



## **3 Chassis**

**30 GENERAL**

**31 FRONT AXLE**

**33 REAR AXLE**

**35 WHEELS AND TYRES**

**36 STEERING ASSEMBLY**

**37 MECHANICAL ELEMENT CONTROLS**

**38 ELECTRONICALLY CONTROLLED SYSTEMS**

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**AUGUST 2001**

**EDITION ANGLAISE**

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"The repair methods given by the manufacturer in this document are based on the technical specifications current when it was prepared.

The methods may be modified as a result of changes introduced by the manufacturer in the production of the various component units and accessories from which his vehicles are constructed."

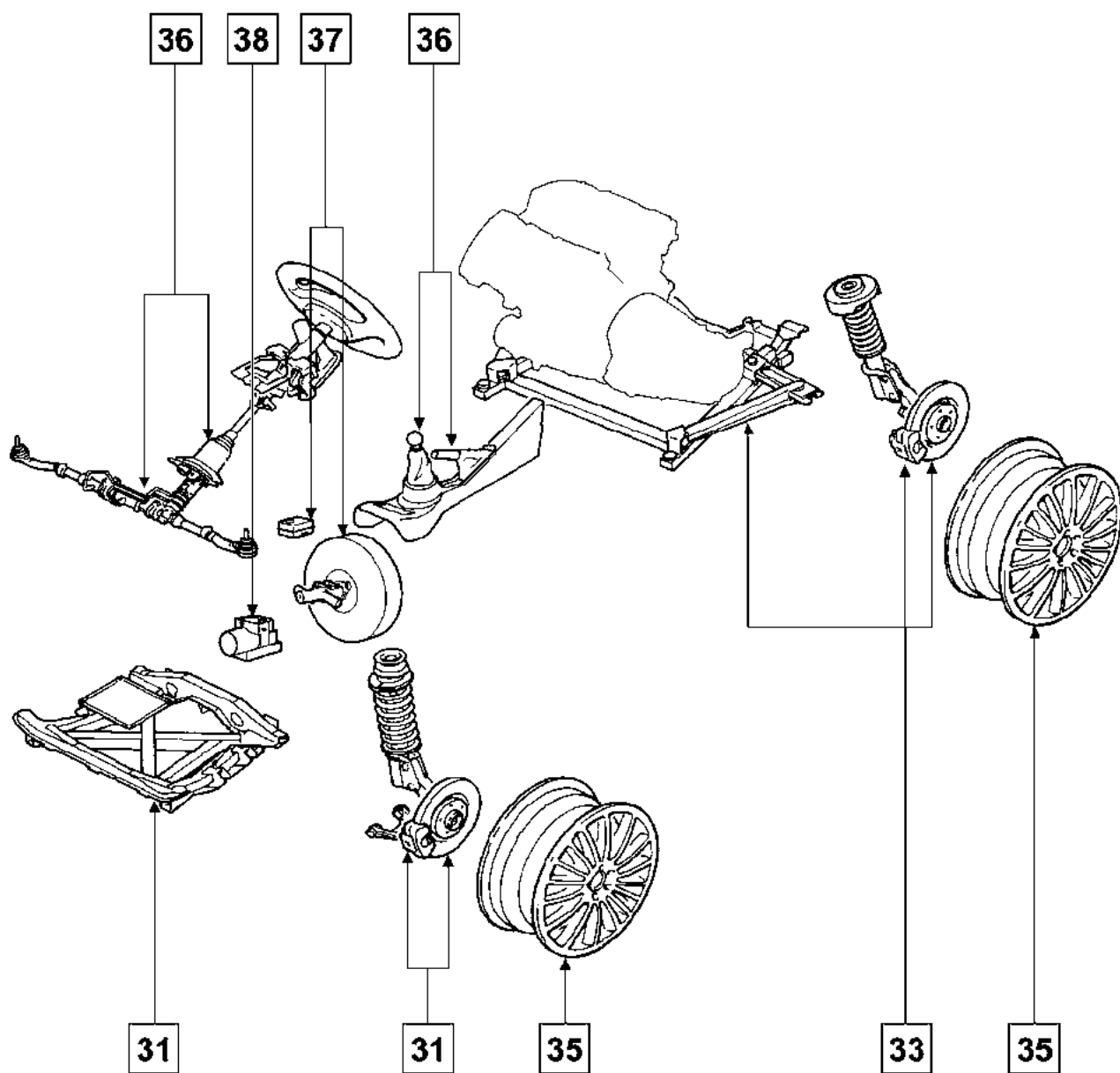
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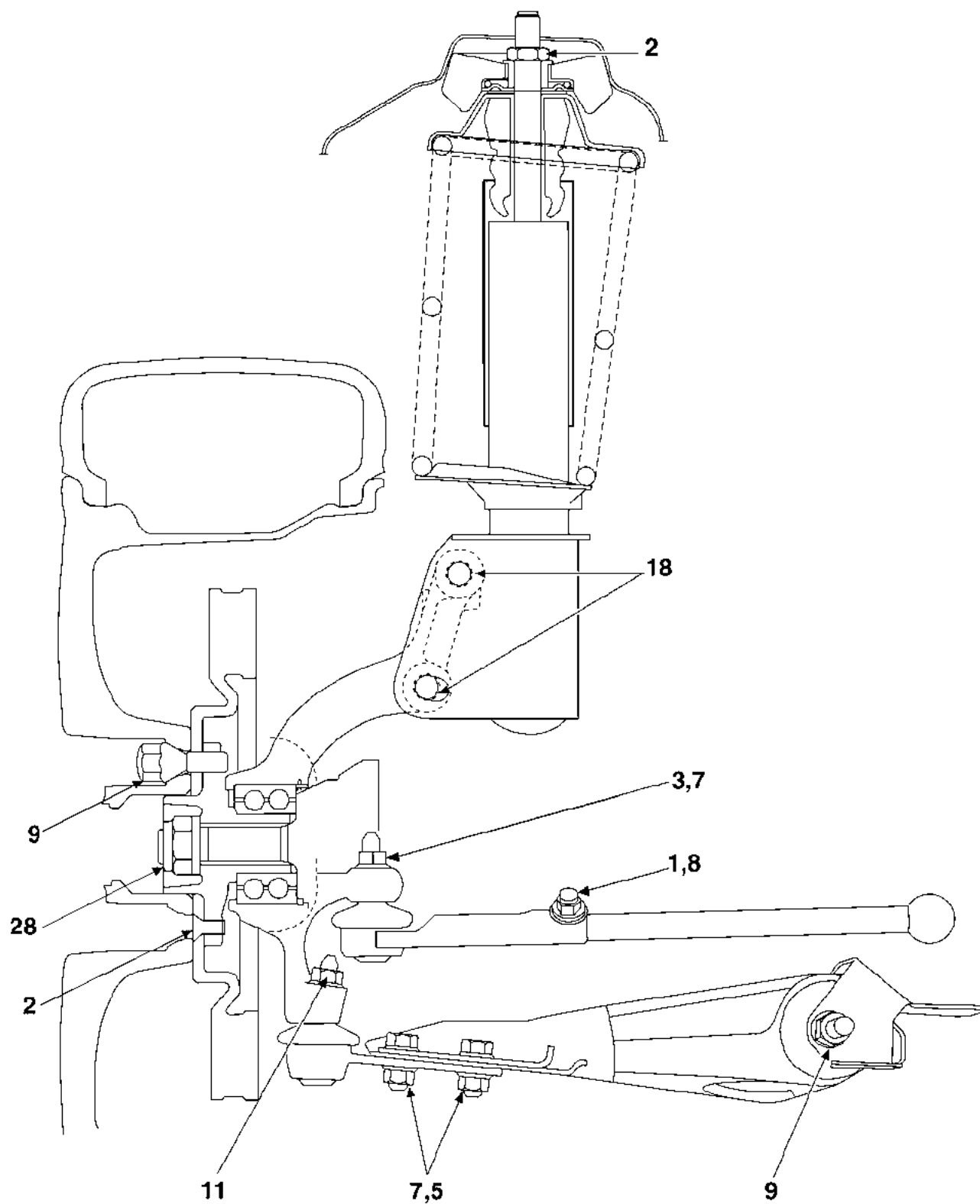
# EXPLODED VIEW

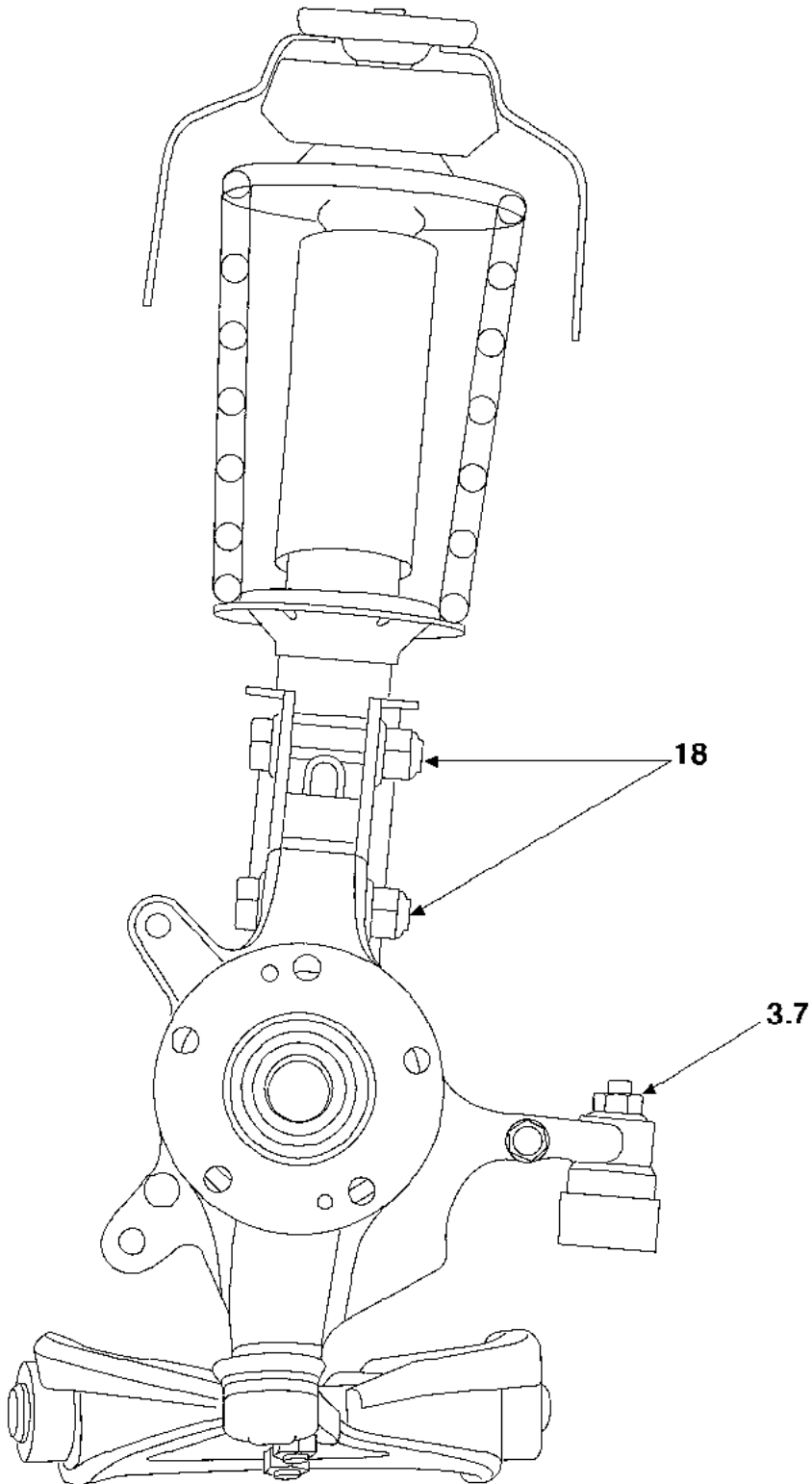


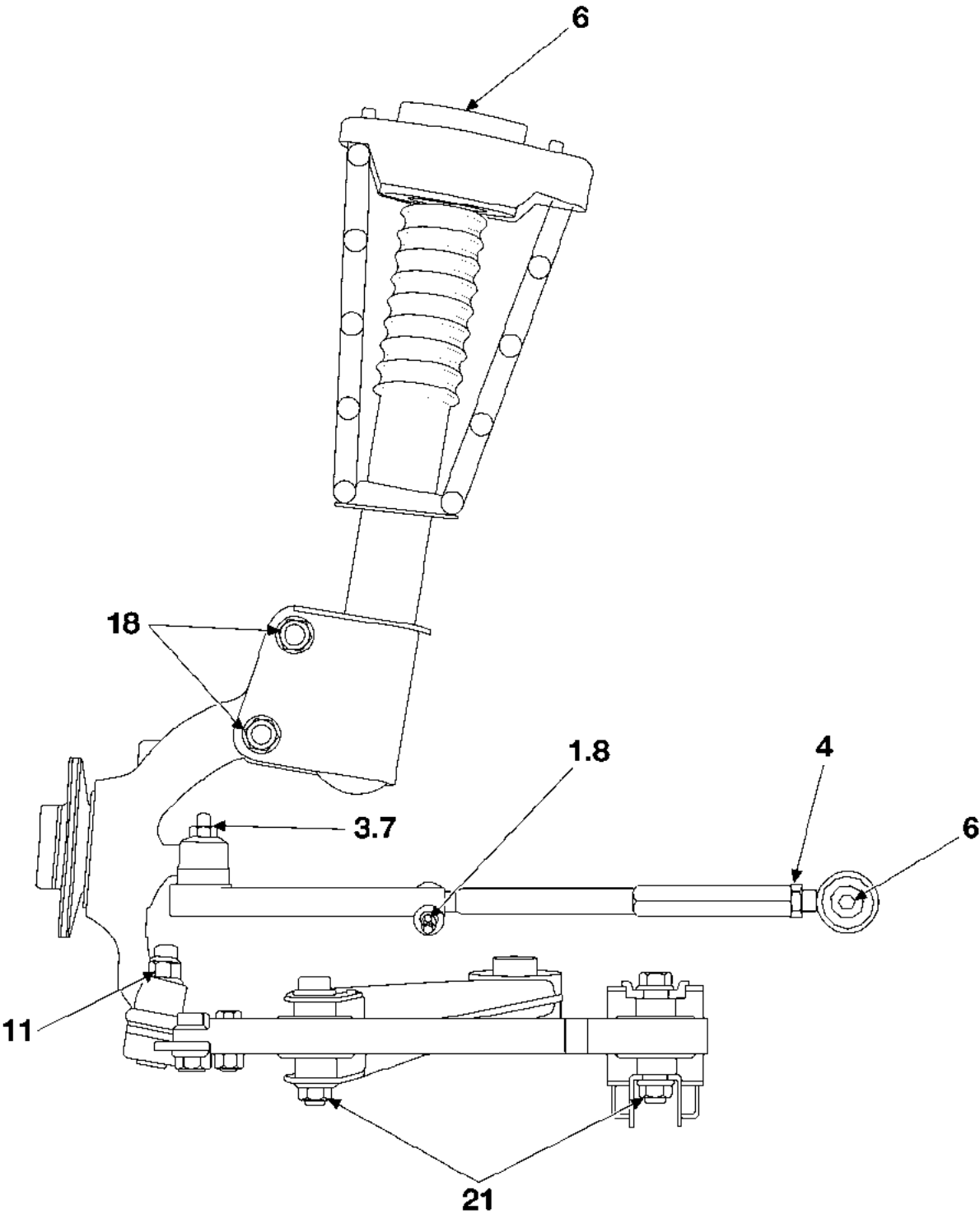
# Chassis

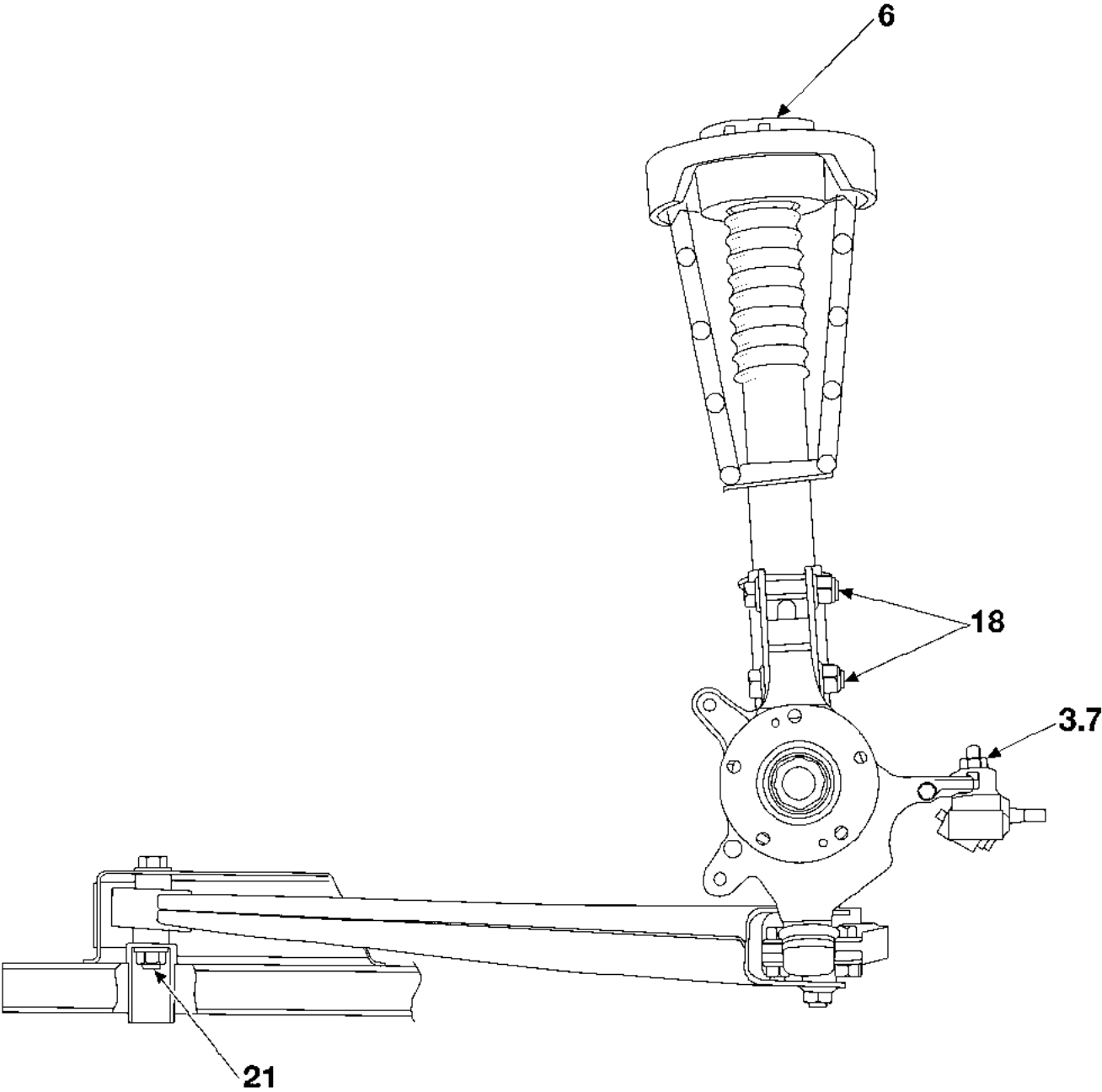
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**GENERAL INFORMATION**  
**Tightening torques (in daNm)**



**30**

	DIMENSIONS	TIGHTENING TORQUES
Bleed screw	-	1,7
Hoses to caliper pistons	M 10 x 100	2.5
Rear arm hoses	M 10 x 100	1.7
Flexible hose to support bracket	M 10 x 100 or M 12 x 100	} 1.7
Master cylinder outlets	M 10 x 100 or M 12 x 100	} 1.7
ABS outlets	M 10 x 100 or M 12 x 100	} 1.7
Brake pipe to brake pipe	M 10 x 100 or M 12 x 100	} 1.7



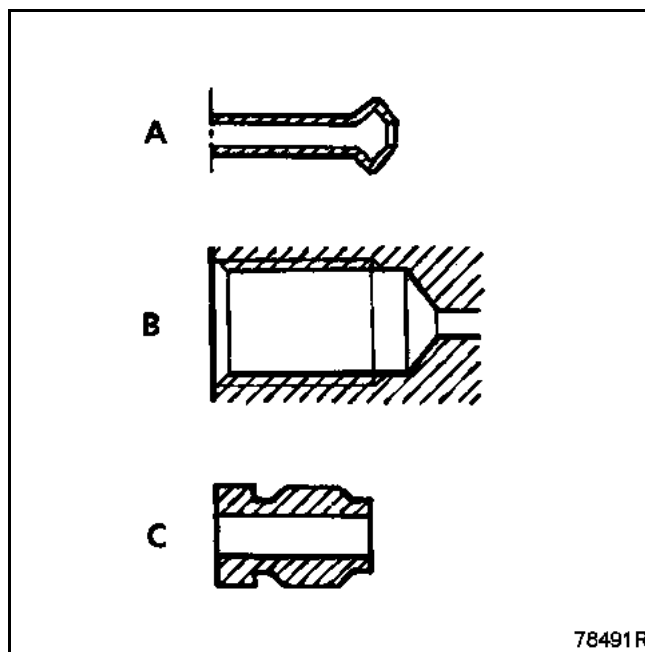
FRONT BRAKES (in mm)	
Slave cylinder diameter	41.3 & 38.1
Diameter of discs	330
Thickness of discs	30
Minimum disc thickness	28
Thickness of pads (including support)	17.75
Minimum pad thickness (including support)	9
Maximum brake disc run-out	0.5
REAR BRAKES (in mm)	
Slave cylinder diameter	57
Diameter of discs	300
Diameter of discs	24
Minimum disc thickness	22
Thickness of pads (including support)	18
Minimum pad thickness (including support)	10
Maximum brake disc run-out	0.5
MASTER CYLINDER (in mm)	
Diameter	25.4

The pipes between master cylinder, calipers, compensator and hydraulic unit are connected by means of threaded unions with METRIC THREADS.

Consequently, only parts specified in the Parts Catalogue for this vehicle should be used.

### Identification of parts:

- SHAPE of the steel or copper PIPE end piece (A),
- SHAPE of the CONNECTING POINTS on the components (B),
- CONNECTIONS on pipework painted GREEN or BLACK: 11 or 12 mm external hexagon (C).



## Brake fluid

### BRAKE FLUID REPLACEMENT INTERVAL

The design of our braking system, and in particular our brake discs (hollow pistons that do not transmit a lot of heat, low levels of fluid in the cylinder, sliding calipers avoiding the need for a reserve of fluid in the area of the wheel that is cooled the least) has enabled us to reduce the risk of vapour lock as much as possible, even in conditions where there is heavy use of the brakes (mountainous regions).

Modern brake fluids still degrade slightly during the first few months of use due to a small uptake of humidity and replacement of the fluid is therefore recommended (refer to vehicle's Warranty and Servicing Handbook).

### Topping up the level

Wear of the brake pads and shoes will cause a gradual drop in the fluid level in the reservoir. This drop should not be compensated for since the level will rise again when the pads are changed. The level should not however be allowed to fall below the minimum mark.

### Approved brake fluids

Mixing two incompatible brake fluids in the circuit will cause a risk of major leaks, mainly due to deterioration of the cups. To avoid such risks, it is essential that you use only those brake fluids that have been inspected and approved by our laboratories and which comply with standard **SAE J 1703 DOT 4**.

SPECIAL TOOLING REQUIRED	
M.S. 815	Bleeding device

On vehicles fitted with a brake servo, it is important that the servo system is not actuated while the system is being bled, regardless of which method is being used to bleed the system.

The bleeding operation is carried out using equipment **M.S. 815** on a four-post lift, wheels on the ground.

Connect the pipes of the **M.S. 815** equipment to the bleed screws of the:

- master cylinder,
- slave cylinder,
- compensator.

Connect the equipment to a compressed air supply point (min. 5 bar).

Connect the fill system to the brake fluid reservoir.

Open:

- the supply, wait until the reservoir is full (both sections),
- the compressed air valve.

Since these vehicles are fitted with X-layout braking circuits, proceed as follows:

Open:

- the bleed screw of the **rear right wheel** and let the fluid flow out for around 20 seconds,
- the bleed screw of the **front left wheel** and let the fluid flow out for around 20 seconds.

**Ignore the air bubbles in the pipes of the bleeding device.**

Proceed in the same way for the **rear left wheel and the front right wheel**.

Check the firmness of the brake pedal when pressed down (press the pedal several times)

Repeat the bleeding operation if necessary.

Top up the brake fluid level in the reservoir after disconnecting the device.

(See Section 38 for bleeding an anti-lock braking system circuit).

### TIGHTENING TORQUES (in daNm)



Wheel bolts	9
Lower arm nut to chassis subframe	9
Ball joint for stub-axle support nut	17
Ball joint nut for the bearing rod	3.7
Bearing nut of the anti-roll bar	1.5

### REMOVAL

Place the vehicle on a two-post lift.

Remove the two wheels.

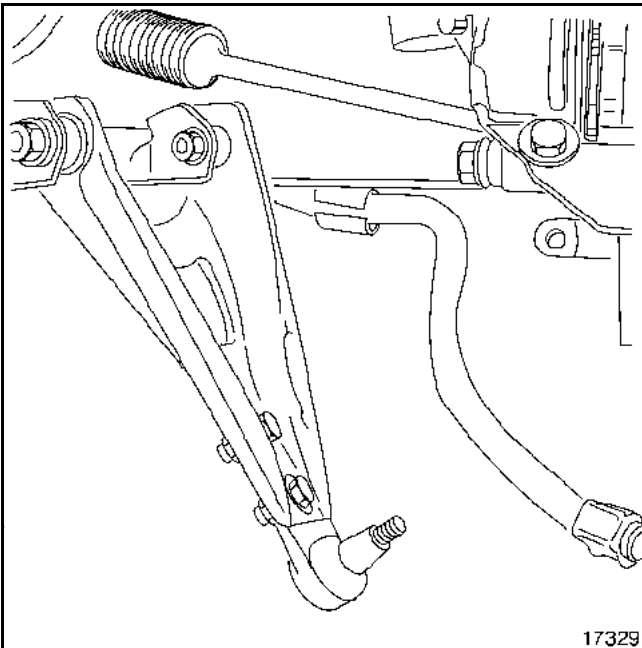
Remove the ABS wiring from the lower wishbone (cable tie).

Remove the mounting nuts of the anti-roll bar on the lower wishbones.

Lower the anti-roll bar.

Remove:

- the stub-axle support nut,
- the two mounting bolts of the wishbone on the chassis subframe,
- the wishbone.

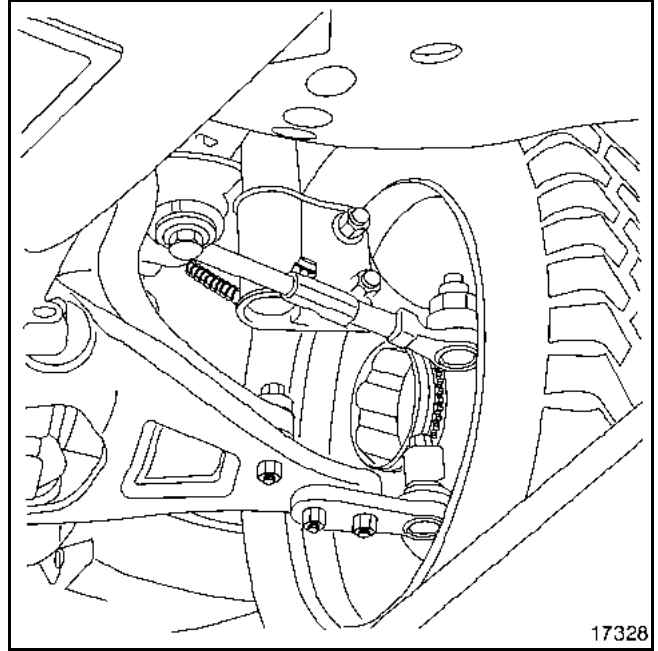


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### REFITTING

Refit:

- the wishbone,
- the two bolts, without tightening them,
- the ball joint shaft into the stub-axle support and tighten the nut,
- the ABS wiring to the lower wishbone (cable ties),
- the anti-roll bar.



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**NOTE:** allow the suspension to rebound and tighten the nuts of the wishbone and the anti-roll bar bearing to the recommended torque (tightening position: vehicle not loaded).

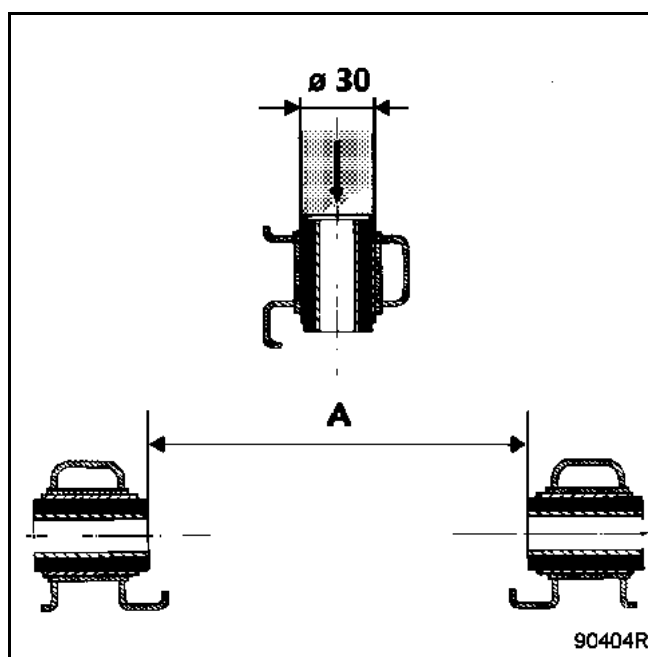
### REPLACEMENT

To ensure that the bushes are correctly positioned in relation to the lower arm, they are replaced one after the other.

Using a press, remove one of the worn bushes with a tube with an external diameter of **30 mm**.

Refit a new bush to obtain a dimension A of **146.5 mm**.

Using a press, remove the second bush and proceed as above, to retain a dimension A of **146.5 mm**.

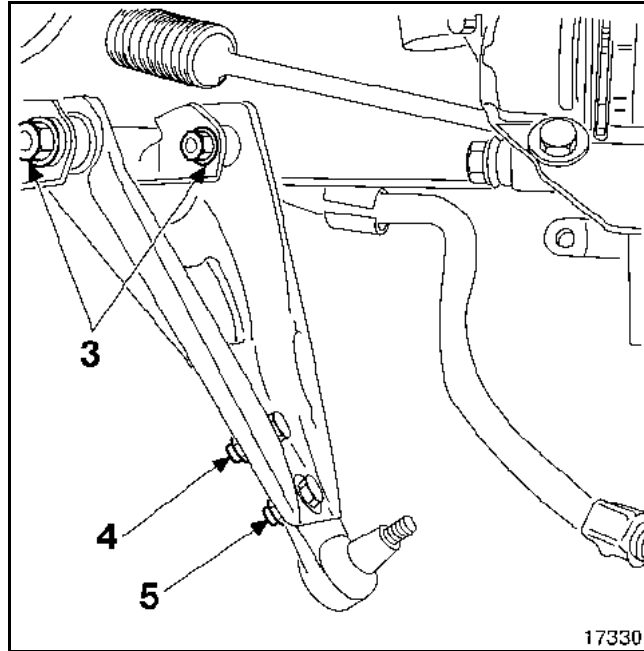


### REPLACEMENT

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

Proceed in the same way as for removing the lower wishbone.

Loosen, but do not remove the two mounting bolts (3) of the wishbone on the subframe.



Remove:

- the ABS sensor from the lower wishbone (cable tie),
- the two mounting bolts (4) and (5) of the ball joint,
- the ball joint.

### REFITTING

Refit the ball joint and tighten to a torque of **7.5 daNm**.

**NOTE:** Fit the ball joint marked "L" (next to hole (5)) to the left-hand side of the vehicle. Fit the ball joint marked "R" to the right-hand side of the vehicle.

Then proceed in the same way as when refitting the lower wishbone.

# FRONT AXLE

## Brake pads

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### SPECIAL TOOLING REQUIRED

Fre.823

Brake caliper piston return tool

### TIGHTENING TORQUE (in daNm)

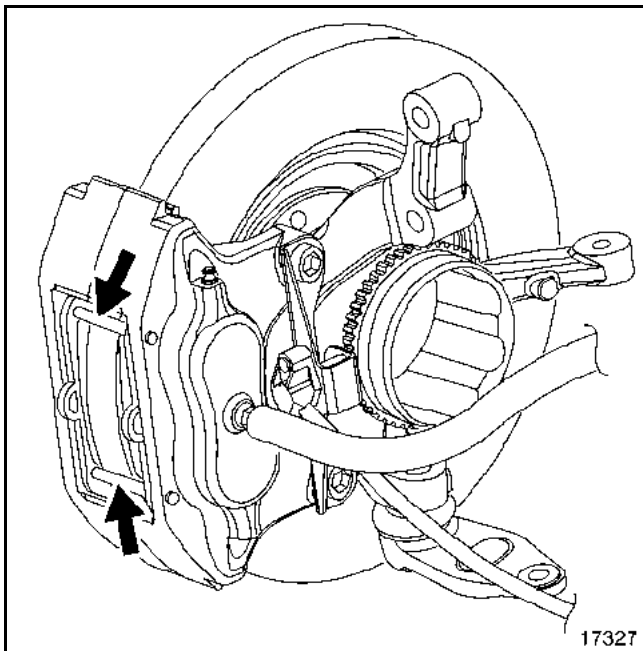


Wheel bolts

9

### REMOVAL

- Push the pistons back into place by hand.
- Remove the retaining pins, the sheath and the spring.
- Remove the brake pads.



### CHECKING

Check:

- the condition and position of the piston dust cover and its retaining spring.


### REFITTING

Push the caliper piston back using tool Fre. 823.

Fit new brake pads.

Fit the sheath, the spring and the retaining pin.

**Press the brake pedal several times in order to bring the piston into contact with the pads.**

TIGHTENING TORQUES (in daNm) 	
Wheel bolt	9
Brake caliper guide bolt	4
Brake caliper mounting bolt	10

REMOVAL

In the passenger compartment, fit a pedal press (limits the amount of brake fluid which will run out).

Release the brake pipe at the wheel cylinder end.

Remove the brake pads (see previous page).

Remove the two mounting bolts for the caliper on the stub axle carrier.

Completely release the brake pipe by turning the caliper.

Check the condition of the hose and replace it if necessary.

REFITTING

Fit the pipe onto the caliper.

Remove the pedal press.

To check the correct operation of the caliper cylinder, slacken the bleed screw and wait for brake fluid to run out.

Retighten the bleed screw.

Refit the caliper on the stub axle carrier and tighten the bolts to the recommended torque.

Refit the pads and the wheel cylinder (follow the method described previously).

REPAIR

**NOTE:** if there are any scratches in the caliper bore, the complete caliper must be replaced.


- To do this:
- remove the brake caliper.
  - remove the rubber dust seal.
  - remove the compressed air piston taking care to place a wooden block between the caliper and the piston to prevent damaging the piston: the piston will not be useable if there is any evidence of impact damage on the skirt.
  - remove the seal from the caliper groove using a round-edged flexible blade (feeler gauge type).

Clean the parts using methylated spirits.

Replace any faulty parts with original parts and then refit the seal, piston and dust seal.



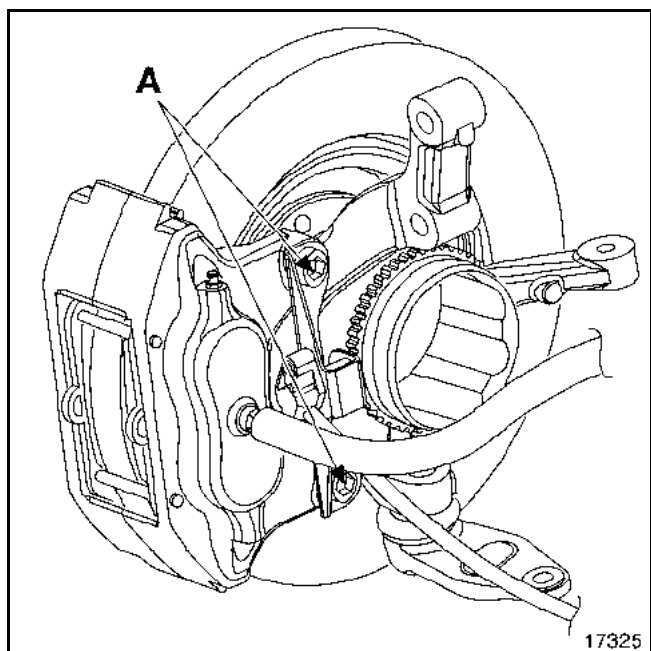
The brake discs cannot be redressed. If they are too worn or scratched they must be replaced.

TIGHTENING TORQUES (in daNm) 	
Wheel bolts	9
Brake caliper mounting bolt	10

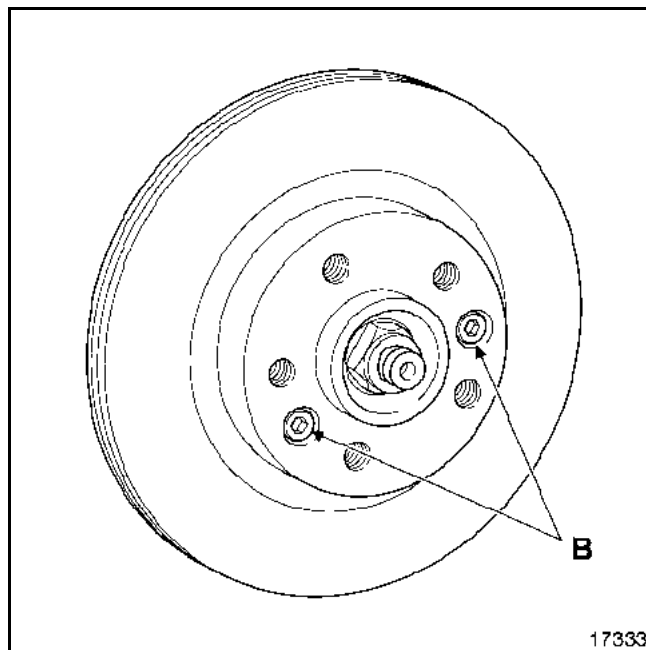
### REMOVAL

Remove:

- the two mounting bolts from the brake assembly (A),



- the two mounting bolts from the disc (B), Torx hexagon key (T40),
- the disc.



### REFITTING

Refit the disc to the hub and secure it in place with the two bolts (B).

Refit the brake caliper, coat the bolts with **Loctite FRENBLOC** and tighten.

**NOTE:** the pads must be replaced as well if a brake disc is replaced.

**Press the brake pedal several times in order to bring the piston into contact with the pads.**

# FRONT AXLE

## Stub axle carrier bearing

**31**

### SPECIAL TOOLING REQUIRED

Rou. 15-01	Puller protection cup
Rou. 604-01	Hub locking tool
T. Av. 476	Ball joint extractor
T. Av. 1050-02	Tool for pushing driveshaft back

### TIGHTENING TORQUES (in daNm)



Driveshaft nut	28
Wheel bolt	9
Shock absorber base nut	18
Brake caliper mounting bolt	10
Track rod end nut	3.7
Key nut on stub-axle carrier	5.5

### REMOVAL

Disconnect the battery.

Remove:

- the wheel,
- the brake caliper and attach it to the spring so as not to damage the pipe,
- the track rod end using the tool **T. Av. 476**,
- the driveshaft nut.

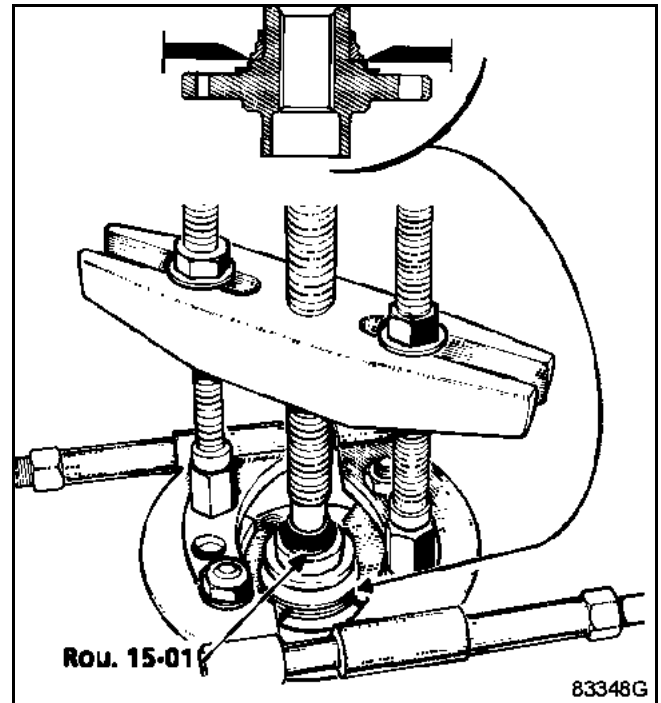
Push the driveshaft back using tool **T.Av.1050-02**.

Remove:

- the brake disc,
- the nut and the key from the lower ball joint,
- the two bolts of the shock absorber base,
- the hub/stub axle carrier/bearing assembly.

Remove the hub using a press.

Remove the lower bush from the hub using an extractor with jaws and tool **Rou. 15-01**.



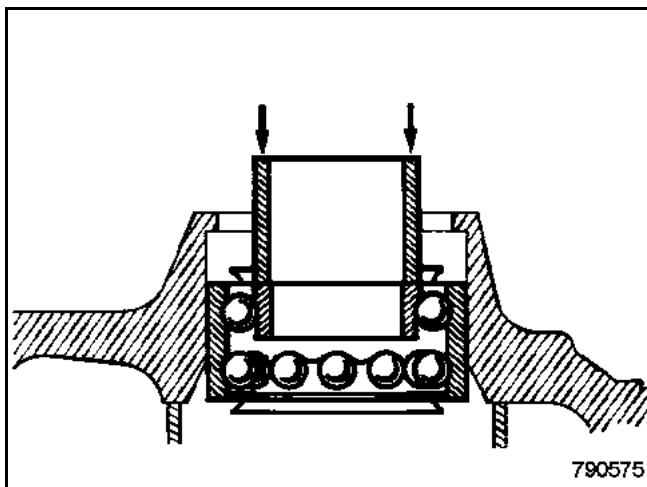
Remove the locking spring ring from the stub axle carrier.

Using the press remove the rest of the bearing by applying pressure to the inner race with a tube of the same diameter.

# FRONT AXLE

## Stub axle carrier bearing

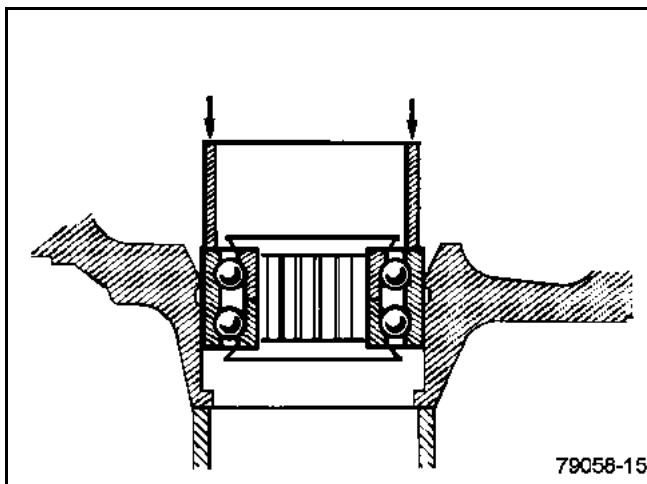
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### REFITTING

Using the press, fit the bearing into the stub-axle carrier with a tube with an exterior diameter of **70 mm** and a bore of **66 mm**: apply the pressure to the outer race.

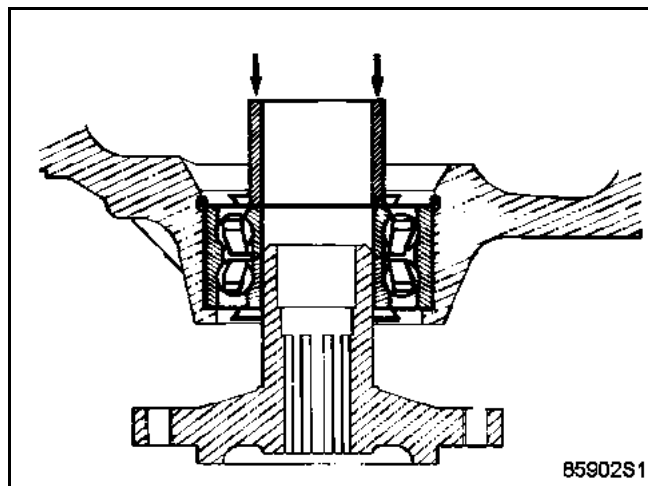
**WARNING:** do not use the inner race for support so as to avoid damaging the bearing as a significant force is used for fitting.



Fit a new locking spring ring.

Coat each of the bearing's sealing lips with multipurpose grease.


Using the press, fit them with the aid of a tube with an external diameter of **48 mm** and an internal diameter of **42 mm**: apply the pressure to the inner bearing race.



Refit the hub / stub axle carrier / bearing assembly to the vehicle.

Then proceed in reverse order to removal observing the tightening torques.

EQUIPMENT REQUIRED
Spring compressor

TIGHTENING TORQUES (in daNm)	
Shock absorber base mounting bolt	18
Rebound stop nut	6
Wheel bolts	9

REMOVAL

Put the vehicle on a 2 post lift.

- Remove:
- the wheels,
  - the mounting bolts of the shock absorber base.

**NOTE:** release the ABS sensor wiring if this is fitted on the base of the shock absorber.

Remove the upper shock absorber nut in the engine compartment.

Remove the shock absorber and spring assembly.

Refitting a shock absorber

To refit the shock absorber, put the shock absorber in a vice and compress the spring using the spring compressor.

Remove the retaining nut of the spring.

Remove the spring and the intermediate parts.

If necessary, replace the shock absorber pad and the rotating stop.

When refitting, ensure that the constituent parts are in their correct locations and decompress the spring.

**NOTE:** apply grease between the ends of the spring and its stops.

REFITTING

Proceed in the reverse order to removal, respecting the tightening torques.

### SPECIAL TOOLING REQUIRED

Sus. 1413	Central bearing compressor
Sus. 1414	Rubber mounting compressor

### TIGHTENING TORQUES (in daNm)



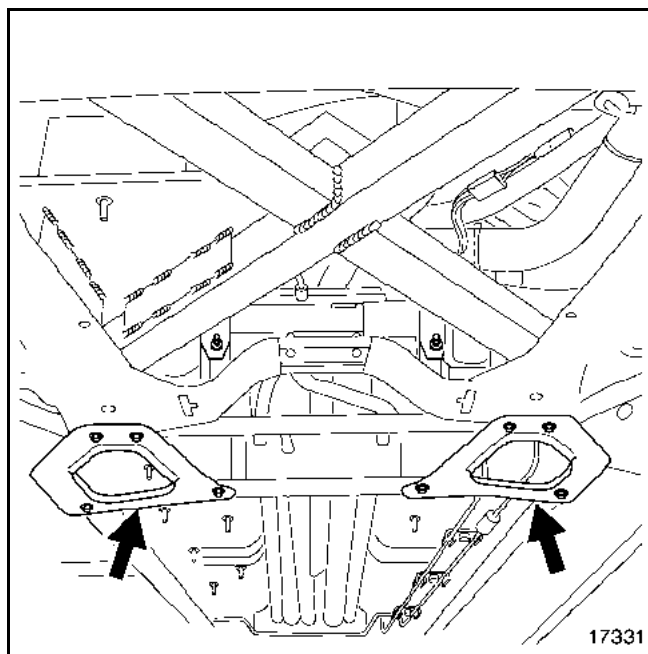
Central bearing bolt	3
Securing nut for rubber mounting	1.5

### REMOVAL

Place the vehicle on a two-post lift.

Remove:

- the two pairs of reinforcement plates from the chassis subframe (4 bolts),

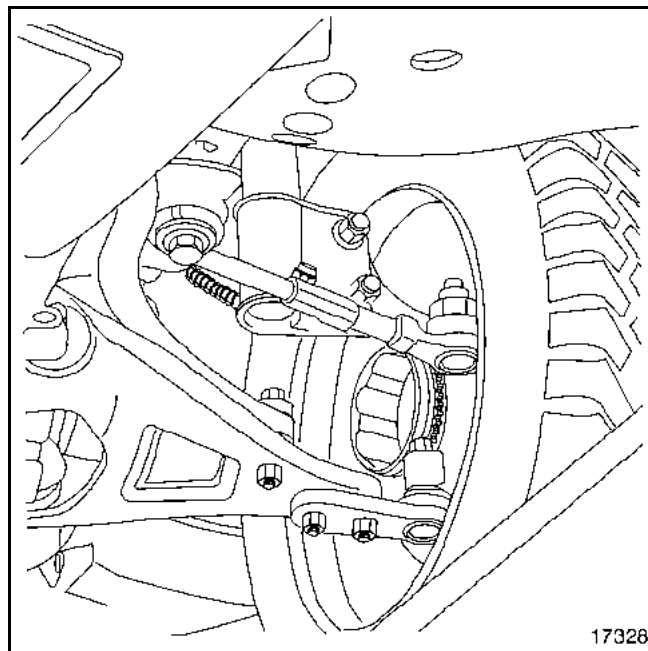


- the two rubber mounting nuts at the ends of the anti-roll bar,
- the two central bearing bolts on the bar.

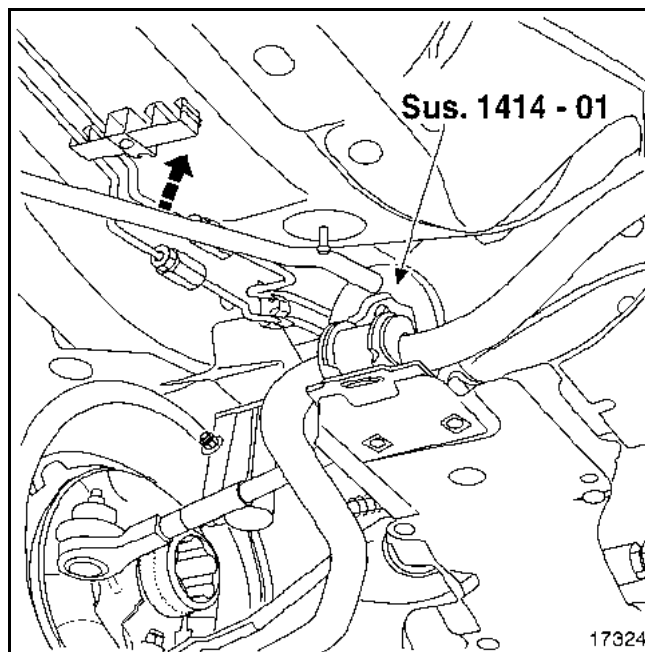
Check the condition of the bearings and the rubber nuts and replace them if necessary.

### REFITTING

Refitting is in reverse order to removal. Observe the correct tightening torques.



- the central bearing bolts using tool **Sus. 1414-01**.



- the two subframe reinforcements.

Rubber bush locking position: **UNLADEN**.

SPECIAL TOOLING REQUIRED	
Mot.1040-01	Support cradle for removal/refitting engine and gearbox unit
T. Av. 476	Ball joint extractor

TIGHTENING TORQUES (in daNm)		
Wheel bolt		9
Track rod end nut		3.7
Steering column universal joint eccentric bolt		2.5
Sub-frame mounting bolt	front Ø 10	6
	rear Ø 12	10.5
Subframe-side member tie-rod nut		3
Key nut on stub axle carrier		5.5
Torque reaction arm		6.5
Steering rack mounting bolts		5



### REMOVAL

Disconnect the battery.

Put the vehicle on a 2 post lift.

Remove the wheels.

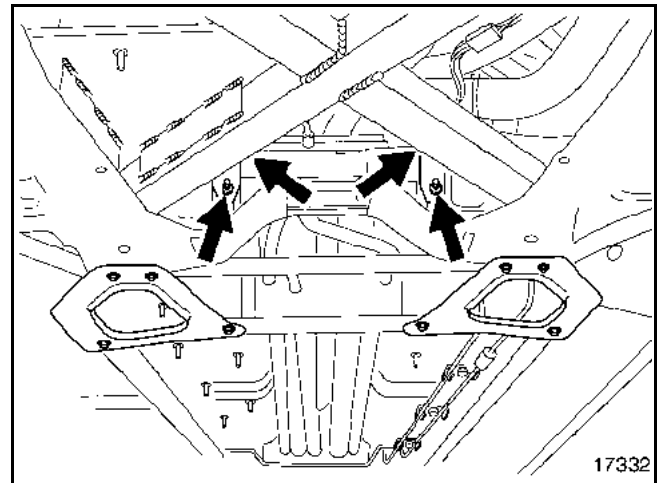
Disconnect the track rod ends using tool **T. Av.476**.

Remove the key on the stub axle carrier.

Release but do not remove the mudguards to gain access to the upper bolt of the sub-frame - side member tie rod.

Remove:

- the two nuts from the heat shield of the steering rack.
- the mounting nuts from the steering rack and attach the rack to the exhaust manifold.



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Attach tool **Mot. 1040-01** under the subframe.

Lower the lift until the tool touches the ground.

Remove the sub-frame mounting bolts.

Carefully raise the lift

### REFITTING

Replace the engine sub-frame mounting bolts as a matter of course and ensure they are tightened to the correct torque.

Proceed in the reverse order to removal.

**NOTE:** the subframe is fitted to the bodywork as follows:

- fit 2 pins in place of the front mounting bolts,
- offer up the subframe,
- screw in, but do not lock, the longest rear right mounting bolt,
- replace the pins with mounting bolts at the front,
- tighten the 4 mounting bolts to the correct torque, starting at the rear,
- refit the heat shields correctly.

SPECIAL TOOLING REQUIRED

Fre.823

Brake caliper piston return tool

TIGHTENING TORQUES (in daNm)



Wheel bolts

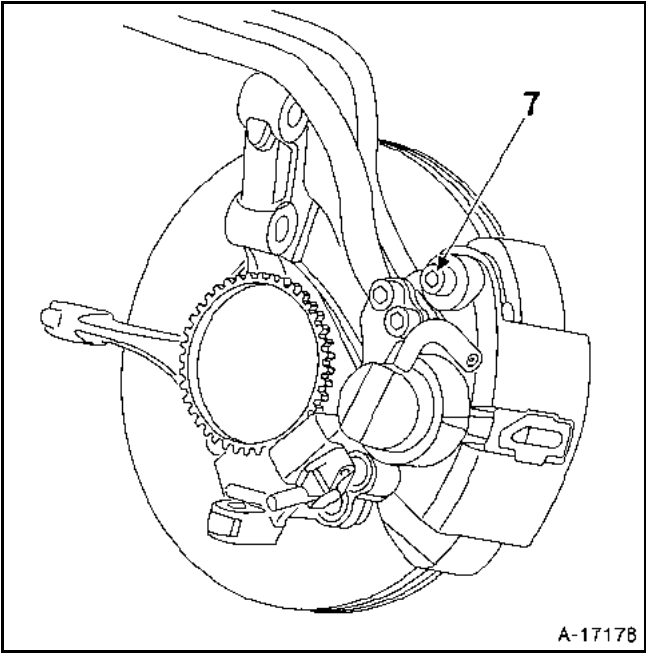
9

Brake caliper guide bolts

4

REMOVAL

Push back the piston by manually sliding the caliper towards the outside.



Remove the guide bolt (7).

**Do not clean this bolt.**

Remove:

- the sliding caliper,
- the pads.

REFITTING

Push back the piston of the master cylinder.


Fit the new brake pads.

Refit the caliper and adjust the guide bolt.

Tighten the guide bolt (7) to the recommended torque.

**Press the brake pedal several times to bring the piston into contact with the pads.**



TIGHTENING TORQUES (in daNm)		
Wheel bolts	9	
Brake caliper guide bolts	4	
Brake caliper mounting bolt	10	

REMOVAL

- In the passenger compartment place a press on the pedal (limits the amount of brake fluid which will run out).
- Remove the gear lever handle and the trim.
- Remove the centre console (4 mounting bolts) and the gear lever cover.
- Undo the handbrake adjusting nut and note the adjustment setting.
- Disconnect the handbrake cable from the caliper and disassemble the assembly.
- Take off the brake pipe at the cylinder end.
- Remove the brake pads (see previous page).
- Remove the two caliper assembly bolts on the stub axle support.
- Take off the brake pipe completely by turning the caliper.
- Check the condition of the pipe and replace it if necessary.


REFITTING

- Place the pipe on the caliper.
- Remove the press from the pedal.
- To check that the caliper cylinder is working properly, unscrew the bleed screw until brake fluid runs out.
- Retighten the bleed screw.
- Refit the caliper to the support.
- Refit the pads and the cylinder using the method described previously.
- Fit the handbrake cable to the assembly and the caliper lever.
- Adjust the handbrake cable nut, carry out several tests and check the setting (1 to 2 notches should move the caliper lever).
- Refit the gear lever cover and the centre console (4 mounting bolts).
- Refit the gear lever handle and the trim.

REPAIR

- NOTE:** if the caliper bore has even the slightest scratch on it, the assembly must be replaced.
- To do this:
- Take off the brake caliper.
  - Remove the compressed air piston, place a wooden block between the caliper and the piston to prevent damage to the piston skirt (which would make it unusable).
  - Remove the caliper groove seal using a round-edged flexible blade (a feeler gauge for example).
- Clean the parts using methylated spirits.
- Replace the damaged parts with original parts, then refit the piston and the seal.

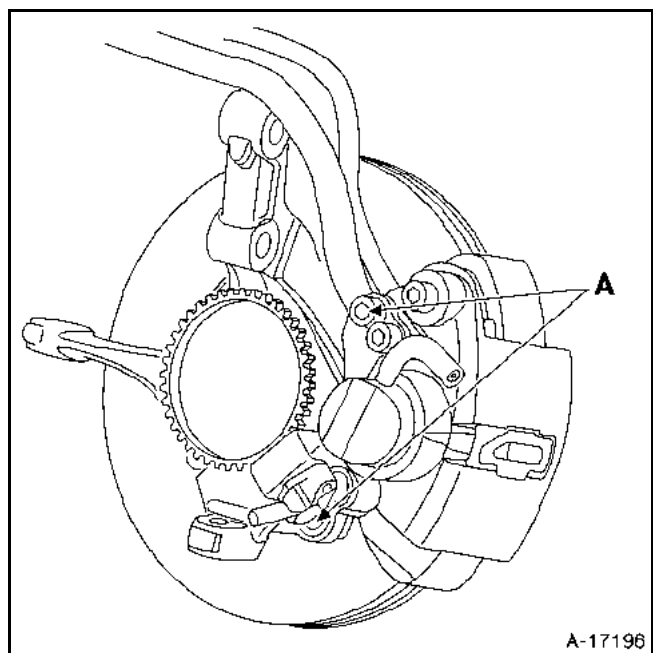
The brake discs cannot be repaired. They must be replaced if they are too worn or scratched.

TIGHTENING TORQUES (in daNm) 	
Wheel bolts	9
Brake caliper mounting bolt	10

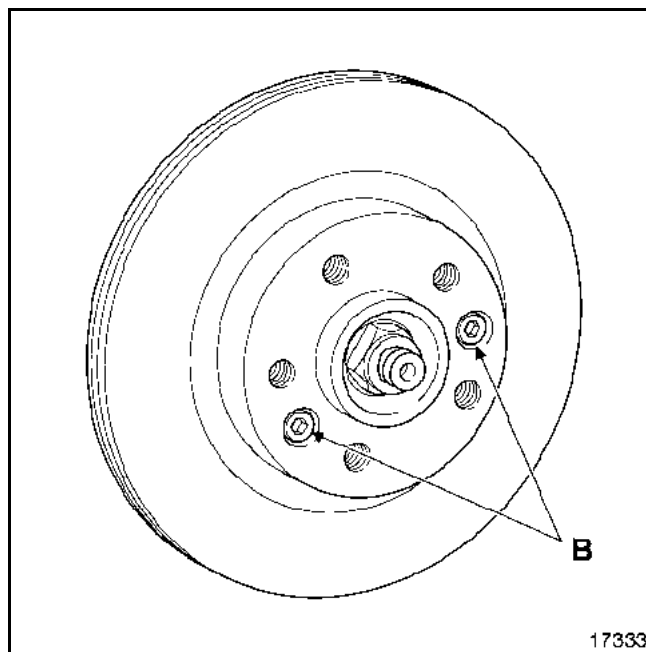
### REMOVAL

Remove:

- the two mounting bolts (A) of the brake assembly.



- the two mounting bolts of the disc (B).



### REFITTING

Refit the disc onto the hub and secure it in place with the two bolts (B).

Refit the brake caliper, re-coat the bolts with **Loctite FRENBLOC** and tighten to the required torque.

**NOTE:** when replacing a brake disc, the pads must also be renewed.

**Press the brake pedal several times to bring the piston into contact with the pads.**

# REAR AXLE

## Stub-axle carrier

**33**

### SPECIAL TOOLING REQUIRED

Rou. 15-01	Puller protection cup
Rou. 604-01	Hub locking tool
T. Av. 476	Ball joint extractor
T. Av. 1050-02	Driveshaft extractor

### TIGHTENING TORQUES (in daNm)



Driveshaft nut	28
Wheel bolt	9
Shock absorber base nuts	18
Brake caliper mounting bolt	10
Track rod end nut	3.7
Key nut on stub axle carrier	5.7

### REMOVAL

Disconnect the battery.

Remove:

- the wheel,
- the brake caliper and attach it to the spring so as not to damage the pipe,
- the track rod end using tool **T.Av. 476**
- the driveshaft nut,

Push back the driveshaft using tool **T. Av. 1050-02**

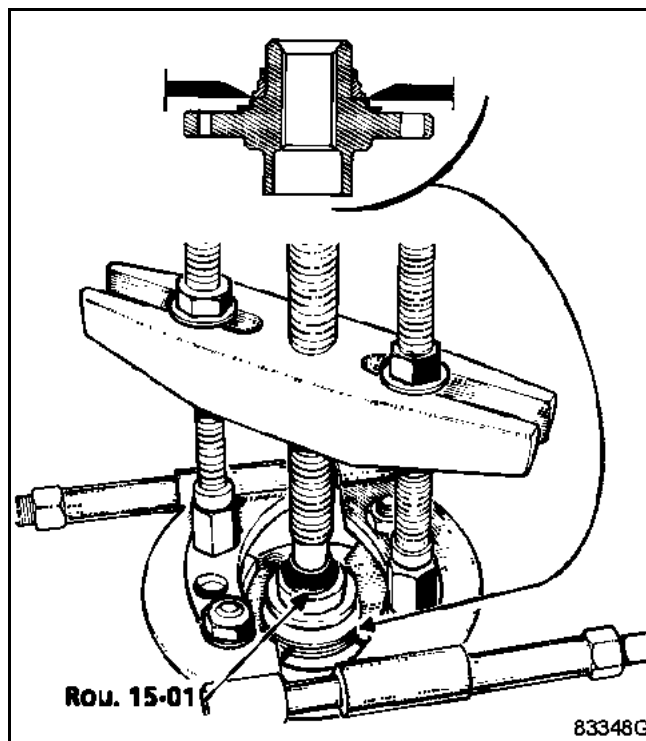
Push back the driveshaft using tool **T. Av.1050-02.**

Remove:

- the brake disc.
- the lower ball joint nut and key,
- the two bolts of the shock absorber base,
- the hub/stub-axle carrier/bearing assembly.

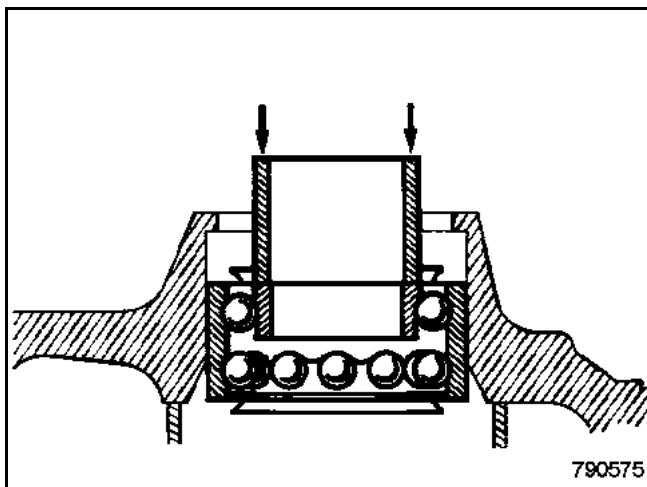
Using the press, remove the hub.

Remove the lower bush from the hub using an extractor with jaws and tool **Rou. 15-01**.



Remove the locking spring ring from the stub axle carrier.

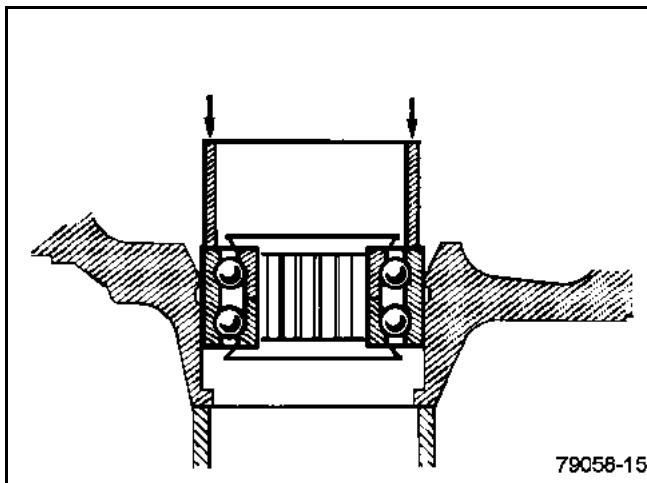
Using the press, remove the rest of the bearing by pressing on the inner race using a tube of the same diameter.



### REFITTING

Using the press fit the bearing into the stub-axle carrier with the aid of a tube with an exterior diameter of **70 mm** and a bore of **66 mm**: apply the pressure to the outer race.

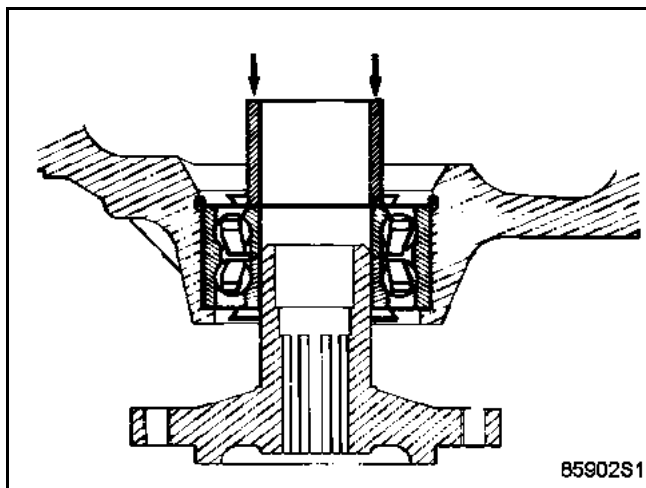
**WARNING:** do not use the inner race for support so as to avoid damaging the bearing as a significant force is used for fitting.



Fit a new locking spring ring.


Coat each of the bearing's sealing lips with multipurpose grease.

Using the press, fit them with the aid of a tube with an external diameter of **48 mm** and an internal diameter of **42 mm**: apply the pressure to the inner bearing race.



Refit the hub / stub axle carrier / bearing assembly to the vehicle.

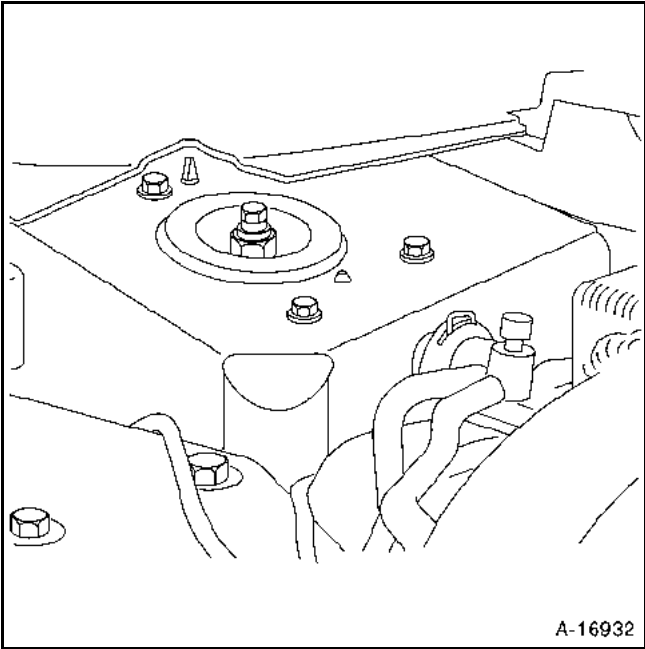
Then proceed in reverse order to removal observing the tightening torques.

TIGHTENING TORQUES (in daNm)		
Shock absorber assembly bolt	18	
Locknut	6	
Wheel bolts	9	

REMOVAL

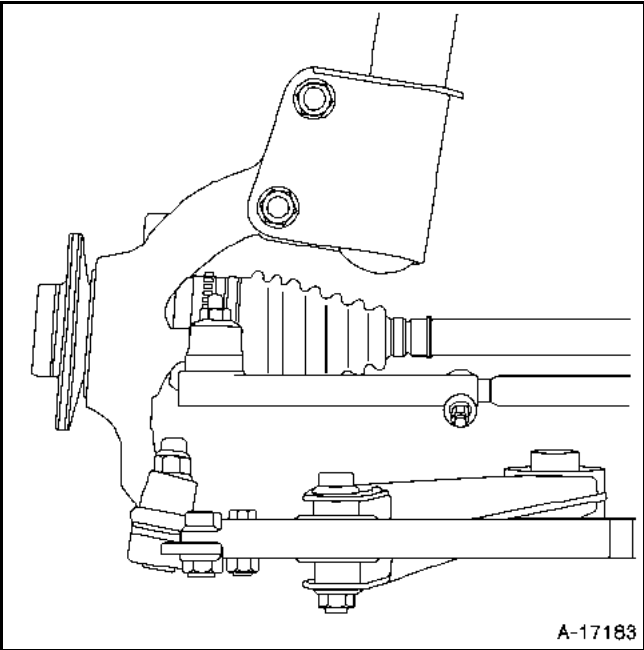
Place the vehicle on a two-post lift.

- Remove:
- the wheels,
  - Remove the upper shock absorber nut in the engine compartment.



**IMPORTANT:** do not use power tools to install and remove the upper shock absorber nut because this may damage the unit.

- Remove:
- the shock absorber mounting bolts,
  - the spring/shock absorber assembly.



Refitting a shock absorber

When replacing a shock absorber, fit it in a vice and compress the spring using a suitable tool.

Remove the spring's mounting nut.

Remove the spring and the intermediate parts.

If necessary replace the upper base and the stop.

When refitting, check that all the components are in place, then release the spring.

**NOTE:** apply grease between the end of the spring and its stops.

REFITTING

Continue the refitting procedure in the reverse order to removal. Observe the correct tightening torques.

### TIGHTENING TORQUES (in daNm)



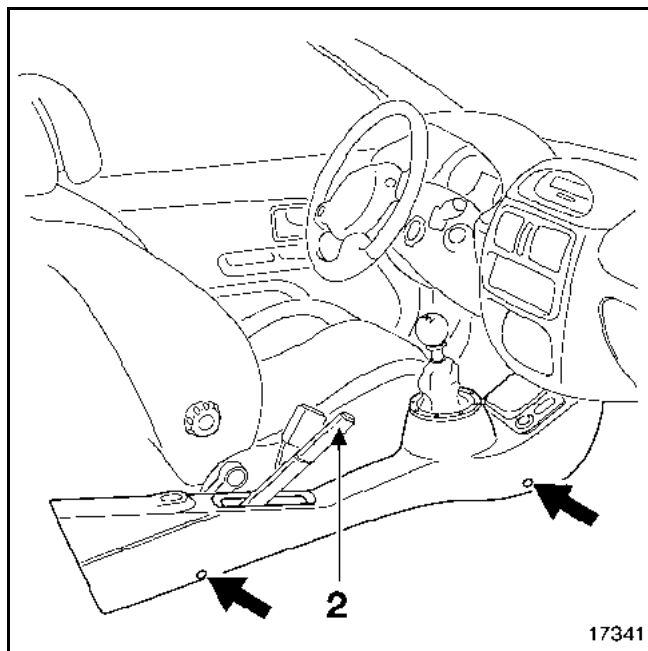
Wheel bolts	9
Front sub-frame mounting bolts	9
Rear sub-frame mounting bolts	9

### REMOVAL

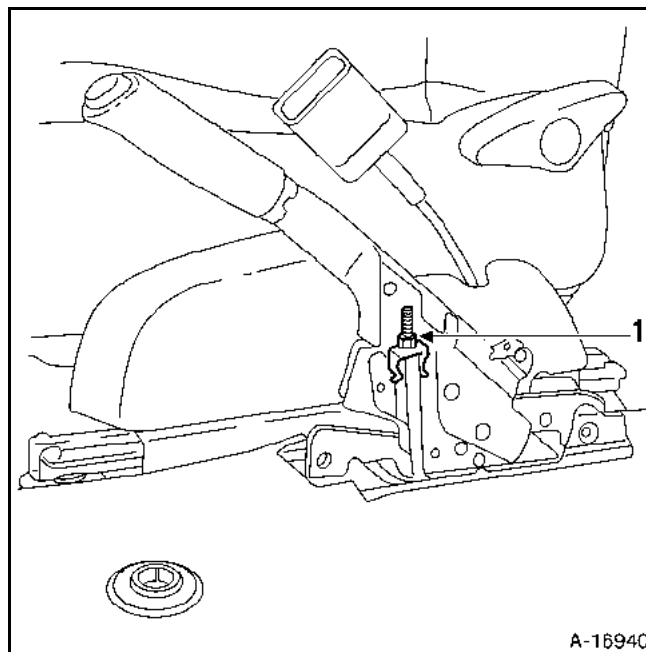
Put the vehicle on a 2 post lift.

Release the handbrake.

Remove the centre console and the trim of the gear lever (4 mounting bolts for the console), then the handbrake lever cover (2).

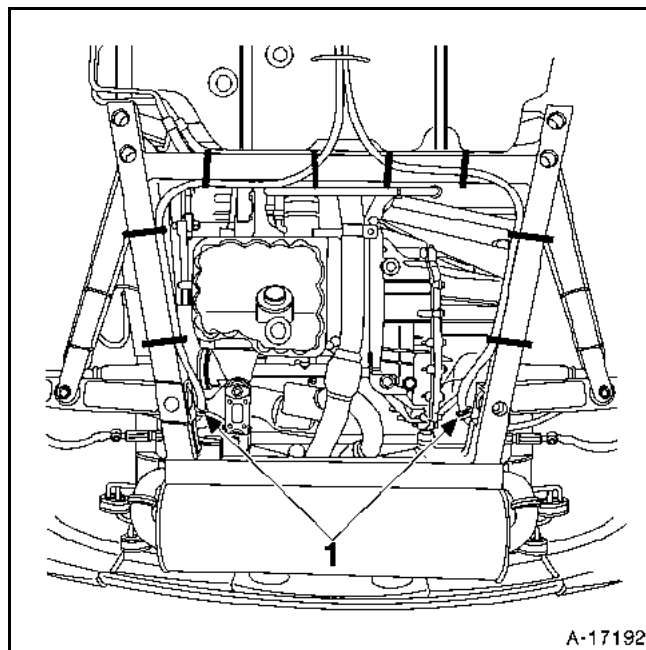


Loosen the handbrake adjusting nut (1) and note the dimension X (approximately 20 mm) then free the cable.



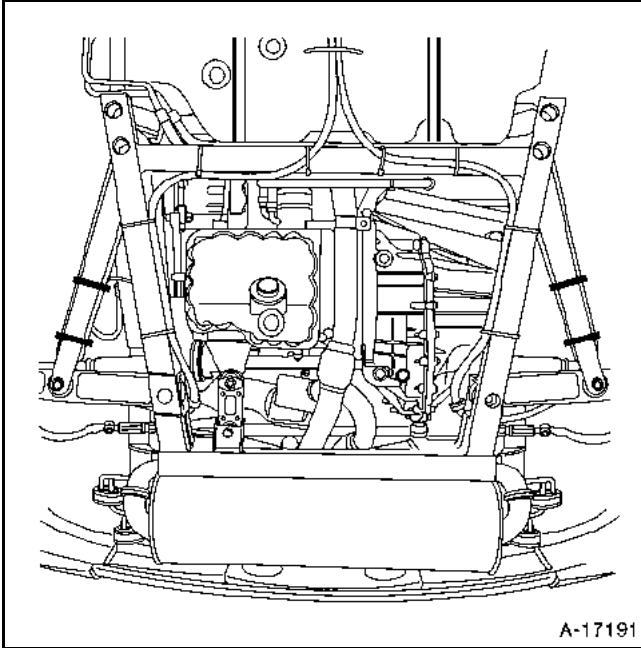
Remove the rear wheels.

Disconnect the handbrake cables from the brake calipers.



Remove the brake cables from the subframe (the clip, the bolt with slip "P" (1) and the cables), disconnect the cables from the subframe.

Remove the ABS sensor cables on the suspension arm.



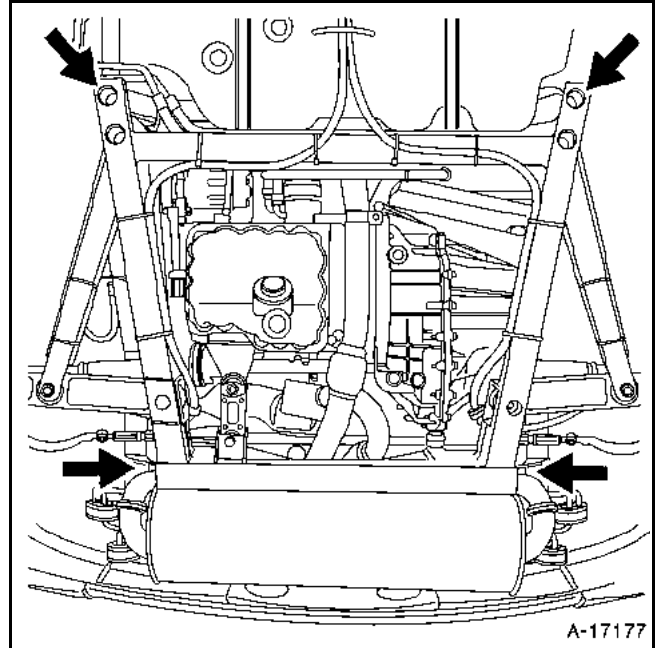
Remove the mounting nut of the suspension arm ball joint.

Remove the suspension arms from the stub-axle carrier.

Insert a shim between the shock absorber and the chassis to keep the suspension and the hub/brake assembly of the subframe separate.

Remove the mounting bolt of the lower torque reaction arm.

Support the subframe and remove the mounting bolts, then detach it from the body.



### REFITTING

For refitting, proceed in reverse order to removal. Observe the tightening torques and fit new clips to hold the handbrake cables and the ABS sensor wiring in place.

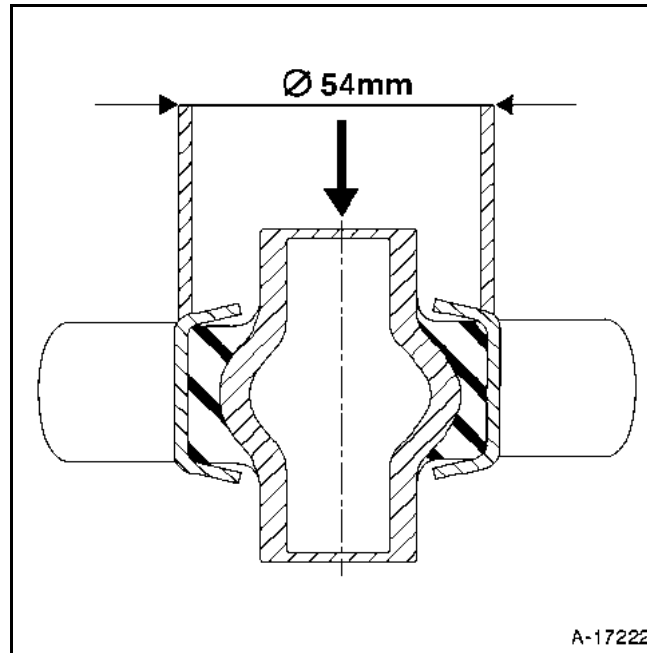
# REAR AXLE

## Rear suspension arm bushes

33

On the press, support the suspension arm and remove the gaiters using a tube with an exterior diameter of **54 mm**.

Refit the new gaiter, ensuring that it is in line with the suspension arm hole.





WHEEL RIMS

There are two forms of wheel identification marking:  
– engraved marking for steel wheel rims,  
– cast marking for alloy rims.

The marking gives the main dimensional specifications of the wheel.

The marking may be complete:

**Example: 5 1/2 J 14 4 CH 36**

or simplified:

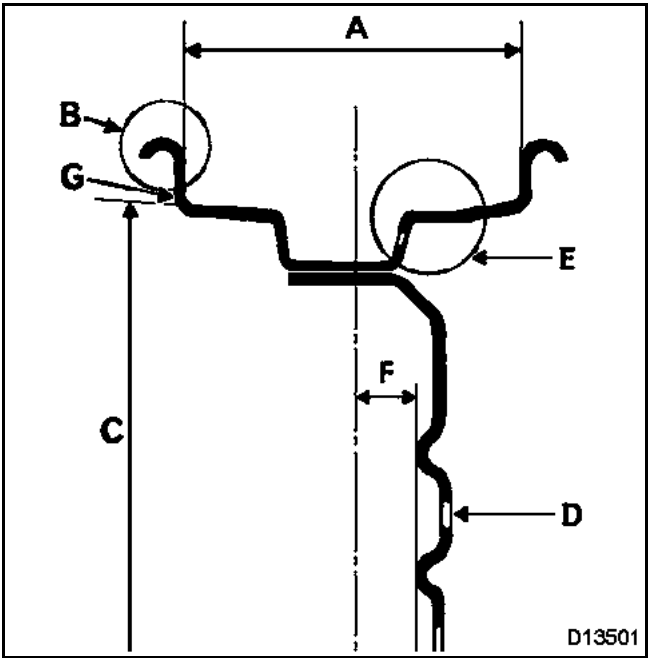
**Example: 5 1/2 J 14**

	A	B	C	D	E	F
Type of wheel	WIDTH (in inches)	RIM PROFILE	NOMINAL DIAMETER (in inches) below the tyre bead	Number of holes	Profile of the tyre bead wire	Offset (in mm)
5 1.2 J 14 4 CH 36	5 1/2	J	14	4	CH	36

The wheel bolts are over a diameter of **100 mm**  
(4 mounting bolts).

**Maximum run-out: 1.2 mm** measured on the rim  
edge (at G).

**Maximum eccentricity: 0.8 mm** measured on the  
pressure face of the tyre beads.



TYRES

Examples of identification marking

205/50 R 17 89 ZR

205 / 50 R 17 89 ZR

1

2

4

5

6

3

1

205

Width of the tyre in mm (l) section

2

50

Ratio  $\frac{h}{l}$

height

width

4

R

Radial structure

5

17

Internal diameter in inches (Ø). Corresponds to the diameter of the rim

6

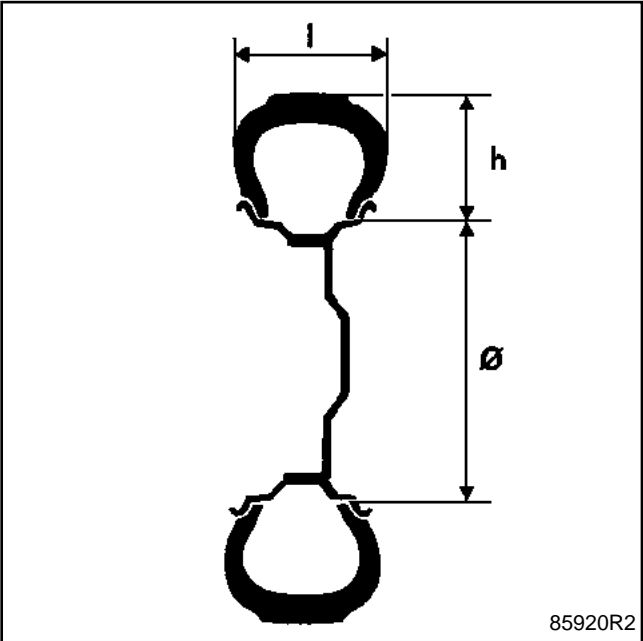
89

Load index

3

ZR

Speed code for 240 km/h and above



Some speed symbols:	Maximum speed	kph
	R	170
	S	180
	T	190
	U	200
	H	210
	V	240
	ZR (and above)	240

Structure of the tyres:

Cross ply	No marking
Radial	R
Grooved	B

# WHEELS AND TYRES

## Specifications

35

Tyre manufacturer	Rim		Tyres		Pressure when cold (bar)	
	Front	Rear	Front	Rear	Front	Rear
Michelin Sport	7J17	8.5J17	205/50 ZR17	235/45 ZR 17	1.6	2.1

Wheel nut tightening torques: 9 daNm

Wheel run-out: 1.2 mm

The tyre pressures must be measured when the tyres are cold. The increase in temperature that occurs when driving also increases the pressure by 0.2 to 0.3 bar.

If the pressure is measured when the tyres are hot, this increase must be taken into account.

**Never deflate a hot tyre.**

**"Snow" or "thermorubber" tyres:** Recommended tyre sizes 205/50-17 (front), 225/45-17 (rear).

You are advised to fit all four wheels with these tyres in order to retain your vehicle's roadholding properties as much as possible.

**Note:**

These tyres sometimes have a defined direction of rotation and a maximum operating speed that is lower than the maximum speed of your vehicle.

**Chains**

They must only be fitted to the rear axle.

They should only be fitted to the "thermorubber" tyres.

Weissenfels M30-10 chains for tyres 225/45-17, part number 6020011294.

**Studded tyres**

These should only be used for a limited period. Their use is governed by local legislation.

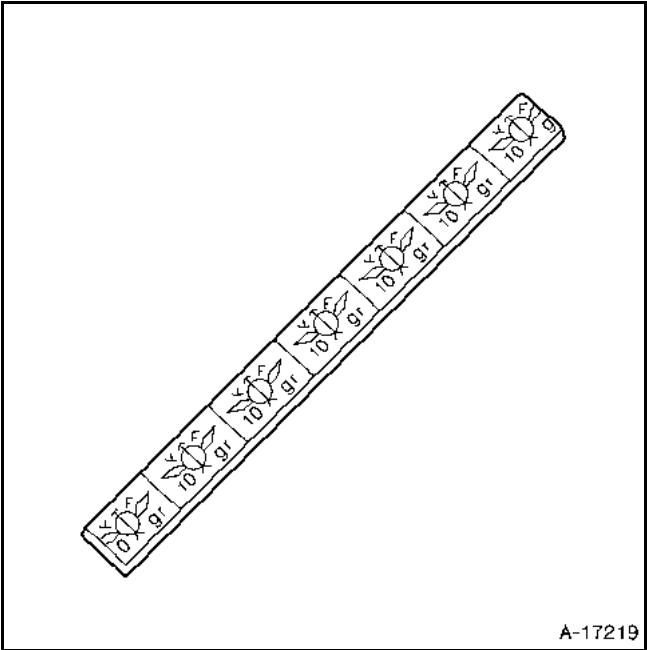
The speed imposed by current legislation must be observed.

These tyres must be fitted to both the front and rear wheels.

However, **the two rear wheels must be fitted as a bare minimum.**

WEIGHTS

Use only the replacement weights:




# STEERING ASSEMBLY

## Axial ball joint

36

SPECIAL TOOLING REQUIRED	
Dir.1305 -01	Axial ball joint removal/refitting tool
Dir.1306	SMI steering rack support tool
T. Av. 476	Ball joint extractor

TIGHTENING TORQUES (in daNm)	
Wheel bolt	9
Track rod end nut	3.7
Parallelism adjustment sleeve bolt	1.7
Axial ball joint	5

Place the vehicle on a two post lift.

### REMOVAL

Disconnect the track rod end using tool **T.Av. 476**.

Slacken the bolt on the parallelism adjustment sleeve and slacken the track rod end while holding the axial ball joint using an open wrench.

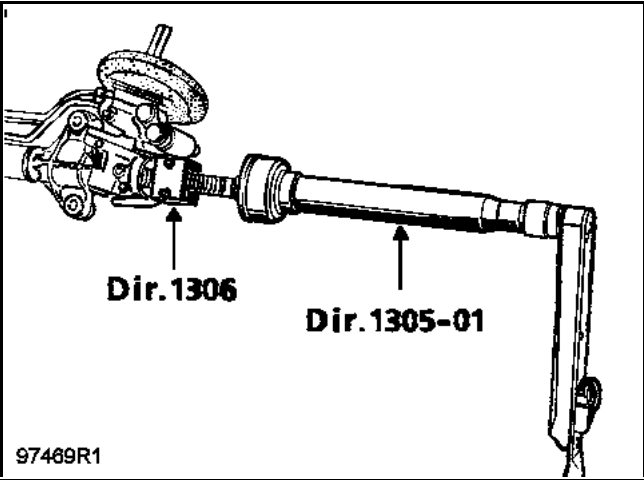
Make a mark or count the number of turns of thread taken up so the parallelism can be readjusted on refitting.

Remove the plastic retaining clip for the gaiter and remove the gaiter.

Turn the wheels so the rack teeth are freed on the valve side.

Fit tool **Dir.1306**.

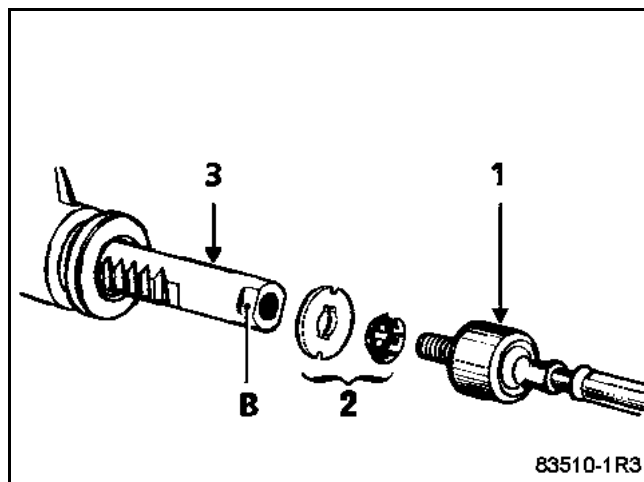
In this position, release the axial ball joint using tool **Dir. 1305-01**.



### REFITTING

Assembly (2) **MUST** be replaced as a matter of course.

**NOTE:** assembly (2) is only fitted if the vehicle has manual steering.



Refit the following to the rack (3):

- the stop washer assembled with the locking ring (2),
- the new axial ball joint (1) having lightly coated the threads with **LOCTITE FREN-BLOC**, ensuring that the air evacuation opening is not blocked.

Before finally tightening the axial ball joint using tool **Dir. 1305-01**, check that the tabs of the locking ring (2) are in line with the flat surfaces (B) of the steering rack (in the case of manual steering).

Tighten the axial ball joint to the recommended torque.

Centre the steering to equalise the air in the gaiters.

Centre the steering to equalise the air in the gaiters.

Fit a new gaiter and secure it with a new clip (after greasing the gaiter bearing surface on the axial ball joint).

### CHECKING

Gently press on the gaiter to check that the other gaiter inflates which indicates the air is circulating correctly.

# STEERING ASSEMBLY

## Power assisted steering rack

36

### SPECIAL TOOLING REQUIRED

Mot.453-01	Hose clamp pliers
T.Av.476	Ball joint extractor

### TIGHTENING TORQUES (in daNm)



Wheel bolt	9
Track rod end nut	3,7
Steering rack mounting bolts	5
Steering column universal joint eccentric bolt	2.5
Torque reaction arm bolt	6.5

Place the vehicle on a two post lift.

### REMOVAL

Remove the front wheels.

Place the pliers **Mot. 453-01** on each of the oil reservoir pipes.

**NOTE:** never tighten the high pressure pipes.

Remove (from above):

- the **high** and **low** pressure pipes on the steering valve.

Cut the rubber gaiter retaining clip and push the gaiter back towards the bulkhead.

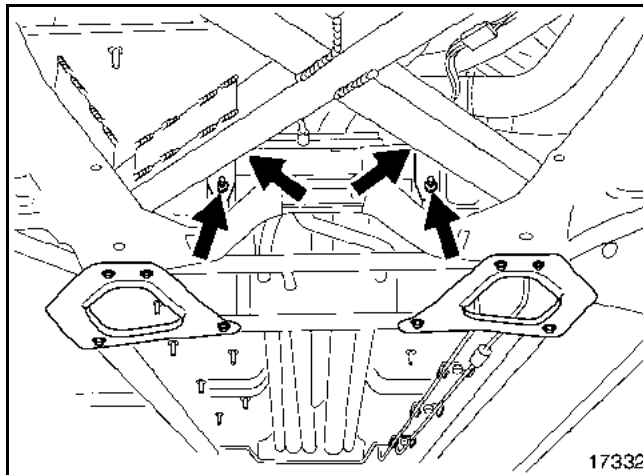
Disconnect the ball joints using tool **T.Av. 476**.

Remove the universal joint eccentric bolt.

Disconnect the **high** and **low pressure** pipes on the steering rack (take precautions to catch the oil) and the nut on the pipe retaining bracket.

Removal:

The steering rack mounting nuts and remove the steering rack from the right-hand side of the vehicle.



### NOTE:

- do not remove the pipes between the valve and cylinder,
- fit plugs to the steering rack openings to prevent the introduction of impurities.

### REFITTING

Proceed in the reverse order to removal, respecting the tightening torques.

Fill the circuit with oil.

Turn the wheels from left to right (engine not running) to distribute the oil in the circuit.

Repeat the operation with the engine running then top up the level.

If a new steering rack is being fitted, fit the track rod ends in the position noted on removal.

To do this, slacken the bolt on the parallelism adjustment sleeve and slacken the track rod end while holding the axial ball joint using an open wrench.

Make a mark or count the number of turns of thread taken up so the parallelism can be readjusted on refitting.

Check the parallelism.

The gaiter **MUST** be replaced by a new gaiter whenever an axial ball joint is removed.

### Fitting the gaiter

Use an ogive on the axial ball joint to prevent damage to the gaiter during fitting.

Coat the gaiter bearing face on the axial ball joint with grease to prevent the gaiter twisting.

Secure the gaiter with a new clip (supplied with the gaiter).

**NOTE:** The steering **MUST** be at the centre point to equalise the air.



### ADJUSTMENT

If the steering rack pinion is noisy, before considering replacing the steering rack, check that the pinion is correctly adjusted.

#### 1. Determining the source of the noise

Hold the steering rack on the pinion side and check for transverse play (up and down). Movement followed by a click is caused by the pinion.

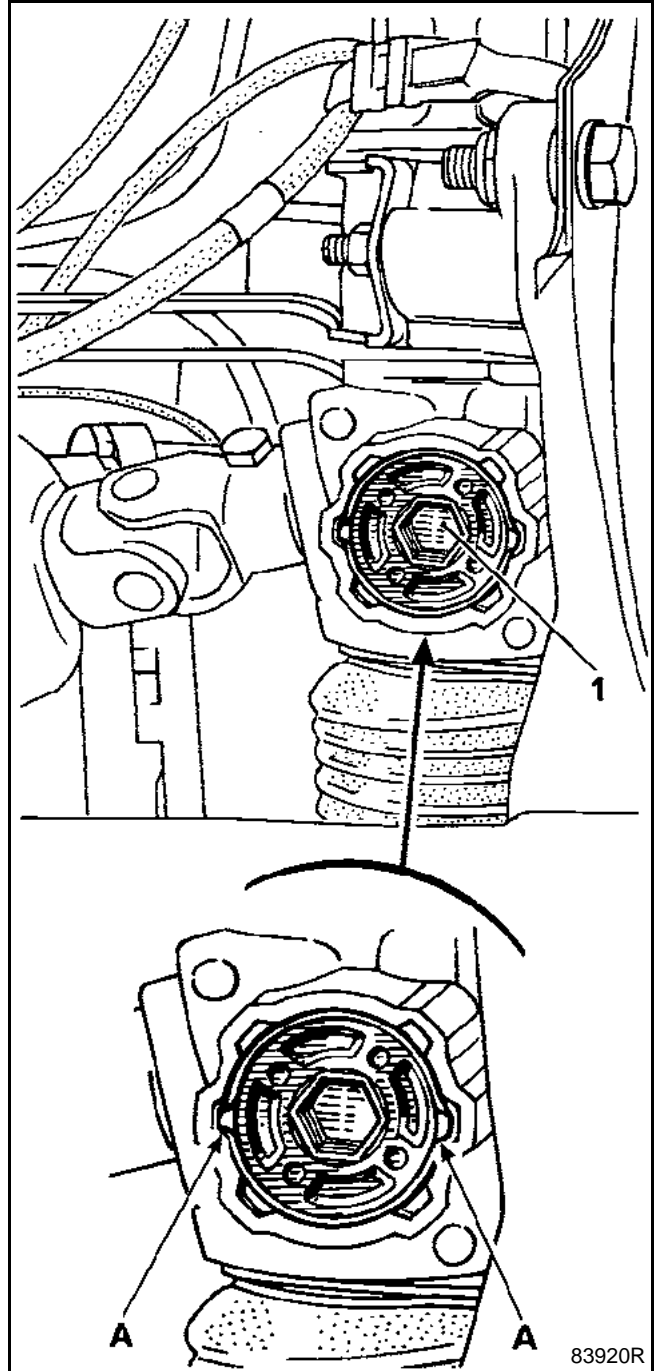
#### 2. Adjusting for SMI steering racks

Release the adjusting nut (1) by straightening the bent over edges (A) on the nut collar.

Check when driving that the steering returns to the centre point.

Maximum adjustment allowed: **1 notch**.

Lock the nut again in the two lugs opposite the housing by bending over the nut collar.



83920R

SPECIAL TOOLING REQUIRED

Mot. 453-01     Hose clamp pliers

TIGHTENING TORQUES (in daNm)



PAS pump mounting bolt	2
Alternator mounting bolt	4
PAS pump bolt on the driveshaft drum	1

REMOVAL

Disconnect the battery.

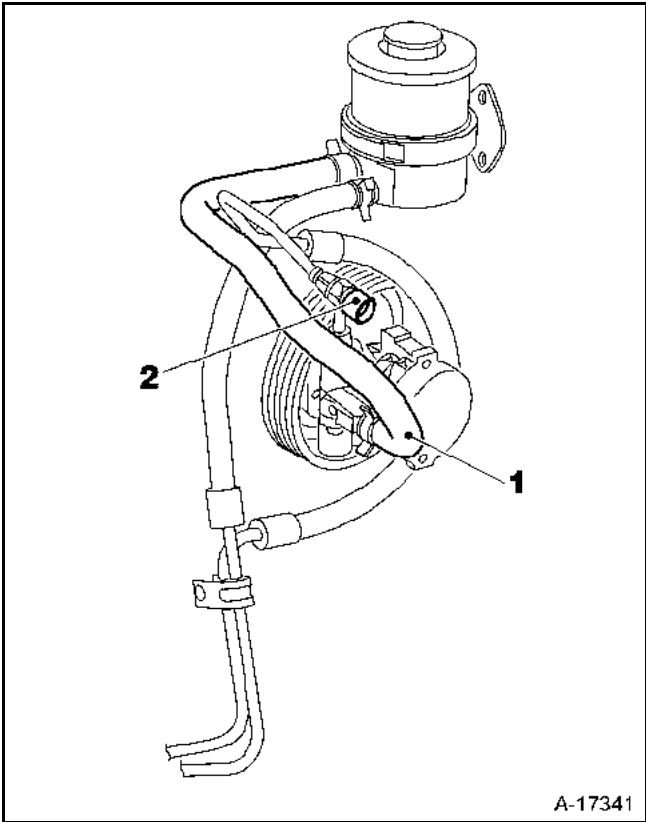
Place the vehicle on a two-post lift.

Remove:

- the engine covers,
- the lower engine plate,
- the accessories belt (see method described in **Section 07 Accessories belt tension**).

Drain the power assisted steering circuit:

Remove the power steering pump pulley (4 bolts).



A-17341

Place pliers Mot. 453-01 on the high pressure pipe (1) at the pump inlet opening.

Remove:

- the pressure switch (2) of the high pressure pipe,
- the high and low pressure pipe clips, using a pipe spanner,
- the power steering pump by removing the three bolts securing it to its bracket.

**NOTE:** when carrying out this operation, protect the alternator from any power steering fluid that may escape.

REFITTING

Refitting is done in reverse order to removal, observing the tightening torques.

Refit the accessories belt (see the method described in **Section 07 Accessories belt tension**)

**NOTE:** the accessories belt is tensioned automatically by a tensioner.

Fill and bleed the circuit.

# STEERING ASSEMBLY

## Steering column

36

### TIGHTENING TORQUES (in daNm)



Steering column universal joint eccentric bolt	2.5
Steering wheel bolt	4.5
Steering column mounting nuts	2
Air bag mounting bolt	0.5

### REMOVAL

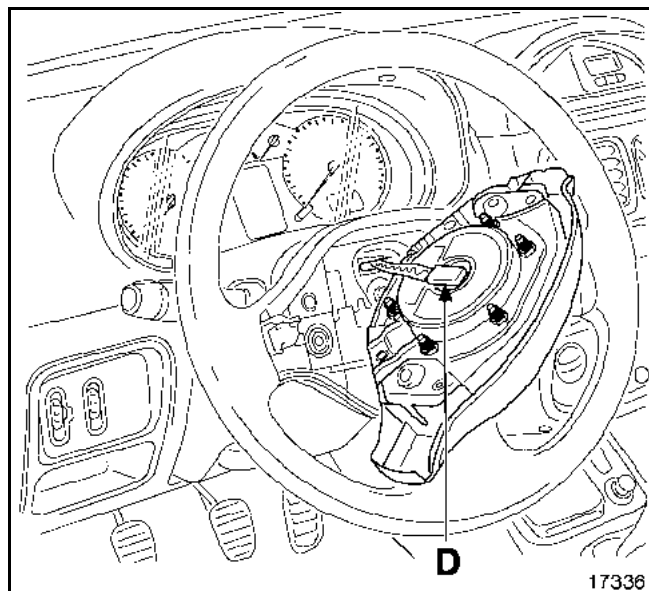
Disconnect the battery.

#### Vehicle without air bag:

Remove the centre cover from the steering wheel (clip-on fitting).

Remove:

- the driver's air bag cushion by the two Torx bolts (T30) (tightening torque **0.5 daNm**) located **behind the steering wheel** and **disconnect the connector (D)**,



- the steering wheel bolt,
- the steering wheel after setting the wheels straight,
- the half cowlings (three bolts).

Disconnect the switches (wiper and lighting) and the rotary switch connector.

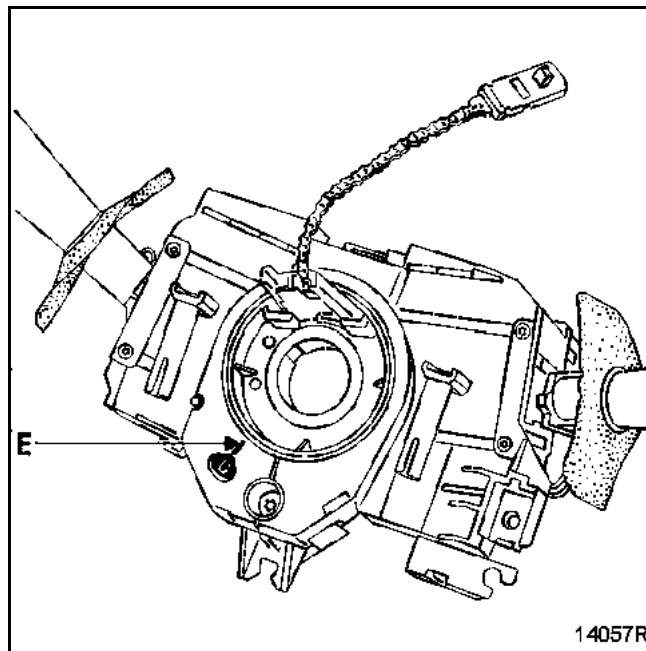
**IMPORTANT:** It is not permitted to handle the pyrotechnic systems (air bags and pretensioners) near a source of heat or flame as there is a risk of triggering.

**IMPORTANT:** Whenever the steering wheel is removed, the air bag connector (D) **MUST** be disconnected. The air bag has a connector which short circuits if it is disconnected to prevent incorrect triggering.

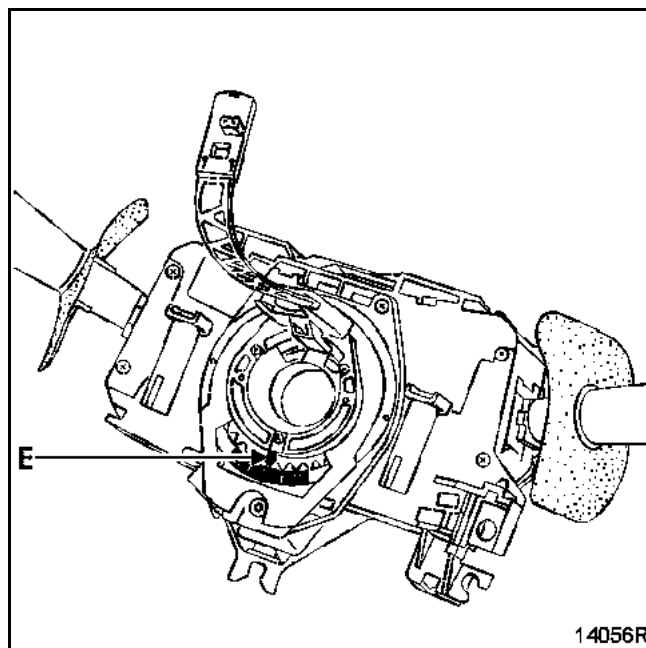
Before removing the assembly, it is essential to mark the position of the rotary switch:

- ensuring that the wheels are straight during removal in order to position the track at the centre,
- checking that the **O** mark on the rotary switch is correctly positioned opposite the fixed index (E).

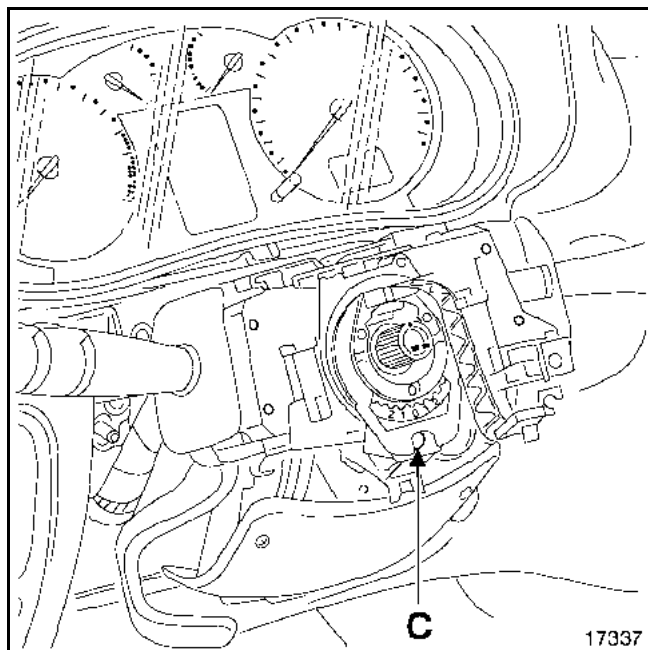
### VALEO ASSEMBLY



### LUCAS ASSEMBLY

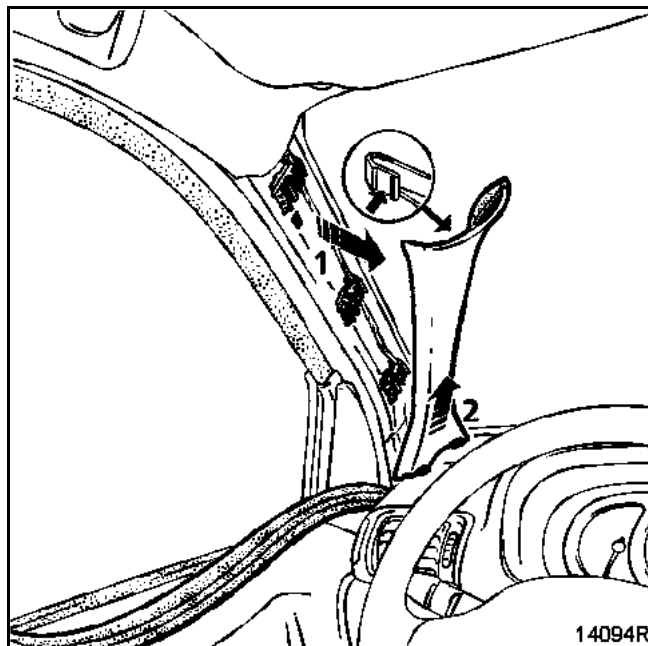


Slacken the bolt (C), then tap sharply once on the screwdriver to unlock the cone and disconnect the assembly from the steering column.

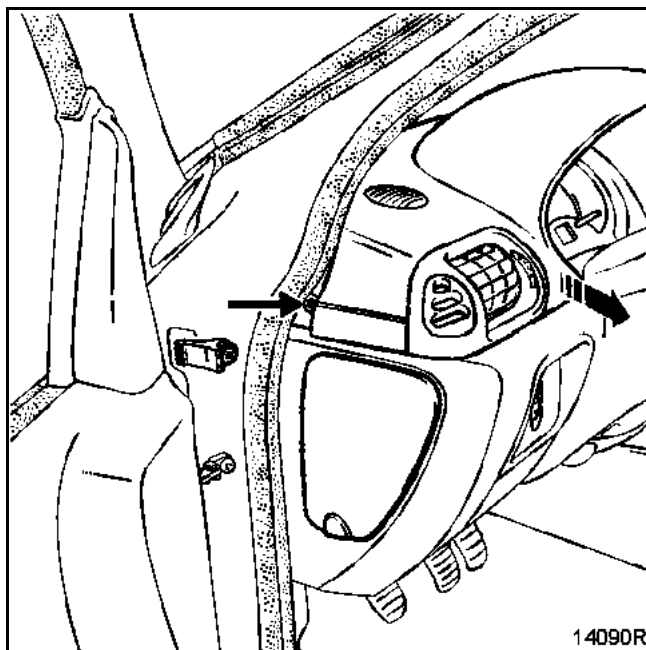


Remove the cover by:

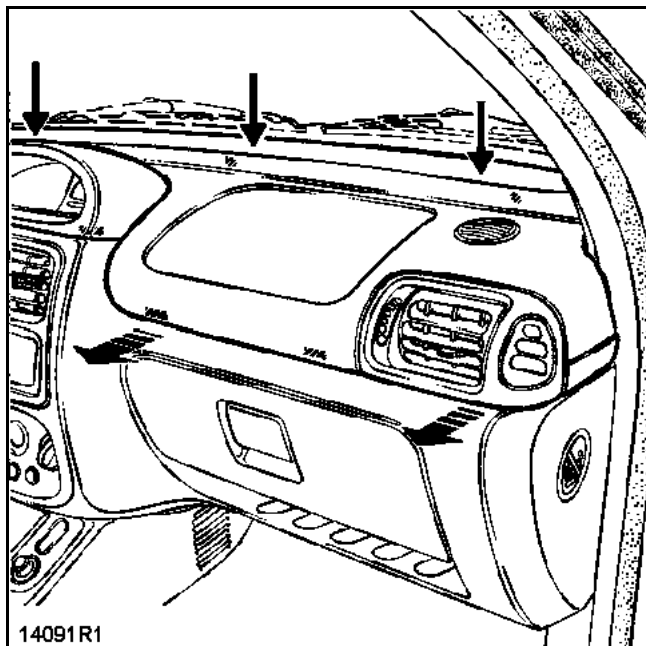
- first of all pulling back the windscreen pillars. To do this, remove the trim by a sufficient amount in order to press the upper clip, move the pillar (1) away and unclip the cover (2).



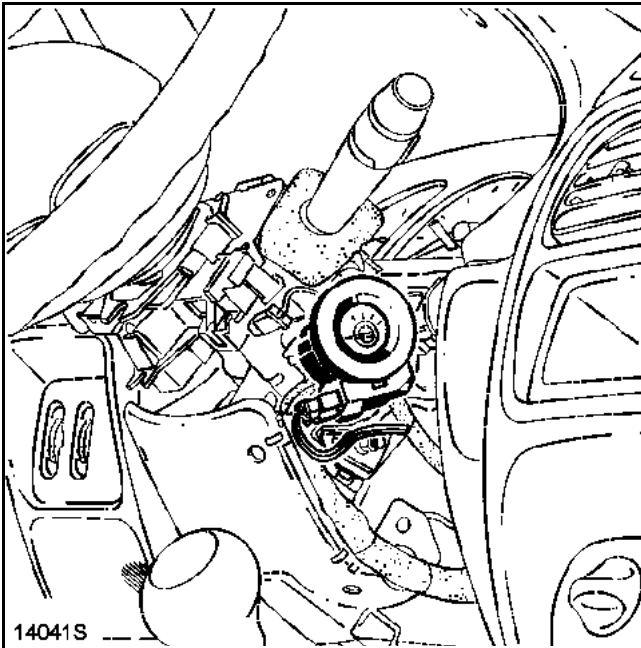
- removing the two side bolts,



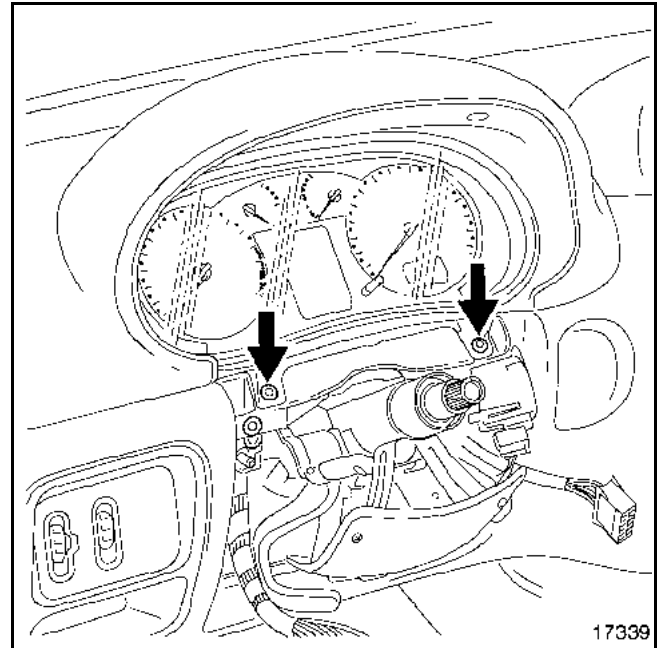
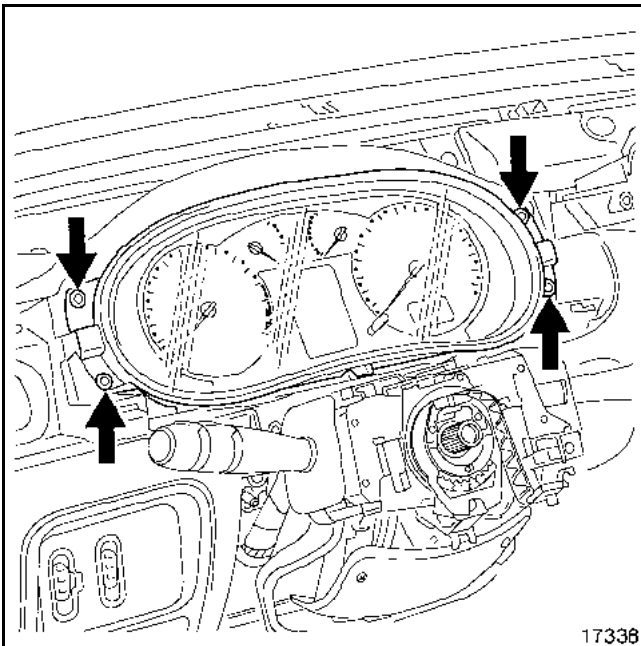
- removing the three upper bolts (next to the windscreen). Then remove the cover completely, proceeding as shown in the diagrams.



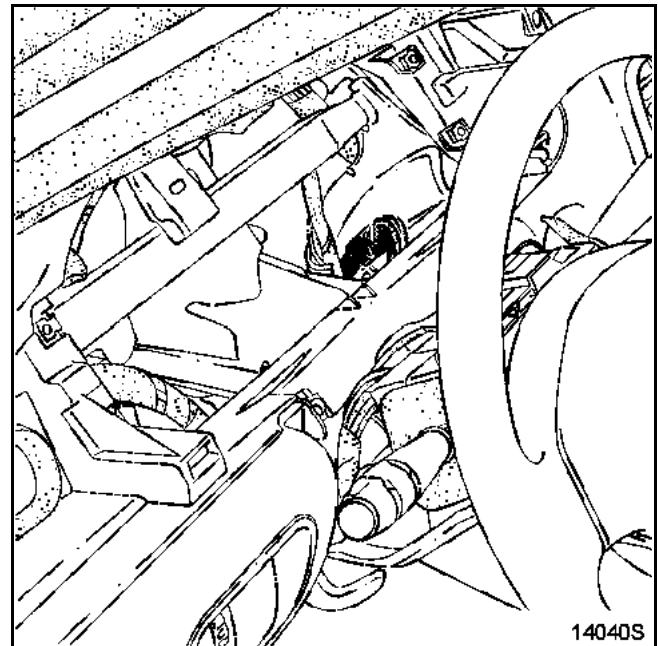
Remove the immobiliser transponder ring.



Remove the instrument panel (six bolts), disconnecting the four connectors.



Disconnect the connector.

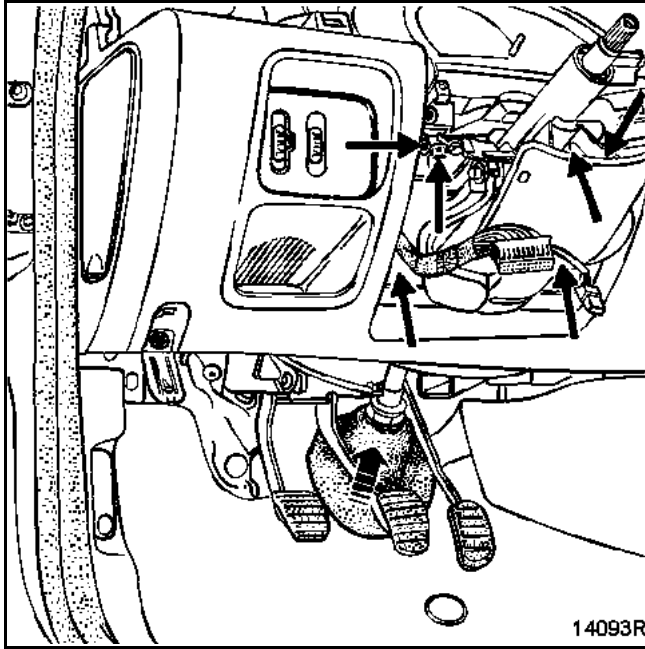


In the engine compartment:

- remove the air duct,
- remove the mounting nuts of the expansion bottle and move the bottle to gain access to the steering column universal joint.

Remove the universal joint eccentric bolt.

Remove the six mounting bolts from the steering column and pull off the bulkhead gaiter.

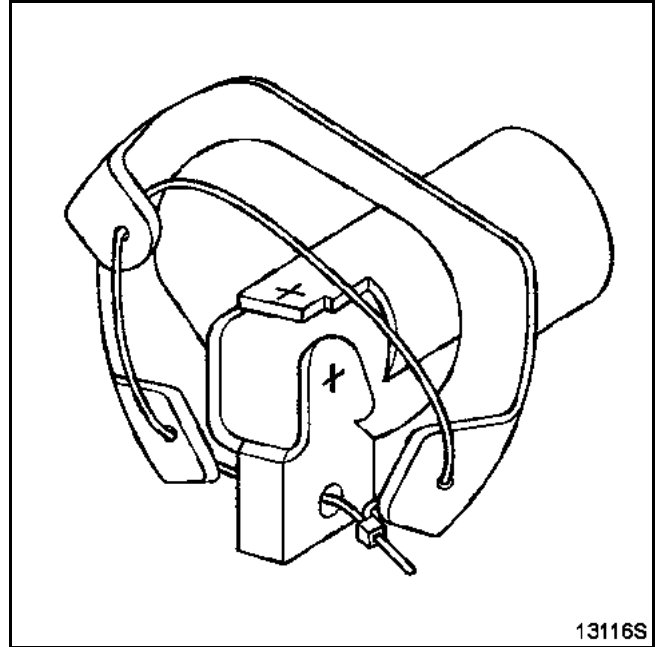


Remove the steering column.

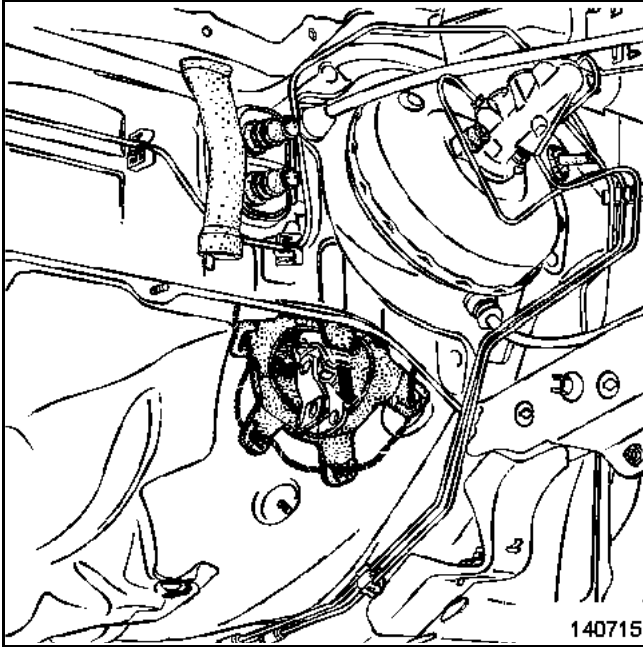
### REFITTING

Refit the steering column.

Fit the gaiter on the bulkhead, having tied the flaps and the universal joint together with string.



Pull off the tab, cut the string to fit the gaiter in place.



Refitting is then the reverse of removal.

Check the instrument panel connectors are correctly reconnected.

### Special notes for refitting

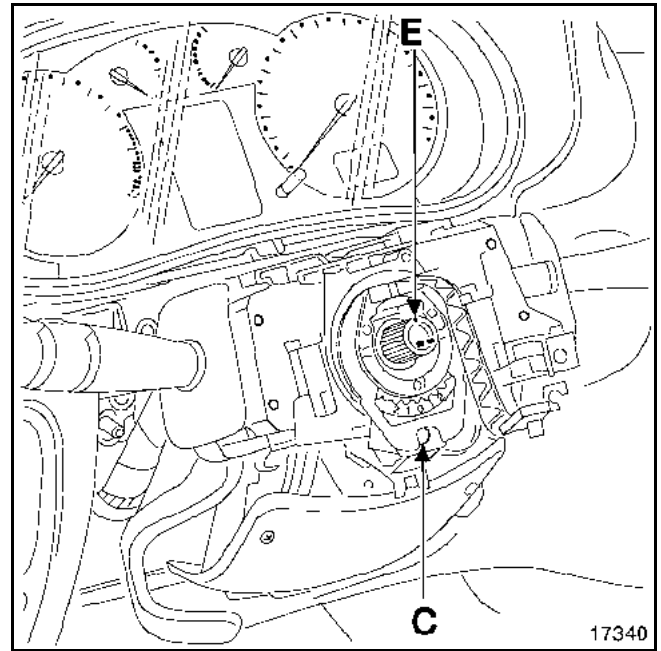
Ensure that the wheels are still straight.

Check that the rotary switch is correctly positioned by checking that the **O** mark of the rotary switch is opposite the fixed index (E).

Install the assembly onto the steering column and connect the connectors.

Continue refitting and do not lock bolt (C) until the two half cowlings are refitted, so that the stalks may be aligned with the dashboard and the instrument panel.

This operation is made easier by the opening on the lower half-cowling which allows access to the bolt (C).



Renew the steering wheel bolt each time it is removed (pre-bonded bolt).

Observe the correct tightening torque (**4.5 daNm**).

**IMPORTANT:** before reconnecting the driver's air bag, the procedure for checking the correct operation of the system must be carried out:

- check that the air bag warning light on the instrument panel comes on when the ignition is on (unlocked computer)
- connect a dummy ignition module to the driver's air bag connector and check that the warning light extinguishes,
- switch off the ignition, connect the air bag in place of the dummy ignition module and attach the air bag to the steering wheel (tightening torque **0.5 daNm**).
- switch on the ignition, check that the air bag warning light illuminates for **3 seconds** when the ignition is switched on and then extinguishes and remains extinguished.

If the warning light does not operate as described above, refer to the **Fault finding** section and check the system using **XR BAG (part no. 1288)**.

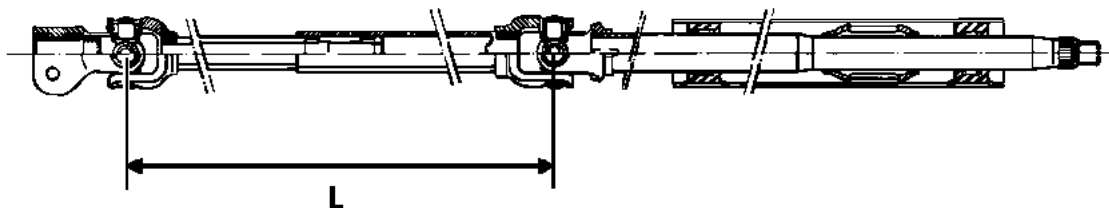
**IMPORTANT:** if these instructions are not followed exactly, the system may not function normally and this might result in incorrect triggering.



### REMOVAL - REFITTING

These vehicles are fitted with a non removable retractable shaft - steering wheel shaft - steering column assembly. If the eccentric bolt of the universal joint needs to be tightened, check that the length of the shaft is correct, otherwise replace the assembly (see **Steering column** section).

### CHECKING




92218R1

#### LEFT-HAND DRIVE

$l = 373.1 \pm 1.5 \text{ mm}$

#### RIGHT-HAND DRIVE

$l = 395.9 \pm 1.5 \text{ mm}$

TIGHTENING TORQUES (in daNm)	
Hydraulic pipe unions	1.7
Mounting nut to the brake servo	1.8

### REMOVAL

Remove the tray under the bonnet.

Disconnect the battery.

Drain the brake fluid reservoir.

Disconnect the brake pipes that go from the reservoir to the master cylinder.

Remove:

- the brake pipes that go from the master cylinder to the ABS unit and note their positions,
- the brake cylinder mounting nuts on the brake servo.

### REFITTING

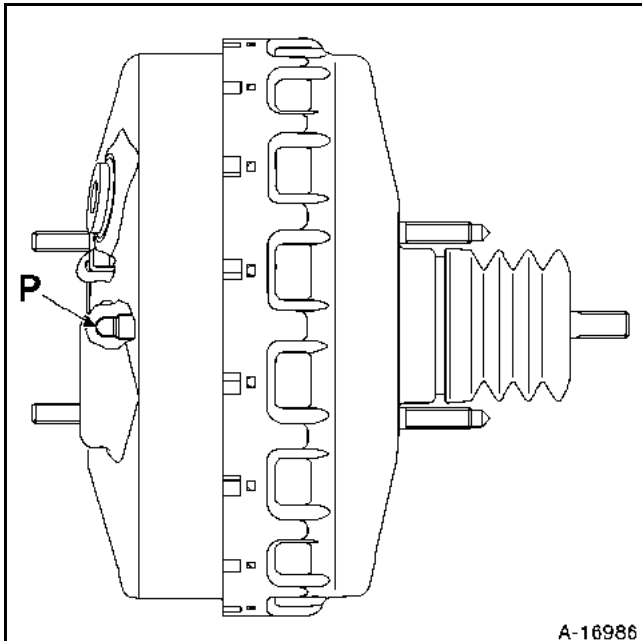
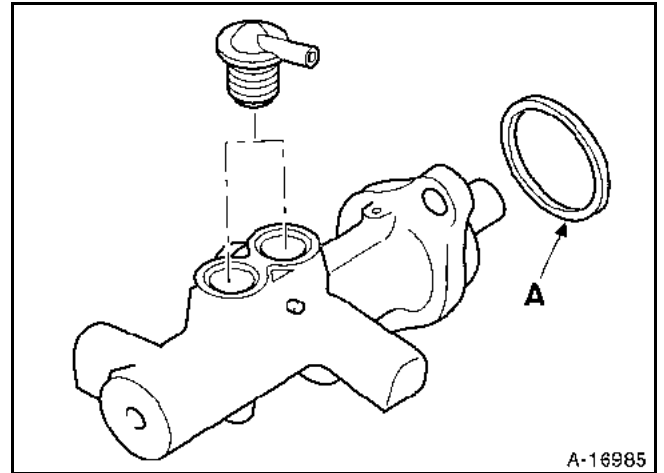
Refitting is the reverse of removal.

The length of the plunger rod cannot be adjusted.

**NOTE:** these vehicles are fitted with a master cylinder that is incorporated in the brake servo. The leak tightness of the brake servo is directly linked with that of the master cylinder. When carrying out any work, a new seal (A) must be installed.

Fit the master cylinder by aligning it on the brake servo so that the pin of the plunger rod (P) is correctly inserted into the body of the master cylinder.

Fill the brake fluid reservoir and bleed the brake circuit.



### TIGHTENING TORQUES (in daNm)



Mounting nut to the brake servo	1.8
Brake servo to the partition	2.3

The brake servo cannot be repaired. Work is only permitted on:

- the air filter,
- the non-return valve.

### REMOVAL

Disconnect and remove the battery.

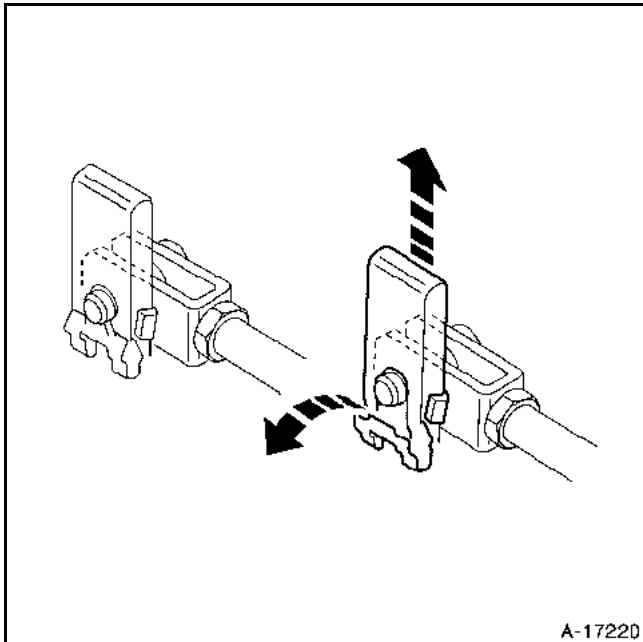
Remove:

- the master cylinder (following the procedure described previously),

Disconnect the vacuum hose from the brake servo.

In the passenger compartment:

- remove pin (A) from the fork connecting the brake pedal to the plunger rod, by removing the clip,



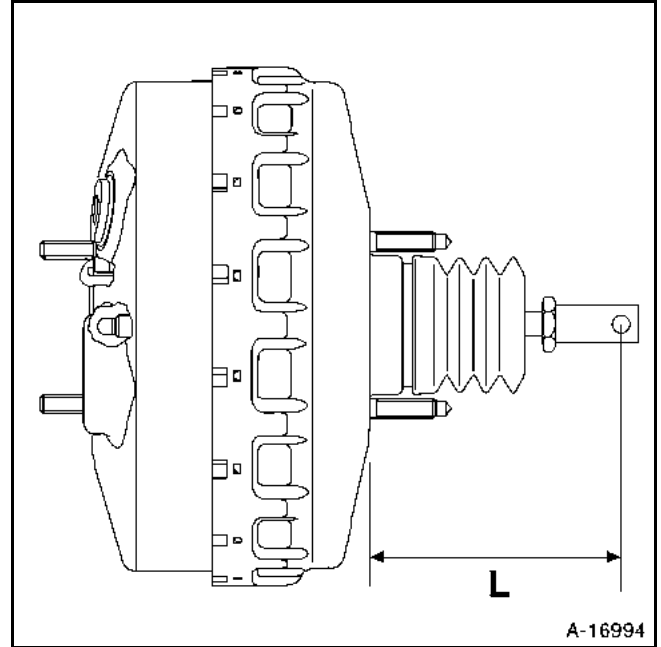
A-17220

- remove the four brake servo mounting nuts.
- remove the brake servo.

### REFITTING

Before refitting, check:

- dimension L - LHD 117.3 mm  
RHD 149.2 mm



A-16994

Continue the refitting procedure in the reverse order to removal.

Bleed the brake circuit.

### SPECIAL TOOLING REQUIRED

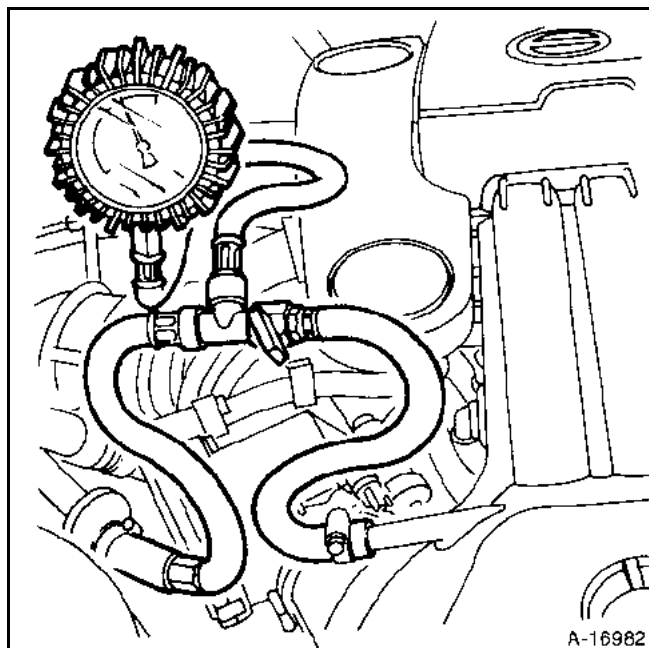
**Mot.1311-01** Pressure gauges and unions to measure the pressure

### CHECKING FOR LEAKS

When checking for leaks in the brake servo, ensure that the seal between the brake and the master cylinder is OK. If there is a leak, replace the seal (A) (see method described on page 37-1).

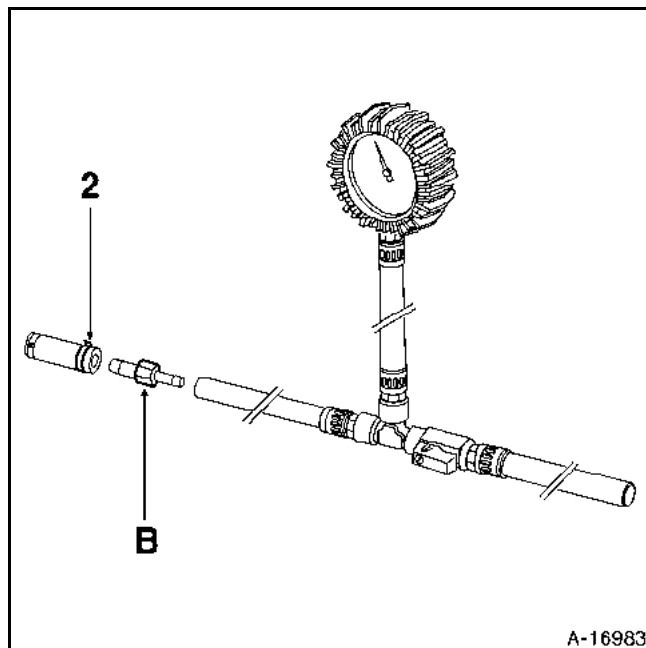
The brake servo is checked for leaks when installed in the vehicle.

Connect tool **Mot. 1311-01** between the brake servo and the vacuum source (inlet manifold).



To do this:

- disconnect the vacuum hose from its union on the engine's manifold.
- use union **T** of Mot. 1311-01 to join the pipes and the vacuum gauge, use connector **B** and clip (2) of the kit to connect the hose to the hose of the non-return valve.
- connect the remaining hose (with thread) to the inlet manifold.



**NOTE:** ensure that the closing valve is on the manifold side.

Run the engine at idle speed for one minute.

Close the valve and switch off the engine.

The vacuum in the circuit must be around **613 mbar**; if the vacuum falls by more than **33 mbar** in **15 seconds**, then there is a leak:

- either in the non-return valve (replace it),
- or in the plunger rod membrane (in which case replace the brake servo).

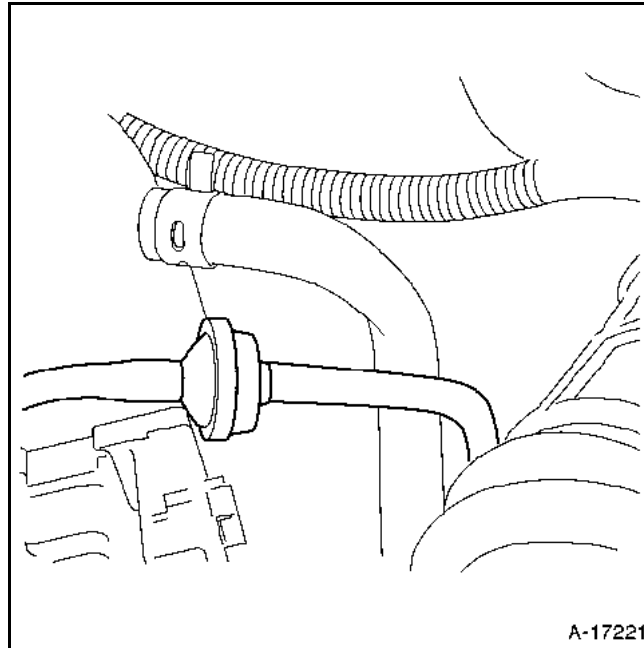
### REPLACING THE NON-RETURN VALVE

This operation may be carried out on the vehicle.

### REMOVAL

Remove the engine covers to gain access.

Disconnect the non-return valve from the inlet manifold and the hoses from the brake servo.



### REFITTING

Replace all the faulty parts.

Refit the assembly into position.

# MECHANICAL ELEMENT CONTROLS

## Handbrake control lever

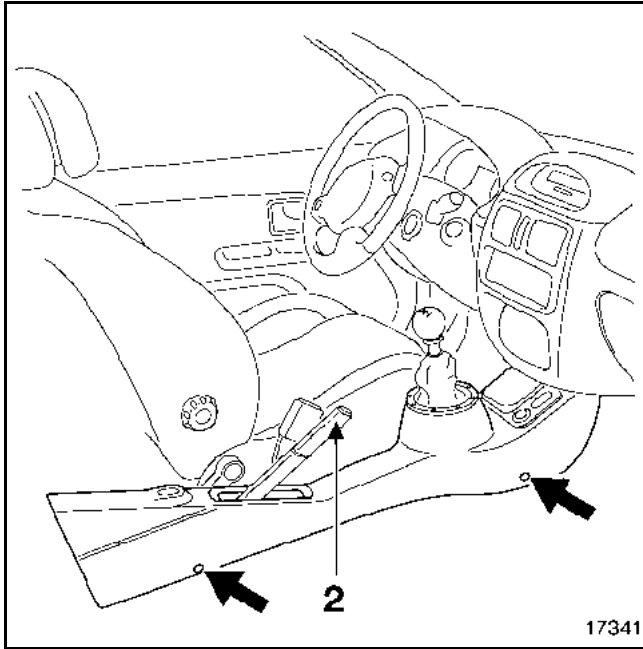
37

### REMOVAL

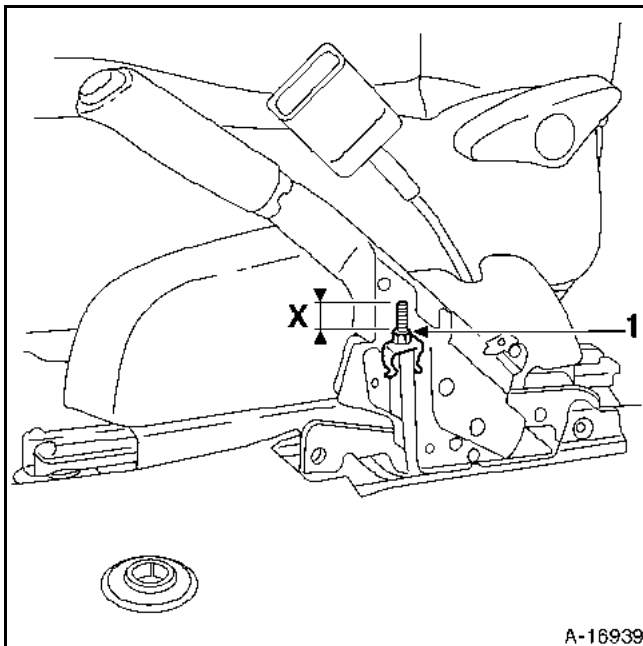
Vehicle on lift.

Release the handbrake.

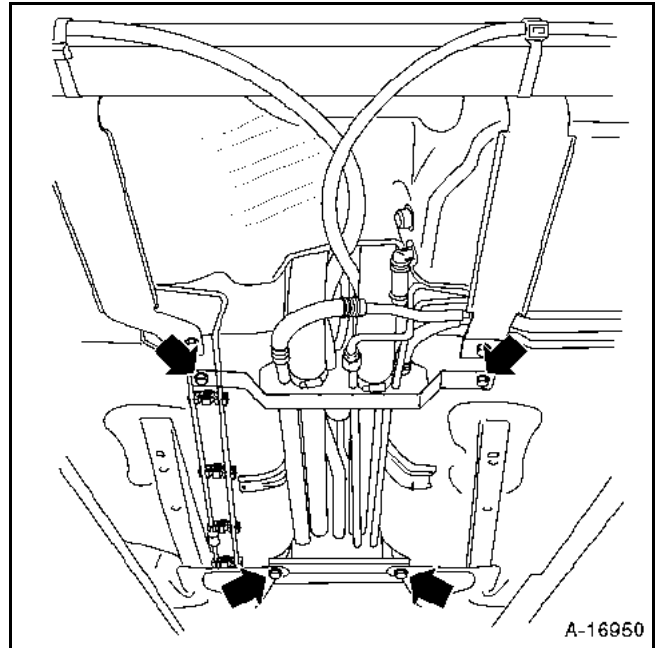
Remove the centre console (four retaining bolts), detach the gear lever gaiter and the handbrake lever cover (2)



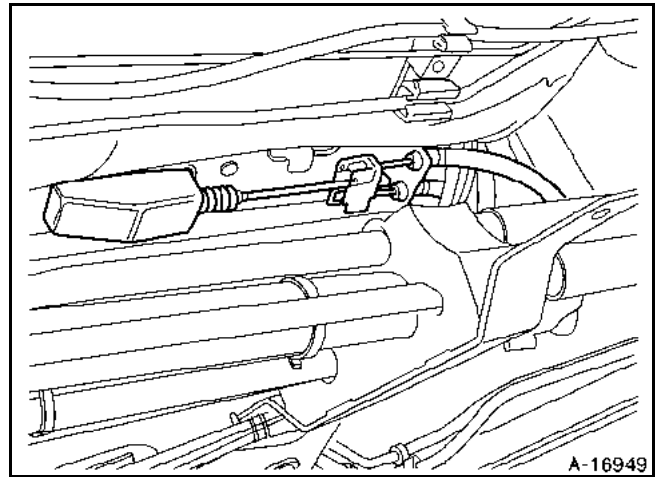
Loosen the handbrake adjusting nut (1) and note the dimensions X (approximately 20 mm) then release the cable.



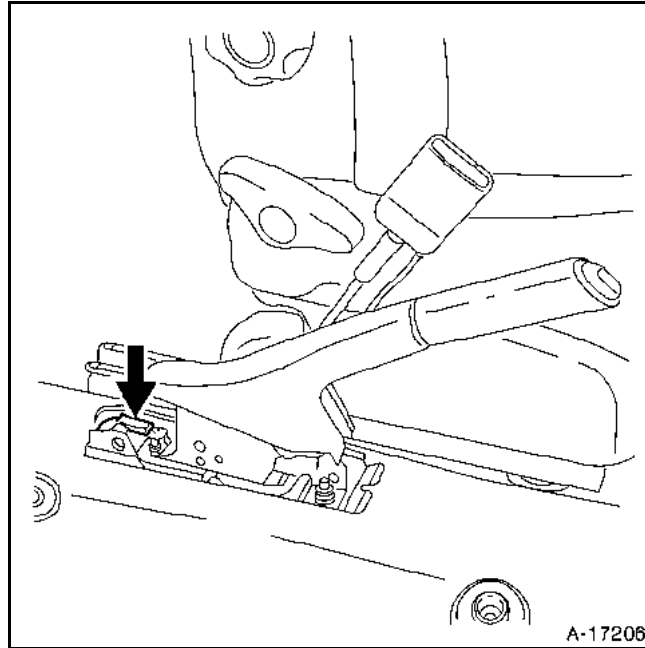
Raise the vehicle, then unscrew the pipe bracket clips.



Detach the two cables at the brake compensator.



In the passenger compartment, remove the two handbrake mounting nuts and disconnect the connector.



Remove the handbrake lever.

### REFITTING

Continue the refitting procedure in the reverse order to removal.

Remember to reconnect the handbrake connector.

Refit the adjusting nut of the handbrake linkage to the dimension noted during removal (approximately **20 mm**).

If necessary adjust the lever travel (see **Adjusting the control** section).

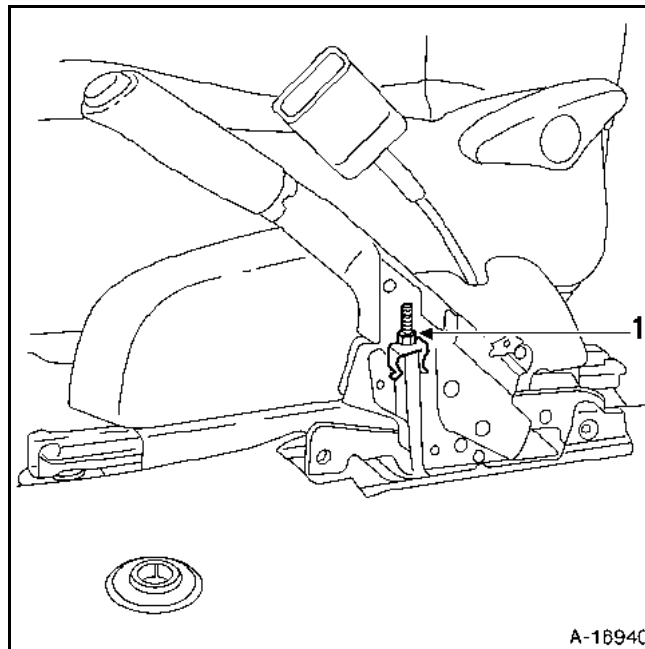
### ADJUSTMENT

**The handbrake must not be used to adjust the play**, it must only be adjusted when replacing the following:

- the brake pads,
- the cables,
- the control lever.

**No other type of adjustment is permitted other than those mentioned above.**


With the vehicle on a lift, unscrew the nut (1) to release the cable and thus the central adjusting device completely (see method described previously).

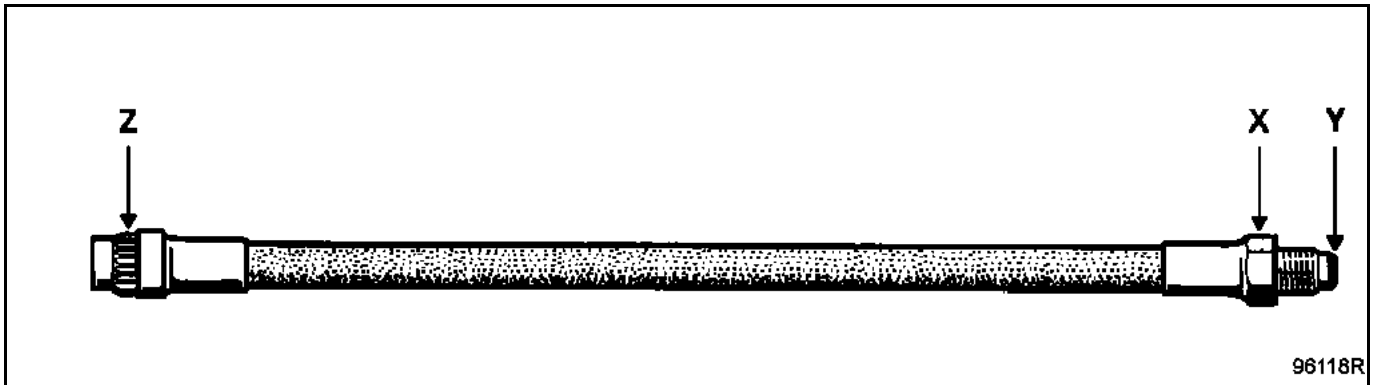


Adjust the handbrake cable nut, carry out several tests and check the setting (1 to 2 notches should move the caliper lever).



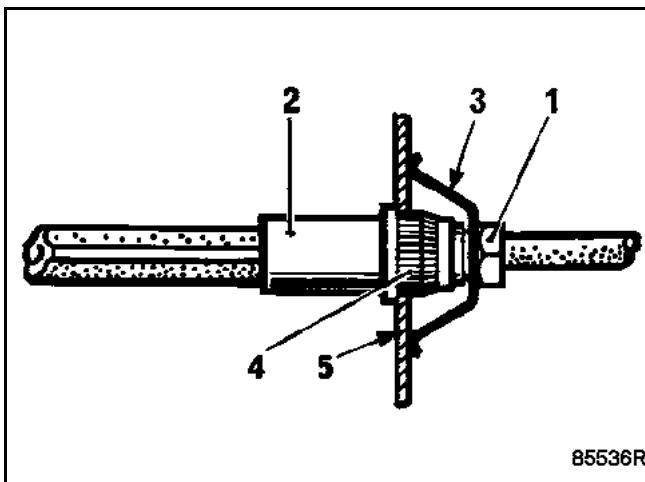
The brake pipes on these vehicles do not have copper seals. The seal is made by the shoulder (Y) on the pipes making contact **with the bottom of the cone**.

TIGHTENING TORQUES (in daNm)	
X = 1.5	
Z = 1.3	



### REMOVAL

Unscrew the union (1) (pipe spanner) between the rigid pipe and the hose (2) until there is slack in the spring (3), which then frees the hose from the splines (4).



Remove the hose from the caliper and if necessary remove the caliper.

### REFITTING

Secure the caliper to the brake and screw in the upper hose, then tighten to a torque of **1.5 daNm**.

The brake pipes are installed once the axle assembly is in position.

- Wheels suspended (suspension in place)
- Axle assembly aligned (wheels straight)

Position the female end piece of the hose on the retaining bracke (5) without distorting it, and check that the end piece (4) is in line with the splines of the bracket, then fit:

- the spring (3),
- the rigid pipe to the hose, checking that the hose does not turn when the assembly is screwed in.

Tighten the union to the required torque.

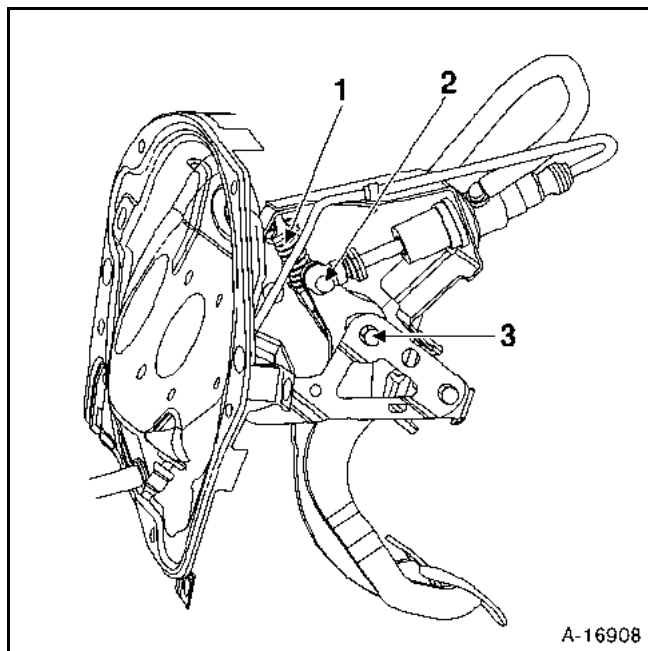
Bleed the brake circuit.

### CLUTCH PEDAL

#### REMOVAL

In the engine compartment remove:

- the plunger rod of the clutch master cylinder (2) from the control lever,
- lift the clutch pedal to release the retaining spring (1),
- the nut (3) of the pedal's mounting shaft bolt,
- the shaft and the pedal.



#### REFITTING

Continue the refitting procedure in the reverse order to removal.

Tightening torque for the bolt: **3.8 daNm**.

### CLUTCH MASTER CYLINDER

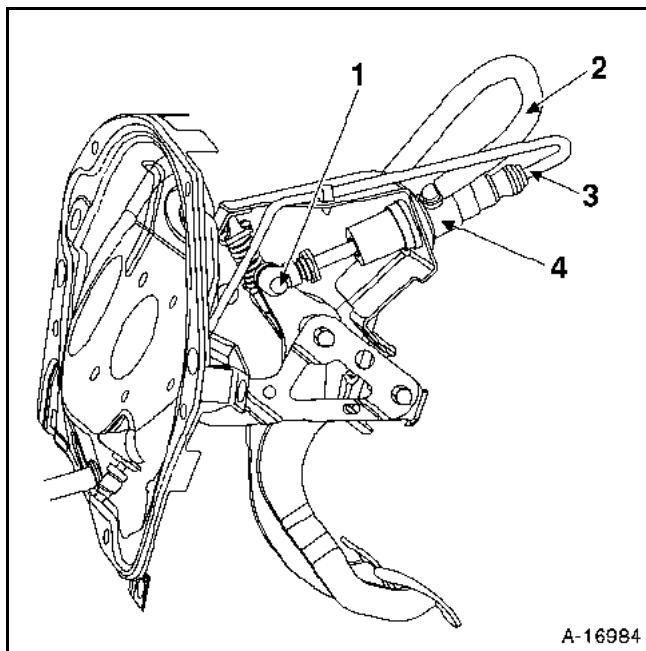
#### REMOVAL

In the engine compartment, remove:

- the tray under the bonnet.
- use tool Ms.583 on the brake hose/clutch reservoir of the clutch master cylinder to reduce fluid loss.

In the passenger compartment, remove:

- the control lever from the plunger rod of the clutch master cylinder (1),
- the hose (2) from the master cylinder reservoir,
- the exhaust pipe (3) - quick-release union,
- hold the master cylinder (4) and turn clockwise to remove it from the bracket.



#### REFITTING

Continue the refitting procedure in the reverse order to removal.

Except turn the clutch master cylinder anticlockwise to attach it to the bracket.

### ● CLUTCH SLAVE CYLINDER

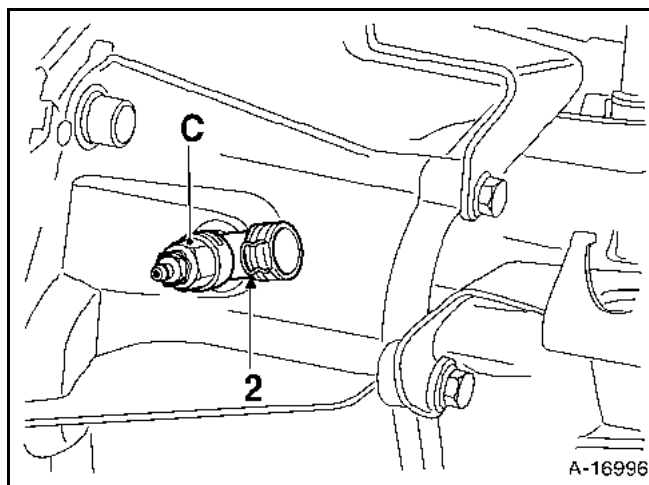
The clutch release bearing is a concentric unit installed around the primary shaft of the gearbox and can only be removed after the gearbox has been removed.

#### REMOVAL

Remove the tray under the bonnet.

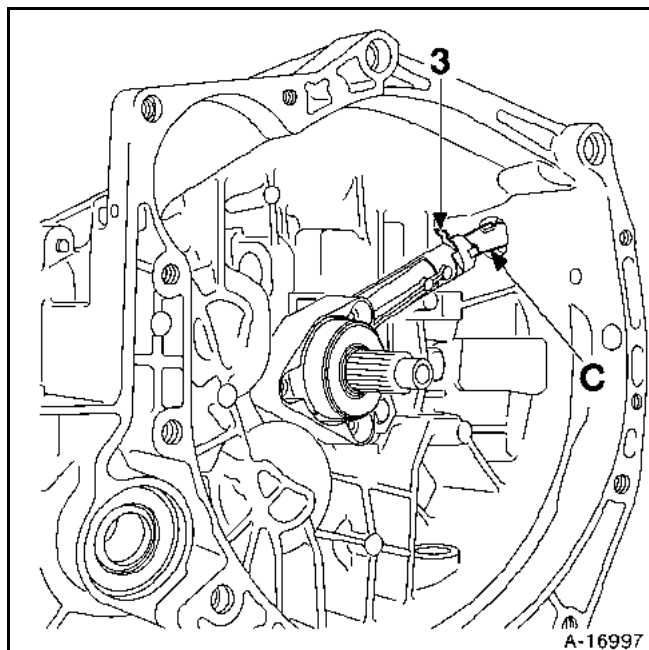
Disconnect the battery.

Detach the pipe that connects the master cylinder to the slave cylinder by detaching the clip (2) located on the union (C).

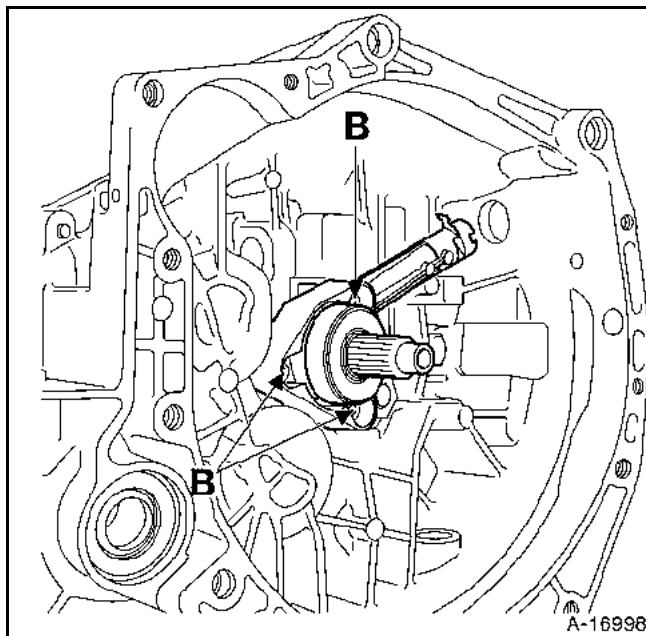


Remove the gearbox.

Release the union (C) for the clutch slave cylinder by removing clip (3).



Remove the 3 mounting bolts (B) from the clutch slave cylinder and remove the cylinder.

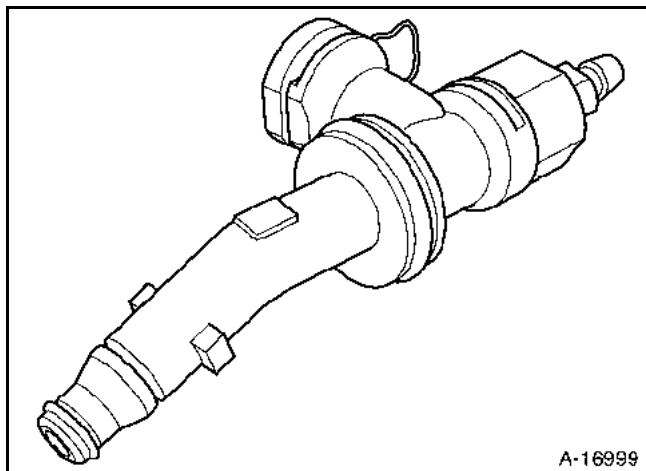


#### REFITTING

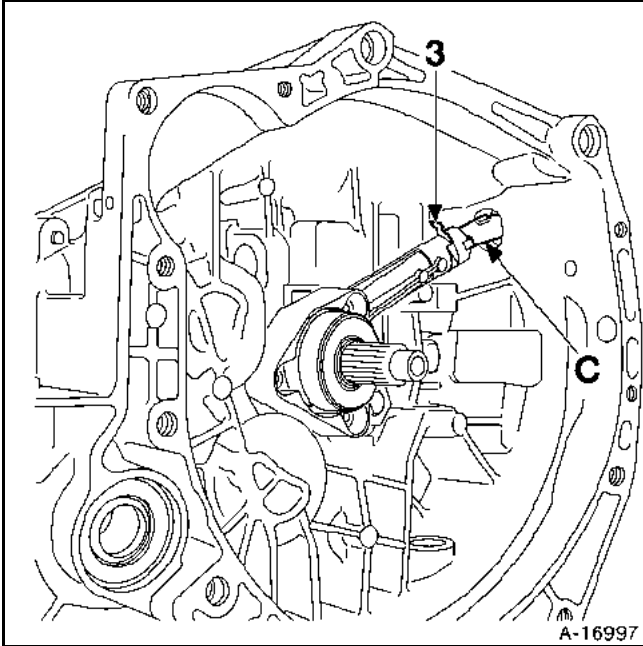
Check the condition of the seals.

Continue the refitting procedure in the reverse order to removal.

When refitting, connect the union to the slave cylinder before tightening the slave cylinder's 3 mounting bolts on the clutch housing, so that the union can be aligned in the clutch housing.



Tighten the 3 mounting bolts (B) of the slave cylinder to the correct torque (**0.9 daNm**).



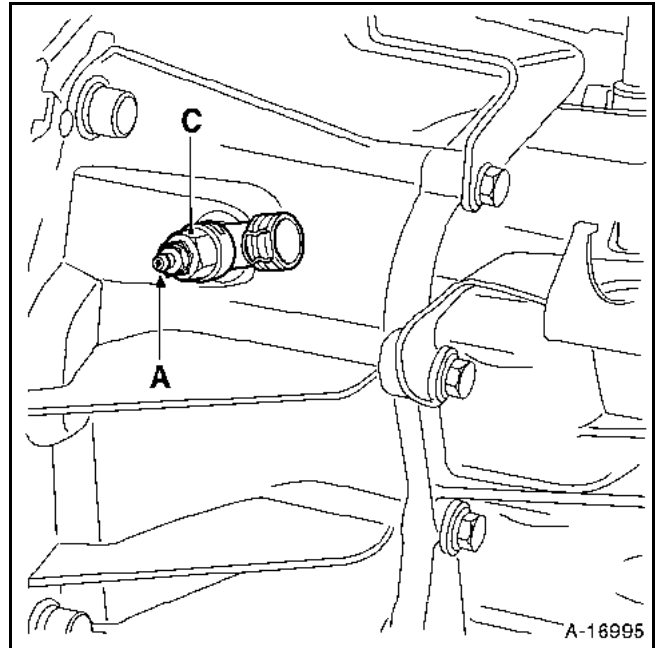
**IMPORTANT:** to avoid damaging the slave cylinder, do not coat the gearbox output shaft with grease.

**NOTE:** to avoid any risk of leaks, always replace the slave cylinder after renewing the clutch mechanism.

Bleed the circuit using the bleed screw (A) located on the union on the slave cylinder.



When bleeding the circuit, use an open-ended spanner to prevent the union (C) from turning when tightening and slackening the bleed screw (A), so as not to damage the slave cylinder and the union.

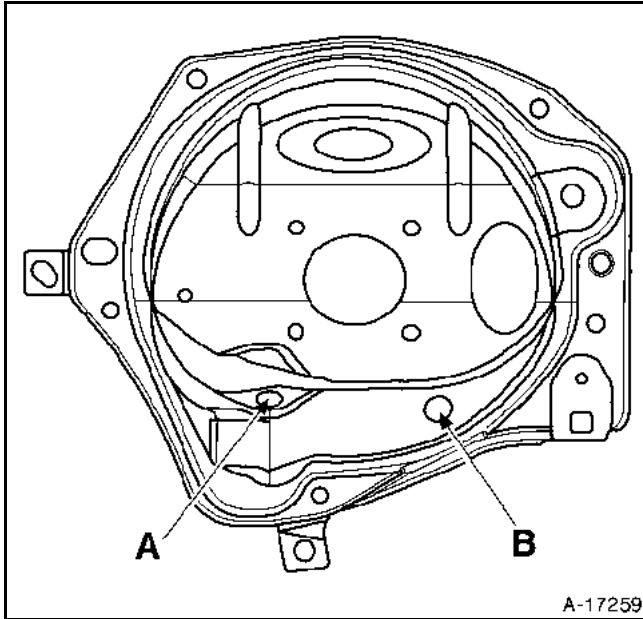


When replacing the pedal assembly mounting plate, the new component must again work in accordance with the following criteria.

On the mounting plate for left-hand drive vehicles, enlarge hole:

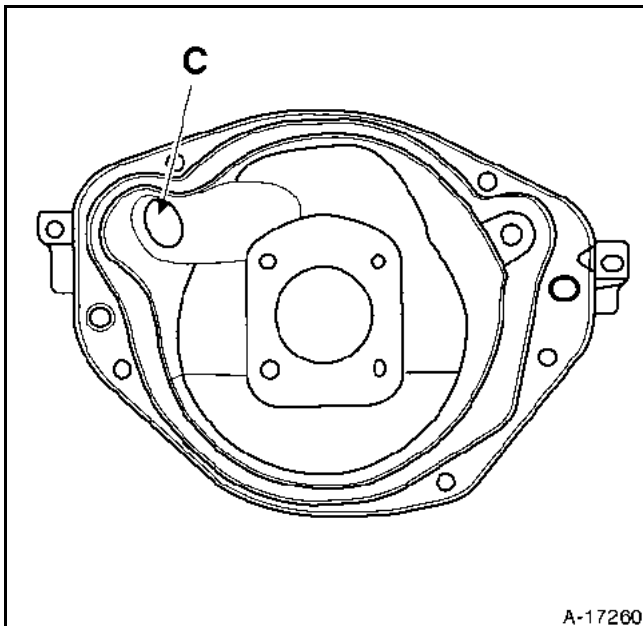
A. to  $16 \pm 0.5$  mm

B. to  $7 \pm 0.5$  mm

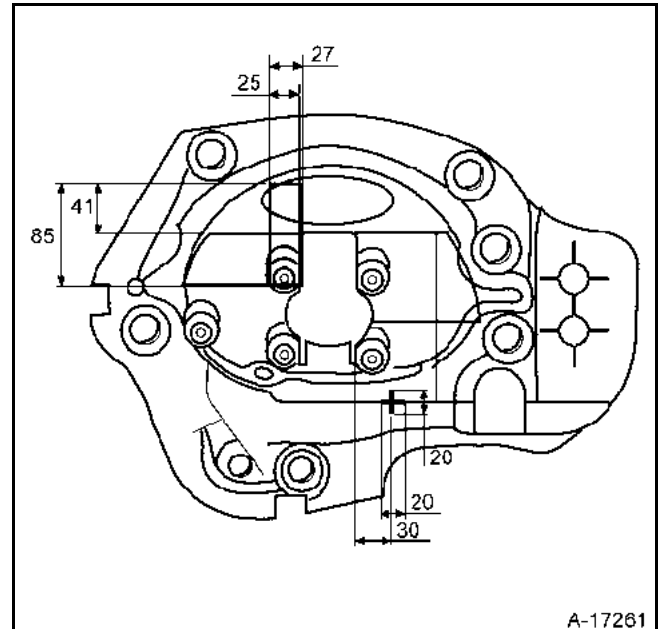


On the mounting plate for right-hand drive vehicles, enlarge hole:

C. to  $25.5 \pm 0.5$  mm

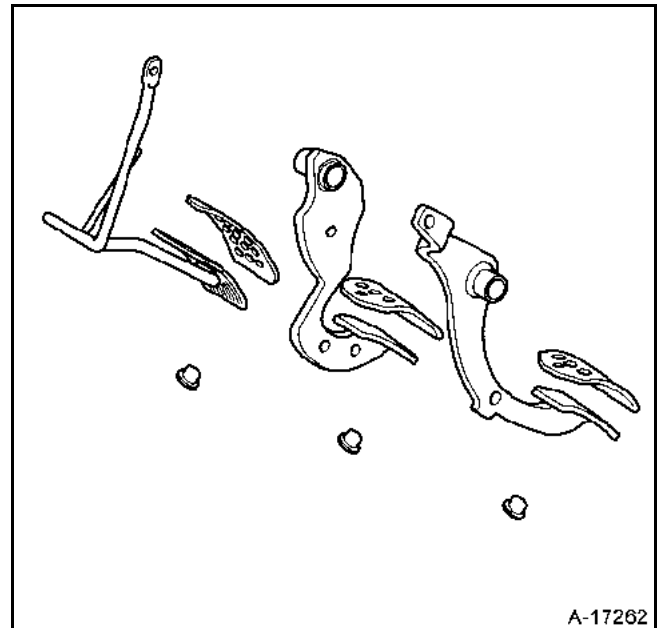


When replacing the pedal assembly insulation, the new component must again work in accordance with the following criteria, as marked, zone A is moved, cut/ split "+" to B.



When replacing the brake, clutch and accelerator pedals, two holes need to be made in the pedal plate to attach the pedal pads.

The position of these holes can be determined by placing a pad on the pedal plate and marking the plate through the mounting holes of the pad.

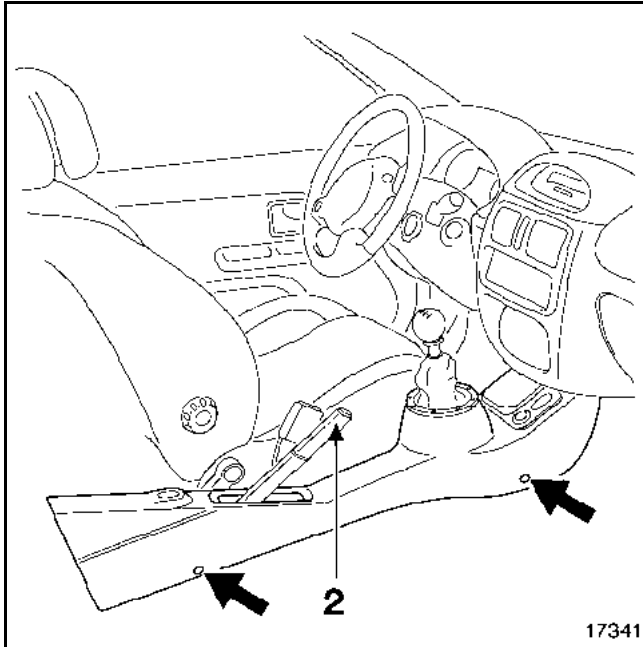


### ● GEAR LEVER

#### REMOVAL

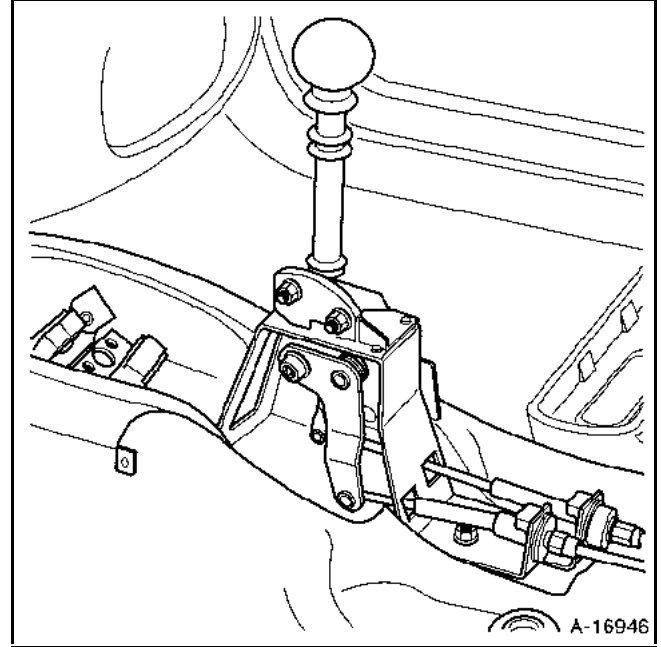
Gear lever button

Detach the gear lever gaiter (four retaining bolts on the console) and, with the handbrake control lever (2) applied, remove the centre console



Detach the gearshift control cables from the gear lever and the retaining brackets.

Remove the gear lever and the bracket.



#### REFITTING

Continue the refitting procedure in the reverse order to removal.

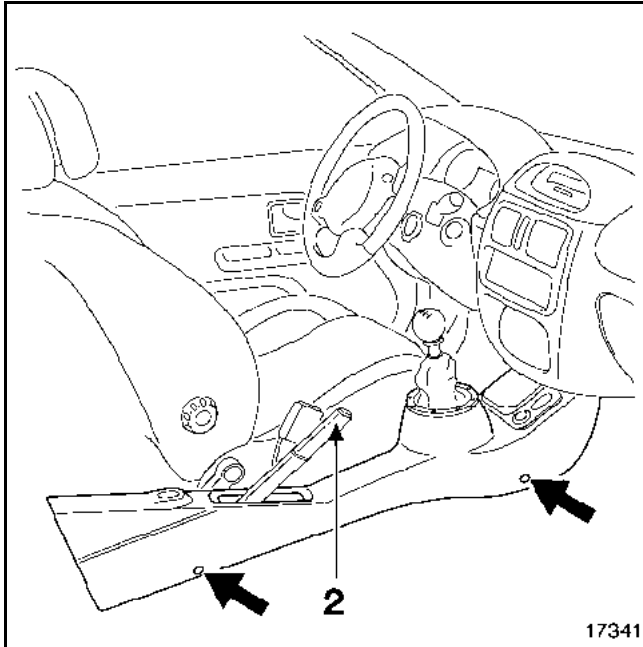
Check the gear change and adjust it if necessary.

### ● GEARSHIFT CABLES

#### REMOVAL

##### Gear lever button

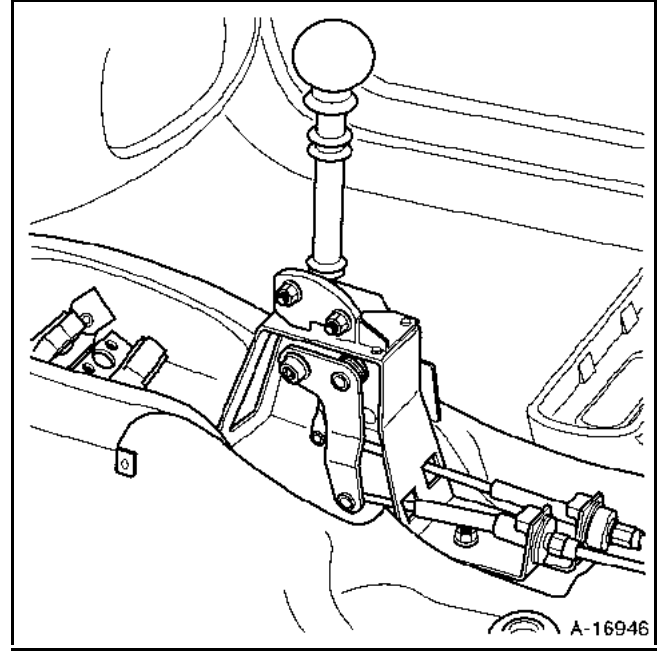
Detach the gear lever gaiter (four stop screws on the console) and, with the handbrake control lever (2) applied, remove the centre console



Detach the gearshift control cables from the gear lever and the retaining brackets.

Remove the engine covers to gain access to the gearbox.

Detach the gearshift control cables from the gear lever and remove them from the lugs in the partition of the engine compartment.

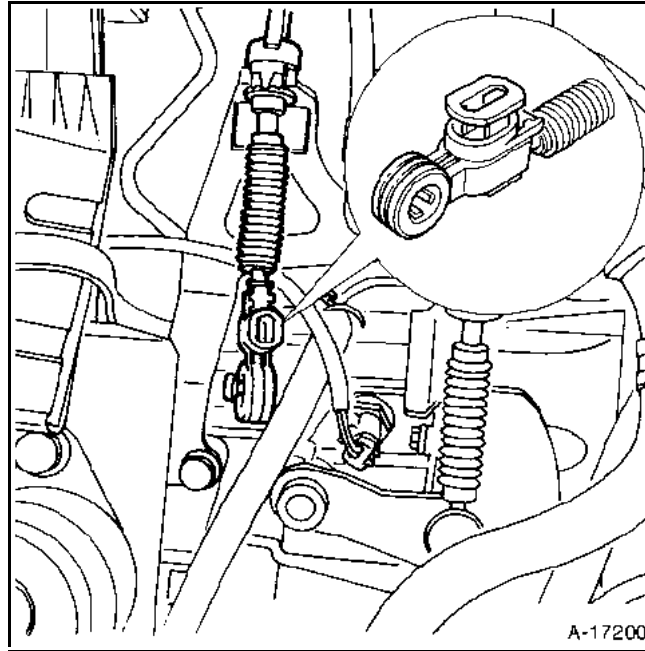


### REFITTING

Continue the refitting procedure in the reverse order to removal.

Ensure that the gearbox is in neutral.

Install the cables with the catch of the adjusting device on the gearbox, and open the gearshift cable (1).



Position the gear lever in the central neutral position, then close the catch of the adjusting device on the gearbox end of the selector cable (1).

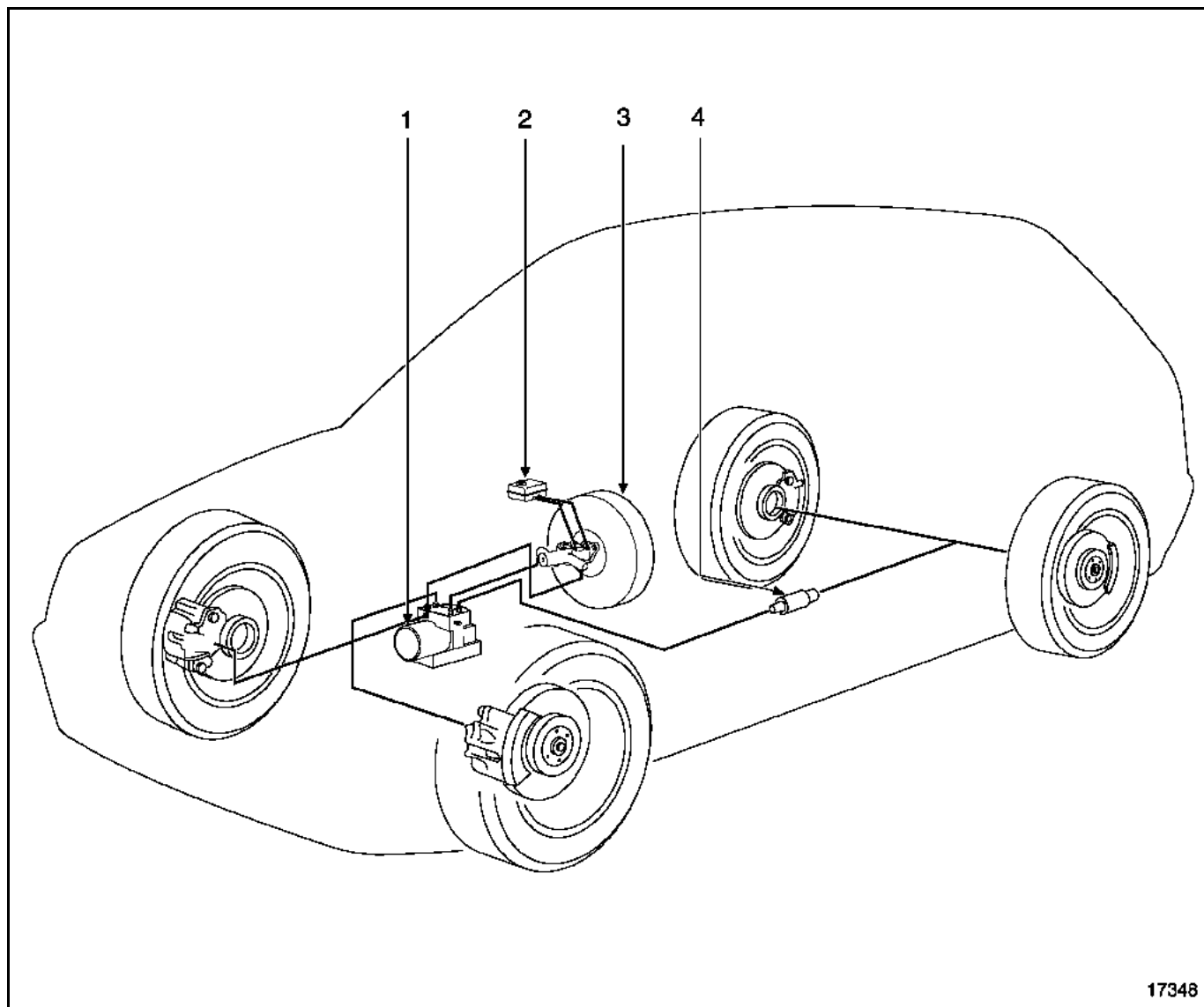


This vehicle is fitted with **BOSCH ABS 5.3** of the four channel additional type; the conventional braking equipment and the **ABS** equipment are separate.

### SPECIAL NOTES

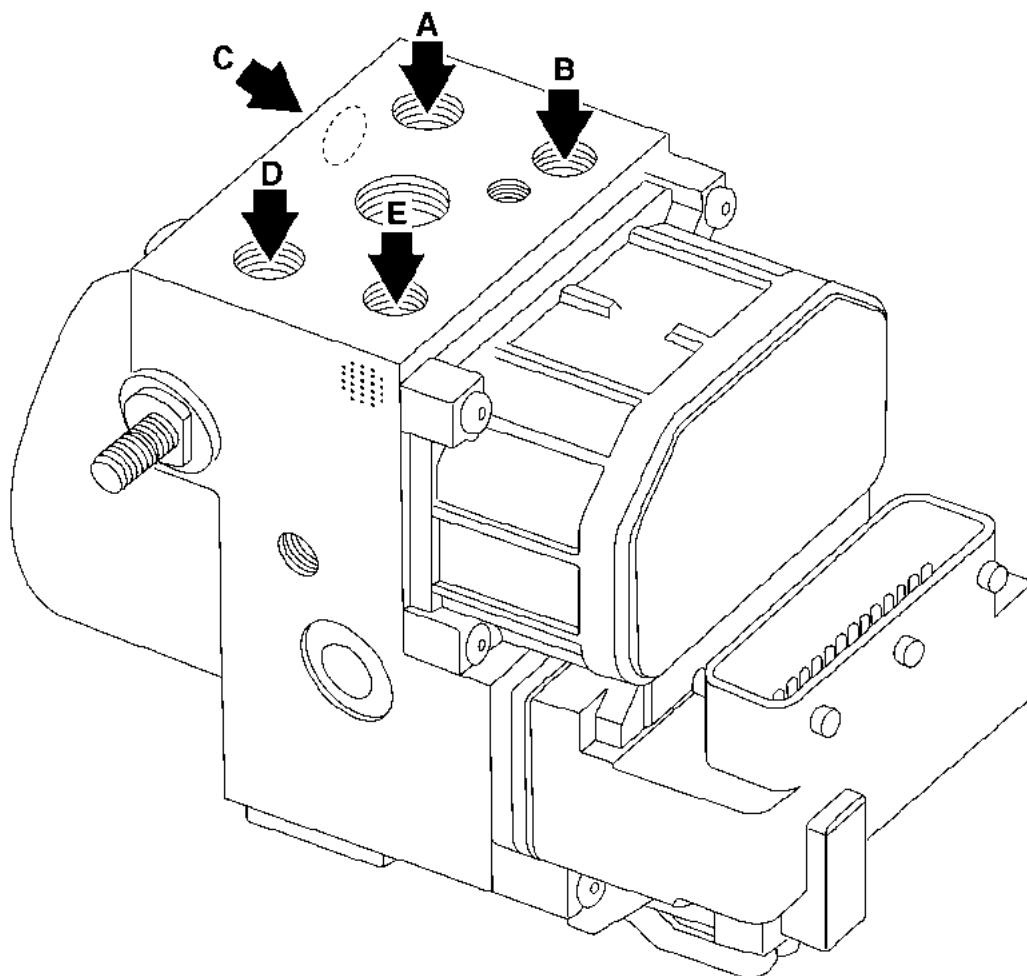
The system comprises four speed sensors. Each hydraulic braking channel is associated with a sensor at each wheel. The front wheels are therefore regulated separately. The rear wheels however are regulated at the same time and in the same way according to the **select low** principle (the first wheel tending to lock causes immediate regulation on the complete axle assembly).

### LOCATION OF BOSCH ABS COMPONENTS



- 1 ABS hydraulic unit
- 2 Master cylinder
- 3 Brake servo
- 4 Proportioning valve

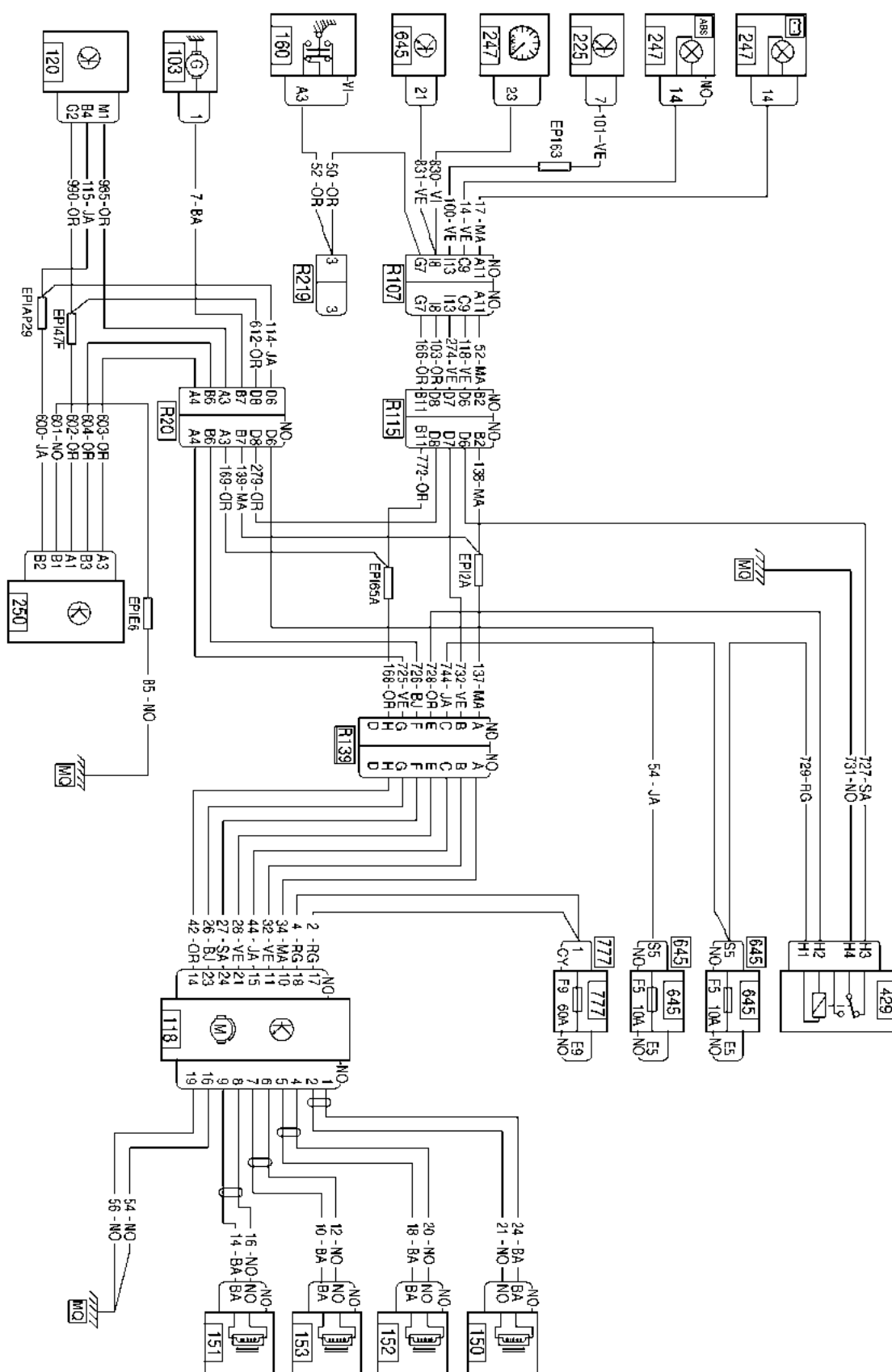
### PRESENTATION OF THE HYDRAULIC CONTROL ASSEMBLY



A-16947

- A Inlet from rear master cylinder
- B Left front wheel
- C Front right wheel
- D Inlet from front master cylinder
- E Rear wheels

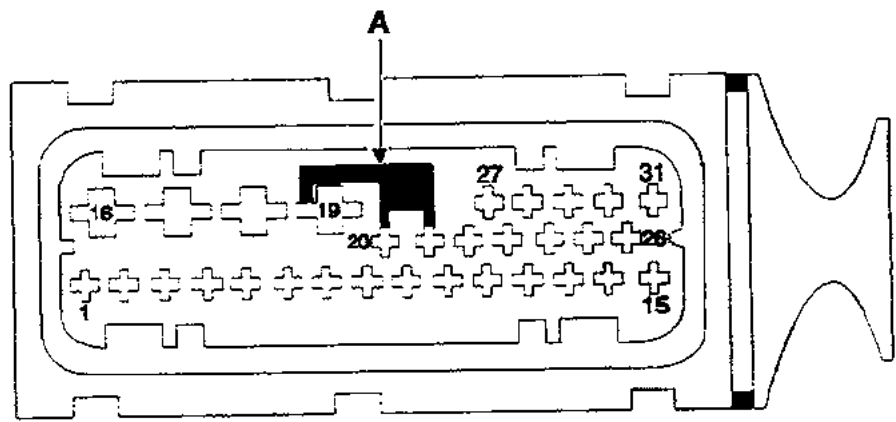
## ELECTRICAL CIRCUIT



### WIRING DIAGRAM KEY

103	Alternator
118	ABS computer
120	Injection computer
150	Rear right wheel sensor
151	Left rear wheel sensor
152	Front right wheel sensor
153	Front left wheel sensor
160	Brake switch
225	Diagnostic socket
247	Instrument panel
250	Vehicle speed sensor
429	Emergency ABS relay (ABS warning has DEL)
645	Passenger compartment connection unit
777	Power feed fuse board
R20	38 track connector, connection to engine attachment
R107	Instrument panel/front of engine
R115	Engine/engine wiring
R139	Engine/ABS
R219	Instrument panel/rear left door

31 TRACK CONNECTOR



PRN3813

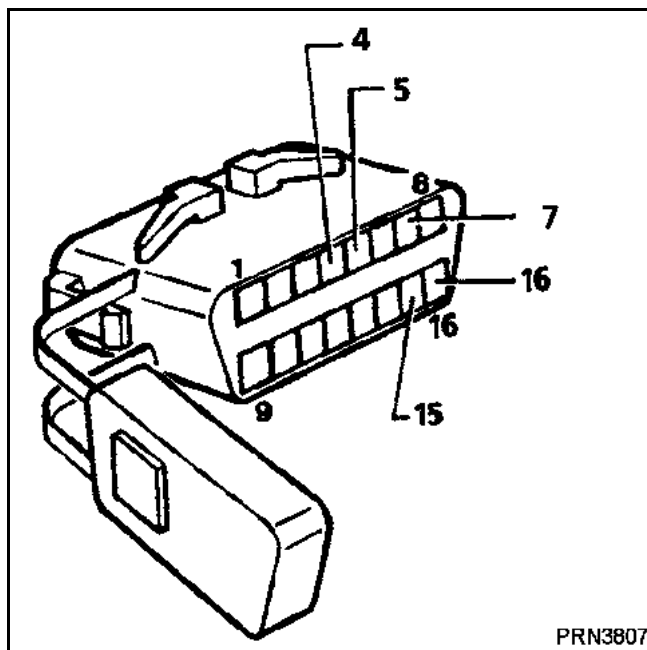
A Micro-spring connecting earth (terminal 19) to pins 20 and 21 (**ABS** and **NIVOCODE** warning lights) if the connector is disconnected.

Allocation of connector tracks.

Track	Description
1	Sensor earth <b>RRD</b>
2	Information sensor <b>RRD</b>
3	Not connected
4	Sensor earth <b>FRH</b>
5	Information sensor <b>FRH</b>
6	Sensor earth <b>FLH</b>
7	Information sensor <b>FLH</b>
8	Sensor earth <b>RLH</b>
9	Information sensor <b>RLH</b>
10	Alternator load
11	Diagnostic line <b>K</b>
12	Not connected
13	Not connected
14	Information on brake light switch
15	+ after ignition data
16	Pump motor earth


Track	Description
17	Battery (solenoid valves and pump motor)
18	Battery (solenoid valves and pump motor)
19	Earth
20	Not connected
21	ABS warning light
22	Not connected
23	Speed signal output <b>RLH</b>
24	Speed signal output <b>RRD</b>
25	Not connected
26	Not connected
27	Not connected
28	Not connected
29	Not connected
30	Not connected
31	Not connected

### DIAGNOSTIC SOCKET



- 4 Chassis earth
- 5 Electronic earth
- 7 Diagnostic line **K**
- 15 Diagnostic line **L**
- 16 + battery

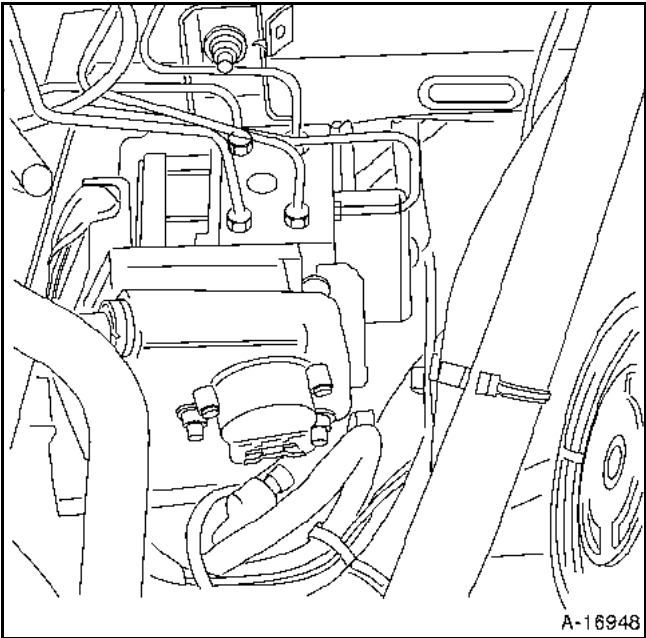
HYDRAULIC CIRCUIT

TIGHTENING TORQUES (in daNm)		
Pipes	M10 X 100	1.7
	M 12 X 100	1.7

Disconnect the connector of the ABS computer.

Remove the two earth wire screws.

Disconnect the five pipes from the hydraulic assembly, marking their position for refitting.



Remove the two mounting nuts of the hydraulic circuit on its bracket.

Remove the hydraulic circuit.

REFITTING

Proceed in the reverse order to removal.

Listen for the click that indicates the fuel pipe union is correctly fastened.

Bleed the brake circuit, for this refer to the following pages.

**NOTE:** the computer must not be removed, if faulty, replace the complete hydraulic assembly.



### HYDRAULIC BRAKING TEST

This section describes the test to be carried out with the diagnostic tool to check the installation of the ABS system on the vehicle and in particular the hydraulic circuit.

**NOTE:** two mechanics are required for this test and the vehicle must be placed on a two post lift.

#### Test method

Place the vehicle on the lift and raise the wheel to be tested. One of the mechanics must be seated in the driver's seat with the diagnostic tool. Switch on ignition, vehicle in neutral, in fault search mode, and apply the brakes. The second mechanic must apply a torque to the wheel and try to turn it.

The mechanic performs on the diagnostic tool an appropriate control action which reproduces the following cycle ten times: alternating increase and decrease of pressure on the wheel being checked. These ABS actions are noted at the wheel as ten locking/releasing operations. The jerky movement of the wheel (the quality of which is noted by the mechanic) indicates that the hydraulic circuit is connected correctly.

**For this sequence, the diagnostic tool program is as follows:**

- Cycle on the wheel to be tested:
  - one pressure drop of 200 ms when the pump starts at the same time,
  - one pressure increase of 300 ms when the pump starts at the same time (ten cycles are performed for the wheel in question).
- The pressure reaches that of the master cylinder for the four wheels.
- The hydraulic pump motor stops.
- The mechanic releases the brake pedal.

This completes the hydraulic test for the wheel in question. Start the test for the other three wheels.

### BLEEDING PROCEDURE

**NOTE:** the hydraulic assembly has already been filled.

This bleeding operation must be followed when one of the following components has been removed:

- the hydraulic assembly,
- the master cylinder,
- the circuit (between the hydraulic assembly and the master cylinder).

1) The braking system is usually bled using the pedal.

**NOTE:** if, after an ABS control test, the pedal travel is not correct, bleed the hydraulic circuit.

2) Bleed the hydraulic circuit.

**IMPORTANT:** the bleed order must be observed (refer to general information, section 30-8).

a) Bleed the **rear right** brake by bleeding the secondary hydraulic circuit using the diagnostic tool:

- Prepare the bleed container and the pipe, then unscrew the bleed screw.
- Pump the brake pedal (around ten times).
- Run the bleed command on the diagnostic tool.
- **Pump the brake pedal during the bleed phase on the diagnostic tool.**
- **At the end of the bleed cycle using the diagnostic tool, continue to pump the brake pedal and close the brake bleed screw.**

b) Repeat the procedure as described in a) for the **rear left**, **front left** and **front right** brakes.

c) Check if the brake pedal travel is correct. If not, restart the bleed procedure.

**IMPORTANT:** check that there is enough brake fluid in the reservoir.

### CHECKING THE WHEEL SPEED SENSOR

- Check the resistance of the sensor connection (from the computer to the 2 pin speed sensor).
- Visually inspect the teeth (48 teeth) on the target. If they are worn, replace the shaft and the target.
- Check the air inlet using a set of feeler gauges. Only the front sensors can be checked.

Front: **A = 1.0 mm**    + 0.5 mm  
                                     - 0.0 mm

