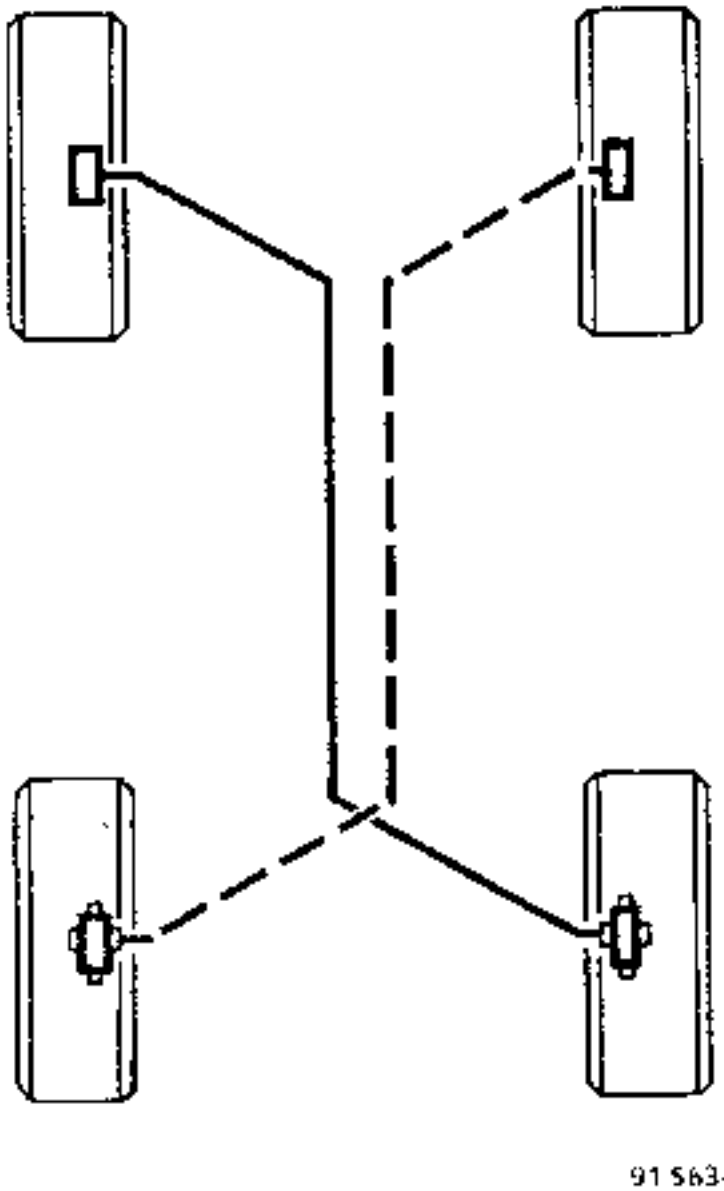
NOTE : the following diagram shows a general principle; it should never be used as a reference for circuit take-offs or allocation. When replacing one of the components of the braking circuit on a vehicle, always mark the pipes before removing to ensure they are reconnected in their original positions.

"X" CIRCUIT BRAKING
with fixed integral compensator in the wheel cylinder



91 563-3 S

X063

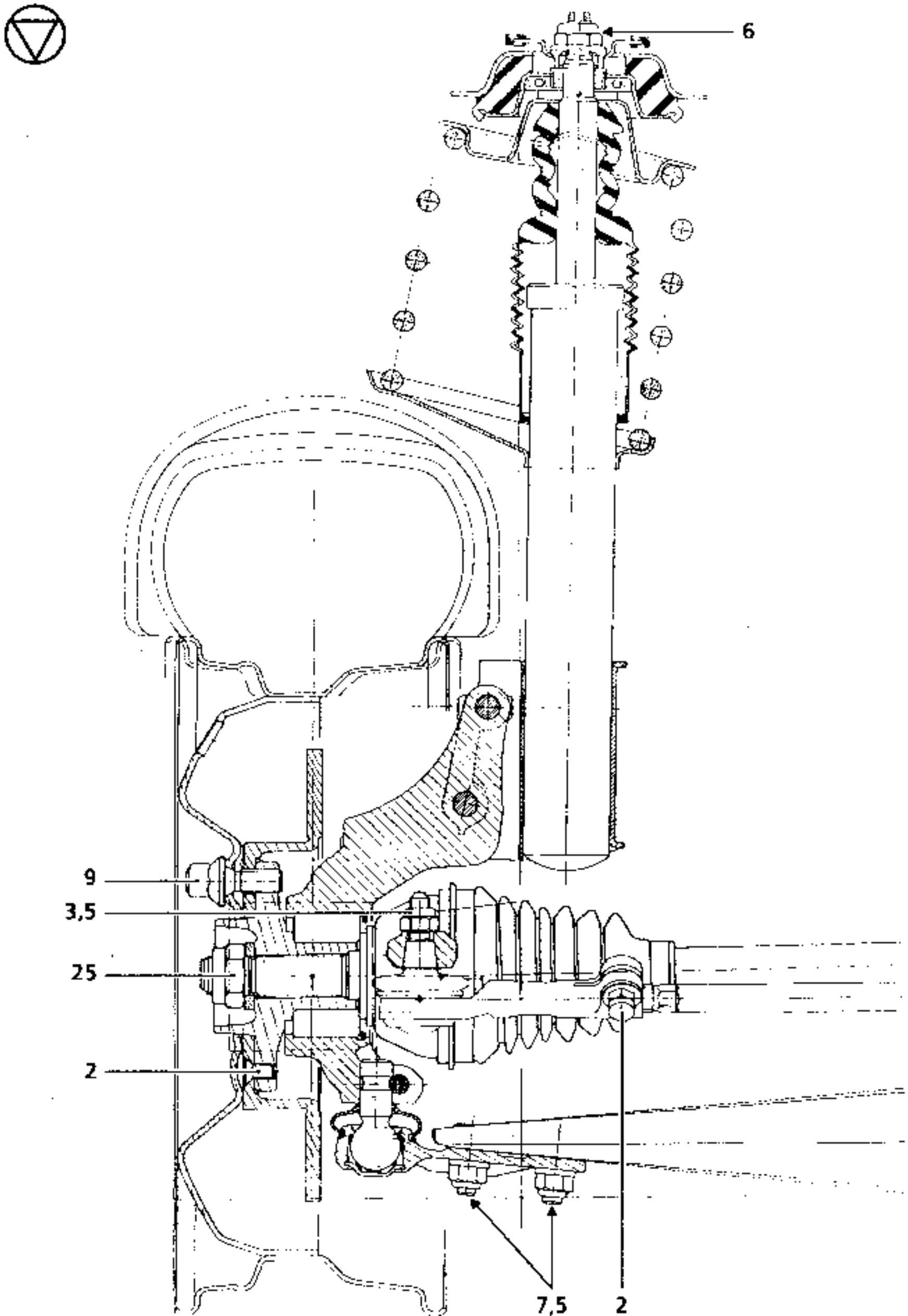
	C063
FRONT BRAKES (dimensions in mm)	
Diameter of slave cylinders	45
Diameter of discs	238
Thickness of discs	8
Minimum disc thickness*	7
Thickness of pads (including backing)	15
Minimum thickness of pads (including backing)	6
Maximum disc run-out	0,07

REAR BRAKES (dimensions in mm)	
Diameter of slave cylinders	20,6
Diameter of drums	180,25
Minimum drum diameter after regrinding	181,25
Shoe width	40
Thickness of shoes (including backing)	6,5
Minimum thickness of shoes (including backing)	2,5

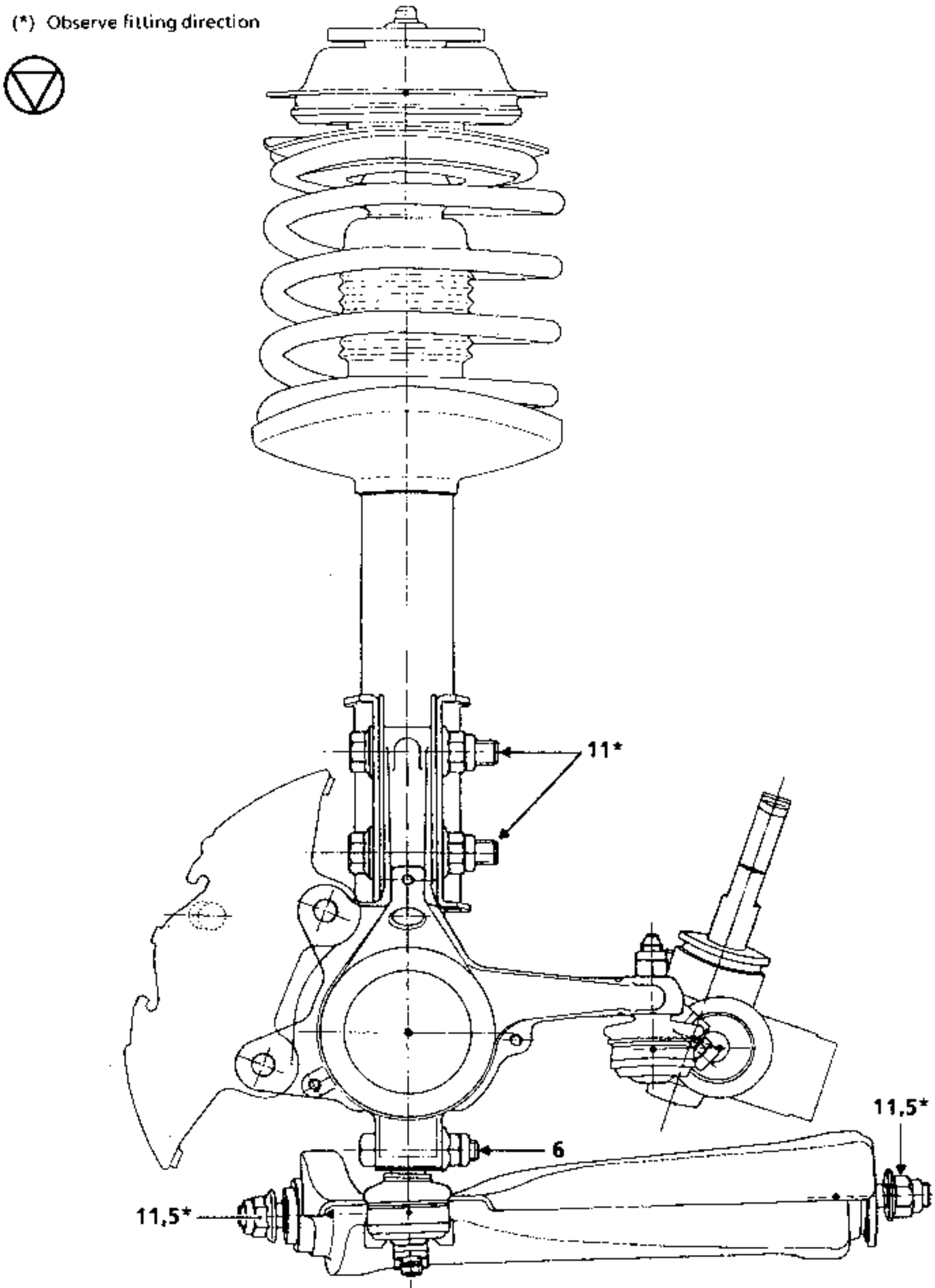
MASTER CYLINDER (dimensions in mm)	
Diameter	20,6

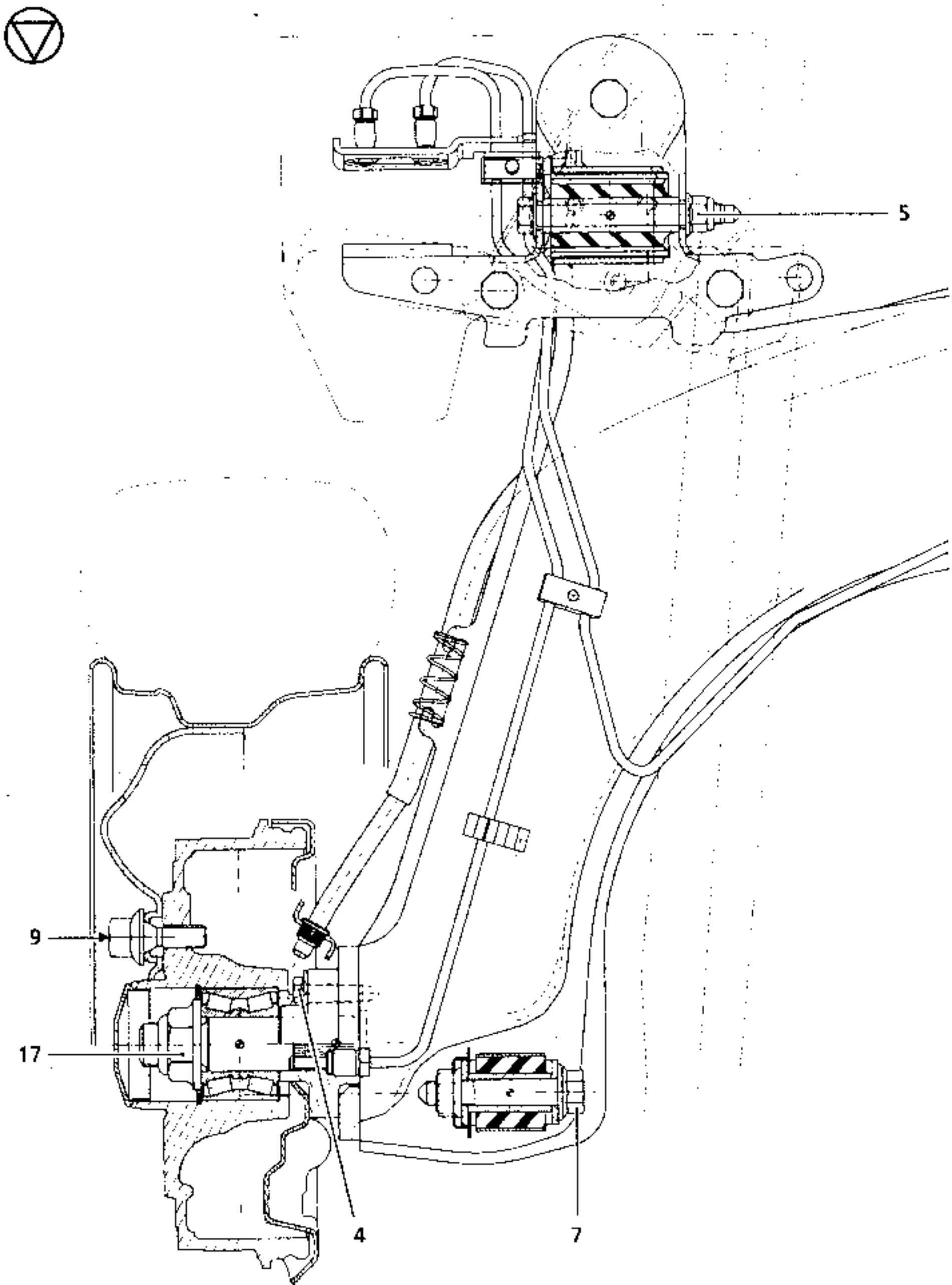
(*) Brake discs cannot be reground. If they are scored or heavily worn they must be replaced.

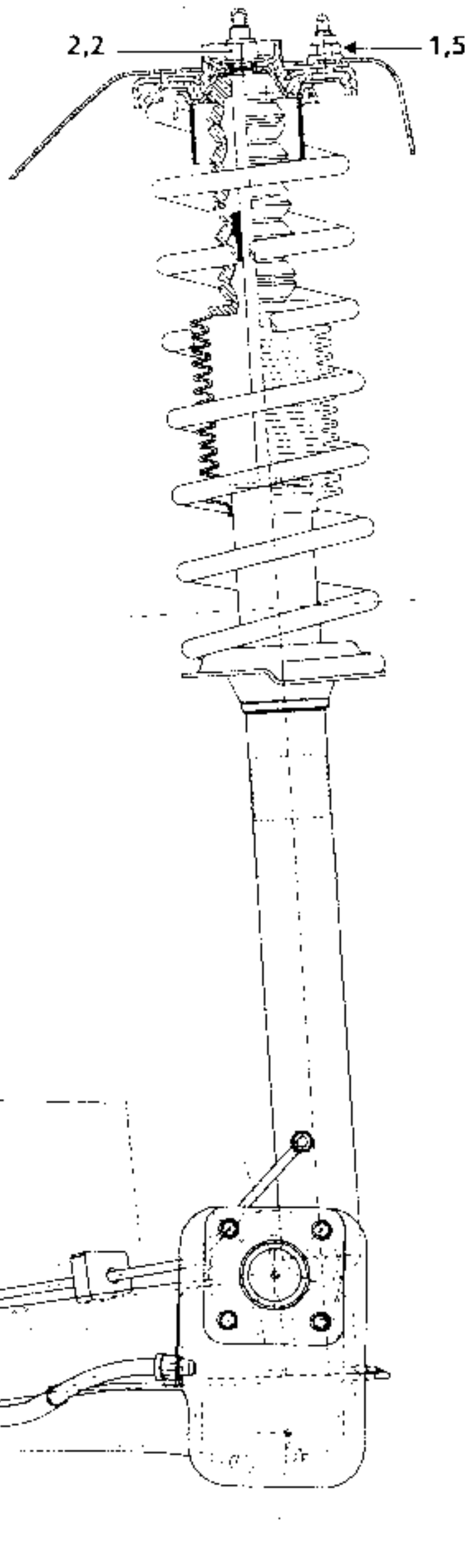
Wheel cylinder with integral fixed compensator : **if there is an operating fault with the wheel cylinder or compensator replace the assembly : no repair may be carried out.**


6
9
3,5
25
2
7,5
2

(*) Observe fitting direction




5
9
17
4
7


2,2
1,5
4
5
4

	DIMENSIONS	TIGHTENING TORQUES
Bleed screw	M7 X 100	0,4 to 0,8
Pipes on front cylinders	M10 X 100	1,5
Rear pipes	M10 X 100	1,3
Rear cylinder feed	M12 X 100	1,3
Master cylinder outlet	M10 X 100	1,3

FRONT AXLE ASSEMBLY

Specifications :

Type :
- pseudo **MAC-PHERSON** without anti-roll bar,
- single plate lower arm, rectangle end.

Suspension :
- bi-tubular shock absorbers,
- constant flexibility,
- impact → rebound movement **150 mm**.

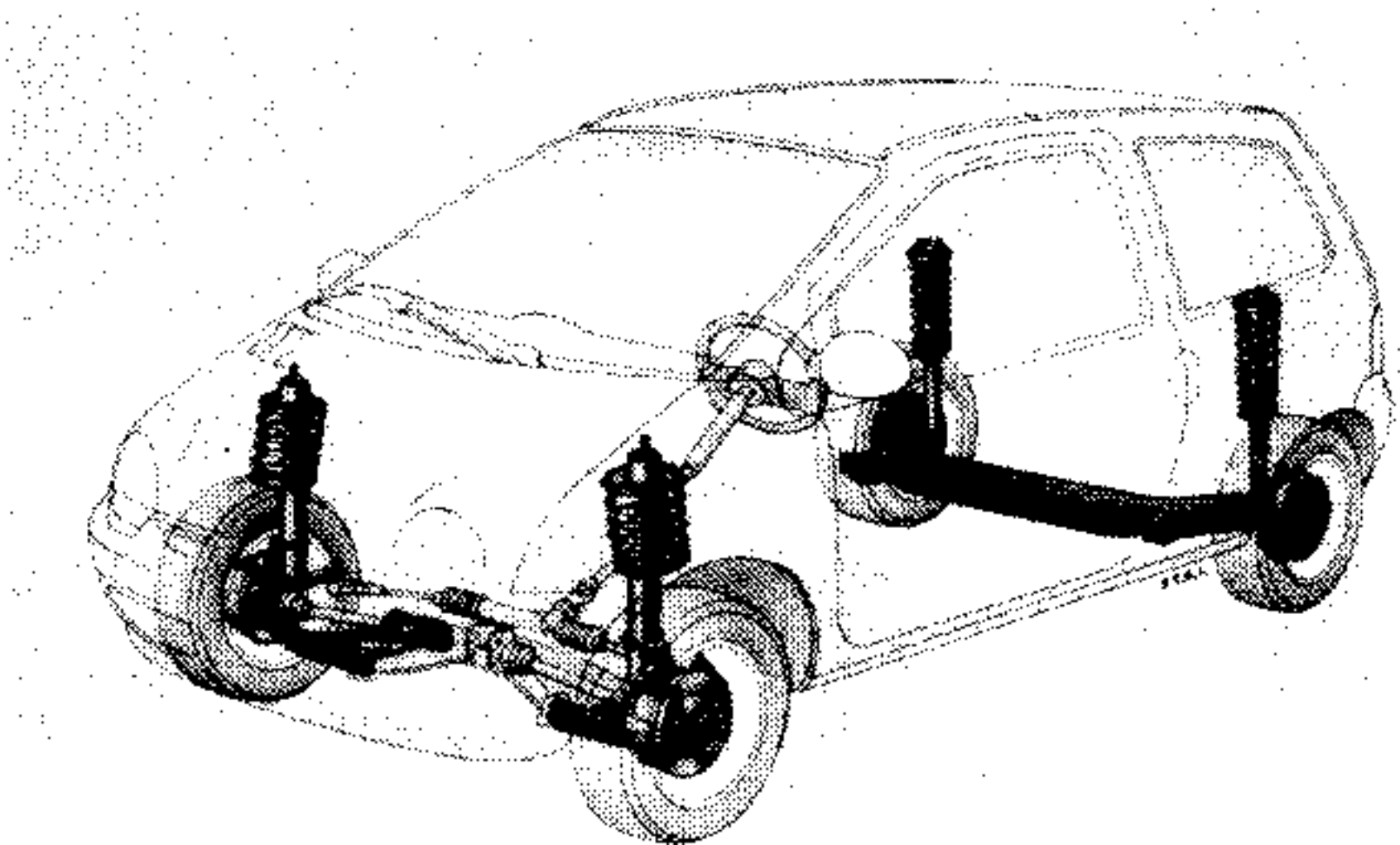
Features:

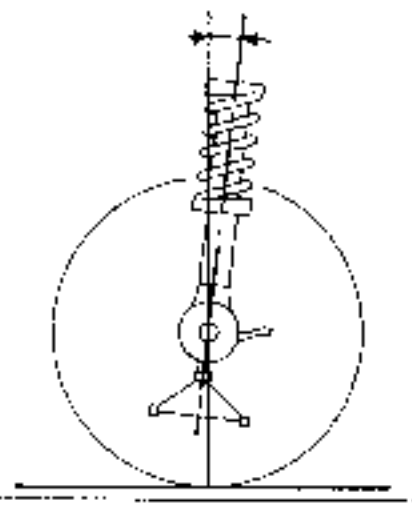
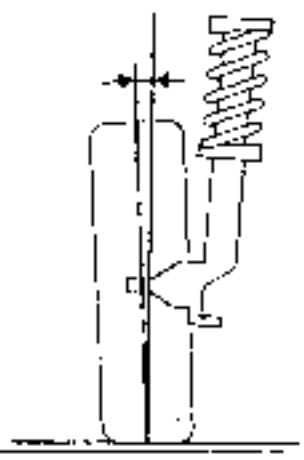
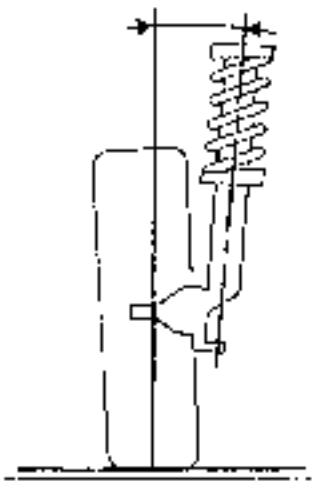
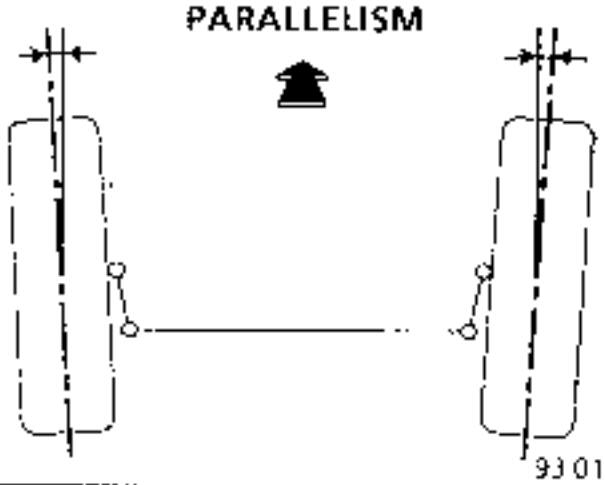
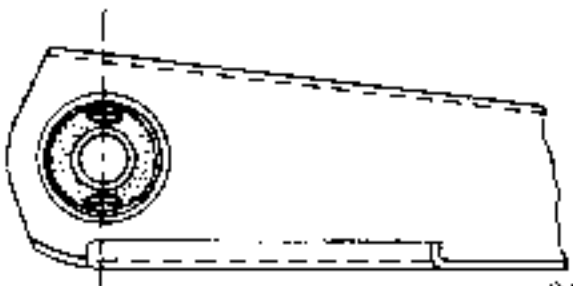
Rectangular arm with rubber bush stiffeners ensure :
- optimum comfort for longitudinal impacts ,
- stabilisation under braking due to the wheel toe-in under longitudinal forces.

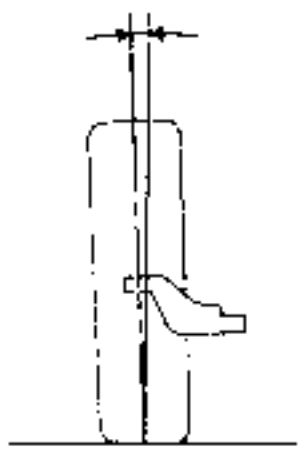
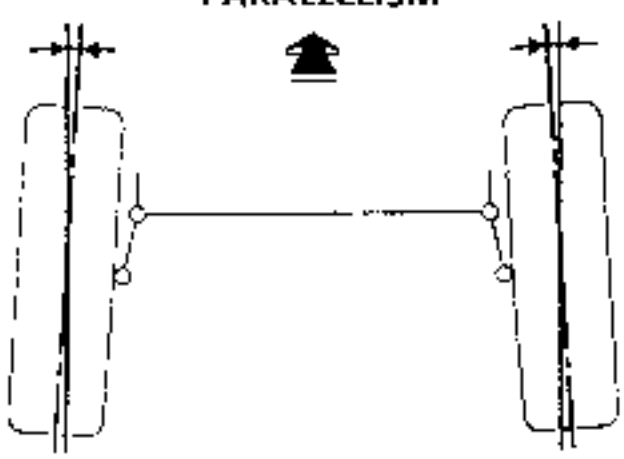
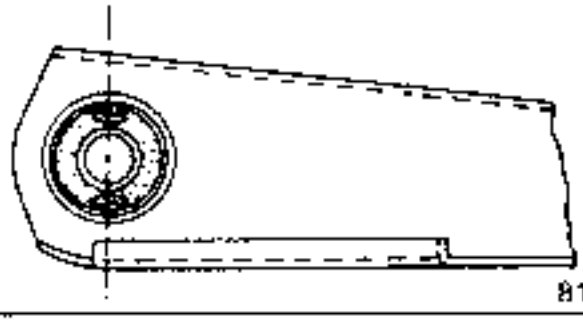
REAR AXLE ASSEMBLY

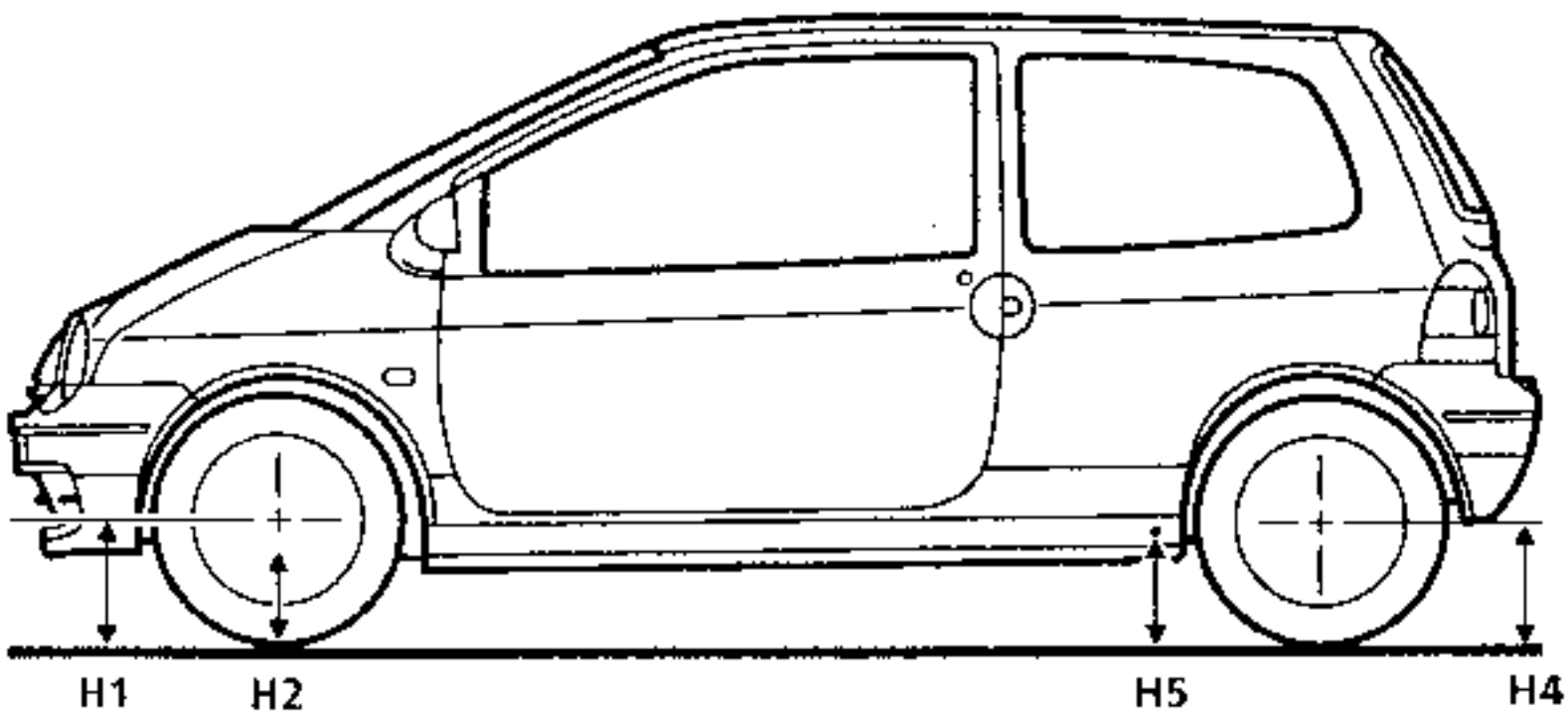
Specifications:

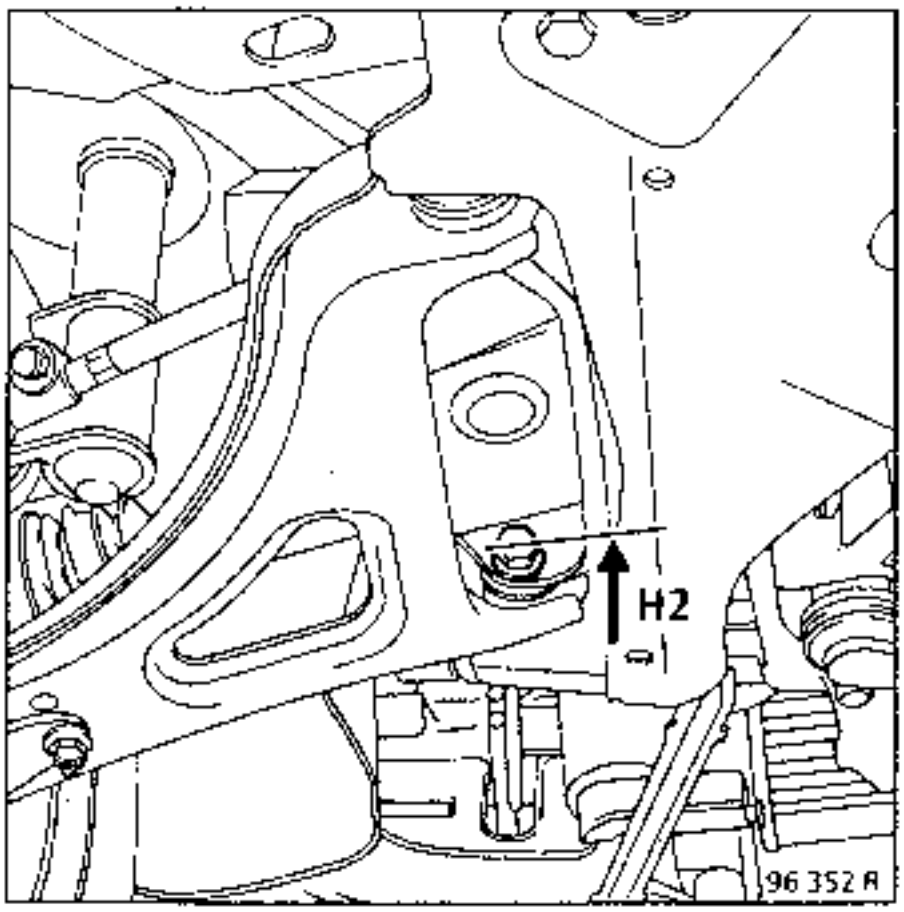
- Flexible H form axle composed of two welded half units.
- Vertical bi-tubular spring - shock absorber assemblies.
- Variable flexibility due to the combination of constant flexibility springs with "soft" rubber stops.



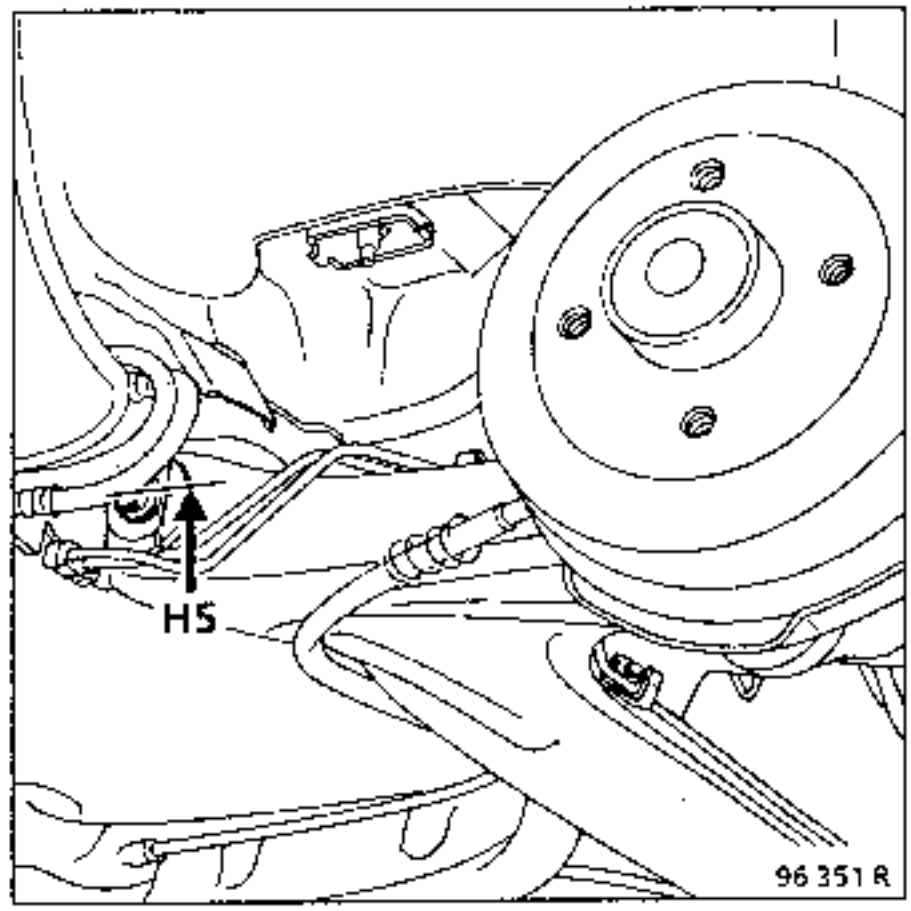
ANGLES	VALUES	POSITION OF FRONT AXLE	ADJUSTMENT
CASTOR  93012 1 S1	2° 1°30' 1° 0°30' 0° } ± 30' Maximum left/right difference = 1°	H5 - H2 = 12 mm H5 – H2 = 29 mm H5 – H2 = 47 mm H5 – H2 = 64 mm H5 – H2 = 82 mm	NON-ADJUSTABLE
CAMBER  93013-1S1	+ 0°47' – 0°26' – 0°30' + 0°05' } ± 30' Maximum left/right difference = 1°	H1 - H2 = 0 mm H1 – H2 = 74 mm H1 – H2 = 89 mm H1 - H2 = 150 mm	NON-ADJUSTABLE
PIVOT  93014 1S1	8°15' 10°32' 10°50' 11°27' } ± 30' Maximum left/right difference = 1°	H1 – H2 = 0 mm H1 - H2 = 74 mm H1 – H2 = 89 mm H1 – H2 = 150 mm	NON-ADJUSTABLE
PARALLELISM  93011 1 S1	Toe out + 0°10' ± 10' + 1 mm ± 1 mm	UNLADEN	Adjustable by turning track rod sleeves 1 turn - 30' (3 mm)
RUBBER BUSHES  81603S1	–	UNLADEN	

ANGLES	VALUES	POSITION OF REAR AXLE	ADJUSTMENT
CAMBER  93 013-2 S1	– 0°30' ± 20'	UNLADEN	NON-ADJUSTABLE
PARALLELISM  93 011 2 S1	Toe - in – 0°20' ± 30' (– 2 mm ± 3)	UNLADEN	NON-ADJUSTABLE
RUBBER BUSHES  81 603 S1	–	UNLADEN	–





Dimension **H2** is measured on the axis of the front mounting bolt for the lower suspension arm on the engine mounting.



Dimension **H5** is measured on the axis of the mounting bolt for the rear axle on the bearing.

The vehicle should be unladen on a flat surface for the underbody heights to be measured (preferably on a vehicle lift) with:
- fuel tank full,
- correct tyre inflation pressures.

H1 and H4 : centre of wheels to ground

H2 : front lower suspension arm mounting to ground

H5 : rear axle mounting on bearing to ground

Measure dimensions :
H1 and H2 at the front
H4 and H5 at the rear
and subtract

H1 – H2 = **62 mm ± 7,5 mm**
H4 – H5 = **5,5 mm ± 7,5 mm**

These values vary inversely to the vehicle trim setting. When the vehicle lowers, these values increase and vice versa.

Consumables

TYPE	QUANTITY	COMPONENTS
Elf-Multi	5 g Coat	Lip seals Wheel bolt threads
Molykote BR2	24 cm^3 Coat	Steering box Drive shaft splines on box side
CAF 4/60 THIXO	1 to 2 drops	Drive shaft roll pin holes
Molykote 33 Medium	Coat	Gear lever joints Pedal shafts
Loctite FRENBLOC	1 to 2 drops	Axial ball joint thread Rear brake plate mounting bolt
Self-vulcanising pins in kit A	77 01 417 243	Repair of tubeless tyres
Loctite SCELBLOC	5 to 6 drops	Drive shaft stub axle
SAE 80W oil	Coat	Rear wheel stub axle

BRAKE FLUID FREQUENCY OF RENEWAL

Modern brake technology, particularly disc brake technology (hollow pistons which transfer low amounts of heat, low volume of fluid in the cylinder, sliding calipers which avoids having a fluid reservoir in the least cooled part of the wheel) has reduced the risk of a vapour lock, even in the case of intensive brake use (mountain areas).

Modern brake fluids do degrade slightly during the first few months of use as they absorb a small amount of moisture, which means that the fluid should be renewed :
- every **31250 miles (50 000 km)** for petrol vehicles,
- every **37500 miles (60 000 km)** for diesel vehicles.

Topping up the level :

Brake lining wear causes the brake fluid to drop in the reservoir. This drop should not be topped up since the level will be restored to the correct level when new linings are fitted. The level should not fall below the minimum mark however.

Approved brake fluids :

Mixing two non-compatible brake fluids in the circuit may cause a high risk of leaks particularly due to deterioration of the brake cups. To avoid such risks, use only brake fluids which have been tested and approved by our laboratories and which confirm to standard **SAE J 1703 dot 3**.

Parts to be renewed when they are replaced

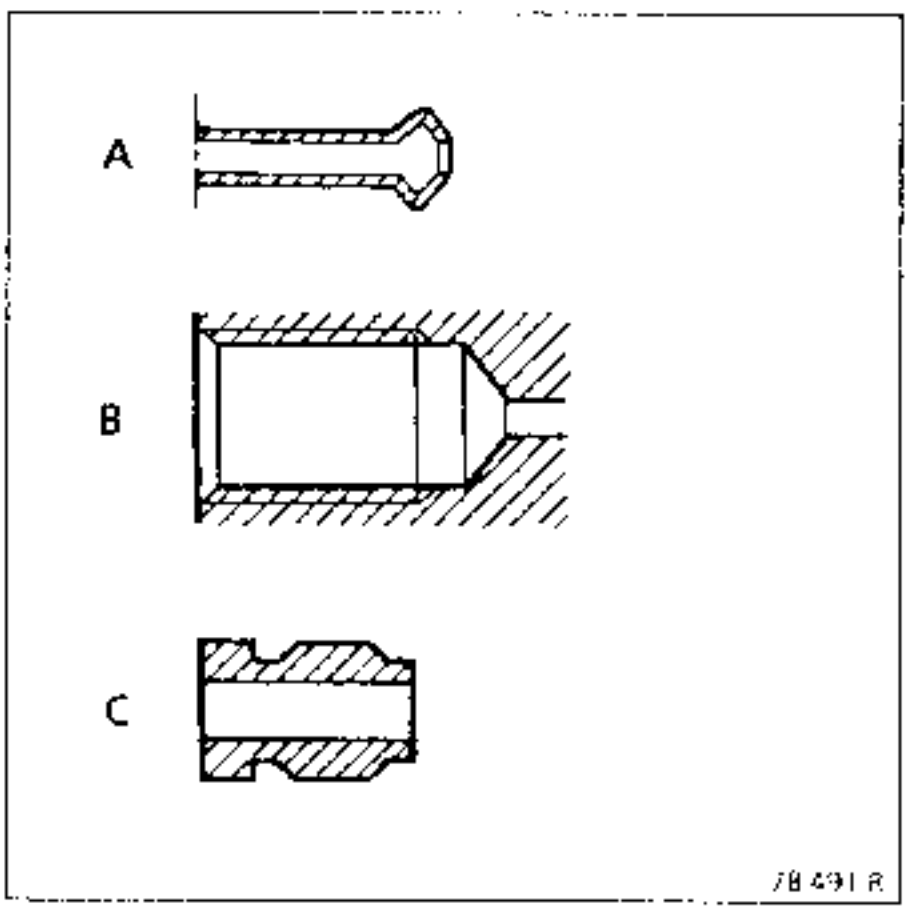
- Axial ball joint stop.
- Balance weight hook.
- Hub bearing.
- Driveshaft bearing gaiter.
- Bearing clips.
- Stub axle locking nut.

The connections of pipes between the master cylinder, front calipers and rear wheel cylinders is assured by METRIC THREAD unions.

Only parts in the Parts Catalogue for this vehicle should be used.

Identification of the parts :

- SHAPE of PIPE end in steel or copper (A),
- SHAPE of THREADED LOCATIONS on wheel cylinder (B),
- GREEN or BLACK pipe UNIONS: hexagonal, 11 mm or 12 mm (C).



Influence of angles

Influence of various angles on course holding and tyre wear.

CAMBER

The comparison of left and right hand angles is important. A difference between the two sides which is greater than one degree will cause a change in trajectory, which must be corrected at the steering wheel, causing tyre wear.

CASTOR

The comparison of left and right hand angles is important. A difference between the two sides which is greater than one degree will cause a change in trajectory, which must be corrected at the steering wheel, causing tyre wear.

This fault is characterised by pulling toward the side where the angle is smaller when travelling at a stable speed.

STEERING HEIGHT

This movement influences the variation in parallelism when the suspension moves.

Different parallelism for the right and left hand wheels causes (without the steering wheel moving) :

- pull to one side on acceleration,
- pull to the other side on return,
- changes in course on poor road surfaces.

PARALLELISM

This adjustment must be made when the steering is at the centre point to avoid influencing road behaviour.

Note that:

- **excess toe-out** causes symmetrical wear on the inside edge of the two tyres,
- **excess toe-in** causes symmetrical wear on the outside edge of the two tyres.

PRELIMINARY CHECKS

Before checking the axle assembly angles, the following points must be checked and any repair or adjustment made :

- Symmetry of tyres on the same axle :
  - dimensions,
  - pressures,
  - degree of wear

- Joints :
  - condition of rubber bearings and cups,
  - ball joint play,
  - bearing play.

- Wheel run-out : this should not exceed **1,2 mm** (compensated for by measuring equipment).

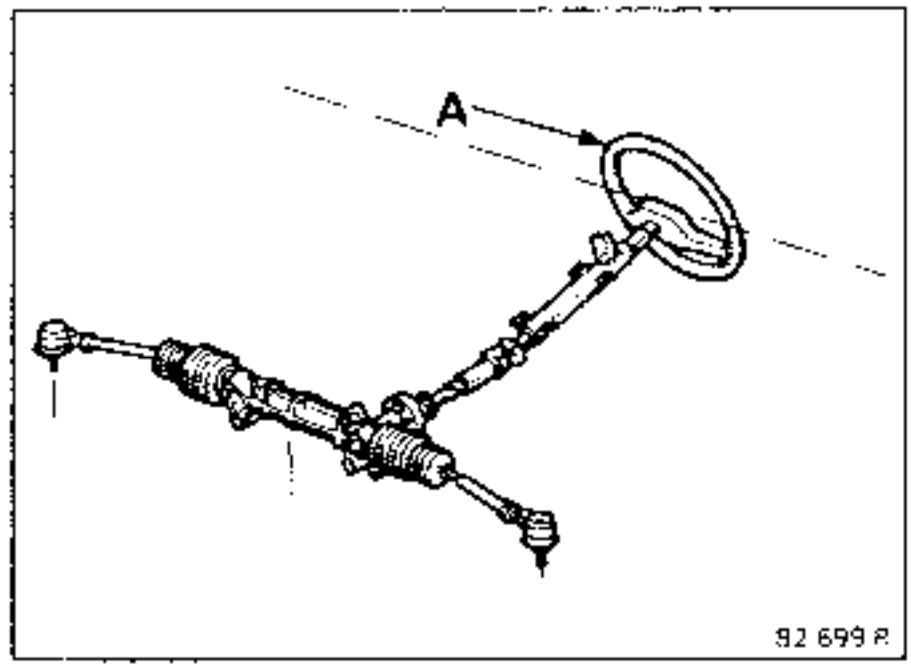
- Symmetry of heights under the body (condition of the suspension)

DETERMINING THE STEERING CENTRE POINT

When checking and adjusting the front axle assembly angles the steering must be at the centre point to avoid pulling.

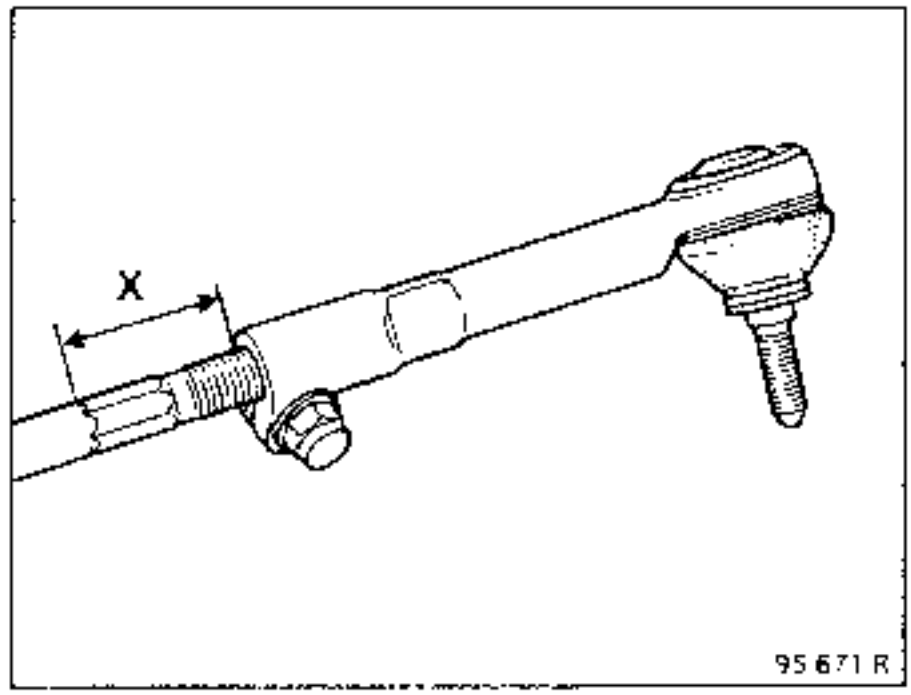
- Remove the keys from the ignition.

- Put the steering lock on (A) : the steering "centre point" is set.



In this position, fit the measuring equipment and proceed with the test.

When adjusting the parallelism, **ensure the dimensions X on the track rod ball joint units are the same**

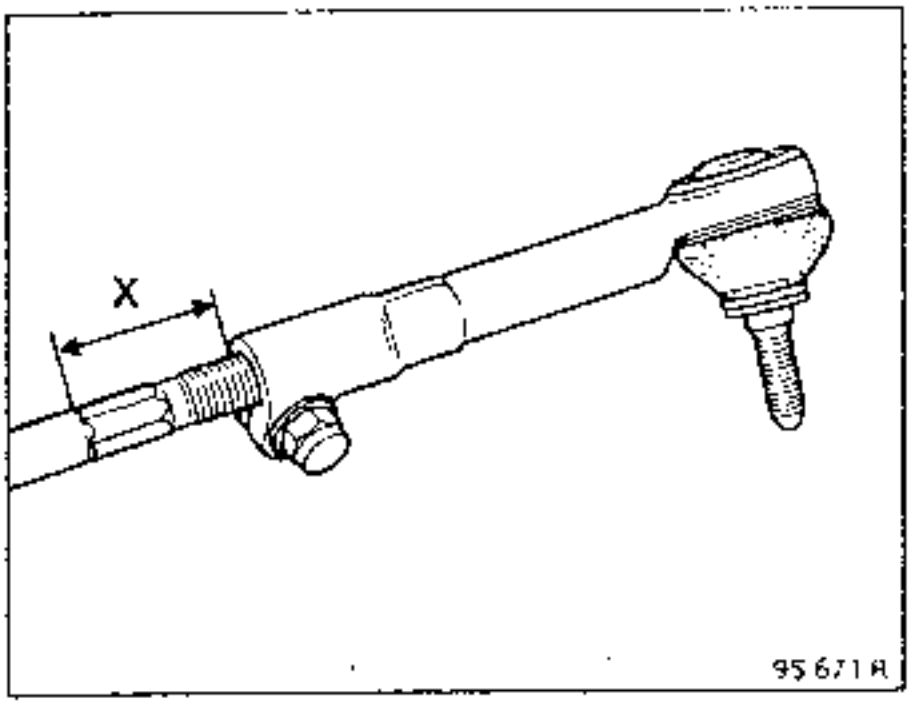


ORDER OF OPERATIONS

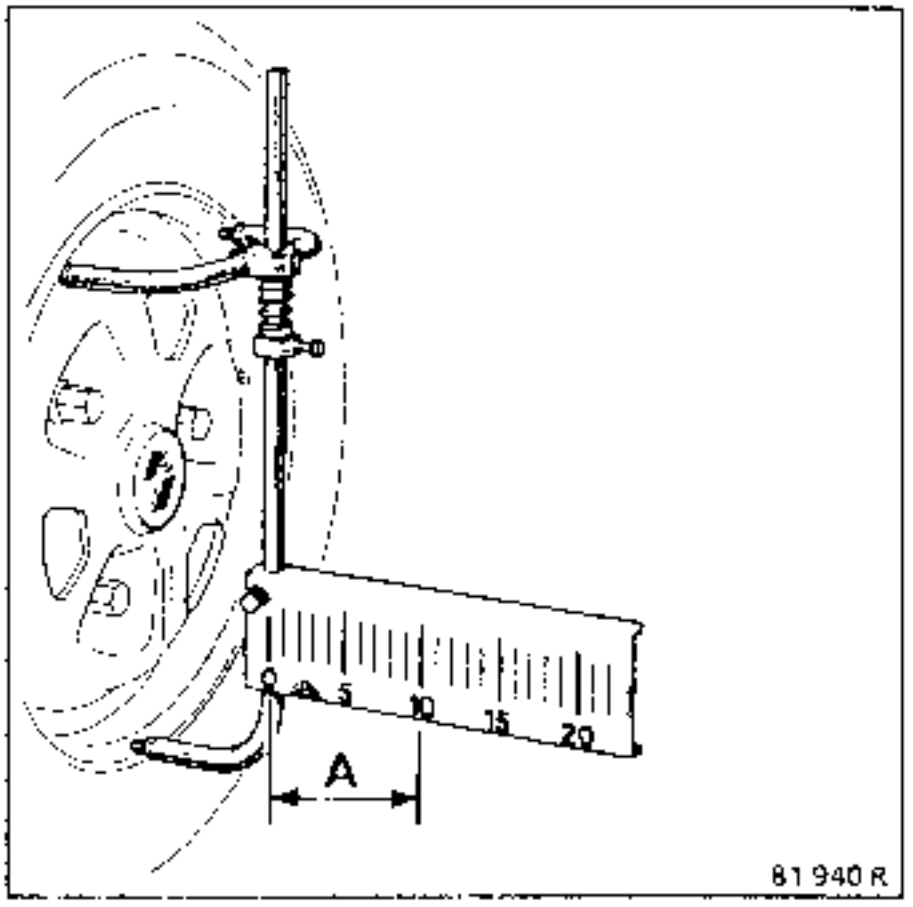
Because of the design of the front axle assembly, when one angle is adjusted (castor, camber, kingpin, parallelism and variation) the other angles are also affected to a greater or lesser degree. (The castor angle has the most influence)

The following order must therefore be observed :

- Fit the equipment to the vehicle following the manufacturer's instructions,
- determine the steering centre point (see previous paragraph) and lock the steering wheel,
- lift the vehicle under the body,
- correct rim run-out,
- put the vehicle on a swivel plate ,
- fit a brake pedal press,
- bounce the suspension to return the vehicle to its normal height,
- check the symmetry of dimension X on the track rod ball joint units,



- measure dimension A on the scale.



(1) **Correct dimension X symmetry:**

- dimension (A) should be equal at both sides.

(2) **Incorrect dimension X symmetry :**

- measure dimensions (A) on the right and left hand sides, subtract and apply half the result to each side.

Example :
Right hand side value : 16
Left hand side value : 10
16 - 10 = 6
6 : 2 = 3

Move the track rods to balance the dimension (A) on both sides :
A = 13

- in this position, set the swivel plates to zero,

- check in the following order :
  - castor angle,
  - kingpin angle
  - camber,
  - parallelism.

ADJUSTING THE PARALLELISM

There may be several situations :

	Parallelism	Distribution	Correction to make
(1)	CORRECT	INCORRECT	Turn the adjustment sleeve the same number of turns (or stops) but in opposite directions for the left and right hand sides to ensure dimension A is the same on both sides.
(2)	INCORRECT	CORRECT	Adjust the parallelism the same amount on both sides ensuring dimension A remains the same for both sides.
(3)	INCORRECT	INCORRECT	Adjust so that the dimension A is the same on both sides then adjust the parallelism as in section (2)

Front axle fault finding

FAULTS	POSSIBLE CAUSES
Incorrect castor angle	– Bent arm – Bent side member
Camber + kingpin angles correct but Camber incorrect Kingpin incorrect	– Bent arm – Bent side member
Camber correct but Kingpin incorrect	– Bent stub axle carrier
Kingpin correct but Camber incorrect	– Bent stub axle carrier
Incorrect variation in parallelism	- See castor Bent arm Bent side member
Parallelism incorrect by more than 6 mm	– Bent right or left hand stub axle carrier

This fault finding system covers all types of braking circuits and components in the current vehicle range

Only the sections appropriate to this Repair Manual should be retained for fault finding.

The fault finding is presented in two sections for ease of application.

I **Effect at the pedal**
II **Behavioural effect.**

I EFFECT AT THE PEDAL

FAULTS	POSSIBLE CAUSES
Hard pedal: High effort for low deceleration	– **Lack of assistance** – **Linings:** - greasy, - iced, do not conform, - overheating, prolonged braking with pedal constantly being pressed (descending a hill), do not conform. – **Piston siezed,** – **Brake pipe crushed,** – **Linings worn** : linings almost worn away, start of metal on metal friction (noise).
Spongy pedal **Note** : as the assistance level for modern vehicles is high, this may give the impression of spongy brakes. For fault finding, for a fault or normal use, there are two tests 1. **Vehicle moving** Judgment test: ratio of pedal travel / deceleration. 2. **Vehicle stationary, engine not running** Complementary test to pedal travel test : press the brake pedal 5 times to empty the brake servo, before testing.	– **Air in the circuit** : incorrect bleeding. – **Internal leak in braking circuit.** – **Lack of fluid in the reservoir** (leak outside of braking circuit).

Long pedal Test to be carried out vehicle stationary, engine not running **Note** : press the brake pedal 5 times to empty the brake servo, before testing.	– **Incorrect segment adjustment** **Drum brakes** Manual adjustment: segments too far from the surface of the drum. **Disk and drum brakes** Automatic adjustment : handbrake cable too tight. **Note** : automatic wear compensation is carried out using the brake pedal if the handbrake cable is not too tight when the handbrake is off. – **High degree of unequal lining wear** (on the edges or in the centre). – **Master cylinder gap too wide.** – **Brake fluid bubbling** or heated.
Pedal goes to the floor Test to be carried out vehicle stationary, engine not running **Note** : press the brake pedal 5 times to empty the brake servo, before testing.	– **Hydraulic leak** (check sealing) – **Sealing cup between two master cylinder circuits faulty.** – **Brake fluid bubbling.**

II BEHAVIOURAL EFFECT

FAULTS	POSSIBLE CAUSES
Brakes are applied	– **Linings need backing off** – **Linings slightly greasy** – **Springs need to be changed**
Brakes noisy	– **Oval drums** – **Disk run-out too great** – **Disk thickness not constant** – **Unusual deposit on disk** (oxides between lining and disk).

Pulling on braking (front)	– **Suspension** front axle assembly, steering should be checked – **Piston siezed***. – **Tyres** (wear - inflation pressure). – **Brake pipe crushed***. ***ATTENTION** : on vehicles with negative offset front axle assemblies, pulling to one side is due to a fault on the opposite side.
Change in course on braking (rear)	– **Brake compensator or limiter** (operating adjustment). – **Piston siezed.** – **Incorrect segment adjustment.** Manual adjustment : segment too far from the drum surface. Automatic adjustment : handbrake cable too tight. **NOTE** : automatic wear compensation is carried out using the brake pedal if the handbrake cable is not too tight when the handbrake is off. – **Return spring**
Brakes overheating	– **Master cylinder gap insufficient to allow master cylinder to return to neutral position** – **Piston siezed or not returning correctly** – **Brake pipe crushed.** – **Handbrake control siezed.** – **Incorrect handbrake control adjustment**

SPECIAL TOOLING REQUIRED	
M.S. 815	Bleeding equipment

For vehicles with a brake servo, it is important to ensure that whatever bleeding method is used, the brake assistance device is not activated during bleeding.

Tool **M.S. 815** is used to bleed the braking system with the vehicle on a four post lift with the wheels on the ground.

Connect the pipes of tool **M.S. 815** to the bleed screw on :
- the master cylinder
- the slave cylinder
- the braking compensator or limiter.

Connect the equipment to a compressed air source (min 5 bars).

Connect the filling equipment to the brake fluid reservoir.

Open:
- the supply source, wait for both parts of the reservoir to fill,
- the compressed air valve.

As these vehicles are fitted with X type circuit braking, proceed as follows :

Open:
- the bleed screw on the right hand rear wheel and let fluid run out for about 20 seconds,
- the bleed screw on the front left hand wheel and let fluid run out for about 20 seconds

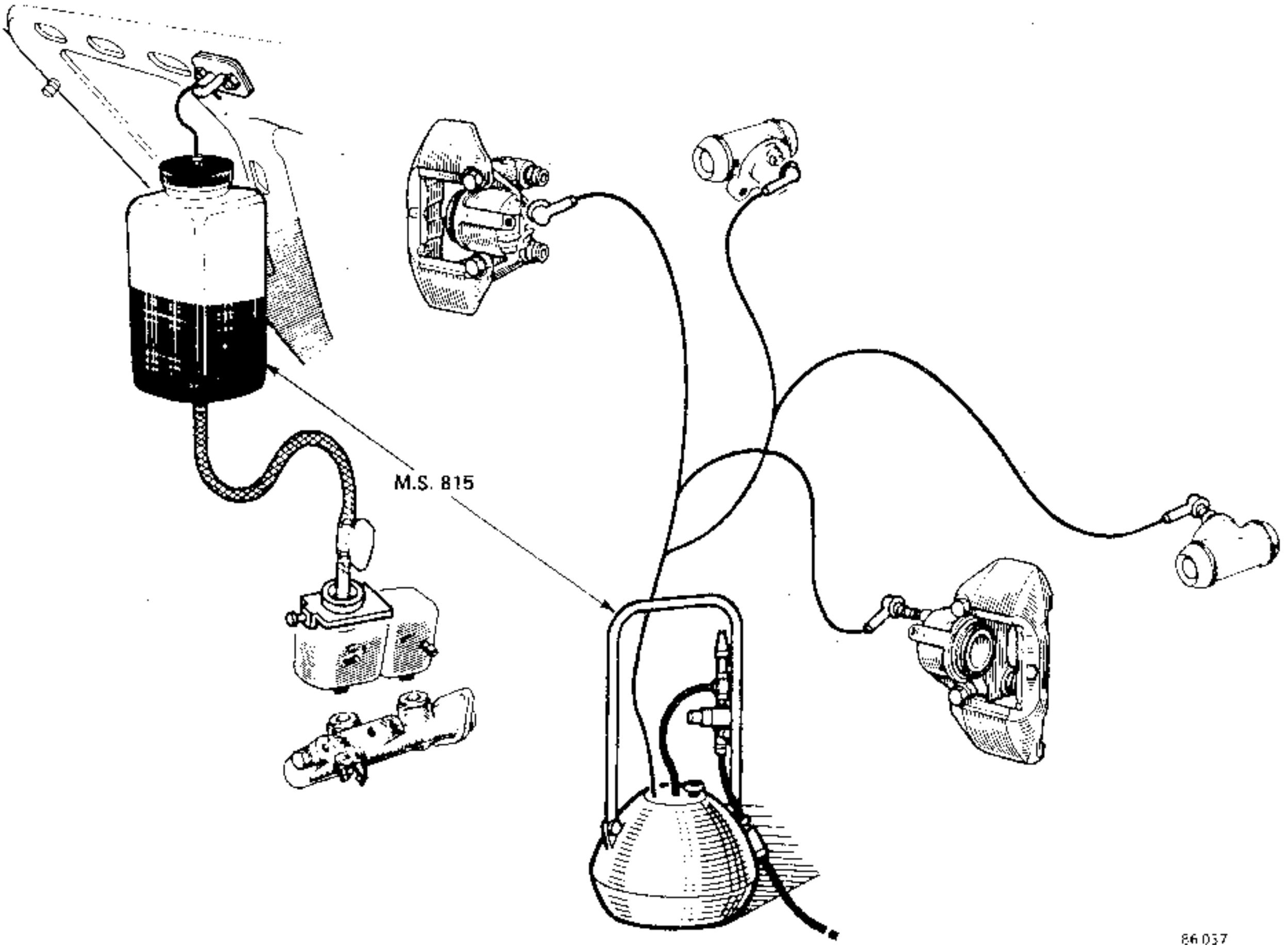
Ignore any air bubbles in the bleeding equipment pipes.

Proceed in the same manner for the rear left hand wheel and the front right hand wheel..

Check the brake pedal resistance when depressed (press several times).

Repeat the bleeding operation again if necessary.

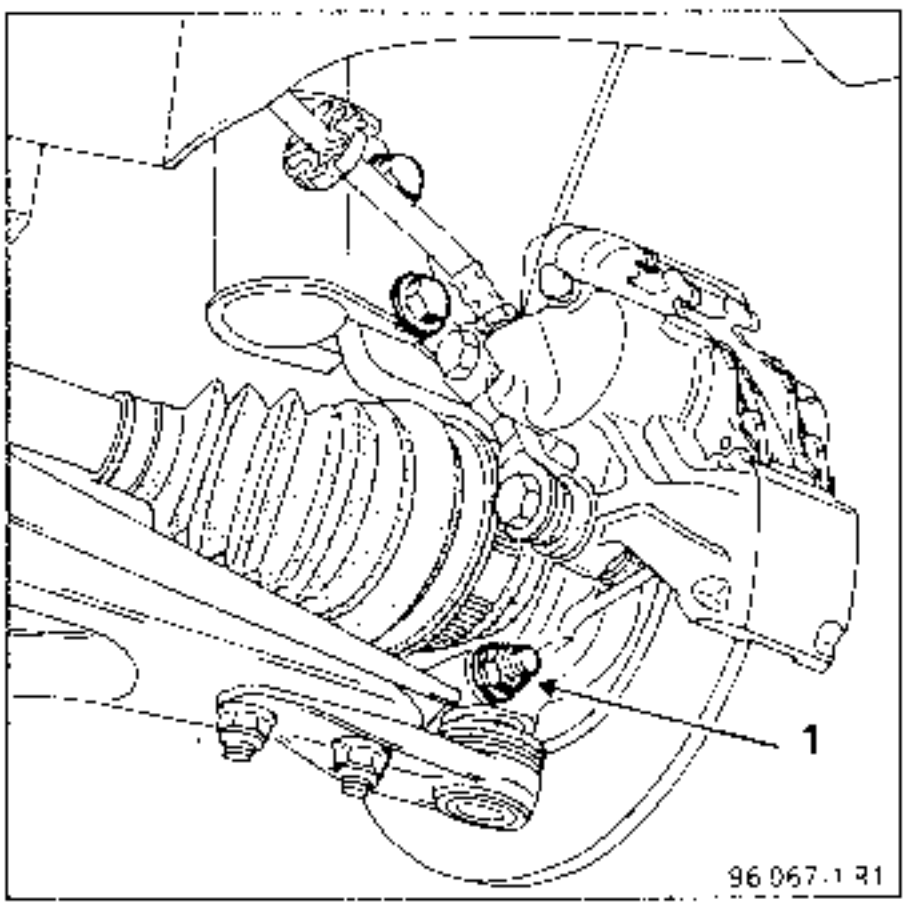
Top up the brake fluid level in the reservoir before disconnecting the equipment.


M.S. 815
86037

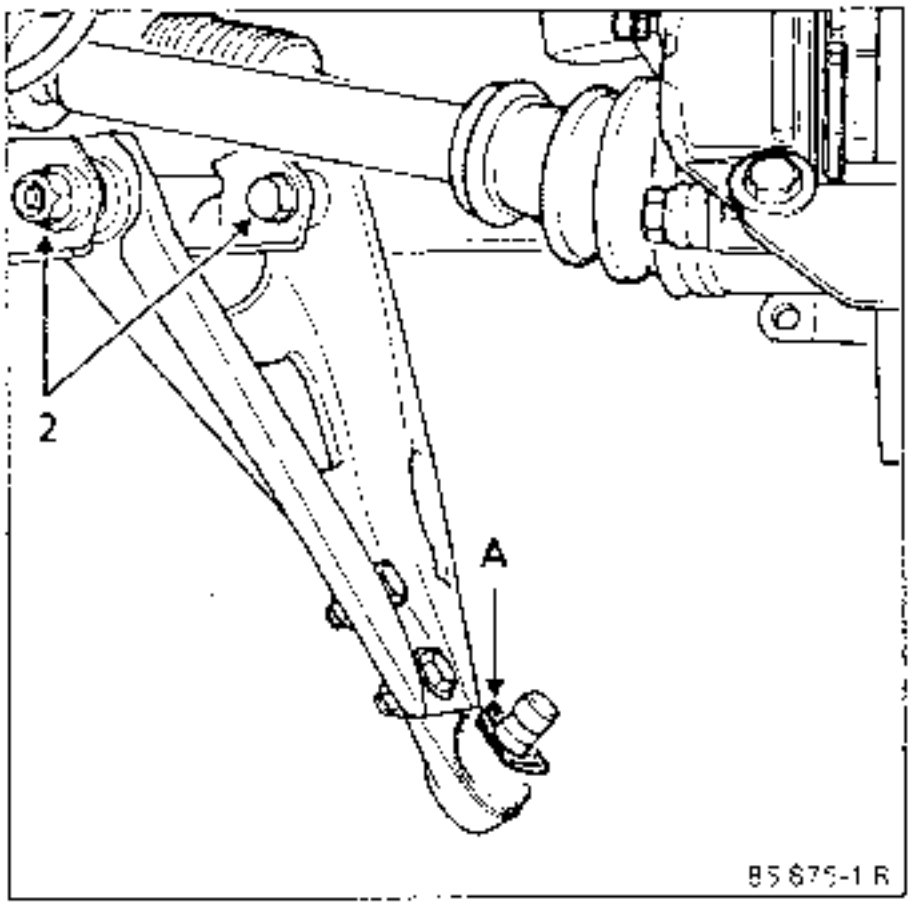
TIGHTENING TORQUES (in daN.m)	
Lower wishbone to engine mounting nut	11,5
Stub axle pinch bolt	6
Track rod end nut	7,5
Wheel bolts	9

REMOVAL

With the vehicle on axle stands, remove :
- the wheel,
- locking nut and bolt (1),



- the two mounting bolts (2) holding the wishbone on the engine mounting.



REFITTING

Note : ensure the protective plastic washer (A) is in place on the track rod end shaft.

Fit :
- the wishbone,
- the two bolts (2) without tightening them,
- the stub axle carrier bearing shaft and tighten locking nut (1) to the recommended torque.

The two lower wishbone nuts should be on the outside of the wishbone.

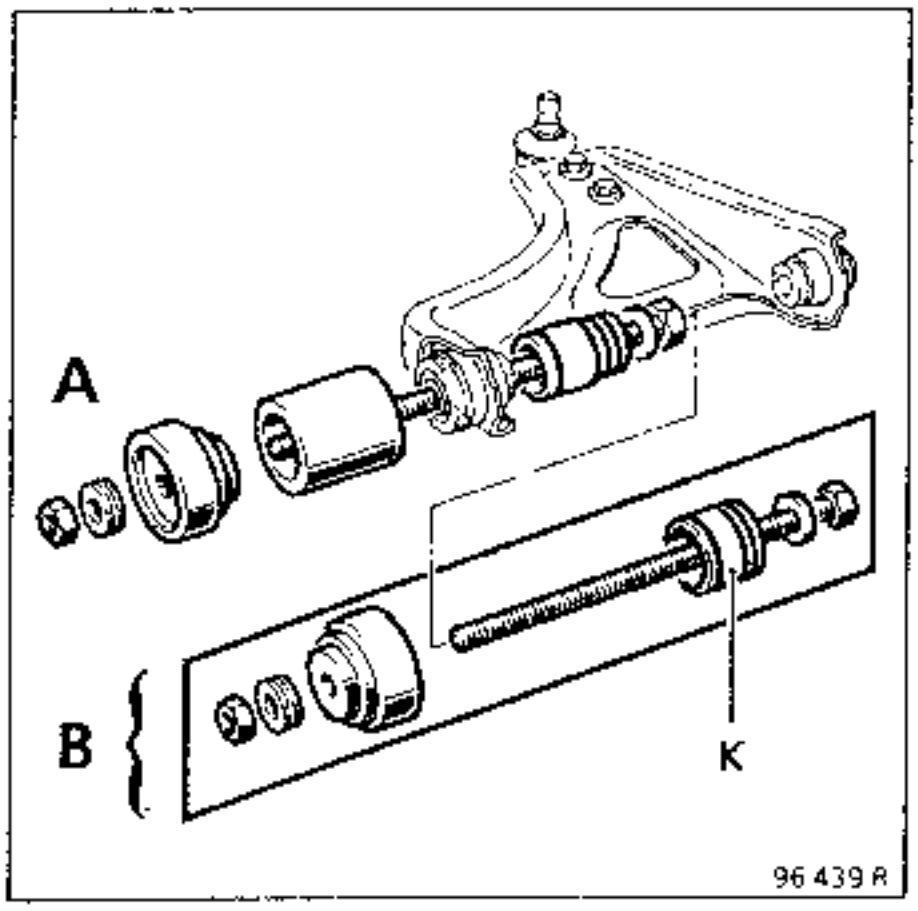
SPECIAL TOOLING REQUIRED	
T.Av. 1271	Tool for replacing lower wishbone rubber bushes

To preserve the central position of the bushes in relation to the wishbone shaft, they should be replaced one after the other: bush 1 then 2.

Tools marked with one groove should be used to replace **bush 1** and those marked with two grooves should be used to replace **bush 2.**

REPLACEMENT

Bush 1

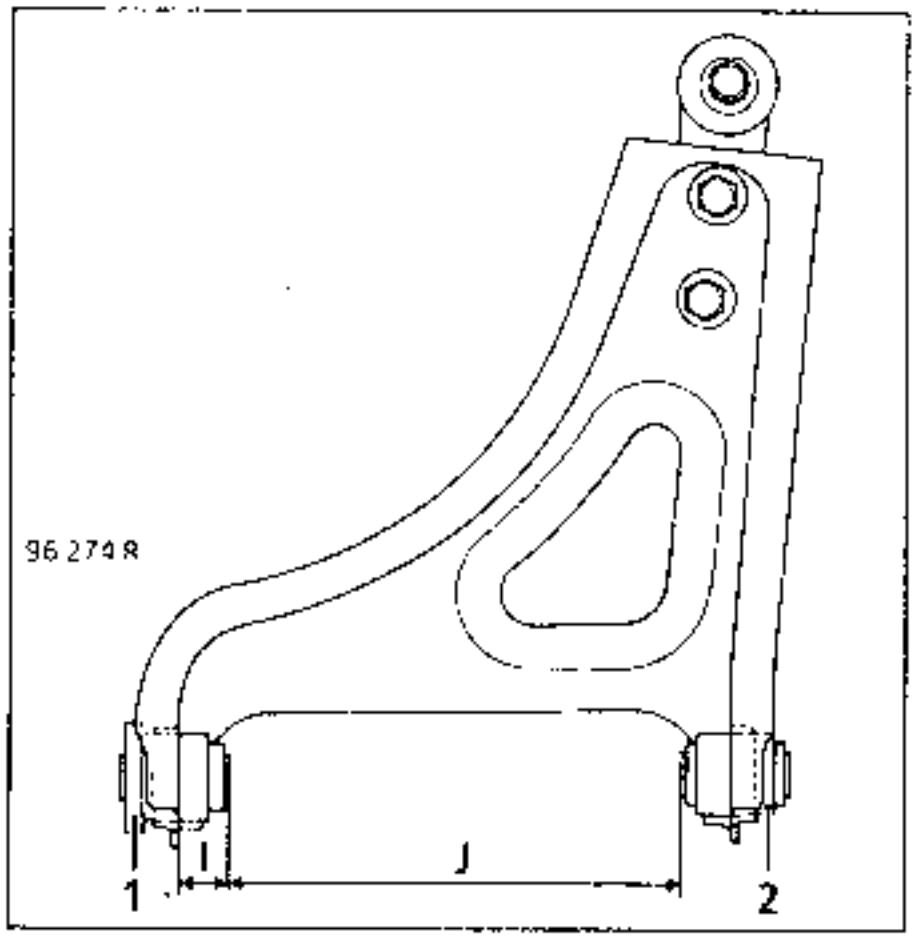


A Removal
B Refitting

To ensure **bush 1** is correctly refitted, slide the bush on until it touches the fitting ring (K).

Dimension required :

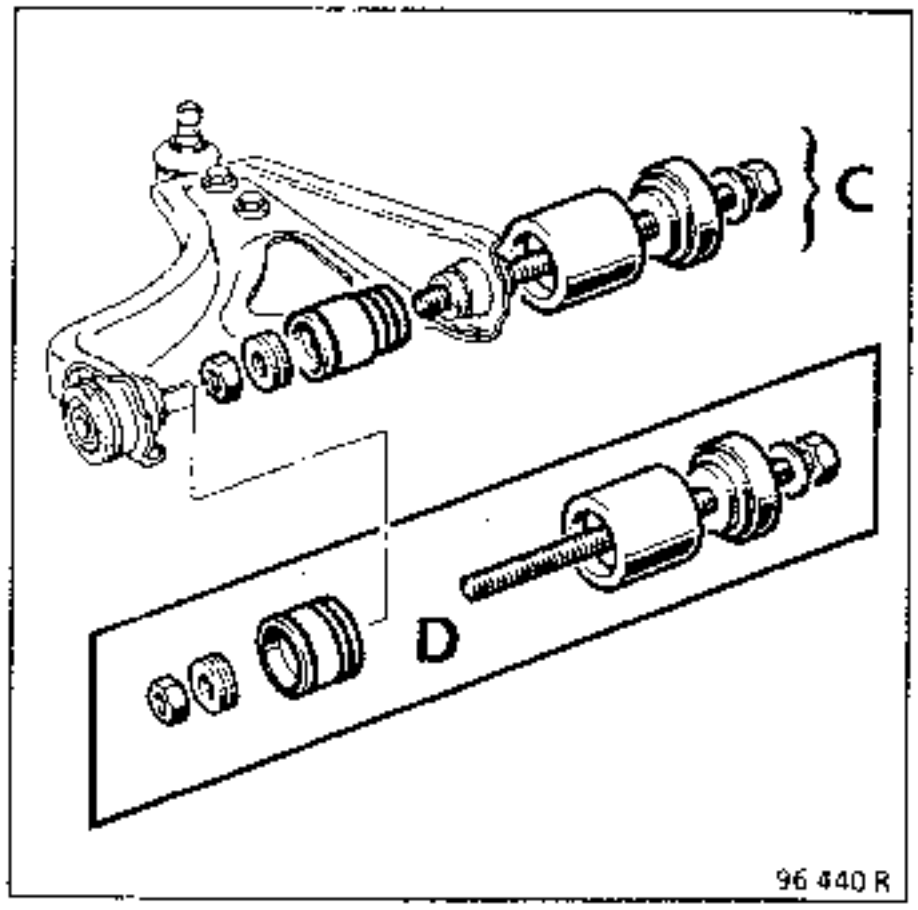
I = 21 mm



Now replace **bush 2** ensuring dimension :

J = 199 ± 0,5 mm

Bush 2



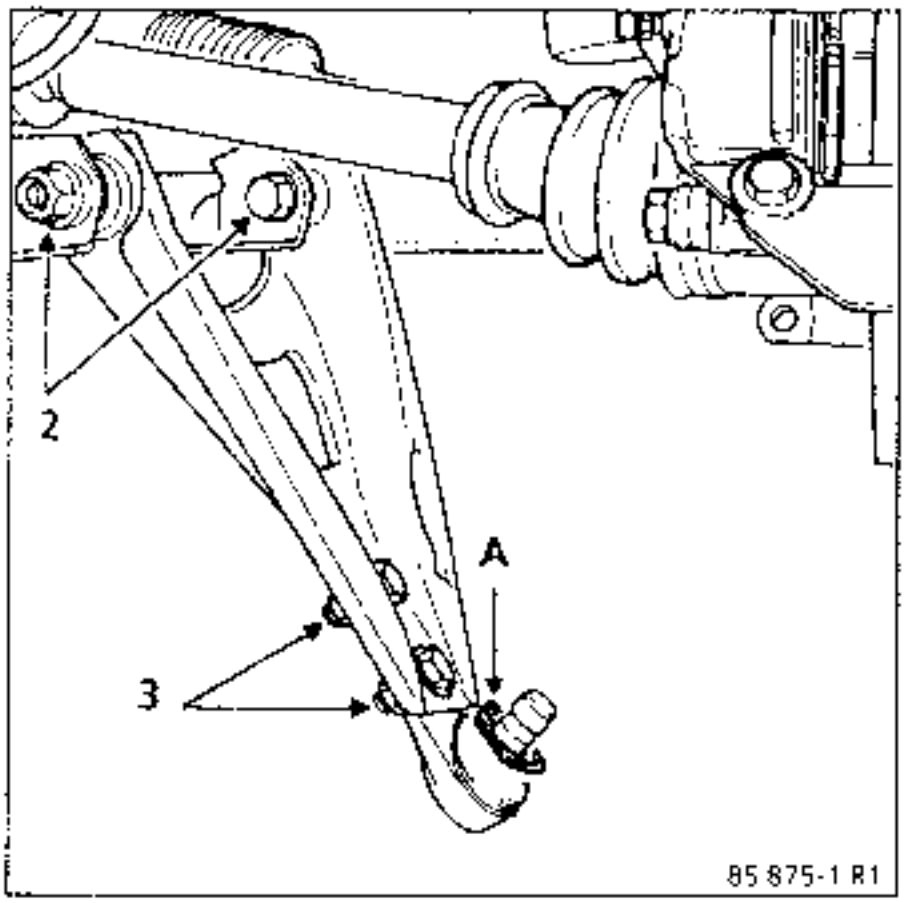
C Removal
D Refitting

REMOVAL

If the gaiter is damaged, the complete ball joint must be replaced.

Proceed in the same manner as for replacing the lower wishbone.

Undo but do not remove the two bolts (2) holding the wishbone to the engine mounting



Remove:

- the two track rod end mounting bolts (3),
- the track rod end.

REFITTING

Note :ensure the protective plastic washer (A) is in place on the track rod end shaft.

Fit the track rod end and torque tighten the mountings.

Proceed in the same manner as for refitting the lower wishbone

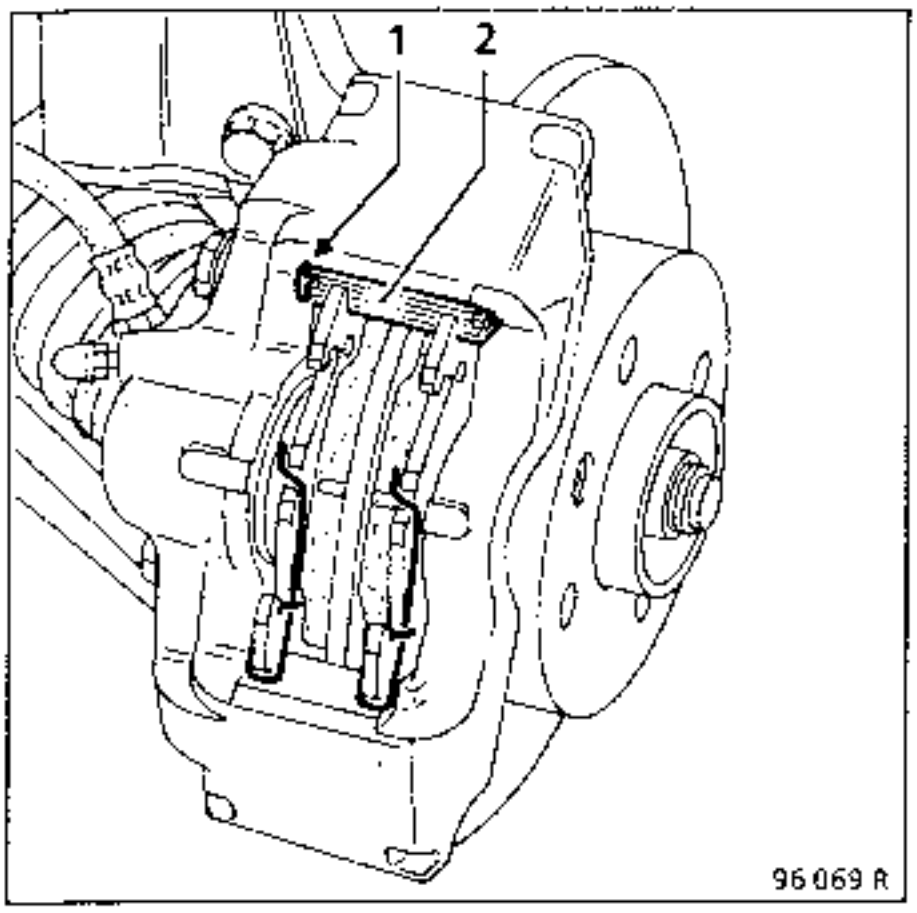
SPECIAL TOOLING REQUIRED	
Fre. 823	Tool for pushing the piston back

TIGHTENING TORQUES (in daN.m)	▽
Wheel bolts	9

REMOVAL

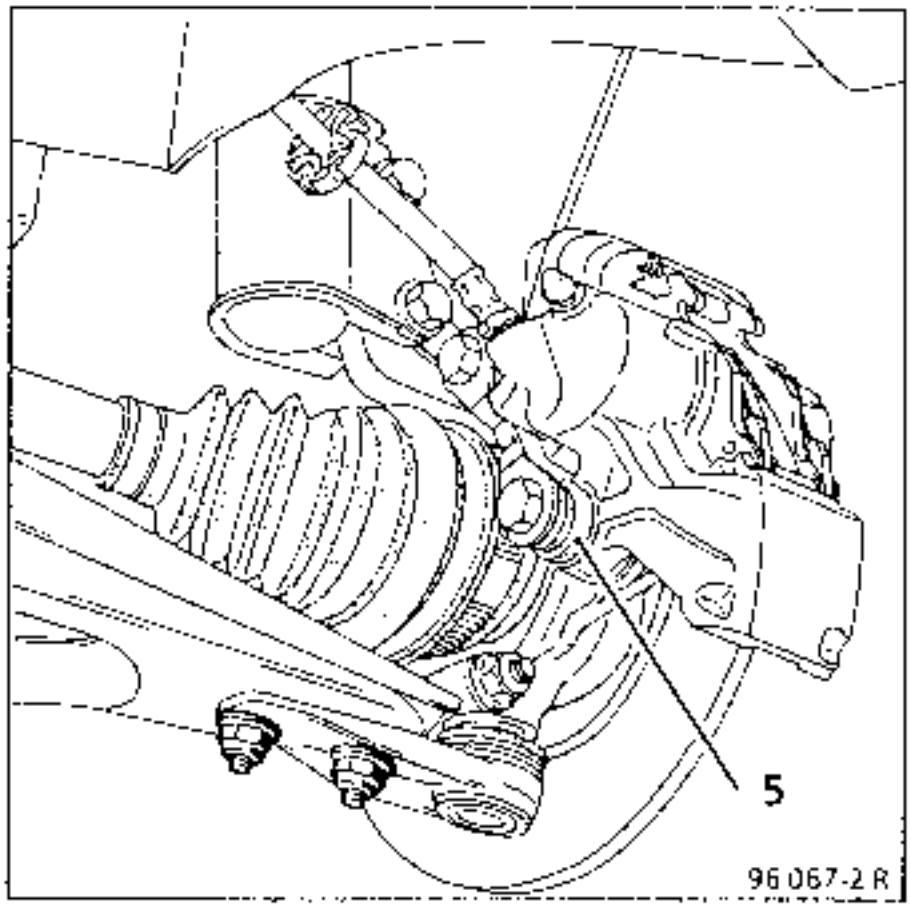
Push the piston back while sliding the caliper outwards by hand.

Remove:
- clip (1),
- retainer (2),
- the pads



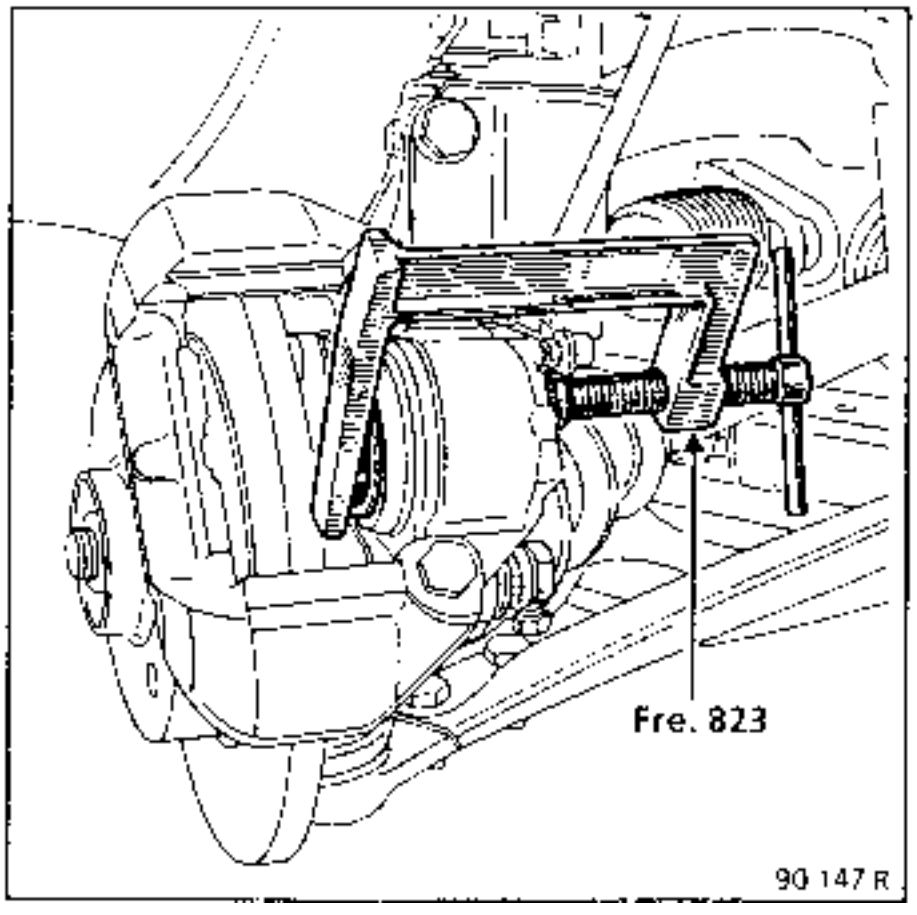
Checking

Check:
- the condition and correct fitting of the dust cover on the piston and the retaining spring,
- the condition of the guide dust cover (5) (caliper retaining bolts).

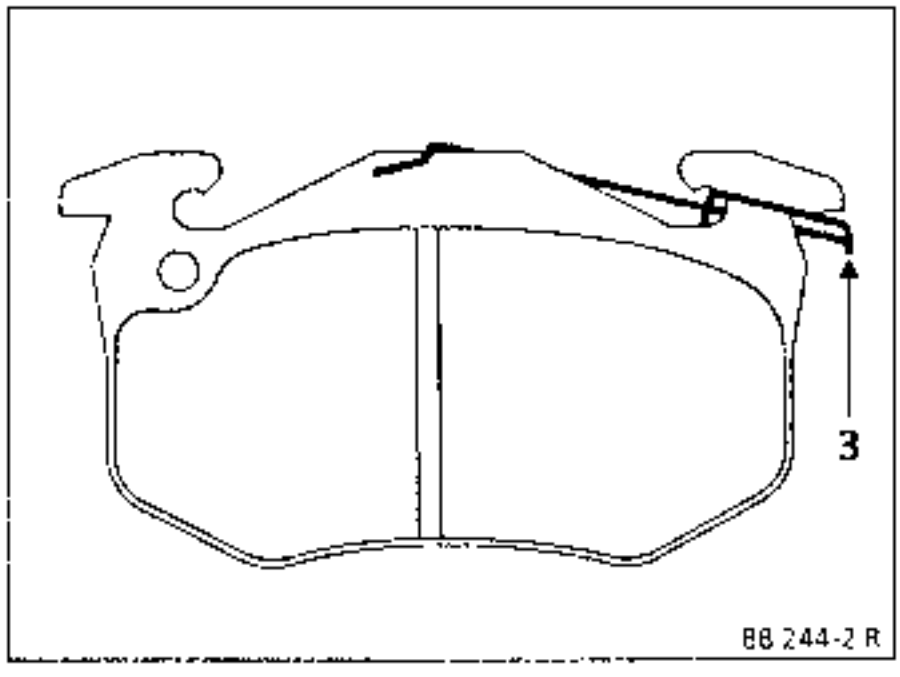


REFITTING

Push the slave piston back using tool Fre. **823**.



Fit the two anti-rattle pins (3) on new pads .

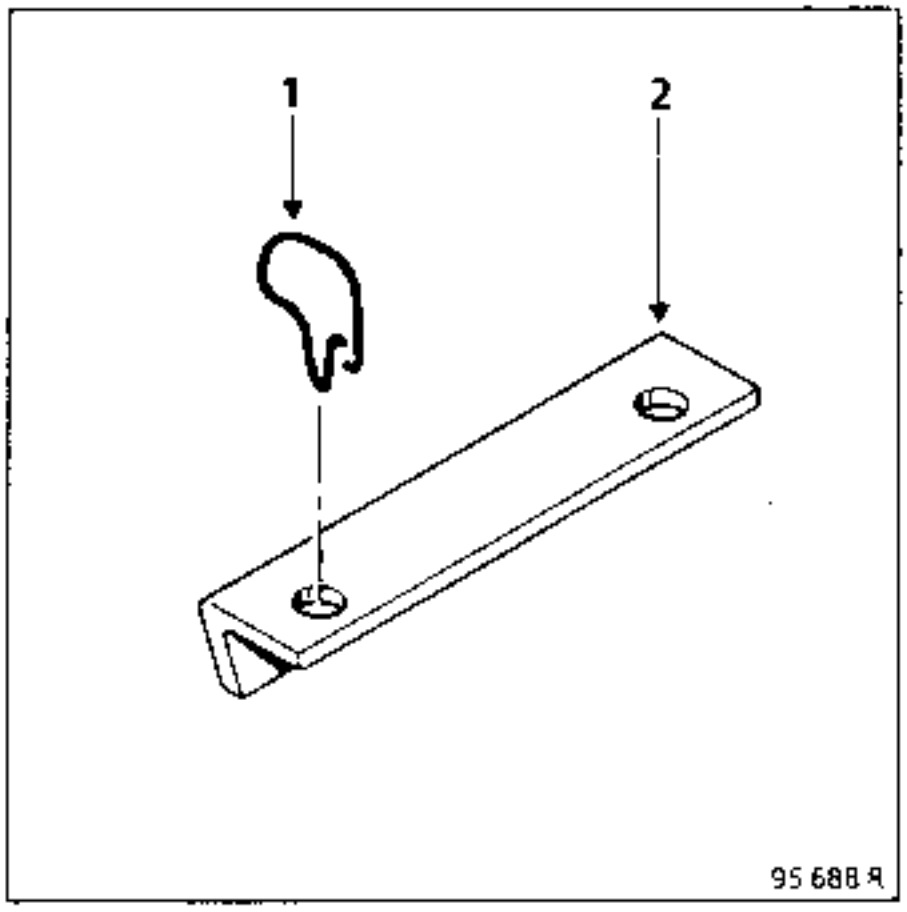


NOTE : these vehicles are fitted with symmetrical pads.

Position the pads in the caliper.

Fit the retainer (2) and refit the clip (1). (One clip per caliper).

NOTE : clip (1) is positioned on the inside of the caliper.



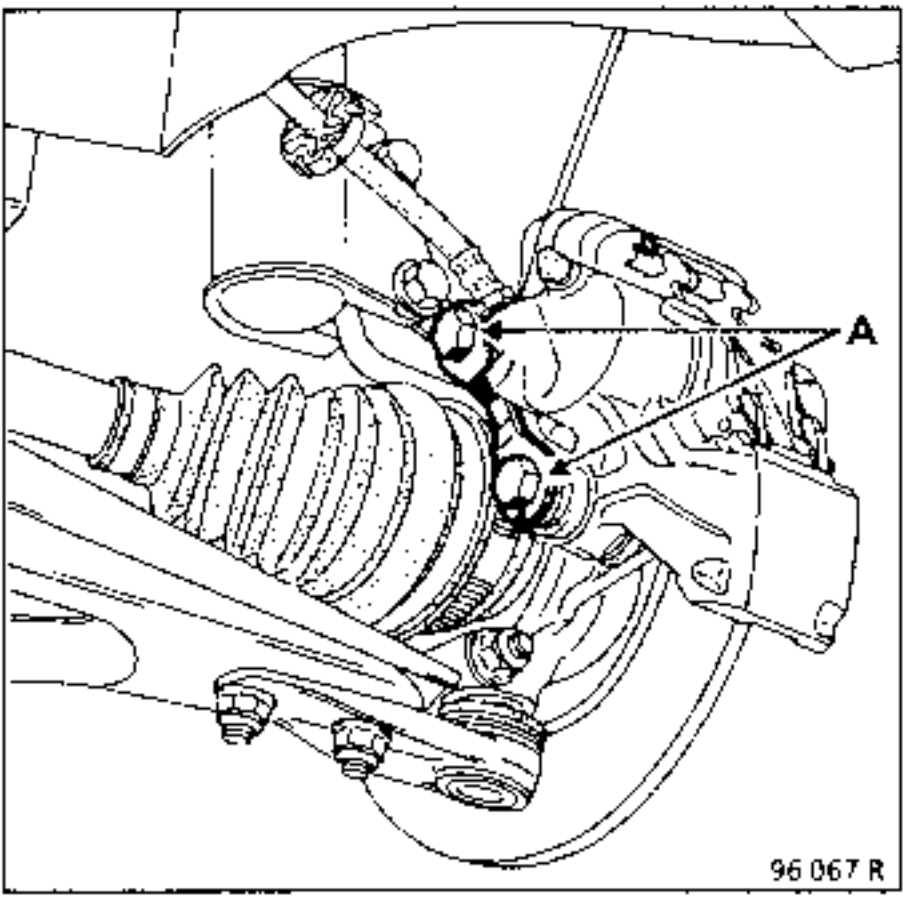
Press the brake pedal several times to bring the pistons into contact with the linings.

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	9
Caliper mounting bolt (BENDIX Series IV)	10

REMOVAL

Loosen the brake hose on the slave cylinder.

Remove:
- the brake pads (see corresponding paragraph),
- the two mounting bolts (A) on the stub axle carrier.



Unscrew the brake hose from the slave cylinder (brake fluid will run out).

Check the condition of the hose and replace it if necessary (see section on replacing a brake hose).

If replacing a caliper, the hose should be replaced.

REFITTING

Screw the hose back on the slave cylinder.

Fit the slave cylinder on the stub axle carrier and torque tighten the two bolts (A).

Check the condition of the pads. If they are greasy, replace them.

Undo the slave cylinder bleed screw and let brake fluid run out (check the level in the brake fluid reservoir is sufficient).

Retighten the bleed screw.

Partially bleed the circuit only if the brake fluid reservoir did not completely empty during the operation, otherwise bleed the complete circuit.

Press the brake pedal several times to bring the pistons into contact with the linings.

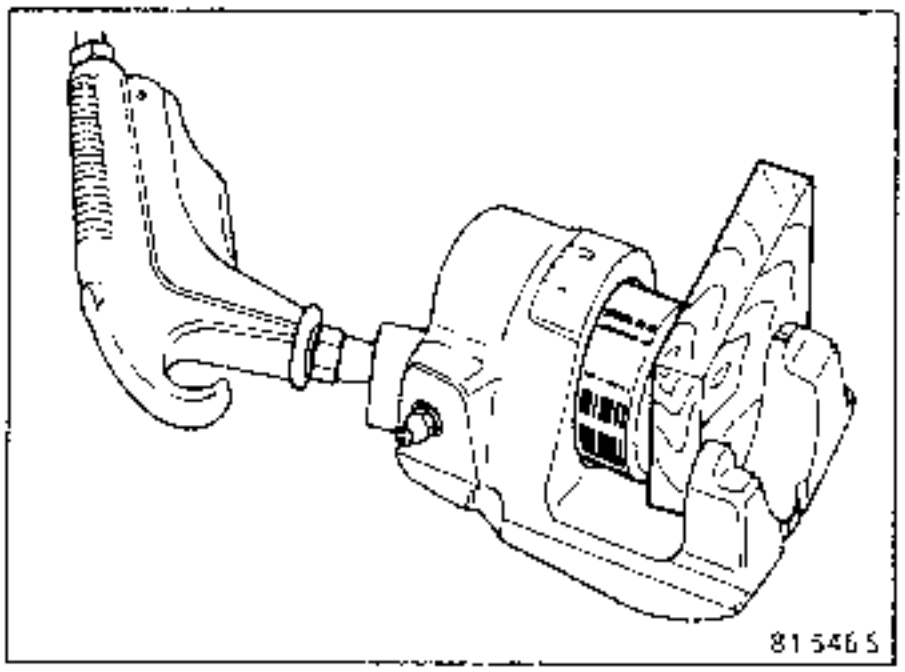
REPAIR

Any scoring in the caliper bore, requires the complete caliper to be replaced.

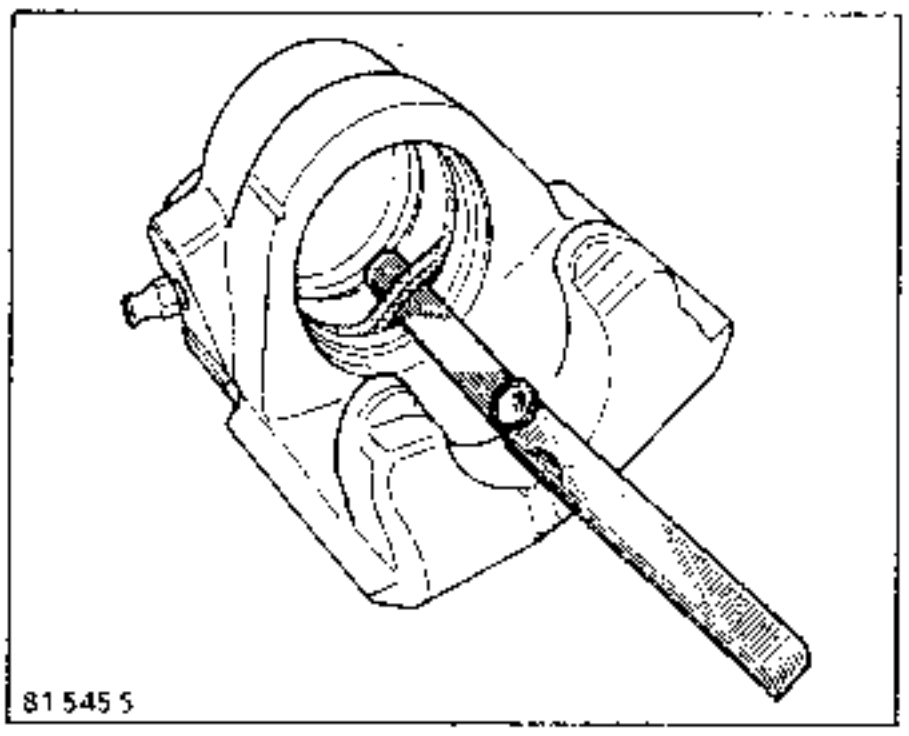
Remove the brake caliper

Remove the rubber dust cover.

Use compressed air to remove the piston taking care to fit a wooden block between the caliper and the piston so that the piston is not damaged : any impact on the piston skirt renders it unusable.



Use a flexible, round edged blade (eg. feeler gauge) to remove the rectangular section seal in the caliper groove.



Clean the parts with white spirit.

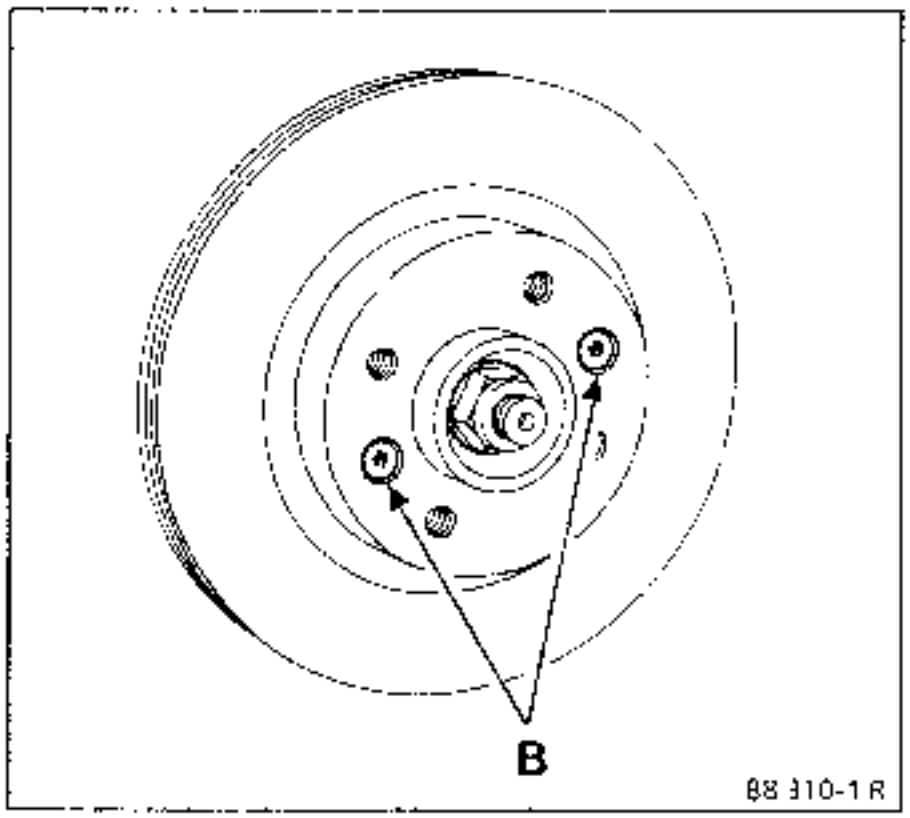
Replace all faulty parts with original parts and refit the seal, the piston and the dust cover.

Brake discs cannot be reground. Any high degree of wear or scoring requires the disc to be replaced.

TIGHTENING TORQUES (in daN.m)	▽
Wheel bolts	9
Disc mounting bolts	2

REMOVAL

Remove:
- the wheel,
- the brake pads (see corresponding paragraph),
- the two disc mounting bolts (B) using a **TORX T40 allen key,**



- the disc.

REFITTING

Fit the disc on the hub and secure it using the two mounting bolts (B).

Refit the brake pads

Press the brake pedal several times to bring the pistons into contact with the linings.

SPECIAL TOOLING REQUIRED	
Rou. 604-01	Hub locking tool
T.av. 476	Ball joint extractor
Rou. 15-01	Driveshaft protector

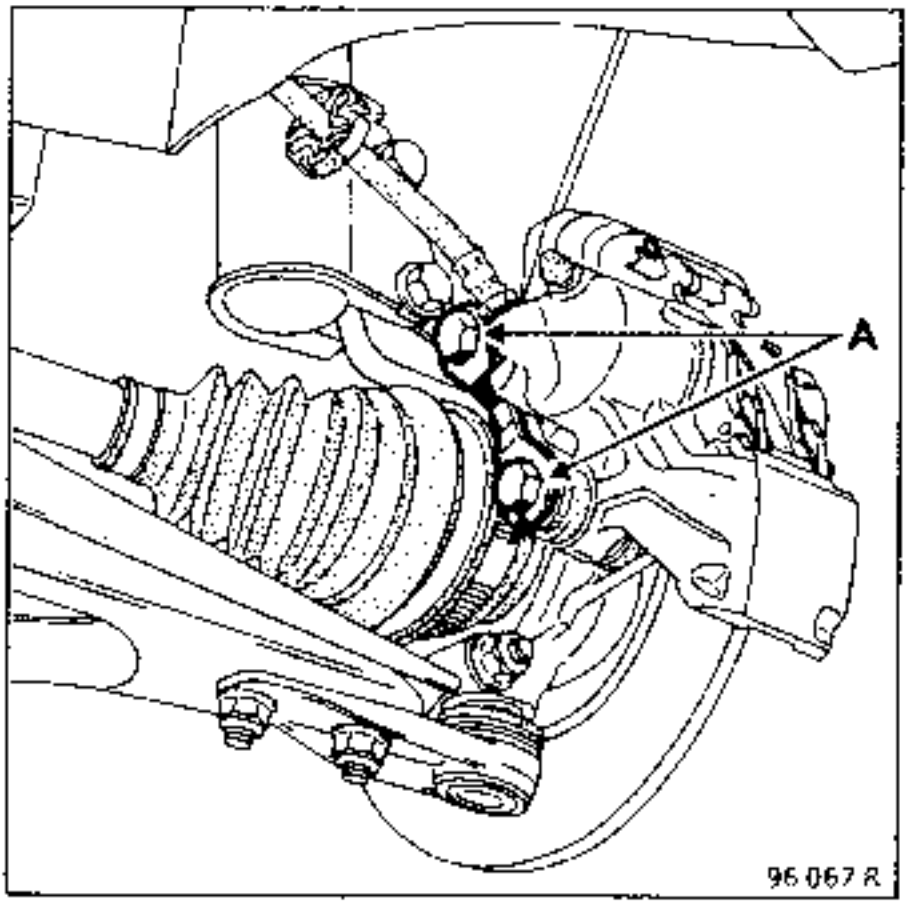
TIGHTENING TORQUES (in daN.m)	
Shock absorber mounting bolt	11
Lower ball joint pinch bolt	6
Track rod end nut	3,5
Brake caliper mounting bolt	10
Driveshaft nut	25
Wheel bolt	9

Testing play

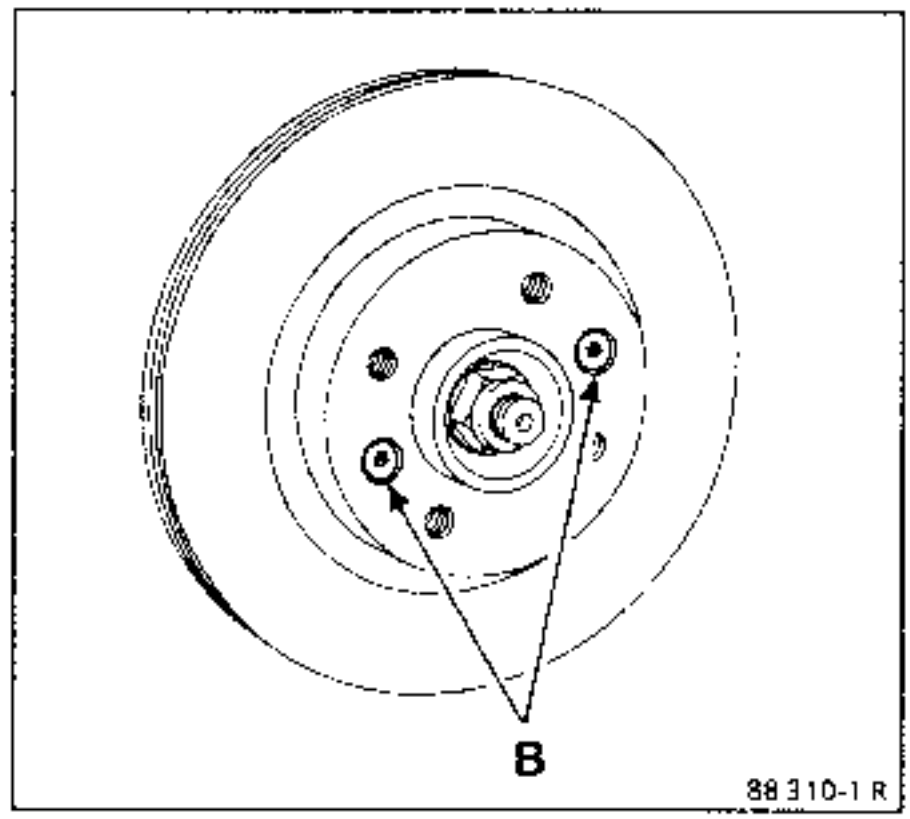
Use a dial gauge on the hub to test the axial play which should be **0 to 0,05 mm**.

REMOVAL

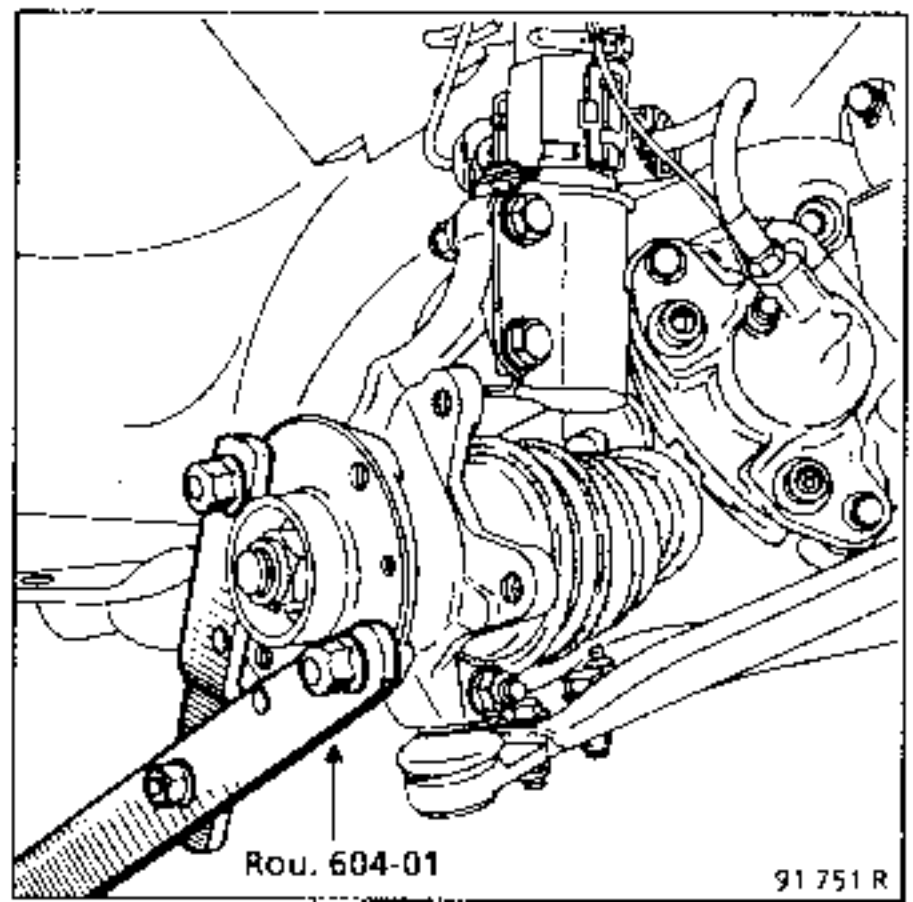
Remove:
- the brake pads (see corresponding paragraph),
- the two caliper mounting bolts (A) on the stub axle carrier,



- the two disc mounting bolts (B),

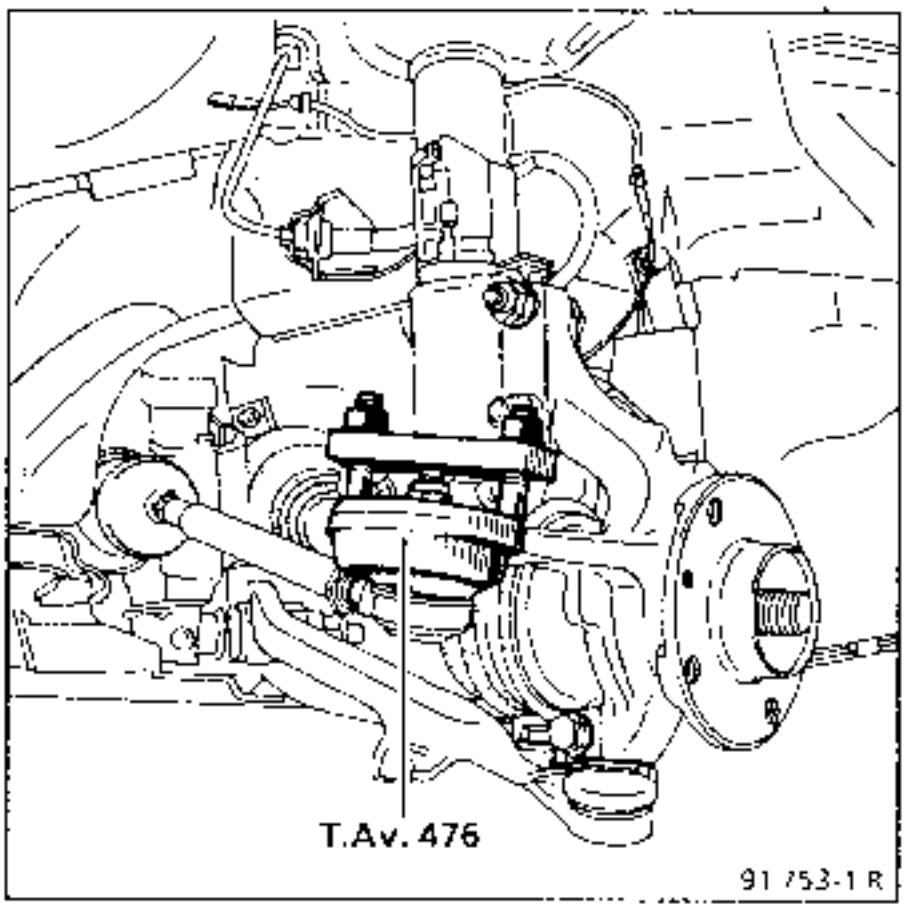


- the driveshaft nut using tool **Rou. 604-01**.

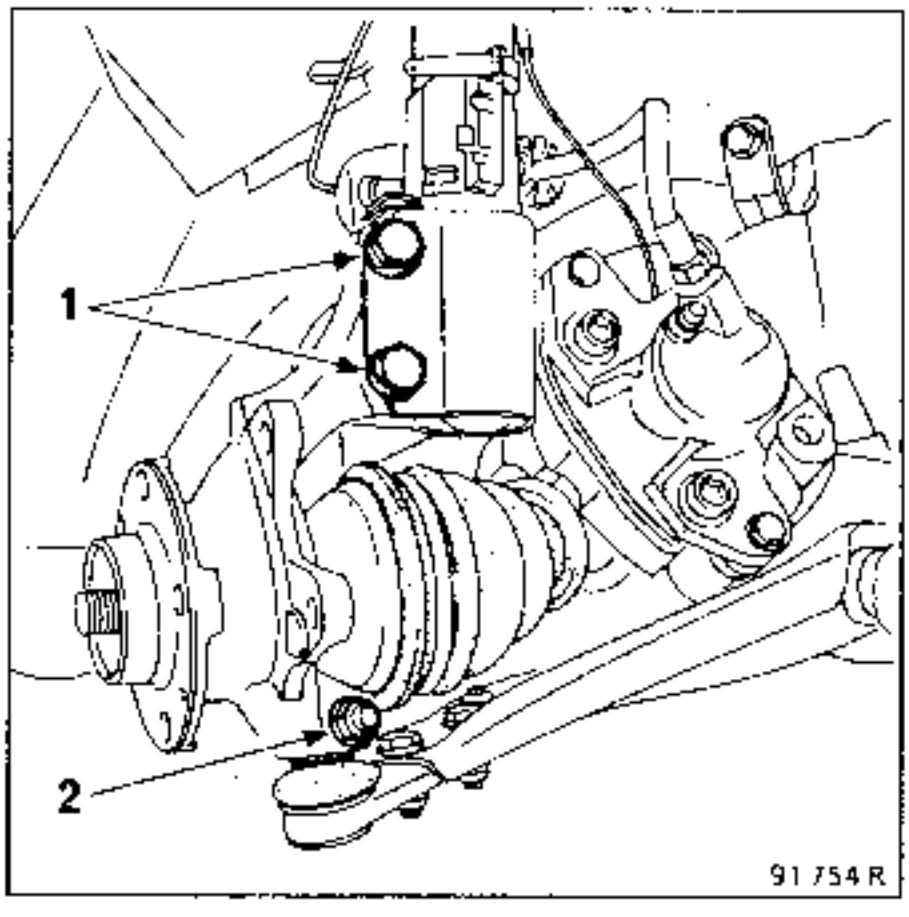


Extract:

– the track rod end using tool **T.Av. 476,**

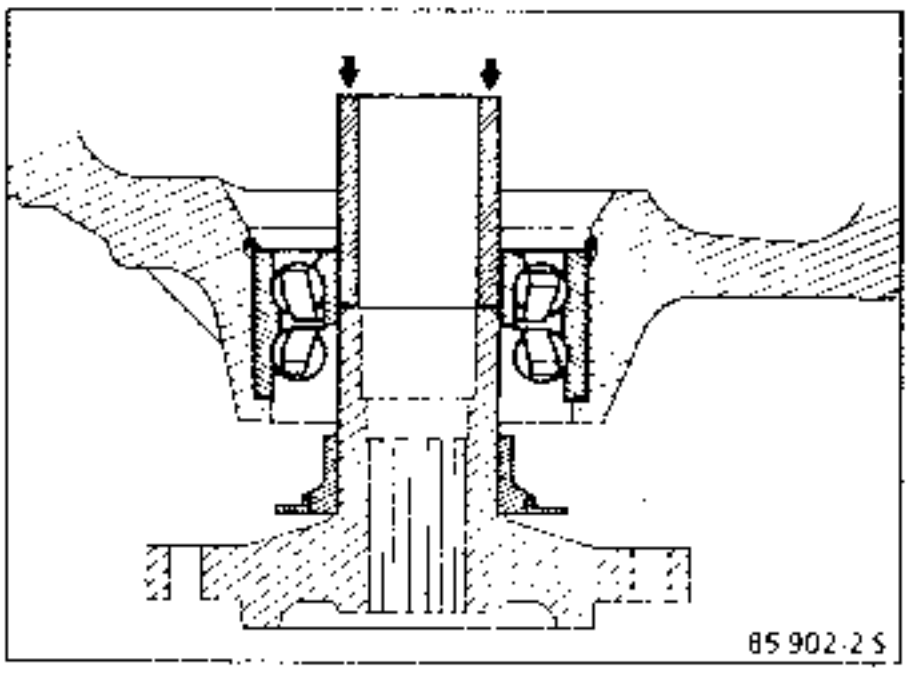


– the mounting bolts (1),
– the locking nut and bolt (2).

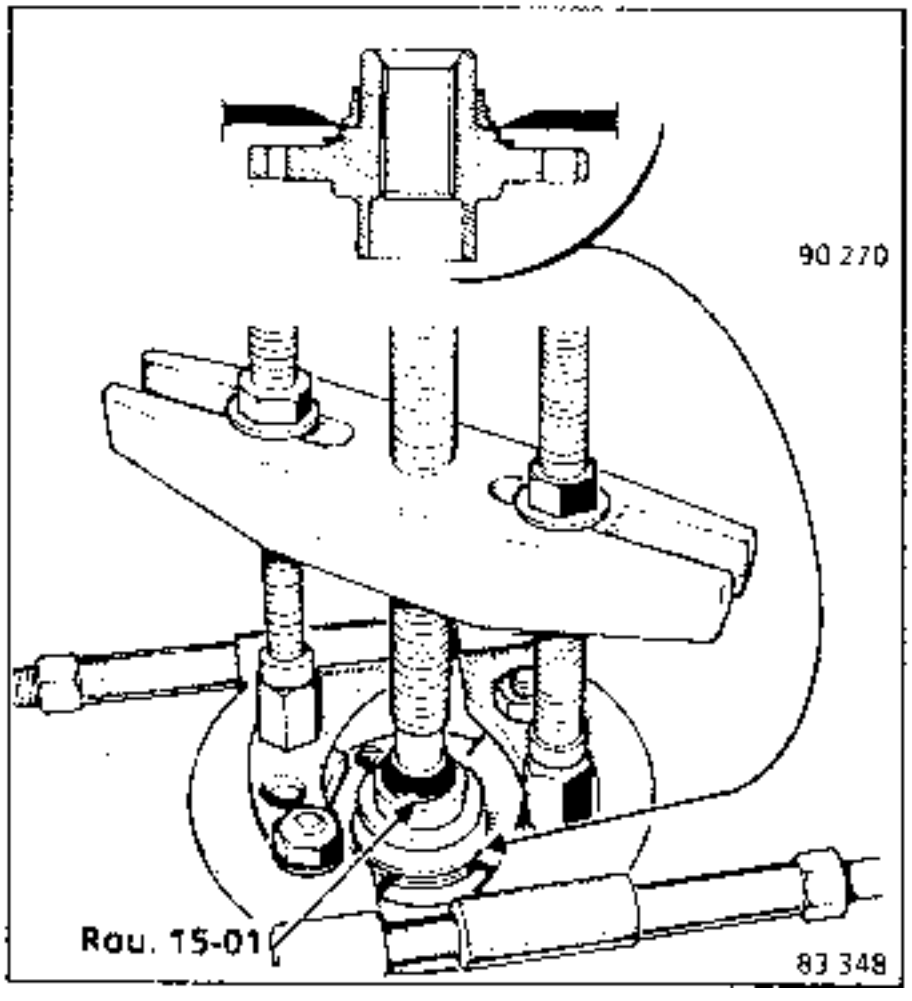


Remove the hub and stub axle carrier assembly.

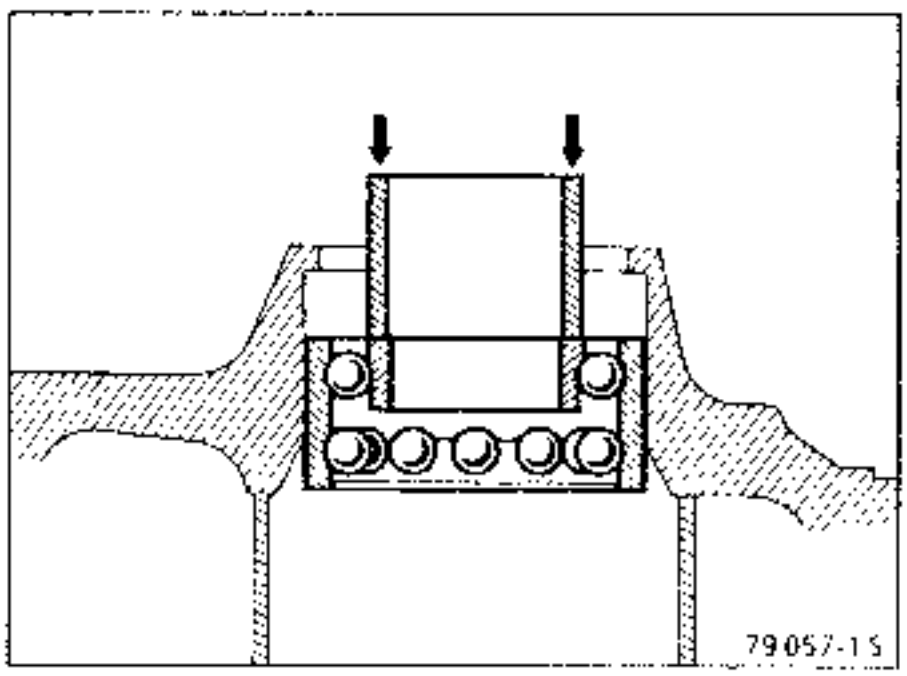
On the press, extract the hub (3).



From the hub remove the inner bearing ring using a jaw extractor of type **FACOM U53T + U53K** and tool **Rou. 15-01.**

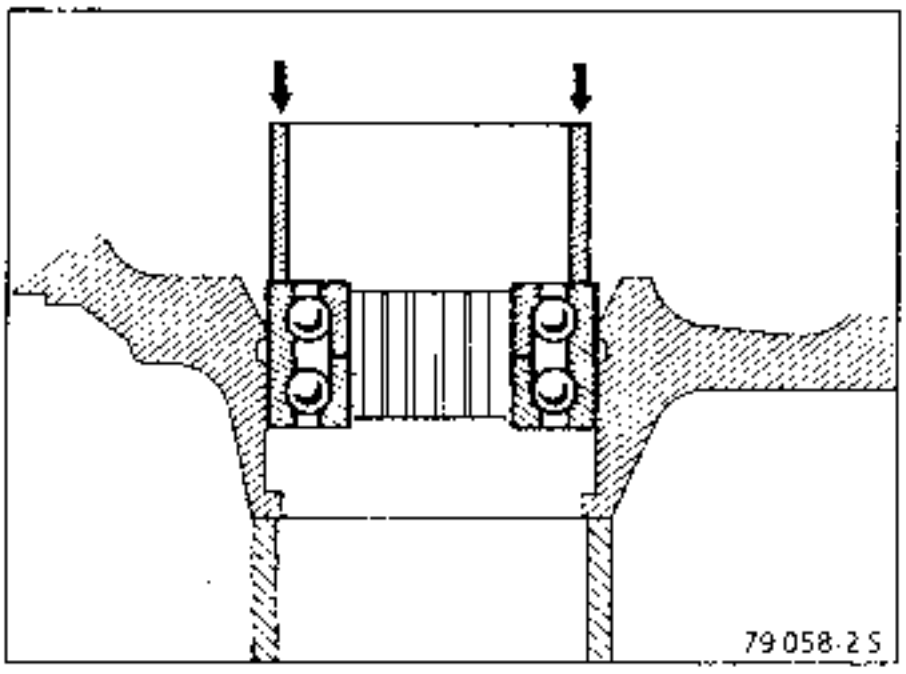


Use one of the two inner rings to extract the outer bearing ring on the press.



REFITTING

Fit the complete bearing (new) in the stub axle carrier on the press.

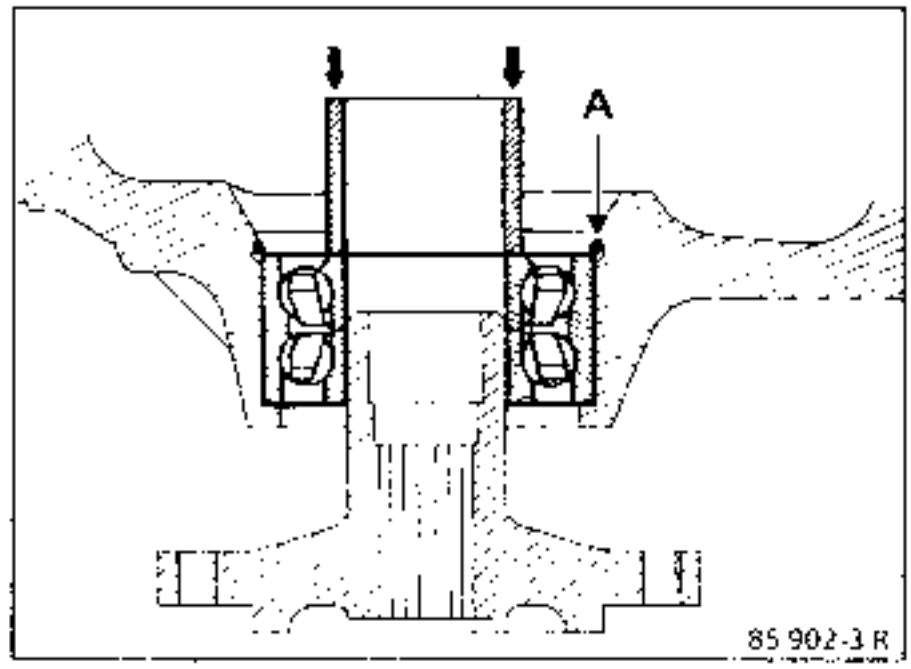


NOTE : do not rest on the inner ring or the bearing will be damaged, since the force required to insert it is considerable.

Fit a new locking ring (A).

Remove the plastic ring.

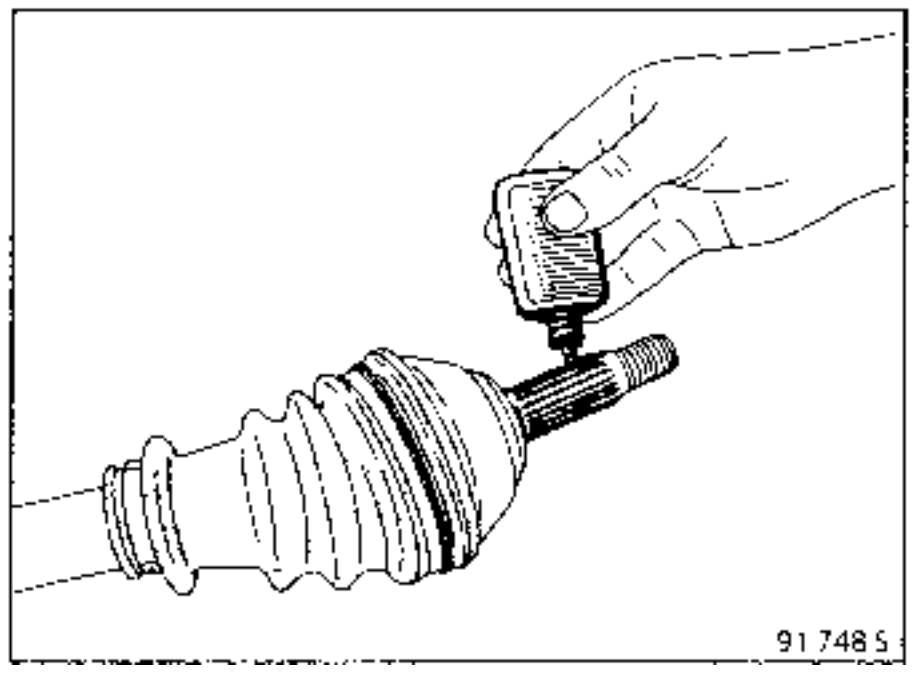
Fit the hub on the press using the inner bearing ring for support.



Remove the bearing locking ring.

Refit the stub axle carrier on the lower arm ball joint and torque tighten the new nut.

Coat the driveshaft stub axle with **Loctite SCELBLOC** having cleaned and degreased the splines.



Fit the drive shaft.

It should slide in freely until reaching a point of resistance for the thread allowing the stub axle nut to be positioned.

If this is difficult, use the tool.

Refitting is then the reverse of removal **taking care not to damage the driveshaft gaiters.**

NOTE : for the shock absorber base mounting, fit the nut on the track rod end side.

Stub axle carrier

The removal and refitting method is identical to that for replacing the bearing.

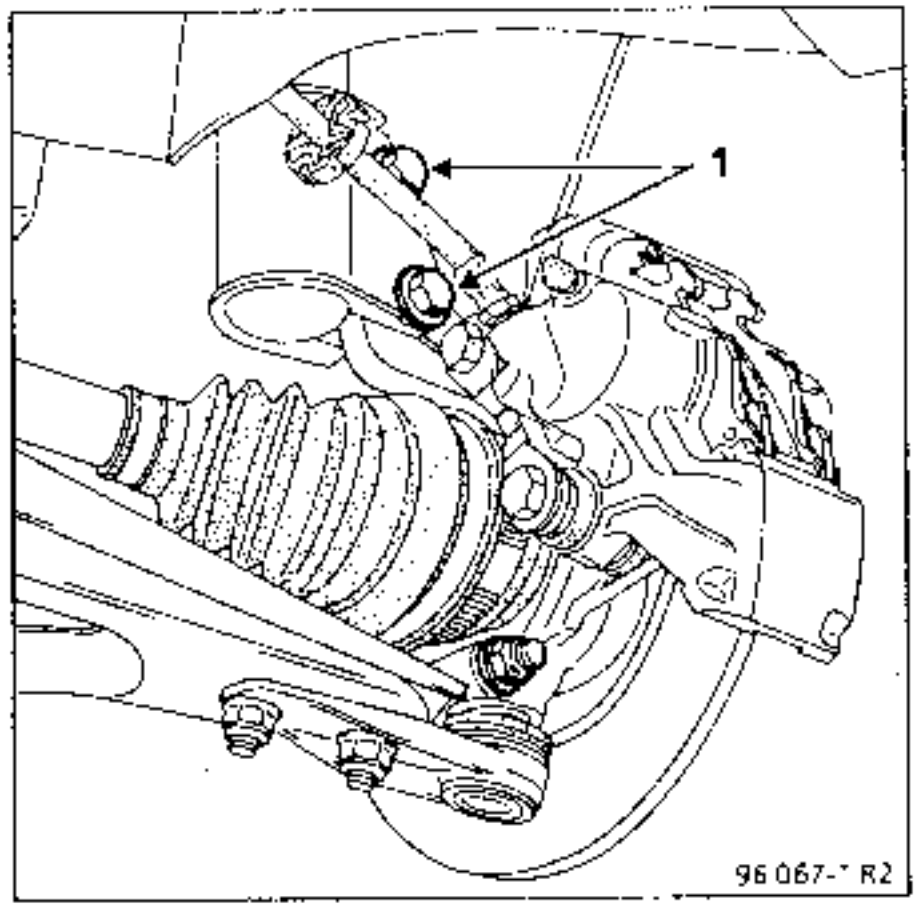
NOTE : the force required for fitting the external bearing ring in its groove is high so when this ring is removed, **the complete bearing should be replaced**, as the bearing track will be scored

SPECIAL TOOLING REQUIRED	
D83 RENA	FACOM kit for shock absorbers

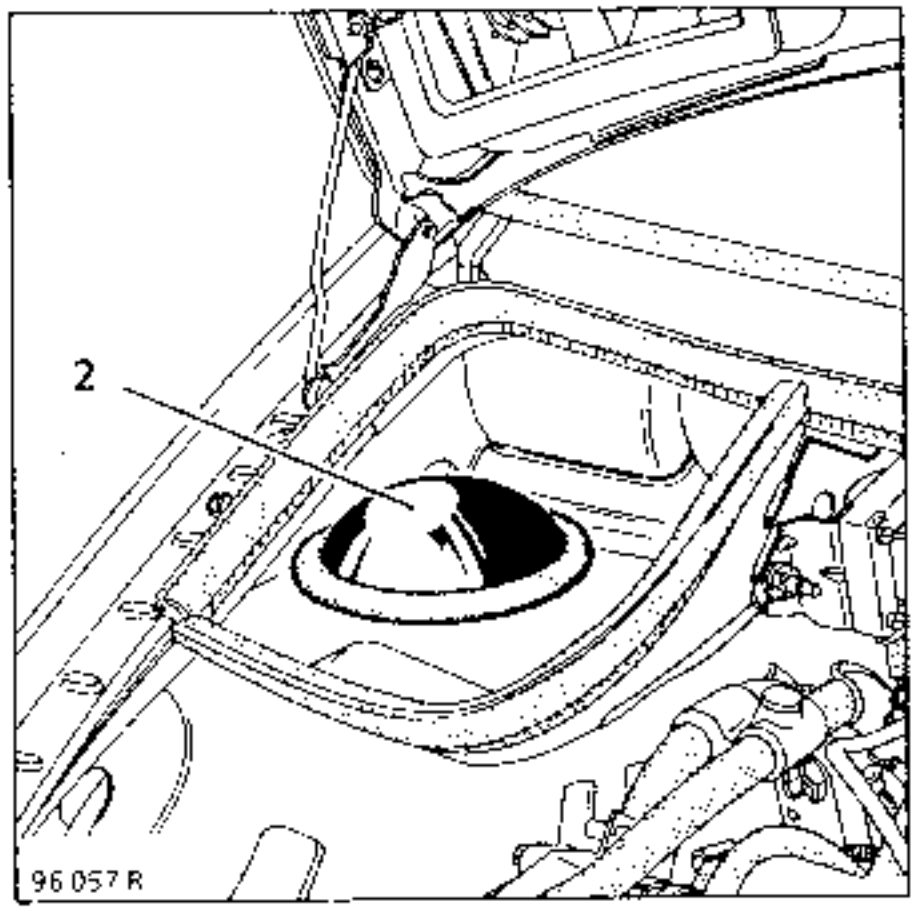
TIGHTENING TORQUES (in daN.m)	
Upper shock absorber mounting nuts	6
Shock absorber base bolts	11
Wheel bolts	9

REMOVAL

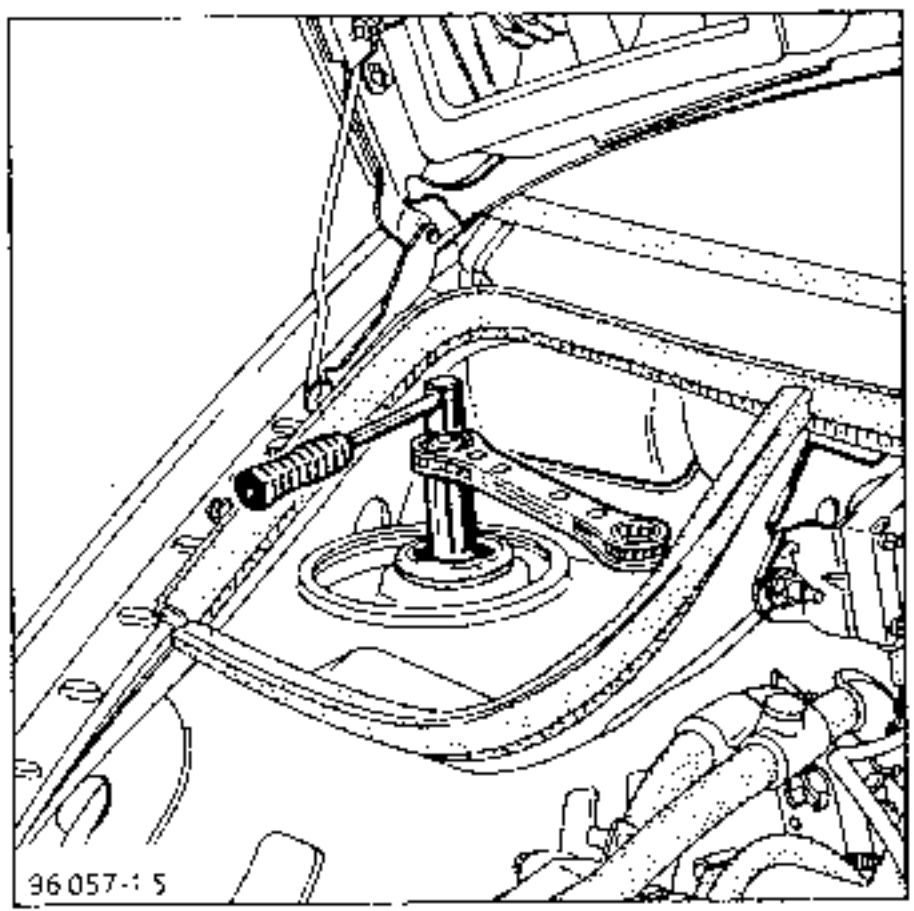
Vehicle on axle stands on the side in question, remove :
- the wheel,
- the two base bolts on the shock absorber (1),



- cover (2),



- the upper shock absorber mounting nut using tool **FACOM D83 RENA**,



- the shock absorber, supporting on the lower wishbone **to avoid contact between the shock absorber and the driveshaft gaiter.**

REFITTING

Refitting is the reverse of removal. **Take care not to damage the driveshaft gaiter.**

Torque tighten :
- the shock absorber base mounting bolts (1) (nut on track rod end side),
- the upper mounting nut,
- the wheel bolts.

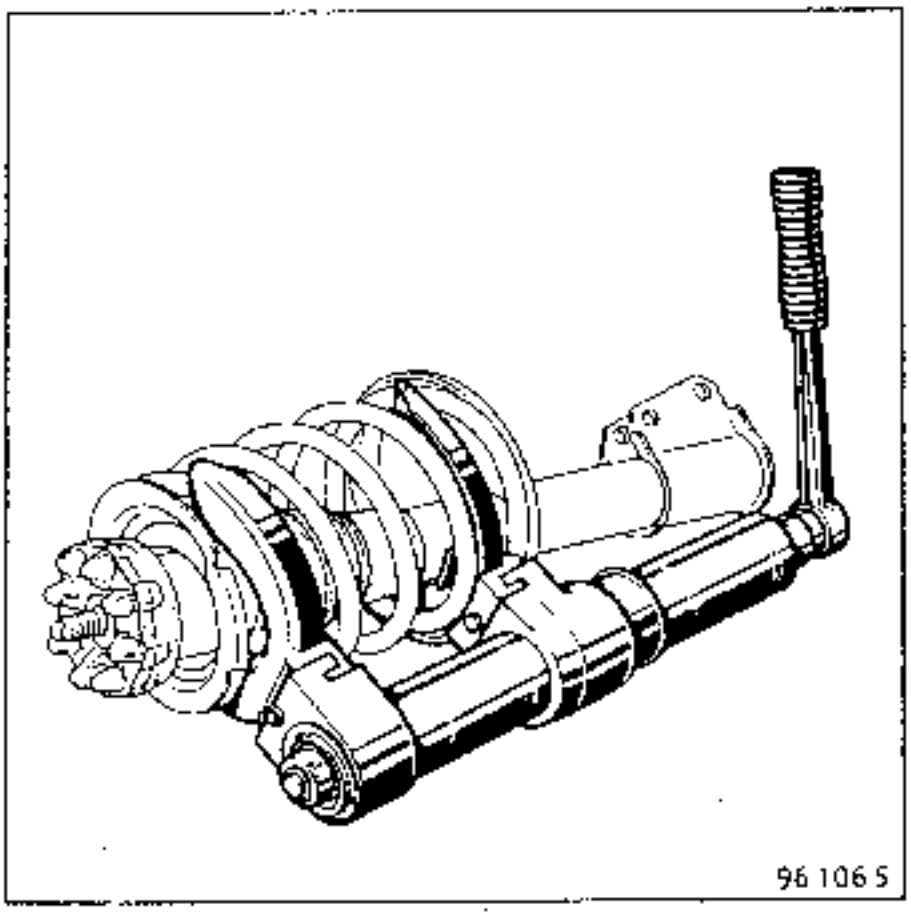
Tooling should be in perfect condition in view of the high forces in the spring.

SPECIAL TOOLING REQUIRED			
Make	Type	Description	Cups
MG	M90	Spring compressor	M1
ZI	ZKL 2013 ZKL 0055	Spring compressor Vice	NO1

TIGHTENING TORQUES (in daN.m)	
Upper shock absorber mounting nut	6

REMOVAL

Fit the cups on the compression tool and position the assembly on the spring as shown in the diagram

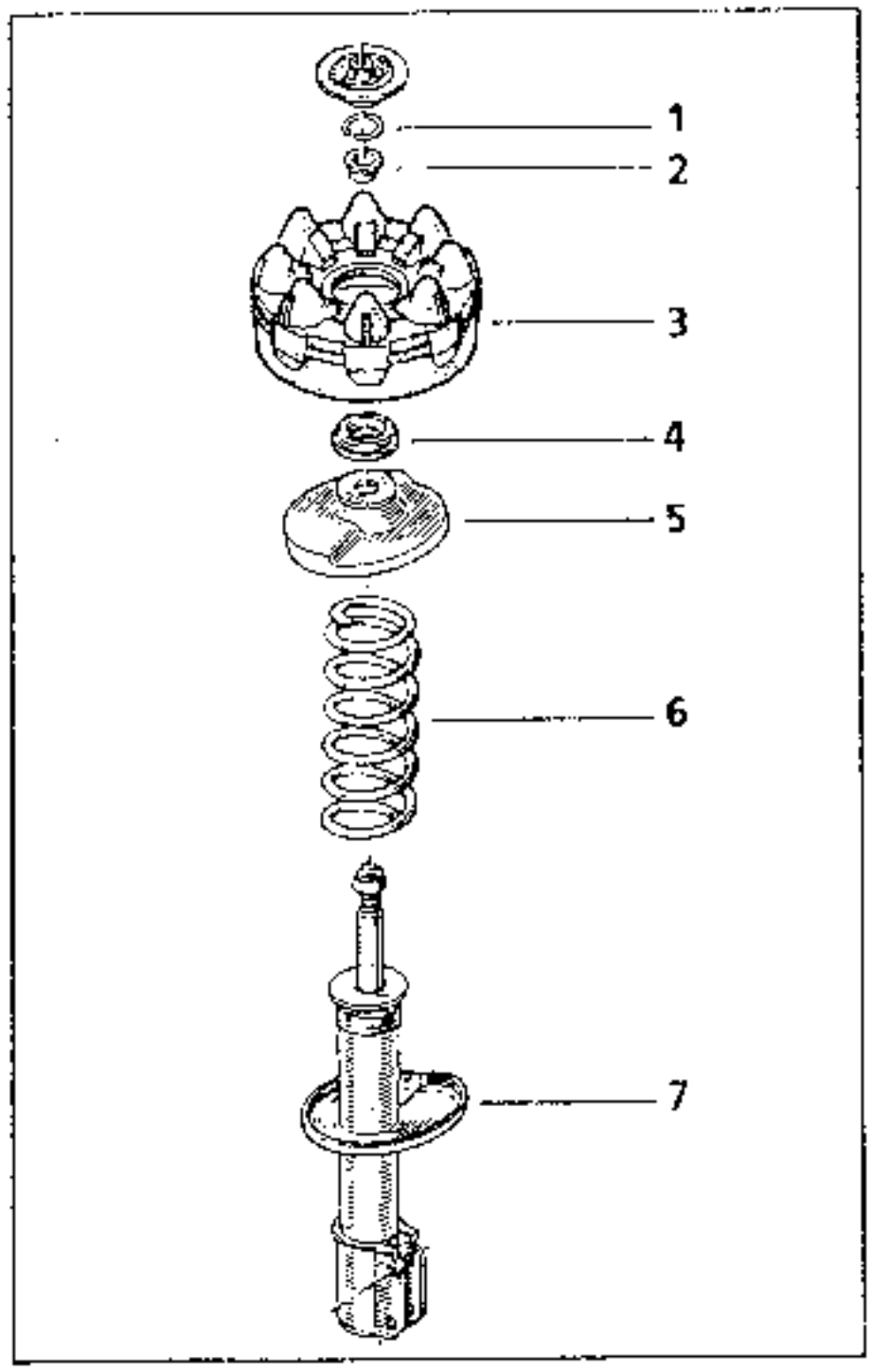


Compress the spring until it no longer presses on the cups.

Remove the clips (1) on the shock absorber rod.

Gradually decompress the spring.

Remove the parts in the order (2) to (6).



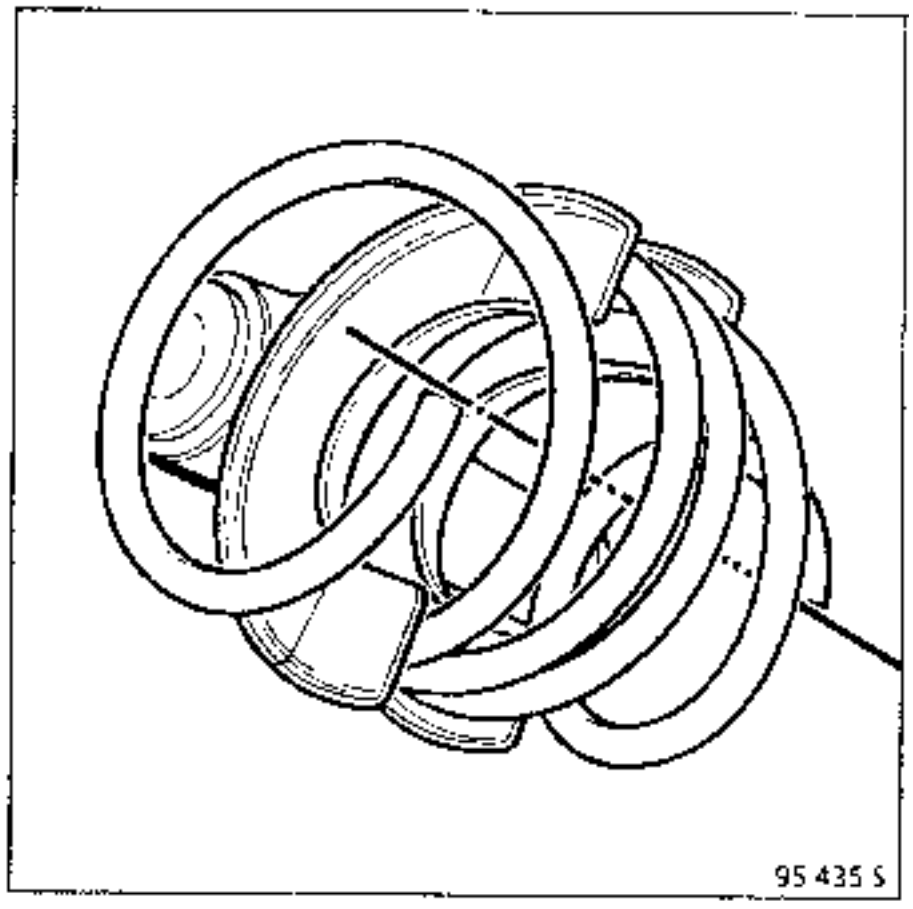
REFITTING THE SPRING - SHOCK ABSORBER

NOTE : shock absorbers are stored horizontally in parts stores

Under these conditions, shock absorbers which operate vertically may not operate correctly initially

Before they are fitted to the vehicle they should be pumped several times by hand in the vertical position.

When replacing the spring, to ease refitting, ensure the spring is correctly positioned in relation to the tool cups



Ensure the component parts are fitted back in the correct manner and in the correct order.

Fit the retaining clips on the shock absorber rods.

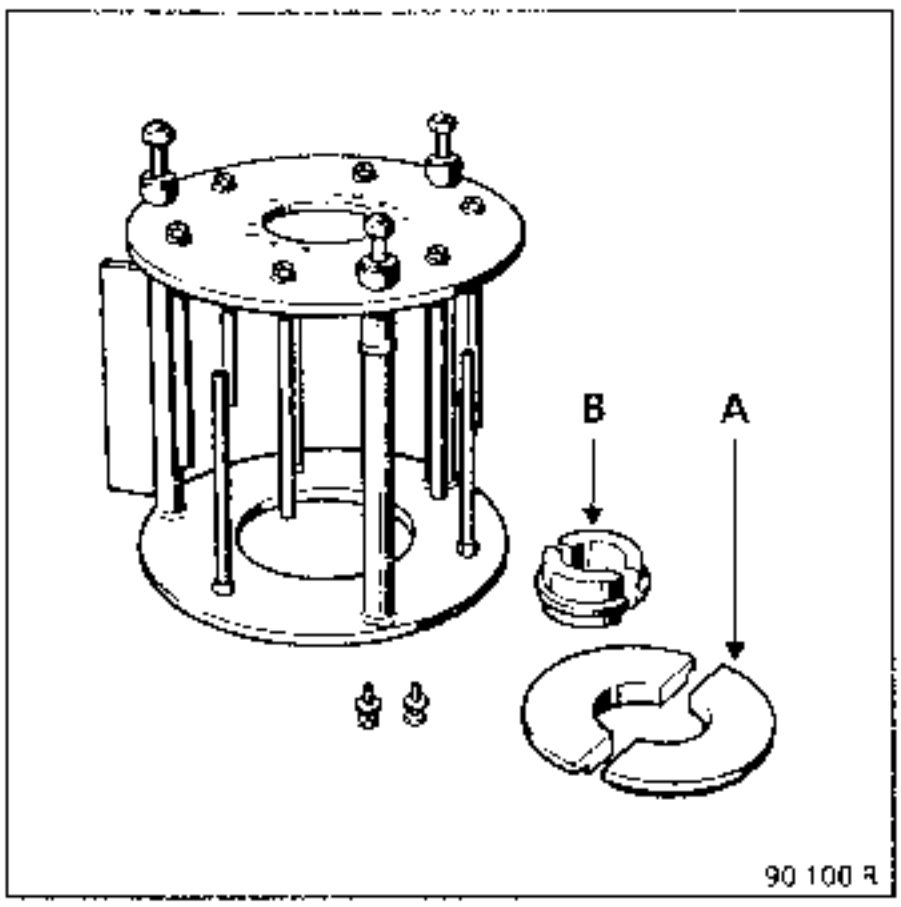
The retaining clips must be renewed each time the shock absorber is removed.

Check the spring is correctly positioned against the stops at the bottom and top of the shock absorber.

Tooling should be in perfect condition in view of the high forces in the spring.

SPECIAL TOOLING REQUIRED	
Sus. 1052	Tool for front shock absorber and spring
Sus. 1052-04	Upper cup

Use components (A) and (B) of tool Sus. 1052.



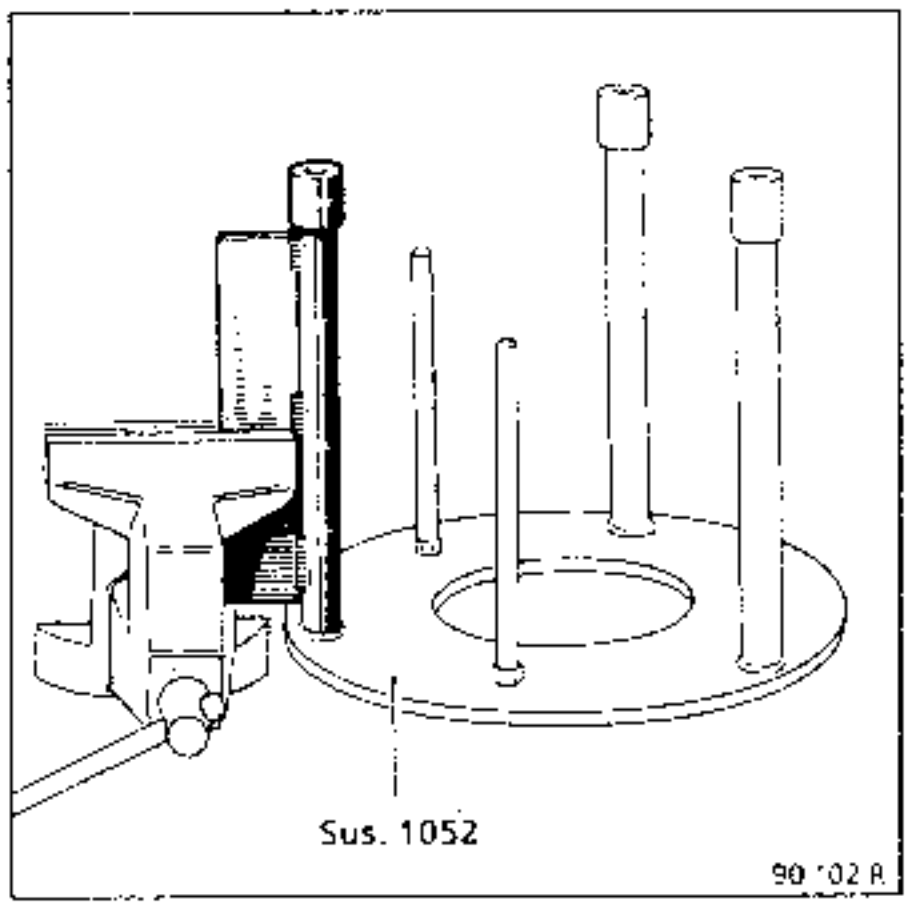
90 100 R

A Pressure plate
B Retaining cup marked "R19"

Also use the upper cup Sus. 1052-04.

SEPARATING SPRING - SHOCK ABSORBER

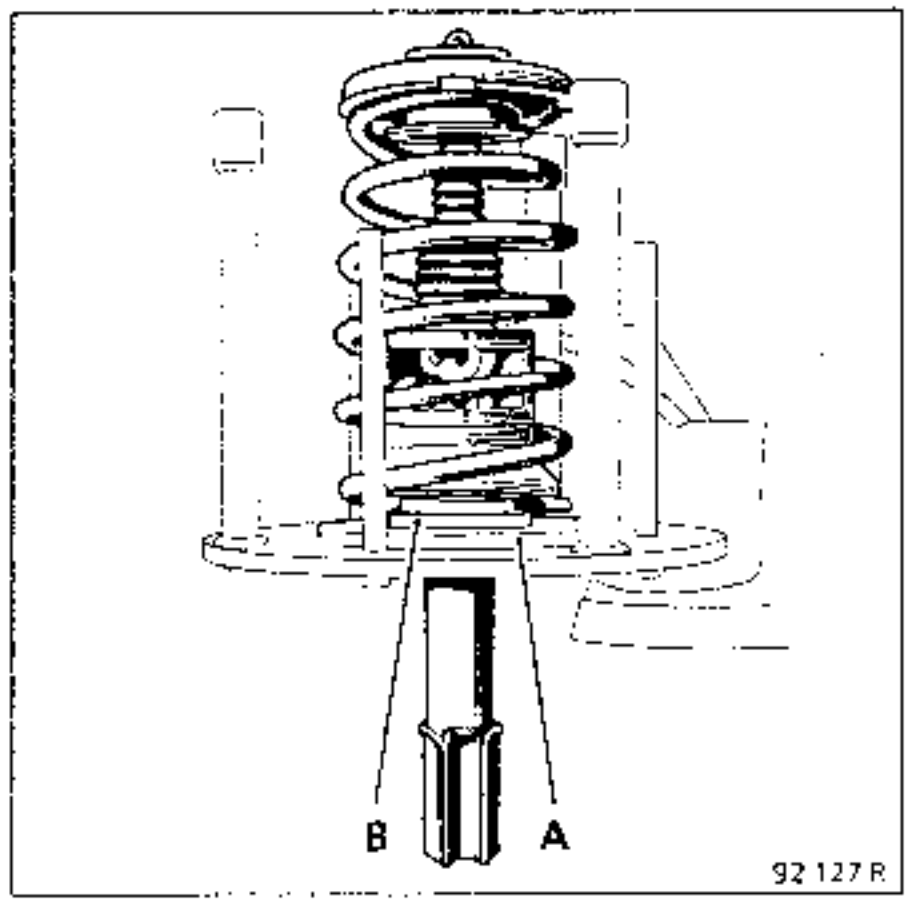
Place the base plate of tool Sus. 1052 in a vice.



Sus. 1052

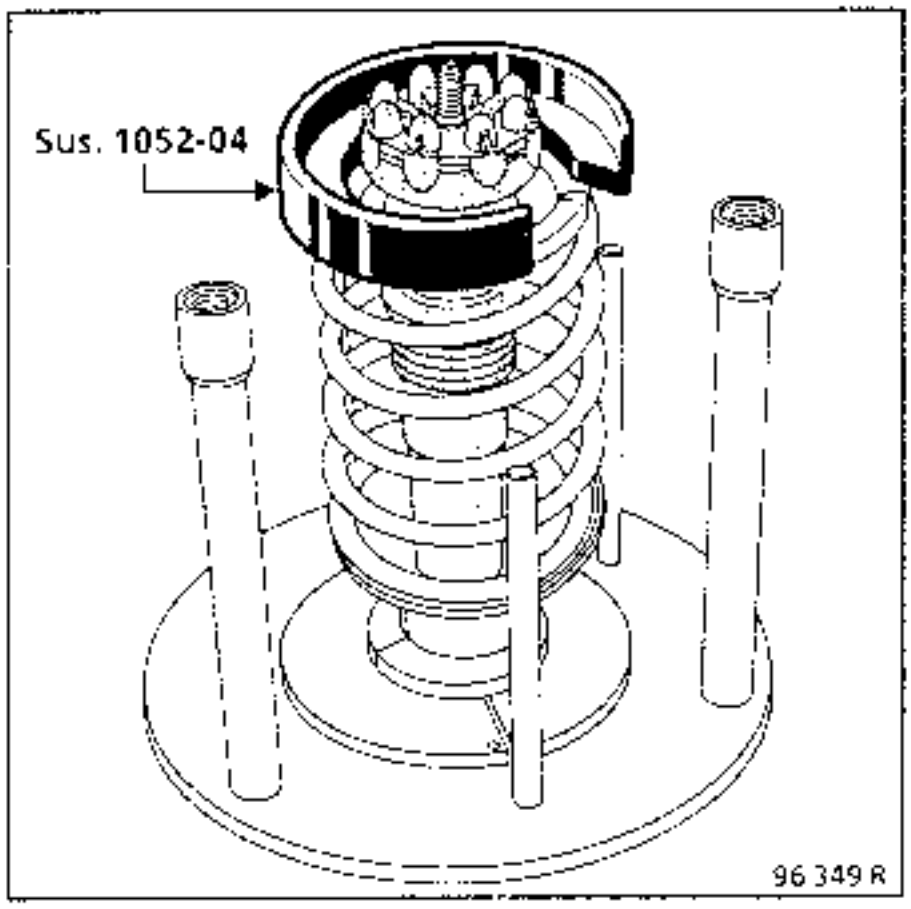
90 102 R

Fit the spring and shock absorber unit positioning the two 1/2 plates (A) and the two 1/2 plates (B).



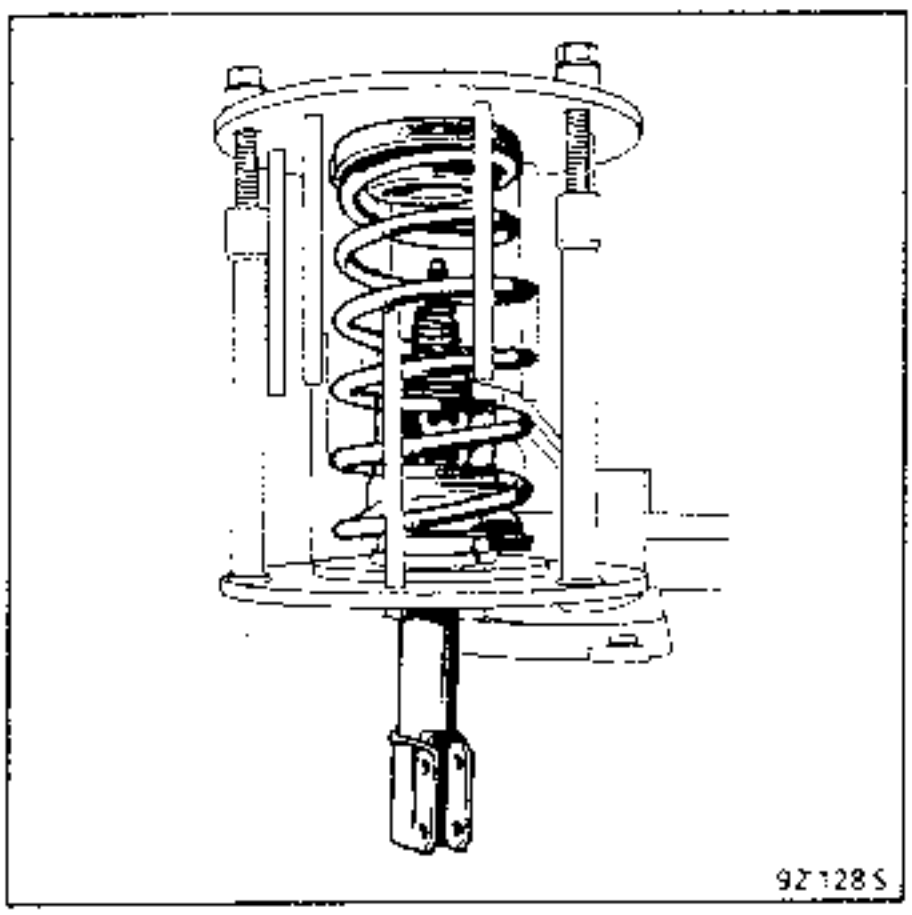
92 127 R

Fit :
– the upper cup **Sus. 1052-04,**



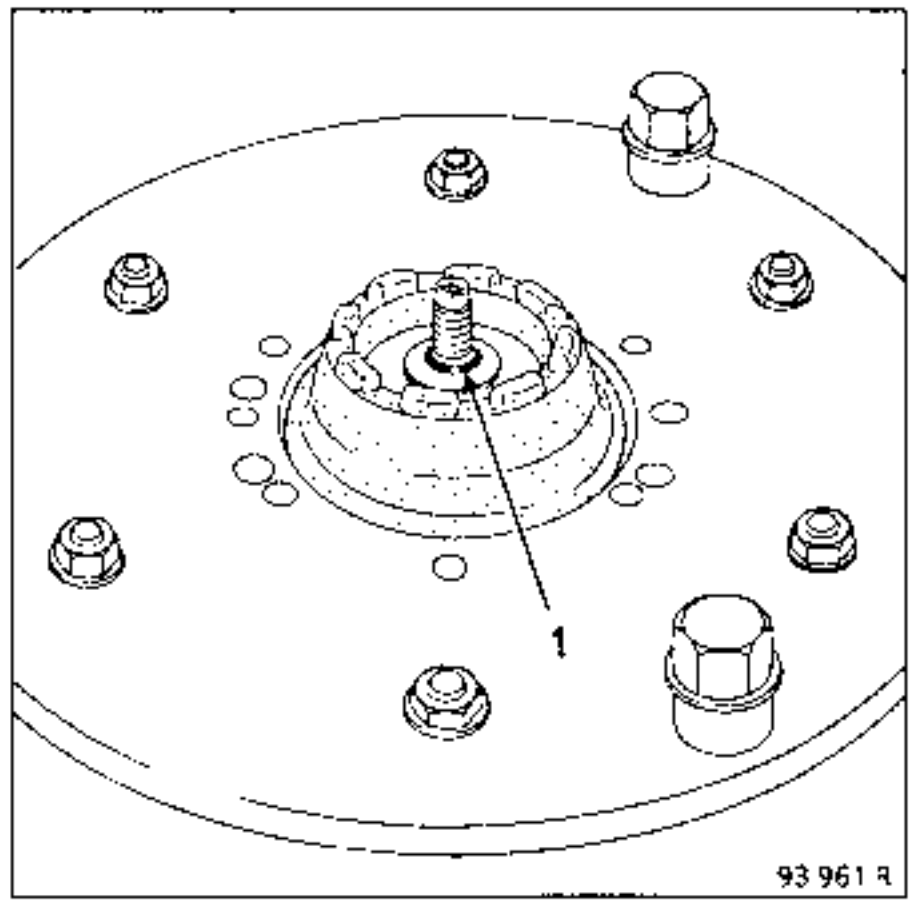
– the upper plate,
– the three compression bolts

NOTE : the threaded rods of the tool are subject to very high forces and should be lubricated well.



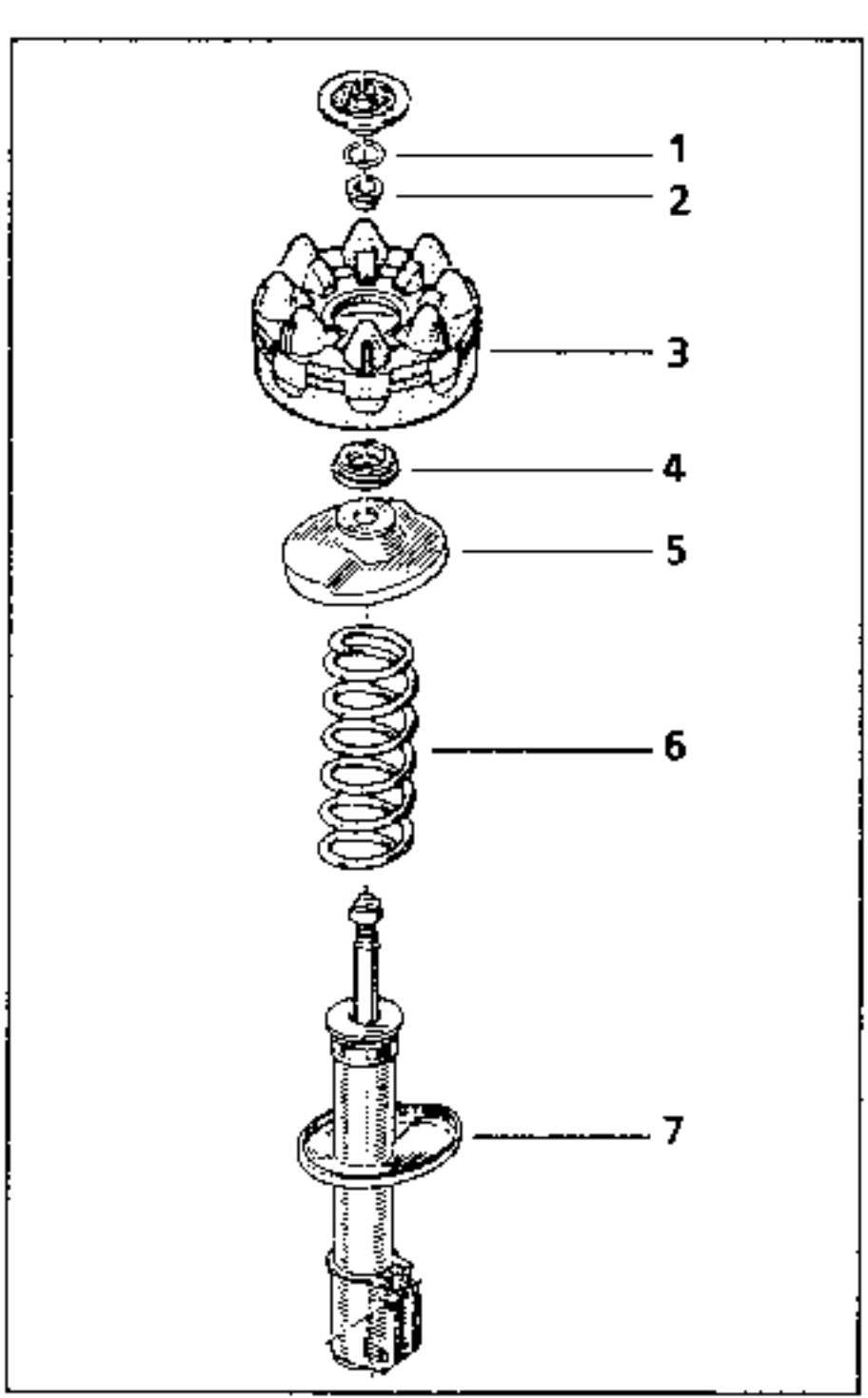
Compress the spring.

Remove the clips on the shock absorber rod (1).



Slowly decompress the spring

Remove the parts in the order (2) to (6).



REFITTING SPRING - SHOCK ABSORBER

Position :
- the shock absorber (7),
- the spring (6),
- the upper cup (5),
- cup **Sus. 1052-04,**
- the upper plate of tool **Sus. 1052.**

Compress the assembly and fit the shock absorber rod into place.

Fit :
- the bearing (4),
- the mounting (3),
- the clip retaining dowel (2),
- the clips (1)

NOTE : renew the clips each time the assembly is removed.

Ensure the spring is correctly positioned on the stops.

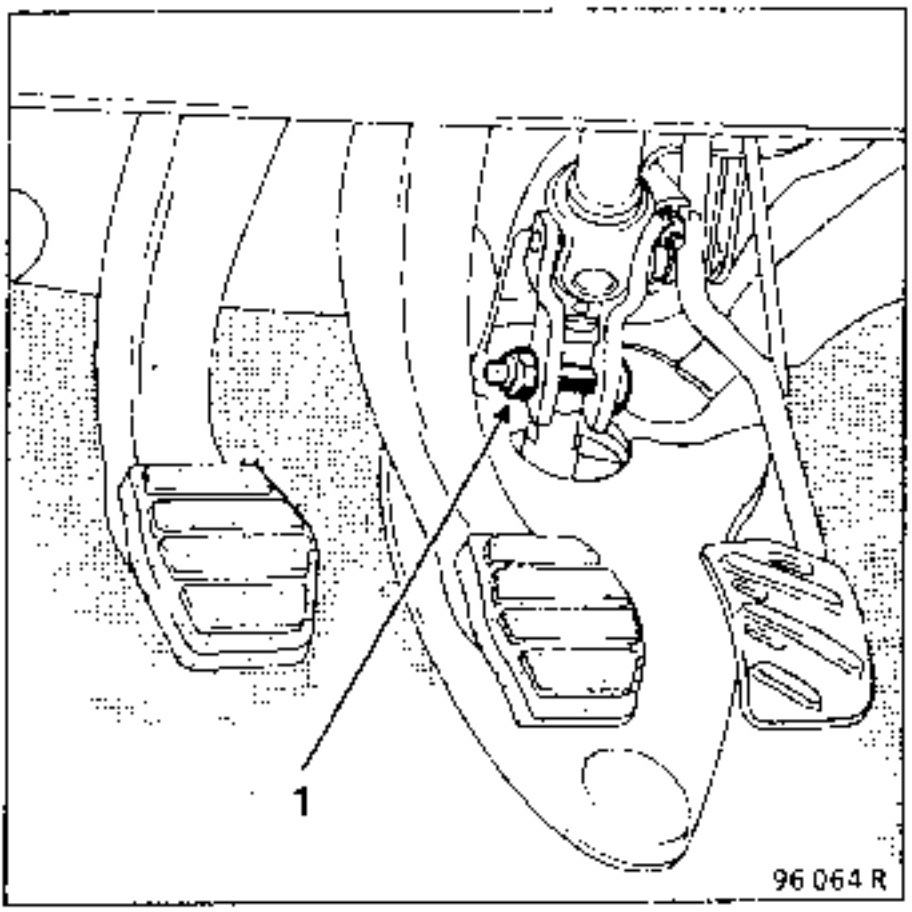
SPECIAL TOOLING REQUIRED	
T.Av. 476	Ball joint extractor
SPECIAL TOOLING REQUIRED	
CELETTE 918 910	Engine - gear box support

TIGHTENING TORQUES (in daN.m)	▽
Track rod end nut	3,5
Steering column universal joint bolt	2,5
Engine mounting bolt	6,5
Parallelism adjustment sleeve bolt	2
Wheel bolt	9

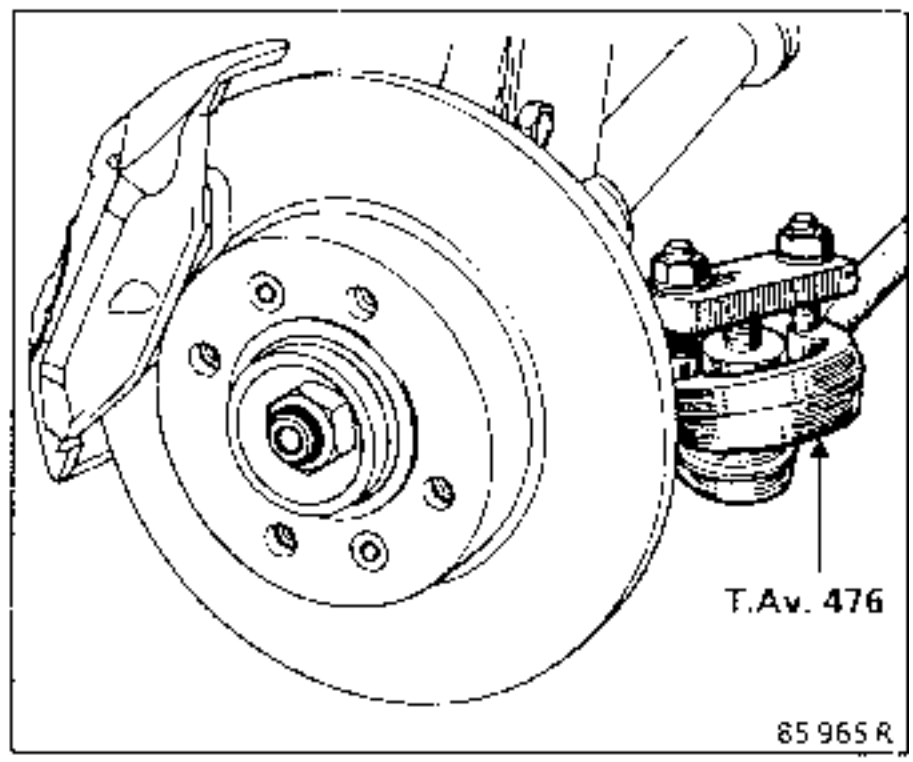
REMOVAL

Disconnect the battery

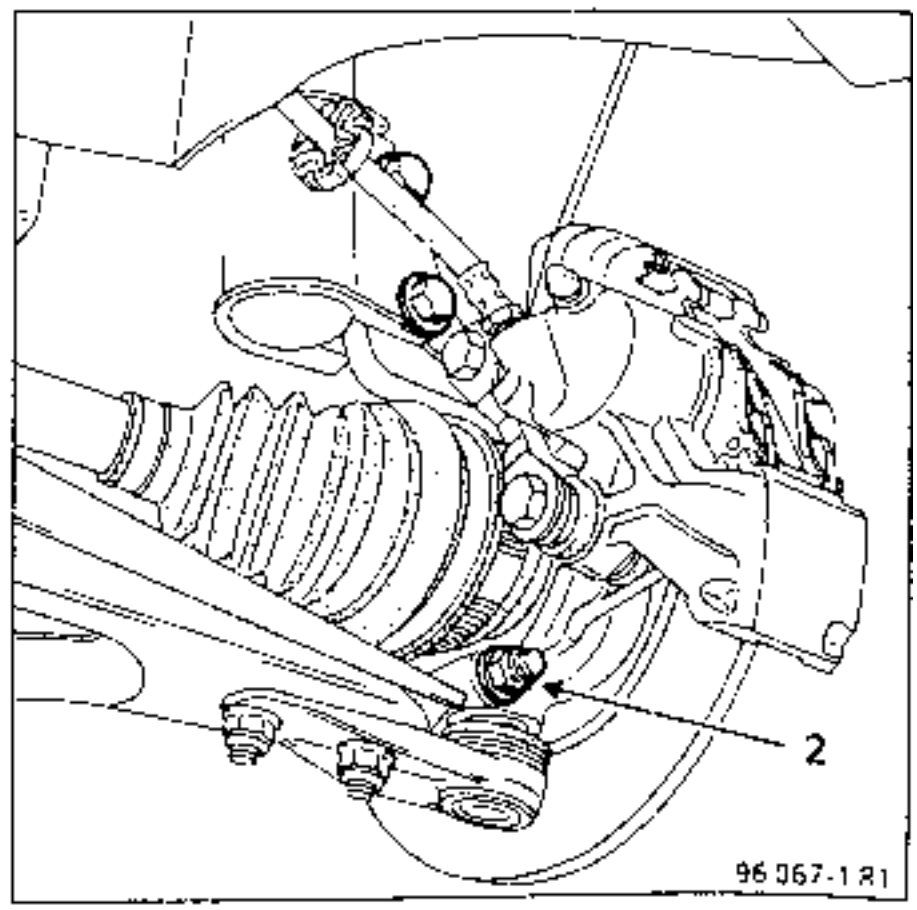
Remove:
- the nut and cam bolt (1) from the steering column universal joint,



- the wheels,
- the track rod ends using tool **T.Av. 476,**

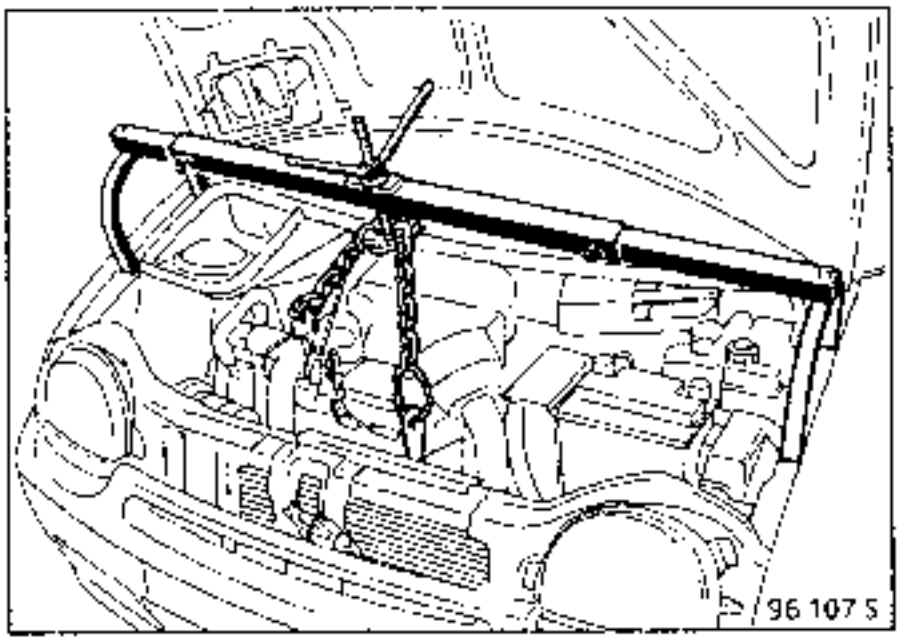


- the lower ball joint nut and bolt (2) ,

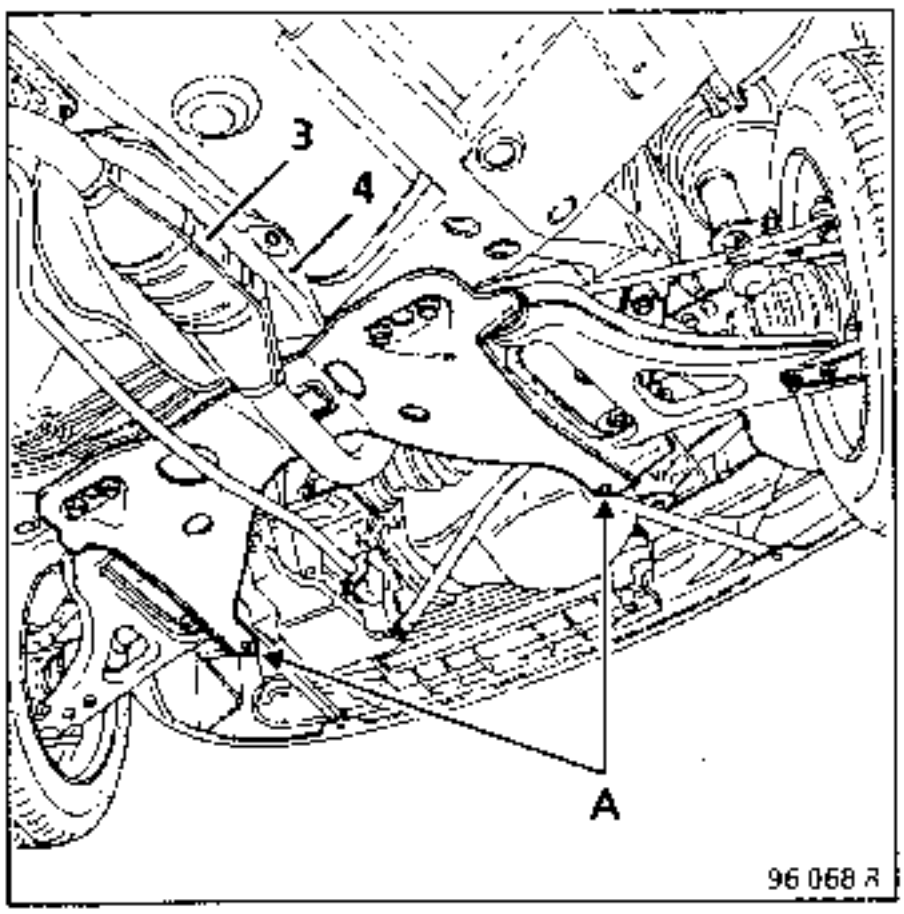


- the oxygen sensor connector.

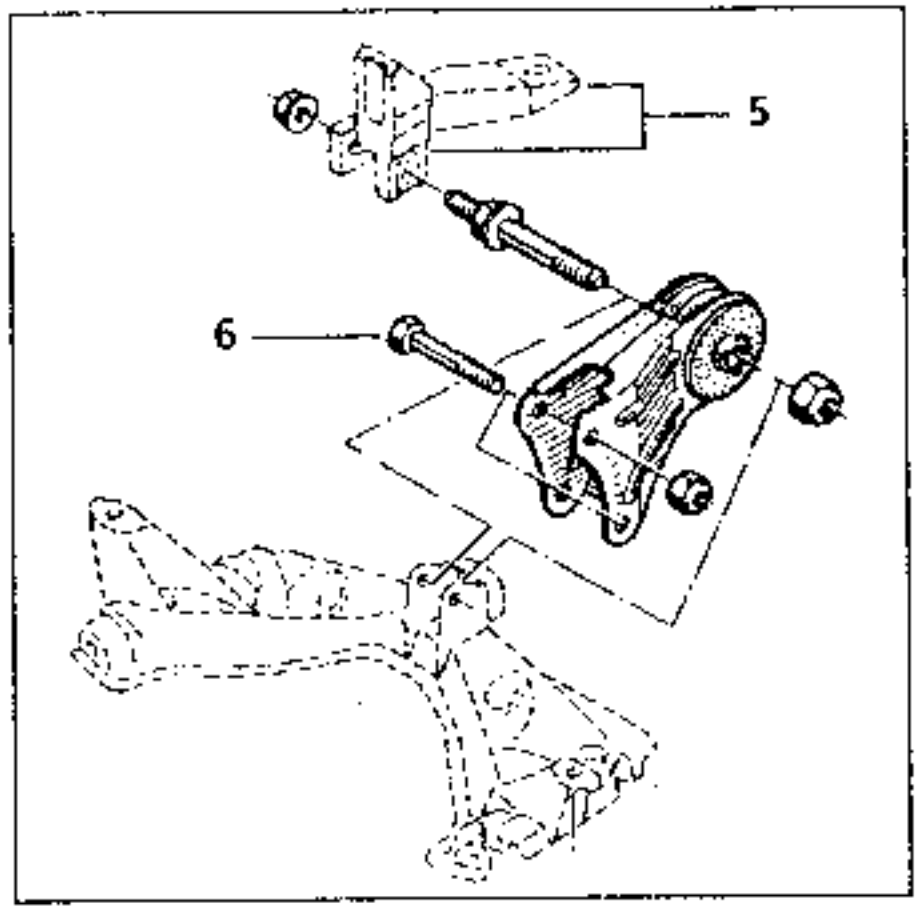
Fit :
- the engine and gear box support **CELETTE 918-910** to the engine lifting rings,
- the support chains



Remove:
- the gear linkage from the gear box side, turn it and attach to the exhaust pipe,
- the two bolts (A),
- the catalytic converter (3),
- the exhaust downpipe heat shield (4),



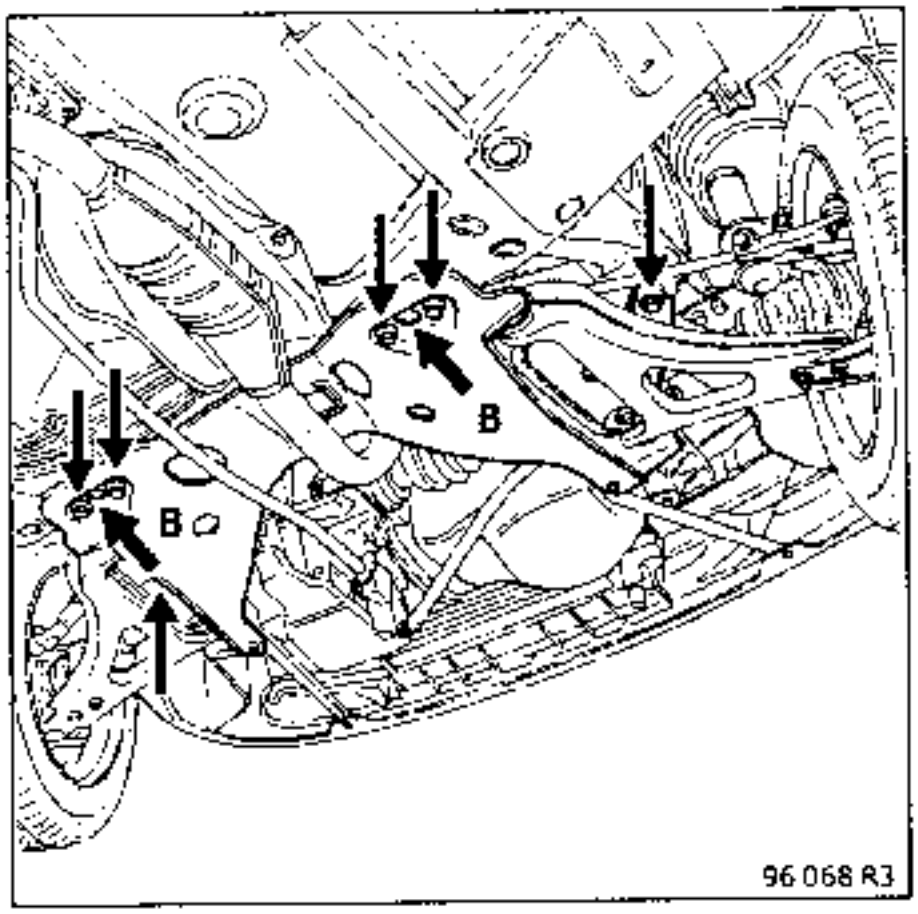
- the two stiffeners (5),
- the two bolts (6) for the rear engine - gear box mounting



Cut the plastic protective collar on the steering joint.

Fit a jack under the engine mounting.

Remove the six engine mounting bolts.



Unhook the pipes from the engine mounting.

Lower the mounting.

REFITTING

Special notes for refitting :

To ensure refitting is correct fit two Ø 12 mm pins (drill for example) in guide hole (B) of the engine mounting before finally tightening the mounting bolts (see previous page).

Observe the recommended tightening torques.

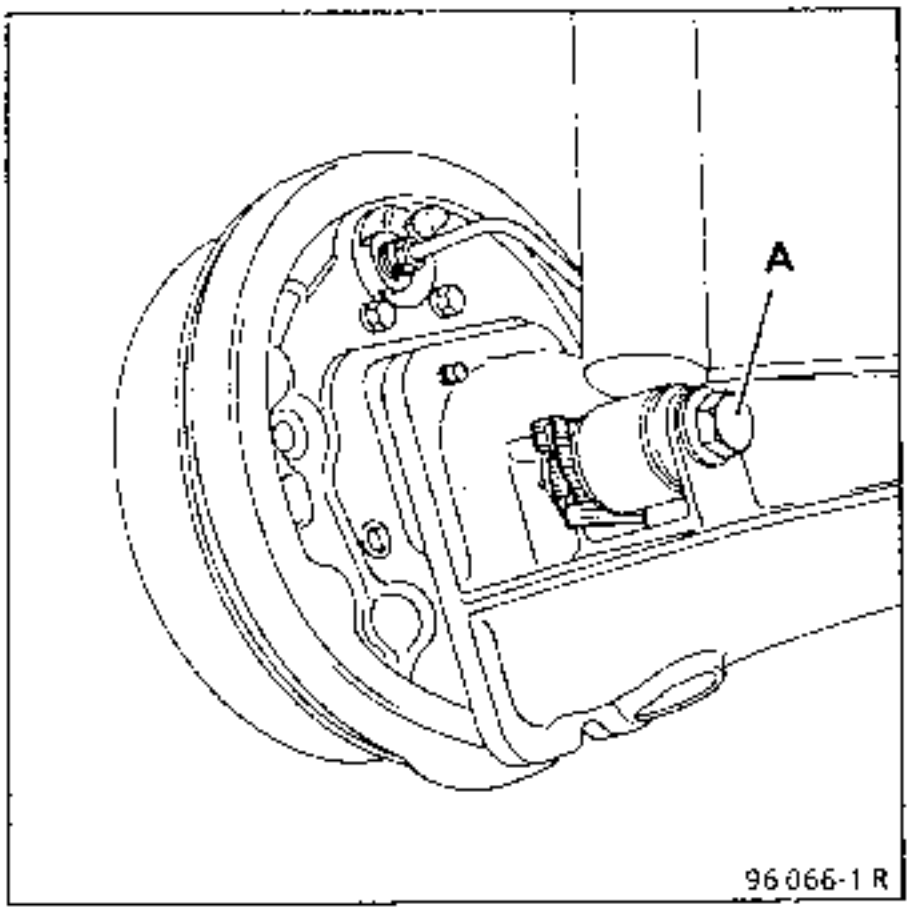
Refitting is the reverse of removal.

Check the axle assembly angles and adjust the parallelism if necessary

TIGHTENING TORQUES (in daN.m)	
Bearing mounting nut on body	4
Wheel bolt	9
Shock absorber base bolt	7

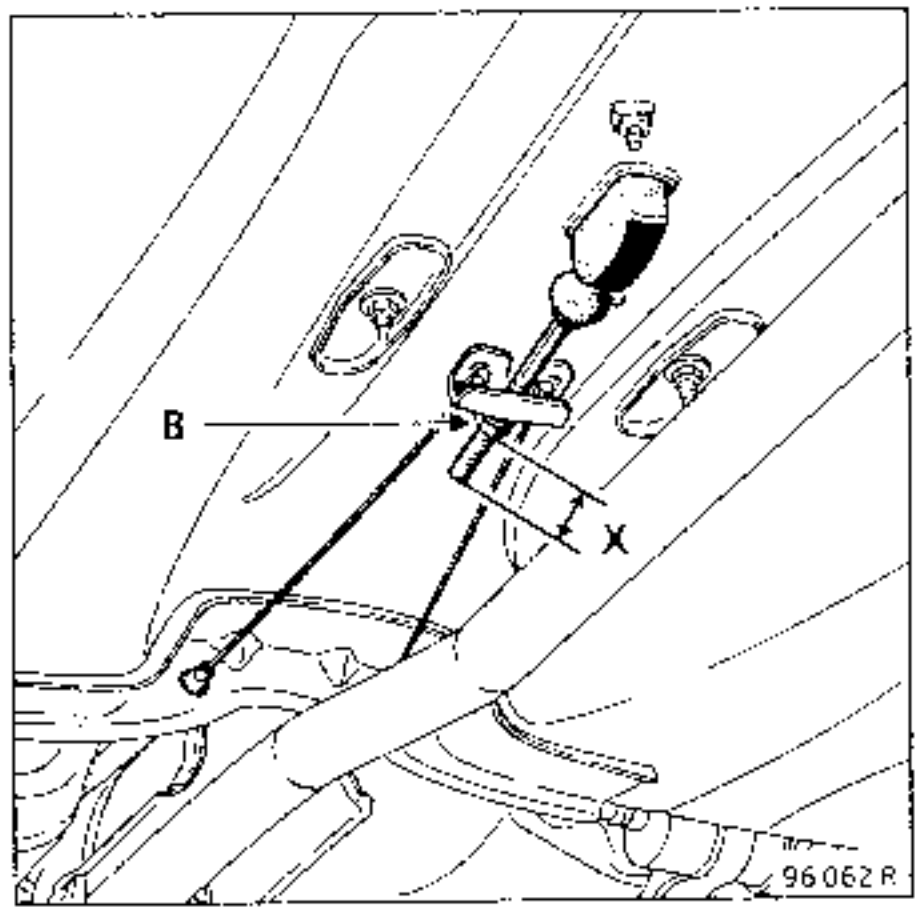
REMOVAL

With the vehicle on a two post lift, remove :
- the wheels ,
- the two lower shock absorber mounting bolts (A),

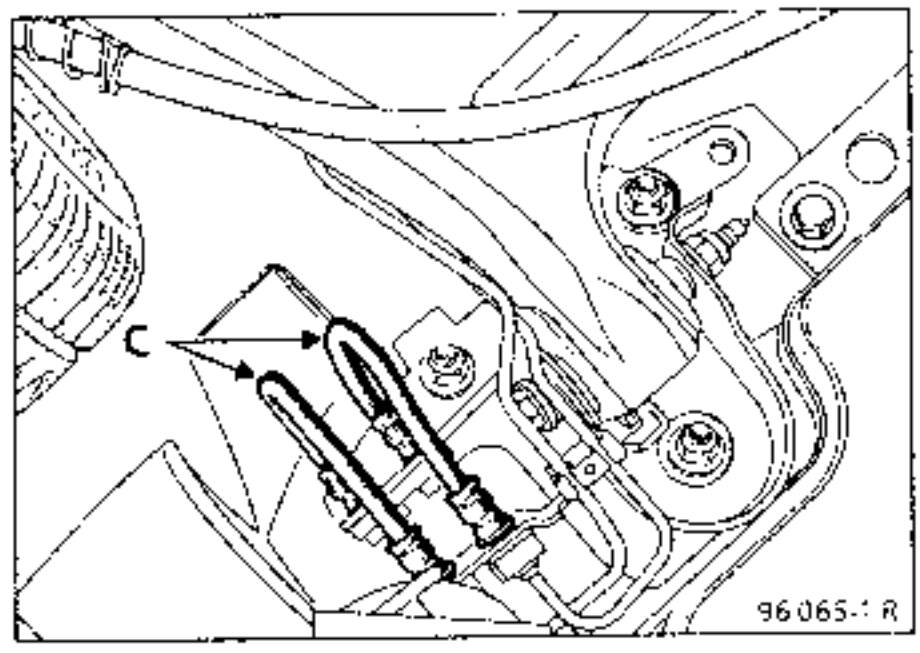


- the handbrake cables, disconnecting the central adjustor (B), under the vehicle.

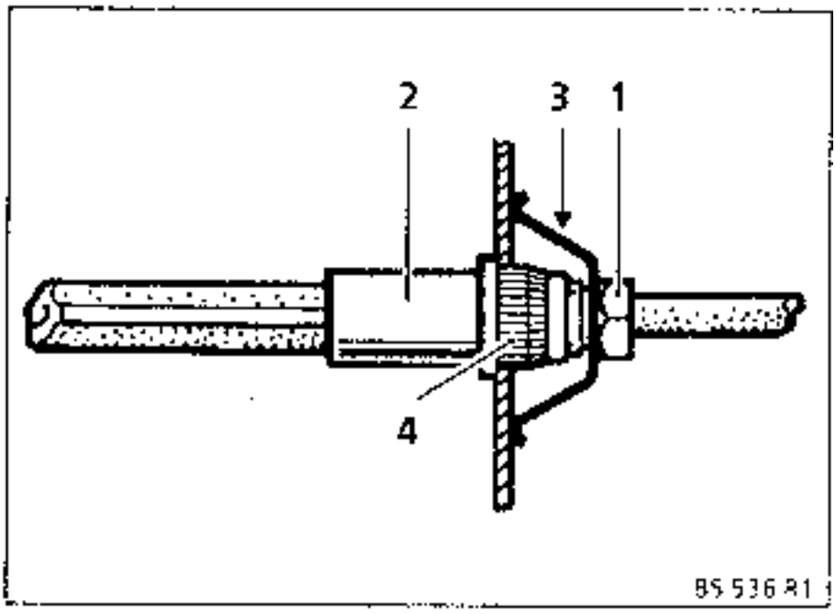
Mark the handbrake adjustment dimension "X".



Disconnect the two brake hoses (C) on the rear left hand side.



Unscrew the union (1) connecting the rigid brake pipe to the brake hose (2) until the spring (3) is not compressed, so that the hose is free of the splines (4).

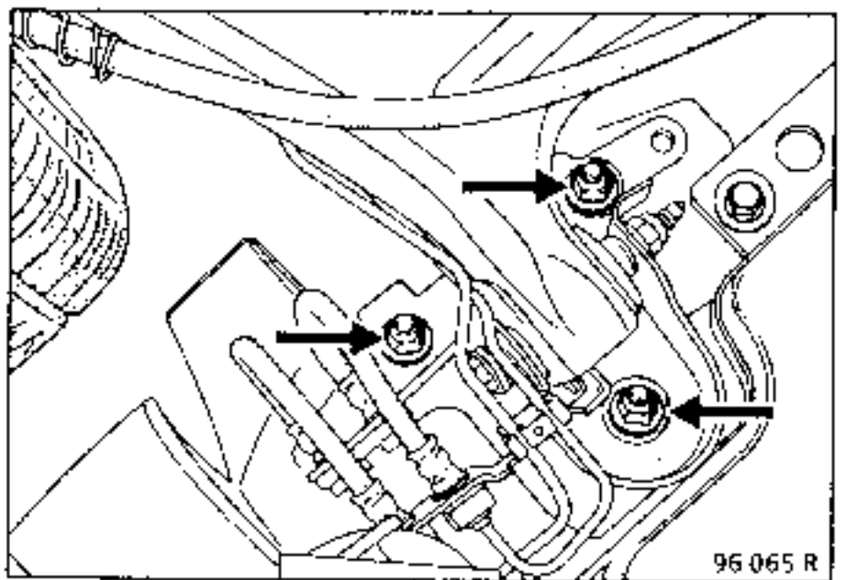


NOTE:

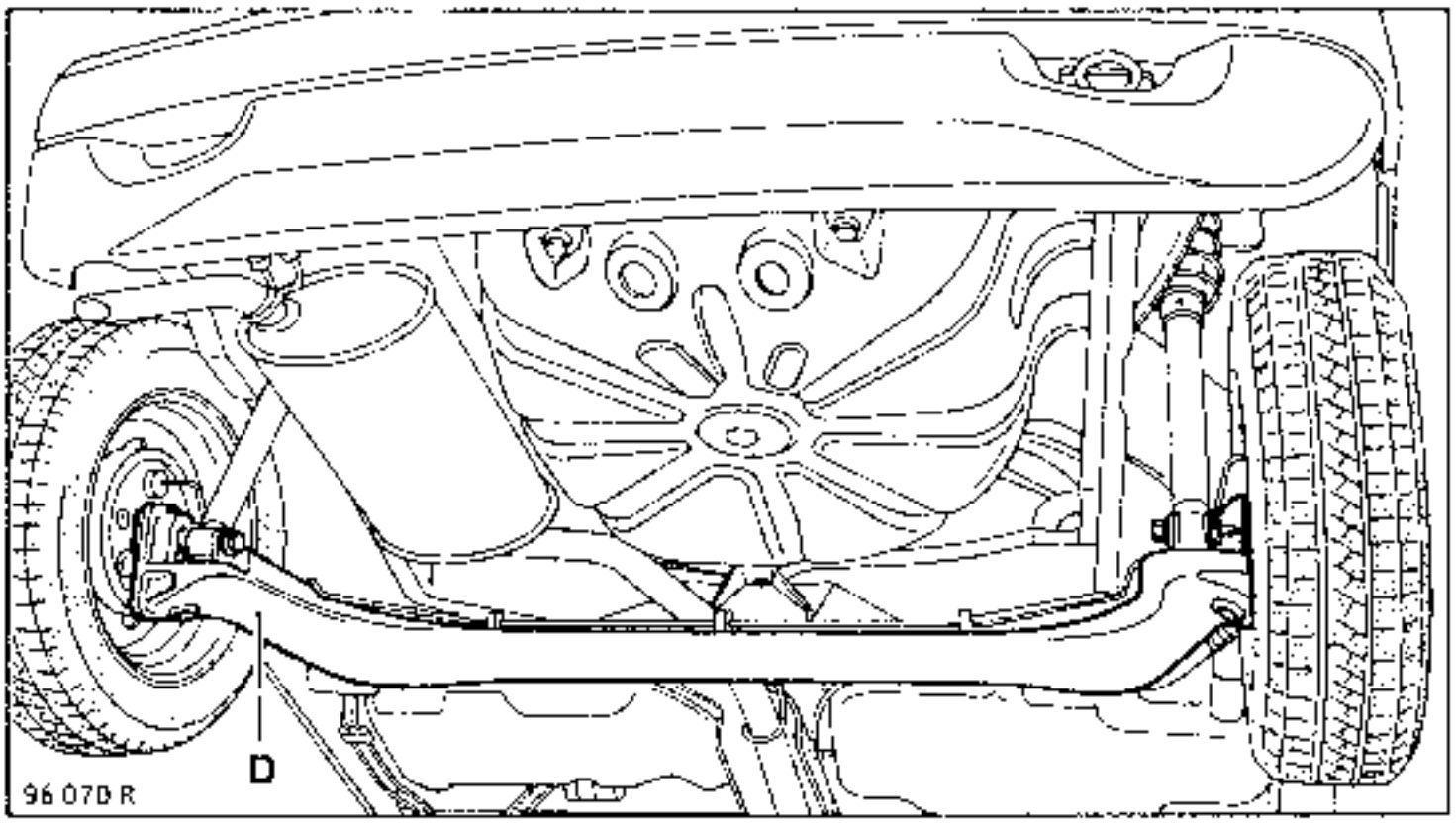
In order not to drain the hydraulic circuit, fit a pedal press on the brake pedal (1/3 of pedal travel).

Fit a jack under the flexible axle.

Remove the six mounting bolts from the flexible axle.



Remove the axle (D).



REFITTING

Refitting is the reverse of removal

Coat the shock absorber base mounting bolts with **Loctite FRENBLOC**.

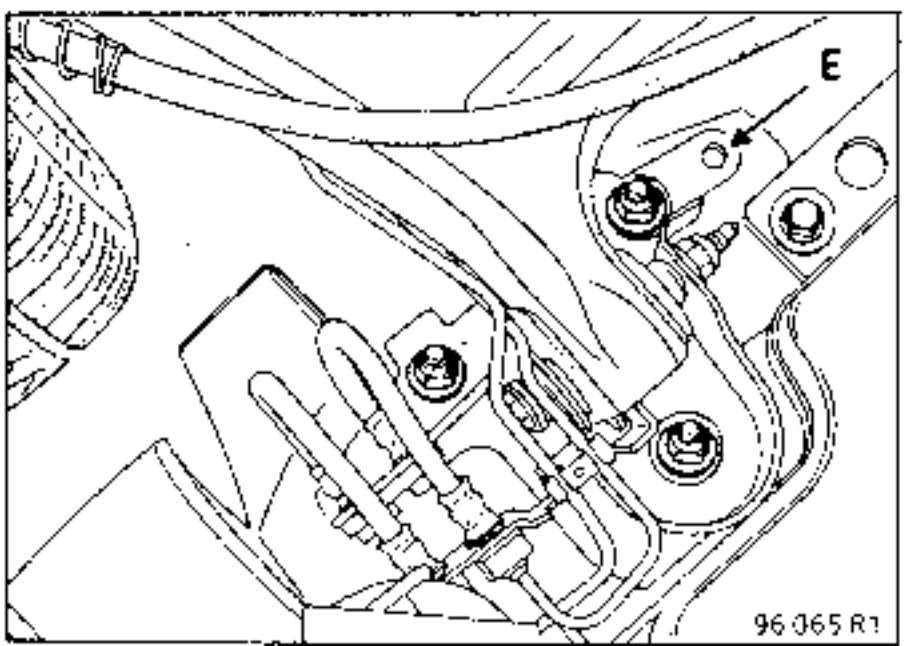
To ensure correct fitting (rubber bearing compression, axle assembly alignment), two **Ø 12 mm** pins must befitted in the locating holes (E) on the flexible axle bearing (drill for example) before tightening the nuts to the recommended torque.

Observe the recommended torque.

Take care not to twist the brake hoses.

Adjust the handbrake to obtain the dimension "X", marked previously.

Bleed the braking circuit (see chapter 37 "Controls").



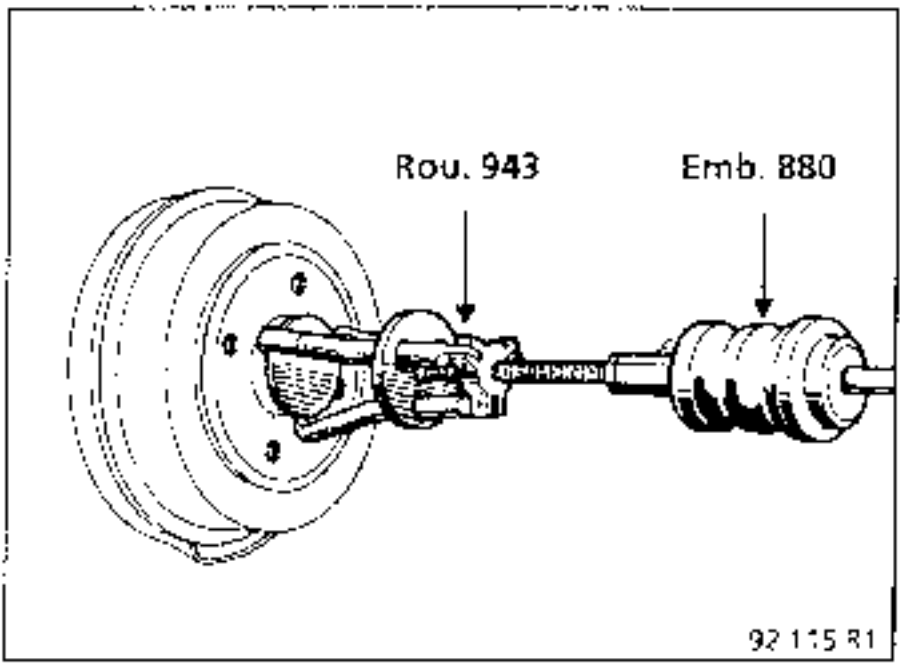
The two brake drums must be of the same diameter, so if one is reground the other must also be reground.
A maximum of 1mm on the diameter is permitted.

SPECIAL TOOLING REQUIRED	
Emb. 880	Inertia extractor
Rou. 943	Hub cover plug extractor

TIGHTENING TORQUES (in daN.m)	▽
Wheel bolts	9
Hub nut	17

REMOVAL

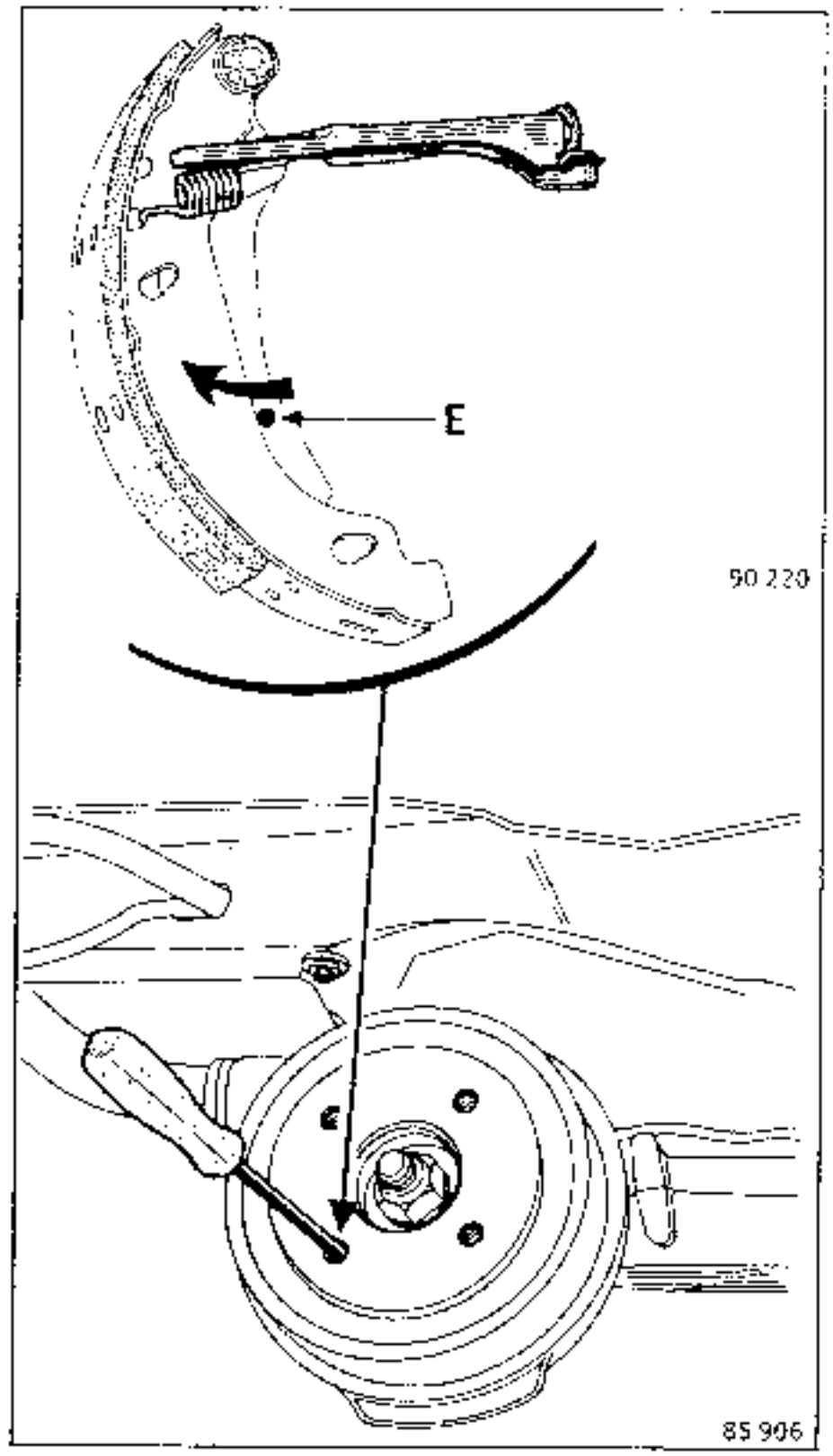
Remove the hub cover plug using tools **Rou. 943** + **Emb. 880.**



Release the handbrake and loosen the handbrake cables by hand to allow the lever to move back.

Fit a screwdriver through one of the wheel mounting bolt holes in the drum and push the handbrake lever to release the brake segment lug (E).

Push the lever back to allow it to release completely.



Remove:
- the nut and the stub axle washer,
- the drum.

REFITTING

Remove the dust from the drum and the linings using a dust removal tool.

Fit:
- the drum,
- the washer and the nut, tighten to the recommended torque,
- the cover plug.

Adjust:
- the linings by repeated pressure on the brake pedal,
- the handbrake (see chapter 37 "Controls").

These vehicles are fitted with fixed integral compensators in the wheel cylinders. If the wheel cylinder or compensator operates incorrectly , replace the complete assembly since repairs are not permitted.

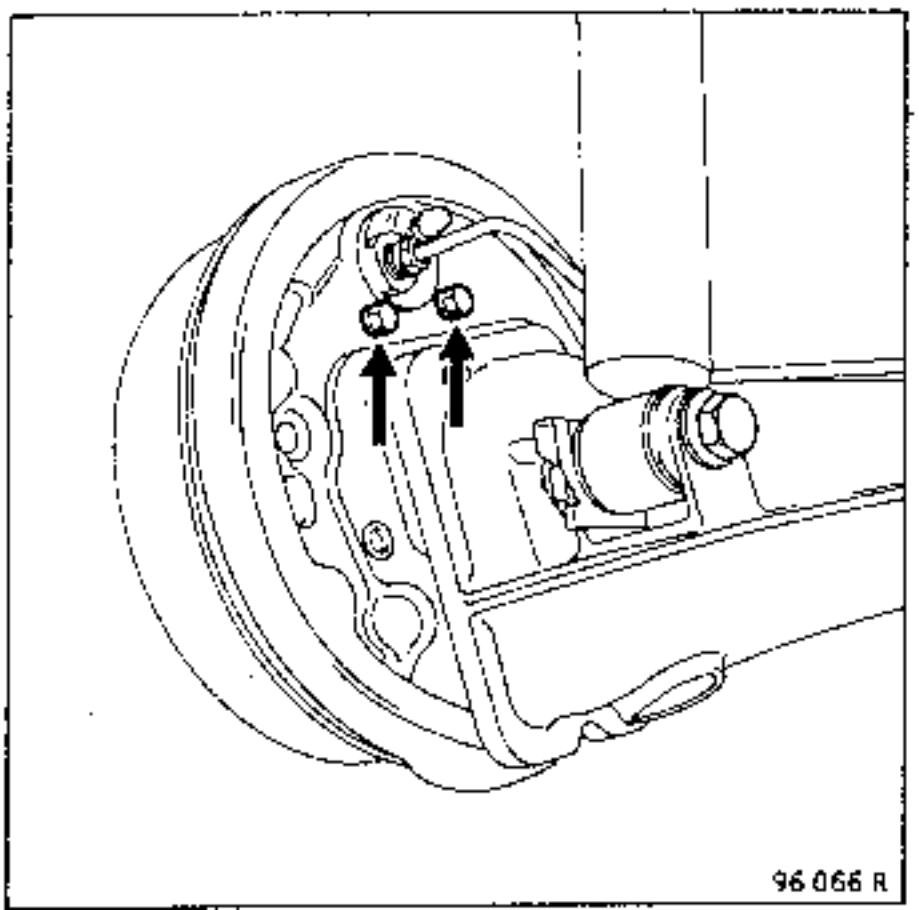
TIGHTENING TORQUES (in daN.m)	▽
Wheel bolts	9
Hub nut	17
Bleed screw	0,8
Pipe bolt	1,5

REMOVAL

Remove:
- the drum (see corresponding paragraph),
- the upper return spring (see paragraph on "Brake linings").

Separate the segments.

Unscrew:
- the rigid pipe union on the slave cylinder using a pipe wrench ,
- the two cylinder mounting bolts on the back plate, remove the cylinder



Check the condition of the segments. If they are oily, replace them.

REFITTING

Clean the drum and linings using a dust removal tool.

Refitting is the reverse of removal

Bleed the braking circuit.

Adjust the linings by repeated pressure on the brake pedal.

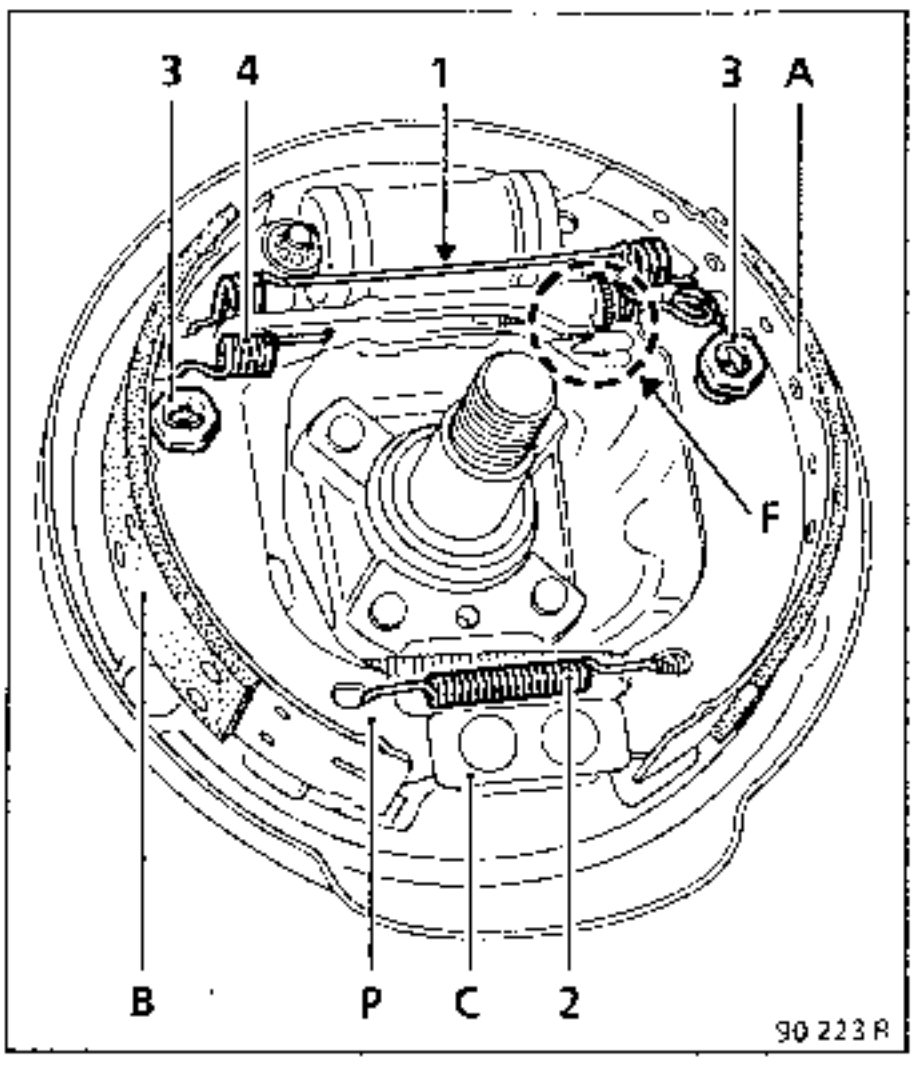
Check the cut-out pressure (see chapter 37 "Controls")

SPECIAL TOOLING REQUIRED	
Emb. 880	Inertia extractor
Rou. 943	Hub cover plug extractor

TIGHTENING TORQUES (in daN.m)	▽
Wheel bolts	9
Hub nut	17

Composition of Bendix 180 x 40 RAI (Incremental Automatic Return) brake

Rear right hand brake plate

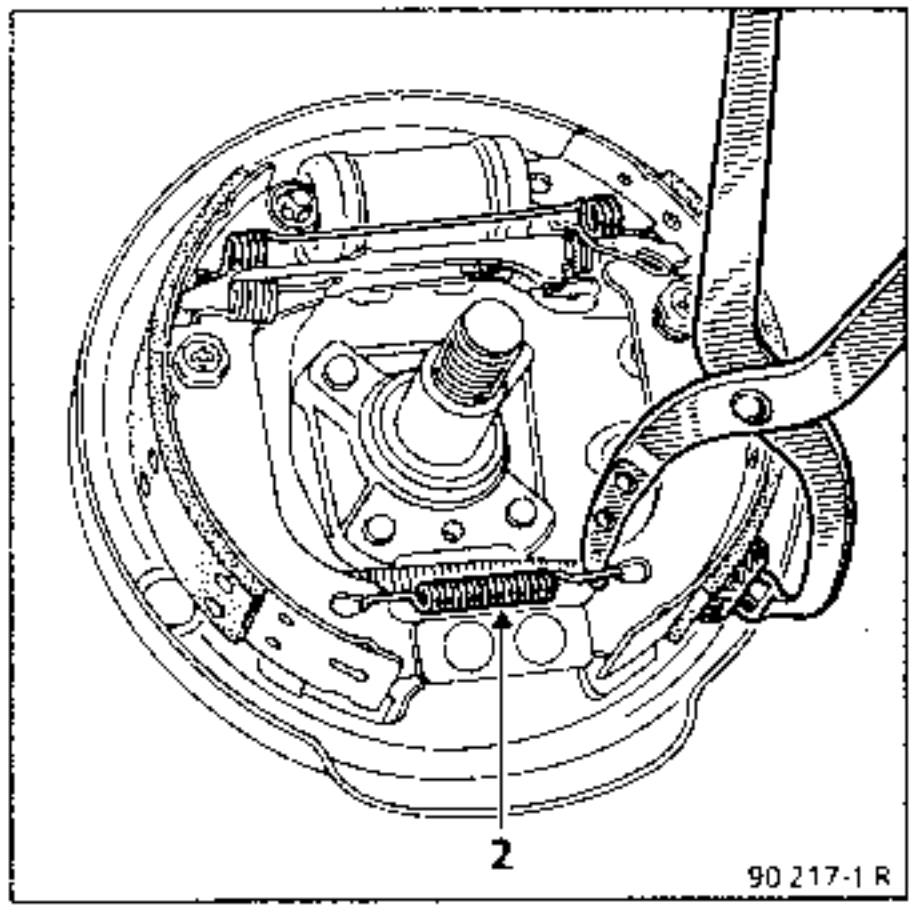


A Primary segment
B Secondary segment
C Fixed stop
P Brake segment base
F RAI
1 Upper return spring
2 lower return spring (base)
3 Side retainer
4 Handbrake lever return spring

REMOVAL

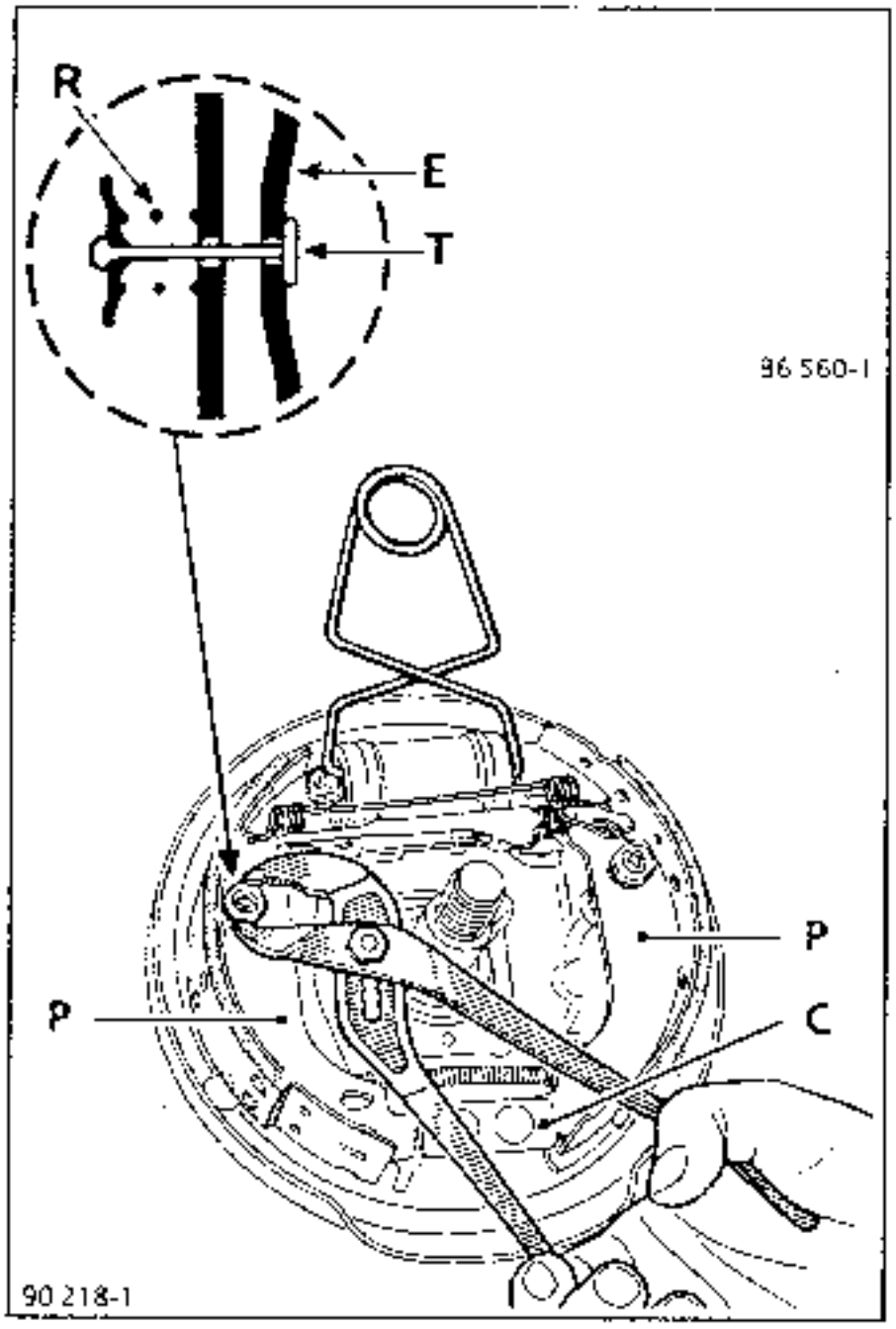
All the brake linings on an axle assembly should be changed together, never use linings of different makes or qualities.

Remove:
- the brake drum (see corresponding paragraph),
- the lower spring (2) using a brake segment wrench.



Fit a clip on the slave cylinder pistons.

Using an adjustable wrench, remove the segment side retainer springs (R) keeping the linking rod (T) in contact with the brake flange (E).

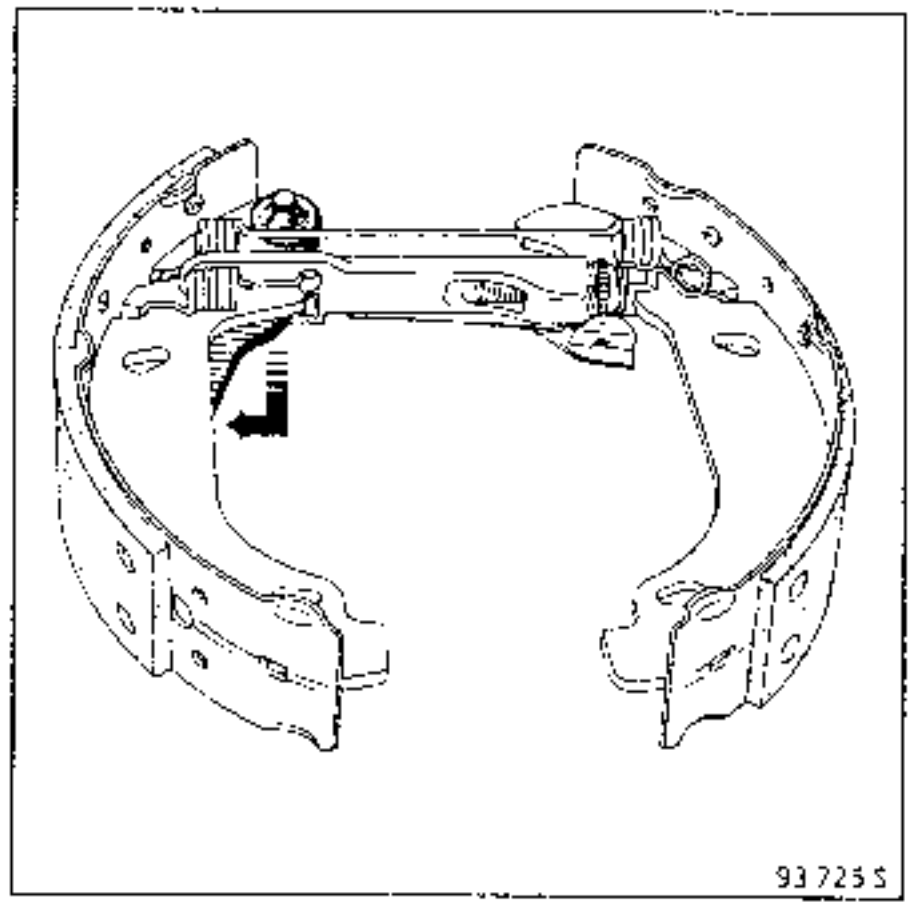


Pull each segment base (P) over the fixed stop (C). Squeeze the segment bases together, to separate the ends close to the slave cylinder.

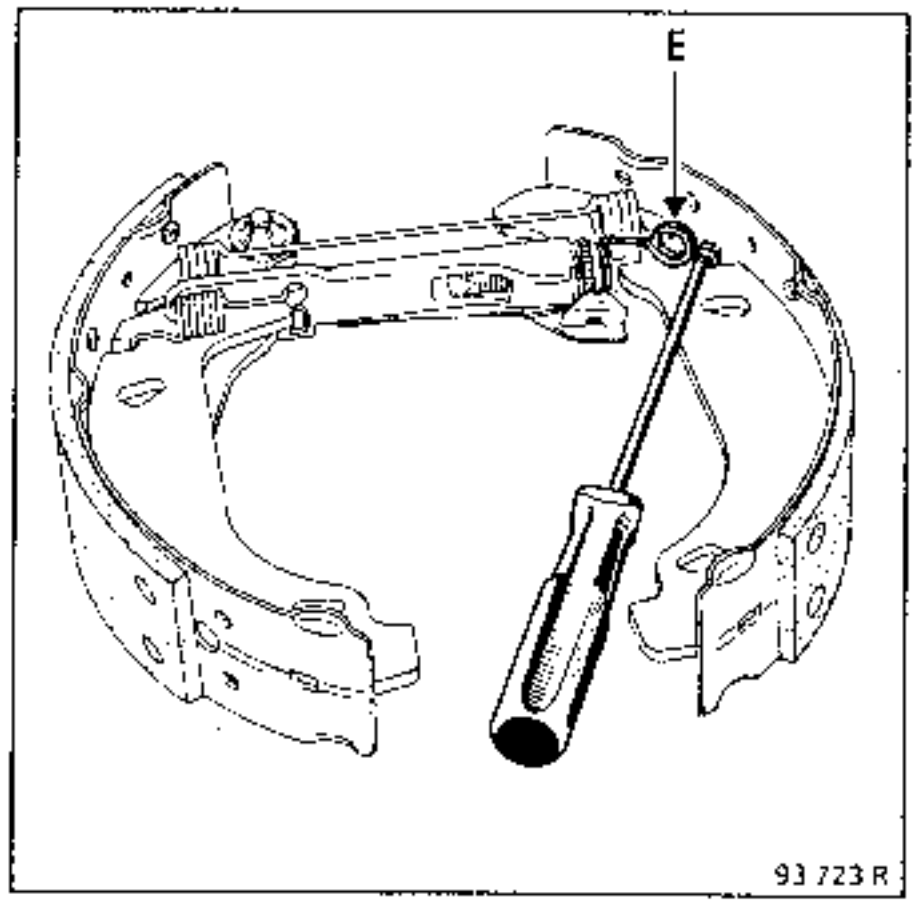
Separate the assembly (RAI and segments) from the brake flange then remove the brake flange, having unhooked the handbrake cable.

Separate the RAI and segments assembly on the bench.

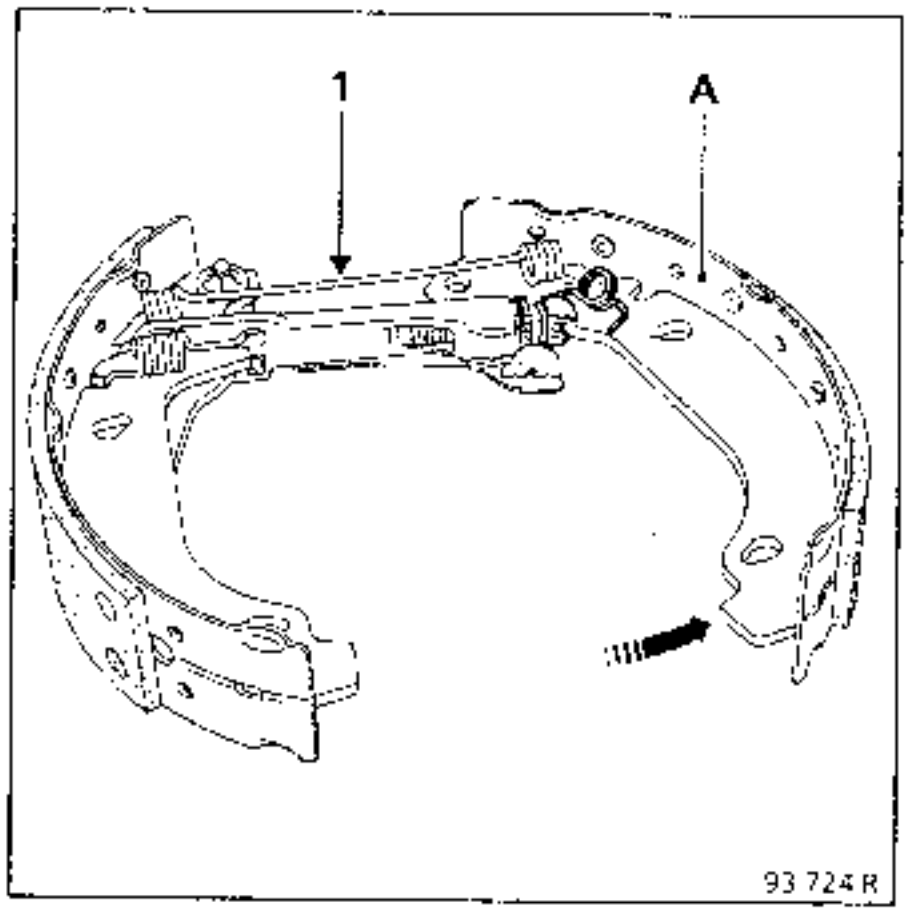
Release the handbrake lever.



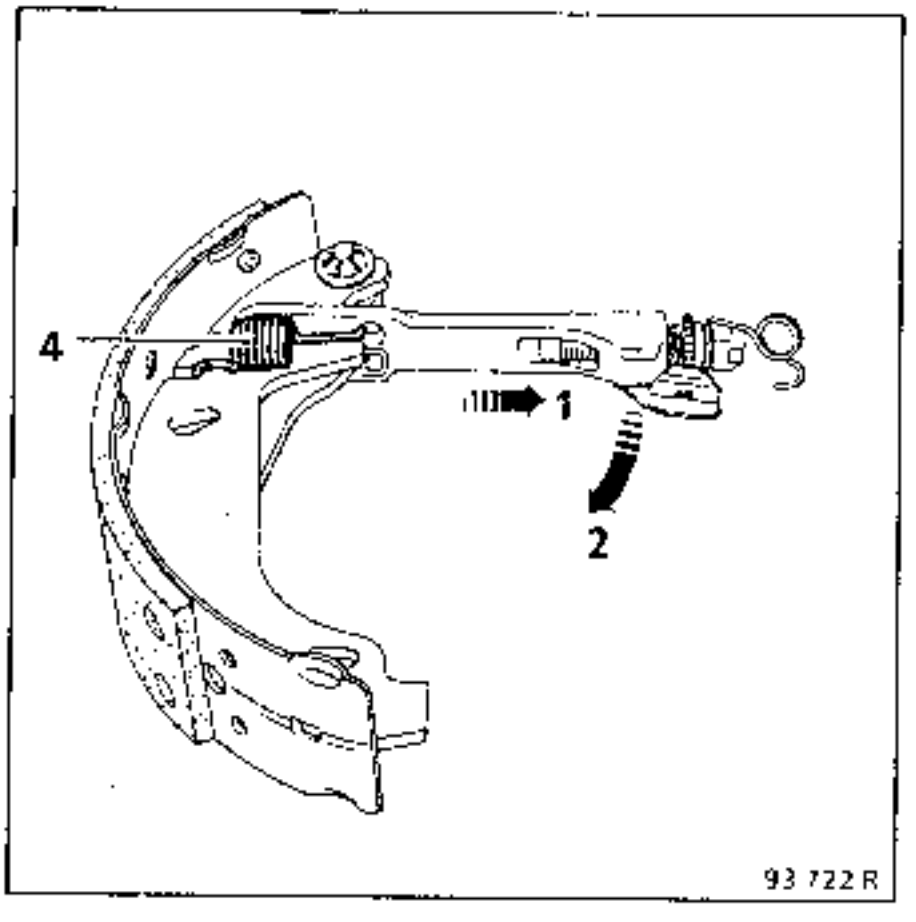
Use a small screwdriver to release pin (E).



Tilt the primary segment (A), in the direction of the arrow, to release the head of the RAI bolt. This allows removal without the force of the upper spring (1).

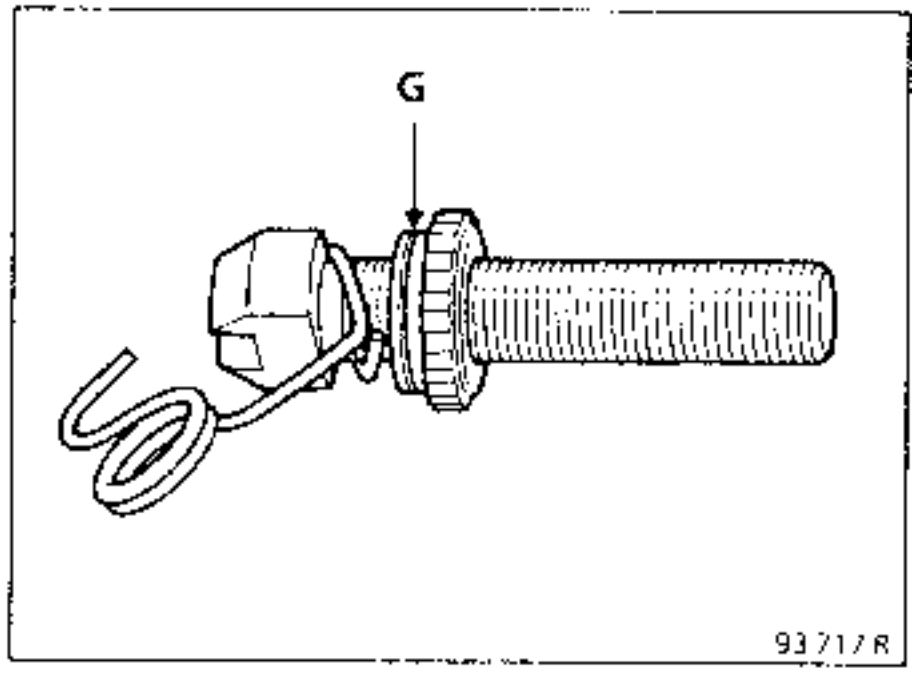


To remove the RAI assembly, pull in the direction of the arrow (1) then tilt following the arrow (2) Remove the spring (4) and the handbrake lever.



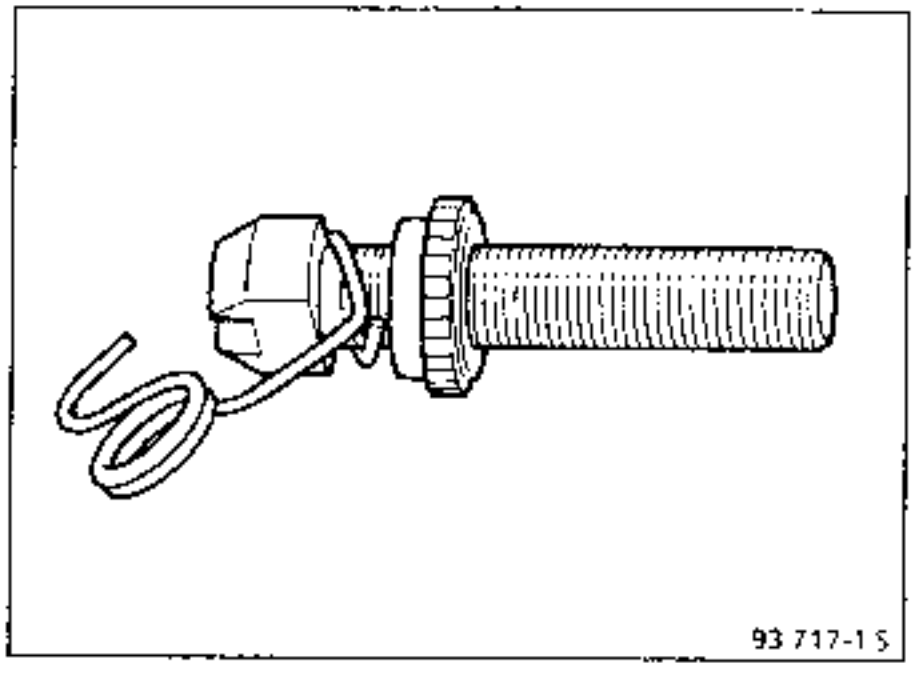
Marking and refitting RAI component parts

Left hand bolt and notched nut



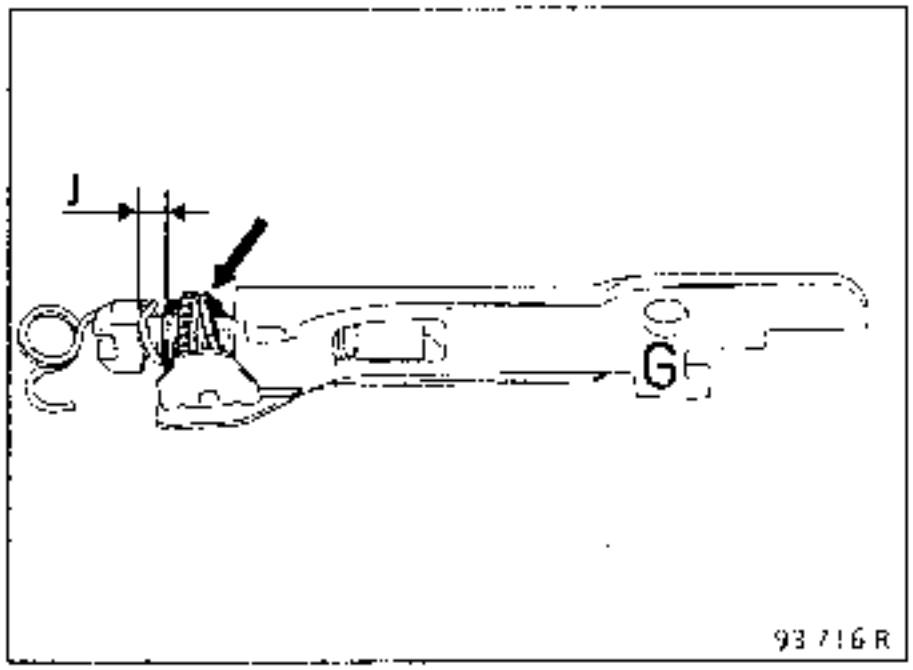
The bolt has a left hand thread, the notched nut has a groove (G), the pin is not painted.

Right hand bolt and notched nut



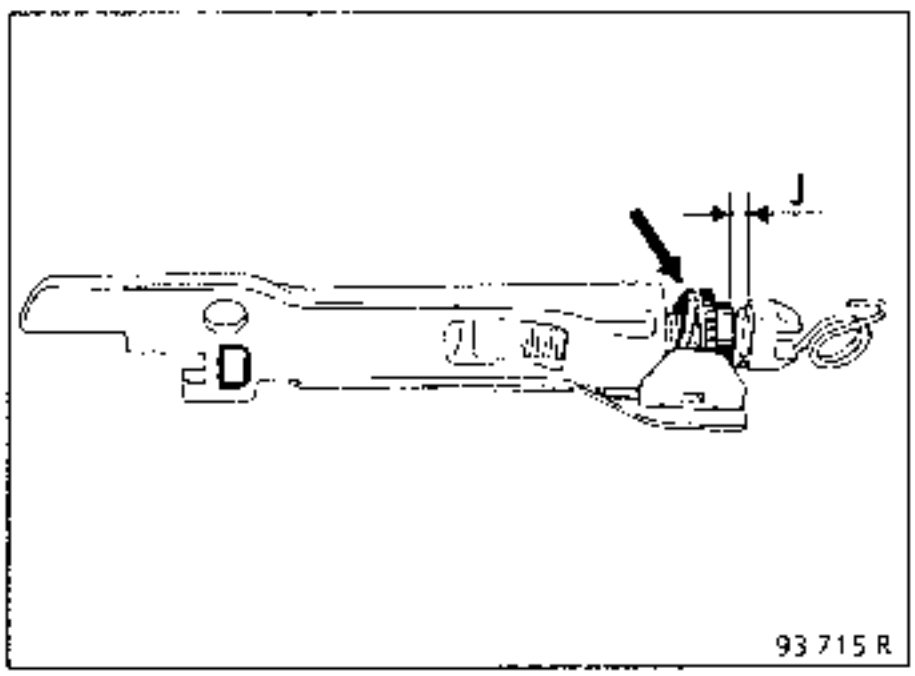
The bolt has a right hand thread, the notched nut has no groove (G), the pin is painted.

Left hand RAI assembly



Note G (left) in the metal and the position of the corner plate.

Right hand RAI assembly

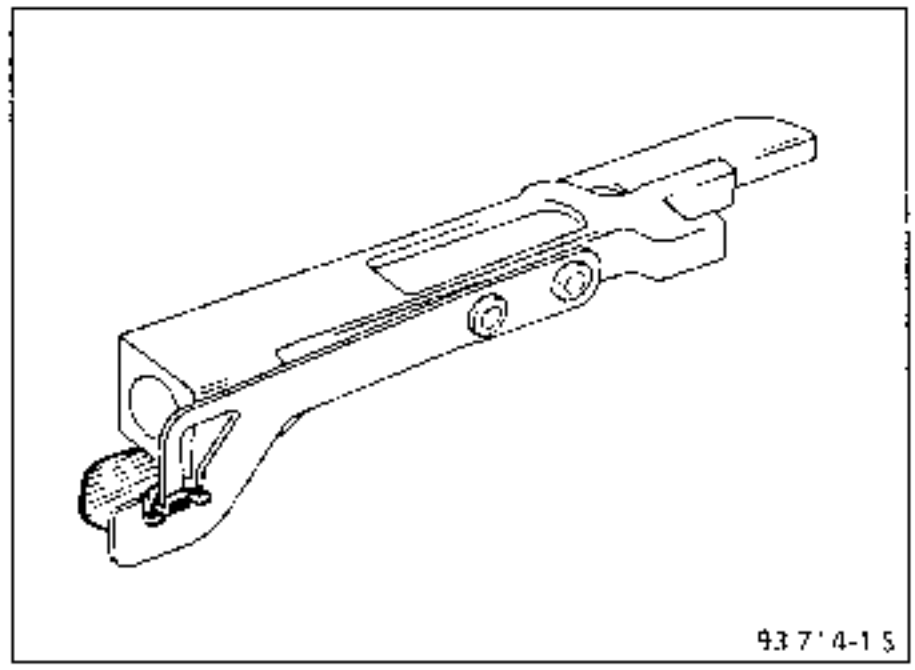


Note D (right) in the metal and the position of the corner plate.

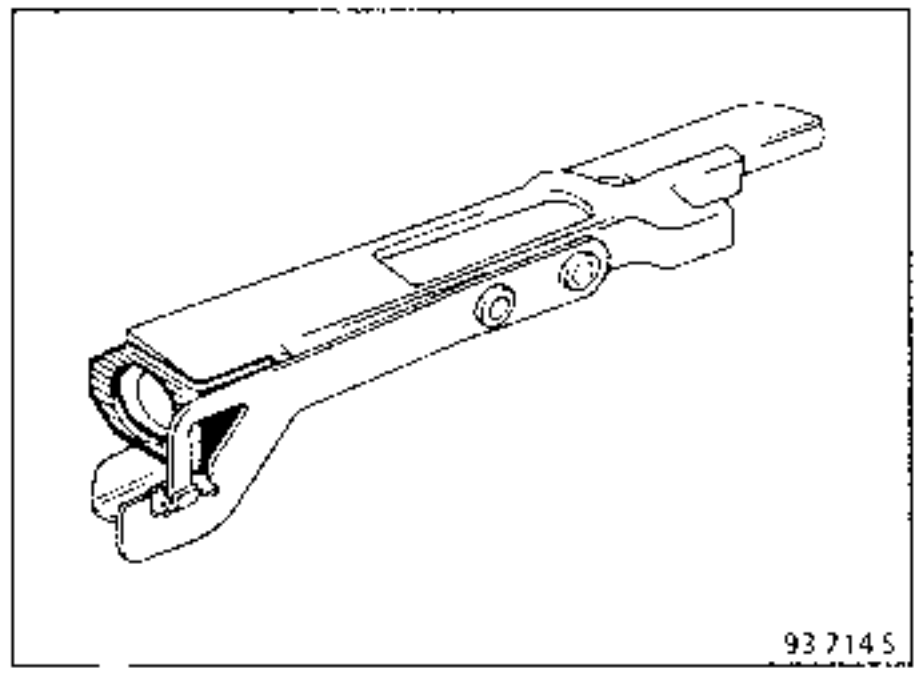
In both cases, do not jam the pin mounting between the head of the bolt and the notched nut, leave slight play (J).

Refitting the RAI

Ensure the clip is correctly positioned.



Refit the corner plate so that the full section is placed between the blade and the rod.

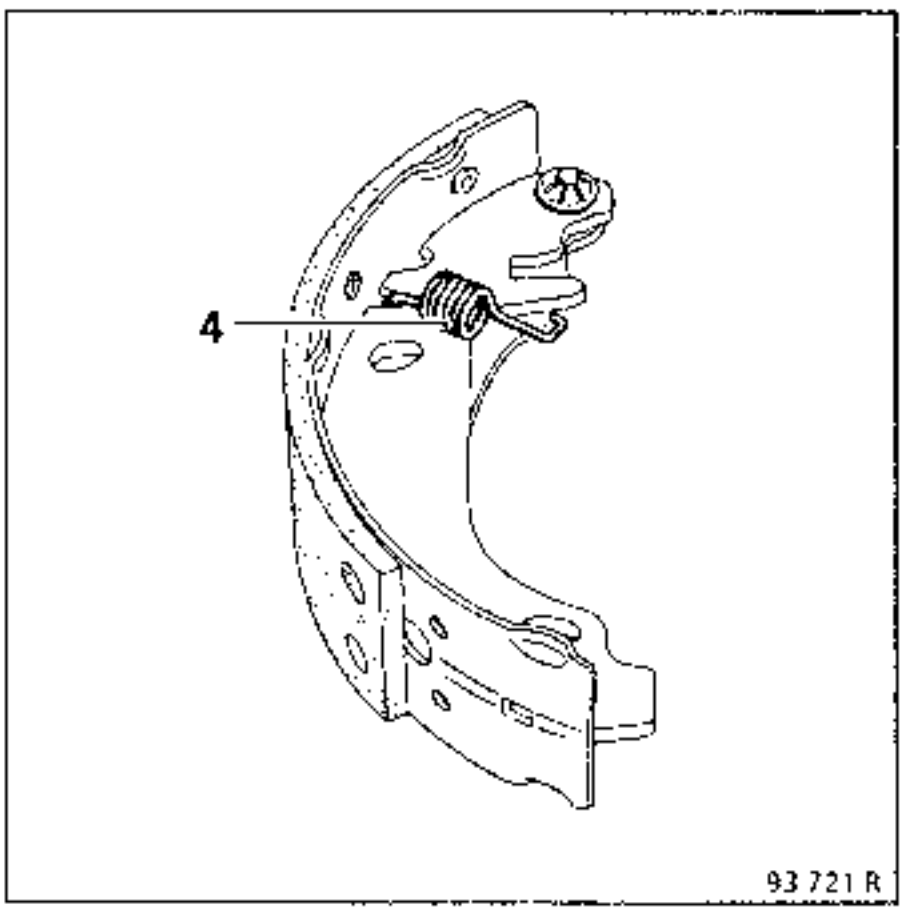


Reassemble the bars with their respective nut, bolt, pin and right hand nut in the right hand bar through the corner plate hole, and the same for the left hand RAI assembly.

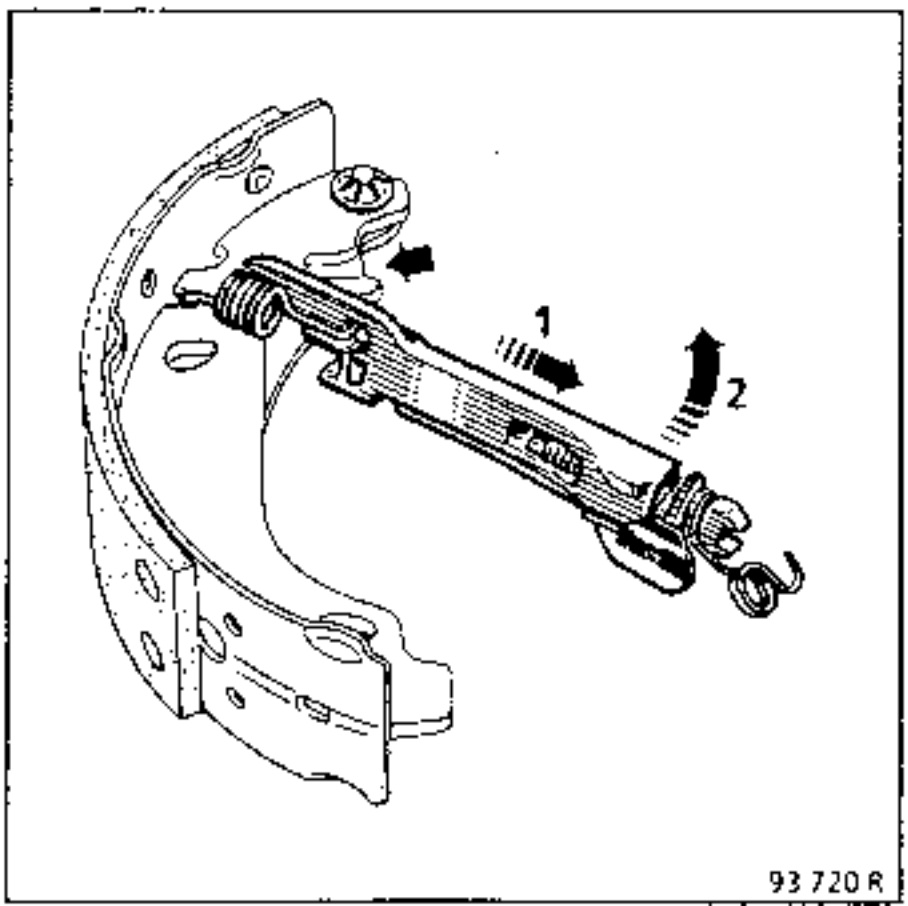
Refit the RAI and segments on the bench

Refit the handbrake lever on the secondary segment using a new clip, then disarm the lever.

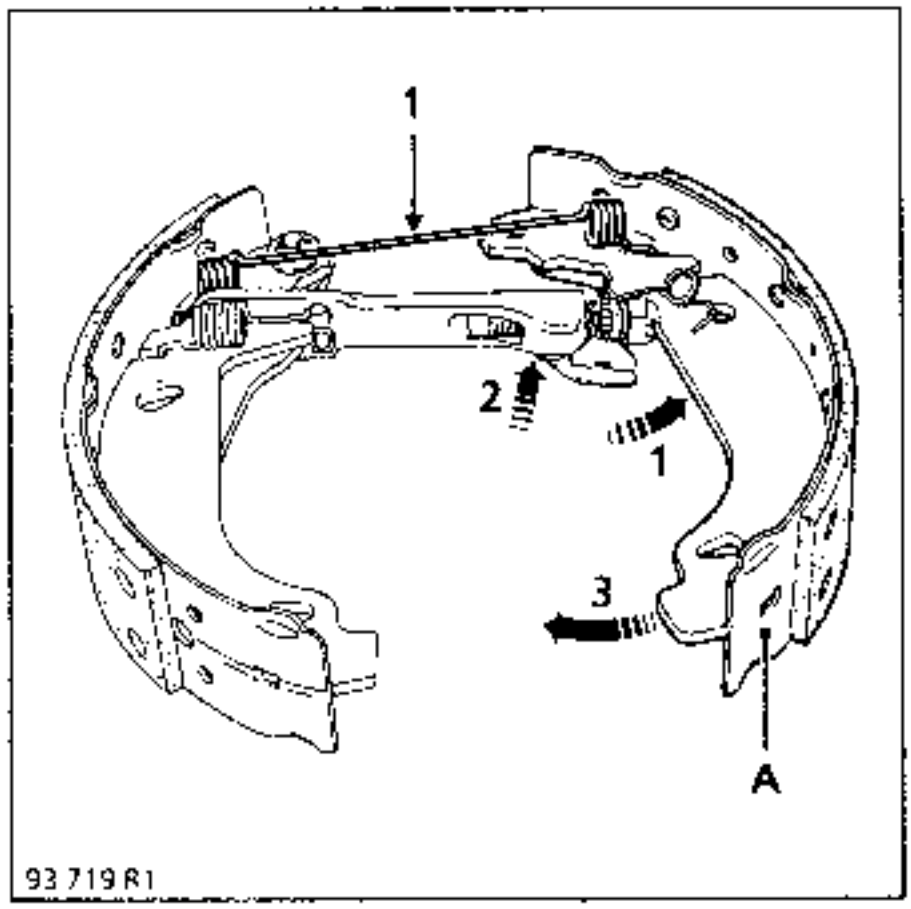
Position the spring (4) in the cut-out in the segment ensuring it is fitted the correct way round - the shorter hook is fitted onto the segment.



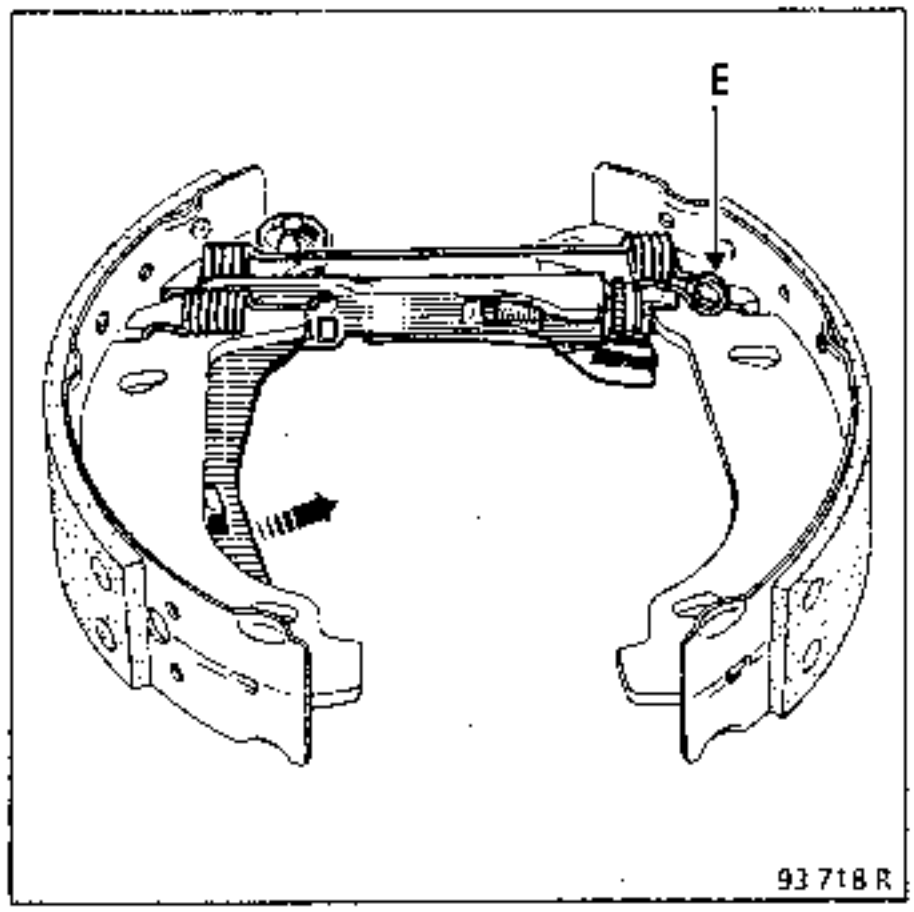
Hook the RAI assembly onto the spring (4) then pull in the direction of the arrows - the RAI assembly automatically moves to its operating position.



Position the upper spring (1) on the lugs on the two segments, then pull in the direction of the arrows, the locater should be positioned in the primary segment (A).



Fit pin (E) and reset the handbrake lever.



REFITTING

Position the assembly on the vehicle.

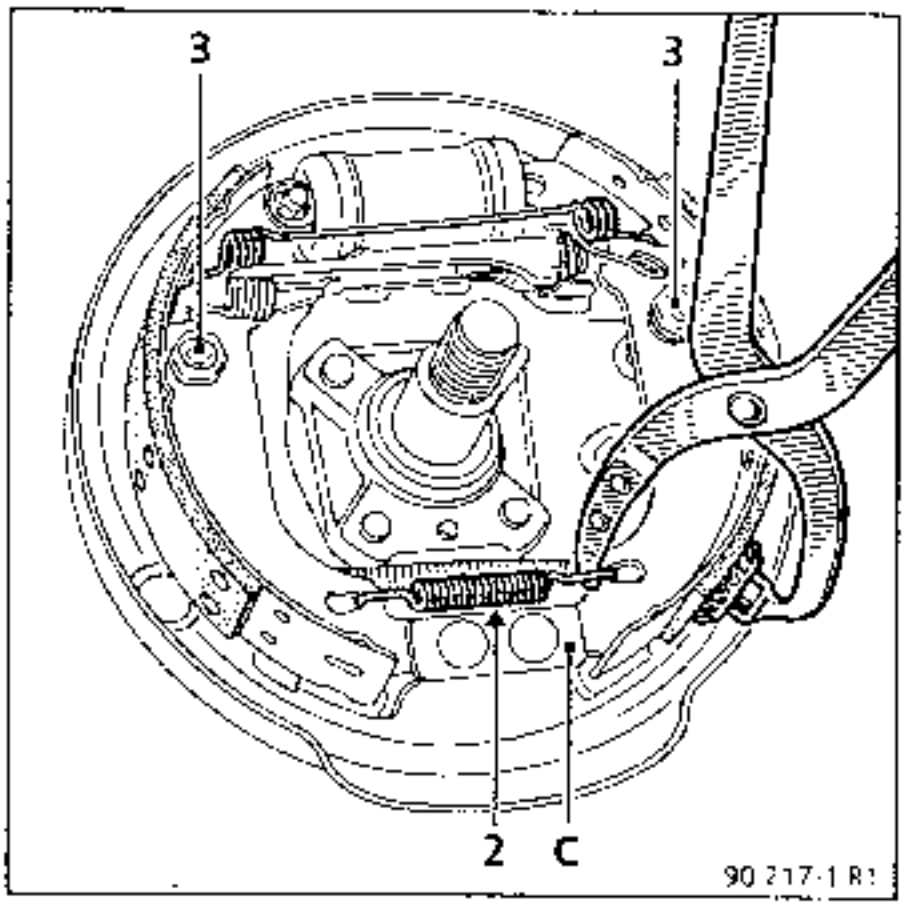
Hook the handbrake cable onto the lever.

Squeeze the bases of the segments together and hook the tops of the segments onto the slave pistons Take care not to damage the covers.

Position the segments on the fixed stop(C)

Fit the side retainers (3).

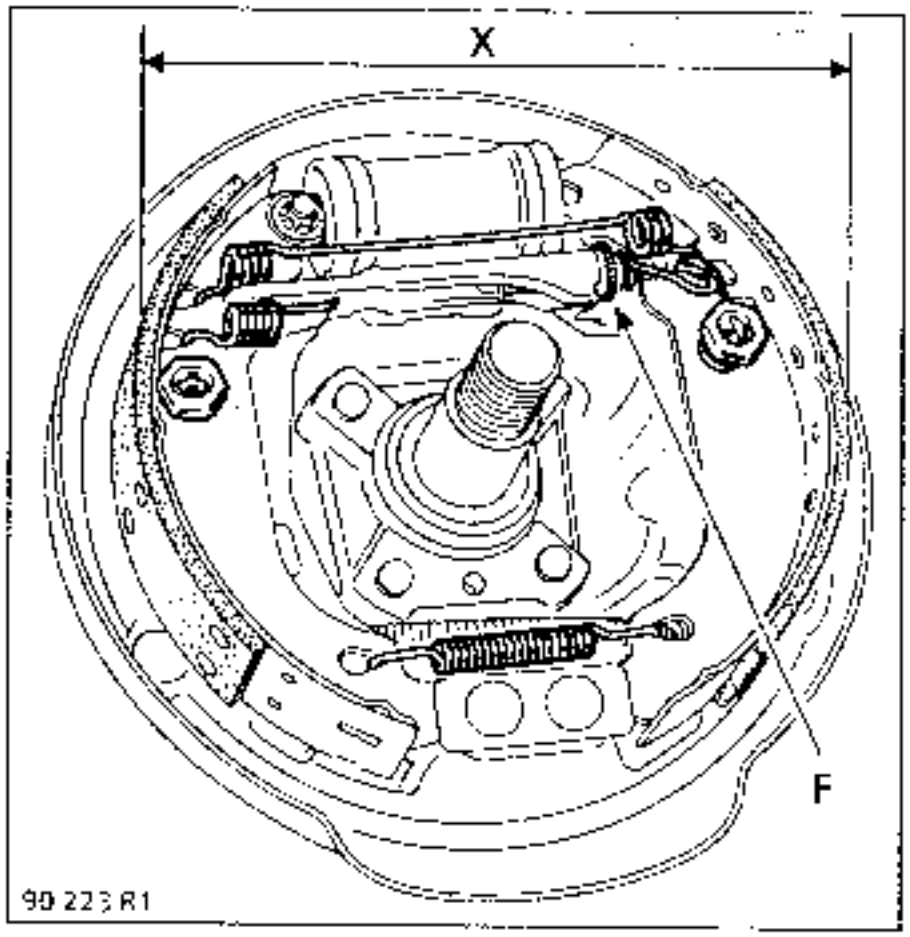
Remove the clip from the slave cylinder pistons and refit the lower spring (2).



ADJUSTMENT

Use a screwdriver to adjust the diameter setting of the segments at the notched segment (F) to obtain diameter (X) between :

179,2 mm and **179,5 mm.**



Carry out the same adjustment on the other brake back plate

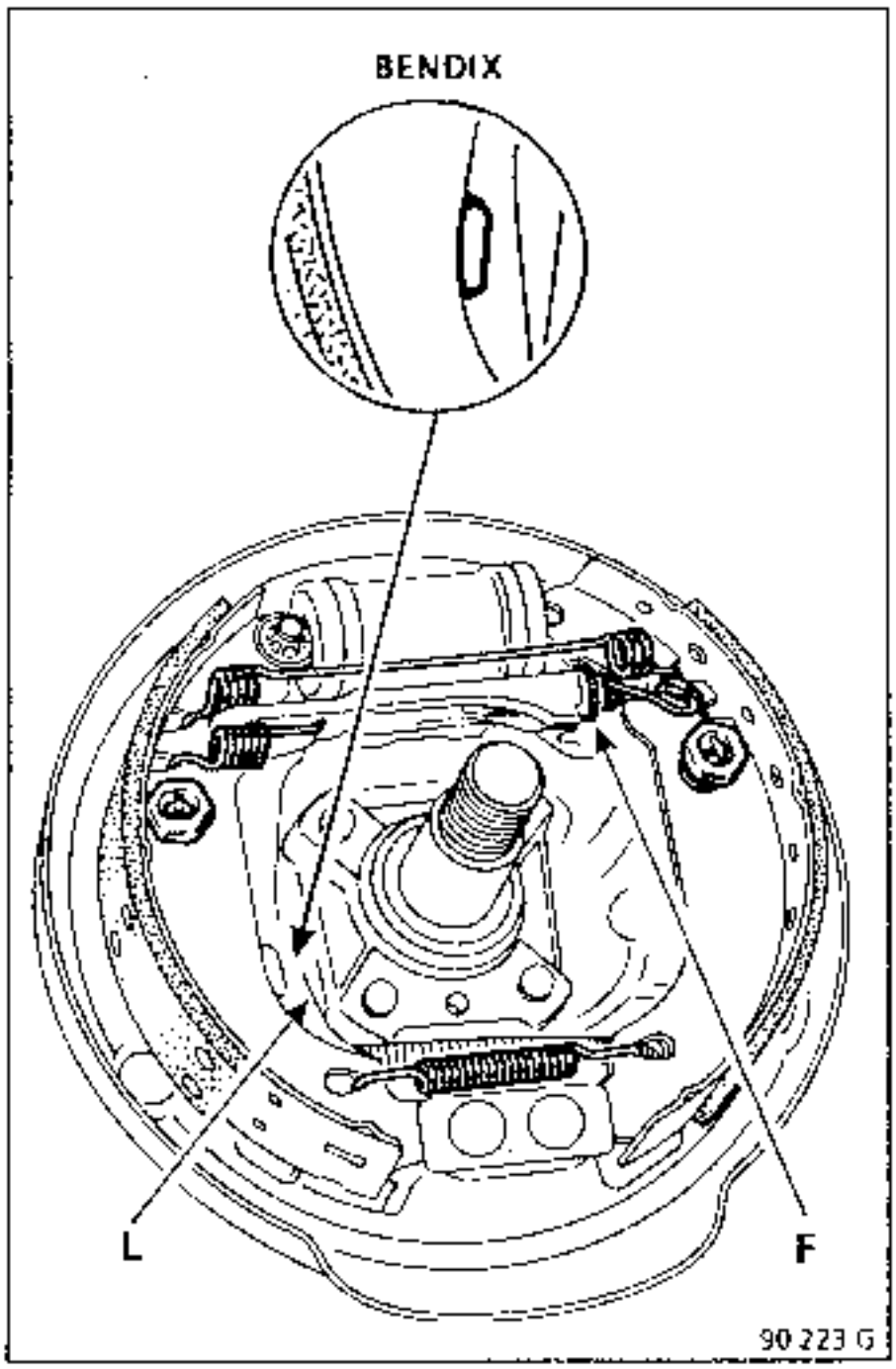
Refit the drums but do not tighten the nuts.

Adjust the shoes by repeatedly pressing the brake pedal (approximately 20 times).

Ensure the RAI is operating correctly ("click" heard from the drums).

Remove the drums

Ensure :
- the cables slide correctly,
- the handbrake levers (L) are correctly positioned against the segments.



Gradually tighten the cables at the central adjustor so that levers (L) activate between the 1st and 2nd notch on control lever travel and remain activated from the 2nd notch.

Lock the central adjustor lock nut.

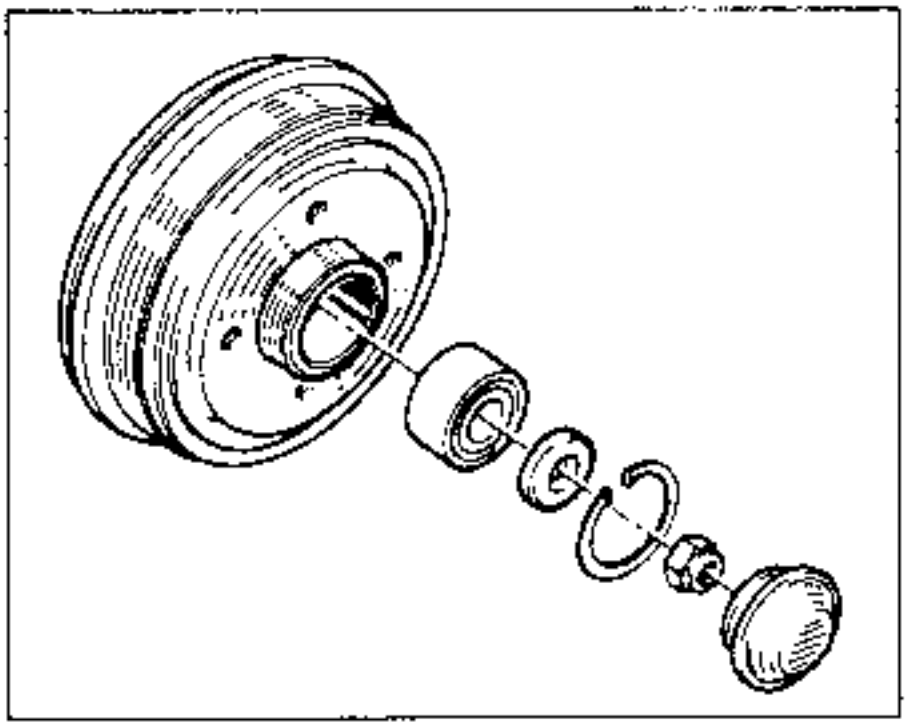
Refit:
- the drums, torque tighten the nuts to **17 daN.m**,
- the hub cover plugs.

SPECIAL TOOLING REQUIRED	
Emb. 880	Inertia extractor
Rou. 943	Hub cover plug extractor
T.Av. 1050	Hub extractor

TIGHTENING TORQUES (in daN.m)	
Hub nut	17
Wheel bolts	9

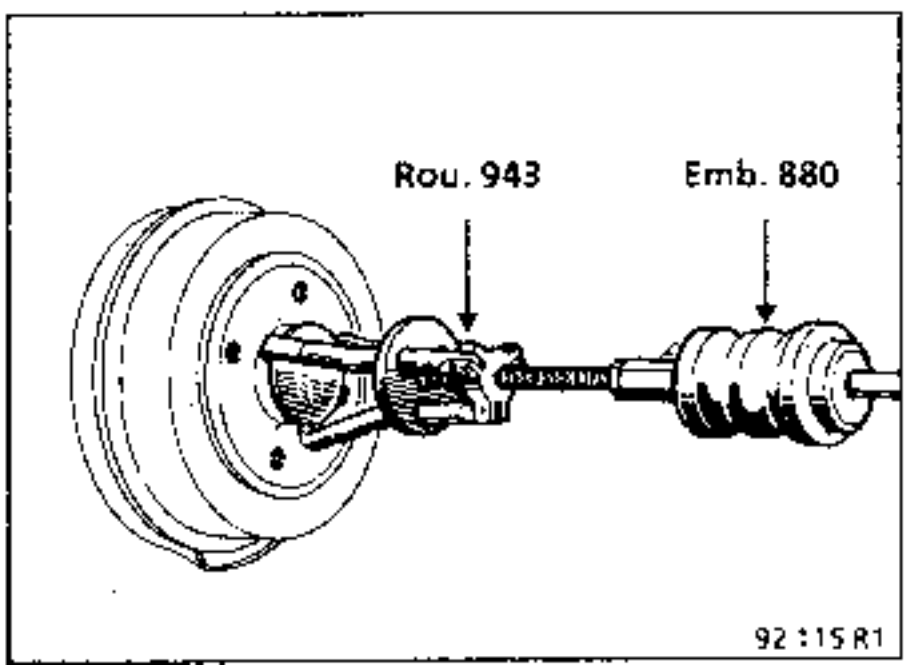
CHECKING

Use a dial gauge mounted on the drum to check the axial play which should be **0 to 0,03 mm max.**



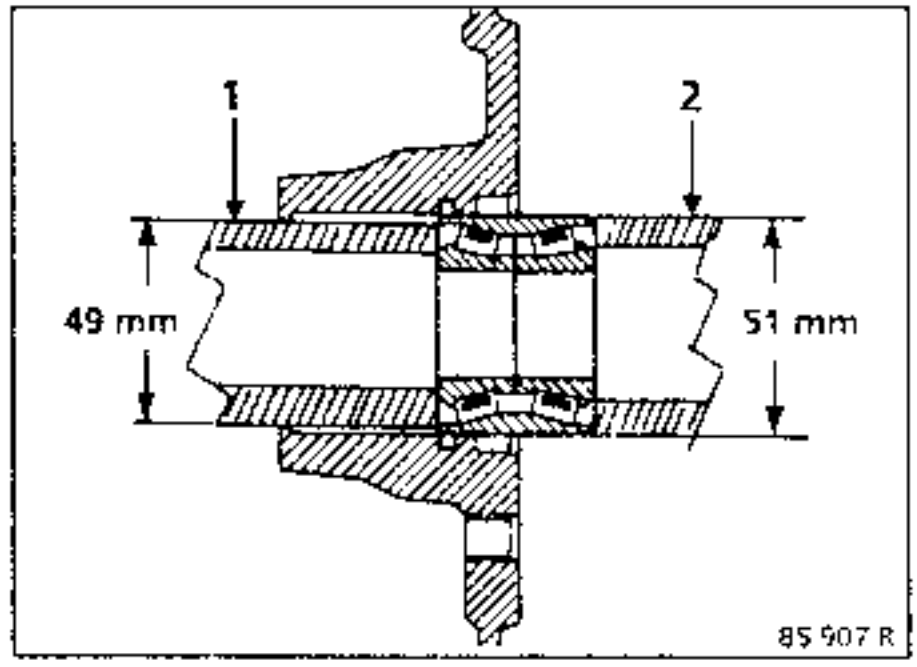
REMOVAL

Remove:
- the hub cover plug using tools **Rou. 943 + Emb. 880,**



- the drum (see corresponding paragraph).

From the drum, remove :
- the bearing retaining clips,
- the bearing using a tube (1).



REFITTING

Using a tube (2) and a press, fit the bearing until it touches the shoulder.

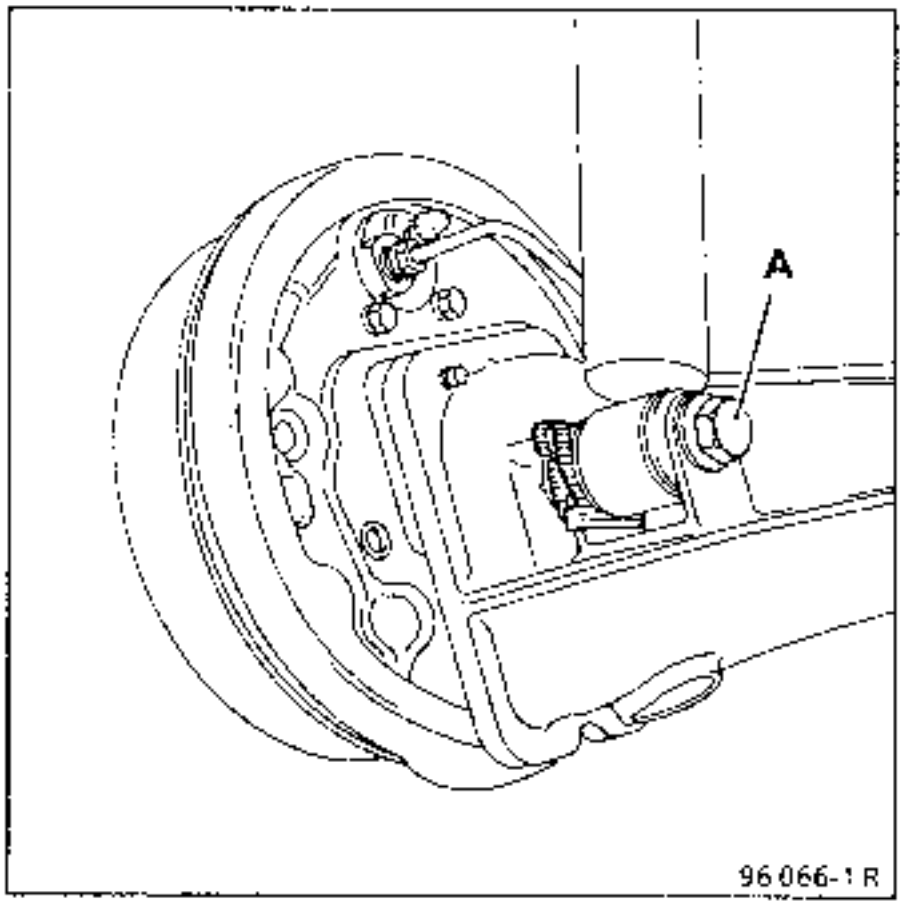
Fit :
- **new** clips
- the drum on the pre-lubricated stub axle : **SAE W 80 oil,**
- the **new** lock nut and torque tighten,
- the hub cover plug.

Adjust:
- the brake linings by repeated pressure on the brake pedal,
- the handbrake (see chapter 37 "Controls").

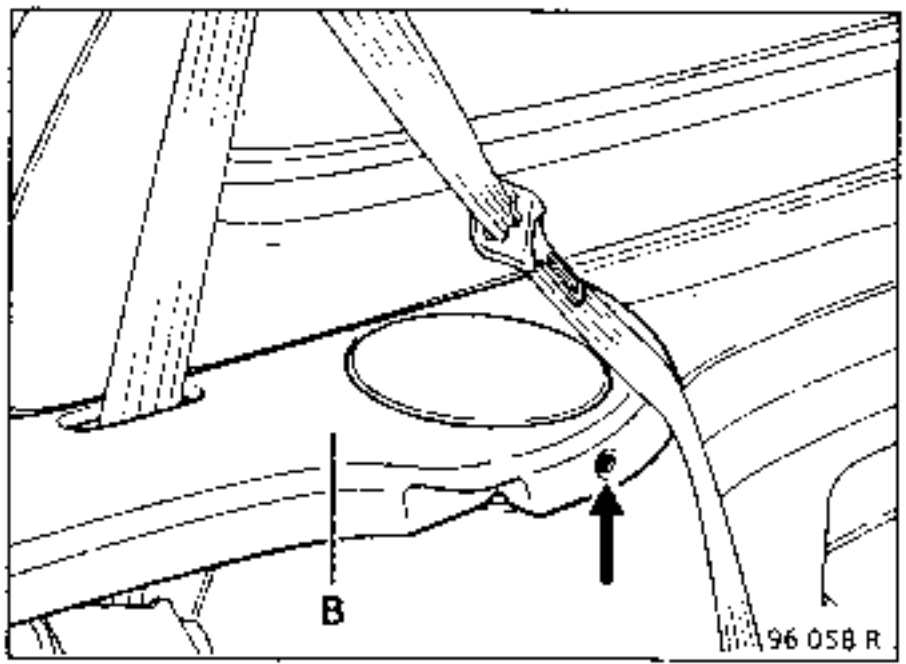
TIGHTENING TORQUES (in daN.m)	
Shock absorber base bolt	7
Upper mounting nut	1,5
Wheel bolts	9

REMOVAL

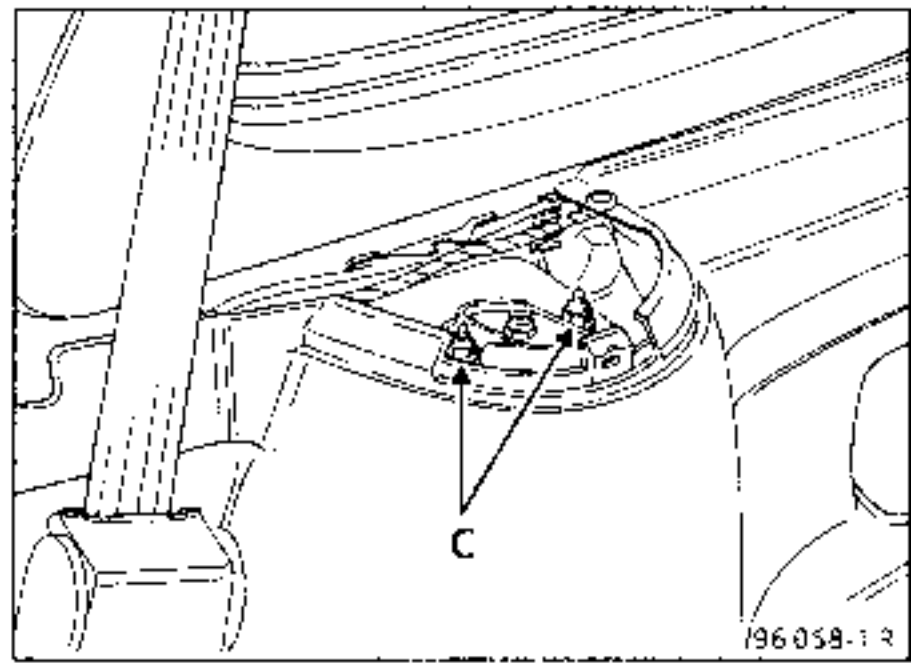
Vehicle on axle stands for the side in question, remove :
- the wheel,
- bolt (A) from the base of the shock absorber,



- la garniture supérieure de custode (B) (2 vis).



- the two upper mounting nuts (C).

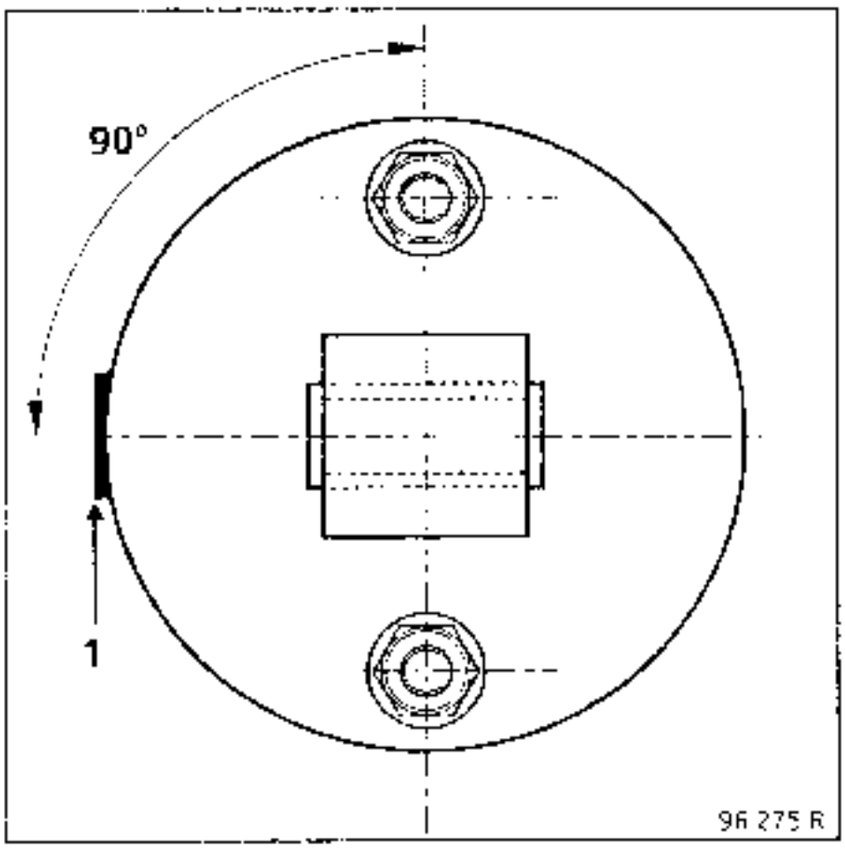


Remove the spring - shock absorber assembly.

REFITTING

When refitting the bearing component on the vehicle the fitting direction for each component part must be observed to ensure easy reassembly.

Reference mark (1) on the upper cup of the assembly should be towards the outside of the vehicle.



Lower the vehicle.

Coat the bolts at the base of the shock absorber with **Loctite FRENBLOC.**

Torque tighten :
- the upper mounting nuts,
- the shock absorber base bolt,
- the wheel bolts.

Tooling should be in perfect condition in view of the high forces in the spring

SPECIAL TOOLING REQUIRED			
Sus. 21		Spring compression tool	
SPECIAL TOOLING REQUIRED			
Make	**Type**	**Description**	**Cups**
MG	**M90**	Spring compressor	**M5**
ZI	**ZKL 2013** **ZKL 0055**	Spring compressor Vice	**N01**
D83 RENA		**FACOM kit for shock absorber rods**	

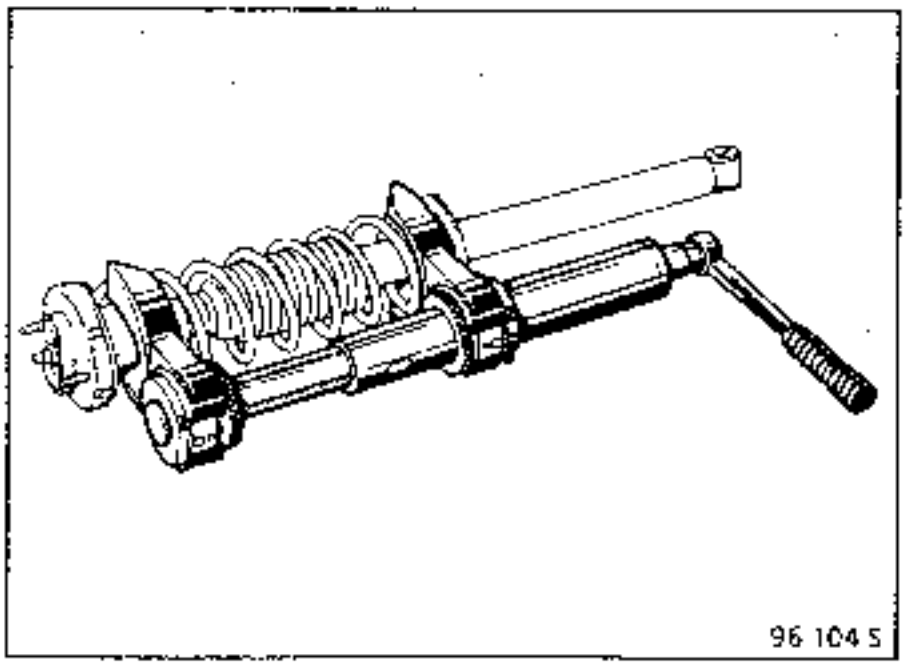
TIGHTENING TORQUES (in daN.m)	
Shock absorber rod nut	**2,2**

REMOVAL

MG and Z international compressors

Hold the assembly in the vice.

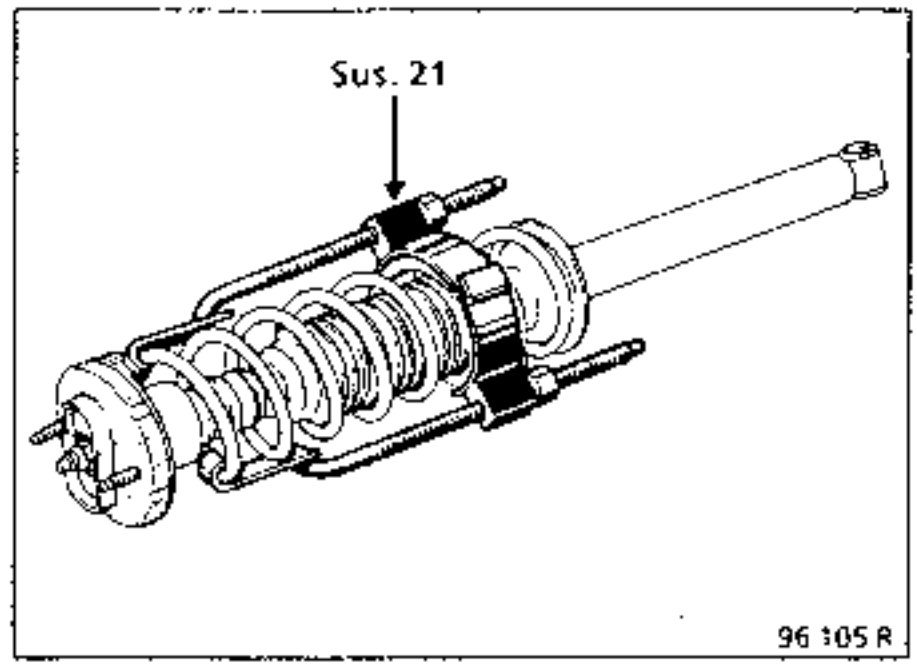
Fit the cups on the compression tool.



Spring compression tool Sus. 21

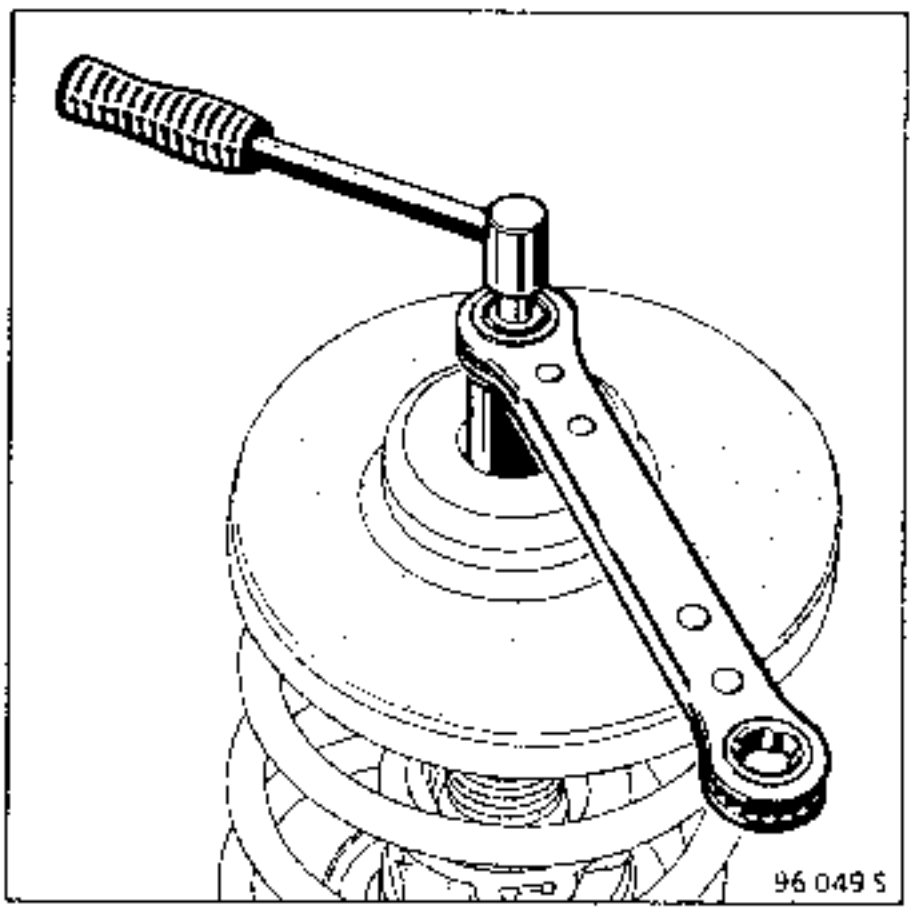
Hold the assembly in the vice.

Fit tool **Sus. 21.**

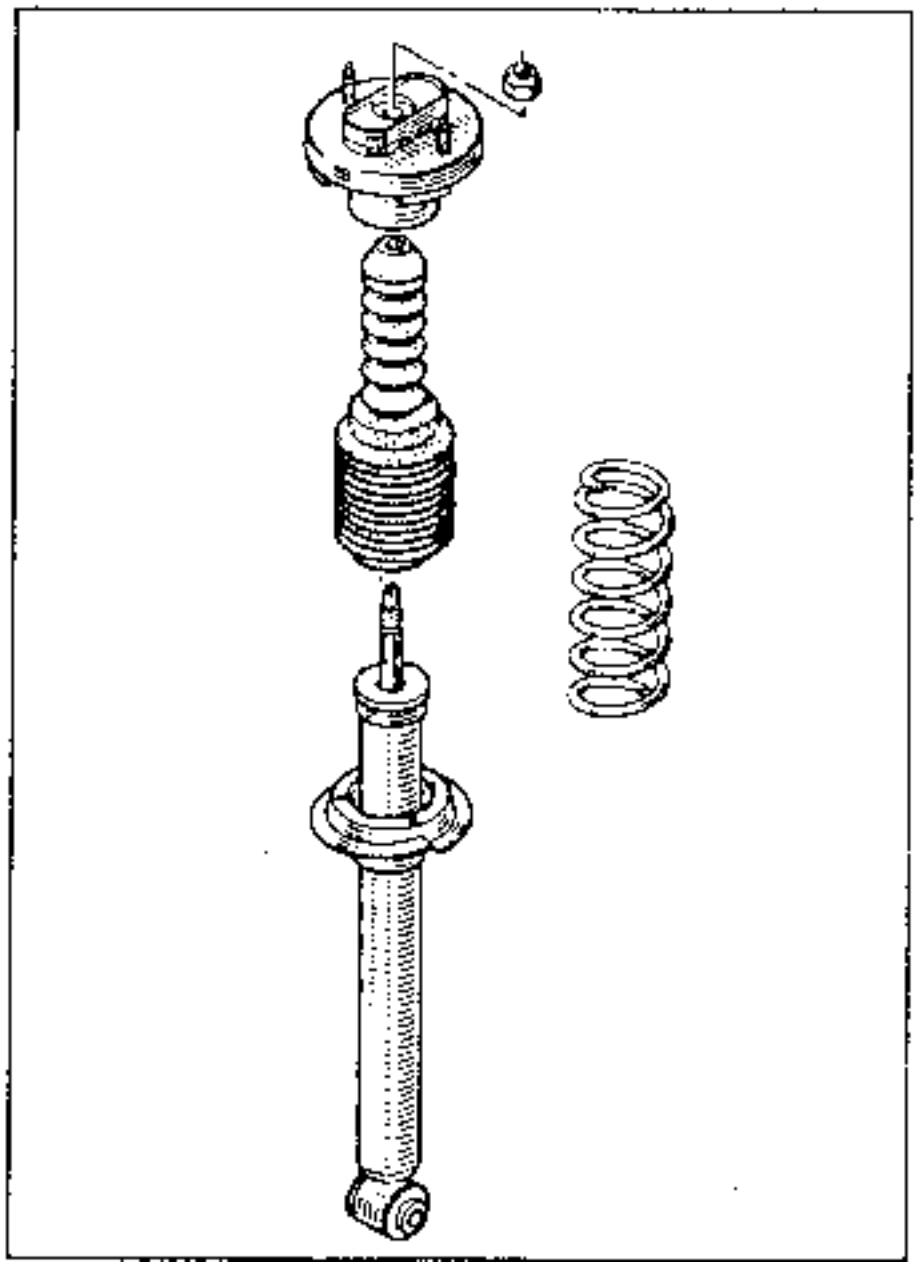


In both cases compress the spring until it no longer presses on the shock absorber cups.

Loosen and remove the shock absorber rod nut using tool **FACOM D83 RENA.**



Separate the component parts.



REFITTING

NOTE : shock absorbers are stored horizontally in parts stores.

Under these conditions, shock absorbers which operate vertically may not operate correctly initially

Before they are fitted to the vehicle they should be pumped several times by hand in the vertical position.

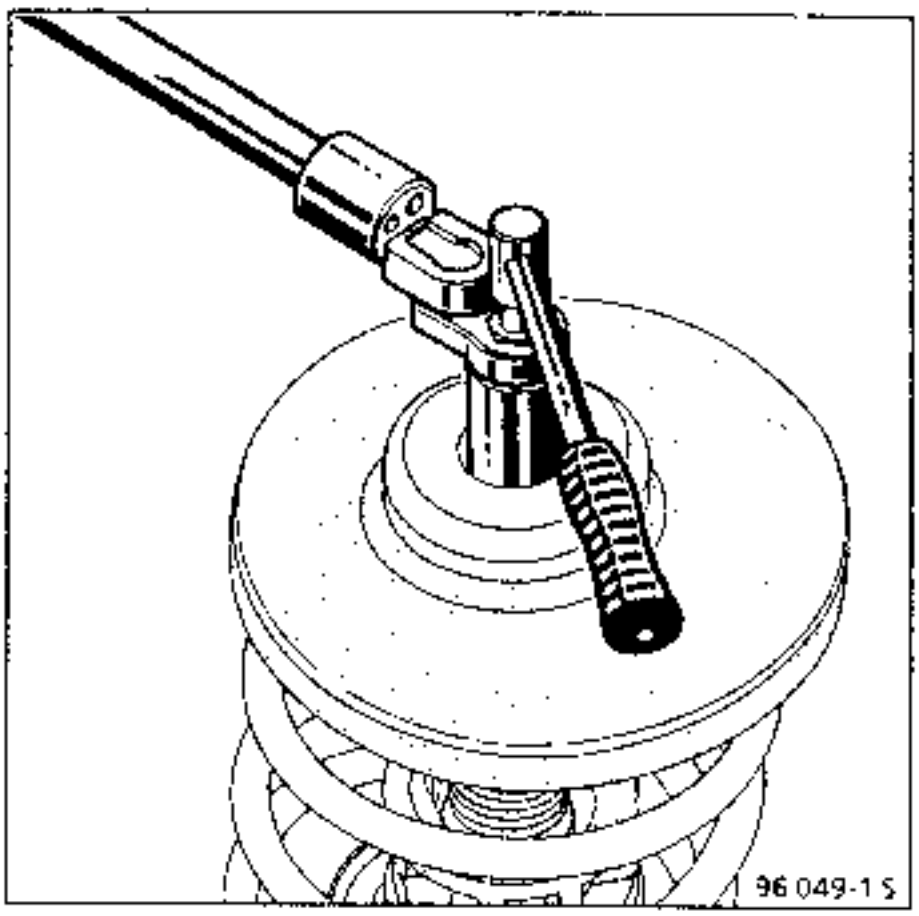
Ensure the component parts are fitted back in the correct manner and in the correct order.

Check the spring is correctly positioned against the stops at the bottom and top of the shock absorber (paint marks at the bottom).

Special note:

The reference mark on the upper cup should be towards the outside of the vehicle (see section "Spring - shock absorber assembly").

Fit and torque tighten the nut (new) using tool **FACOM D83 RENA.**



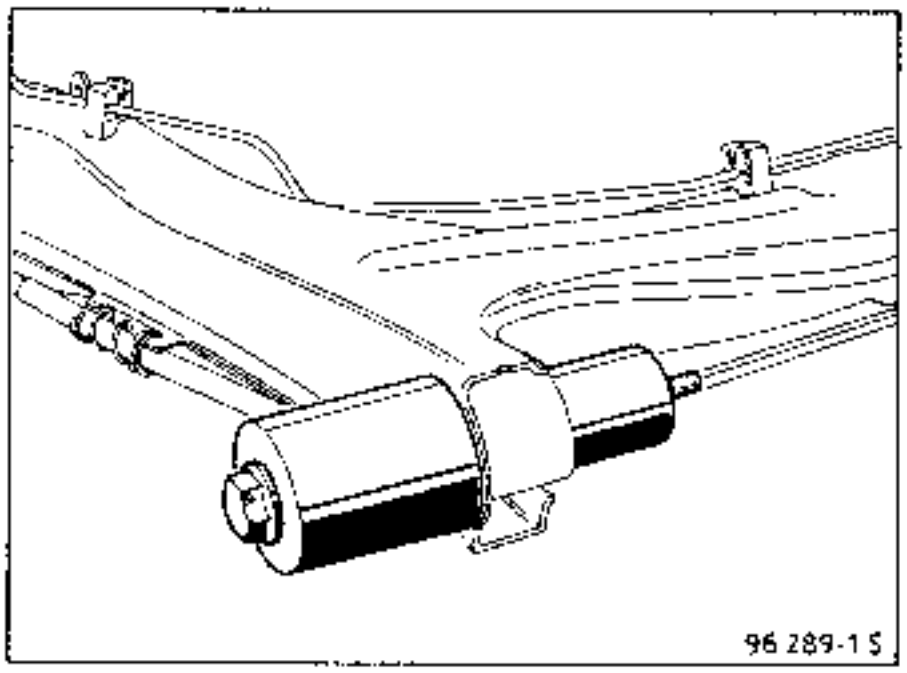
Decompress the spring and remove the tool.

SPECIAL TOOLING REQUIRED	
T.Are. 1270	Tool for removing and fitting flexible axle rubber bushes

This operation is carried out with the rear axle assembly removed

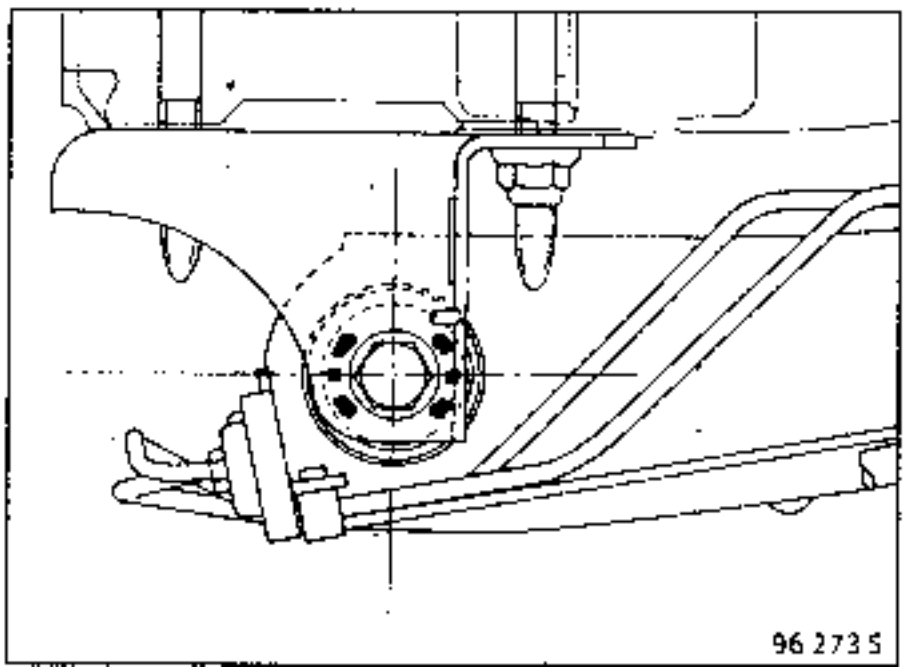
REMOVING

Use tool **T.A.R. 1270** to remove the rubber bushes.

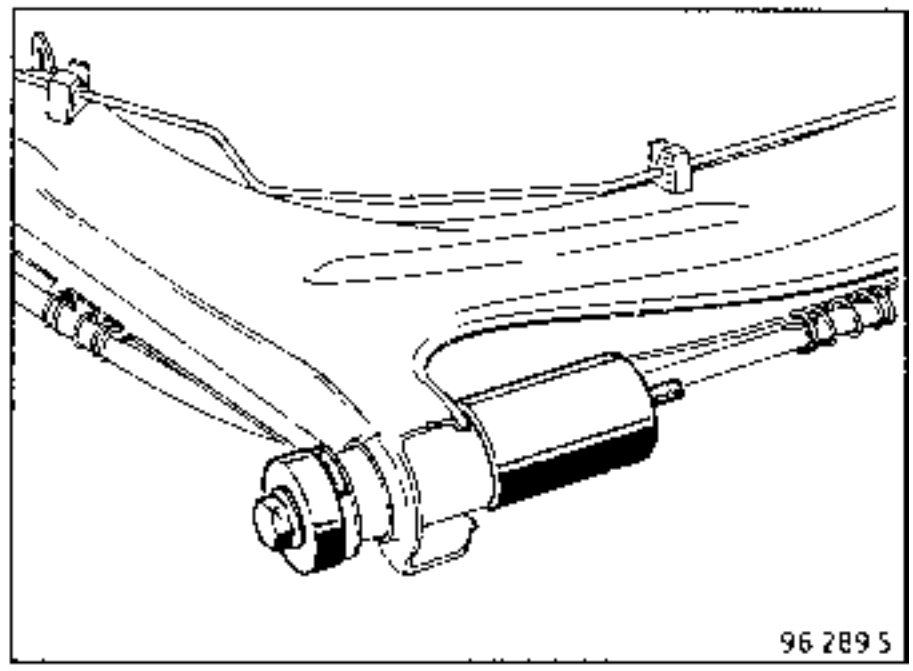


REFITTING

Ensure the cells are correctly positioned.



Refit the new bush ensuring it is correctly positioned in relation to the axle (shoulder to the outside).



WHEELS

The identification mark of the wheels is stamped on the steel rims

This gives information on the main dimensions of the wheel

This mark may be complete :

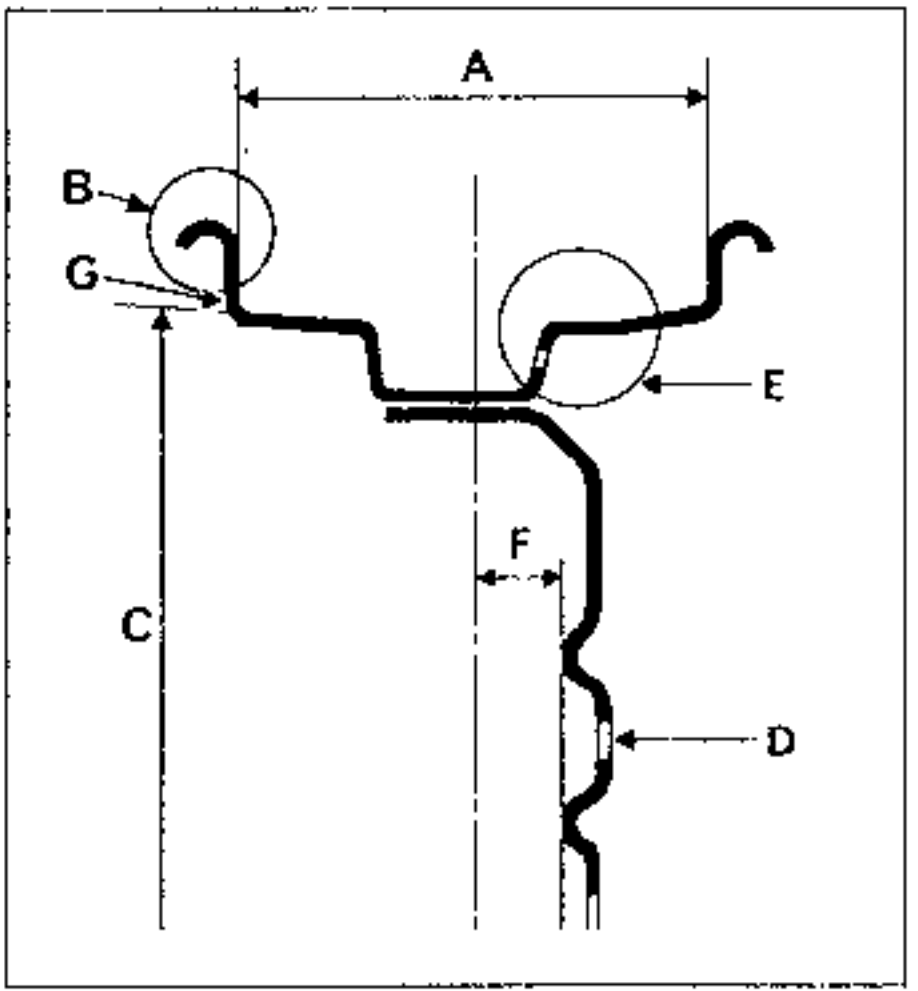
Example : 5 1/2 J 14 4 CH 36
or simplified
Example : 5 1/2 J 14

	A	B	C	D	E	F
WHEEL TYPE	WIDTH (in inches)	RIM PROFILE	Ø NOMINAL (in inches). Under tyre bead	Number of holes	Tyre fixing profile	Offset in mm
5 1/2 J 14 4 CH 36	5 1/2	J	14	4	CH	36

The wheel bolts are set to **100 mm** diameter (4 bolts).

Maximum run-out: 1,2 mm measured on the rim edge (at G).

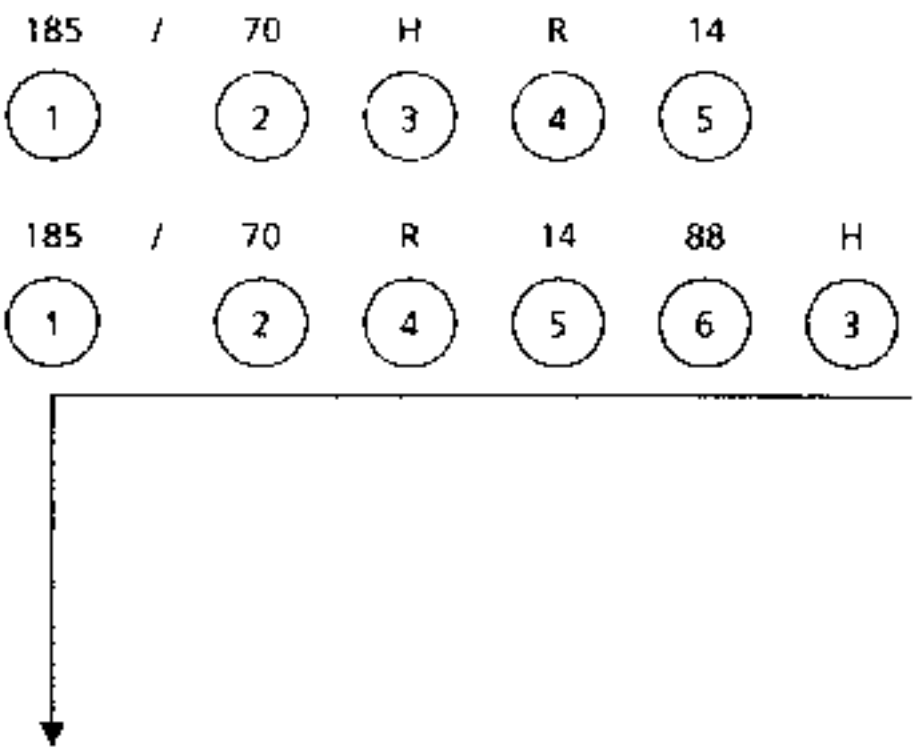
Maximum radial run-out: 0,8 mm measured on the tyre bead contact face.

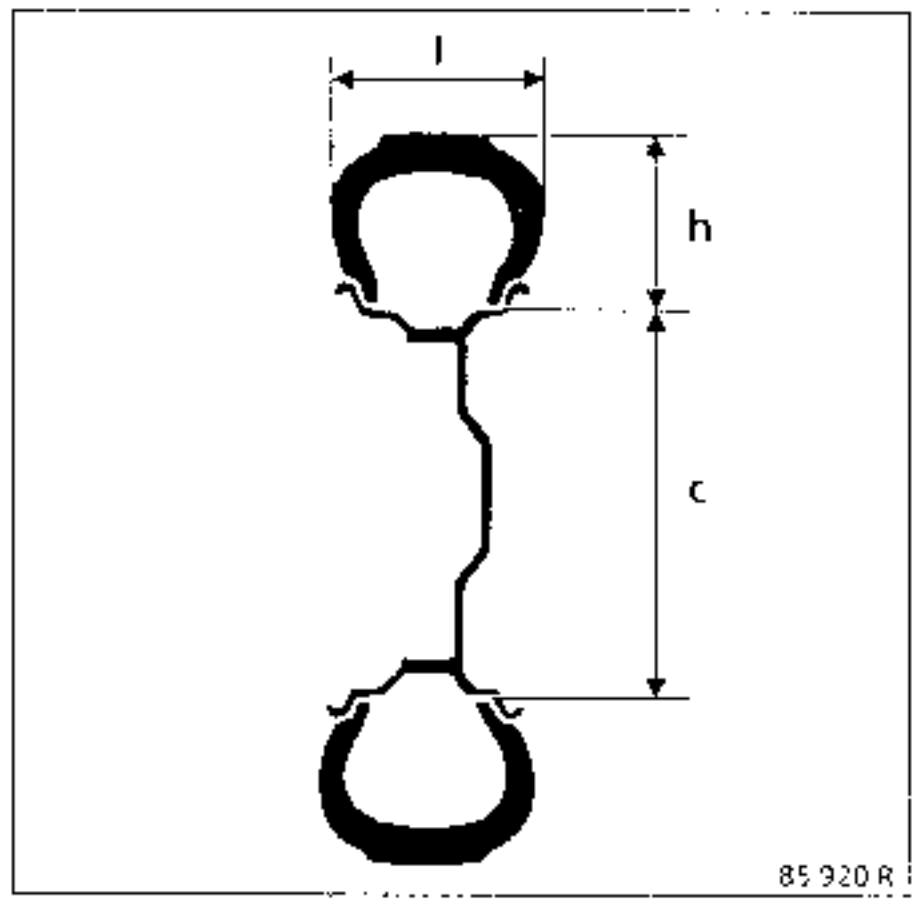


TYRES

There may be two types of identification marking for the same type of tyre.

Example : 185/70 H R 14
or 185/70 R 14 88 H





1	185	Tyre size in mm (S) section
2	70	Ratio H/S $\frac{\text{Height}}{\text{Section}}$
4	R	Radial structure
5	14	Internal diameter in inches. This corresponds to the diameter of the rim.
6	88	Load index 88 (560 kg)
3	H	Speed index 210 km/h 130 mph max

Speed index symbols :

Max. speed	km/h
R	170
S	180
T	190
U	200
H	210
V	240
Z +	240

Types of structure :

Diagonal	No mark
Radial	R
Diagonal belted	B (Bias belted)

Type	Rim	Rim run out (mm)	Wheel bolt tightening torque (daN.m)	Tyres	Inflation pressure (bar)	
					Front	Rear
C063	4,5 B13	1,2	9	145/70 R13S	2,3	2

The tyres are **TUBELESS** (no inner tube).

Tyre inflation pressures should be checked when cold. The increase in pressure when driving may be as much as 0,2 to 0,3 bar.

If tyre pressures must be checked when warm, take this increase in pressure into account and never deflate the tyres.

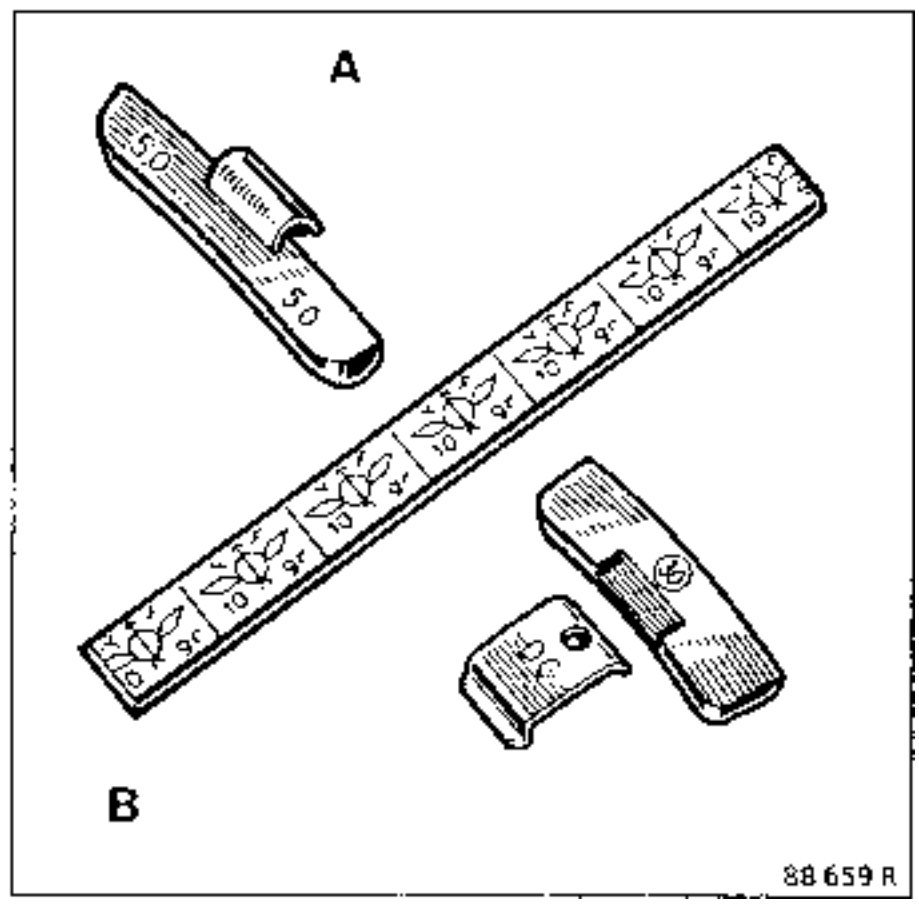
Wheel balancing

BALANCE WEIGHTS

Use parts from the parts Department only :

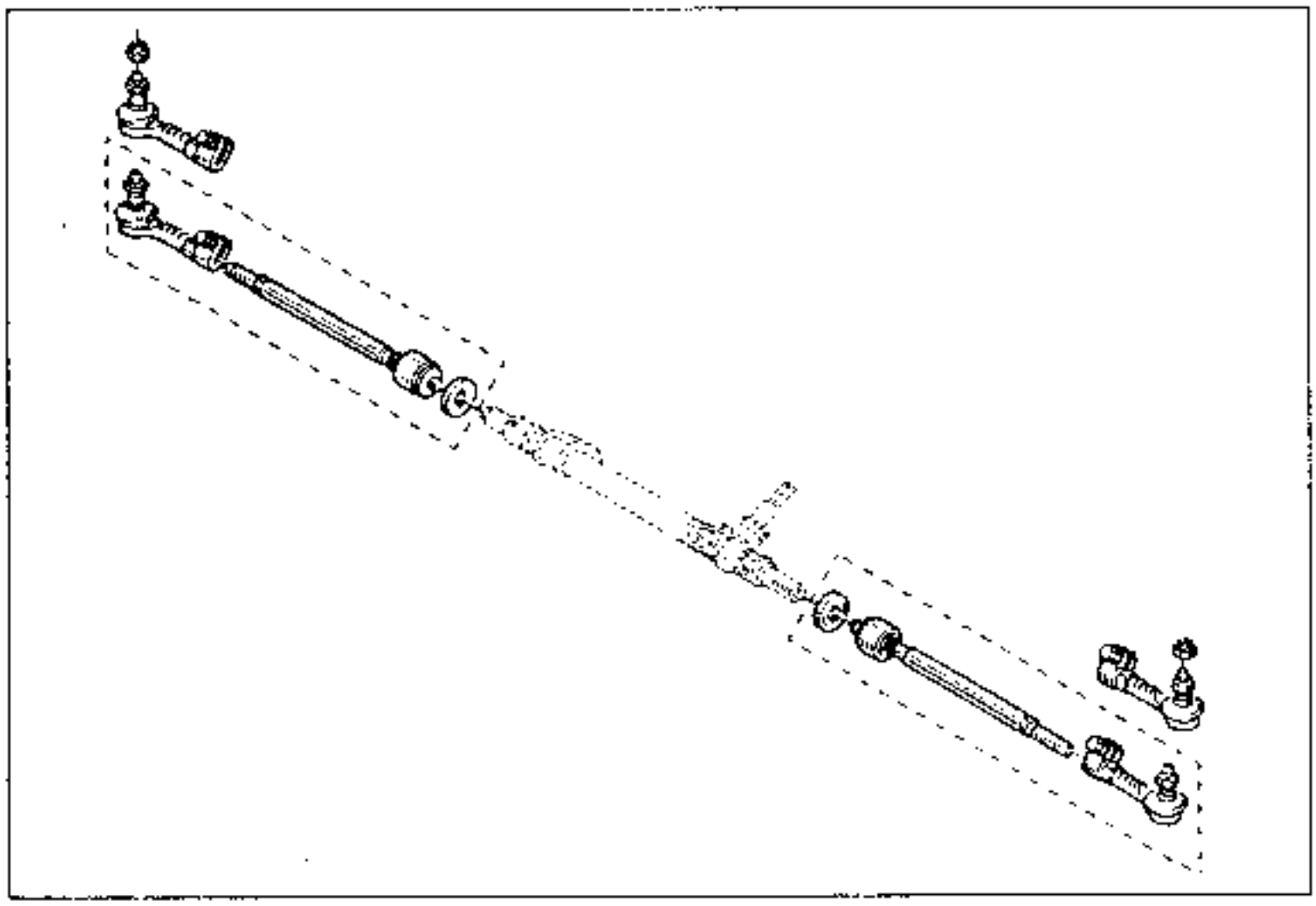
- fixed by hooks to steel rims (hooks part of weight),
- fixed by hooks (flat hooks) or self adhesive for alloy rims.

A Steel rims
B Alloy rims



The axial ball joint may be replaced with the steering assembly on the vehicle. Tool **Dir. 1266** allows the steering rack bar to be locked to the steering box.

IMPORTANT : to avoid damaging the rack and pinion teeth during this operation, they **MUST** be secured by tool **Dir. 1266.**

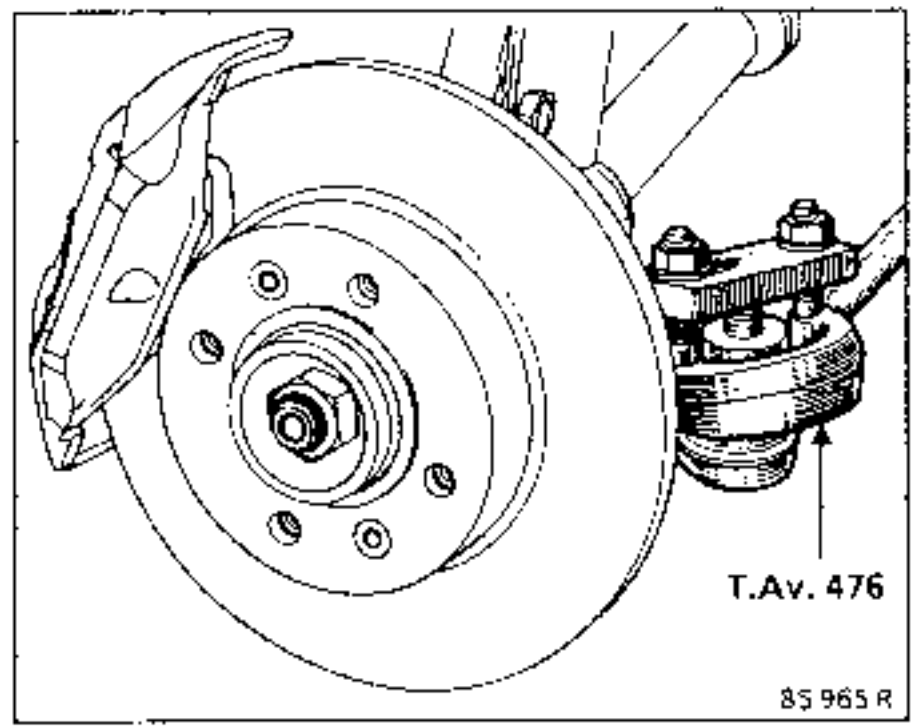


SPECIAL TOOLING REQUIRED	
Dir. 812 -01	Wrench for tightening axial ball joints
Dir. 812-02	12/100 threaded stud
Dir. 1266	Rack retaining tool
T.Av. 476	Ball joint extractor

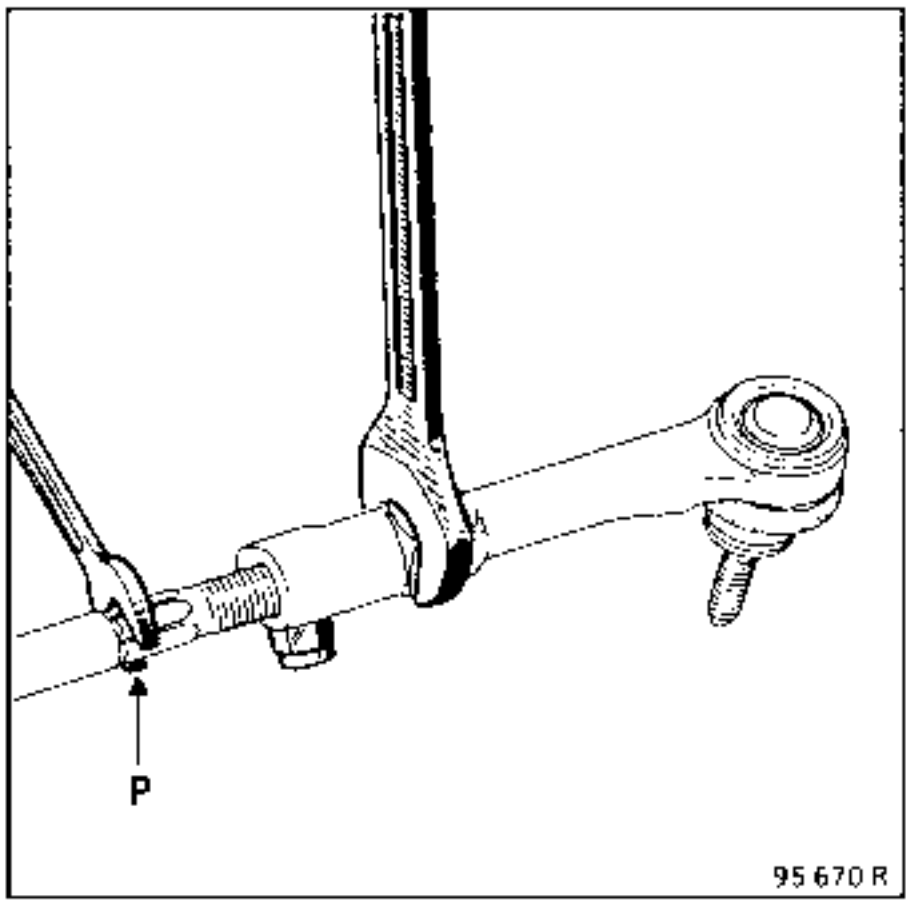
TIGHTENING TORQUES (in daN.m)	▽
Axial ball joint	5
Ball joint nut	3,5
Parallelism adjustment sleeve bolt (tangent tightening)	2
Wheel bolts	9

REMOVAL

Disconnect the steering joint using tool **T.Av. 476**.



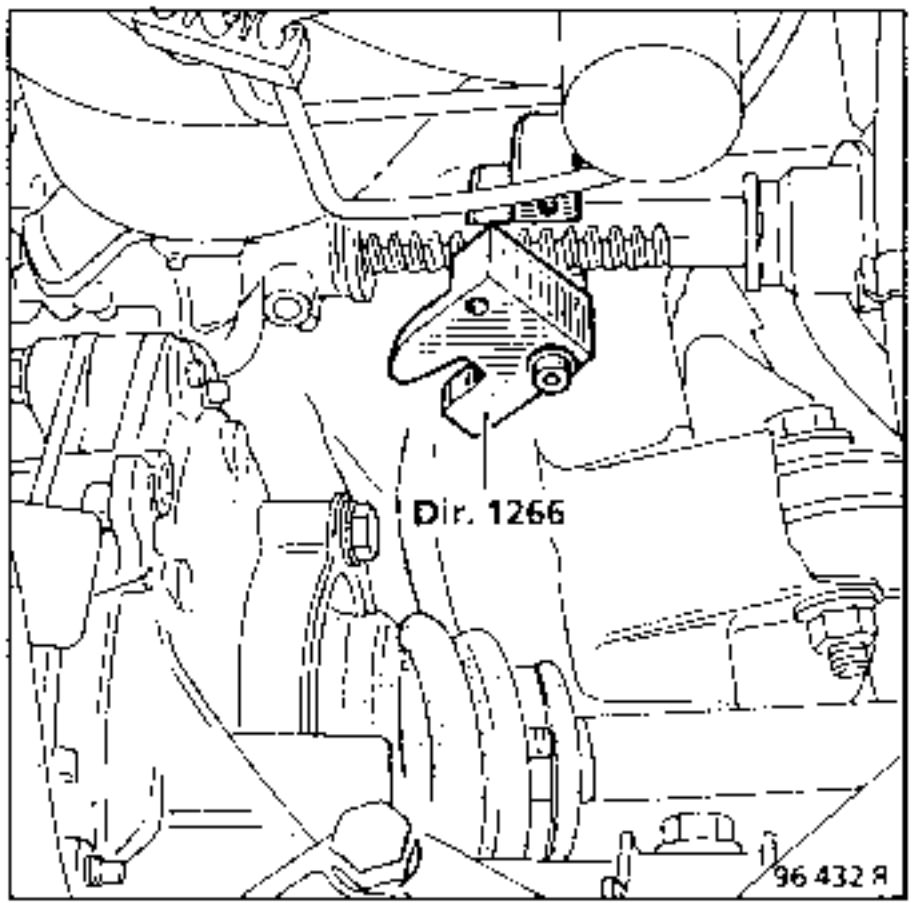
Unscrew the parallelism adjustment sleeve bolt and unscrew the ball joint unit holding the axial joint with an open wrench at "P".



Count the number of threads used in order to pre-adjust the parallelism when refitting

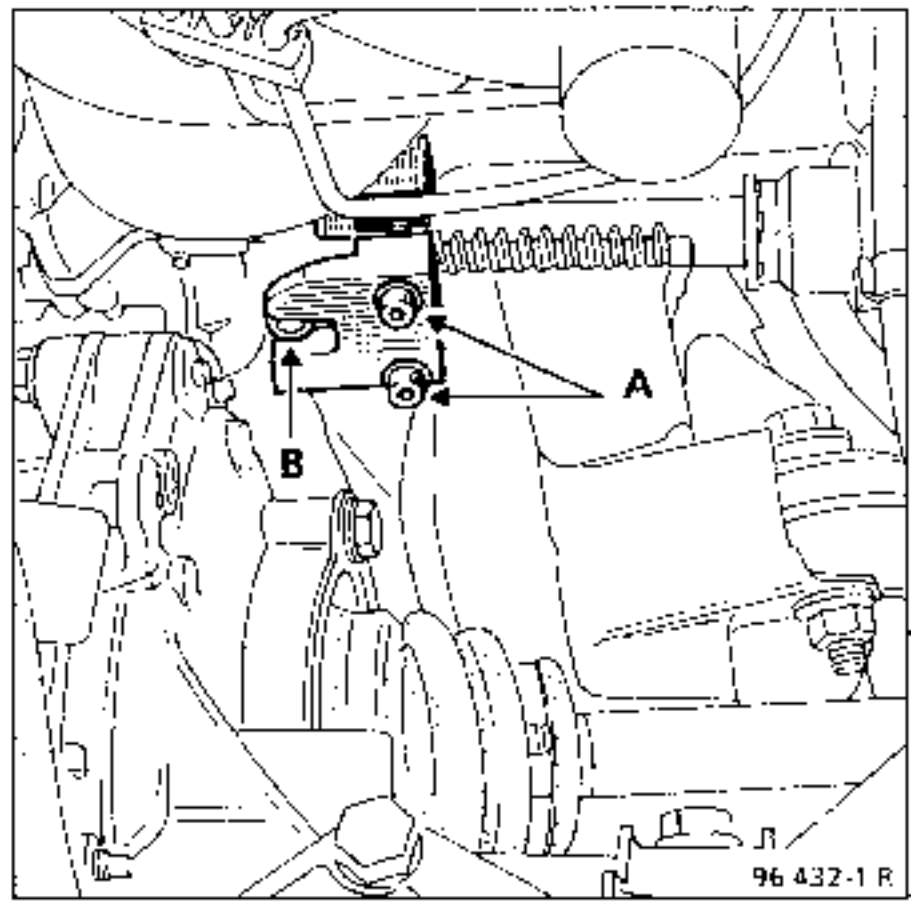
Remove the plastic retaining collar from the gaiter and remove the gaiter

Position tool **Dir. 1266** on the teeth of the rack.

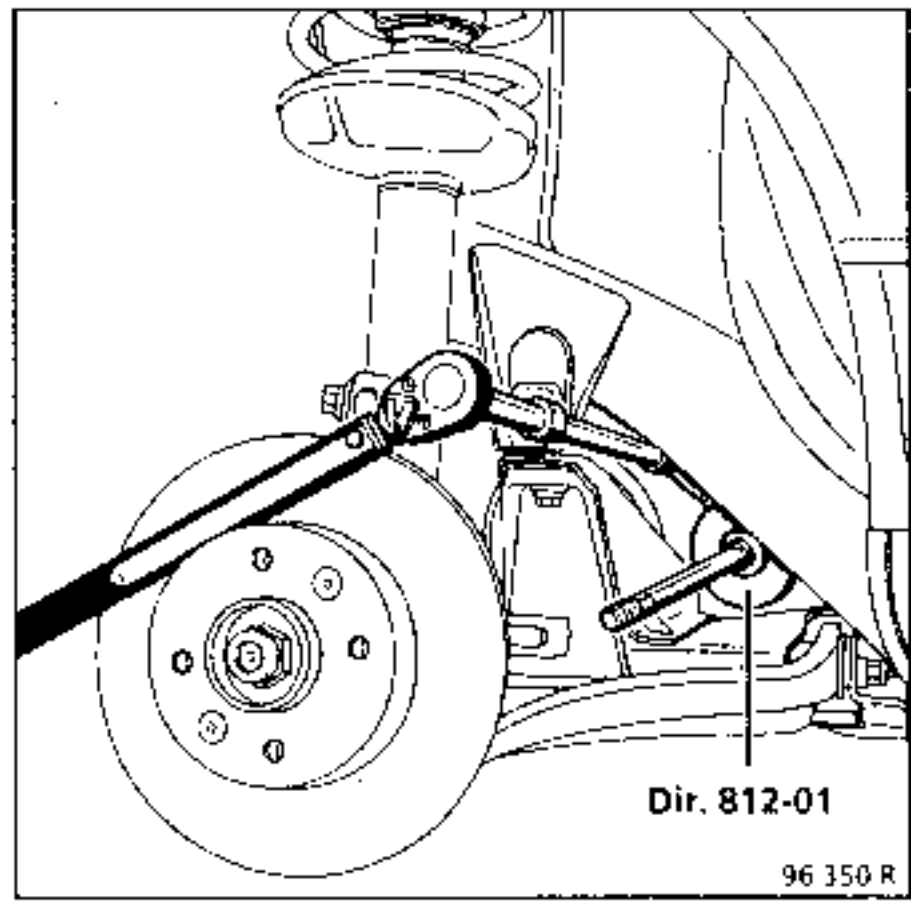


Tighten the two bolts (A).

Turn the wheels to full lock to engage tool **Dir. 1266** in reference lug (B) on the steering box.



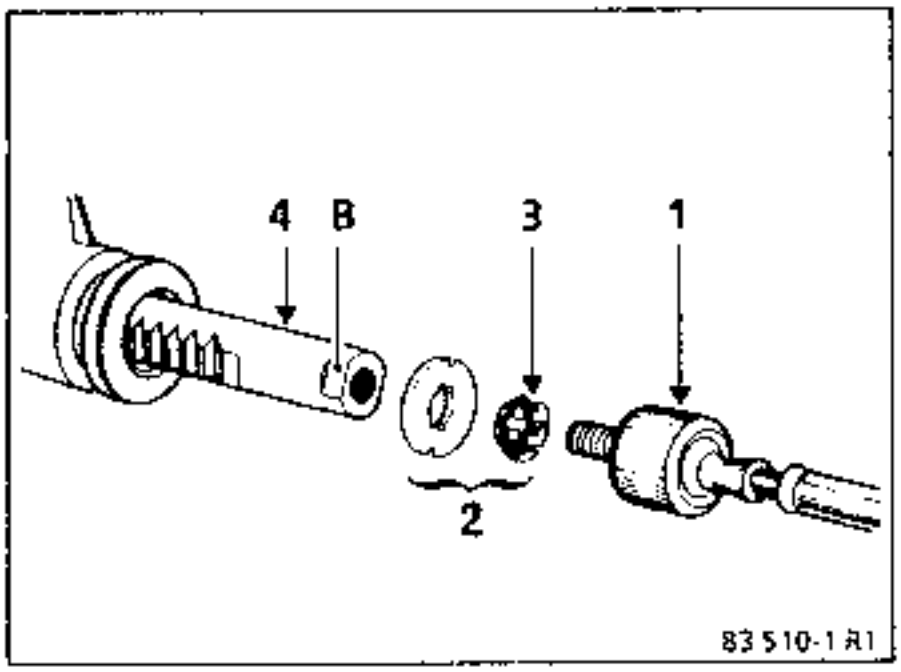
Undo the axial ball joint using tool **Dir. 812-01.**



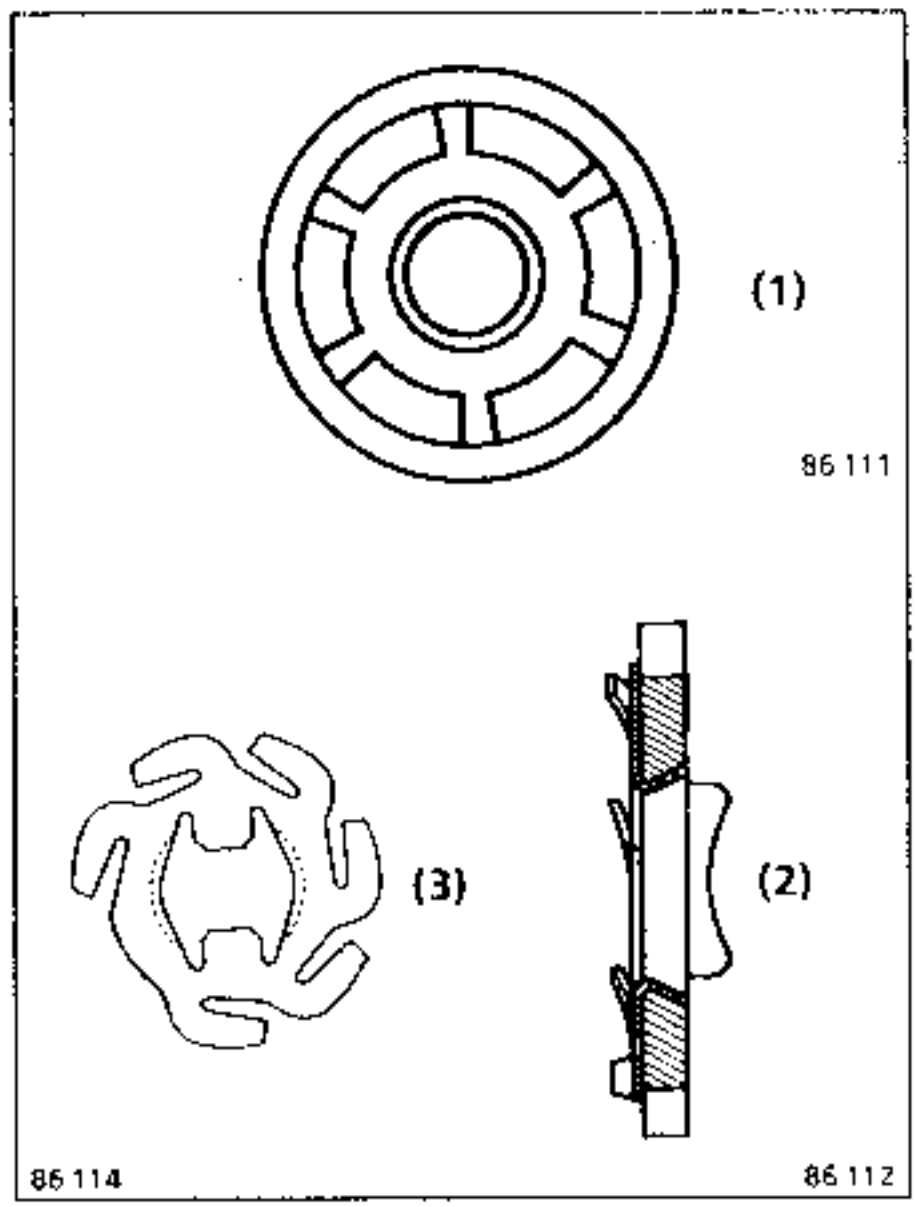
REFITTING

NOTE : before fitting the new bars, fit a threaded stud 12 X 100 into the threads at the end of the rack to remove all traces of **Loctite** from the original fitting and to ensure the threaded parts do not sieze on refitting.

Replace the assembly (2). If the notches on ball joint (1) have not been damaged, it may be reused.



Refit on the rack (4) :
- the assembly (2) (washers + locking ring (3)),
- the axial ball joint (1) having previously coated the thread with Loctite **FRENBLOC**.

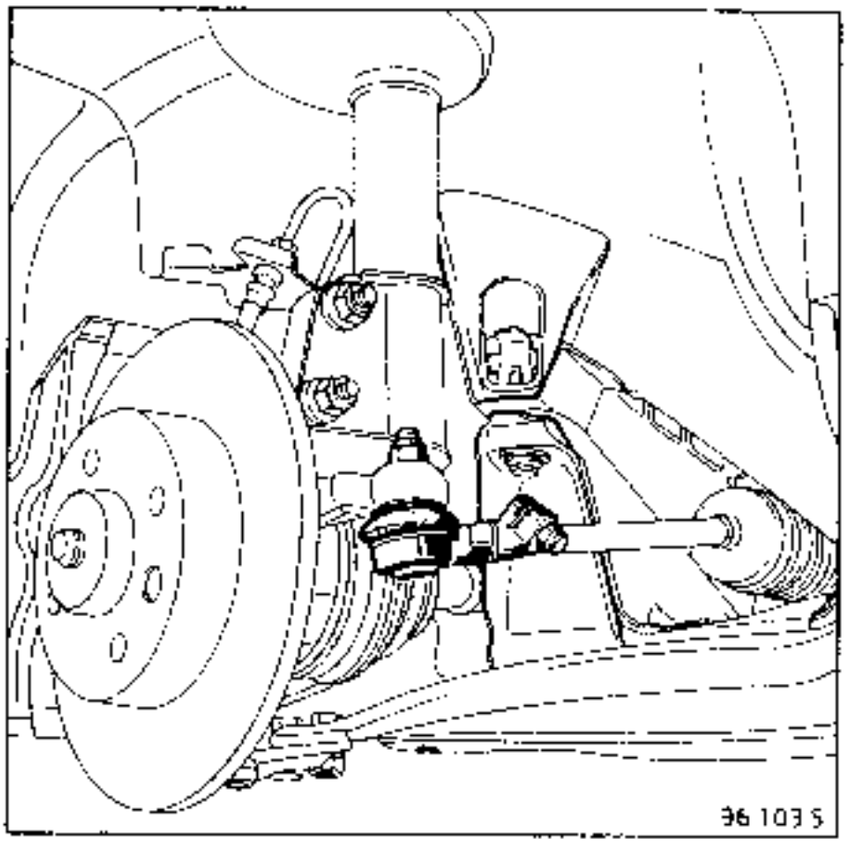


Before tightening the ball joint with tool **Dir. 812-01** check that the locking washer tabs (2) fit with the flats (B) on the rack.

Refit the gaiter and its collar.

Screw the ball joint unit in by the number of turns noted when removing it.

Reconnect the ball joint to the stub axle carrier.



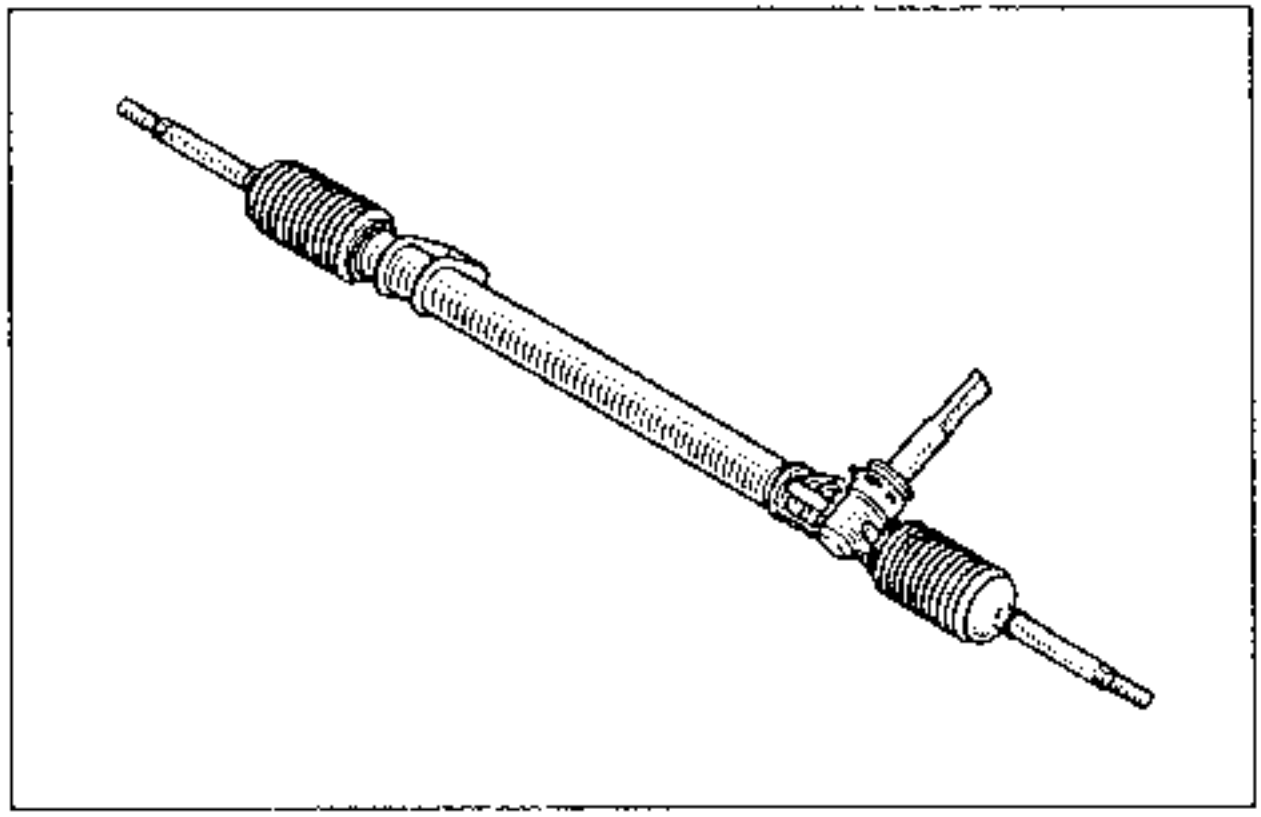
Check and adjust the parallelism then tighten the adjustment sleeve bolt to the recommended torque.

NOTE:

Ball joint unit marking :

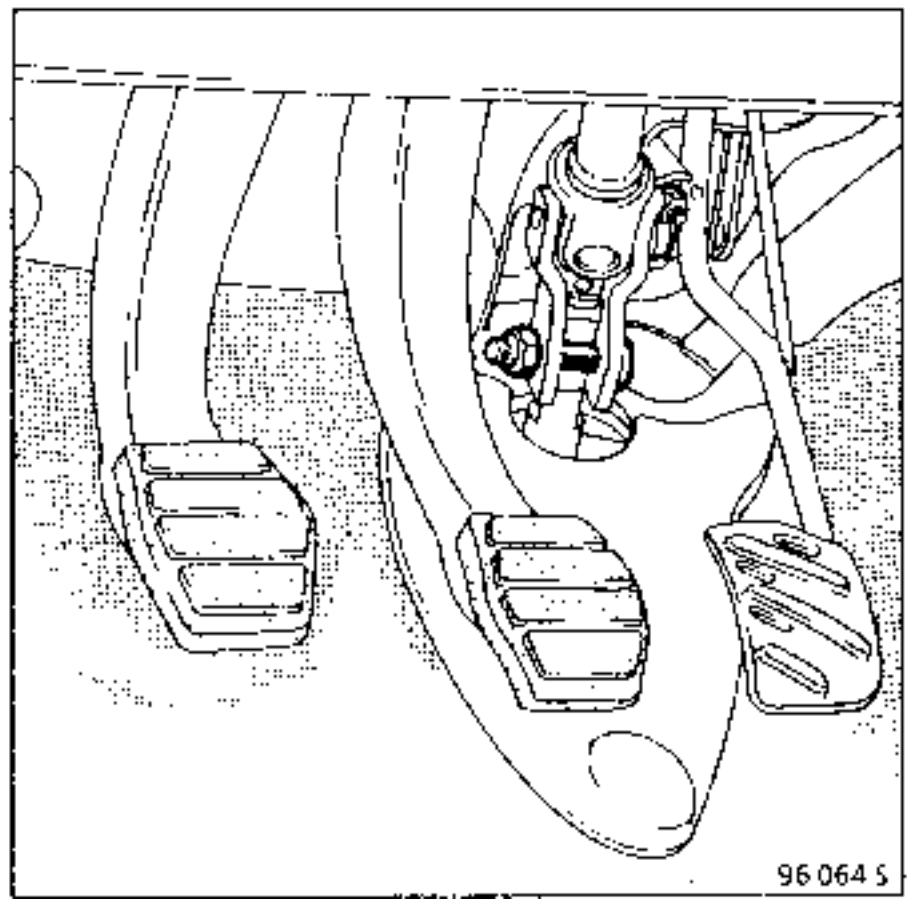
- right hand side → 3 marks
- left hand side → 4 marks

This operation requires the engine mounting assembly to be removed beforehand.



SPECIAL TOOLING REQUIRED	
T.Av. 476	Ball joint extractor
SPECIAL TOOLING REQUIRED	
CELETTE 918 910	Component support

TIGHTENING TORQUES (in daN.m)	▽
Track rod end nut	3,5
Axial ball joint	5
Steering box mounting bolts	5
Engine mounting bolt	6,5
Steering column universal joint mounting	2,5
Bolt on ball joint unit (tangential tightening)	2
Wheel bolts	9

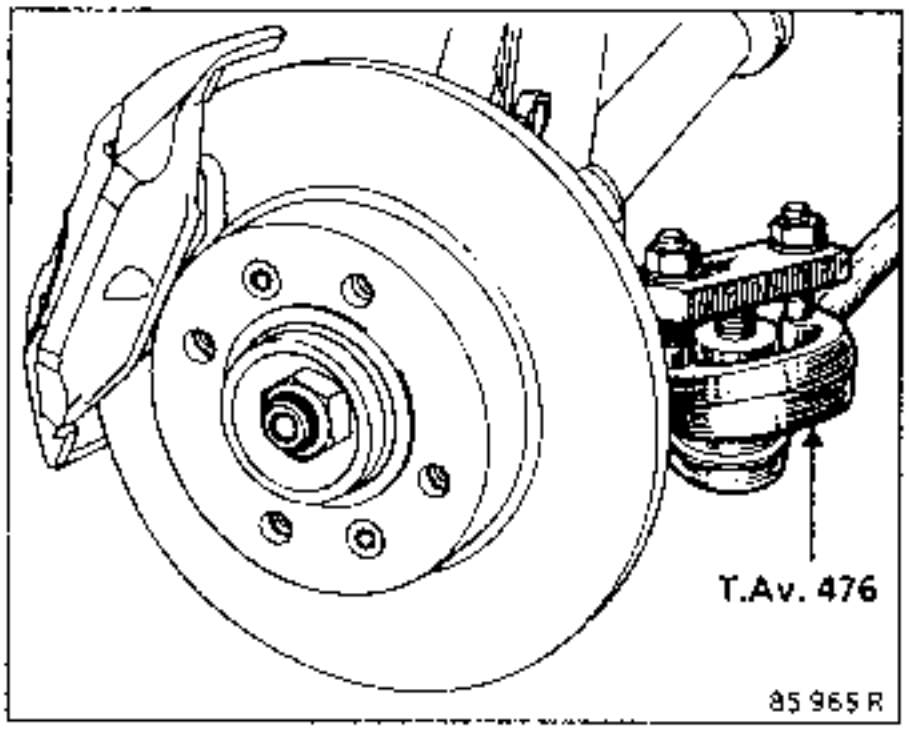


REMOVAL

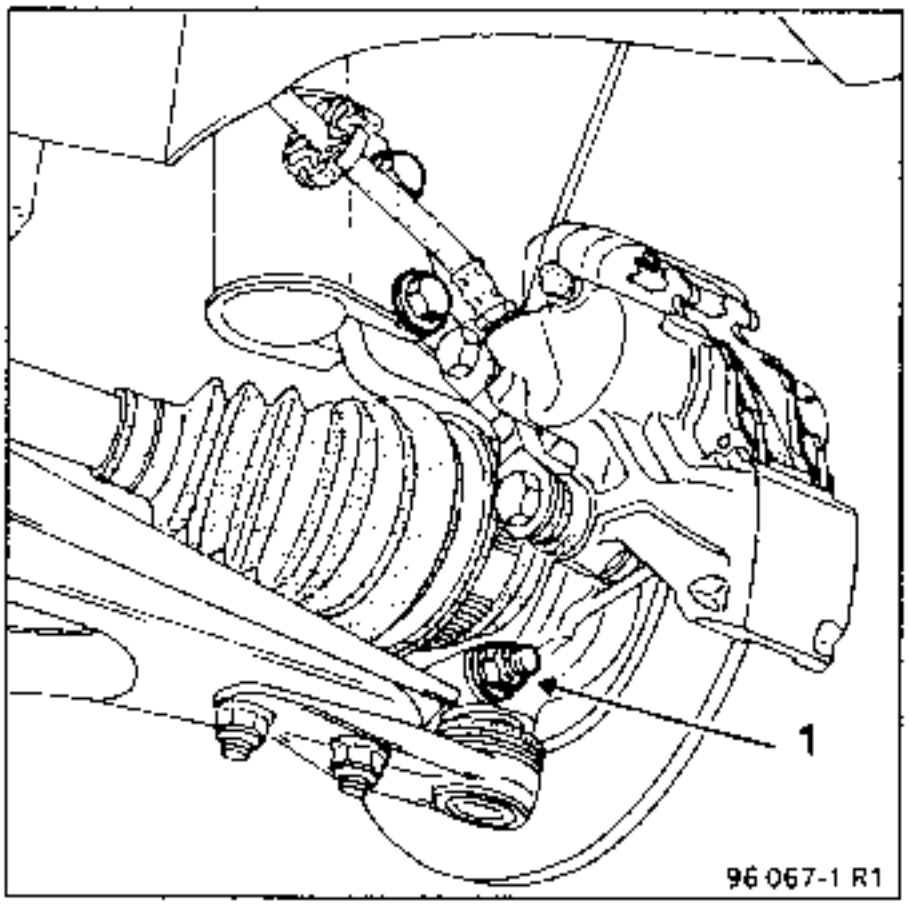
With the wheels straight, remove the steering column universal joint mounting nut and cam bolt.

REMOVAL

Remove:
- the front wheels,
- the track rod ends using tool **T.Av. 476**,

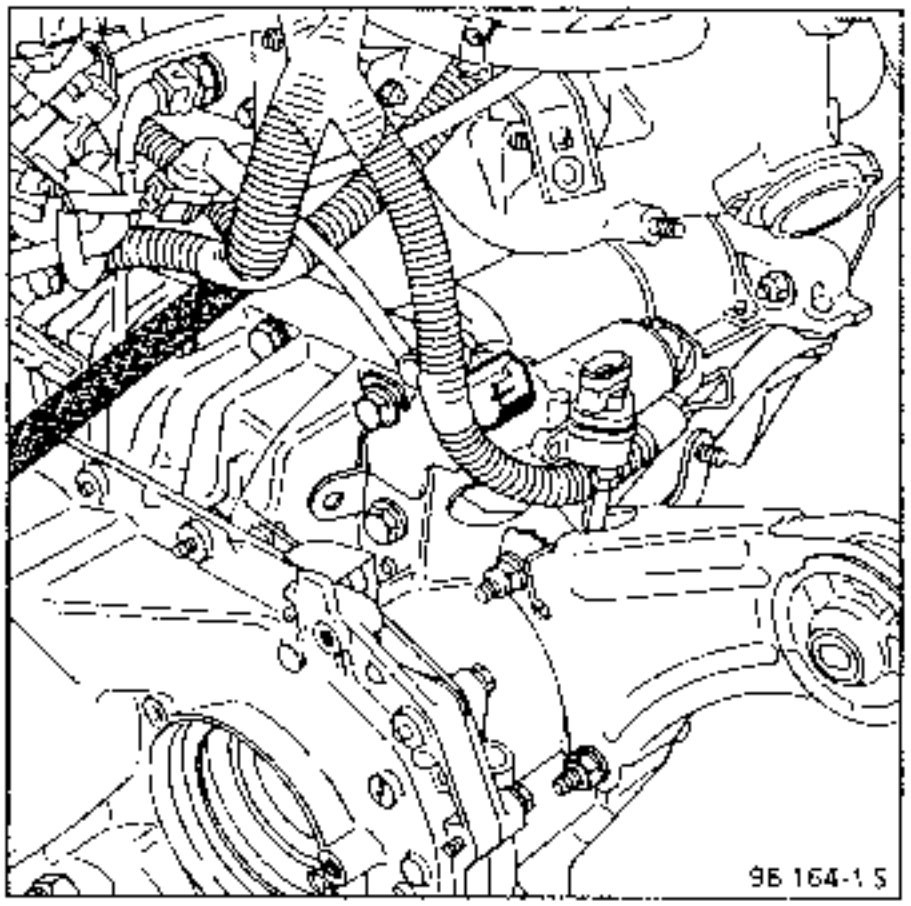


- the nut and keyed bolt (1) from the lower ball joint,

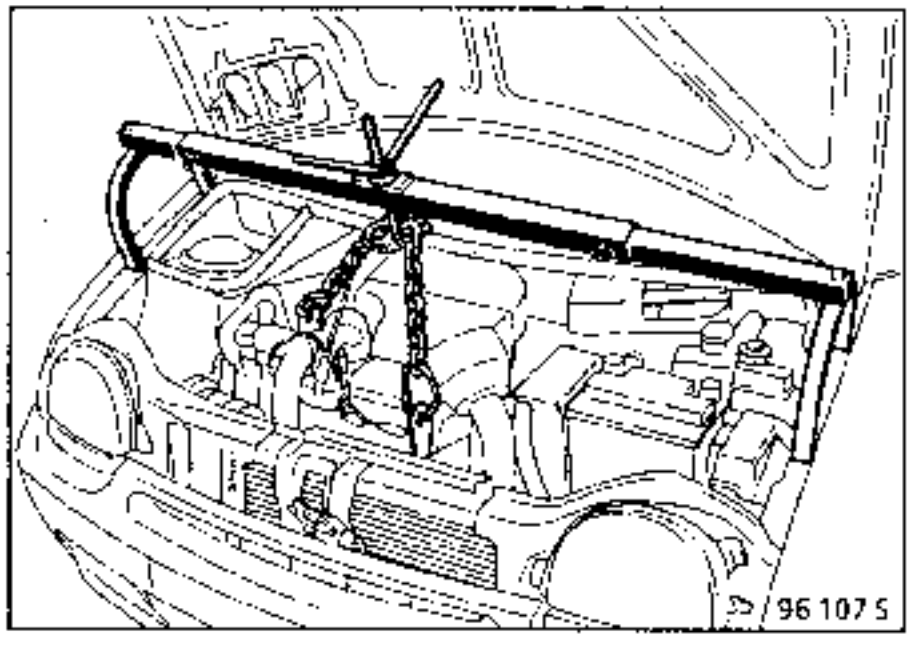


- the ignition coil.

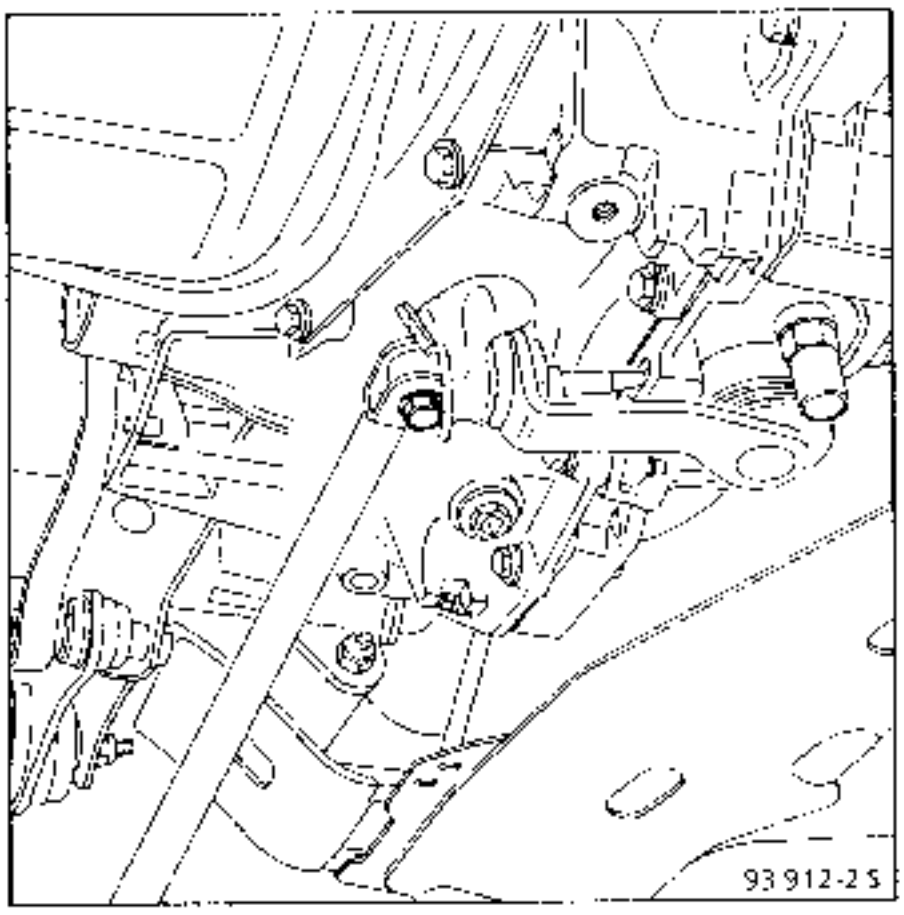
Disconnect the oxygen sensor.



Fit the support **CELETTE 918 910** on the engine lifting rings (chains under tension).

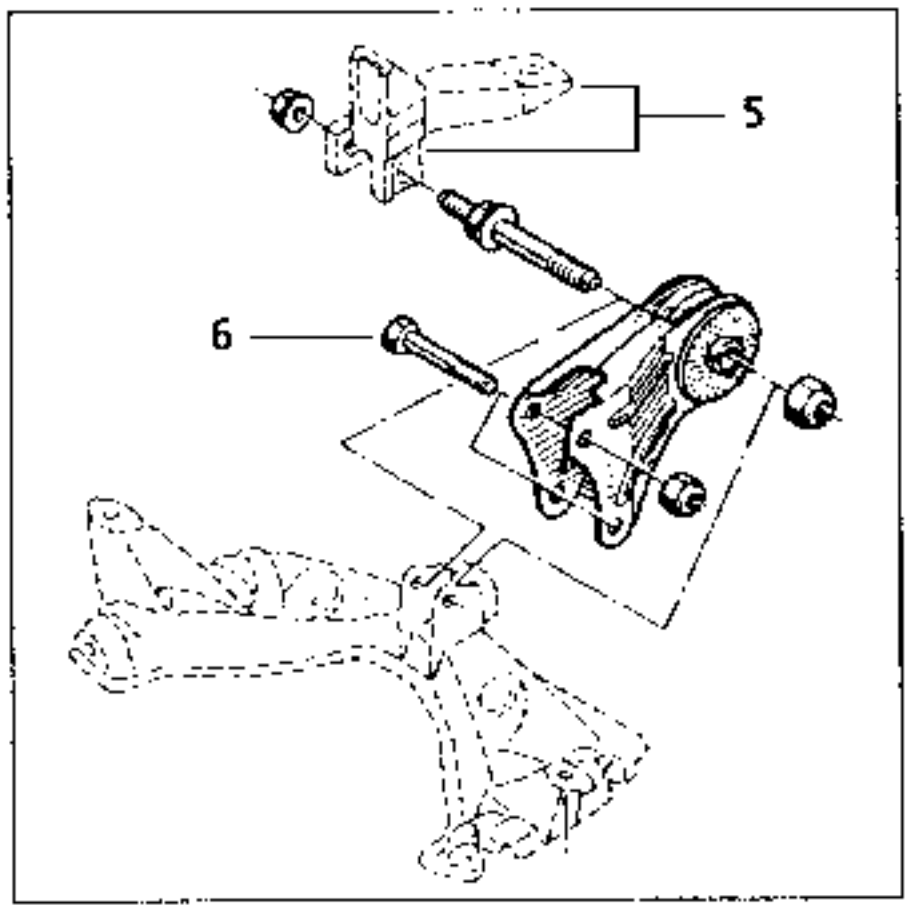


Disconnect the gear control linkage from the gear box output after removing the protective gaiter.

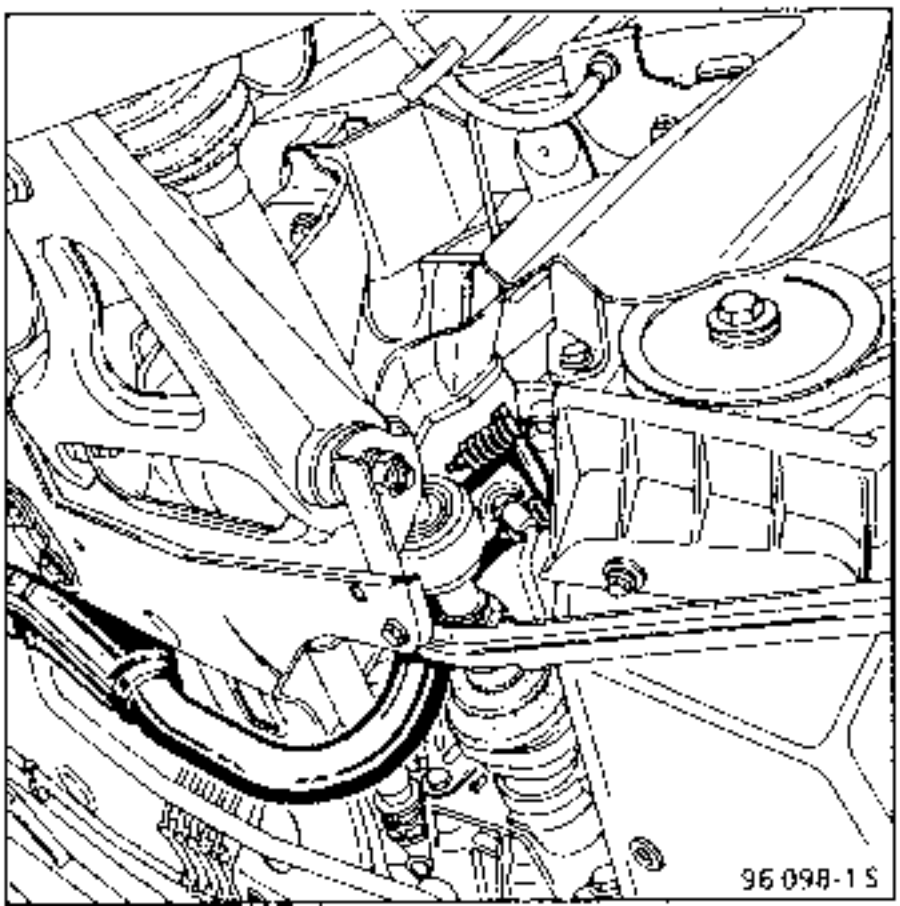


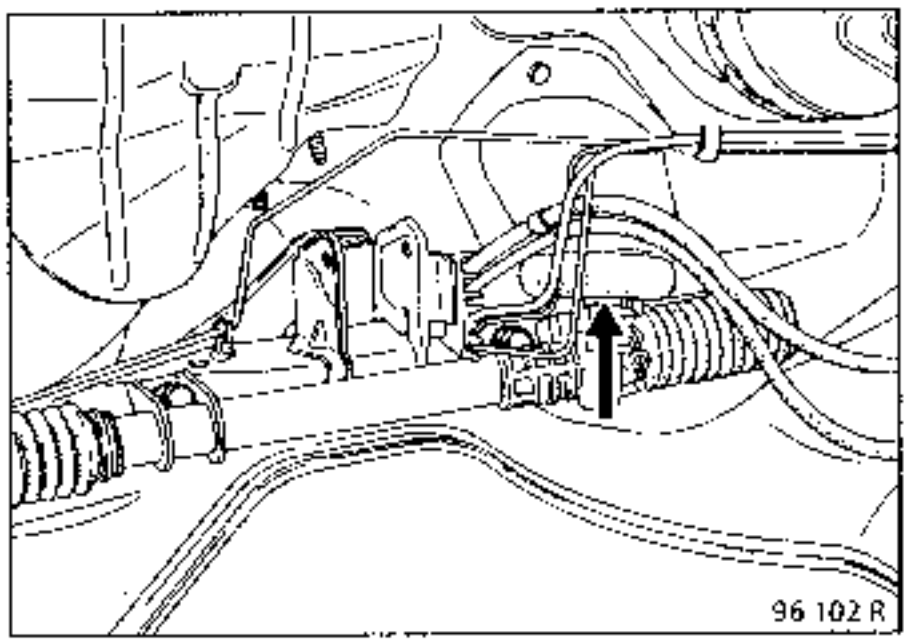
Attach the control rod to the exhaust pipe.

Remove:
- the catalytic converter,
- the heat shield,
- the two stiffeners (5),
- the 2 bolts from the rear engine - gear box mounting (6).



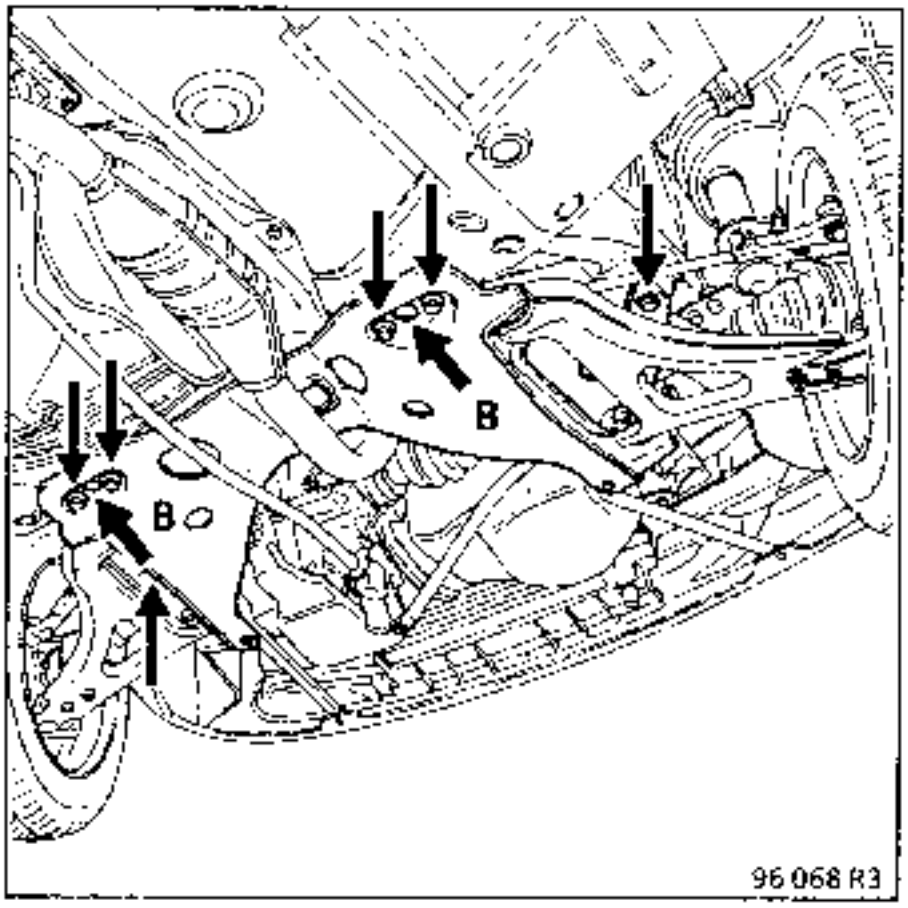
Cut the plastic retaining collar on the rubber steering box protector.





Fit the support jack under the engine mounting.

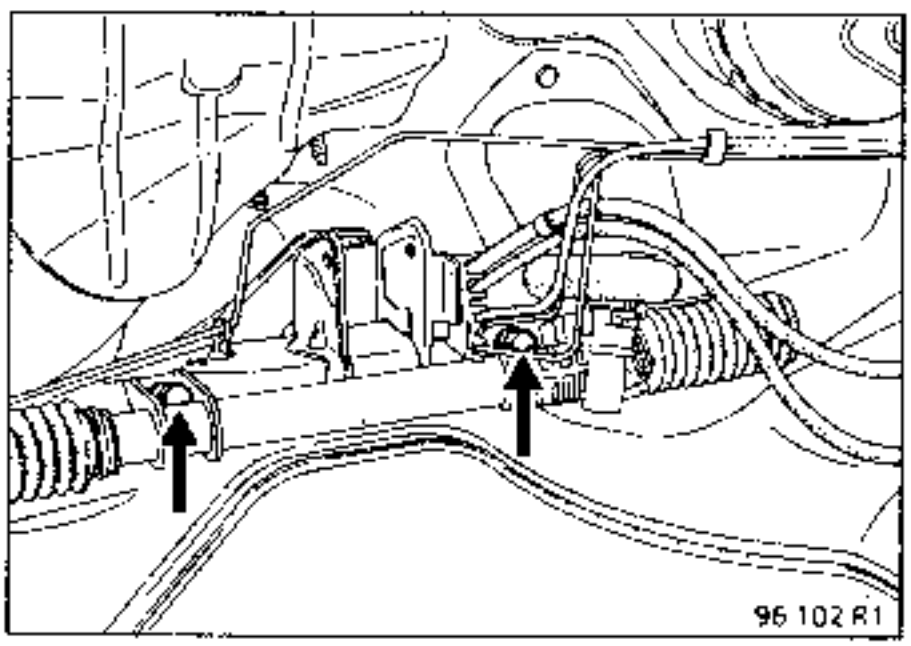
Remove the six engine mounting bolts.



Remove the pipes from under the engine mounting.

Lower the engine mounting.

Remove the two bolts mounting the steering box on the engine mounting.

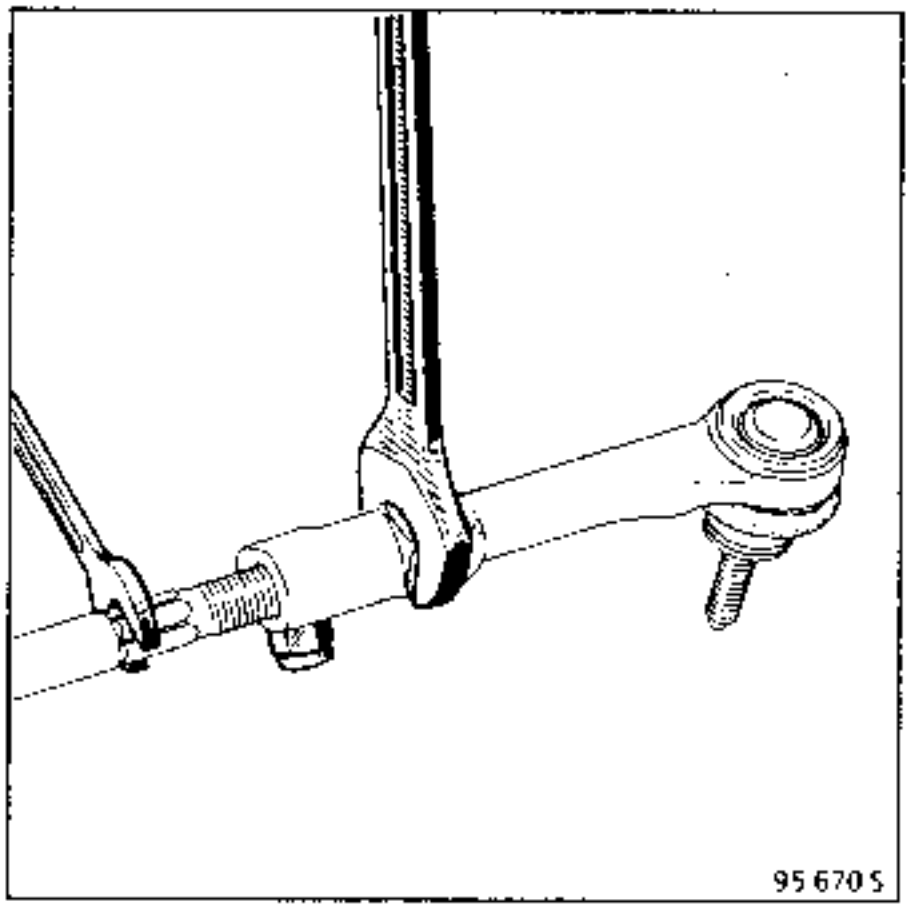


NOTE : Never unscrew the axial ball joints from the steering rack, except when replacing them.

If the steering box is to be replaced, retain the ball joint units from the stub axle side.

To do this :

- Loosen and unscrew the tangential locking bolt by approximately one turn.
- Unscrew the ball joint unit noting the number of turns required.



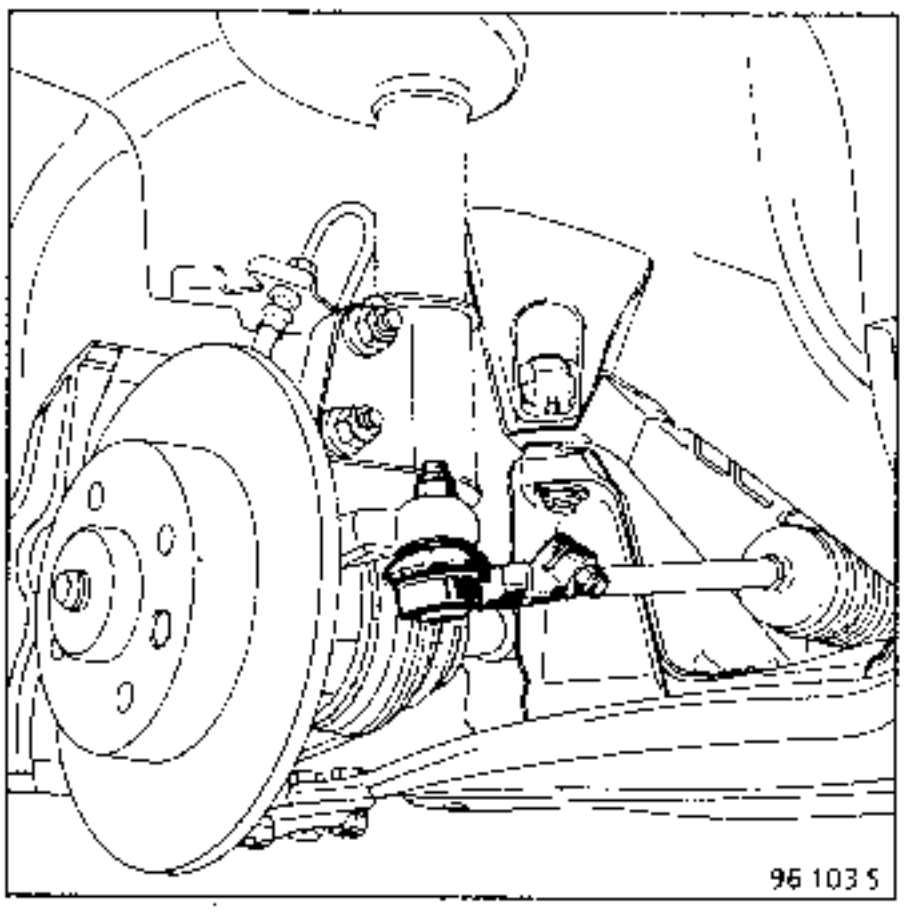
REFITTING

If fitting a new steering box, refit the ball joint units in the same position as when they were removed.

Refit the steering unit on the engine mounting and torque tighten the bolts.

Assemble :
- the mounting under the body, ensuring tightening torques are observed,
- the ball joint units on the stub axle carriers

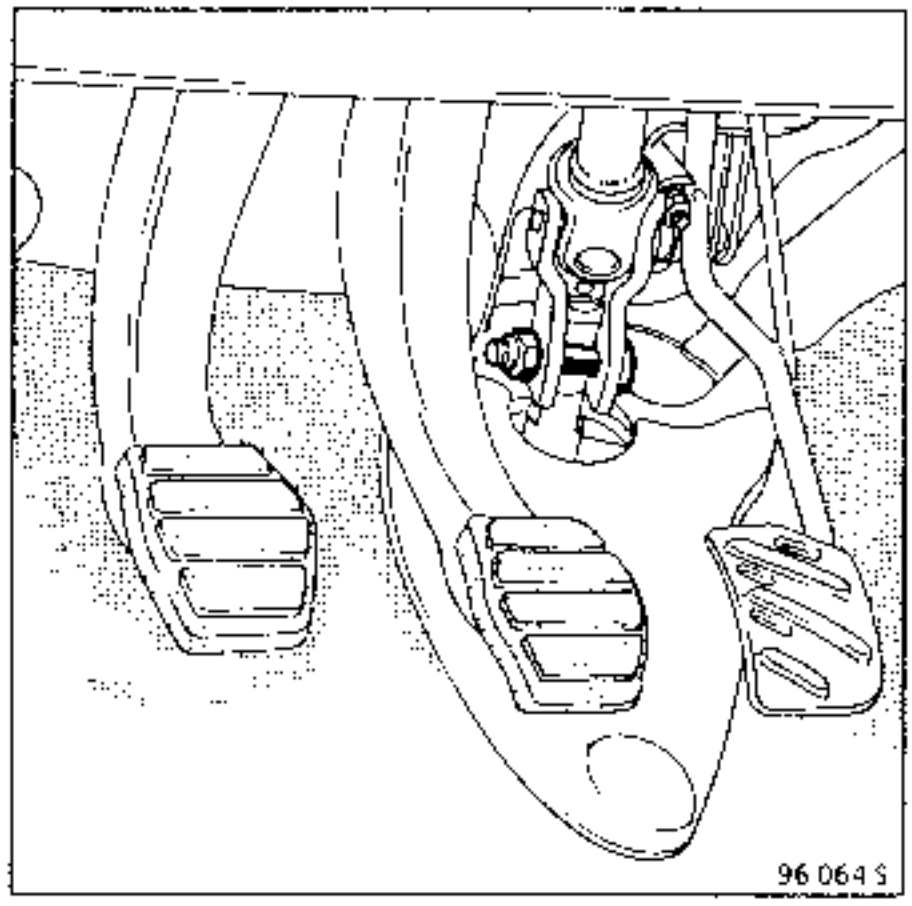
To ensure refitting is correct, fit two **Ø 12 mm** pins (drill for example) in guide holes (B) of the engine mounting before finally tightening the mounting bolts (see previous page)


96 103 S

Place the steering rack at the centre point (wheels straight).

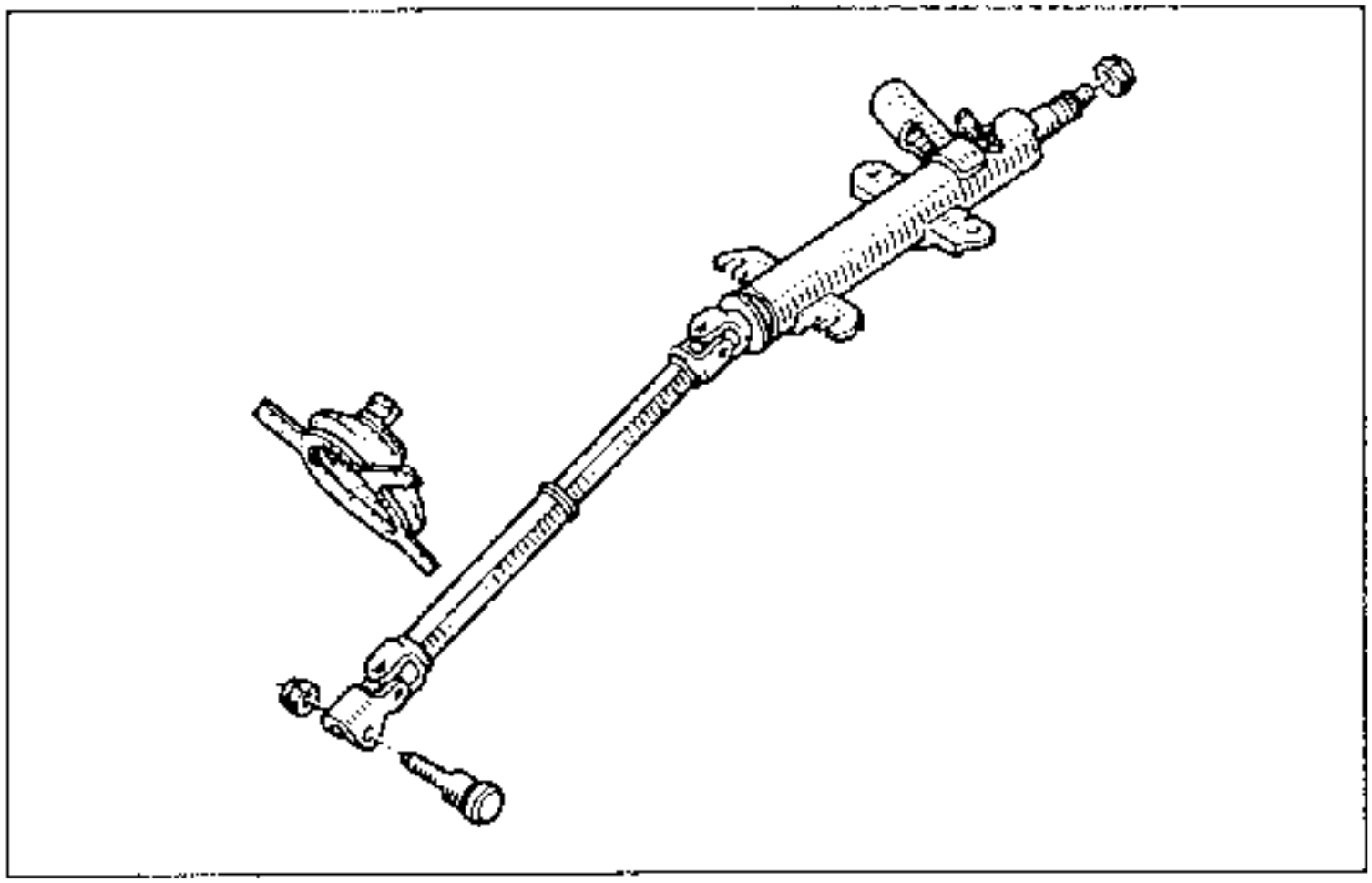
Fit the steering column universal joint on the steering pinion stem.

Fit the cam bolt and the nut and torque tighten.


96 064 S

Check the front axle assembly angles and adjust the parallelism if necessary

The steering column is sold as a complete unit. No individual parts are available.



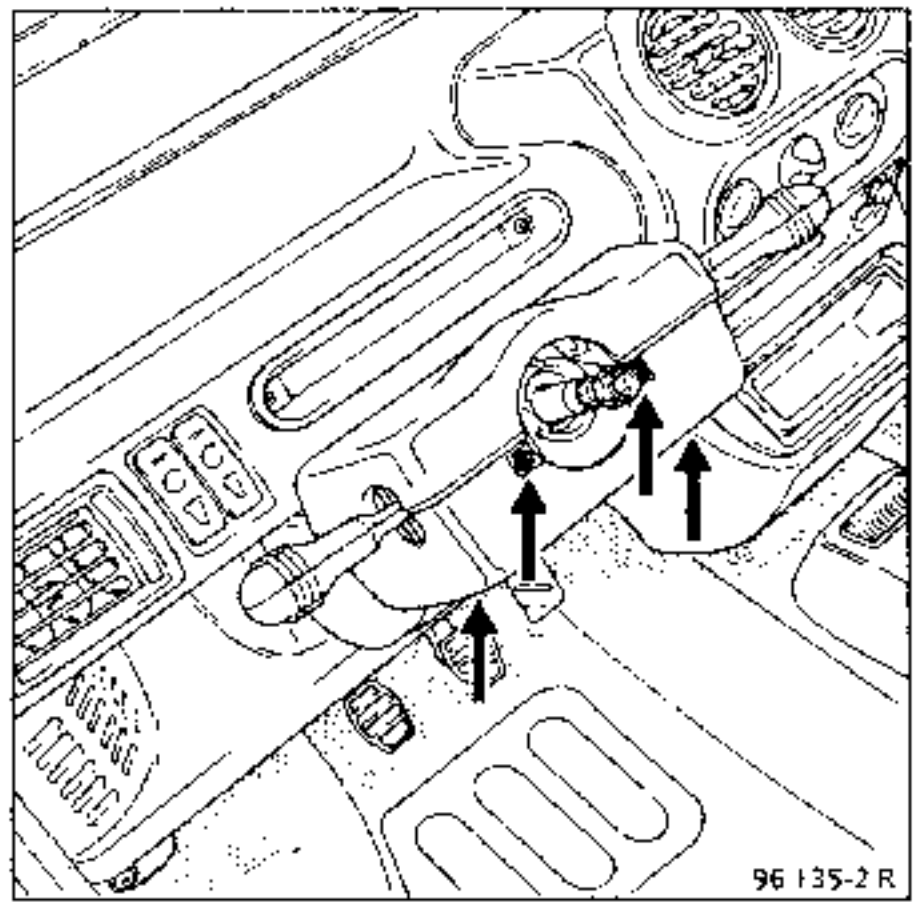
TIGHTENING TORQUES (in daN.m)	
Steering wheel nuts	4
Universal joint cam bolt	2,5
Steering column mounting bolts	2,5

REMOVAL

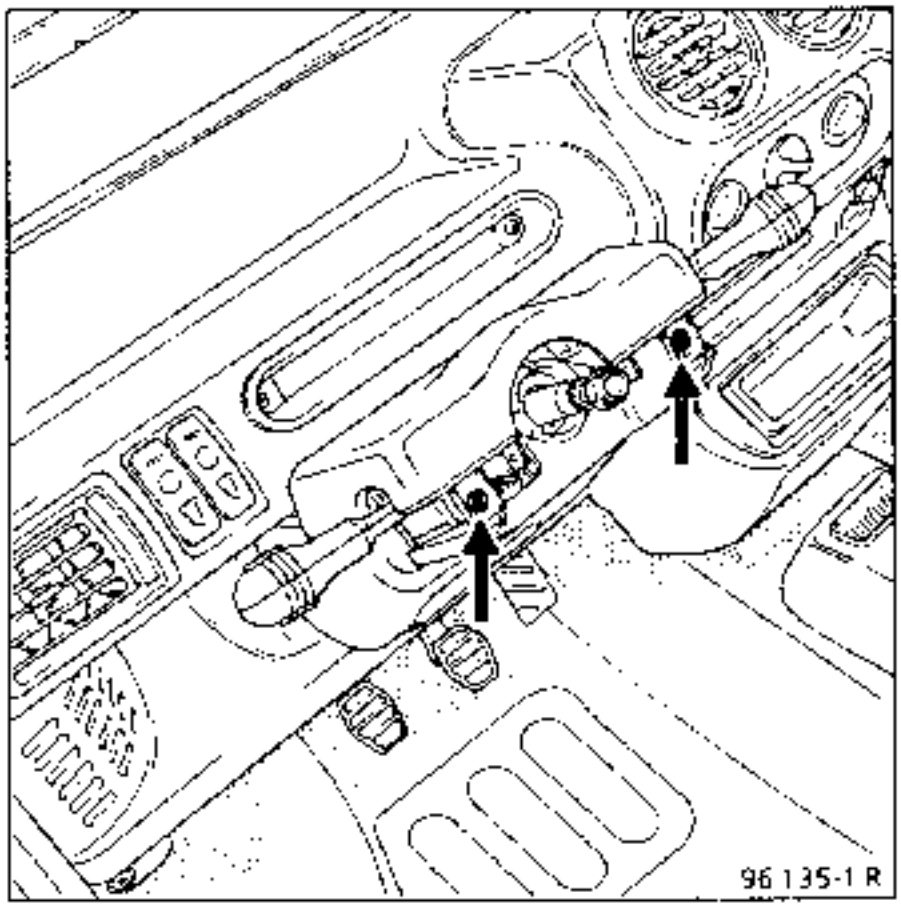
Remove the steering wheel having marked its position

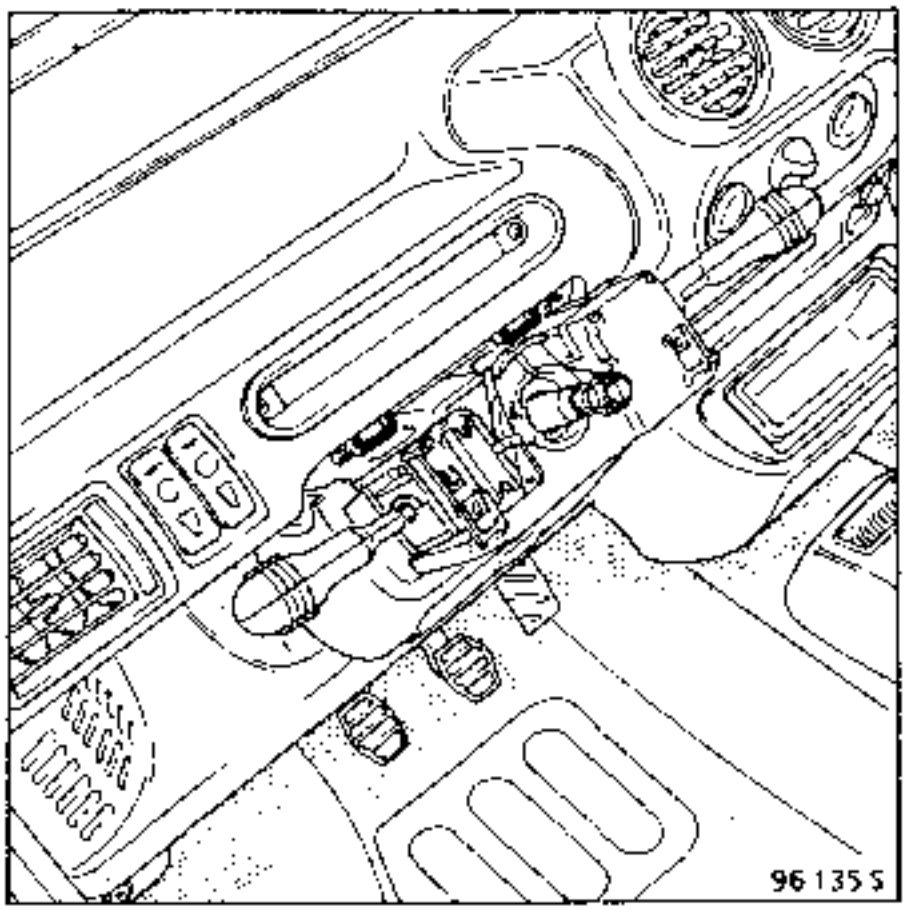
Disconnect the battery

Remove:
- the cowling under the steering wheel,

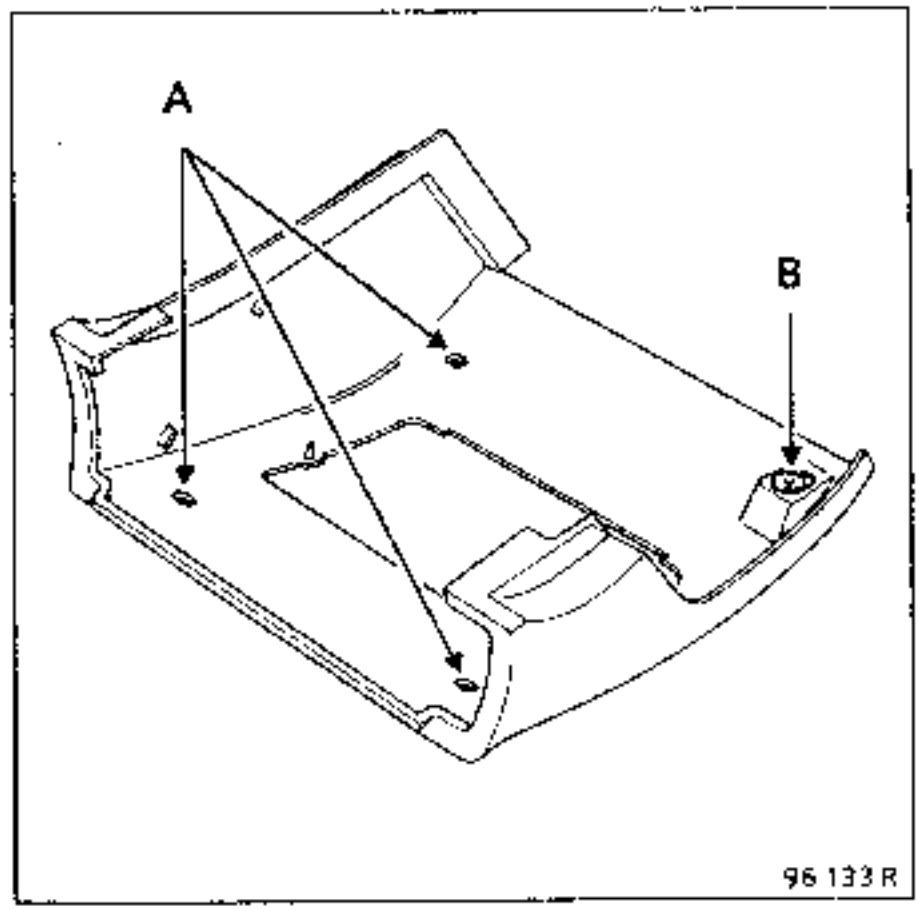


– the upper cowling,



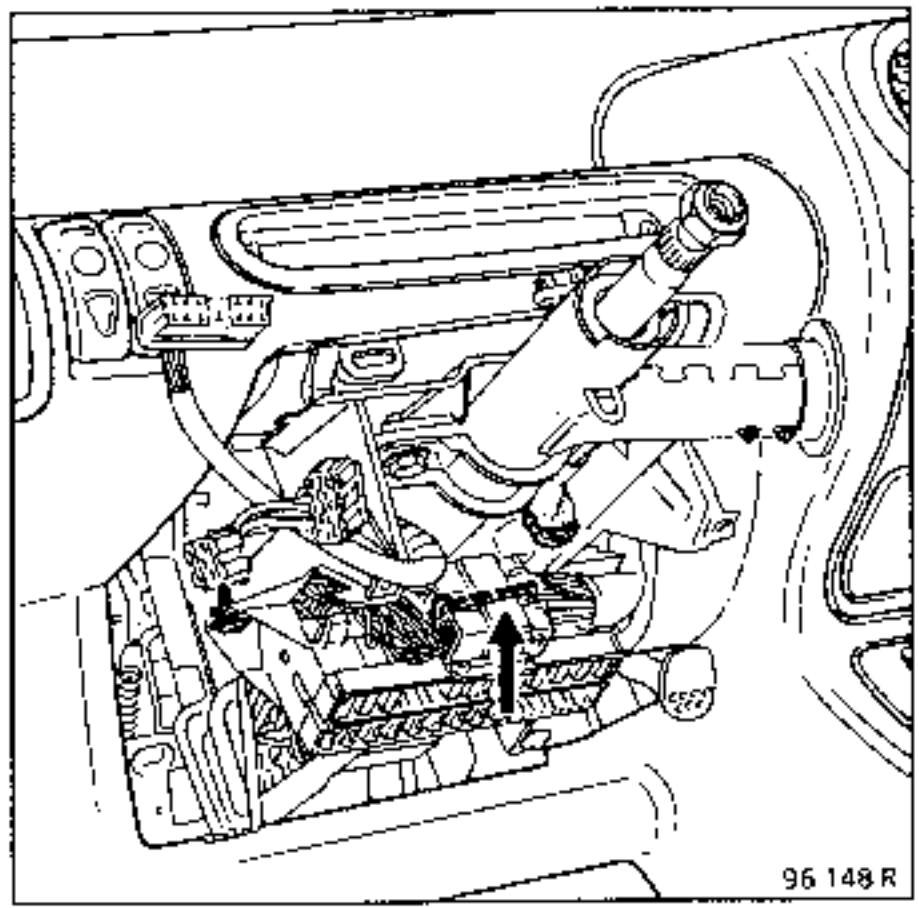


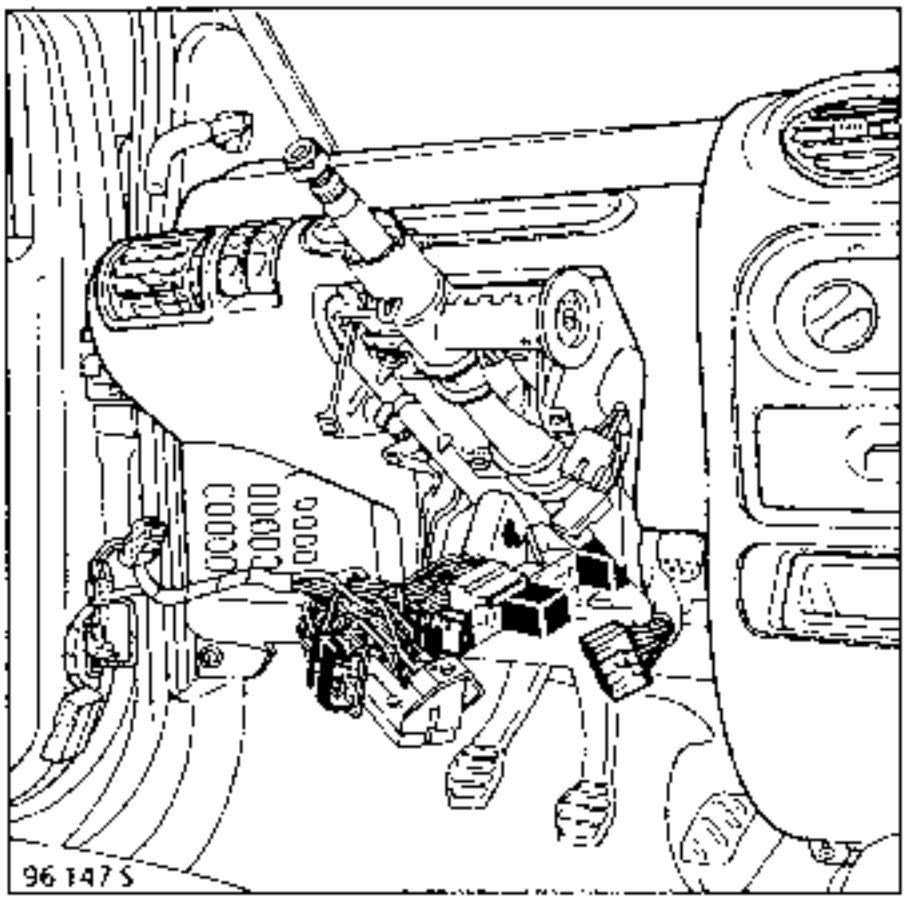
– the steering column cover (three Torx bolts (A) and one clip (B),



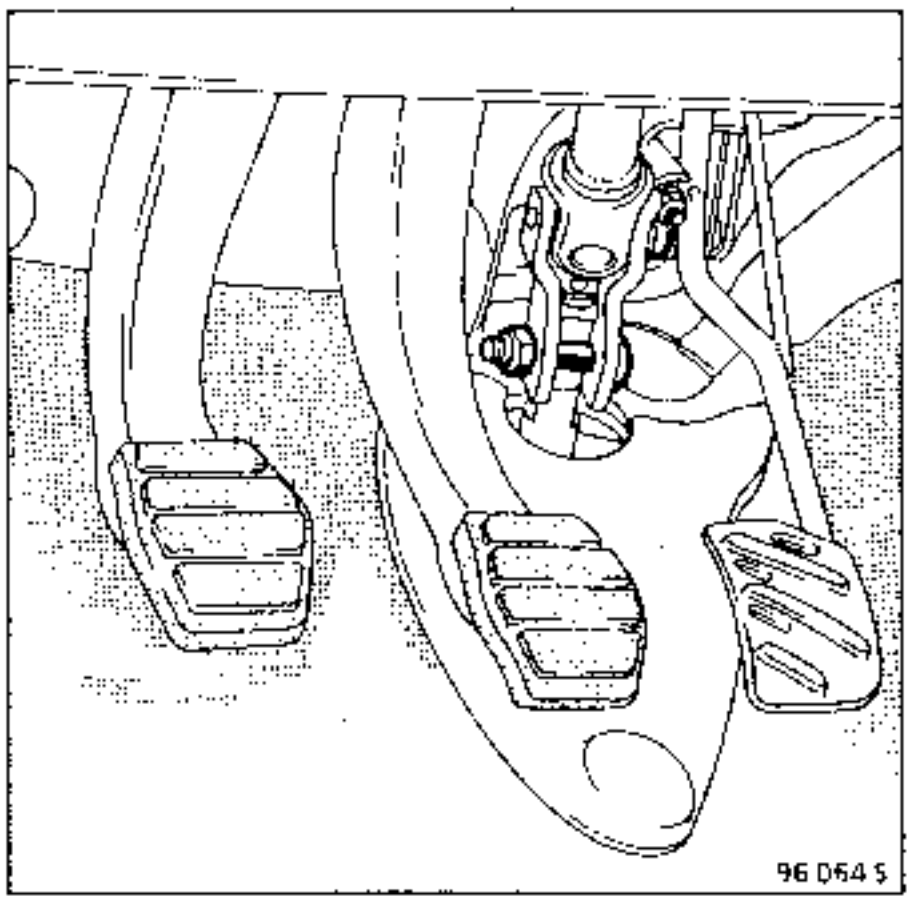
– the lighting control (one bolt)

Disconnect the main wiring harness and remove the fuse plate





Remove:
– the universal joint cam bolt and nut,



– the four column mounting bolts and remove the assembly.

REFITTING

Check the length of the retractable shaft (see corresponding section).

When the steering column is locked by the ignition switch, the steering wheel should be at the centre point

Consequently :

- Place the steering rack in the central position (wheels straight)
- Fit the steering column (locked) and fit the universal joint on the stem of the steering pinion.

Secure the column and replace :

– the control switches on the steering wheel and reconnect them,

the upper and lower cowlings round the steering wheel,

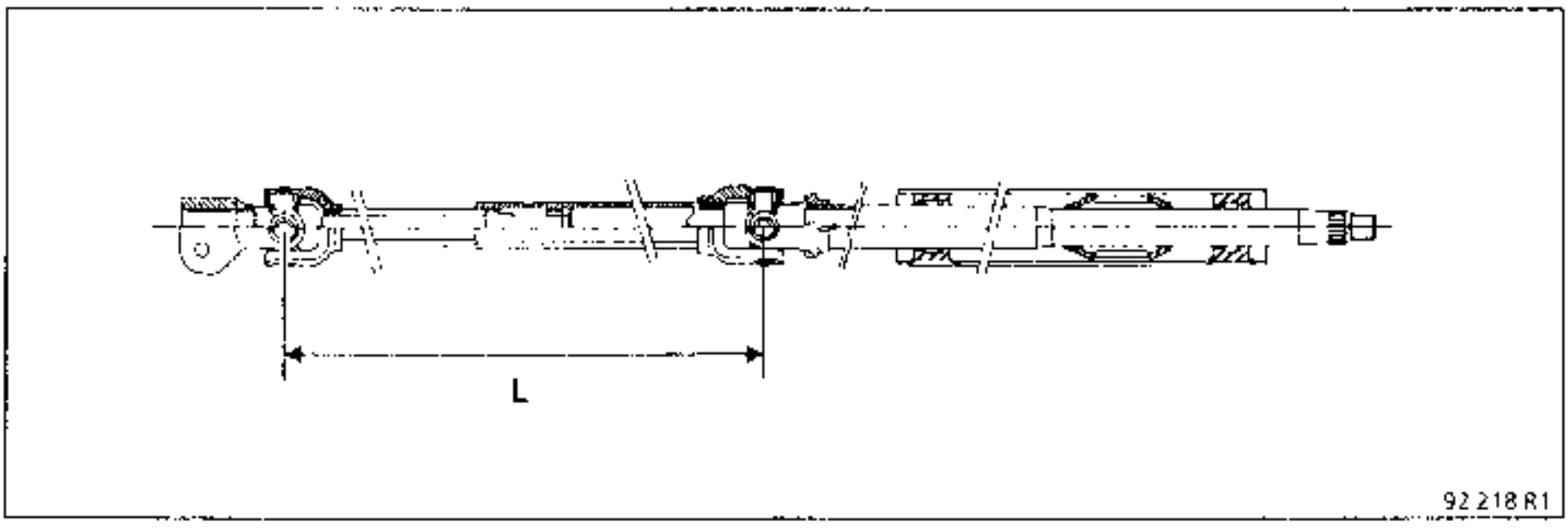
the lower cover under the steering wheel,

– the steering wheel in the position marked when it was removed,
– the cam bolt,
– the nut and torque tighten it

REMOVAL - REFITTING

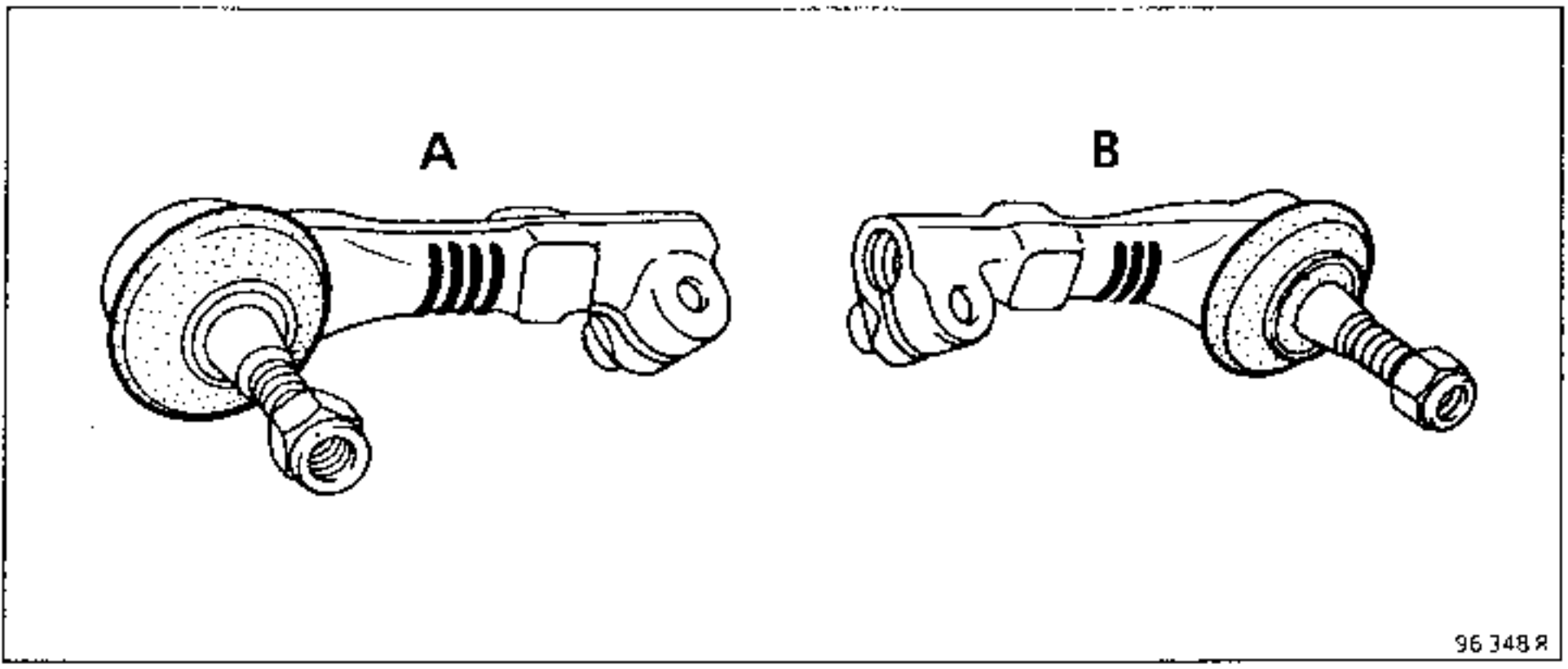
These vehicles are fitted with a retractable shaft - steering wheel shaft - non-removable steering column. If the cam bolt of the universal joint cannot be fitted, check that the shaft length is correct, otherwise replace the assembly (see section on steering column).

CHECKING



L = 289,8 ± 1 mm

Identification of track rod ends

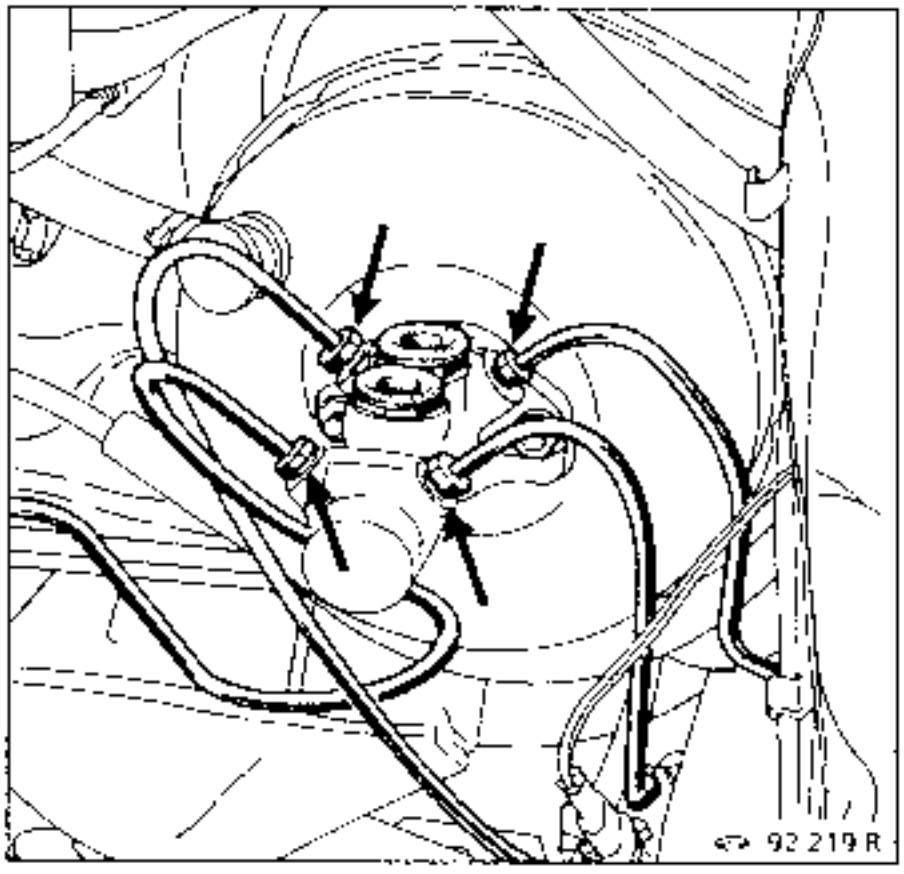


A Left hand unit (4 cast marks)
B Right hand unit (3 cast marks)

TIGHTENING TORQUES (in daN.m)	
M 10 x 100	1,3
M 12 x 100	1,3
Mounting bolt on brake servo	1,3

REMOVAL

Drain and remove the brake fluid reservoir by pulling from above.



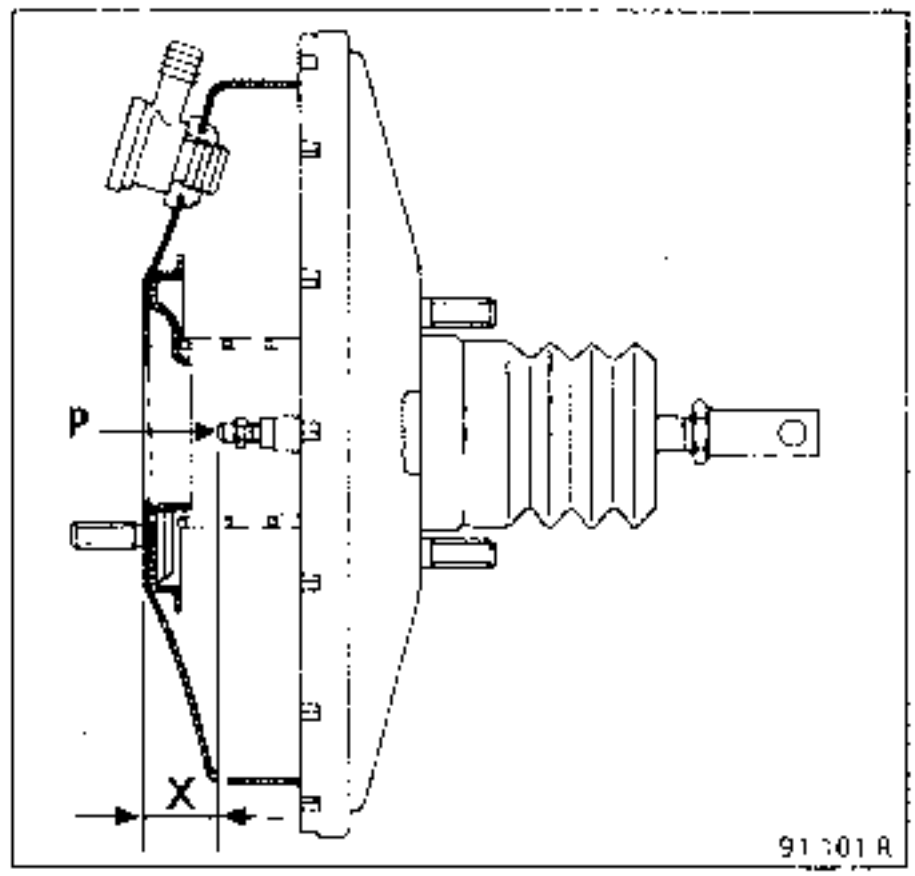
Remove:
- the pipes and mark their position,
- the two mounting nuts on the brake servo.

REFITTING

Check the length of the push rod

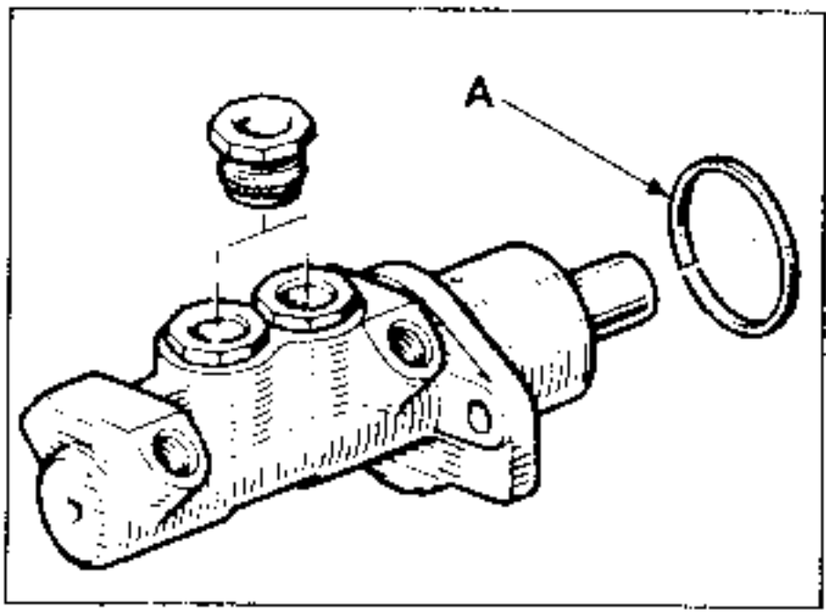
X = **22,3 mm**

Adjust using pin (P) depending on model

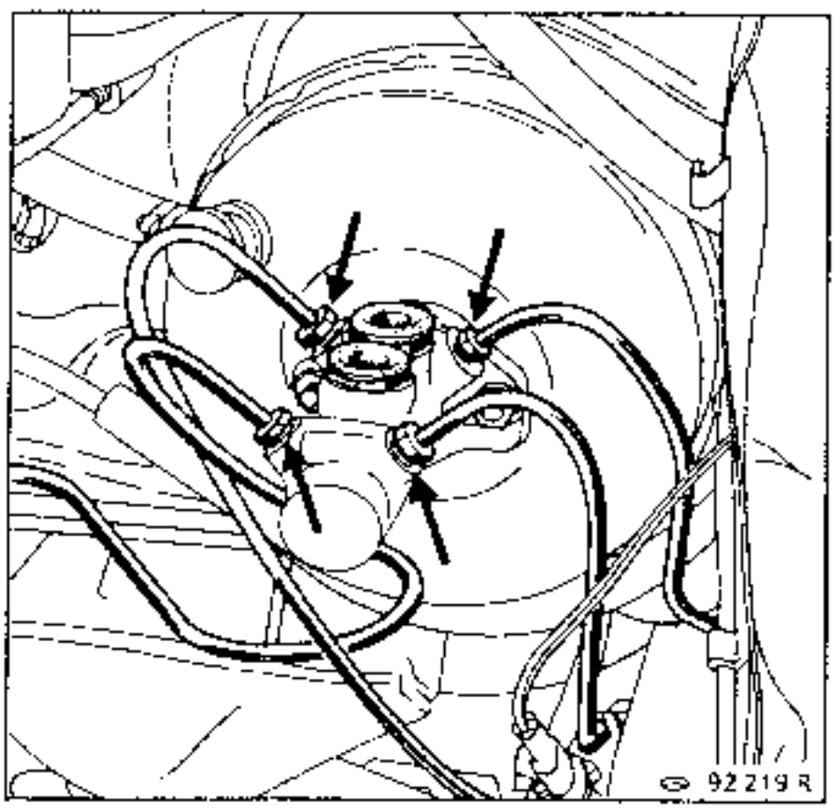


NOTE : these vehicles are fitted with master cylinders which are integral with the brake servo. The sealing of the brake servo is directly linked to that of the master cylinder. When any operation is carried out a new seal (A) must be fitted.

Fit the master cylinder on the brake servo, aligning it so that the push rod (P) is correctly inserted into the master cylinder.



Reconnect:
- the pipes, using the positions marked when they were removed,



- the brake fluid reservoir, pressing down so that it clicks into position on the master cylinder.

Bleed the brake circuit.

TIGHTENING TORQUES (in daN.m)	
Master cylinder on brake servo	1,3
Brake servo on bulkhead	2,3

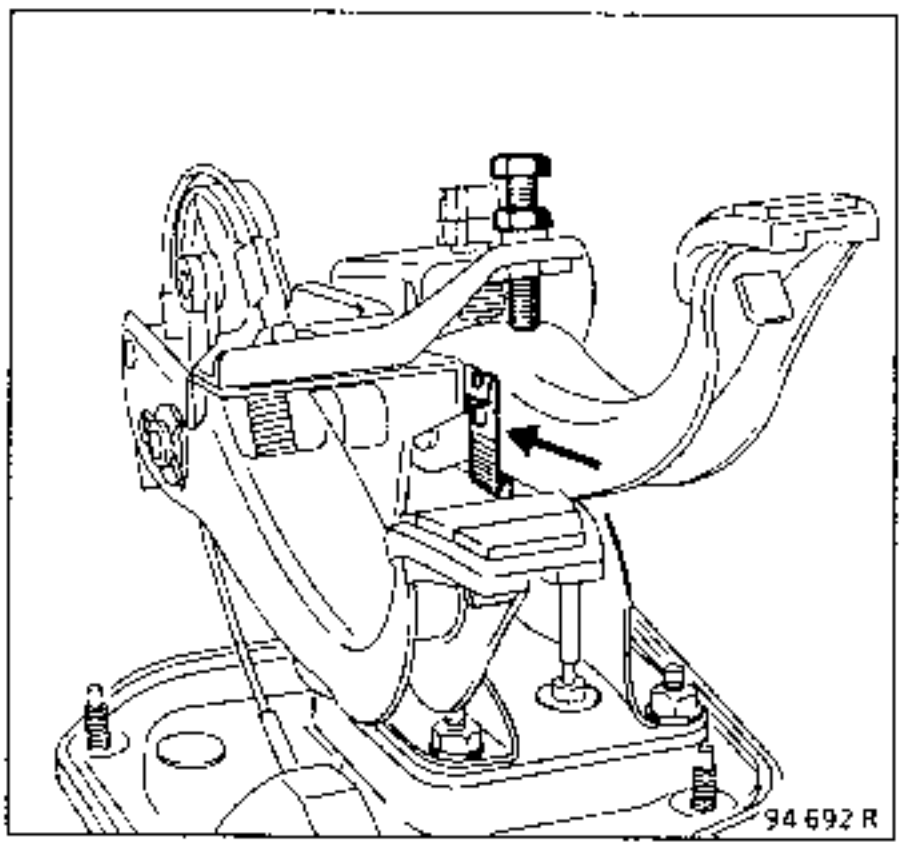
The brake servo cannot be repaired. Intervention is permitted only on:
- the air filter,
- the non-return valve.

REMOVAL

Remove:
- the air filter unit,
- the battery,
- the master cylinder.

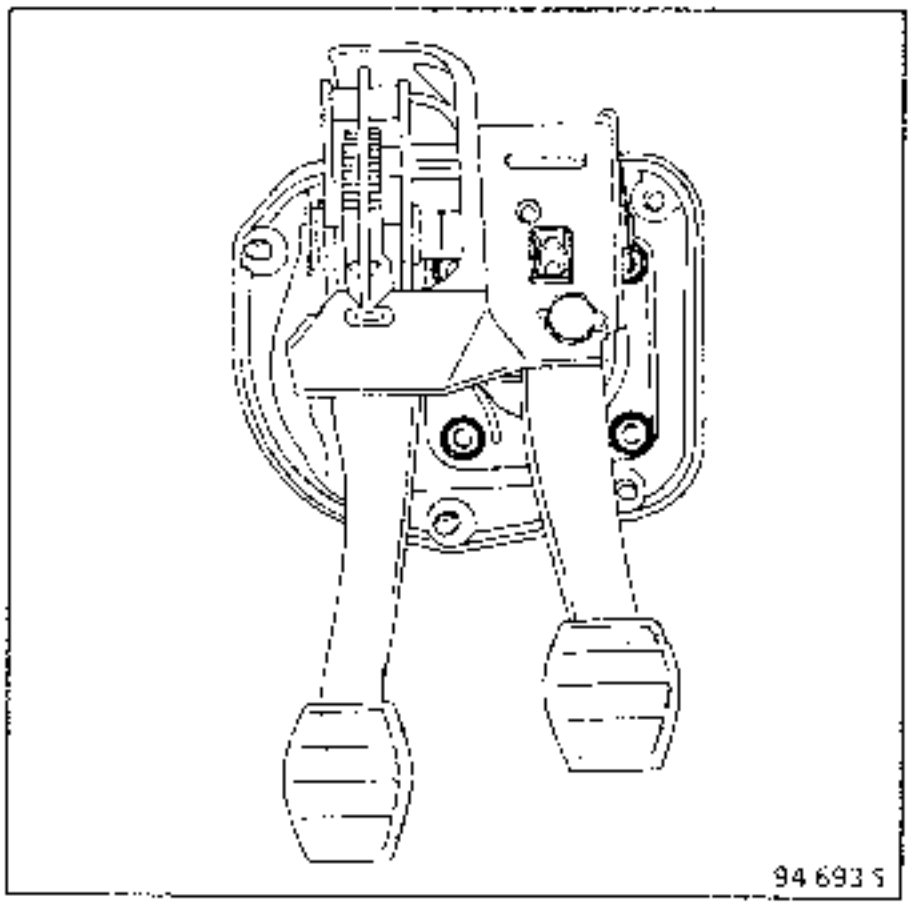
Disconnect the vacuum hose from the brake servo

From inside the vehicle, remove the clevice shaft connecting the brake pedal with the push rod having removed the clip.



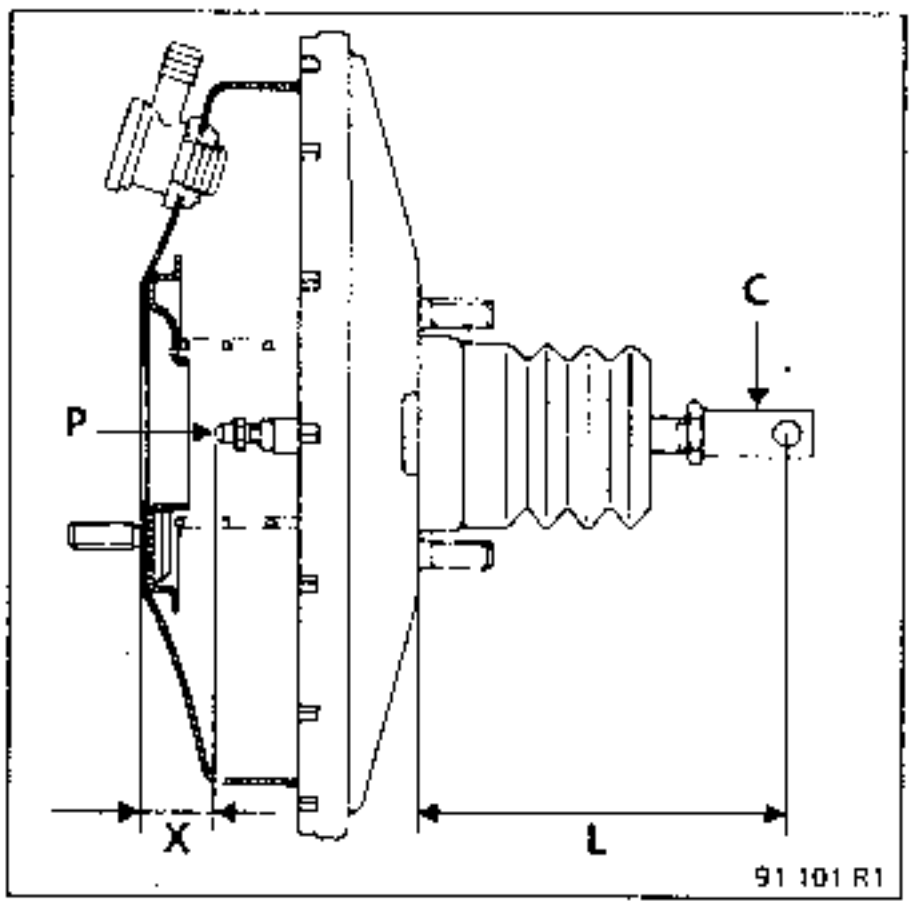
Retain the spacer.

Unscrew the brake servo mounting bolts and remove the brake servo.



REFITTING

Before refitting check :
- **L = 132,5 mm** adjustable depending on model using rod (C),
- **X = 22,3 mm** adjustable depending on model using rod (P)



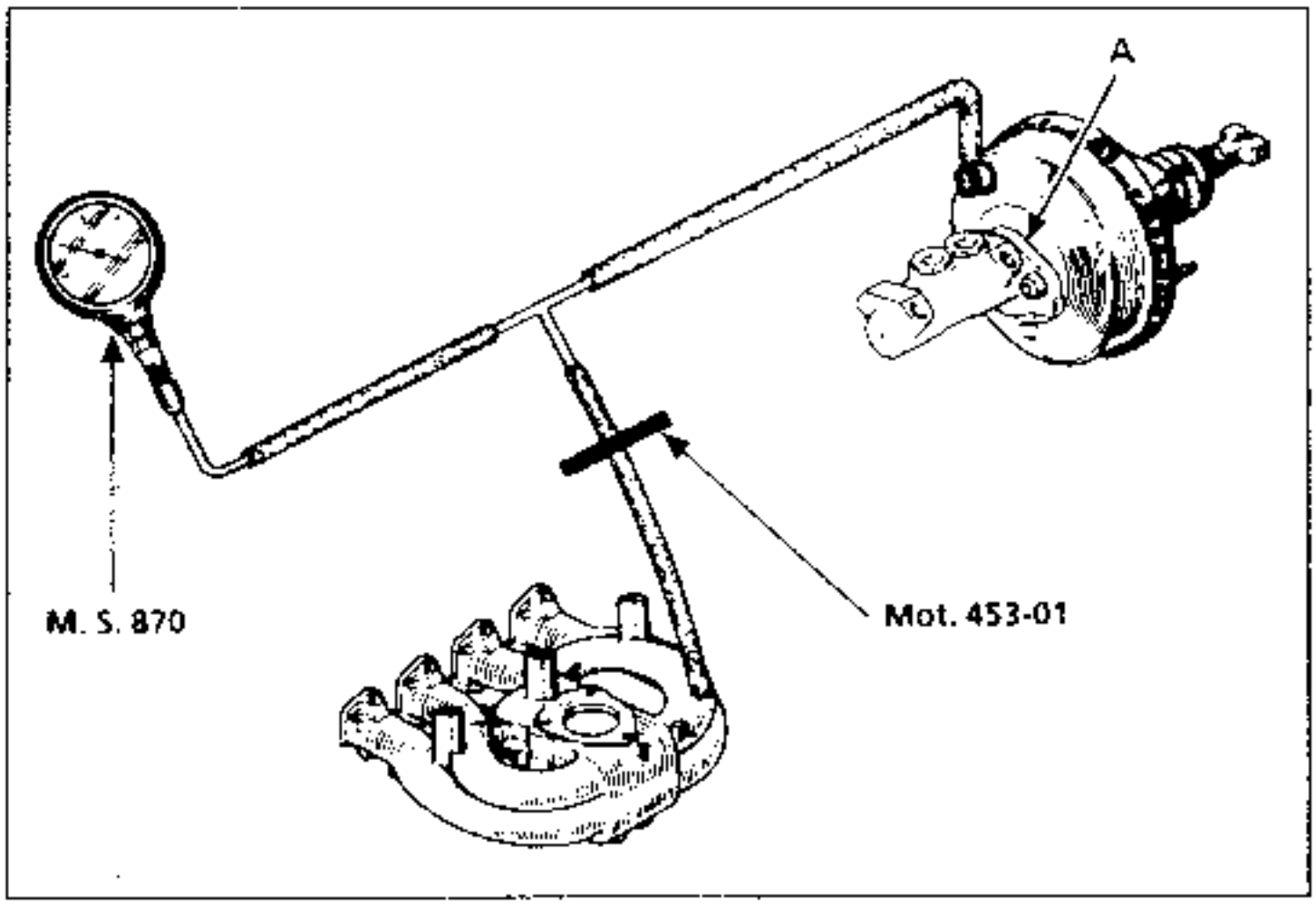
Refit the master cylinder **(see notes in relevant section)**.

Bleed the brake circuit.

SPECIAL TOOLING REQUIRED		
Mot	453 -01	Hose clamp
M.S.	870	Vacuum meter

CHECKING THE SEALING

When checking the sealing of the brake servo, ensure perfect sealing between this unit and the master cylinder. If there is a leak, replace seal (A).



The sealing of the brake servo should be checked on the vehicle, when the hydraulic circuit is in operating condition:

Connect the vacuum meter **M.S. 870** between the brake servo and the vacuum source (inlet manifold) using a "T" union and the shortest pipe possible.

Run the engine at idle speed for a minute.

Clamp the pipe (clamp **Mot. 453-01**) between the "T" union and the vacuum source.

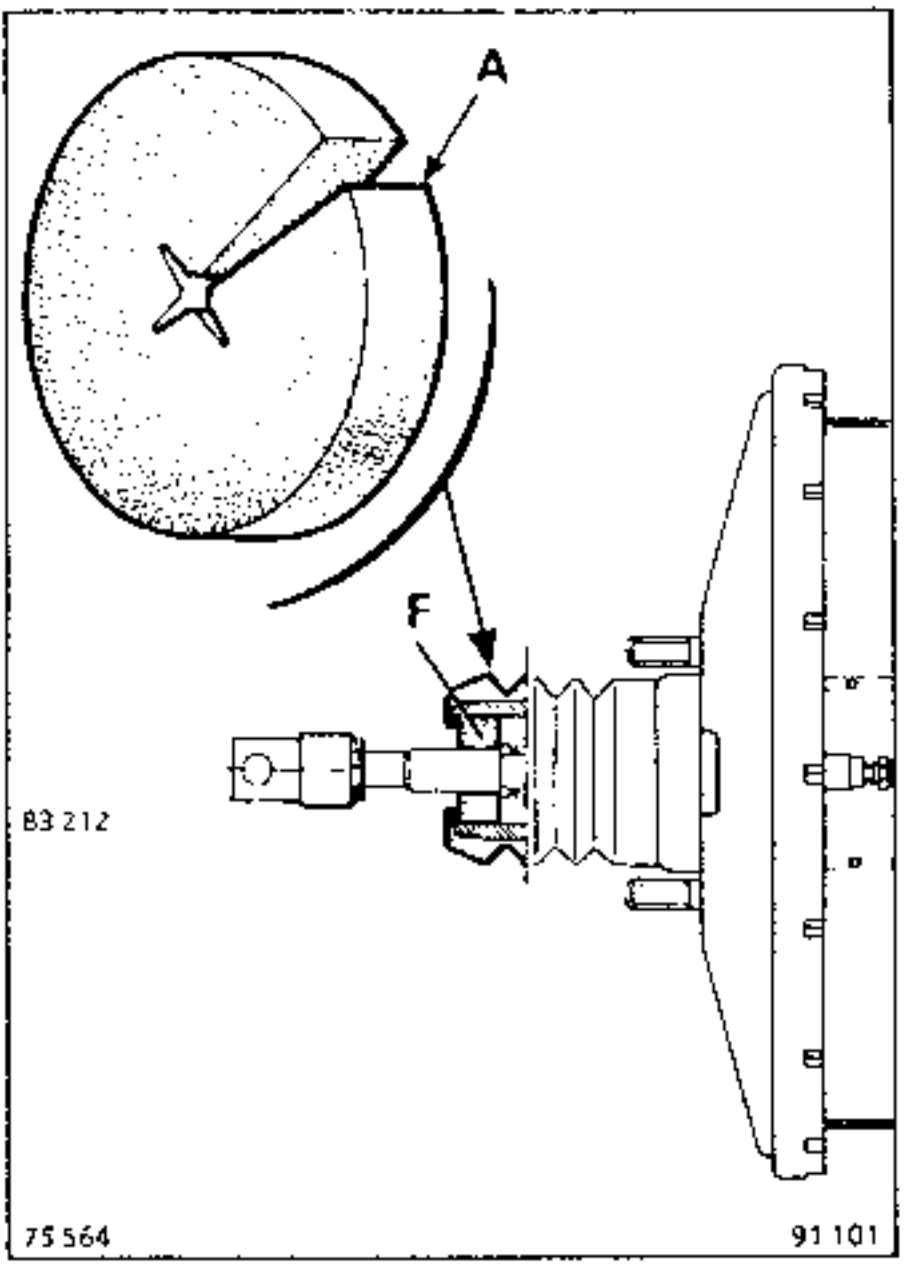
Stop the engine.

If the vacuum drops by more than 33 mbar (25 mm/Hg) in 15 seconds, there is a leak either

- at the non-return valve (replace it),
- or the push rod diaphragm (in this case, replace the brake servo).

If the brake servo is not operating, the braking system still operates but the force required at the brake pedal is much greater to obtain the same deceleration as with assisted braking.

REPLACING THE AIR FILTER



When replacing the air filter (F), the brake servo does not need to be removed

Use a screwdriver or a metal hook under the pedal support to remove the old filter, (F). Cut the new filter at A (see diagram) and fit it round the rod then fit it into position ensuring the complete bore is covered to prevent any non-filtered air from entering.

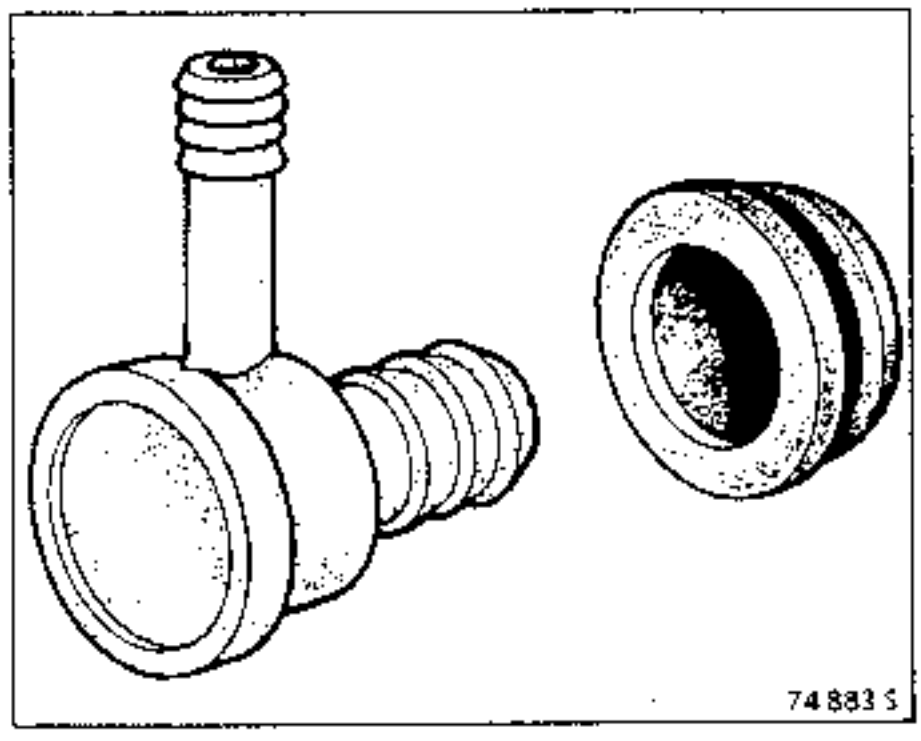
REPLACING THE NON-RETURN VALVE

This operation may be carried out on the vehicle.

REMOVAL

Disconnect the vacuum inlet pipe from the brake servo.

Pull the non-return valve while twisting it to release it from the rubber sealing washer



REFITTING

Check the condition of the rubber sealing washer and the non-return valve.

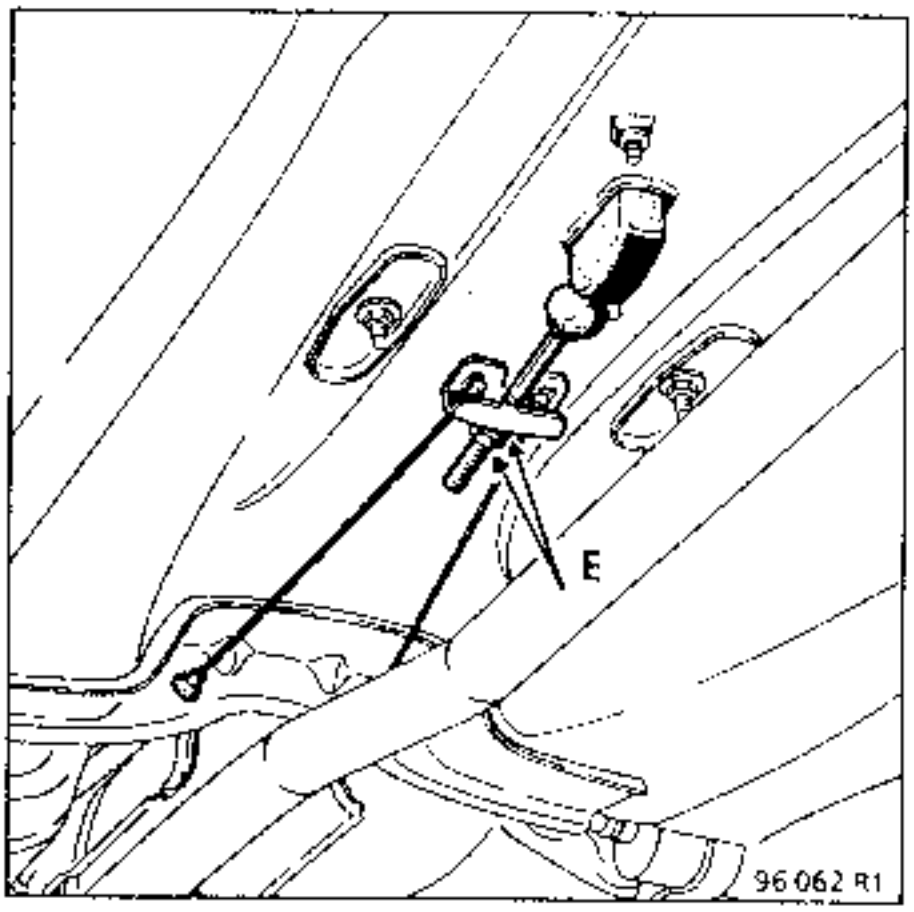
Replace any faulty parts

Refit the assembly.

REPLACEMENT

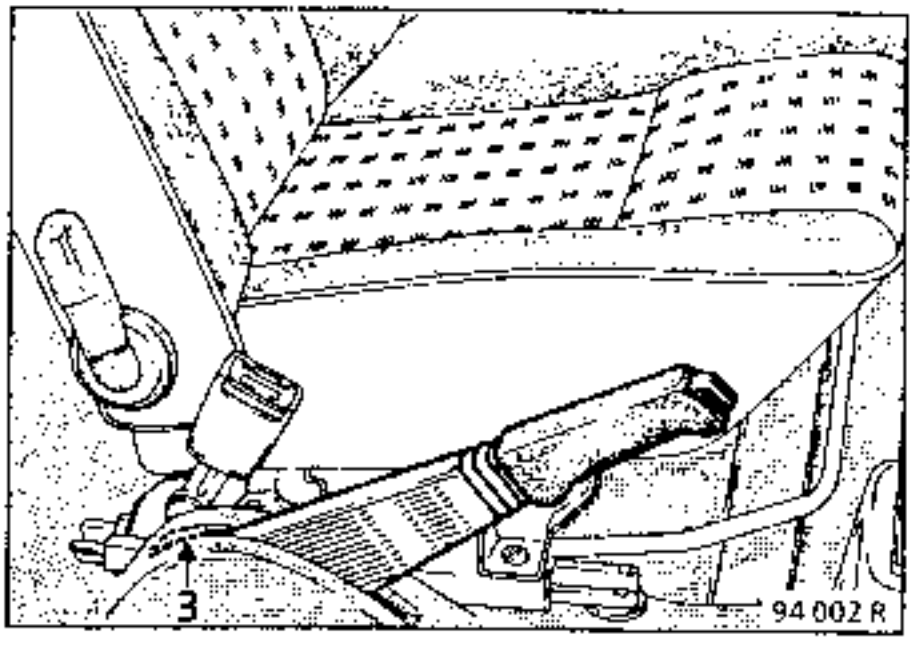
Release the handbrake.

Loosen then remove the nuts (E).



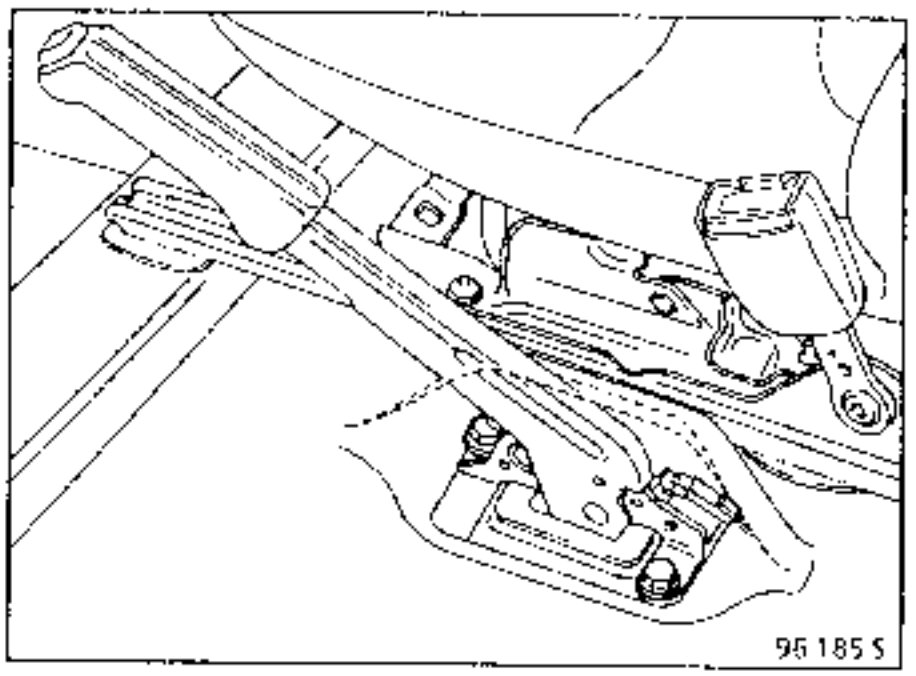
Remove the control linkage from the compensating device.

In the passenger compartment, make a slight cut in the carpet (3).



Disconnect the handbrake switch wire.

Unscrew the two mounting bolts from the handbrake mounting.



Remove the handbrake.

When refitting, adjust the handbrake travel.

ADJUSTMENT

Incorrect handbrake adjustment. Cable too taut :

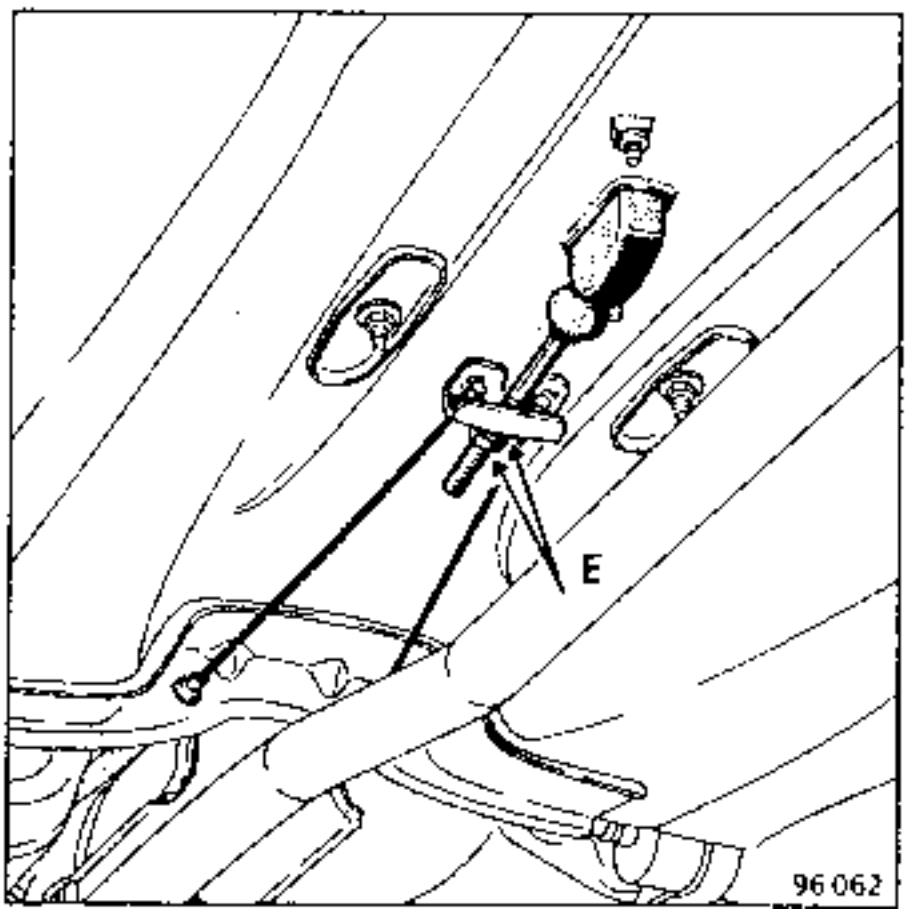
- prevents the automatic wear compensation system from operating correctly,
- causes long pedal travel.

Do not re-tighten the cables to cure this fault. The problem will re-appear.

The handbrake is not a play compensation mechanism, it should only be adjusted when refitting :
- brake linings,
- cables,
- handbrake lever

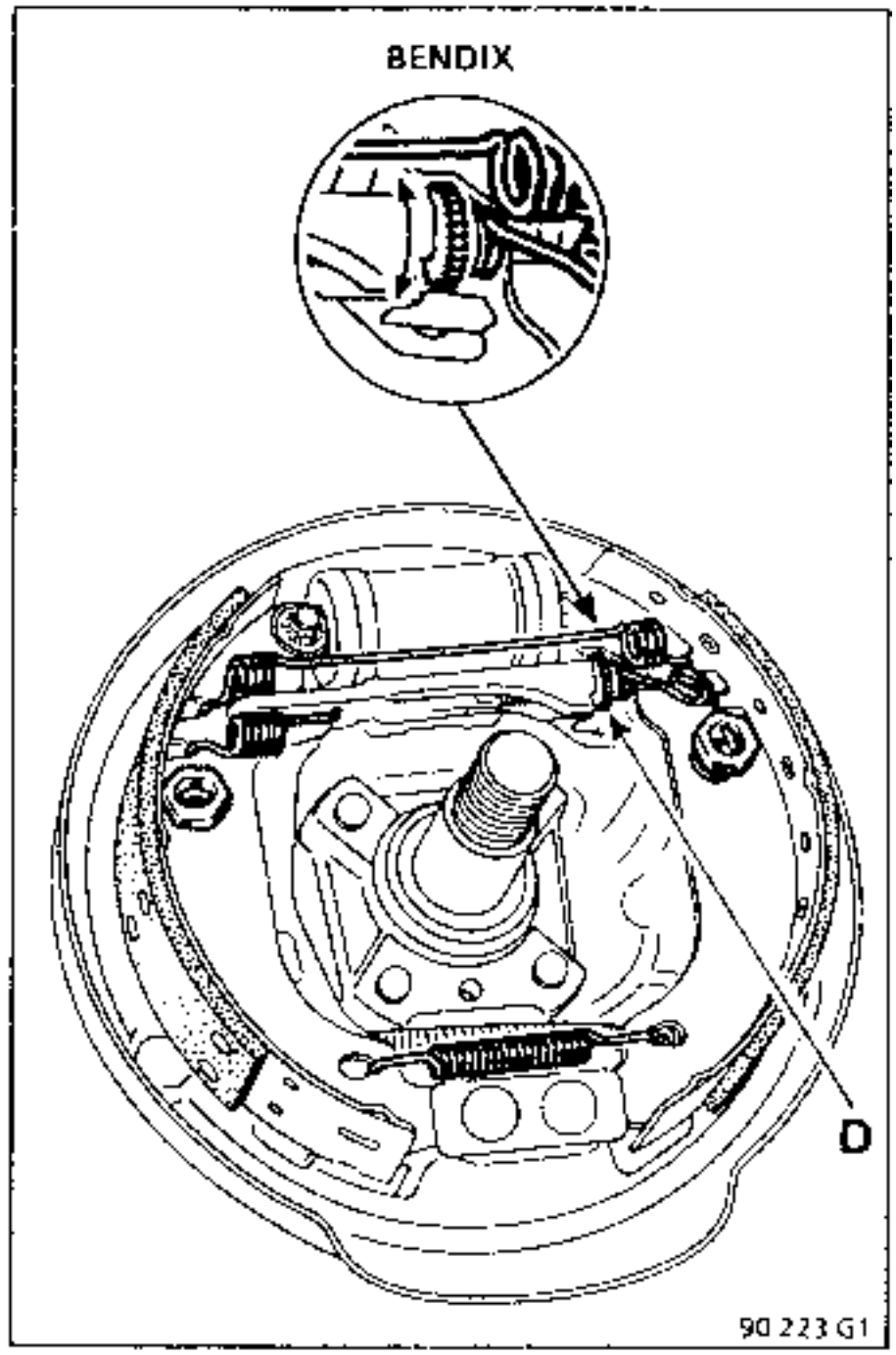
Any other adjustment is not permitted.

Vehicle on a lift, supported under the body, unscrew nuts (E) to free the central adjustor.

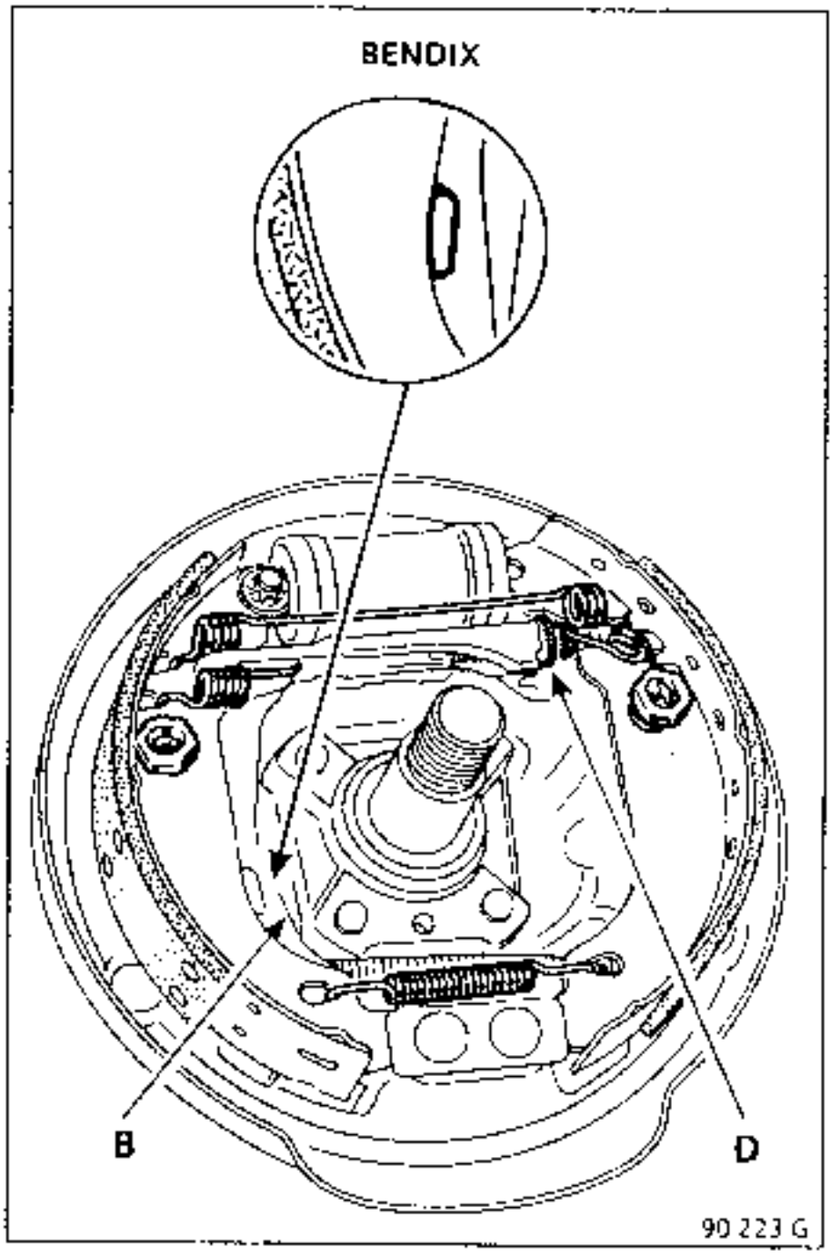


Remove:
- the two rear wheels,
- the two drums.

Check the operation of the automatic wear compensation system by moving the notched segment (D) (ensure it turns in both directions), then release it by 5 to 6 notches.



Ensure :
- the cables slide correctly,
- **the handbrake levers (B) are correctly in contact with the segments.**



Tighten the cables gradually at the central adjustor so that **levers (B) activate between the 1st and 2nd notch** of the handbrake control lever travel and remain activated from the **2nd notch**

Tighten nuts (E).

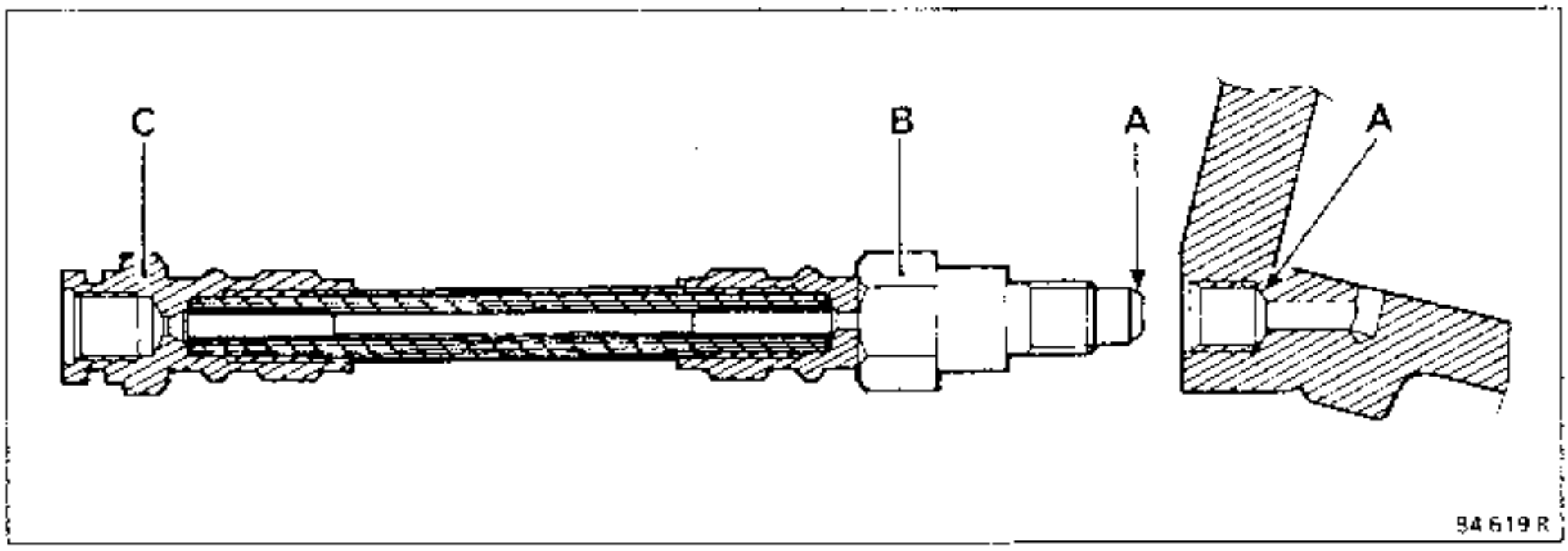
Refit the drums.

Vehicle on its wheels :

Adjust the linings by pressing the brake pedal firmly several times and checking to hear the automatic compensation device clicks.

These vehicles are fitted with brake pipes which do not have a copper seal
The seal is made by the "**bottom of the cone**" of shoulder (A) of the pipe.

TIGHTENING TORQUES (in daN.m)
B = 1,5
C = 1,3

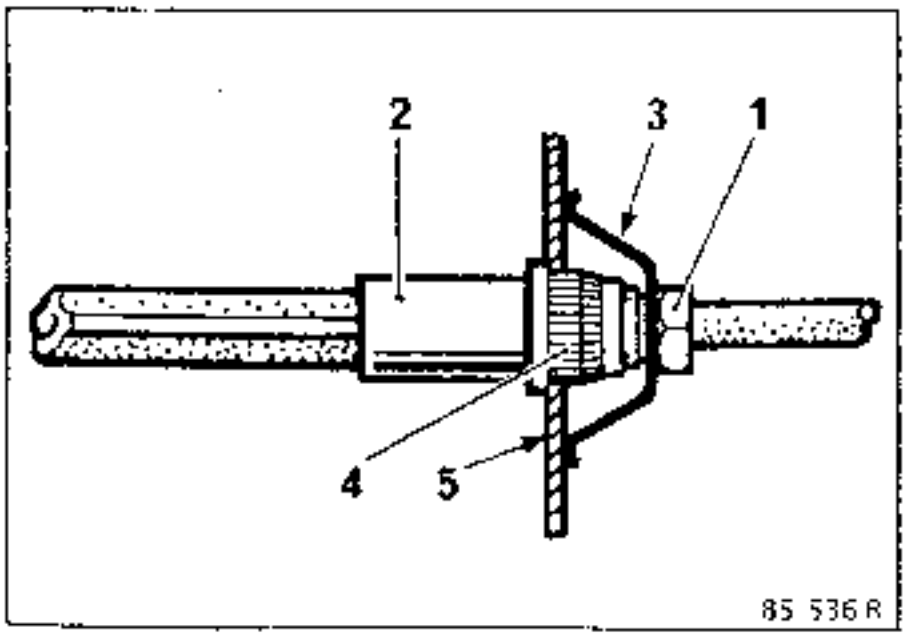


PRECAUTIONS TO BE TAKEN WHEN REMOVING - REFITTING A SLAVE CYLINDER OR BRAKE PIPE

For reasons of safety, in order to avoid twisting the brake pipe which might cause it to rub against a suspension component, this order of operations must be followed :

REMOVAL

Unscrew rigid pipe union (1) from hose (2) until the spring (3) is no longer under compression so that the hose can be removed from the splines (4).



Unscrew the hose from the caliper, and if necessary remove the caliper.

REFITTING

Fit the caliper on the brake and screw the hose into position, then torque tighten to **1,5 daN.m**.

The hoses must be fitted with the axle assembly in position :

- Wheels free to turn (suspension in place).
- Axle assembly straight (wheels straight).

Position the female end of the hose on the retaining bracket (5), without twisting the hose and check that the end fitting (4) engages freely with the splines, then fit :

- the spring (3),
- the rigid pipe onto the hose, checking that the pipe does not turn when it is screwed on.

Torque tighten the union.

Bleed the brake circuit.

CHECKING PRINCIPLE

These vehicles are fitted with braking compensators which are integral with the wheel cylinder.

The pressure is read in X by comparing the pressure for the rear wheels with the pressure for the front wheels.

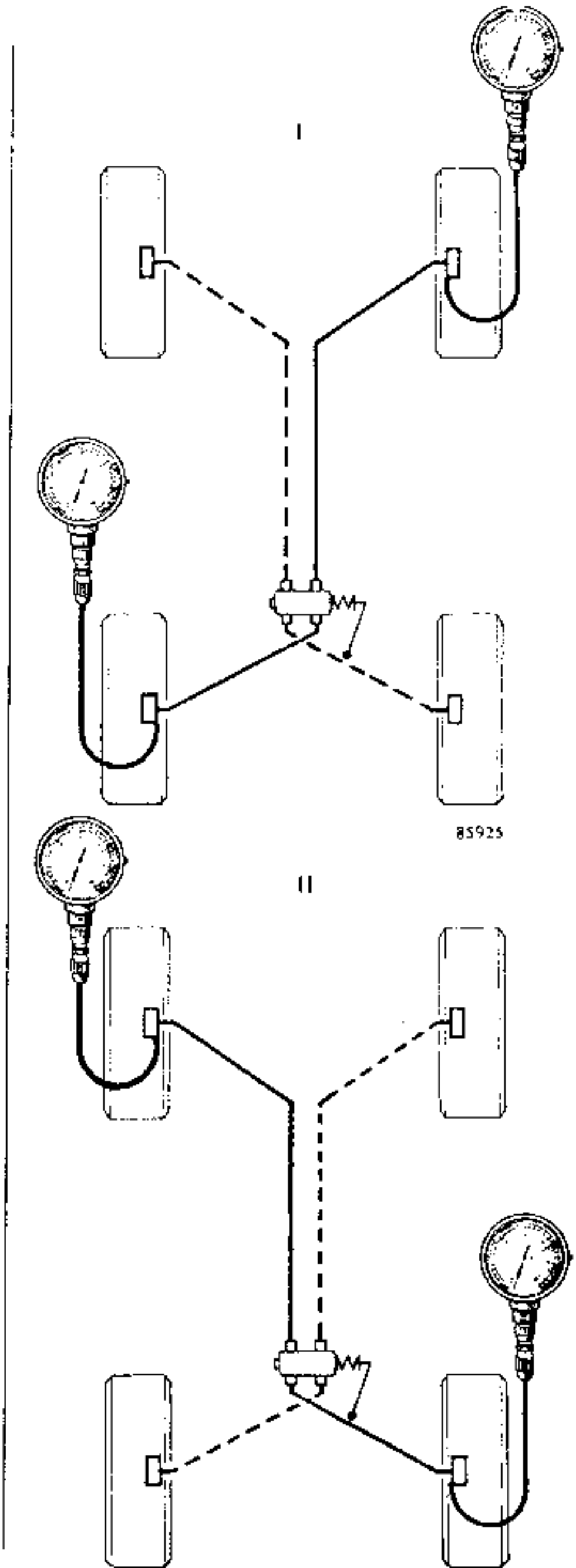
Both circuits must be checked.

I : front right / rear left

II : front left / rear right

Fixed compensator integral with wheel cylinder

Only one test is required for this type of compensator; **if the pressure in incorrect, replace the compensator and wheel cylinder assembly.**

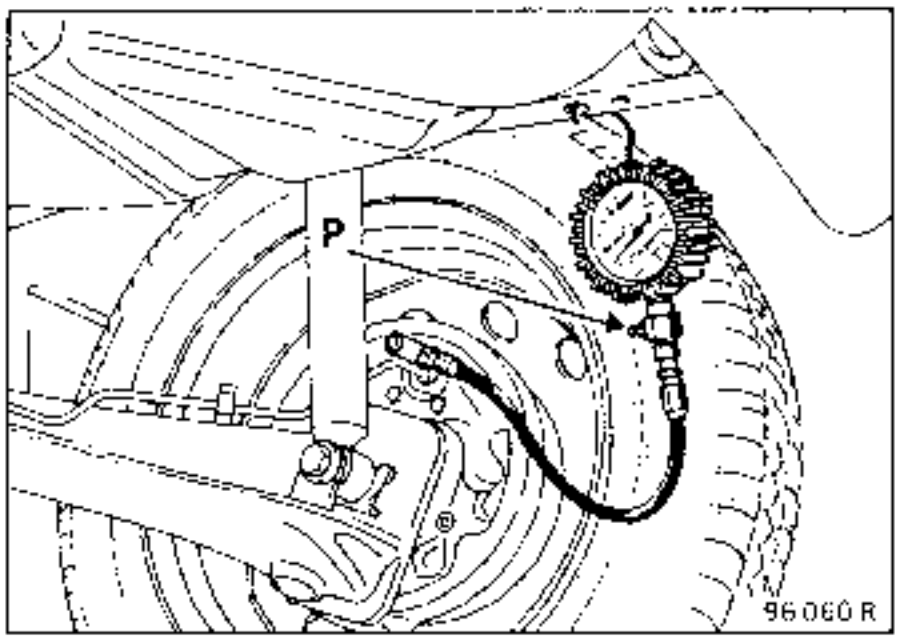


SPECIAL TOOLING REQUIRED	
Fre. 244 -04 or Fre. 1085	Test gauge for brake pressure limiter

CHECKING

Connect gauge Fre. 244-04 or Fre. 1085 :
- one at the front right hand side,
- one at the rear left hand side.

Bleed the gauges : screw (P).



Press the brake pedal several times until the checking pressure is reached for the front wheels (see table). Read off the corresponding pressure for the rear wheels.

Carry out the same test for the other circuit:
- one at the front left hand side,
- one at the rear right hand side.

If there is a significant difference (values exceed tolerances), replace the wheel cylinder since no other operations may be performed.

ADJUSTMENT VALUES

Only one test may be carried out on these vehicles. If the values are incorrect, replace the wheel cylinder.

Vehicle type	Test pressure (Bar)	
	Front	Rear
C063	60	$22,5\ ^{+0}_{-4}$

REMOVAL

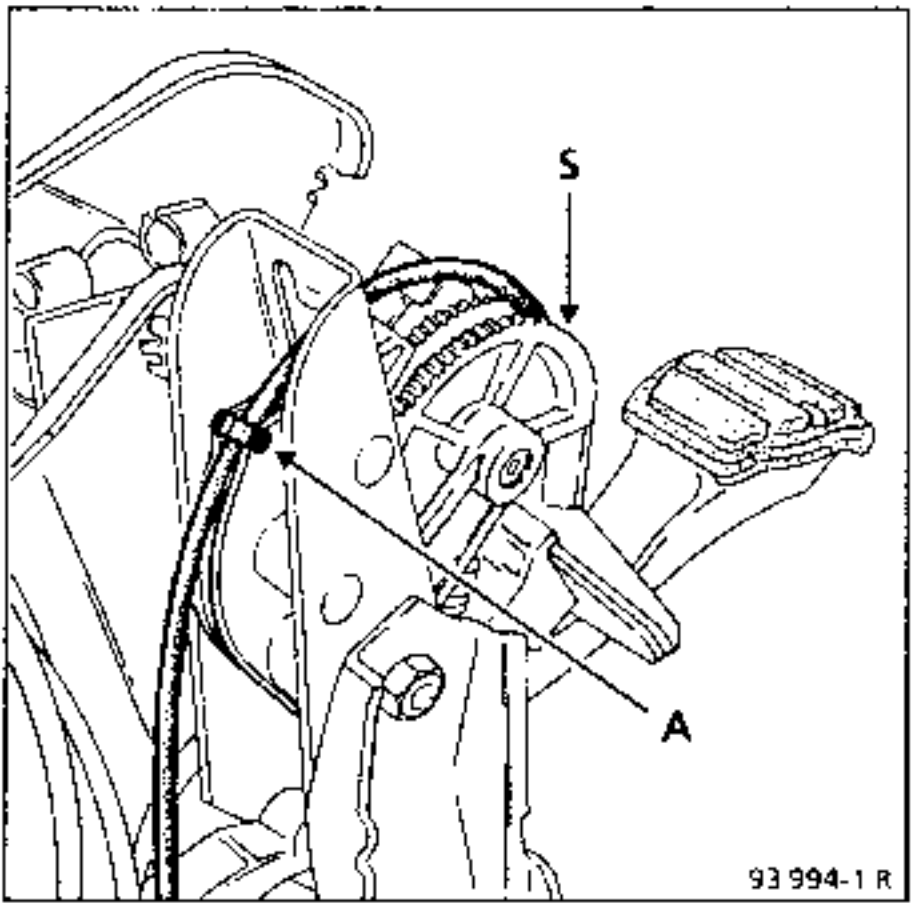
In the engine compartment :

Unhook the cable from the fork

In the passenger compartment :

Press the pedal to pull on the cable.

Remove the end of the cable from the play compensation device and the ring on the notched sector (A) .



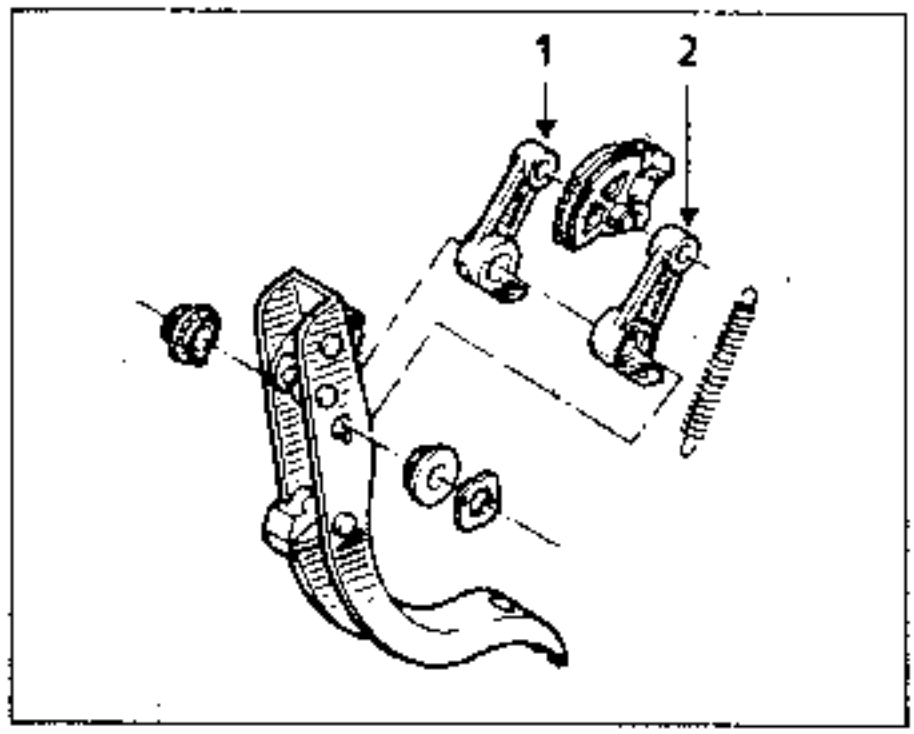
Push the cable back as far as possible, then using a tube of inner diameter **12 mm**, cover the cable sleeve stop to release the cable from the pedal plate.

Remove the complete cable from the engine compartment.

REFITTING

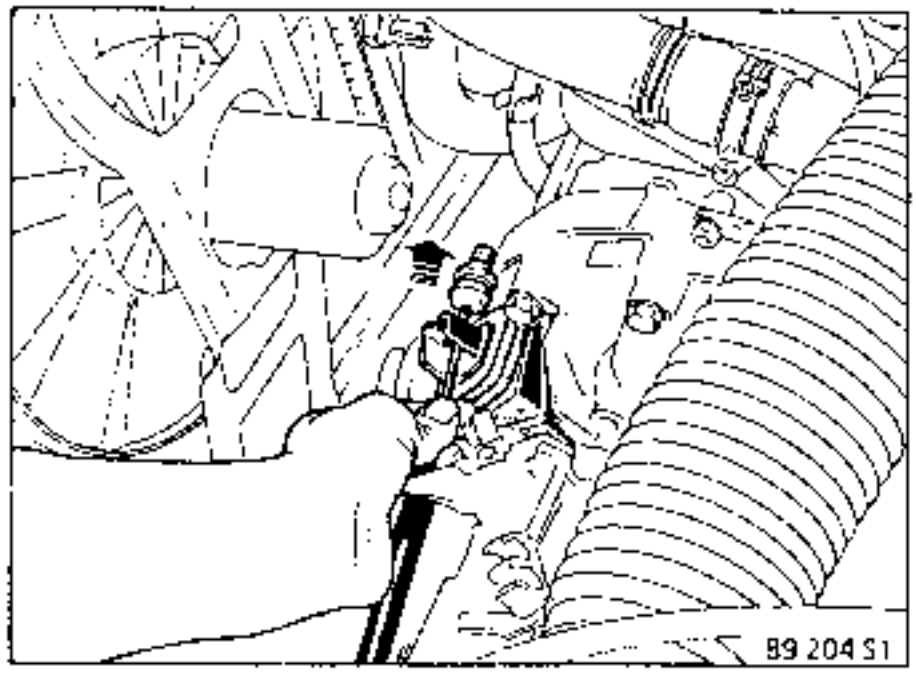
From the engine compartment, thread the cable into the passenger compartment.

In the vehicle, check that the tilting mechanisms (1) and (2) return freely.



Fit the cable in the ring (A) on the notched sector and fit the cable sleeve stop into its position on the sector (S).

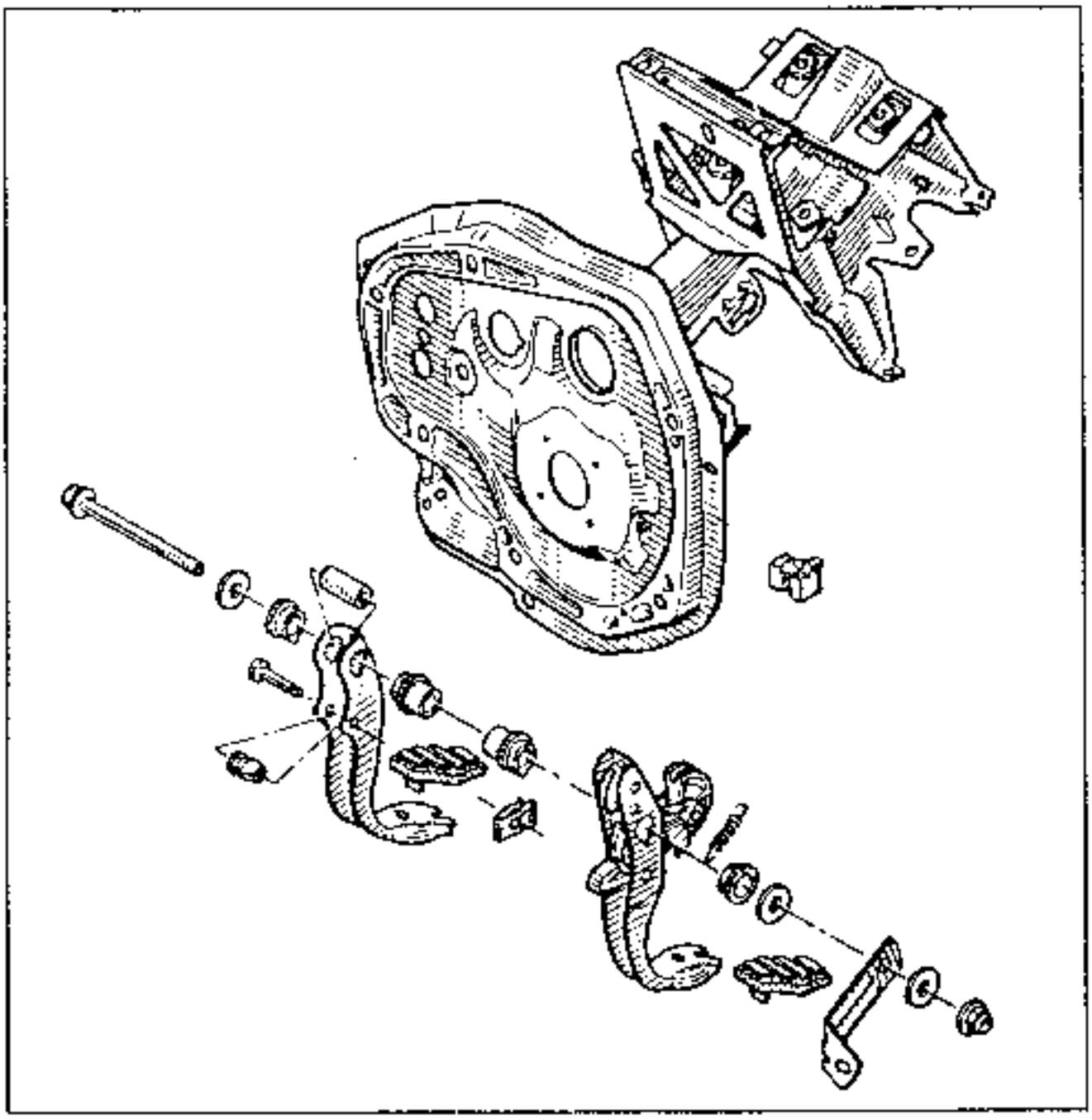
Attach the cable to the clutch fork.



Check the cable sleeve is correctly positioned in the bulkhead.

Press the clutch pedal several times to clip the cable sleeve stop on the plate. The cable is adjusted automatically.

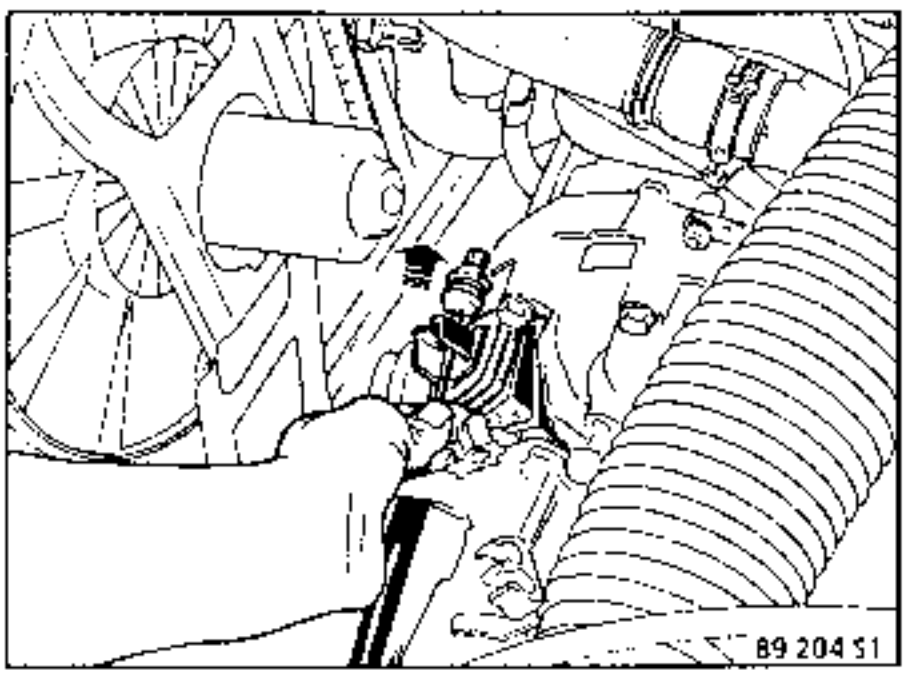
Carry out tests to ensure the system operates correctly (see page 37-17).



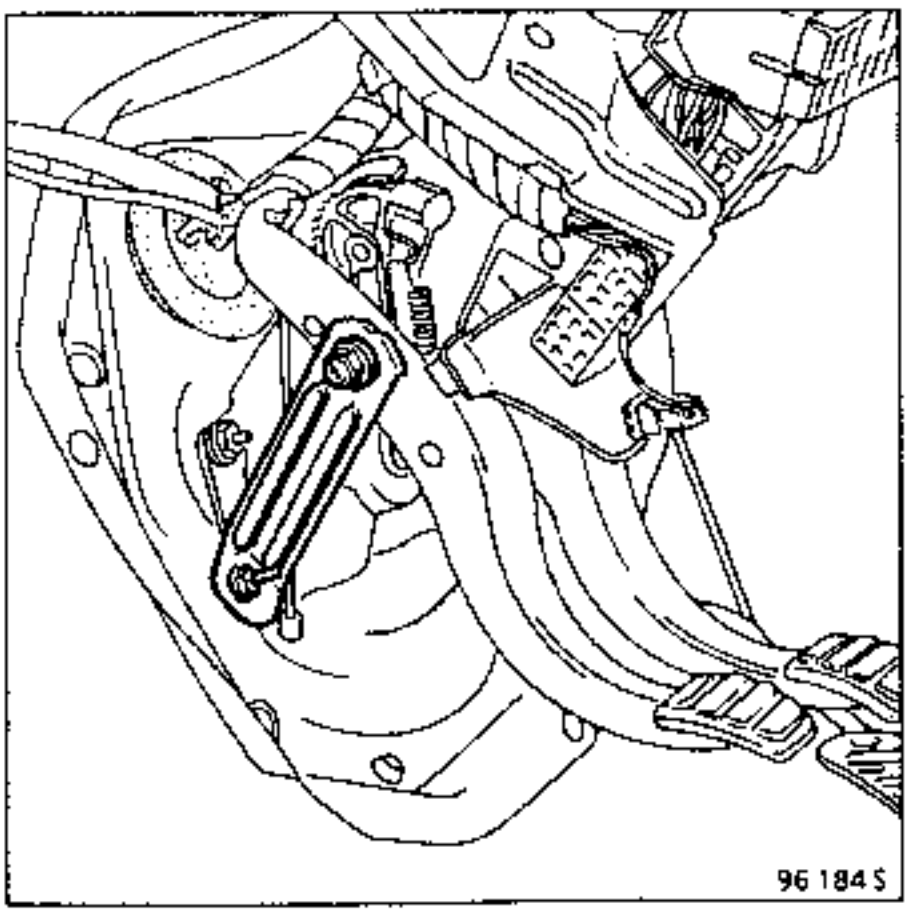
REMOVAL

Disconnect the battery.

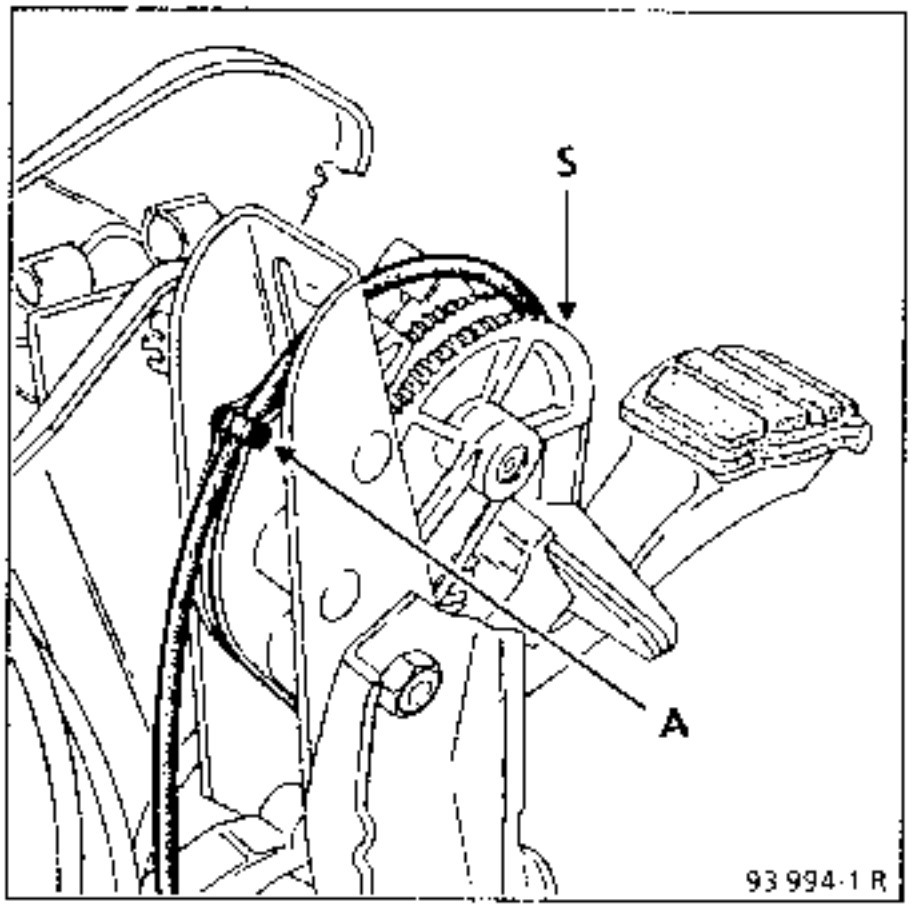
Disconnect the cable from the clutch fork.



In the passenger compartment remove:
- the lower cover under the steering wheel,
- the pedal shaft nut,
- the plate stiffener mounting nut and remove the plate.



Release the cable from the adjustor sector and the ring (A) on the notched sector.



Remove the pedal with the bearings and tilting mechanisms.

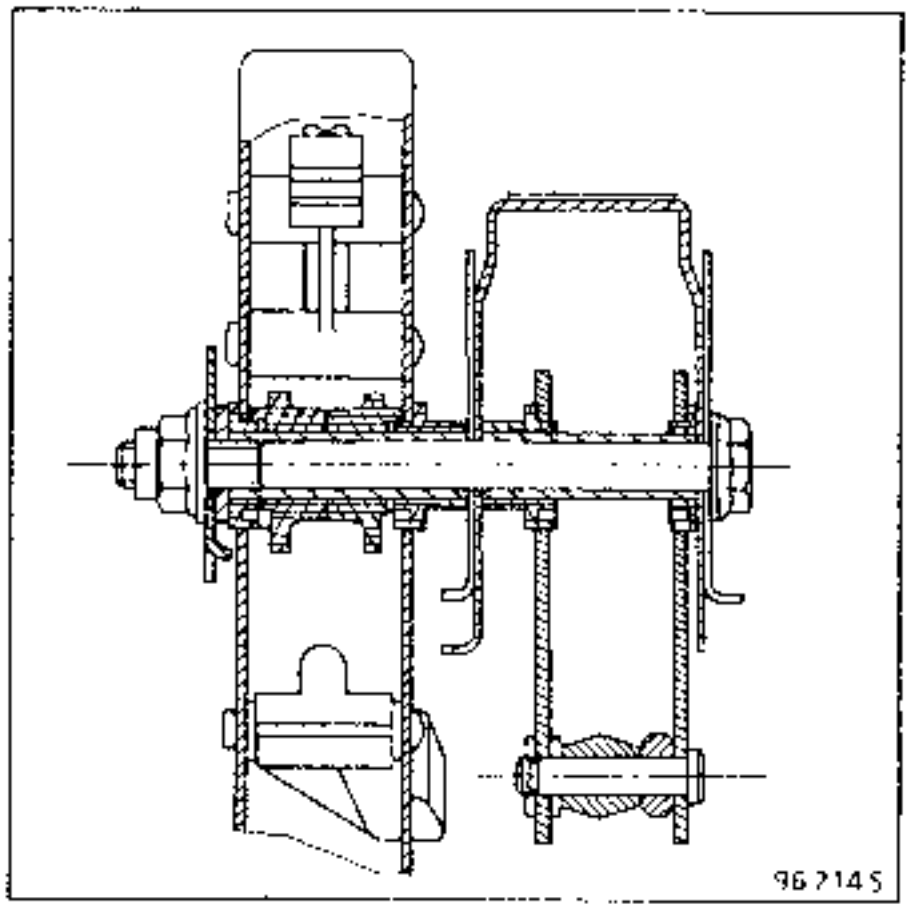
Check the condition of the parts.

REFITTING

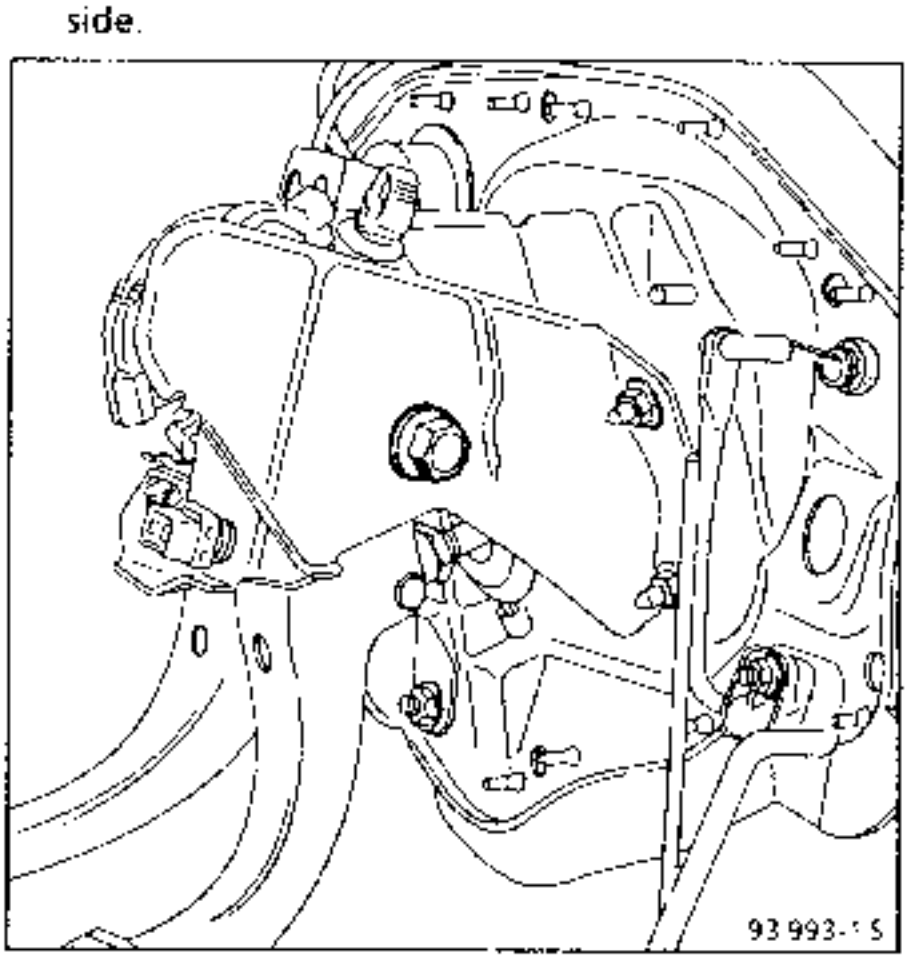
Coat the shaft, bearings, sector notches (S) and cam (C) with **ELF MULTI** grease.

Lock the bearing - tilting mechanism assembly

Refit :
- the plastic bearings, the largest on the brake pedal side,



- the pedal, keeping the shaft on the right hand side.



NOTE : do not use a hammer to refit the pedal shaft

Fit:
- the washer,
- the stiffener and screw in the mounting nuts.

Tighten the stiffener mounting nut then the pedal shaft

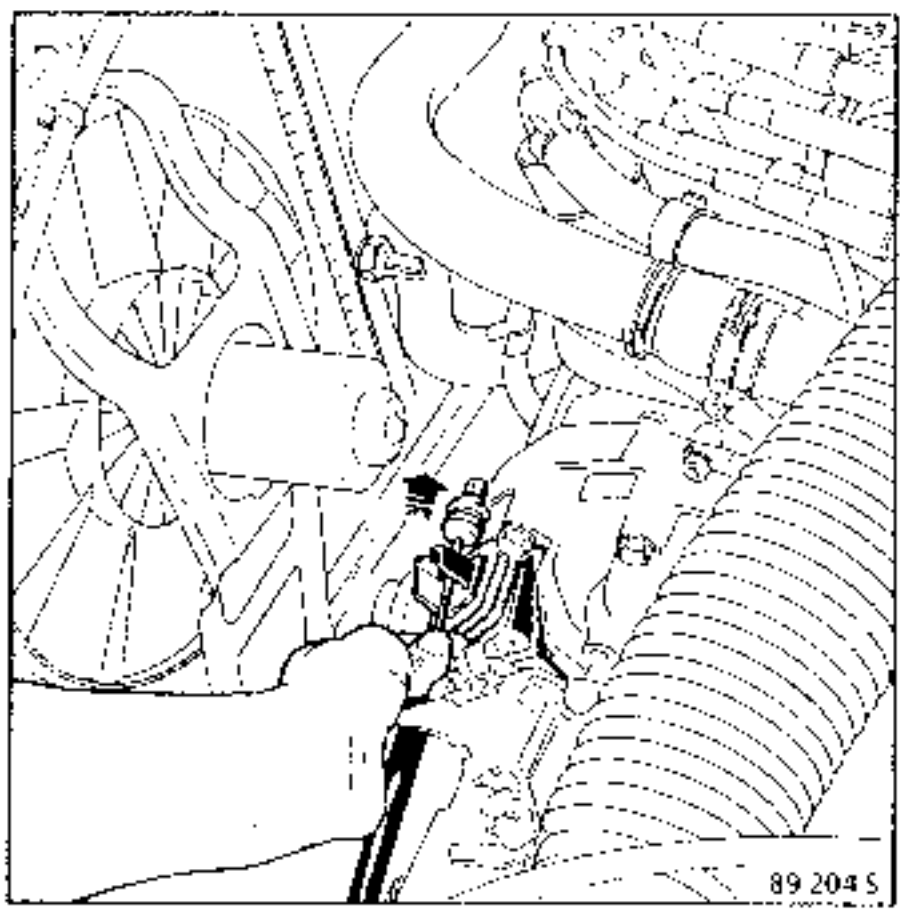
Refit the cable to the fork and pedal.

Check:
- the cable sleeve stop is correctly clipped onto the plate,
- the upper stop is correctly positioned,
- the tilting mechanisms return to the rest position.

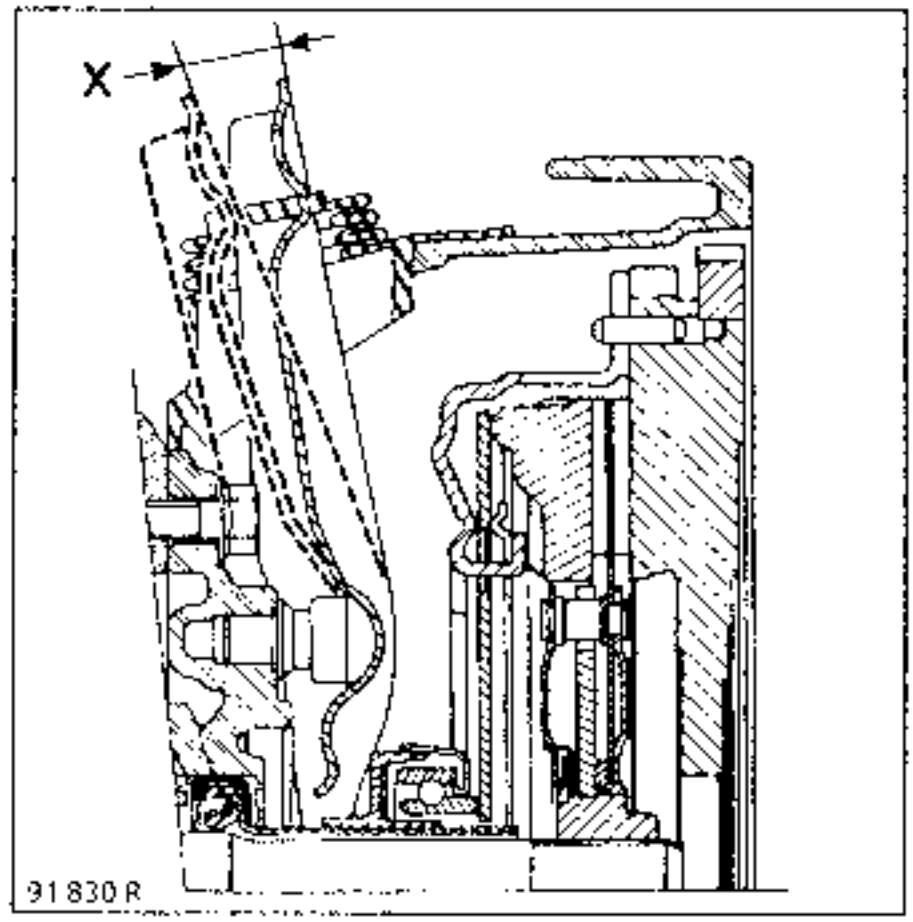
Check the operation of the assembly.

Pedal not depressed, pull the cable at the fork on the gear box.

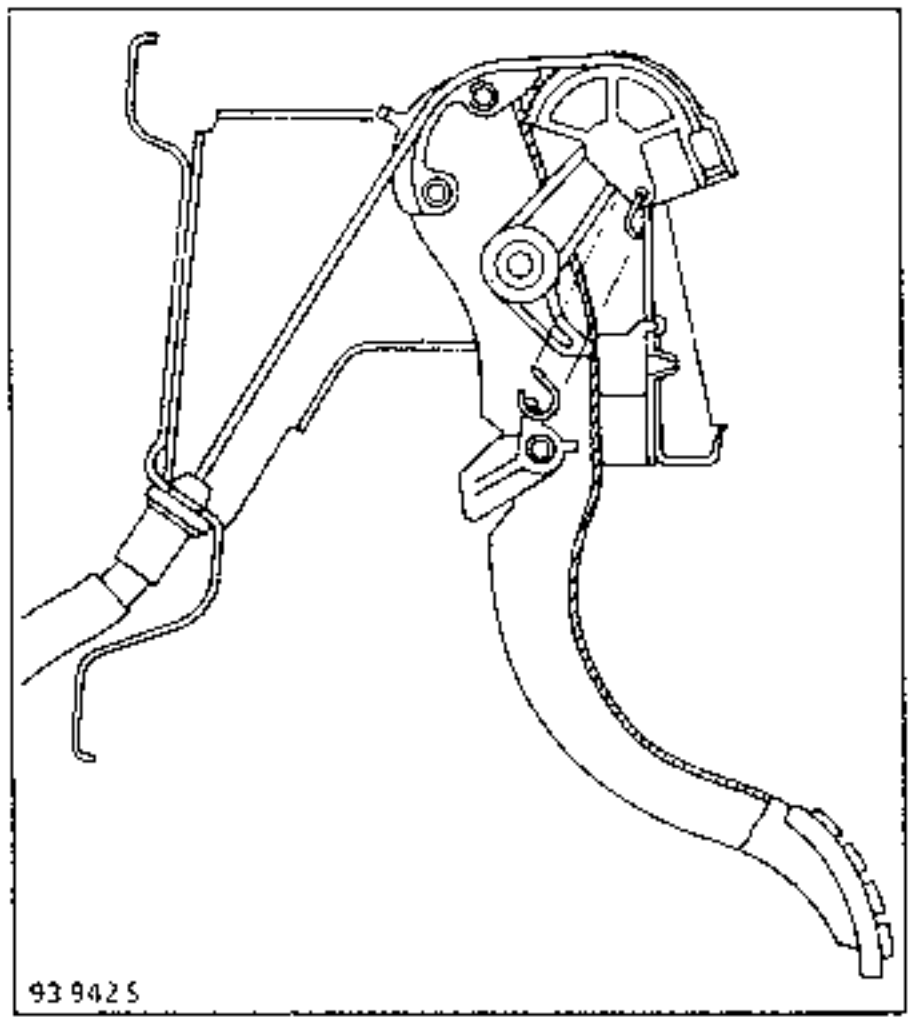
The cable should have a minimum of **2 cm** slack.



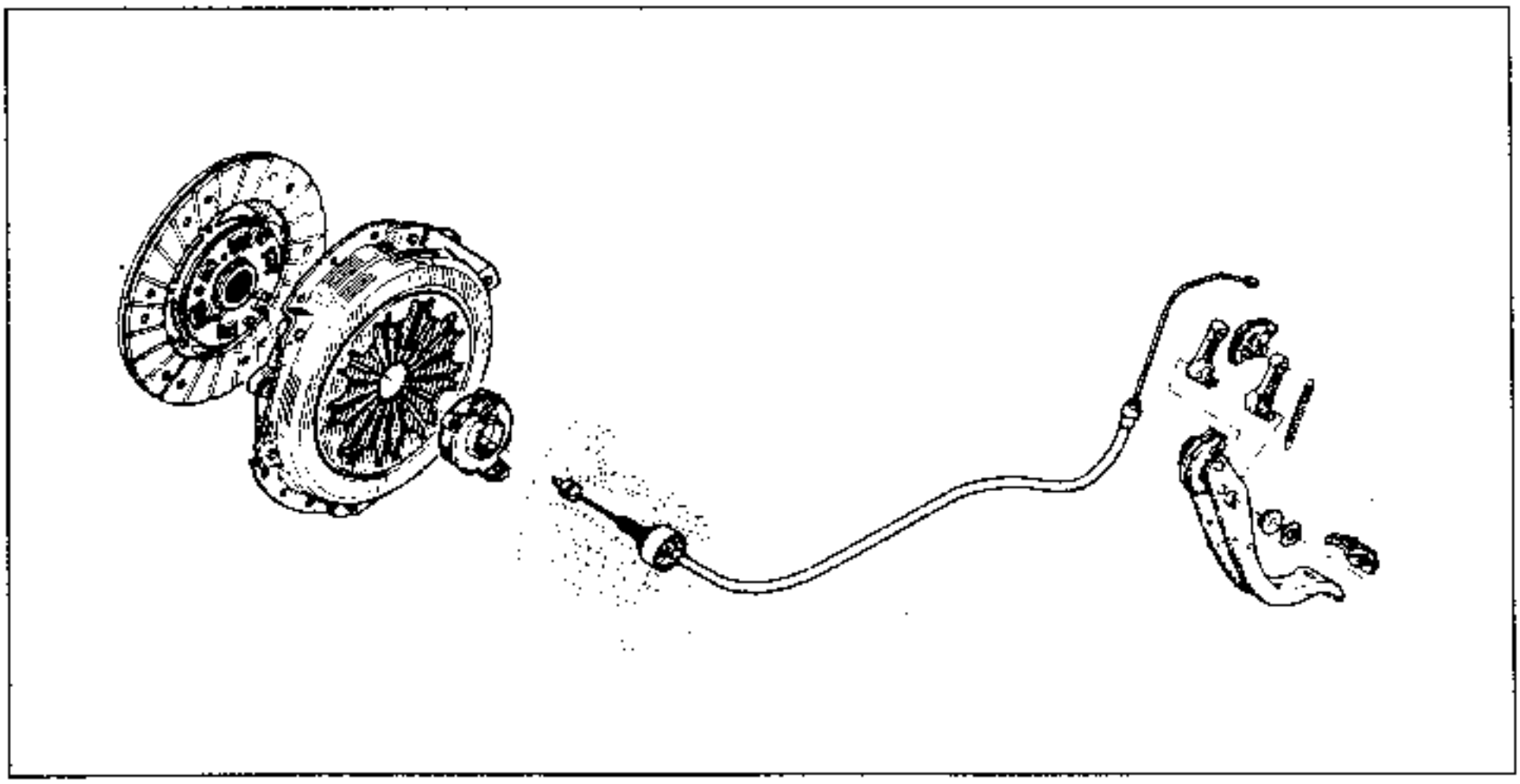
Check the fork travel. It should be :
X = 17 to 18 mm minimum



SECTION VIEW



EXPLODED VIEW



OPERATION

WEAR COMPENSATION

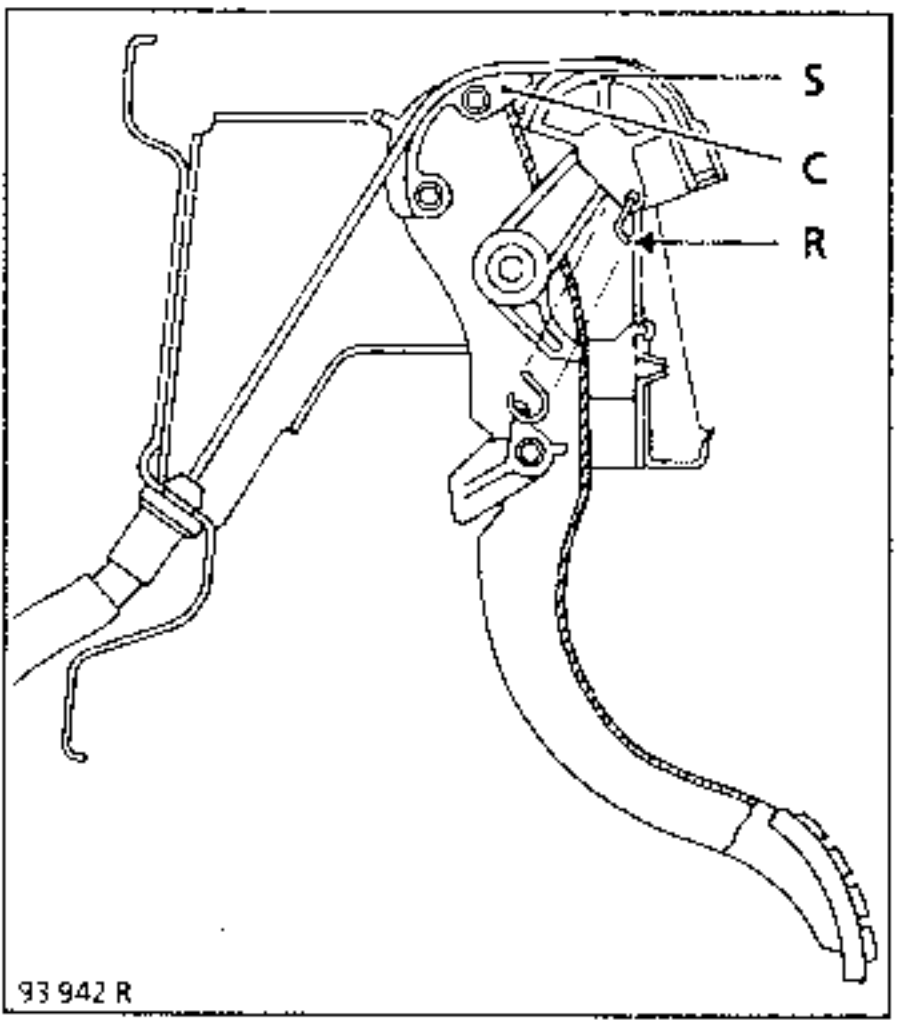
The spring (R) permanently applies pressure to the play compensation sector (S).

The cable is always taut, which pulls the fork and keeps the thrust pad in constant contact with the diaphragm.

Adjustment is automatic.

DECLUTCHING

When the pedal is depressed, the notched cam (C) engages in the teeth on the play compensation sector (S) to avoid pivoting and thus allows the cable to be pulled.

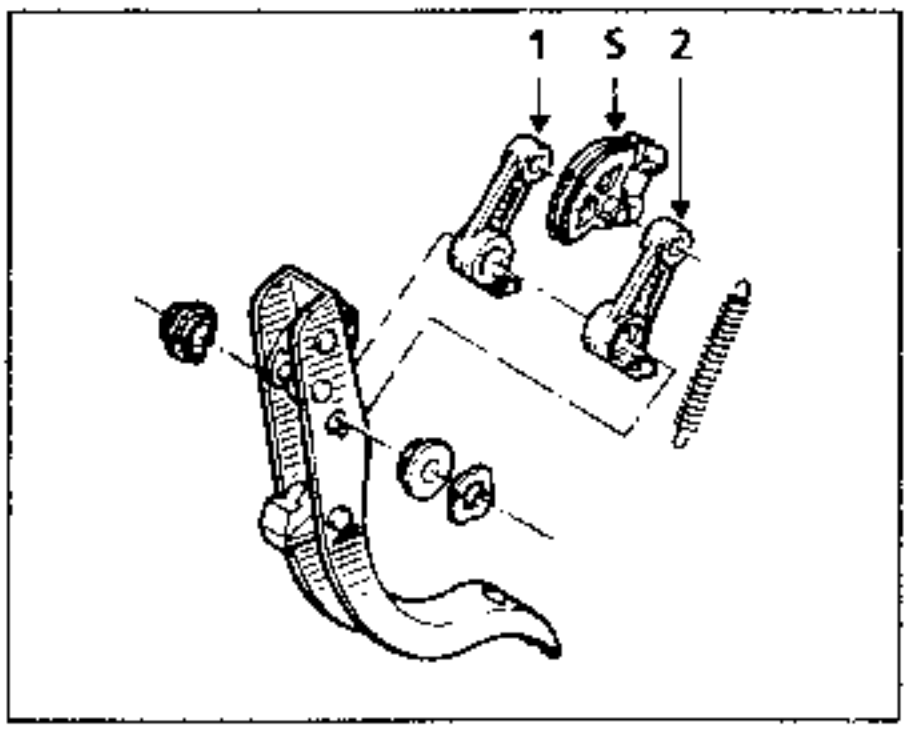


CHECKS

In order to check the correct operation of the system, check :

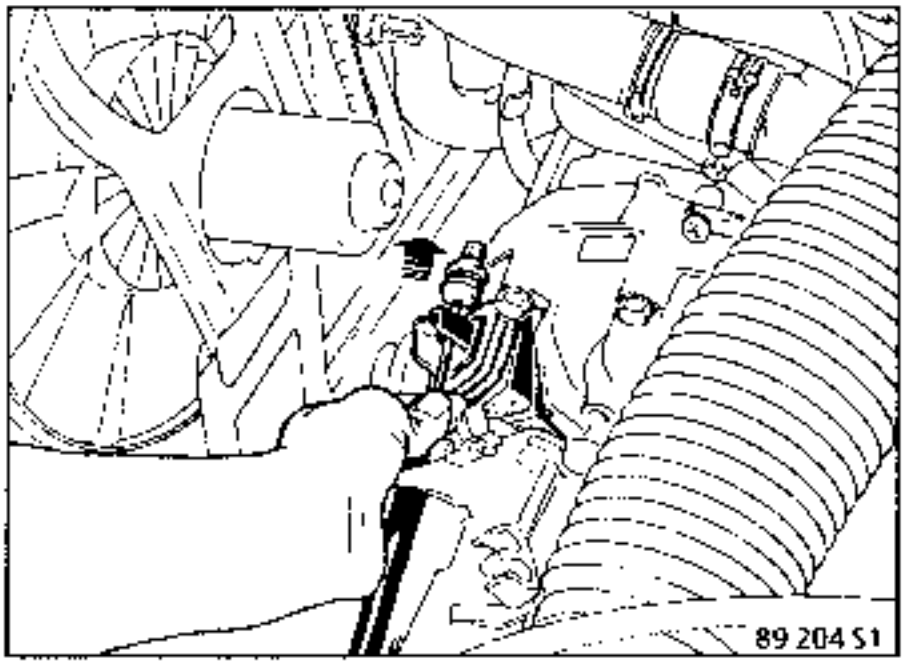
1. that the notched sector (S) pivots on its shaft,

2. that the tilting mechanisms (1) and (2) return freely to the rest positions.



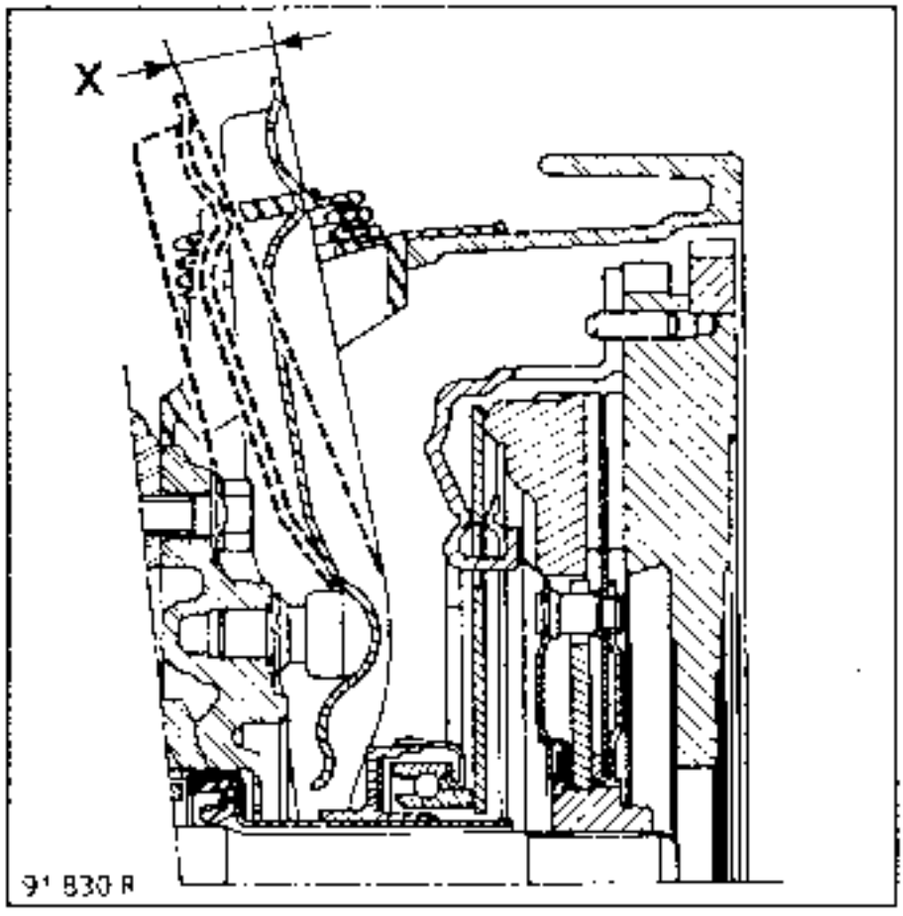
3. Pull the cable at the clutch fork on the gear box

There should be a minimum **2 cm** cable slack.



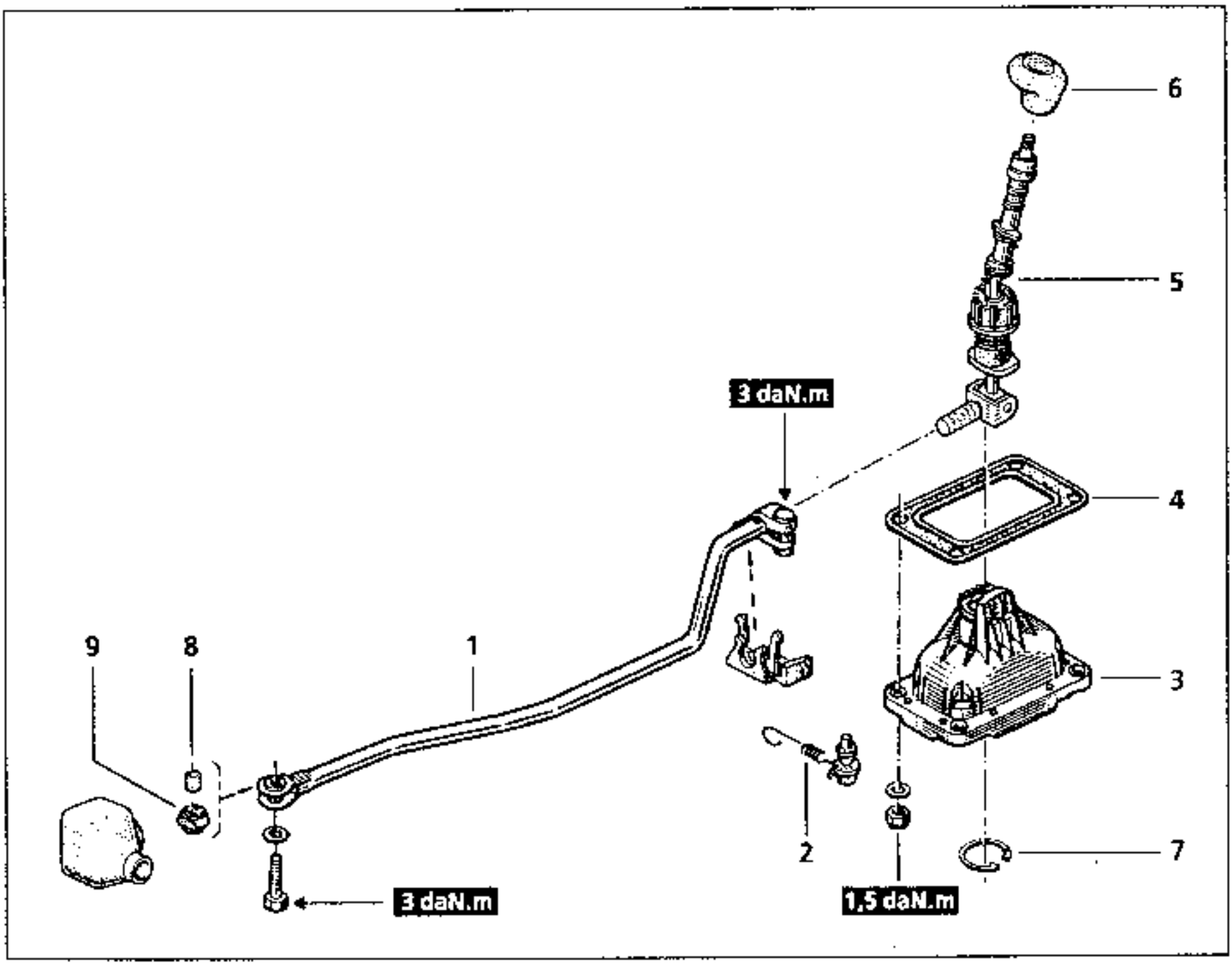
These tests show whether the notched sector (S) is free in the "clutch in" position.

4. Check the fork travel It should be :
X = 17 to 18 mm



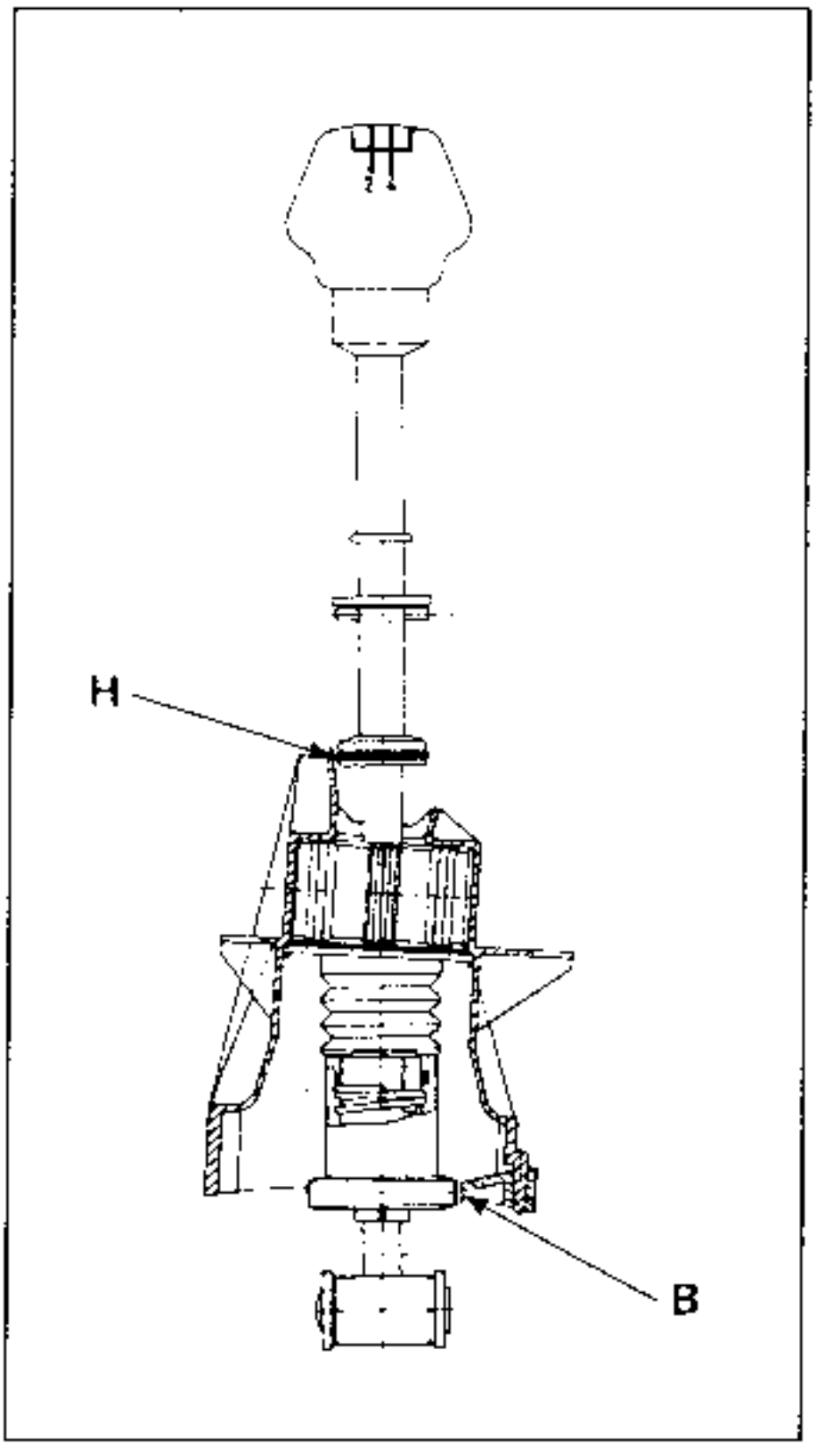
These preliminary checks should be carried out before any serious operation on the clutch itself.

EXPLODED VIEW AND TIGHTENING TORQUES



1	Link rod
2	Return spring on 3/4 line
3	Housing
4	Plate
5	Lever and locking ring assembly
6	Handle
7	Locking ring
8	Ring
9	Sleeve

These vehicles are fitted with a double locking external gear control which avoids reverse gear being selected accidentally instead of first gear without having to release the locking ring.

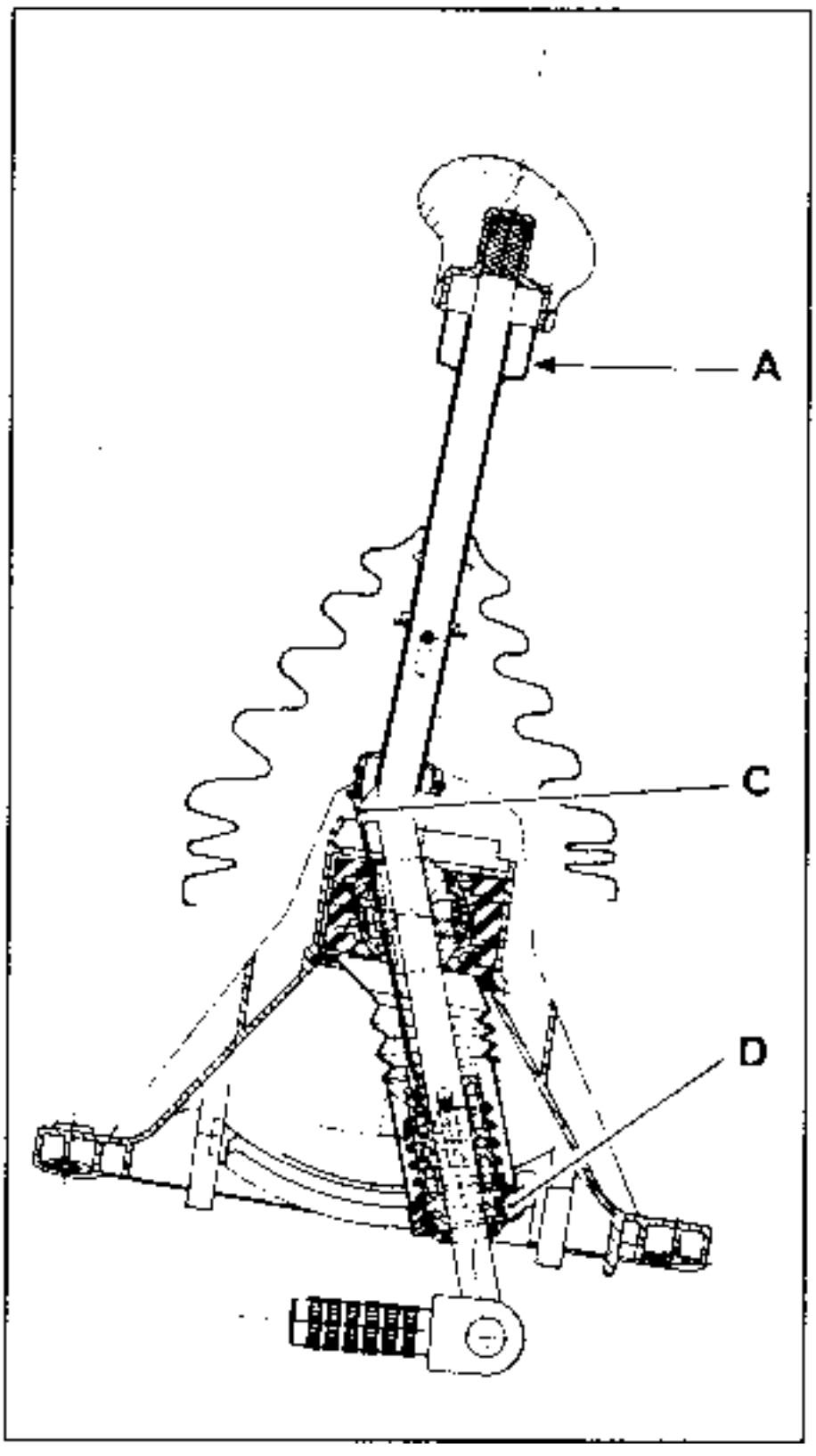


OPERATION

The upper locking ring (A) operates a cable (C) on a second locking ring (D) at the bottom of the lever.

Gear prevention is therefore operative at the lower stop (B) and the upper stop (H) at the same time.

NOTE : this control should be adjusted with 1st gear engaged.



TIGHTENING TORQUES (in daN.m)	
Mounting nut holding unit to body	1,5
Collar bolt connecting link to joint	3

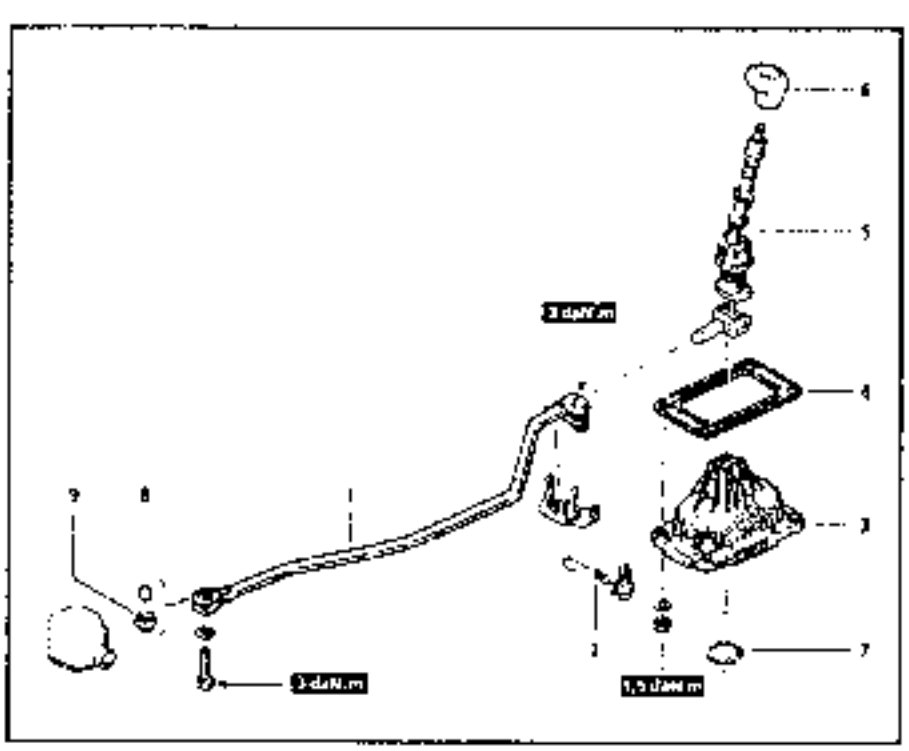
CONSUMABLES
33 Medium grease :
Control lever joint

REMOVAL

In the vehicle, release the console gaiter.

Under the vehicle, disconnect :
- the exhaust pipe rubber mountings,
- the return spring (2),
- the link (1) from the lever joint.

Remove the unit mounting nuts and remove the lever and unit assembly, pushing the exhaust pipe to one side.



Hold the gear lever control joint in a vice fitted with jaws and remove :
- the handle (6),
- the gaiter,
- the locking ring (7).

Remove the lever and locking ring assembly from the unit.

NOTE : the Parts Department supplies the lever and locking rings as one assembly.

REFITTING (Special Notes)

Coat the lever joints with **33 Medium**.

Glue the handle (6) onto the lever.

Adjust the control.

Tighten the nuts and bolts to the recommended torque.

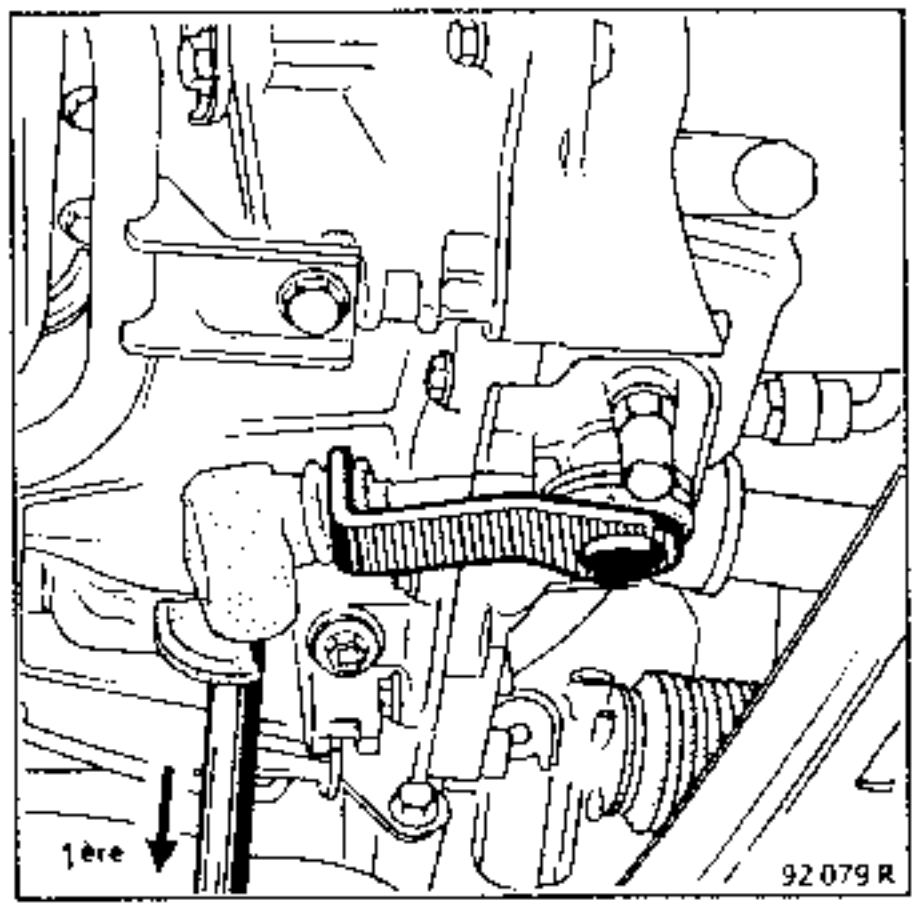
SPECIAL TOOLING REQUIRED	
B.Vi. 1133	Block for locking JB gear box input lever in 1st gear

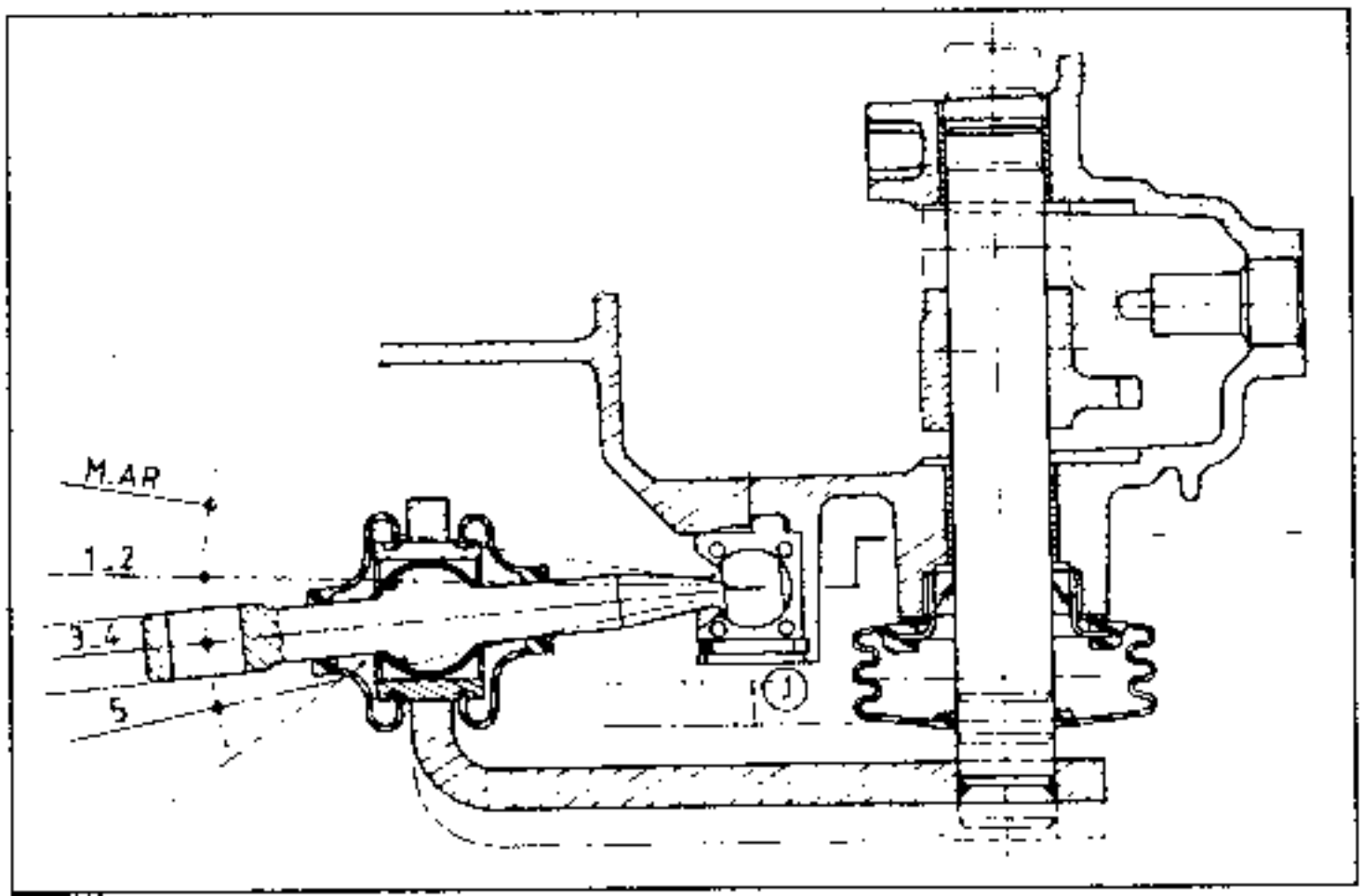
TIGHTENING TORQUES (in daN.m)	
Collar bolt connecting link to joint	3

ADJUSTMENT

Remove the protective plate.

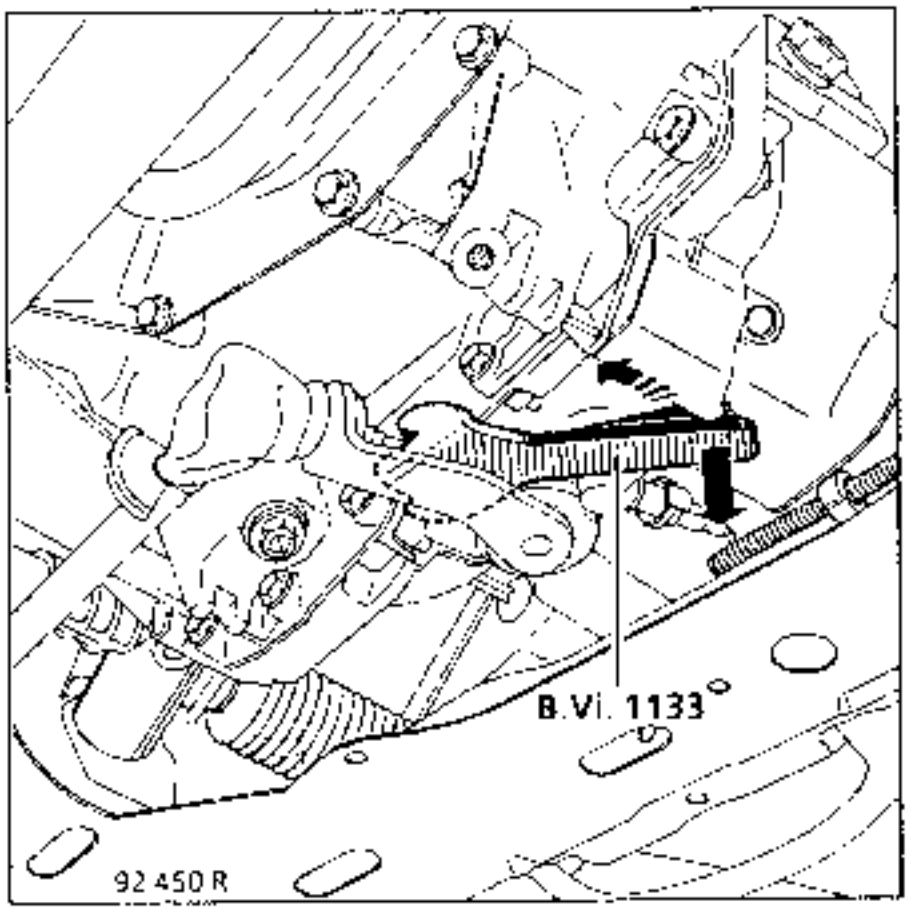
Engage 1st gear.



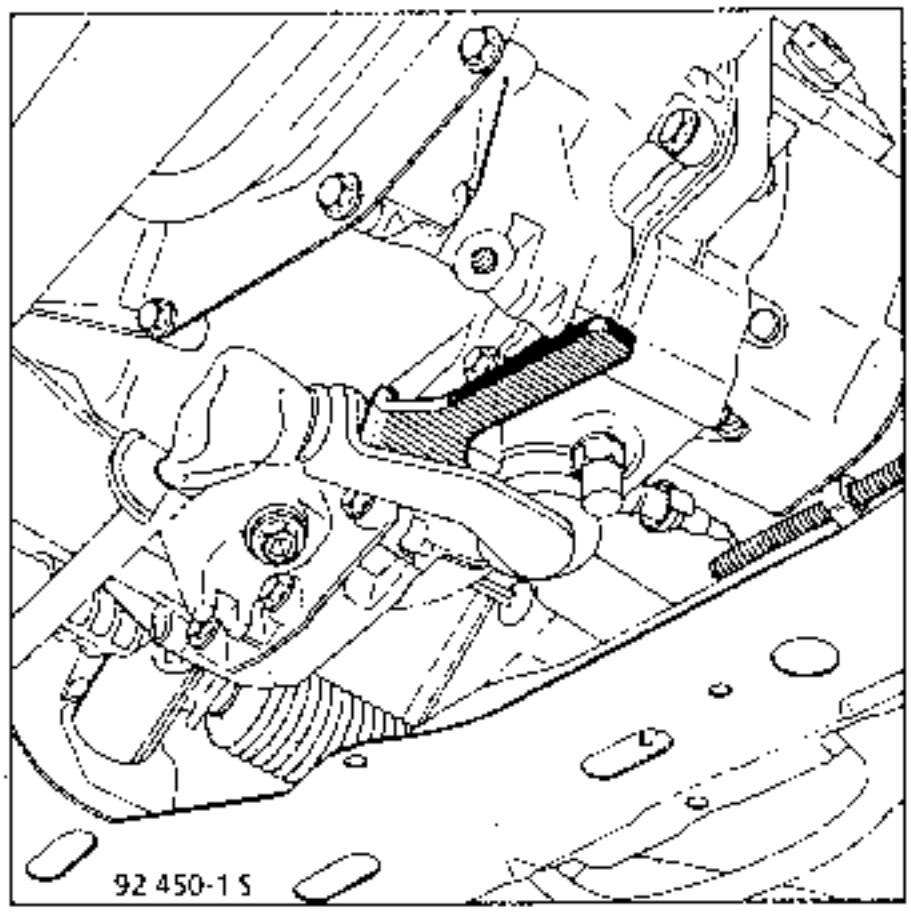


ADJUSTMENT

Fit block **B.Vi. 1133** in order to adjust the backlash.

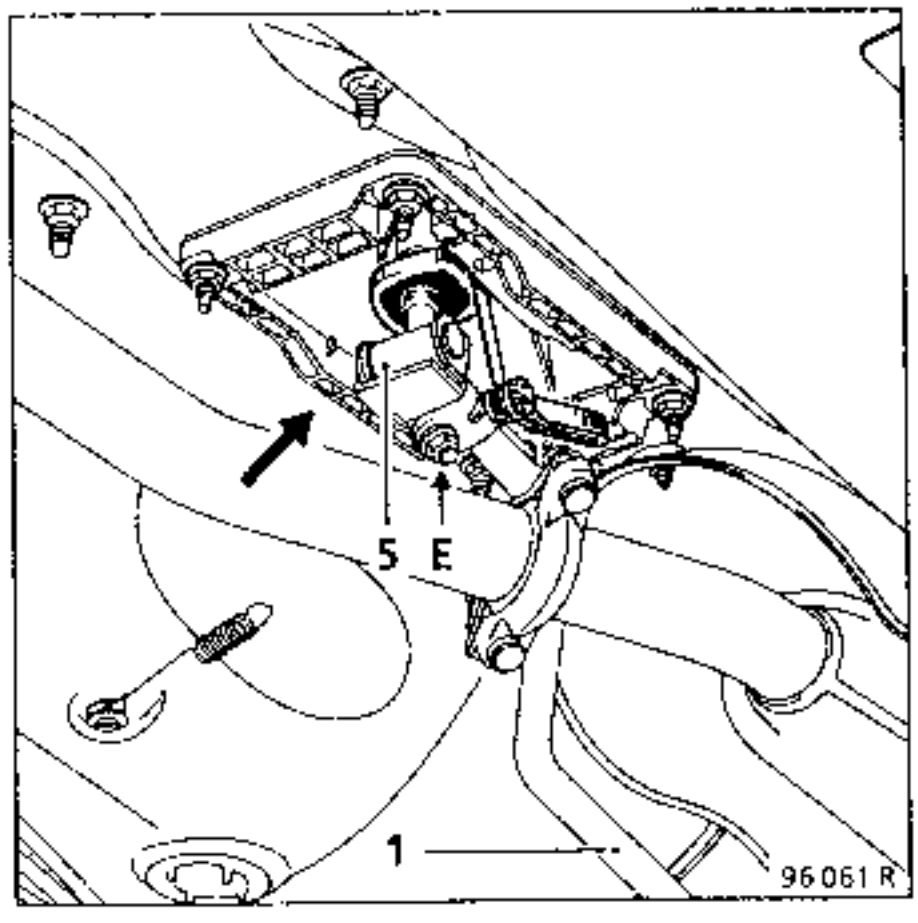


Pull the end of the block down and tilt it through **45°** until it contacts the lug on the housing.



Fit link (1) on the lever joint (5) leaving a gap of about **5 mm** between the link and the joint body.

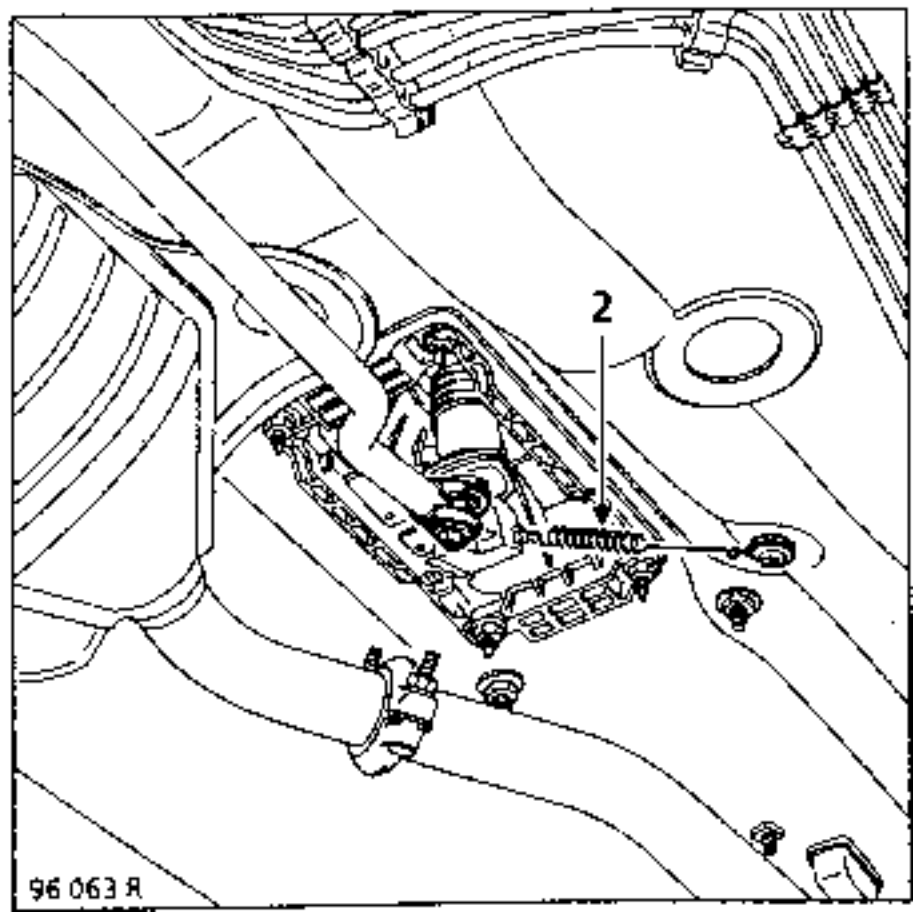
Press the lower locking ring on the lever against the housing, fitting a **2mm** shim in between.



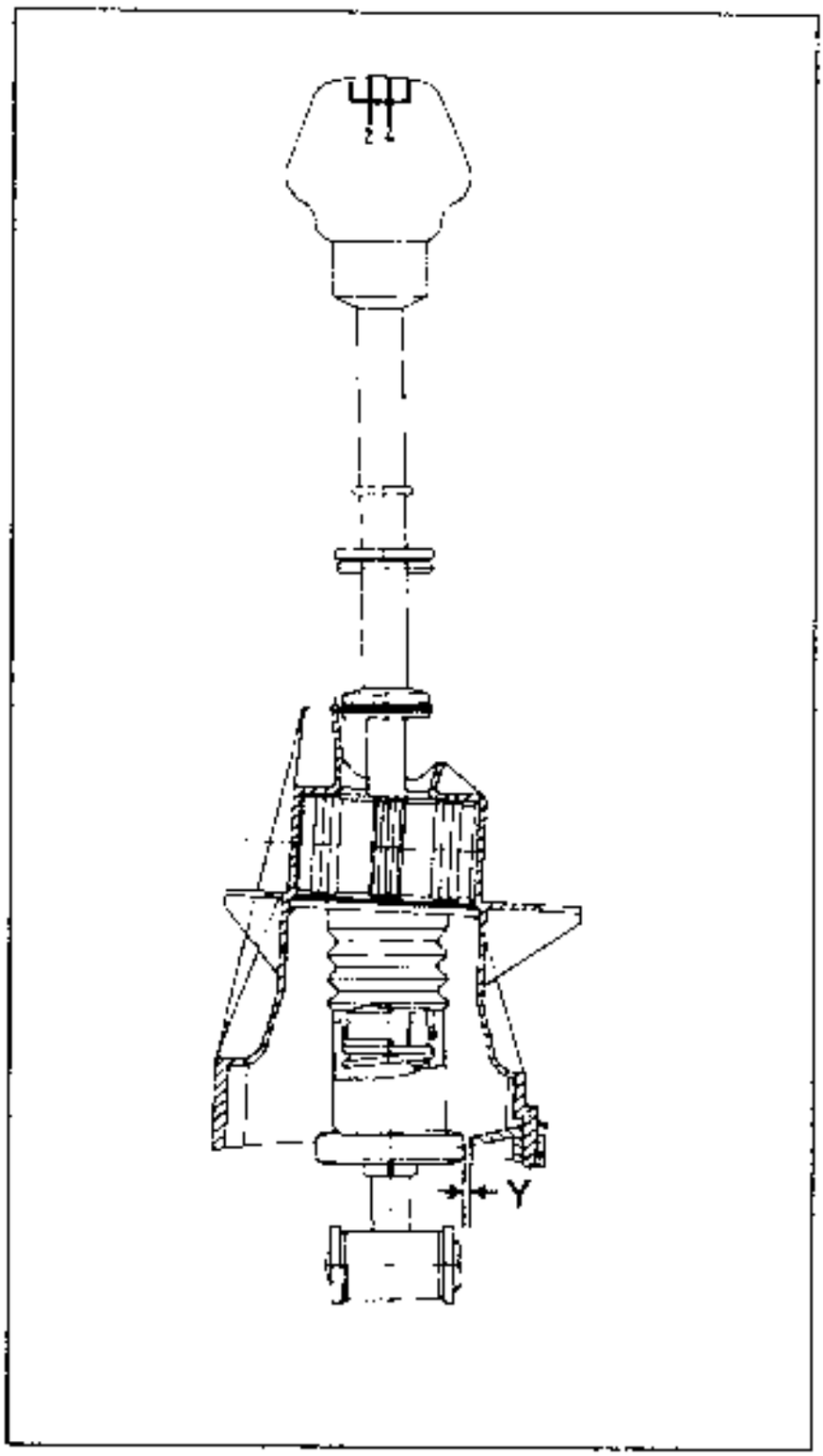
In this position, tighten nut (E).

NOTE : to avoid the old adjustment returning, it is sometimes necessary to turn the lever joint in the link.

Remove the shim and replace the return spring (2).



Check the end play "Y" which should be between **2** and **5 mm.**



Remove block **B.Vi. 1133.**

Check the gears engage correctly.

Replace the protective plate.