



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

BB0A - BB0C - BB0D - BB0E - CB0A - CB0C - CB0D - CB0E

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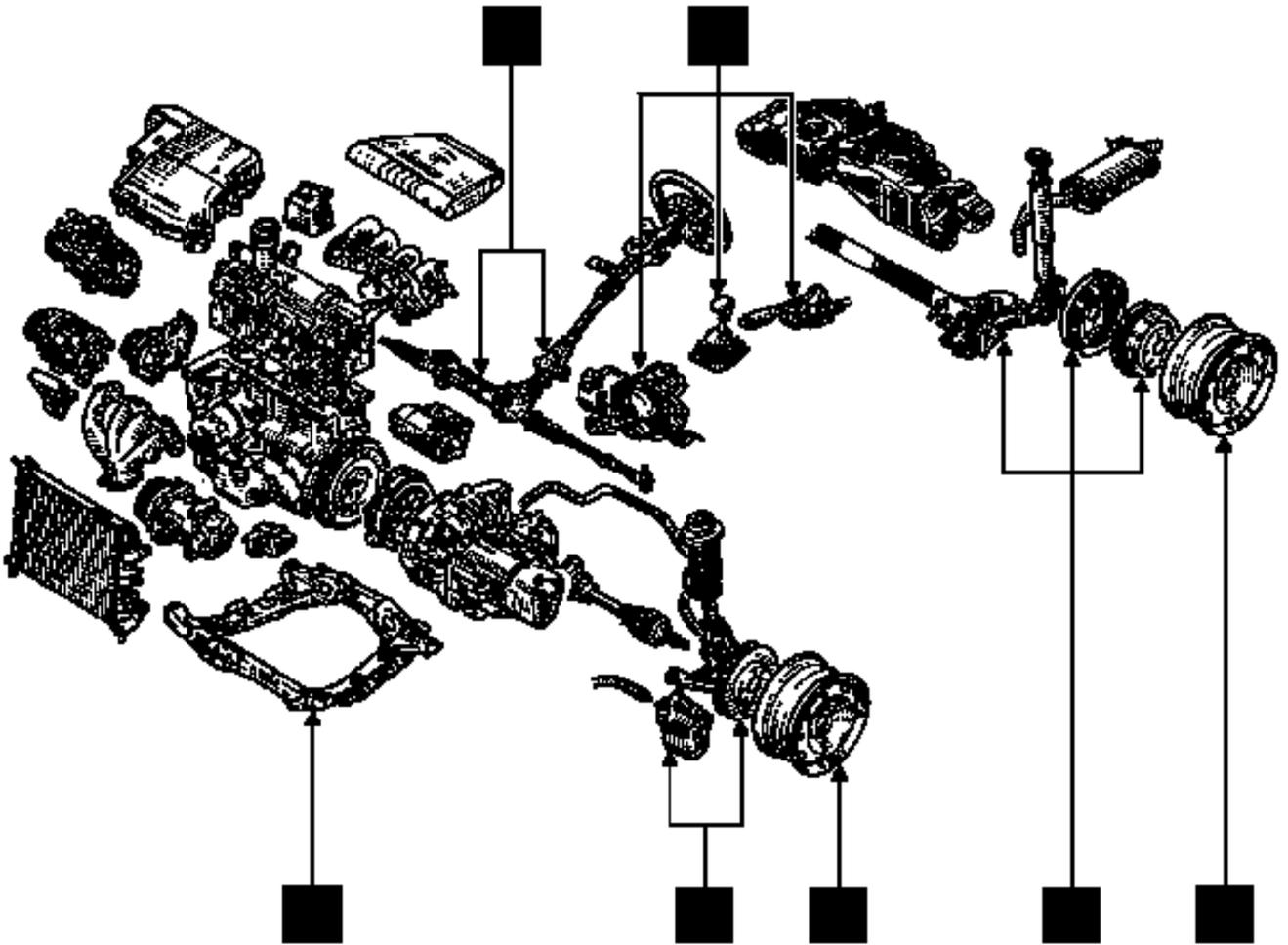
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EXPLODED VIEW



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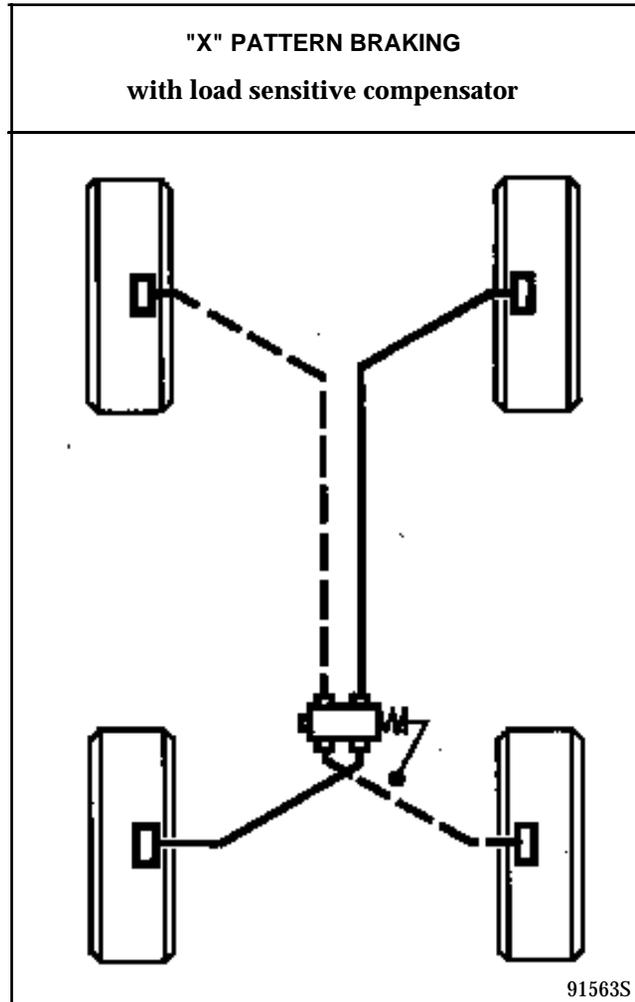
Chassis

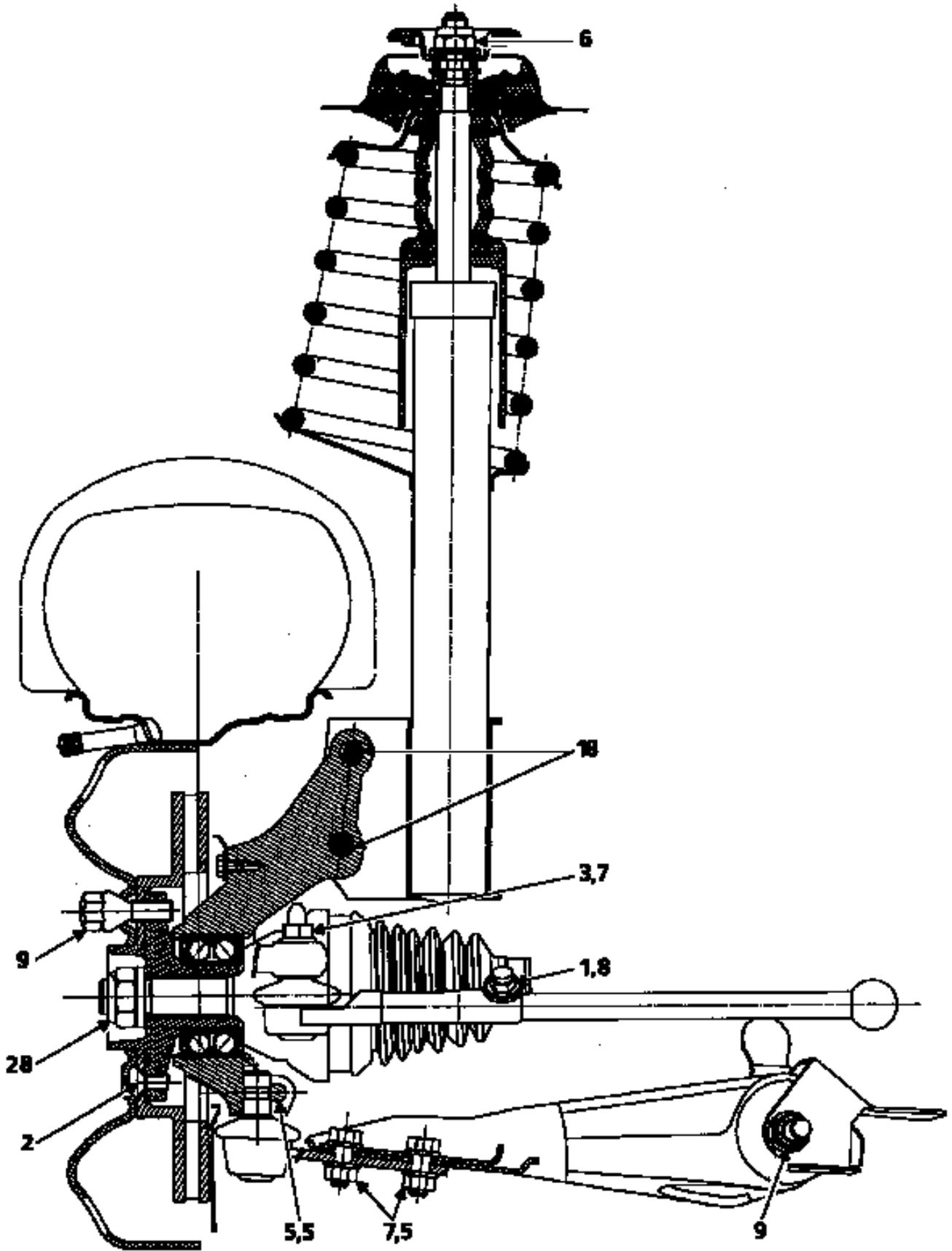
Contents

	Page		
30	GENERAL		
	General diagram of braking circuits	30-1	
	Tightening torques (in daN.m)	30-2	
	Dimensions of the main braking components	30-8	
	Brake unions and pipes	30-9	
	Brake fluid	30-9	
	Bleeding the brake circuit	30-10	
31	FRONT AXLE		
	Lower wishbone	31-1	
	Lower wishbone rubber bushes	31-2	
	Lower wishbone ball joint	31-3	
	Brake pads	31-4	
	Brake caliper	31-5	
	Brake disc	31-6	
	Stub axle carrier bearing	31-7	
	Spring and shock absorber assembly	31-9	
	Anti-roll bar	31-10	
	Sub-frame	31-12	
33	REAR AXLE		
	Rear axle assembly	33-1	
	Shock absorber	33-4	
	Spring	33-5	
	Brake drum	33-6	
	Wheel cylinder	33-8	
	Brake linings (drum)	33-9	
	Bearing	33-11	
35	WHEELS AND TYRES		
	Specifications	35-1	
	Wheel balancing	35-4	
36	STEERING ASSEMBLY		
	Axial ball joint	36-1	
	Manual steering rack	36-3	
	Power assisted steering rack	36-4	
	Gaiter	36-6	
	Steering rack pinion	36-7	
	Manual steering assistance pump	36-8	
	Power assisted steering electric pump assembly	36-14	
	Steering column	36-15	
	Retractable shaft	36-21	
37	MECHANICAL ELEMENT CONTROLS		
	Master cylinder	37-1	
	Brake servo	37-3	
	Air filter - Brake servo non-return valve	37-6	
	Vacuum pump	37-7	
	Handbrake control lever	37-8	
	Handbrake control	37-10	
	Brake pipes	37-12	
	Braking compensator	37-13	
	Clutch control	37-17	
	Clutch automatic wear take-up system	37-18	
	External gear control	37-19	
38	ELECTRONICALLY CONTROLLED HYDRAULIC SYSTEMS		
	BOSCH ABS		
	Presentation of BOSCH ABS 5.3	38-1	
	Location of components	38-2	
	Presentation of the hydraulic regulation assembly	38-3	
	Wiring diagram	38-4	
	Wiring diagram key	38-5	
	31 track connector	38-6	
	Diagnostic socket	38-7	
	Hydraulic assembly	38-8	
	Hydraulic braking test	38-11	

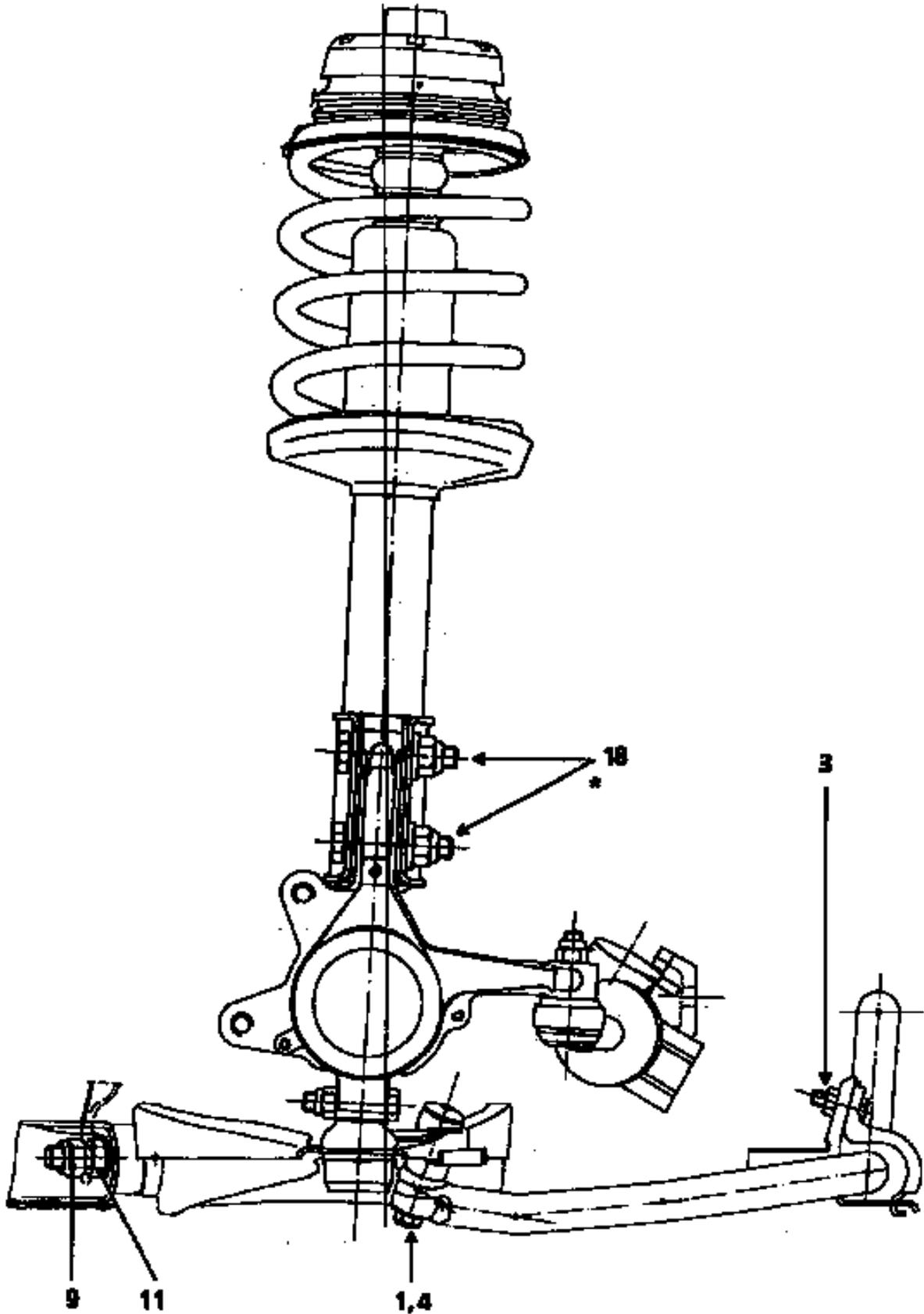
General diagram of braking circuits

NOTE : the diagram below shows the general principle ; in no case should it be taken as reference for the circuit connections and allocations. When replacing one of the components of the brake circuit on a vehicle, always mark the pipes before removing them so that they can be connected back in their original positions.

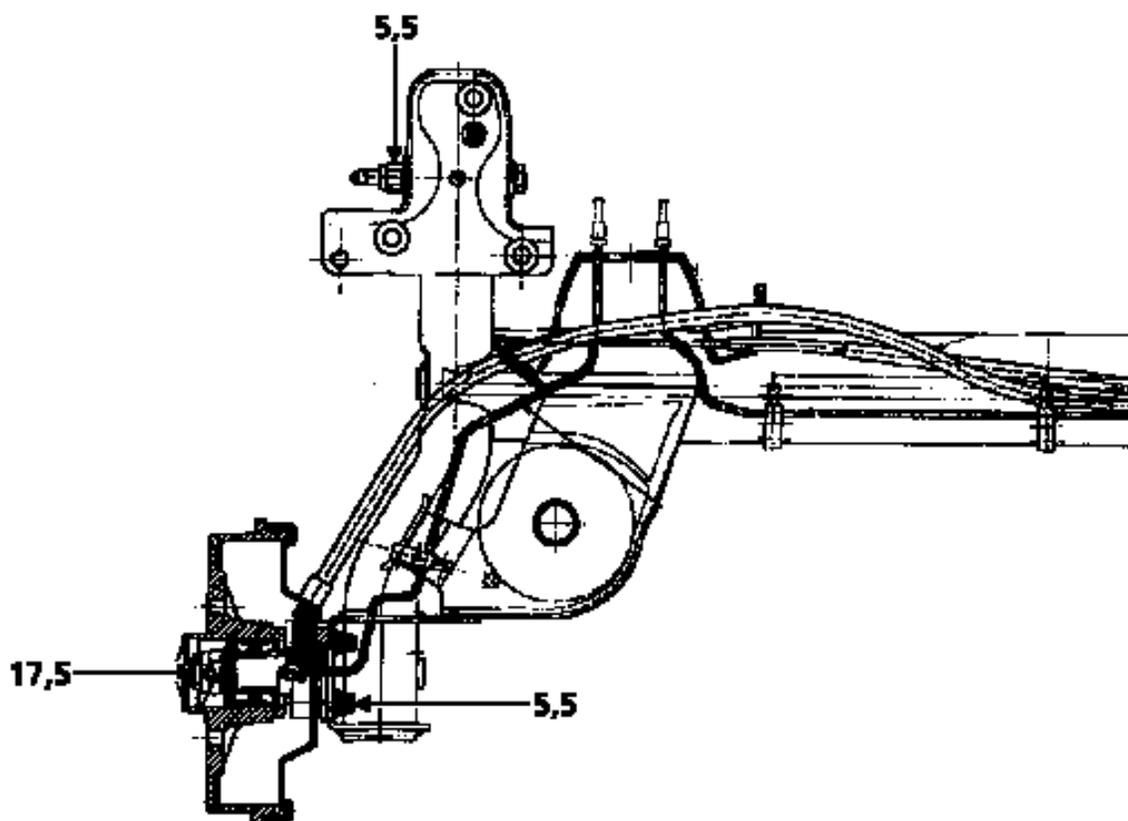


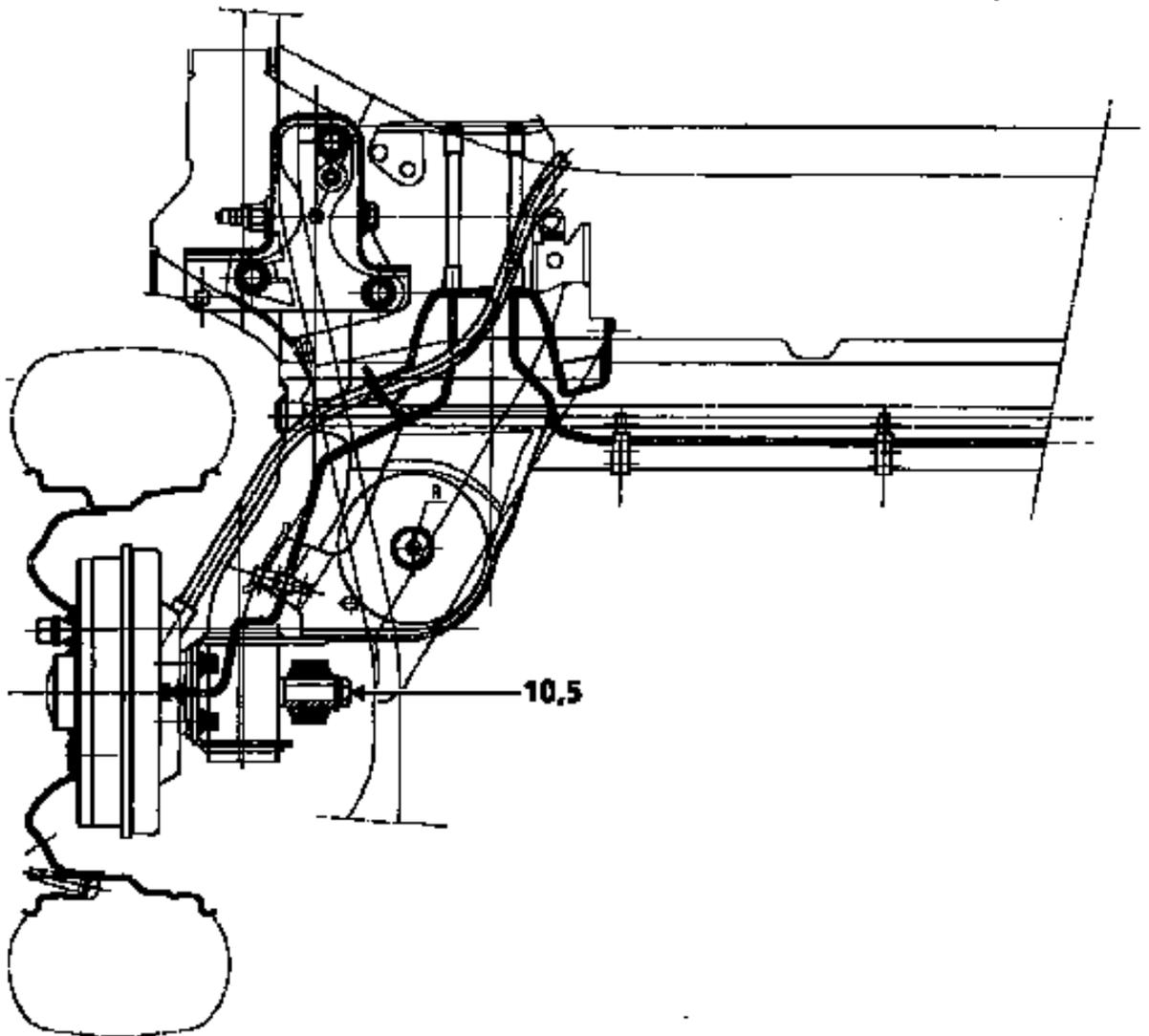


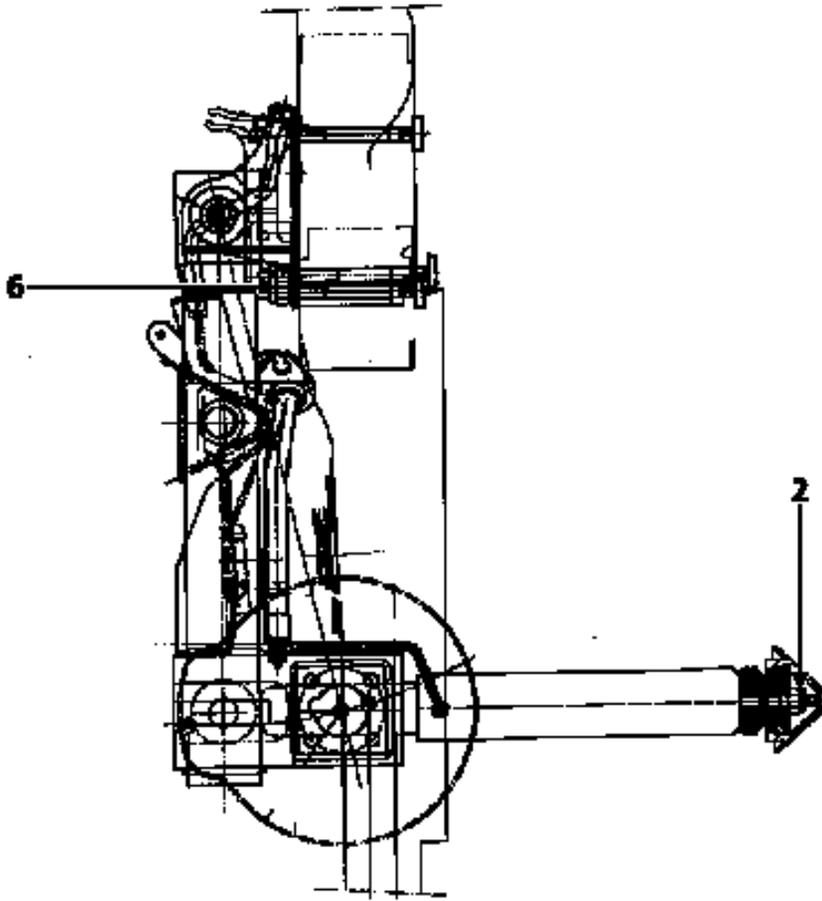
DI3035R



* Must be fitted in this way







GENERAL
Tightening torques (in daN.m)



30

	DIMENSIONS	TIGHTENING TORQUE
Bleed screw	-	0.6 to 0.8
Hoses for front calipers in front wheel cylinders	M 10 × 100	1.7
Hoses on rear suspension arm	M 10 × 100	1.7
Rear wheel cylinder supply	M 10 × 100 or M 12 × 100	} 1.7
Master cylinder outlets	M 10 × 100 or M 12 × 100	} 1.7
Compensator inlets	M 10 × 100 or M 12 × 100	} 1.7
Compensator outlets	M 10 × 100 or M12 × 100	} 1.7

Dimensions of the main braking components

	B/C B0A (1) B/C B0C (1) B/C B0E (1)	B/C B0A (2) B/C B0C (4) B/C B0D (1) B/C B0E (3) (4)	B/C B0C (2) B/C B0D (2) B/C B0E (2) (3)
FRONT BRAKES (in mm)			
Diameter of wheel cylinders	54	54	54
Diameter of discs	238	238	259
Thickness of discs	12	20	20.6
Minimum disc thickness	10.5	17.7	17.6
Pad thickness (including backing)	18.2	18.2	18.2
Minimum pad thickness (including backing)	6	6	6
Maximum disc run-out	0.07	0.07	0.07
REAR BRAKES (in mm)			
Diameter of wheel cylinders	19	17.5 *	17.5
Diameter of drums	180.25	203.2	203.2
Maximum drum wear diameter	181.25	204.2	204.2
Diameter of discs	-	-	-
Thickness of discs	-	-	-
Minimum disc thickness	-	-	-
Lining size	36.7	36.7	36.7
Lining thickness (including backing)	(A)	(A)	(A)
Minimum lining thickness (including backing)	2	2	2
MASTER CYLINDER (in mm)			
Diameter	20.6	20.6	20.6

- (1) without ABS
- (2) with ABS
- (3) with CA
- (4) with or without ABS

* except B/C B0A

- (A) The lining thicknesses are :
 - 4.85 mm for the B/C B0A,
 - 4.6 mm (leading shoe) and 3.3 mm (trailing shoe) for the B/C B0C, B/C B0D and B/C B0E.

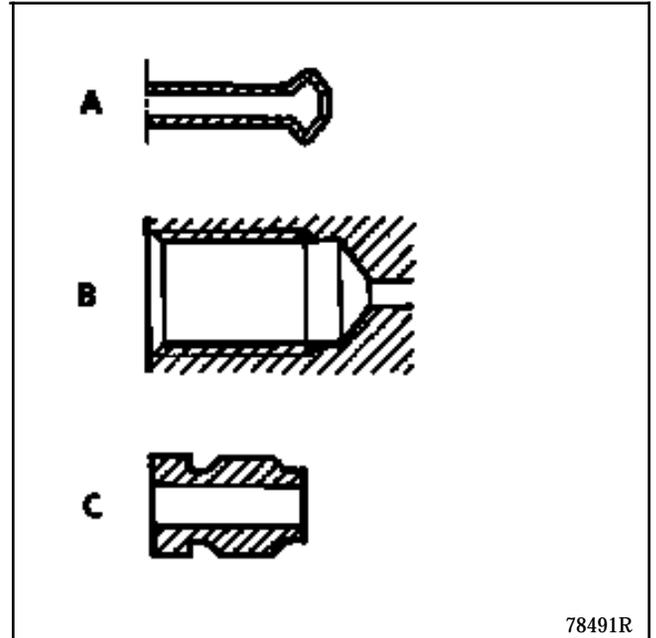


The connection of the pipes between the master cylinder, calipers, compensator and the hydraulic assembly is made using threaded unions with a METRIC THREAD.

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

Identification of parts

- SHAPE of the ends of PIPES in steel or copper (A),
- SHAPE of the THREADED LOCATIONS on components (B),
- Pipe UNIONS coloured GREEN or BLACK: HEXAGONAL OUTSIDE 11 mm or 12 mm (C).



Brake fluid

BRAKE FLUID RENEWAL FREQUENCY

The technology of our brakes, and of our disc brakes in particular (hollow pistons which transmit little heat, a low volume of fluid in the cylinder, sliding calipers avoiding the need for a fluid reservoir in the least cooled area of the wheel), has allowed us to reduce the risk of vapour lock as far as possible, even under conditions of intensive use of the brakes (mountainous areas).

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 important to use only those brake fluids which have been tested and approved by our Technical Department and which conform to standard **SAE J 1703 DOT 4**.

SPECIAL TOOLING REQUIRED	
M.S. 815	Bleed equipment

For vehicles fitted with a brake servo, during bleeding and whatever the method applied, it is important that the assistance device is not used.

Bleeding is carried out using the **M.S. 815** tool on a four post lift with the wheels on the ground.

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

- master cylinder ,
- wheel cylinder ,
- compensator .

Connect the tool to a compressed air supply point (minimum 5 bars).

Connect the filling system to the brake fluid reservoir.

Open:

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

Proceed as follows for vehicles fitted with X pattern braking:

Open:

- **the rear right hand wheel** bleed screw and allow the fluid to run out for approximately 20 seconds,
- **the front left hand wheel** bleed screw and allow the fluid to run out for approximately 20 seconds.

Ignore any bubbles in the bleed tool hoses .

Do the same for the **rear left and front right wheels.**

Check the firmness of the brake pedal when depressed (apply several times).

Repeat the bleed operation if necessary.

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

(For bleeding of the ABS braking circuit, consult section 38).

TIGHTENING TORQUES (in daN.m)



Wheel bolts	9
Lower wishbone nut on sub-frame	9
Cotter bolt on stub-axle carrier	5.5
Anti-roll bar bearing nut	1.5

REMOVAL

Put the vehicle on a two post lift.

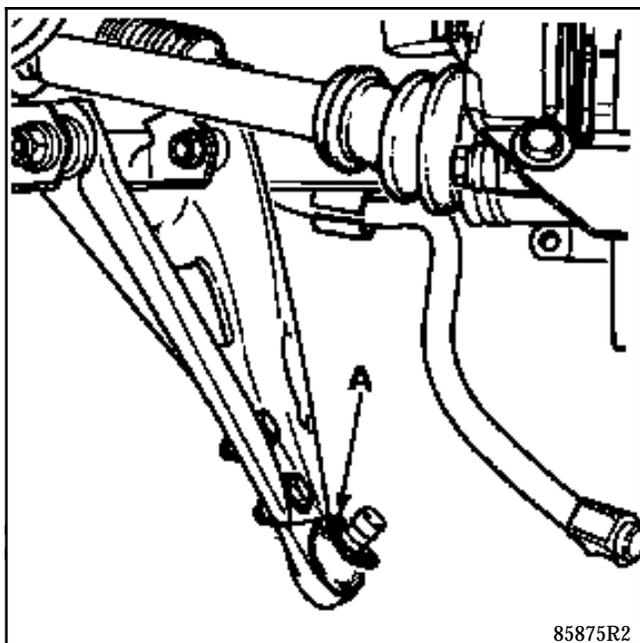
Remove both wheels.

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

Release the anti-roll bar downwards.

Remove:

- the nut and Cotter bolt on the stub-axle carrier,
- the two mounting bolts for the wishbone on the sub-frame,
- the wishbone.



REFITTING

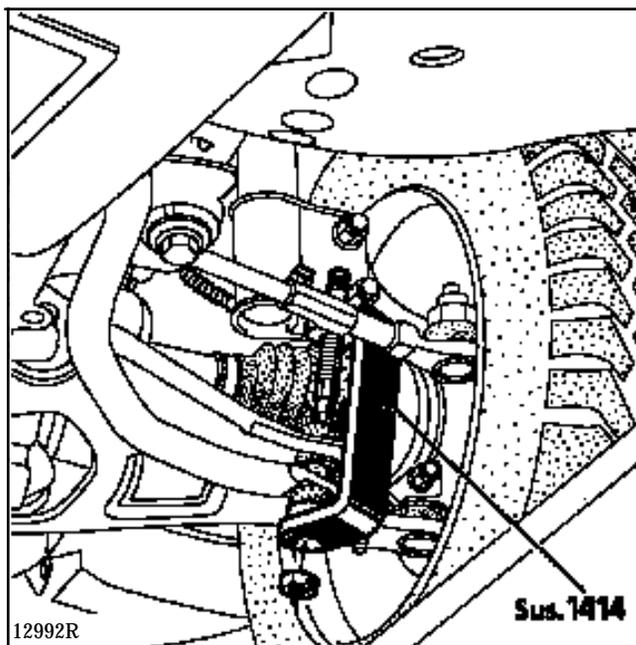
NOTE: ensure the plastic protective washer (A) is present on the lower ball joint shaft.

REFIT:

- the wishbone,
- the two bolts without tightening them,
- the ball joint shaft in the stub-axle carrier and tighten the Cotter bolt nut.

Refit the anti-roll bar and fit the mounting nuts using tool **Sus. 1414** (see method in anti-roll bar section).

This tool allows the rubber mounting to be compressed to fit the nut.



NOTE: bounce the suspension and tighten the wishbone and anti-roll bar bearing nuts to the recommended torque (tightening position: vehicle unladen).

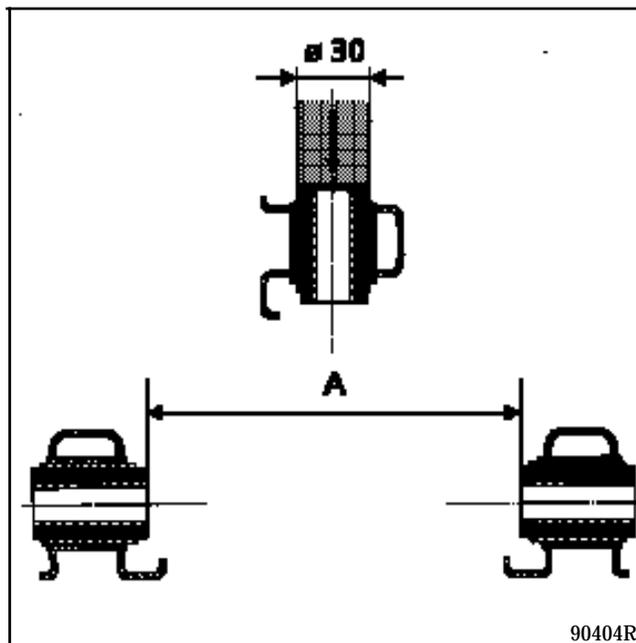
REPLACEMENT

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

On the press, remove one of the worn bushes using a tube of external diameter **30 mm**.

Refit the new bush, ensuring that dimension **A = 146.5 mm**.

Remove the second bush on the press and proceed in the same manner as for the first bush, ensuring the new bush is fitted so that dimension **A = 146.5 mm**.

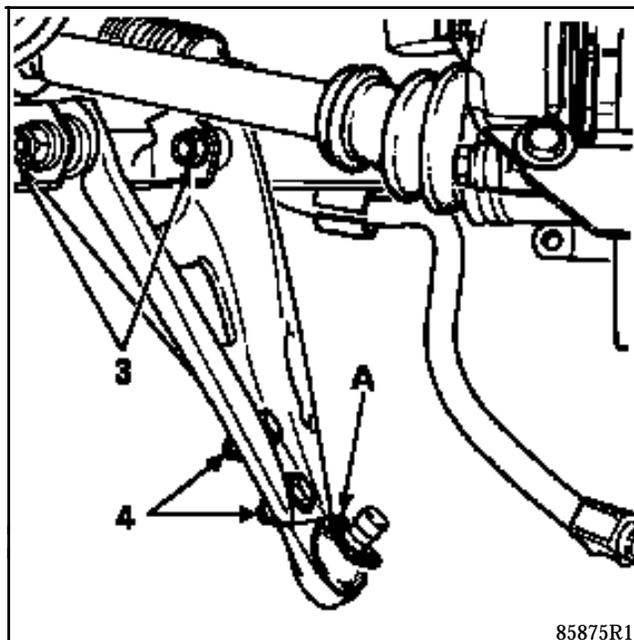


REMOVAL

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

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

Slacken but do not remove the two mounting bolts (3) for the wishbone on the sub-frame.



Remove:

- the two ball joint mounting bolts (4) ,
- the ball joint.

REFITTING

Note: ensure the plastic protective washer (A) is present on the lower ball joint shaft.

Fit the ball joint and torque tighten the mountings.

Then proceed in the same manner as for refitting the lower wishbone.

SPECIAL TOOLING REQUIRED

Fre. 823

Tool for pushing piston back

TIGHTENING TORQUES (in daN.m)

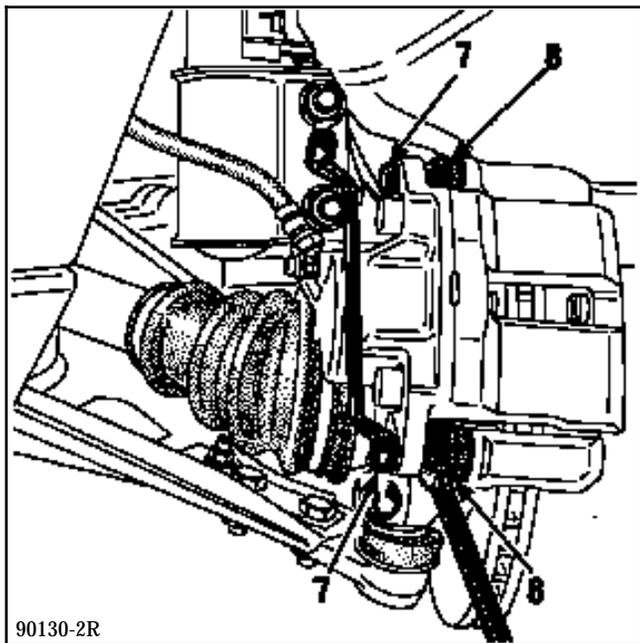


Wheel bolts	9
Brake caliper guide bolt	4

REMOVAL

Disconnect the wear warning light wire (if fitted).

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



Remove the guide bolts (7) using the two wrenches.

Do not clean these bolts.

Remove:

- the sliding caliper,
- the pads.

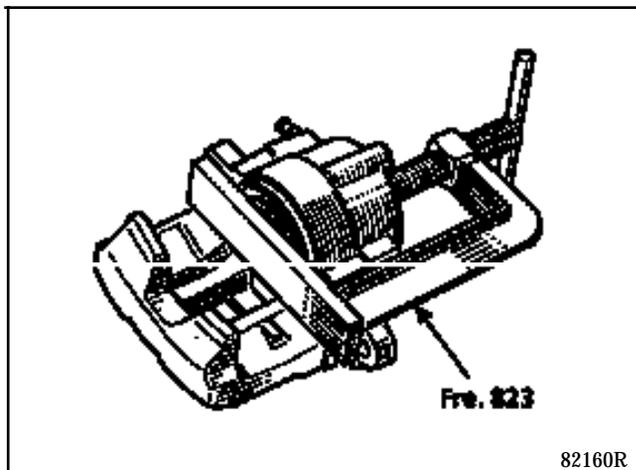
Checking

Check:

- the condition and fitting of the piston dust cover and its retaining spring ring,
- the condition of the guide dust covers (8).

REFITTING

Push back the wheel cylinder piston using tool Fre. 823.



Fit new brake pads.

Refit the caliper into position and fit the lower guide bolt (7) coated with **Loctite FRENBLOC**.

Press on the caliper and fit the upper guide bolt coated with **Loctite FRENBLOC**.

Tighten the guide bolts to the recommended torque, beginning with the lower bolt.

Reconnect the wear warning light wire (if fitted).

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

TIGHTENING TORQUES (in daN.m)



Wheel bolts	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 pipe 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 cover,
- remove the piston using compressed air, inserting a wooden block between the caliper and the piston to prevent damage to the piston: any trace of damage to the piston skirt will render it unusable
- remove the seal from the caliper groove using a flexible rounded edge blade (eg feeler gauge).

Clean the parts using methylated spirits.

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

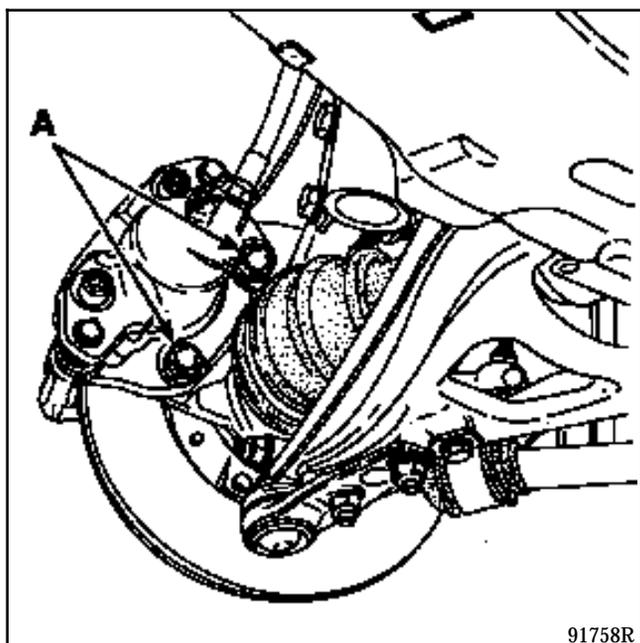
Brake discs cannot be reground. If they are too heavily worn or are scratched they must be replaced.

TIGHTENING TORQUES (in daN.m)		
Wheel bolts	9	
Brake caliper mounting bolt	10	

REMOVAL

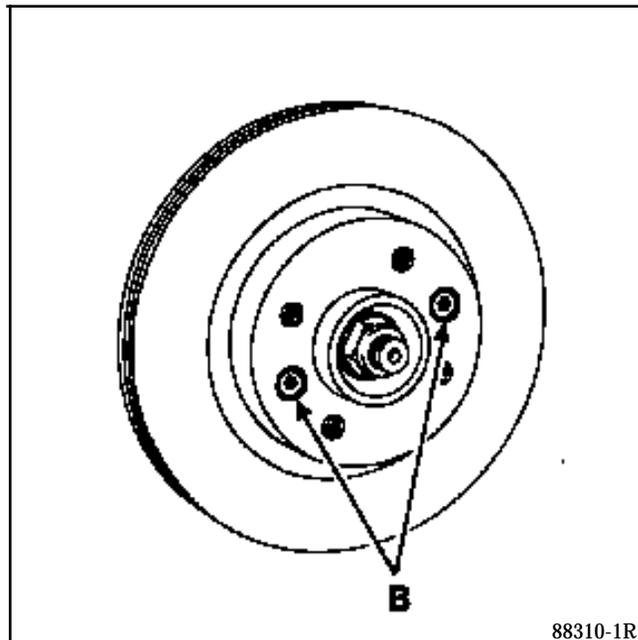
Remove:

- the two brake assembly mounting bolts (A),



91758R

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



88310-1R

REFITTING

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

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

NOTE: when a brake disc is replaced, the pads must also be renewed.

Press several times on the brake pedal to put the piston in contact with the pads.

FRONT AXLE

Stub axle carrier bearing

31

SPECIAL TOOLING REQUIRED		
Rou.	15 -01	Shaft protector
Rou.	604 -01	Hub locking tool
T.Av.	476	Ball joint extractor
T.Av.	1050-02	Tool for pushing driveshaft back

TIGHTENING TORQUES (in daN.m)		
Driveshaft nut	28	
Wheel bolts	9	
Shock absorber base nut	18	
Brake caliper mounting bolt	10	
Track rod end nut	3.7	
Cotter bolt nut on stub axle carrier	5.5	

REMOVAL

Disconnect the battery.

Remove:

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

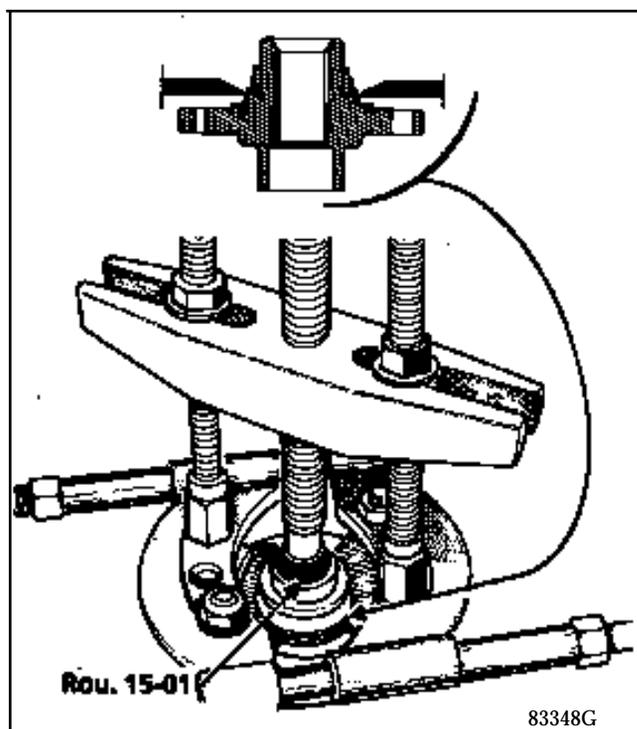
Push back the driveshaft using tool T. Av. 1050-02.

Remove:

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

Remove the hub on the press.

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



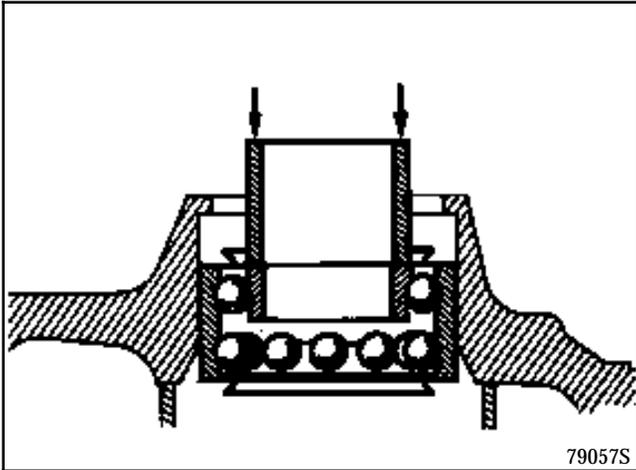
Remove the locking spring ring from the stub axle carrier.

On the press remove the remainder of the bearing, taking care to take the weight on the inner bush using a tube of the same diameter.

FRONT AXLE

Stub axle carrier bearing

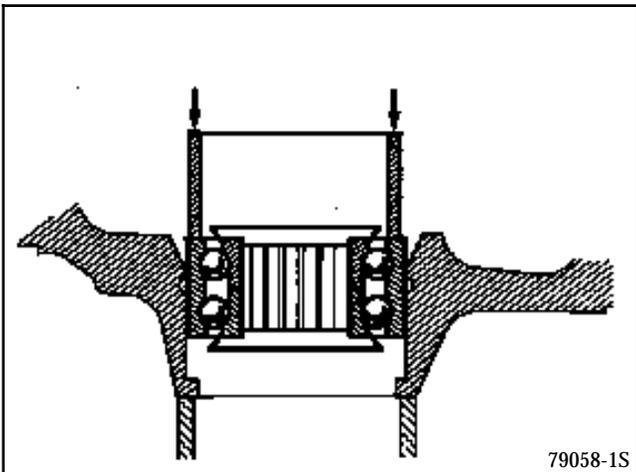
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REFITTING

Fit the bearing on the press, into the stub axle carrier using a tube of external diameter **70 mm** and bore **66 mm**, taking the weight on the external bush.

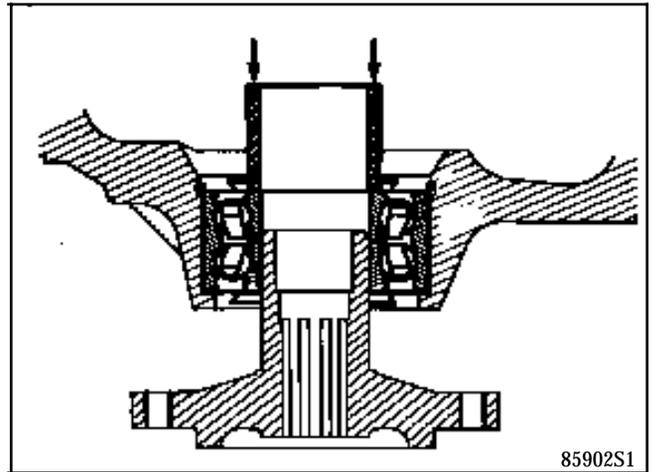
IMPORTANT: do not take the weight on the internal bush to avoid damaging the bearing as the force required to push the bearing on is quite considerable.



Fit a new locking spring ring.

Coat each sealing lip of the bearing with multi-purpose grease.

Fit on the press, using a tube of external diameter **48 mm** and internal diameter **42 mm**, taking the weight on the inner bearing bush.



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

Refitting is then the reverse of removal. Observe the correct tightening torques.

FRONT AXLE

Spring and shock absorber assembly

31

EQUIPMENT REQUIRED

Spring compressor

TIGHTENING TORQUES (in daN.m)



Shock absorber base mounting bolt	18
Rebound stop nut	6
Wheel bolts	9

REMOVAL

Put the vehicle on a four post lift.

Remove:

- the wheels,
- the shock absorber base mounting bolts.

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.

Replacing a shock absorber

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

Remove the spring retaining nut.

Remove the spring and the intermediate parts.

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

When refitting, ensure all components are replaced in the correct location and then decompress the spring.

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

REFITTING

Refitting is the reverse of removal. Observe the correct tightening torques.

FRONT AXLE

Anti-roll bar

31

SPECIAL TOOLING REQUIRED

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

TIGHTENING TORQUES (in daN.m)



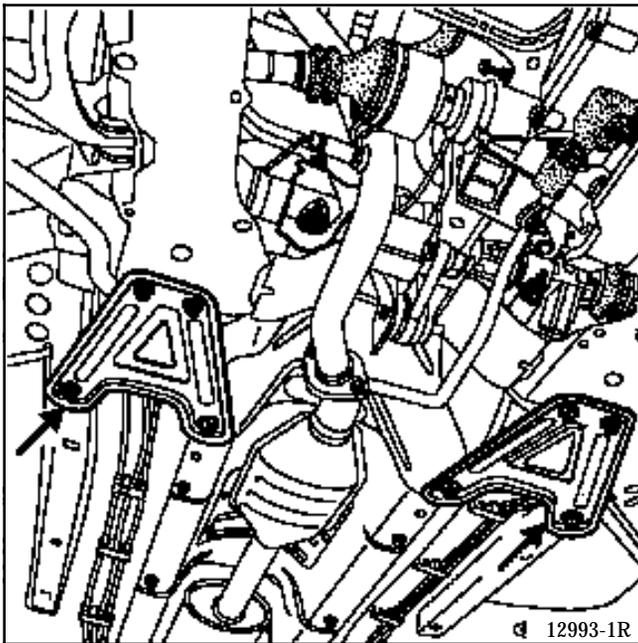
Central bearing bolt	3
Rubber mounting nut	1.5

REMOVAL

Put the vehicle on a 4 post lift.

Remove:

- the two lower bolts from the exhaust downpipe,
- the two sub-frame reinforcements (4 bolts),



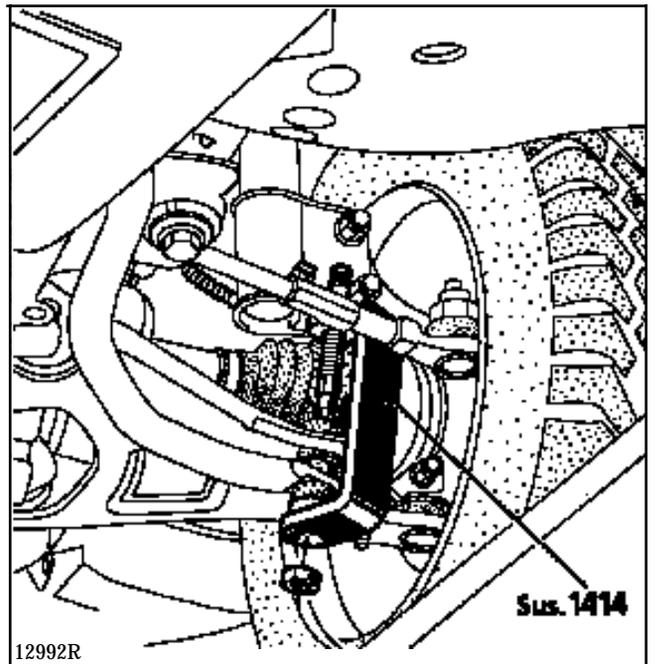
- the two rubber mounting nuts at the ends of the anti-roll bar,
- the two bolts from the central bearings on the bar.

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

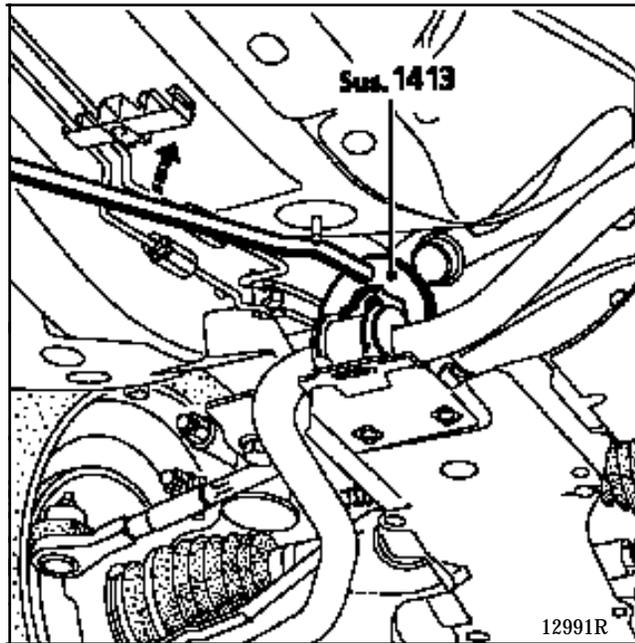
REFITTING

Refit :

- the rubber mounting nuts using tool **Sus. 1414**,



- the central bearing bolts using tool **Sus. 1413**.



- the two sub-frame reinforcements,
- the lower bolts on the exhaust downpipe.

Rubber bush locking position : **UNLADEN**.

SPECIAL TOOLING REQUIRED		
Mot.	1040-01	Dummy sub-frame for removing / refitting engine / transmission assembly
T. Av.	476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)		
Wheel bolts		9
Track rod end nut		3.7
Steering universal joint eccentric bolt		2.5
Sub-frame mounting		
bolt	front Ø 10	6
	rear Ø 12	10.5
Sub-frame - side member tie rod nut		3
Cotter bolt nut on stub axle carrier		5.5
Engine tie bar		6.5
Steering rack mounting bolts		5

REMOVAL

Disconnect the battery.

Put the vehicle on a two post lift.

Remove the wheels.

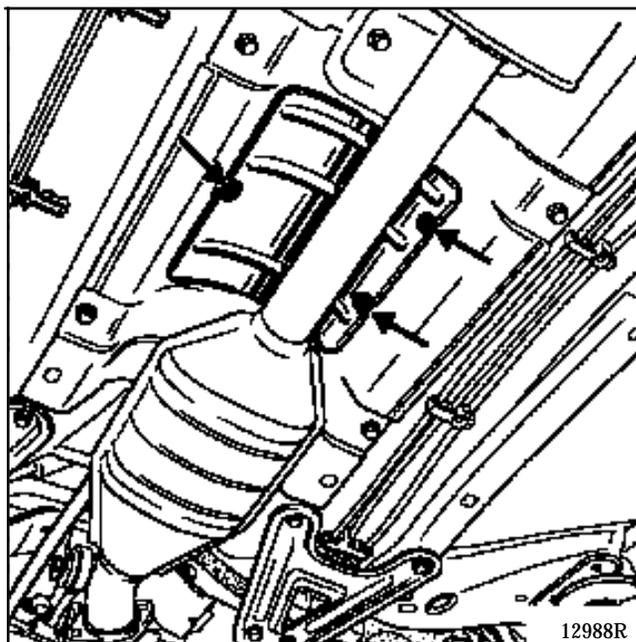
Remove the track rod ends using tool T. Av. 476.

Remove the Cotter bolt on the stub axle carrier.

Release but do not remove the mudguards to reach the upper bolt on the sub-frame - side member tie rod and remove it.

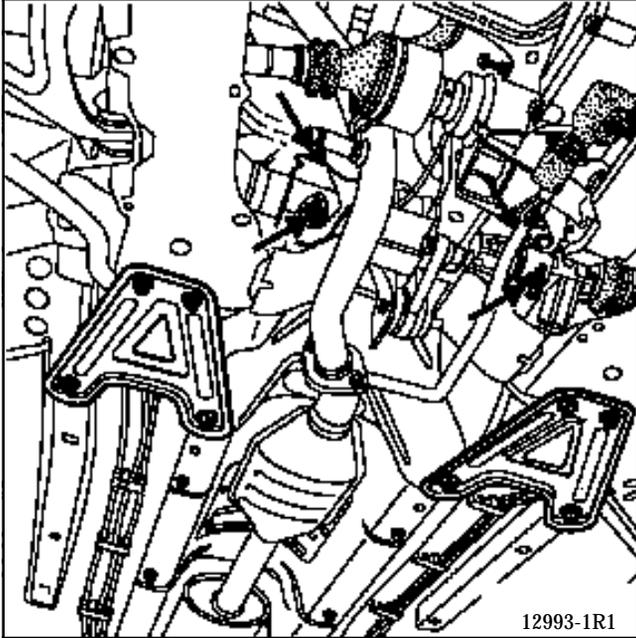
Remove:

- the exhaust downpipe and attach the catalytic converter,
- the bolt (engine side) for the engine tie bar.
- the gear control by removing the two bolts at the ends of the control. To do this, the catalytic converter heat shield must be removed and the gaiter on the gearbox side must also be removed.



Remove:

- the two nuts for the steering rack heat shield,
- the mounting nuts for the steering rack and attach it to the exhaust manifold.



Fit tool **Mot. 1040-01** under the sub-frame.

Lower the lift until the tool touches the ground.

Remove the sub-frame mounting bolts.

Carefully raise the lift.

REFITTING

Systematically renew the sub-frame mounting bolts and ensure they are tightened to the correct torque.

Refitting is the reverse of removal.

NOTE: the sub-frame is fitted to the body in the following manner :

- fit 2 pins in place of the front mounting bolts
- offer up the sub-frame,
- tighten, but do not lock, the rear mounting bolts (begin with the longest rear right hand bolt),
- replace the pins with mounting bolts at the front,
- tighten the four mounting bolts to the correct torque, beginning at the rear,
- ensure that the heat shields are correctly refitted.

REAR AXLE

Rear axle assembly

33

TIGHTENING TORQUES (in daN.m)



Axle mounting nut	5.5
Wheel bolt	9
Shock absorber upper nut	2
Shock absorber base bolt	10.5

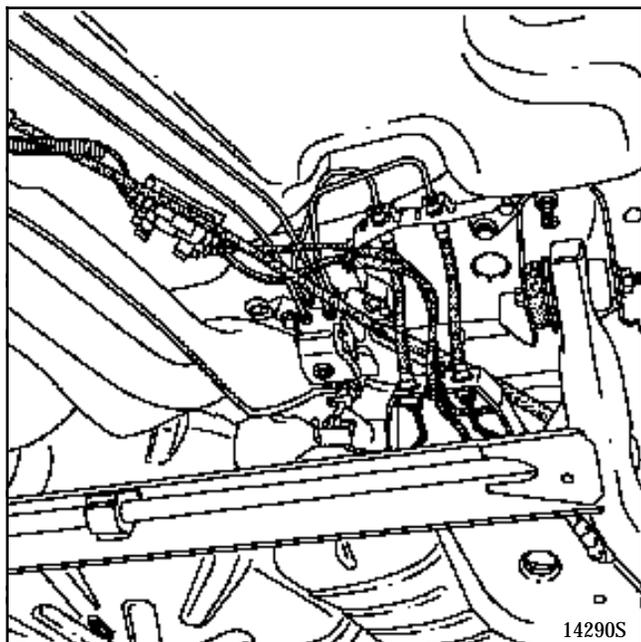
REMOVAL

Put the vehicle on a two post lift.

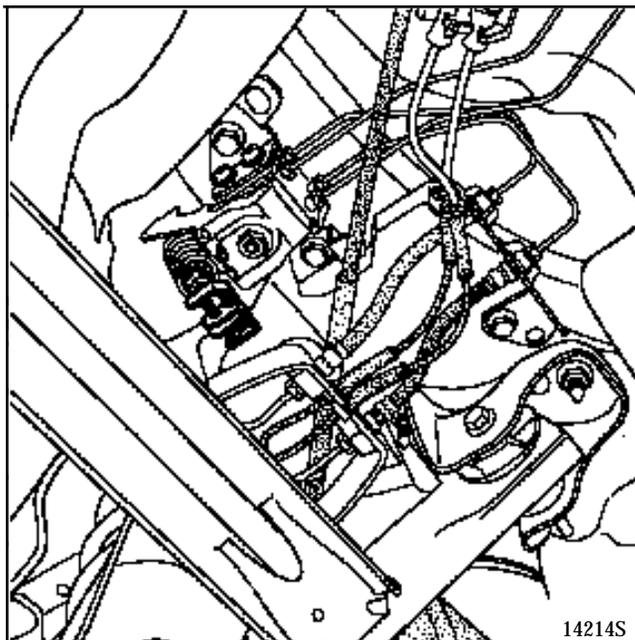
Remove the two rear wheels.

Fit the pedal press to limit the amount of brake fluid running out.

Disconnect the two rigid brake fluid pipes.

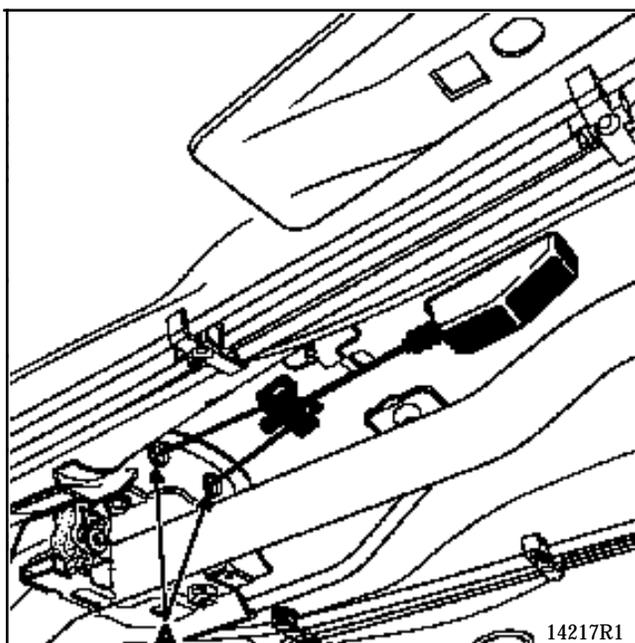


Remove the compensator pin by removing the retaining clip on the rear axle.



In the passenger compartment, slacken the hand-brake cable (see the method described in section 37 of the **Workshop Repair Manual**).

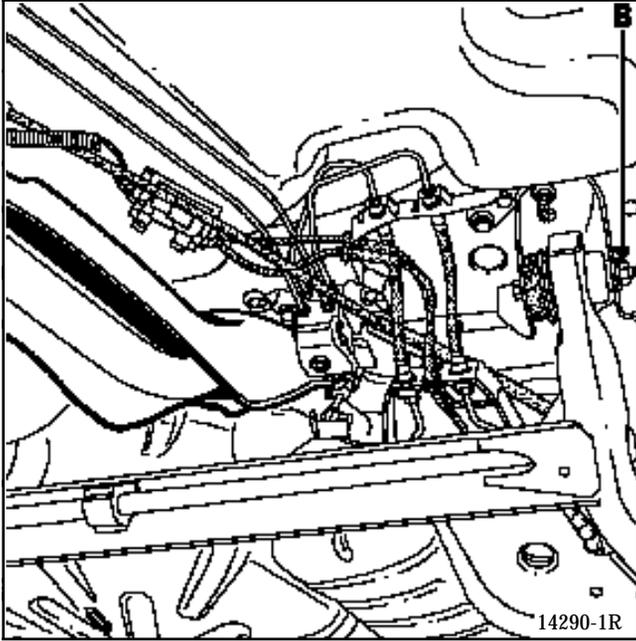
Under the vehicle, remove the two rear heat shields and unclip the brake cables from the body (A).



REAR AXLE

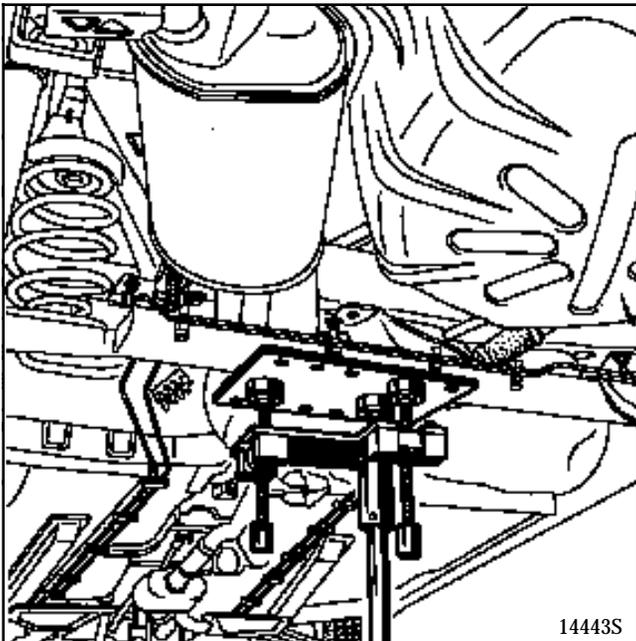
Rear axle assembly

33



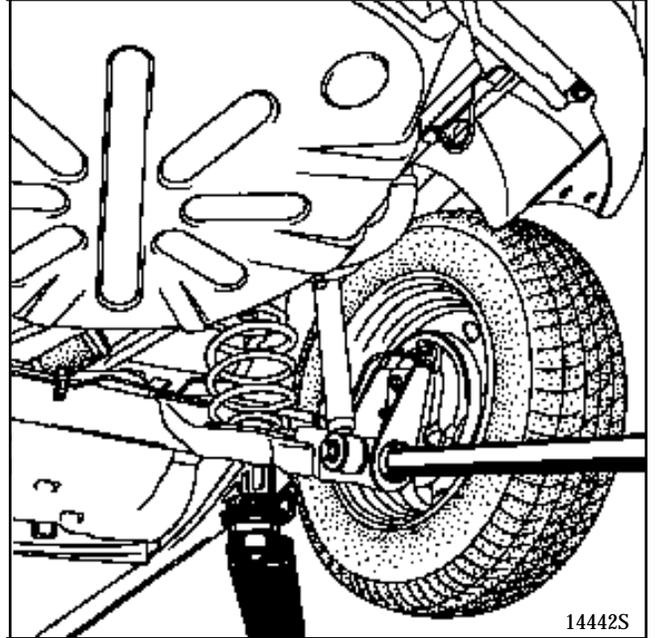
NOTE: slacken, but do not remove the rubber bush bolts (B).

Fit the component jack.

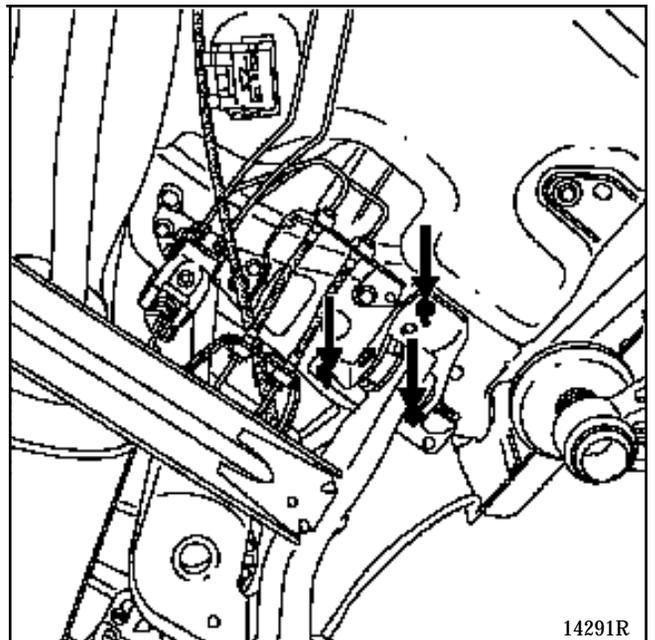


Remove the shock absorber lower bolts by using a bar to lift it.

Remove the springs as you go.



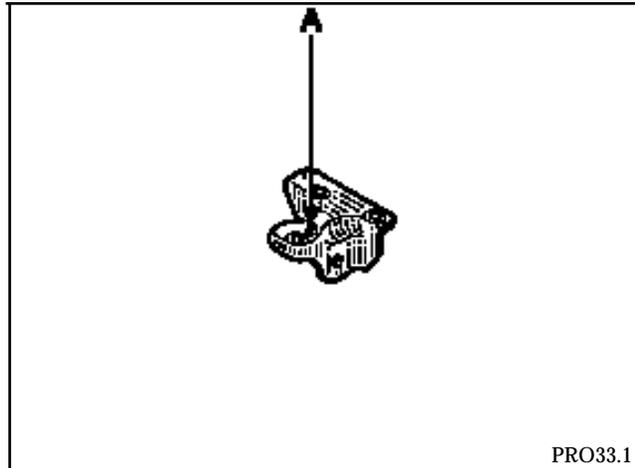
NOTE: before removing the second bolt, ensure that there are two people to hold the rear axle assembly. When the bolt is removed, tilt the assembly until it is correctly balanced. Remove the six rear axle assembly bearing nuts on the body.



Completely remove the axle assembly whilst keeping it balanced on the component jack.

REFITTING

Position the axle assembly, in balance, on the component jack, position the mounting bearings so the the positioning pin (A) is to the top.



PRO33.1

Fit the axle assembly until it has passed the mounting bolts and replace the six nuts.

Using two people, tilt the rear axle assembly to refit the springs and the shock absorber bolts.

Refitting is the reverse of removal. Observe the correct tightening torques.

Correctly replace the heat shields.

Bleed the brake circuit.

REAR AXLE

Shock absorber

33

TIGHTENING TORQUES (in daN.m)



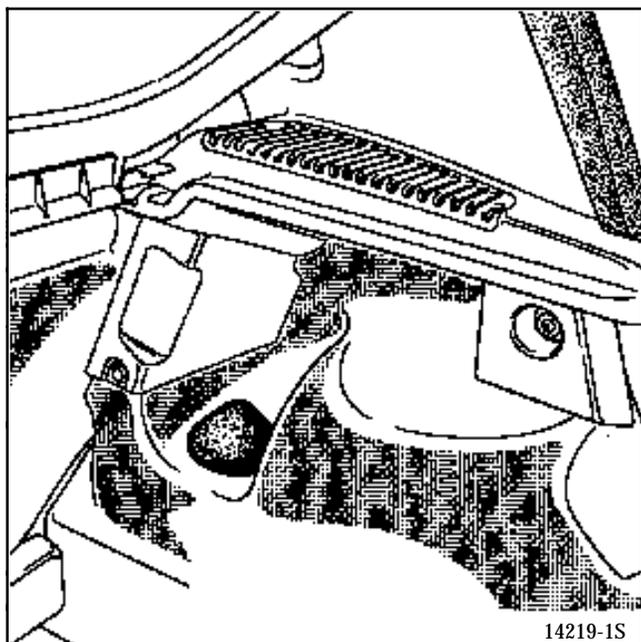
Shock absorber upper nut	2
Shock absorber base mounting bolt	10.5

REMOVAL

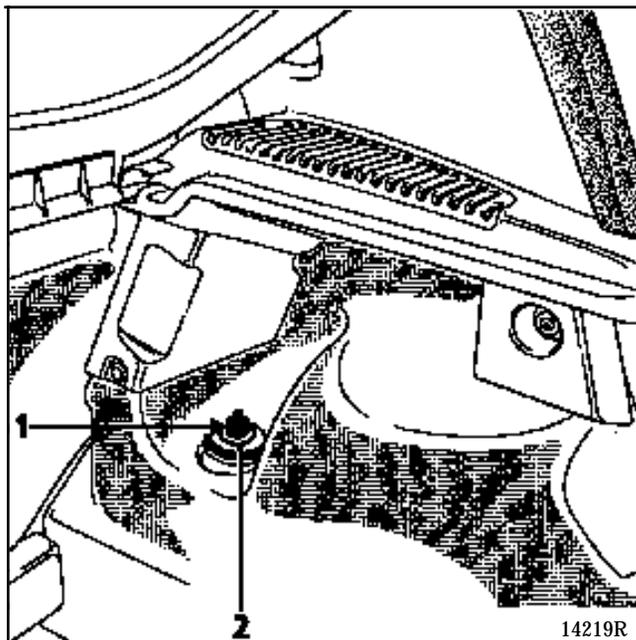
Put the vehicle on a two post lift.

Put the vehicle on its wheels, and in the luggage compartment remove:

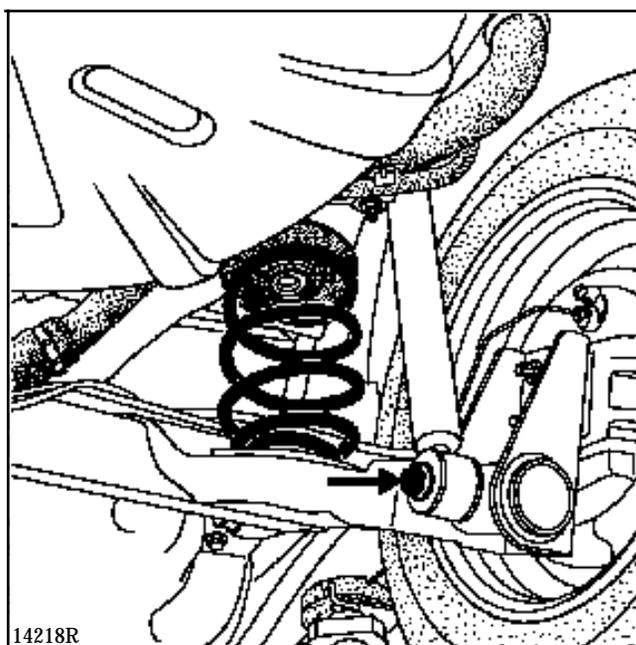
- the shock absorber cover ,



- the nut (1) and the rubber bush (2).



Lift the vehicle and remove the shock absorber lower bolt.



IMPORTANT : do one side at a time.

REFITTING

Refitting is the reverse of removal. Observe recommended tightening torques.

TIGHTENING TORQUES (in daN.m)



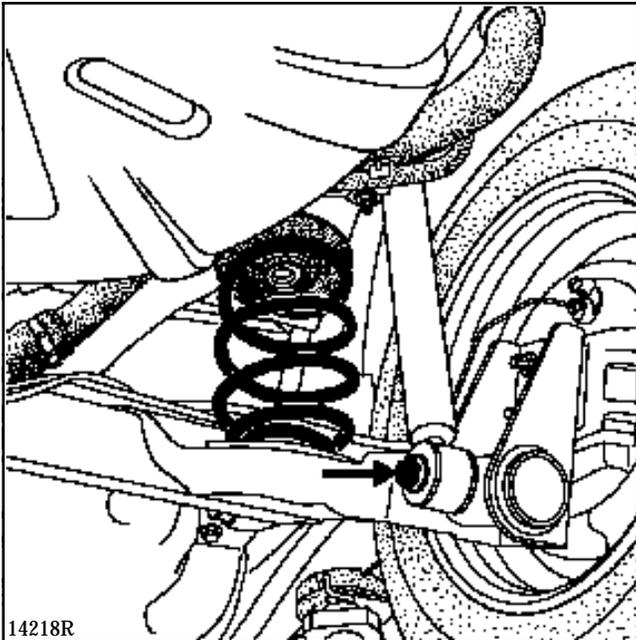
Shock absorber base mounting bolt

10.5

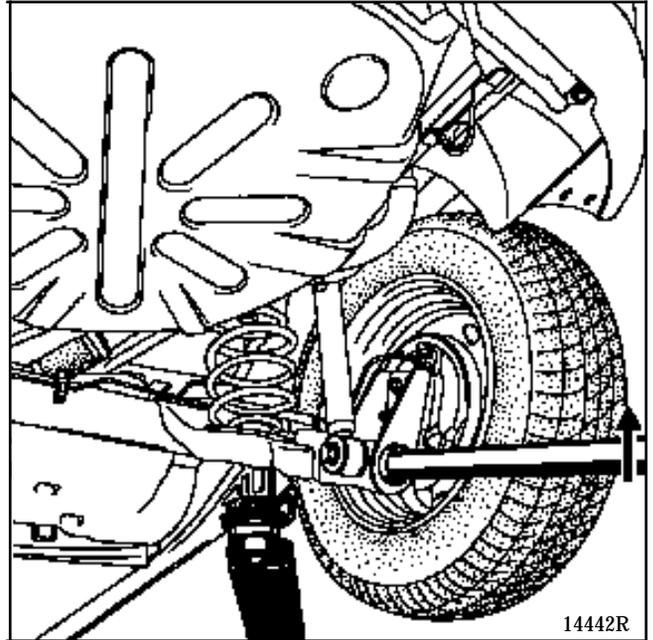
REMOVAL

Put the vehicle on a two post lift.

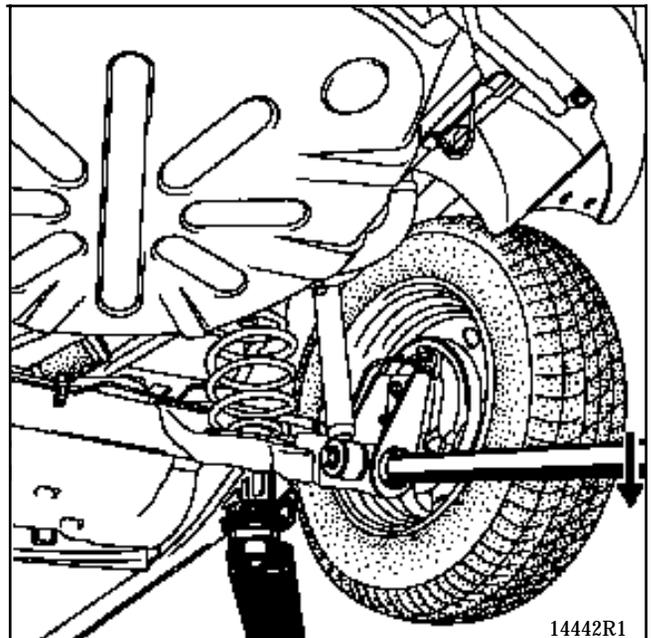
Lift the vehicle and remove the shock absorber lower bolt.



NOTE: to make it easier to remove the shock absorber lower bolt, insert a bar in the axle to lift it.



To remove the spring, lever downwards on the axle to release it.



IMPORTANT : do one side at a time.

REFITTING

Refitting is the reverse of removal. Observe recommended tightening torques.

The two brake drums must be of the same diameter, if one is reground, the other must also be reground. Never exceed the maximum wear diameter marked on the drum.

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

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	9
Hub nut	17.5

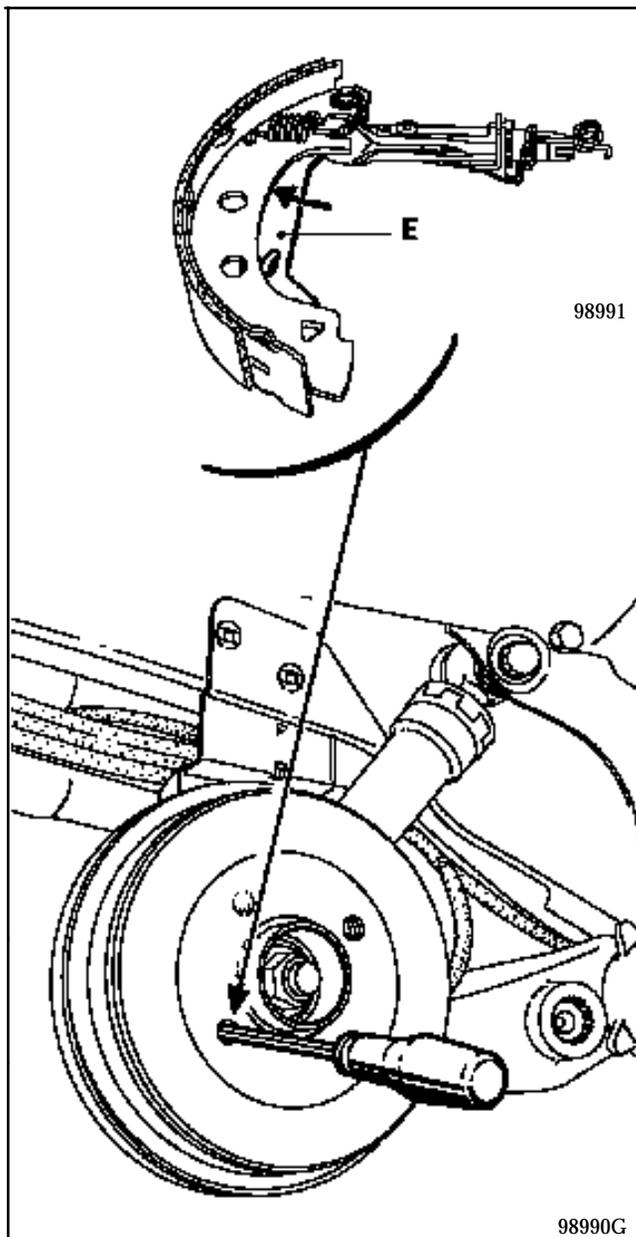
REMOVAL

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

Release the handbrake, slacken the secondary handbrake cables to allow the lever to move back.

Insert a screwdriver through one of the wheel mounting holes in the drum and push the handbrake lever to release the lug from the brake shoe (E).

Help the lever to slacken by pushing it towards the rear.



Remove:

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

REFITTING

Remove all dust from the drum and the linings using brake cleaner.

Fit:

- the drum,
- the washer and the nut, which must be torque tightened,
- the plug.

Adjust:

- the linings by repeatedly pressing the brake pedal,
- the handbrake (see section 37 "Controls").

TIGHTENING TORQUES (in daN.m)		
Wheel bolts	9	
Hub nut	17.5	
Bleed screw	0.5 to 0.8	
Pipe bolt	1.7	

REMOVAL

Remove:

- the drum (see corresponding section),
- the upper return spring (see paragraph "**Brake linings**").

Separate the shoes.

Slacken:

- the rigid pipe union on the wheel cylinder using a pipe wrench,
- the two cylinder mounting bolts on the backing plate and remove it.

Check the condition of the shoes. If they have traces of oil on them, renew them.

REFITTING

Remove all dust from the drums and the linings using brake cleaner.

Refitting is the reverse of removal.

Bleed the braking circuit (see section 38).

Adjust the linings by repeatedly pressing the brake pedal.

Check the cut-out pressure (see section 37 "**Controls**").

REAR AXLE

Brake linings (drum)

33

SPECIAL TOOLING REQUIRED

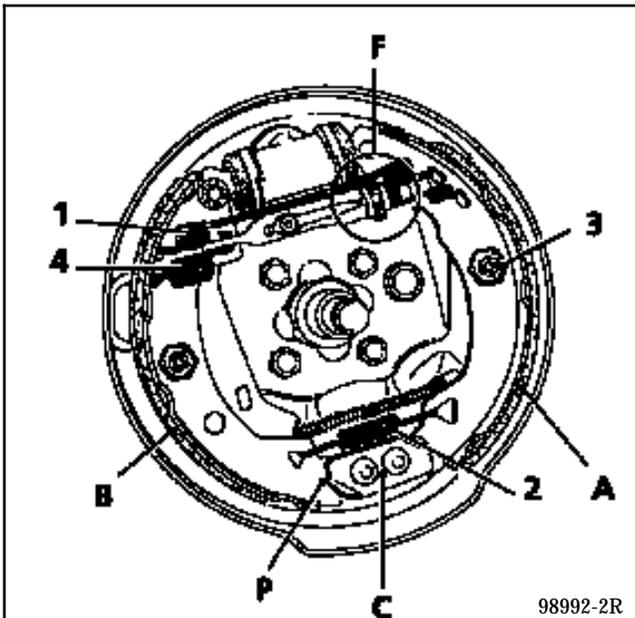
Emb. 880	Inertia extraction tool
Rou. 943	Hub cover plug extractor

TIGHTENING TORQUES (in daN.m)



Wheel bolts	9
Hub nut	17.5

Composition of RAI brake (Rattrapage Automatique Incrémental - automatic wear take up system).



- A Leading shoe
- B Trailing shoe
- C Fixed point
- P Base of brake shoe
- F RAI automatic wear take up system
- 1 Upper return spring
- 2 Lower return spring (for base)
- 3 Side retainer
- 4 Handbrake lever return spring

REMOVAL

Brake shoes must be replaced on the complete axle - never fit shoes of differing makes or grades.

Remove:

- the brake drum (see corresponding paragraph),
- the lower spring (2) using brake shoe pliers.

Using adjustable pliers, remove the shoe side retaining springs.

In turn, pass each brake shoe base over the fixed point. Squeeze the bases of the shoes together to separate the ends at the wheel cylinder end.

Separate the assembly (RAI and shoes) from the brake backing plate then remove it, after unclipping the handbrake cable.

REFITTING

Present the assembly to the vehicle.

Attach the handbrake cable to the lever.

Squeeze the bases of the shoes together and position the other ends on the wheel cylinder pistons. Take care not to damage the covers.

Position the shoes on the fixed point (C).

Fit the side retainers (3).

Remove the pliers from the wheel cylinder pistons then refit the lower spring (2).

ADJUSTMENT

Using a screwdriver, adjust the brake shoe diameter using the notched segment.

Refit the drums without tightening the nuts.

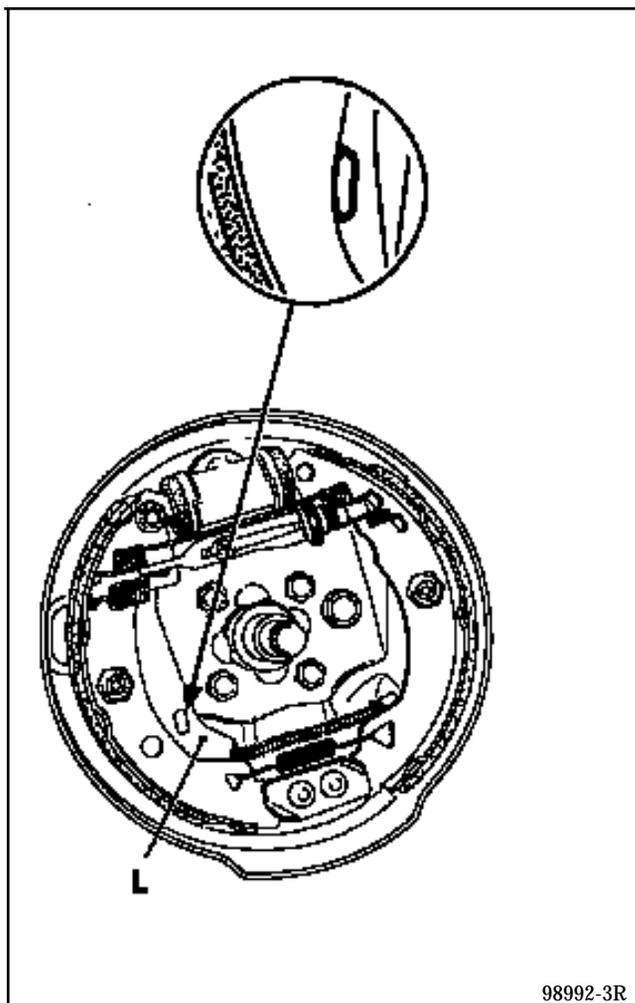
Centre the linings by repeatedly pressing the brake pedal (approximately 20 times).

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

Remove the drums.

Ensure:

- the cables slide freely,
- the handbrake levers (L) are correctly positioned against the shoes.



98992-3R

Progressively tighten the cables at the central adjuster so that levers (L) **start to move between the 1st and 2nd notch** of the control lever travel and remain applied from the 2nd notch.

Lock the lock nut on the central adjuster.

Refit:

- the drums and tighten the nuts to a torque of **17.5 daN.m**,
- the plugs.

REAR AXLE Bearing

33

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

TIGHTENING TORQUES (in daN.m)		
Hub nut		17.5
Wheel bolts		9

CHECKING

Check the end float using a dial gauge mounted on the drum : **0 to 0.03 mm maximum.**

REMOVAL

Remove:

- the hub plug using tools **Rou. 943 + Emb. 880**,
- the brake drum (see corresponding section).

From the drum, remove:

- the bearing retaining clip,
- the bearing using a tube.

REFITTING

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

Fit:

- a **new** clip,
- the drum on the pre-lubricated stub axle,
- a **new** lock nut and tighten to the correct torque,
- the hub plug.

Adjust:

- the brake shoes by repeatedly pressing the brake pedal,
- the handbrake (see section 37 "Controls").

WHEEL RIMS

There are two forms of wheel identification marking:

- engraved markings for steel 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

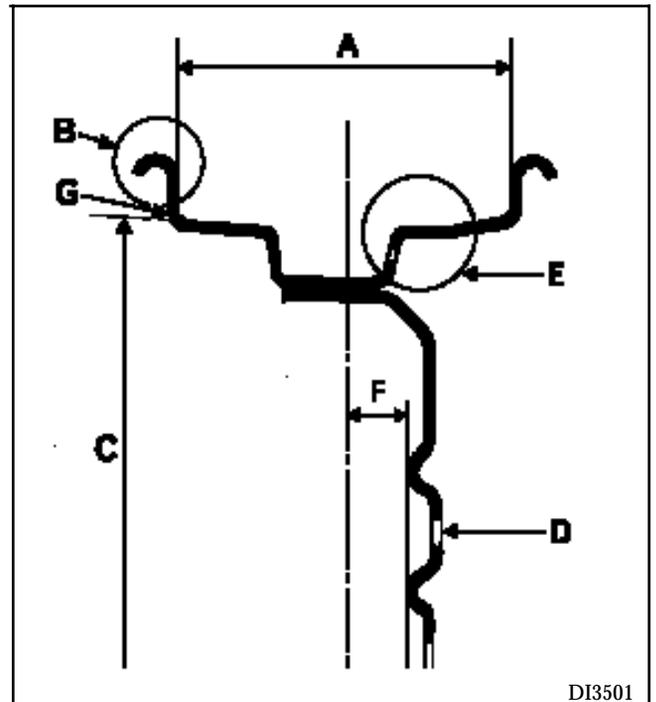
Example : 5 1/2 J 14

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

The four 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.

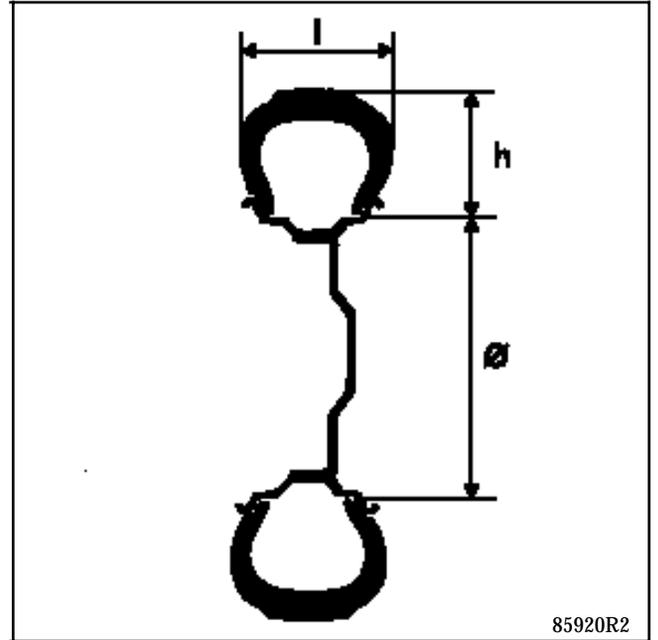
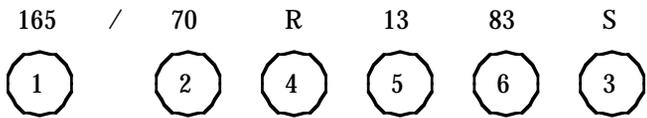


DI3501

TYRES

Examples of identification marking

165/70 R 13 83 S



- | | | |
|---|-----|--|
| 1 | 165 | Tyre width in mm (l) section |
| 2 | 70 | h/l ratio $\frac{\text{height}}{\text{width}}$ |
| 4 | R | Radial structure |
| 5 | 13 | Inner diameter expressed in inches(Ø).Corresponds to the diameter of the rim |
| 6 | 83 | Load index |
| 3 | S | Speed index 180 km/h maximum |

Some speed symbols :

Maximum speed	km/h
R	170
S	180
T	190
U	200
H	210
V	240
ZR over	240

Types of structure :

Diagonal	No marking
Radial	R
Bias belted	B

WHEELS AND TYRES Specifications

35

Vehicle	Rim	Tyres	Inflation pressure (bar) cold	
			FRONT	REAR
B/C B0A	5 B 13	165/70 R 13 T	2.2	2.1
B/C B0C			2.3	2.1
B/C B0D	5 B 13 5.5 J 14	165/70 R 13 T 165/60 R 14 T 165/65 R 14 T	2.4	2.1
B/C B0E	5 B 13	165/70 R 13 T 175/70 R 13 T (1)	2.3	2.1

(1) with air conditioning

Wheel nut tightening torques : **9 daN.m**

Rim run-out : **1.2 mm**

The tyre inflation pressures are values for a fully laden vehicle or motorway use.

The tyre inflation pressure must be checked when cold. The increase in temperature during driving increases the pressure by **0.2 to 0.3 bar**.

If the inflation pressures are checked when the tyres are warm, take this pressure increase into consideration. **Never deflate a warm tyre.**

Chains

For safety reasons, chains may NEVER be fitted to the rear axle.

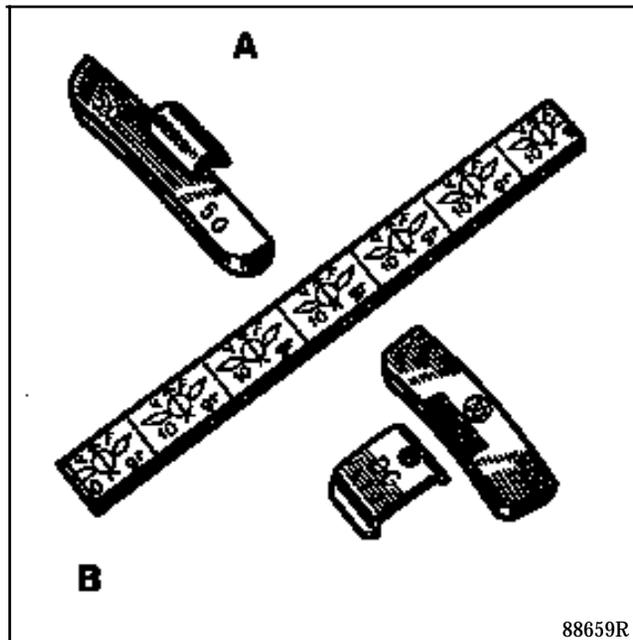
"Snow" or "thermorubber" tyres: all four wheels must be fitted with these tyres to retain vehicle adhesion as far as possible.

BALANCE WEIGHTS

Only use weights provided by the Parts Department:

- fitted using hooks to steel wheels (hook is part of the weight),
- fitted using hooks (flat hooks) or self adhesive for alloy wheels.

- A Steel wheel rim**
B Alloy wheel rim



STEERING ASSEMBLY

Axial ball joint

36

SPECIAL TOOLING REQUIRED		
Dir.	1305 -01	Tool for removing - refitting axial ball joint
Dir.	1306	Tool for retaining SMI unit rack
T.Av.	476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)		⚠
Wheel bolts		9
Track rod end nut	3.7	
Bolt on parallelism adjustment sleeve	1.7	
Axial ball joint		5

Put 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.

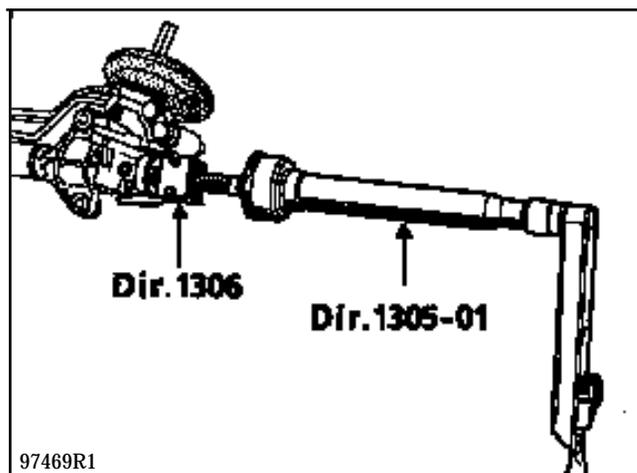
Make a mark or count the number of turns of thread taken up so the parallelism can be pre-adjusted on refitting.

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

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

Fit tool Dir. 1306.

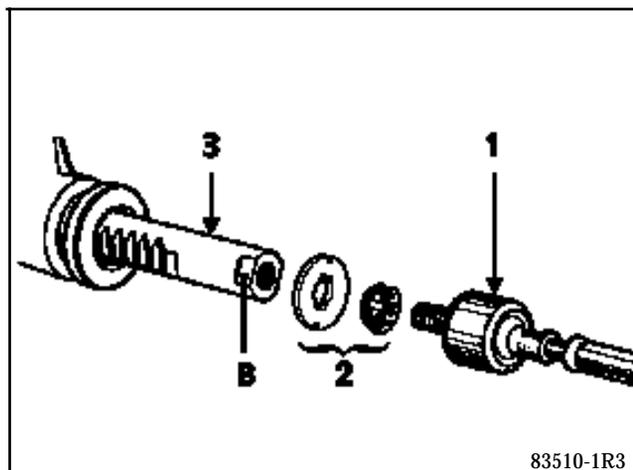
In this position, release the axial ball joint using tool Dir. 1305-01.



REFITTING

Assembly (2) **MUST** be renewed systematically.

NOTE: assembly (2) is only fitted to vehicles with manual steering.



Refit 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 on the locking ring (2) align with the flats (B) on the rack (in the case of a vehicle with manual steering).

Tighten the axial ball joint to the recommended torque.

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 the other gaiter inflates which indicates the air is circulating correctly.

SPECIAL TOOLING REQUIRED		
T.Av.	476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)		
Wheel bolts		9
Track rod end nut	3.7	
Steering rack mounting bolts	5.5	
Universal joint eccentric bolt	2.5	

Put the vehicle on a two post lift.

REMOVAL

Remove the front wheels.

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,
- the steering rack mounting bolts on the sub-frame.

Remove the steering rack.

REFITTING

Refitting is the reverse of removal. Observe the recommended tightening torques.

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 pre-adjusted on refitting.

Check the parallelism.

NOTE : the markings on the track rod ends **MUST BE OBSERVED** (one mark on right hand joint, two marks on left hand joint).

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 daN.m)



Wheel bolts	9
Track rod end nut	3.7
Steering rack mounting bolts	5
Universal joint eccentric bolt	2.5
Engine tie bar bolt	6.5

Put the vehicle on a two post lift.

REMOVAL

Remove the front wheels.

Fit a clamp **Mot. 453-01** to each of the pipes from the oil reservoir.

NOTE : never clamp the high pressure pipes.

Special notes for F8Q engine

Remove (from above) :

- the battery,
- the battery mounting,
- the **high** and **low** pressure pipes from 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**.

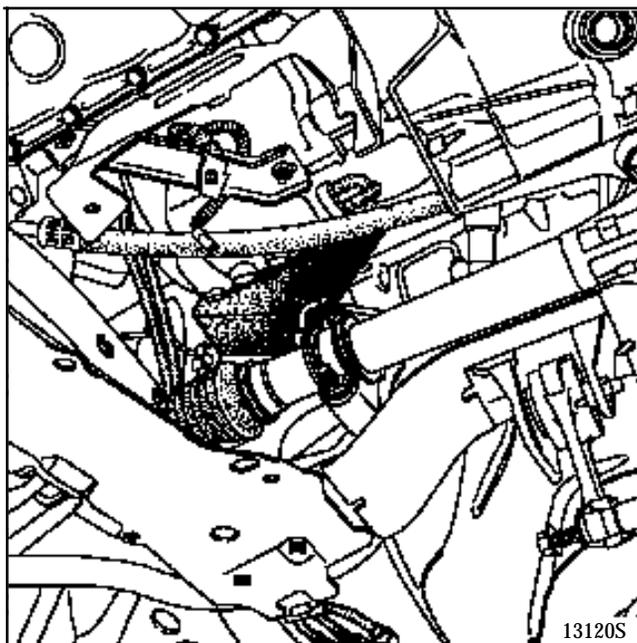
Remove the universal joint eccentric bolt.

Disconnect the oxygen sensor.

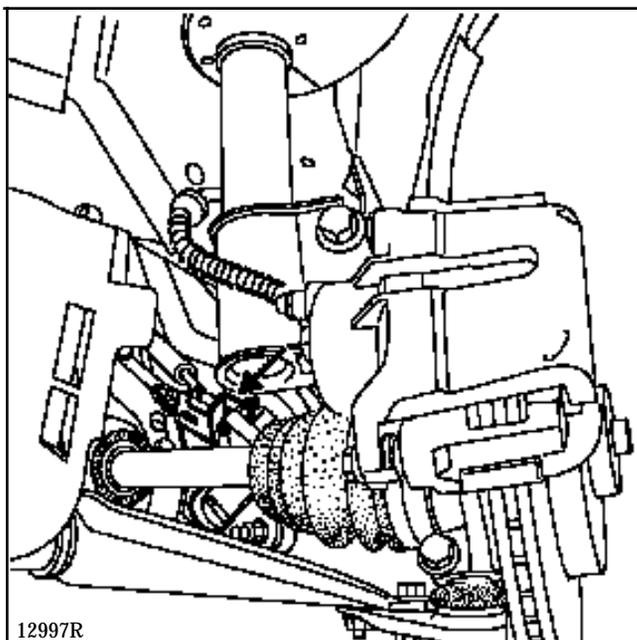
Remove the exhaust downpipe.

Remove the bolt (engine side) from the engine tie bar and pivot the engine and transmission assembly forwards.

Insert a retaining block.



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.



Remove:

- the two nuts on the heat shield for the right hand steering rack bearing,
- the steering rack mounting nuts and remove it from the timing side.

NOTE:

- do not remove the jack-valve pipes,
- put plugs in the take offs of the steering rack to prevent purities entering the system.

REFITTING

Refitting is the reverse of removal. Observe the recommended 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 pre-adjusted on refitting.

Check the parallelism.

The gaiter **MUST** be renewed with a new gaiter whenever an axial ball joint is removed.

Fitting the gaiter

Use a protector 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 rack pinion is correctly adjusted.

1. Determining the source of the noise

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

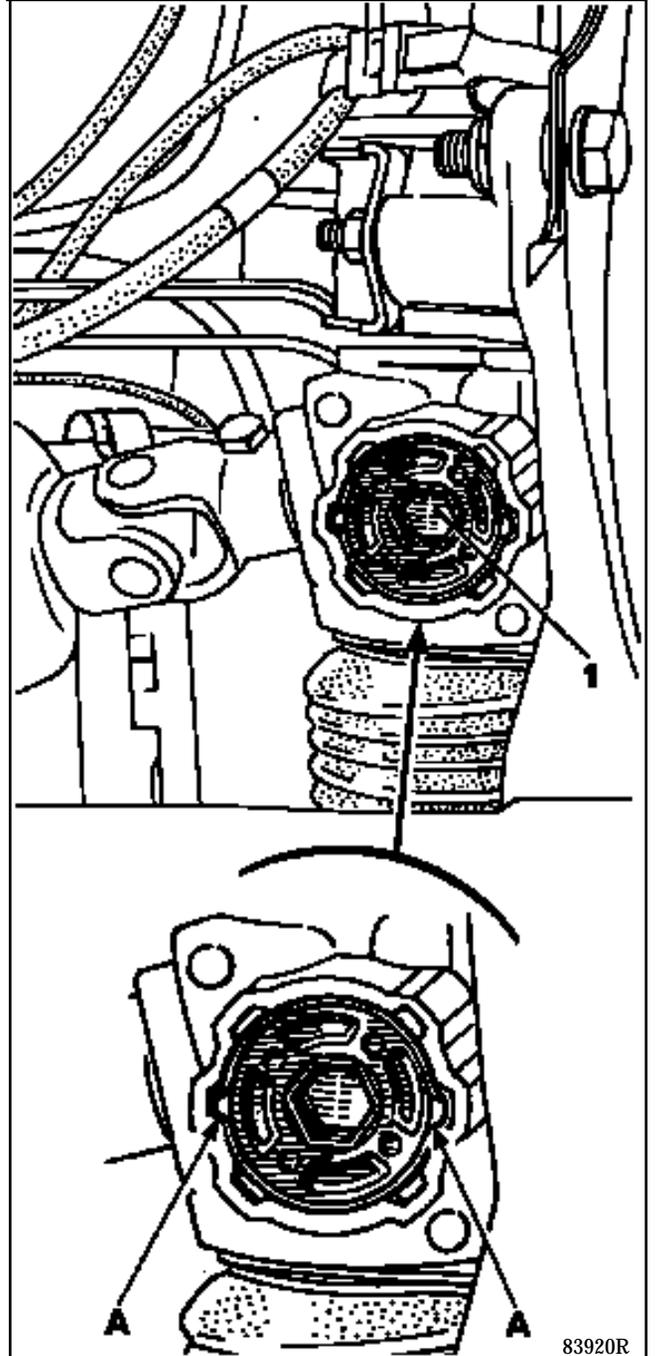
2. Adjusting for SMI steering racks

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

Check when driving that the steering wheel 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.



SPECIAL TOOLING REQUIRED		
Mot.	453 -01	Hose clamp pliers
Dir.	1083 -01	Tool for refitting the PAS pump pulley
B.Vi.	22 -01	
	+	
B.Vi.	47	Tool for removing the PAS pump pulley
	or	
Dir.	1083 -02	

TIGHTENING TORQUES (in daN.m)	
PAS pump mounting bolt	2
Alternator mounting bolt	4

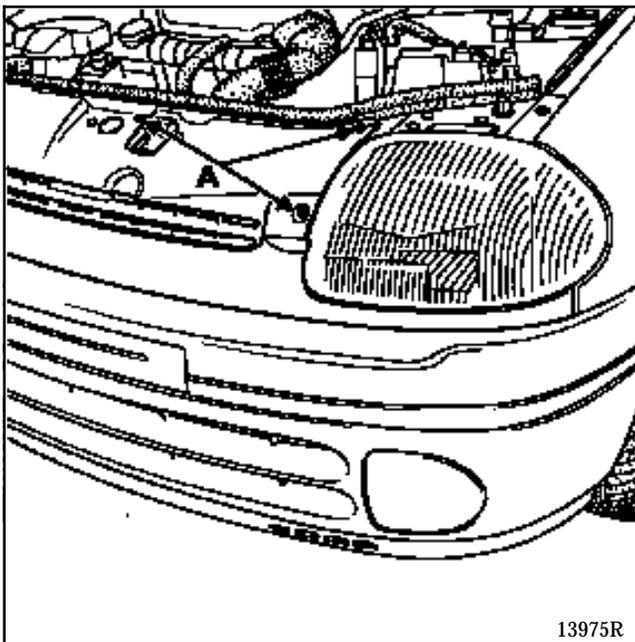
Put the vehicle on a two post lift.

REMOVAL

Disconnect the battery.

Remove the front right hand wheel and the associated mudguard.

Remove the radiator grille (6 bolts (A)).

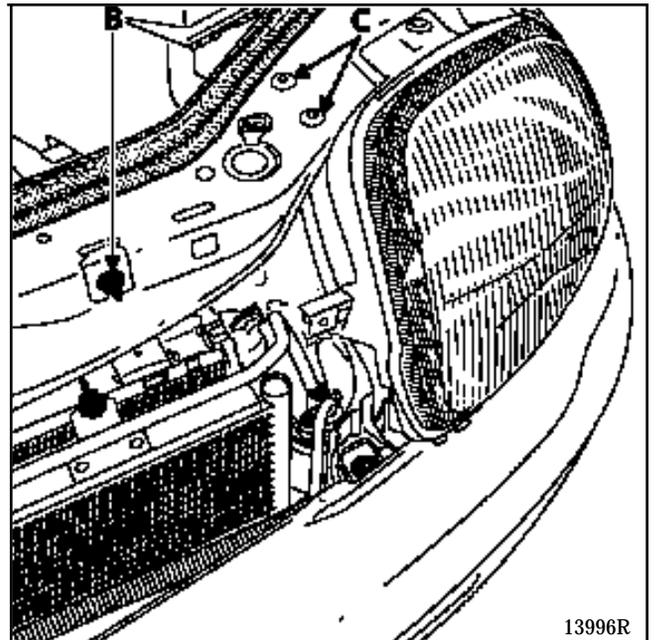


Remove the two cooling assembly mounting nuts (B) on the upper cross member.

Move this to one side and slacken, but do not remove, the two cross member lower mounting bolts.

Remove the four cross member upper mounting bolts (C).

Push the cross member to the rear without removing the engine compartment opening cable.



Remove:

- the alternator belt,
- the alternator,
- the PAS pump belt (see method described in section 11).

Disconnect the PAS pressostat connector.

Remove the high pressure hose mounting bracket.

Fit a clamp **Mot. 453-01** to the low pressure hose and disconnect the two hoses.

Remove the power assisted steering pump (four bolts).

REFITTING

Refitting is the reverse of removal. Observe the tightening torques.

Refit the PAS pump belt and the alternator belt (see method described in section 11).

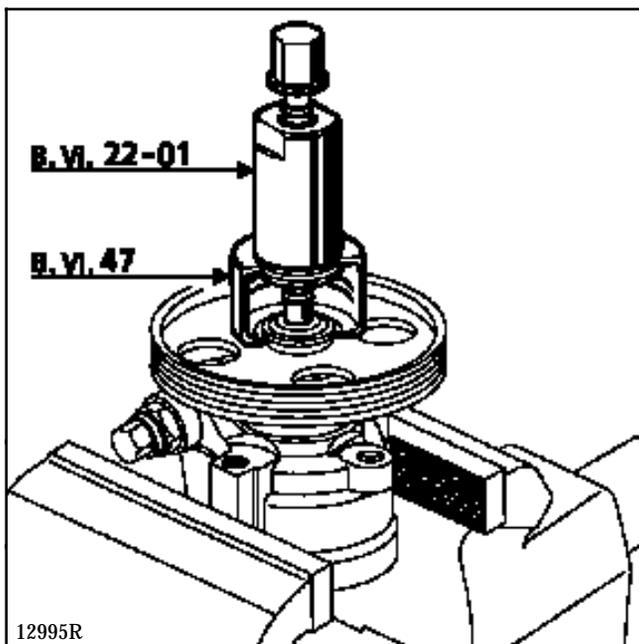
Check the tension of the alternator belt (see section 07 "**Belt tension**").

Fill and bleed the circuit, moving the steering from lock to lock.

REPLACING THE PULLEY

REMOVAL

With the pump removed (see removal method on following pages), set it in a vice and extract the pulley using tools **B.Vi. 22-01** + **B.Vi. 47** or **Dir. 1083-02**.

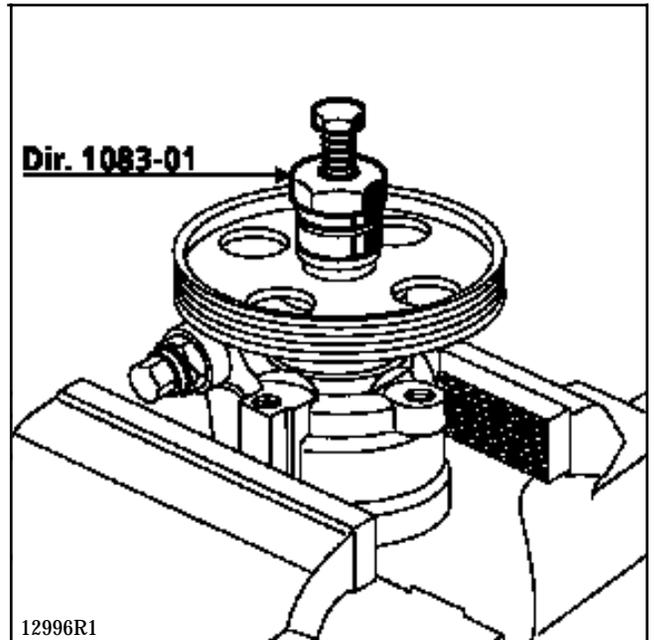


REFITTING

Refit the pulley using tool **Dir. 1083-01**.

Press the pulley on to dimension:

$$X = 34.7 \pm 0.2$$



SPECIAL TOOLING REQUIRED

Mot.	453 -01	Hose clamp pliers
-------------	----------------	--------------------------

Put the vehicle on a two post lift.

REMOVAL

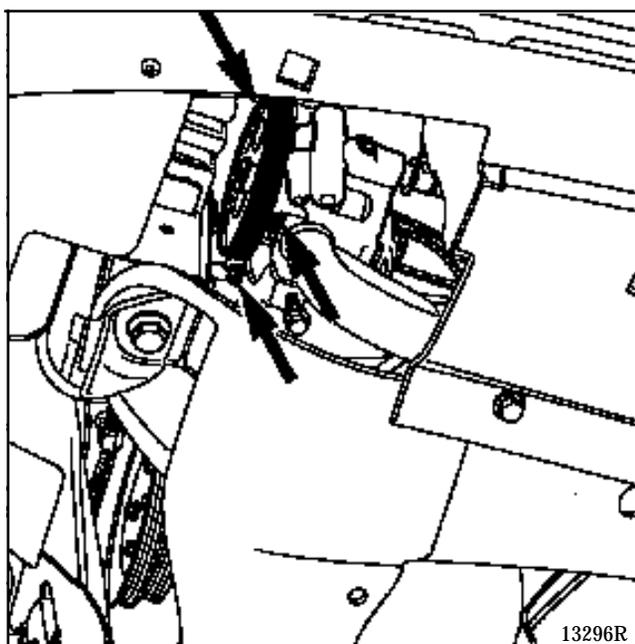
Remove:

- the alternator belt,
- the PAS pump belt,
- the alternator.

Fit a clamp **Mot. 453-01** to the supply pipe.

Disconnect the supply and high pressure pipes.
Take precautions to catch the PAS fluid.

Remove the three pump mounting bolts and remove the pump.

**REFITTING**

Refitting is the reverse of removal. Observe the procedure for tensioning the belt (see section 07).

Fill and bleed the circuit, moving the steering from lock to lock.

SPECIAL TOOLING REQUIRED		
Mot.	453 -01	Hose clamp pliers

Put the vehicle on a two post lift.

REMOVAL

Remove:

- the right hand wheel,
- the right hand mudguard,
- the accessories belt (see the method described in section 11 of the **Workshop Repair Manual**),
- the pulley.

Fit a clamp **Mot. 453-01** to the supply pipe.

Disconnect the supply pipe. Take precautions to catch the PAS fluid.

The connector support panel (one bolt) must be removed so the high pressure pipe can be disconnected.

Remove the pump (three bolts).

REFITTING

Refitting is the reverse of removal. Ensure that the belt is correctly fitted (see section 11 of the **Workshop Repair Manual**).

Fill and bleed the circuit, moving the steering from lock to lock.

SPECIAL TOOLING REQUIRED

Mot. 453 -01	Hose clamp pliers
---------------------	--------------------------

Put the vehicle on a two post lift.

REMOVAL

Remove:

- the PAS pump belt,
- the pulley.

Fit a clamp **Mot. 453-01** to the supply pipe.

Disconnect the supply and high pressure pipes.
Take precautions to catch the PAS fluid (protect the alternator).

Remove the three pump mounting bolts and remove the pump.

REFITTING

Refitting is the reverse of removal. Observe the procedure for tensioning the belt (see section 07).

Fill and bleed the circuit, moving the steering from lock to lock.

SPECIAL TOOLING REQUIRED**Mot. 453 -01 Hose clamp pliers**

Put the vehicle on a two post lift.

REMOVAL

Remove:

- the right hand wheel,
- the right hand mudguard,
- the bumper (ten bolts).
- the accessories belt,
- the pulley.

Fit a clamp **Mot. 453-01** to the supply pipe.

Disconnect the supply and high pressure pipes.
Take precautions to catch the PAS fluid.

Remove the three pump mounting bolts and remove the pump.

REFITTING

Refitting is the reverse of removal. Observe the procedure for tensioning the belt (see section 07).

Fill and bleed the circuit, moving the steering from lock to lock.

SPECIAL TOOLING REQUIRED

Mot. 453 -01 Hose clamp pliers

TIGHTENING TORQUES (in daN.m)



Electric pump assembly mounting bolts 2

Put the vehicle on a two post lift.

REMOVAL

Disconnect the battery.

Remove:

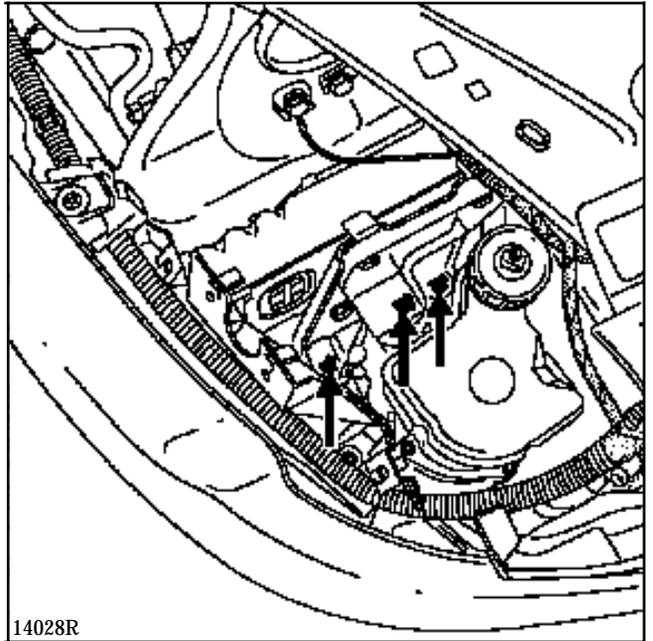
- the front left wheel,
- the front left headlight, use the method described in section 80 of the **Workshop Repair Manual**,
- the front mudguard.

Fit a clamp **Mot. 453-01** to the hose.

Disconnect the two hoses (Take precautions to catch the PAS fluid).

Disconnect the electric pump assembly motor connector .

Remove the three electric pump assembly mounting bolts.

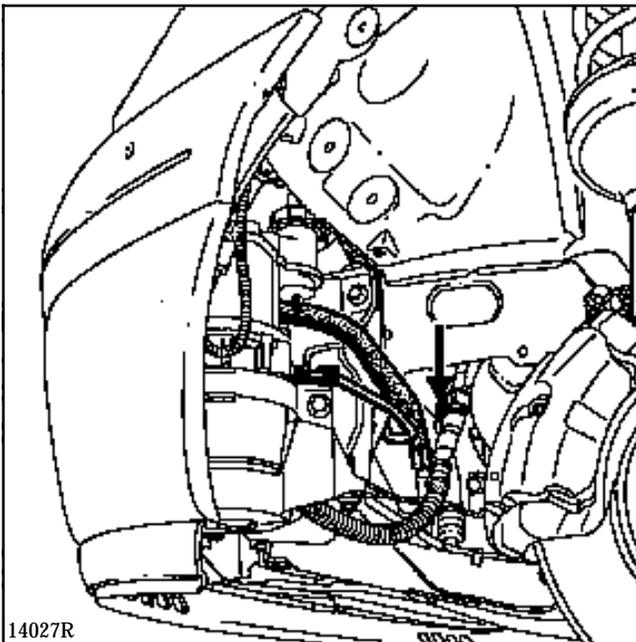


14028R

REFITTING

Refitting is the reverse of removal.

Bleed the circuit. The battery has to be removed to allow access to the PAS reservoir.



14027R

STEERING ASSEMBLY

Steering column

36

TIGHTENING TORQUES (in daN.m)



Universal joint eccentric bolt	2.5
Steering wheel bolt	4.5
Steering column mounting nuts	2
Air bag cushion mounting bolts	0.5

REMOVAL

Disconnect the battery.

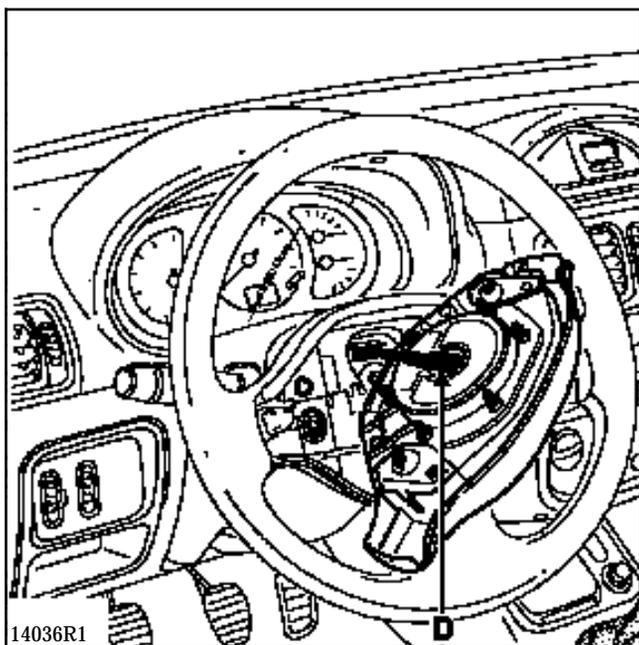
Vehicle without an air bag :

Remove the central steering wheel cover (clipped).

Vehicle with an air bag:

Remove:

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



14036R1

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

Disconnect the control stalks (wipers and lights) and the rotary switch connector.

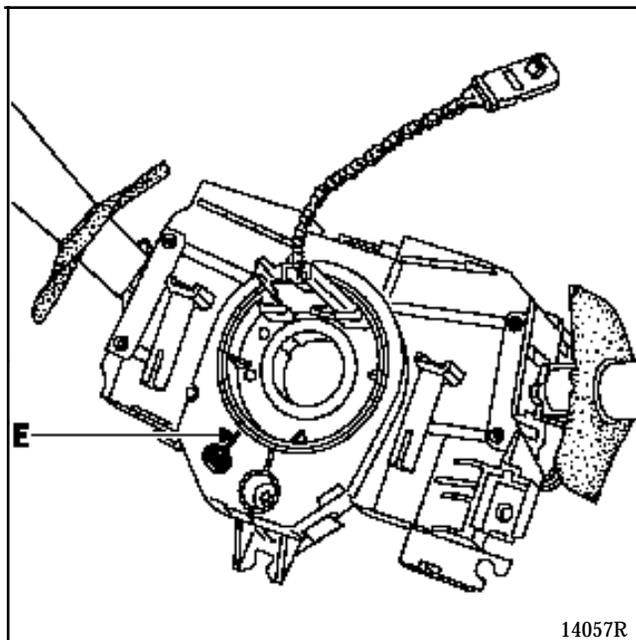
IMPORTANT: pyrotechnic systems (air bags and pretensioners) must not be handled near to a heat source or flame - they may be triggered.

IMPORTANT: whenever the steering wheel is removed, the air bag connector (D) **MUST** be disconnected. The air bag is fitted with a connector which short circuits when it is disconnected to avoid any incorrect triggering.

Before removing the assembly, the position of the rotary switch **MUST** be noted :

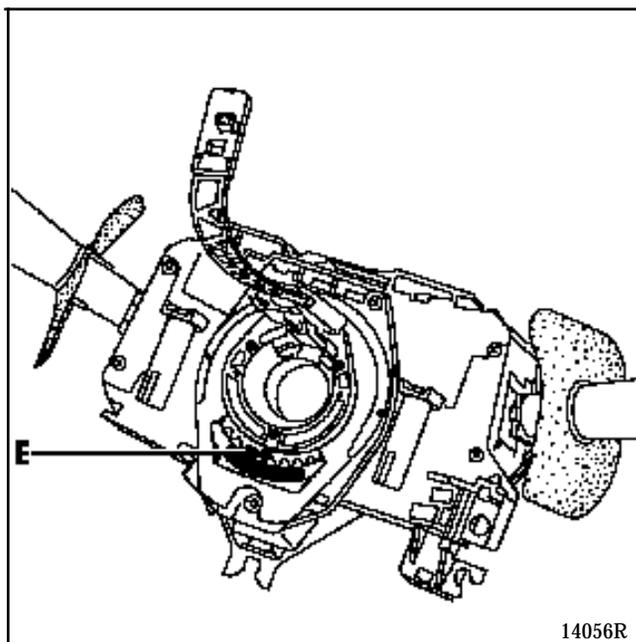
- either by ensuring the wheels are straight when removing it so that the strip may be positioned centrally,
- or by checking that the "0" mark on the rotary switch is in line with the fixed reference mark (E).

VALEO ASSEMBLY



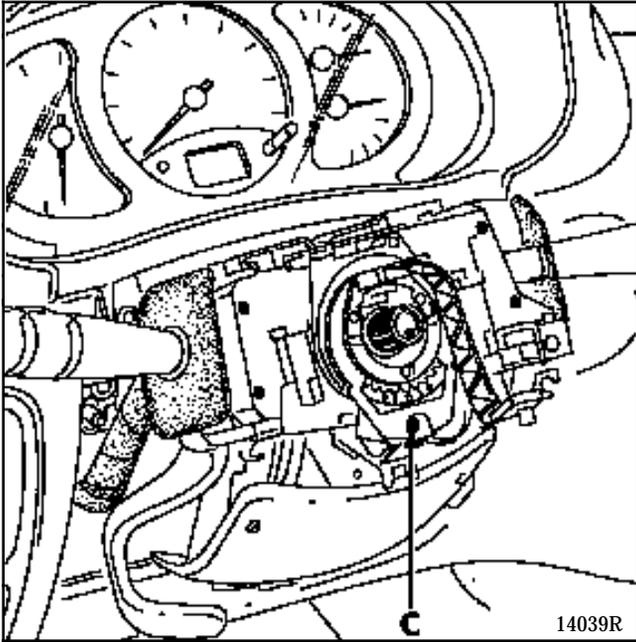
14057R

LUCAS ASSEMBLY



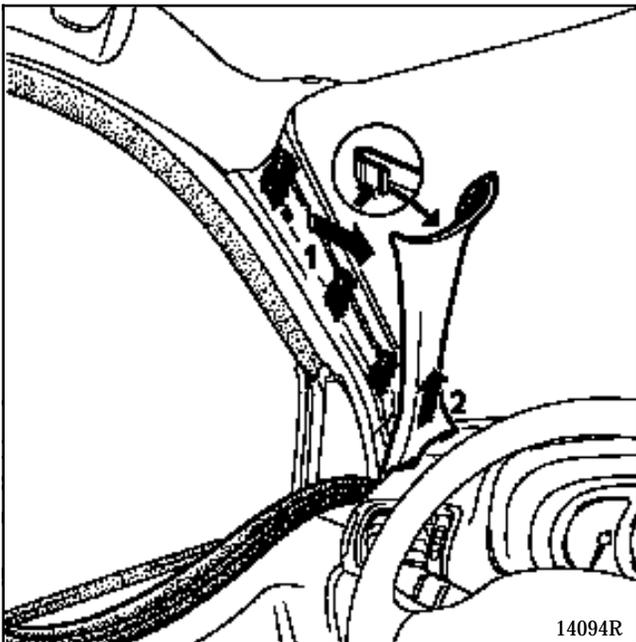
14056R

Slacken the bolt (C) then tap sharply on the screwdriver to release the cone and remove the assembly from the steering column.

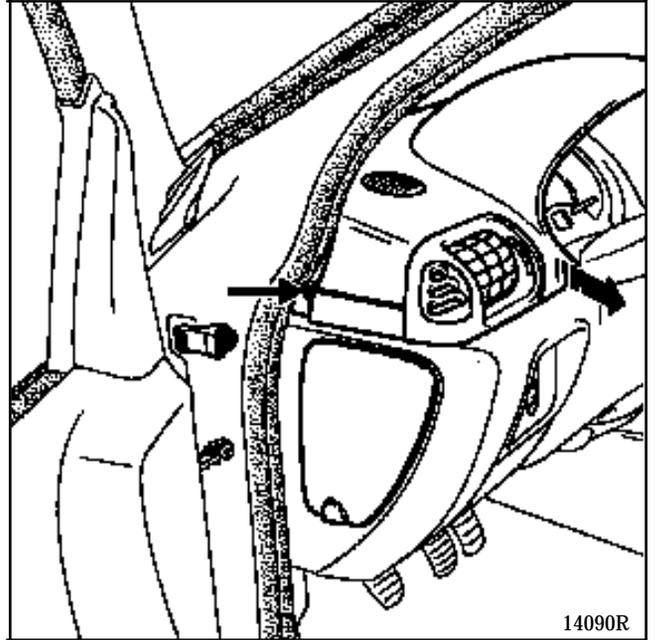


Remove the top dash section by :

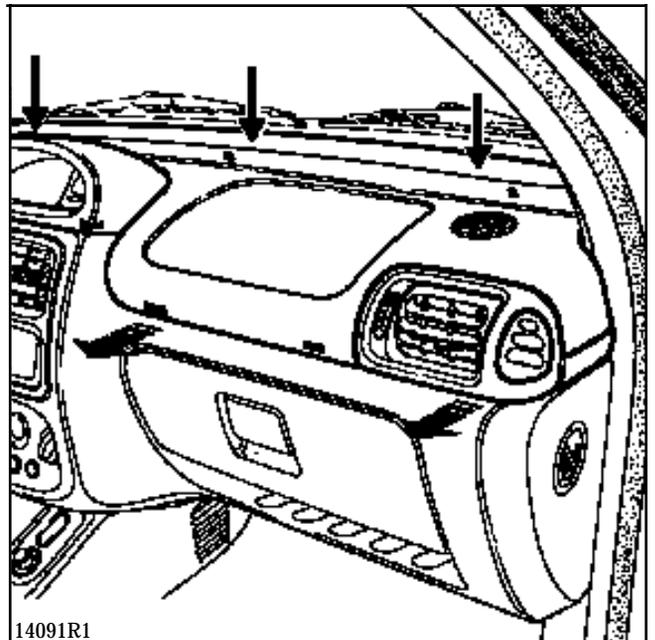
- first removing the windscreen pillar lining by pulling the trim away enough so that the upper clip may be pressed, then remove the pillar trim(1) and unclip it from the top dash section (2),



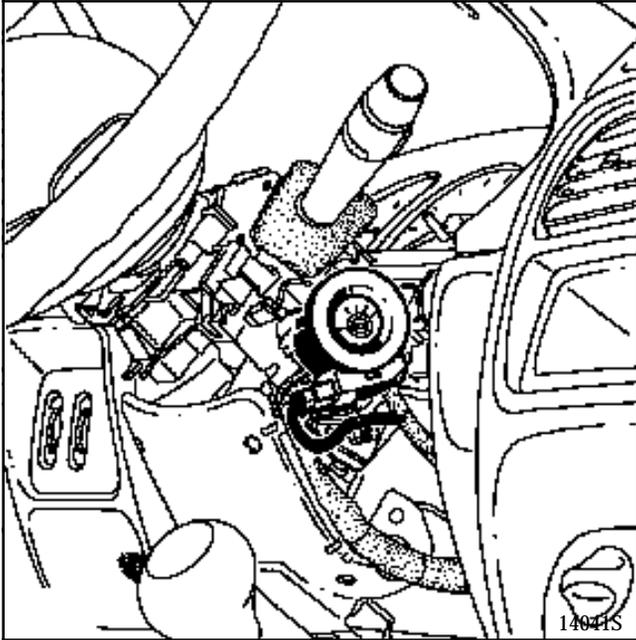
- remove the two side bolts,



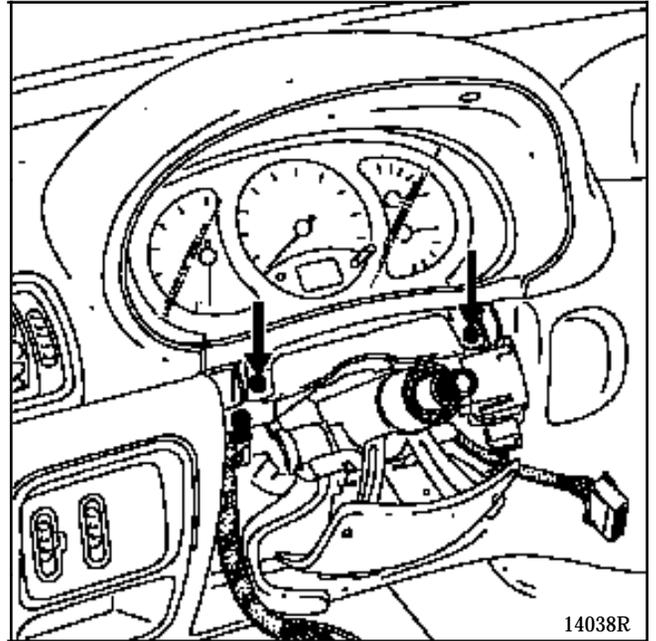
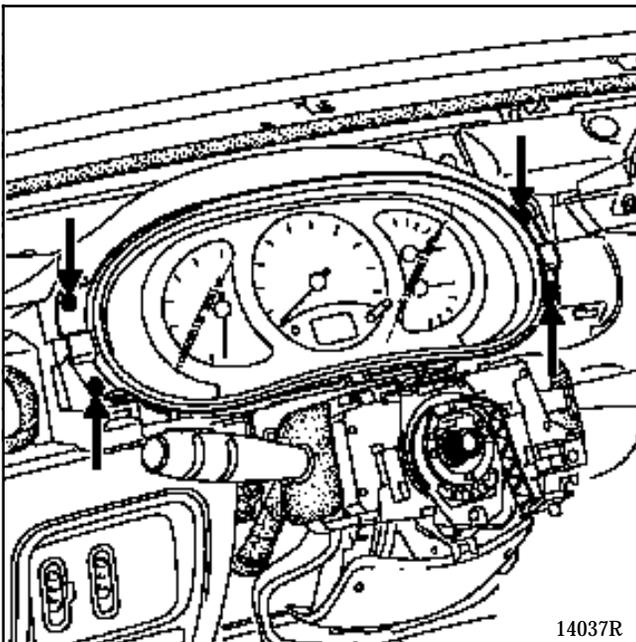
- remove the three bolts at the top (near the windscreen) and completely remove the top dash section as shown in the diagrams.



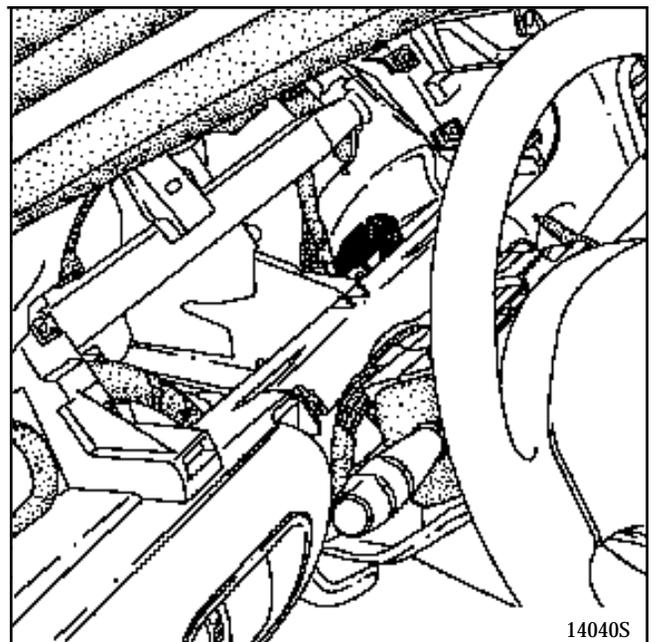
Remove the immobiliser antenna ring.



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



Disconnect the connector.



STEERING ASSEMBLY

Steering column

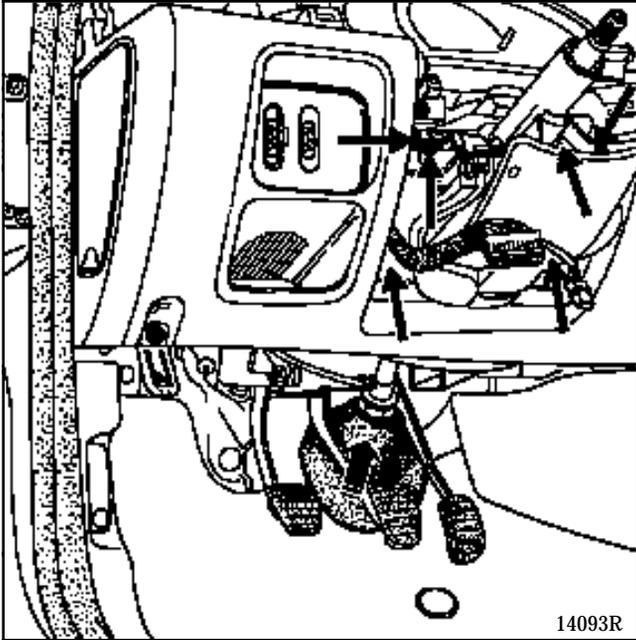
36

In the engine compartment:

- remove the air intake tube,
- remove the expansion bottle mounting nuts and move it to allow access to the steering column universal joint.

Remove the eccentric bolt from the universal joint.

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

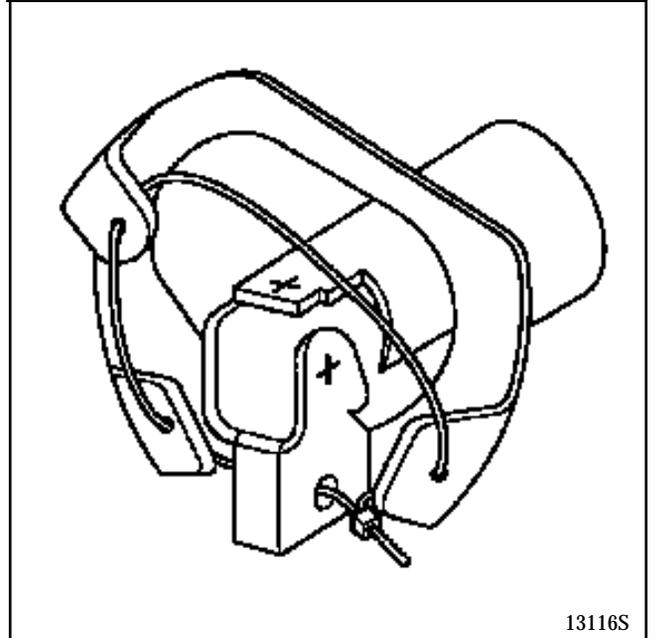


Remove the steering column.

REFITTING

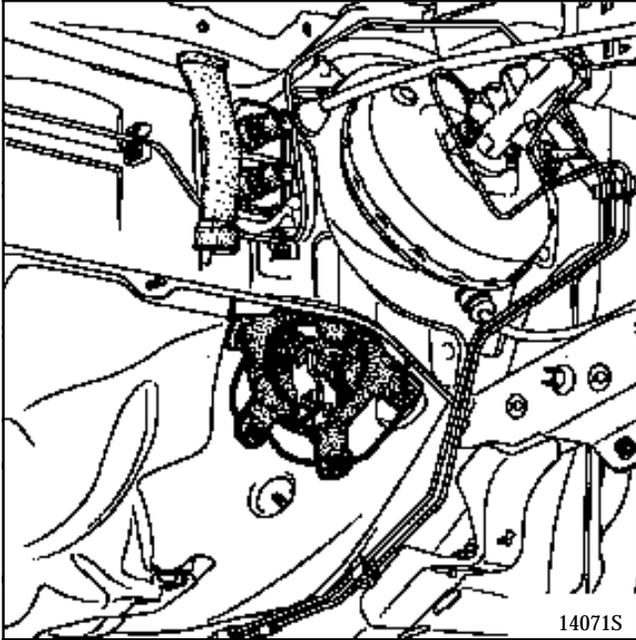
Refit the steering column.

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



13116S

Pull on the tab then cut the string to put the gaiter in place.



For the rest of the parts, refitting is the reverse of removal.

Ensure that the instrument panel connectors are correctly connected.

Special notes for refitting

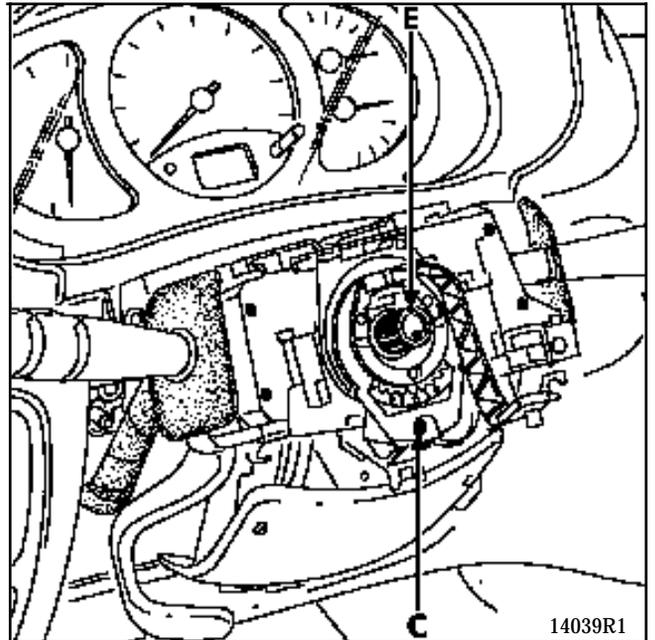
Ensure that the wheels are still straight.

Check that the rotary switch is correctly positioned by checking that the "0" mark of the rotary switch is pointing to the fixed reference mark (E).

Position the assembly on the steering column and connect the various connectors.

Carry out the rest of the refitting procedure and do not lock bolt (C) until the half cowlings are back in place, so that the stalks are correctly aligned to the instrument panel and the dashboard.

This operation is made easier by the hole cut in 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 daN.m).

IMPORTANT : Before reconnecting the driver's air bag cushion, check to see if the system is operating correctly as follows:

- check the air bag warning light on the instrument panel is illuminated when the ignition is on,
- connect a dummy ignition module to the driver's air bag connector and check that the warning light extinguishes,
- switch the ignition off, connect the air bag cushion in place of the dummy ignition module and secure the cushion to the steering wheel (tightening torque **0.5 daN.m**),
- switch the ignition on. Check the warning light illuminates for **three seconds** when the ignition is switched on 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 the **XR BAG (Elé. 1288)**

IMPORTANT : if these instructions are not followed exactly the system may not operate normally and could even be triggered incorrectly.

STEERING ASSEMBLY

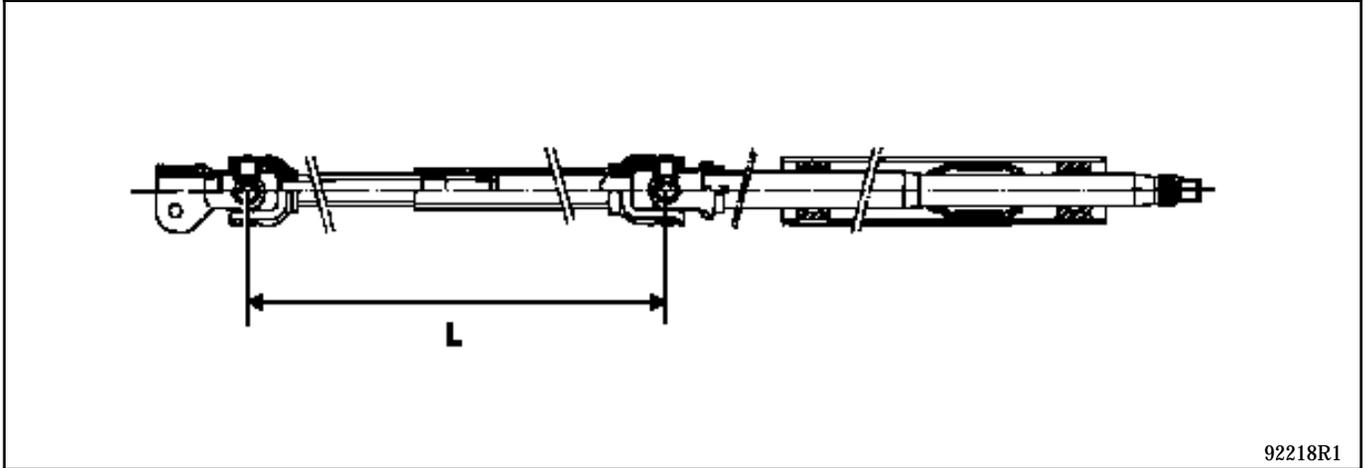
Retractable shaft

36

REMOVAL - REFITTING

These vehicles are fitted with a non-removable retractable shaft - steering wheel shaft - steering column assembly. If it is necessary to repair the universal joint eccentric bolt, check that the shaft length is correct or replace the assembly (see paragraph "Steering column").

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 daN.m)



Hydraulic pipe unions	1.7
Mounting nut on brake servo	1.8

REMOVAL

Disconnect the battery.

Disconnect the brake fluid level detector connector.

Remove the injection computer (depending on version).

Release the PAS reservoir and move it to the side, towards the engine.

Drain and remove, by pulling up, the brake fluid reservoir (take care to catch the fluid which will run out).

Remove:

- the pipes and note their positions,
- the two mounting nuts on the brake servo.

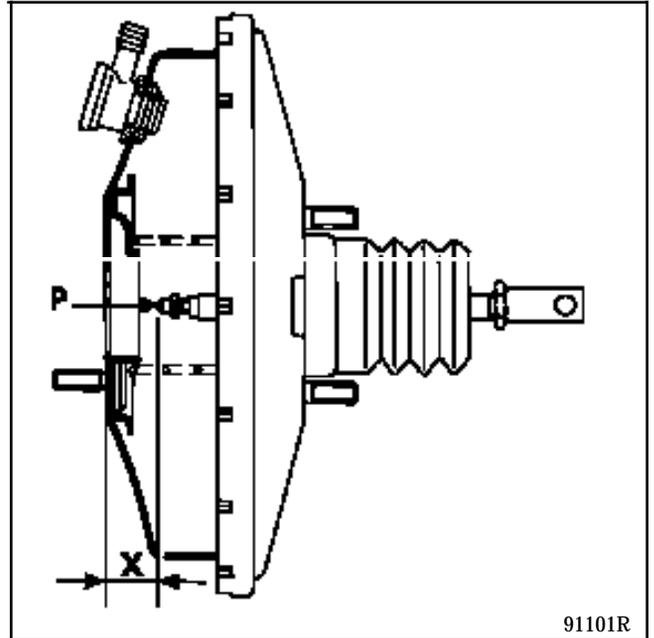
REFITTING

Refitting is the reverse of removal.

Check the length of the pushrod.

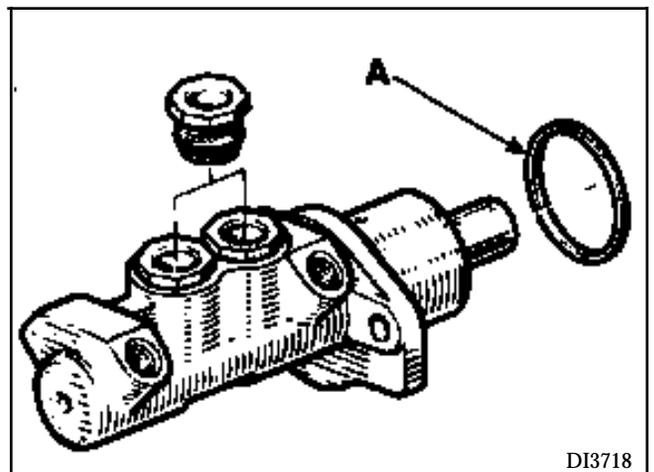
Dimension X = 22.3 mm.

Depending on model, adjust using pin (P).



NOTE : these vehicles have a master cylinder which is integral to the brake servo. Sealing of the brake servo is directly linked to that of the master cylinder. During any operation, a new seal (A) must be fitted.

Fit the master cylinder in alignment with the brake servo so that pushrod pin (P) enters correctly into the master cylinder housing.

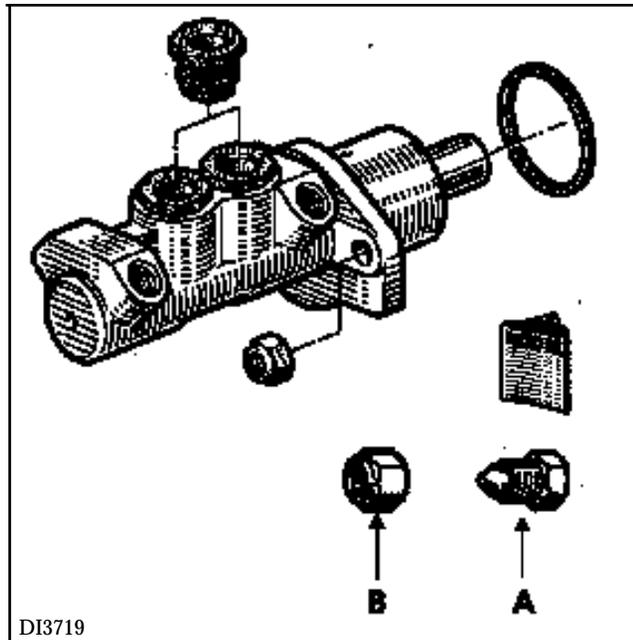


Fill the brake fluid reservoir and bleed the brake circuit.

MASTER CYLINDER (EXCHANGE)

The kit sold by the Parts Department comprises :

- one master cylinder (4 outlets or 2 outlets for ABS),
- two plugs (A),
- two mounting nuts (B).



TIGHTENING TORQUES (in daN.m)



Mounting nut on brake servo	1.8
Brake servo on bulkhead	2.3

The brake servo cannot be repaired. Operations are only allowed on :

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

REMOVAL

Disconnect and remove the battery.

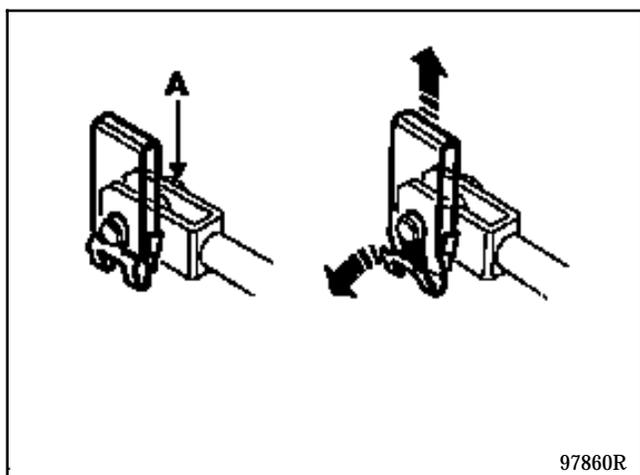
Remove:

- the master cylinder (following the method described previously),
- the battery protection plate (4 bolts, 1 nut),
- the two mounting nuts for the expansion bottle and move it towards the engine.

Disconnect the flexible vacuum hose from the brake servo.

In the passenger compartment:

- remove the pin (A) from the clevice connecting the brake pedal to the pushrod by moving the clip,

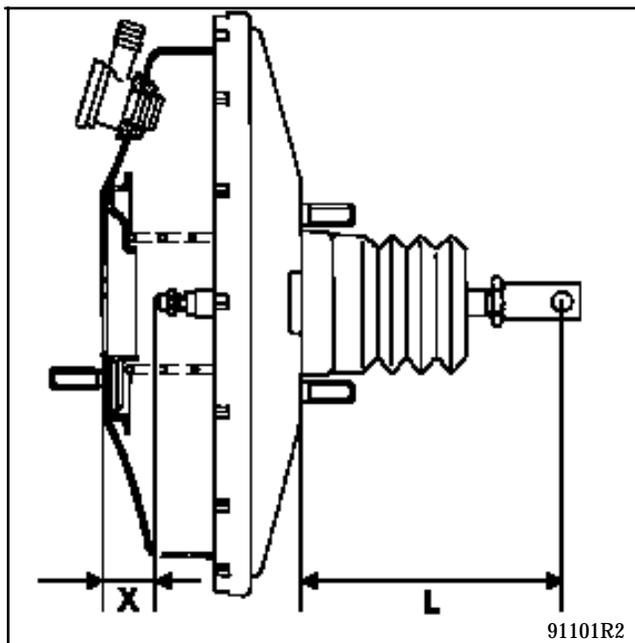


- Remove the four brake servo mounting nuts,
- Remove the brake servo.

REFITTING

Before refitting, check :

- dimension L = 104.8 mm,
- dimension X = 22.3 mm.



91101R2

Refitting is the reverse of removal.

Bleed the brake circuit.

SPECIAL TOOLING REQUIRED

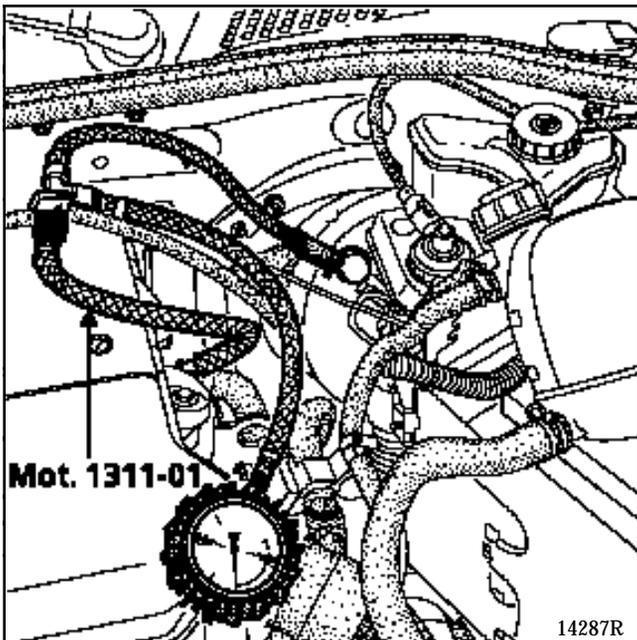
Mot. 1311-01 Pressure gauges and unions for measuring pressure

CHECKING SEALING

When checking the sealing of the brake servo, ensure the seal between the brake servo and the master cylinder is perfect. If there is a leak, replace the seal (A), (see method described on page 37-1).

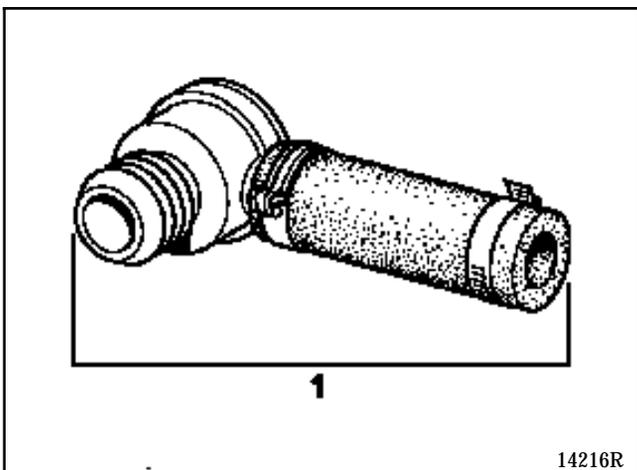
The sealing of the brake servo is checked on the vehicle.

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

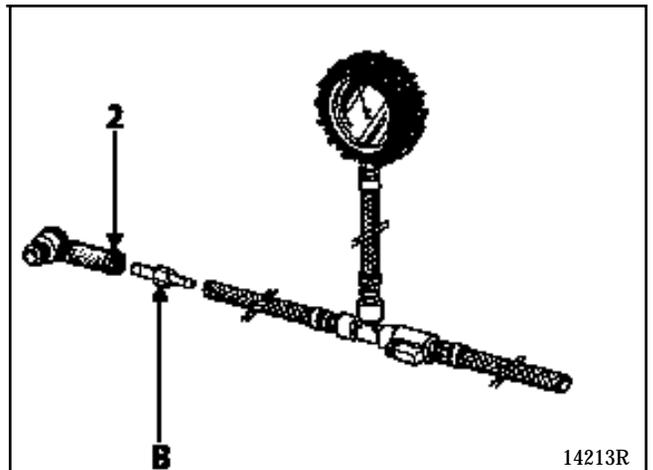


To do this :

- completely remove the vacuum hose,
- retain the non-return valve / flexible hose assembly (1) by removing the clamp,



- use the "T" union to join the pipes, the vacuum gauge and the assembly (1) (use connector **B** from the **Mot. 1311-01** kit and a hose clip (2)).



- Fit the assembly by connecting the valve on the brake servo and the pipe to the manifold outlet.

NOTE : ensure that the closure valve is on the side of the manifold.

Run the engine at idle speed for one minute.

Close the valve and turn off the engine.

The vacuum in the circuit should be about **613 mbar**, if the vacuum drops by more than **33 mbar** in **15 seconds**, there is a leak located either:

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

SPECIAL TOOLING REQUIRED

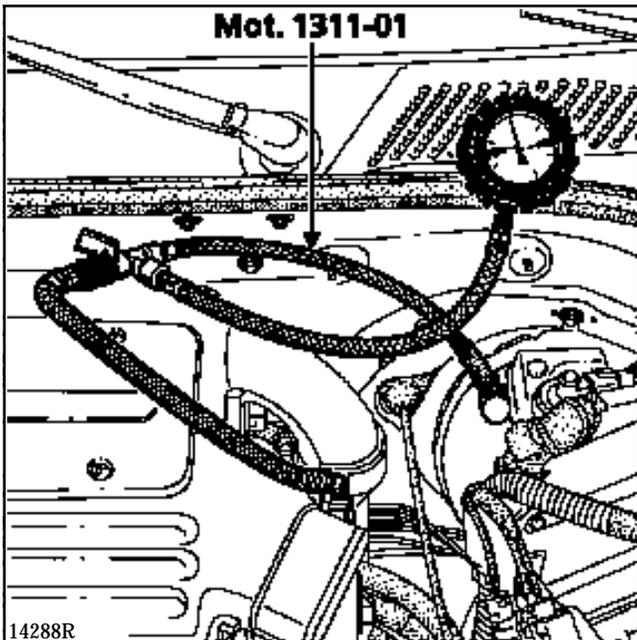
Mot. 1311 -01	Pressure gauges and unions for measuring pressure
---------------	---

CHECKING SEALING

When checking the sealing of the brake servo, ensure the seal between the brake servo and the master cylinder is perfect. If there is a leak, replace the seal (A), (see method described on page 37-1).

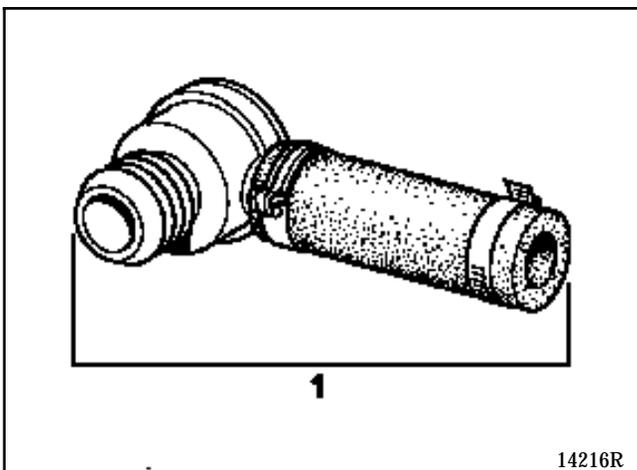
Checking the sealing of the brake servo can be carried out on the vehicle.

Fit the tool Mot. 1311-01 between the brake servo and the vacuum source (vacuum pump).

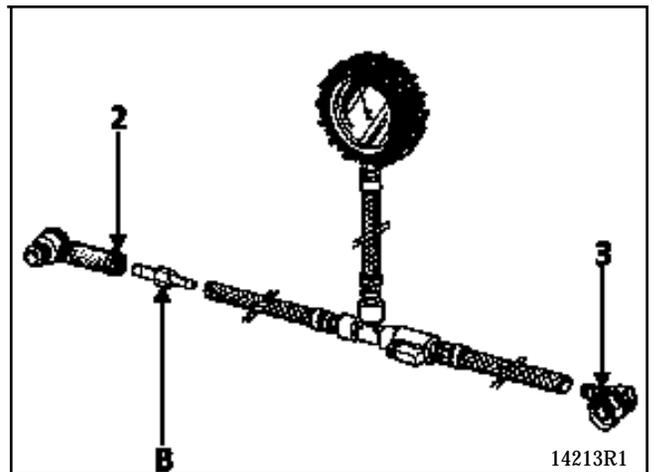


To do this :

- completely remove the vacuum pipe,
- retain the non-return valve / flexible hose assembly (1) by removing the clamp,



- use a "T" union to join the pipes, the vacuum gauge and the assembly (1) (use the **B** connector from the Mot. 1311-01 kit and a hose clamp (2)),
- Fit a quick-release connector to the other pipe (3) which can be ordered from the Parts Department (77 00 105 874),



- fit the assembly in place by connecting the valve on the brake servo and the quick release connector on the vacuum pump.

NOTE : ensure that the closure valve is on the manifold side.

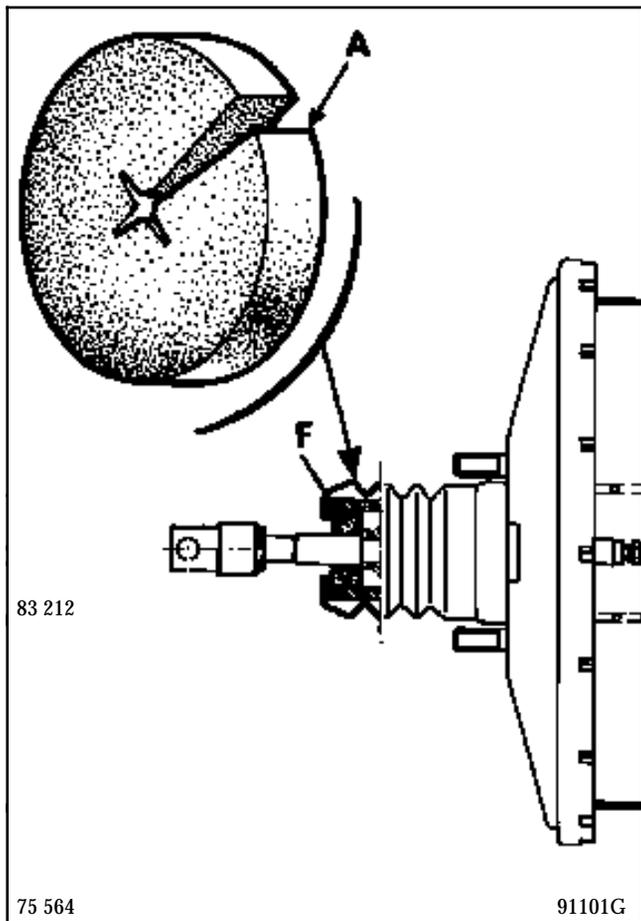
Warm the engine and run at **4 000 rpm.**, the vacuum should be **933 mbar** in **3 seconds**.

Close the valve and turn off the engine.

The vacuum in the circuit should be **933 mbar**, if the vacuum falls more than **33 mbar** in **15 seconds**, there is a leak which may be located either :

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

REPLACING THE AIR FILTER



To replace the air filter (F), the brake servo does not need to be removed.

Under the pedal mounting, use a screwdriver or a metal hook to remove the worn filter (F). Cut the new filter at A (see diagram) and fit it around the rod, then press it into position, checking that it fills the complete opening to prevent any non-filtered air from passing through.

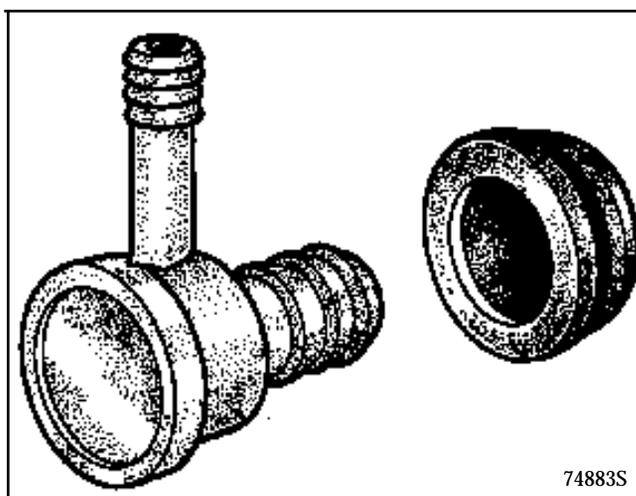
REPLACING THE NON-RETURN VALVE

This operation may be carried out on the vehicle.

REMOVAL

Disconnect the brake servo vacuum inlet pipe.

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.

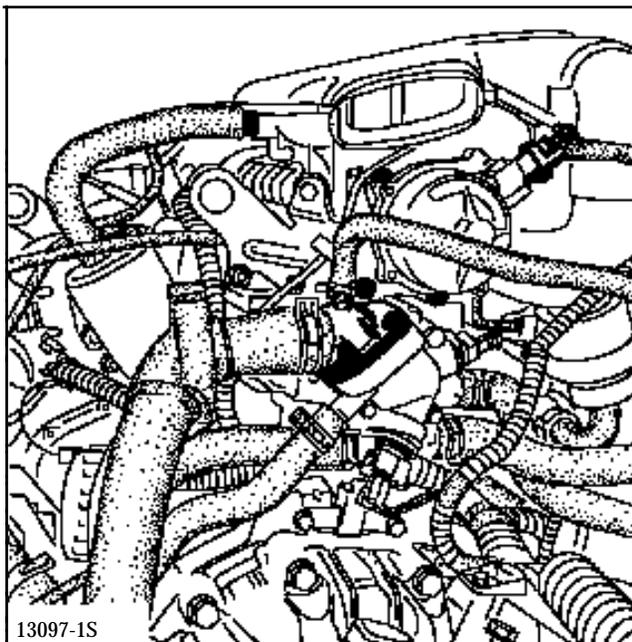
Refit the assembly into position.

REMOVAL

Remove the air tube.

Disconnect the quick release vacuum pipe.

Remove the vacuum pump (four bolts).



Systematically renew the drive dog when replacing the pump.

REFITTING

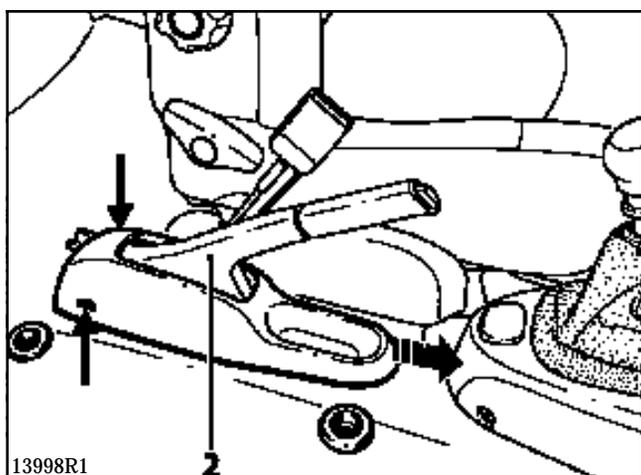
Refitting is the reverse of removal.

REMOVAL

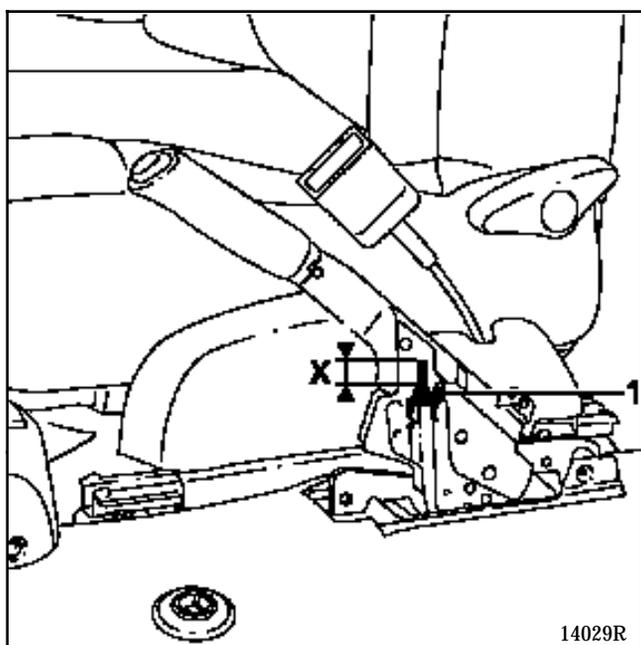
Vehicle on a lift.

Release the handbrake.

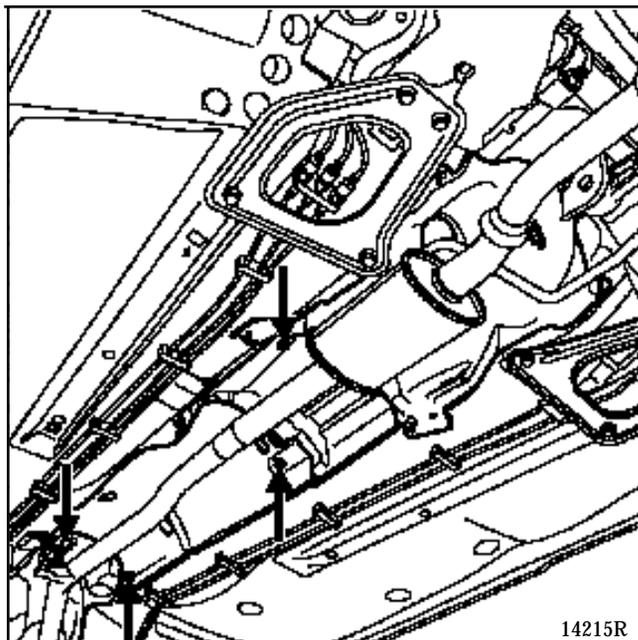
Remove the central console (two bolts) and the plastic cover (2) of the lever.



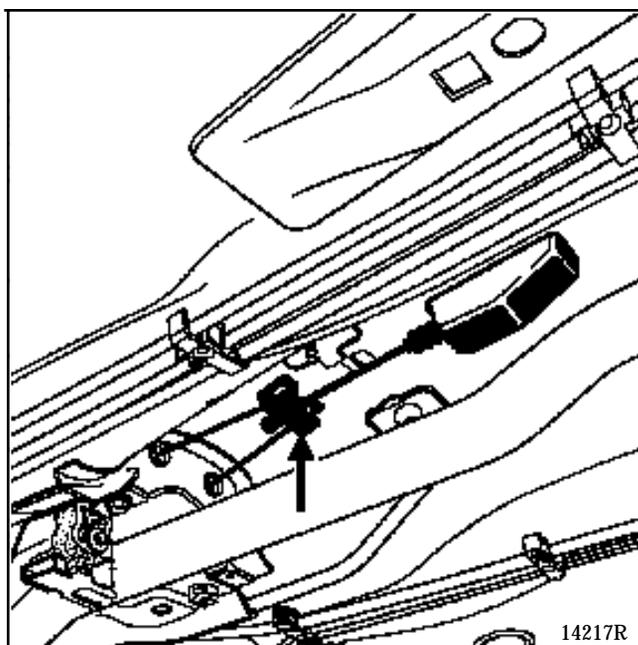
Slacken the handbrake adjustment nut (1) and note dimension X (approximately 20 mm), to release the cable.



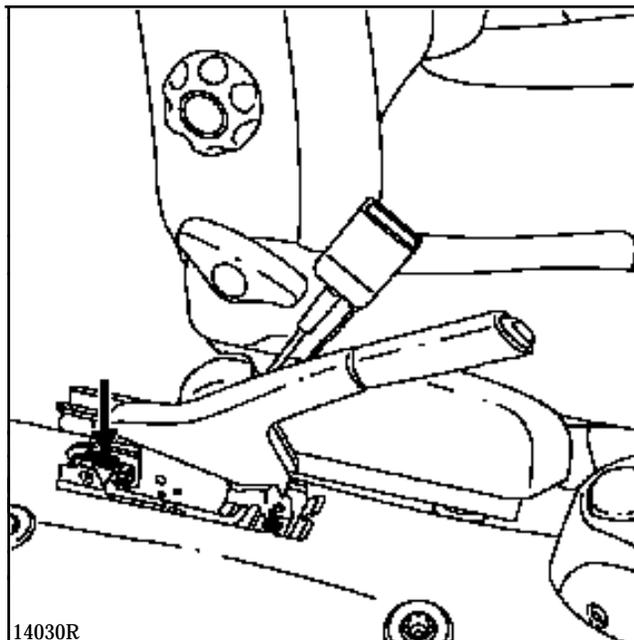
Lift the vehicle and remove the heat shield and the exhaust pipe (four bolts).



Release 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

Refitting is the reverse of removal.

Remember to reconnect the handbrake connector.

Reset the handbrake control linkage adjustment nut to the dimension noted on removal (about 20 mm).

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

Correctly refit the heat shields.

ADJUSTMENT

Incorrect adjustment of the handbrake where the cable is too tight:

- prevents the correct operation of the automatic compensation system for the brake shoes ,
- causes long brake pedal travel.

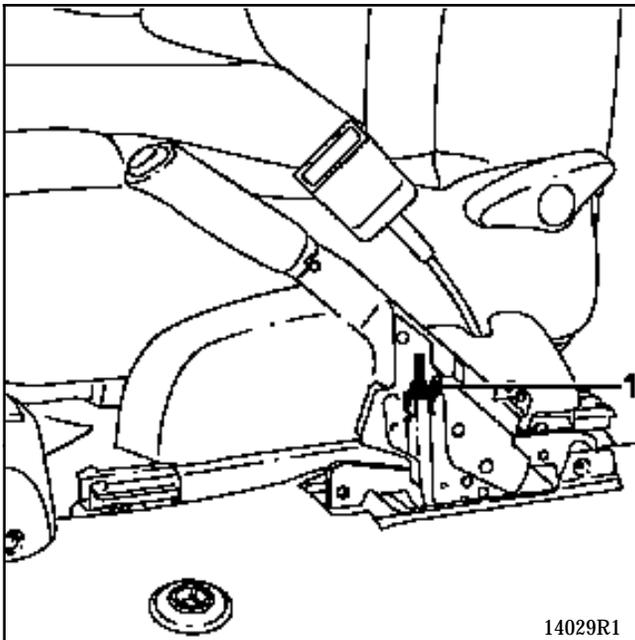
The cables should not be re-tensioned to correct this fault since it will quickly occur again.

The handbrake should not be used to adjust play, it should only be adjusted when replacing :

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

Any other adjustment except in the above cases is not permitted.

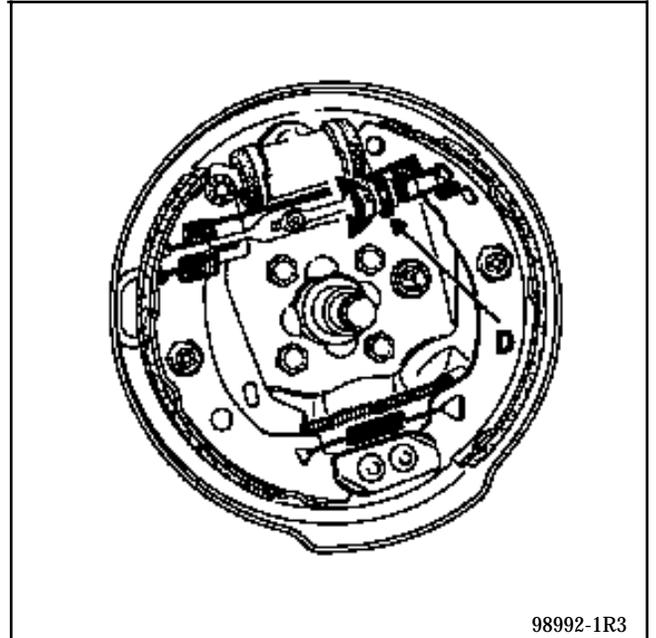
With the vehicle on a lift, slacken the nut (1) to completely release the cable and thereby the central adjuster (see method described previously).



Remove:

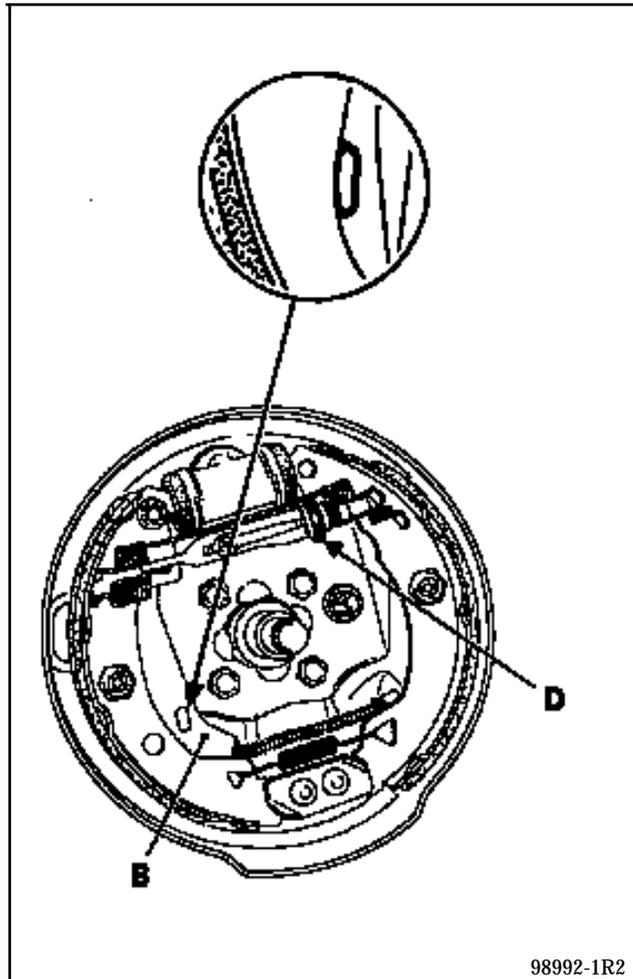
- the two rear wheels,
- the two drums.

Check the operation of the compensation system by rotating the notched sector (D) (ensure it turns in both directions), then turn it back by 5 to 6 teeth.



Ensure :

- the cables slide correctly,
- the handbrake levers (B) are in the correct position against the brake shoes.



Progressively tighten the cables at the central adjuster so that **levers (B) start to move between the 1st and 2nd notch** of the control lever travel and **remain applied from the 2nd notch**.

Tighten the lock nut.

Fit the drums.

With the vehicle on its wheels, adjust the brake linings by pressing the brake pedal firmly and progressively for a number of times while listening for the automatic compensation system clicking.

These vehicles have brake pipes without a copper seal. The seal is by contact "at the bottom of the cone" of the shoulder (Y) on the pipe.

TIGHTENING TORQUES (in daN.m)	
X = 1.5	
Z = 1.3	

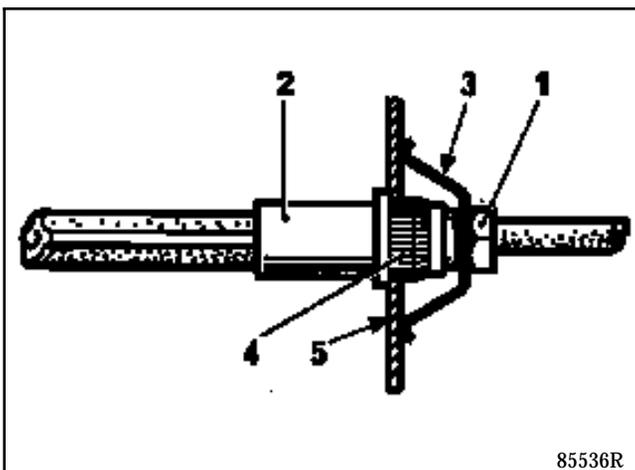


PRECAUTIONS TO BE TAKEN WHEN REMOVING - REFITTING A BRAKE CYLINDER OR A BRAKE PIPE.

For safety reasons and to ensure that the brake pipe is not twisted and is not liable to touch a suspension component the following order of operations must be observed:

REMOVAL

Slacken the union (1) (pipe wrench) between the rigid pipe and the hose (2) until the spring (3) becomes slack which releases the hose from the splines (4).



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

REFITTING

Fit the caliper to the brake and screw the hose onto it, then torque tighten to **1.5 daN.m.**

The brake pipes are fitted when the axle assembly is in position:

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

Position the female end of the hose on the retaining bracket (5), without twisting it and check that the end piece (4) fits freely into 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 together.

Torque tighten the union.

Bleed the brake circuit.

CHECKING PRINCIPLE

These vehicle are fitted with a load sensitive braking compensator.

The pressure is read in an **X pattern**, by comparing the pressure at the rear wheels with a given pressure at the front wheels.

The dual compensator has two totally separate bodies which act in an **X pattern** on one front wheel and one rear wheel.

Both circuits must be checked.

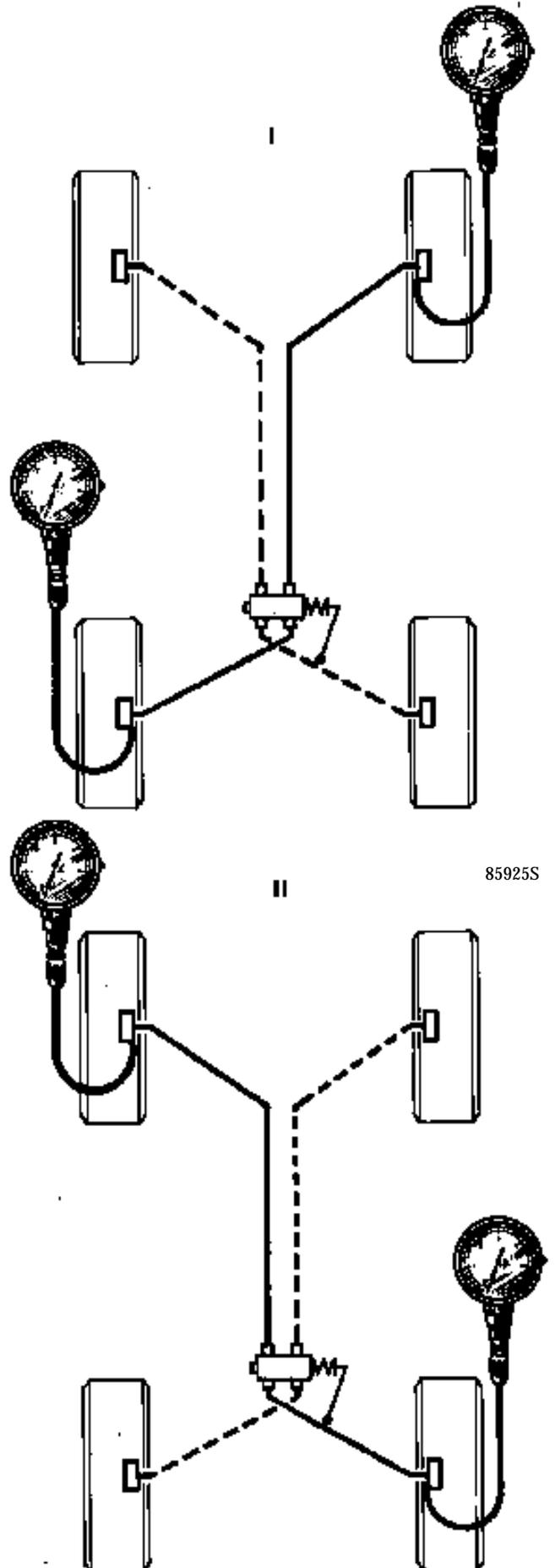
I : front right/ rear left.

II : front left/ rear right.

Load sensitive compensators

For load sensitive compensators, the adjustment allows alteration of the rear pressure depending on the front pressure.

The adjustment is made simultaneously in both bodies. If the pressure is incorrect for one of the two bodies, replace the compensator.



MECHANICAL ELEMENT CONTROLS

Braking compensator

37

SPECIAL TOOLING REQUIRED

Fre.	244 -03	} Pressure gauge for checking compensator rating
	or	
Fre.	1085 -01	

TIGHTENING TORQUES (in daN.m)



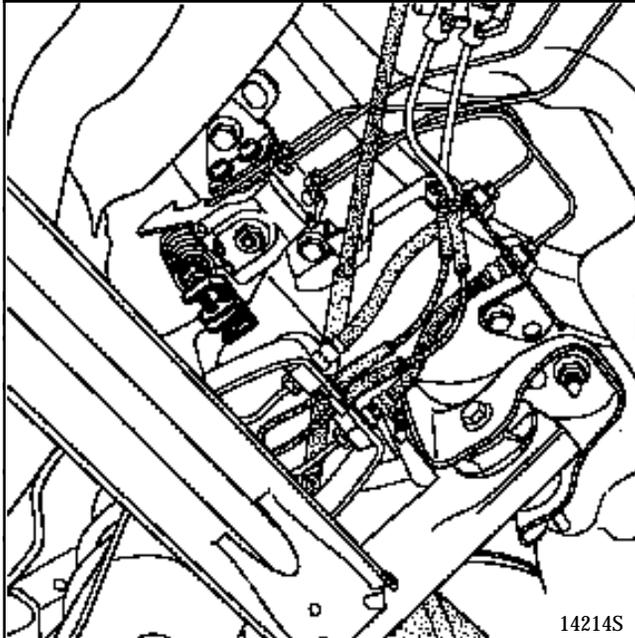
Hydraulic unions	1.7
Compensator mounting bolt	1.8
Rod adjustment bolt	1

Vehicle on a two post lift.

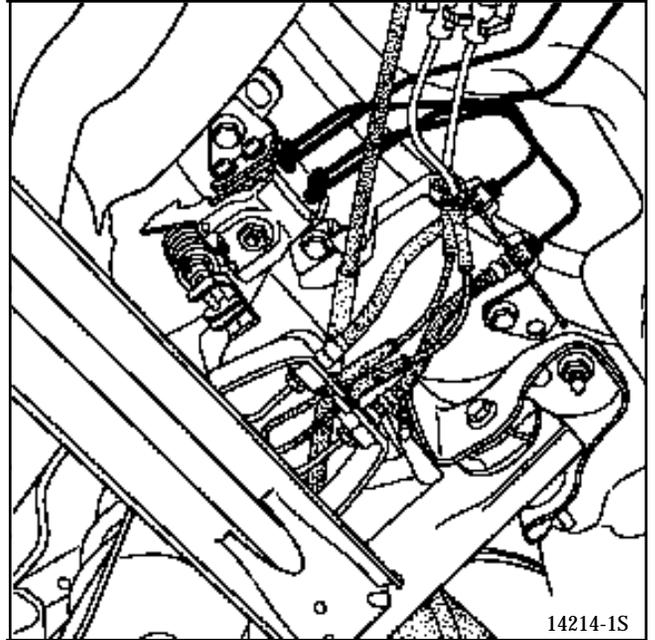
REMOVAL

Fit a pedal press to limit the amount of brake fluid which runs out.

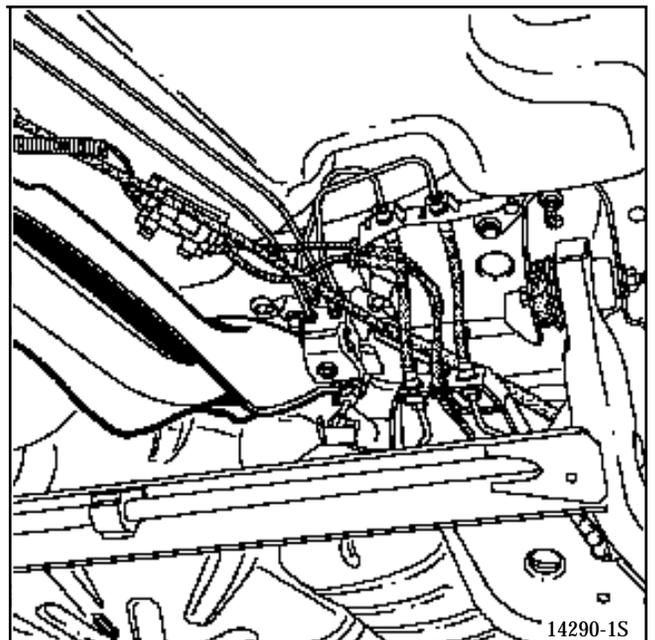
Remove the rod from the compensator by removing the retaining clip on the rear axle.



Disconnect the brake pipes (at the compensator), note their positions.

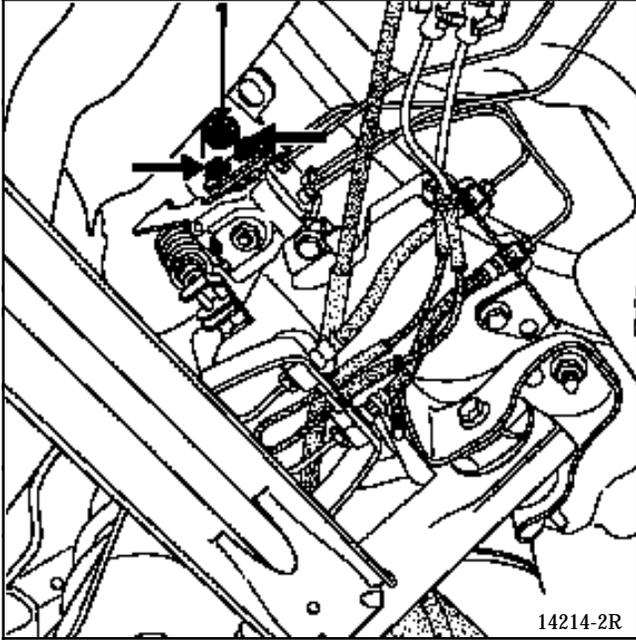


Remove the heat shield (one bolt, two quick release connectors).



Remove the compensator (two bolts).

Slacken, but do not remove, the mounting bolt (1) from the compensator retaining bracket.



REFITTING

Refitting is the reverse of removal.

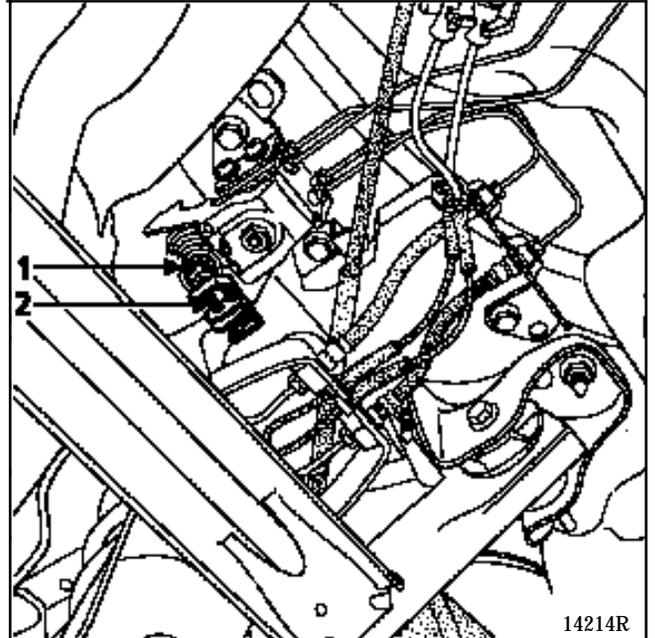
Reconnect the pipes on the compensator, and ensure that the two black ones are on the right hand side and the two green ones are on the left hand side.

Bleed and check the circuit (see section "Checking - Adjusting").

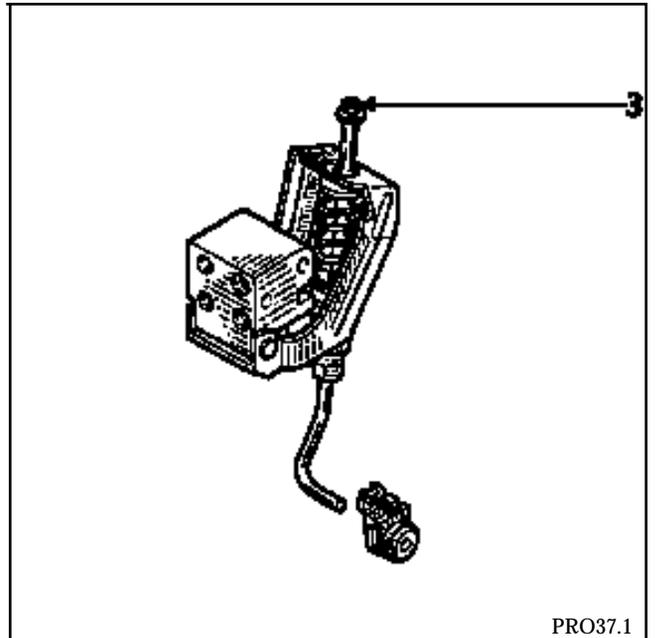
Correctly refit the heat shields.

ADJUSTING

To adjust the braking compensator, slacken bolt (1) and move the rod (2) in the sleeve.



NOTE : do not alter the position of nut (3).

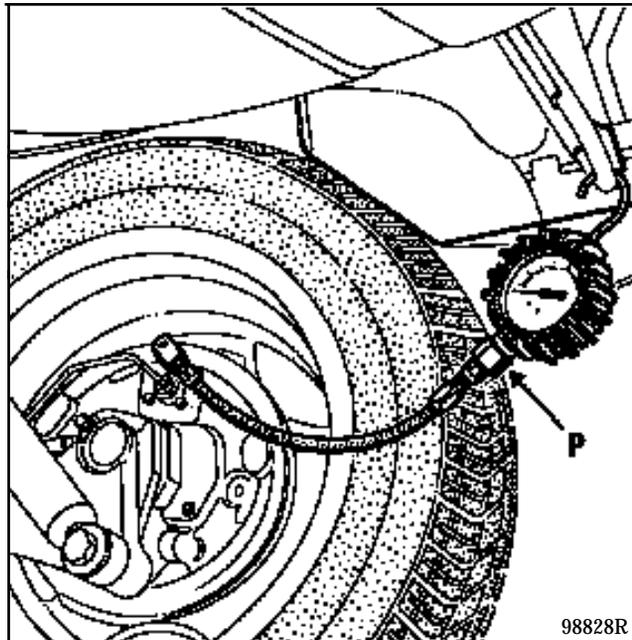


CHECKING

Connect two pressure gauges Fre. 244-03 or Fre. 1085-01 :

- one at the front right hand side,
- one at the rear left hand side.

Bleed the pressure gauges via screw (P).

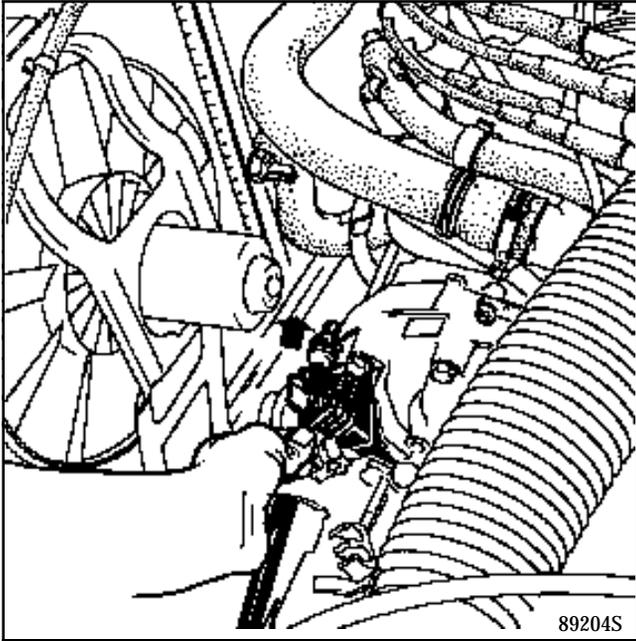


Progressively press the brake pedal until the pressure at the front wheels is the setting pressure (see table of values). Read the corresponding pressure at the rear wheels; correct it if necessary.

• CLUTCH CABLE

REMOVAL

In the engine compartment, disconnect the cable from the fork.



Passenger compartment side, disconnect the cable at the pedal by removing the end from its location on the wear compensation sector.

Remove the cable sleeve stop from the bulkhead.

Remove the complete cable via the engine compartment.

REFITTING

From the engine compartment, thread the cable through the bulkhead.

Fit the cable end piece into position on the wear compensation sector.

Fit the cable onto the clutch fork.

The adjustment is carried out automatically when the pedal is pressed.

• CLUTCH PEDAL

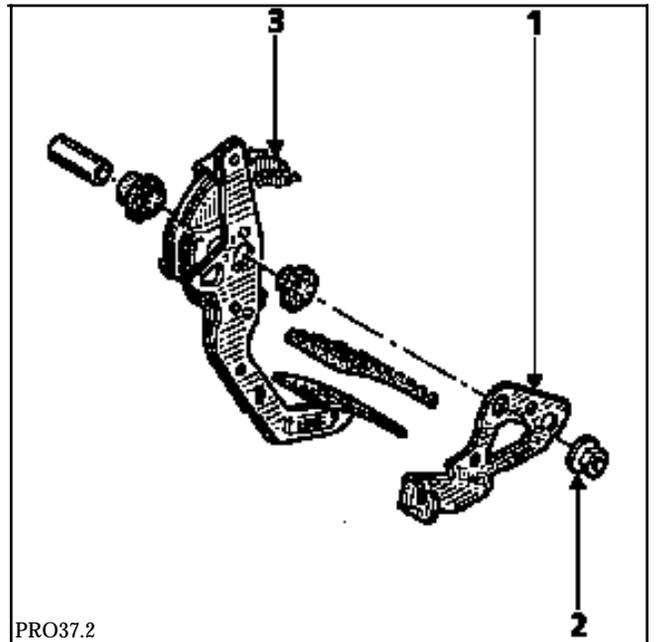
REMOVAL

In the engine compartment, disconnect the cable from the fork.

In the passenger compartment, remove:

- the cable at the pedal by pulling the end from its location on the wear compensation sector ,
- the stiffener(1),
- the nut from the pedal mounting shaft (2).

Remove the pedal.



REFITTING

Refitting is the reverse of removal.

Fit the cable end piece into position on the wear compensation sector(3).

In the engine compartment, fit the cable onto the clutch fork.

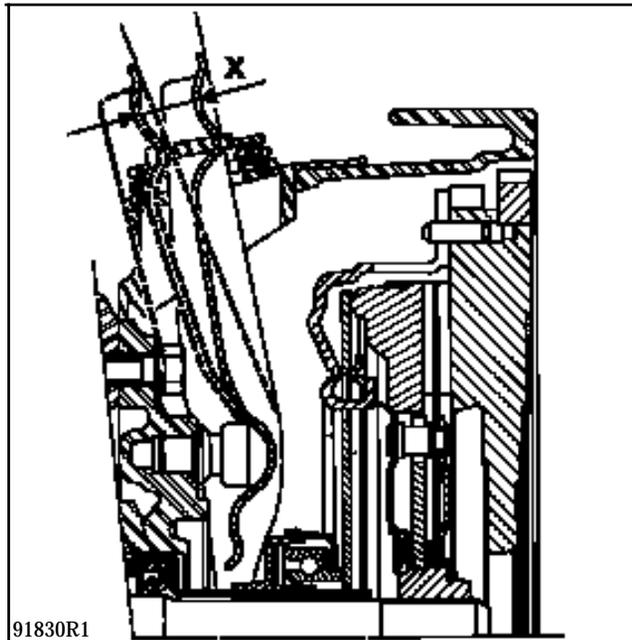
The adjustment is carried out automatically when the pedal is pressed.

SPECIAL NOTES

In order to ensure the assembly operates correctly, check that:

- the notched sector pivots correctly about its pin,
- the ratchets return to the rest position freely,
- the cable is always taut on the fork and there is at least 2cm of slack,
- the fork travel is between:

$$X = 27.4 \text{ and } 30.7 \text{ mm}$$



These components should be checked before any operation on the clutch itself.

TIGHTENING TORQUES (in daN.m)

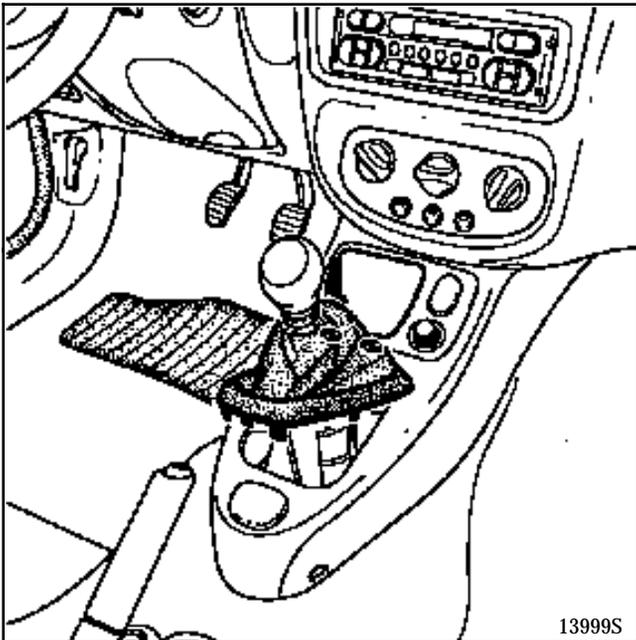


Mounting nut for unit on body	1.5
Linkage mounting clip bolt on clevice	2
Linkage mounting bolt on clevice	3
Linkage - lever mounting nut	3

REMOVAL

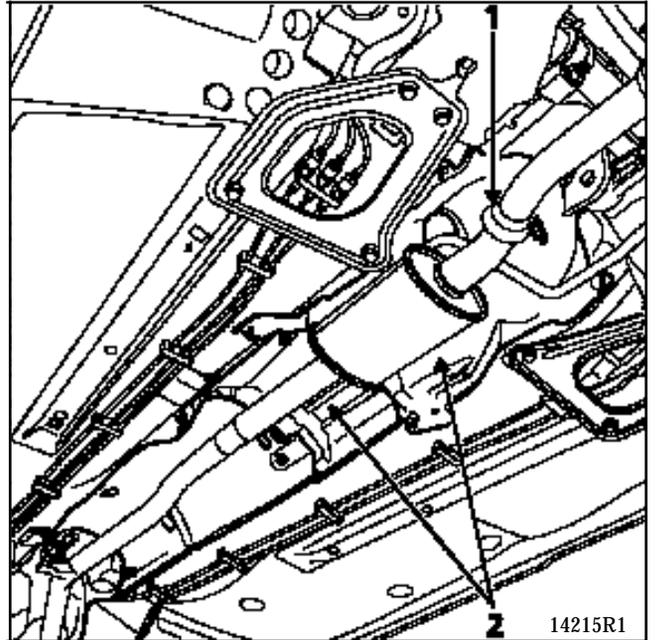
Disconnect the battery.

In the vehicle, remove the gaiter from the console.



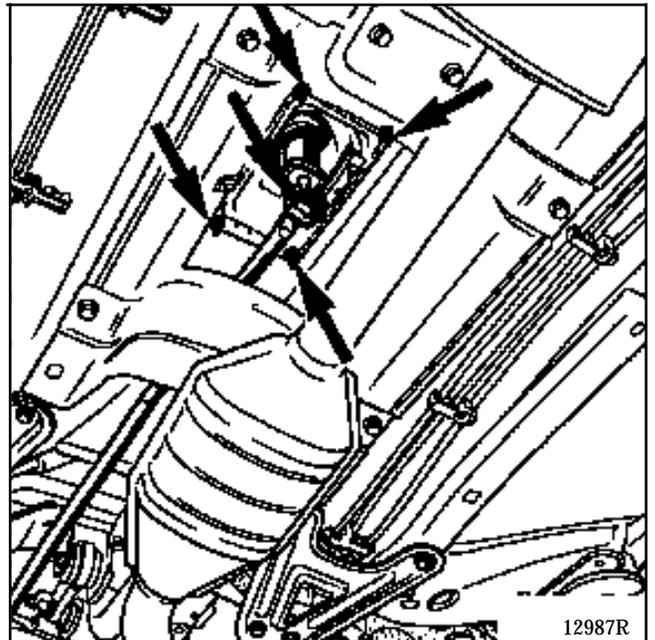
Under the vehicle:

- release the primary exhaust pipe (1),
- remove the heat shields (2).



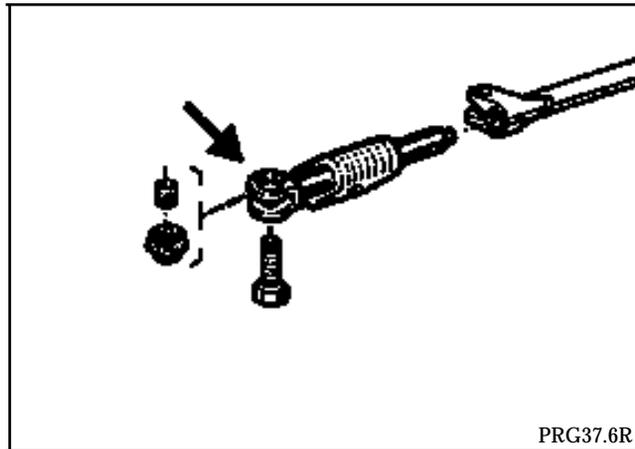
Remove:

- the linkage-lever mounting nut,
- the four control unit mounting nuts.



REMOVAL of the control linkage

After removing the lever - linkage connecting nut,
remove the linkage - selector connecting bolt.



REFITTING

Correctly refit the heat shields.

Refitting is the reverse of removal.

Coat the lever joints and the linkage pin with **33 Médium grease**.

Ensure the clevice is fitted correctly : offset on gearbox side.

SPECIAL TOOLING REQUIRED

B.Vi. 1133	Shim for locking the gearbox input lever in 1st
------------	---

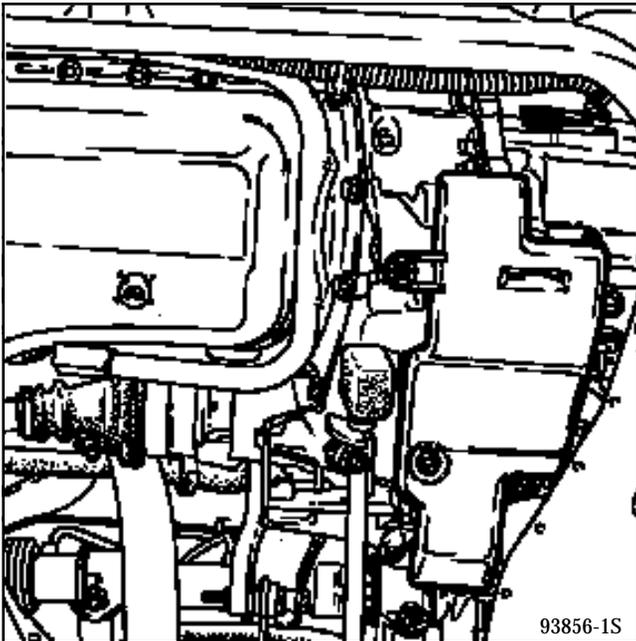
TIGHTENING TORQUES (in daN.m)



Linkage mounting clip bolt on clevice	2
---------------------------------------	---

ADJUSTMENT

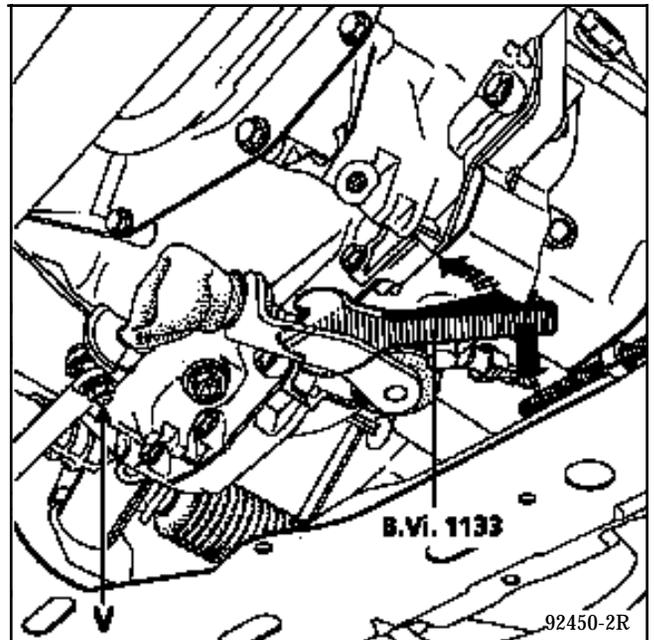
Remove the collector or the engine undertray.



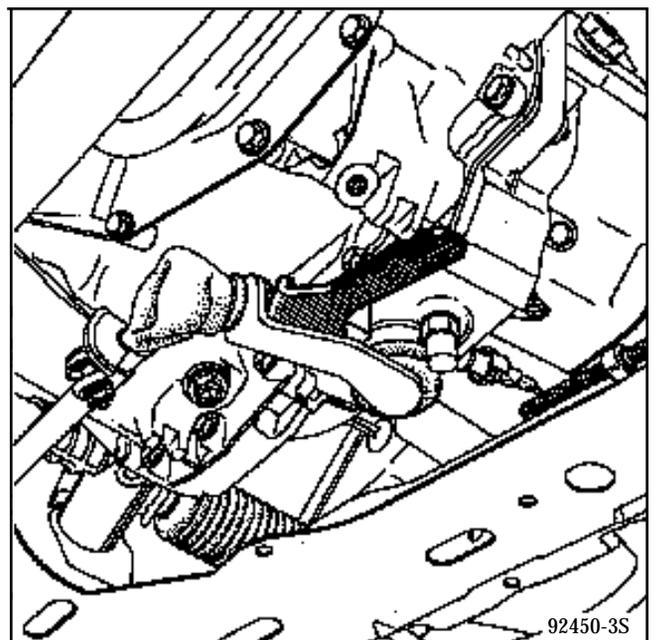
Engage 1st gear.

Slacken bolt (V).

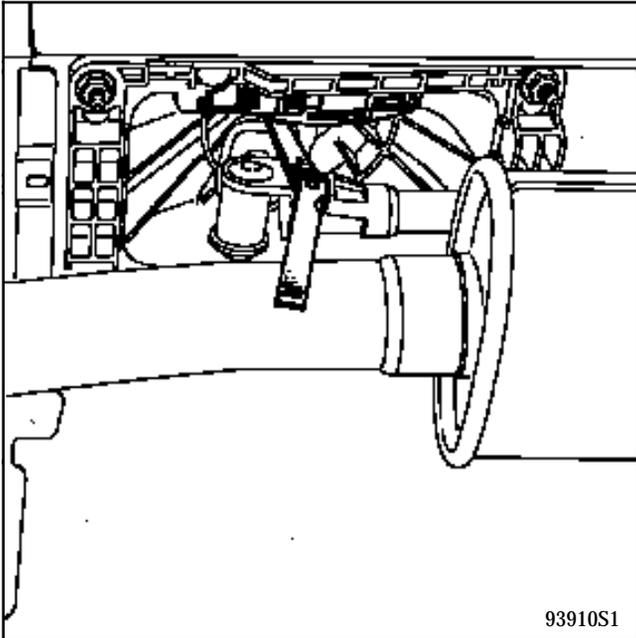
Fit shim B.Vi. 1133 to take up any play.



At the same time pull the end of the shim downwards and pivot it through approximately 45° until it touches the lug on the housing.



Press the lower lever gate against the gearbox ramp , inserting a **9 mm** shim.



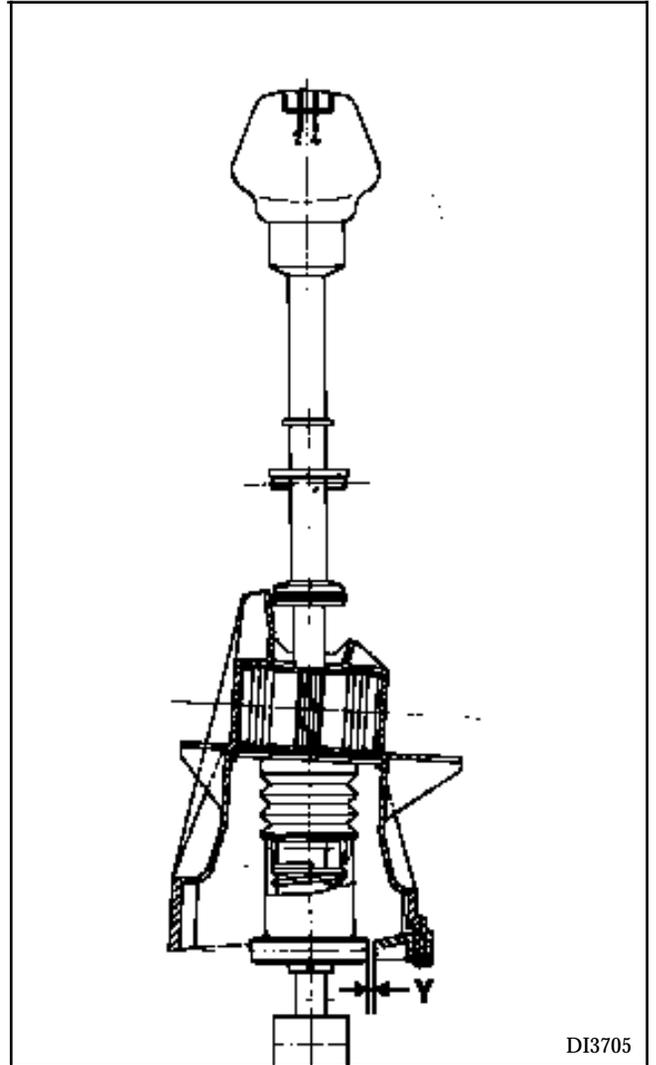
In this position, tighten bolt (V).

Check the resulting play (Y) which must be between **7 and 10 mm**.

Remove shim **B. Vi. 1133**.

Check the gears engage correctly.

Refit the collector or the engine undertray.



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.

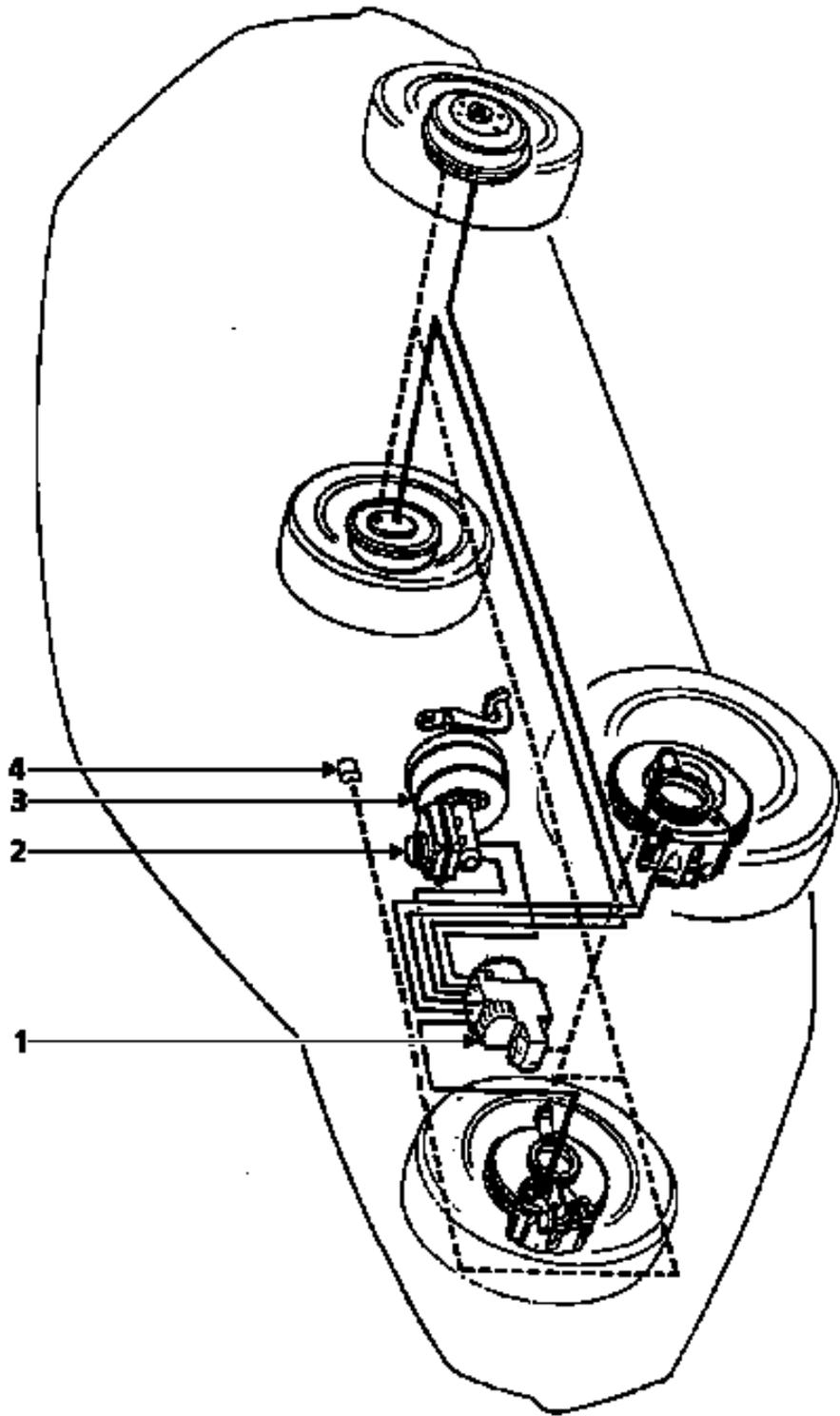
SPECIAL NOTES

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 which tends to lock causes immediate regulation on the complete axle assembly).

On this vehicle, the braking compensator is suppressed (on versions fitted with ABS) and its role is ensured by the special programme in the ABS assembly computer and is known as REF (Electronic Braking Distributor).

IMPORTANT: if the ABS fuse is removed, be careful during road tests not to brake hard as the REF function is no longer activated (identical front and rear pressure), so there is a risk that the vehicle will spin.

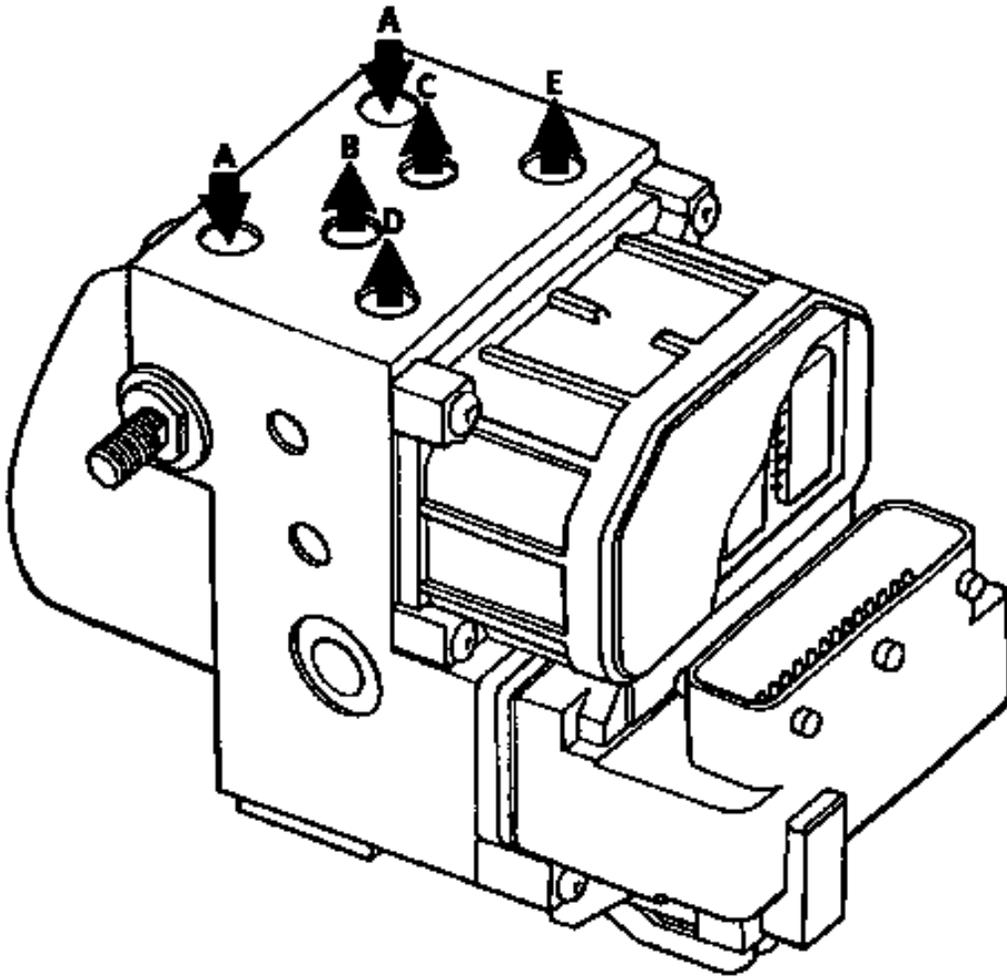
LOCATION OF THE BOSCH ABS COMPONENTS



DI3896

- 1 Hydraulic assembly
- 2 Master cylinder
- 3 Brake servo
- 4 Brake fluid level warning light

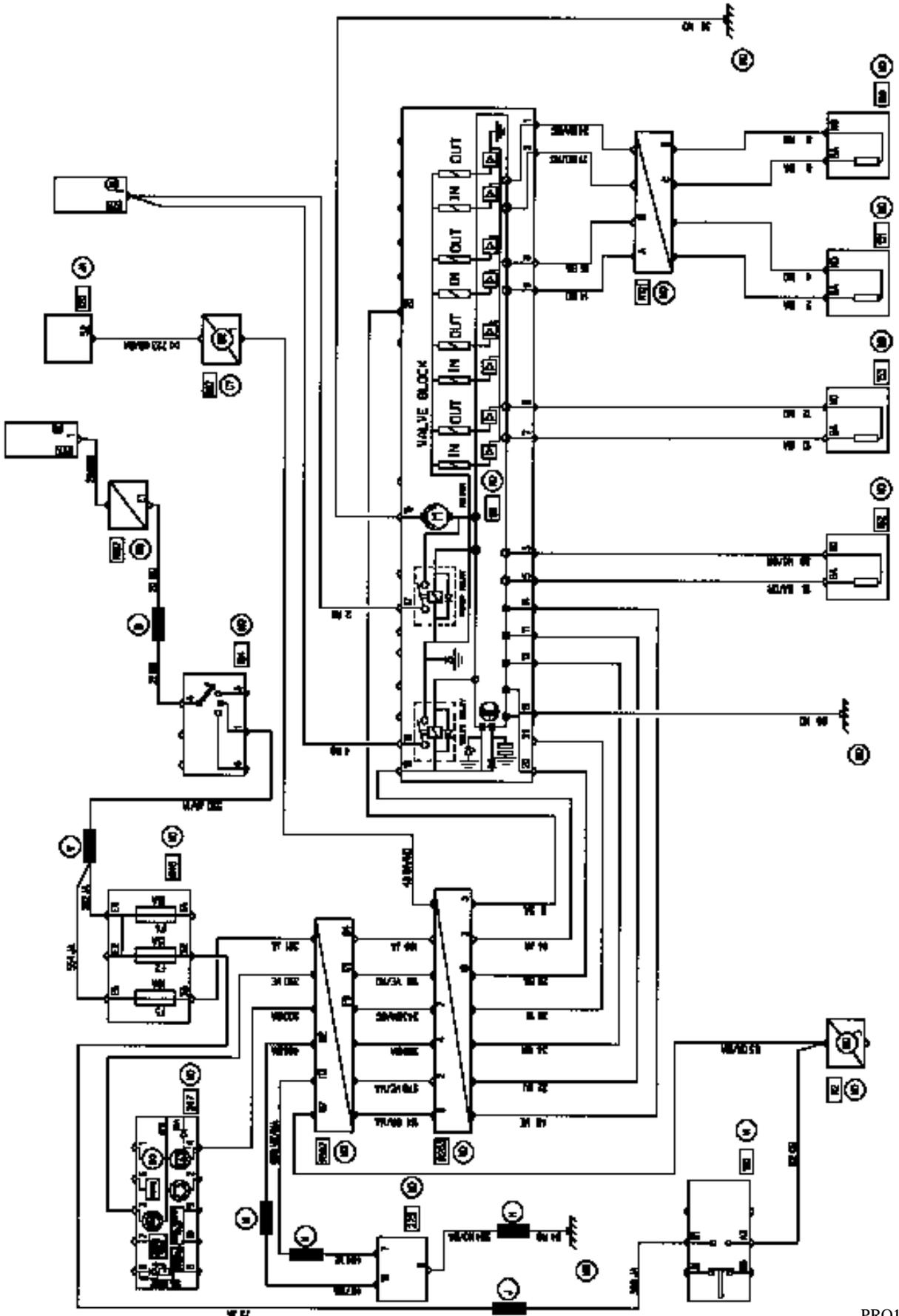
PRESENTATION OF THE HYDRAULIC REGULATION ASSEMBLY



PRN3819

- A Inlet from master cylinder
- B Rear left wheel
- C Rear right wheel
- D Front right wheel
- E Front left wheel

WIRING DIAGRAM

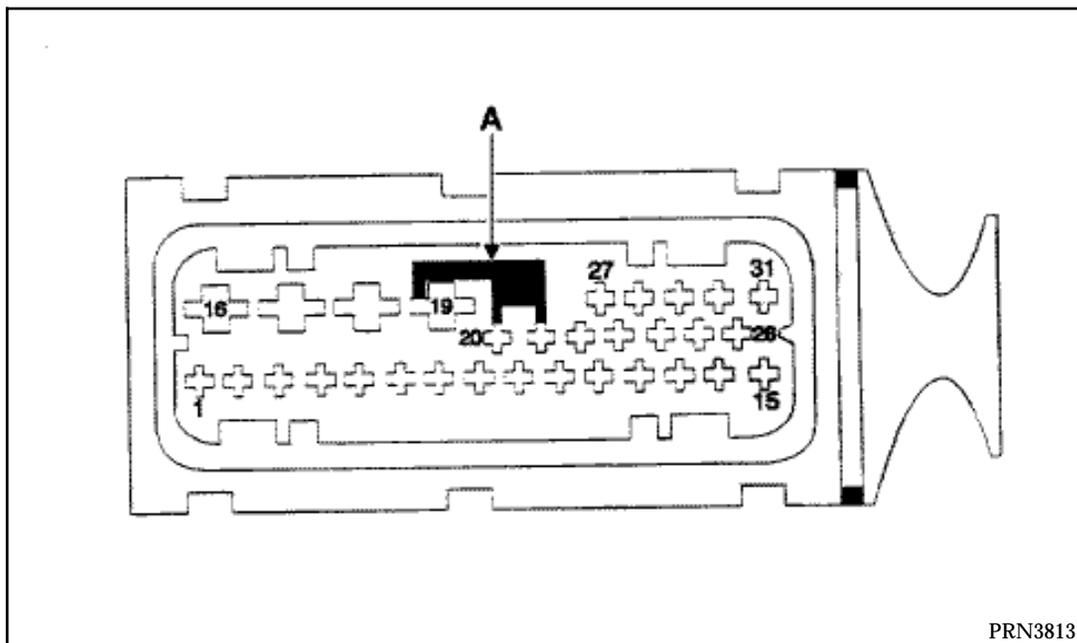


WIRING DIAGRAM KEY

- 104 Ignition switch
- 118 ABS computer
- 120 Injection computer
- 150 Rear right wheel sensor
- 151 Rear left wheel sensor
- 152 Front right wheel sensor
- 153 Front left wheel sensor
- 160 Stop switch
- 225 Diagnostic socket
- 247 Instrument panel
- 645 Passenger compartment connection unit
- 777 Power feed fuse board

- R2 Dashboard/rear left
- R67 Front of engine/engine
- R101 Right hand side member/Right hand headlight
- R107 Dashboard/Front of engine

31 TRACK CONNECTOR



PRN3813

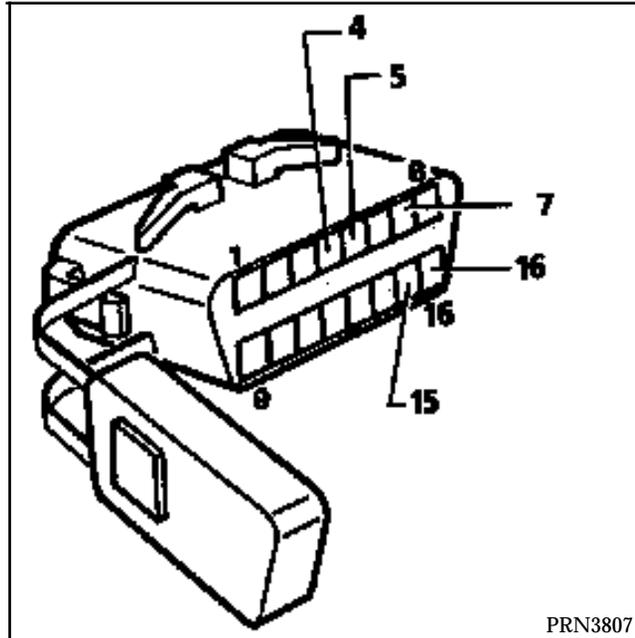
A Micro-spring connecting earth (terminal 19) to pins 20 and 21 (ABS and NIVOCODE warning lights) if the connector is disconnected.

Allocation of connector tracks

Track	Description
1	Sensor earth RRH
2	Sensor information RRH
3	Sensor earth FRH
4	Not connected
5	Sensor information FRH
6	Sensor earth FLH
7	Sensor information FLH
8	Sensor earth RLH
9	Sensor information RLH
10	Not connected
11	Diagnostic line K
12	Diagnostic line L
13	Not connected
14	Stop lights switch information

Track	Description
15	+ after ignition computer feed
16	Pump motor earth
17	+ BAT (solenoid valves and pump motor)
18	+ BAT (solenoid valves and pump motor)
19	Electronic earth
20	Not connected
21	ABS warning light
22	Not connected
25	Not connected
26	FRH wheel speed output (to be introduced)
27	Not connected
31	Not connected

DIAGNOSTIC SOCKET



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

SPECIAL TOOLING REQUIRED

Mot. 1311-06

**Tool for removing petrol
pipe connectors**

HYDRAULIC ASSEMBLY

TIGHTENING TORQUES (in daN.m)		
Pipe unions	M10 X 100	1.7
	M12 X 100	1.7

REMOVAL

Put the vehicle on a two post lift.

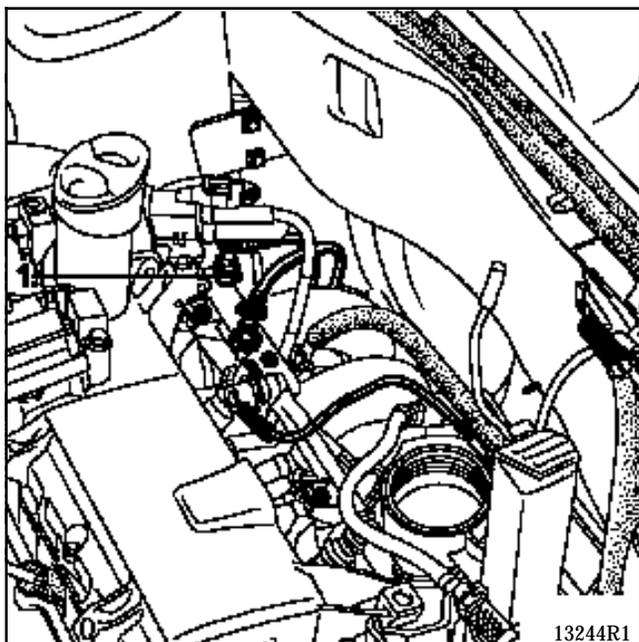
Disconnect the battery.

Fit a pedal press to limit the amount of brake fluid which will run out.

Remove:

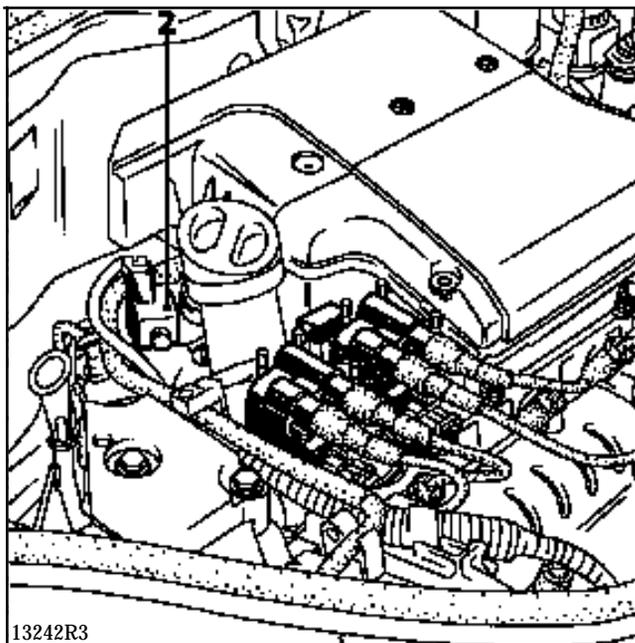
- the air filter unit,
- the dipstick.

Using the **Mot. 1311-06**, disconnect the fuel re-
turn pipe (1).



Remove the canister bleed solenoid valve (2).

NOTE : it is fixed to the top of the inlet manifold
below the cover.

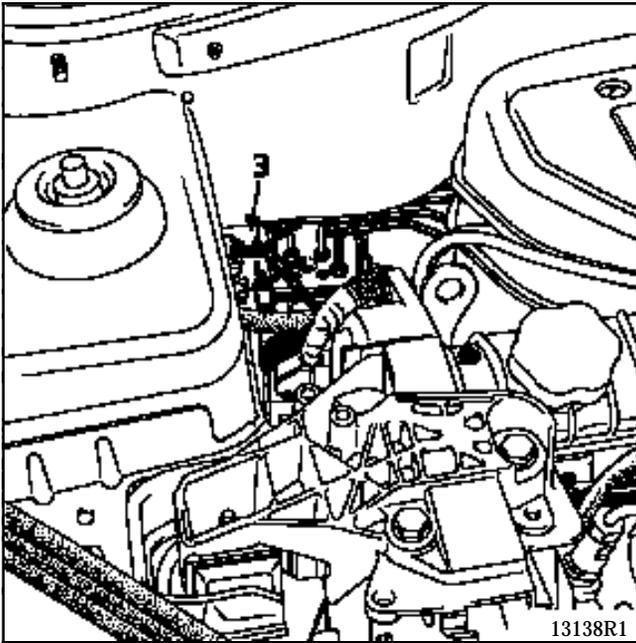


IMPORTANT: when opening a fuel circuit, use a
cloth as protection against petrol which may spurt
out as a result of residual pressure.

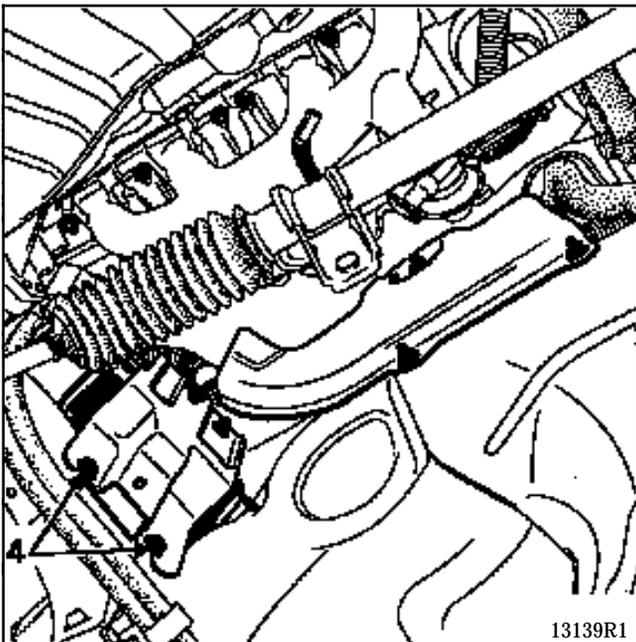
Disconnect the ABS computer connector.

Remove the two earth wire bolts.

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

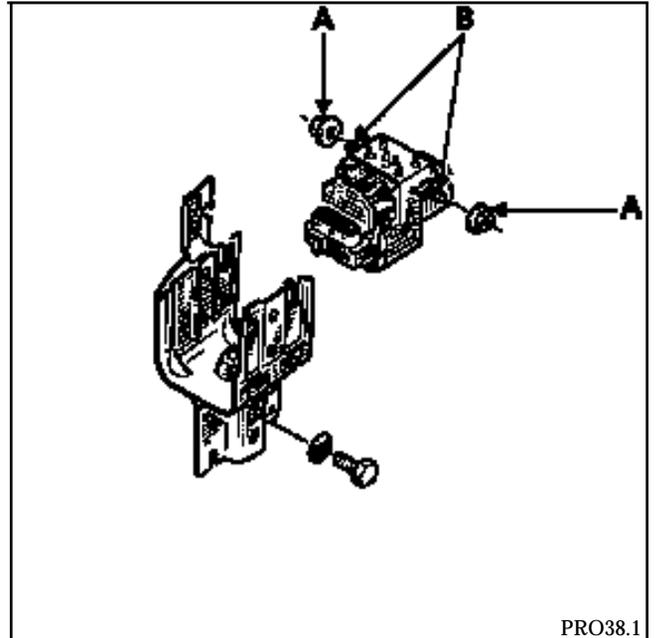


Remove the upper bolt (3) and the two lower mounting bolts (4) for the hydraulic assembly support.



IMPORTANT: lower the hydraulic assembly mounting enough to allow the "front right wheel" pipe to be unclipped (see page 38-3).

Remove the two mounting nuts (A) for the hydraulic assembly on its support.



Remove the hydraulic assembly.

NOTE : to make removal of the hydraulic assembly easier, remove the two bolts (B).

REFITTING

Refitting is the reverse of removal.

To ensure that the petrol connector is correctly joined, a "click" must be heard when the two parts are connected.

Bleed the braking circuit, as described on the following pages.

NOTE : the computer must not be removed. If there is a fault, replace the complete hydraulic assembly.

HYDRAULIC ASSEMBLY

TIGHTENING TORQUES (In daN.m)		
Pipe unions	M10 X 100	1.7
	M12 X 100	1.7

REMOVAL

Put the vehicle on a two post lift.

Disconnect the battery.

Remove the front right wheel.

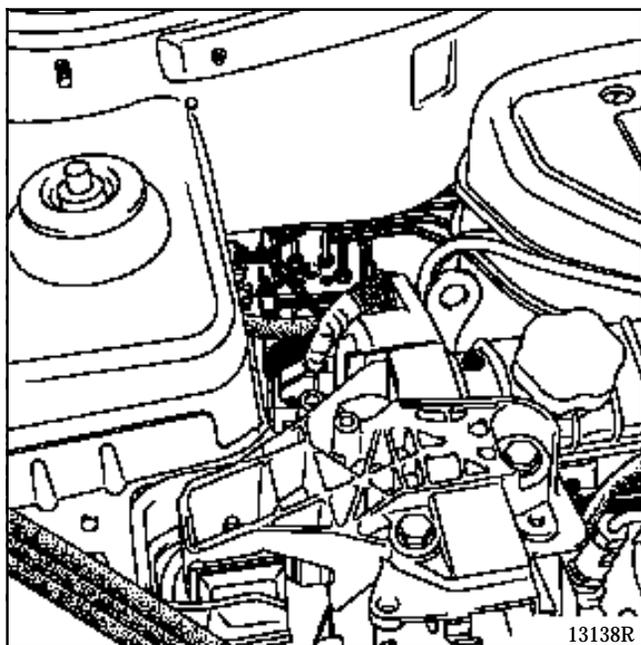
Fit a pedal press to limit the amount of brake fluid which will run out.

From above

Disconnect the computer connector.

Remove the two earth bolts.

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

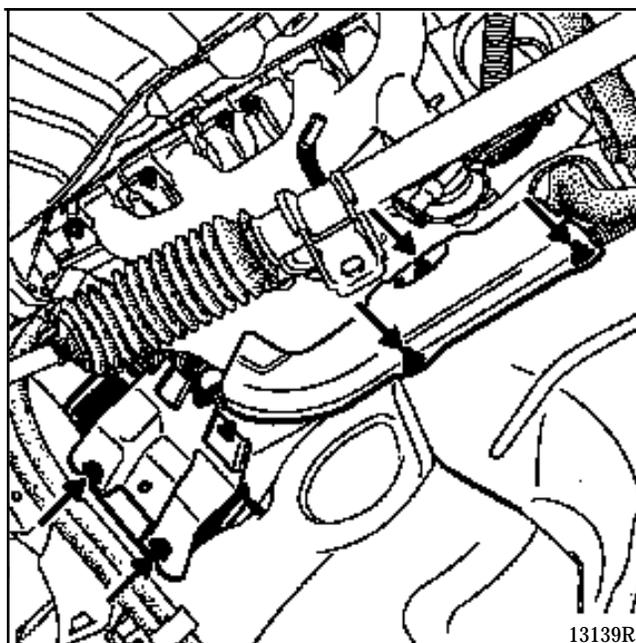


Remove the upper hydraulic assembly mounting bolt.

From below

Remove:

- the exhaust downpipe,
- the exhaust manifold heat shield (3 bolts),
- the two lower mounting bolts for the hydraulic assembly,



- the hydraulic assembly via the wheel arch.

REFITTING

Refitting is the reverse of removal.

Correctly refit the heat shield.

NOTE : the computer must not be removed. If there is a fault, replace the complete hydraulic assembly.

HYDRAULIC BRAKING TEST

This section describes the test to be carried out using the **XR25**, to check the mounting of the ABS system in the vehicle and, in particular, the hydraulic circuit.

NOTE: for this test, two persons are required and the vehicle must be on a two post lift, if possible.

Principle of the test

Put the vehicle on the lift with the wheel to be tested raised. One of the operators must be in the passenger compartment in the driver's position with the **XR25**. Switch the ignition on, vehicle in neutral, in fault finding mode and press the brake pedal. The second operator must apply a torque to the wheel to try and rotate it.

The operator generates an appropriate command on the **XR25** which carries out the following cycle ten times: alternate decrease then increase in pressure at the wheel to be checked. These actions in the ABS will be noted at the wheel as ten alternate locking and releasing operations. The jerky movement of the wheel, noted qualitatively by the operator, signify that the hydraulic circuit for this wheel is correctly connected.

The programme for the **XR25** for this sequence is as follows:

- Cycle on the wheel to be tested :
 - a drop in pressure for **200 ms** where the pump starts at the same time,
 - an increase in pressure for **300 ms** where the pump starts at the same time (ten cycles are carried out for the wheel in question).
- The pressure increases to master cylinder pressure for all four wheels.
- The hydraulic pump motor stops.
- The operator releases the brake pedal.

The hydraulic test for the wheel in question is complete - begin the test for the three other wheels.

BLEEDING PROCEDURE

NOTE : the hydraulic assembly is pre-filled.

This bleeding procedure must be used when one of the following components has been removed:

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

1) Bleed the braking system conventionally using the pedal.

NOTE : if, after a road test with ABS regulation, the pedal travel is not correct, bleed the hydraulic assembly.

2) Bleeding the hydraulic assembly.

IMPORTANT : the bleeding order must be observed, beginning with the **rear right** , then the **rear left**, **front left** and then **front right**.

- a) Bleed the **rear right** brake by bleeding the hydraulic assembly secondary circuit using the XR25:
- position the bleed container and the hose, open the brake bleed screw,
 - pump the brake pedal (approximately ten times),
 - start the bleed command on the **XR25**,
 - pump the brake pedal during the diagnostic bleed phase,
 - at the end of the bleed cycle on the **XR25**, continue to pump the brake pedal and close the brake bleed screw.
- b) Carry out the procedure described at a) for the **rear left**, **front left** and **front right** brakes.
- c) Check the pedal travel and if it is incorrect, restart the bleeding procedure.

IMPORTANT : ensure there is sufficient brake fluid in the reservoir.

CHECKING THE WHEEL SPEED SENSORS

- a) Check the resistance of the sensor connections (from the computer connector to the 2 track speed sensor connector).
- b) Visually inspect the teeth (26 teeth) on the target and if they are faulty, replace the target.
- c) Check the air gap using a set of shims. Only the front sensors can be checked.

Front: $0.1 < Z < 1.9$ mm

