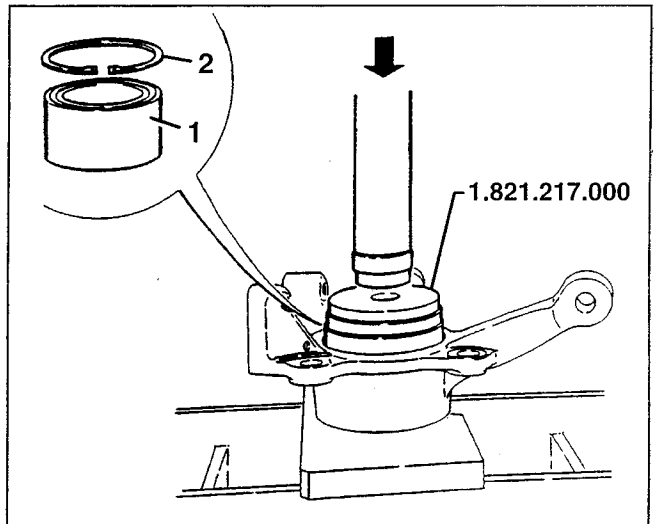


1. Assemble, in the seat provided on the wheel upright, the flexible bearing retainer ring.

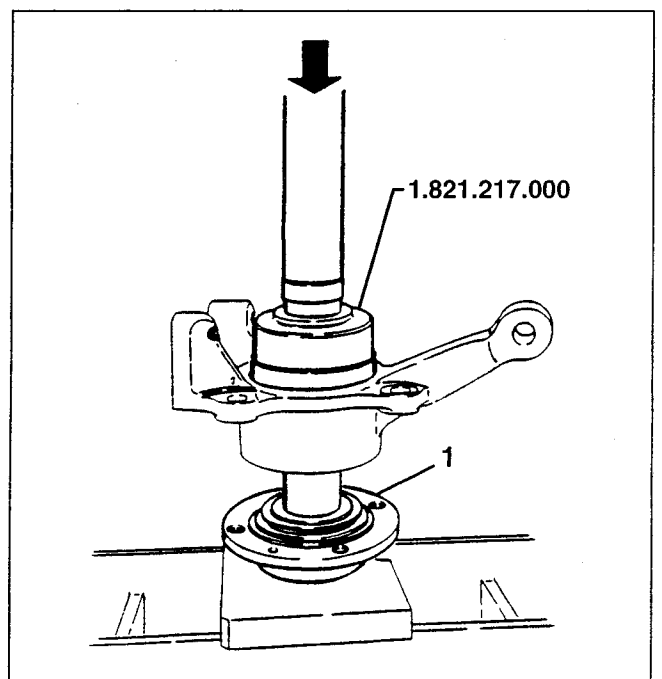


**Only for 6-cylinder vehicles**

1. Working under the press and using installing tool no. 1.821.217.000, insert the bearing in the wheel upright.  
 2. In the seat on the wheel upright, install flexible bearing retainer ring.



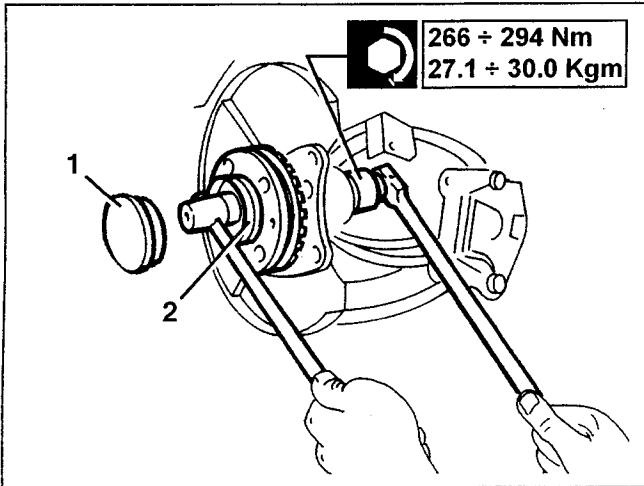
1. Working under the press and using installing tool no.. 1.821.045.000, insert the hub in the wheel upright.



## REAR WHEEL HUB

### REMOVING / REFITTING

- Remove the wheel.
- Remove the brake caliper and disks (see GROUP 33).
- 1. Remove the dust cover.
- 2. Slacken the fastening nut and remove the hub from the wheel upright.



### CHECKS AND INSPECTIONS



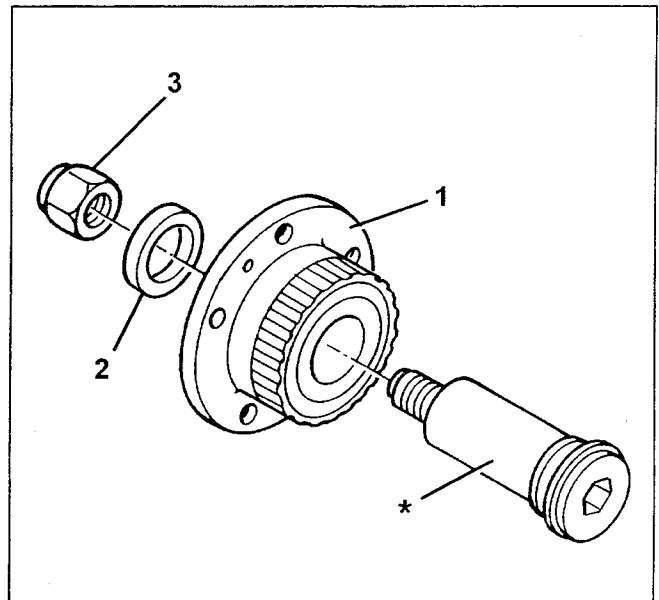
**CAUTION:**

When removing the nut fastening the upright, it is absolutely necessary to change the nut when refitting.

1. Check the wheel bearing splined inside the hub for wear. In the event of excessive play or noise, change the complete hub.
2. Check the spacer for wear and replace it if necessary.
3. Replace the wheel hub fastening nut.

NOTE: If necessary, check the pin (\*) for wear cracks or distortion and replace it if necessary.

N.B. To remove the pin from the wheel upright the use of a press is necessary as it is force-fitted.

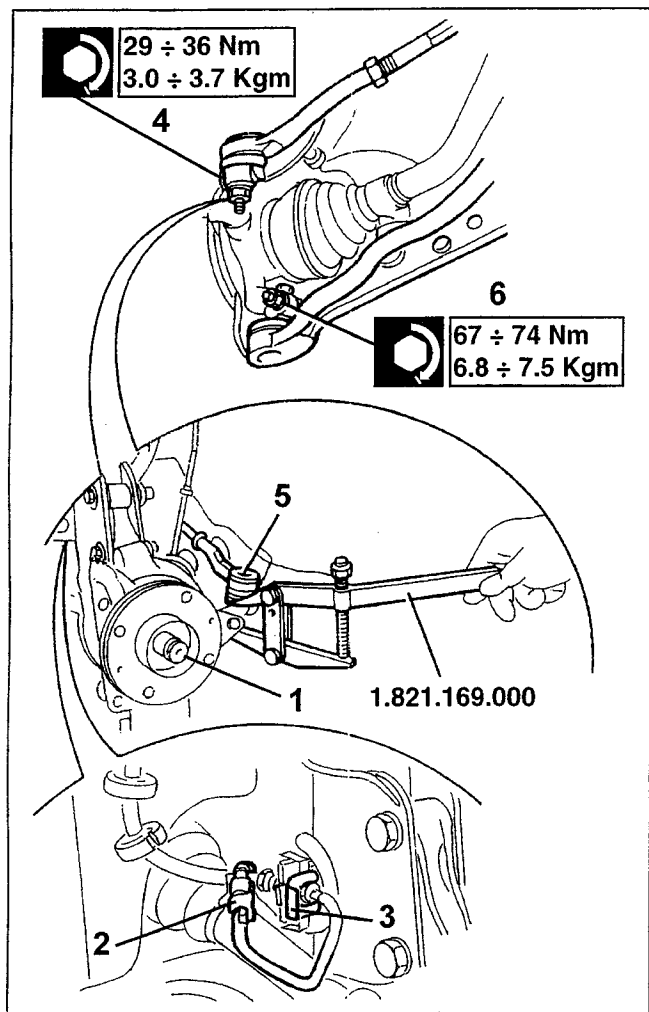


## WHEELS AND HUBS (Versions with ABS active sensors)

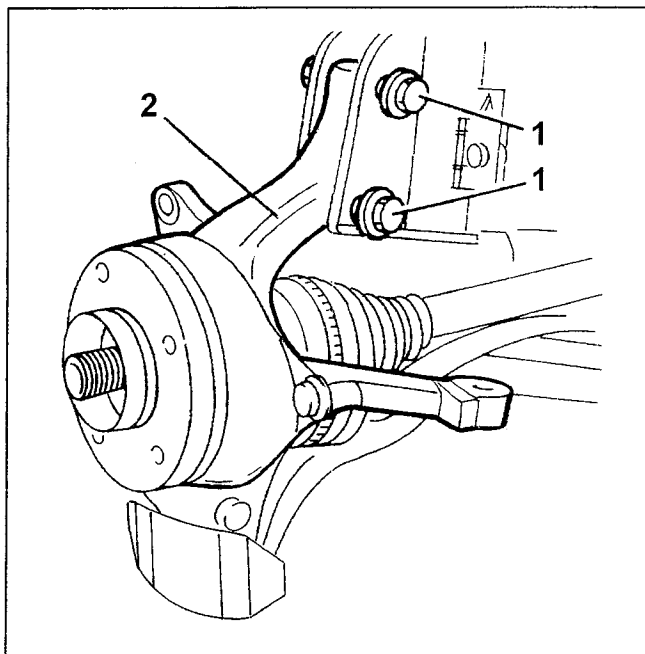
### FRONT STEERING KNUCKLE (6 cylinder version)

#### REMOVING/REFITTING

- Remove the wheel.
- 1. Remove the bevelling and undo the nut fixing the wheel hub to the constant velocity joint.
- 2. Disconnect the pad wear electrical connection.
- 3. Remove the retainer.
- Remove the complete caliper and move it aside, without disconnecting the braking system pipes (see GROUP 33).
- Remove the brake disc (See Group 33).
- 4. Undo the nut for the ball joint connecting the side steering rod to the steering knuckle.
- 5. Using tool N° 1.821.169.000, disconnect the ball joint from the steering knuckle.
- 6. Undo the bolt connecting the track control arm to the steering knuckle and remove it from the ball joint.



1. Undo the two bolts.
2. Remove the steering knuckle/wheel hub assembly.

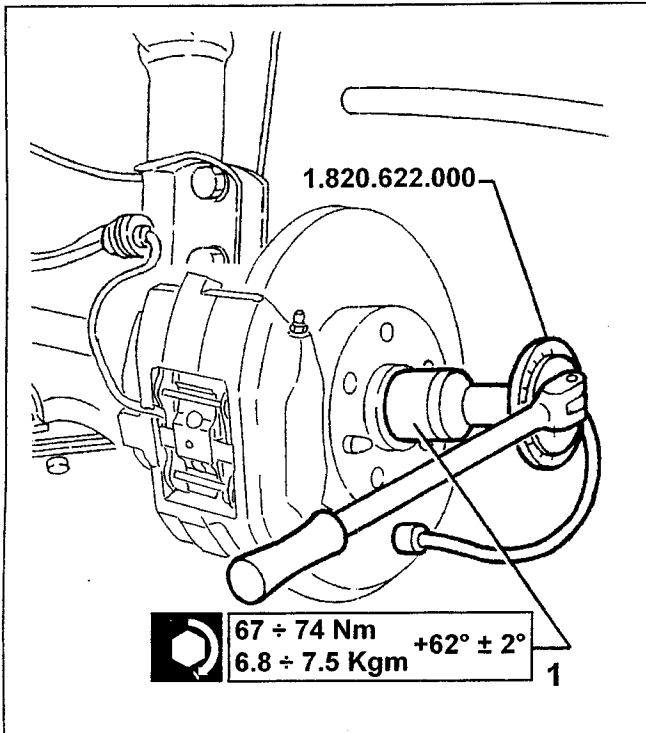


Proceed with the refitting, reversing the order of the operations carried out for the removal, tightening the nuts and bolts to the recommended torque and following the instructions below for staking the wheel hub fixing nuts and adjusting the position of the steering knuckle.

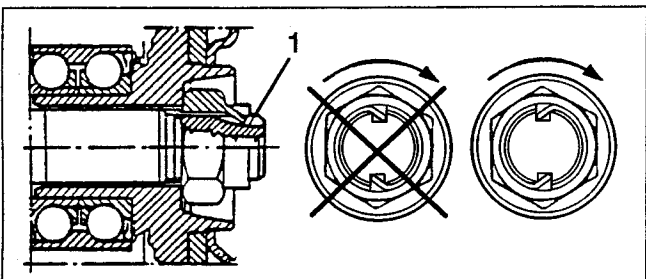
#### STAKING FRONT WHEEL HUB FIXING NUT

- Always use a new nut.
- Thoroughly clean the threaded end of the drive-shaft using a wire brush and then blow through with compressed air.
- Clean the thread of the nut and the element using ethyl alcohol or heptane.

1. Tighten the new nut to the recommended torque and then rotate the nut further as described using tool No. 1.820.622.000.



1. Using a chisel, stake the collar of the nut twice (the same as the nut which was removed).



**NOTE:** The cuts in the collar are made in the notch in the hub on the opposite side to which the nut is tightened: in this way, the safety element is more resistant to any accidental loosening.

### ADJUSTING FRONT SUSPENSION STEERING KNUCKLE POSITION

**NOTE** The operation described below, which must be carried out each time the two bolts fixing the steering knuckle to the shock absorber stem have to be loosened or removed, is aimed at keeping the wheel camber angle within the recommended limits by cancelling the clearance between the fixing bolts and the openings for the actual bolts (see specific paragraph).

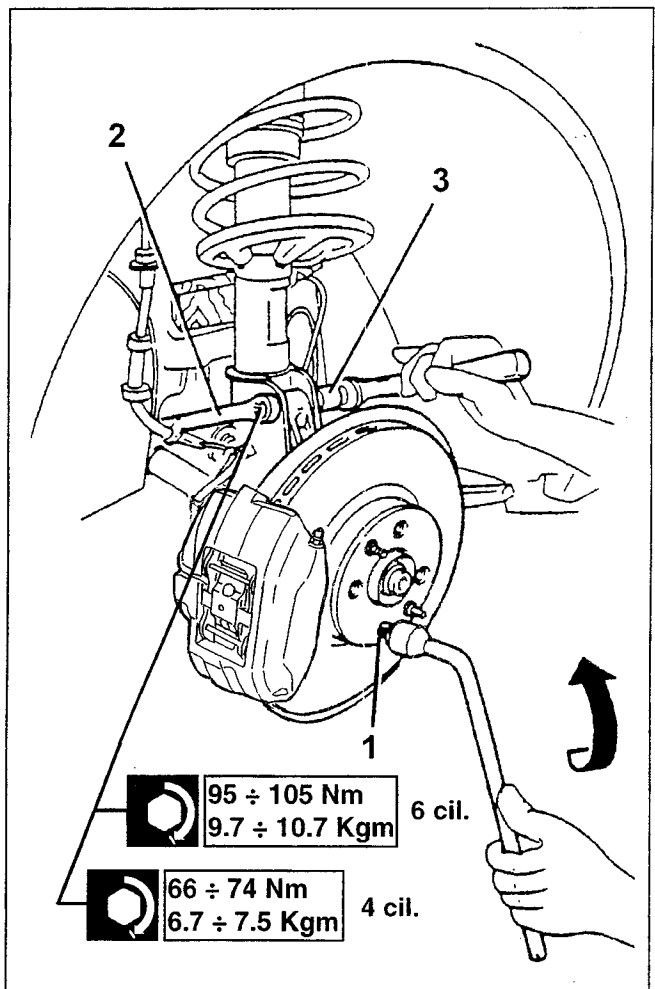
– Position a suitable wooden reaction element between the spring plate and the bodyshell.



**WARNING:**

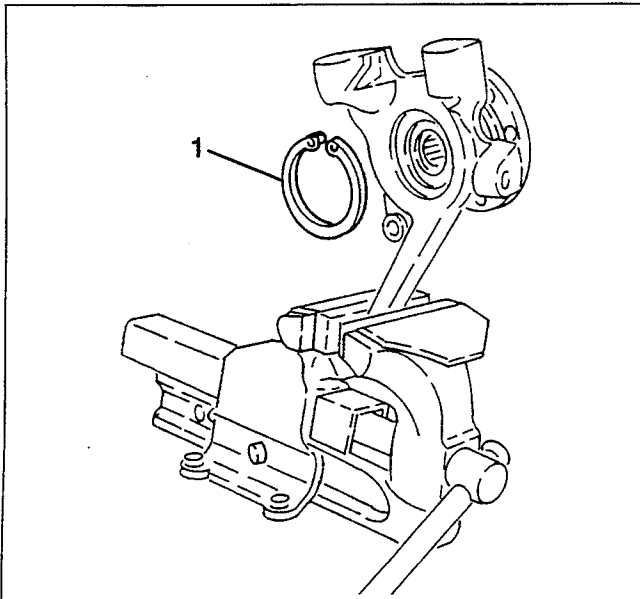
Make sure that the reaction element support point corresponds to the spring plate and not the coils because if that were the case it could cause involuntary movements and/or distortion of the actual spring during operation.

1. Temporarily position one of the wheel bolts and adjust it in the direction illustrated in the diagram using a spanner.
2. Position a fixed spanner in order to retain the fixing bolt nut.
3. Tighten the fixing bolts to the recommended torque.

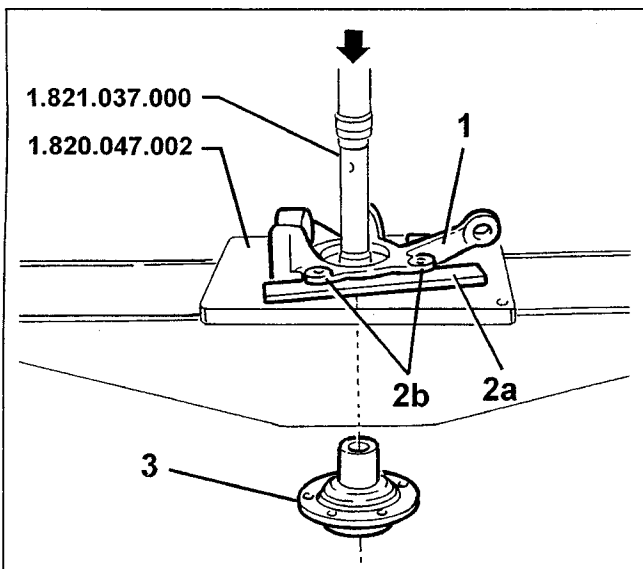


**DISMANTLING**

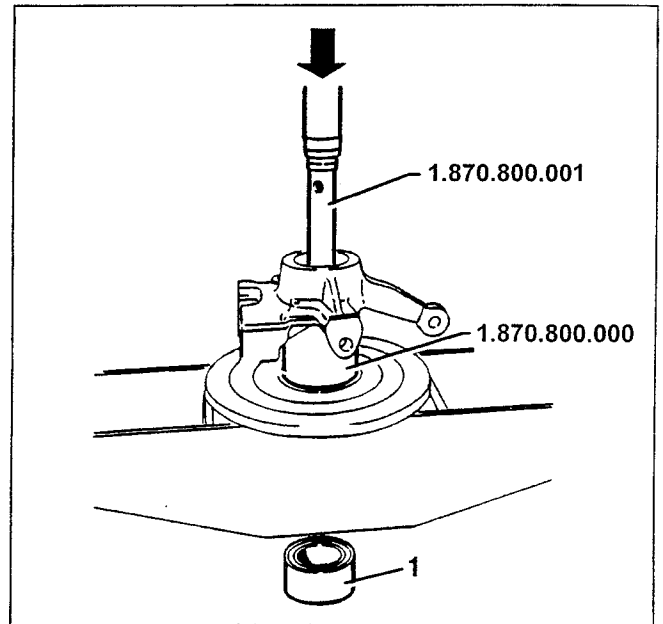
1. Tighten the steering knuckle/wheel hub assembly in a vice and remove the hub retaining circlip.



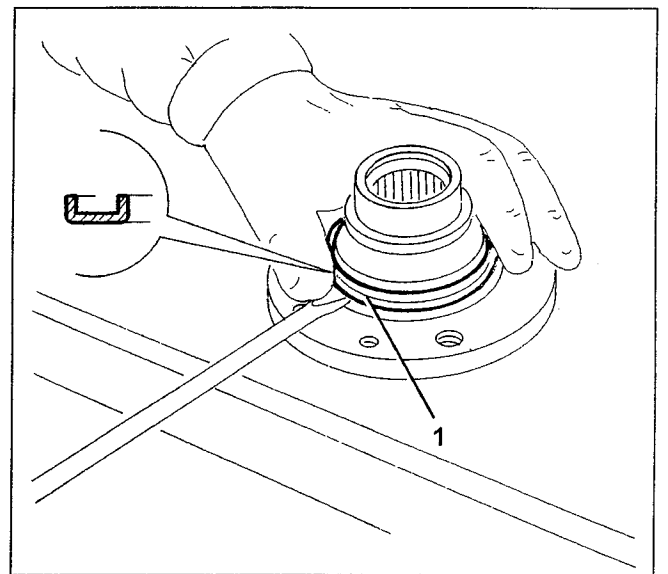
1. Position the steering knuckle/hub assembly on the press using plate N° 1.820.047.002.
2. Fit a suitable shim (2a), under the fixing tabs (2b), in order to ensure that the steering knuckle is in a flat position.
3. Working on the press, remove the wheel hub from the steering knuckle using extractor N° 1.821.037.000.



1. Working on the press, extract the bearing outer race from the steering knuckle using support N° 1.870.800.000 and extractor N° 1.870.800.001.



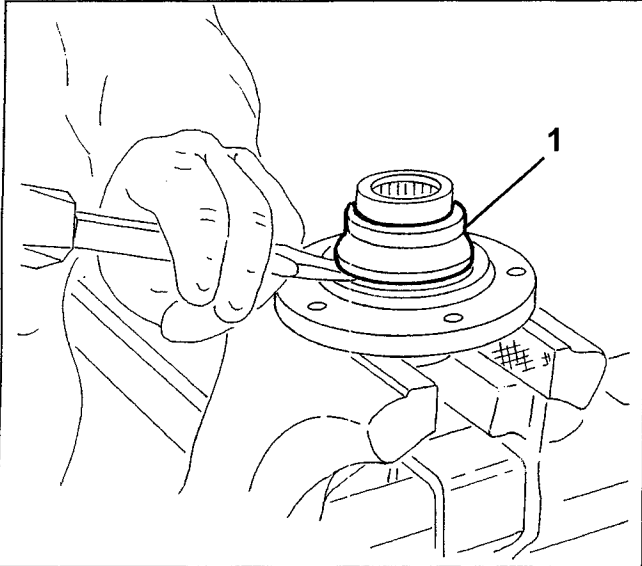
1. Using a screwdriver, remove the dust seal from the wheel hub.



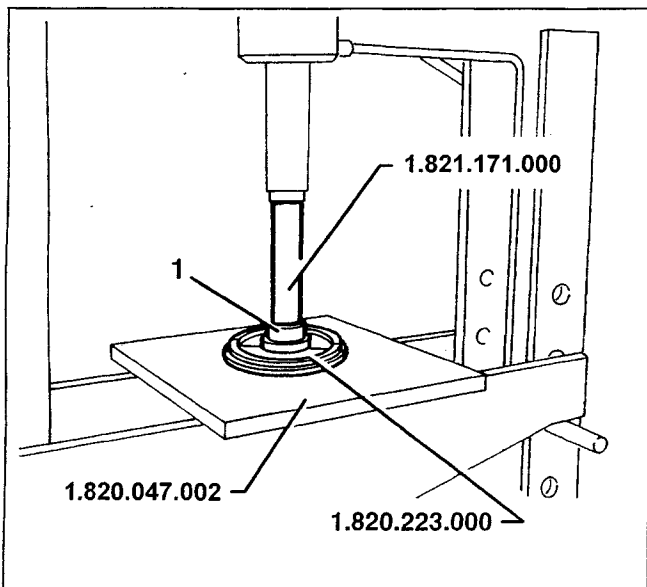
**WARNING:** suitable protective clothing (protective goggles) must be worn for the next operation involving the use of a chisel.

1. Using a suitable chisel, move the bearing inner race away from the wheel hub.

**NOTE:** the inner race must be moved sufficiently to allow the plate described in the next point to be inserted.



1. Working on the press and using plate N° 1.820.047.002, half-rings N° 1.820.223.000 and extractor (grip) N° 1.821.171.000, remove the bearing inner race from the wheel hub.

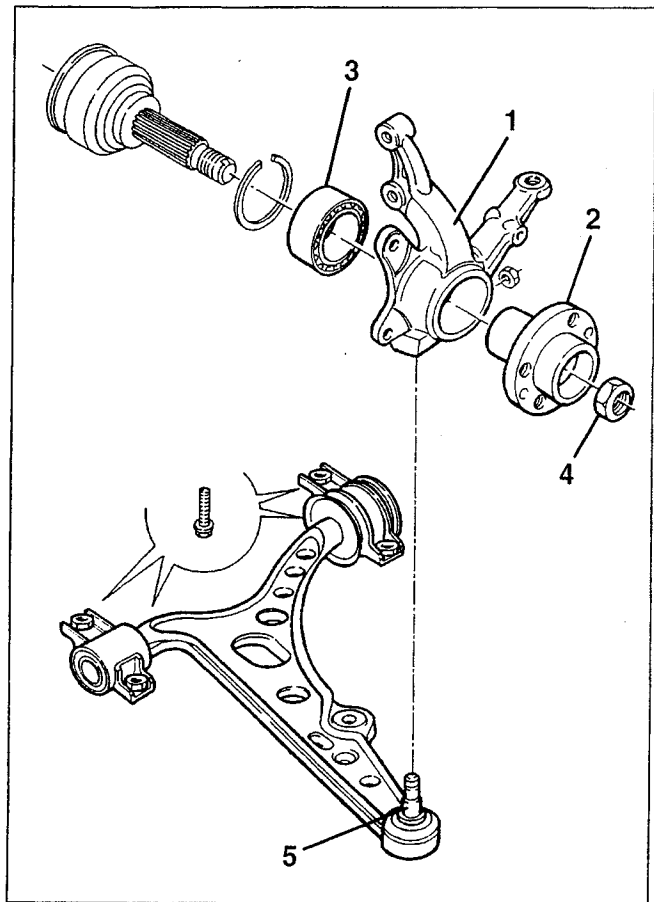


if this is not the case, proceed with replacing the wheel hub.

3. Check the rolling bearing for signs of cracks, seizing or sticking; if necessary, replace the bearing.

4. Proceed with replacing the nut securing the constant velocity joint before refitting.

5. Check the condition of the ball joint fixing the steering knuckle to the track control arm looking for distortions, excess wear, cracks, sticking or signs of oxidation and, if necessary, replace the ball joint.



### INSPECTIONS AND CHECKS

1. Check that the inner surfaces of the steering knuckle do not show signs of seizing, that the arms are not damaged and do not show signs of impact, distortions or breaks; if this is not the case, proceed with replacing the steering knuckle.

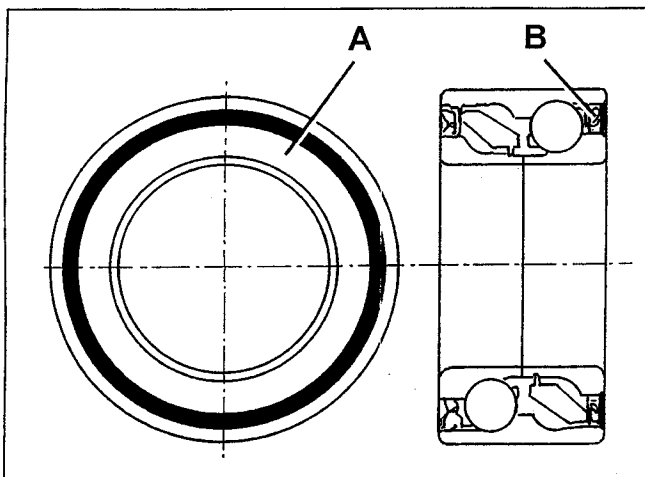
2. Check that the surfaces of the wheel hub are not damaged and do not show signs of impact or breaks;

**REASSEMBLY**

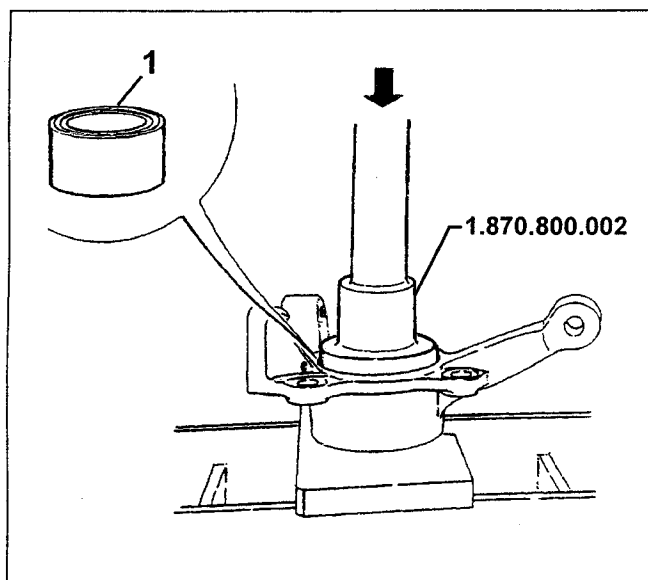


**WARNING:**  
For fitting bearing (A) with multi-pole magnetic codifier (B)

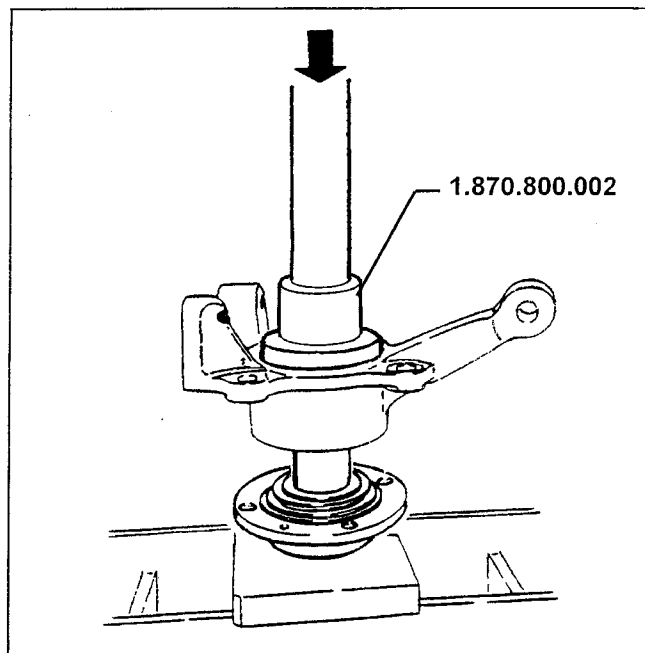
- Remove the plastic protection for the magnetic codifier (B) (black) just before fitting the bearing.
- The bearing should be fitted with the magnetic codifier facing towards the ABS sensor.
- Avoid any impacts to the magnetic codifier.
- Do not get the surface of the magnetic codifier dirty.
- Avoid any contact between the magnetic codifier and magnetic sources.
- At the end of the magnetic codifier fitting operation, check that it is clean, if not clean it with a clean cloth.



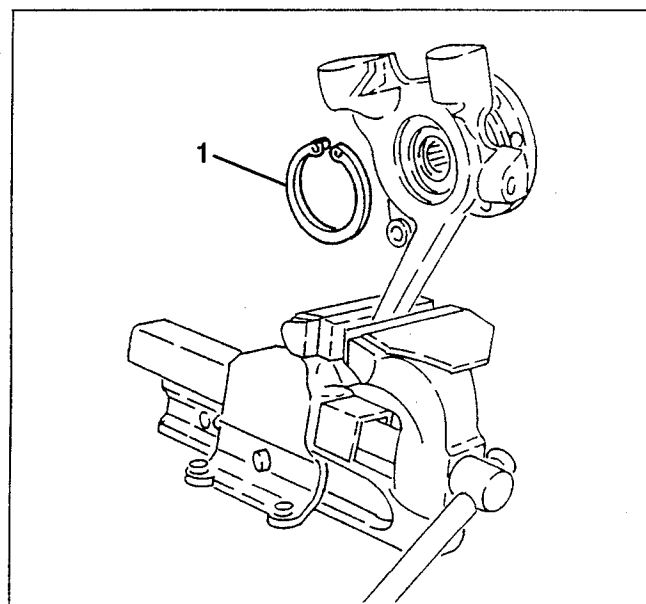
1. Working on the press and using tool N° 1.870.800.002, fit the bearing on the steering knuckle.



1. Working on the press and using tool N° 1.870.800.002, fit the hub on the steering knuckle.



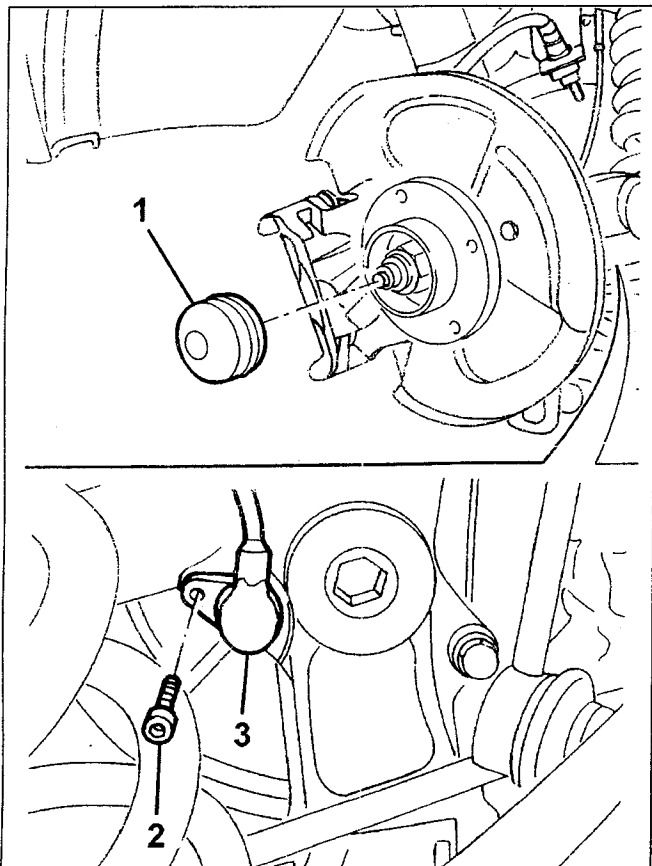
1. Fit the bearing retaining circlip in the housing in the steering knuckle.



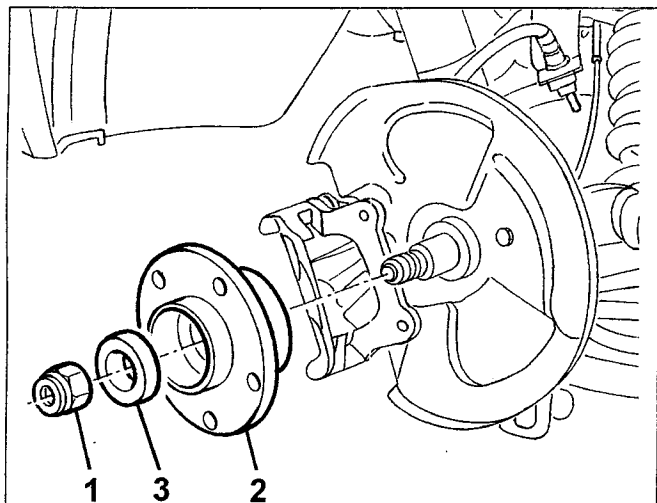
**REAR WHEEL HUB  
(6 Cylinder Version)**

**REMOVING / REFITTING**

- Remove the wheel.
- Remove the brake calipers and discs (see GROUP 33)
- 1. Remove the protective dust cover.
- 2. Undo the bolt fixing the active sensor.
- 3. Remove the active sensor from the housing.



1. Undo the nut fixing the hub.
2. Remove the hub from the steering knuckle.
3. Recover the spacer.

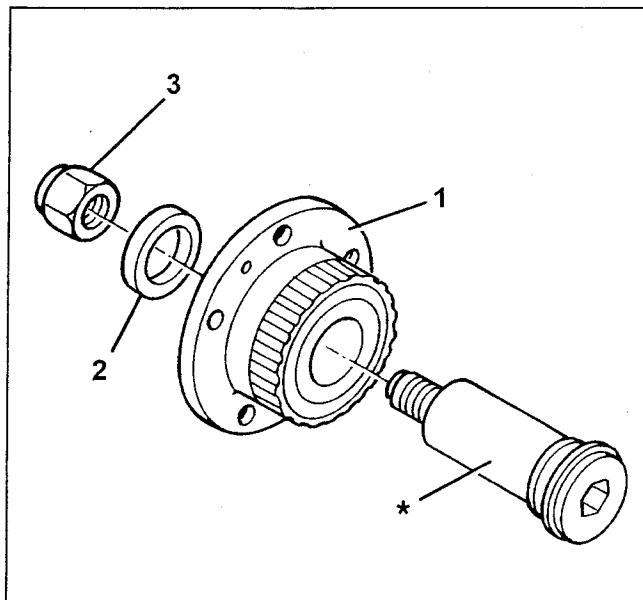


**INSPECTIONS AND CHECKS**



**WARNING:**  
If the steering knuckle fixing nut is removed, it is vital for this nut to be replaced when refitting.

1. Check the wheel bearing fitted inside the hub for wear. If there is excess wear or excess noise, the complete hub should be replaced.
  2. Check the spacer for wear and, if necessary, replace it.
  3. Proceed with replacing the wheel hub fixing nut.
- NOTE: If necessary, check the bearing (\*) for wear, cracks or distortions and, if necessary, replace it.
- N.B. A press must be used in order to remove the bearing from the steering knuckle because it is a forced fit.



Proceed with the refitting, reversing the order of the operations carried out for the removal.



## WHEELS

The wheels (rims and tyres) are the most suitable ones for the features of the car and ensure the highest degree of safety and comfort under all normal conditions of driving. Before changing the rims and tyres installed on the vehicle always consult the table of the types allowed. Always keep to the original rim-tyre match.

### RIMS

The steel or alloy rims must be installed using specific studs for each type of rim.

Therefore, when replacing steel rims with alloy rims or vice-versa, it is absolutely necessary to use the specific studs for the type of wheel fitted.

### TYRES

The tyres fitted on the vehicle are "tubeless", i.e. without inner tube. In order to maintain driving comfort, and ensure long life of the tyres, it is advisable to:

- Pay attention to the balancing of the wheels and the correct balancing of the front and rear carriage.
- Do not insert tools of any kind between the rim and the tyre.
- If the rim is distorted, change it.
- When balancing use specific counterweights for tubeless tyres.
- The tyre pressure (including the spare wheel) must be as specified.
- With tubeless tyres no inner tube must be used.

To ensure uniform wear between the front and rear wheels, it is advisable to switch the tyres between the axles every 10.000 - 15.000 km keeping them on the same side of the car to avoid inverting the direction of rotation.



**CAUTION:**  
Do not cross the tyres over.

Some types of tyres have wear indicators; they must be changed as soon as these indicators can be seen on the tread.

Also check the tyres for uneven wear of the tread.

Tread wear gradually increases the risk of aquaplaning on wet surfaces.

Violent shocks against kerbs, holes in the road and obstacles of various kinds, as well as prolonged driving on rough roads may cause damage to the tyres that may not always be easily visible.

This results in swelling, distortion or cuts on the side of the tyre that often cannot be seen, but which can cause deflation or bursting of the tyre.

## TYRE PRESSURE AND WEAR

The observance of the correct tyre pressure not only determines the life of the tyre, but also driving safety as it affects roadholding of the actual vehicle.

The pressure of each tyre, including the spare, must be checked at regular intervals and before long journeys.

The tyre pressure should be checked cold; use a pressure gauge keeping to the specified ratings.

Incorrect pressure causes abnormal wear of tyres:

### A. Normal pressure

The correct inflating pressure of the tyre ensures maximum life on its whole width and wear is more even.

This condition also involves:

- Better vehicle roadholding.
- The highest degree of steering smoothness and accuracy
- Lower fuel consumption, due to the lower resistance to roll of the wheel.

### B. Low pressure

A low tyre pressure causes uneven wear of the tread (higher on the side bands) and overheating can lead to the detachment of parts of the tyre and cause damage to the carcass. Such damage may cause sudden swelling or bursting of the tyre.

### C. Excessive pressure

Excessive pressure involves:

- Uneven tread wear, more accentuated in the centre.
- Lower comfort of the vehicle.
- Higher vulnerability of the car.

## WHEEL BALANCING

Each wheel, complete with tyre, has been balanced dynamically and statically in the factory. When changing tyres the wheels must be re-balanced, to avoid unstable driving, wear of the steering components and uneven wear of the tyres.



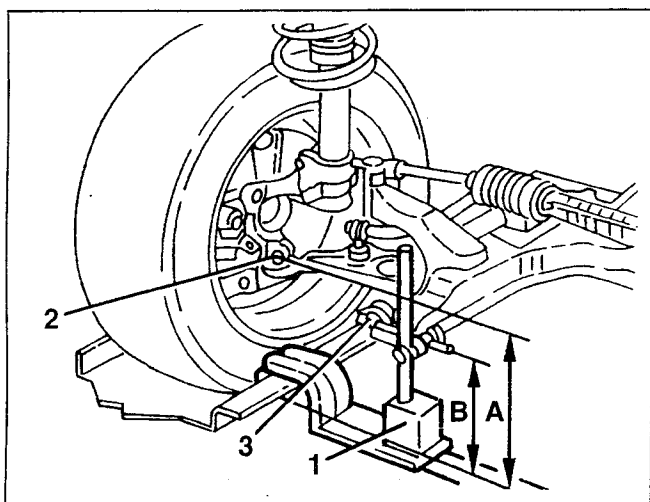
**WARNING:**  
For balancing light alloy wheels only use original Alfa Romeo counter-weights.

## WHEEL ALIGNMENT

### CHECKING THE FRONT WHEEL ALIGNMENT

- Inflate the tyres to the specified pressure.
- Fill with fuel and the specified oils and fluids.
- Set the car on a lift.
- Sway the car a few times to settle the suspensions.

1. Position the reference tool on the on the car resting surface.
2. Using a surface gauge measure the distance "A" between the car resting surface and the centre of the steering knuckle fastening screw.
  - With the help of a millimetred rule measure the distance found.
3. Using the surface gauge measure the distance "B" between the car resting surface and the centre of the wishbone pin.
  - With the help of the millimetred rule measure the distance found.



- Calculate the difference between dimension "B" and dimension "A" and check that it is with the specified limits.



Front alignment B-A		
SPIDER 3.0 V6	SPIDER 1.8 T.S. 16v 2.0 T.S. 16v	GTV 1.8 T.S. 16v 2.0 T.S. 16v
-36 ± 5 mm*	-33 ± 5 mm*	-32 ± 5 mm*
-46 ± 5 mm**	-42 ± 5 mm**	-43 ± 5 mm**

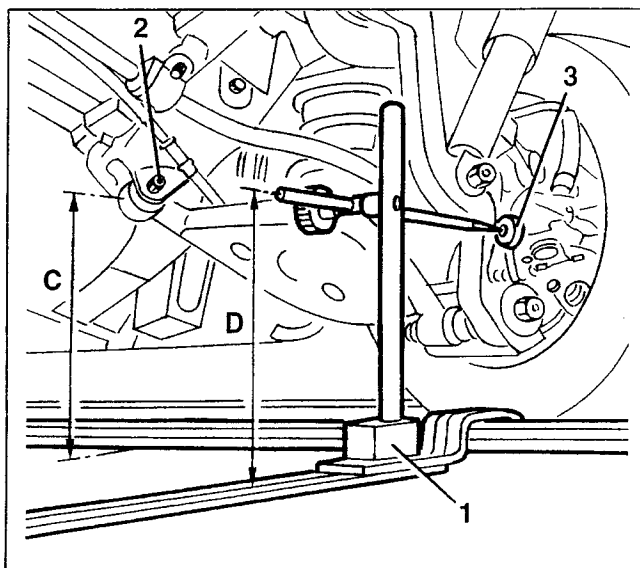
\* To '97 versions  
\*\* '98 versions

**NOTE:** If the alignment values are not within the specified values change both suspension springs.

### CHECKING THE REAR WHEEL ALIGNMENT

- Inflate the tyres to the specified pressure.
- Fill with fuel and the specified oils and fluids
- Set the car on a lift.
- Sway the car a few times to settle the suspensions.

1. Position the reference tool on the car resting surface.
2. Using a surface gauge measure the distance "C" between the car resting surface and the fulcrum of the spring carrier arm.
  - With the help of a millimetred rule measure the distance found.
3. Using the surface gauge measure the distance "D" between the car resting surface and the rear wheel centre.
  - With the help of the millimetred rule measure the distance found.



- Calculate the difference between dimension "C" and dimension "D" and check that it is with the specified limits.



Rear alignment C - D		
SPIDER 3.0 V6	SPIDER 1.8 T.S. 16v 2.0 T.S. 16v	GTV 1.8 T.S. 16v 2.0 T.S. 16v
-74 ± 5 mm*	-74 ± 5 mm*	-77 ± 5 mm*
-72 ± 3 mm**	-74 ± 5 mm**	-77 ± 5 mm**

\* To '97 versions  
\*\* '98 versions

**NOTE:** If the alignment values are not within the specified values change both suspension springs.

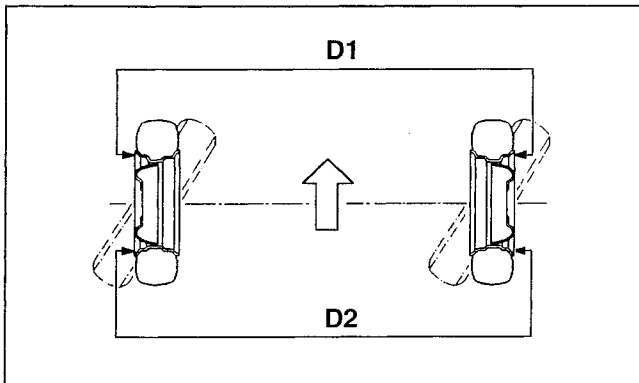
## CHECKING THE CHARACTERISTIC ANGLES

### Preliminary operations

- Inflate the tyres to the specified pressure.
- Fill with fuel and the specified oils and fluids.
- Check that the eccentricity and orthogonality of the wheel rims does not exceed:
  - 1 mm for steel rims
  - 0.3 mm for alloy rims

### CHECKING THE FRONT WHEEL TOE-IN

- Using suitable tools, check that the toe-in is within the specified limits.



Front wheel toe-in D2 - D1	
SPIDER - GTV	
-1.5 ± 0.5 mm*	
-2.0 ± 0.5 mm**	

\* To '97 versions  
\*\* '98 versions

If the toe-in is other than specified, proceed as follows:  
1. Slacken the fastenings for adjusting the track rods.

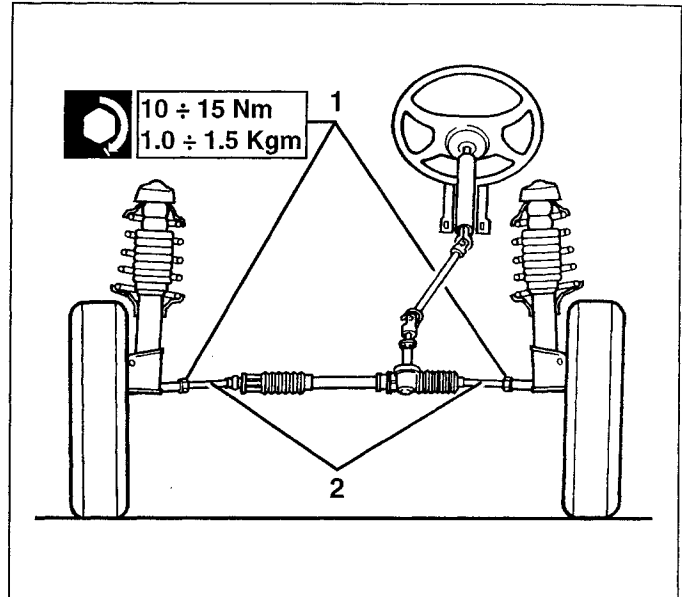


**WARNING:**  
Each time the front wheel toe-in is adjusted, it is necessary to check that the boots turn freely on the rod and if necessary remove them and lubricate with the specified grease.

2. Turn the rods, until reaching the specified value without changing the position of the steering wheel spokes

**NOTE:** Adjustment should be carried out on the rods of both wheels.

- Tighten the track rod adjustment fastenings to the specified torque.



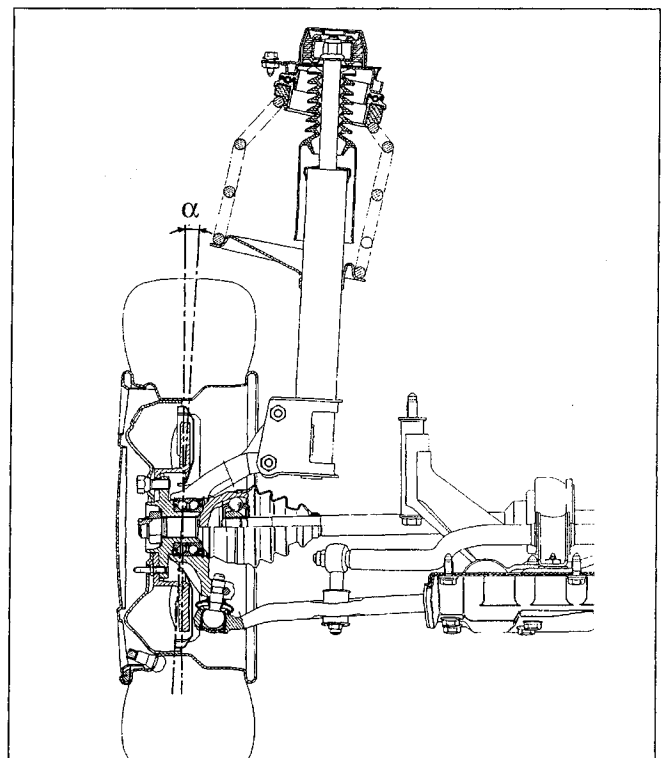
### CHECKING THE FRONT WHEEL CAMBER AND CASTER

- Check that the camber and caster angles (not adjustable) are within the specified limits.



Front wheel camber "α"		
	SPIDER	GTV
3.0 V6	1.8 T.S. 16v 2.0 T.S. 16v	1.8 T.S. 16v 2.0 T.S. 16v
	-0°39' ± 20*	-0°39' ± 20'
	-0°56' ± 20**	-0°30' ± 20**

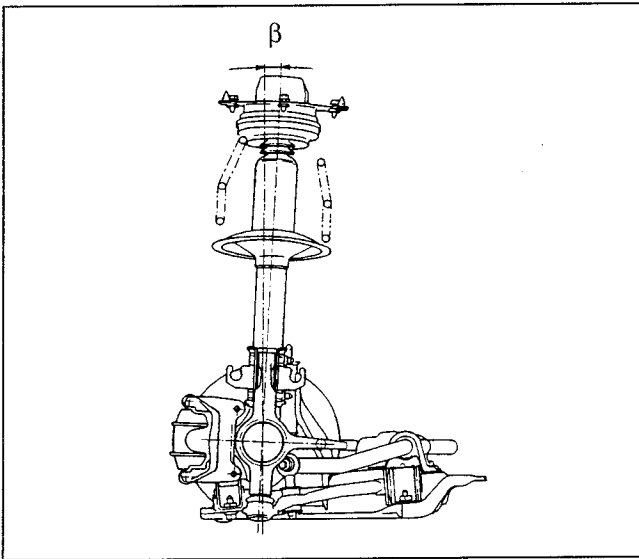
\* To '97 versions  
\*\* '98 versions





Caster "β"		
SPIDER		GTV
3.0 V6	1.8 T.S. 16v 2.0 T.S. 16v	1.8 T.S. 16v 2.0 T.S. 16v
3°8' ± 30'*	3°9' ± 30'*	3°12' ± 30'*
2°45' ± 30'***	2°55' ± 30'***	2°59' ± 30'***

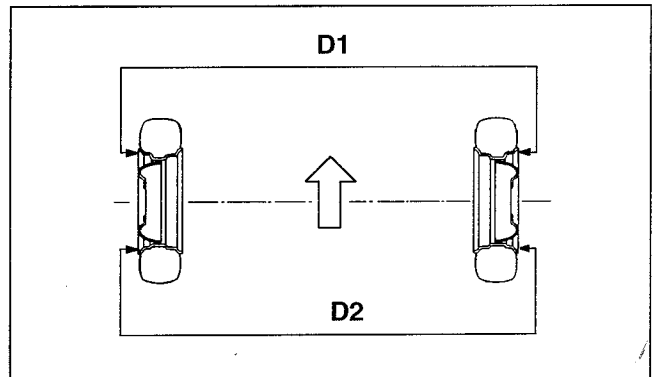
\* To '97 versions  
\*\* '98 versions



**NOTE:** If the values are not within the specified limits, body squaring should be checked (see GROUP 70).

**CHECKING THE REAR WHEEL TOE-IN**

– Using suitable tools, check that the toe-in is within the specified limits.



Rear wheel toe-in D2 - D1
SPIDER - GTV
+2.5 ± 0.5 mm*
+3.0 ± 0.5 mm**

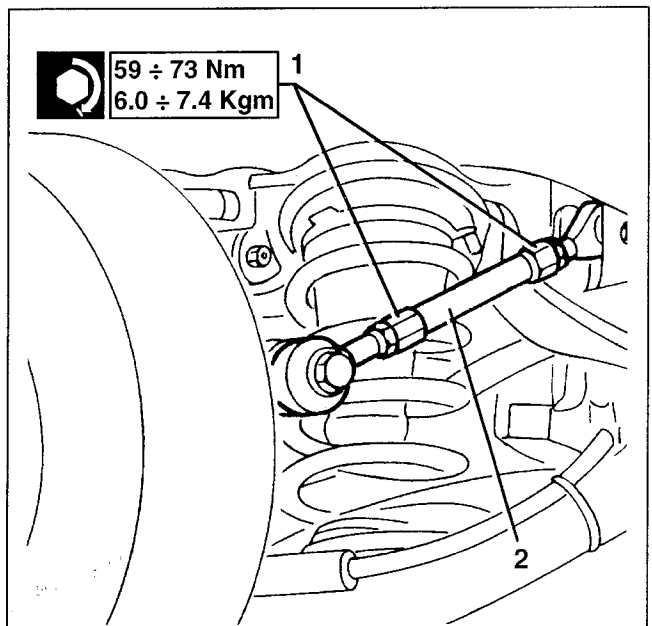
\* To '97 versions  
\*\* '98 versions

If the toe-in is other than specified proceed as follows:

1. Slacken the fastenings of the adjustment rods.
2. Turn the rods, until reaching the specified value

**NOTE:** Adjustment should be carried out working on the rods of both wheels.

– Tighten the rod fastenings to the specified torque.



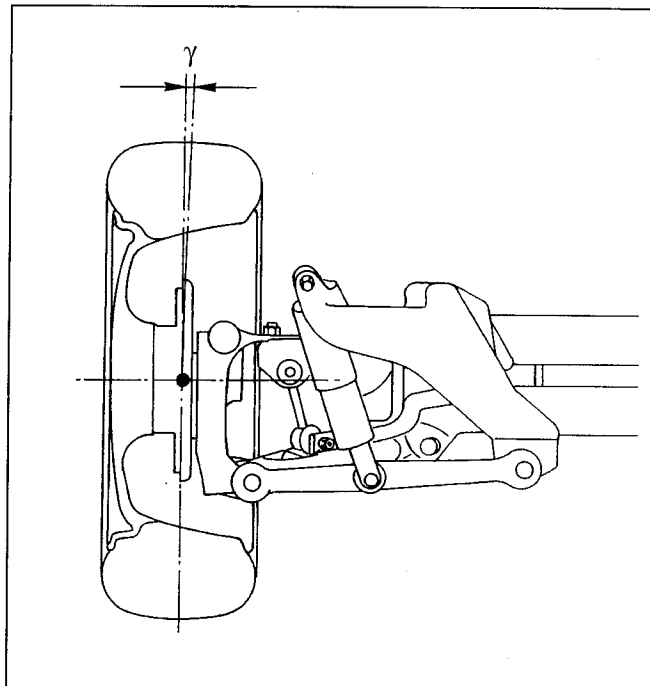
**CHECKING THE REAR WHEEL CAMBER**

– Check that the camber angle (not adjustable) is within the specified limit.



Rear wheel camber "γ"		
	SPIDER	GTV
3.0 V6	1.8 T.S. 16v 2.0 T.S. 16v	1.8 T.S. 16v 2.0 T.S. 16v
-1°10' ± 20'*	-1°5' ± 20' *	-1°8' ± 20'*
-0°52' ± 20'**	-0°59' ± 20' **	-1°14' ± 20'**

\* To '97 versions  
 \*\* '98 versions



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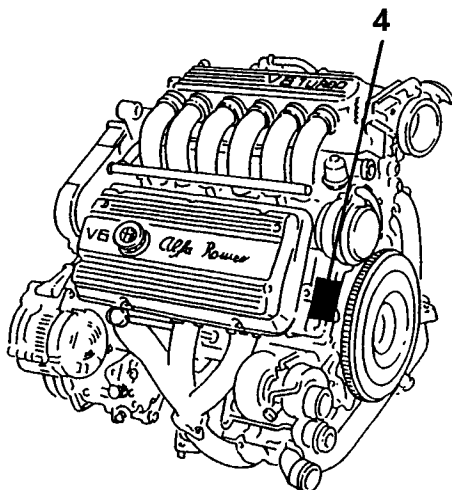
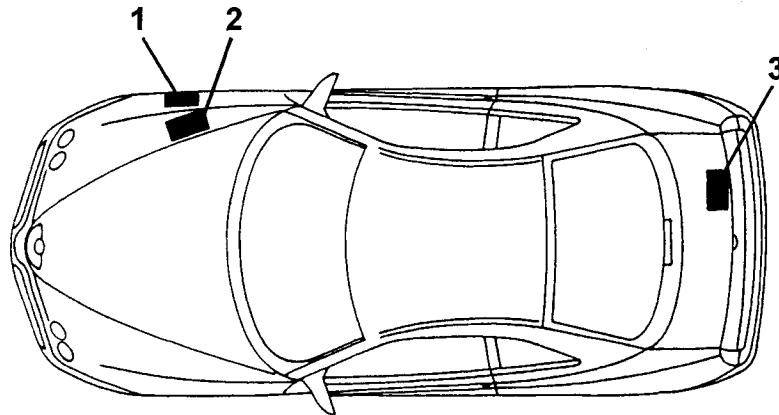
- Checking the front wheel alignment ..... 1
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FOR THE INFORMATION NOT GIVEN HEREIN,  
REFER TO THE CORRESPONDING GROUP OF  
"SPIDER-GTV".  
THE REFERENCE ENGINE IS THE "6 CYLINDER "  
(3.0 V6 ENGINE)

### MODEL IDENTIFICATION

<b>Brand name</b>	GTV V6 TB
<b>Version</b>	Coupé
<b>Version (on identification plate)</b>	916C2A
<b>Chassis (in engine compartment, on upper right-hand shock absorber bracket)</b>	-
<b>Progressive chassis number</b>	6000001
<b>Engine (code)</b>	AR 16202
<b>Engine symbol</b>	1996 TB
<b>Gearbox (code)</b>	C.503.5.29.21

### IDENTIFICATION PLATE LOCATION




1. Identification data plate
2. Chassis marking
3. Paintwork identification plate
4. Engine marking



### IDENTIFICATION DATA PLATE

The plate is applied in the engine compartment on the upper left-hand shock absorber bracket. It contains the following data:

	(F)
	(A)
	(B)
	(C)
	(C)
	1 - (C)
2 - (C)	
(E)	MOTORE - ENGINE (D)
	VERSIONE - VERSION (D)
	N° PER RICAMBI N° FOR SPARES (D)

- A. National homologation
- B. Chassis number punch mark
- C. Maximum authorised weights prescribed by national laws, where relevant
- D. Version identification (e.g. 916C2A) Version identification
- E. Smokiness
- F. Manufacturer's name punch mark

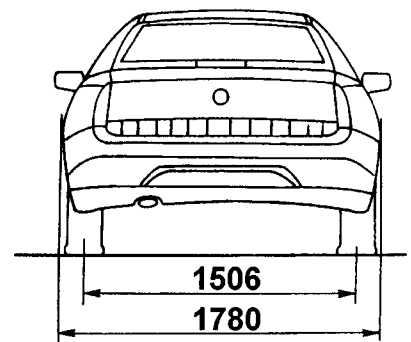
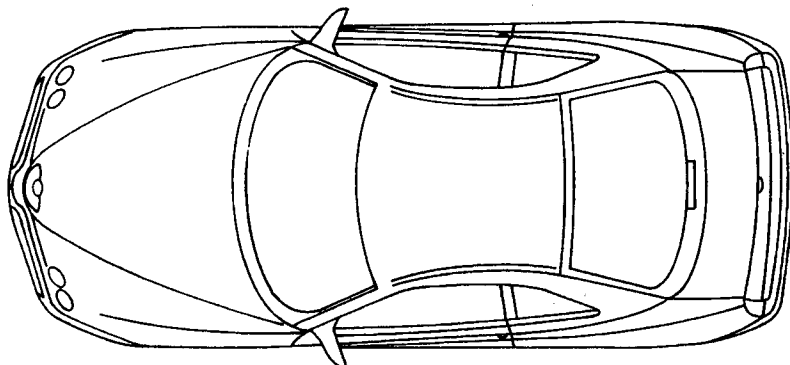
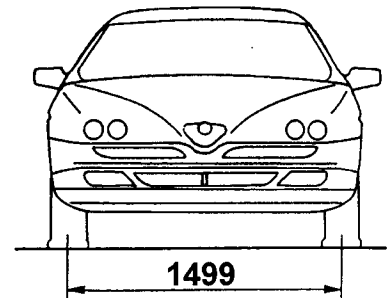
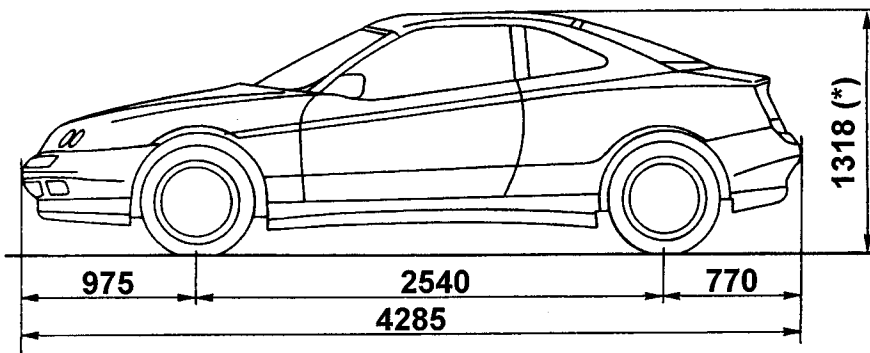
### PAINTWORK IDENTIFICATION PLATE

This plate is applied on the inside of the boot and contains the following data:

Verniciatura originale Peinture originale/Original painting Originallackierung/Pintado original	A
Colore/Tinta/Colour Farbton/Color	B
Codice/Code/Codigo	C
PER RITOCCHI E RIVERNICIATURE	D

- A. Paint manufacturer
- B. Colour name
- C. Colour code
- D. Touch-up and re-spray code

### DIMENSIONS



(\*): Unladen vehicle  
PA497200000009

**WEIGHTS AND LOADS**

Unit: kg

Features		Version	916C2A
Kerb weight (without driver)			1430
Maximum admitted load			1820
Load			390
Maximum weight allowed on each axle	front		1060
	rear		870
Towable weight	trailer with brakes		1000
	trailer without brakes		500
Maximum load on tow hitch			50

**WHEELS AND TYRES**

Features		Versions	916C2A	916C2A '98 models
Rim size	standard		6.5J x 16" (alloy)	
	optional		-	7.5J x 17" (alloy)
Tyre size	standard		205/50 ZR16	205/50 R16 87Y
	optional		-	225/45 ZR17 91Y (*)
Tyre pressure (cold)		bar (kg/cm <sup>2</sup> )	front 2.7 rear 2.5	
Space saver spare wheel	Rim size		4J x 15" (steel)	4J x 15" C26
	Tyre size		T125/80 R15 96M	
	Tyre pressure	bar (kg/cm <sup>2</sup> )	4.2	

(\*): Snow chains cannot be fitted on these tyres.

**IMPORTANT:**
**Increase pressure by 0.3 bar in the event of constant driving at top speed.**

**FLUIDS AND LUBRICANTS**

Type	Assembly ref.	Application	Classification	Name
OIL	10 - Engine	Engine (filling)	API SJ CCMCG5 ACEA A3-96 SAE 10W/40	SELENIA 20 K (*)
	21 - Gearbox	Gearbox-differential (filling)	API GL-5 SAE 75W 90	TUTELA ZC 75 SYNTH
	50 - Add. units	Compressor (filling)	-	SANDEN SP 10 "PAG"
FLUID	10 - Engine	Cooling circuit (filling)	-	ALFA ROMEO CLIMAFLUID SUPER PERMANENT -40°C
	18 - Clutch	Hydraulic brake-clutch circuit (filling)	DOT 4	ALFA ROMEO BRAKE FLUID SUPER DOT 4
	33 - Brakes		SAE J 1703 F	
	41 - Steering	Power steering (filling)	G.M. DEXRON II	TUTELA GI/A
	50 - Additional units	Climate control system (filling)	-	RIVOIRA: SUVA R134a HOECHST - TAZZETTI: FRIGEN R134a ICI - TAZZETTI: KLEA R134a
GREASE	18 - Clutch	Clutch thrust bearing and lever	-	TUTELA MR3
		Clutch cylinder strut		
	21 - Gearbox	Gear engage rod and ball lever bushings	-	TUTELA ZETA 2 ISECO MOLYKOTE LONGTERM N. 2 OPTIMOL PU 035
	27 - Front axle	Drive shaft CV joints	-	BERUTOX GKN HTB
	33 - Brakes	Pedal board joints and bushing	-	TUTELA ZETA 2
ABS inductive sensor seats				

(\*): For sportier use, we recommend **SELENIA Racing 10W/60** fully synthetic engine oil.

**FLUIDS AND LUBRICANTS (Continued)**

Type	Assembly ref.	Application	Classification	Name
GREASE	41 - Steering	Roller bushing seat on steering column	-	SPCA SPAGRAPH
				ISECO ERGON RUBBER GREASE
	44 - Suspensions and wheels	Wishbone brackets	-	REINACH SFERUL B2 AR
GREASE MOLYKOTE 7544 PG54				
		Side steering linkage	-	TUTELA MR3 MOLYGUARD SYL 113

**INDICATIVE CAPACITIES**

Capacity	Version	916C2A
Fuel tank		70 litres
Fuel reserve		~ 9 litres
Engine oil	Sump + filter (for regular replacement)	6.5 litres
Gearbox-differential oil		2 litres
Power steering system oil		1.3 kg
Brake and clutch circuit oil		0.4 kg
Engine coolant		11.7 litres
Climate control compressor oil		240 ± 15 cm <sup>3</sup>
Climate control system fluid		0.700 kg + 0.05 kg (1)

(1): Additional amount to be computed considering the fluid which remains the recharge device lines.