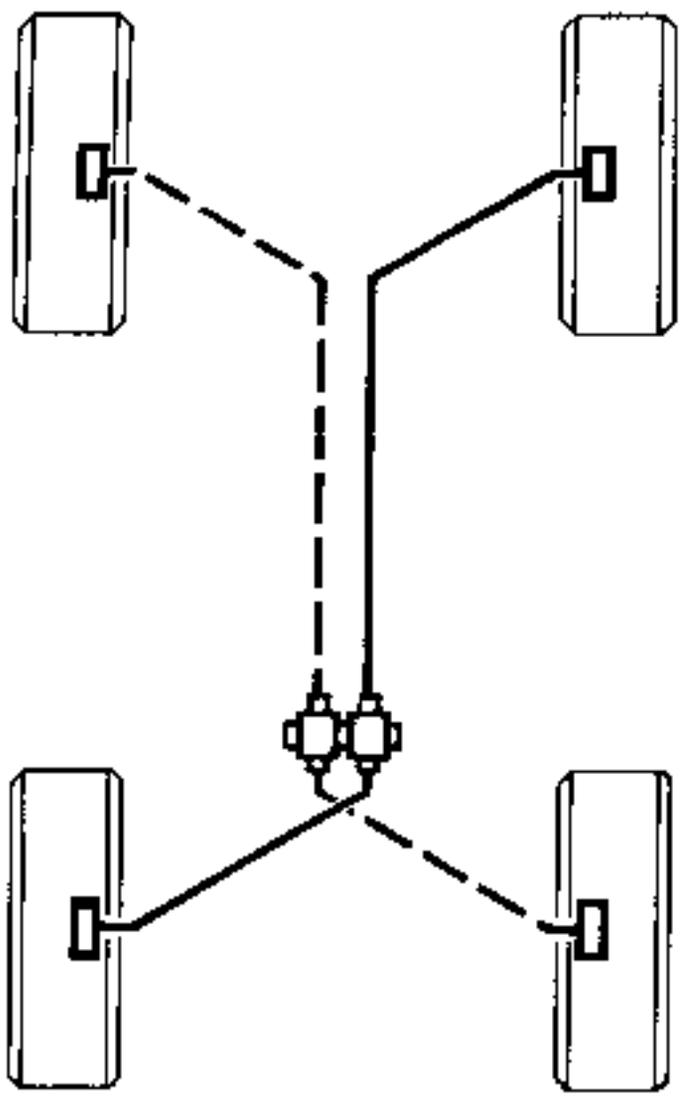


NOTE : The following diagrams show general operating principles. Under no circumstances are they to be taken as a reference for the take-offs and allocation of the circuits. When one of the constituent parts of the brake circuit on the vehicle is replaced, the pipes and lines must always be marked before dismantling in order that they can be reconnected in their initial positions.

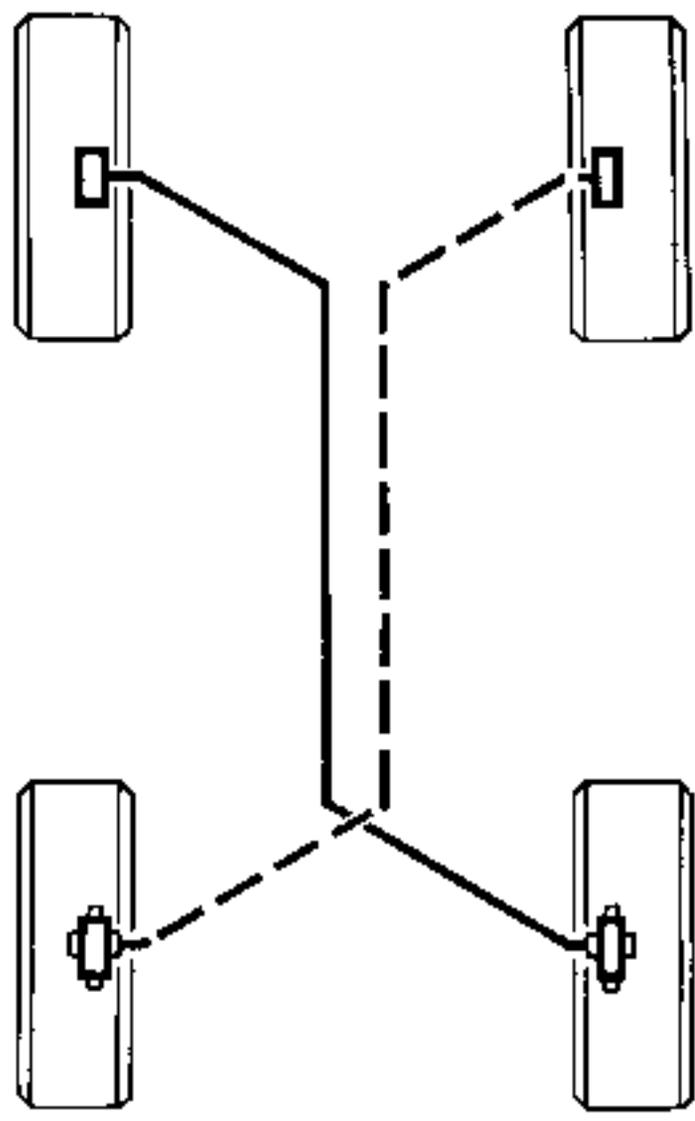
**"X" TYPE BRAKING ARRANGEMENT
with fixed compensators**



91563-25

- L481
 - L482
 - L486
 - L48E
 - L48F
 - L48J
- 1st TYPE

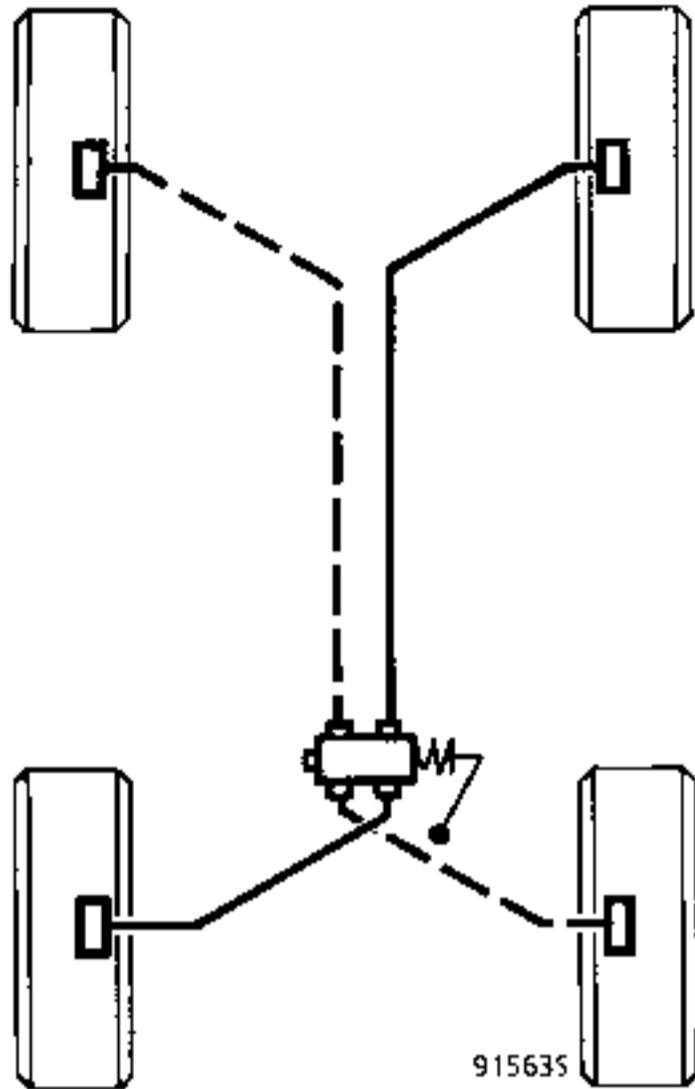
**"X" TYPE BRAKING ARRANGEMENT
with compensators integrated
in the wheel cylinder**



91563-35

- L481
 - L482
 - L486
 - L48E
 - L48F
 - L48J
 - L48M
 - L48N
- 2nd TYPE
- B481
 - B482
 - B486
 - L486
 - B48V
 - L48V
 - B48E
 - B48J
 - B48F

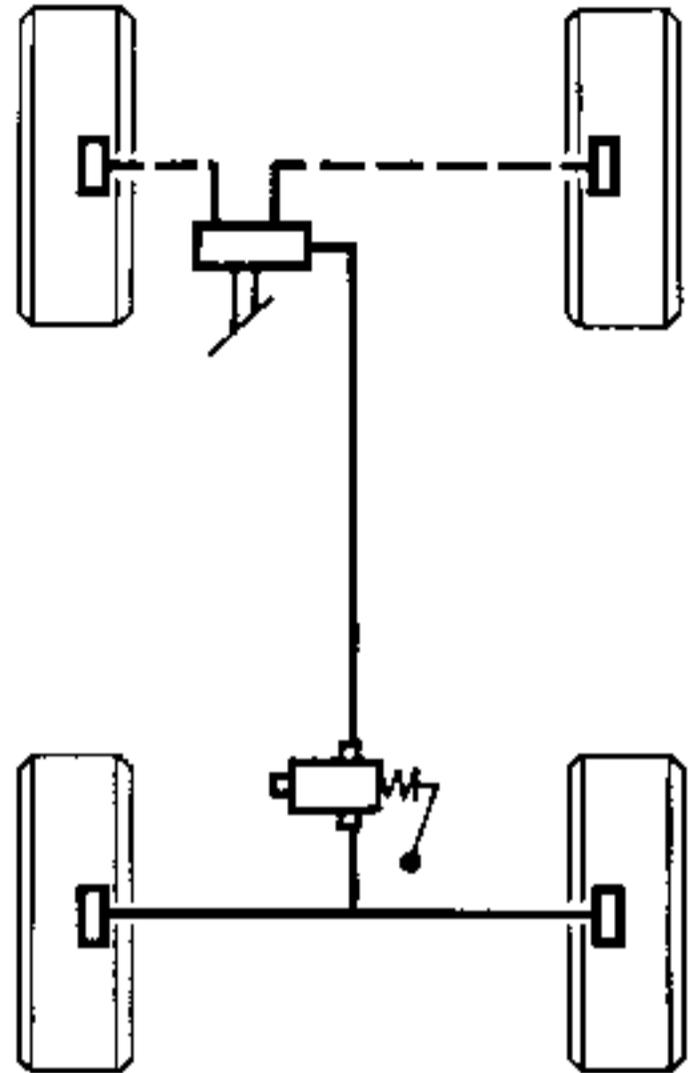
"X" TYPE BRAKING ARRANGEMENT
with load controlled compensator



915635

- B480 B48A L48P
- L480 L48A B48R
- B483 B48C L48R
- L483 L48C B48Y
- B487 B48K L48Y
- L487 L48K B48W
- B488 B48O L48W
- L488 L480
- L489 B48P
- L485
- L48L
- L485 4 x 4
- L48L 4 x 4
- K480 K487 K48I
- K481 K488 K48J
- S481 K489 K48K
- K482 K48A K48O
- S482 K48E K48P
- K483 K48F K48V
- K486 K48H S48V
- S486 S48H K48W
- K48R
- K483 4 x 4
- K486 4 x 4
- K46K 4 x 4
- K48V 4 x 4

"ABS" BRAKING ARRANGEMENT
with load controlled compensator



91563-45

- B483 L488
- L483 B48P
- B487 L48P
- L487 B48K
- B488 L48K
- B48R
- L48R
- B48Y
- L48Y
- K483
- K48K
- K487
- K488
- K48R

"X" TYPE BRAKING ARRANGEMENT**with load controlled compensator**

Except for the versions with **ABS**, these vehicles are equipped with a dual braking circuit arranged in an "X" formation, the master cylinder is of the "Tandem" type (having two separate internal systems) :

The master cylinder activates separately :

- 1 - the front righthand - rear lefthand brakes,
- 2 - the front lefthand - rear righthand brakes.

The braking on the rear wheel is restricted :

- either by a fixed compensator,
- or by two fixed compensators incorporated in the wheel cylinders.
- or by a dual load controlled compensator.

"X" TYPE BRAKING ARRANGEMENT**with load controlled compensator**

Vehicles with **ABS** have a compact hydraulic unit comprising a "Tandem" master cylinder and a hydraulic amplifier.

The master cylinder activates statically and separately :

- 1 - the front righthand brake,
- 2 - the front lefthand brake.

The hydraulic amplifier activates the two rear brakes dynamically which are restricted by :

- a delay valve,
- a single load controlled compensator.

Vehicle Type	B48I L48I B481 L481 B48D L48D B48F L48F B48H L48H L48M	B484 L484 B482 L482 B48E L48E B48J L48J L48N	B48W L48W L483 B483 L489 B48K L48K B487 L487 B488 L488	B480 L480 B486 L486 B48V L48V B48A L48A	B488 L488 B48W L48W	B483 L483 B48K L488 B48W L48W L48K	L485 B48Q L48Q B48Y L48Y L48R B48R L48L	B48Y L48Y L48R B48R
FRONT BRAKES (dimensions in mm)								
Wheel cylinder diameter	48	48	54	54	54	54	54	54
Disc diameter	238	238	265	244	244	265	285	285
Disc thickness	12	20	19.7	19.7	19.7	19.7	21	21
Minimum disc thickness*	10.5	18	17.7	17.7	17.7	17.7	19	19
Pad thickness (including backing)	18	18	17.5	17.5	17.5	17.5	17.5	17.5
Minimum pad thickness (including backing)	6	6	6.5	6.5	6.5	6.5	6.5	6.5
Maximum disc run-out	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
REAR BRAKES (dimensions in mm)								
Wheel cylinder diameter	22 or 20.6(1)	22 or 20.6(1)	22	22 or 20.6(1)	22	36	36	36
Drum diameter	180.25	180.25	228.5	180.25	228.5	-	-	228.5
Maximum diameter of drums after re-facing	181.25	181.25	229.5	181.25	229.5	-	-	229.5
Disc diameter	-	-	-	-	-	255	255	-
Disc thickness	-	-	-	-	-	10.5	10.5	-
Minimum disc thickness*	-	-	-	-	-	9.5	9.5	-
Lining width	40	40	40	40	40	-	-	40
Lining thickness (including shoe)	6.5	6.5	6.5	6.5	6.5	14	14	6.5
Minimum lining thickness (including shoe)	2.5	2.5	2.5	2.5	2.5	6	6	2.5
MASTER CYLINDER (dimensions in mm)								
Diameter	19	19	20.6	20.6	20.6	(ABS)	(ABS)	20.6

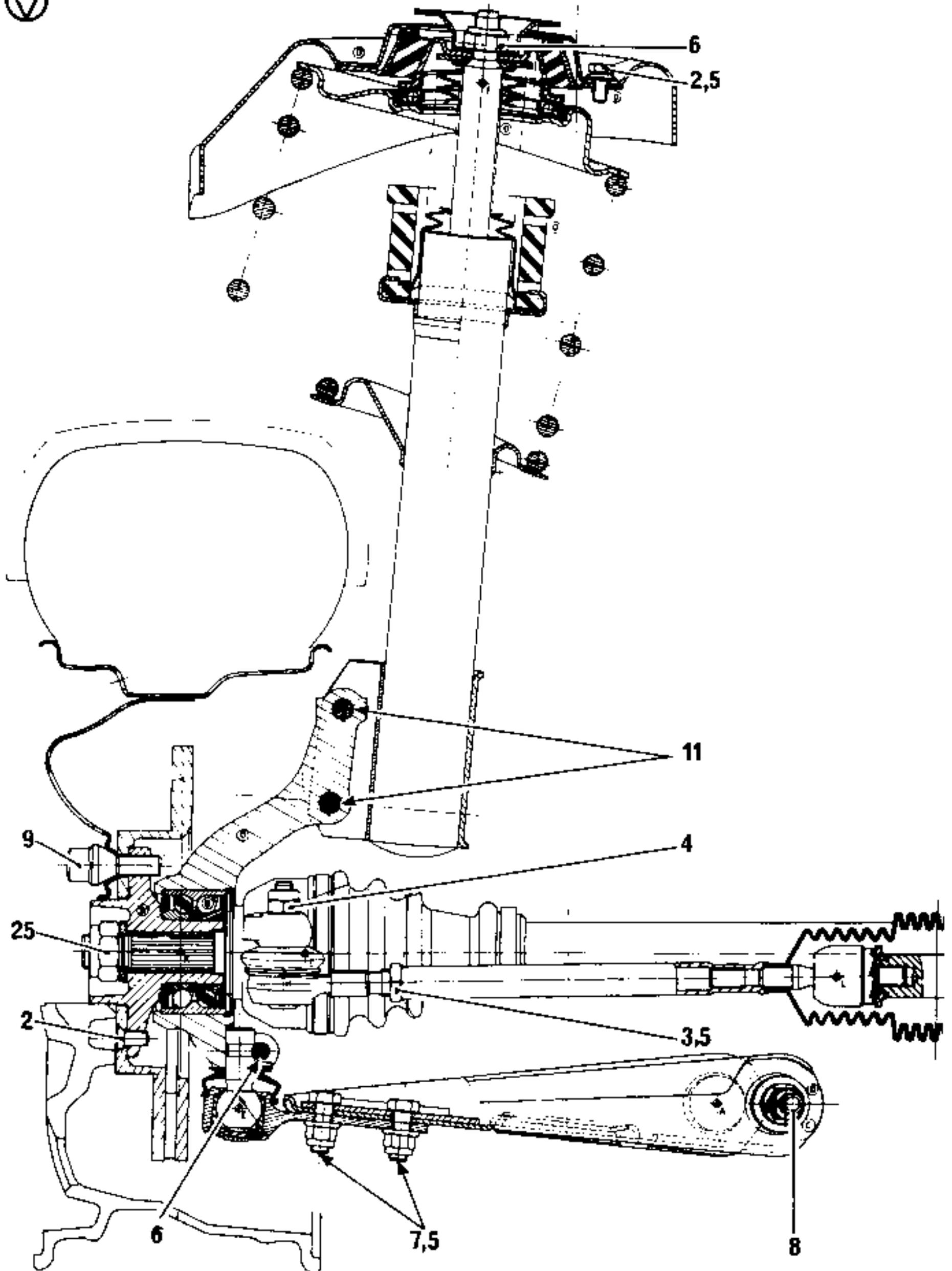
* The brake discs must not be re-faced. The part must be changed if excessive scoring or wear is present.

(1) Wheel cylinder with integral fixed compensator : if the wheel cylinder or compensator does not operate correctly, change the assembly, as all repairs are forbidden.

Vehicle type	K48I K484 K481 S481 K482 S482 K48E K48H S48H K48J K48M K48N	K483 K488 K48K K487	K486 K48V S486 S48V K489 K48A K48B K48C K48O	K483 K48K K488 K48W	K486 4 x 4 K48V 4 x 4 K483 4 x 4 K48K 4 x 4
FRONT BRAKES (dimensions in mm)					
Wheel cylinder diameter	48	54	54	54	54
Disc diameter	238	265	244	265	244
Disc thickness	20	19.7	19.7	19.7	19.7
Minimum disk thickness*	18	17.7	17.7	17.7	17.7
Pad thickness (including backing)	18	17.5	17.5	17.5	17.5
Minimum pad thickness (including backing)	6	6.5	6.5	6.5	6.5
Maximum disc run-out	0.07	0.07	0.0	0.07	0.07
REAR BRAKES (dimensions in mm)					
Wheel cylinder diameter					
Drum diameter	22	22	22	36	22
Maximum drum diameter after re-facing	228.5	228.5	228.5	—	255
	229.5	229.5	229.5	—	256
Disc diameter	—	—	—	255	—
Disc thickness	—	—	—	10.5	—
Minimum disc thickness*	—	—	—	9.5	—
Lining width	—	—	—	—	—
Lining thickness (including shoe)	40	40	40	—	45
Minimum lining thickness (including shoe)	6.5	6.5	6.5	14	6.5
	2.5	2.5	2.5	6	2.5
MASTER CYLINDER (dimensions in mm)					
Diameter	19	20.6	20.6	(ABS)	20.6

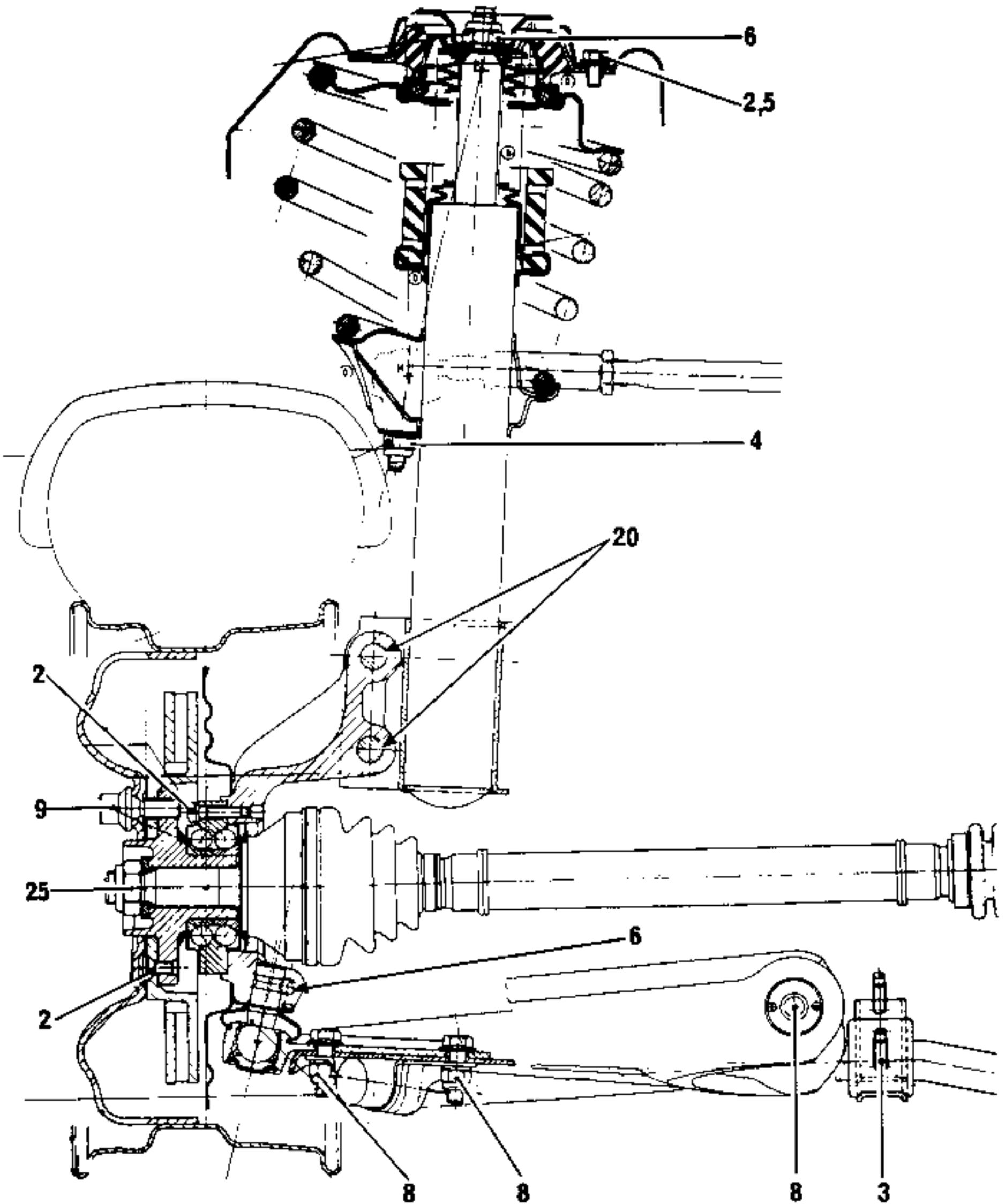
* The brake discs must not be re-faced. The part must be changed if excessive scoring or wear is present.

(1) Wheel cylinder with integral fixed compensator : if the wheel cylinder or compensator does not operate correctly, change the assembly, as all repairs are forbidden.



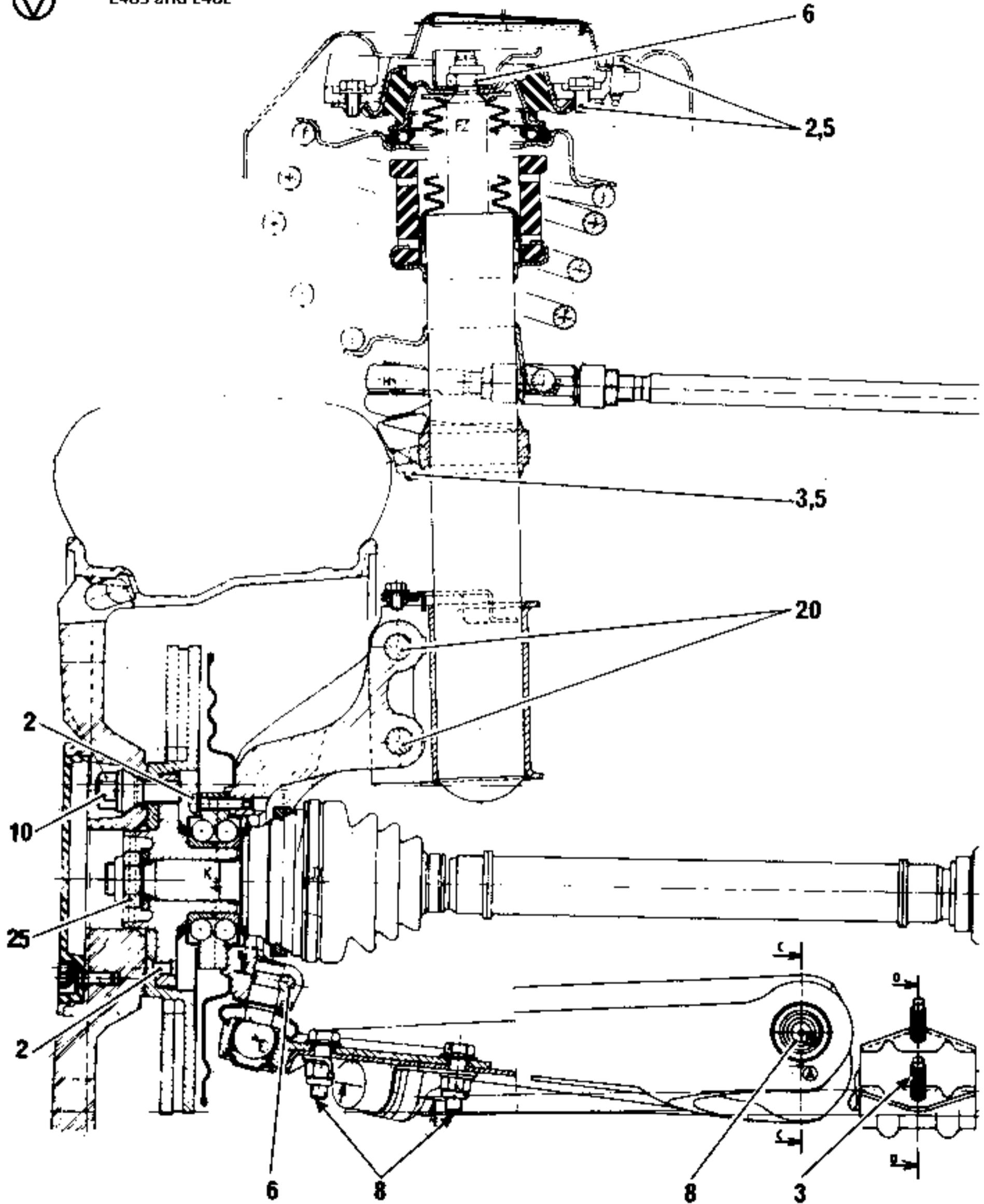


All types except L485 and L48L





L485 and L48L

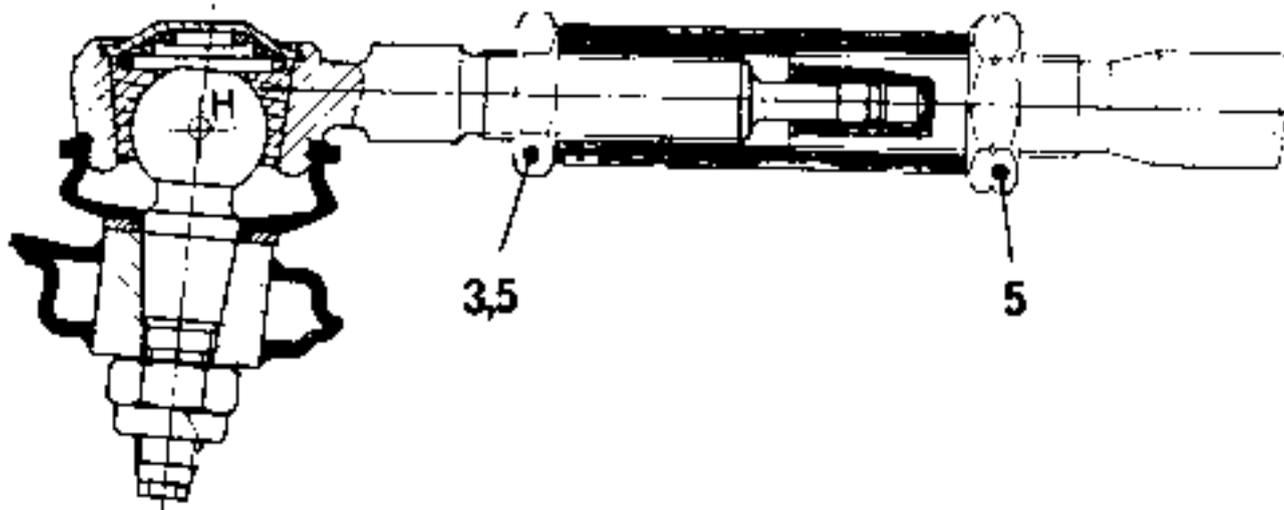




HIGH STEERING BOX LINK ARM

1st TYPE

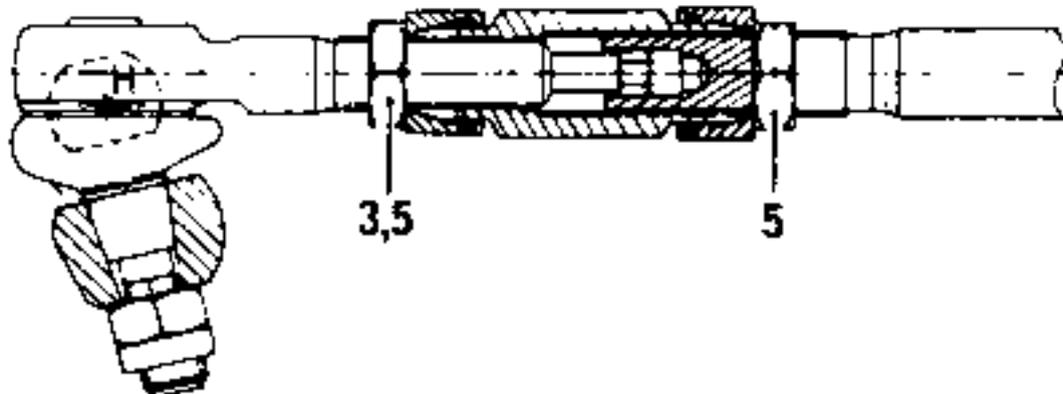
TORQUE AFTER PARALLELISM ADJUSTED



21309-1

2nd TYPE

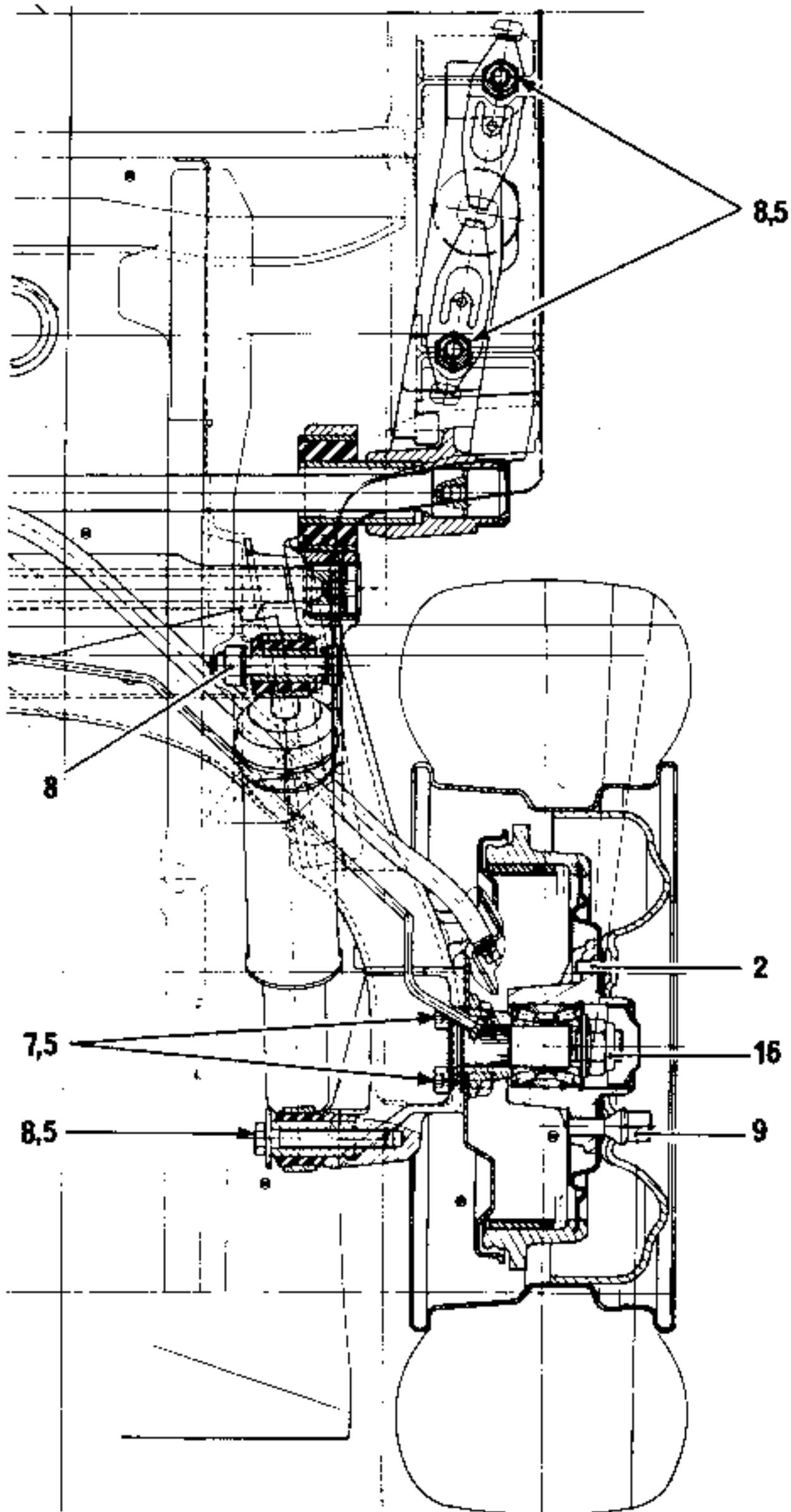
TORQUE AFTER PARALLELISM ADJUSTED



21309-2

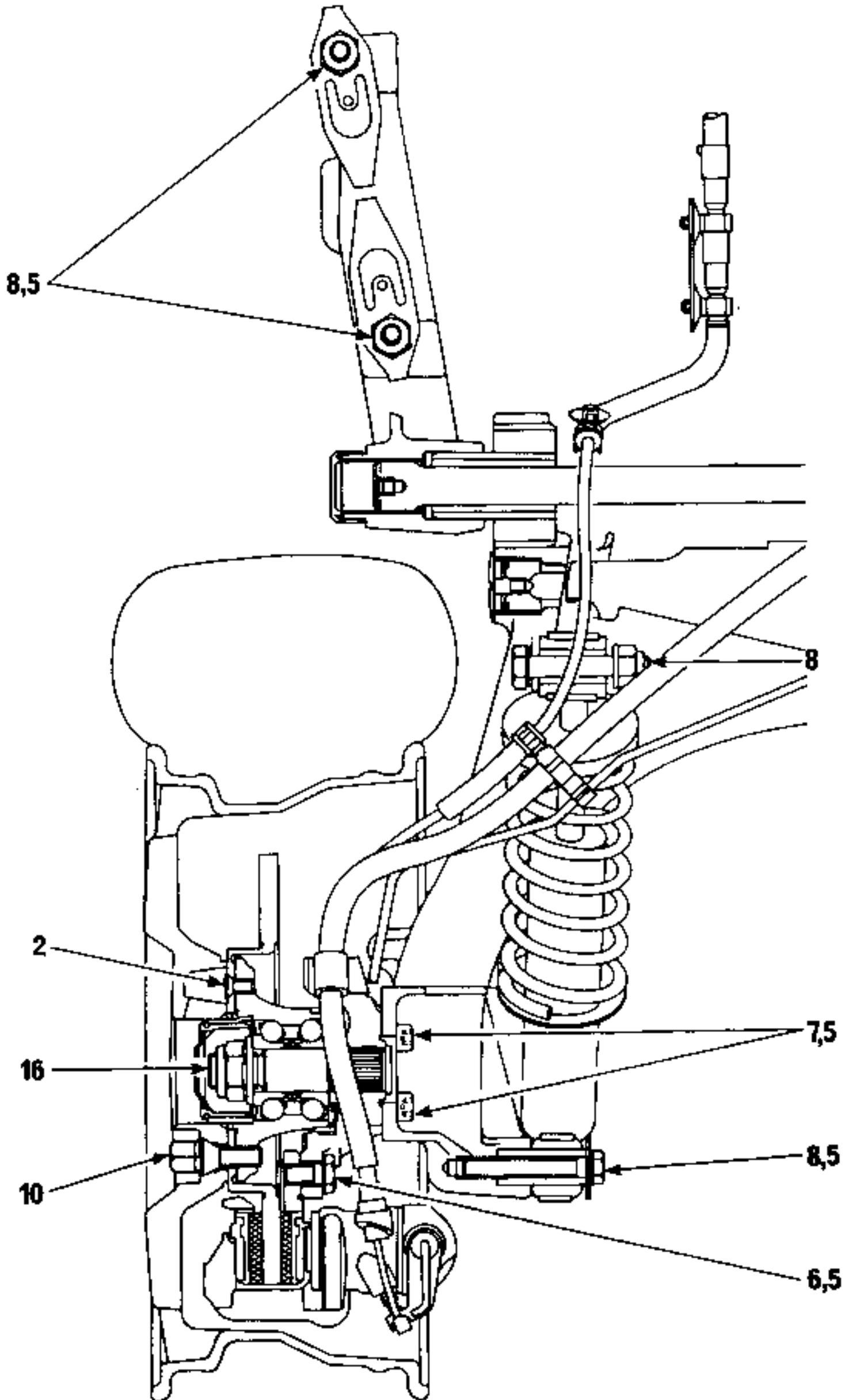


Except 4 x 4 vehicles



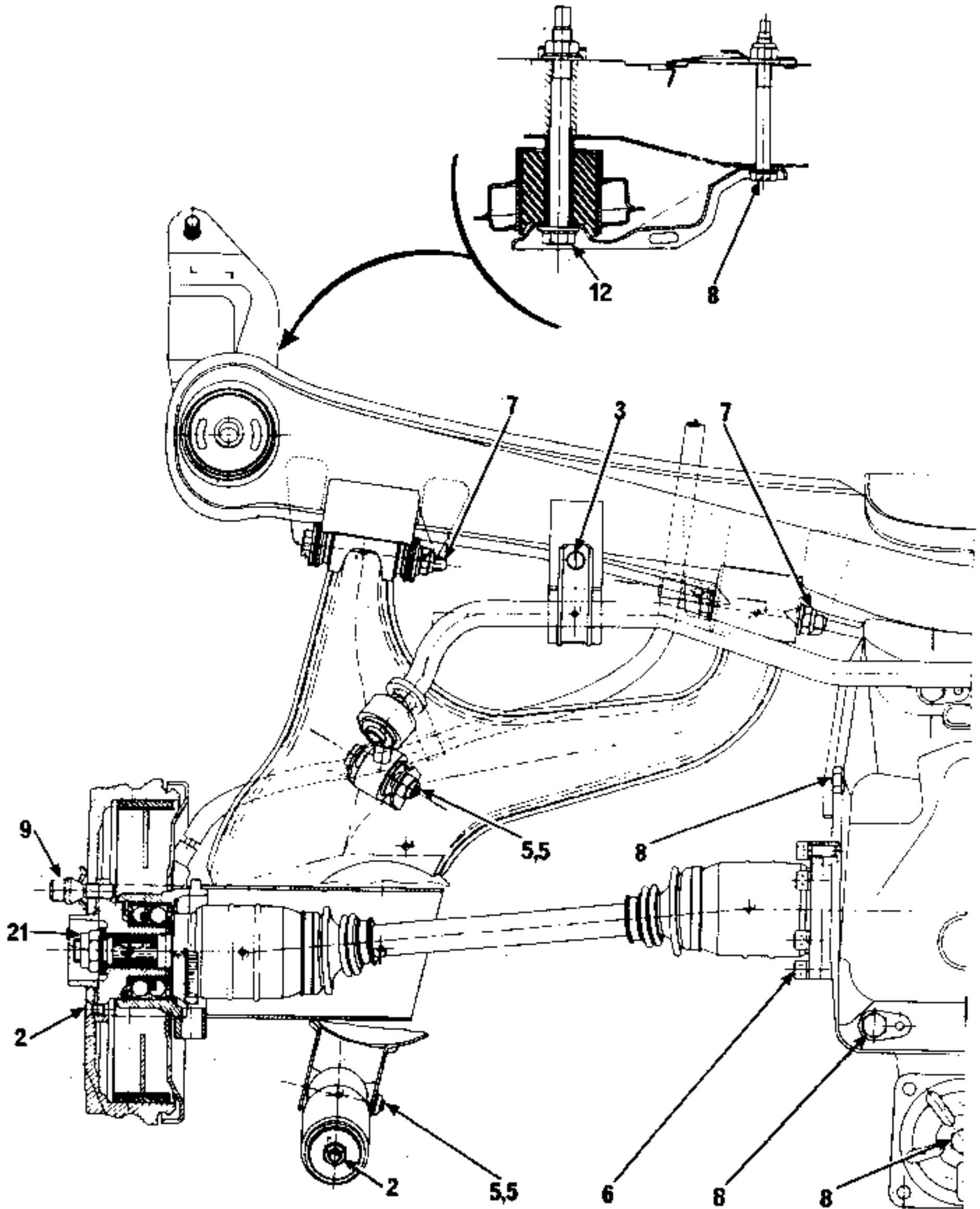


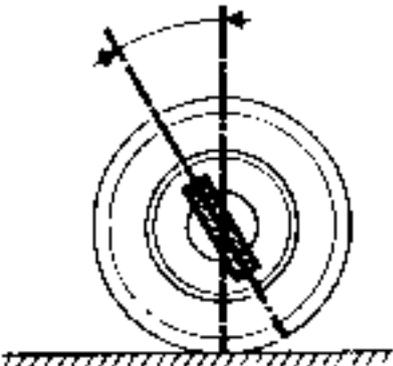
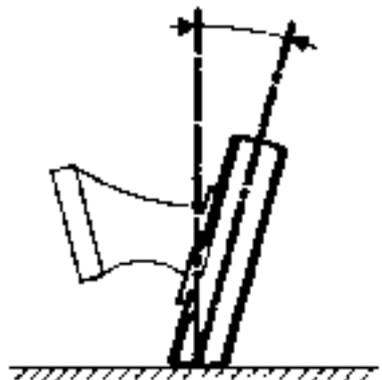
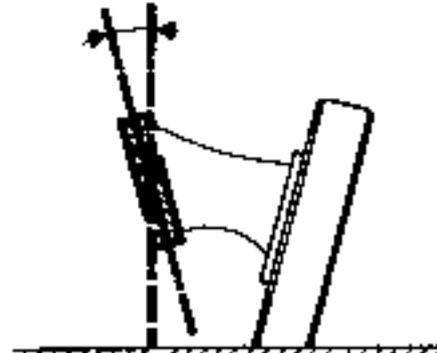
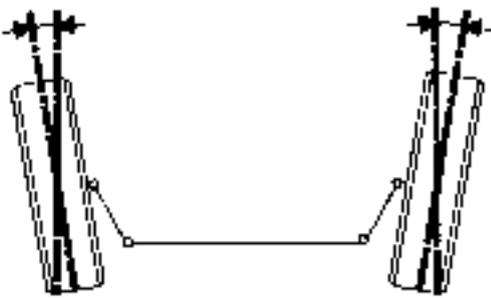
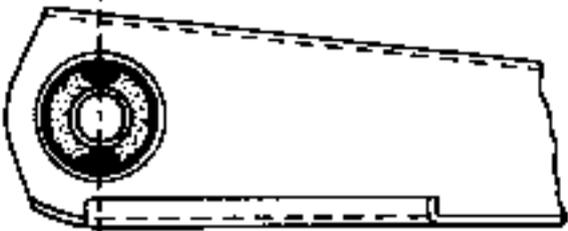
Except 4 x 4 vehicles



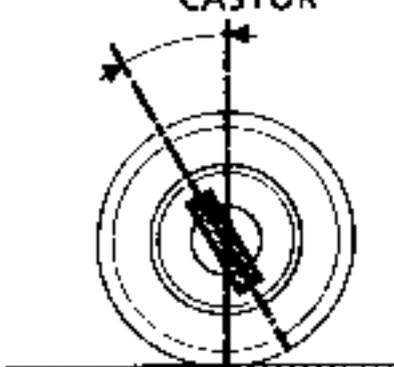
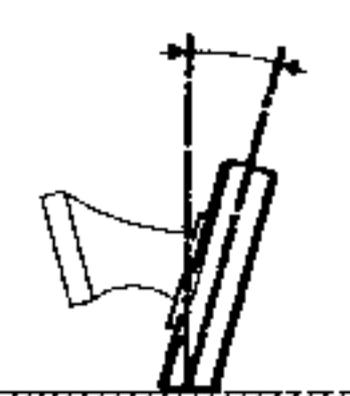
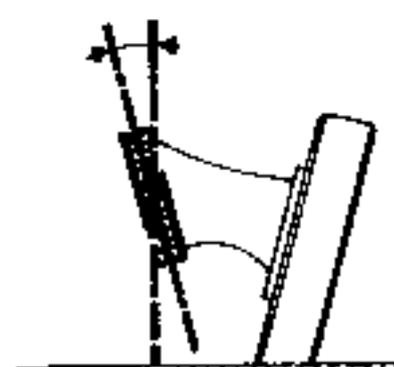


4 x 4 vehicles



ANGLES	VALUES	FRONT AXLE POSITION	ADJUSTMENT
<p>CASTOR</p>  <p>213013-1</p>	<p>3° 2°30' 2° 1°30' 1°</p> <p>Maximum difference between RH and LH sides = 1°</p>	<p>H5 - H2 = 28 mm H5 - H2 = 50 mm H5 - H2 = 70 mm H5 - H2 = 90 mm H5 - H2 = 112 mm</p>	<p>NOT ADJUSTABLE</p>
<p>CAMBER</p>  <p>213013-2</p>	<p>0°40' 2°30' 0° -0°20' -0°35'</p> <p>± 30'</p> <p>Maximum difference between RH and LH sides = 1°</p>	<p>H1 - H2 = 56 mm H1 - H2 = 64 mm H1 - H2 = 84 mm H1 - H2 = 103 mm H1 - H2 = 123 mm</p>	<p>NOT ADJUSTABLE</p>
<p>KING PIN INCLINATION</p>  <p>213013-3</p>	<p>10°45' 11° 11°40' 12°15' 12°45'</p> <p>± 30'</p> <p>Maximum difference between RH and LH sides = 1°</p>	<p>H1 - H2 = 56 mm H1 - H2 = 64 mm H1 - H2 = 84 mm H1 - H2 = 103 mm H1 - H2 = 123 mm</p>	<p>NOT ADJUSTABLE</p>
<p>PARALLELISM</p>  <p>7B4235</p>	<p>(toe-out)</p> <p>0° 10' ± 10' (1 mm ± 1)</p>	<p>UNLADEN</p>	<p>Adjustable by rotating steering arm sleeves 1 turn - 30' (3 mm)</p>
<p>POSITION FOR TIGHTENING RUBBER BUSHES</p>  <p>8160351</p>	<p>-</p>	<p>UNLADEN</p>	<p>-</p>

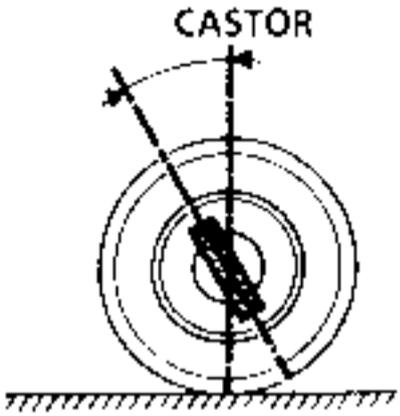
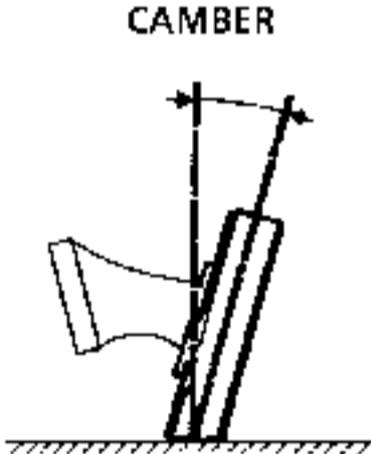
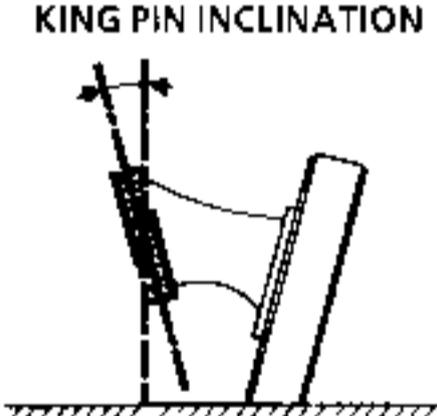
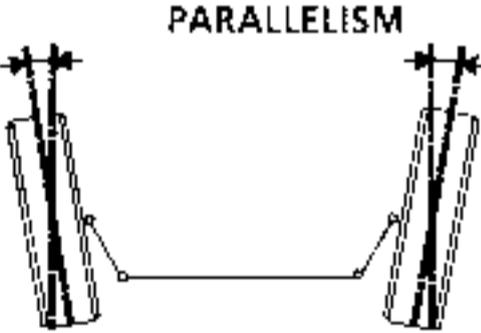
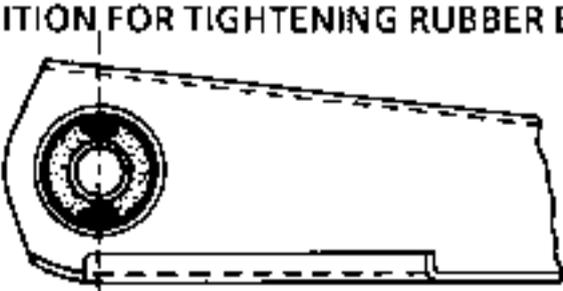
All types except L485 and L48L

ANGLES	VALUES		FRONT AXLE POSITION	ADJUSTMENT
<p>CASTOR</p>  <p>213013-1</p>	<p>Manual steering and PAS (2)</p> <p>3°30' 3° 2°30' 2° 1°30'</p>	<p>PAS (1)</p> <p>4°30' 4° 2°30' 2° 1°30'</p> <p>with a tolerance of ± 30'</p>	<p>H5 - H2 = 35 mm H5 - H2 = 55 mm H5 - H2 = 75 mm H5 - H2 = 95 mm H5 - H2 = 115 mm</p>	<p>NOT ADJUSTABLE</p>
<p>CAMBER</p>  <p>213013-2</p>	<p>-0°05' } -0°10' } ± 30' -0°25' } -0°35' } -0°50' }</p> <p>Maximum difference between LH and RH sides = 1°</p>		<p>H1 - H2 = 78 mm H1 - H2 = 83 mm H1 - H2 = 98 mm H1 - H2 = 110 mm H1 - H2 = 130 mm</p>	<p>NOT ADJUSTABLE</p>
<p>KING PIN INCLINATION</p>  <p>213013-3</p>	<p>12°10' } 12°20' } + 30' 12°45' } 13°05' } 13°40' }</p> <p>Maximum difference between LH and RH sides = 1°</p>		<p>H1 - H2 = 78 mm H1 - H2 = 83 mm H1 - H2 = 98 mm H1 - H2 = 110 mm H1 - H2 = 130 mm</p>	<p>NOT ADJUSTABLE</p>
<p>PARALLELISM</p>  <p>784235</p>	<p>(toe-out)</p> <p>0° 10' ± 10' (1 mm = 1)</p>		<p>UNLADEN</p>	<p>Adjustable by rotating steering arm sleeves 1 turn = 60' (6 mm)</p>
<p>POSITION FOR TIGHTENING RUBBER BUSHES</p>  <p>8160351</p>	<p>-</p>		<p>UNLADEN</p>	<p>-</p>

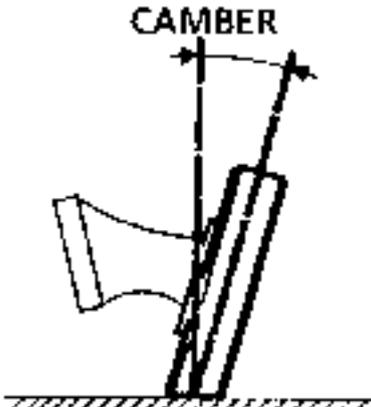
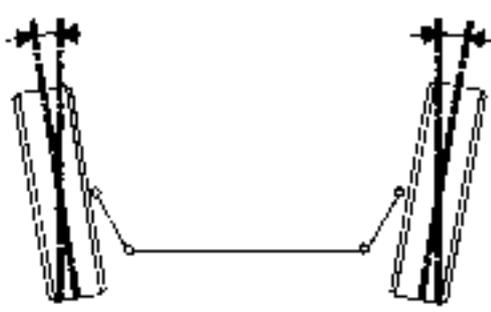
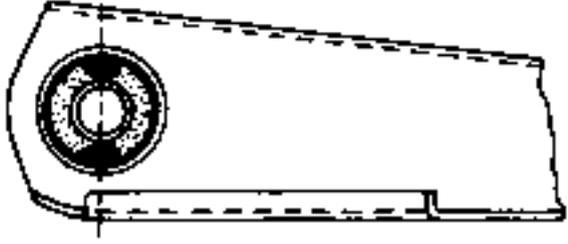
(1) As from 1990 model 1990

(2) Up to and including 1989 model

L485 and L48L vehicles

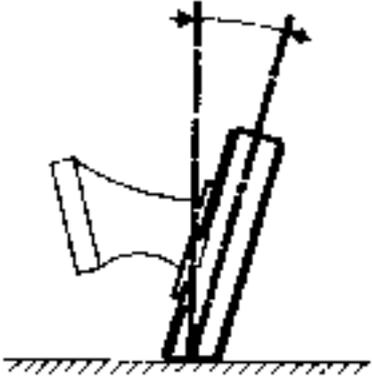
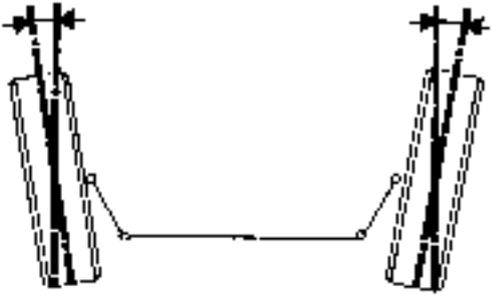
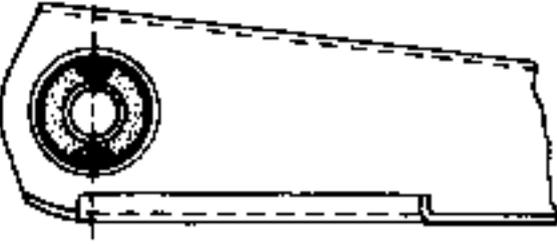
ANGLES	VALUES	FRONT AXLE POSITION	ADJUSTMENT
<p>CASTOR</p>  <p>213013-1</p>	<p> $5^{\circ}20'$ $4^{\circ}50'$ $4^{\circ}20'$ $3^{\circ}50'$ $4^{\circ}20'$ </p> <p> $\left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} = 30'$ </p> <p>Maximum difference between RH and LH sides = 1°</p>	<p> H5 - H2 = 35 mm H5 - H2 = 55 mm H5 - H2 = 75 mm H5 - H2 = 95 mm H5 - H2 = 115 mm </p>	<p>NOT ADJUSTABLE</p>
<p>CAMBER</p>  <p>213013-2</p>	<p> $0^{\circ}05'$ $-0^{\circ}20'$ $-0^{\circ}30'$ $-0^{\circ}35'$ $-0^{\circ}30'$ </p> <p> $\left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} = 30'$ </p> <p>Maximum difference between RH and LH sides = 1°</p>	<p> H1 - H2 = 60 mm H1 - H2 = 90 mm H1 - H2 = 120 mm H1 - H2 = 130 mm H1 - H2 = 145 mm </p>	<p>NOT ADJUSTABLE</p>
<p>KING PIN INCLINATION</p>  <p>213013-3</p>	<p> $10^{\circ}5'$ $11^{\circ}5'$ $11^{\circ}55'$ $12^{\circ}10'$ $12^{\circ}30'$ </p> <p> $\left. \begin{array}{l} \\ \\ \\ \\ \end{array} \right\} = 30'$ </p> <p>Maximum difference between RH and LH sides = 1°</p>	<p> H1 - H2 = 60 mm H1 - H2 = 90 mm H1 - H2 = 120 mm H1 - H2 = 130 mm H1 - H2 = 145 mm </p>	<p>NOT ADJUSTABLE</p>
<p>PARALLELISM</p>  <p>784235</p>	<p>Over two wheels (toe-out)</p> <p> $0^{\circ}10' + 10'$ $1 \text{ mm} \pm 1 \text{ mm}$ </p>	<p>UNLADEN</p>	<p>Adjustable by rotating steering arm sleeves 1 turn = $60'$ (6 mm)</p>
<p>POSITION FOR TIGHTENING RUBBER BUSHES</p>  <p>8160351</p>	<p>—</p>	<p>UNLADEN</p>	<p>—</p>

X48 vehicles prior to 01/07/1992

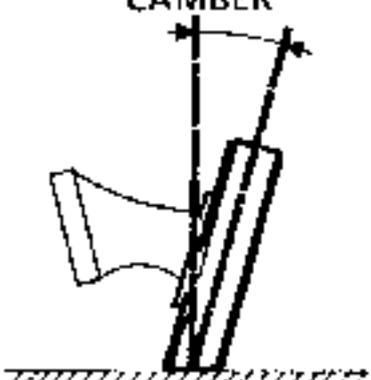
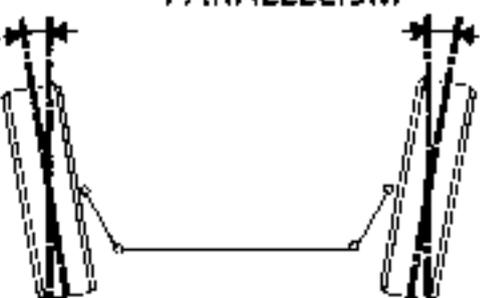
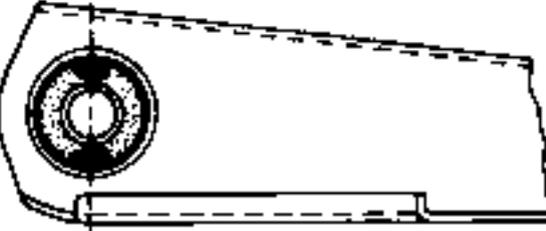
ANGLES	VALUES	REAR AXLE POSITION	ADJUSTMENT
 <p>CAMBER</p> <p>213013-2</p>	<p>-0° 40' ± 10'</p> <hr/> <p>-0° 20' ± 10' (1)</p>	<p>UNLADEN</p>	<p>NOT ADJUSTABLE</p>
<p>PARALLELISM</p>  <p>78423S</p>	<p>Over two wheels (toe-in)</p> <p>- 20' to - 50' or - 2mm to - 5 mm</p>	<p>UNLADEN</p>	<p>NOT ADJUSTABLE</p>
<p>POSITION FOR TIGHTENING RUBBER BUSHES</p>  <p>8160351</p>	<p>-</p>	<p>UNLADEN</p>	<p>-</p>

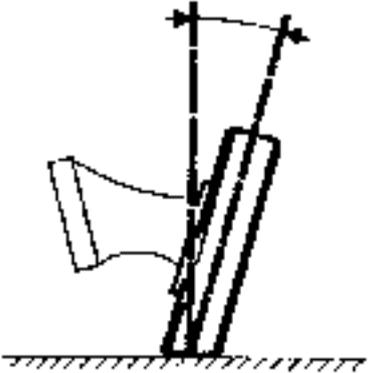
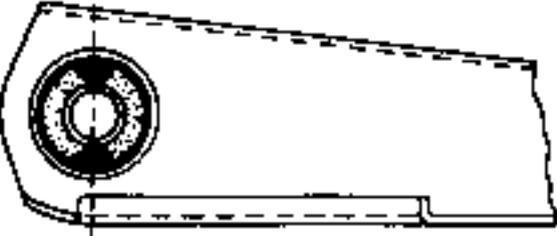
(1) As from 1989 model

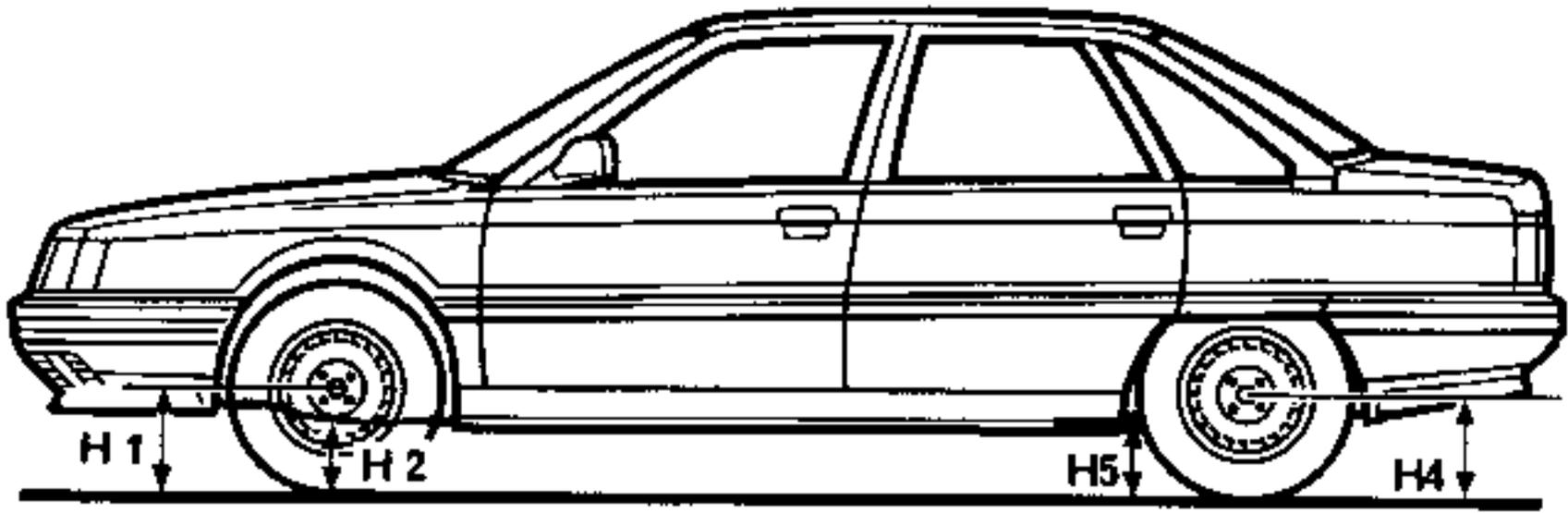
X48 vehicles after 01/07/1992 except petrol turbo version

ANGLES	VALUES	REAR AXLE POSITION	ADJUSTMENT
<p>CAMBER</p>  <p>213013-2</p>	<p>$-1^{\circ}15' \pm 10'$</p>	<p>UNLADEN</p>	<p>NOT ADJUSTABLE</p>
<p>PARALLELISM</p>  <p>784235</p>	<p>Over two wheels (toe-in) -4' to -24' or -0.4 mm to -2.4 mm</p>	<p>UNLADEN</p>	<p>NOT ADJUSTABLE</p>
<p>POSITION FOR TIGHTENING RUBBER BUSHES</p>  <p>8160351</p>	<p>-</p>	<p>UNLADEN</p>	<p>-</p>

Petrol turbo vehicles as from 01/07/1992

ANGLES	VALUES	REAR AXLE POSITION	ADJUSTMENT
<p>CAMBER</p>  <p>213013-2</p>	<p>- 1° 15' ± 10'</p>	<p>UNLADEN</p>	<p>NOT ADJUSTABLE</p>
<p>PARALLELISM</p>  <p>7842.35</p>	<p>Over two wheels (toe-in) - 16' to - 24' or - 1.6 mm to - 2.4 mm</p>	<p>UNLADEN</p>	<p>NOT ADJUSTABLE</p>
<p>POSITION FOR TIGHTENING RUBBER BUSHES</p>  <p>B160351</p>	<p>-</p>	<p>UNLADEN</p>	<p>-</p>

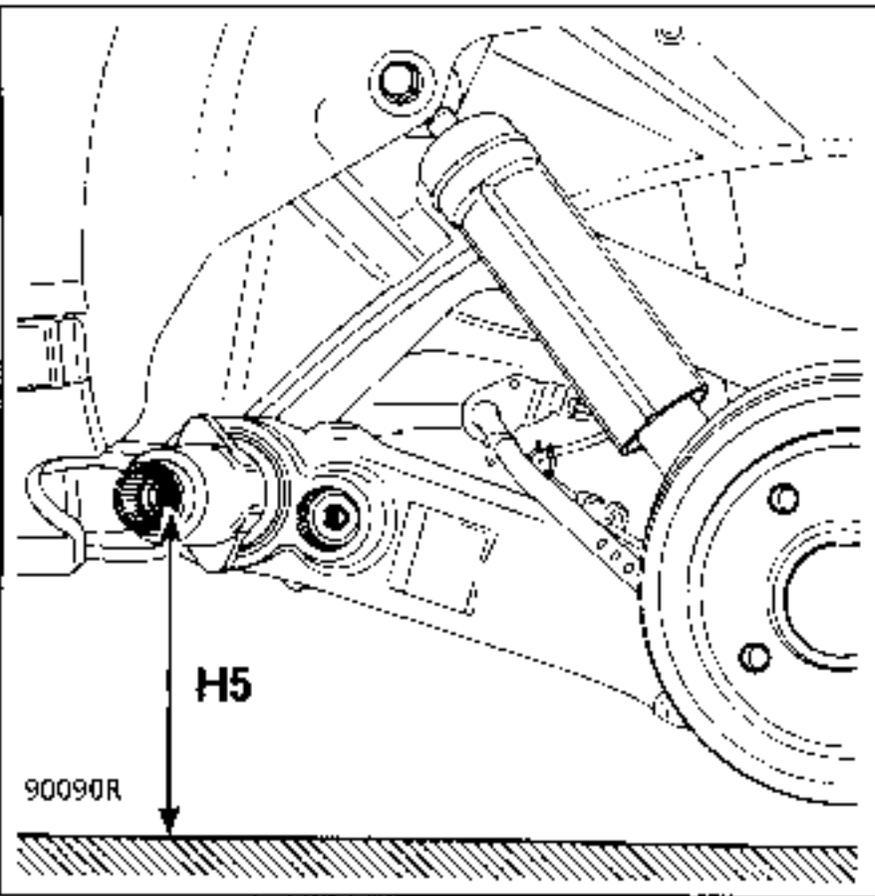
ANGLES	VALUES	REAR AXLE POSITION	ADJUSTMENT
<p data-bbox="476 347 622 382">CAMBER</p>  <p data-bbox="781 736 912 771">213013-2</p>	<p data-bbox="1022 537 1240 573">- 0° 30' = 10'</p>	<p data-bbox="1415 537 1583 573">UNLADEN</p>	<p data-bbox="1699 537 2004 573">NOT ADJUSTABLE</p>
<p data-bbox="423 803 663 839">PARALLELISM</p>  <p data-bbox="803 1178 912 1214">784235</p>	<p data-bbox="984 885 1275 975">Over two wheels (toe-in)</p> <p data-bbox="978 1021 1282 1151">- 30' to - 50' or - 3 mm to - 5 mm</p>	<p data-bbox="1415 994 1583 1029">UNLADEN</p>	<p data-bbox="1688 994 2018 1083">By rotating one cam bolt</p>
<p data-bbox="159 1260 919 1295">POSITION FOR TIGHTENING RUBBER BUSHES</p>  <p data-bbox="788 1651 904 1686">8160351</p>	<p data-bbox="1116 1455 1137 1491">-</p>	<p data-bbox="1415 1450 1583 1485">UNLADEN</p>	<p data-bbox="1836 1455 1858 1491">-</p>



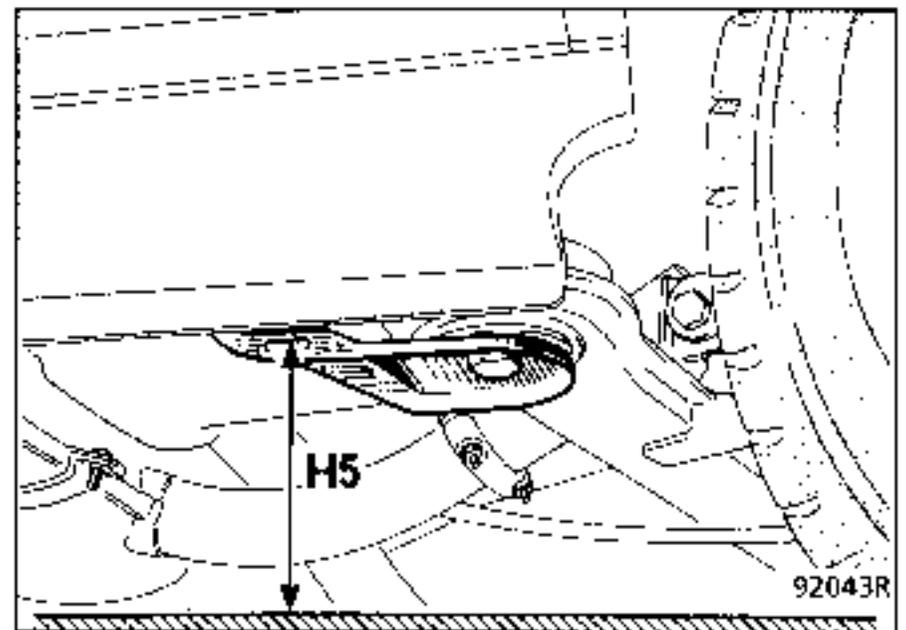
213020-1

4 x 2 VEHICLES

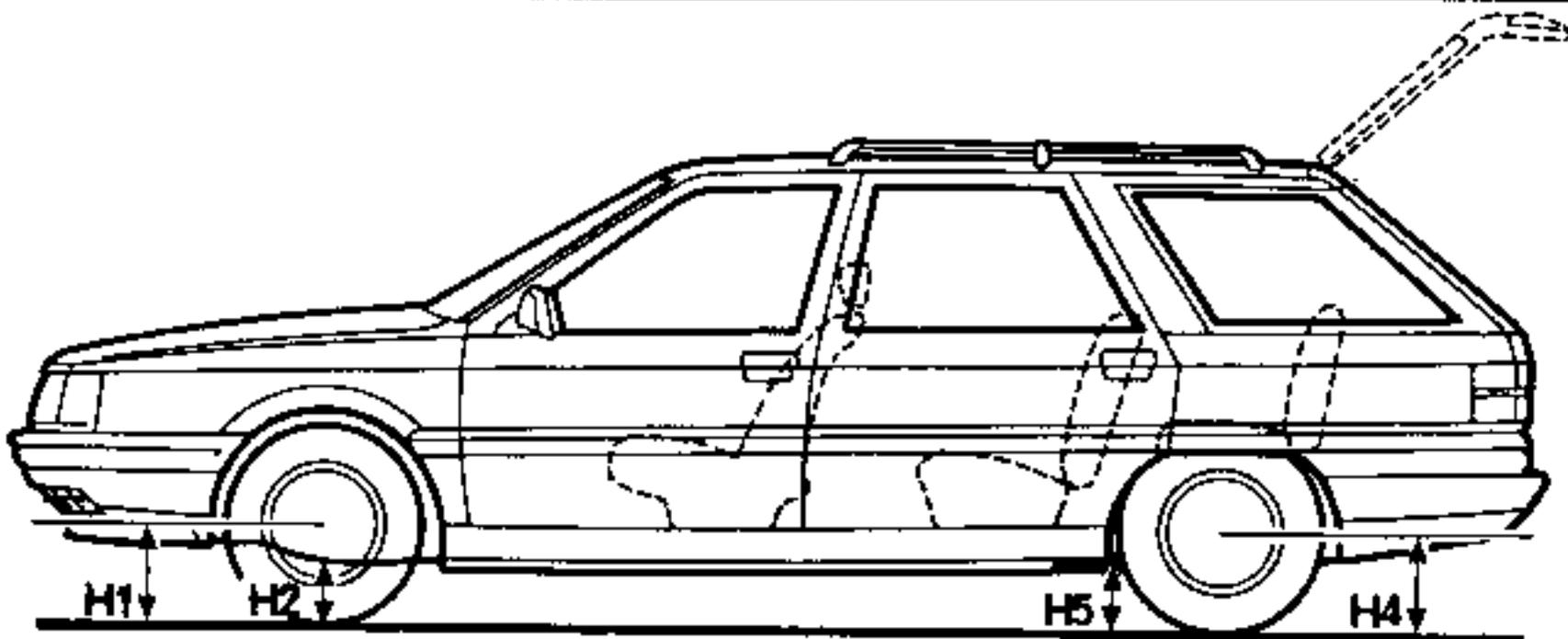
4 x 4 VEHICLES



90090R



92043R



213020-2

The underbody height is measured with the vehicle unladen (preferably on a lift) :

- fuel tank full,
- correct tyre inflation pressures.

H1 to H4 equals distance from wheel centre lines to ground.

H2 equals distance of front side member from ground measured along the wheel centre line.

H5 equals distance from suspension bar centre line to ground (4 x 2 vehicle).

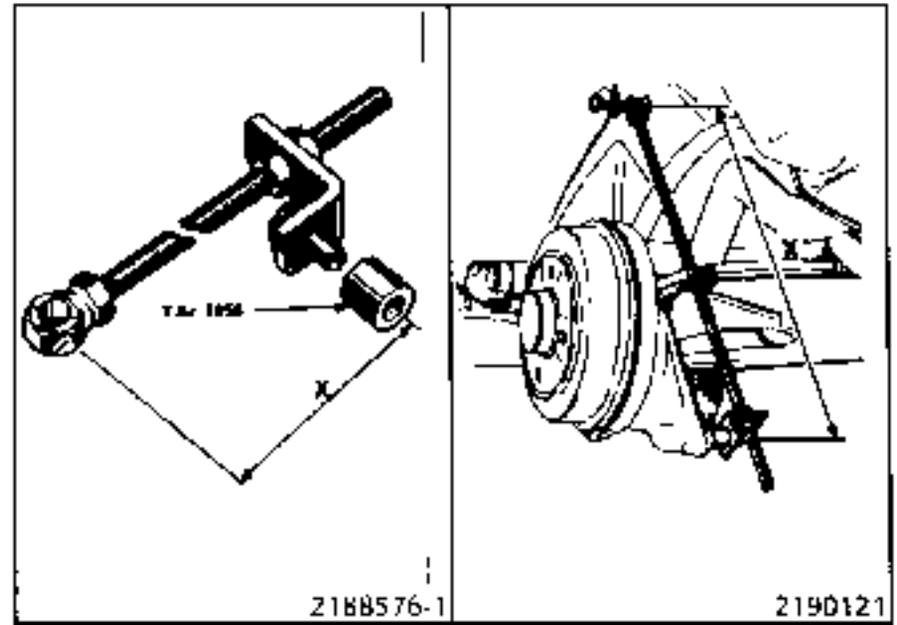
H5 equals distance from a front face along rear jacking point (4 x 4 vehicle).

Measure :

- H1 and H2 at the front,
- H4 and H5 at the rear and calculate the difference.

* Tolerance : ± 7.5 mm

Only the rear underbody height can be adjusted by rotating the torsion bars. Whenever the underbody height has been altered, check the setting of the headlight beams.



Type	At the front H1 - H2 = ...mm*	At the rear H4 - H5 = ...mm*	Dimension X (mm) RH and LH
B481 B48F B484 L481 L48F L484 B482 B48H B48I L482 L48H L48I B48D B48J L48D L48J B48E L48M L48E L48N	84	28	496
L481 DAI L48J DAI	64	0	508
B487 L487 B483 L489 B48W B48C L48C L483 B48K B48P L48P B488 L48K L488 L48W	98	30	485
B480 L480 B486 B48A L48A L486 B48O L48O B48V L48V	84	23	485
L485 L48L	119	52	445
B48Y B48R B48Q L48Y L48R L48Q	108	38	480
K480 K481 K48H K48A S481 S48H K48I K482 K48J K48O S482 K48M K486 K48N S486 K48V K48E S48V K48F	84	10	475
K487 K48R K483 K48K K489 K488 K48W	98	10	475
K48J	64	10	475
K483 4 x 4 K48K 4 x 4	88	44	-
K486 4 x 4 K48V 4 x 4	73	42	-

TYPE	QUANTITY	UNITS CONCERNED
MOLYKOTE BR2	24 cm ³ Smear	Steering box Driveshaft splines at gearbox end Torsion bar splines
RHODORSEAL 5661 (ex- CAF 4/60 THIXO)		Driveshaft roll pin hole
MOLYKOTE 33 MEDIUM	Smear	Anti-roll bar bearing bushes
LOCTITE FRENBLOC	1 to 2 drops	Axial ball joint threads Rear brake plate mounting bolts
LOCTITE SCELBLOC	5 to 6 drops	Drive shaft stub axle

Parts to be replaced systematically when they have been removed

- Axial ball joint lock plates.
- Balance weight clips.
- Hub bearings.
- Drive shaft gaiter - bearing.
- Girling brake calliper guide bolts.
- Bearing clips.
- Stub axle lock nut.
- Bolts securing stub axle to arm (4x2).
- Drive shaft metal cap gaiter (4x4).

Vehicle Type	B481	L481	K481	B480	K480	S480	L483
	S481			L480			L485
	B482	L482	K482	B483	K483	L483	L489
	B484	K484		K483 4 x 4			L48C
	B48D	L48D		B486	K486	L486	L48L
	B48E	L48E	K48E	S486	K486 4 x 4		L48Q
	B48F	L48F	K48F	B487	K487	L487	L48Y
	B48H	L48H	K48H	B488	K488	L488	
	S48H			K488 4 x 4			
	B48I	L48I	K48I	K489	L489		
	B48J	L48J	K48J	B48A	L48A	K48A	
	L48M	K48M		K48B			
	L48N	K48N		B48C	K48C		
	B48U	K48U	L48U	B48K	L48K	K48K	
				K48 4 x 4			
				B48O	K48O	L48O	
				B48P	L48P	K48P	
				B48Q	L48Q		
				B48R	L48R	K48R	
				K48S	L48S		
				B48V	L48V	K48V	
				S48V	K48 4 x 4		
				B48W	L48W	K48W	
				B48Y	L48Y		
Diameter	25 mm			25.4 mm			24.9 mm

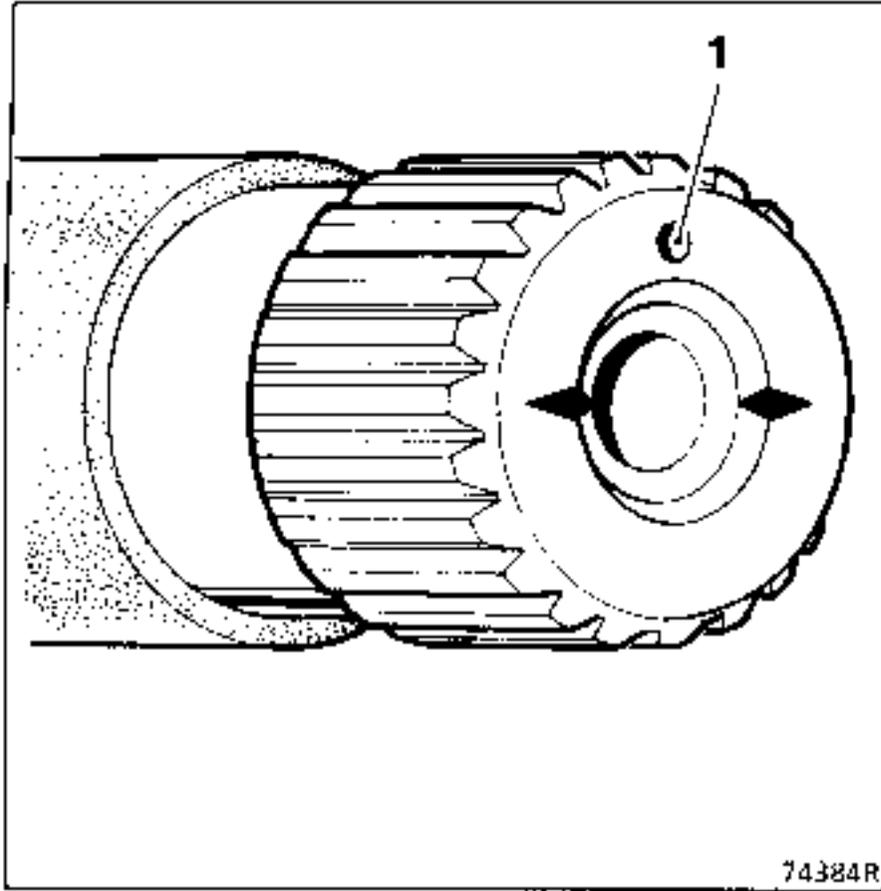
Vehicle Type	L481	B481	L480	B480	K480	L485	K483 4 x 4
		L482	B482	L483	B483	S480	L48L
	L484	B484	L485		K481		K48K 4 x 4
	L48E	B48E	L486	B486	S481		K48V 4 x 4
	L48F	B48F	L487	B487	K482		
	L48I	B48I	L488	B488	S482		
	L48J	B48J	L489		K483		
	L48M		L48A	B48A	K486		
	L48N		L48C	B48C	S486		
	L48D	B48D	L48K	B48K	K487		
	L48H	B48H	L48L		K488		
	L48U	B48U	L48O		K489		
			B48O		K48A		
			L48P		K48B		
			B48P		K48C		
			L48Q		K48E		
			B48Q		K48F		
			L48S		K48H		
			L48V		S48H		
			B48V		K48I		
			L48W		K48J		
			B48W		K48K		
			L48R		K48M		
			B48R		K48N		
			B48Y		K48P		
			B48Y		K48R		
					K48S		
					K48U		
					K48V		
					K48W		
Diameter	21 mm		24 mm		22 mm	26.5 mm	20.5 mm
Length	575 mm		575 mm		575 mm	575 mm	—
Number of splines at bearing end	31		31		31	31	—
Number of splines at link block end	30		30		30	30	—

Vehicle Type	K480	S480		B480	L480
	B481	L481	K481	B483	L483
	S481			L485	
	B482	L482	K482	B486	L486
	S482			B487	L487
	K483			B488	L488
	L484	B484		L489	
	L485			B48A	L48A
	K486	S486		B48C	L48C
	K487			B48K	L48K
	K488			L48L	
	K489			B48O	L48O
	K48A	K48B	K48C	B48P	L48P
	L48D	B48D		B48Q	L48Q
	L48E	K48E	B48E	B48R	L48R
	L48F	K48F	B48F	L48S	
	L48H	B48H	K48H	B48V	L48V
	S48H			B48W	L48W
	L48I	B48I	K48I	B48Y	L48Y
	L48J	K48J	B48J		
	K48K				
	L48L				
	L48M	K48M			
	L48N	K48N			
	K48P				
	K48R				
	K48S				
	L48U	B48U	K48U		
	K48V	S48V			
	K48W				
Diameter	24.5 mm			22.5 mm	
Length	650 mm			650 mm	
Number of splines at bearing end	31			31	
Number of splines at link block end	30			30	

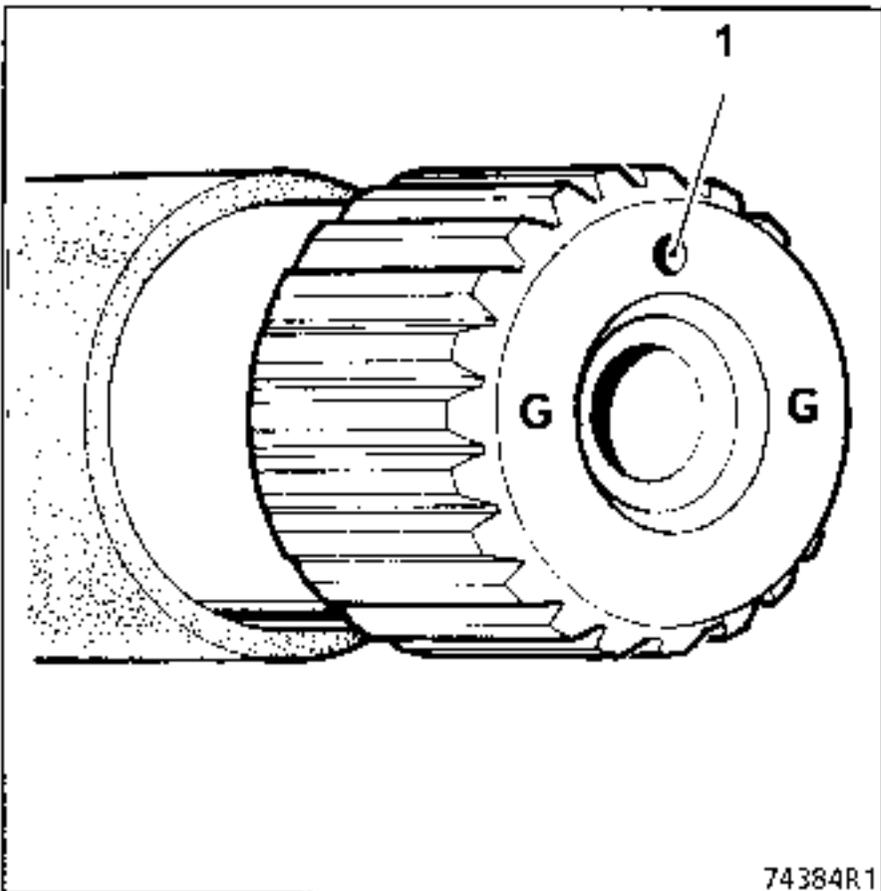
As the direction of torsion when laden is reversed, the righthand and lefthand bars are identified by :

- recesses on their ends
or
- letters stamped on their ends

LEFTHAND BAR

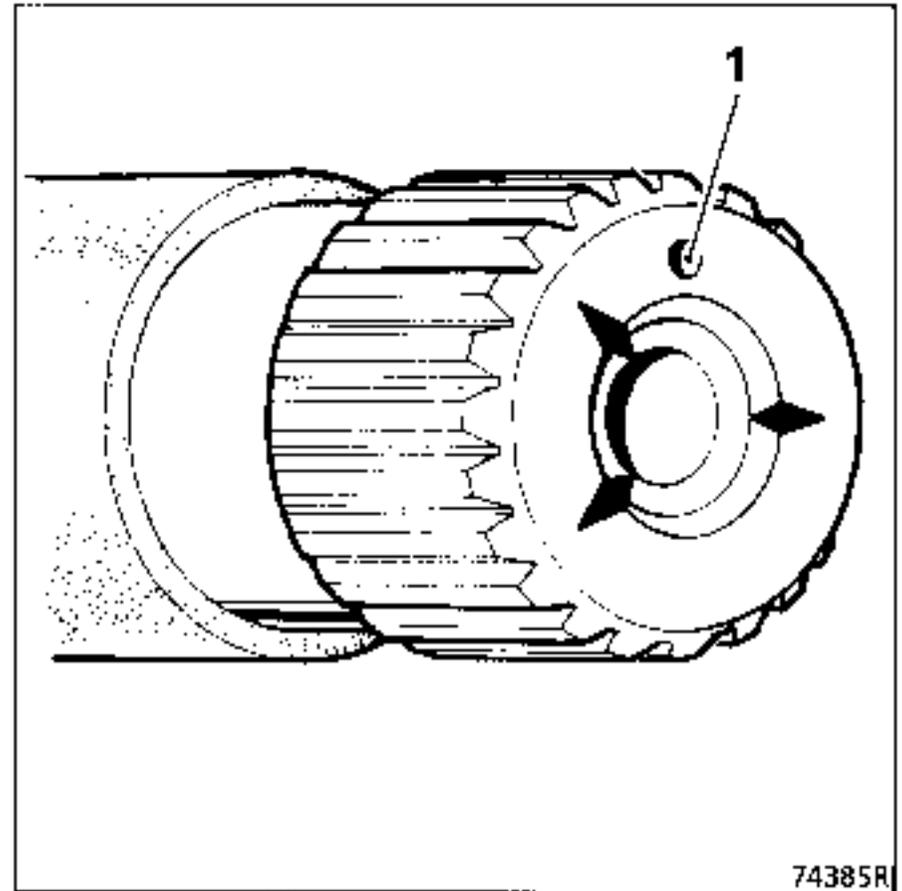


2 recesses

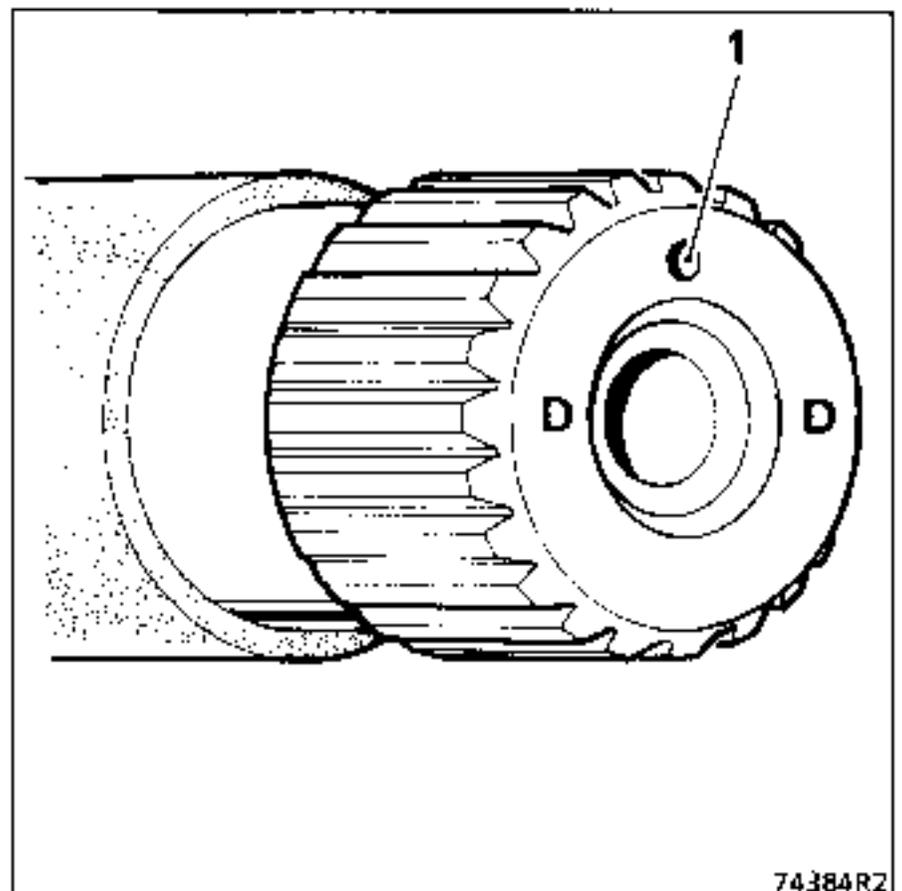


Letter G (lefthand)

RIGHTHAND BAR



3 recesses



Letter D (righthand)

NOTE : the bars have a marking "1" (drill bit), used to position the bar in the bearings.

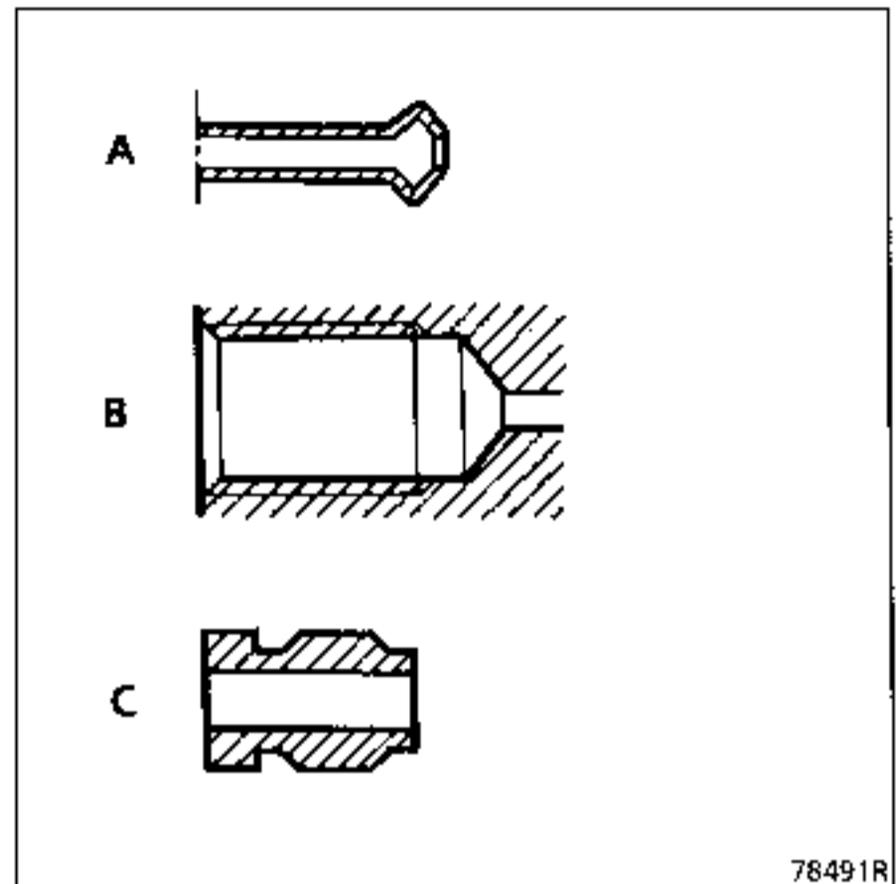


METRIC THREADS are used on all pipe unions connecting the master cylinder, front callipers, brake limiter and rear wheel or calliper cylinders.

It is therefore important to use only those parts which are shown in the Parts Catalogue or microfiche for this vehicle.

Identification of components :

- **SHAPE** of PIPE ends in steel or copper tube (A),
- **SHAPE** of **THREADED BORES** in calliper or wheel cylinder (B),
- **UNIONS** for **GREEN** or **BLACK** pipes :
11 or 12 mm, hexagonal (C).



Influence of angles

Influence of the various front axle angles on holding a straight line and tyre wear.

CAMBER

The relationship between the righthand and lefthand camber angles is important; they should be equal. A difference of more than one degree will cause a pull to one side which will have to be corrected at the steering wheel and this leads to abnormal tyre wear.

CASTOR

The relationship between the righthand and lefthand castor angles is important; they should be equal. A difference of more than one degree will cause a pull to one side which will have to be corrected at the steering wheel and this leads to abnormal tyre wear.

It may be recognised by a pull to the side with the small angle at steady speed.

STEERING BOX HEIGHT SETTING

This adjustment affects parallelism variation when the suspension is working.

Variations in parallelism which differ between righthand and lefthand sides lead to the following (steering wheel in same position) :

- a pull to one side on acceleration,
- a pull to the opposite side on braking,
- difficulty in maintaining a straight line on rough surfaces.

PARALLELISM

This adjustment must be made with the steering in the centre position so as to avoid affecting the vehicle's behaviour.

It should be noted that :

- excess toe-out leads to symmetrical tread wear on the inside edge of both tyres,
- excess toe-in leads to symmetrical tread wear on the outside edge of both tyres.

PRELIMINARY CHECKS

Before checking the angles of an axle, the following points must be checked and adjusted, if necessary :

- symmetry of tyres on any one axle :
 - dimensions,
 - inflation pressures,
 - degree of wear.
- pivot points :
 - condition of silentbloc bushes,
 - ball joint clearance,
 - bearing clearance.
- wheel run out :
This should not exceed 1.2 mm (it will be compensated by measuring equipment).
- underbody height symmetry (state of suspension).

DETERMINING THE STEERING CENTRE POINT

When checking or adjusting the front axle, the steering centre point must be determined so as to prevent pulling to one side.

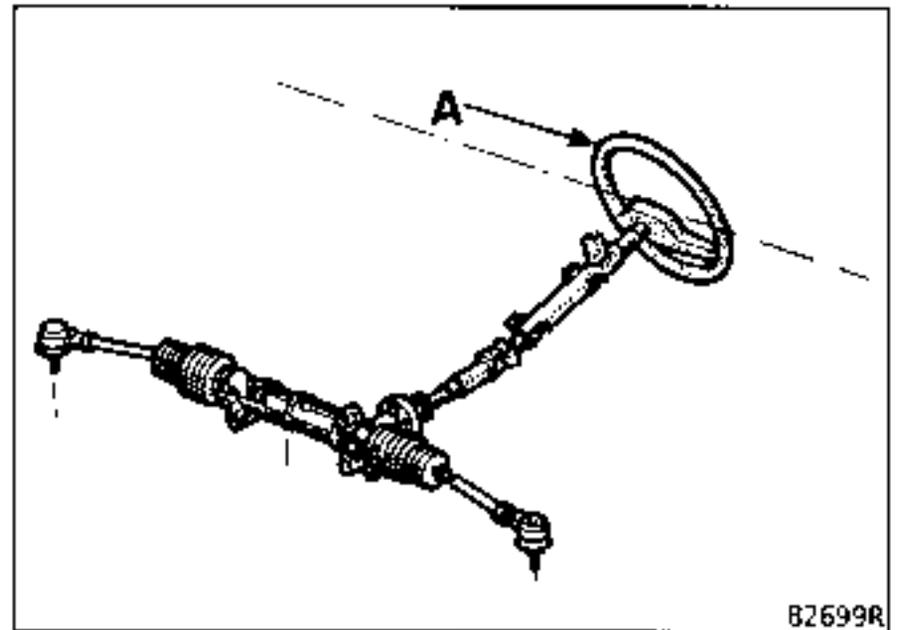
● Transverse engine

Turn the steering wheel on full lock in one direction.

Mark the steering wheel rim (A) at the top.

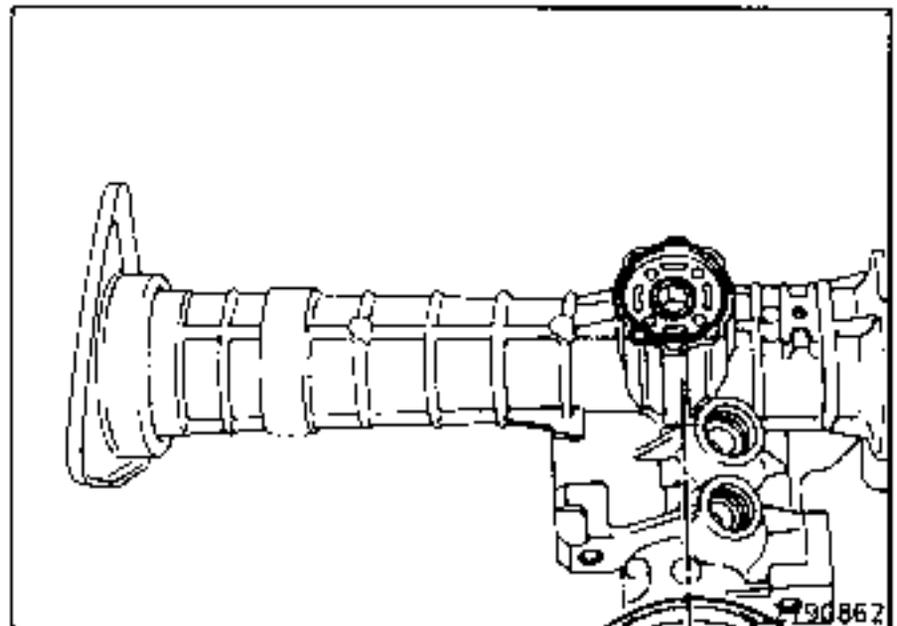
Now turn the steering wheel on full lock in the other direction, counting the number of turns and fractions of a turn.

Turn the steering wheel back half the number of turns and fractions of a turn just counted. This is the steering "centre point".



● Longitudinal engine

Fit tool Dir. 1 067 in holes A and B of the steering box and rack.



● All types

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

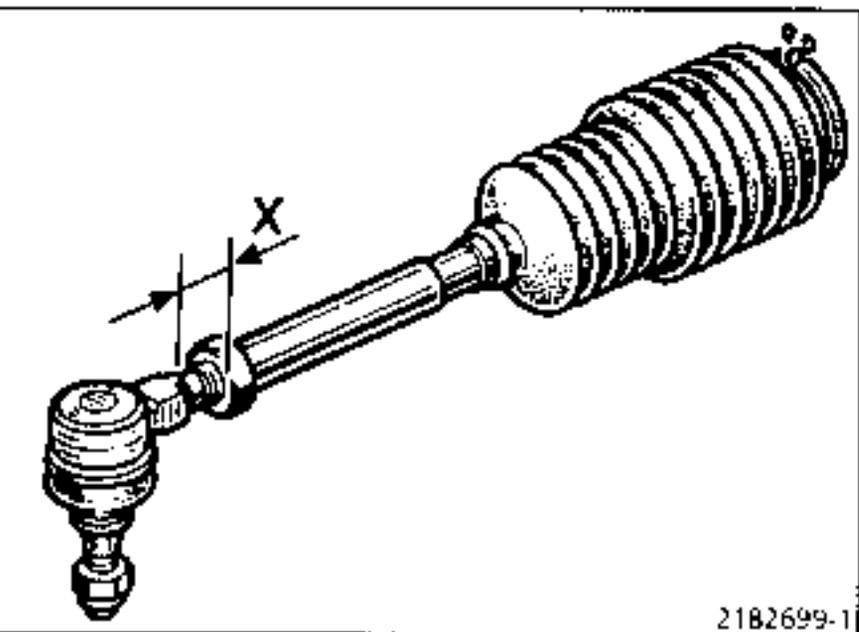
SEQUENCE OF OPERATIONS

Owing to the design of the front axle, a modification to any of the angles (castor, camber, KPI, parallelism or distribution) will affect the other angles to a varying extent. The castor angle has the greatest influence.

It is, therefore, absolutely essential to perform the following operations in the order given :

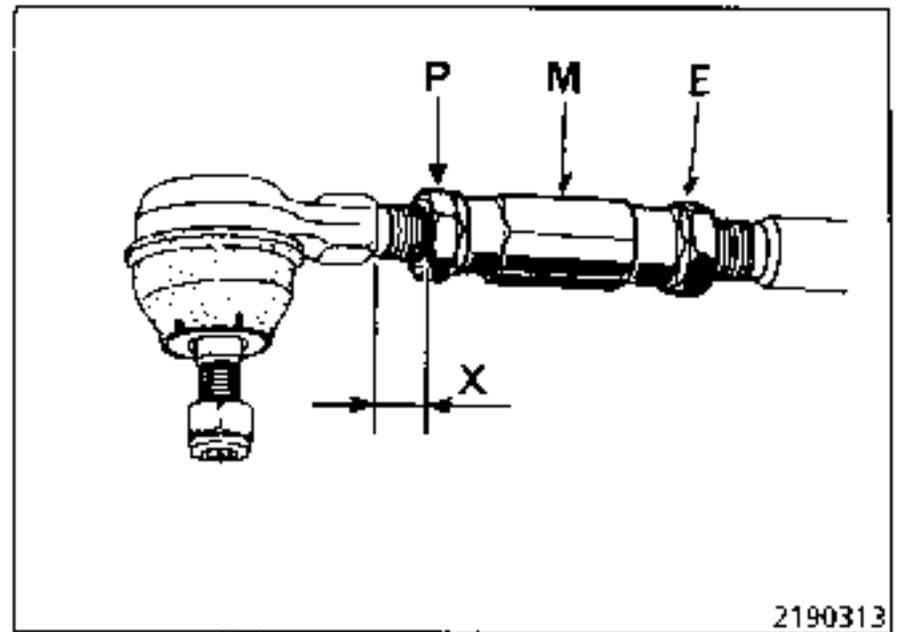
- fit the checking apparatus to the vehicle according to the manufacturer's instructions,
- determine the steering centre point (see preceding page) and lock the steering wheel,
- raise the vehicle under the bodyshell,
- cancel the rim run-out,
- lower the vehicle onto turntables,
- fit the brake pedal press,
- move the suspension up and down to settle the vehicle,
- check that the lengths X of the ball joint housings on the steering arms are symmetrical

TRANSVERSE

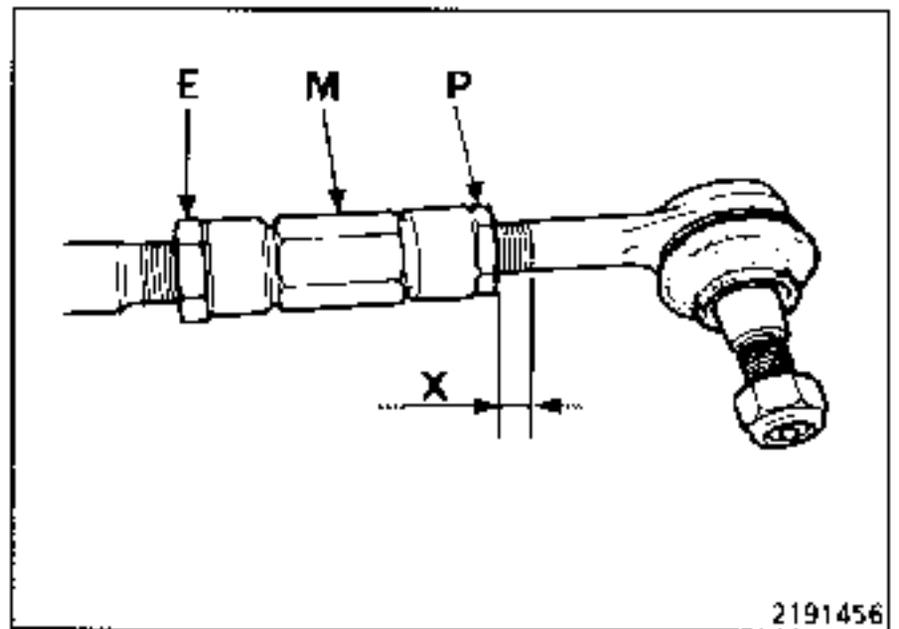


IN-LINE

1st type



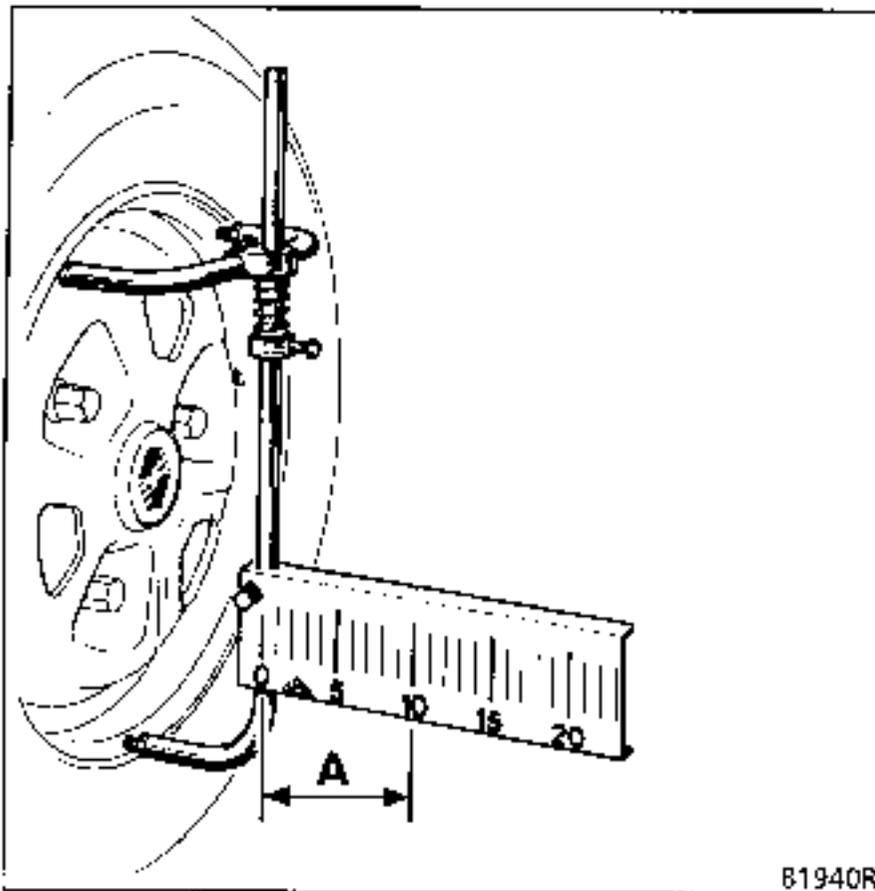
2nd type



When adjusting the parallelism, ensure that the lengths X of the ball joint housings on the steering arms are symmetrical.

1 Symmetry of lengths X correct :

- dimension A must be evenly distributed.



2 Symmetry of lengths X incorrect :

- measure dimensions A on the righthand and lefthand sides, deduct one from the other and allow half the result for each side.

Example :

Value on righthand side : 16

Value on lefthand side : 10

$$16 - 10 = 6$$

$$6 : 2 = 3$$

Move the steering arms to balance dimensions A on both sides :

$$A = 13$$

- in this position, set the turntables to zero,
- check in sequence :
 - . castor,
 - . KPI,
 - . camber,
 - . parallelism.

ADJUSTING THE PARALLELISM

Several cases are possible :

Parallelism	Distribution	Correction to be made
① CORRECT	INCORRECT	Turn the adjusting sleeve by the same number of turns (or end piece) but in the opposite direction for the lefthand and righthand sides to obtain the same value A on both sides.
② INCORRECT	CORRECT	Adjust the parallelism by the same value on the righthand and lefthand sides, making sure that the value of A is always the same on both sides.
③ INCORRECT	INCORRECT	Firstly adjust the distribution so as to balance the values of A on both sides, then adjust the parallelism as in case n° ②

Front axle fault-finding

INCIDENTS	POSSIBLE CAUSE
Incorrect castor	- Bent arm - Bent side member
Camber + KPI correct but Camber incorrect KPI incorrect	- Bent arm - Bent side member
Camber good but KPI incorrect	- Bent stub axle carrier
KPI correct but Camber incorrect	- Bent stub axle carrier
Variation in parallelism incorrect	Bent arm - See Castor Bent side member
Parallelism incorrect by more than 6 mm	- Bent righthand or lefthand stub axle carrier

This fault-finding section includes all types of braking systems and components in the current vehicle ranges.

Only those components relating to the vehicle described in this Workshop Repair Manual should be looked at when making a diagnosis.

This section is in two parts to make fault-finding easier :

- I Effect noticed at the brake pedal
- II Effect noticed in vehicle behaviour.

I EFFECT NOTICED AT THE BRAKE PEDAL

INCIDENTS	POSSIBLE CAUSE
<p>"Hard pedal" : Great effort needed and only slight deceleration</p>	<ul style="list-style-type: none"> - Servo incidents. - Linings/Pads : <ul style="list-style-type: none"> - oily, - glazed, not to specification, - overheating (owing to excessive braking on descents) or not to specification. - Seized piston. - Pinched brake line. - Linings/Pads worn : linings/pads almost non-existent, metal starting to rub on metal (very noisy).
<p>"Soft pedal" :</p> <p>Note : since the servo system on current vehicles is very effective, the impression may be given that the pedal is "soft". To find out whether an incident has occurred or the braking system is operating normally, two tests must be performed.</p> <ol style="list-style-type: none"> 1. Vehicle moving Assessment test : relation between pedal travel and deceleration. 2. Vehicle stationary with ignition off Additional test on pedal travel : depress the brake pedal 5 times to empty the brake servo, before assessing the result of the test. 	<ul style="list-style-type: none"> - Air in system : poor bleeding. - Internal leakage in braking system. - Lack of fluid in reservoir (external leak in braking system).

<p>Long pedal travel</p> <p>Test to be performed with vehicle stationary and ignition off.</p> <p>Note : The brake pedal must be depressed 5 times in order to empty the brake servo before taking account of the test result.</p>	<ul style="list-style-type: none"> - Incorrect shoe adjustment. <p>Drum brakes</p> <ul style="list-style-type: none"> - Manual adjustment : shoes too far from drum surface. <p>Disc and drum brakes.</p> <ul style="list-style-type: none"> - Automatic adjustment : handbrake cable too taut. <p>Note : Automatic wear take-up is performed by means of the brake pedal, provided the handbrake is not abnormally tight in the "off" position.</p> <ul style="list-style-type: none"> - Excessively worn pads/linings or pads/linings not symmetrical (askew or crossed). - Excessive master cylinder operating clearance. - Brake fluid boiling or has heated up.
<p>Pedal to the floor</p> <p>Test to be performed with vehicle stationary and ignition off.</p> <p>Note : The brake pedal must be depressed 5 times in order to empty the brake servo before taking account of the test result.</p>	<ul style="list-style-type: none"> - Hydraulic leakage (check for leaks) - Faulty sealing cup between the two master cylinder circuits. - Brake fluid boiling.

II EFFECT NOTICED IN VEHICLE BEHAVIOUR

INCIDENTS	POSSIBLE CAUSE
<p>Brakes binding</p>	<ul style="list-style-type: none"> - Chamfer the linings. - Oil or grease on linings. - Fit new return springs.
<p>Brakes grabbing or juddering</p>	<ul style="list-style-type: none"> - Oval drums. - Excessive disc run-out. - Disc not of even thickness. - Abnormal deposit on discs (corrosion between lining and disc).

<p>Brakes pulling to one side (front)</p>	<ul style="list-style-type: none"> - Check front axle, suspension and steering. - Piston seized*. - Tyres (worn · incorrect inflation pressure). - Pinched brake-line*. <p>* WARNING : On vehicles with front axles with negative off-set, pulling to one side indicates an incident on the opposite side.</p>
<p>Brakes pulling to one side (rear)</p>	<ul style="list-style-type: none"> - Incorrect compensator or limiter setting or operation - Piston seized. - Incorrect shoe adjustment. <p>Manual adjustment : shoe too far from drum</p> <p>Automatic adjustment : handbrake cable too tight.</p> <p>Note : Automatic wear take-up is performed by means of the brake pedal, provided the handbrake is not abnormally tight in the "off" position.</p> <ul style="list-style-type: none"> - Return spring.
<p>Brakes overheating</p>	<ul style="list-style-type: none"> - Master cylinder operating clearance insufficient to allow master cylinder to return to neutral position. - Piston seized or not returning properly. - Pinched brake line. - Handbrake mechanism seized. - Incorrect handbrake adjustment.

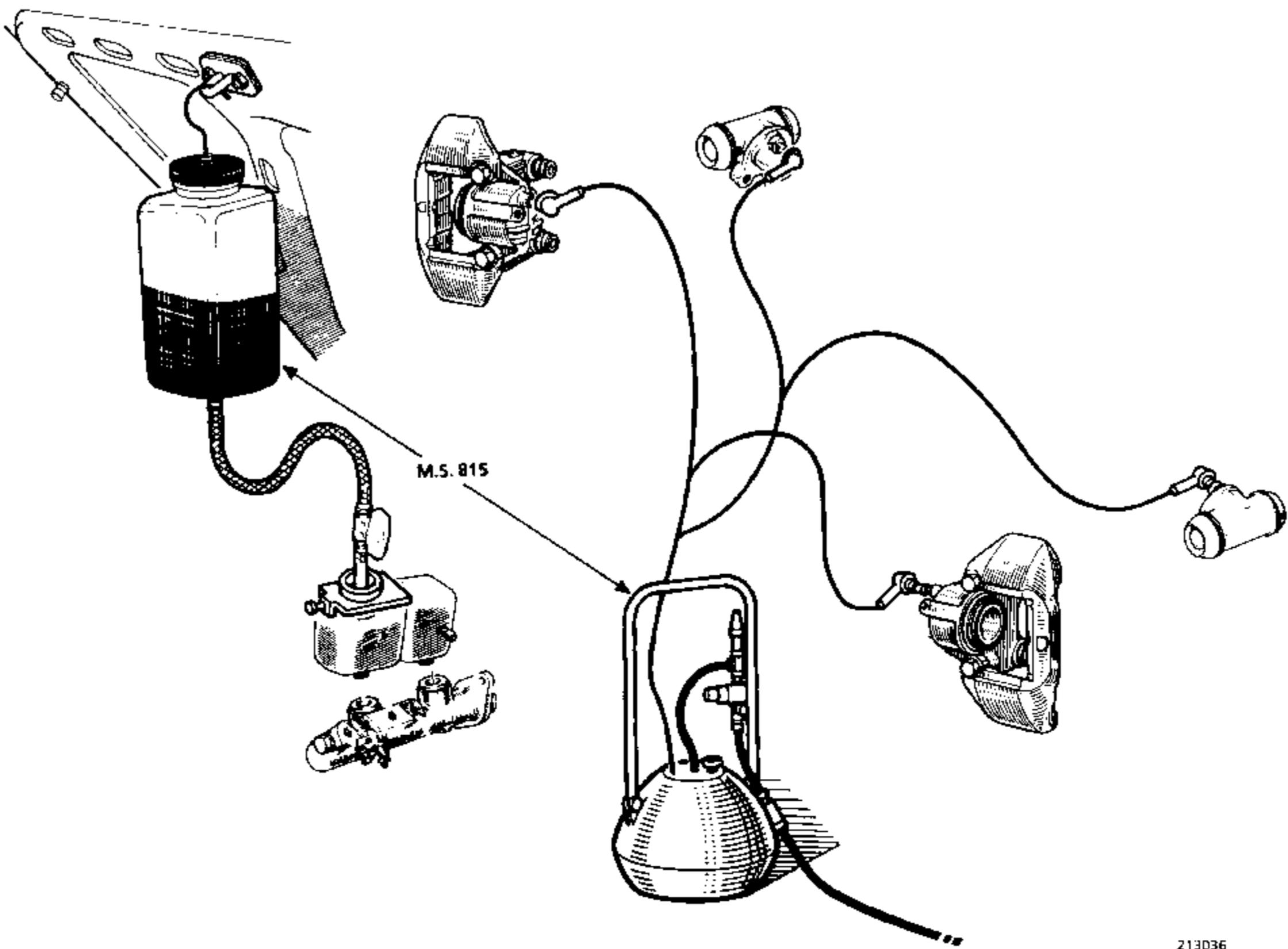
ESSENTIAL SPECIAL TOOLING		
M.S.	815	Bleeding apparatus

for vehicles fitted with a brake servo, it is important that the unit is not activated during the bleeding operation, whatever method is employed.

- Bleeding is carried out using apparatus M.S. 815 with the vehicle on a 4-post lift (wheels not free).
- Connect the M.S. 815 tubes to the bleed screws on :
 - master cylinder,
 - wheel and calliper cylinders,
 - brake compensator or limiter.
- Connect the apparatus to an air line (minimum pressure 5 bars).
- Connect the fluid re-filling system to the fluid reservoir.
- Open the feed tap. Wait until the fluid reservoir is full (both compartments).
- Turn on the compressed air.

As these vehicles are fitted with braking circuits arranged in "X" formation, proceed as follows :

- Open :
 - the bleed screw on the righthand rear wheel and let the fluid run out for about 20 seconds,
 - the bleed screw on the lefthand front wheel and let the fluid run out for about 20 seconds.
- Ignore any bubbles that may appear in the tubes of the apparatus.
- Proceed in the same way for the rear lefthand and front righthand wheels.
- Check that there is firm resistance when the brake pedal is depressed (operate several times).
- Re-bleed if necessary.
- Top up the fluid in the reservoir after disconnecting the apparatus.

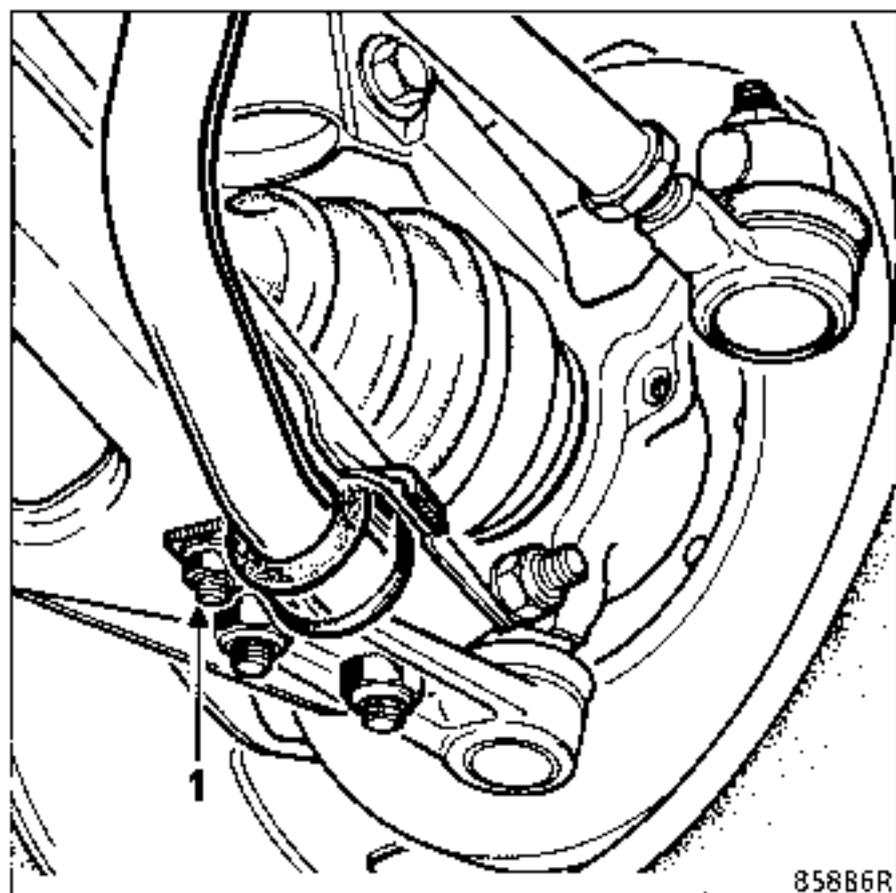


TIGHTENING TORQUES (in daN.m)	
Nuts securing lower wishbone to cradle	8
Nuts securing key to stub-axle carrier	6
Nuts securing anti-roll bar bearings	3
Lower ball joint nuts	7.5
Wheel bolts	9

REMOVAL

With the vehicle on its wheels, :

Remove the anti-roll bar bearings (1) from the bottom arms.

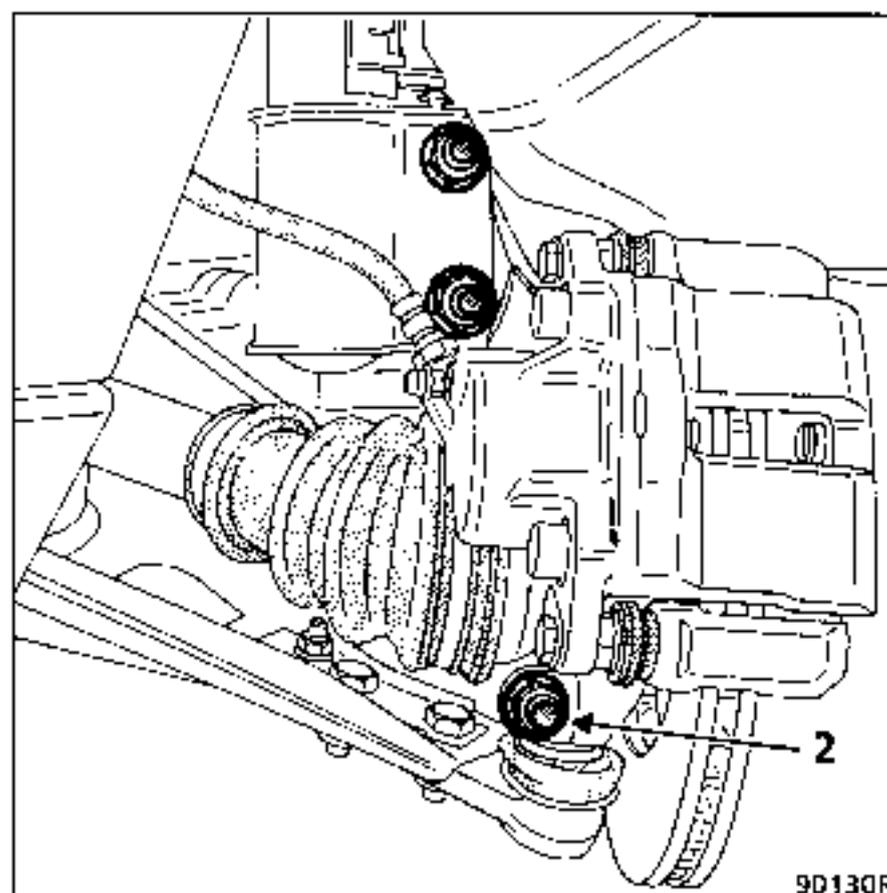


858B6R

Free the anti-roll bar by pulling it downwards.

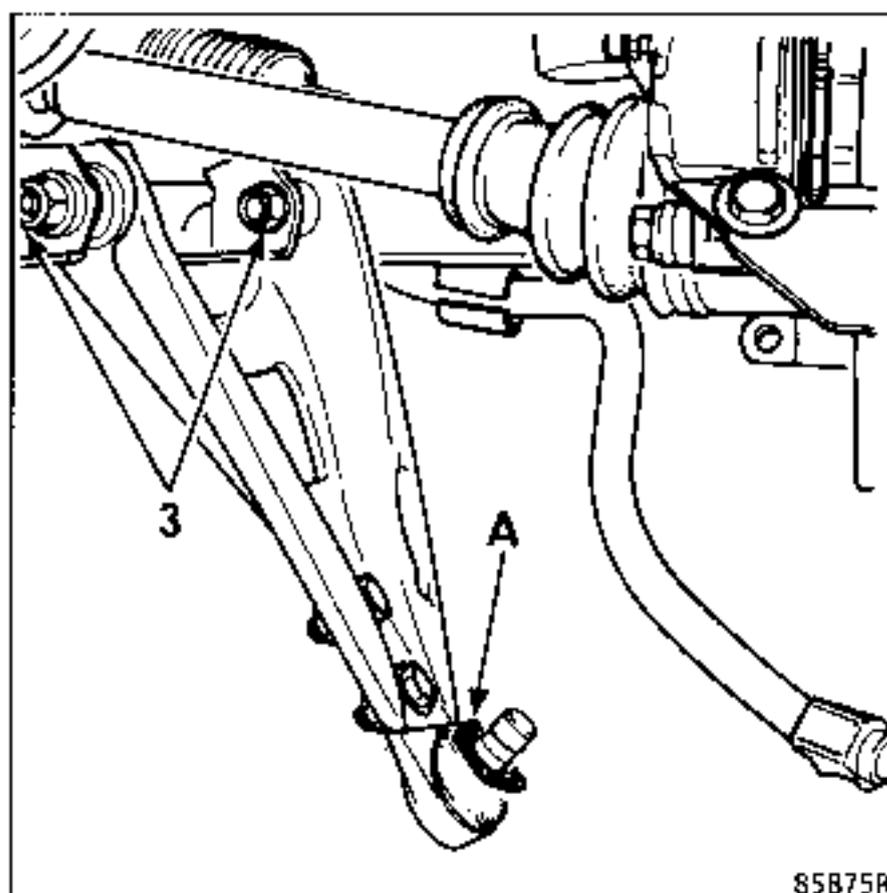
With the vehicle on axle stands, remove :

- key-securing bolt and nut (2),



9D130R

- the two bolts (3) securing the arm to the cradle,



85B75R

- the arm.

REFITTING

NOTE : Make sure that plastic protection washer A is on the lower ball joint shaft.

Fit in place :

- the arms,
- the two bolts (3) but do not tighten them,
- the ball joint shaft in the stub axle carrier and torque tighten key nut (2).

With the vehicle on its wheels :

Refit the anti-roll bar but do not tighten its bearings.

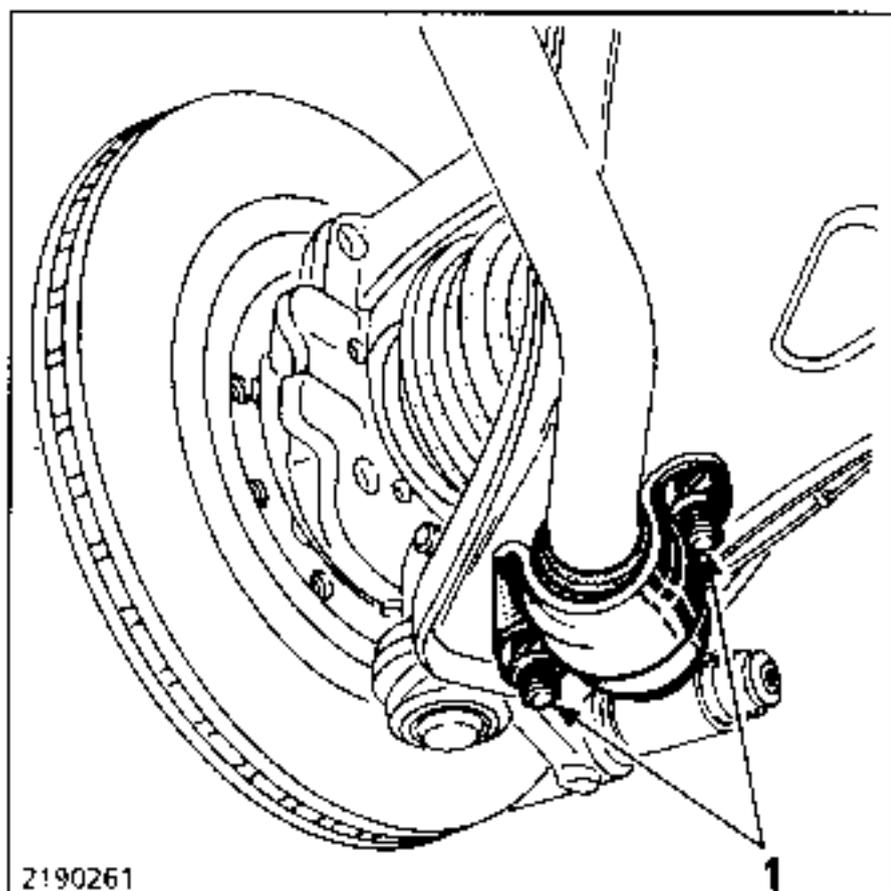
Operate the suspension and torque tighten the arm and anti-roll bar bearing nuts as specified (tightening position : unladen).

TIGHTENING TORQUES (in daN.m)		
Nuts securing lower wishbone to cradle		8
Nuts securing key to stub axle carrier		6
Nuts securing anti-roll bar bearings		8
Lower ball joint nuts		8
Wheel bolts	4 bolts	9
	5 bolts	10

REMOVAL

With the vehicle on its wheels, remove :

- the anti-roll bar bearings (1) from the bottom arms.

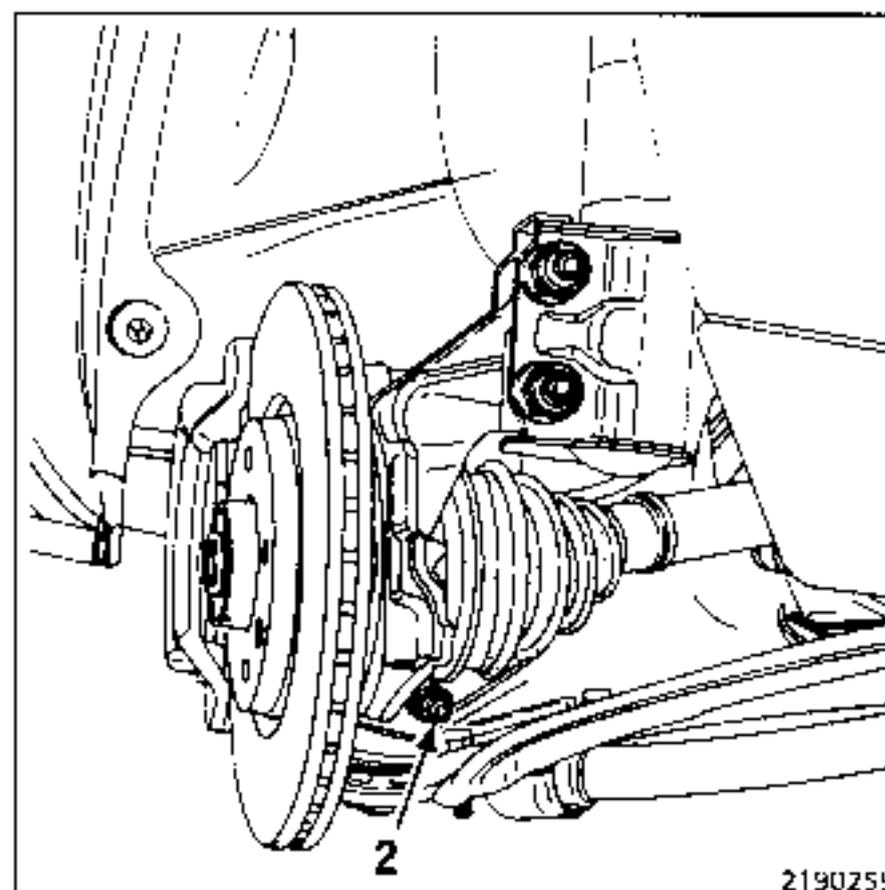


NOTE : The bolts securing the bearing (1) also hold the lower ball joint, so place a nut on one of the bolts to prevent the lower ball joint slipping.

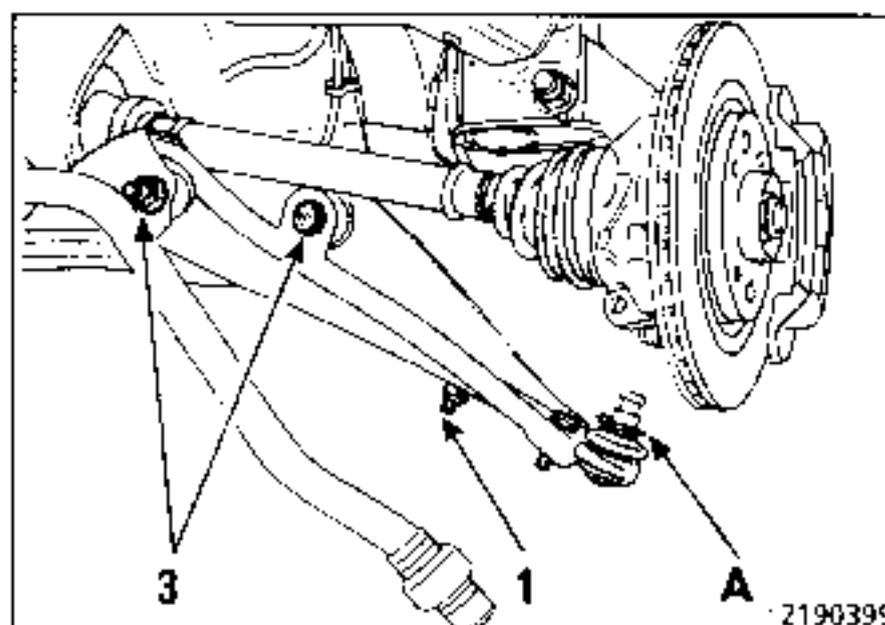
Free the anti-roll bar by pulling it downwards.

With the vehicle on axle stands, remove :

- key-securing bolts and nuts (2),



- the two bolts (3) securing the arm to the cradle,



- the arm.

REFITTING

NOTE : Make sure that plastic protection washer A is on the lower ball joint shaft.

Fit in place :

- the arm,
- the two bolts (3) but do not tighten them,
- the ball joint shaft in the stub axle carrier and torque tighten key nut (2).

With the vehicle on its wheels :

Fasten bearings (1) but do not tighten them after removing the nut holding the ball joint.

Vehicle unladen :

Torque tighten :

- the anti-roll bar bearings,
- the two bolts (3) securing the lower arm to the stub axle carrier.



The rubber bushes must be changed one at a time to maintain their symmetrical position in relation to the pivot pin.

Press out one worn bush first, using a piece of tubing with an outer diameter of 30 mm or 34 mm.

Press in the new bush until dimension A is reached :

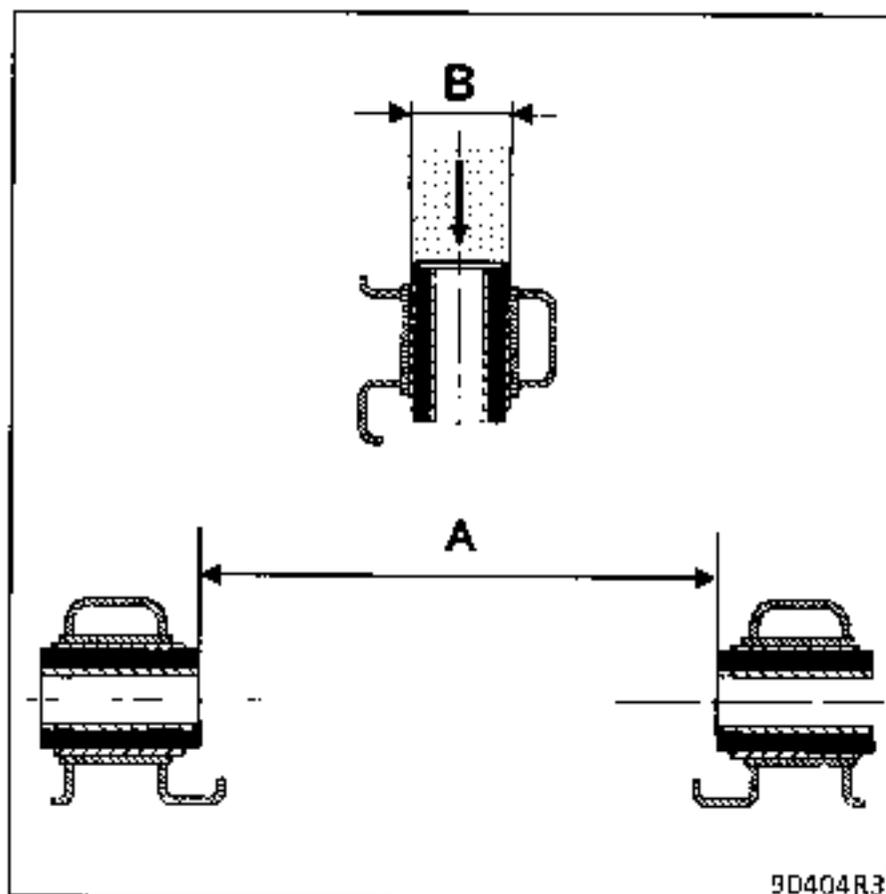
190 ± 0.5 mm in-line engine
147 ± 0.5 mm transverse engine

Press out the second worn bush and press in a new bush keeping to the dimensions A :

190 ± 0.5 mm in-line engine
147 ± 0.5 mm transverse engine

Note for in-line engines :

The lower arm front and rear bushes are not identical (see appropriate PR for the vehicle concerned).



B = Ø 30 transverse engine

B = Ø 34 in-line engine

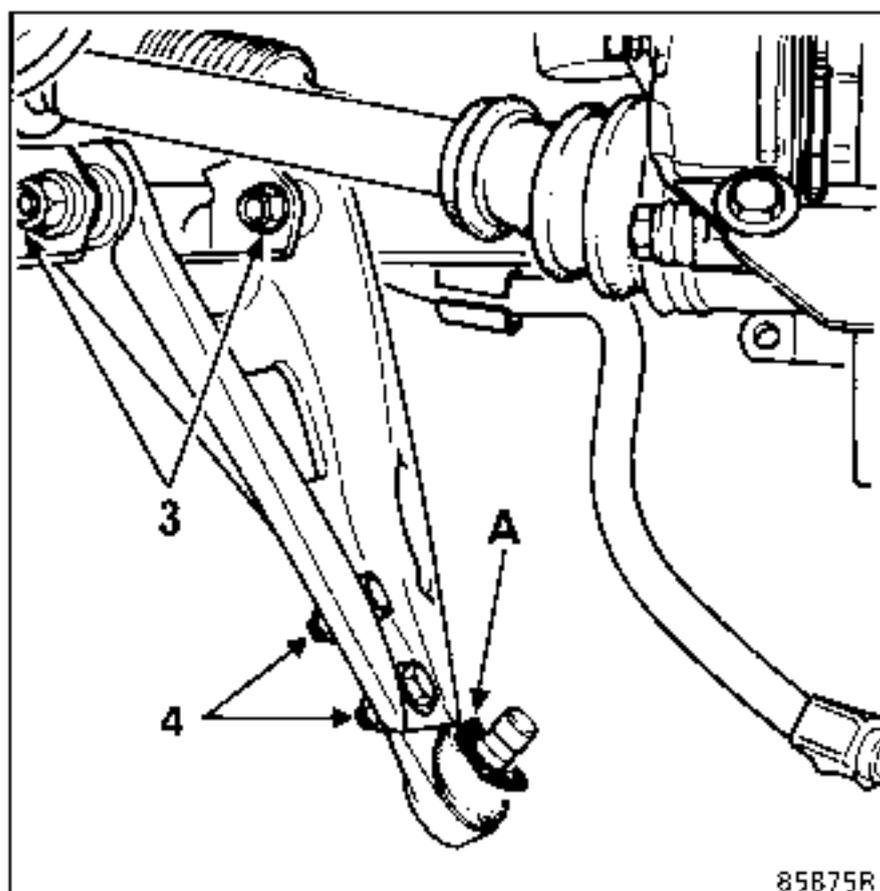


DISMANTLING

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

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

Slacken, but do not remove, the two bolts (3) securing the arm to the cradle.



Remove :

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

REFITTING

NOTE : Make sure that plastic protection washer A is on the lower ball joint shaft.

Fit the ball joint in place and torque tighten its mountings.

Proceed in the same manner as for refitting the lower arm.

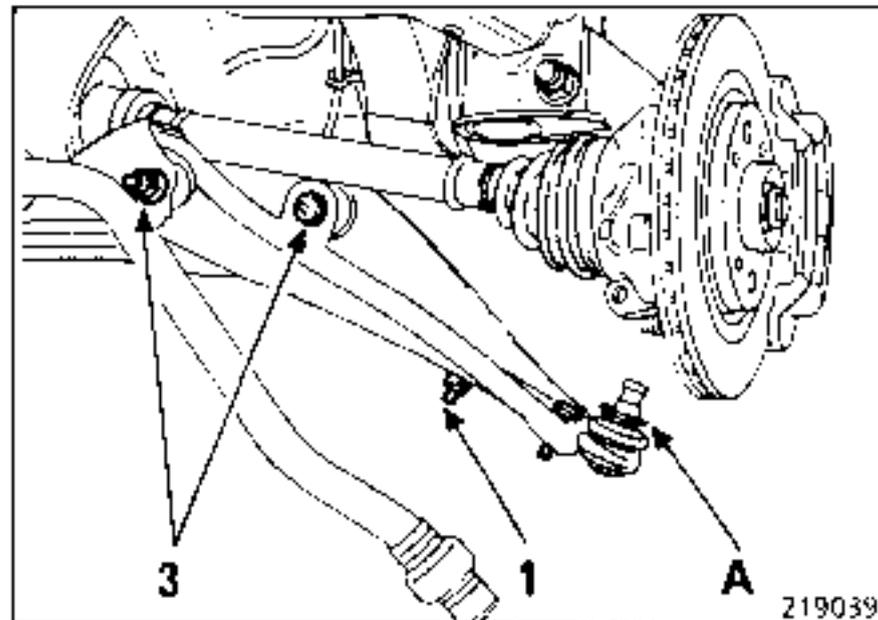


DISMANTLING

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

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

Slacken, but do not remove, the two bolts (3) securing the arm to the cradle.



Remove:

- nut (1) securing the ball joint,
- the ball joint.

REFITTING

NOTE : Make sure that plastic protection washer A is on the lower ball joint shaft.

Fit the ball joint in place and hold it in place by one of its mountings only (1).

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

ESSENTIAL SPECIAL TOOLING

Fre. 823 Piston retractor

TIGHTENING TORQUES (in daN.m)

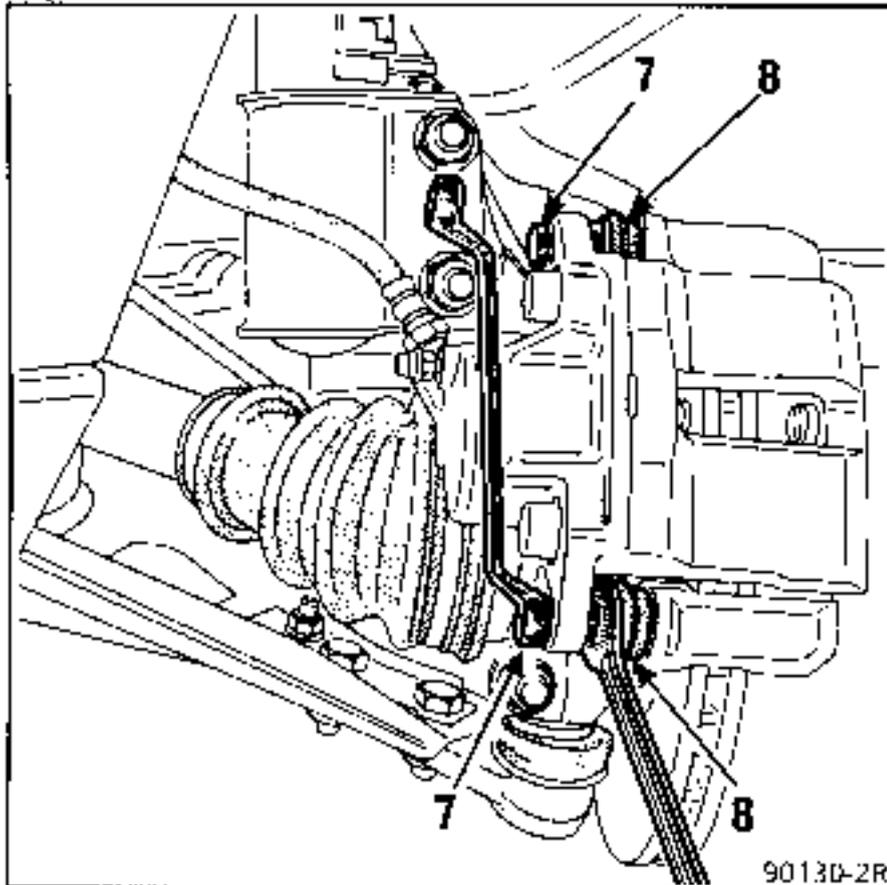


Wheel bolts	8
Brake calliper guide bolts	3.5

REMOVAL

Disconnect the brake pad wear warning light wire.

Push the piston in by sliding the calliper outwards by hand.



Remove the guide bolts (7) using two spanners.

Do not clean these bolts.

- Free the sliding calliper,
- Remove the brake pads.

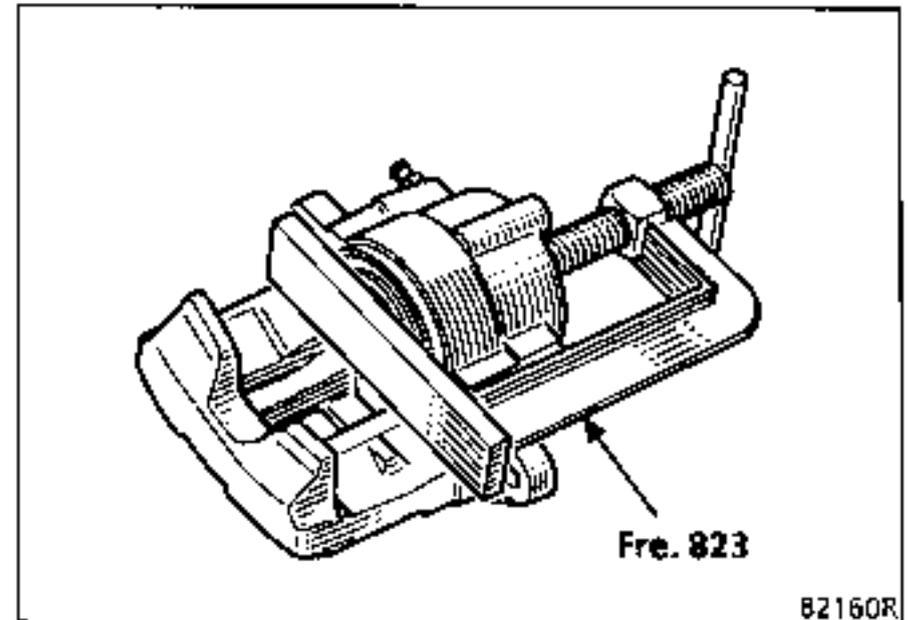
Checks :

Check :

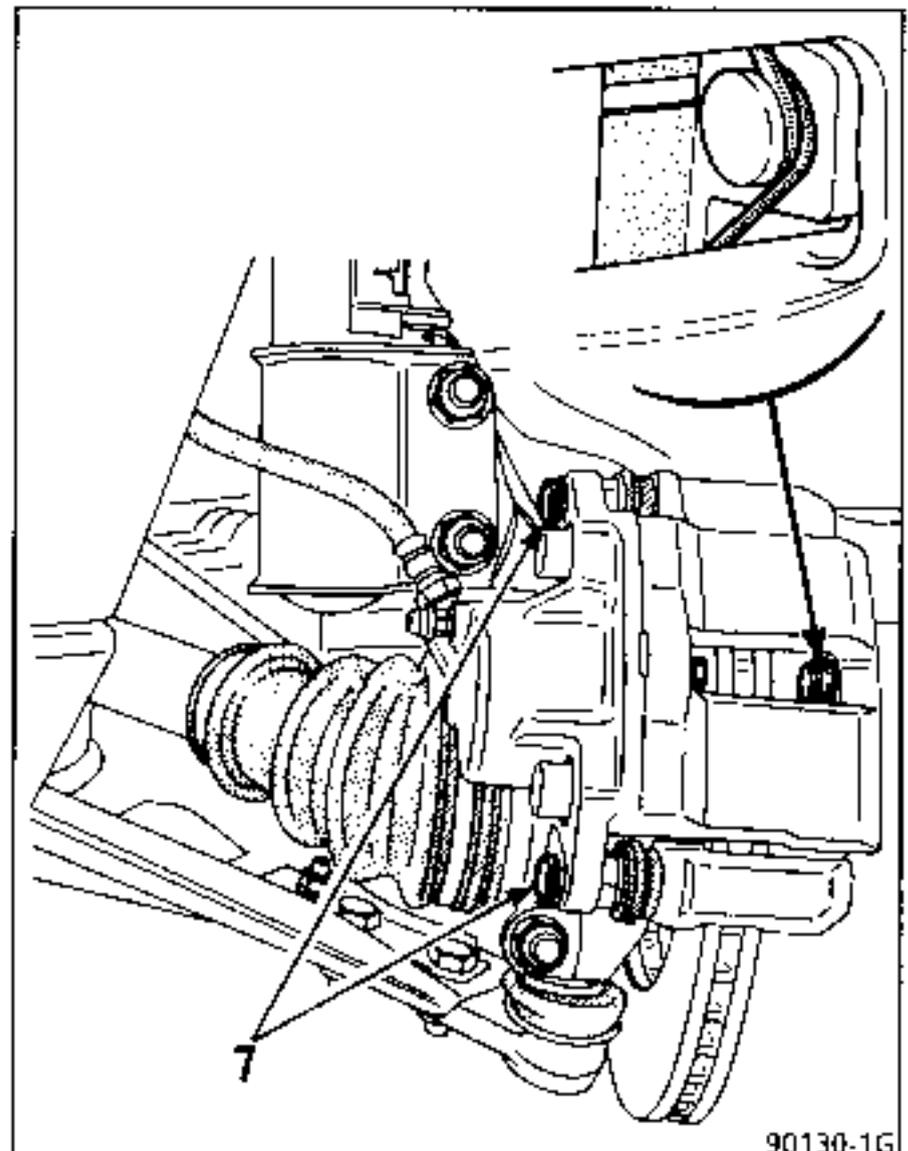
- that the piston dust cover and retaining ring are in good condition and correctly fitted,
- the condition of the calliper guide dust covers (8).

REFITTING

Push the piston into its housing using tool Fre. 823.



Fit the new pads the correct way round and fit the springs.



The pad to which the wear warning light wire is connected is fitted on the inside.

Fit in place the calliper and fit bolt (7) for the lower guide, coated with **LOCTITE FRENBLOC**.

Press on the calliper and fit the upper guide bolt coated with **LOCTITE FRENBLOC**.

Torque tighten the guide bolts, starting with the lower bolt.

Reconnect the pad wear warning light wire.

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

ESSENTIAL SPECIAL TOOLS

Fre. 823 Piston retractor

TIGHTENING TORQUES (in daN.m)



Wheel bolts

8

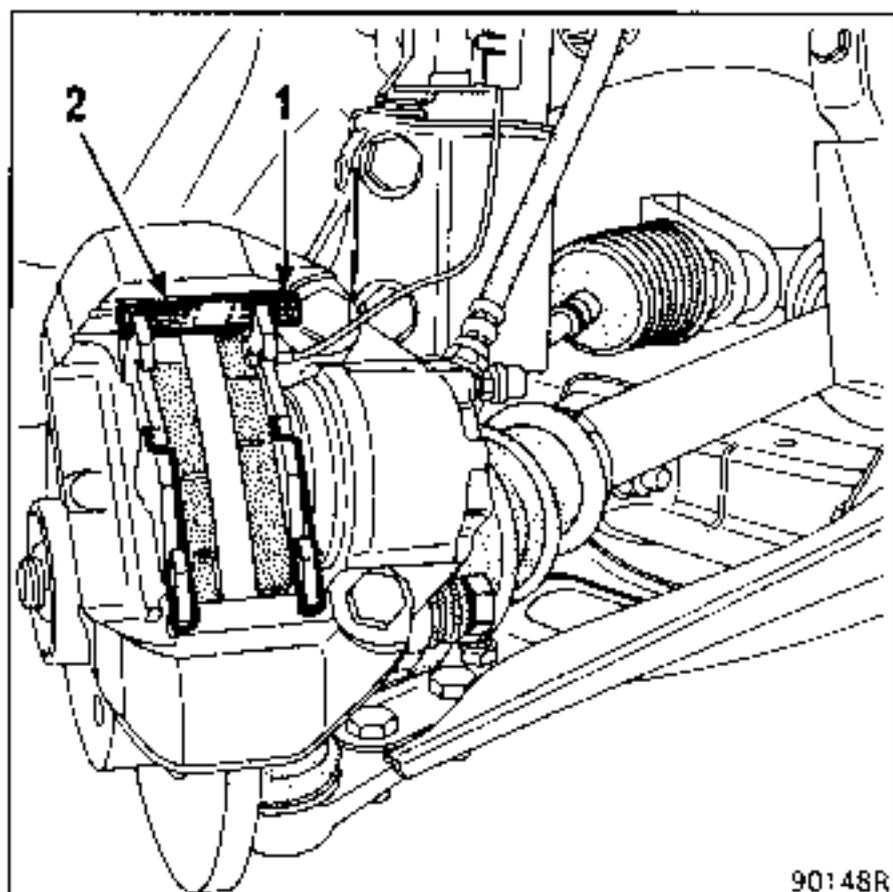
REMOVAL

Disconnect the pad wear warning light wire.

Push the piston in by sliding the calliper outwards by hand :

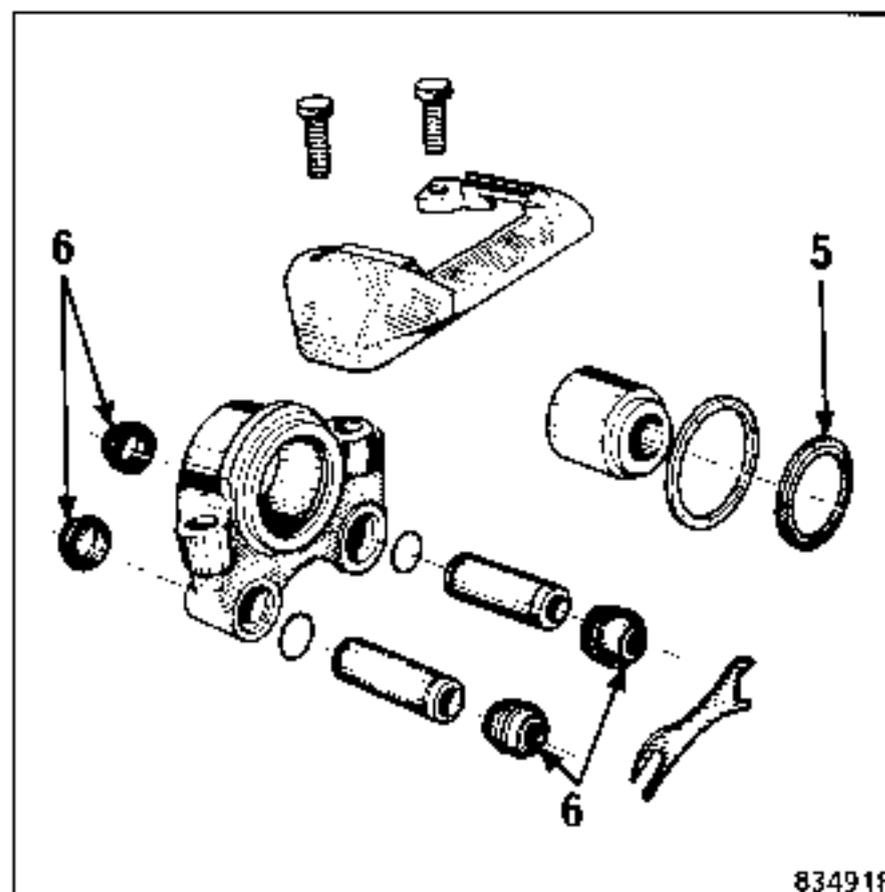
Remove :

- clip (1),
- wedge (2),
- the pads.



90148R

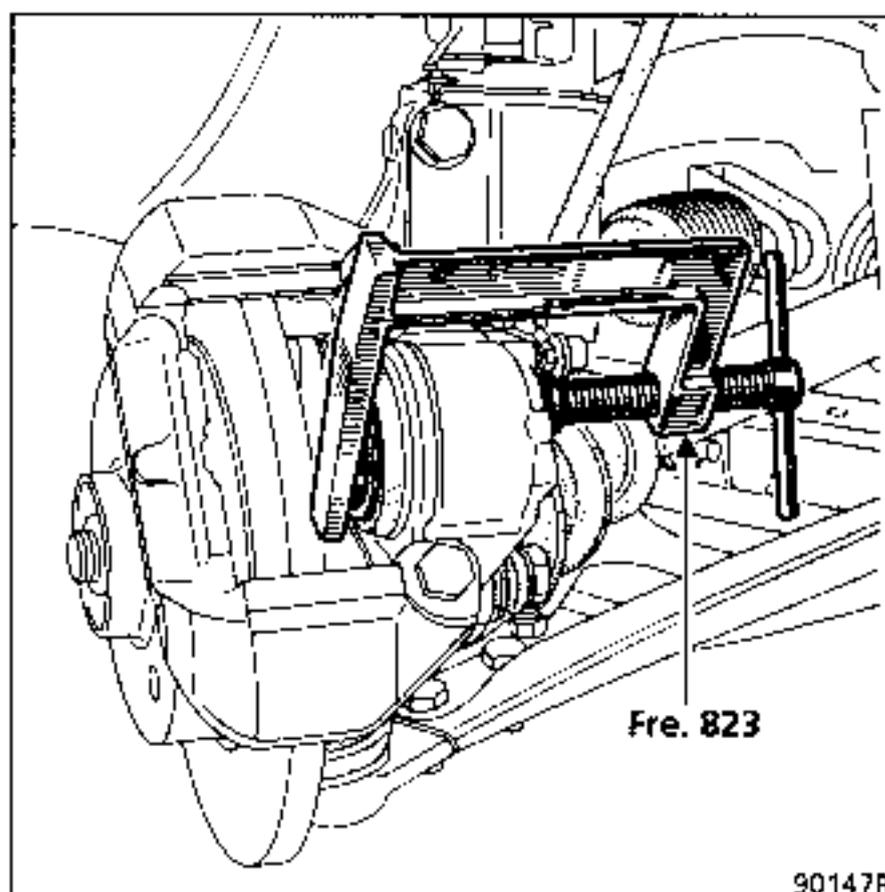
Check the condition of the piston dust cover (5) and gaiters (6) protecting the calliper slides and change them if necessary. If they have to be changed, grease the end of the piston and the two slides, having first cleaned them with methylated spirit.



83491R

REFITTING

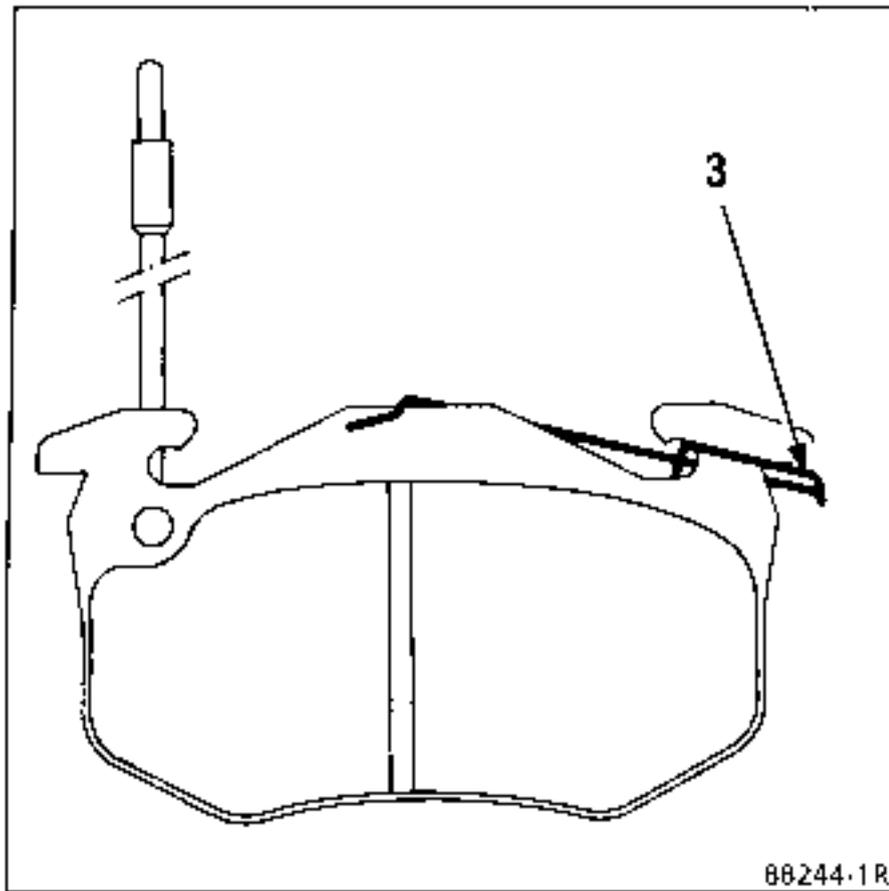
Push back the wheel cylinder piston using tool Fre. 823.



Fre. 823

90147R

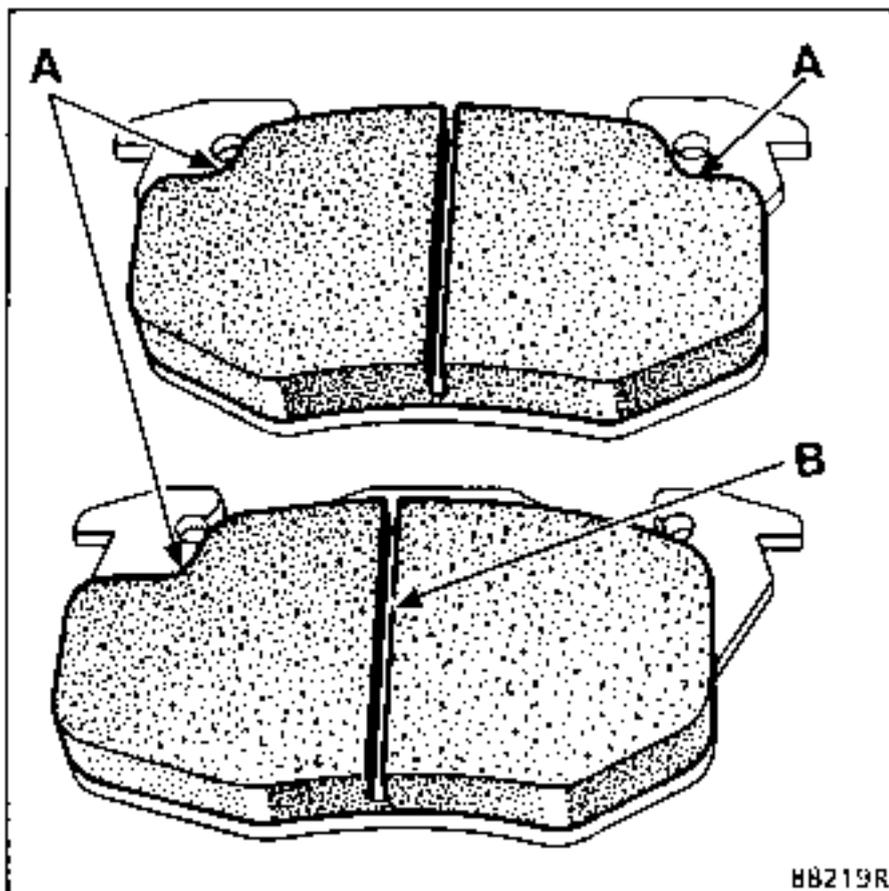
Fit the two anti-rattle springs (3) on the new pads.



88244.1R

NOTE : these vehicles are equipped with pads with offset linings.

Special point concerning offset brake pads :

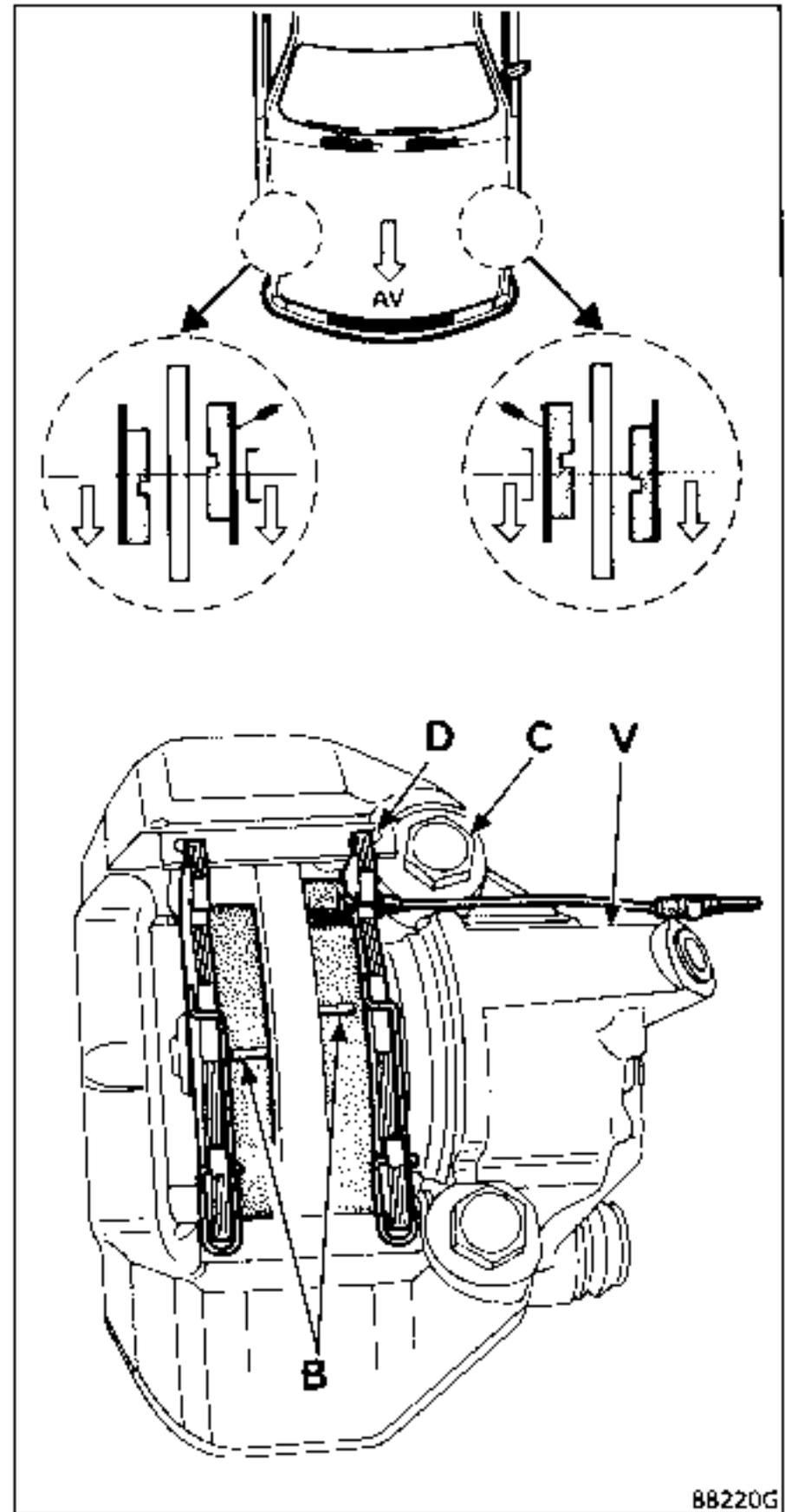


88219R

- the offset lining has a single shoulder at (A) whereas a symmetrical lining has two shoulders,

- groove (B) is also offset in relation to the symmetrical lining,

- Direction of fitting :
 - on the outside the linings and groove (B) are offset towards the front of the vehicle,
 - on the inside the linings and groove (B) are offset towards the rear of the vehicle,
 - the pad wear warning light wires must be on the same side as the bleed screws (V).

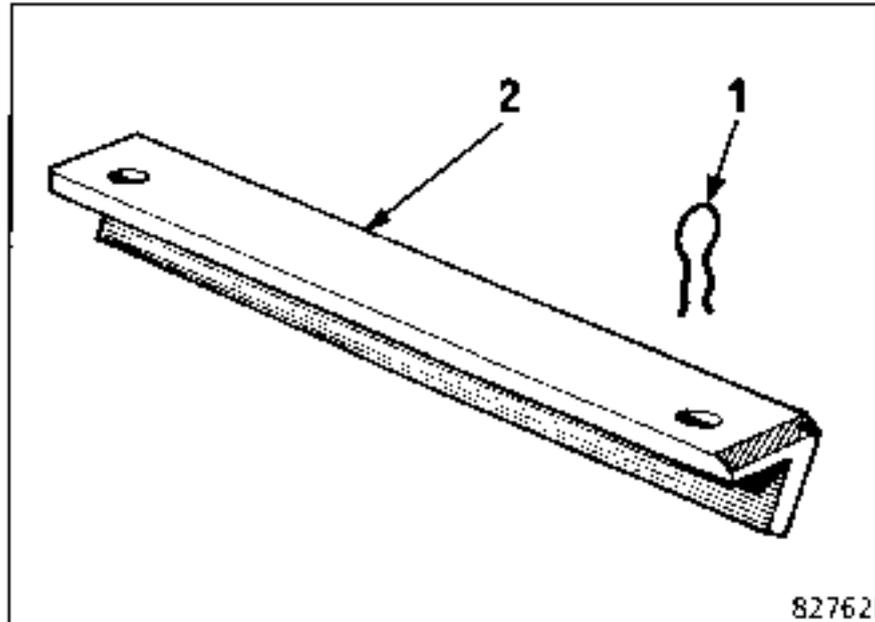


88220G

Position the pads in the calliper and insert wedge (2).

Fit in place clip (1) (one clip only per calliper).

NOTE : The clip is fitted at (D) on the inner side of the calliper, near bolt (C) which holds the calliper bracket.



Reconnect the pad wear warning light wire.

Press down several times on the brake pedal so as to bring the piston into contact with the pads.

ESSENTIAL SPECIAL TOOLING

Fre. 823 Piston retractor

TIGHTENING TORQUES (in daN.m)

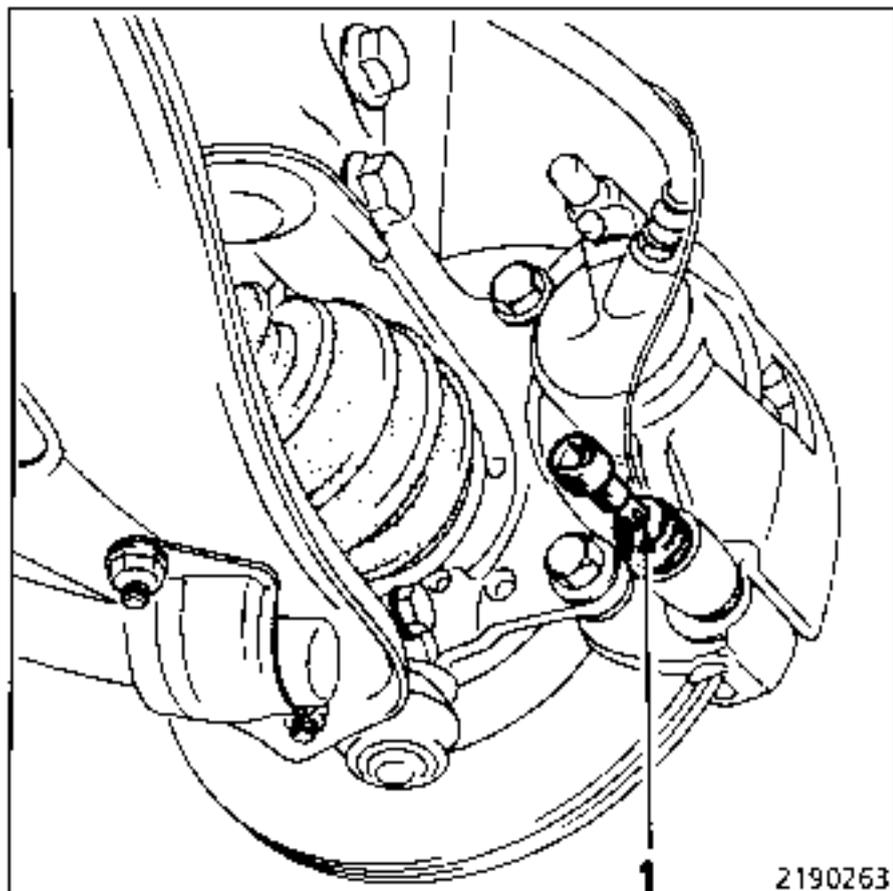


Wheel bolts (4 bolts)	9
Wheel bolts (5 bolts)	10
Brake calliper guide bolts	2.5

REMOVAL

Disconnect the pad wear warning light wire.

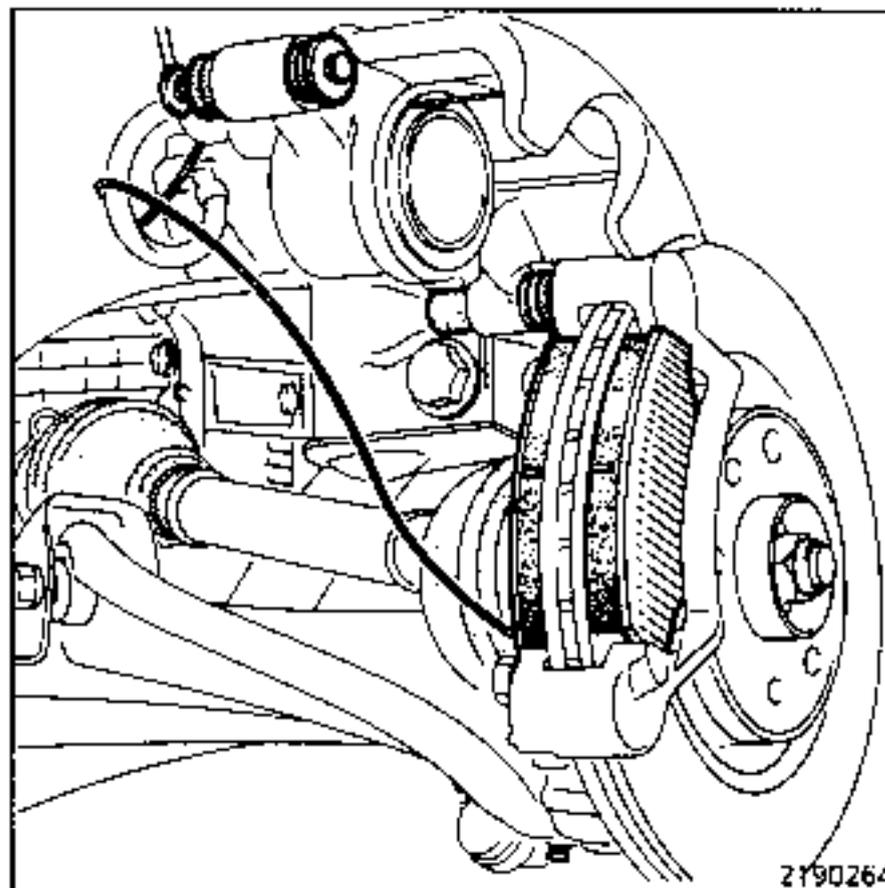
Push the piston in by sliding the calliper outwards by hand.



Unscrew guide bolt (1) and separate it from the calliper bracket.

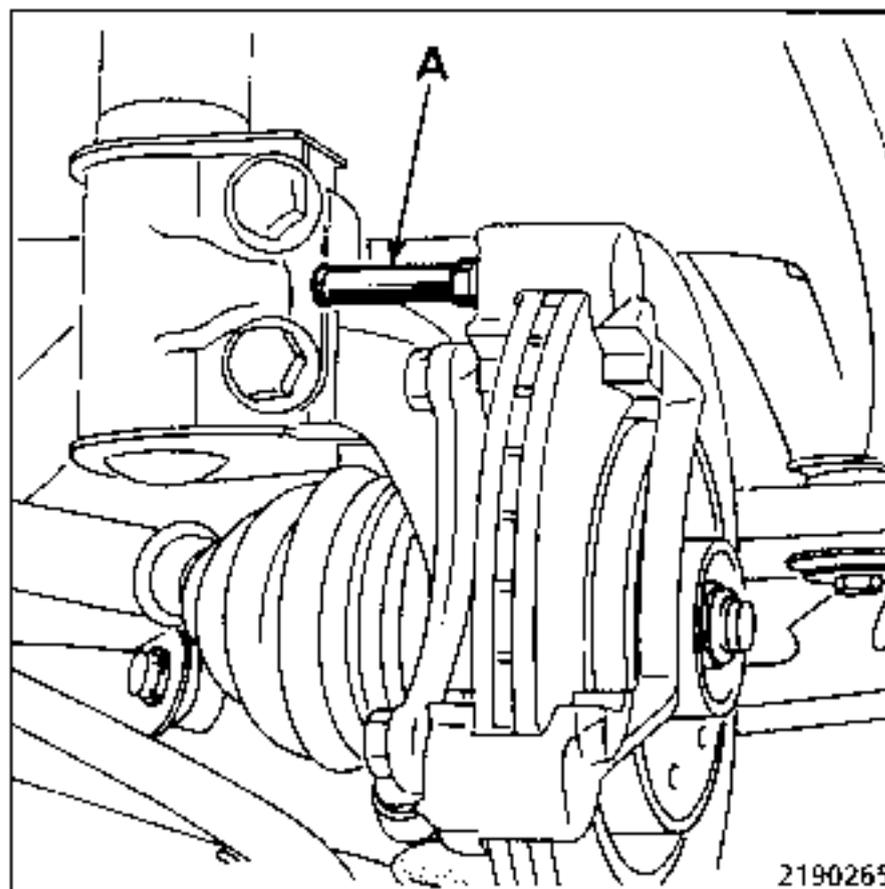
Release :

- the sliding calliper by moving it upwards and remove it from its upper guide,



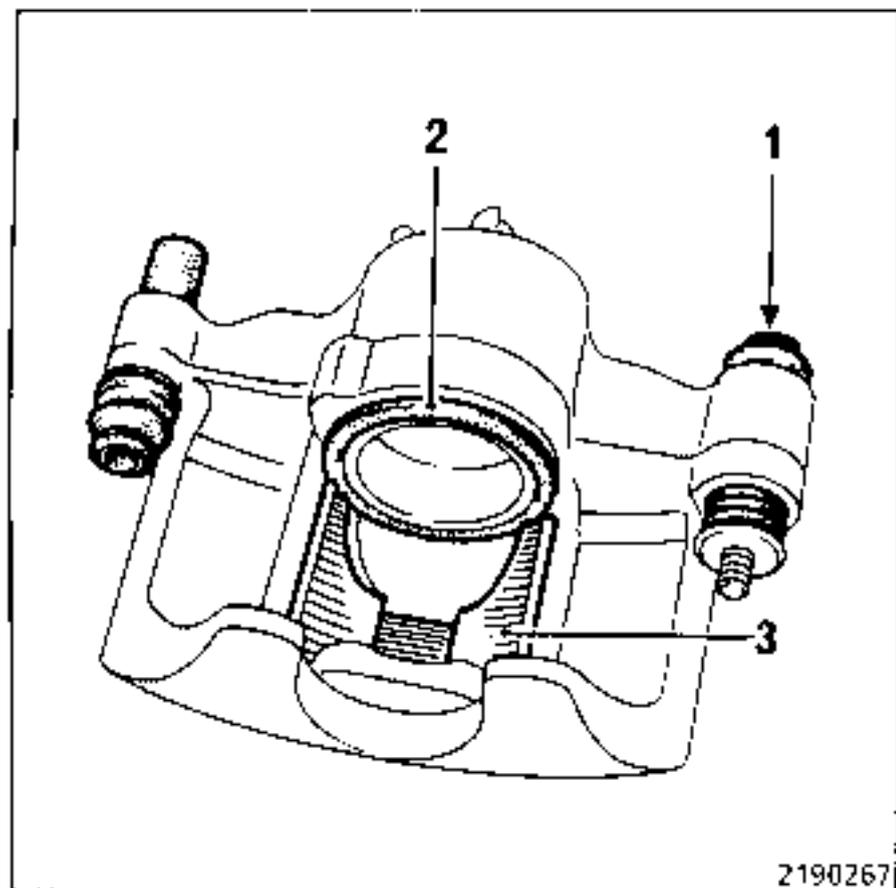
- the pads.

Make sure that upper guide A is in perfect condition. Clean it with methylated spirit, then grease it.



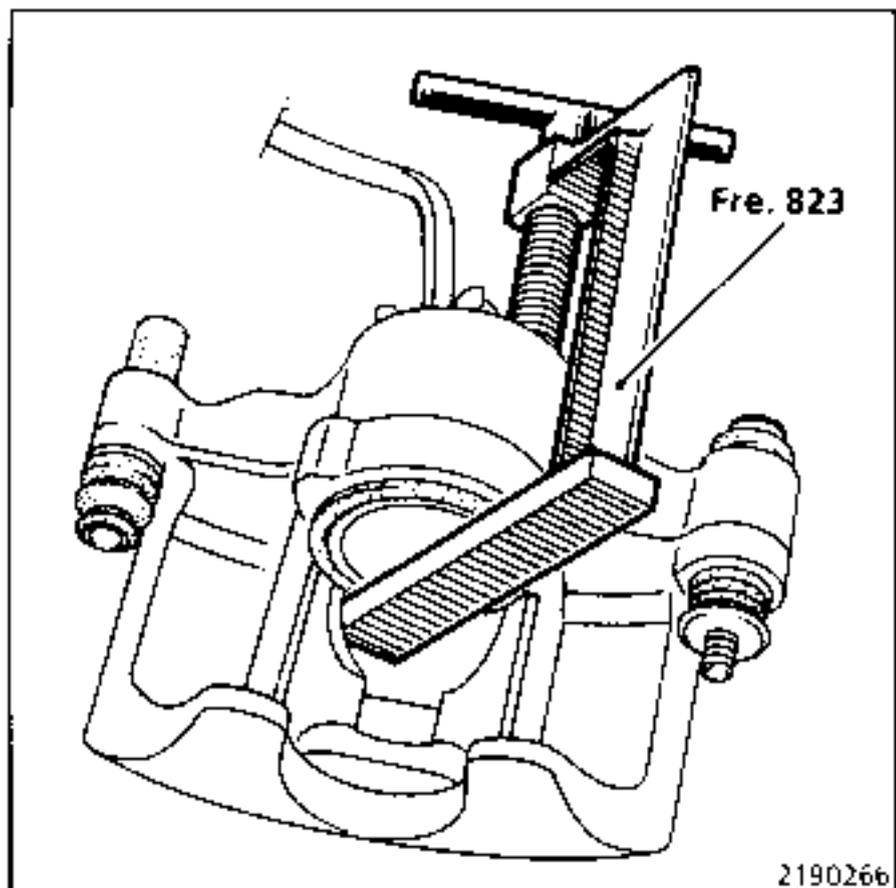
Check :

- that spring (3) is in the correct position,
 - the condition of piston dust cover (2), the gaiters protecting bolt (1) and the calliper guide.
- Change any components if necessary.



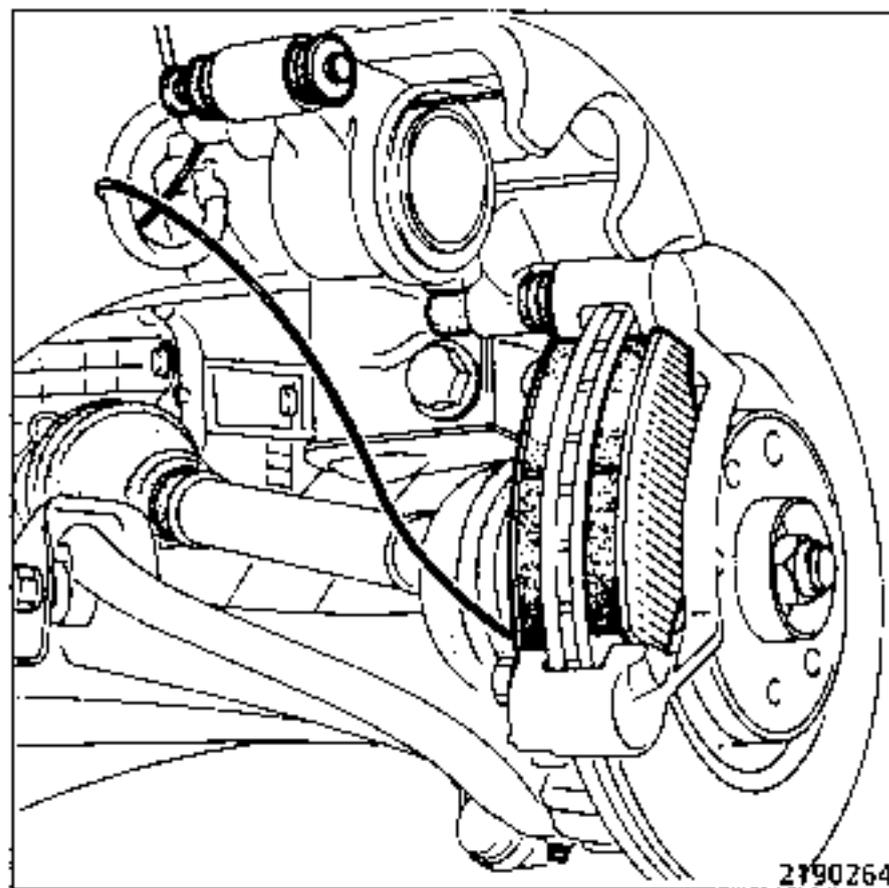
REFITTING

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



Fit in place :

- the new pads making sure they are fitted the correct way round. The pad to which the wear warning light is connected is to be mounted on the inside.



- fit the calliper on its upper guide and tilt it downwards.

Torque tighten the calliper guide bolt.

Reconnect the pad wear warning light wire.

Press down several times on the brake pedal so as to bring the piston into contact with the pads.

TIGHTENING TORQUES (in daN.m)		
Wheel bolts (4 bolts)	9	
Wheel bolts (5 bolts)	10	
Calliper securing bolts (BENDIX Series IV)	10	
Guide bolts (GIRLING)	3.5	
Guide bolts (BENDIX Series IV M)	2.5	

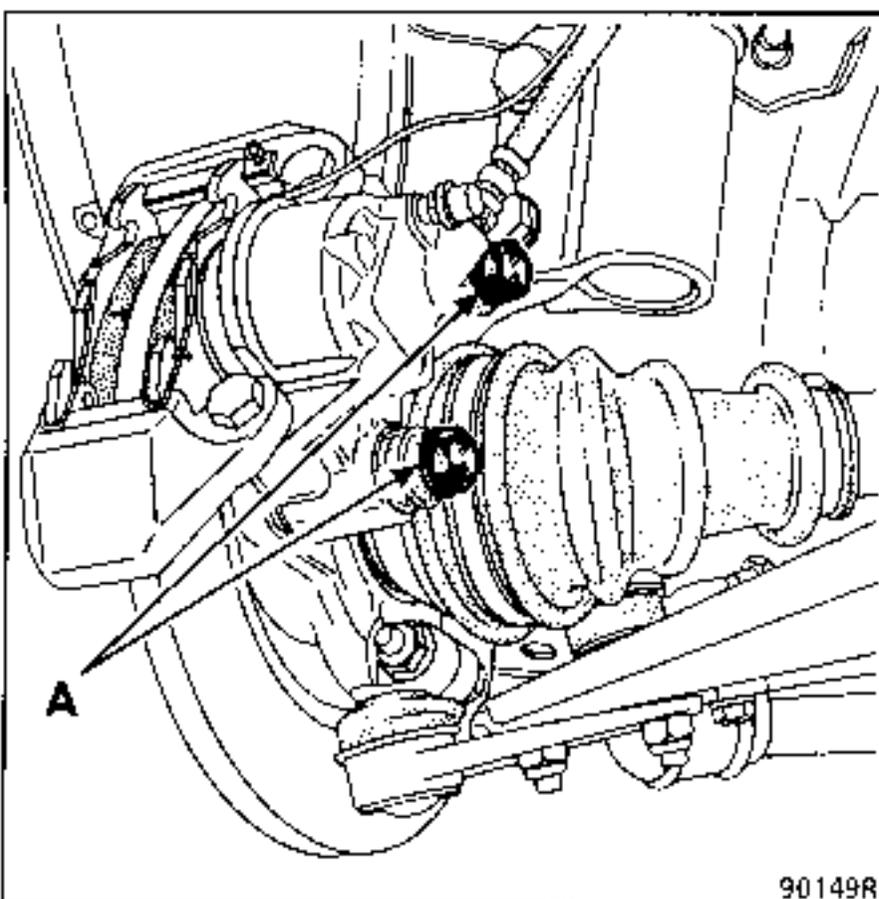
REMOVAL

Slacken the brake hose at the calliper end.

Remove the brake pads (see relevant section).

Special points concerning BENDIX Series IV

Remove the two bolts (A) securing the calliper to the stub axle carrier.



90149R

All types

Unscrew the calliper from the brake hose (be ready to catch the draining brake fluid).

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

REFITTING

Screw the new calliper onto the hose.

Slacken the calliper bleed screw and wait until brake fluid starts to flow out (having first checked that there is sufficient fluid in the reservoir).

Retighten the bleed screw.

BENDIX Series IV

Fit the calliper to the stub axle carrier and torque tighten the two bolts (A).

All types

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

If the brake fluid reservoir has not been completely emptied during the operation, a partial bleeding of the system will be sufficient.

Operate the brake pedal several times in order to push the piston into contact with the brake pads.

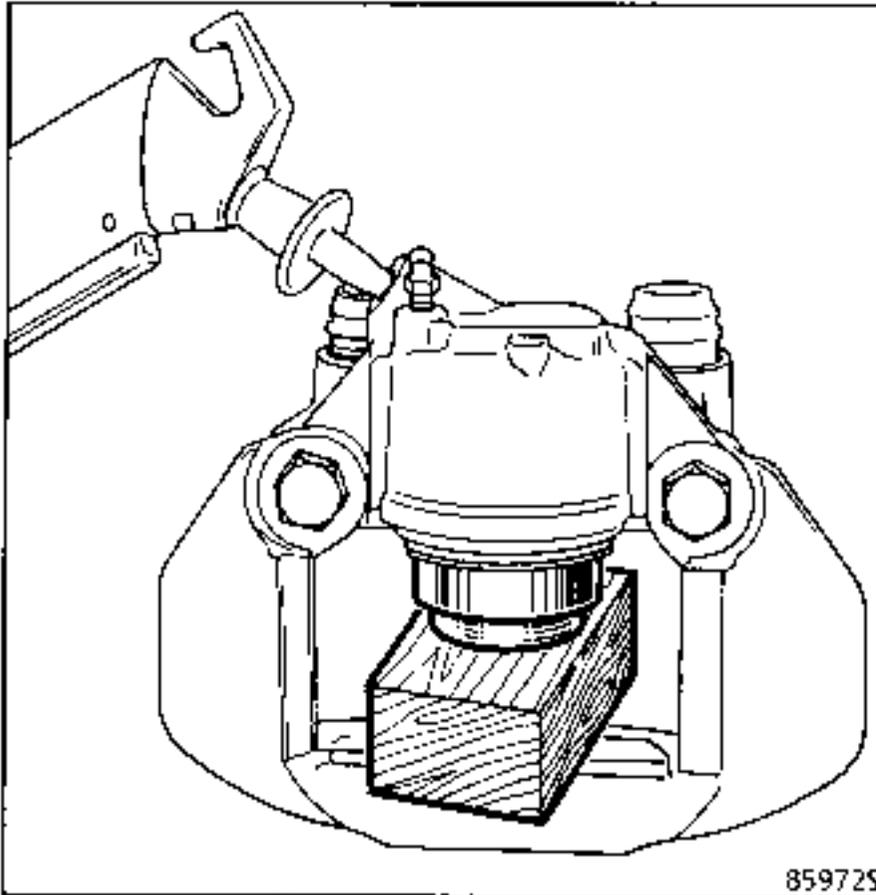
OVERHAULING

The calliper assembly must be changed whenever any scratching or scoring is present in the piston bore.

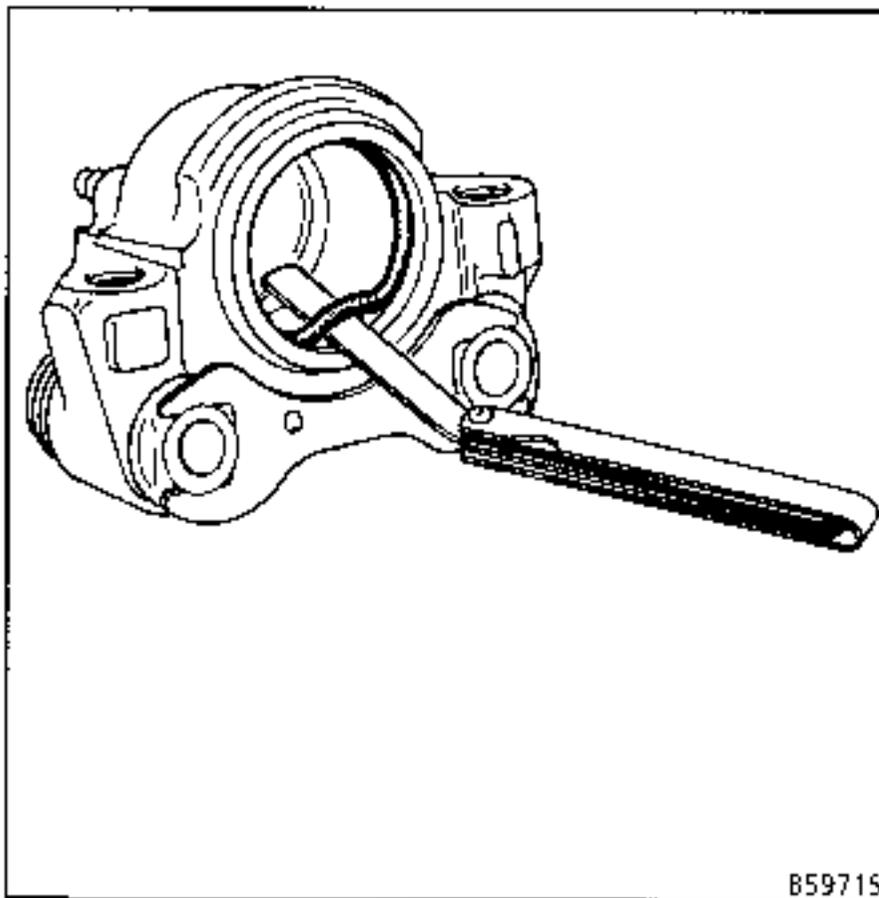
Remove the calliper.

Take off the rubber dust cover retaining ring (for GIRLING brakes).

Expel the piston using an air line and taking care to avoid damaging the piston by inserting a block of wood between the piston and the calliper. The piston must not be re-used if there is any sign of impact damage to the skirt.



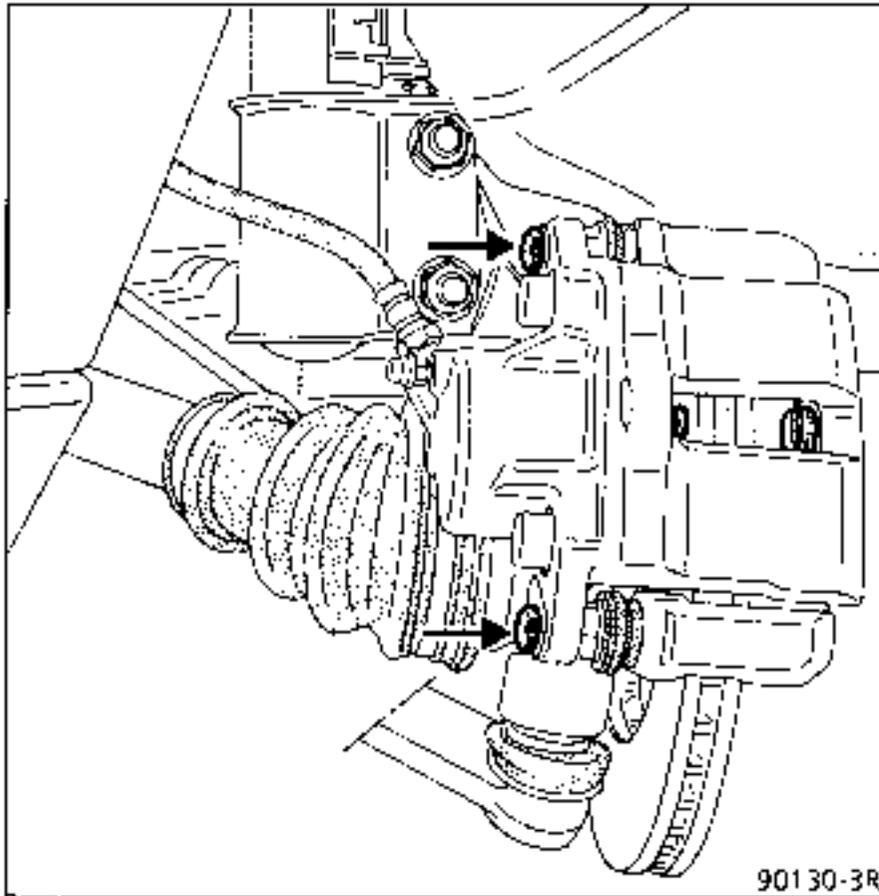
Take out the rectangular section seal from the calliper groove using a round-ended flexible blade (eg, a feeler gauge).



Clean all components in methylated spirit.

All faulty components must be replaced by genuine new parts, then refit the seal, piston and dust cover (with its retaining ring for GIRLING brakes).

When changing the brake pads or working on this type of brake calliper, the guide bolts* must be systematically replaced and torque tightened to a torque of 3.4 and 3.8 daN.m starting with the bottom bolt.



* Bolts supplied in the spare parts kit.

The brake discs must not be re-faced. The part must be changed if excessive wear or scoring is present.

TIGHTENING TORQUES (in daN.m)



Wheel bolts (4 bolts)	9
Wheel bolts (5 bolts)	10
Brake calliper mounting bolts	10
Calliper bracket mounting bolts	
BENDIX Series IV	6.5

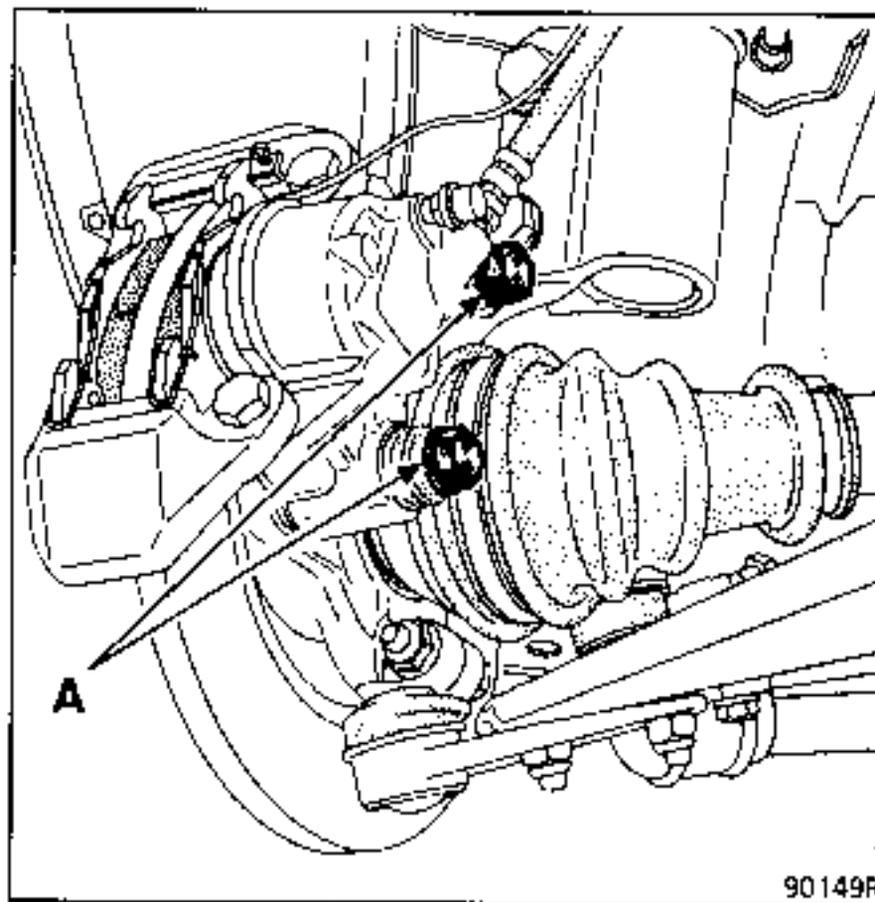
REMOVAL

Remove :

- the two screws (A) securing the brake assembly.

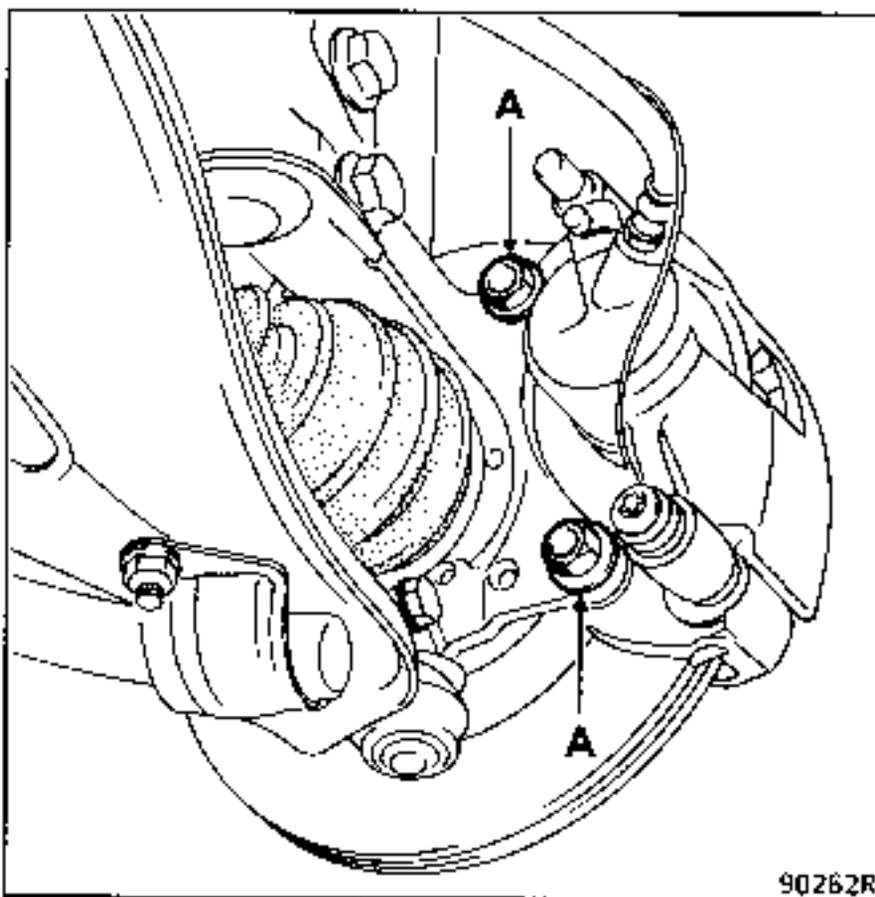
GIRLING

BENDIX Series IV



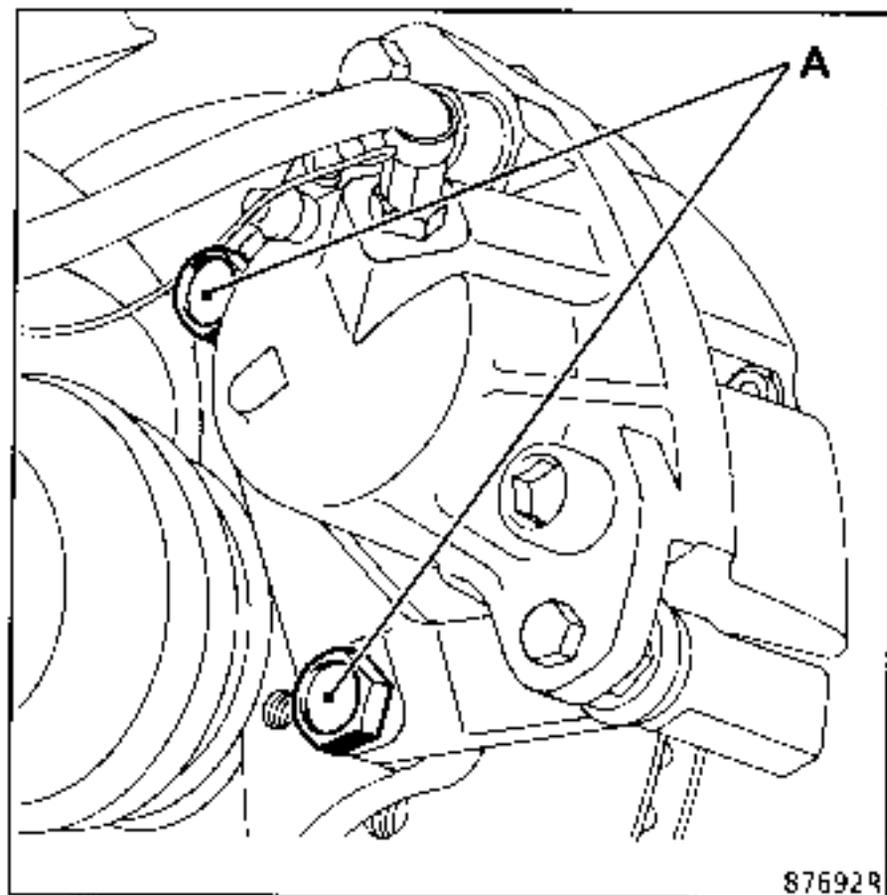
90149R

BENDIX Series IV M



90262R

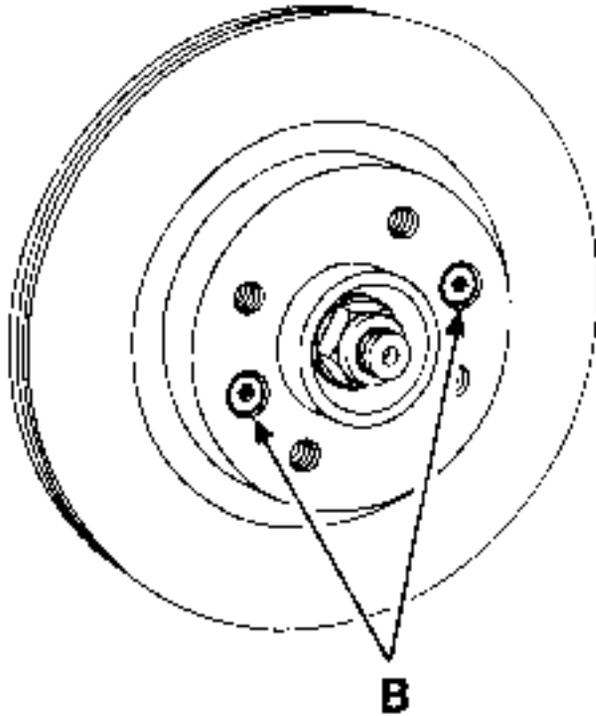
- the two bolts (B) securing the disc,
- the disc.



87692R

REFITTING

Offer up the disc to the hub and secure it with the two cap bolts (B).



88310-1R

Refit the brake calliper, smear the mounting bolts with **LOCTITE FRENBLOC** and tighten to the specified torque.

Operate the brake pedal several times in order to push the pistons into contact with the brake pads.

CHANGING

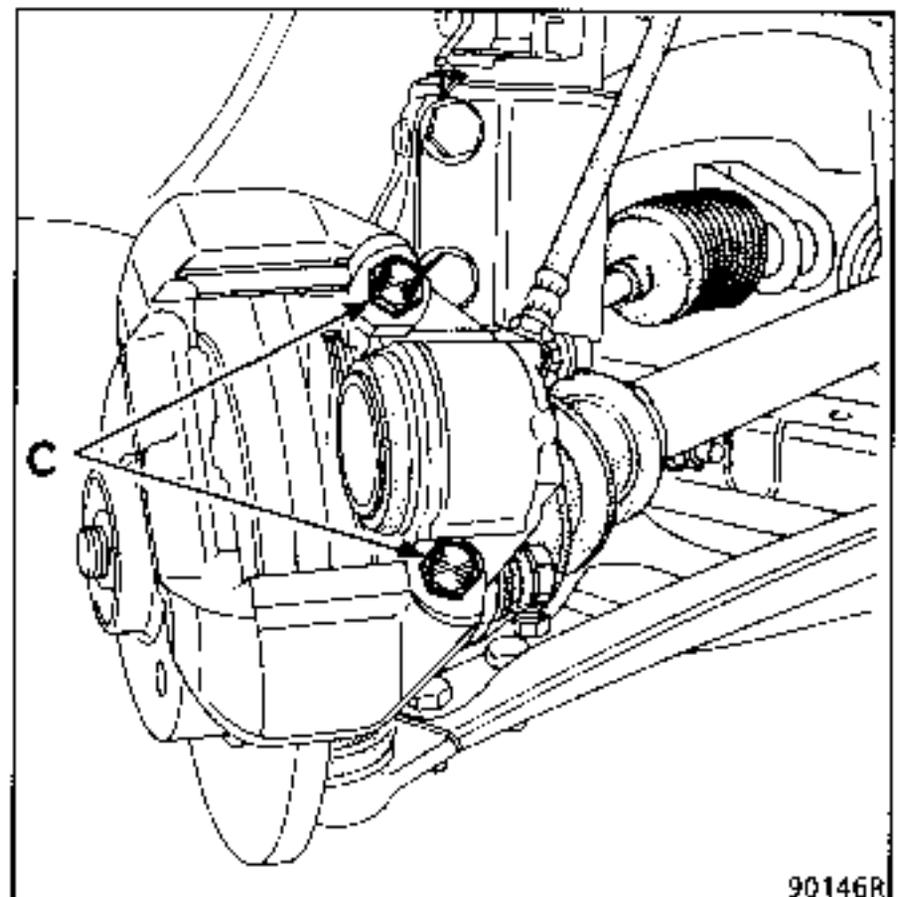
When changing a brake disc, the pads must also be changed.

In this case, it will be necessary firstly to change the pads and secondly to remove the calliper brackets (see "Removal/Refitting" section).

Special point concerning BENDIX Series IV

To change the disc, remove :

- the pads,
- the two calliper bracket bolts (C).



90146R

ESSENTIAL SPECIAL TOOLING		
M.S.	580	Impact tool
Rou.	15-01	Shaft protecting end piece
Rou.	604-01	Hub locking tool
T.Av.	476	Ball joint extractor
T.Av.	1050-02	Hub extractor

TIGHTENING TORQUES (in daN.m) 	
Bolts securing stub axle carrier to shock absorber base	11
Lower ball joint key-securing nuts	6
Steering ball joint nuts	4
Brake calliper securing bolts	10
Driveshaft nuts	25
Wheel bolts	9

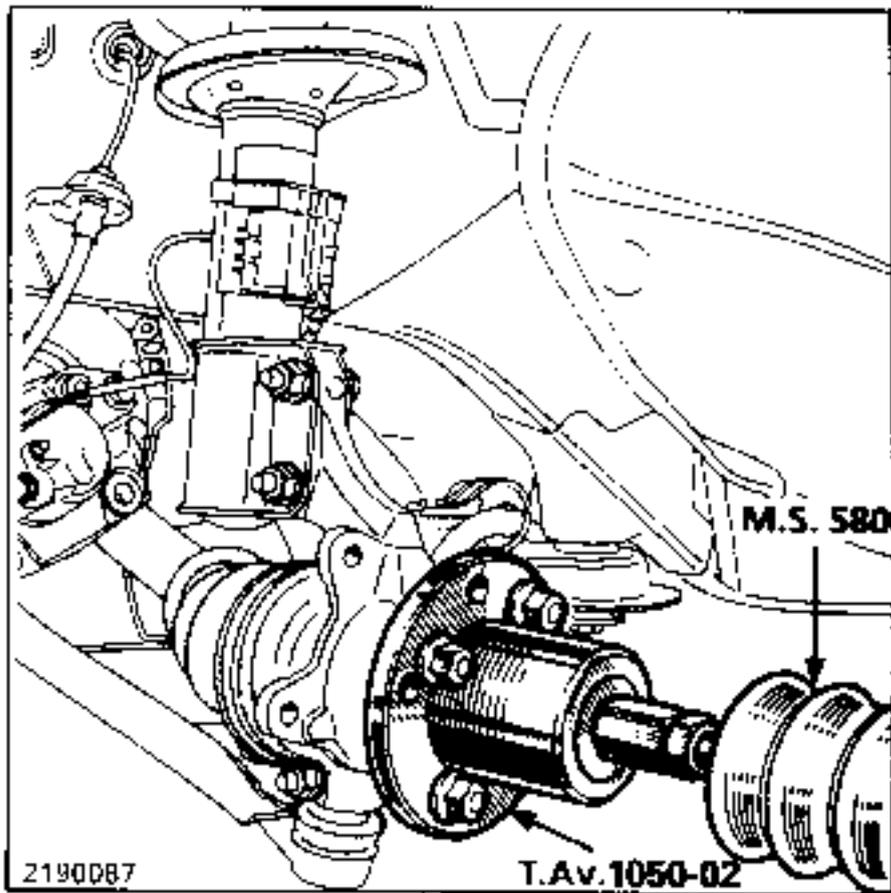
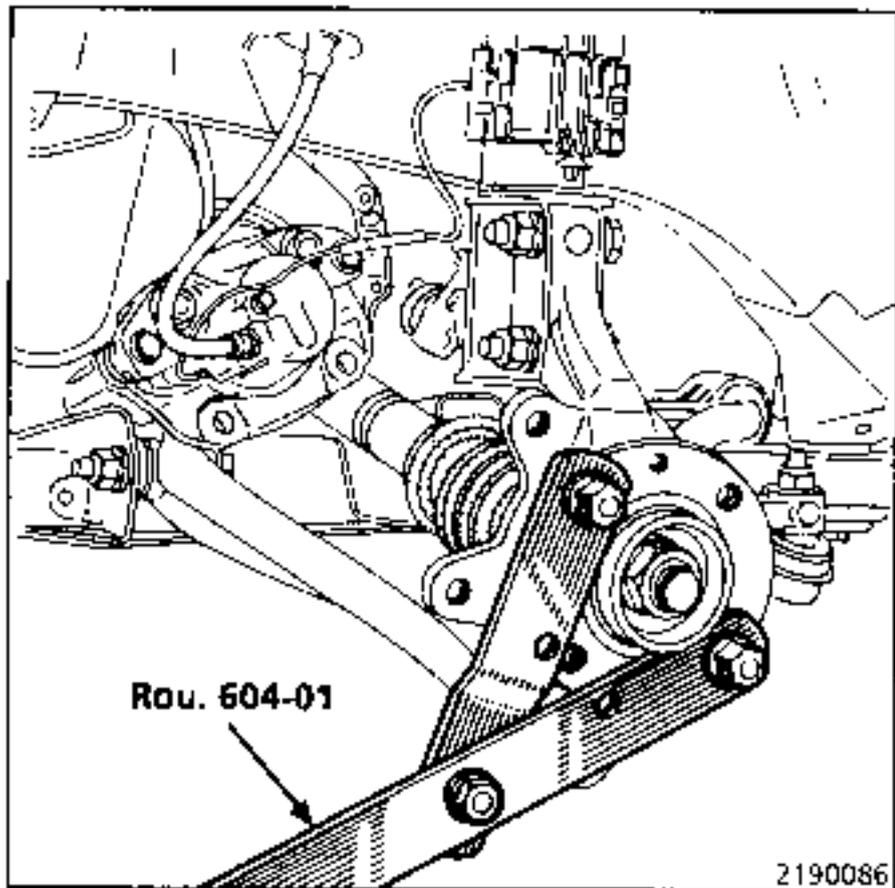
Checking the clearance

Using a clock gauge on the hub, check that the axial clearance is between : 0 to 0.05 mm.

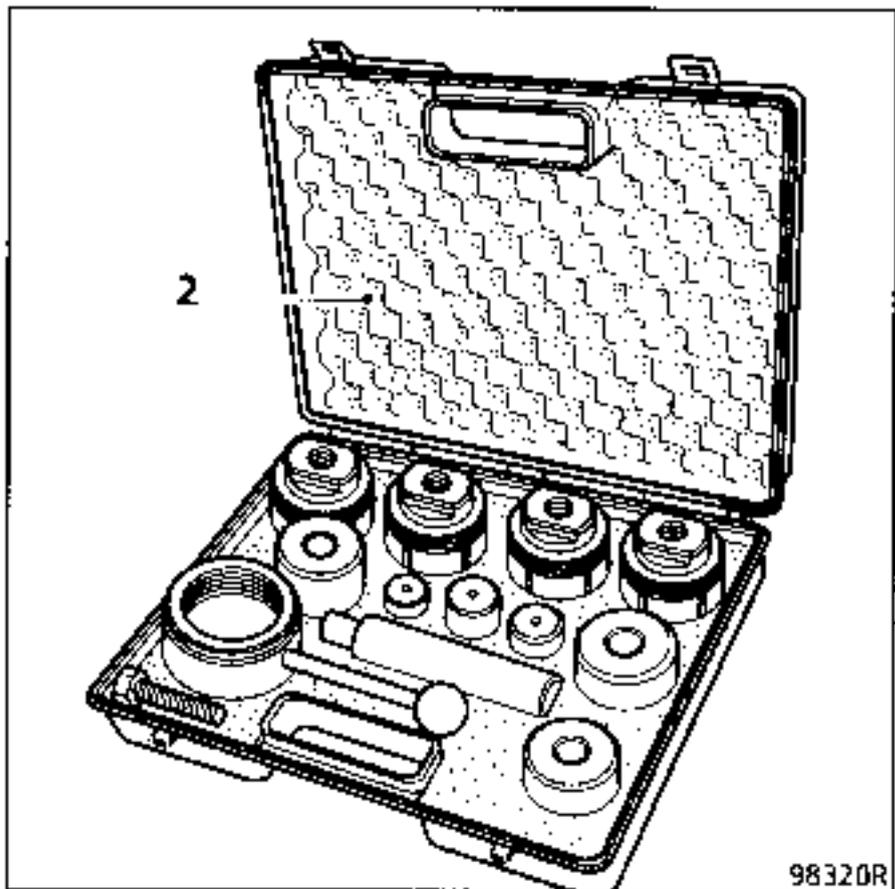
REMOVAL

Remove:

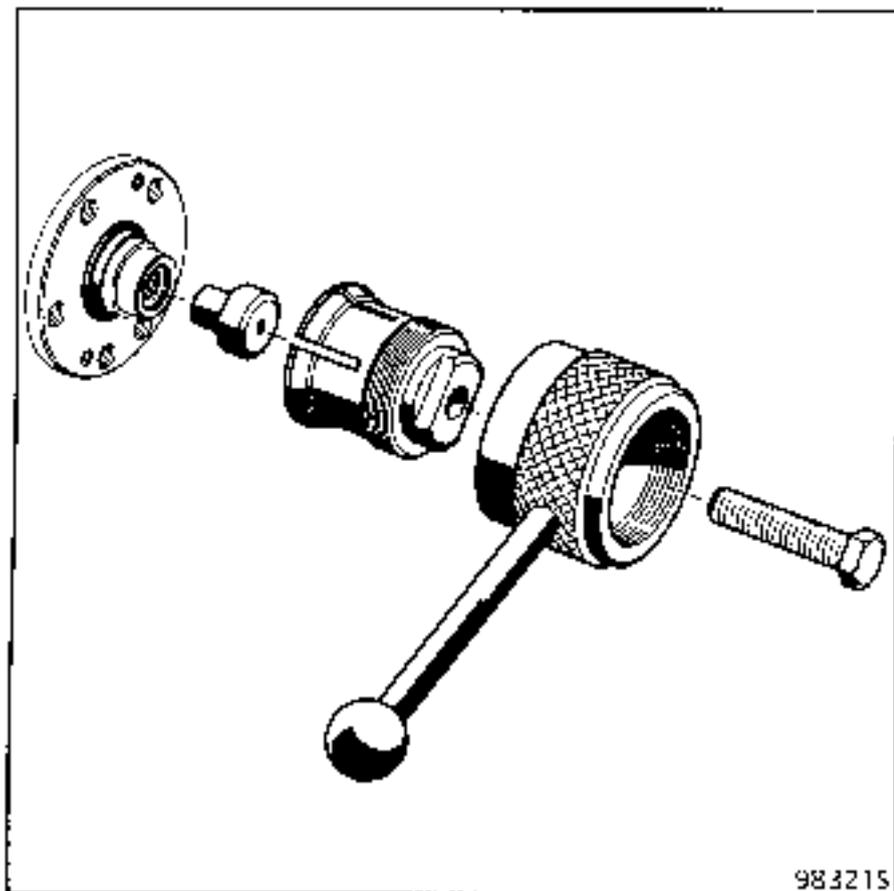
- the brake disc (see "Braking System" section),
- the driveshaft nut using tool Rou. 604-01.



Remove the interior bearing ring using the hub bearing extractor kit, see Tooling Catalogue, tool reference 914 0951.

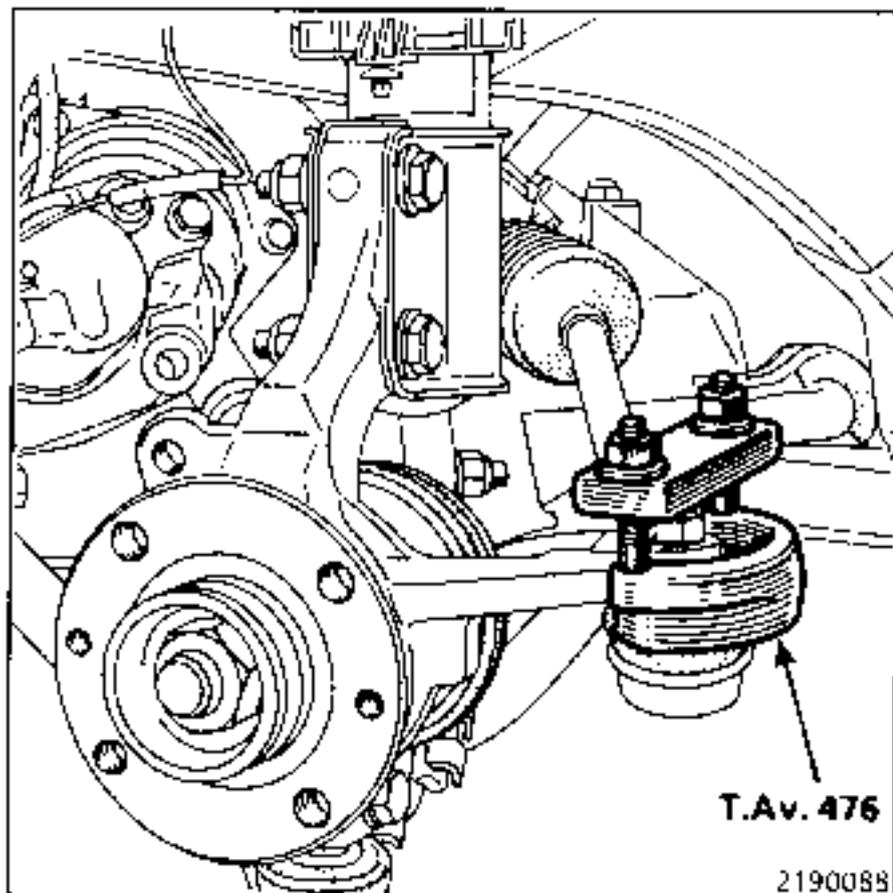


Extract the hub using tool T.Av. 1050-02 + M.S. 580.



983215

Disconnect the steering arm using tool T.Av. 476.

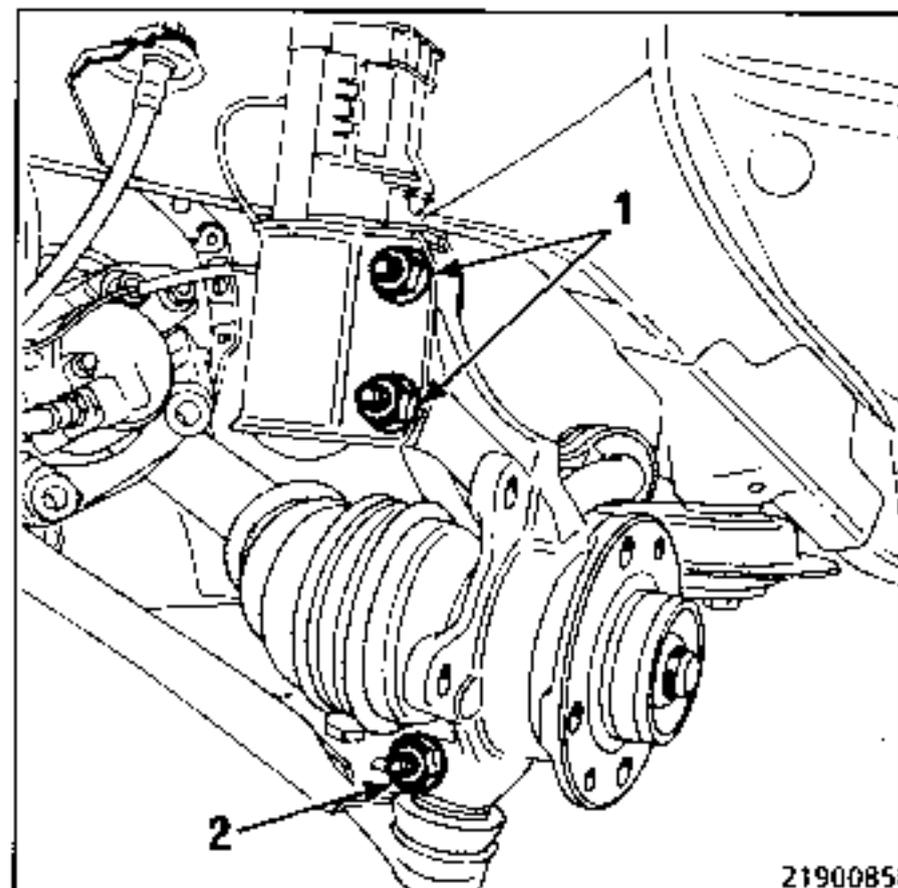


T.Av. 476

2190088

Remove :

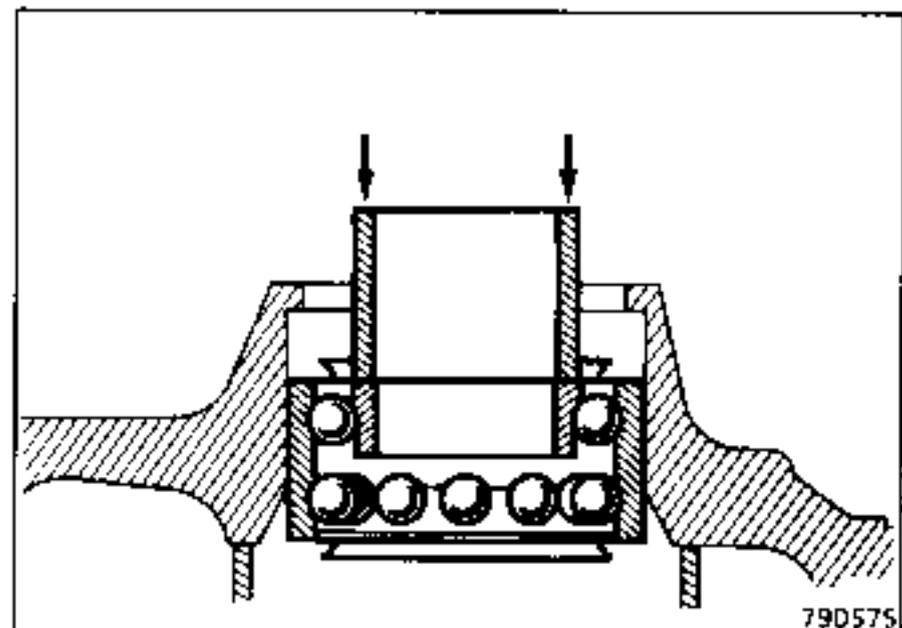
- securing bolts (1),
- key-securing bolt and nut (2),



2190085

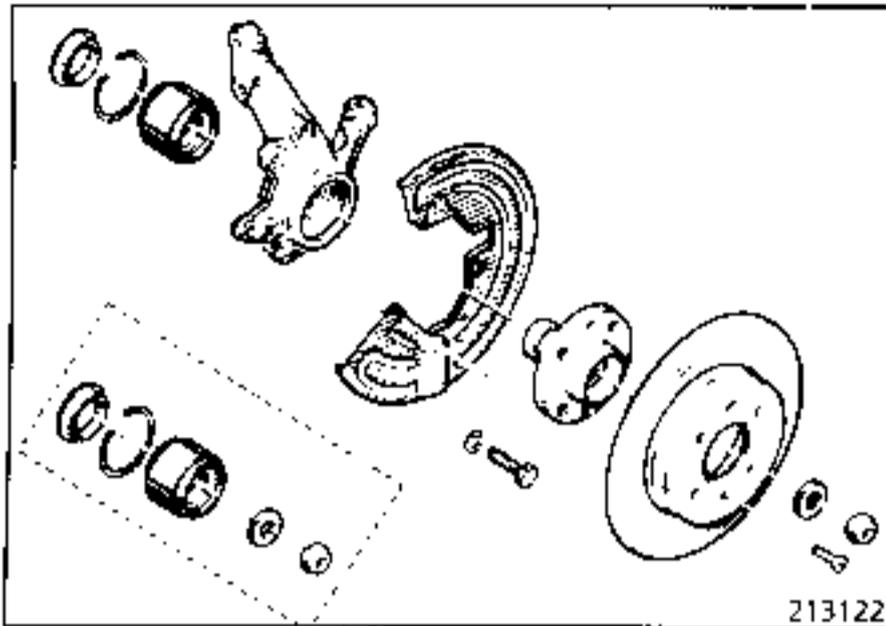
- the lock ring.

On the press, extract the outer bearing track using one of the two inner bearing tracks for assistance, leaving their ball races and the seals in position.

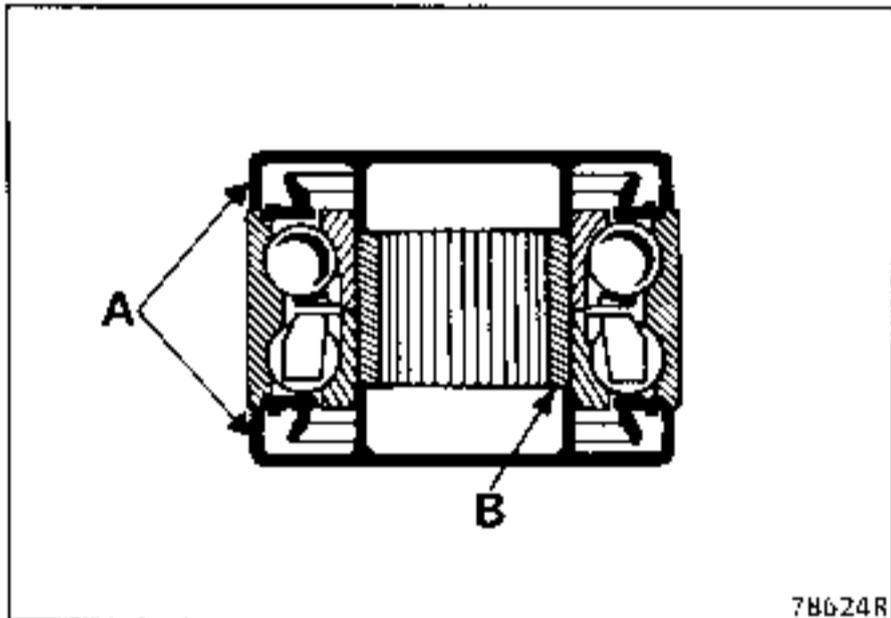


790575

REFITTING

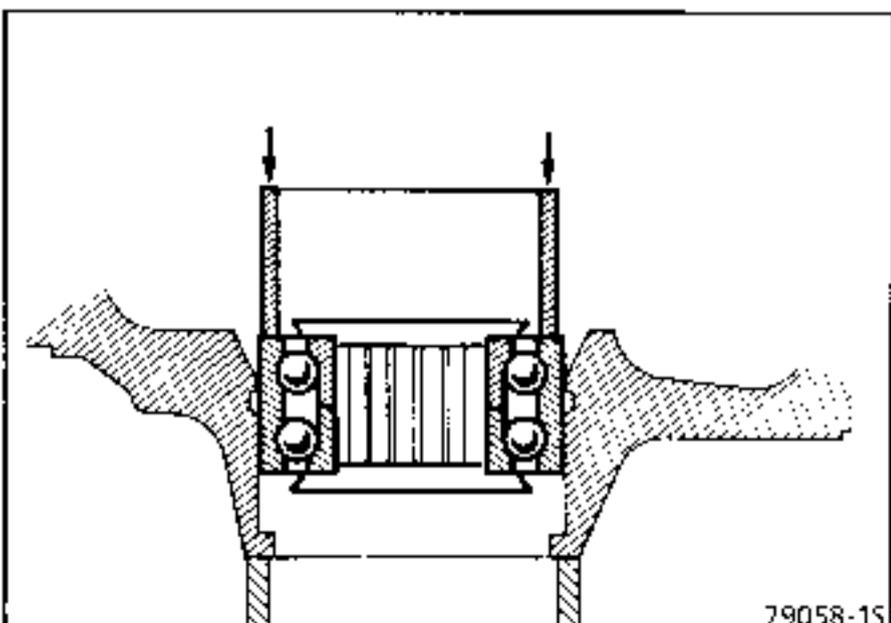


Remove the two plastic protectors (A) from the new bearing.



On the press, fit the bearing with its plastic ring (B) in the stub axle carrier using a piece of tubing with an outer diameter of 71 mm and a bore of 66 mm, resting on the outer track bearing.

Do not rest on the inner track bearing or the bearing will be damaged, as great stress must be applied when fitting the bearing.

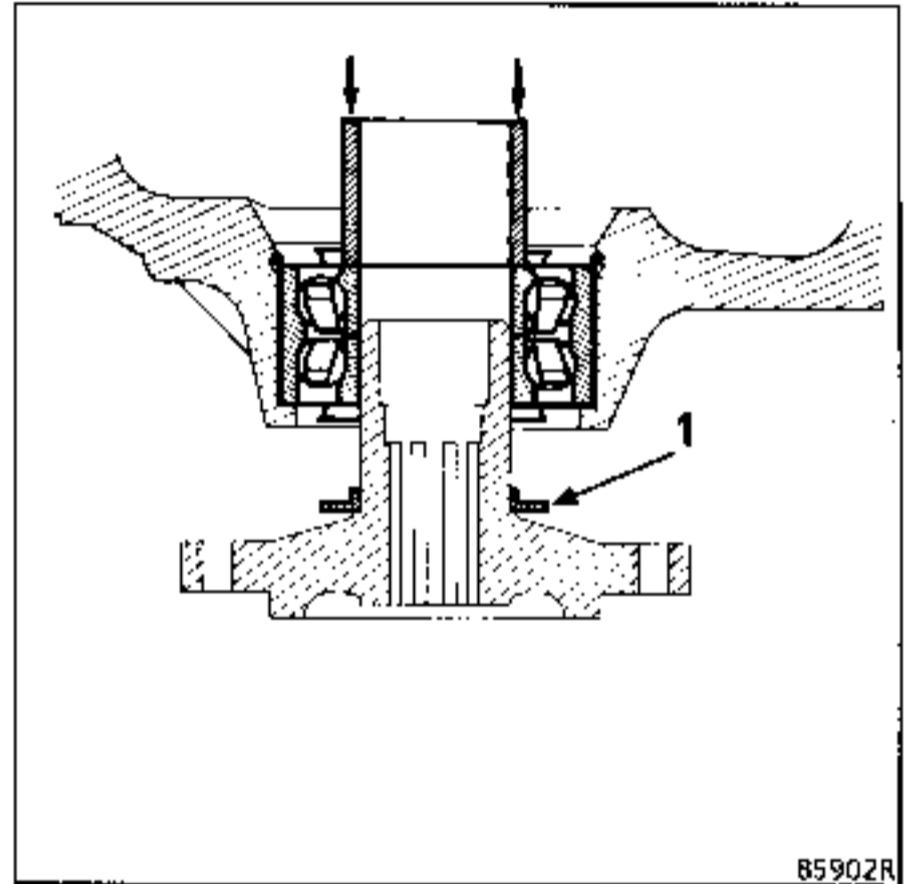


Remove plastic ring (B).

Fit the new lock ring in place.

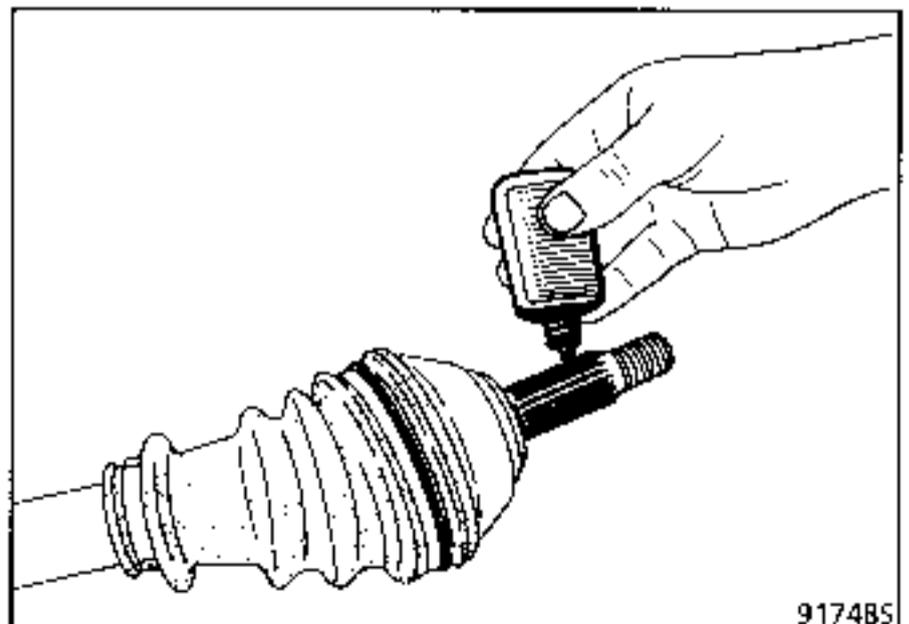
Coat each sealing lip with grease.

Place thrust washer (1) on the hub and fit it on the press using a piece of tubing with an outer diameter of 48 mm and a bore of 43 mm, resting on the inner bearing track bearing.



Refit the stub axle carrier to the vehicle.

Coat the driveshaft stub axle with **LOCTITE SCELBLOC**.

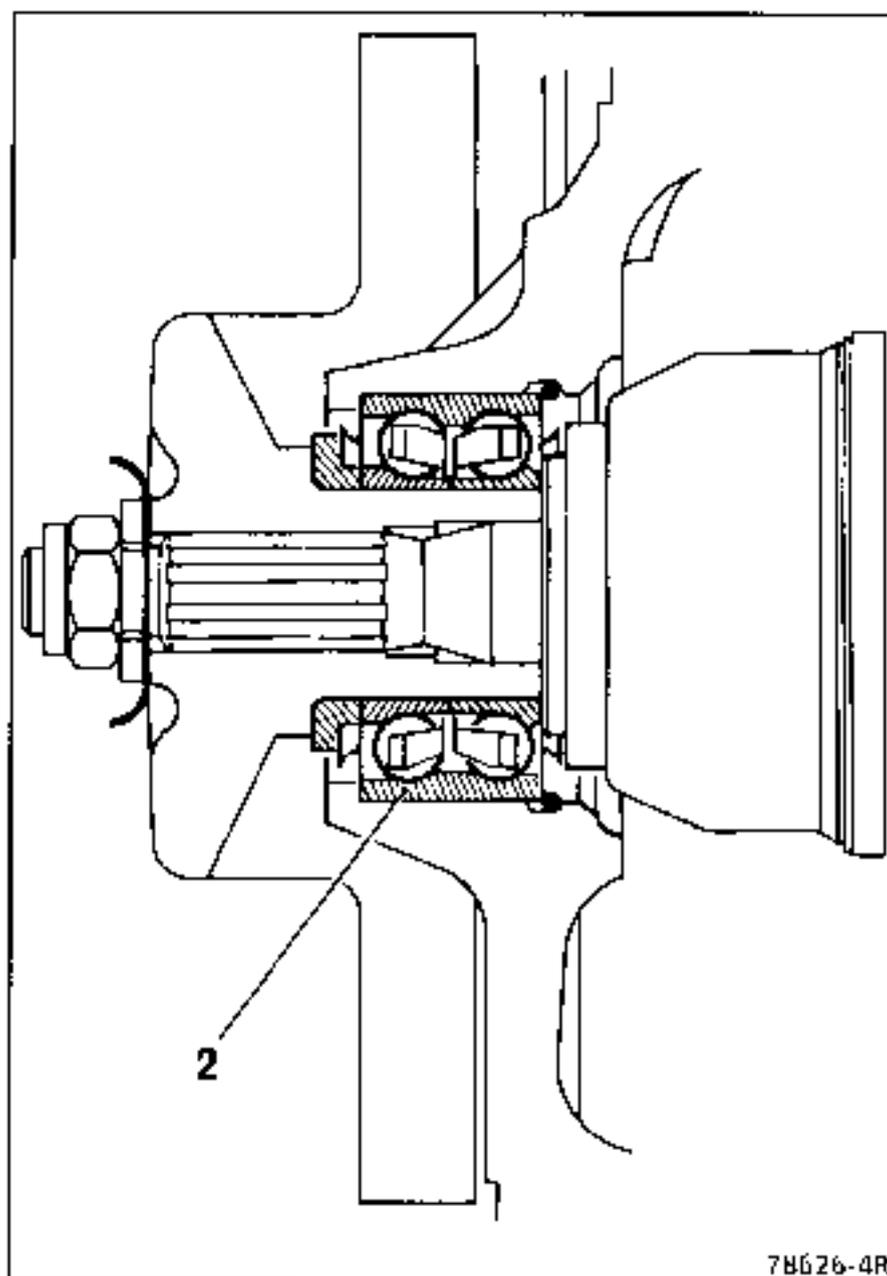


Proceed in the reverse order to removal and torque tighten the nuts as recommended.



The method for removing and refitting the stub axle carrier is identical to the method for changing the bearing.

NOTE : As the stress applied for fitting the outer track bearing (2) of the bearing in its bore is very great, the entire bearing must be changed when the outer track bearing is removed, since the bearing will have marked a path in the track bearings.



ESSENTIAL SPECIAL TOOLING

M.S.	580	Impact tool
Rou.	15-01	Shaft protecting end piece
Rou.	604-01	Hub locking tool
T.Av.	1050-02	Hub extractor

TIGHTENING TORQUES (in daN.m)

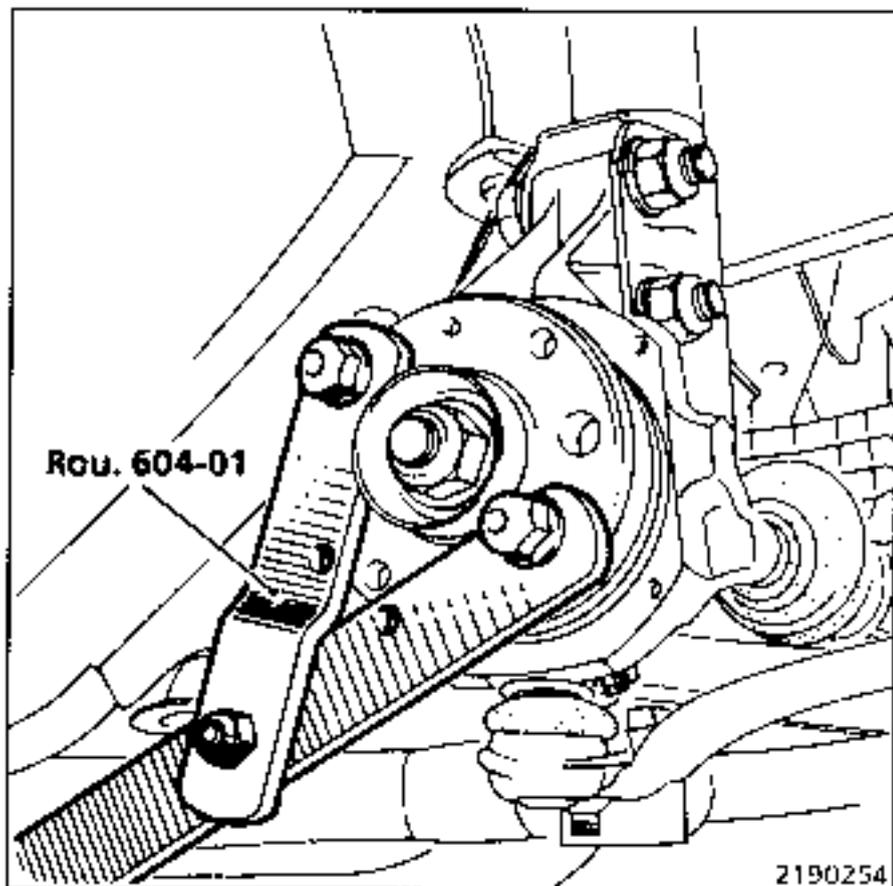


Driveshaft nuts		25
Wheel bolts	4 bolts	9
	5 bolts	10
Brake calliper securing bolts		10
Bearing mounting bolts		2

REMOVAL

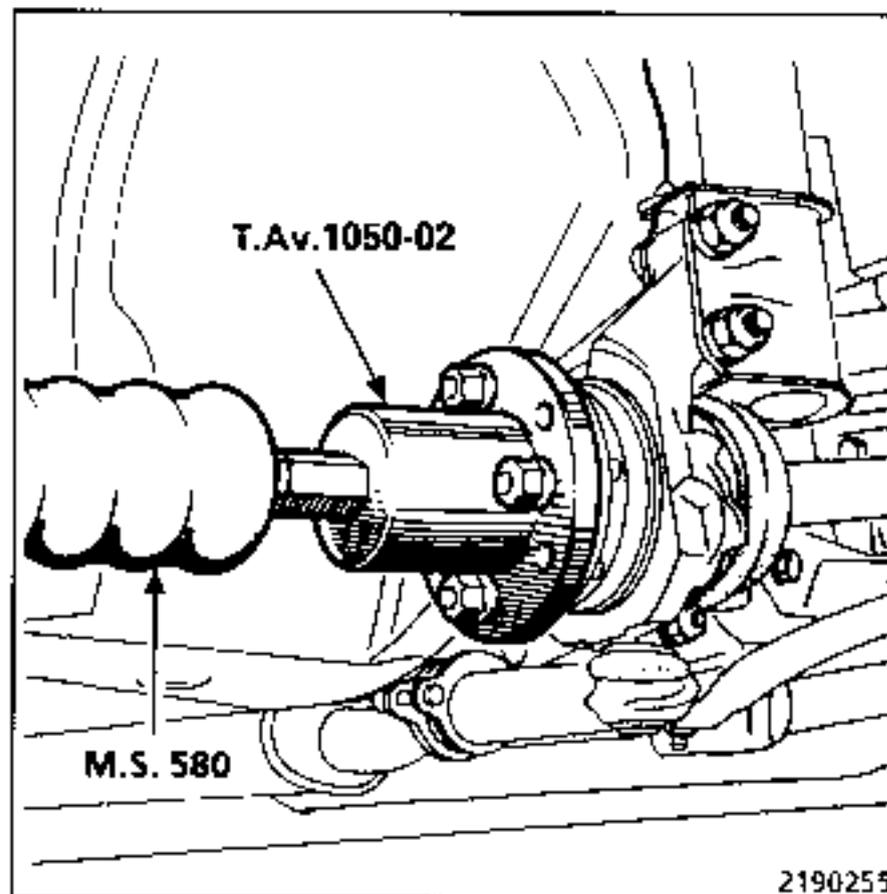
Remove:

- the brake disc (see "Braking system" section),
- the driveshaft nut, using tool Rou. 604-01.



2190254

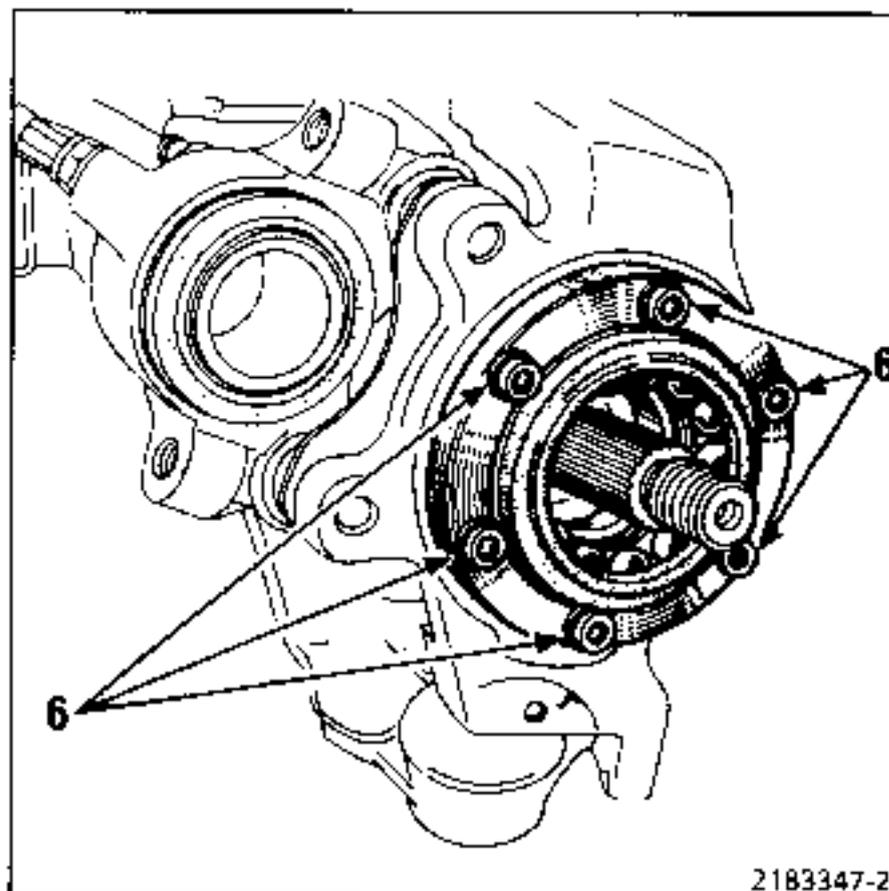
Extract the hub using tool T.Av. 1050-02 + M.S. 580.



2190255

Remove:

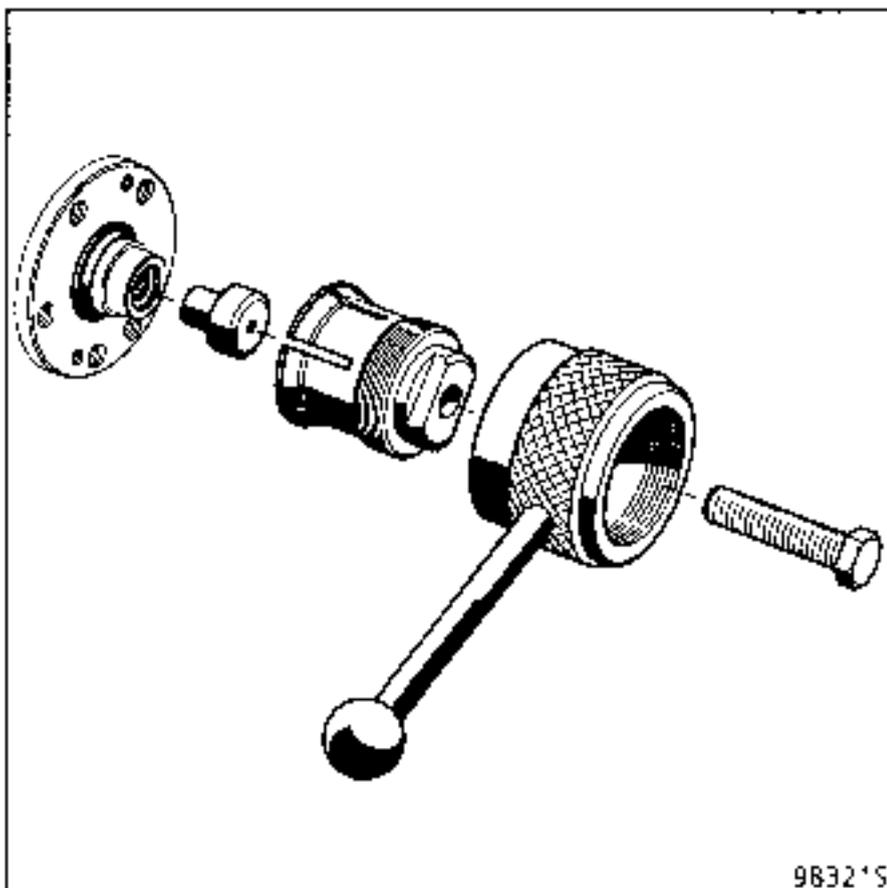
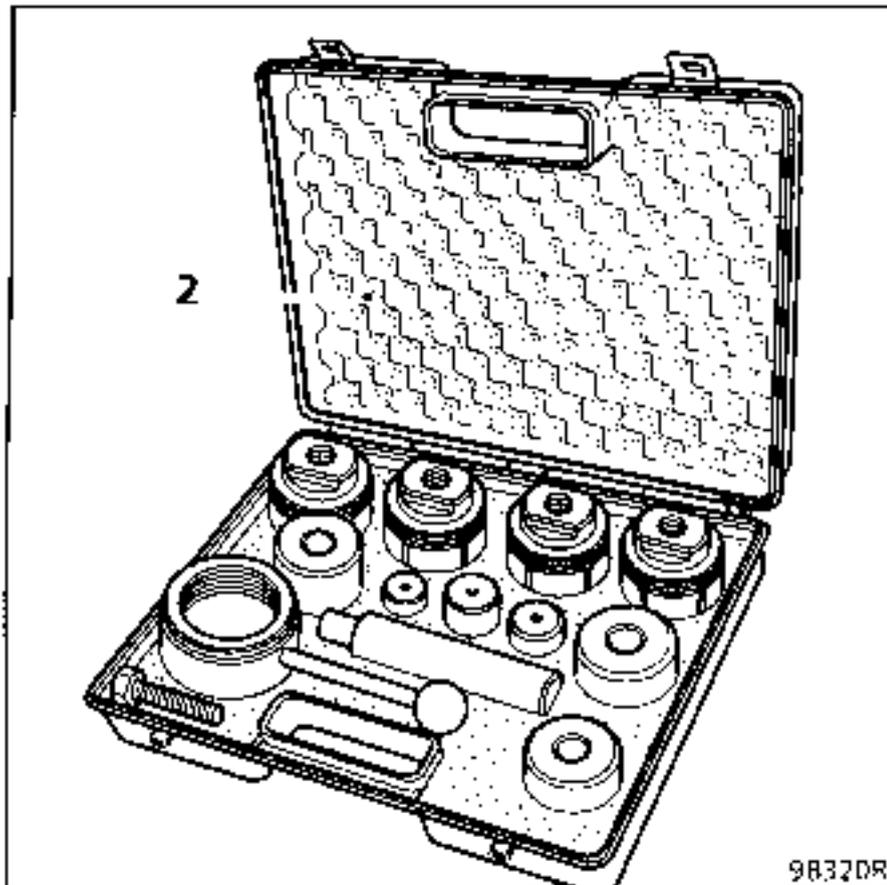
- the bolts (6) holding the bearing,



2183347-2

- the bearing and its inner half track bearing remaining on the driveshaft stub axle.

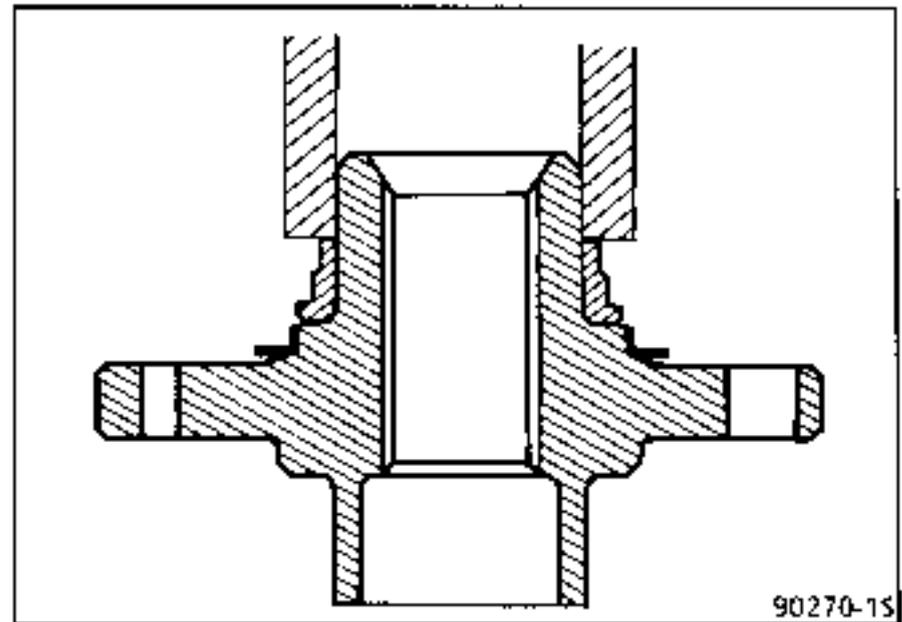
From the hub, extract the other half track bearing using a tool from the hub bearing extractor kit. Refer to Tooling Manual, tool reference 914 0951.



REFITTING

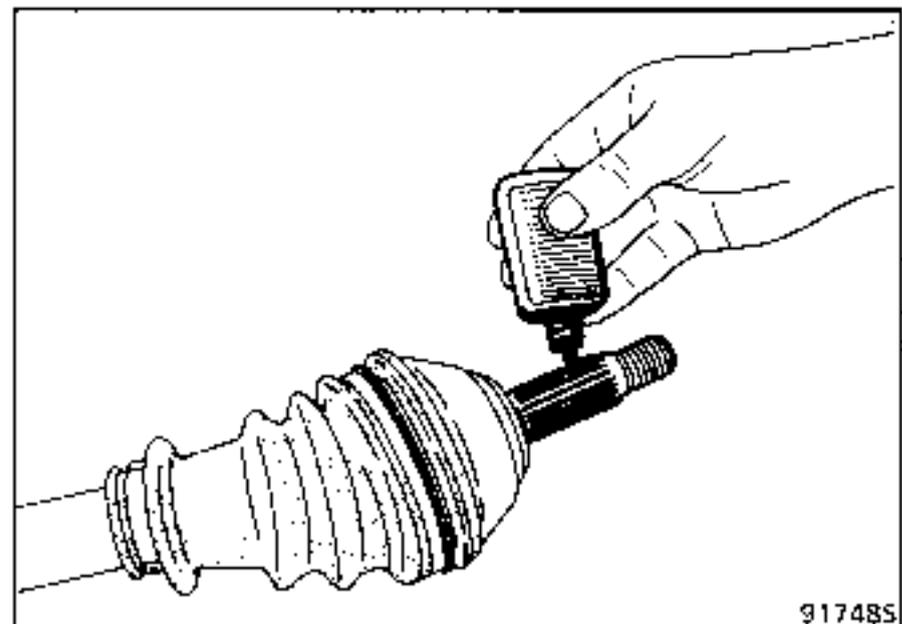
Engage the bearing inner half track bearing on the driveshaft stub axle and secure the bearing on the stub axle carrier

On the press, push the other half track bearing onto the hub using a piece of tubing with a bore of 41 mm.



Coat the ball bearings, the bearing tracks and sealing lips with grease.

Coat the driveshaft stub axle with LOCTITE SCELBLOC.



Engage the hub on the driveshaft stub axle (using a mallet if necessary) until the nut can be screwed up by a few threads.

fit in place the hub locking tool Rou. 604-01 and torque tighten the driveshaft nut.

Refit the braking assembly (see relevant section).

For transverse engines, please refer to the "Stub axle carrier bearing" section.

ESSENTIAL SPECIAL TOOLING

Rou.	604-01	Hub locking tool
T.Av.	476	Hub extractor

TIGHTENING TORQUES (in daN.m)

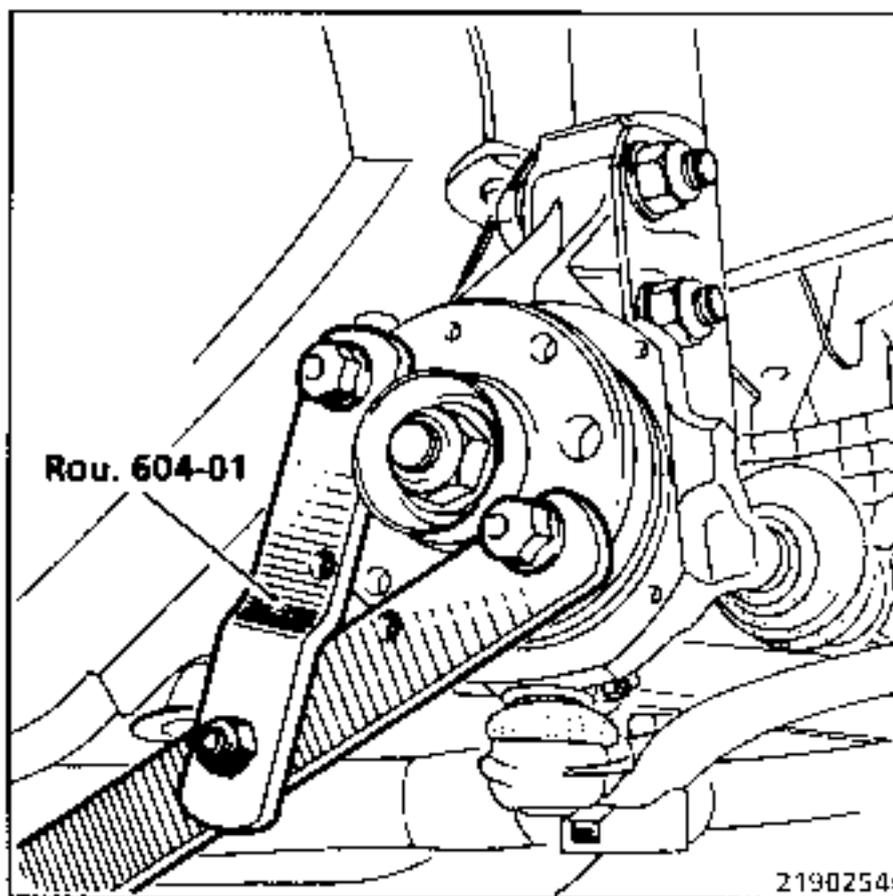


Bolts securing stub axle carrier to shock absorber base	20
Lower ball joint key-securing nuts	6
Steering ball joint nuts	4
Brake calliper securing bolts	10
Driveshaft nuts	25
Wheel bolts 4 bolts	9
5 bolts	10

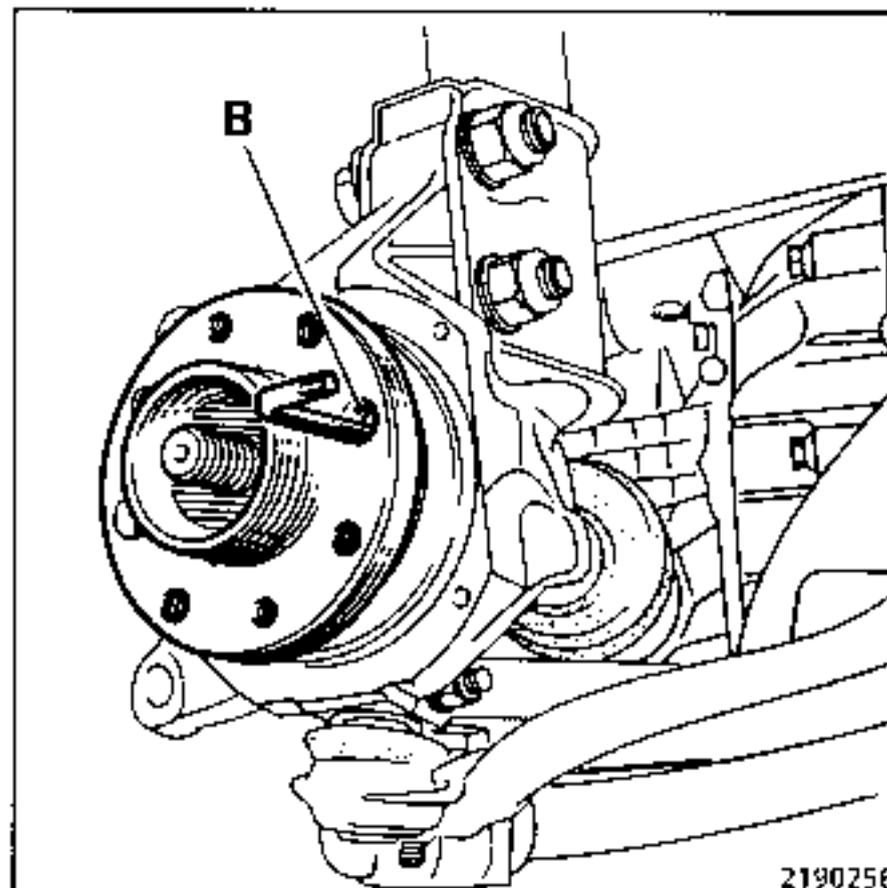
REMOVAL

Remove :

- the brake disc (see "Braking system" section),
- the driveshaft nut, using tool Rou. 604-01.

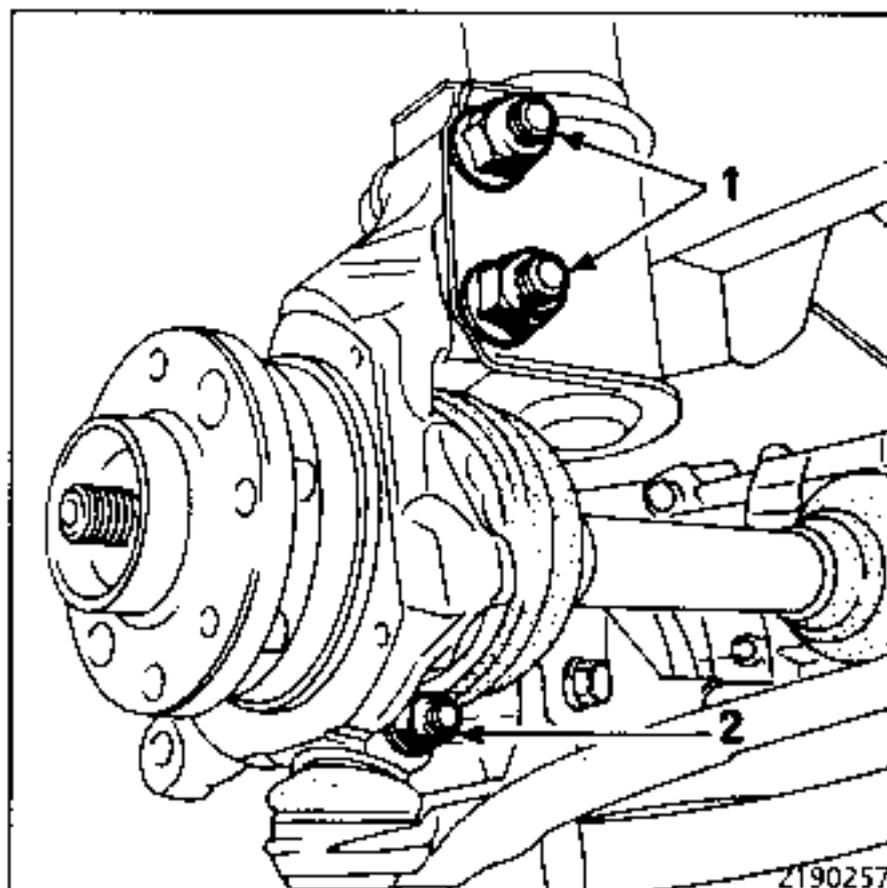


Through holes (B) in the hub, remove the bearing securing bolts.



Remove:

- the hub-bearing assembly,
- the securing bolts (1),
- the key-securing nut and bolt (2),



- the stub axle carrier.

REFITTING

When the stub axle carrier has been secured, reassemble the bearing and braking system, taking care that all components are clean and in good operating order.

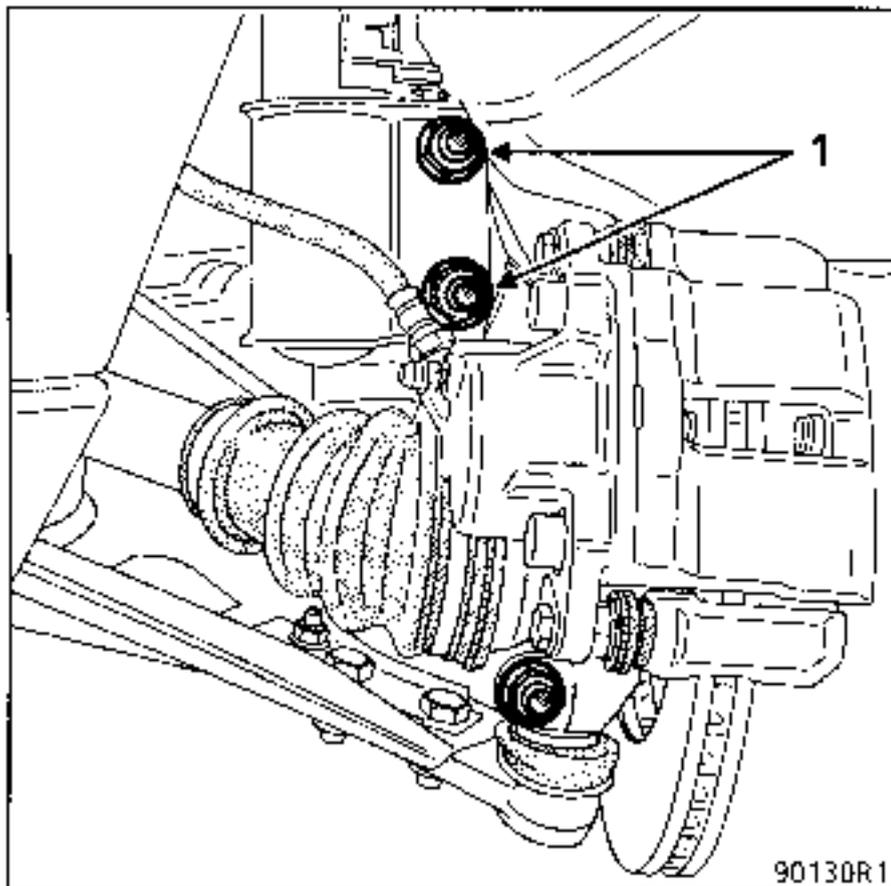
TIGHTENING TORQUES (in daN.m)		
Shock absorber piston rod nuts	6	
Shock absorber base securing bolts	8	
Shock absorber cup securing nuts	2.5	
Wheel bolts	9	

REMOVAL

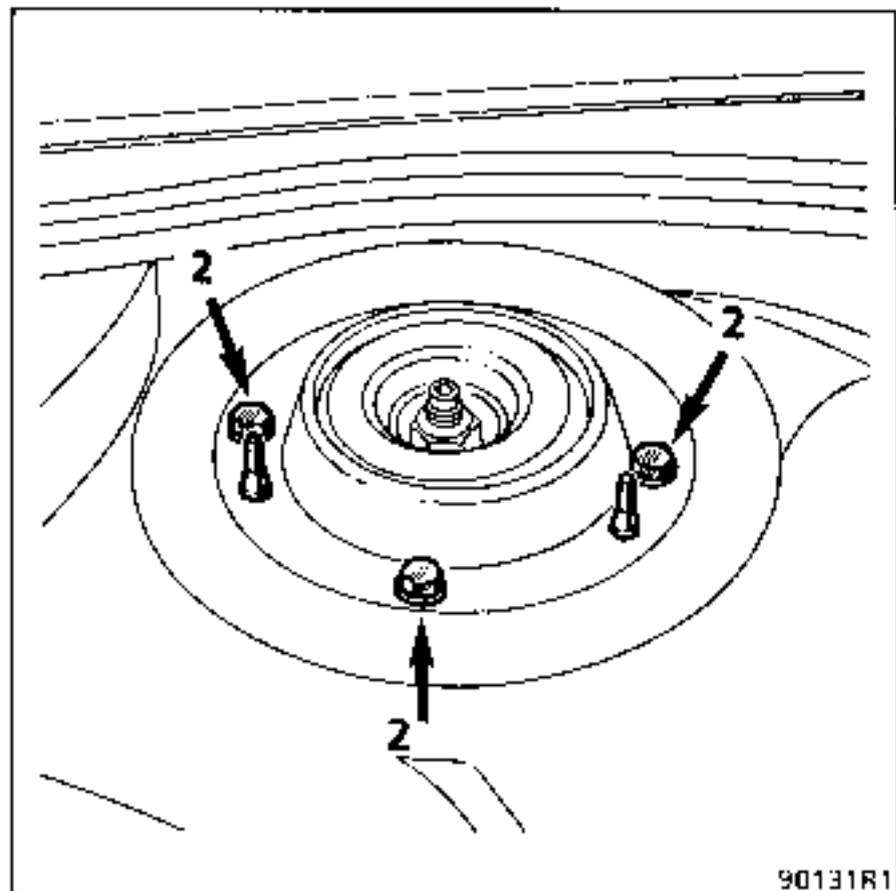
With the vehicle on stands on the side in question.

Remove:

- the wheel,
- the two bolts (1) securing the bottom of the shock absorber,



- the three upper securing bolts (2),



- the shock absorber, pressing down on the bottom arm to prevent the shock absorber coming into contact with the driveshaft gaiter.

REFITTING

Proceed in the reverse order to removal, taking care not to damage the driveshaft gaiter.

Torque tighten :

- bolts (1) securing the bottom of the shock absorber (1),
- upper securing bolts (2).

ESSENTIAL SPECIAL TOOLING

T.Av. 476 Ball joint extractor

TIGHTENING TORQUES (in daN.m)



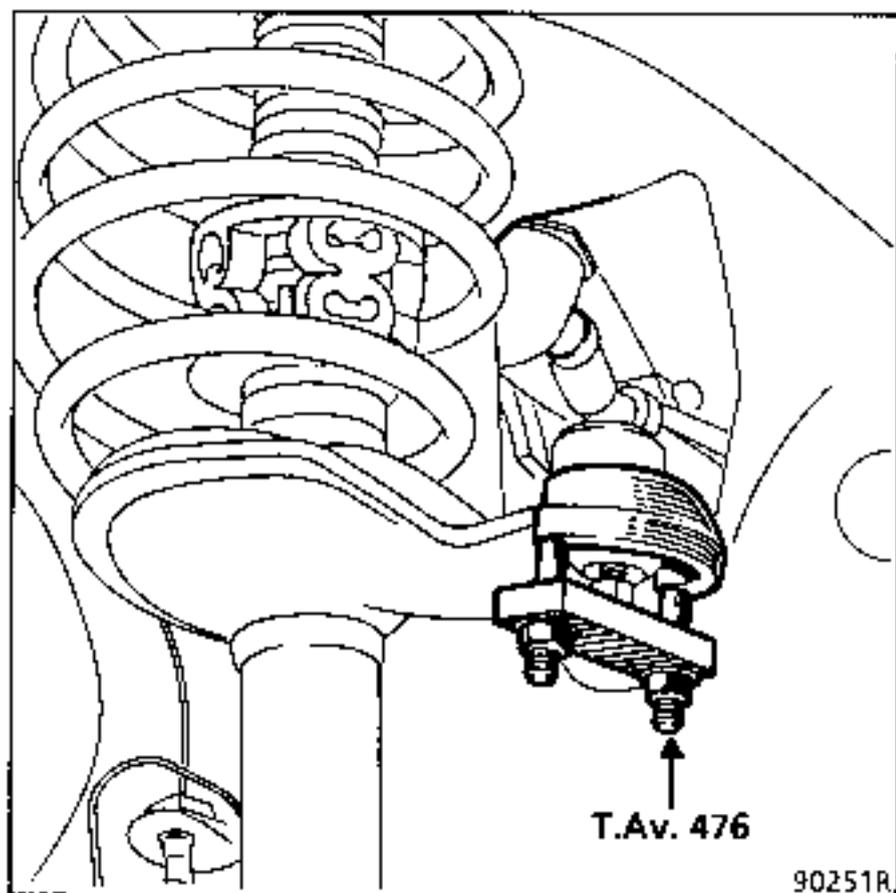
Shock absorber piston rod nuts	6
Shock absorber base securing bolts	20
Shock absorber cup securing nuts	2.5
Steering ball joint nut	4
Wheel bolts	4 bolts 9
	5 bolts 10

REMOVAL

With the vehicle on stands on the side in question.

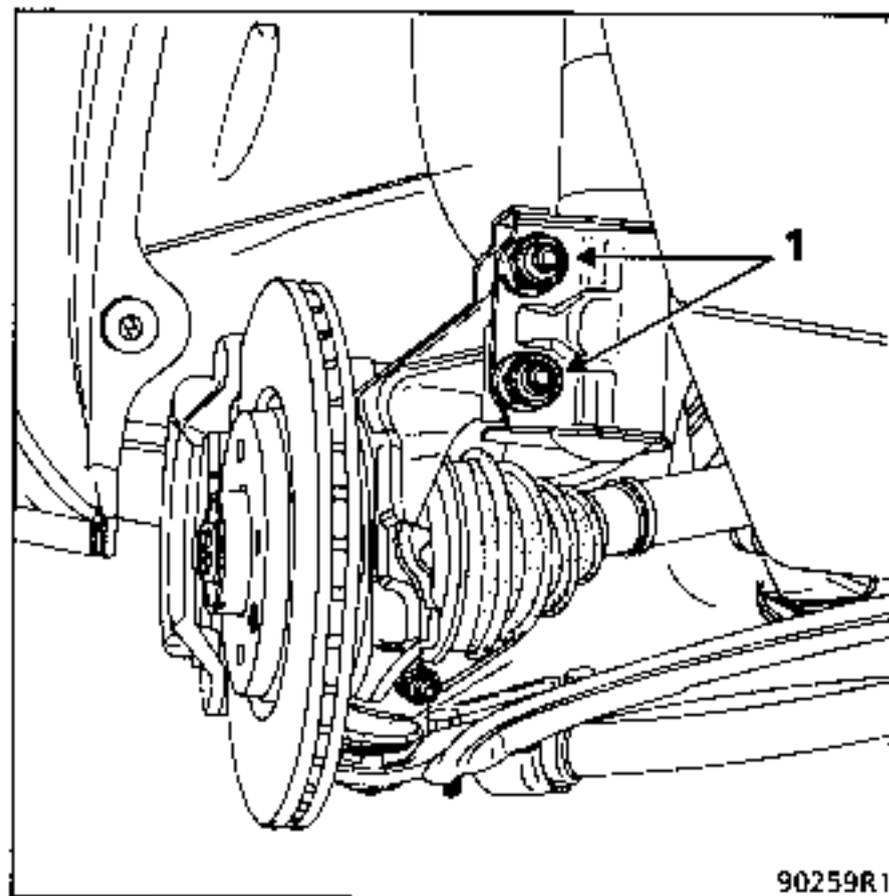
Remove :

- the wheel,
- the steering ball joint, using tool T.Av. 476,

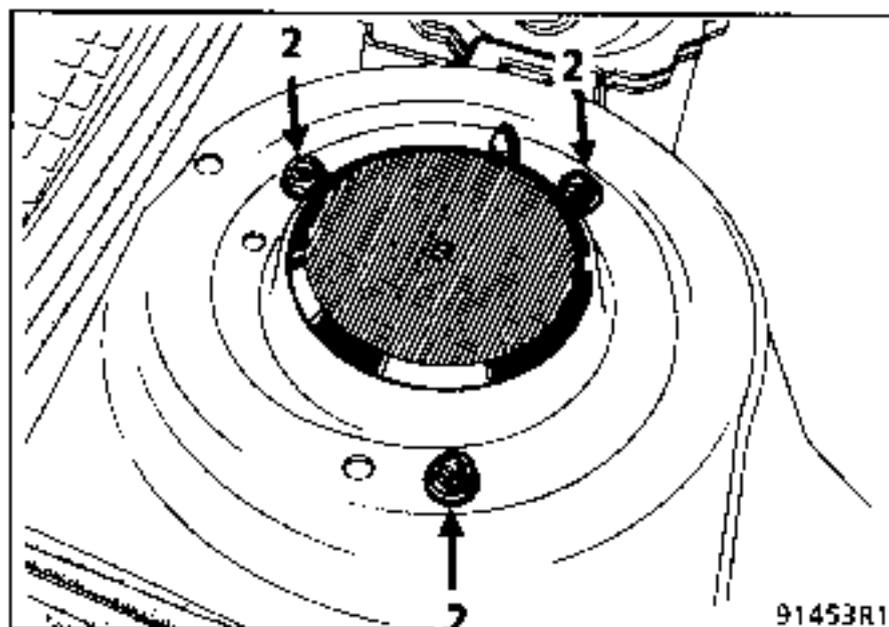


- the two bolts (1) securing the bottom of the shock absorber,

NOTE : The bolts have a splined section so they must be tapped with a mallet for removal.



- the three upper securing bolts (2),



- the shock absorber, by pressing on the bottom arm to prevent the shock absorber coming into contact with the driveshaft gaiter.

REFITTING

Fit the shock absorber, taking care not to damage the driveshaft gaiter.

Refit and torque tighten :

- the steering ball joint,
- the bolts (1) securing the bottom of the shock absorber,
- the upper securing bolts(2).

Check and, if necessary, adjust the parallelism.

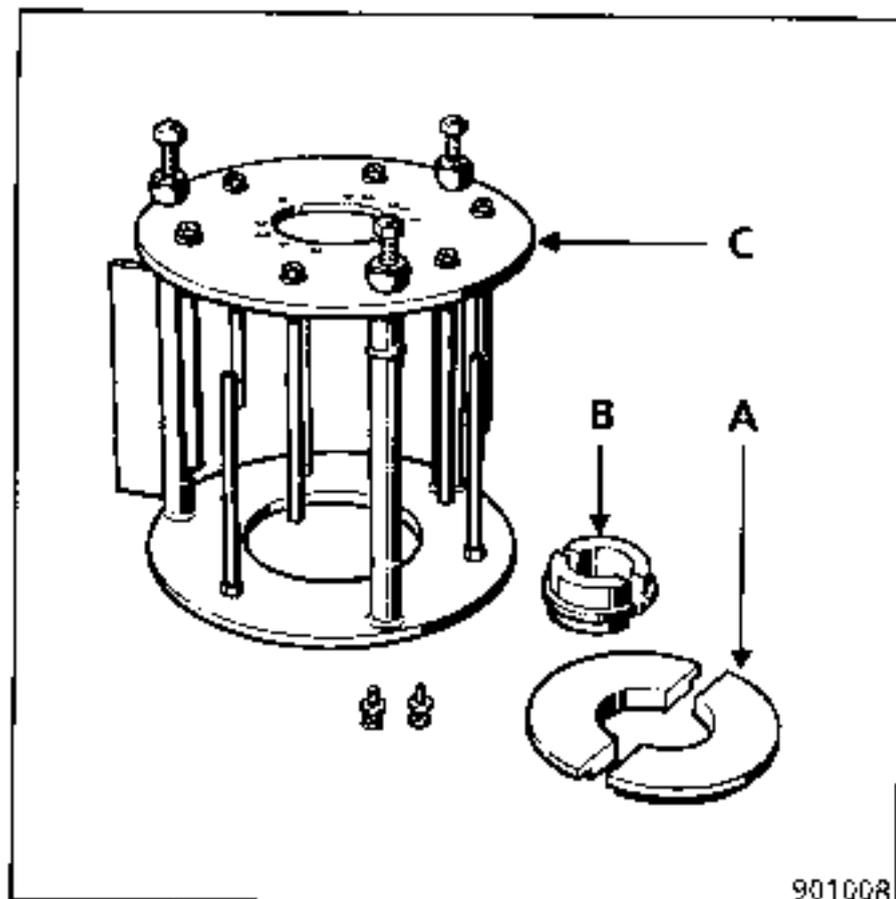
NOTE : As the steering arm is mounted on the shock absorber body, the parallelism must be checked when the shock absorber has been changed.

In view of the high compression load of the coil springs, it is essential that all suspension tooling is kept in perfect condition.

ESSENTIAL SPECIAL TOOLING

Sus. 1052 Tooling for operating on front spring and shock absorber

Use components A - C - D - F from tool Sus. 1052.

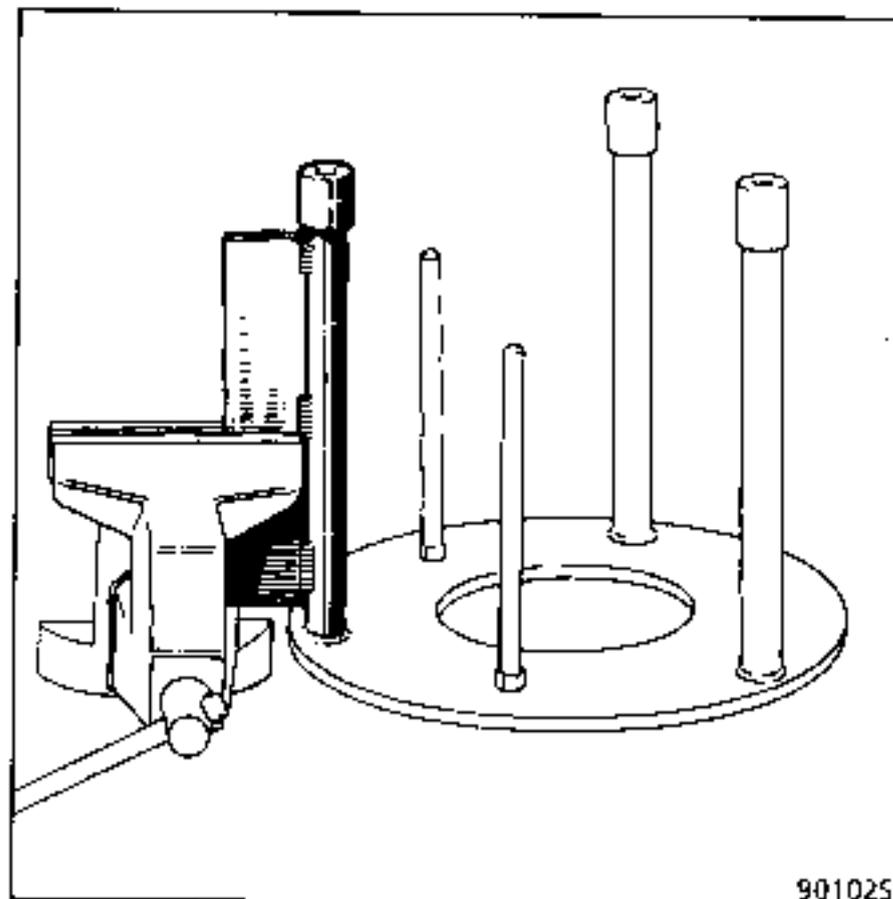


Upper and lower compression pad assembly.

- A Retainer half cups.
- C Half shell marked R21 for retaining 48mm diameter shock absorber body.
- D Spigot.
- F Half shell marked R9 - R11 for 50 mm diameter shock absorber body.

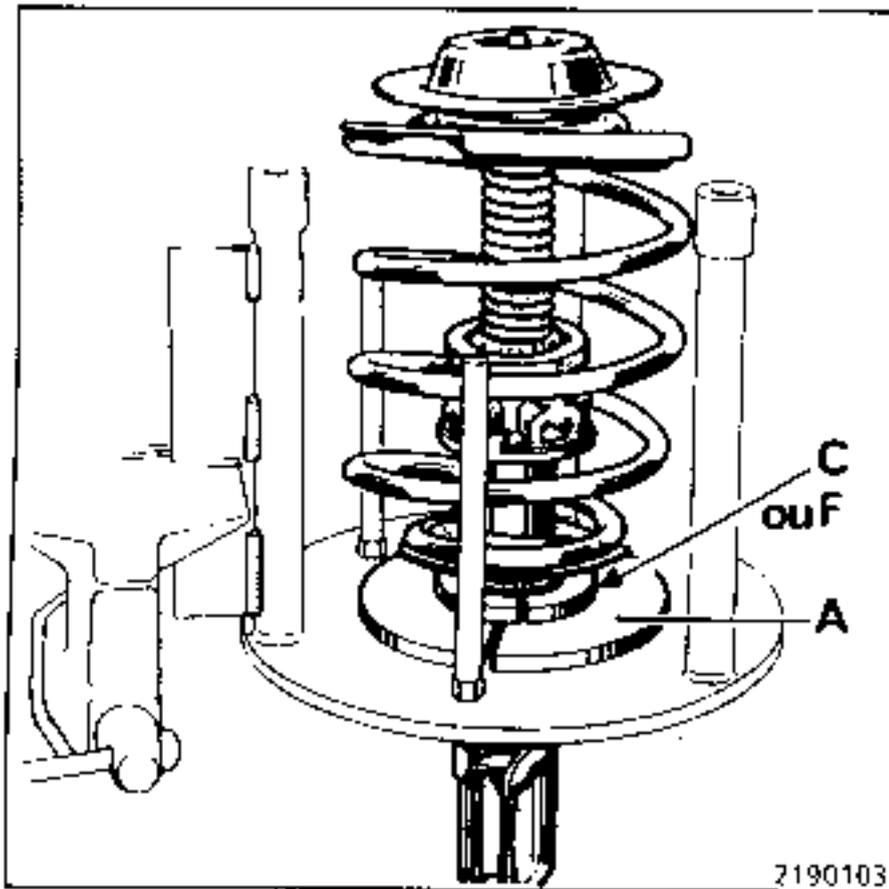
DISMANTLING THE SPRING AND SHOCK ABSORBER

Place the lower pad from tool Sus. 1052 in a vice.

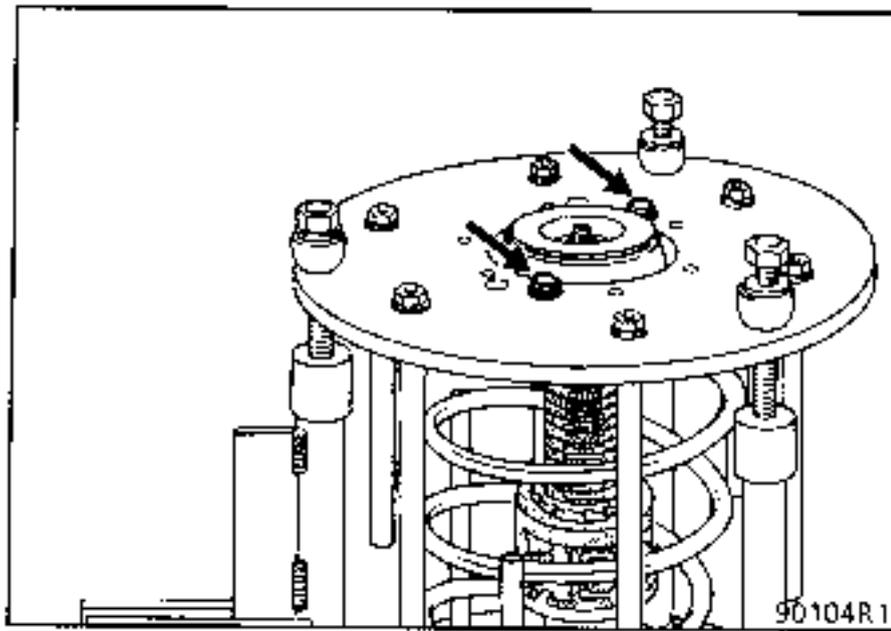


Fit in place :

- the spring-shock absorber assembly, positioning the two half-cups A and the two half-shells C for the 48 mm diameter shock absorber or two half-shells F for the 50 mm diameter shock absorber,

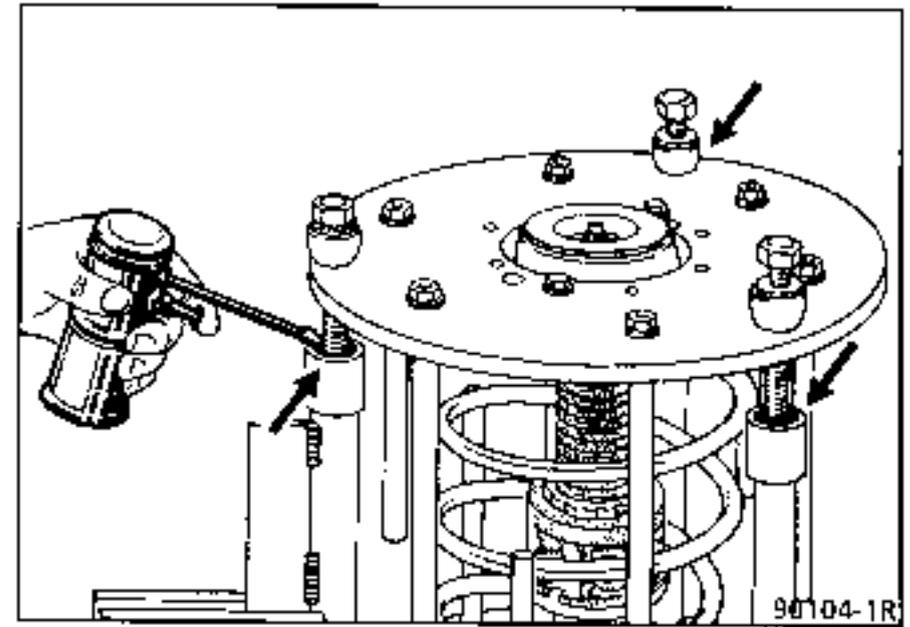


- the upper pad,
- the two bolts, holding the upper shock absorber cup in the marked holes (vehicle markings given on the upper pad),

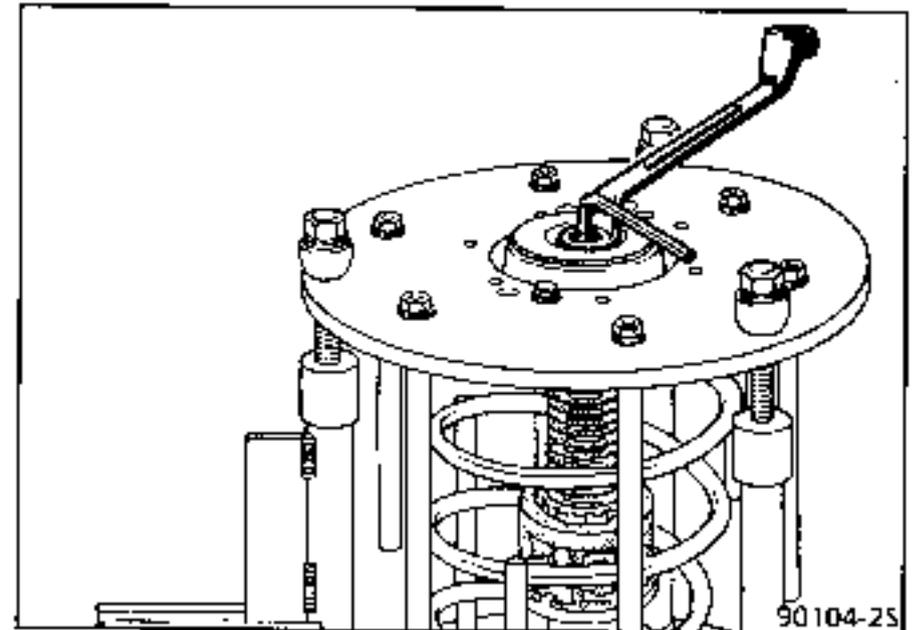


- the three compression bolts, putting plenty of oil in the oil grooves.

NOTE : As the threaded rods of the tool are subject to very great stresses, it is essential for them to be liberally oiled.

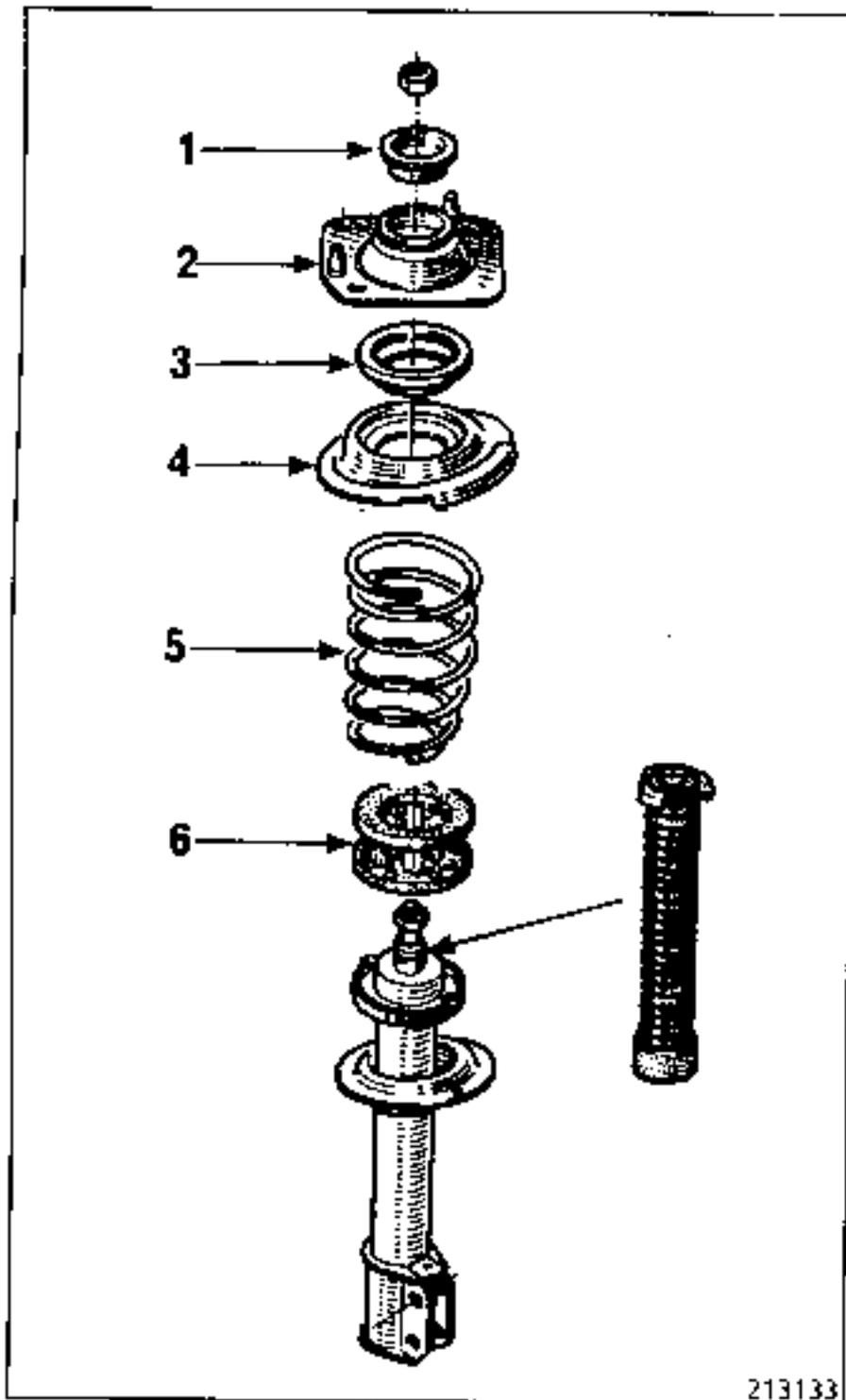


- Compress the spring by approximately 10 mm.
- Remove the nut from the shock absorber rod.



- Gradually release the pressure from the spring.

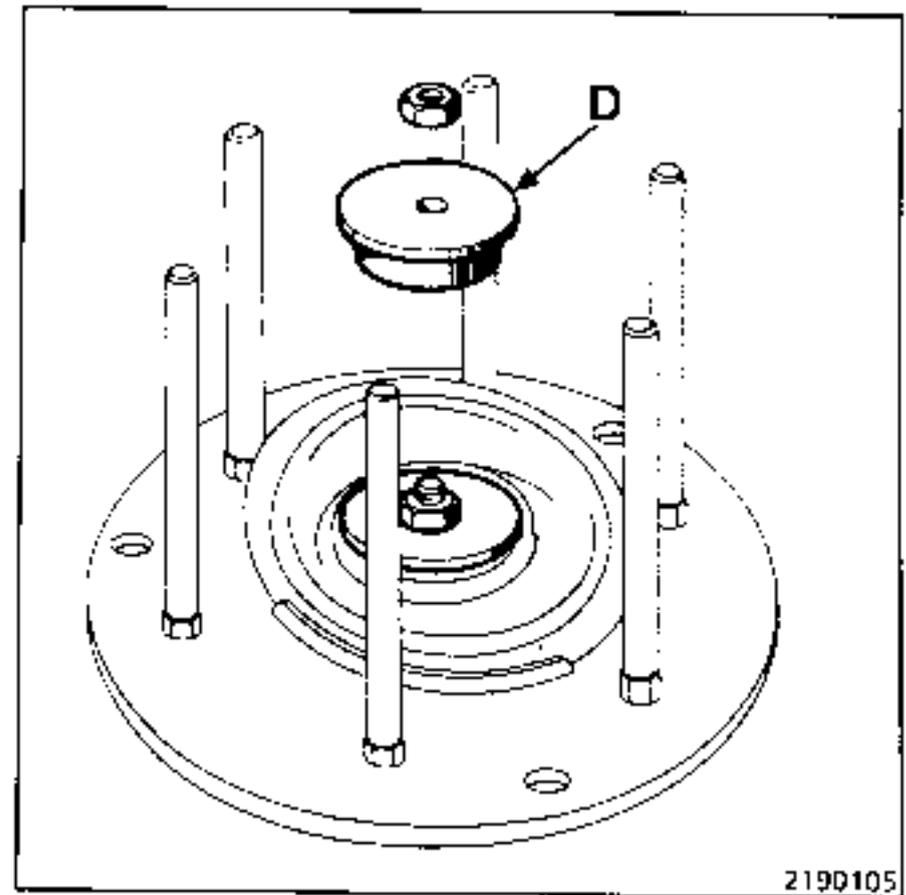
Remove parts 1 to 6 in order.



Parts 3 and 4 form the stub axle carrier pivot assembly.

REFITTING THE SPRING AND SHOCK ABSORBER

Fit spigot D in place on the upper pad of tool Sus. 1052 so as to hold assembly 2 - 3 - 4 in position.

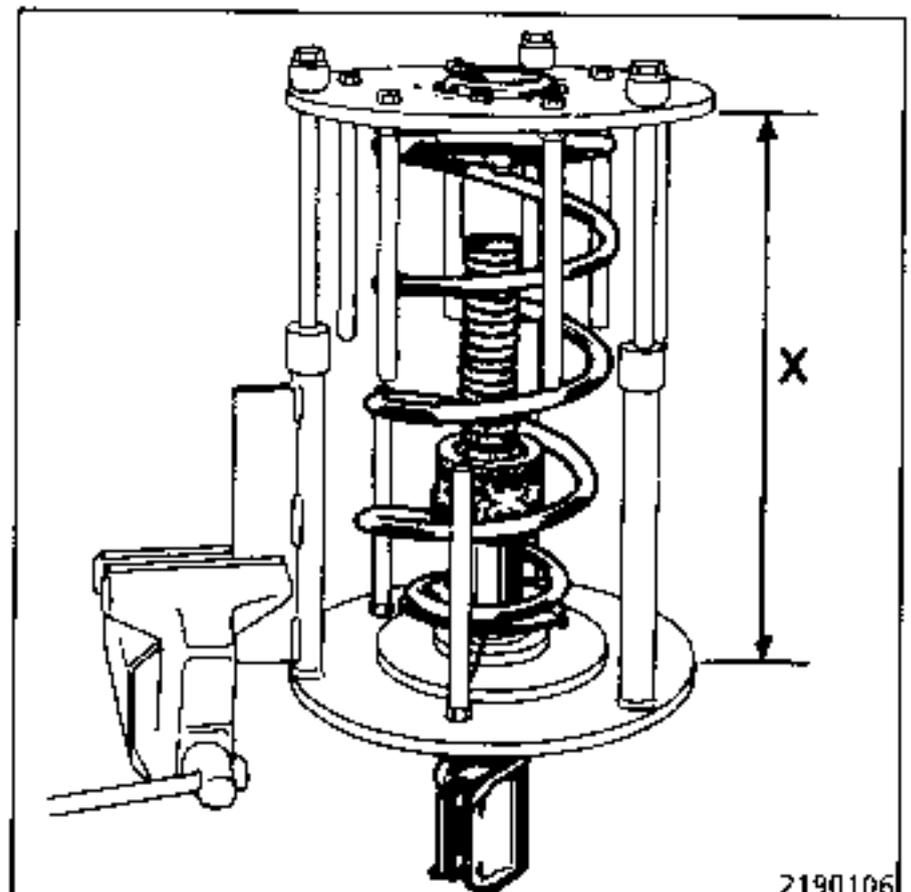


Position :

- the shock absorber,
- the spring on the lower shock absorber cup so that it is positioned correctly on the retaining stop,
- the upper pad/spigot assembly with the markings opposite one another.

Make sure that the spring is against the upper stop.

Compress the assembly to a height X of approximately 400 mm.

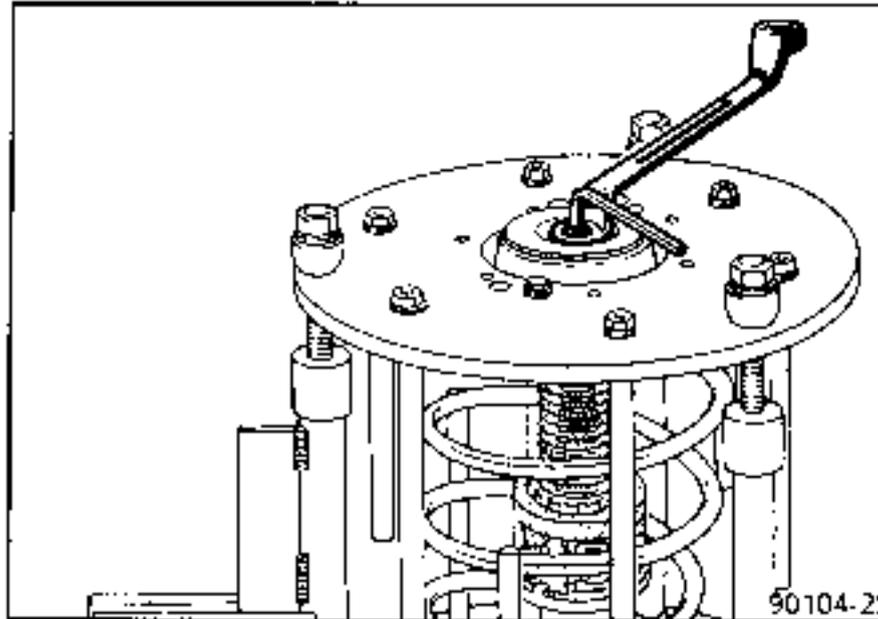


Remove the spigot.

Compress the assembly and insert the shock absorber rod.

Fit in place :

- cup (1),
- the nut.



Torque tighten the nut.

Gradually release the pressure from the spring.

Remove:

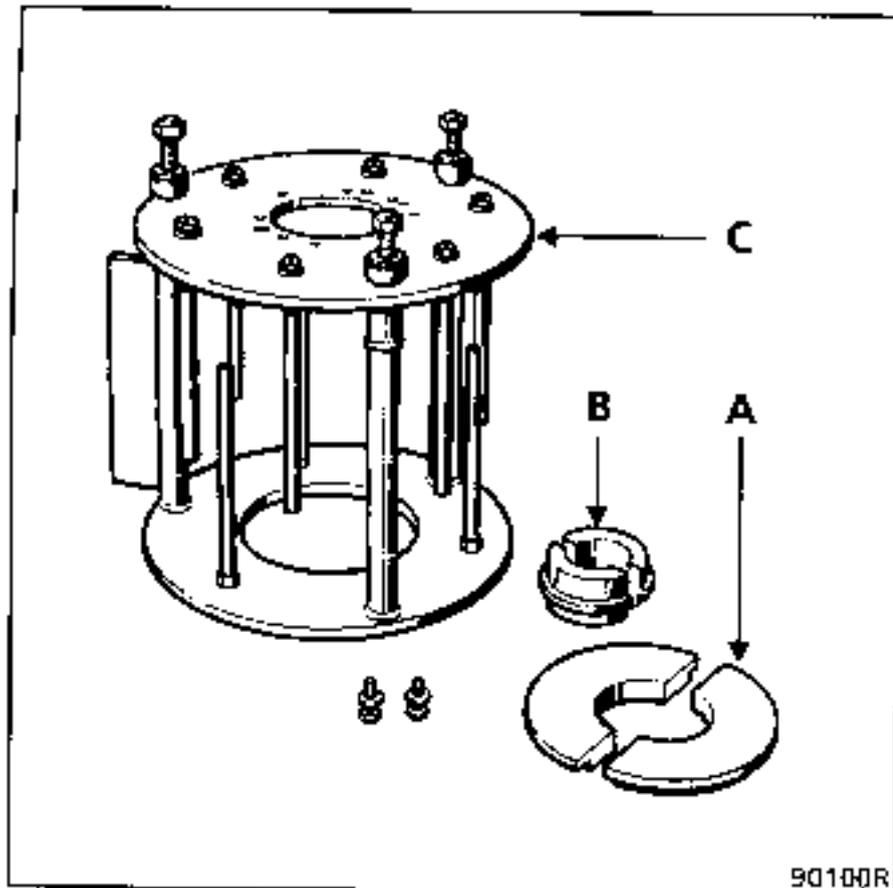
- the upper pad from the tool,
- the spring-shock absorber assembly from the compression tool.

In view of the high compression load of the coil springs, it is essential that all suspension tooling is kept in perfect condition.

ESSENTIAL SPECIAL TOOLING

Sus. 1052 Tooling for operating on front spring and shock absorber

Use components A - D - E from tool Sus. 1052.



Upper and lower compression pad assembly.

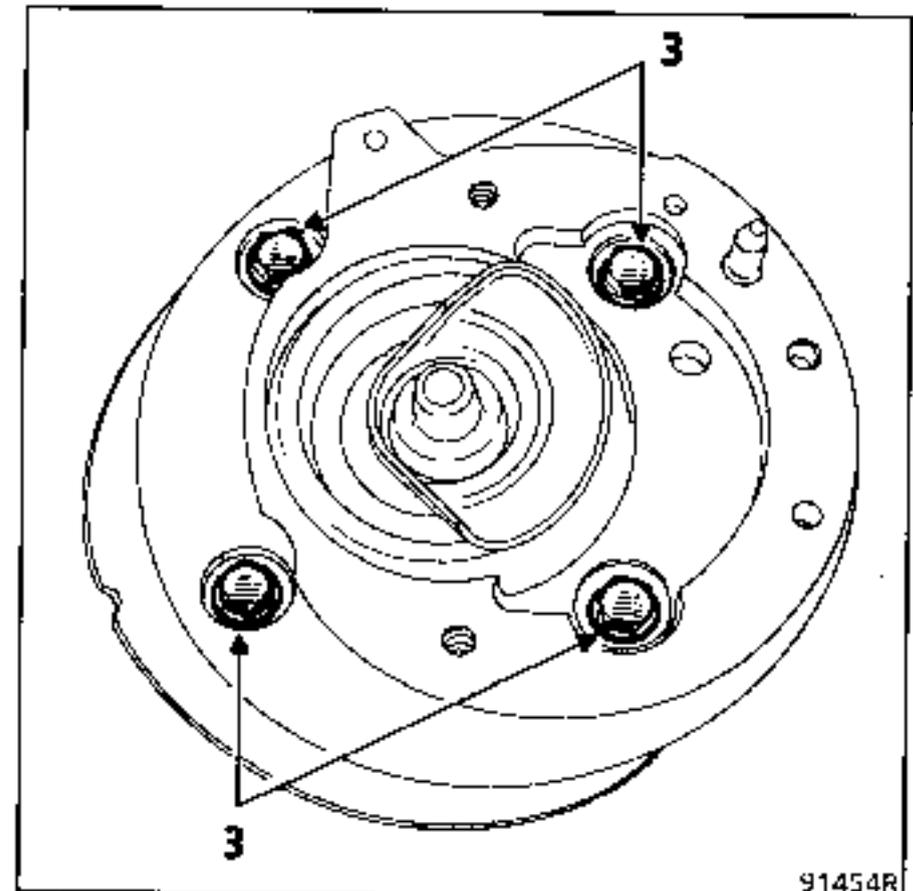
A Retainer half cups.

D Spigot.

E Half shell marked R21.

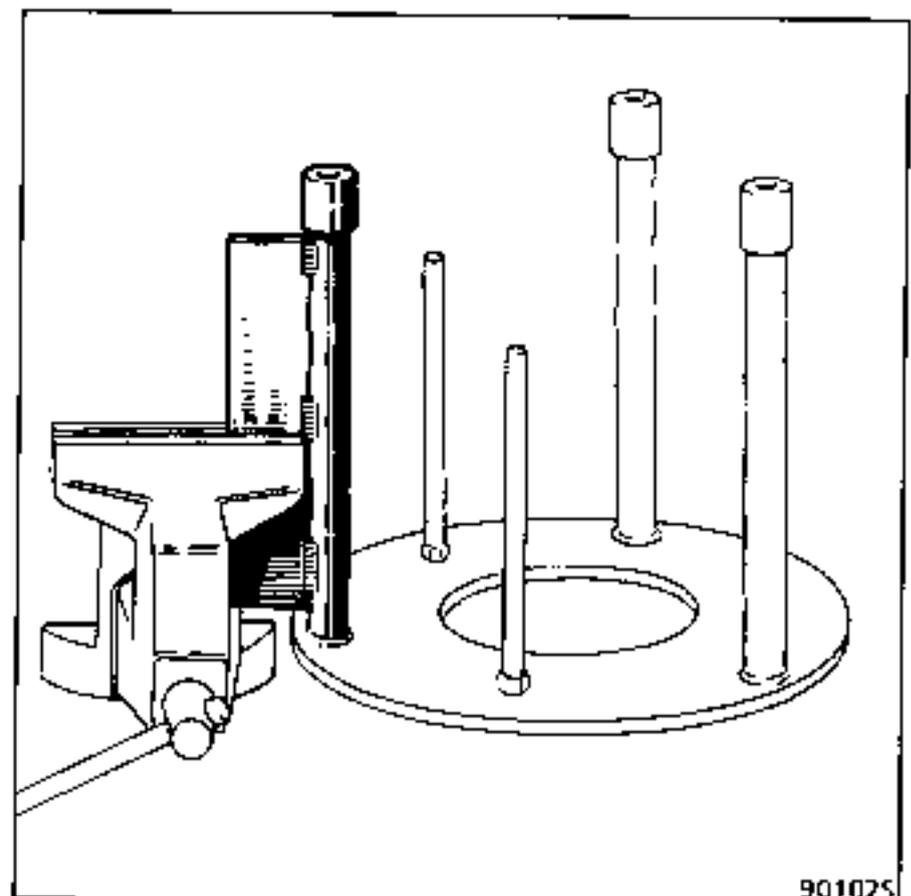
Special feature of L485

Remove the upper pad (four mounting bolts 3) from the spring-shock absorber assembly.



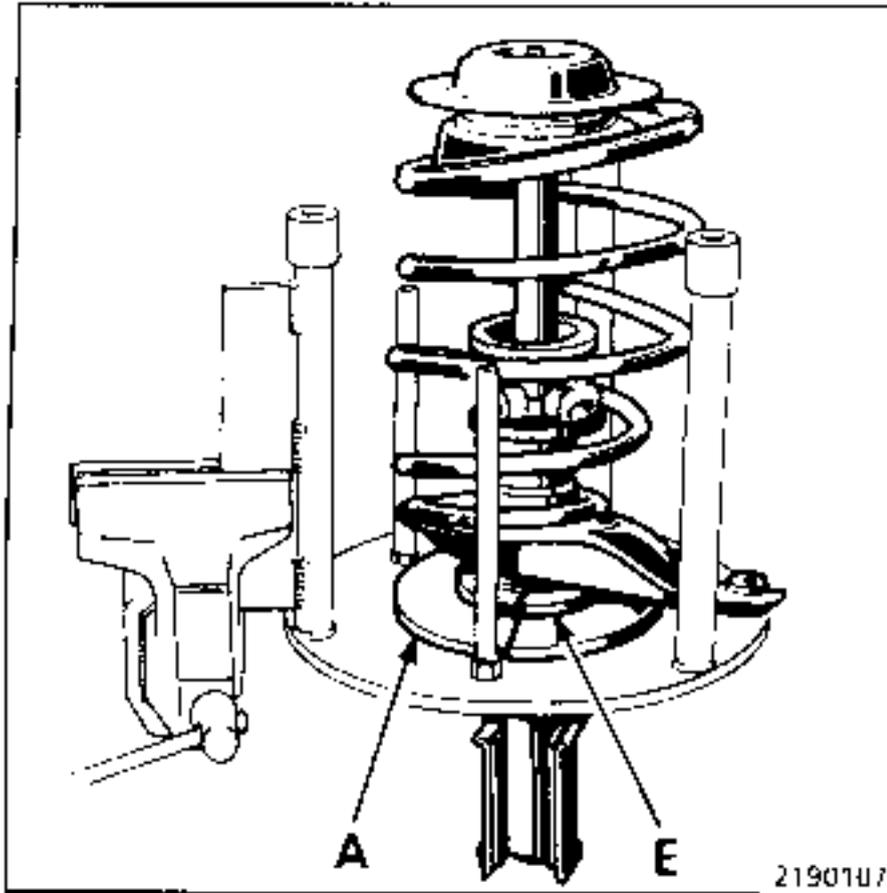
DISMANTLING THE SPRING AND SHOCK ABSORBER

Place the lower pad from tool Sus. 1052 in a vice.

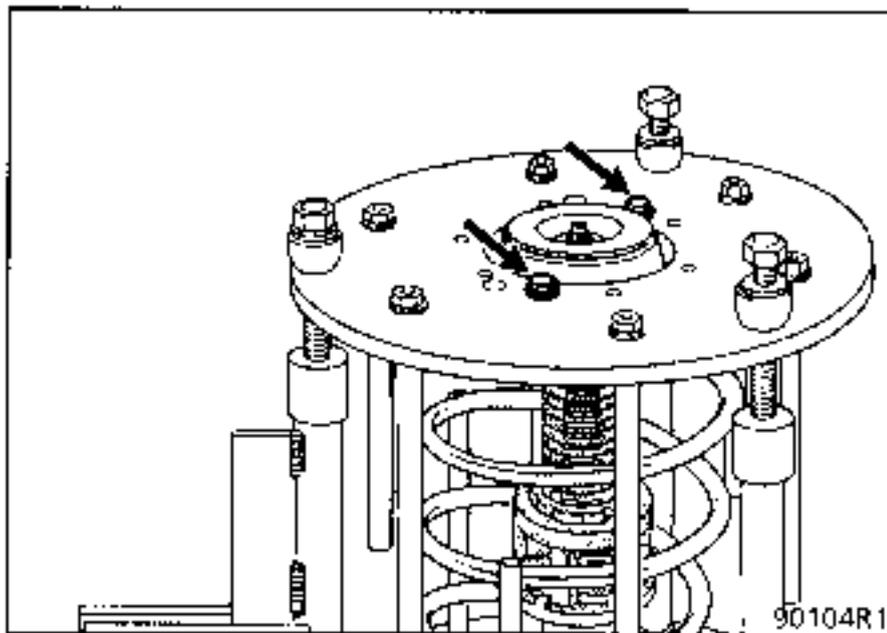


Fit in place :

- the spring-shock absorber assembly, positioning the two half cups (A) and the two half shells (E) as shown in the drawing,

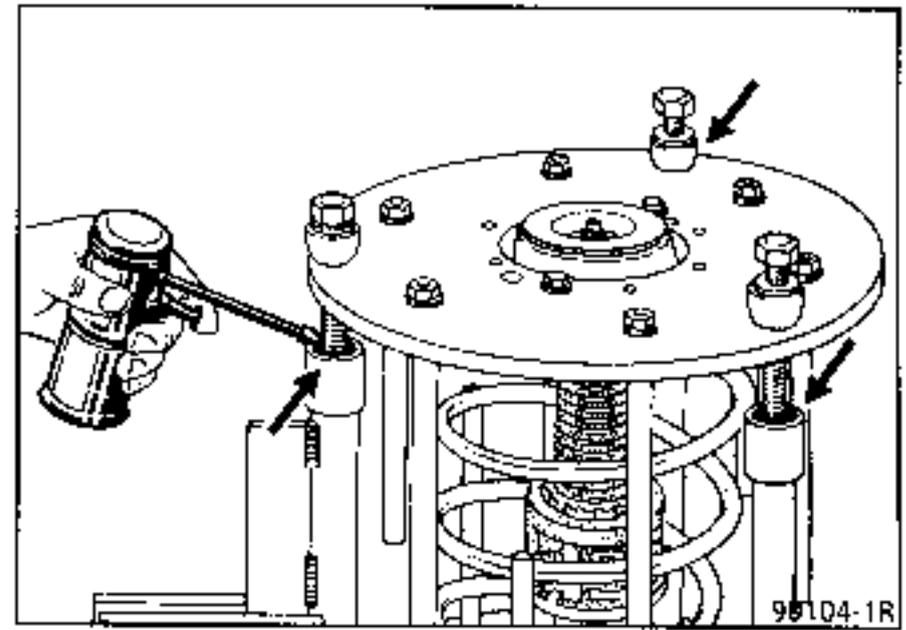


- the upper pad,
- the two bolts holding the upper shock absorber cup in the marked holes (vehicle markings stamped on the upper pad),

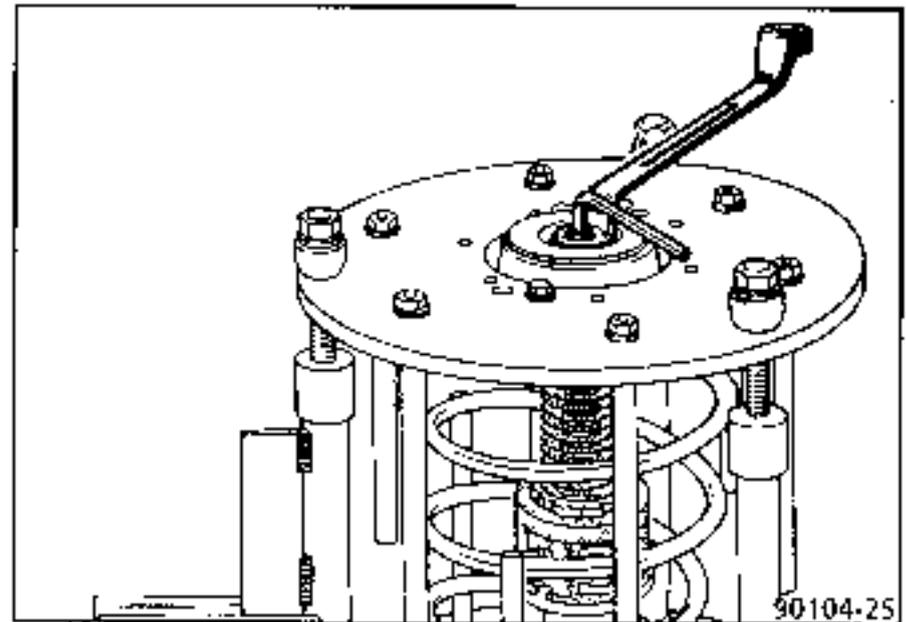


- the three compression bolts, putting plenty of oil in the oil grooves.

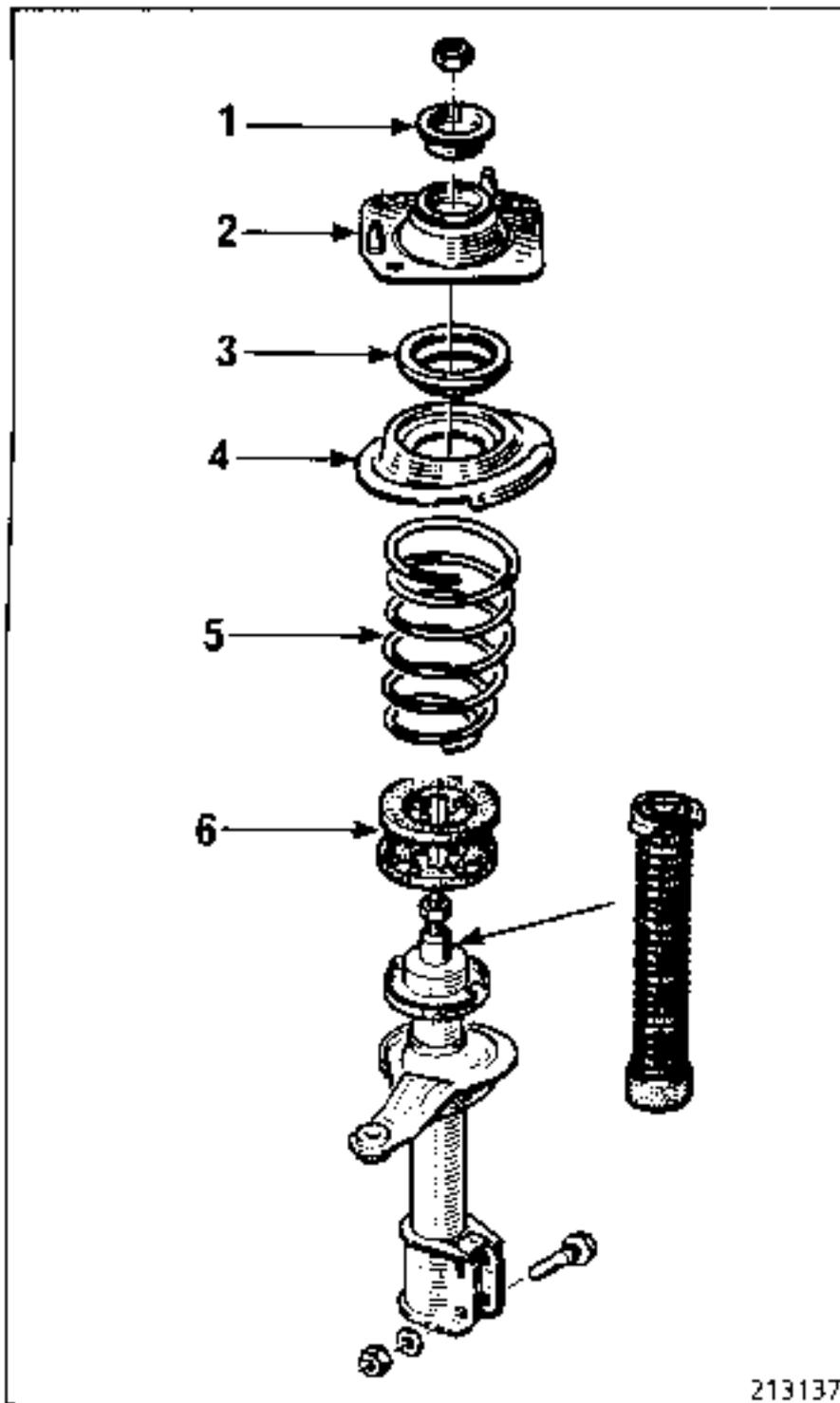
NOTE : As the threaded rods of the tool are subject to very great stresses, it is essential for them to be liberally oiled.



- Compress the spring by approximately 10 mm.
- Remove the nut from the shock absorber rod.



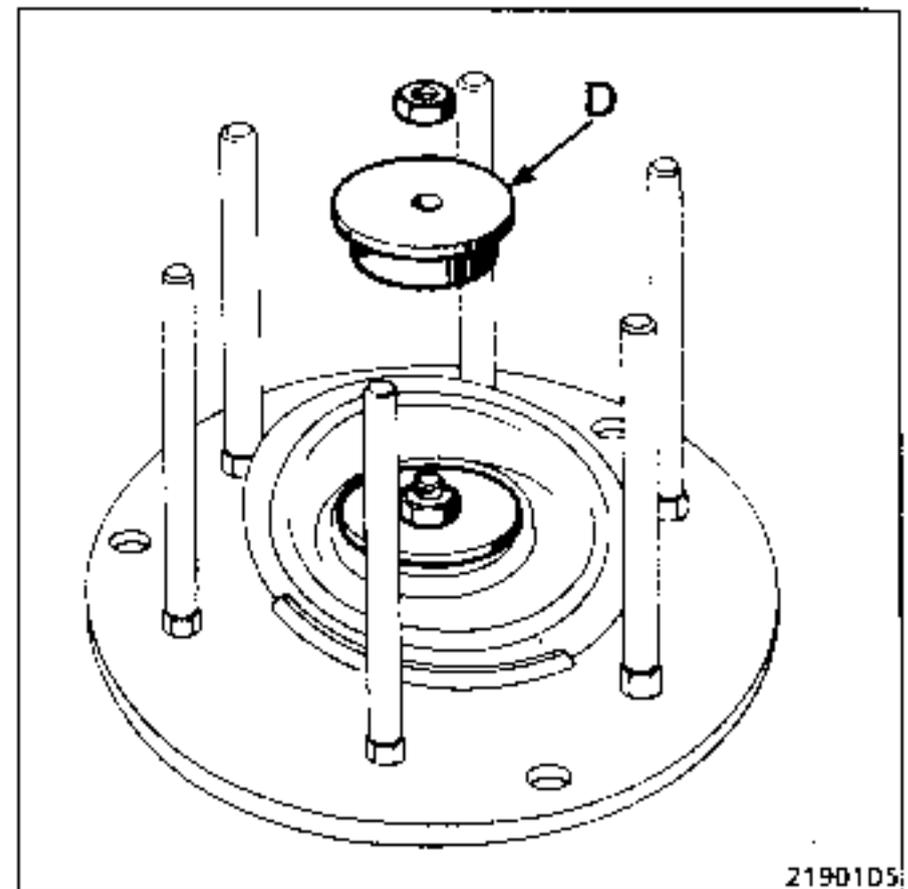
- Gradually release the pressure from the spring.
- Remove parts 1 to 6 in numerical order.



Parts 3 and 4 form the stub axle carrier pivot assembly.

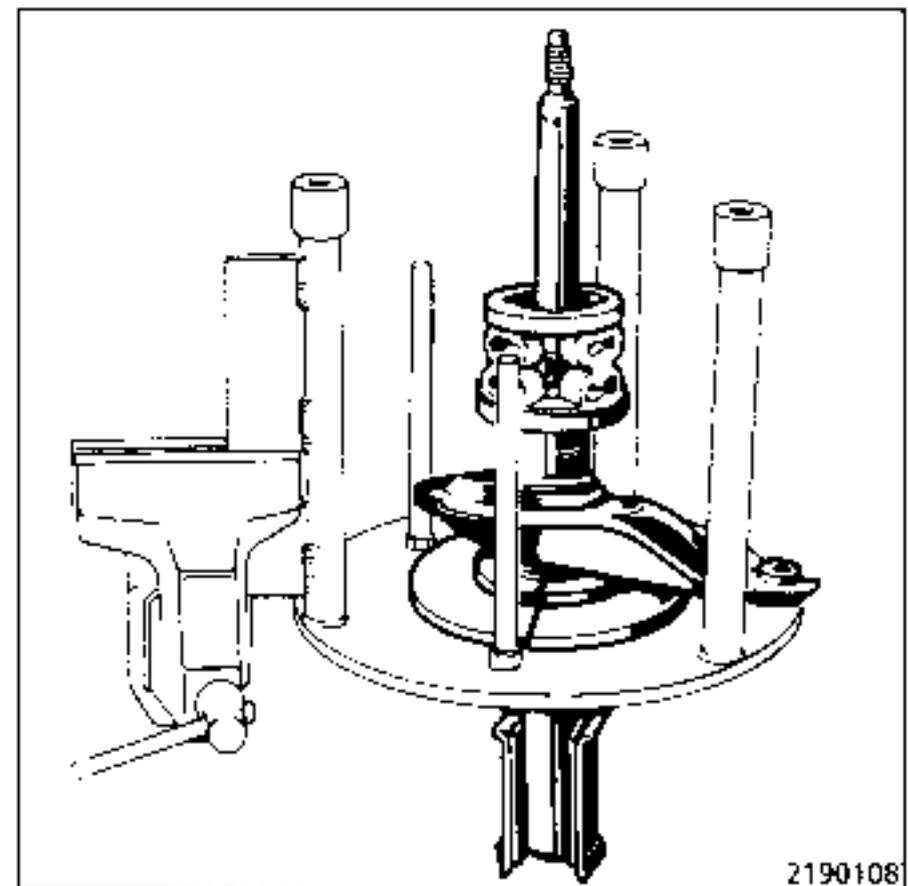
REFITTING THE SPRING AND SHOCK ABSORBER

Fit spigot D in place on the upper pad of tool Sus. 1052 so as to hold assembly 2 - 3 - 4 in position.



Position:

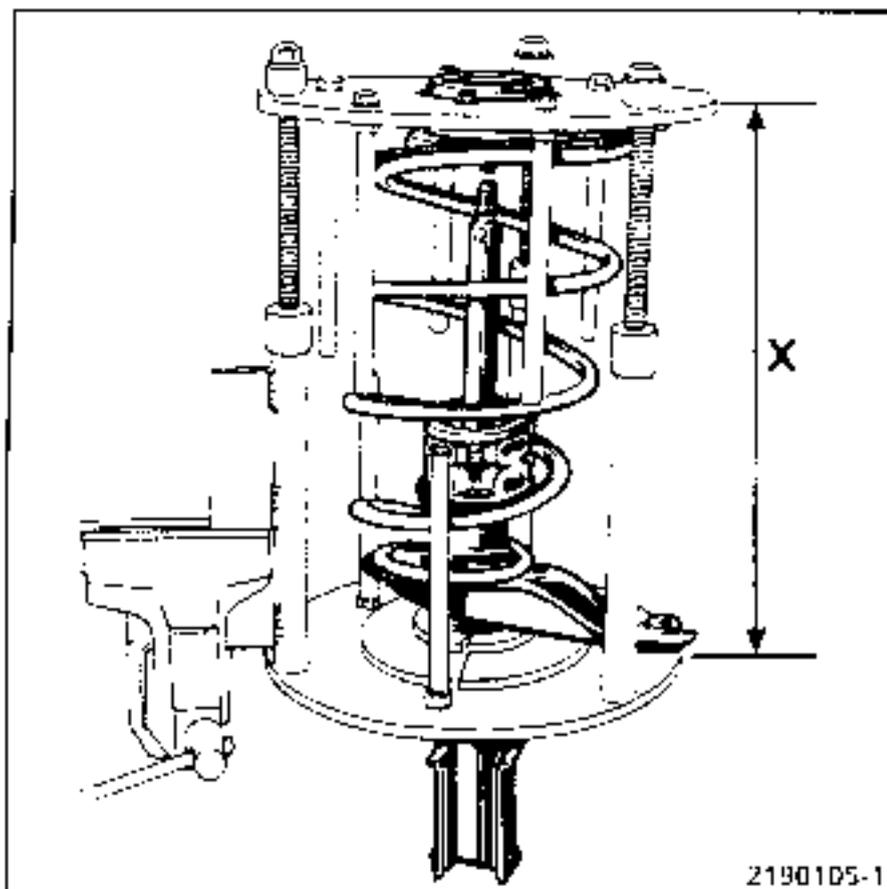
- the shock absorber, as shown in the drawing,



- the spring on the lower shock absorber cup so that it is positioned correctly on the retaining stop,
- the upper pad/spigot assembly with the markings opposite one another.

Make sure that the spring is against the upper stop.

Compress the assembly to a height X of approximately 400 mm and ensure that the spring is correctly positioned in the upper cup.



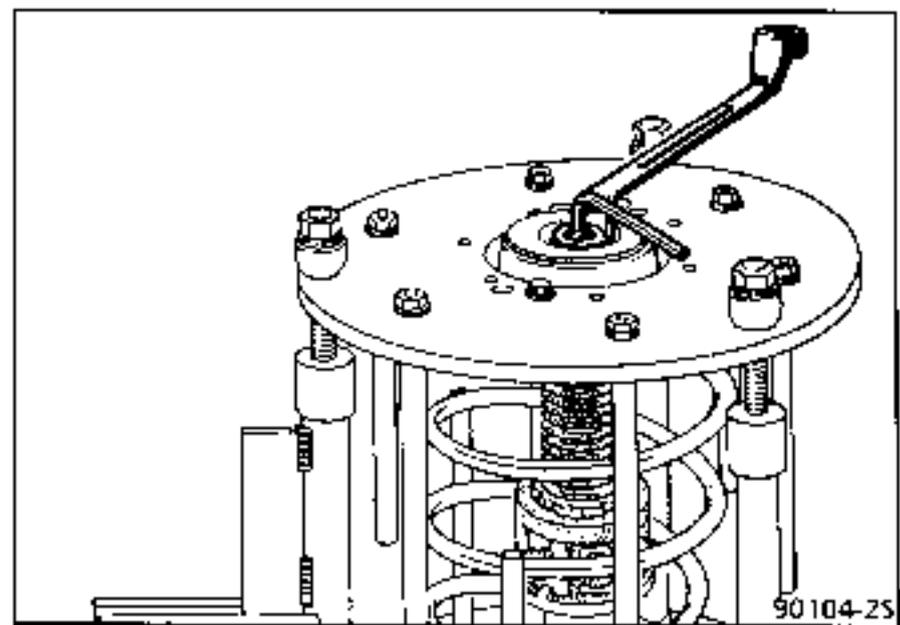
Remove the spigot.

Compress the assembly and insert the shock absorber rod.

NOTE : If the parts do not align correctly, use a 6 mm diameter rod centred in the hexagonal socket to guide the shock absorber.

Fit in place :

- cup (1),
- the nut.



Torque tighten the nut.

Gradually release the pressure from the spring.

Remove:

- the upper pad from the tool,
- the spring-shock absorber assembly from the compression tool.

Special point for L485

Fit the upper pad to the spring-shock absorber assembly.

TIGHTENING TORQUES (in daN.m)



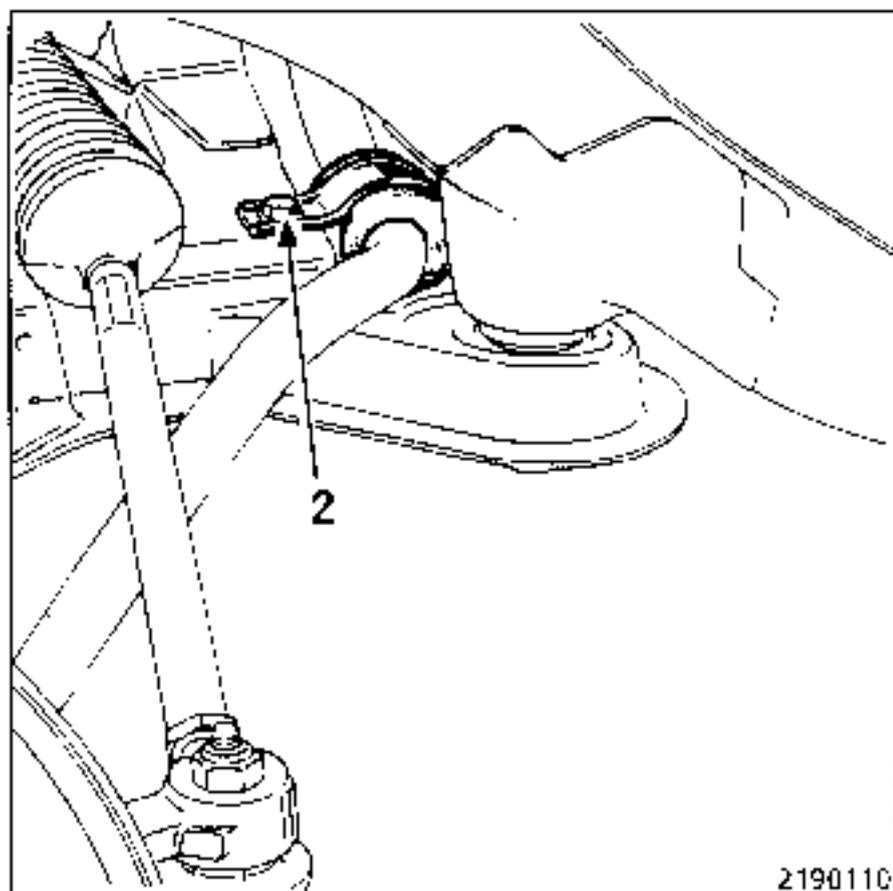
Nuts securing bearings to cradle	3
Nuts securing bearings to arm	3

REMOVAL

With the vehicle on its wheels.

Remove:

- bearings (2) from the cradle,



- bearings (1) from the bottom arms.

Raise the lefthand side and remove the wheel :

- take out the anti-roll bar.

Check the condition of the bushes and change them if necessary.

REFITTING

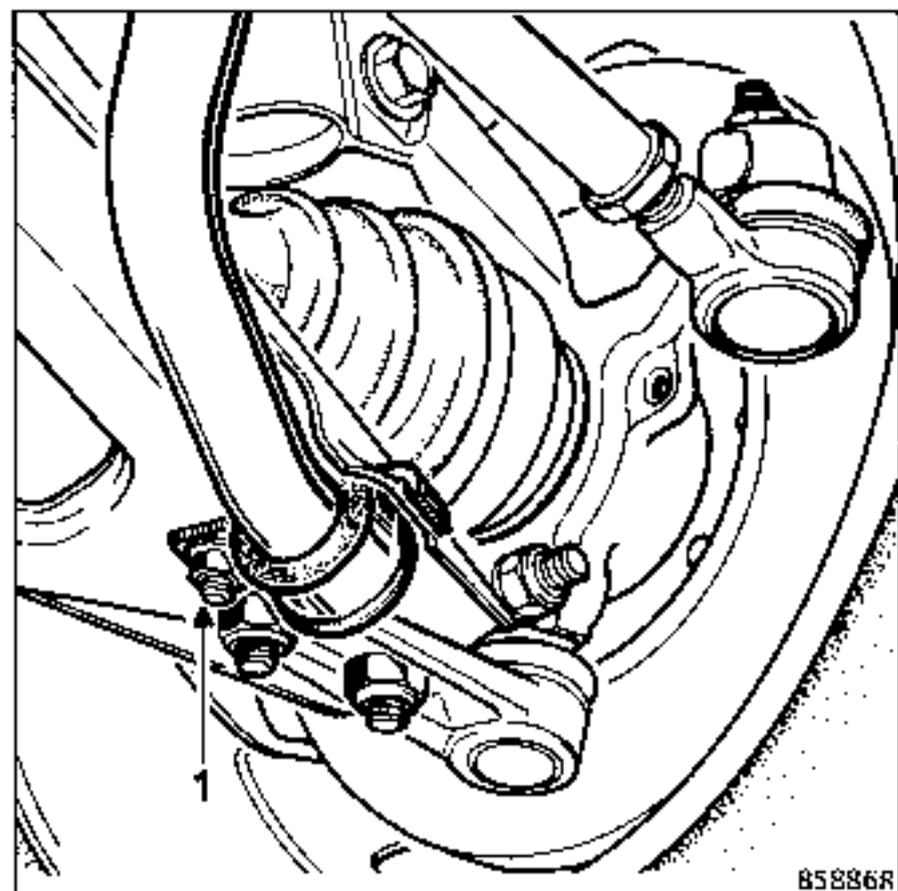
Coat the bushes with **MOLYKOTE 33 Medium grease**.

Fit the anti-roll bar in place.

Secure the two bearings (2) on the cradle but do not tighten them.

Place the vehicle on its wheels and compress the front.

Secure the bearings (1) on the bottom arms.



Vehicle unladen :

- torque tighten the four bearings.

Whenever carrying out an operation on the anti-roll bar for these vehicles, only the bushes on the arms (1) are to be coated in **MOLYKOTE 33 Medium grease**.

Never coat the bushes on the cradle (2) with grease (risk of the bar sliding and causing noises).

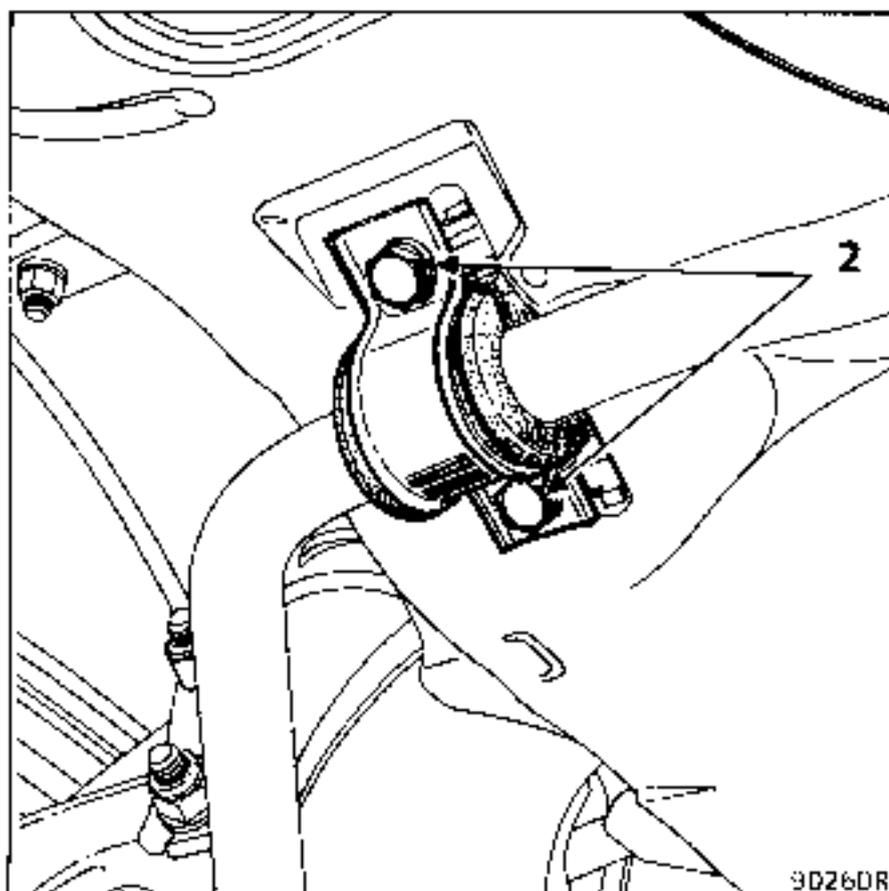
TIGHTENING TORQUES (in daN.m)	
Nuts securing bearings to cradle	3
Nuts securing bearings to arm	8

REMOVAL

With the vehicle on its wheels.

Remove:

- bearings (2) from the cradle,



- bearings (1) from the arms,
- the anti-roll bar.

NOTE : Bolts (1) securing the bearing also retain the lower ball joint. Place a nut on one of the two bolts to ensure that the ball joint does not move.

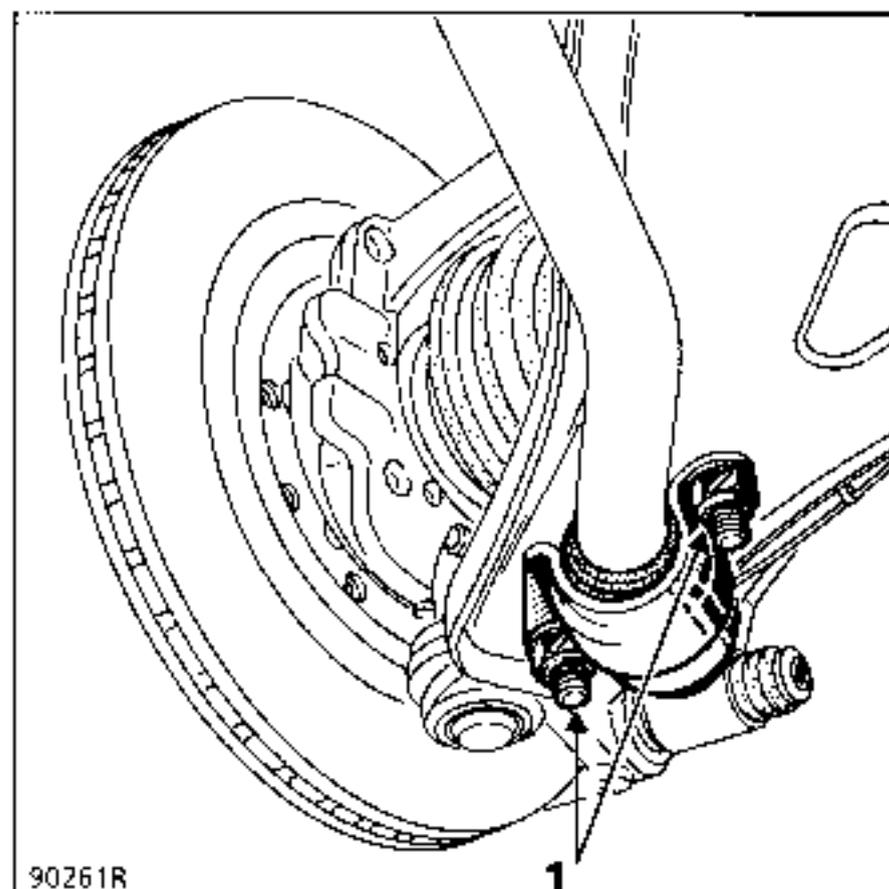
Check the condition of the bushes and change them if necessary.

REFITTING

Coat the bushes with **MOLIKOTE 33 Medium** grease.

Fit the anti-roll bar in place.

Fit the bearings (1) without tightening them, after removing the nut holding the ball joint.



Compress the front of the vehicle and secure the two bearings (2) on the cradle.

Vehicle unladen :

- torque tighten the four bearings.

Whenever carrying out an operation on the anti-roll bar for these vehicles, only the bushes on the arms (1) are to be coated in **MOLIKOTE 33 Medium** grease.

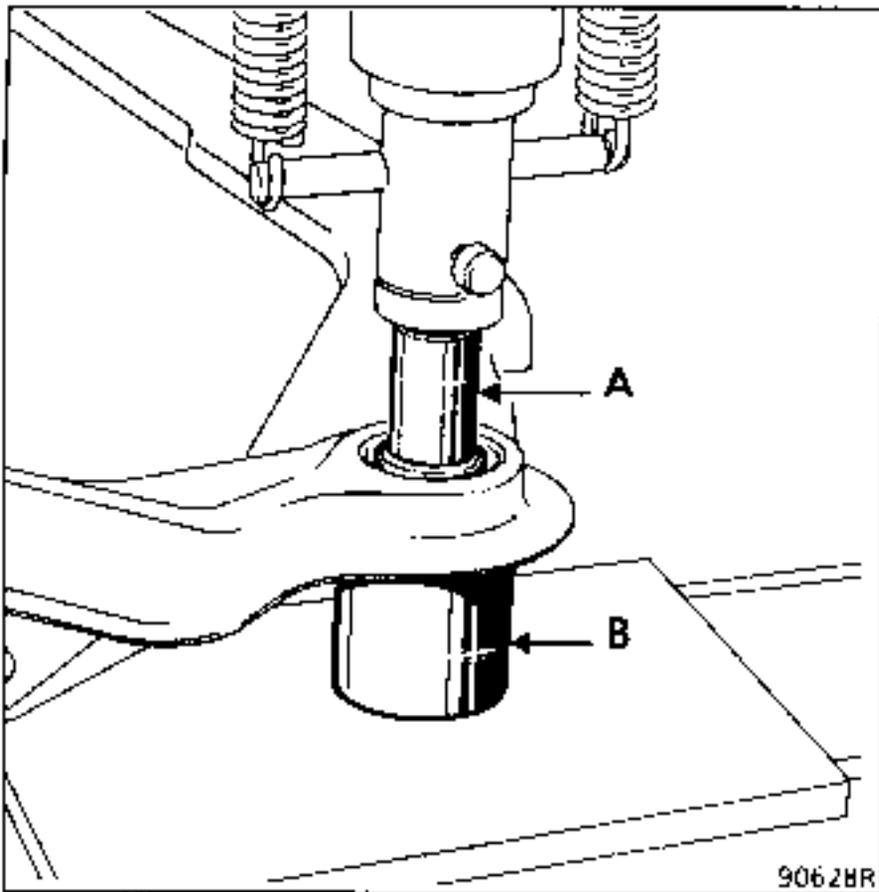
Never coat the bushes on the cradle (2) with grease (risk of the bar sliding and causing noises).

REMOVAL-REFITTING CONNECTION STUDS ON REMOVED CRADLE

REMOVAL

On the press, remove the connection stud using a piece of tubing (A) and a shaft (B).

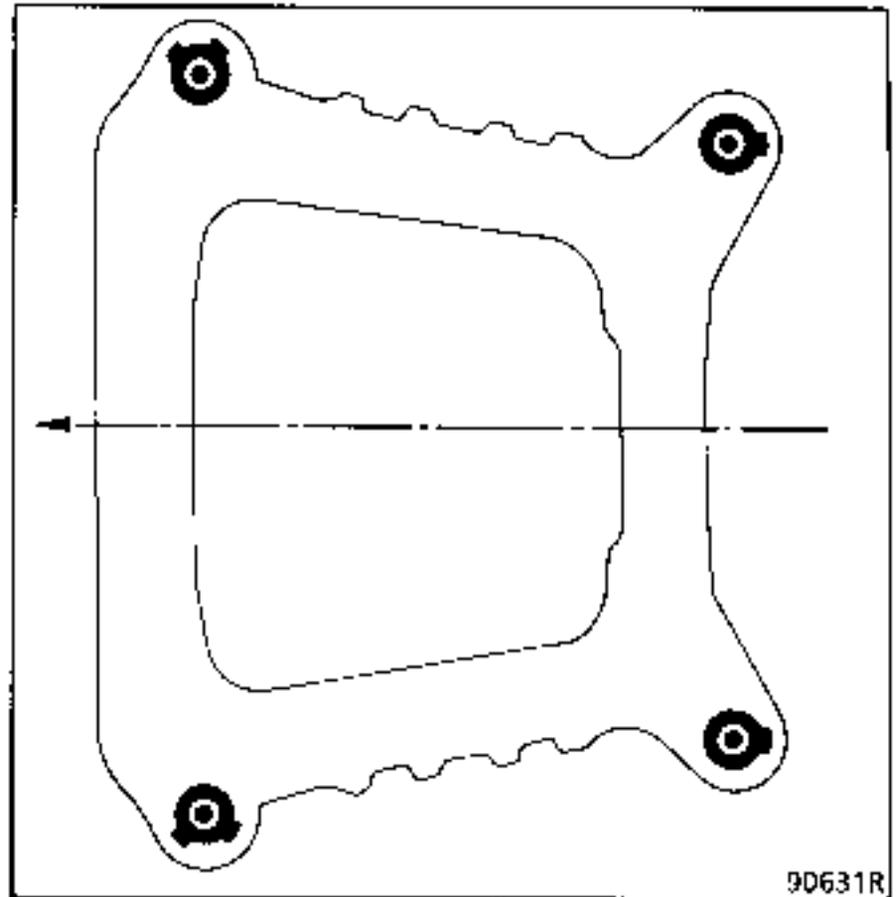
Dimensions: Tube (A) int. diameter 72 ± 1 mm
ext. diameter 80 ± 1 mm
Shaft(B) ext. diameter 30 ± 5 mm



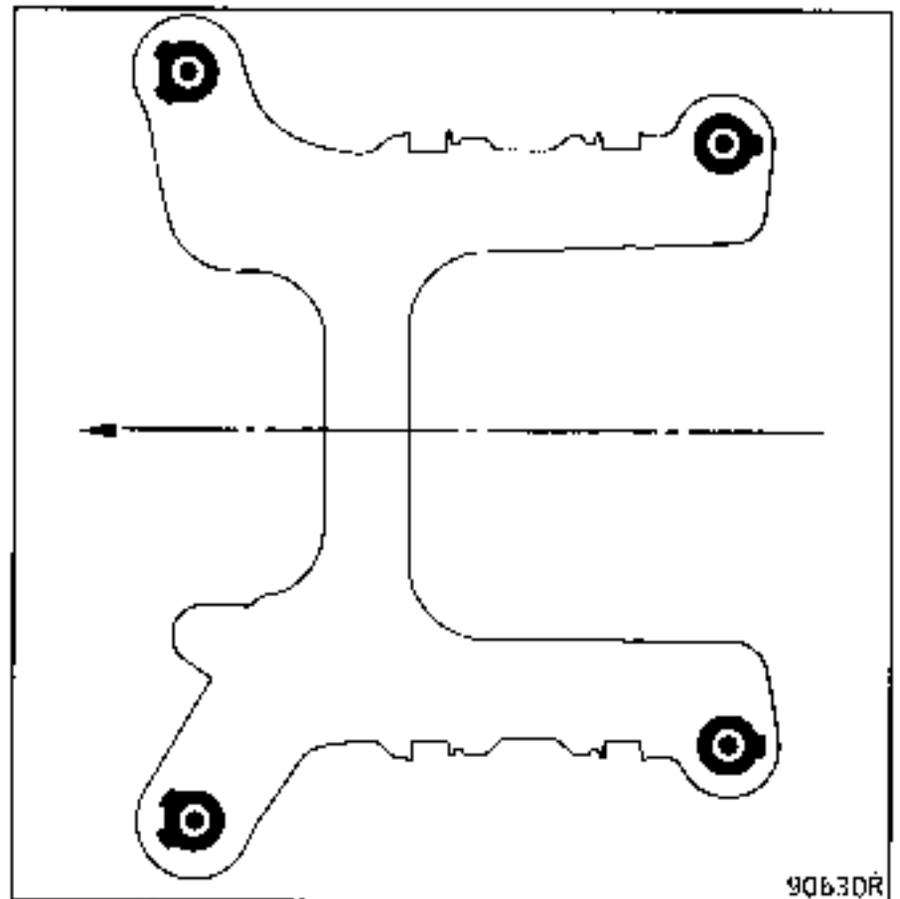
REFITTING

Ensure that the studs are positioned correctly (check lugs are in correct direction) - see following diagrams.

Transverse engine



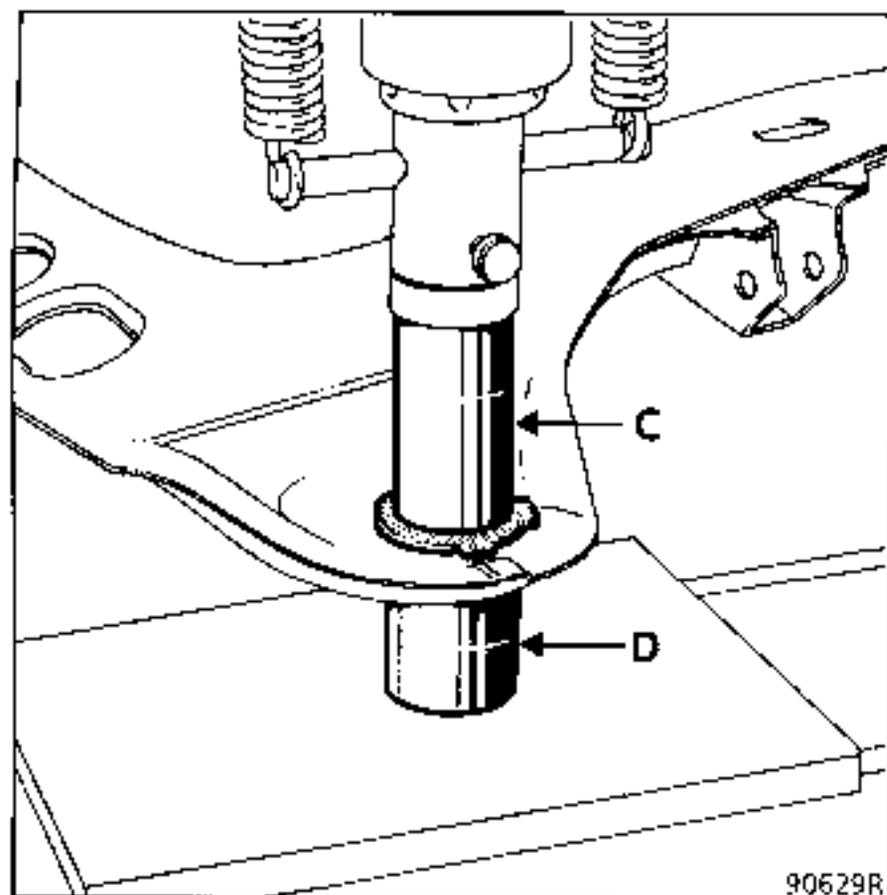
In-line engine



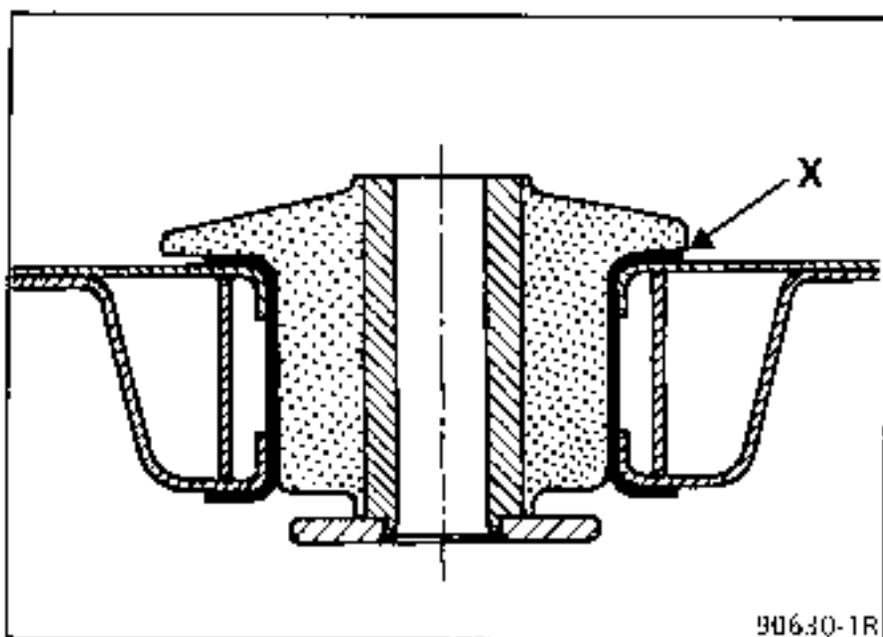
←----- Vehicle front and centre line

On the press, fit the connection stud previously coated with soapy water (and no other product) using two pieces of tubing (C) and (D).

Dimensions : Tube (C) int. diameter 40 ± 1 mm
ext. diameter 50 ± 1 mm
Tube (D) int. diameter 52 ± 1 mm
ext. diameter 60 ± 1 mm



Position of fitted studs



X = 0.3 mm: maximum clearance after fitting between studs and cradle.

REMOVAL-REFITTING CONNECTION STUDS WITH CRADLE IN-SITU

ESSENTIAL SPECIAL TOOLING

Mot. 1179 Stud removal and fitting tool

TIGHTENING TORQUES (in daN.m)



Cradle mounting bolts

8.5

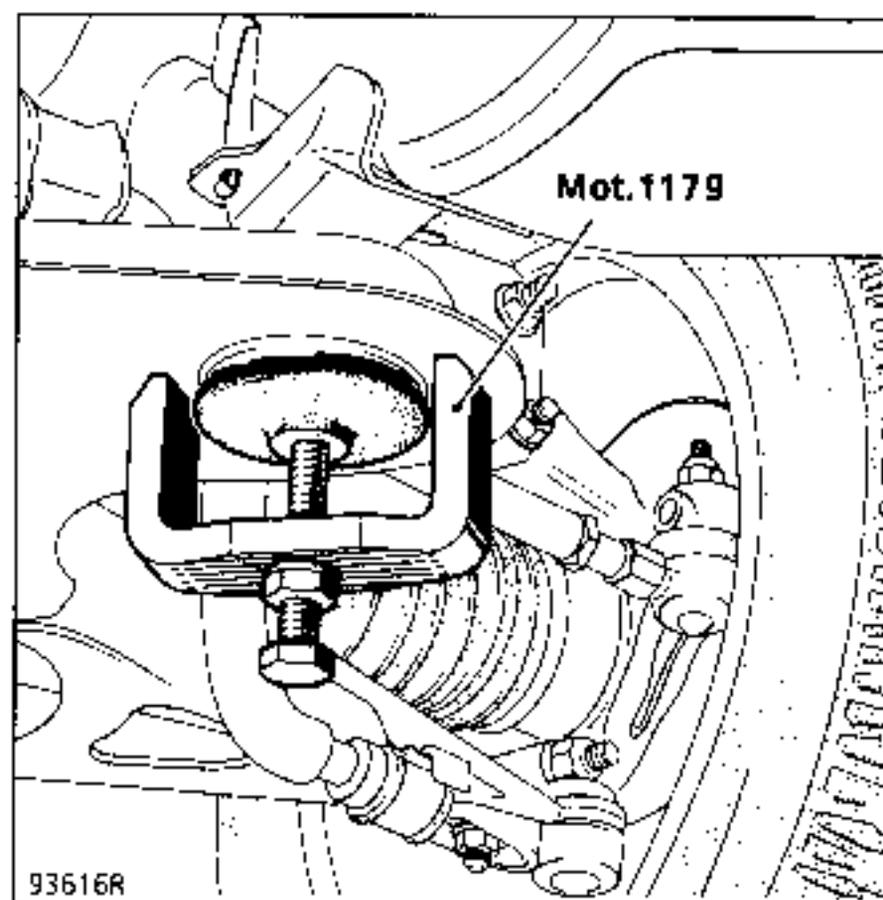
WARNING : As the cradle supports the engine, the studs can only be replaced one at a time.

REMOVAL

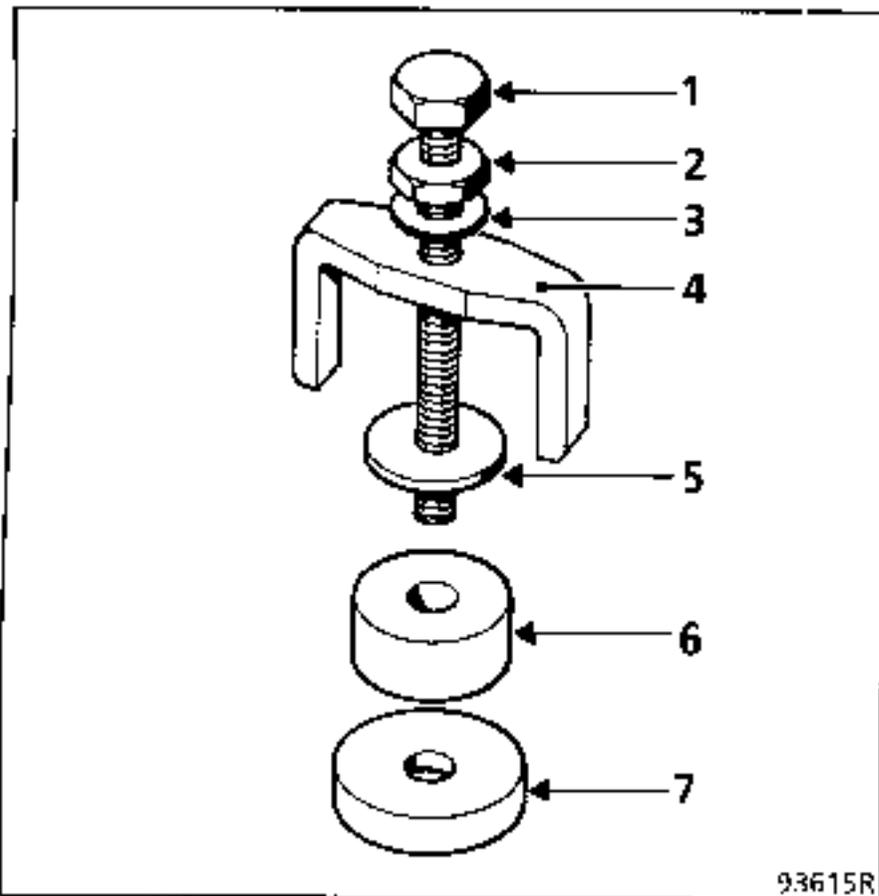
Place the vehicle on a lift.

Slacken and remove the cradle mounting bolt from the stud to be replaced.

Fit in place tool Mot. 1179.

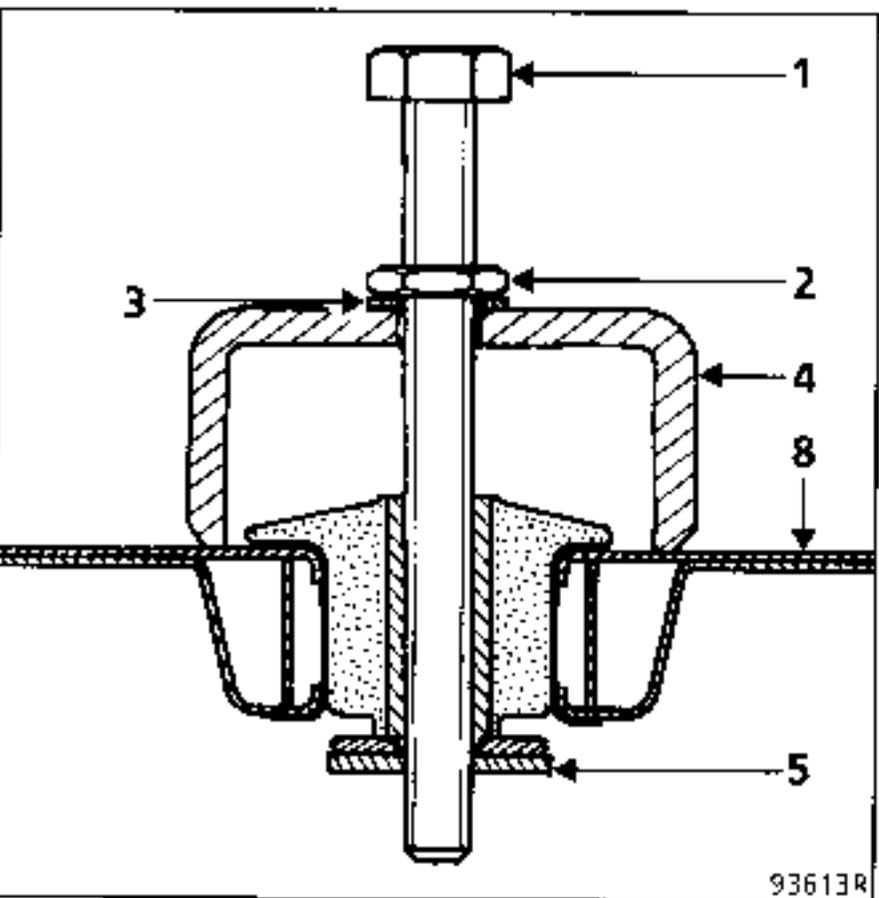


Description of tool Mot. 1179.



93615R

The extraction operation is performed using parts (1), (2), (3), (4), (5).



93613R

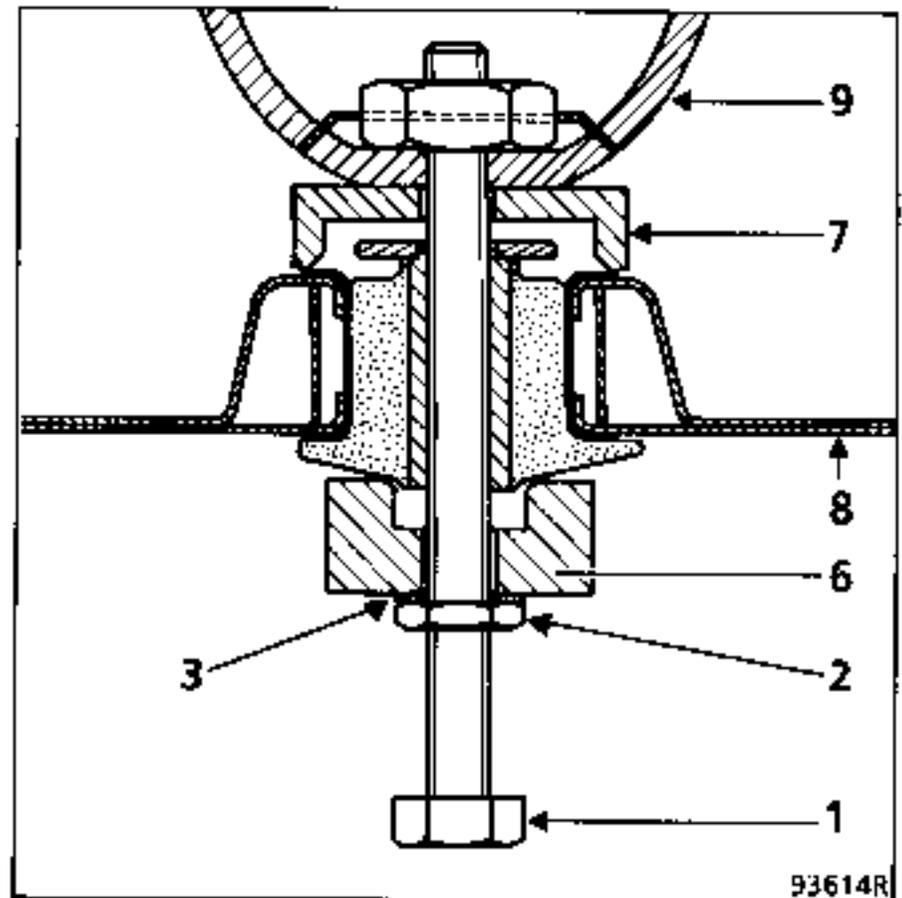
Fit threaded washer (5) between cradle (8) and chassis (9).

Run up bolt (1) by 4 or 5 threads..

Tighten the lock nut until the stud is removed.

REFITTING

Refitting is performed using parts (1), (2), (3), (6), (7).



93614R

Coat the connection stud with soapy water and no other type of product.

Fit spacer (7) between chassis (9) and cradle (8).

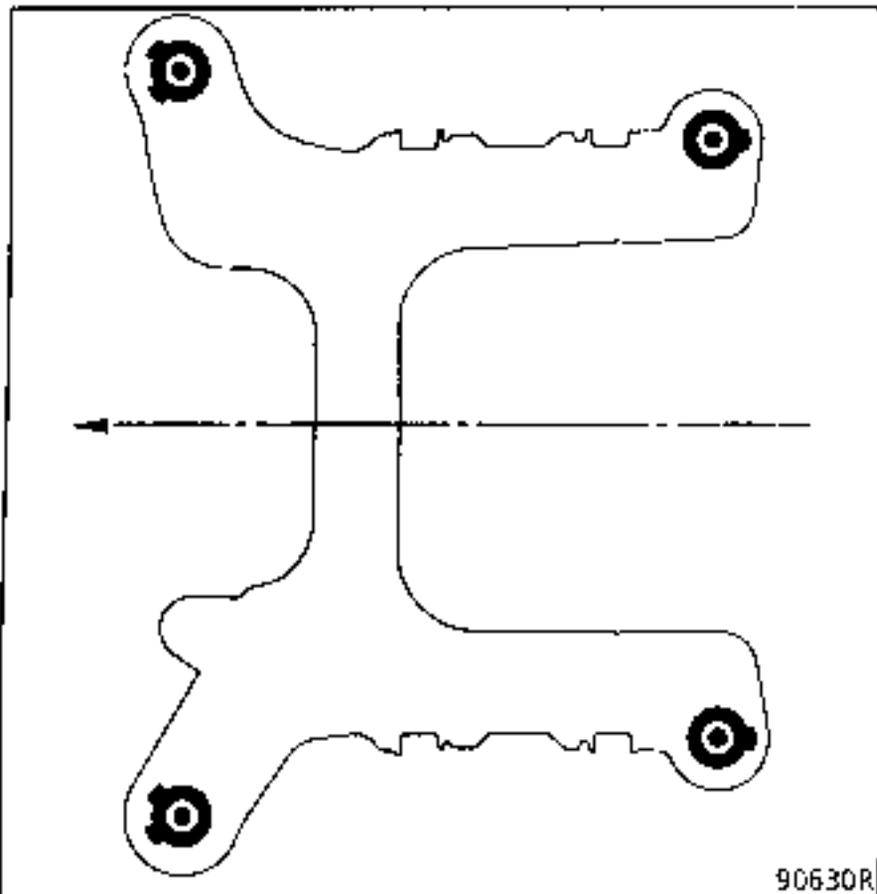
Run up bolt (1) on the chassis cage nut by 6 or 7 threads.

Tighten lock nut (2) until the stud is fully fitted (ensure that the lugs are facing the right way and check the maximum fitting clearance).

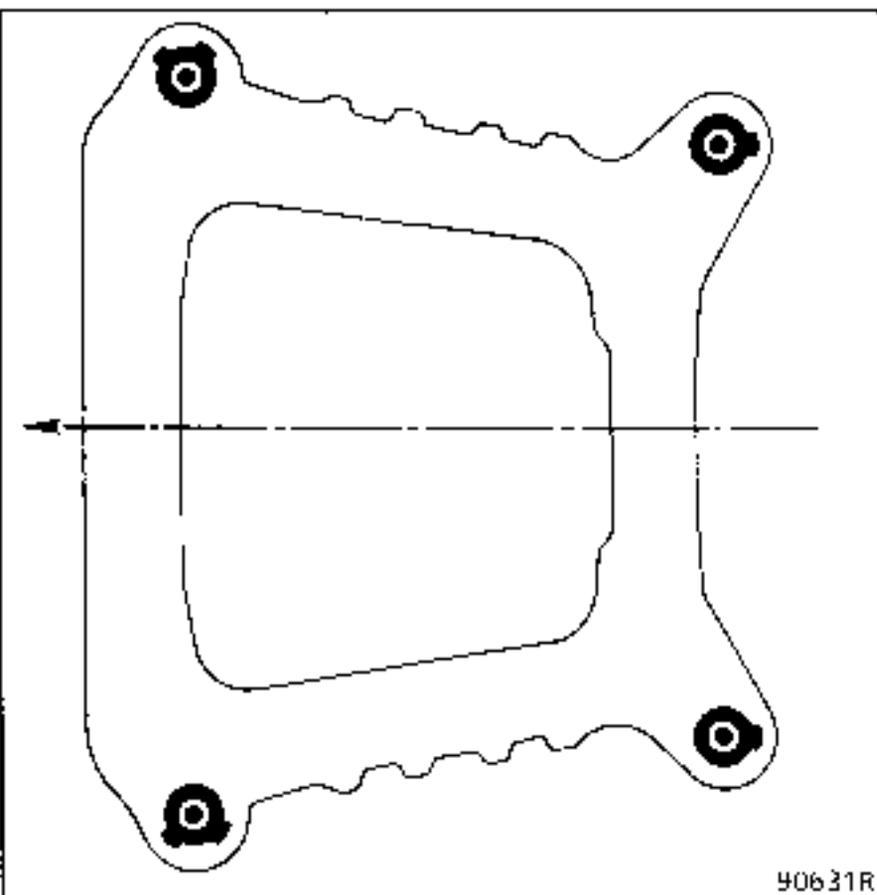
Remove the fitting tool (remembering to remove spacer (7)).

Refit the cradle mounting bolt and torque tighten it.

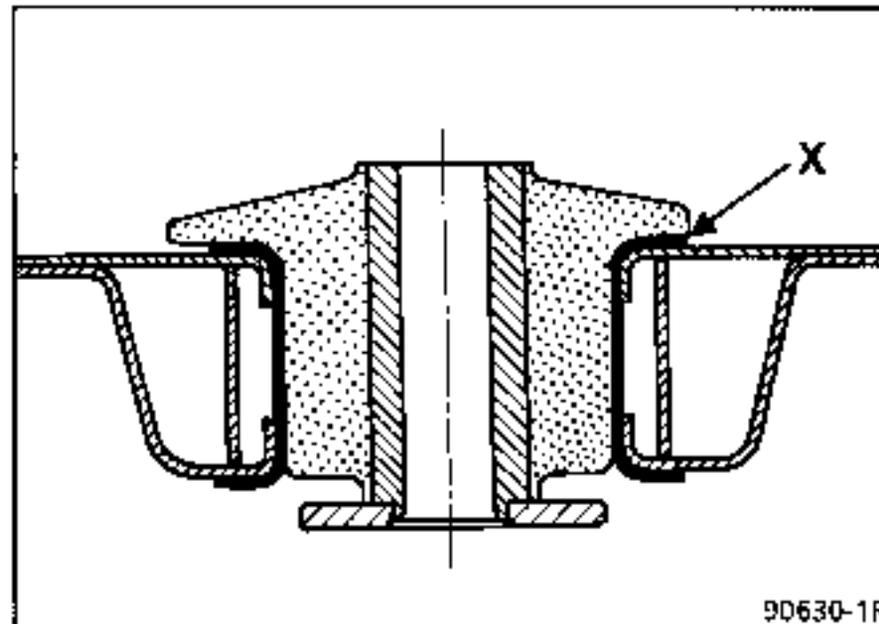
In-line engine



Transverse engine



Position of fitted studs



$X = 0.3 \text{ mm}$: maximum clearance after fitting
between stud and cradle.

TIGHTENING TORQUES (in daN.m)		
Bearing securing nuts		8.5
Wheel bolts	4 bolts	9
	5 bolts	10
Shock absorber bottom bolts		8.5

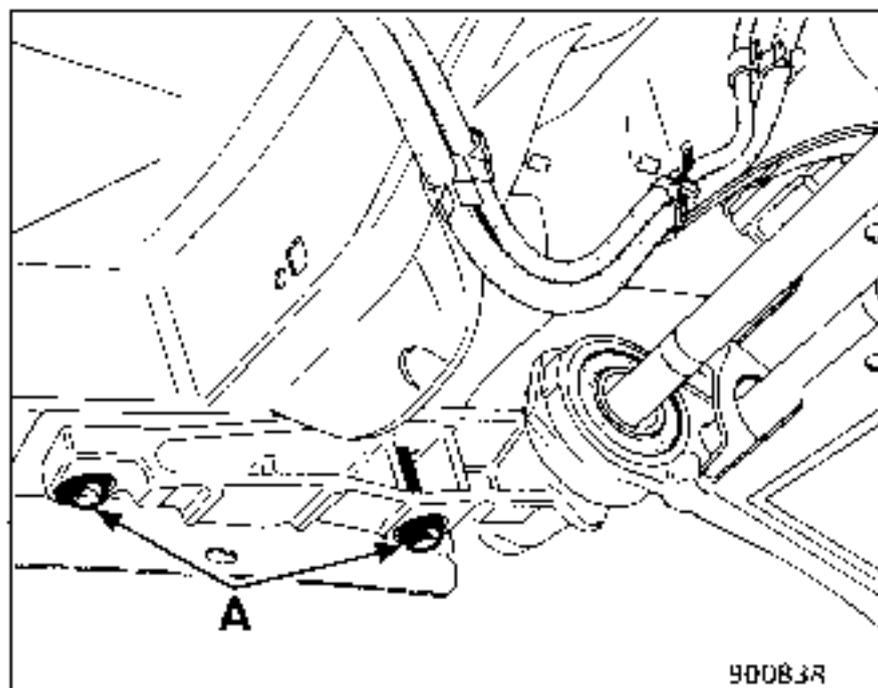
As these vehicles are equipped with rear axles having four bars, the operation for removing the assembly does not require any action to be taken with respect to the torsion bars

REMOVE

Place the rear of the vehicle on axle stands.

Remove:

- the shock absorbers (see relevant section),
- the handbrake secondary cables,
- the brake hoses,
- the compensator control (depending on version),
- the four bolts (A) securing the bearings,



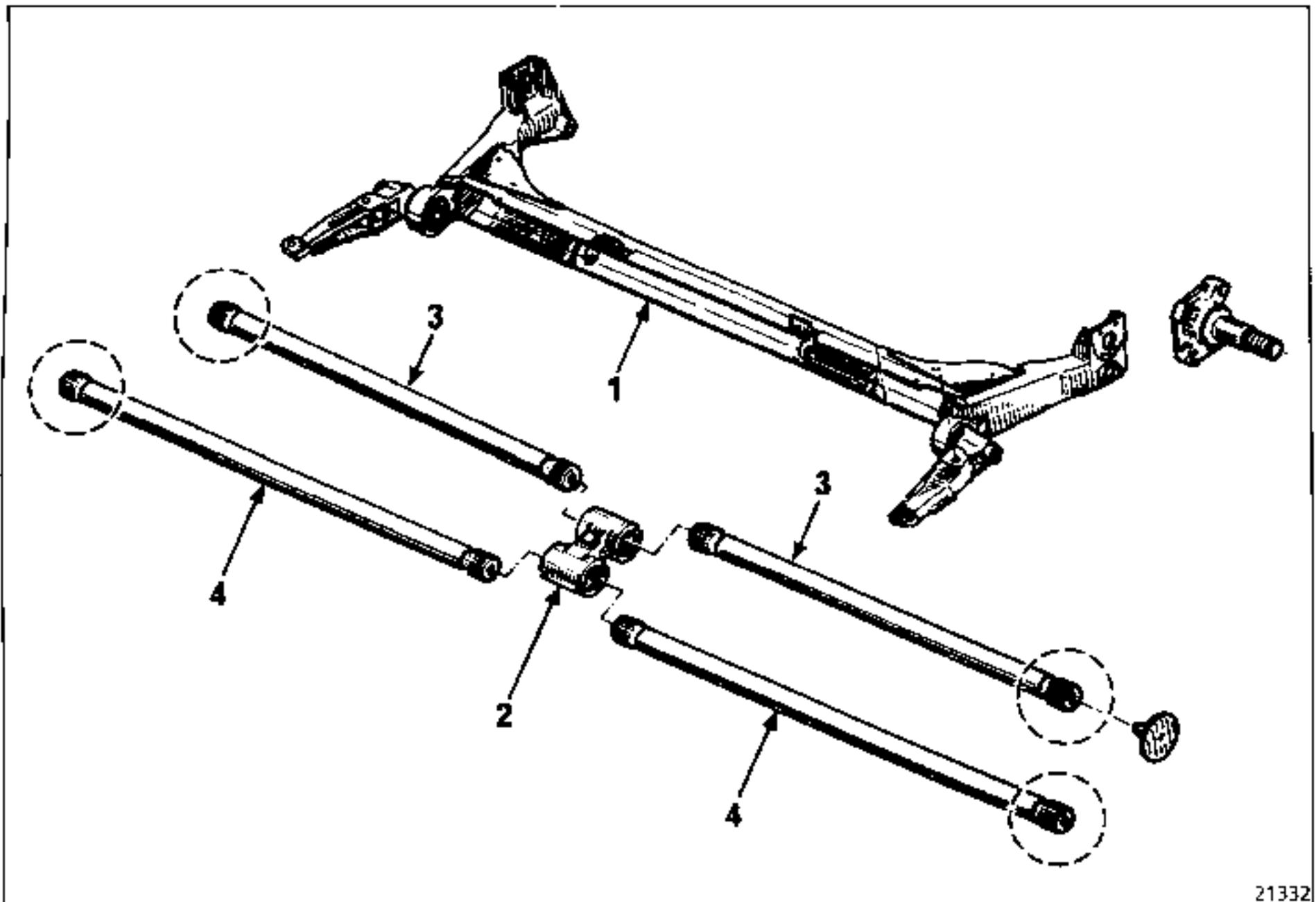
- the rear axle assembly.

REFITTING

Proceed in reverse order to removal.

Bleed the brake circuit and adjust the compensator if necessary (see "Braking system" section).

EXPLODED VIEW



The rear axle consists of :

- two arms connected by a V-shaped section (1) cannot be dismantled. If any components are deformed in any way, the entire assembly must be replaced;
- two anti-roll bars (3),
- two suspension bars (4),
- a link block (2) connecting the bars.

The assembly is connected to the body by means of two bearings fitted on silentbloc bushes.

NOTE : It is prohibited to use a jack under the V-shaped section (1) to raise the vehicle.

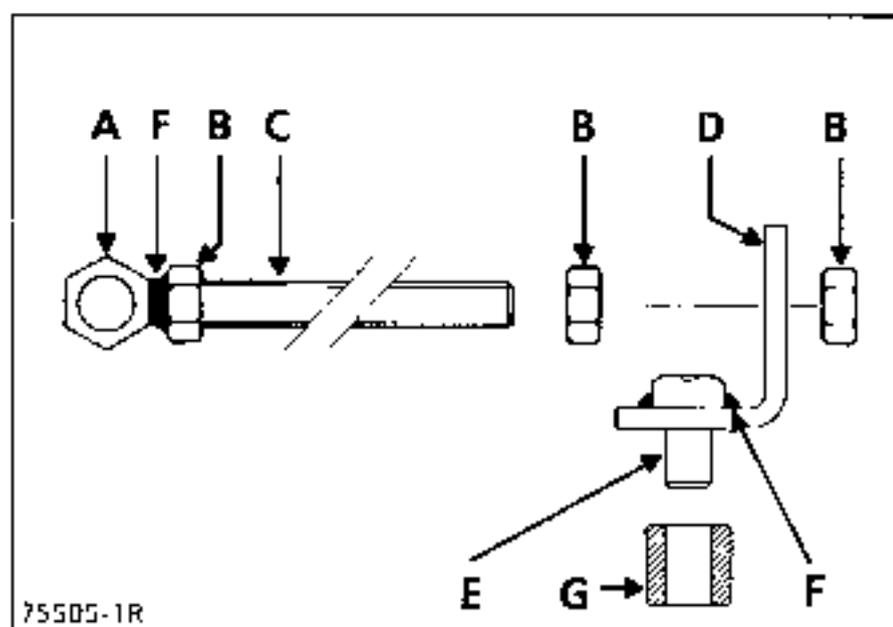
REPLACEMENT

The Parts Department supplies bare rear axles in service exchange; it is, therefore, necessary to retain the bars and link block from the old axle so as to prepare the assembly.

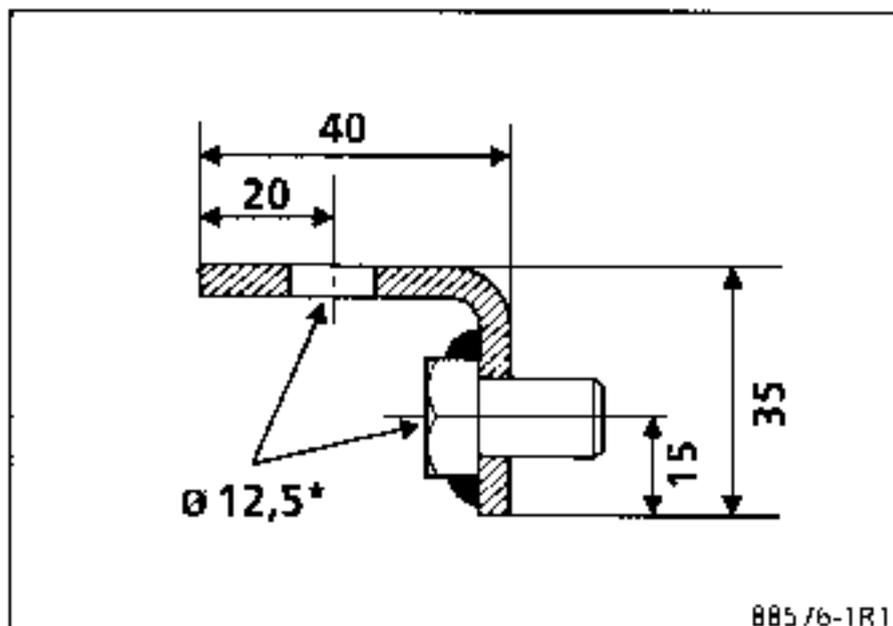
Fit in place on the vehicle the rear axle, without its torsion bars or the link block.

So as to be able to fit the arms in such a way that the torsion bars can be positioned correctly, two tools must be made up locally in accordance with the drawing below.

- A 14 mm diameter nut
- B 12 mm diameter nut
- C 12 mm diameter threaded rod, 660 mm in length
- D Flat iron bracket 30 x 5 mm
- E 12 x 60 mm bolt cut to 20 mm
- F Solder
- G Spacer from tool T.Ar. 1056



Bracket D



* Drilling diameter

First set the two tools to obtain the correct dimension for X.

GOOD ROADS

B481 - B482 - B48E - B48F - B48J
L481 - L482 - L48E - L48F - L48J
L48M - L48N - B48D - L48D
B48I - L48I - B484 - L484 $X = 496$ mm

B483 - B486 - B488 - B48K - B48A - L48A
L483 - L486 - L488 - L489 - L48K
B48V - B48W - L48W - L48V - B487 $X = 485$ mm
L487 - B48C - L48C - B48P - L48P
B480 - L480 - B48O - L48O

L485 - L48L $X = 445$ mm

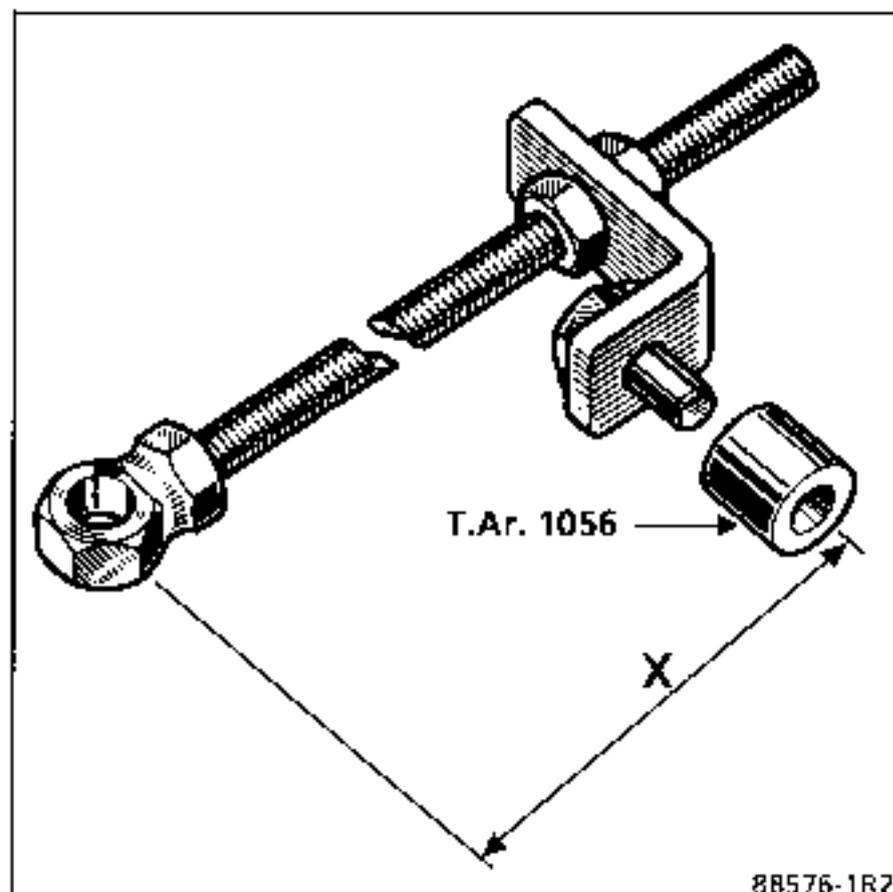
B48Q - L48Q - B48R
B48Y - L48Y - L48R $X = 480$ mm

K481 - K482 - K483 - K486 - K488 - K48R
K48E - K48F - K48J - K48K - K48M
K48N - S481 - S482 - S486
K48H - S48H - K48V - S48V - K480
K48A - K48I - K48O - K487 - K489 $X = 475$ mm

UNMADE ROADS

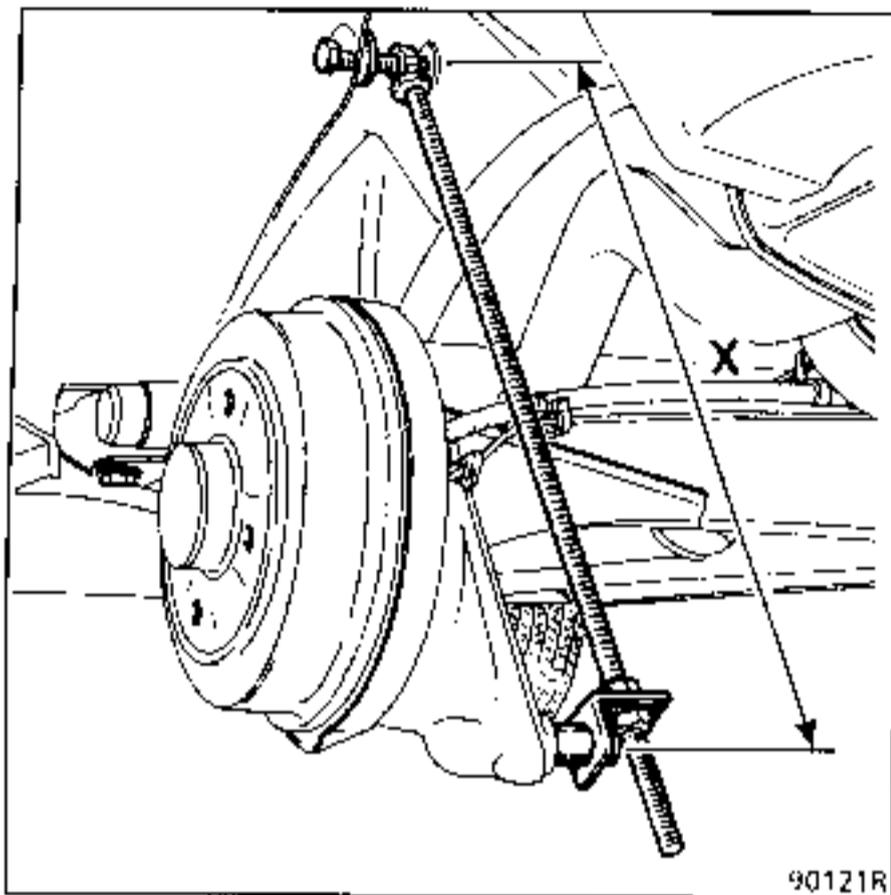
L481 - L48J $X = 508$ mm

K48J $X = 475$ mm

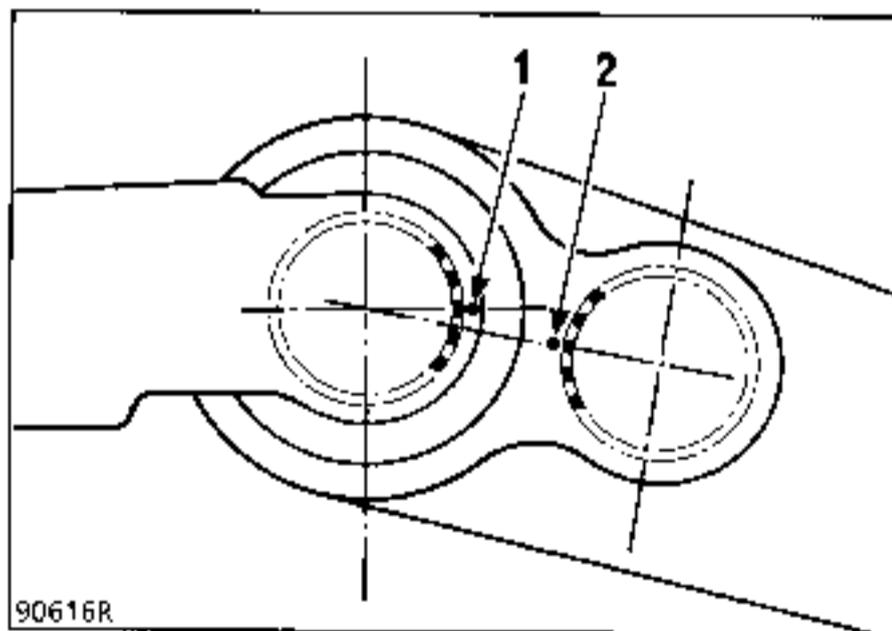


REPLACEMENT

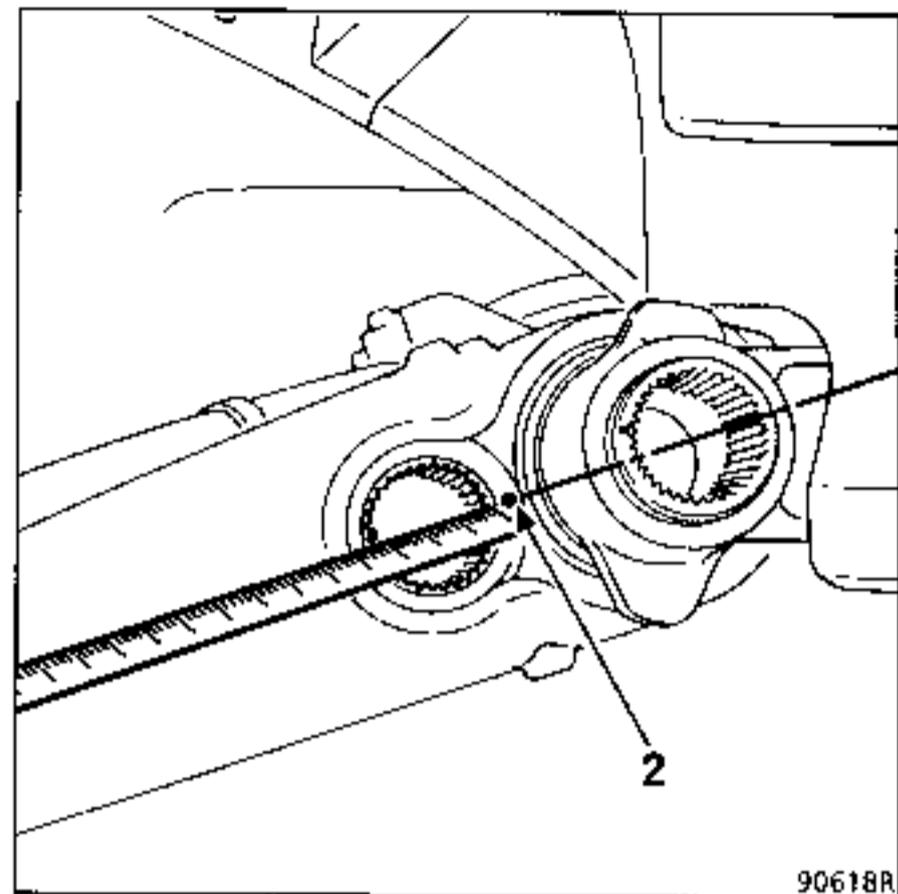
Fit the two tools in place of the shock absorbers.



The bearings have a mark (1) enabling the suspension bars to be initially positioned, but mark (2) must be made on the external anchorages of the anti-roll bars.



To do this: place a ruler on the centreline of the two anchorages and make a mark (2) (at the bottom of a tooth).

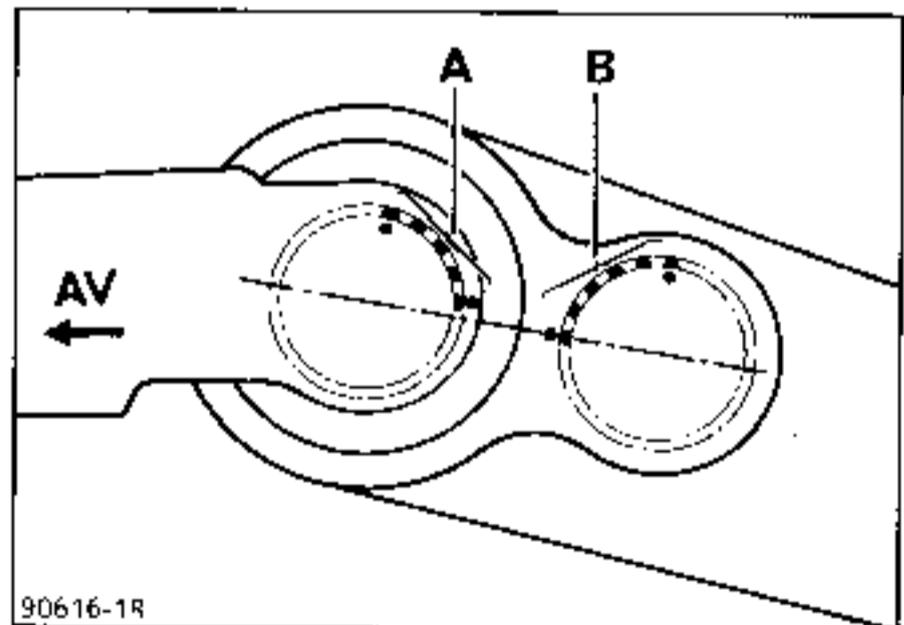


1 - TRANSVERSE ENGINE (B and L48)

Fit in place (anchorages greased) :

- one anti-roll bar with the mark offset by five teeth, as shown in the drawing,

LEFT-HAND SIDE



A = 4 teeth

B = 5 teeth

- the link block, centring it in the V-shaped section,
- the second anti-roll bar offset by the same number of teeth in the opposite direction to the first anti-roll bar (as viewed from the outer anchorage end),
- one suspension bar, with the mark offset by four teeth, as shown in the drawing.

NOTE: Raise the link block to make it easier to fit the suspension bar.

REPLACEMENT

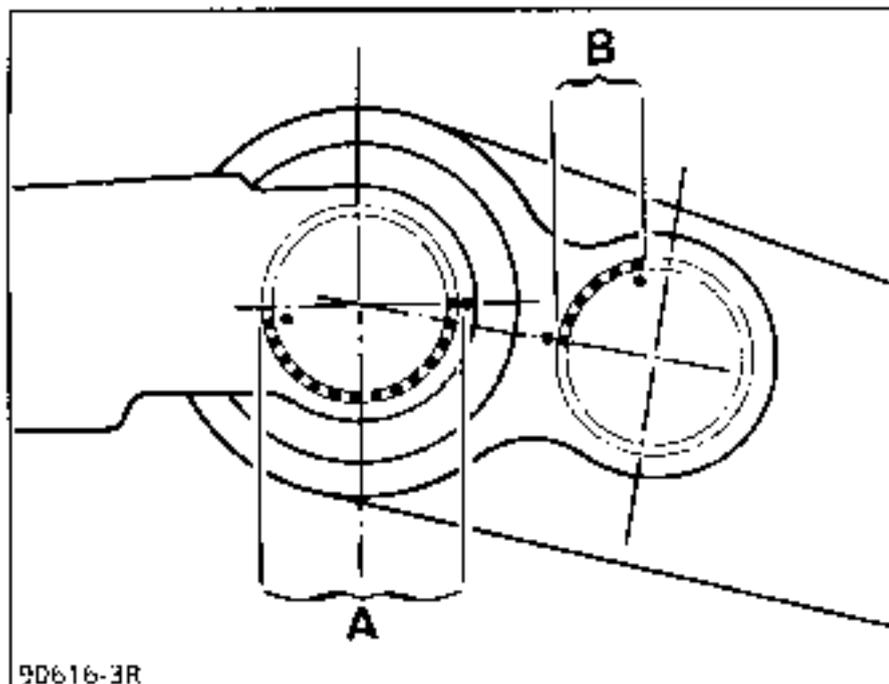
- Fit the second suspension bar offset by the same number of teeth in the opposite direction to the first suspension bar (as viewed from the outer anchorage end).

Transverse engine (K48)

Fit in place (anchorage greased):

- an anti-roll bar with the mark offset by five teeth, as shown in the drawing,

LEFT-HAND SIDE



A = 13 teeth

B = 5 teeth

- the link block, centring it in the V-shaped section,
- the second anti-roll bar offset by the same number of teeth in the opposite direction to the first anti-roll bar (as viewed from outer anchorage end),
- one suspension bar, with the mark offset by thirteen teeth, as shown in the drawing.

NOTE: Raise the link block to make it easier to fit the suspension bar.

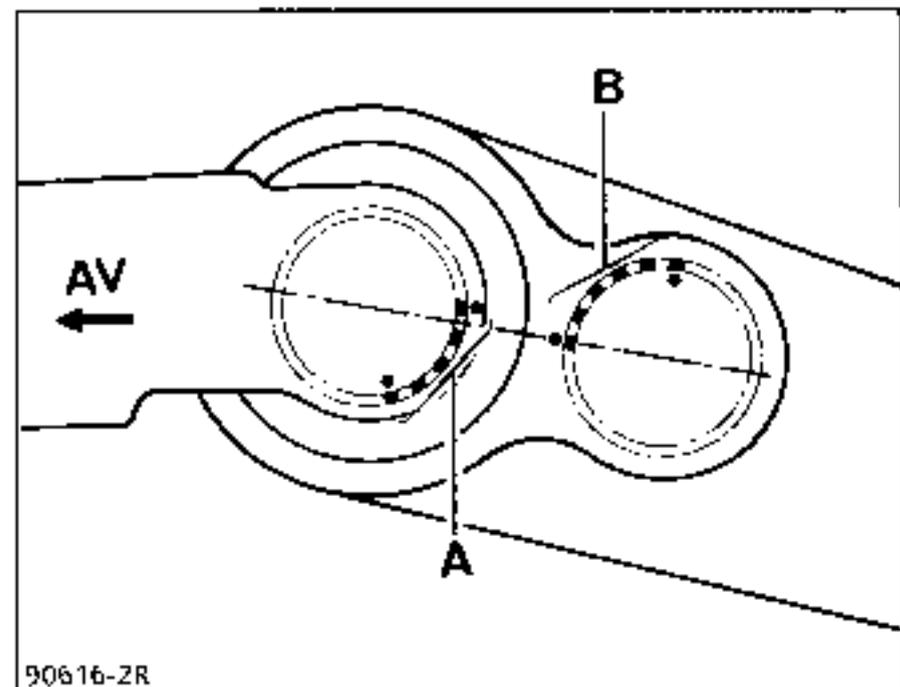
- Fit the second suspension bar offset by the same number of teeth in the opposite direction to the first suspension bar (as viewed from the outer anchorage end).

II - LONGITUDINAL ENGINE (B and L48)

Fit in place (anchorage greased):

- one anti-roll bar with the mark offset by five teeth as shown in the drawing,

LEFT-HAND SIDE



A = 4 teeth

B = 5 teeth

- the link block, centring it in the V-shaped section,
- the second anti-roll bar offset by the same number of teeth in the opposite direction to the first anti-roll bar (as viewed from outer anchorage end),
- one suspension bar, with the mark offset by four teeth, as shown in the drawing.

NOTE: Raise the link block to make it easier to fit the suspension bar.

- Fit the second suspension bar offset by the same number of teeth in the opposite direction to the first suspension bar (as viewed from the outer anchorage end).

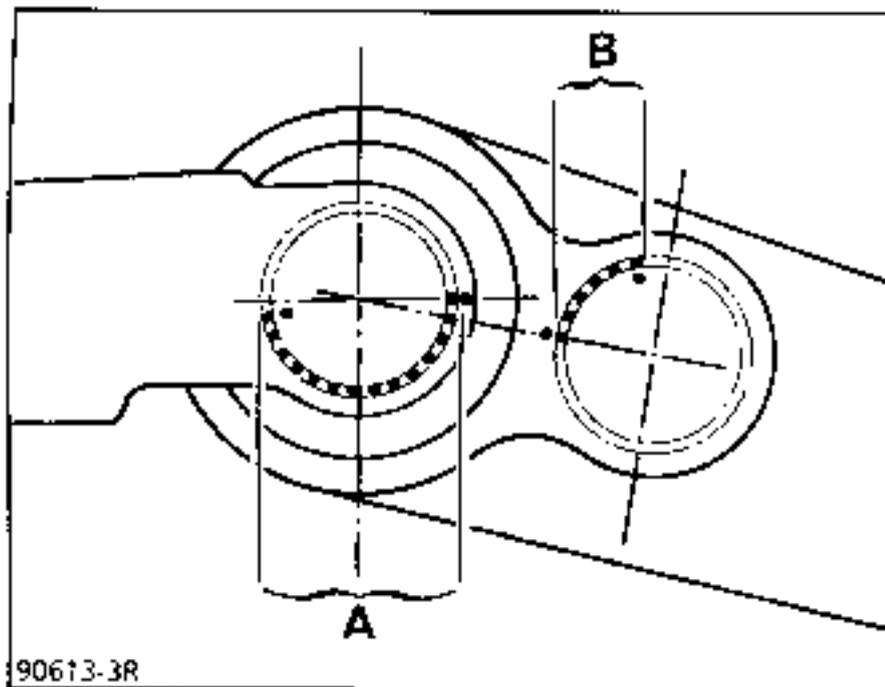
REPLACEMENT

Longitudinal engine (K and S48)

Fit in place (anchorage greased):

- one anti-roll bar with the mark offset by five teeth, as shown in the drawing,

LEFT-HAND SIDE



A = 13 teeth

B = 5 teeth

- the link block, centring it in the V-shaped section,
- the second anti-roll bar offset by the same number of teeth in the opposite direction to the first anti-roll bar (as viewed from the outer anchorage end),
- one suspension bar, with the mark offset by thirteen teeth, as shown in the drawing.

NOTE: Raise the link block to make it easier to fit the suspension bar.

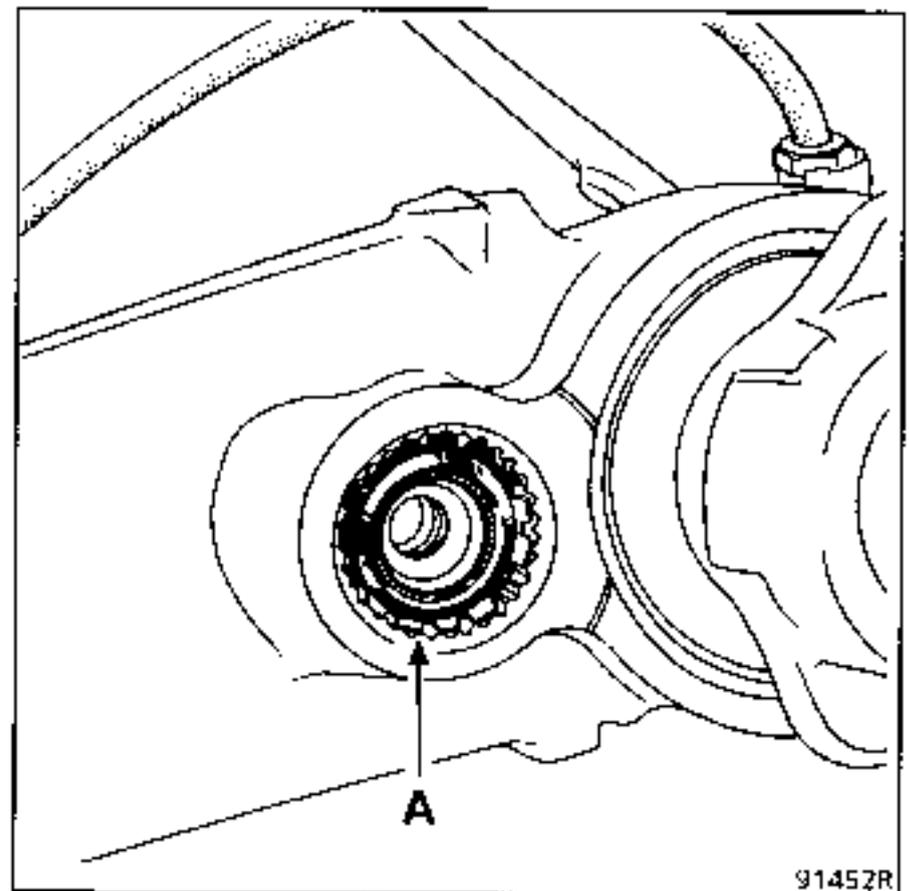
- Fit the second suspension bar offset by the same number of teeth in the opposite direction to the first suspension bar (as viewed from the outer anchorage end).

ALL TYPES

Remove the tools and refit the shock absorbers.

Place the vehicle on its wheels and measure the underbody heights (see chapter on "Checking and adjusting the underbody height").

if the vehicle height is correct, fit new clips (A) in the torsion bar anchorages.



Check and adjust if necessary :

- the brake compensator (depending on version),
- the headlight beam setting.

ESSENTIAL SPECIAL TOOLING

Rou. 604-01 Hub locking tool

TIGHTENING TORQUES (in daN.m)

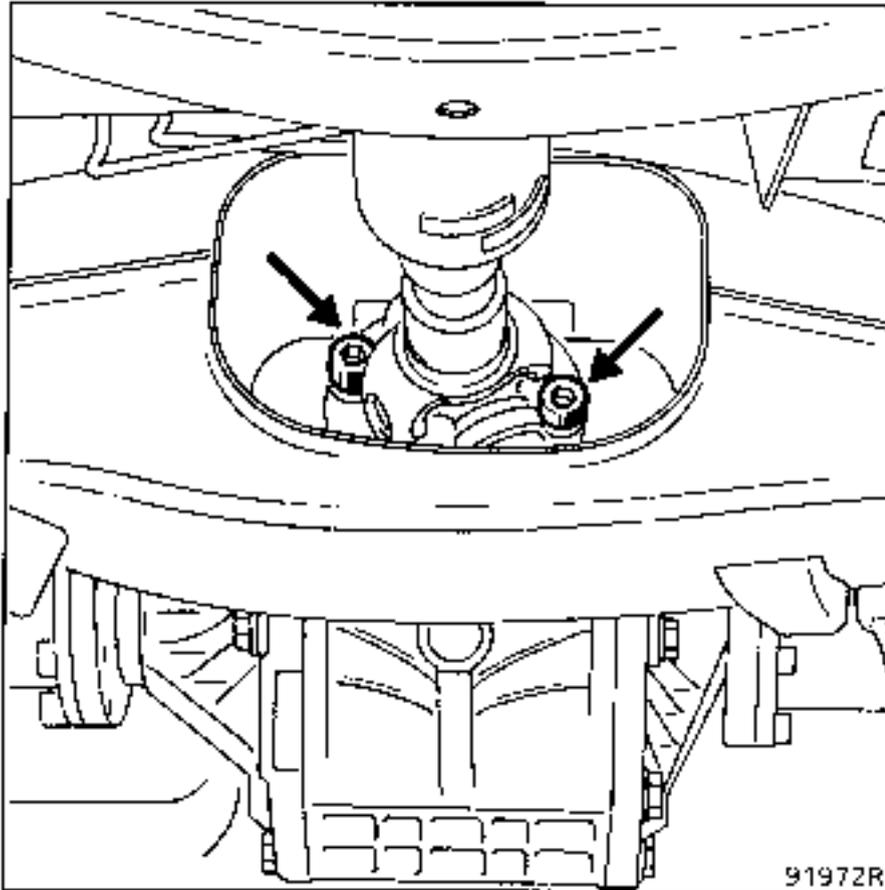


Shock absorber bottom bolts	5.5
Anti-roll bar securing bolt	5.5
Bolts securing drive shaft to sun wheel	6
Final drive flange bolts	5
Final drive rear mounting	8
Bolt securing cross member to:	
bush	12
carrier panel	8
Wheel bolts	
4 bolts	9
5 bolts	10

REMOVING

With the vehicle on its wheels remove:

- the bolts securing the final drive flange,



91972R

- the brake drums (see the relevant section),
- the handbrake cables and disengage them from the guides on the arms.

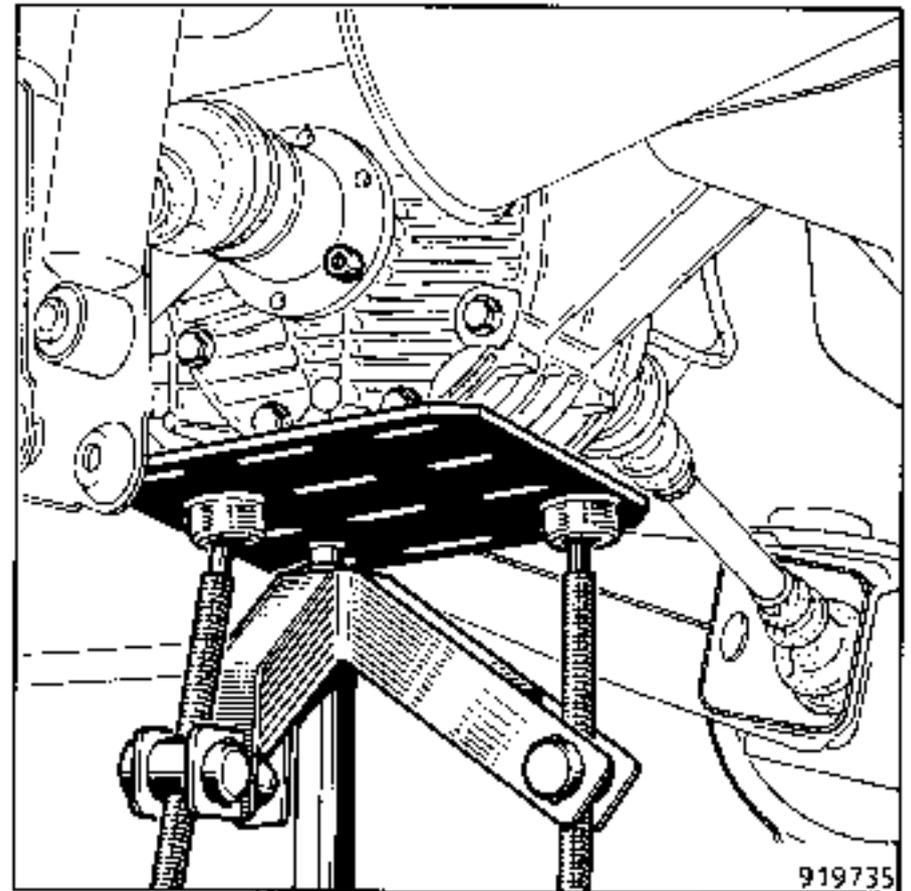
Refit the drums but do not tighten.

Remove the springs (see relevant section).

Refit but do not tighten:

- the drive shafts,
- the anti-roll bar link arm pins.

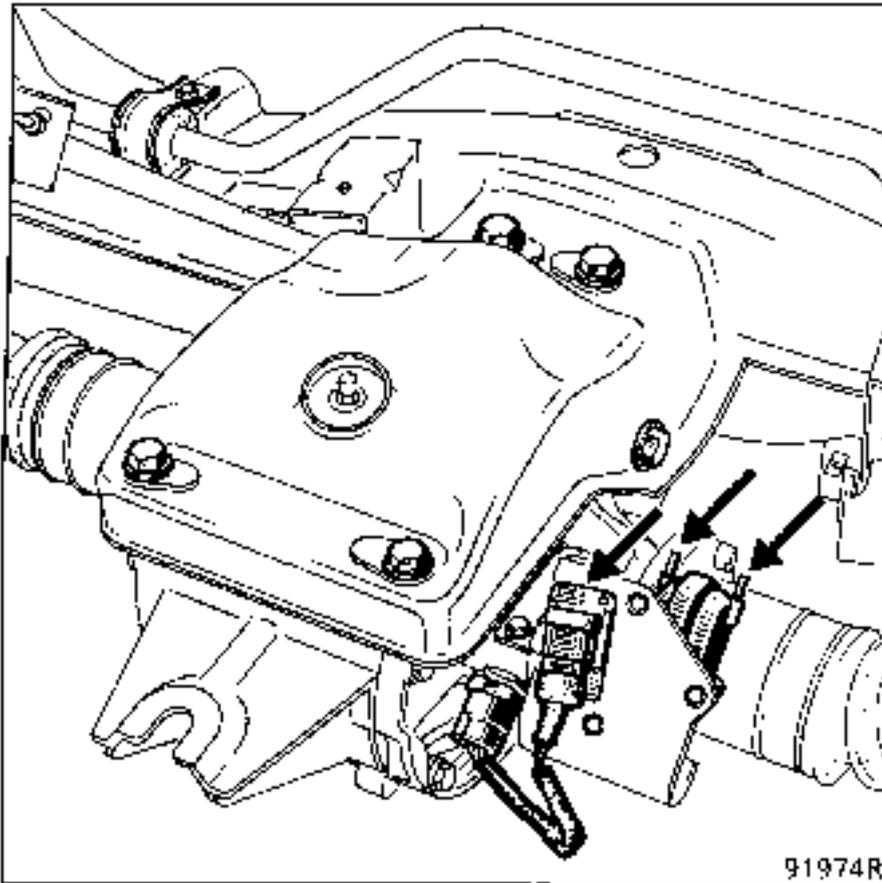
Support the rear axle using a jack.



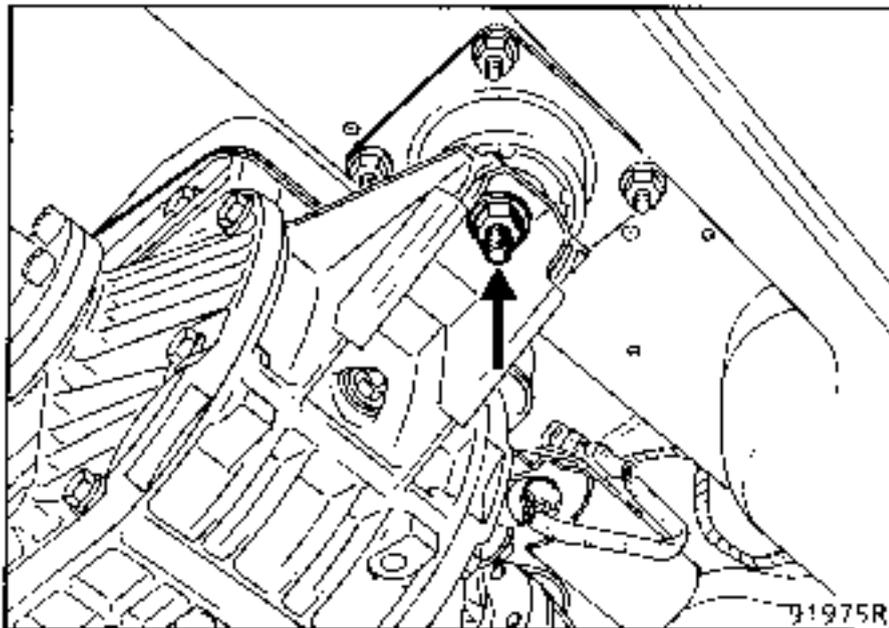
919735

Remove:

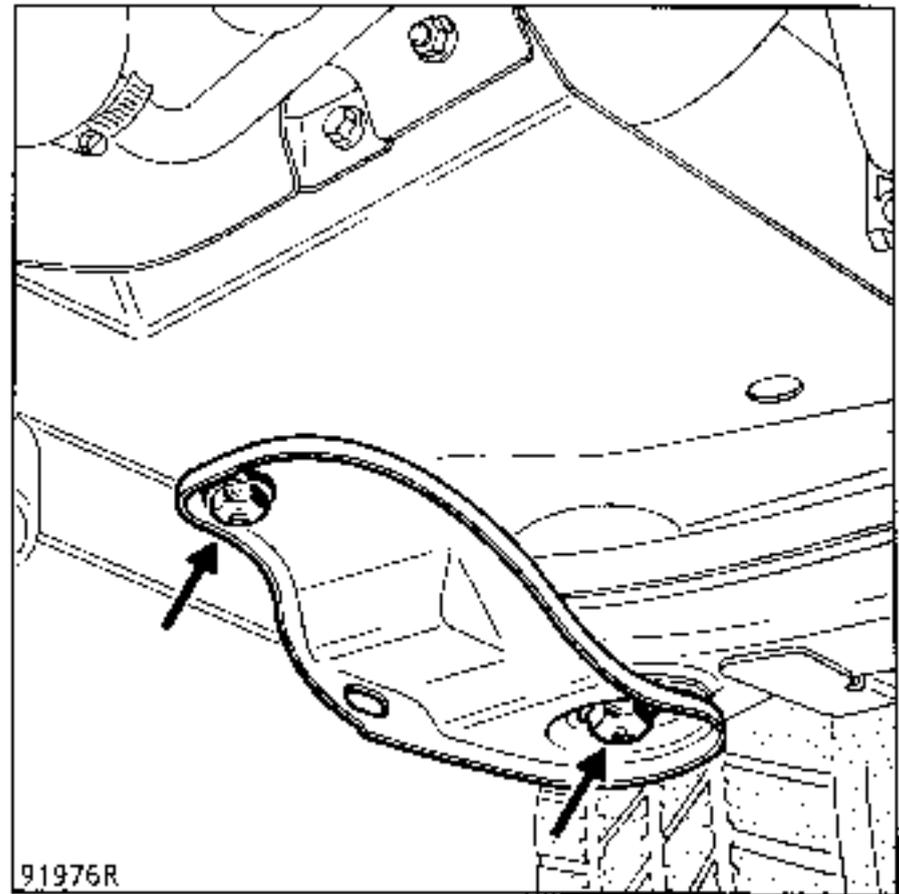
- the pneumatic controls for the dog clutch and the switch connector,



- the rear mounting for the final drive on the body,



- the front mountings for the final drive mounting cross member.



Lower the strut, disengaging the prop shaft from the cross member.

Remove the assembly.

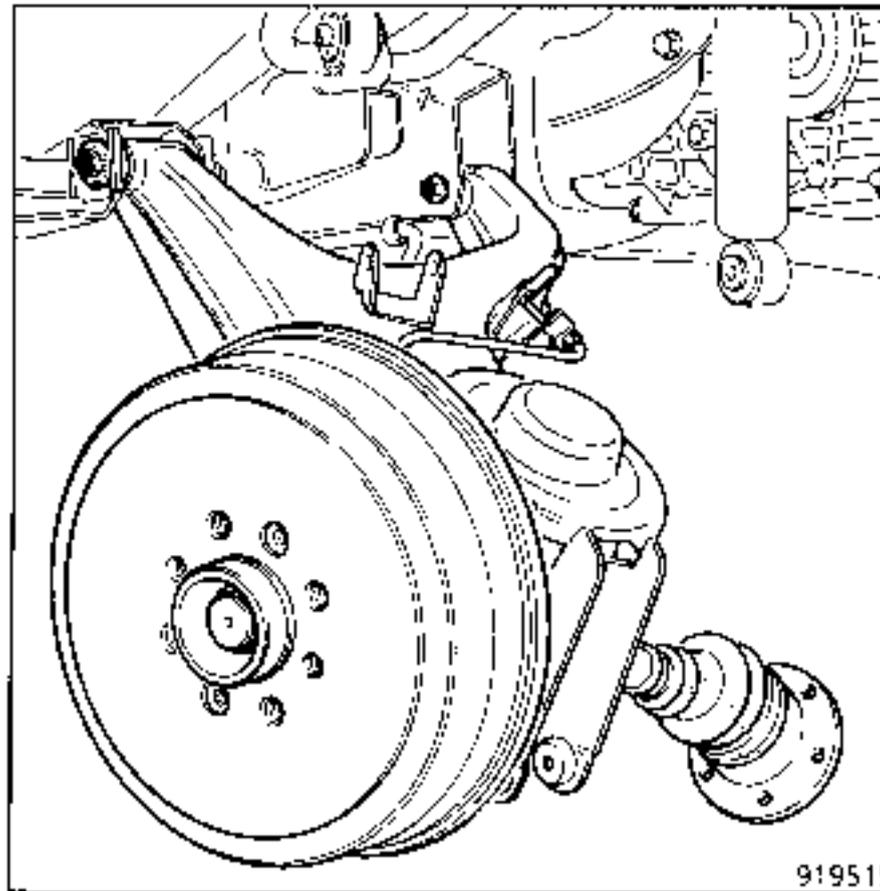
REFITTING

Fit in place :

- the rear axle assembly on the vehicle, engaging the prop shaft in the cross member,
- the final drive rear mounting and torque tighten it,
- the front mountings for the final drive mounting cross member and torque tighten them,
- the dog clutch controls and the connector.

Place a jack under the swing arms and remove:

- the pins from the anti-roll bar link arm,
- the drive shafts from the sun wheels.



Fit in place :

- the springs (see the relevant section),
- the final drive flange,
- the handbrake cables.

With the vehicle on its wheels, torque tighten the final drive flange.

Bleed the brake circuit, check and adjust the brake compensator, if necessary.

The two drum brakes must be of the same diameter. Therefore, if one drum is refaced, then the other drum must also be refaced. A maximum metal removal of 1 mm on the diameter is permitted.

ESSENTIAL SPECIAL TOOLING

Emb. 880	Inertia extractor
Rou. 943	Hub centre cap extractor

TIGHTENING TORQUES (in daN.m)

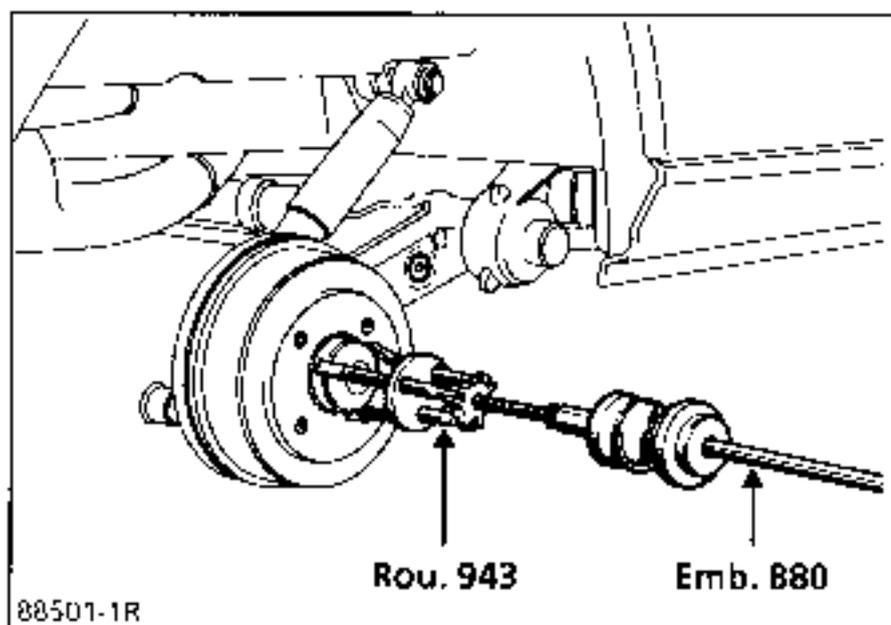


Wheel bolts	9
Hub nuts	16

REMOVING

Remove:

- the hub centre cap using tools Rou. 943 and Emb. 880.

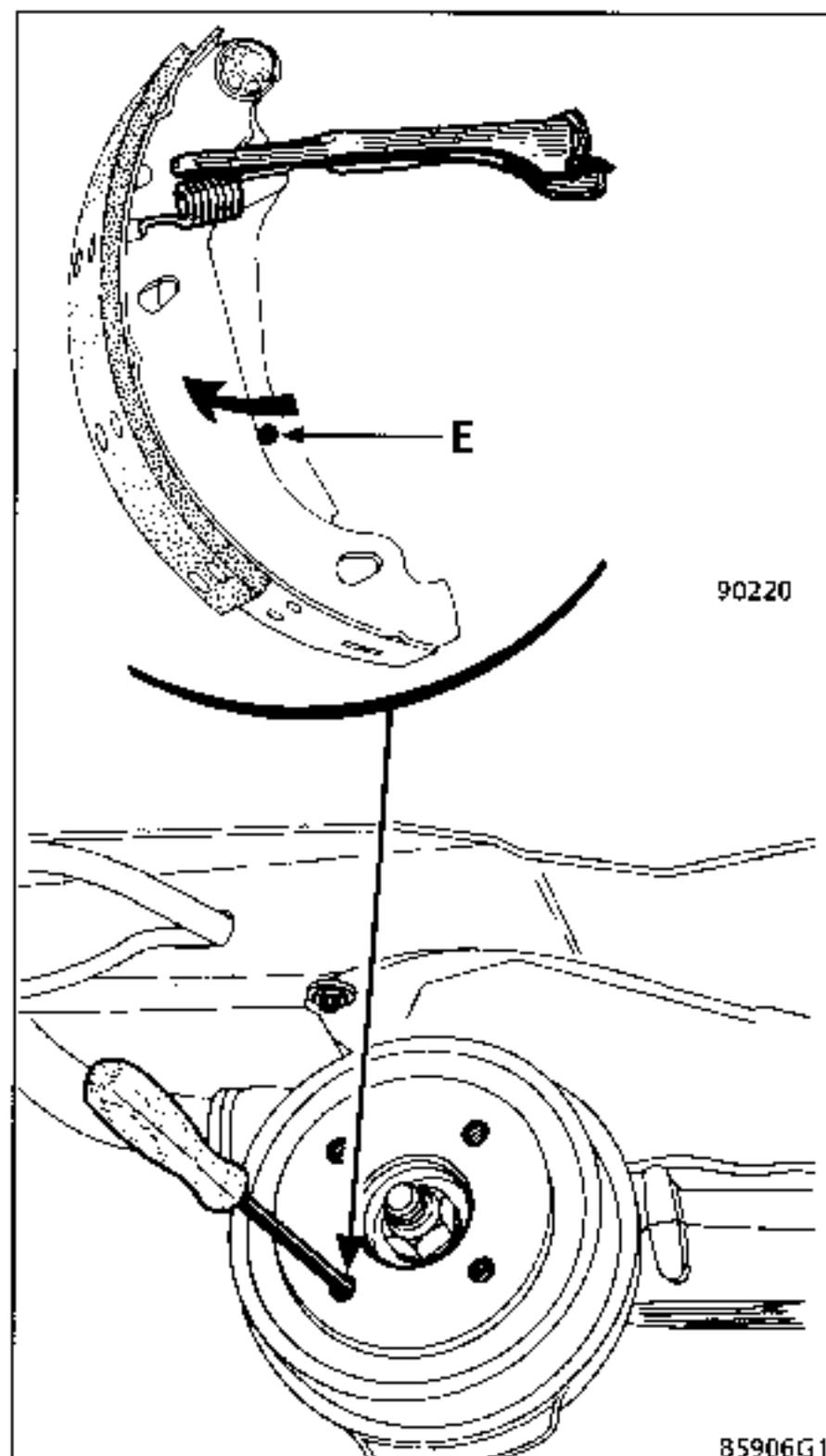


Release the handbrake.

Slacken off the secondary handbrake cables so that the lever can move back.

Pass a screwdriver through one of the wheel-securing holes on the drum and press down on the handbrake lever so as to free the stud on the brake shoe (E).

Help the lever to release itself by pushing it towards the rear.



Remove:

- the flange nut,
- the drum.

REFITTING

Clean the drum and linings using a brake cleaner.

Fit in place:

- the drum,
- the nut, torque tightening it,
- the hub centre cap.

Adjust the shoe positions by pressing down repeatedly on the brake pedal.

Adjust the handbrake.

The two drums must be of the same diameter, therefore refacing of one drum means the other drum must be refaced. A maximum metal removal of 1 mm on the diameter is permissible.

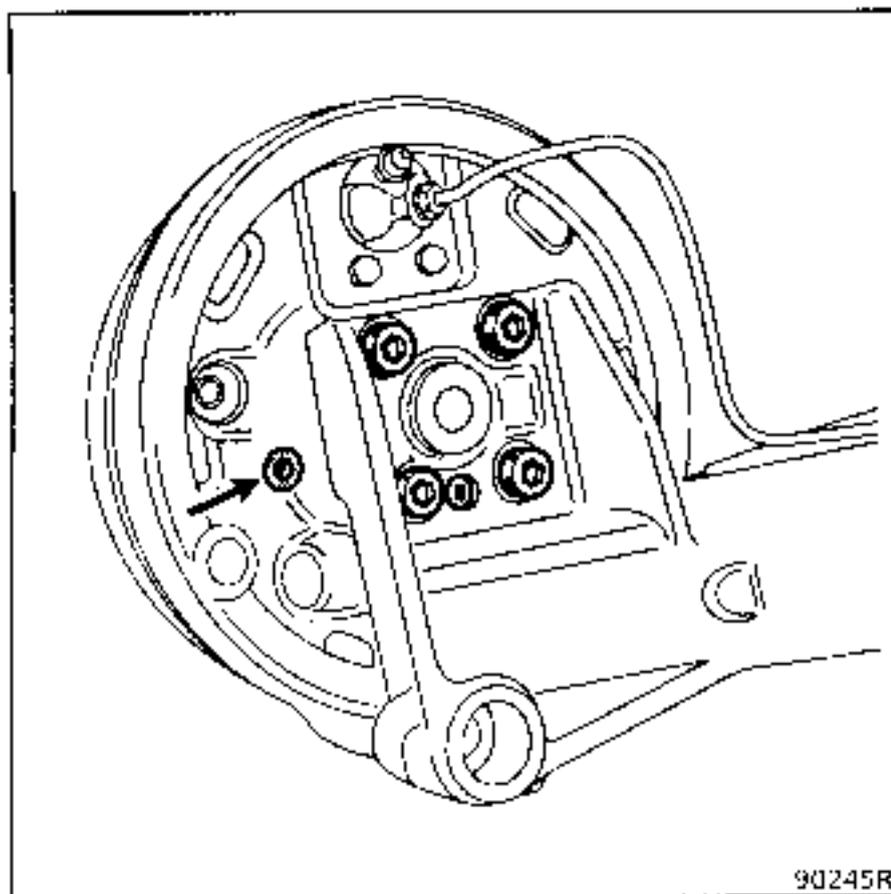
TIGHTENING TORQUES (in daN.m) 	
Wheel bolts	9
Hub securing nut	16

REMOVING

Release the handbrake

Slacken off the secondary cables to allow the operating lever to move rearwards.

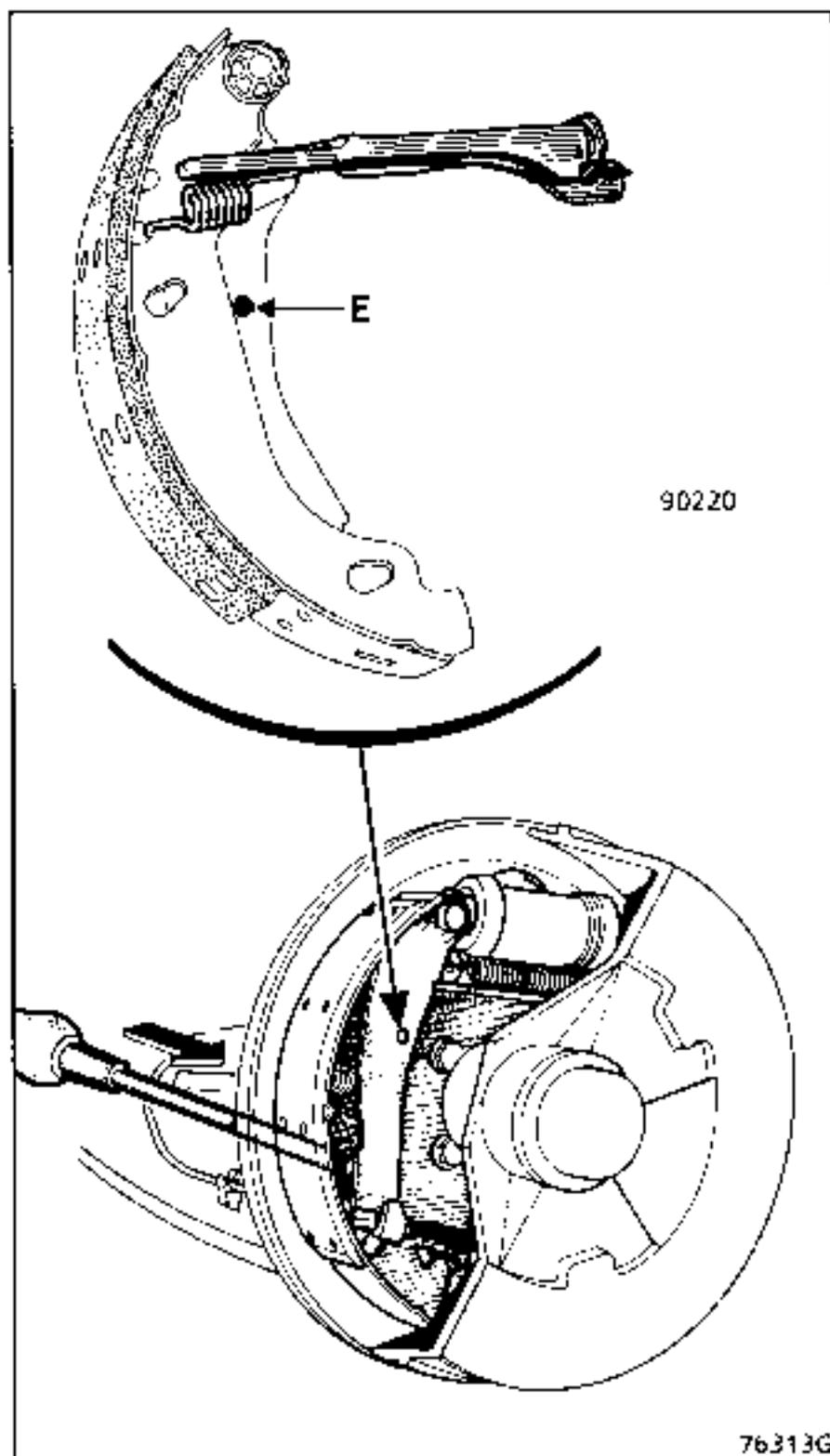
Remove the back plate blanking plug so that the automatic wear take-up mechanism may be released.



Insert a screwdriver and push against the handbrake lever to release stud (E) from the brake shoe.

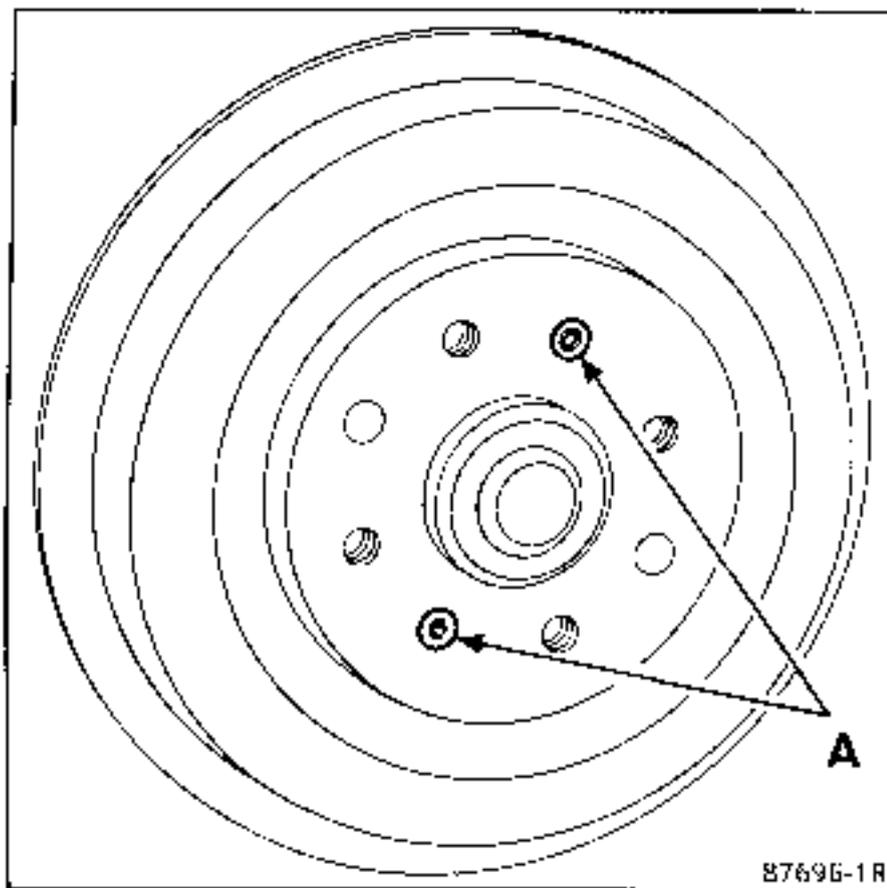
NOTE: There are holes in the back plate and the brake shoe to provide access to the lever which is on the other side of the shoe

Once the stud is freed, the lever may be pushed to the rear.



Remove :

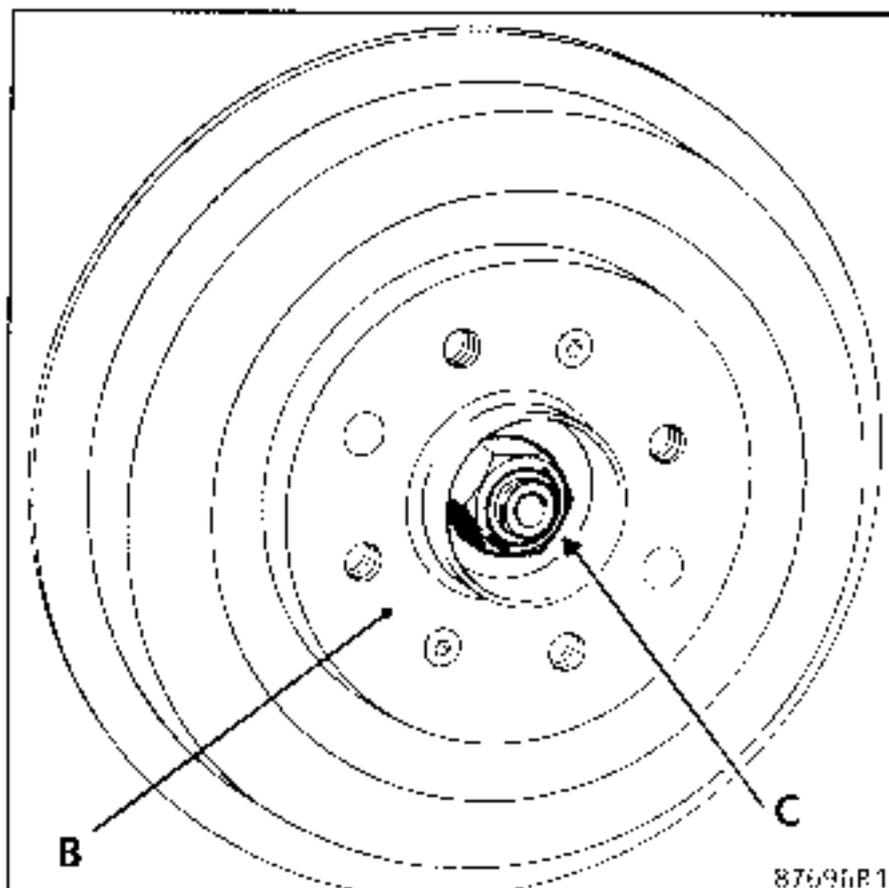
- the two brake drum securing bolts (A),
- the brake drum.



Special points concerning changing of linings.

Remove :

- the hub centre cap,
nut (C),



- the hub - drum assembly (B).

REFITTING

Clean the drum and linings using a brake cleaner.

Fit in place:

- the drum,
- the nut and torque tighten it (according to re-
moval),
- the centre cap.

Adjust the shoe position by pressing down repeatedly on the brake pedal.

Adjust the handbrake.

Refit the blanking cover to the back plate.

These vehicles may be fitted with fixed compensators incorporated in the wheel cylinders: if there is any defect in the operation of the wheel cylinder or compensator, the entire assembly must be changed, any repair being forbidden.

TIGHTENING TORQUES (in daN.m)		
Wheel bolts	9	
Hub securing nuts	16	
Bleed screws	0.8	
Brake pipe union bolts	1.3	

REMOVING

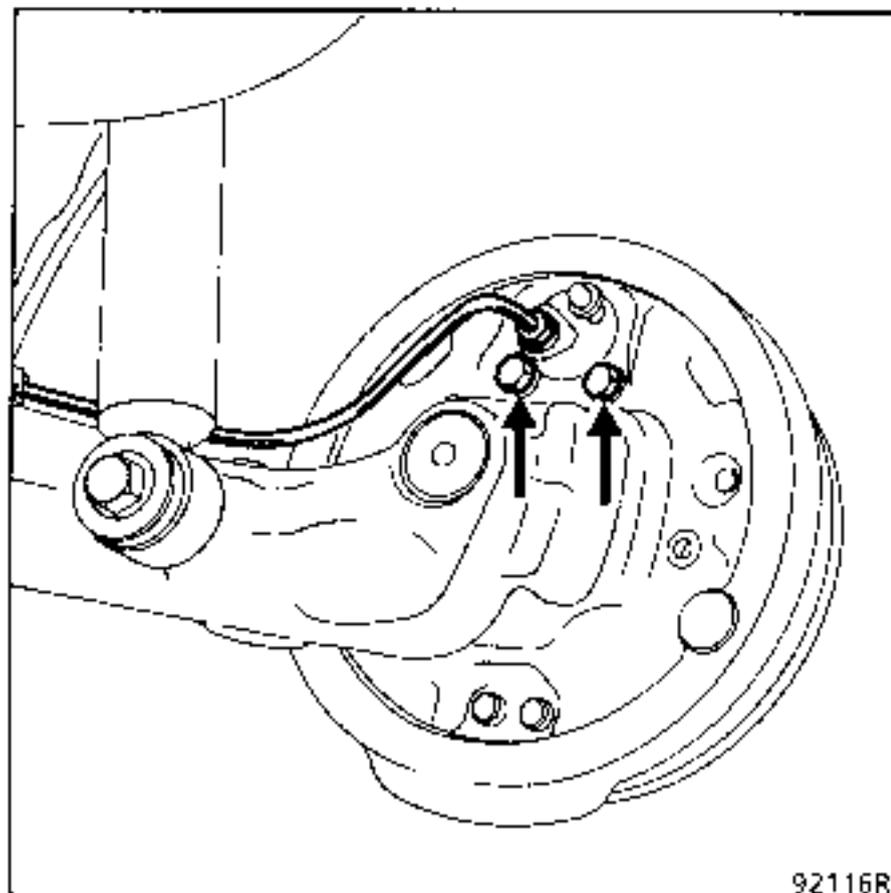
Remove :

- the drum (see relevant section),
- the brake shoes (see "Brake pads" section).

Unscrew:

- the rigid pipe union from the wheel cylinder using a pipe spanner,
- the two bolts securing the cylinder to the anchor plate and remove the cylinder.

Check the condition of the shoes; change them if there are any traces of oil on them.



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REFITTING

Dust out the drums and linings.

Refit the components in the reverse order to removal (see "Brake pads" section).

Bleed the brake system.

Adjust the shoe position by pressing down repeatedly on the brake pedal.

Vehicles with integral compensators :

Check the cut-off pressure (see relevant paragraph).

ESSENTIAL SPECIAL TOOLING

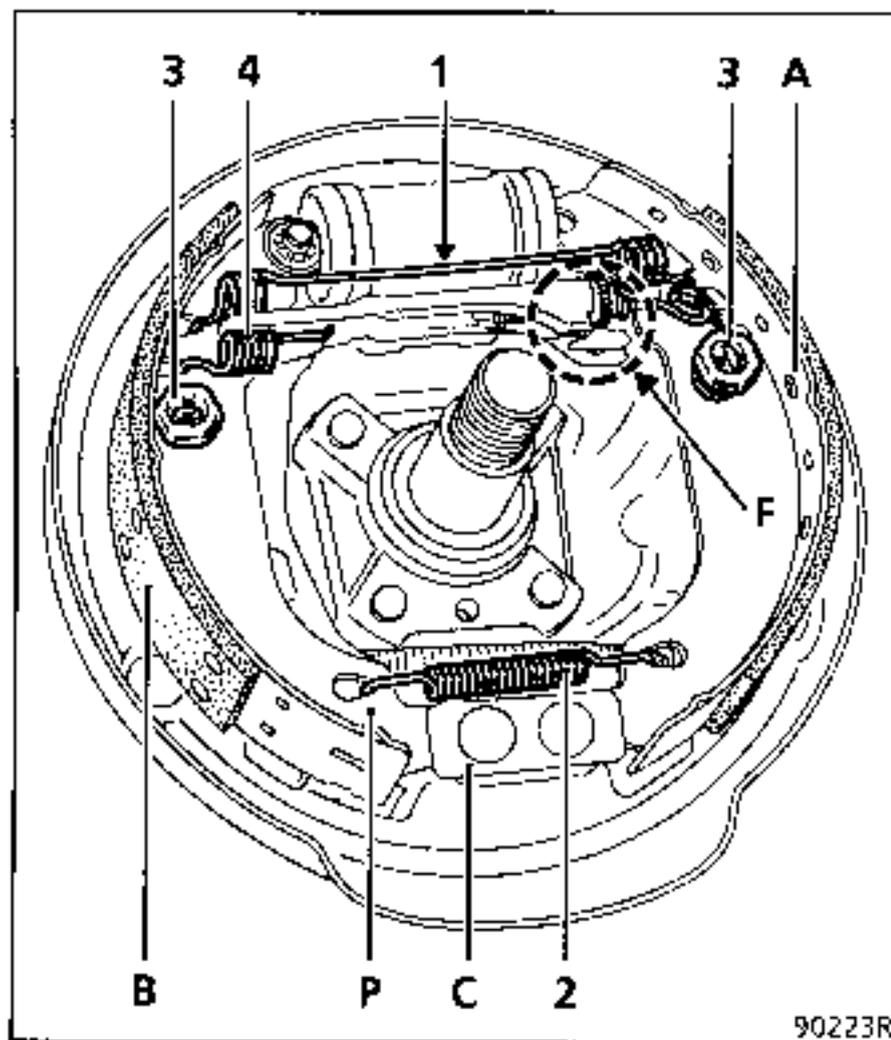
Emb.	880	Inertia extractor
Rou.	943	Hub centre cap extractor

TIGHTENING TORQUE (in daN.m)



Wheel bolts	9
Hub securing nuts	16

Composition of BENDIX 180 x 40 RAI brake (incremental automatic take-up).

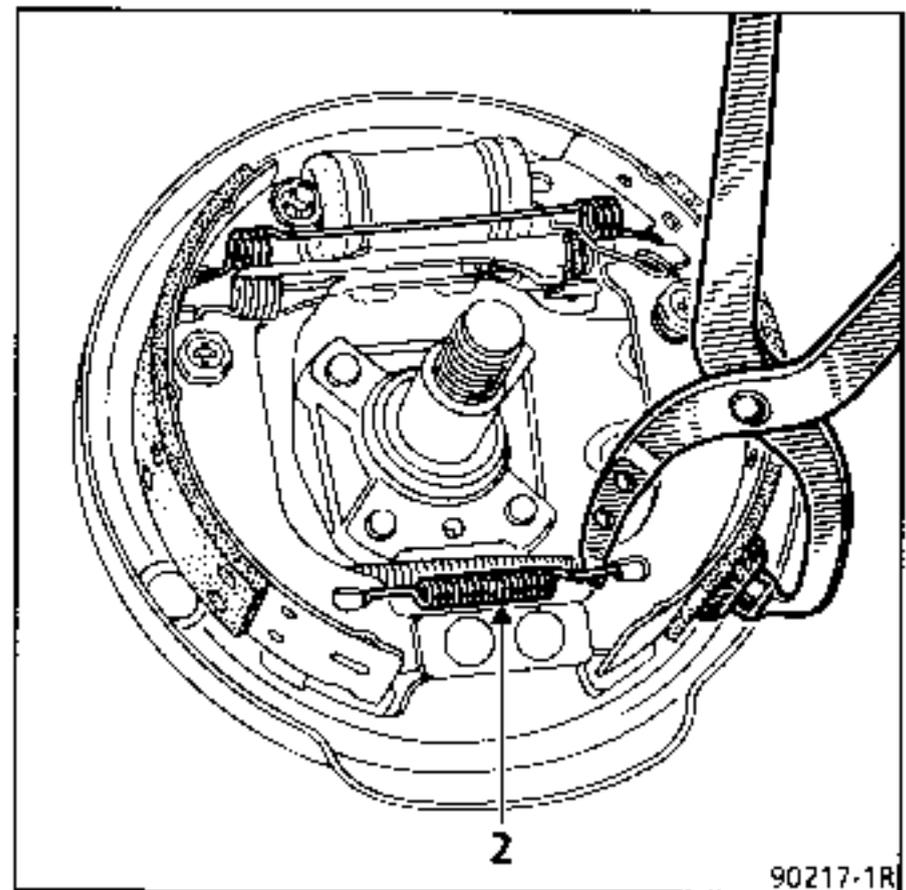


- A Leading shoe
- B Trailing shoe
- C Fixed point
- P Brake shoe foot
- F RAI
- 1 Upper return spring
- 2 (Base) lower return spring
- 3 Side fastening
- 4 Handbrake lever return spring

REMOVING

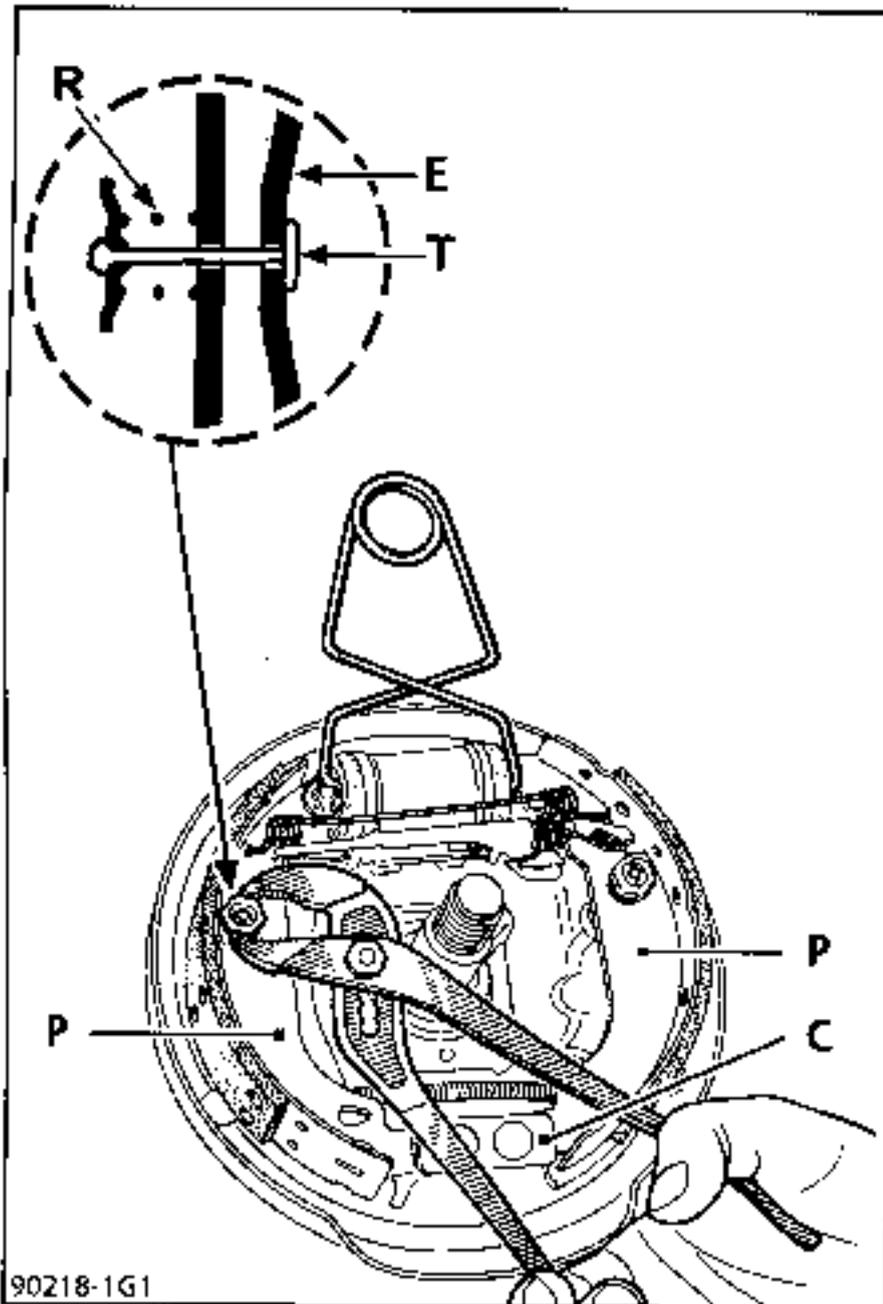
All the shoes on any given axle are to be replaced at the same time. Always fit shoes with linings of the same make and grade.

Remove lower spring (2) using brake shoe grips.



Fit a clamp to the wheel cylinder pistons.

Using multiple joint pliers and keeping connecting link (T) in contact with brake back plate (E), remove springs (R) laterally holding the trailing shoe.

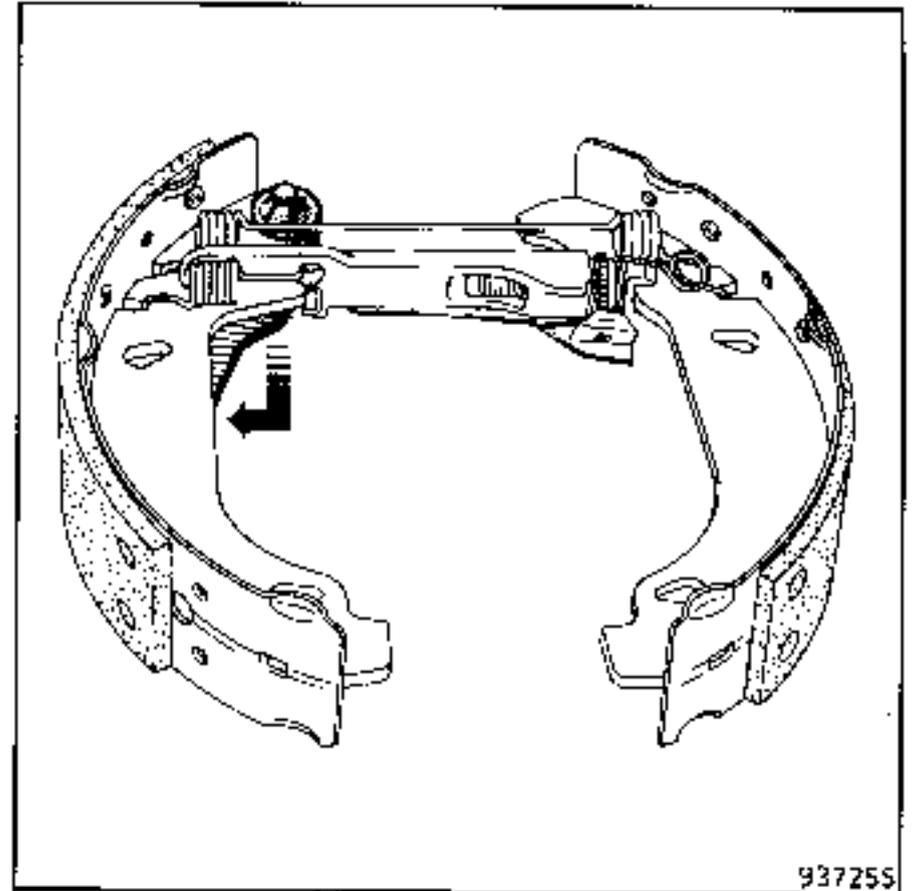


Pass each shoe base (P) above fixed point (C) alternately. Tighten the shoe bases with respect to one another to move the tips away at the wheel cylinder.

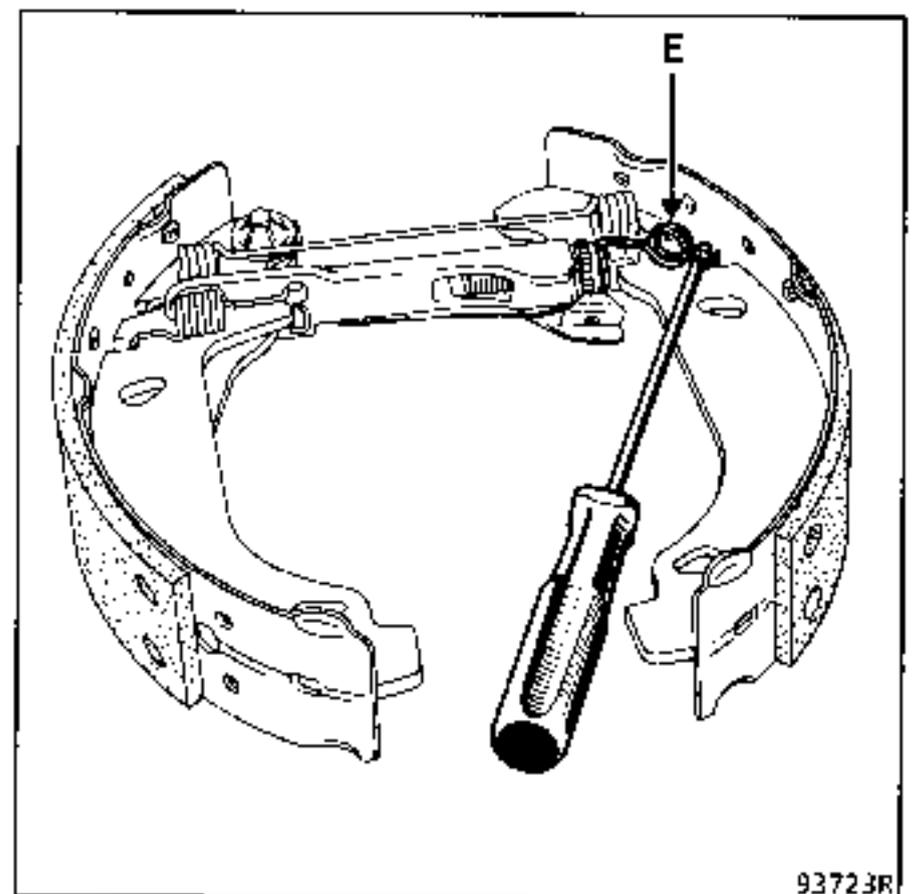
Move the assembly (RAI and shoes) away from the brake back plate then remove it, after first unfastening the handbrake cable.

On the work bench, dismantle the RAI and shoe assembly.

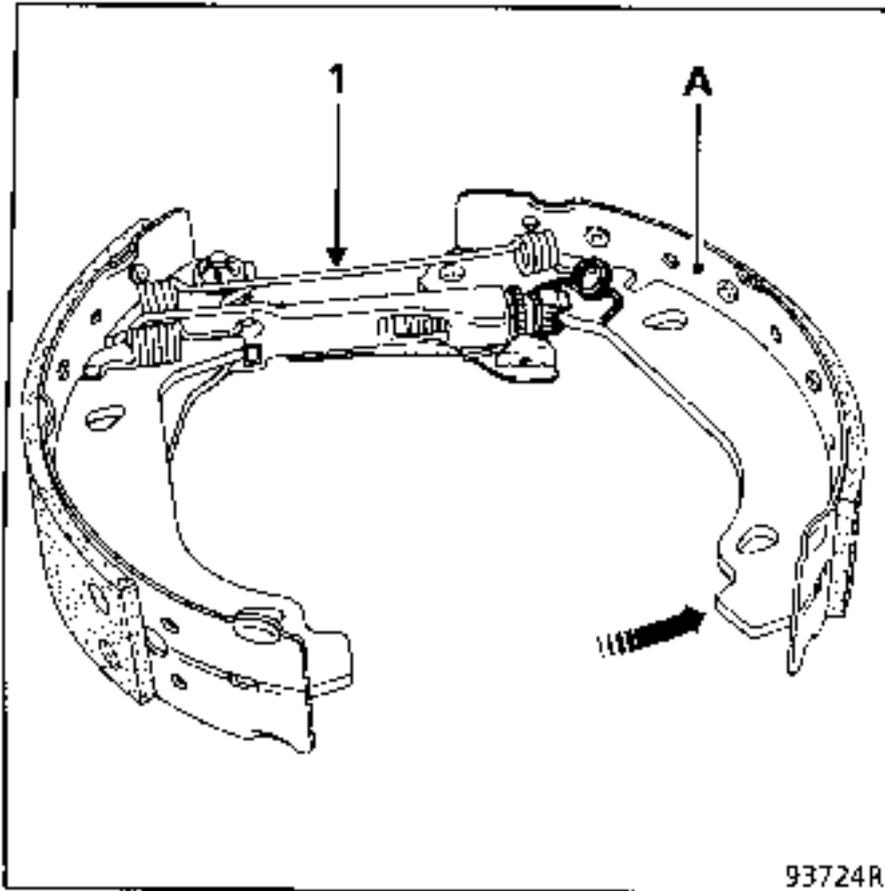
Disarm the handbrake lever.



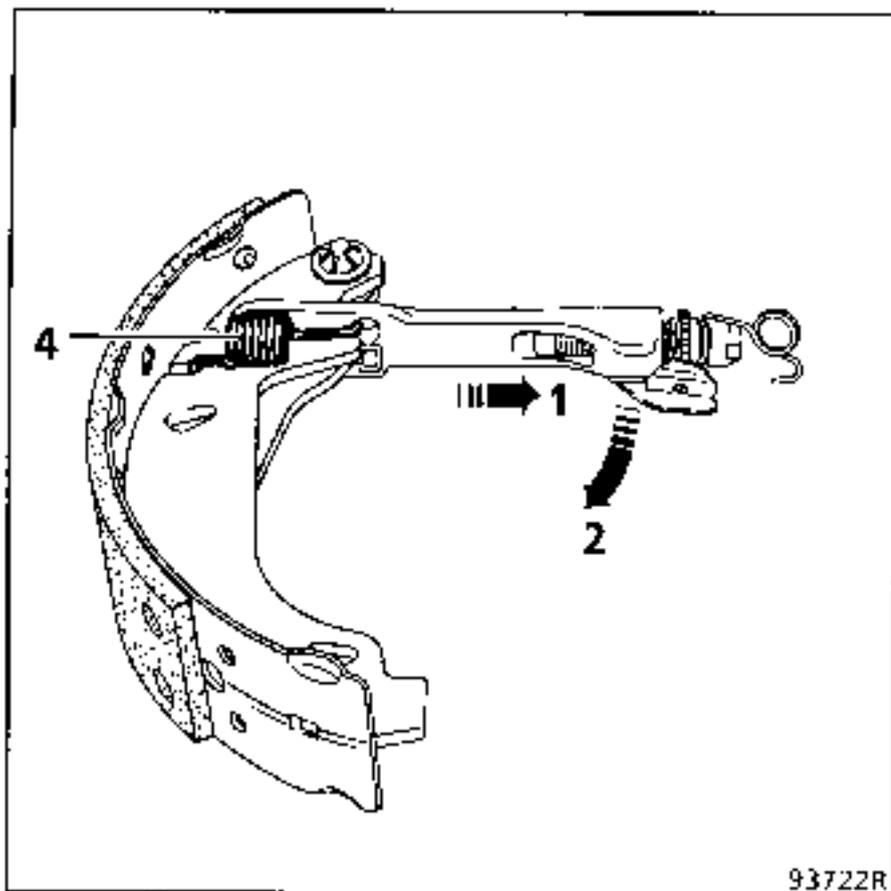
Using a small screwdriver, unfasten clip (E).



Pivot leading shoe (A), as shown by the arrow so as to release the head of the RAI screws. This will enable upper spring (1) to be removed easily.

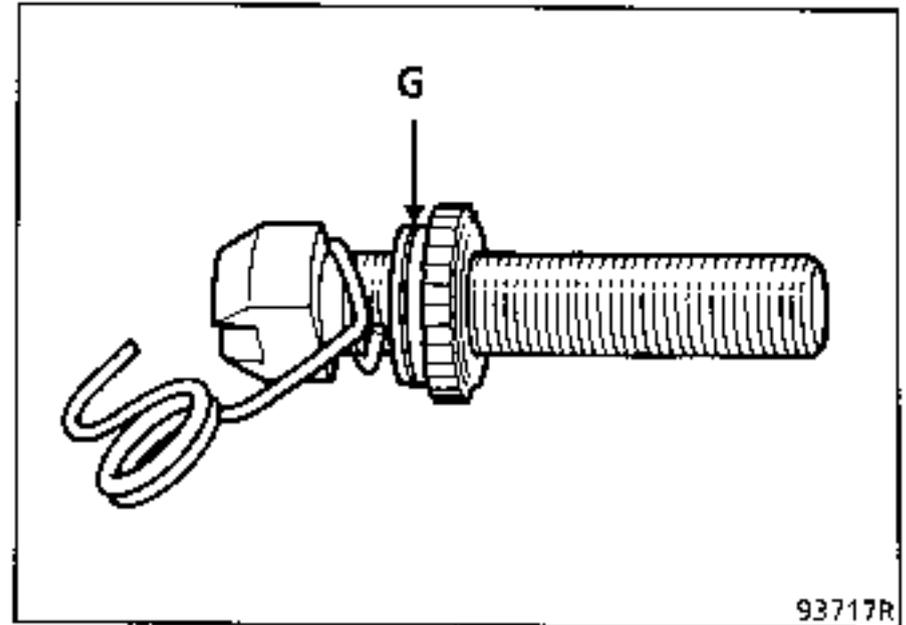


To remove the RAI assembly, pull in the direction of arrow (1) then turn in the direction of arrow (2). Remove spring (4) and the handbrake lever.



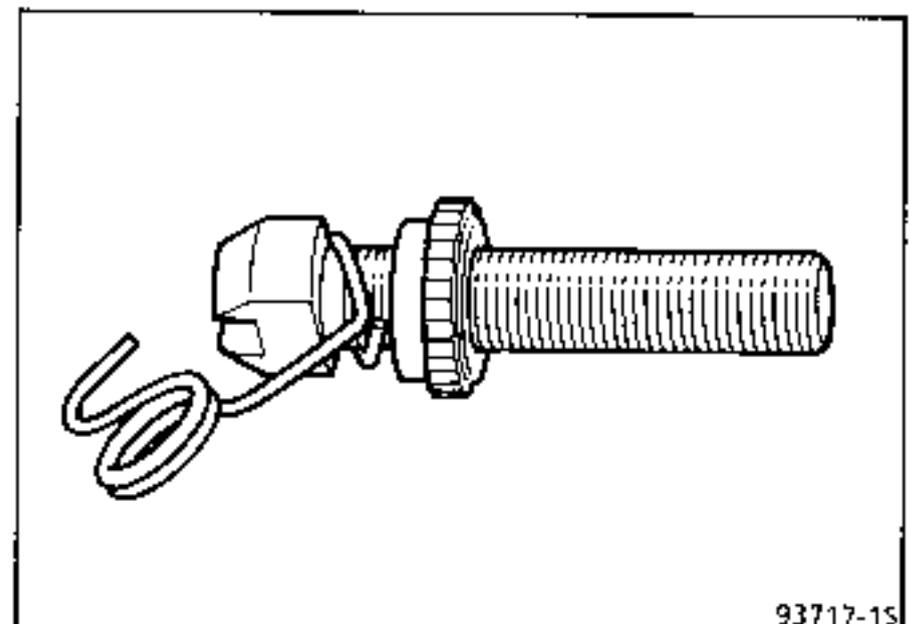
Marking and reassembly of the parts constituting the RAI system.

Left-hand bolt and notched nut



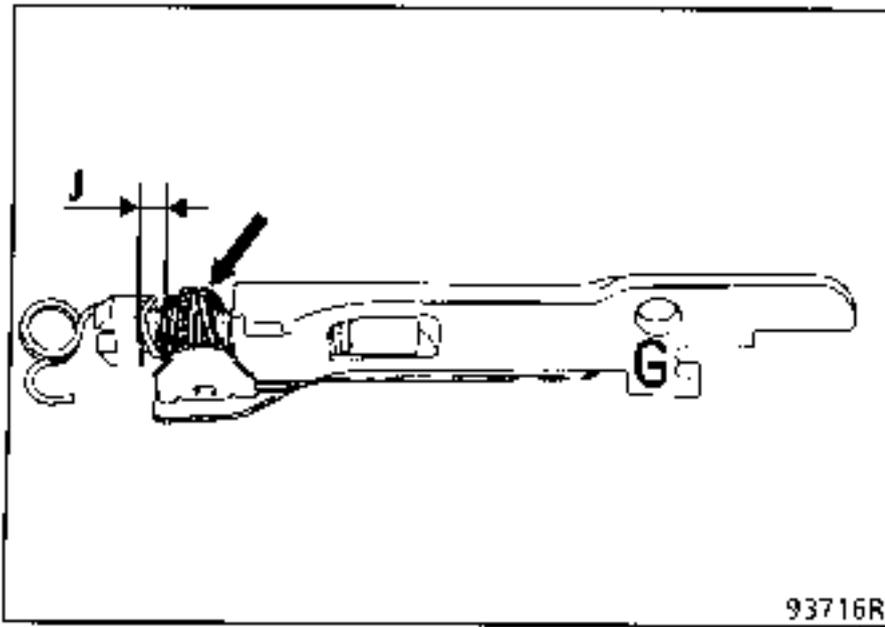
The bolt has a left-hand thread, the notched nut has a groove (G) and the clip is not painted.

Right-hand bolt and notched nut



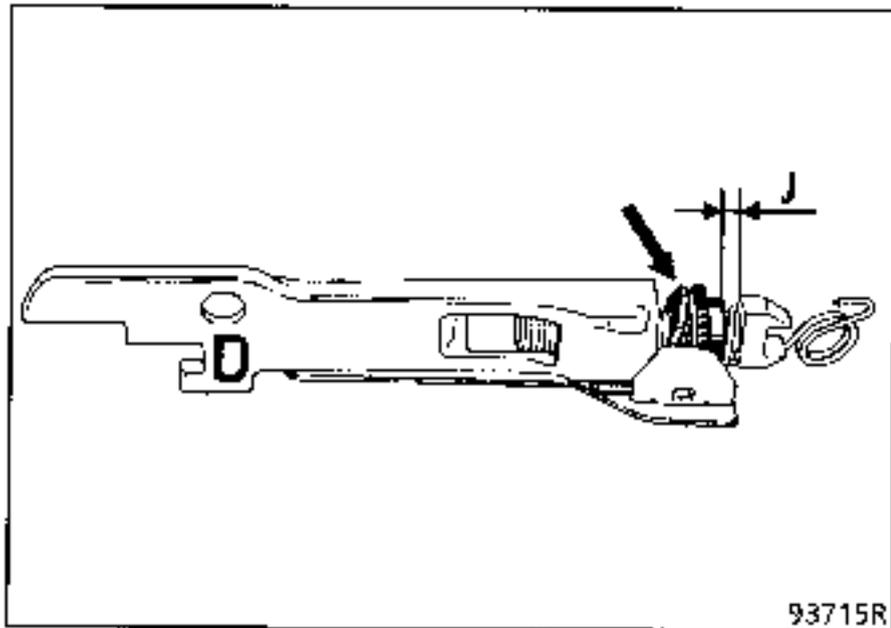
The bolt has a right-hand thread, the notched nut does not have a groove and there are dabs of paint on the clip.

Left-hand RAI assembly



Note the **G** (left-hand) stamped on the part and the position of the bracket.

Right-hand RAI assembly



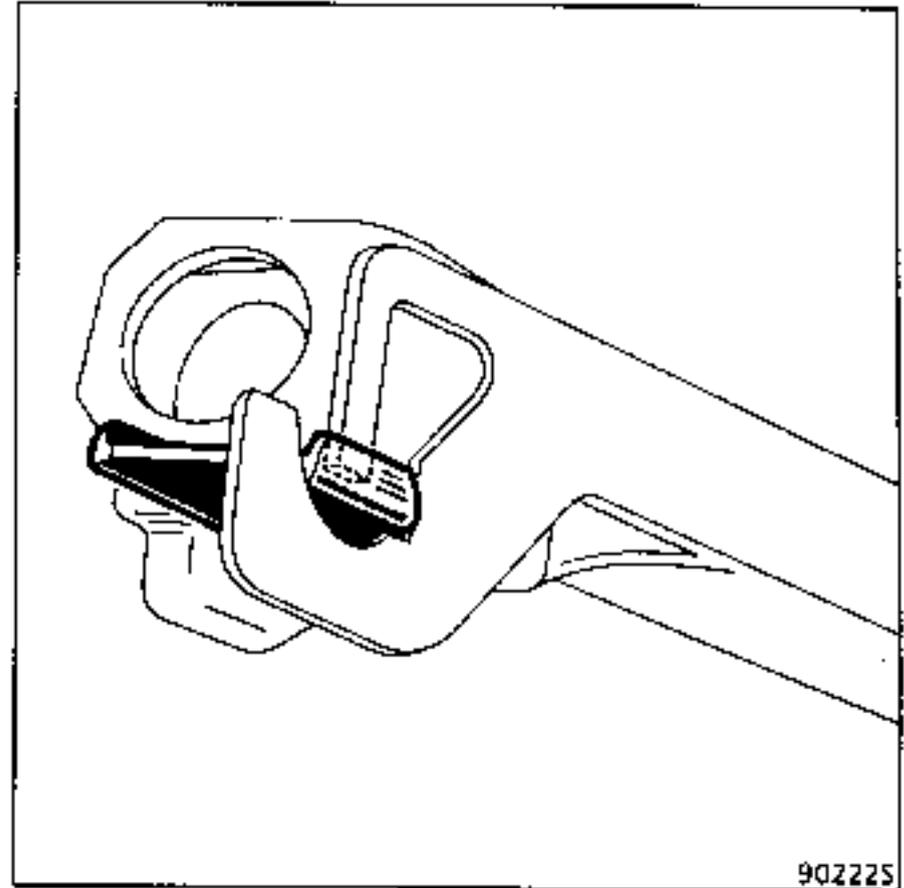
Note the **D** (right-hand) stamped on the part and the position of the bracket.

In both cases, the clip fastening must not be jammed between the bolt head and the notched nut; a slight clearance (J) must be left (J).

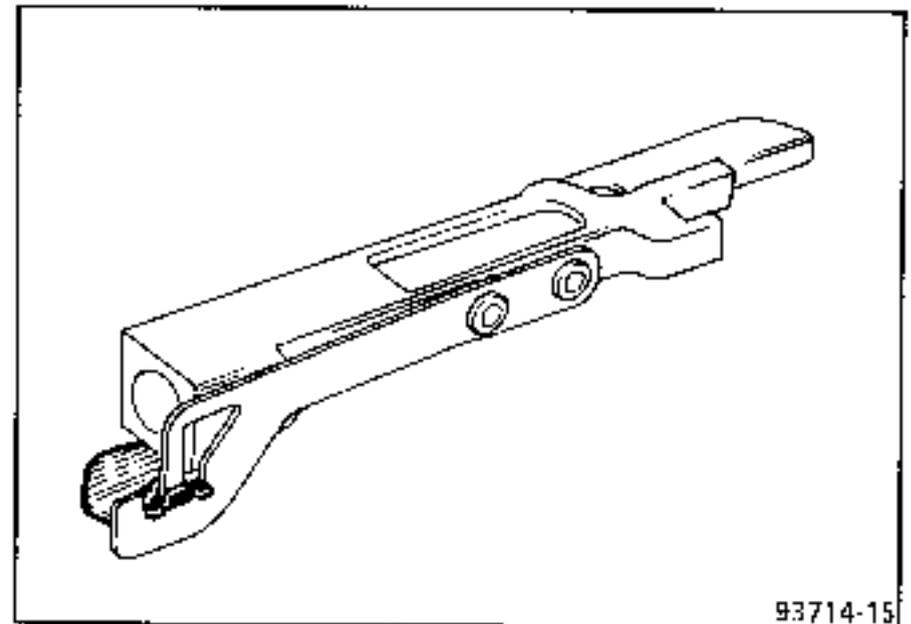
Reassembling the RAI assembly

Ensure that the catch is positioned correctly.

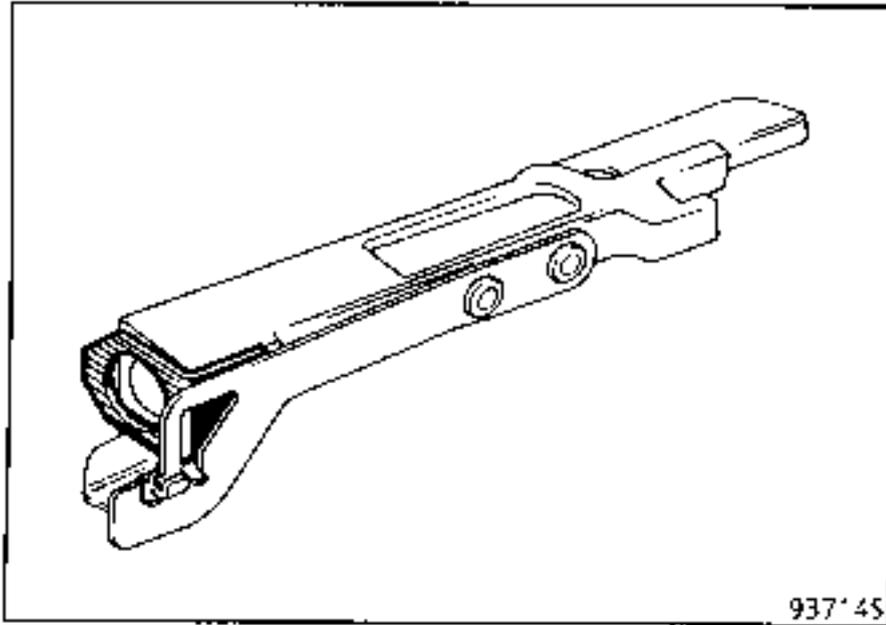
1ST TYPE



2ND TYPE



Refit the bracket, the solid section should be placed between the blade and the link arm.

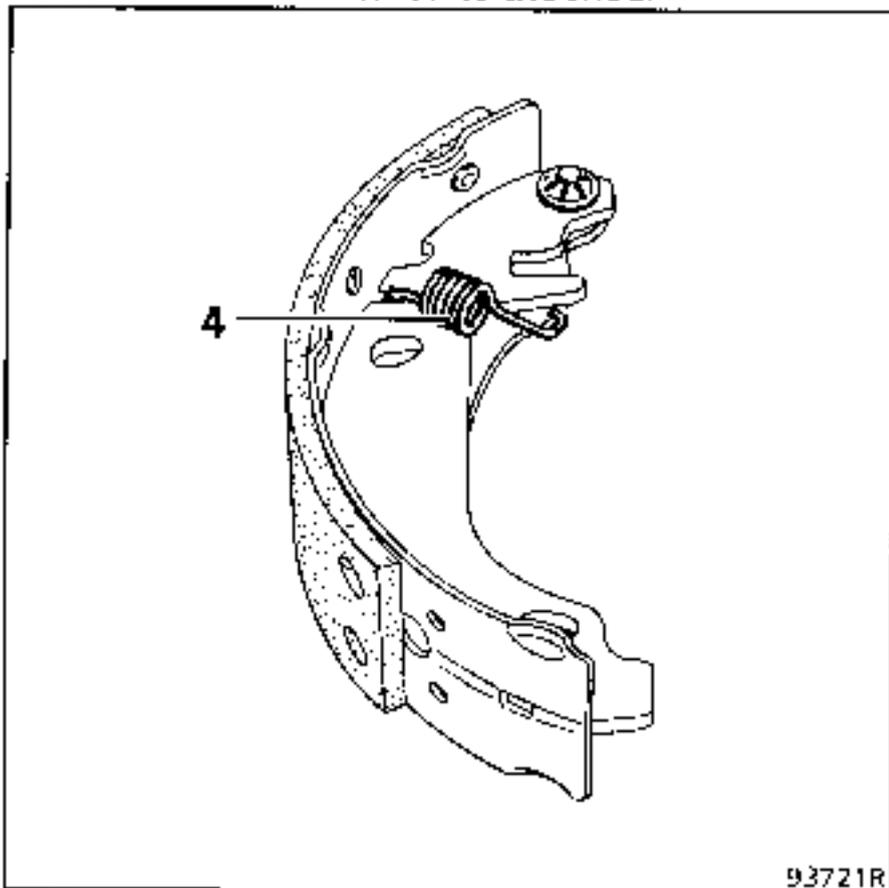


Then assemble the link arms with their respective bolts and nuts, with the right-hand bolt, clip and nut in the right-hand link arm, passing through the hole in the bracket and likewise for the left-hand RAI.

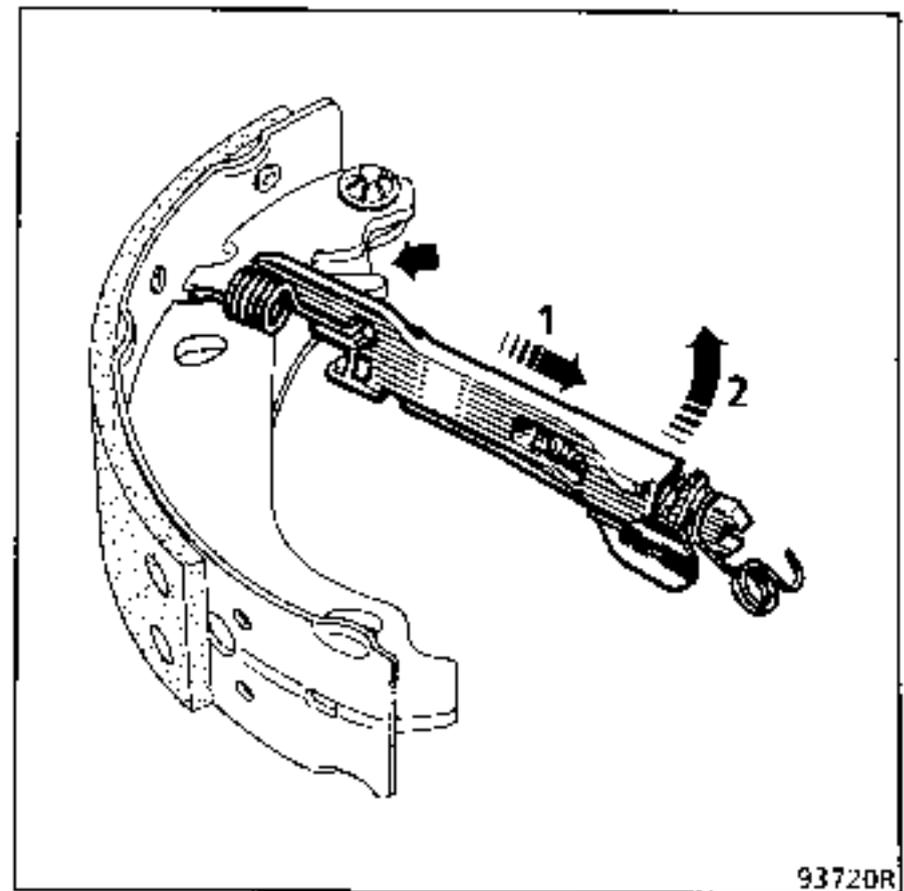
On the repair bench, refit the RAI and shoe assembly.

Refit the handbrake lever to the trailing shoe with a new clip, then disarm the lever.

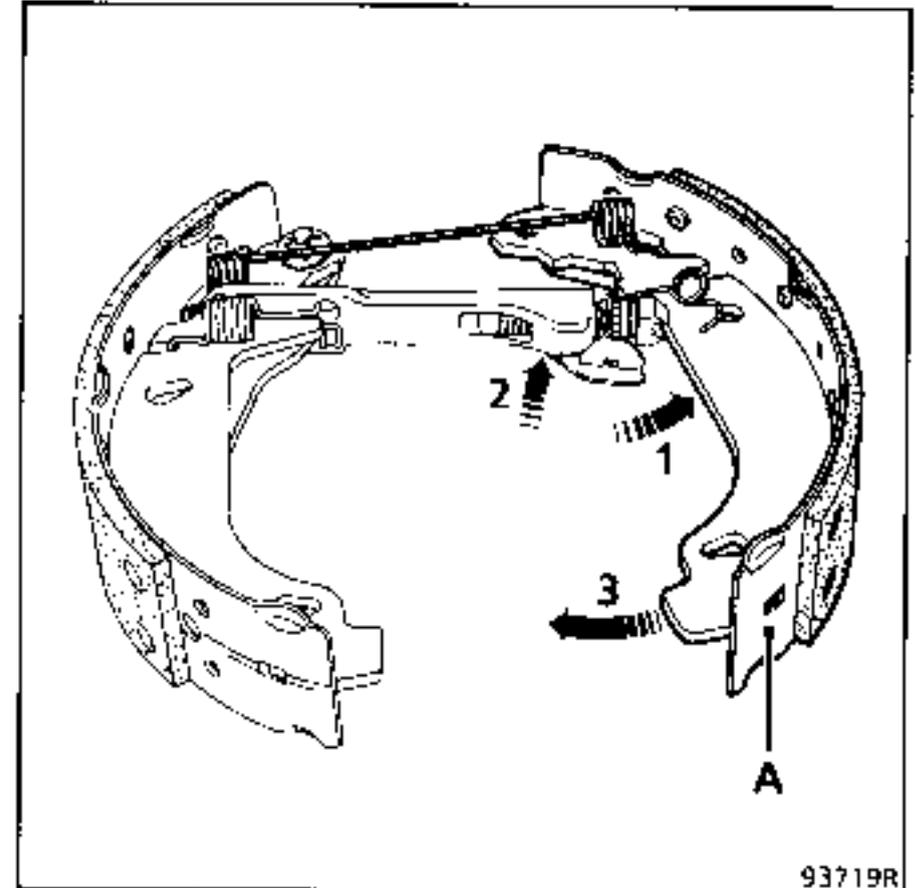
Position spring (4) in the notch in the shoe taking care that it is fitted in the correct direction with the shorter hook secured to the shoe.



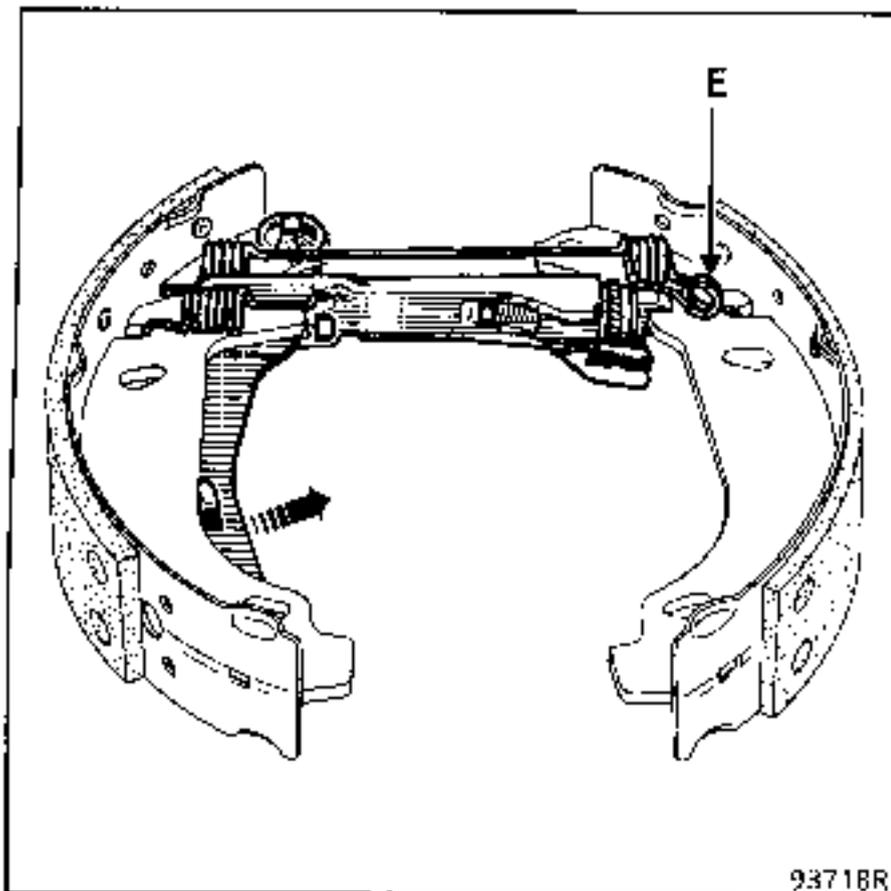
Attach the RAI assembly to spring (4) then pull in the direction shown by the arrows and the RAI moves automatically into its operating position.



Position the upper spring (1) in the notches in the two shoes, then pull in the direction shown by the arrows and the recess on the bolt should locate in that of the leading shoe (A).



Attach clip (E) and rearm the handbrake lever.



REFITTING

Offer the assembly up to the vehicle.

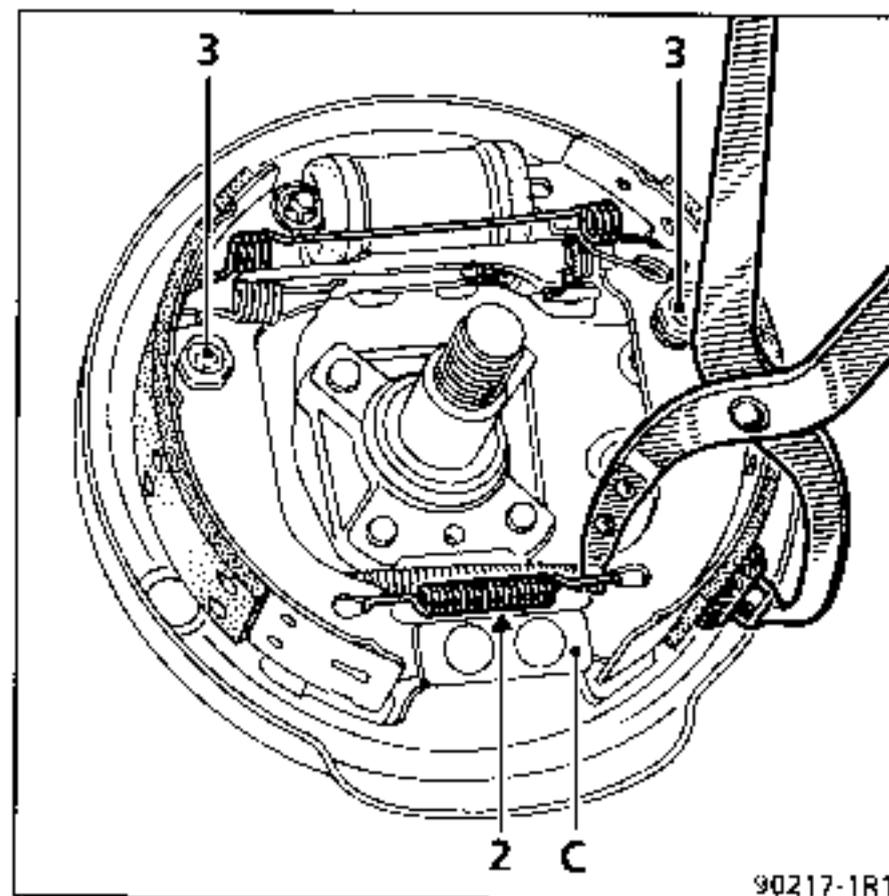
Attach the handbrake cable to the lever.

Tighten the bases of the brake shoes and position the tips on the wheel cylinder pistons. Take care not to damage the caps.

Position the shoes on fixed point (C).

Fit in place the side retaining devices (3).

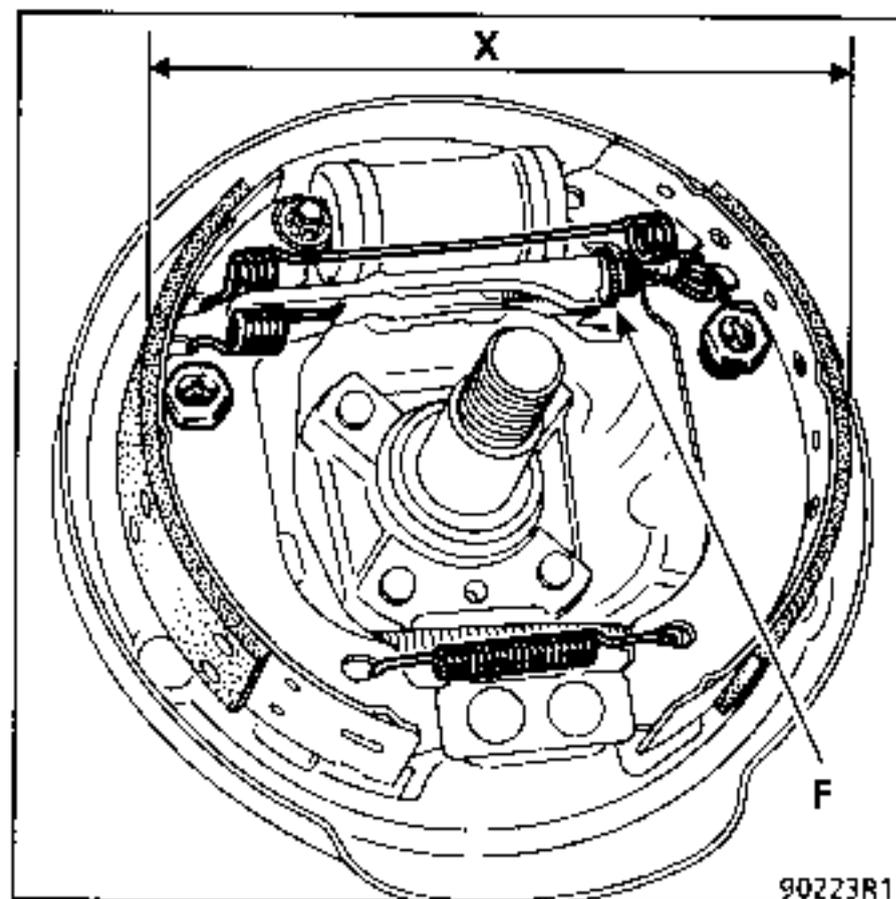
Remove the clamps from the wheel cylinder pistons then refit the lower spring (2).



ADJUSTING

Using a screwdriver, adjust the diametric setting of the shoes via notched sector (F) in order to obtain a diameter (X) between:

179.2 mm and 179.5 mm



Adjust the other brake anchor plate in the same way.

Refit the drums but do not tighten the nuts.

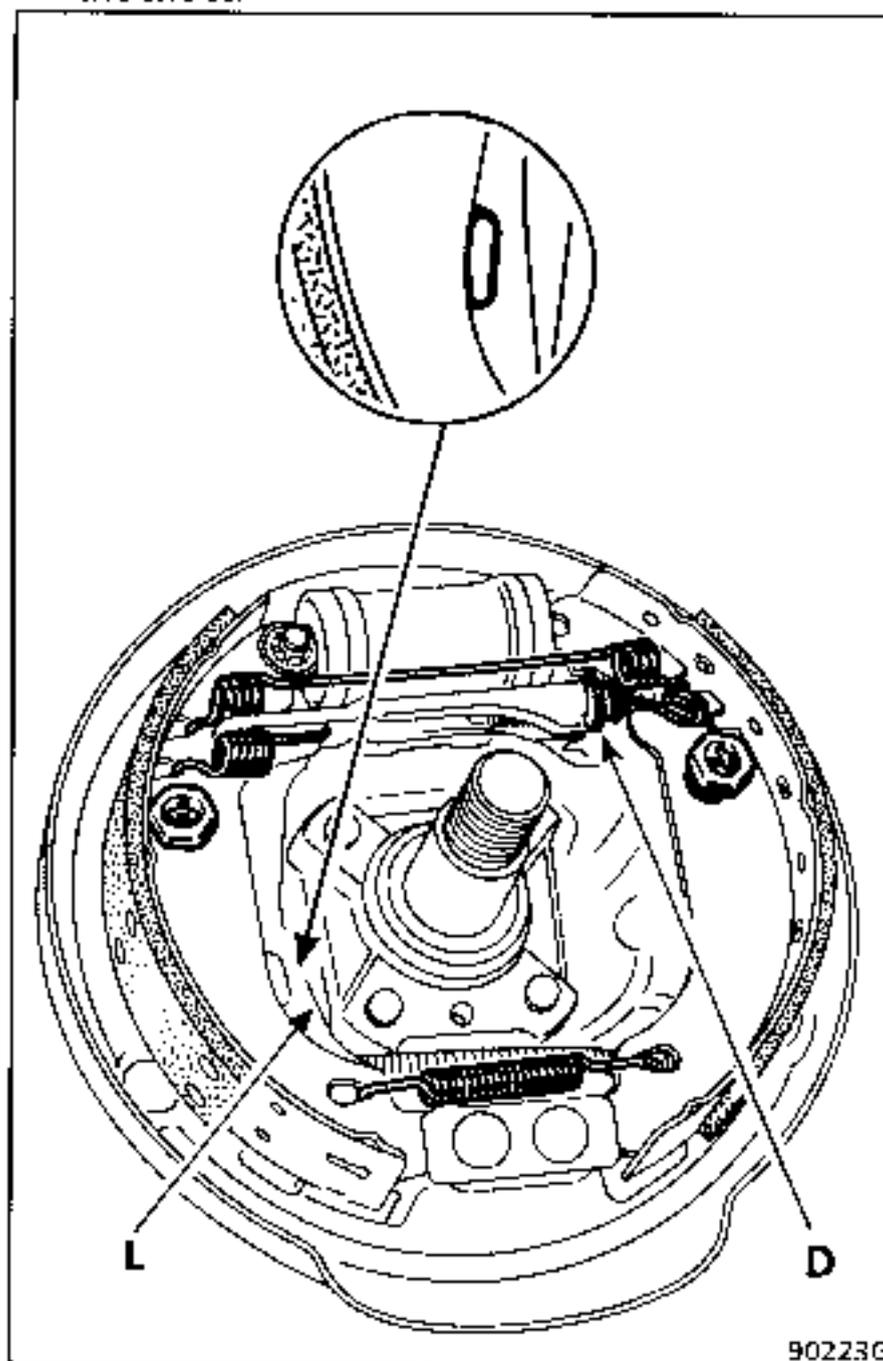
Adjust the linings by pressing down repeatedly on the brake pedal (approximately 20 times).

Ensure that the RAI operates correctly (a characteristic "click" will be heard from the drums).

Remove the drums.

Ensure :

- that the cables slide correctly,
- that the handbrake levers (L) bear correctly on the shoes.



Gradually tension the cables at the central adjusting point so that levers (L) lift off between the first and second notches of the control lever travel and remain lifted off at the second notch.

Tighten the lock nut at the central adjusting point.

Refit :

- the drums and torque tighten the nuts to 16 daN.m,
- the plugs.

ESSENTIAL SPECIAL TOOLING

Fre. 573-01 Handbrake cable clamp

TIGHTENING TORQUE (in daN.m)



Wheel bolts	9
Hub securing nuts	16

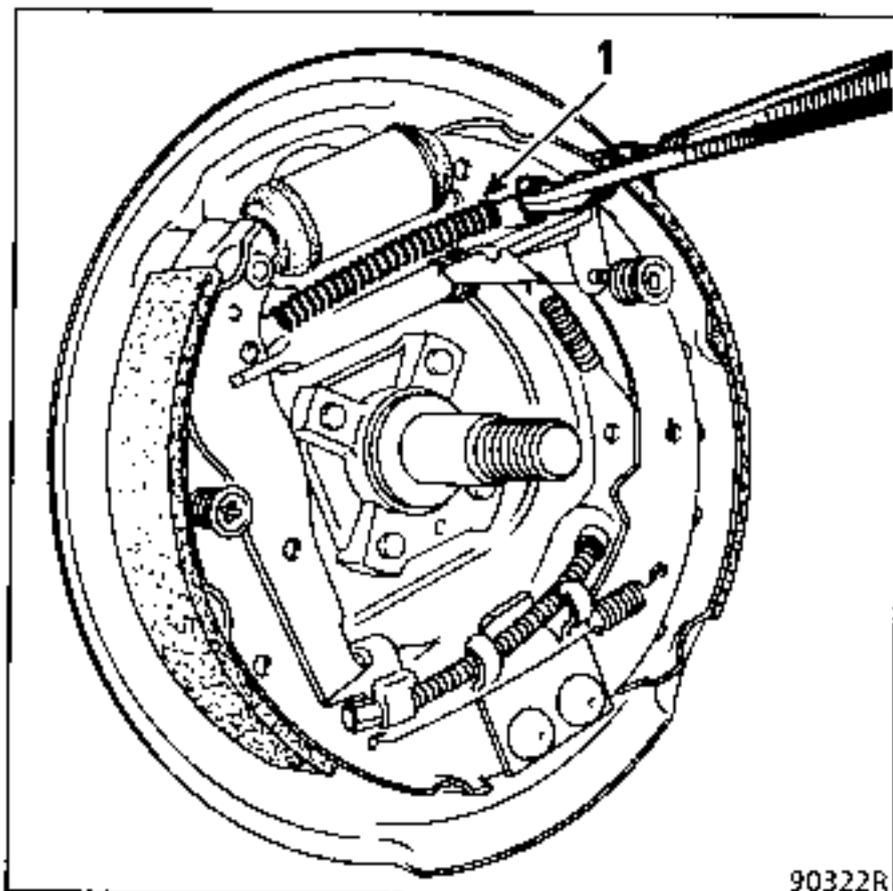
All the shoes on any given axle are to be replaced at the same time. Always fit shoes with linings of the same make and grade.

REMOVING

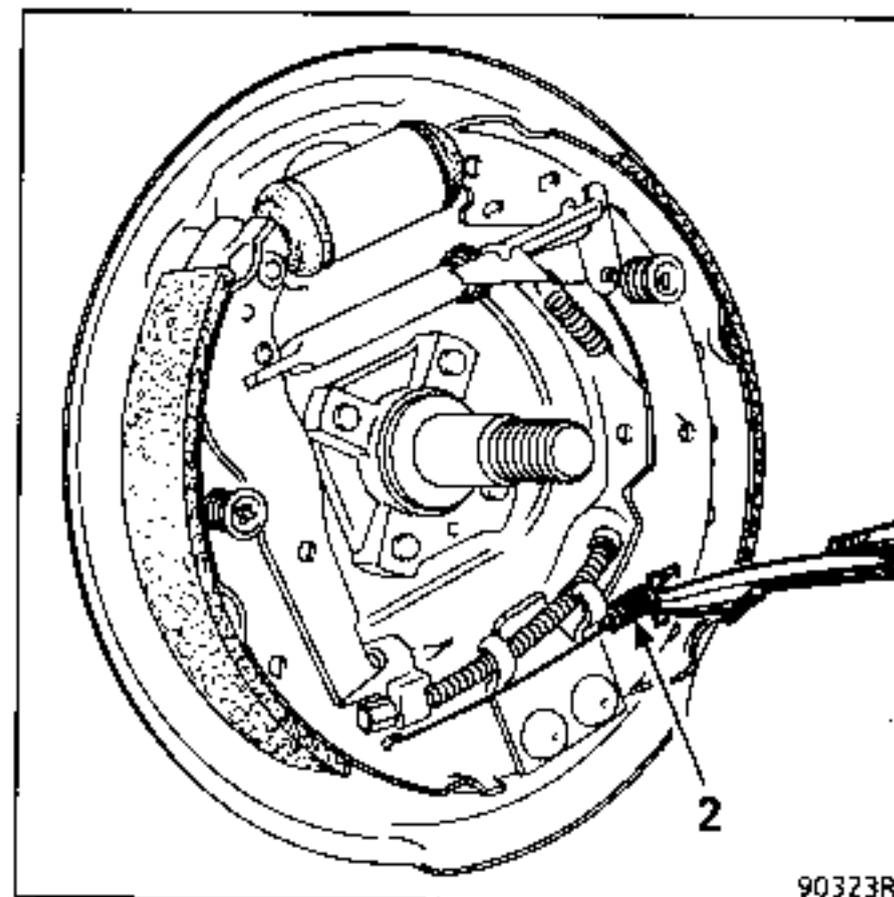
Remove the brake drum (see relevant section).

Remove :

- the upper spring (1) using brake shoe grips,



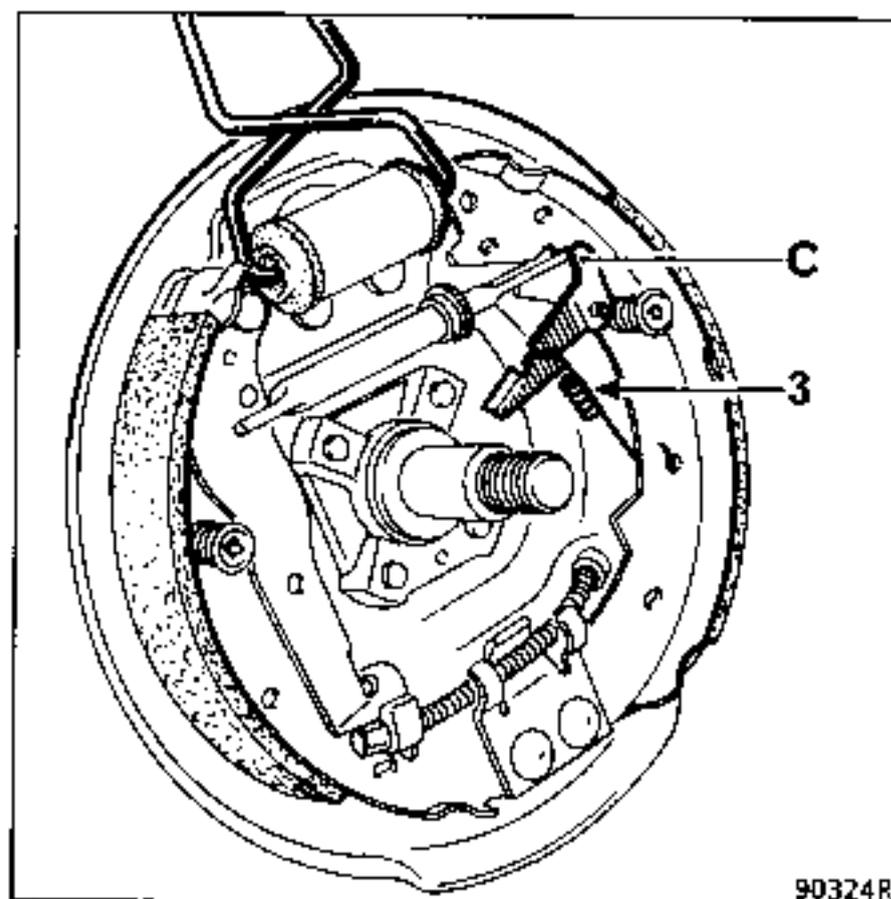
- the lower spring (2) using brake shoe grips.



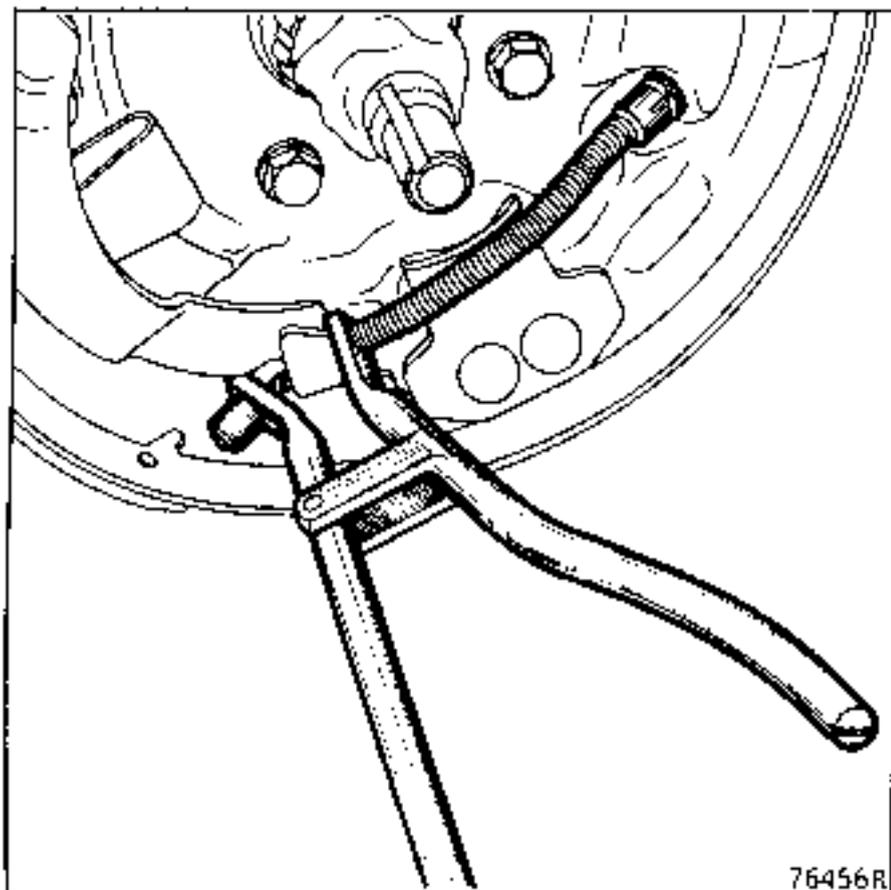
Fit clamp to the wheel cylinder piston.

Remove :

- spring (3) and adjusting lever (C),



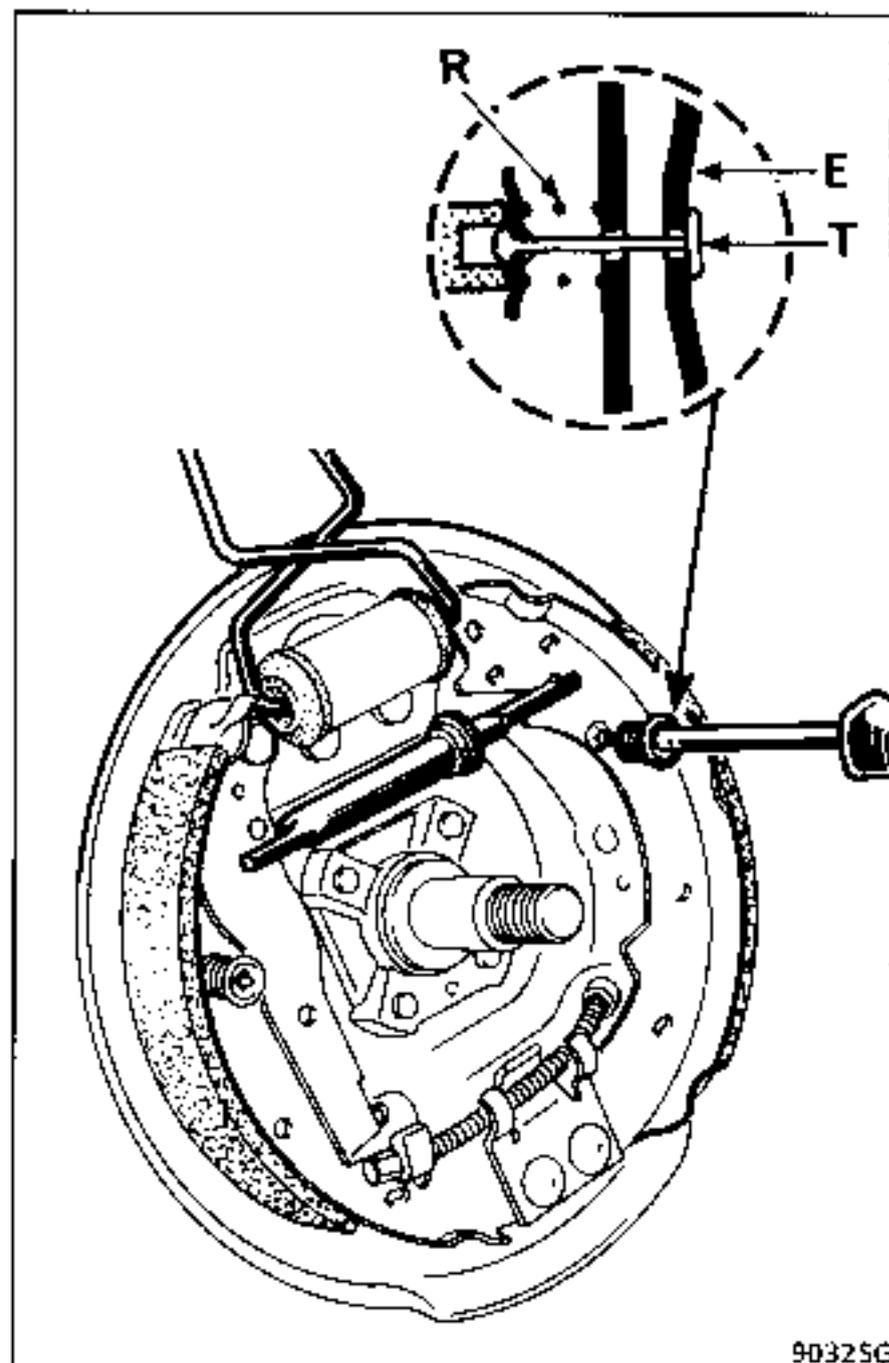
- handbrake cable using tool Fre. 573-01.



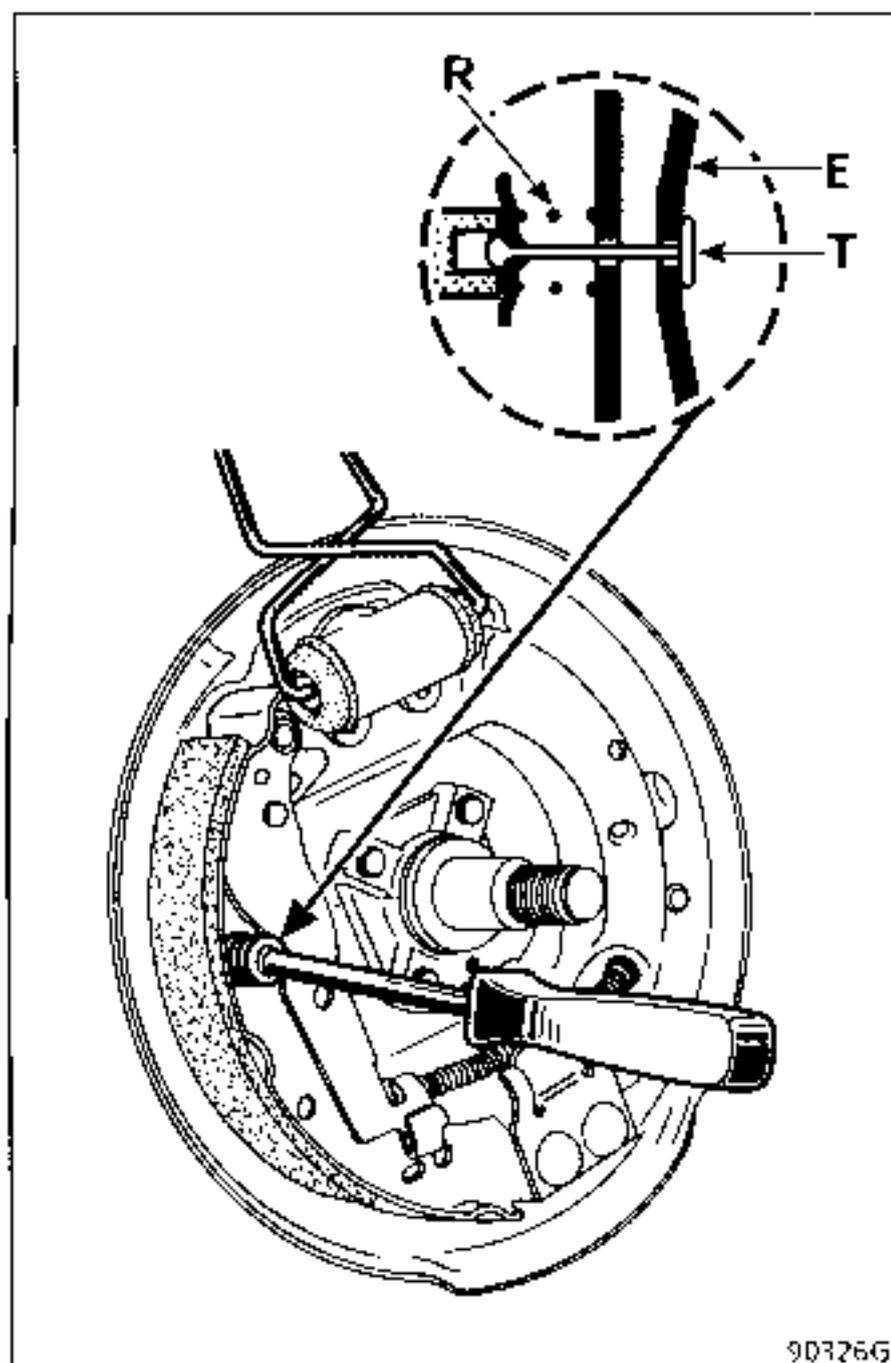
Using a tool such as the end of a valve adjusting spanner, remove lateral shoe spring (R), holding connecting rod (T) against brake back plate (E).

Remove :

- the leading shoe - thrust link assembly.



- spring (R) holding the trailing shoe,
- the trailing shoe.



Dust out the drums and back plates using dust removal equipment.

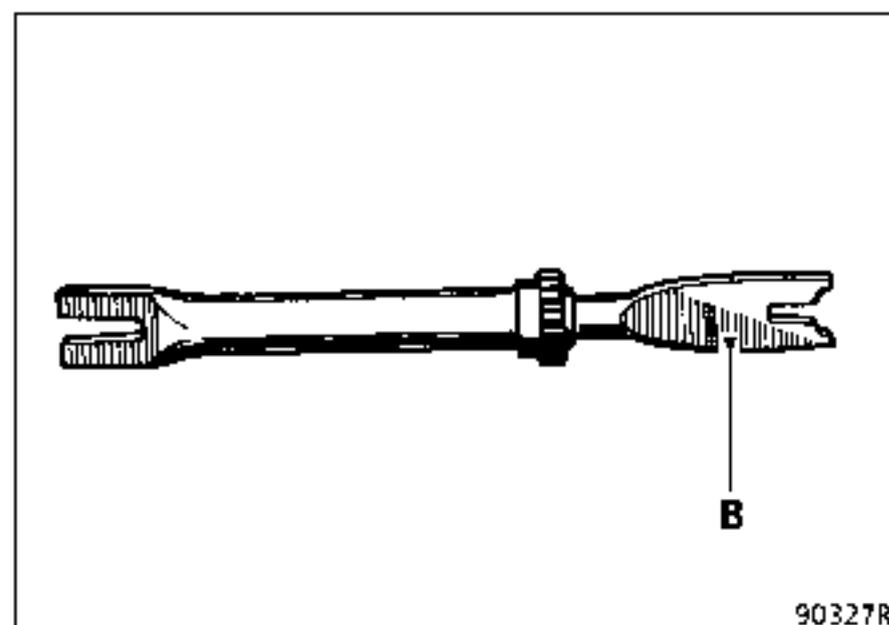
REFITTING

NOTE: The component parts of the brakes are different for the left-hand and right-hand sides so it is essential not to interchange them.

Lightly grease the thread on the thrust link and mark it.

On the left-hand brake : the screw thread is right-hand.

The screw end (B) is **METALLIC SILVER** in colour.



On the right-hand brake: the screw thread is left-hand.

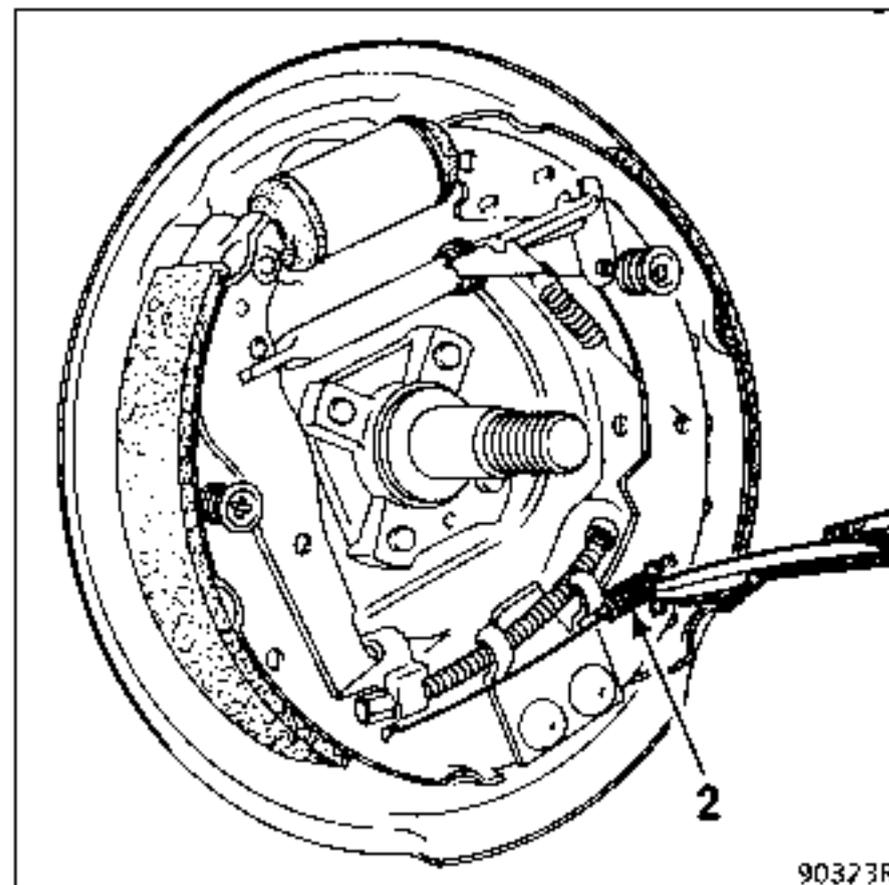
The screwed end (B) is **GOLD** in colour.

Fit in place:

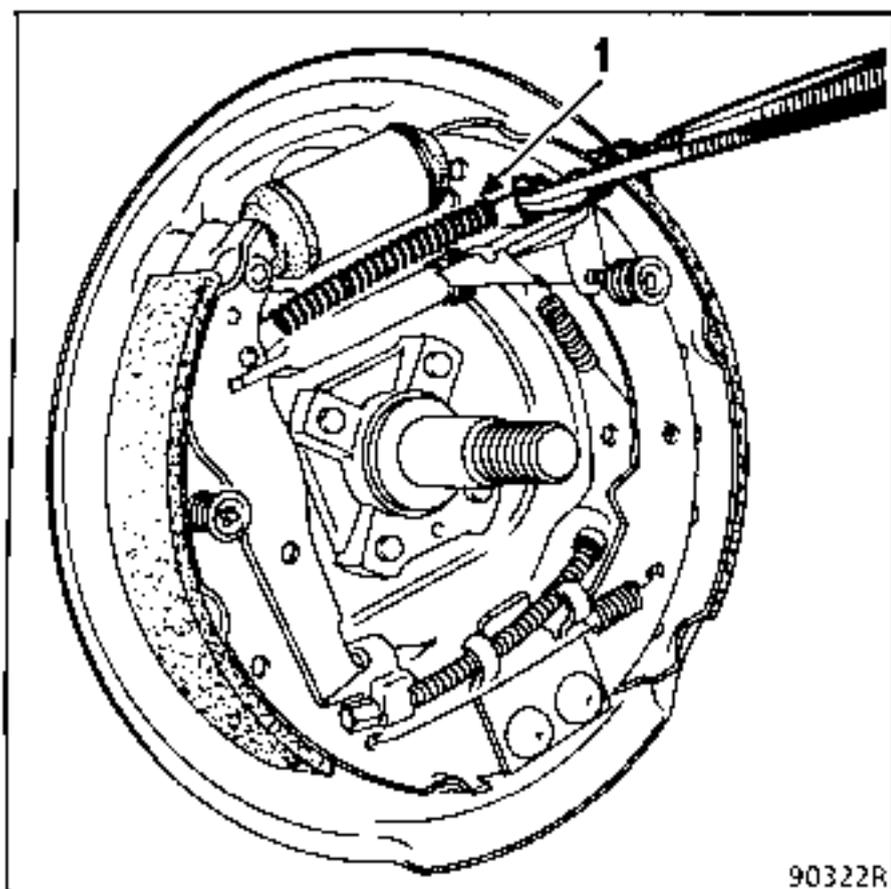
- the trailing shoe and secure it,
- the thrust link,
- the leading shoe and secure it,
- spring (3) and adjusting lever (C).

Remove the clamps from the wheel cylinder pistons then refit:

- lower spring (2),



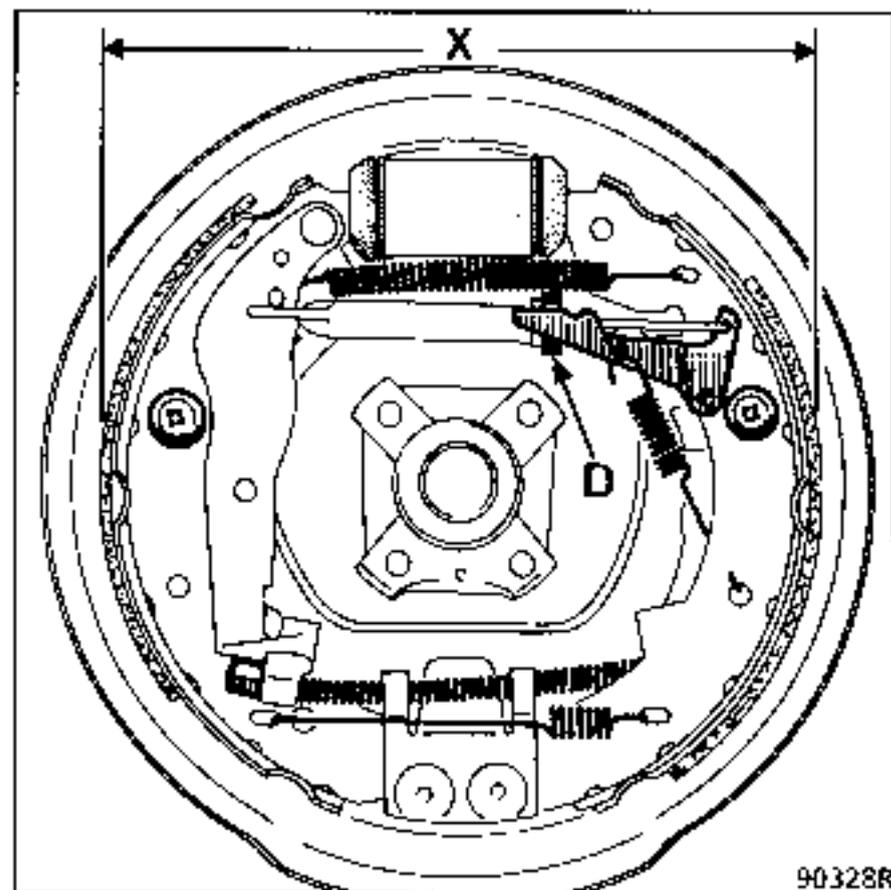
- upper spring (1).



ADJUSTING

Using a screwdriver, adjust the diametral positions of the shoes via toothed quadrant (D) so that diameter (X) is between:

227.9 mm and 228.5 mm.



Perform the same adjustment on the other anchor plate.

Refit the drum.

Adjust the positions of the brake linings by pressing down repeatedly on the brake pedal.

Adjust the handbrake (see relevant paragraph).

ESSENTIAL SPECIAL TOOLING

Rou.	604-01	Hub locking tool
T.Av.	1050-02	Hub extractor
Fre.	573-01	Handbrake cable spring release pliers
Fre.	826	Tool for removing spring
M.S.	580	Impact tool

TIGHTENING TORQUES (in daN.m)



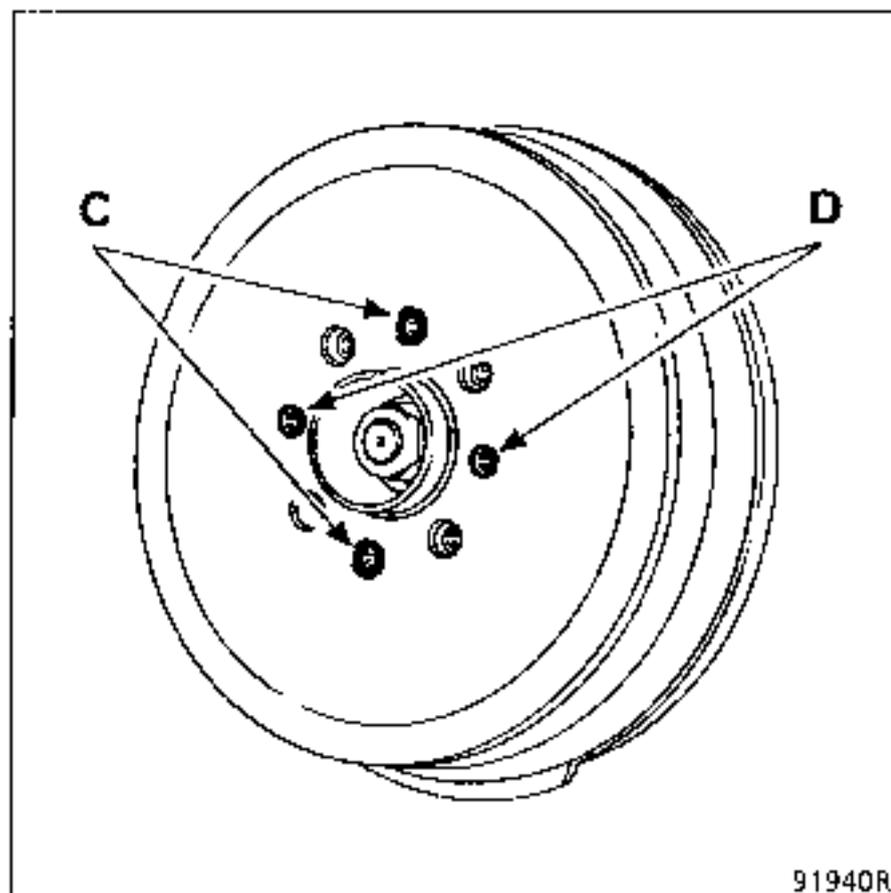
Drive shaft nuts	21
Wheel bolts	9

All the linings on any given axle must be replaced at the same time. Always fit linings of the same brand and quality.

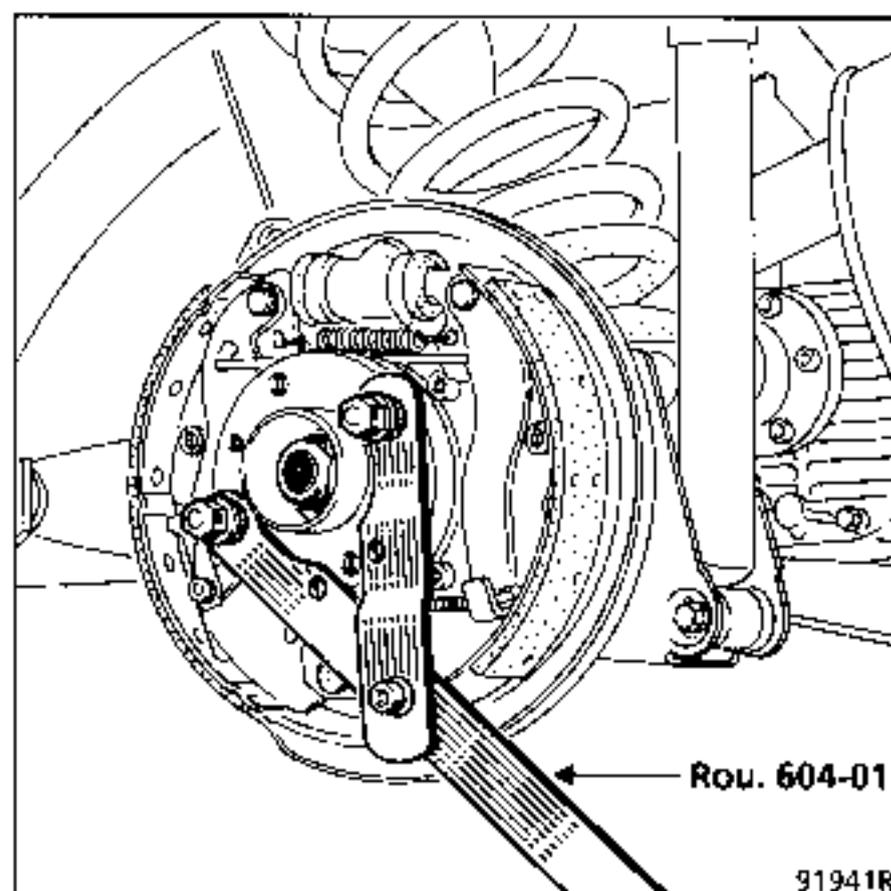
REMOVING

Remove :

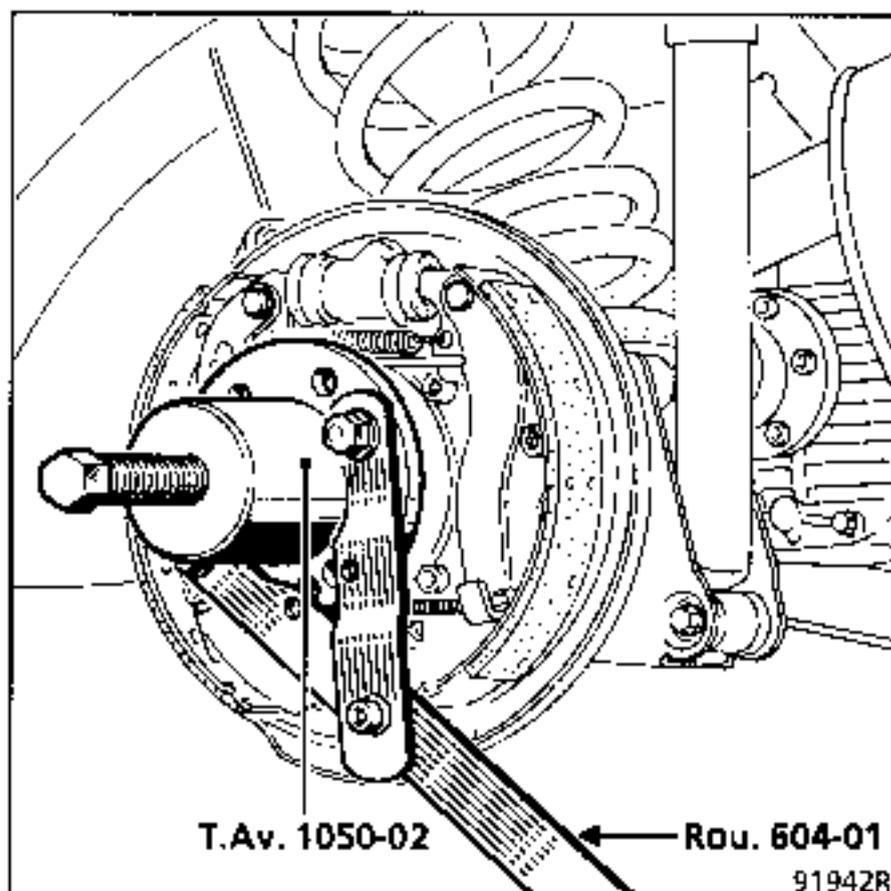
- the brake drums, two bolts (C); if problems are encountered, extract them by inserting two bolts in holes (D),



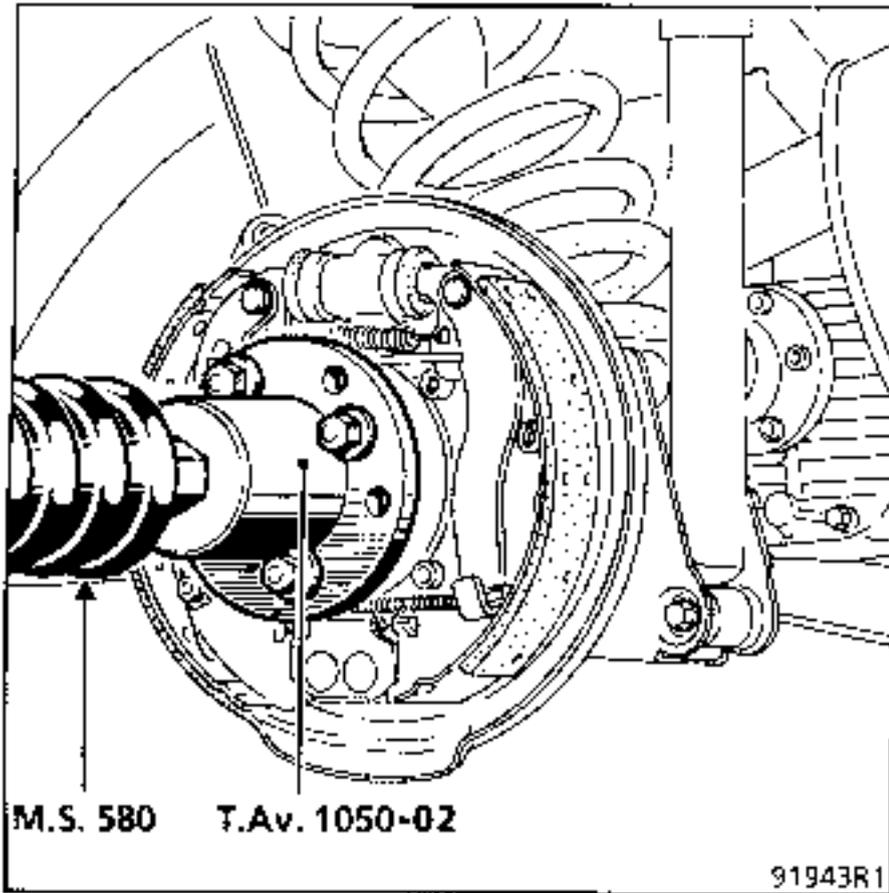
- the drive shaft nut, tool Rou. 604-01.



- Push back the drive shaft to release tools T.Av. 1050-02 + Rou. 604-01.

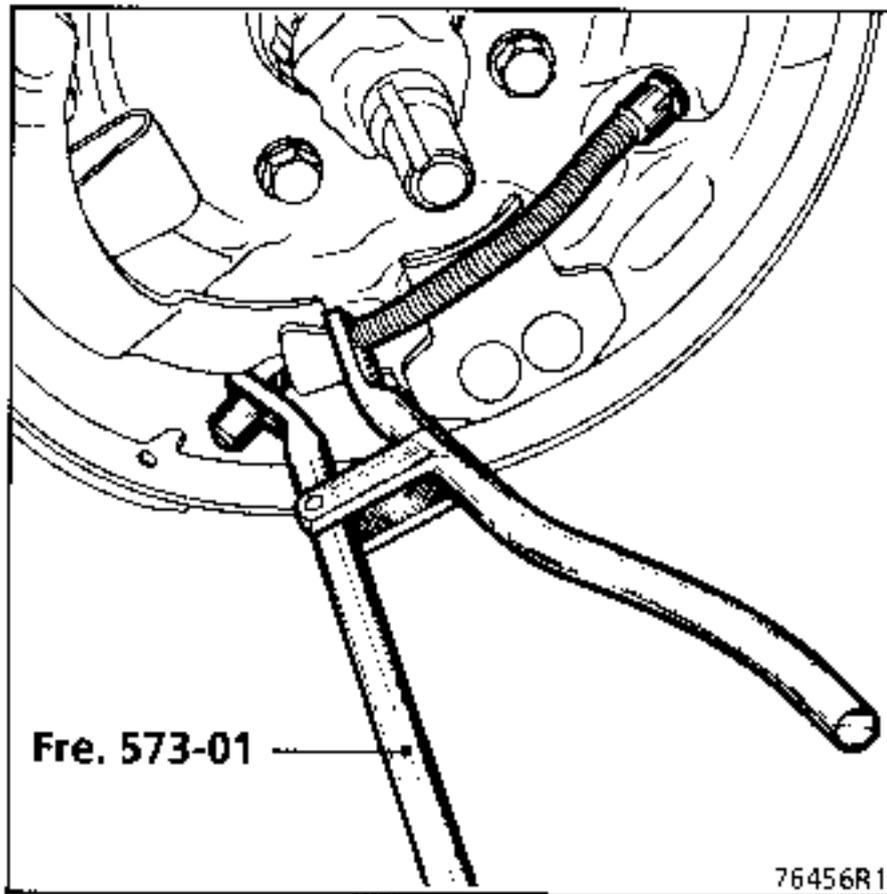


Extract hub, using tools T.Av. 1050-02 + M.S. 580.

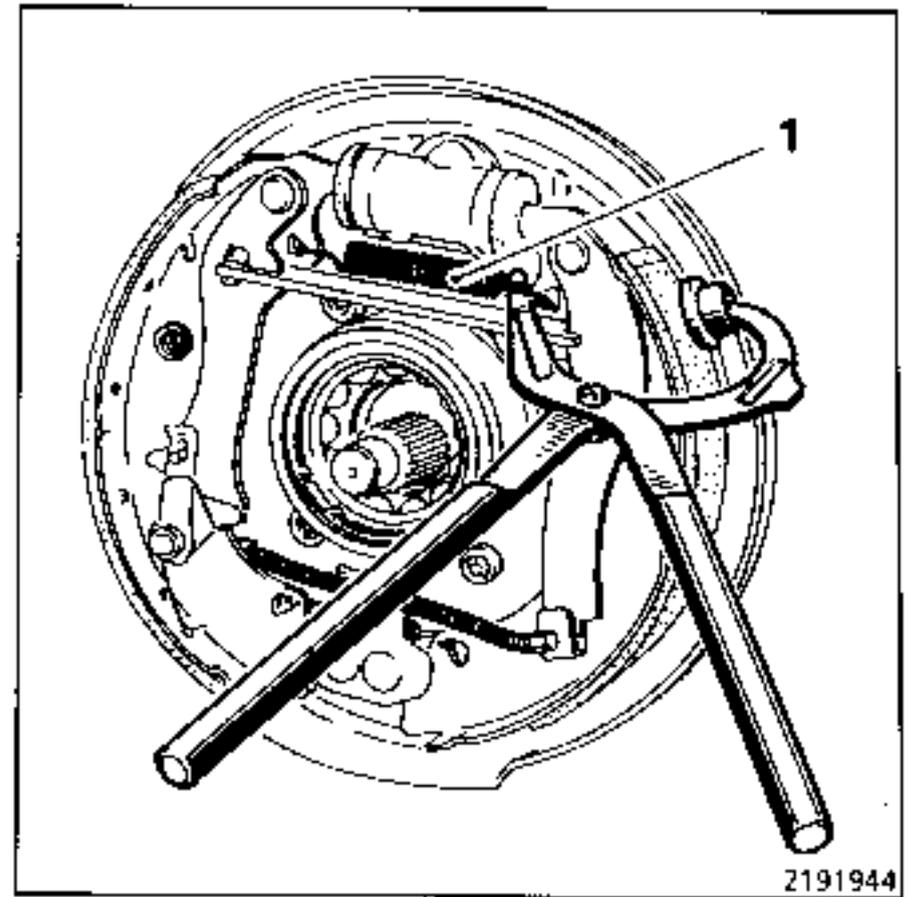


Remove:

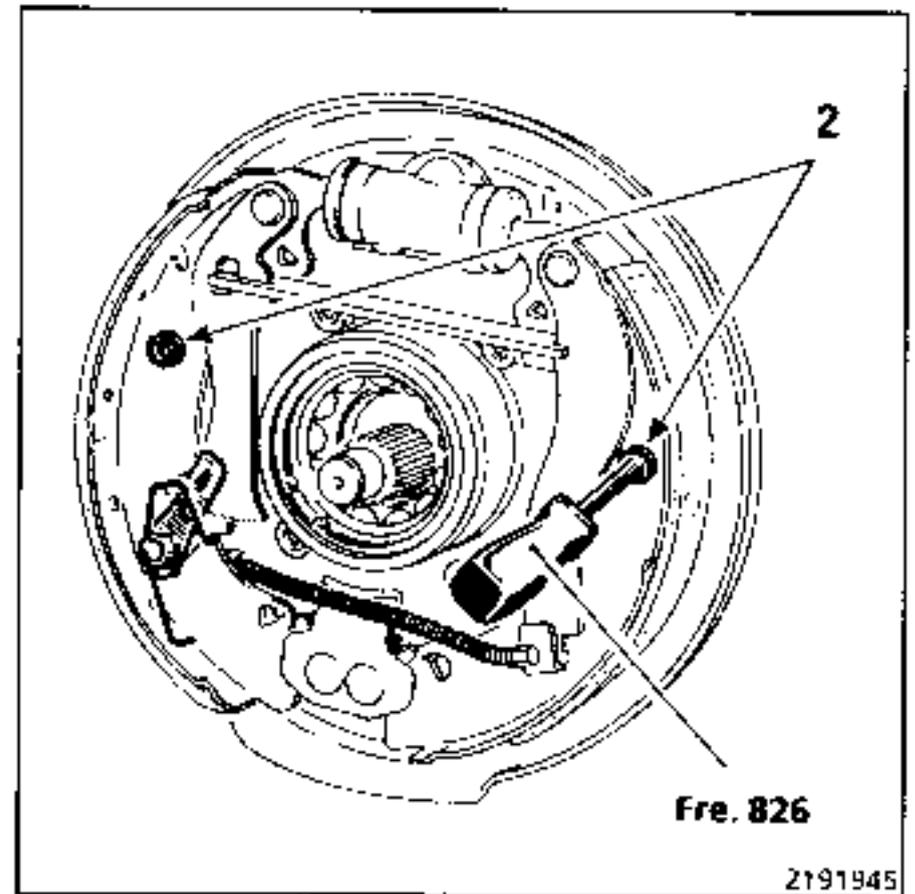
- the handbrake cable, using tool Fre. 573-01,



- the upper spring (1) using a brake shoe grip,



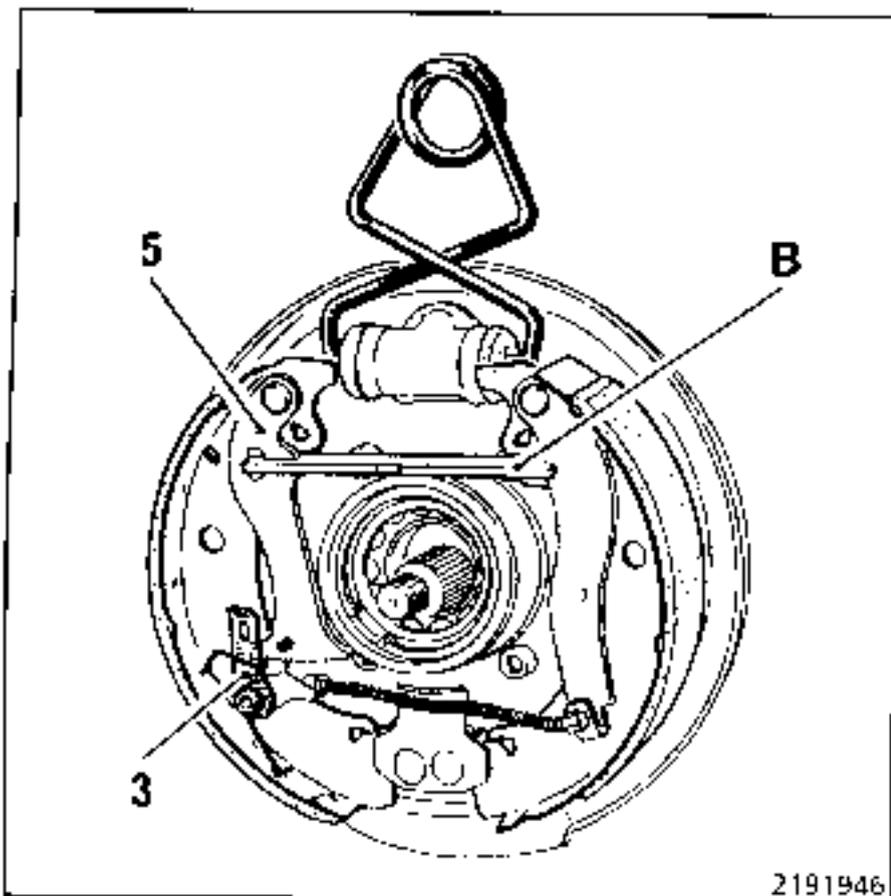
- the side retaining springs (2), using tool Fre. 826.



Fit a grip on the wheel cylinder pistons.

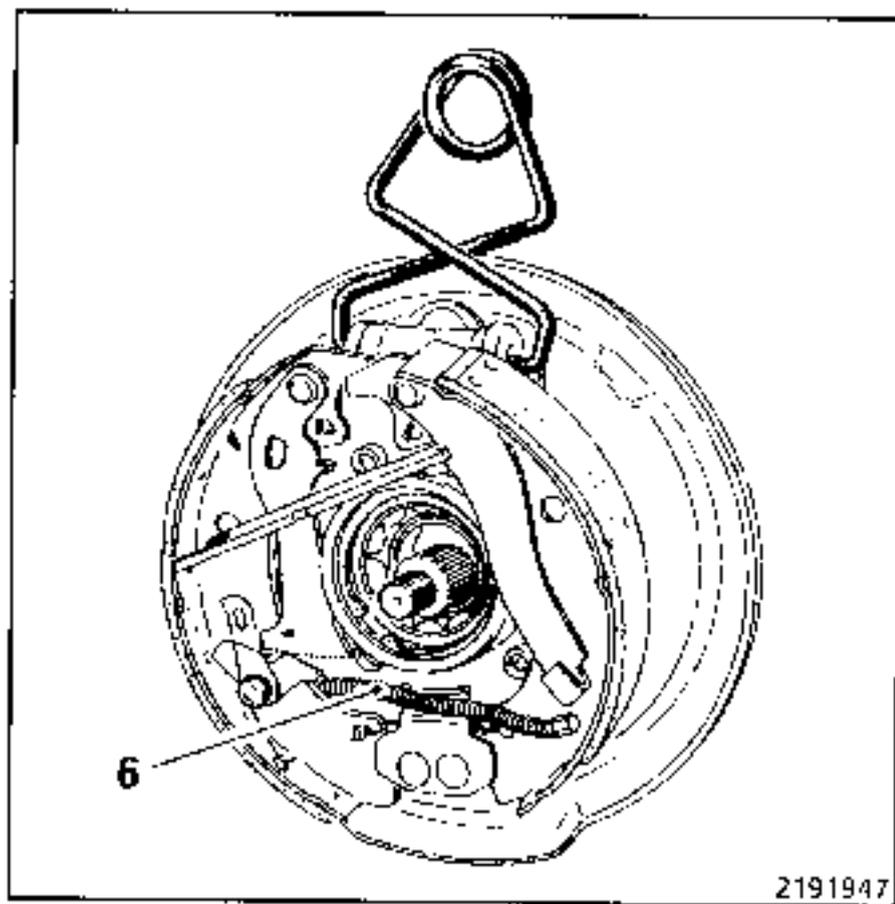
Release:

- the wear compensation system removing clip (3) from the pin and separating the shoes from the wheel cylinder,



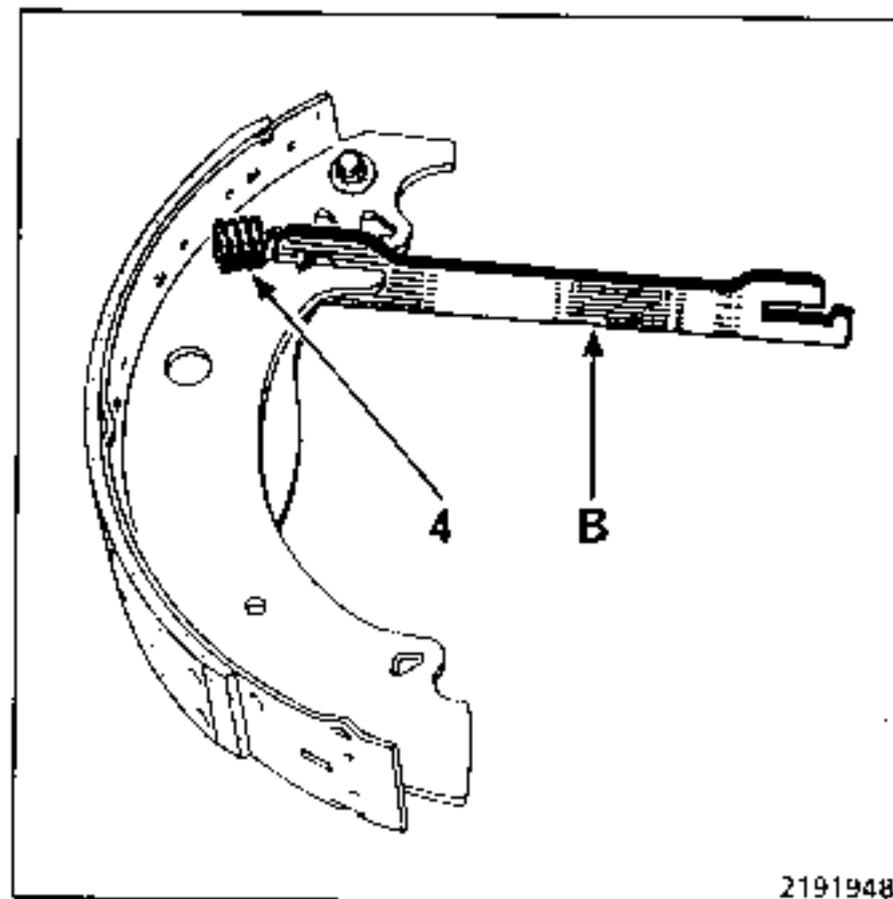
- the connecting bar (B) from the wear compensation lever (5).

Remove the two shoes including the lower spring (6).

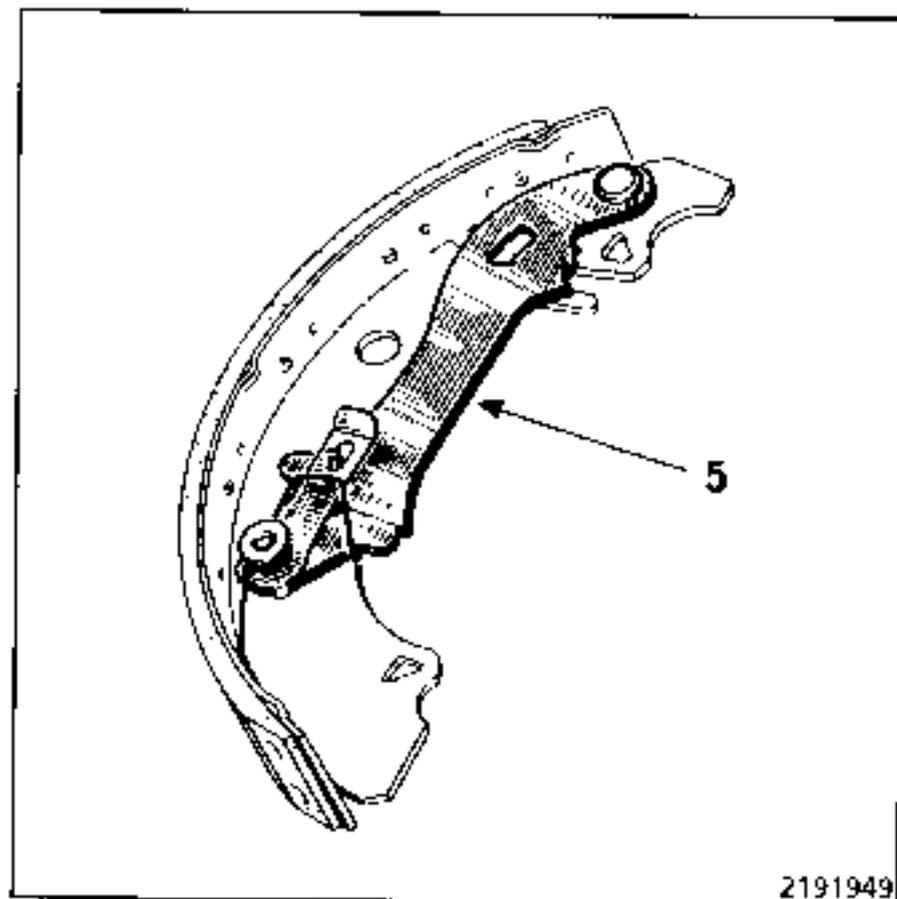


Remove:

- arm (B),
 - spring (4).
- from the trailing shoe.



Remove the wear compensation lever (5) from the leading shoe.



Clean the drum and flange, protecting the hub bearing.

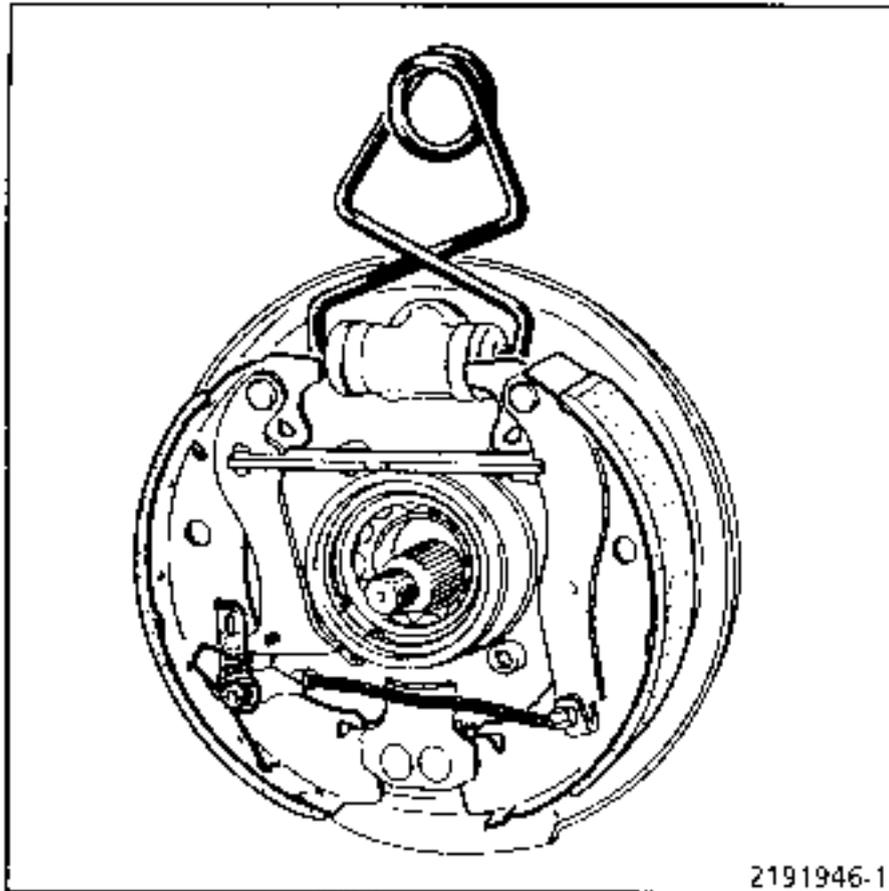
REFITTING

Install the arm (B) with the spring (4) fitted on the trailing shoe.

Reattach lever (5) to the leading shoe without engaging the toothed quadrant (C).

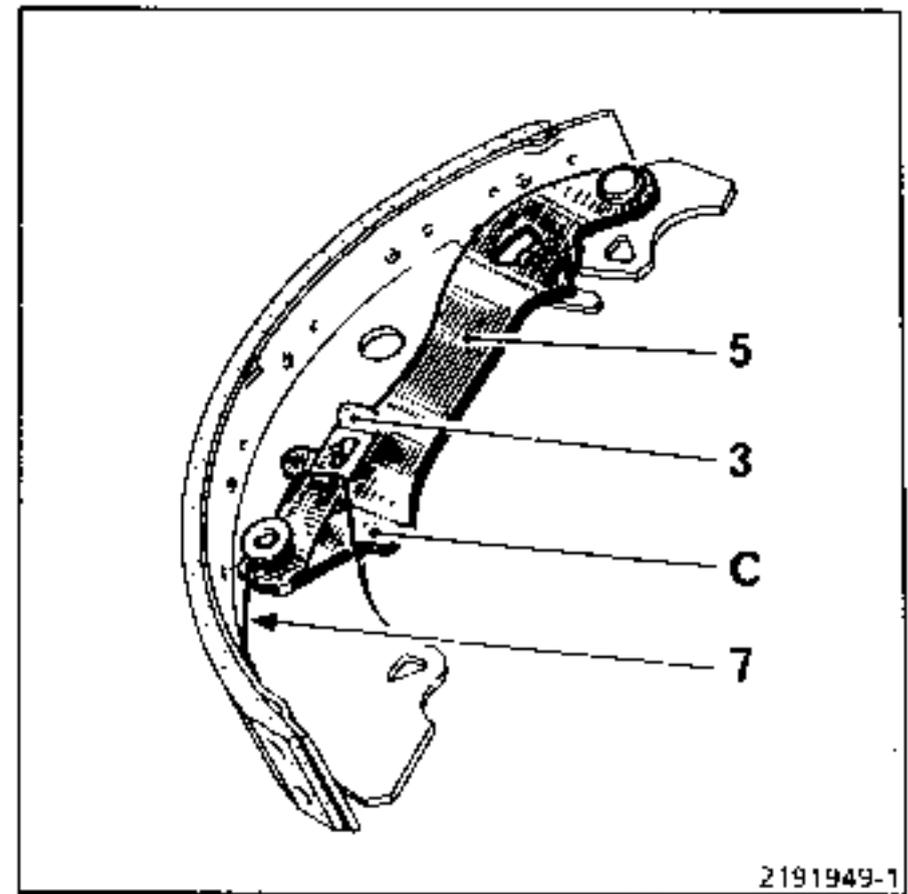
Connect the two shoes using the lower spring (6) and fit them on the back plate.

Engage the connecting bar (B) in the lever (5).



Remove the grips on the wheel cylinder pistons and then refit the side retaining springs (2) using tool Fre. 826.

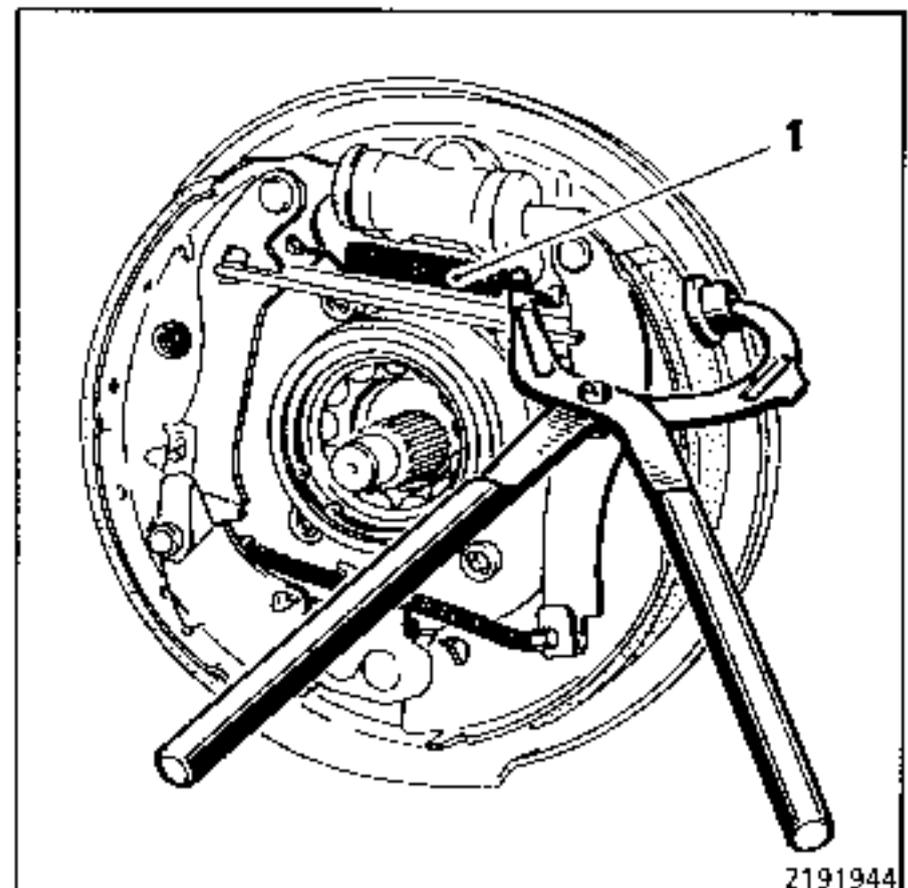
Refit toothed segment (C) in lever (5) and engage clip (3) around pin.



Check that the spring is correctly positioned (7).

Refit :

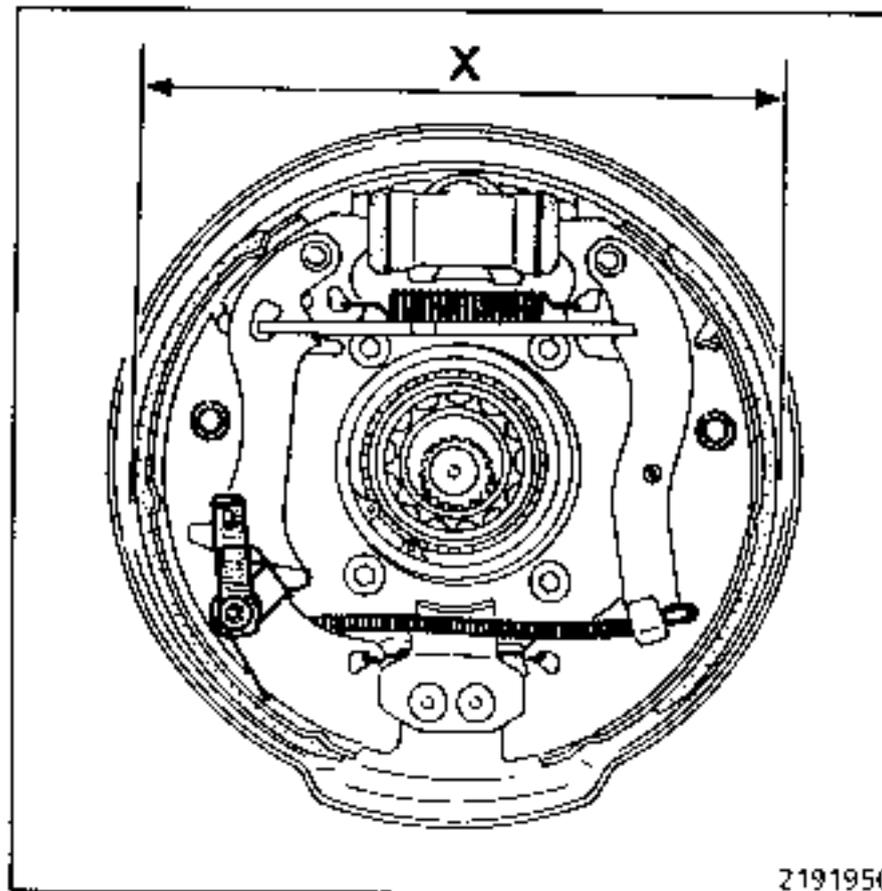
- the upper spring (1),



- the handbrake cable, using tool Fre. 573-01.

ADJUSTING

Using a screwdriver, adjust the diametral positions of the shoes via toothed quadrant (C) so that diameter (X) is between 254 mm and 254.5 mm.



Perform the same adjustment on the other anchor plate.

Brush the drive shaft splines and coat them with **LOCTITE SCELBLOC**.

Refit:

- the hub and torque tighten using tool **Rou. 604-01**,
- the drum.

Adjust :

- the linings by pressing down repeatedly on the brake pedal,
- the handbrake (see relevant paragraph).

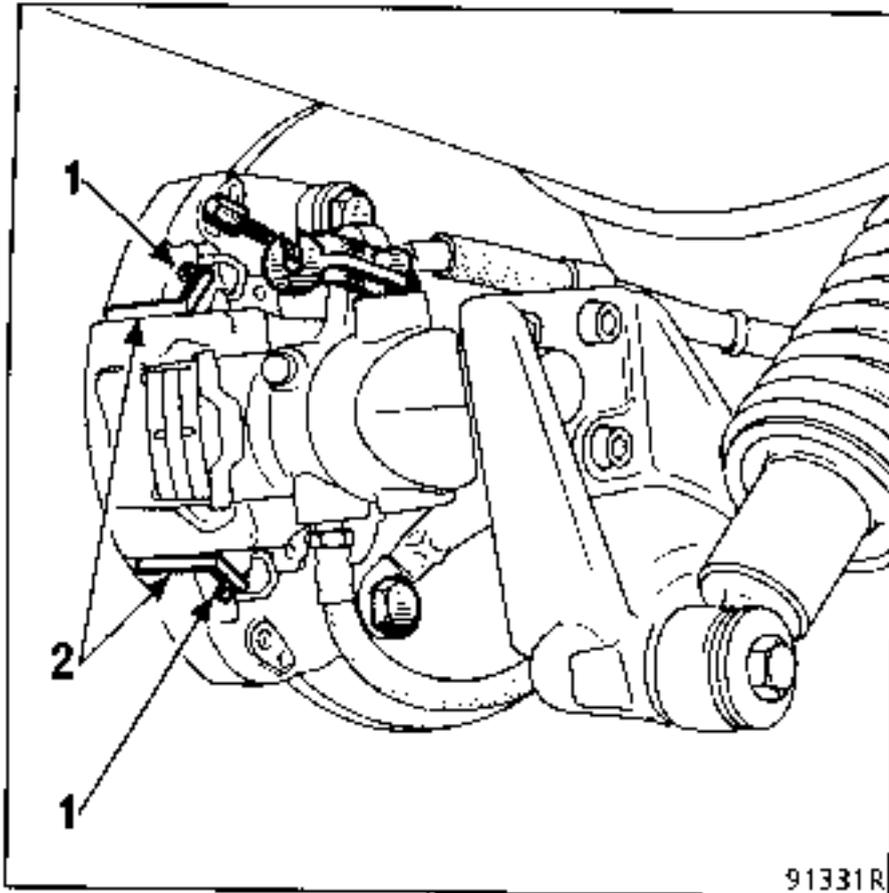
TIGHTENING TORQUES (in daN.m)



Wheel bolts (4 bolts)	9
Wheel bolts (5 bolts)	10

REMOVAL

Disconnect the handbrake cable.



Remove:

- the two rollpins (1),
- the two keys (2) using a pin drift,
- the brake calliper,
- the pads.

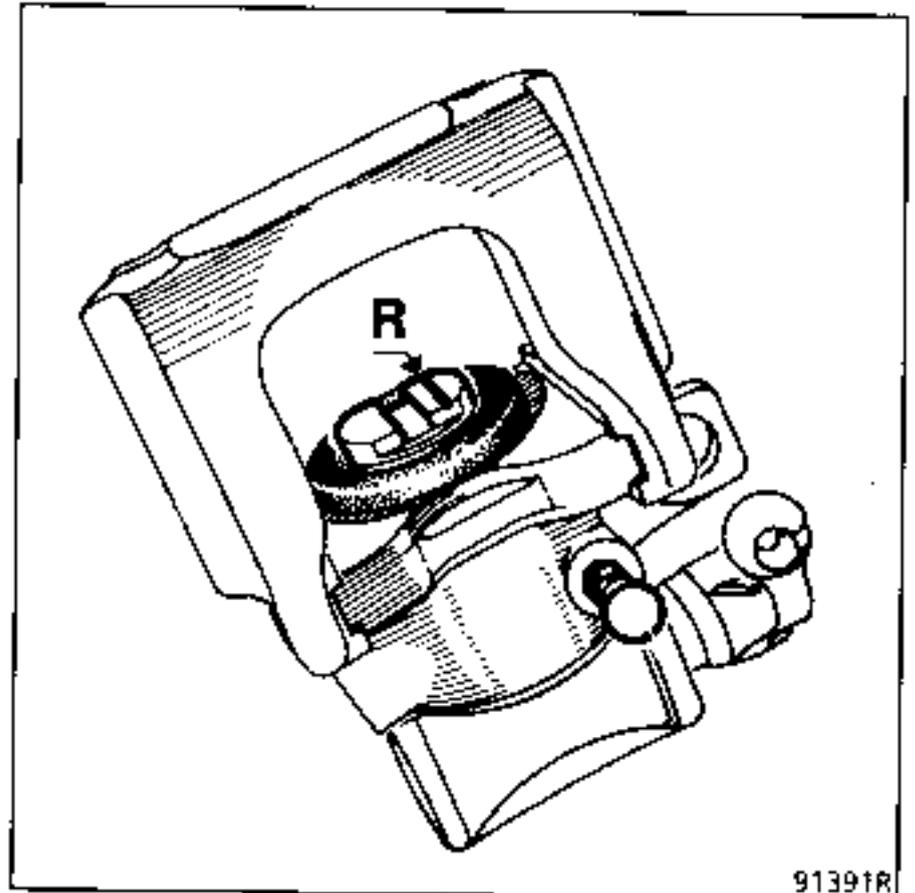
CHECKING

Check the condition of the piston dust cover and springs under the pads and that they are correctly mounted.

REFITTING

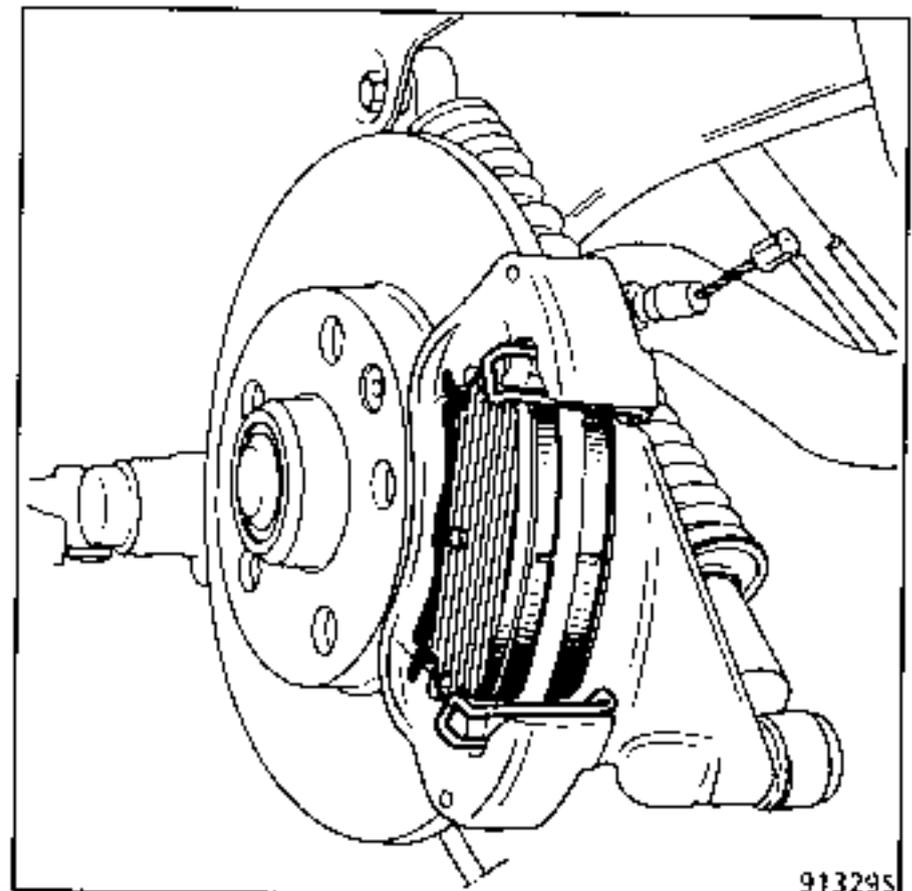
Push the piston back by screwing it up using a screwdriver with a square cross section until it will turn but does not go in any further.

Direct the piston so that line (R) on its bearing face is at the bleed screw end.

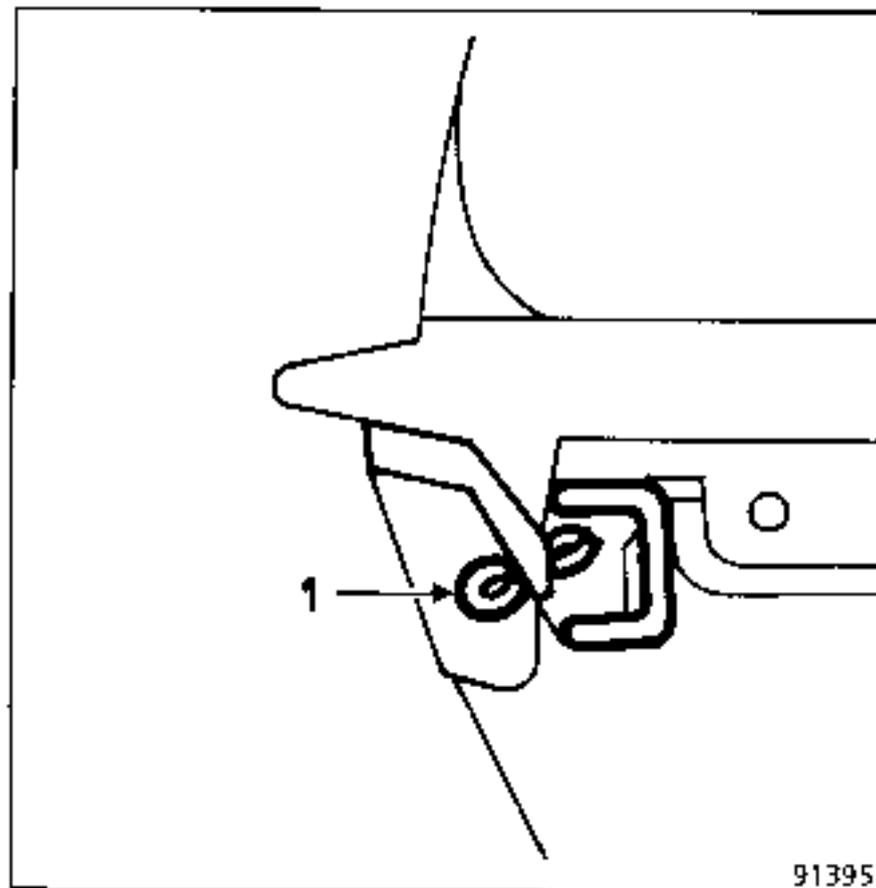


Fit in place :

- the new pads on their springs,



- the calliper between the pin spring and the bearing face of the key on the calliper bracket,
- the first key; insert a screwdriver in the location for the second key and insert this one by pressing on the screwdriver,
- the two rollpins (1) locking the keys.



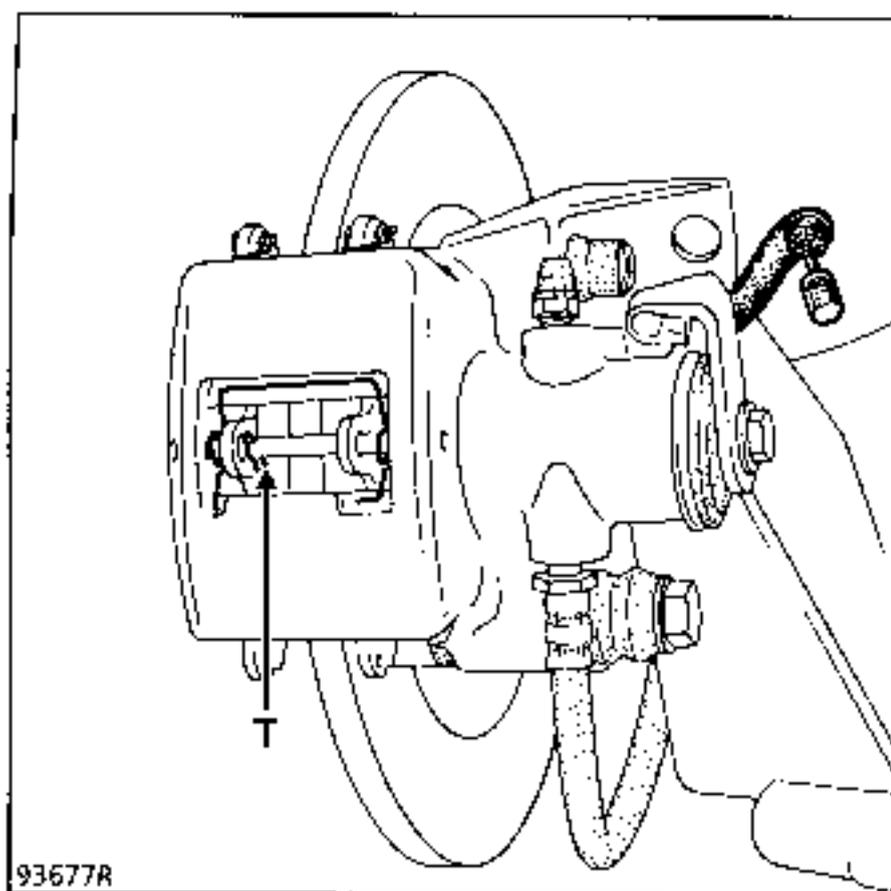
Reconnect the handbrake cables.

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

TIGHTENING TORQUES (in daN.m)		
Wheel bolts (4 bolts)	9	
Wheel bolts (5 bolts)	10	
Secondary carrier bolts	3,5	
Main carrier bolts	7	

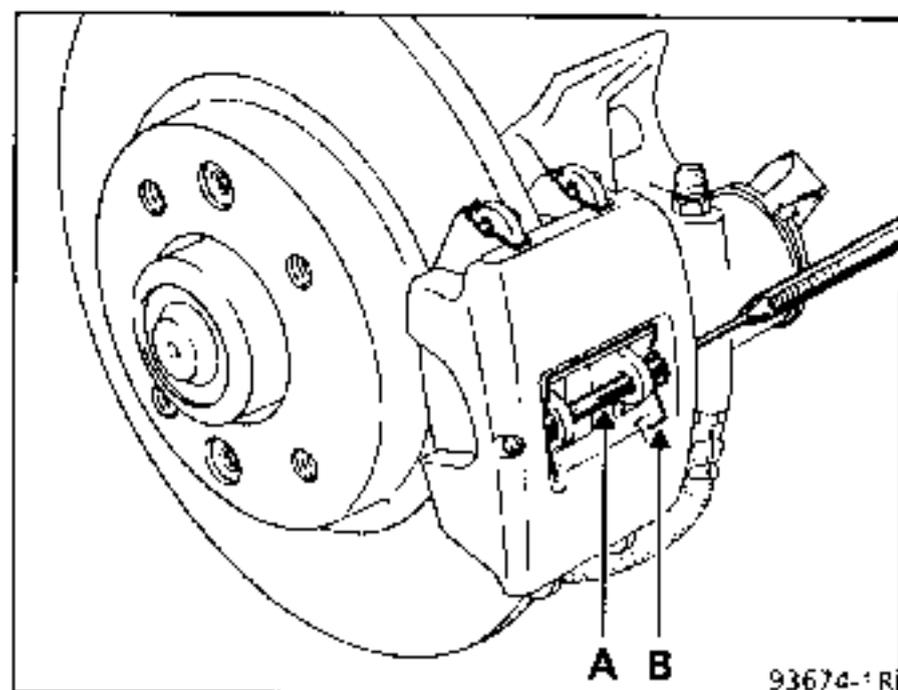
REMOVAL

Disconnect the handbrake cable.

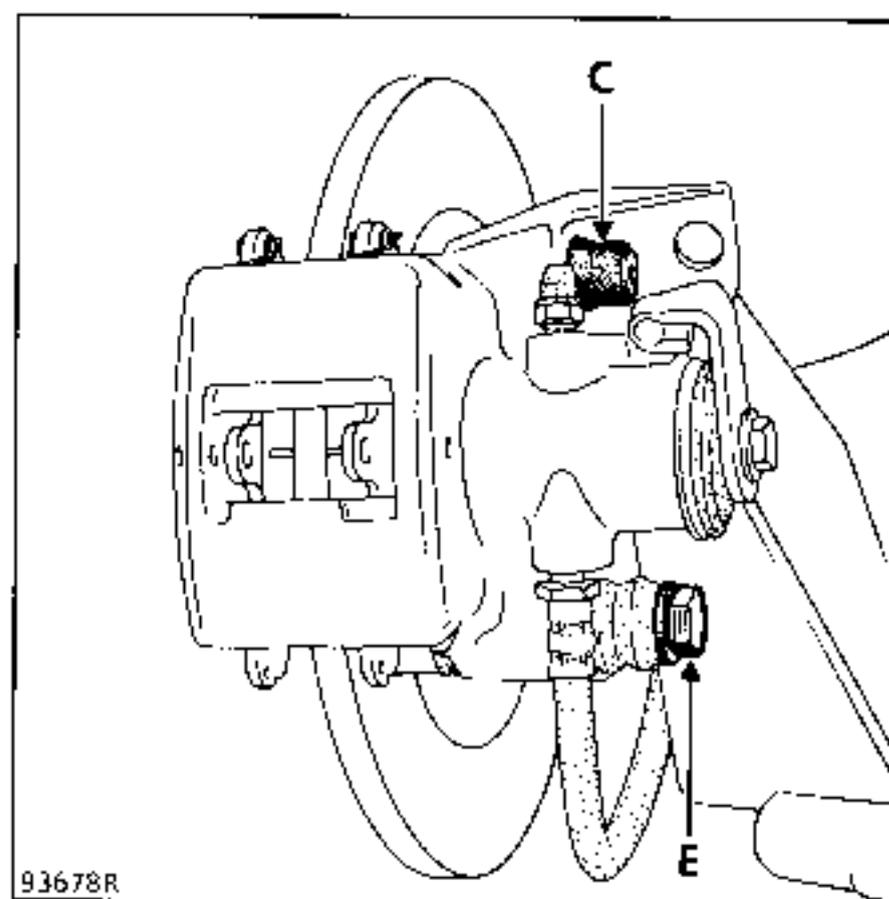


Remove:

- rollpin (T),
- pad-retaining pin (A) using a pin drift,

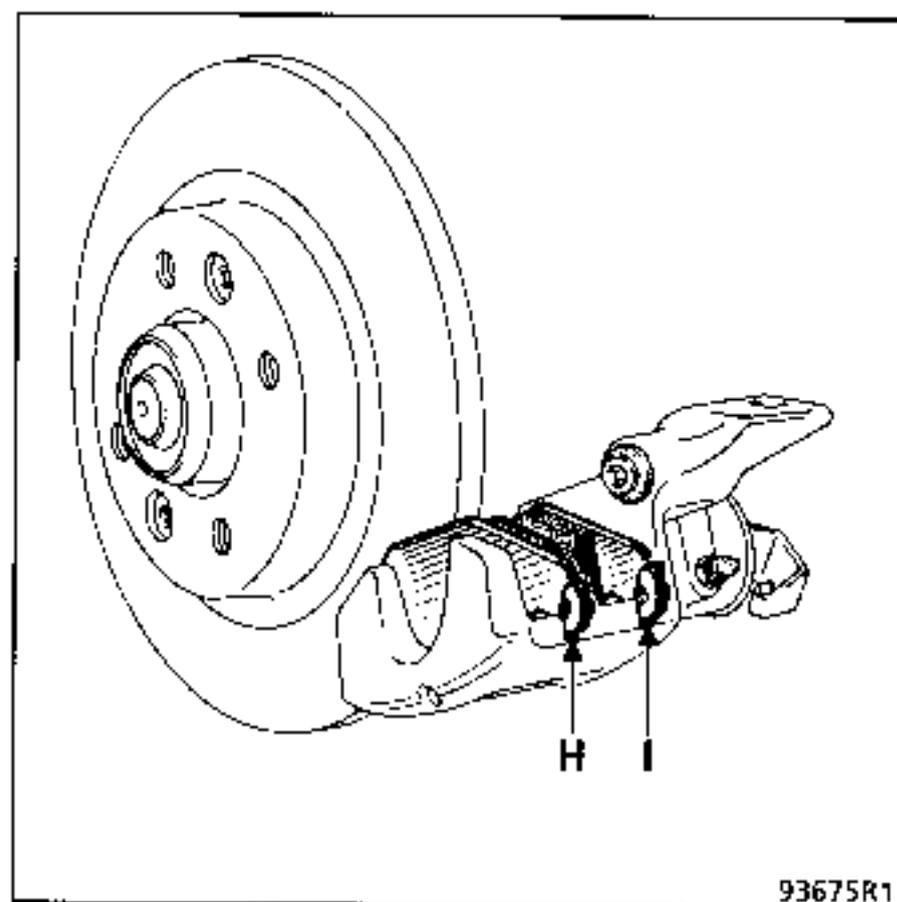


- spring (B),
- bolt (C) mounting the secondary carrier.



Then turn the calliper of main carrier (E).

Remove outer pad (H) and inner pad (I).



NOTE : On some vehicles the bolt mounting the main carrier (E) must be slackened in order to remove inner pad (I).

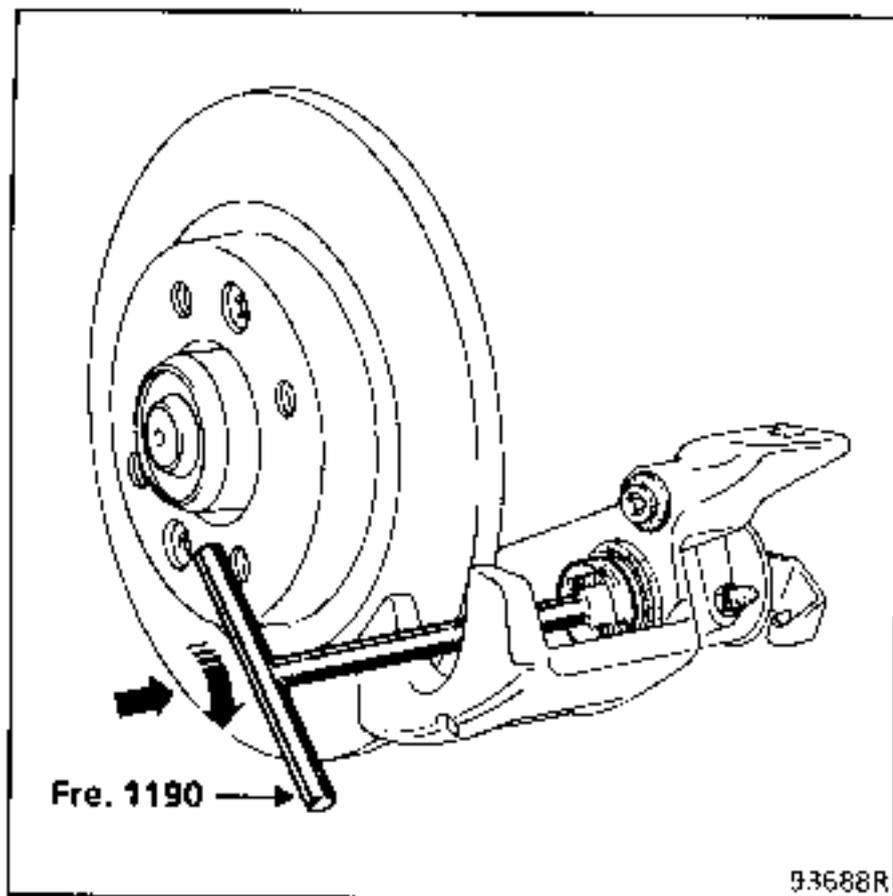
CHECKING

Check :

- the condition and mounting of the dust cover, piston and springs,
- that the calliper slides on its main carrier.

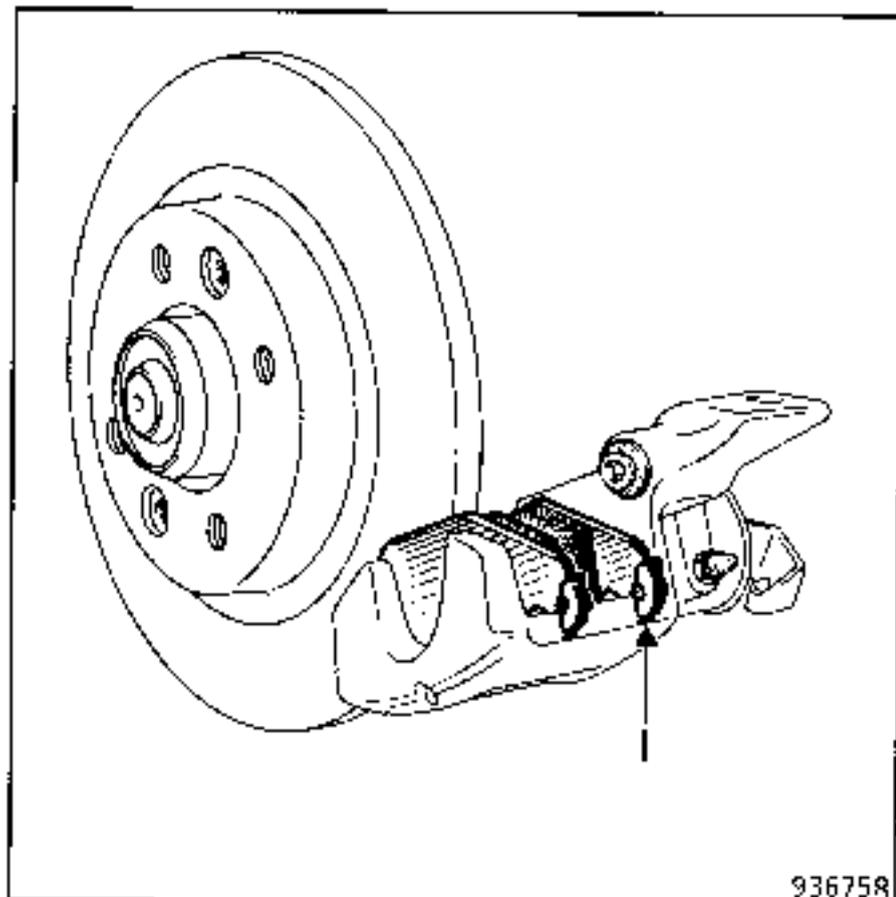
REFITTING

Push on the piston, screwing it up using tool Fre. 1190 until it is at the bottom of its bore.



93688R

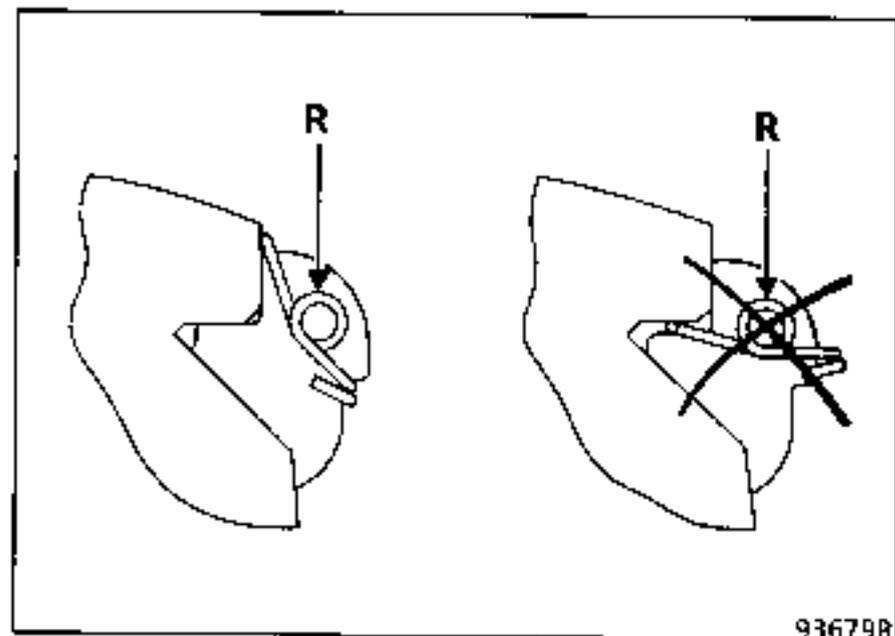
Fit in place the new pads fitting inner pad (I) first.



93675R

ATTENTION

Side springs (R) must be fitted correctly.

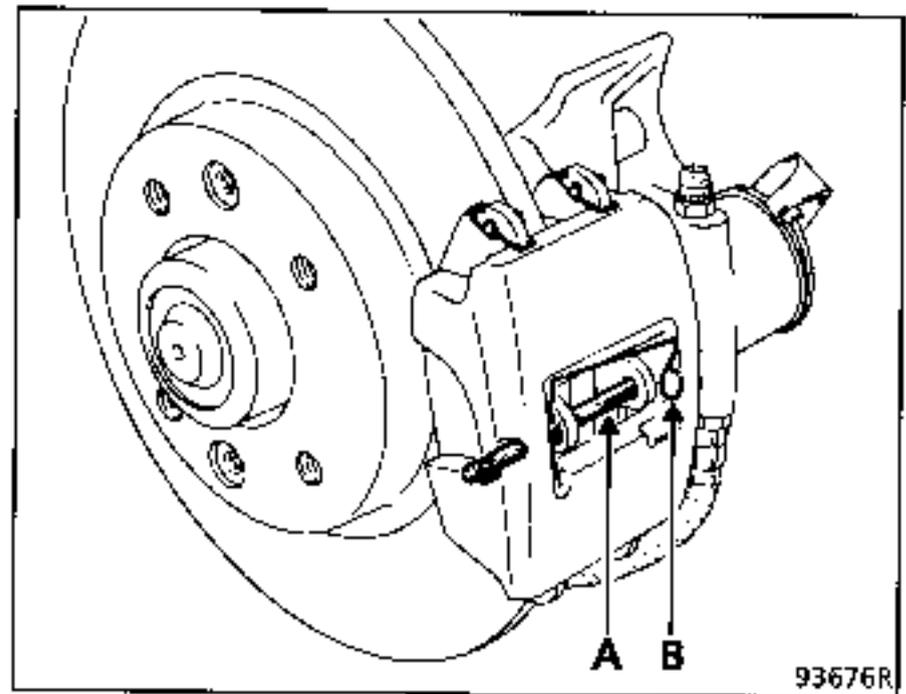


93679R

Return the calliper to its operating position and fit bolt (C) securing the secondary carrier coated with **LOCTITE FRENBLOC** then torque tighten it.

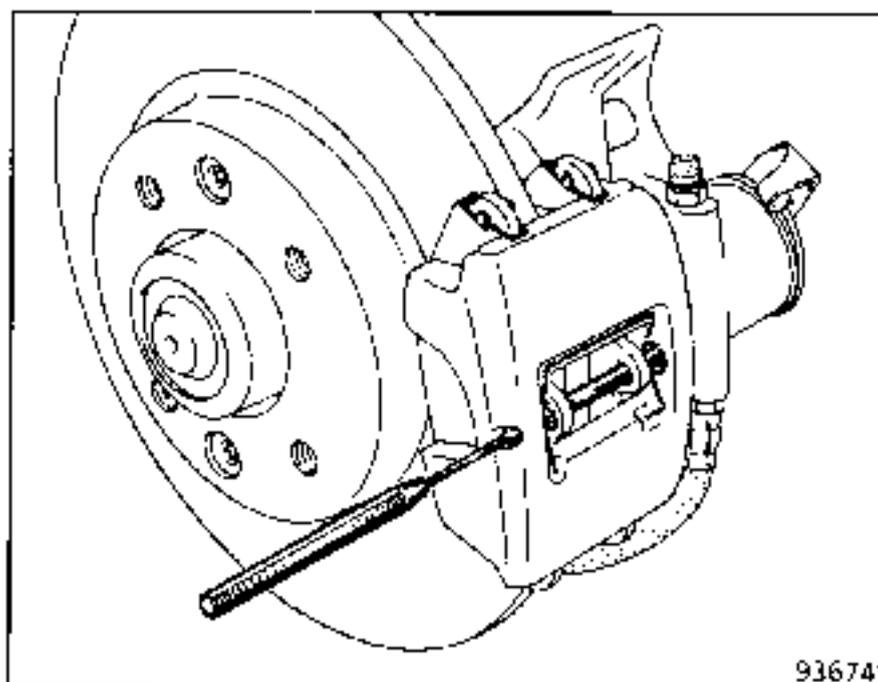
NOTE : If bolt (E) securing the main carrier has been dismantled, it must be refitted first, coated with **LOCTITE FRENBLOC** and torque tightened.

Position pad retaining pin (A) passing it through spring (B).

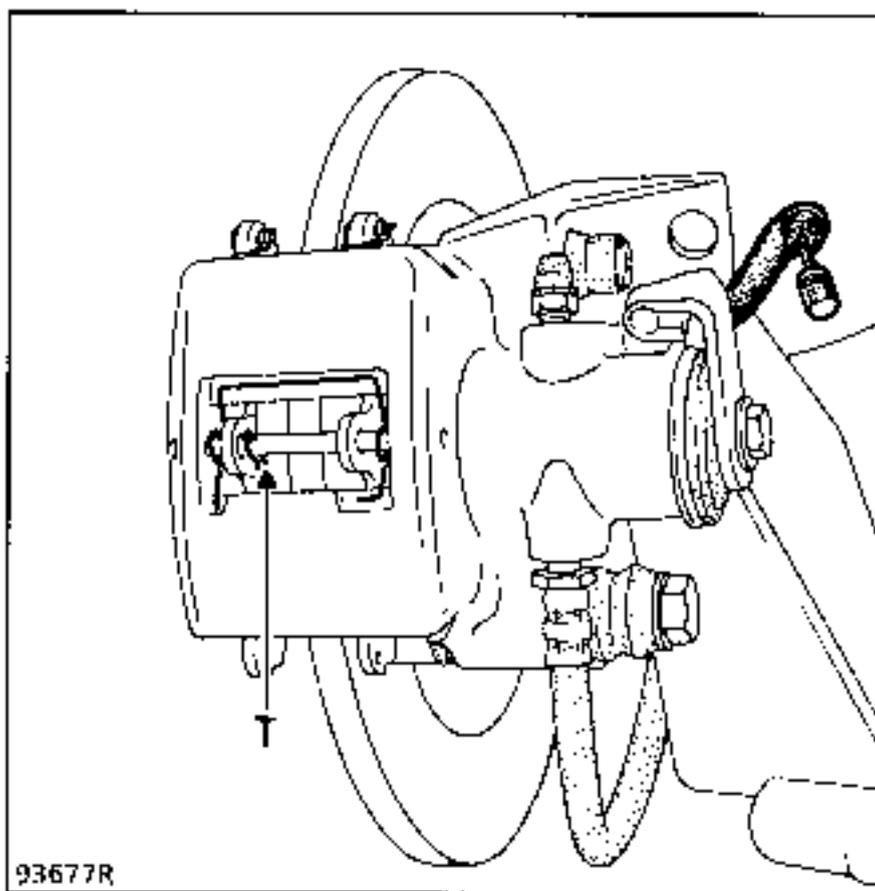


93676R

Then clip on the retaining pin using a pin drift.



Refit rollpin (T) and the handbrake cable.



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

TIGHTENING TORQUES (in daN.m)



Wheel bolts (4 bolts)	9
Wheel bolts (5 bolts)	10

REMOVING

Release the brake hose at the calliper end.

Remove the brake pads (see the relevant paragraph).

Unscrew the calliper on the hose (place a container underneath to catch the fluid).

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

REFITTING

Screw the new calliper onto the hose.

Unscrew the bleed screw on the calliper and wait for brake fluid to flow out. (Check that the level in the compensator reservoir is sufficient.).

Retighten the bleed screw.

Check the condition of the pads; if they are greasy replace them.

If the compensator reservoir has not been completely emptied during the operation, a partial bleeding of the system will be sufficient. If the reservoir has been emptied, carry out the full bleeding sequence:

- of the brake system,
- of the clutch system (depending on version).

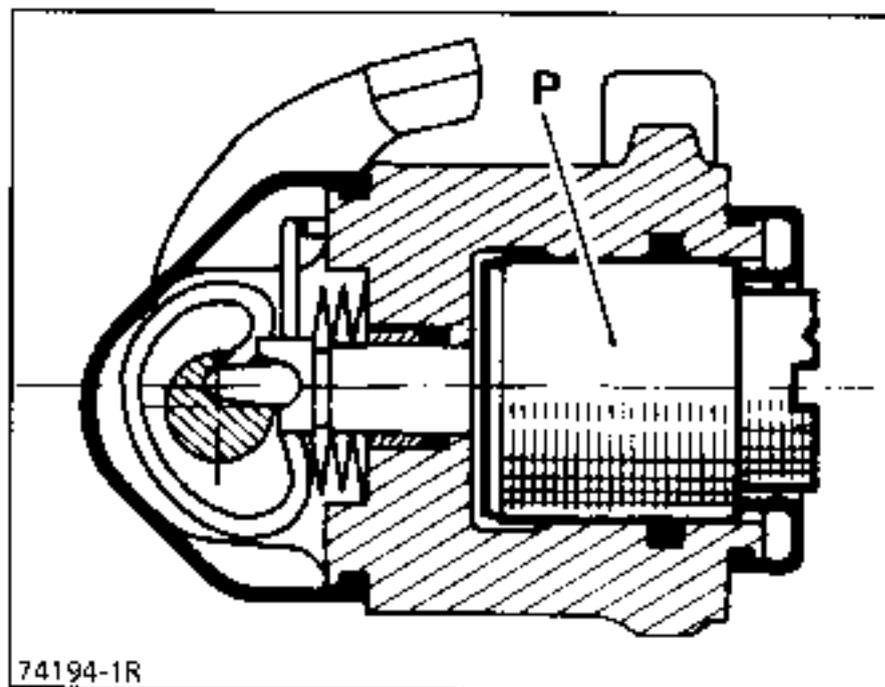
Press down on the brake pedal several times to bring the piston into contact with the pads.

OVERHAULING

The calliper assembly must be changed whenever any scratching or scoring is present in the piston bore.

Remove the brake calliper.

The interior of the piston (P) must not be dismantled.

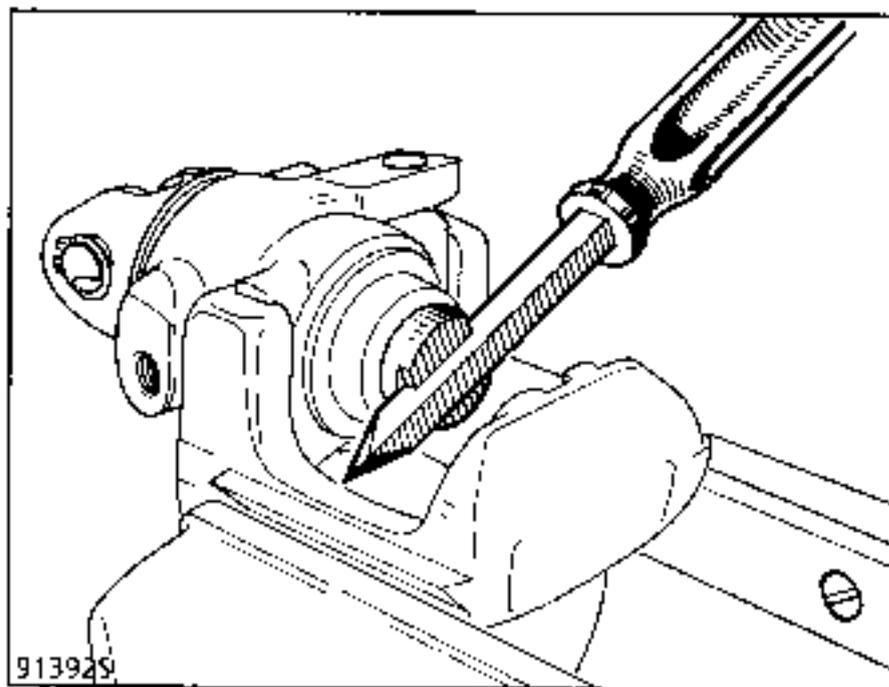


74194-1R

Place the calliper in a vice fitted with soft jaws.

Remove the rubber dust cover.

Remove the piston by unscrewing it with a screwdriver with a square cross section.

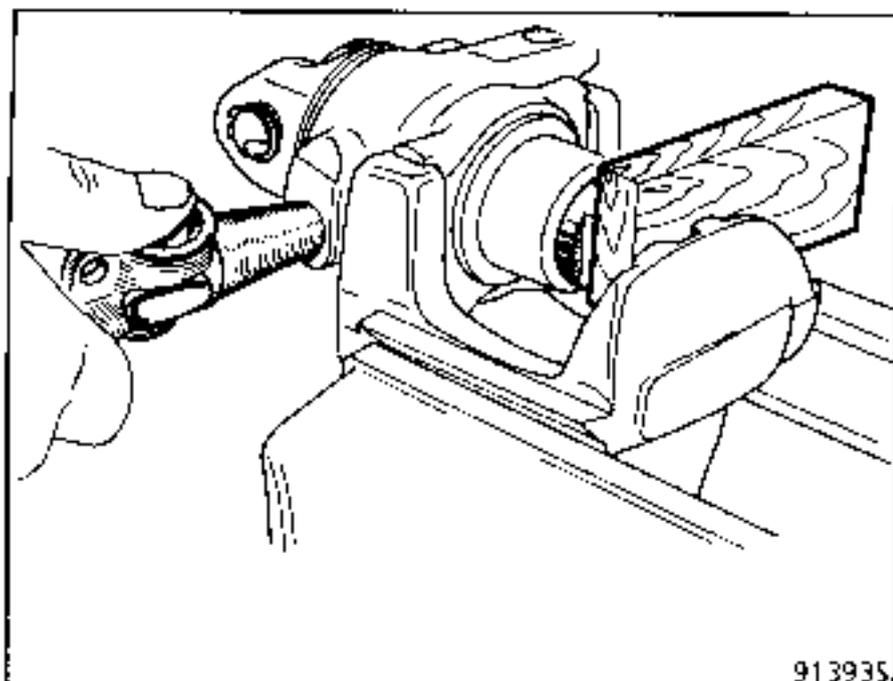


91392S

REPAIR

When the piston turns freely, gradually introduce compressed air into the cylinder, taking care not to eject the piston abruptly and placing a block of wood between the calliper and the piston in order to prevent damage to the piston.

If there are any marks from impacts or scoring on the piston, it cannot be reused.



Take the seal out of its groove using a steel blade with rounded edges.

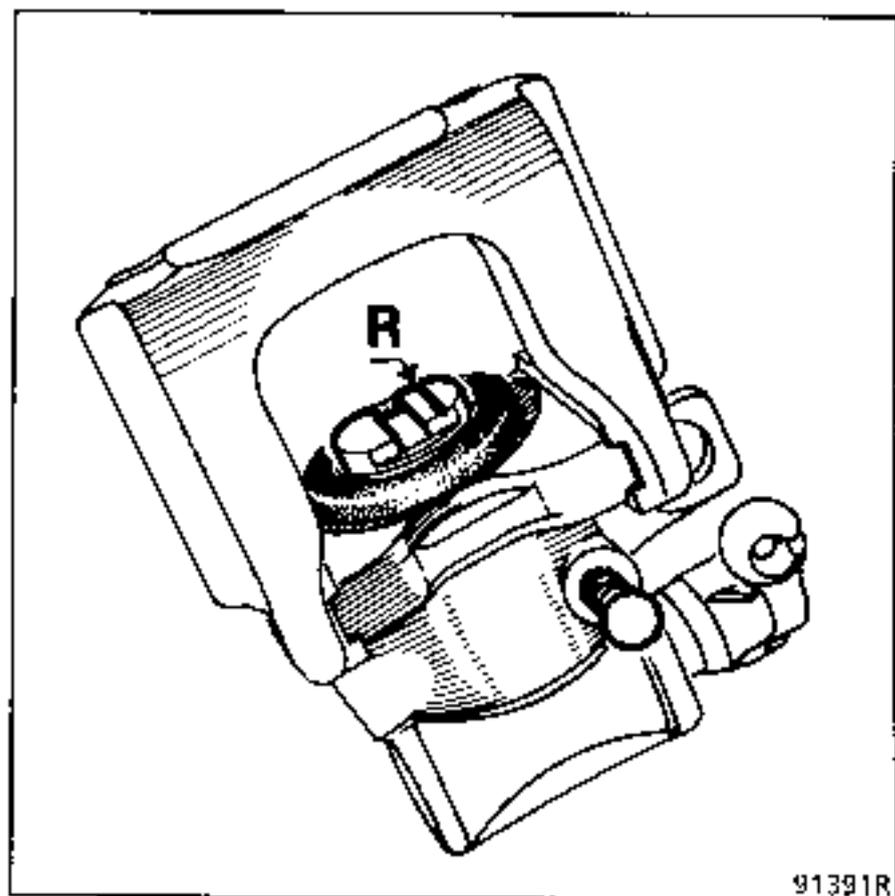
Clean the parts with methylated spirit and reassemble them.

Lubricate the seal and piston using brake fluid.

Gradually press in the piston by hand to prevent damage to the seal.

Finally press in the piston by screwing it up with a screwdriver until the piston turns but does not go in any further.

Direct the piston so that line (R) marked on the bearing face is at bleed screw (P) end, so as to enable the calliper to be bled properly and the pad to be fitted correctly in the central groove of the piston.



Coat the periphery of the piston with SPAGRAPH grease.

Fit a new protective cap.

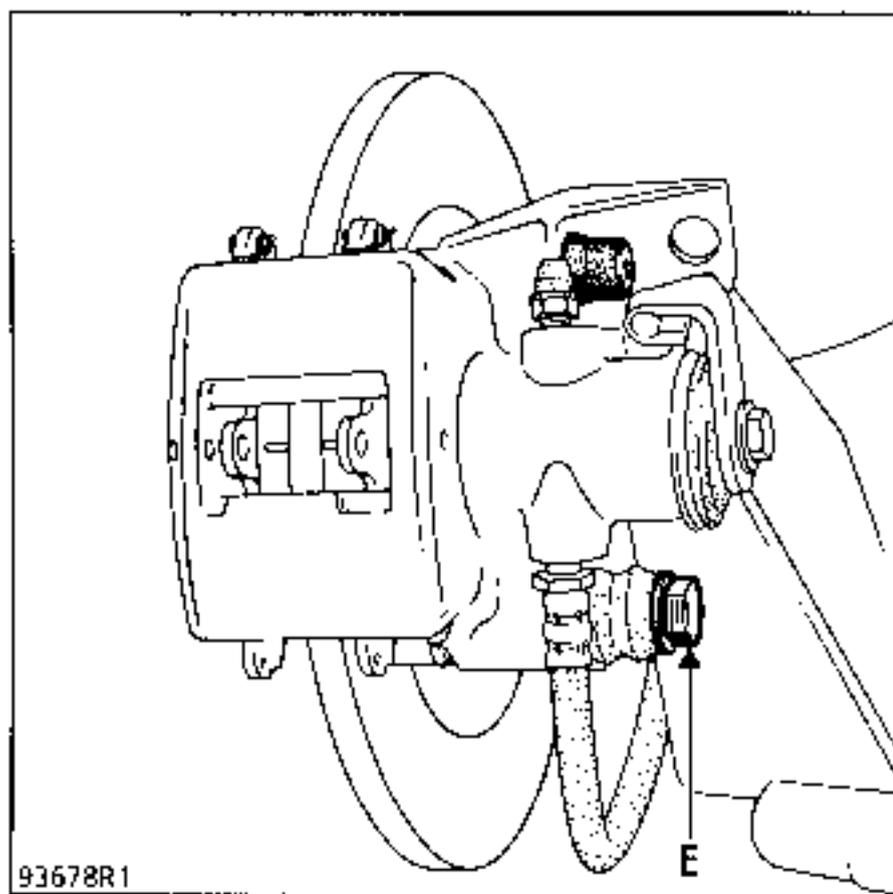
TIGHTENING TORQUES (in daN.m)		
Wheel bolts (4 bolts)	9	
Wheel bolts (5 bolts)	10	
Secondary carrier bolts	3.5	
Main carrier bolts	7	

REMOVING

Release the brake hose at the calliper end.

Remove the brake pads (see relevant section).

Remove main carrier (E).



Unscrew the calliper on the hose (place a container underneath to catch the fluid).

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

REFITTING

Screw the new calliper on to the hose.

Unscrew the bleed screw on the calliper and wait for the brake fluid to flow out. (Check that the level in the compensator reservoir is sufficient.)

Retighten the bleed screws.

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

Refit bolt (E) securing the main carrier, coat it with **LOCTITE FRENBLOC** then torque tighten it.

Refit the pads (see relevant section).

If the compensator reservoir has not been completely emptied during the operation, a partial bleeding of the system will be sufficient. If the reservoir has been emptied, carry out the full bleeding sequence:

- of the braking system,
- of the clutch system (depending on version).

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

ESSENTIAL SPECIAL TOOLING

Fre.	514	Handbrake control dismantling tool
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DISMANTLING

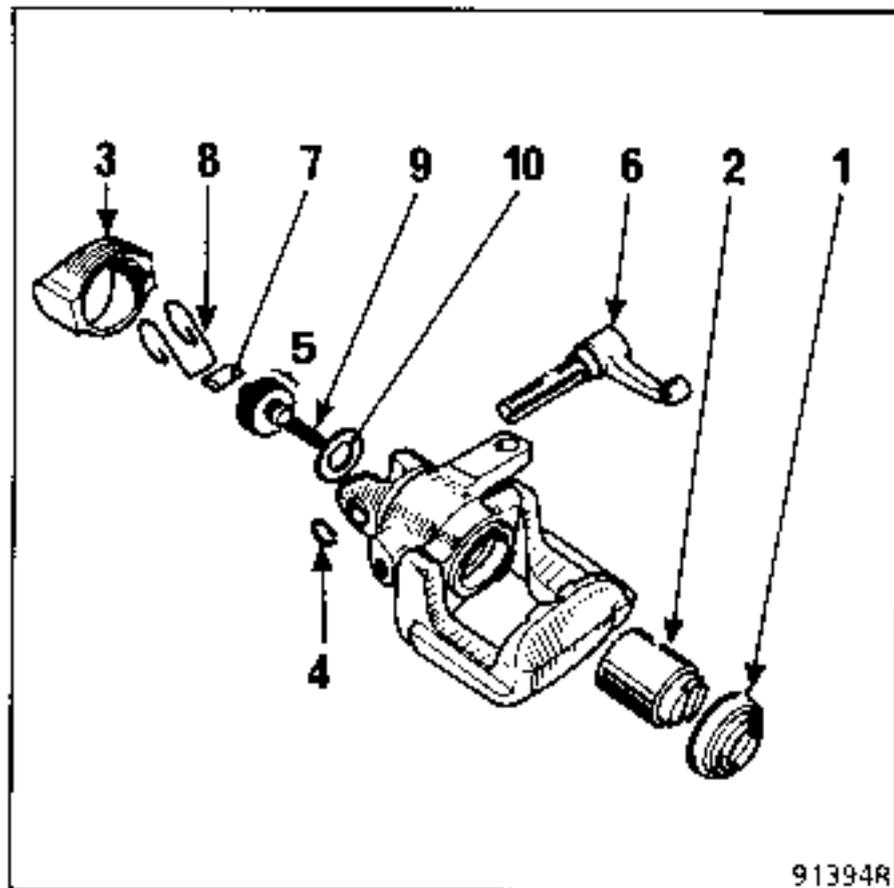
Place the calliper in a vice fitted with soft jaws without separating it from the support cylinder.

Remove:

- sealing cap (1),
- piston (2) by unscrewing it.

Turn dust cover (3) over (it is fitted on shaft (6)).

Remove circlips (4).

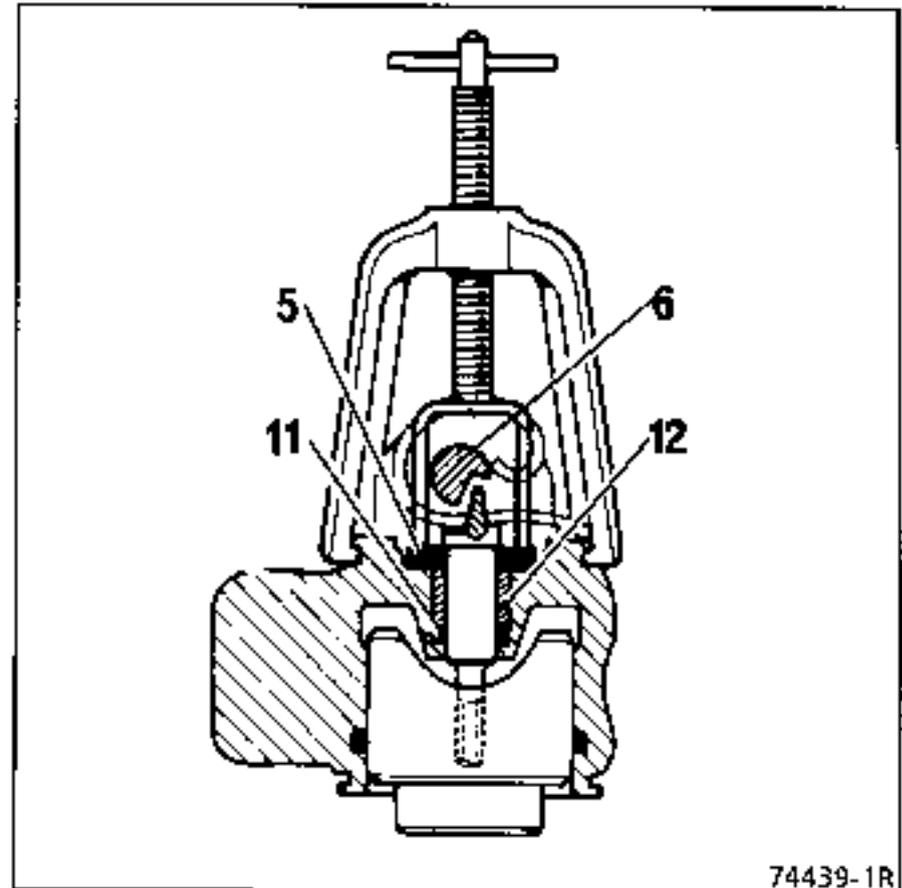


91394R

Compress flexible washers (5) using tool Fre. 514.

Remove:

- shaft (6) with dust cover (3) by pulling on the lever,
- pusher (7),
- spring (8),



74439-1R

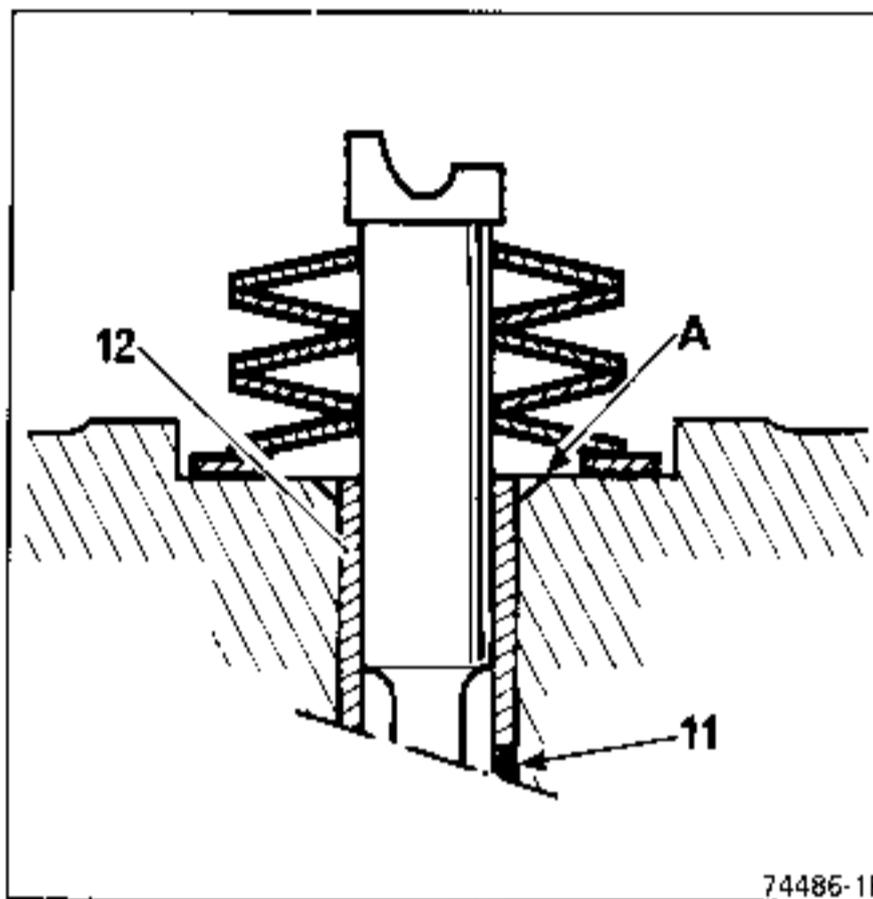
- adjusting screw (9),
- washer (10),
- flexible washers (5),
- bush (12) using a pin drift,
- O-ring (11).

Clean all the parts in methylated spirit.

REASSEMBLY

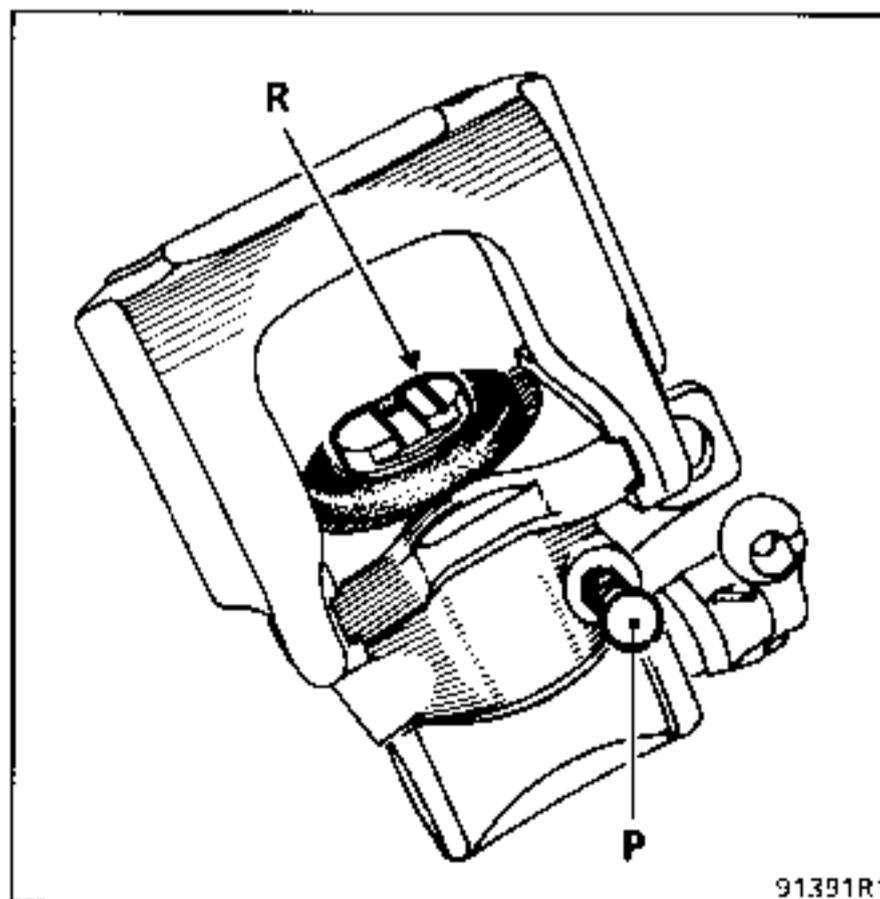
Fit in place:

- O-ring (11),
- bush (12) until it is flush with face (A) using a piece of tubing of suitable diameter.



Check the position of the flexible washers: they must be fitted as shown in the diagram to allow the handbrake lever to be in the "rest" position.

Then proceed in the reverse order to dismantling.



Direct the piston so that line (R) on its bearing face is at bleed screw (P) end.

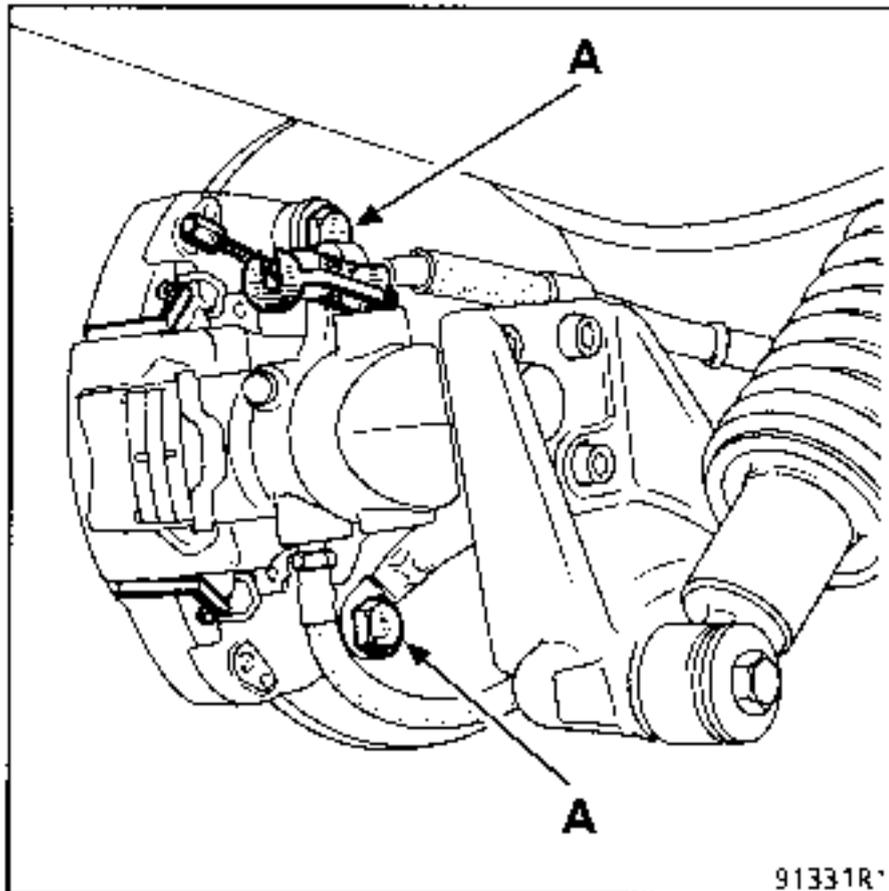
The brake discs must not be refaced. The part must be changed if excessive wear or scoring is present.

TIGHTENING TORQUES (in daN.m)		
Wheel bolts (4 bolts)	9	
Wheel bolts (5 bolts)	10	
Brake calliper mounting bolts	6.5	

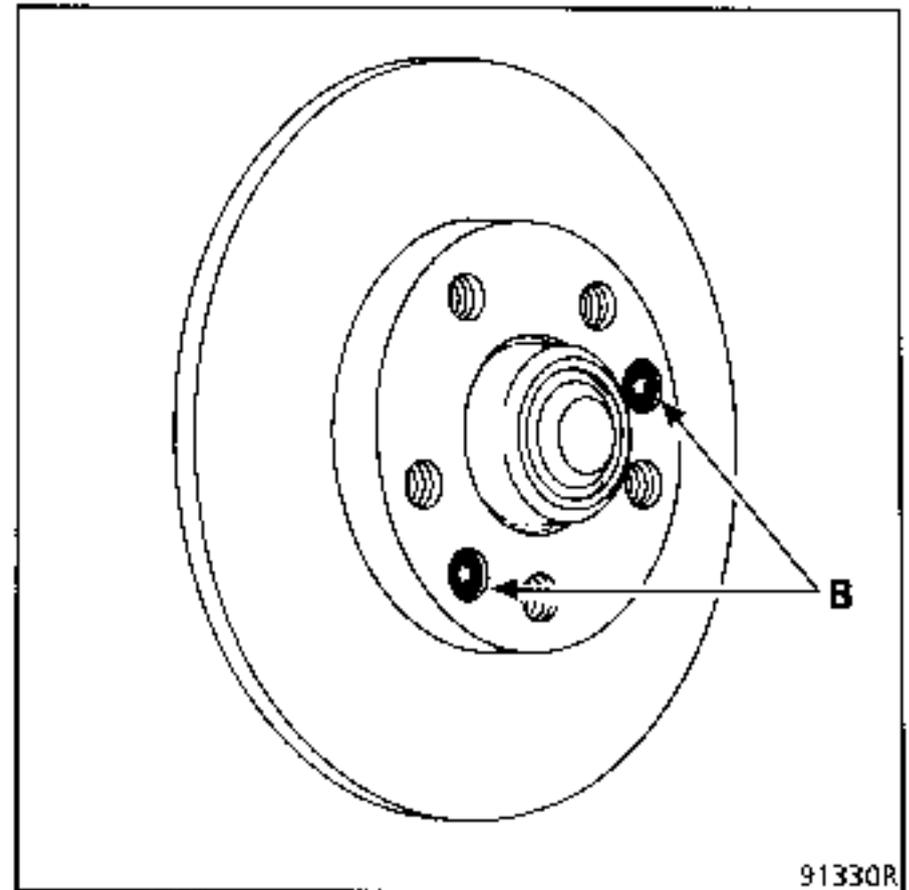
REMOVING

Remove:

- the brake pads (see the corresponding paragraph),
- the two bolts (A) securing the calliper bracket,



- the two bolts securing the disc (B),



- the disc.

REFITTING

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

Coat the calliper bracket bolts with **LOCTITE FRENBLOC** and torque tighten them.

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

ESSENTIAL SPECIAL TOOLING

Emb. 880	Impact tool
Rou. 943	Hub plug extractor
T.Av. 1050-02	Hub extractor

TIGHTENING TORQUES (in daN.m)



Hub nut		16
Wheel bolts	4 bolts	9
	5 bolts	10

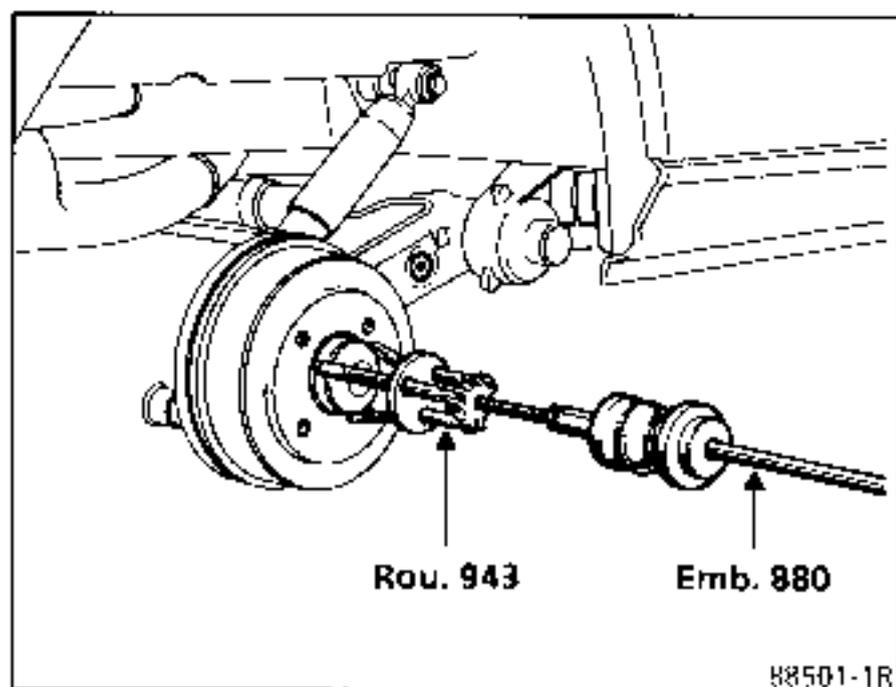
NOTE : L485 and L48L are fitted with hubs with integral bearings, thus the entire assembly has to be changed.

CHECKING

Using a clock gauge secured to the brake drum, check the axial clearance. It should be 0 to 0.03 mm max.

REMOVING

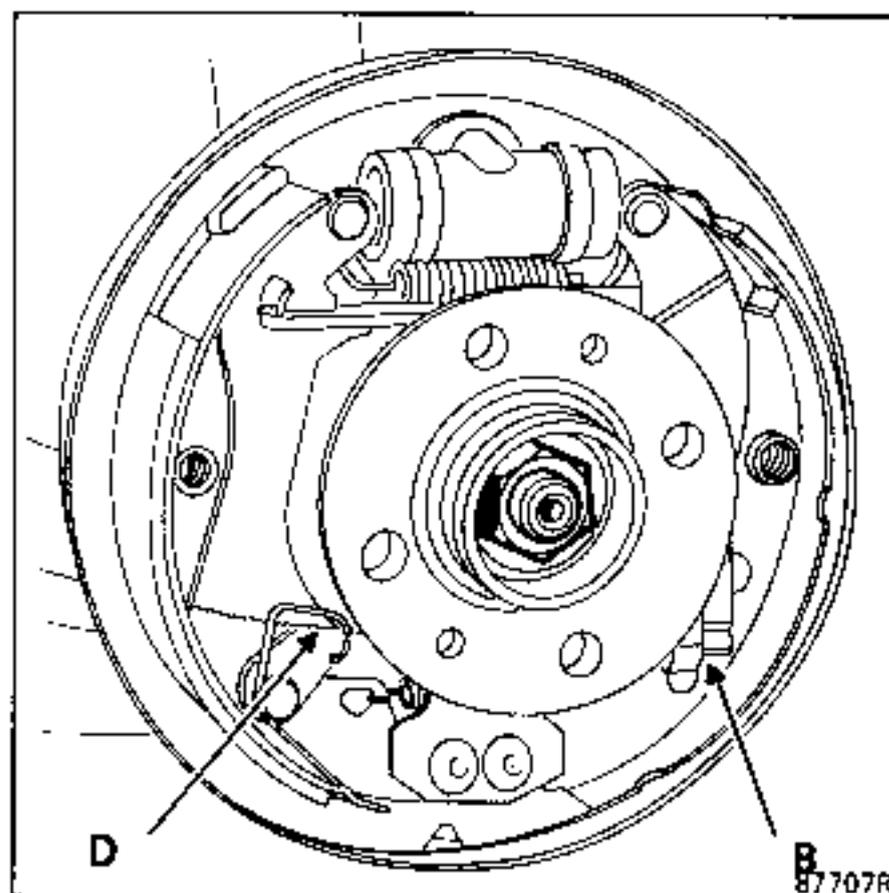
Remove :
- the hub plug using tools Rou. 943 + Emb. 880,



- the drum (see corresponding section).

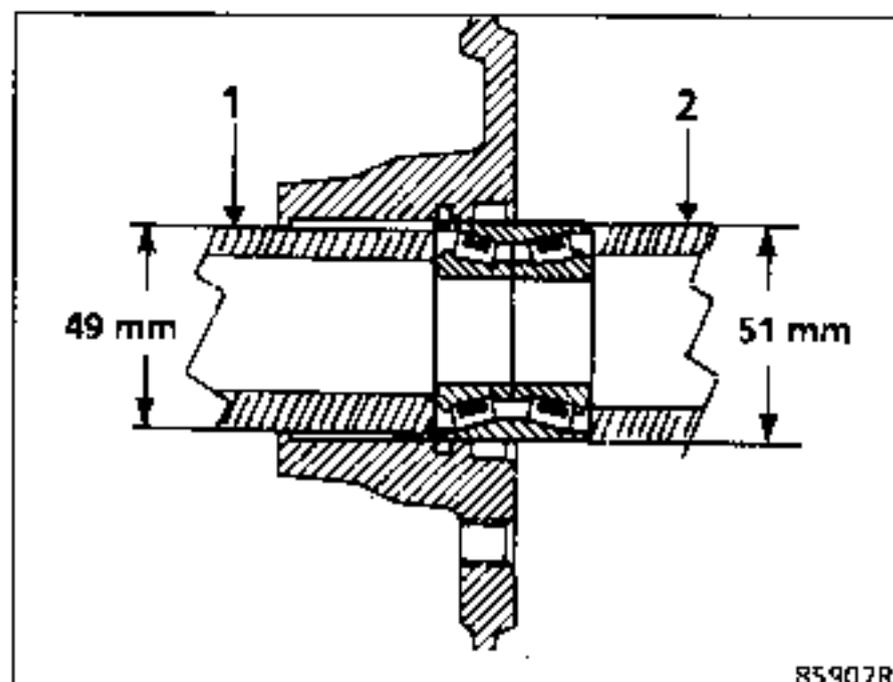
Assembly with metal-lined drum

Remove :
the hub (by releasing nut A).



All types

From the drum or hub remove:
- the bearing retaining clip,



- the bearing, using a piece of tubing (1).

REFITTING

Using a piece of tubing (2) and a press, push on the bearing until it is in contact with the shoulder.

Fit in place:

- a new clip,
- the drum or hub on the stub axle which has already been oiled with **SAE W 80**,
- a new lock nut and torque tighten it,
- the hub plug.

Assembly with metal-lined hub

Fit the drum in place on the hub.

All types

Adjust the brake pads by pressing down several times on the brake pad.

Adjust the handbrake (see corresponding section).

ESSENTIAL SPECIAL TOOLING

M.S.	580	Impact tool
Rou.	15-01	Protective end cup
Rou.	604-01	Hub locking tool
T.Av.	1050-02	Hub extractor

TIGHTENING TORQUES (in daN.m)



Shock absorber bottom securing bolts	5.5
Anti-roll bar securing bolt	5.5
Bolts securing drive shaft to sun wheel	6
Drive shaft nut	21
Bolts securing arm	7
Brake back plate bolts	5.5
Calliper bracket bolts	6.5
Wheel bolts	4 bolts 9
	5 bolts 10

CHECKING

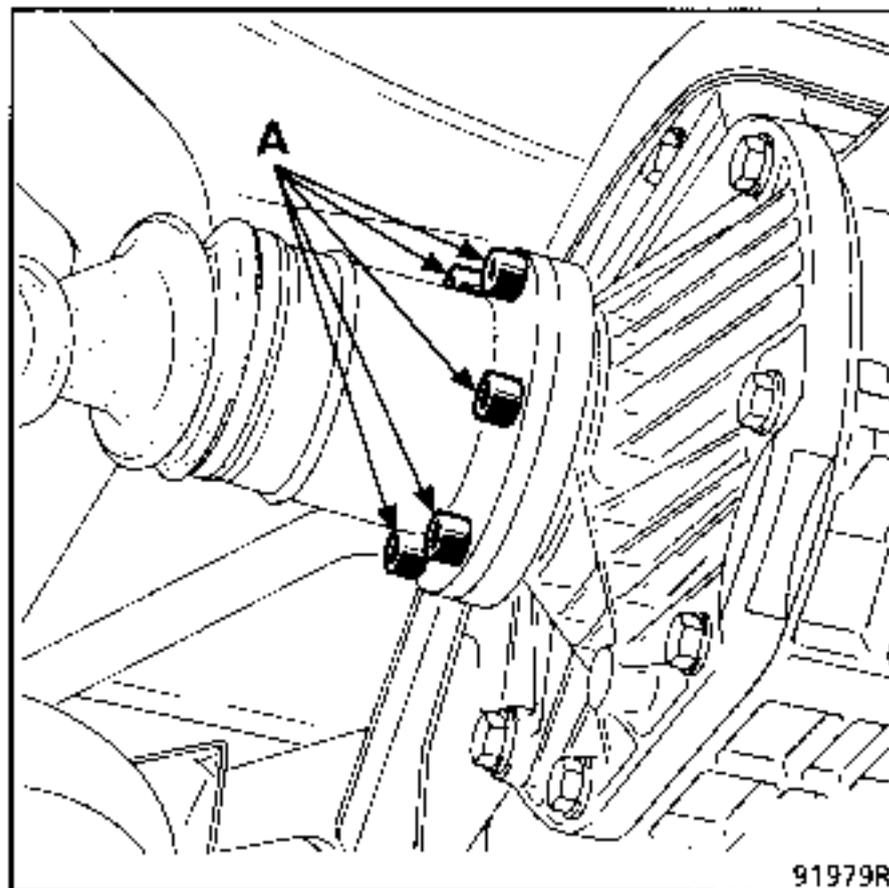
Using a clock gauge secured to the hub, check the axial clearance which should be between 0 and 0.05 mm.

REMOVING

Remove:

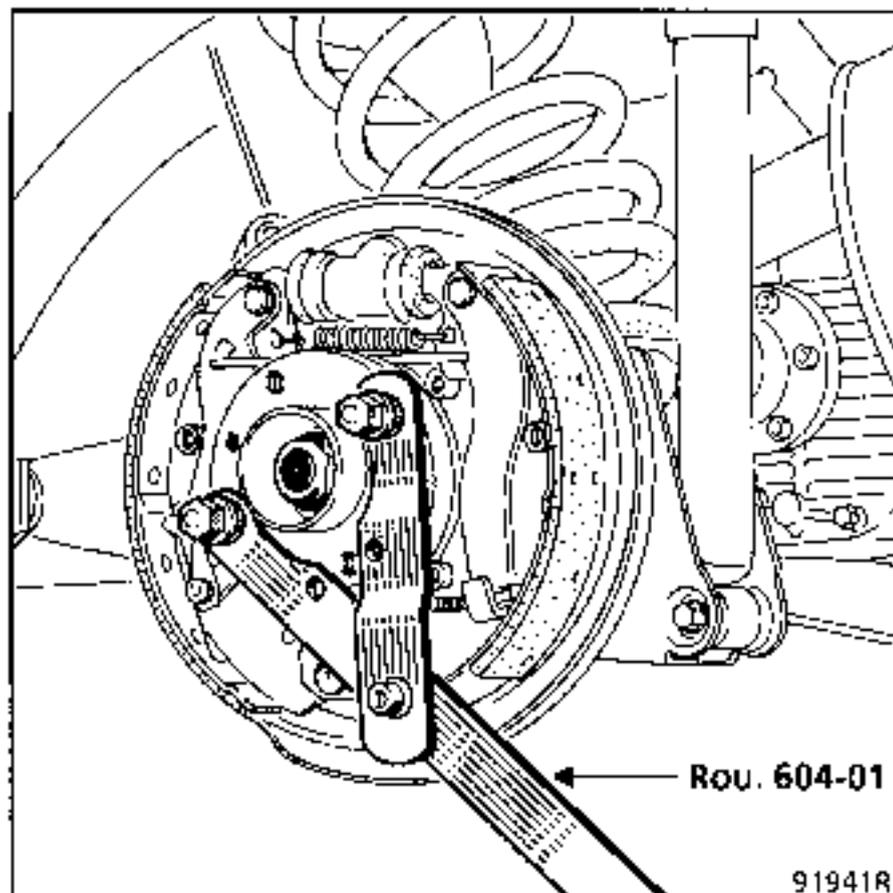
- the brake drum or disc (depending on version),
- the drive shaft nut using tool Rou. 604-01,

- the six mounting bolts (A) on the sun wheel, with the hub locked in place, using tool Rou. 604-01.

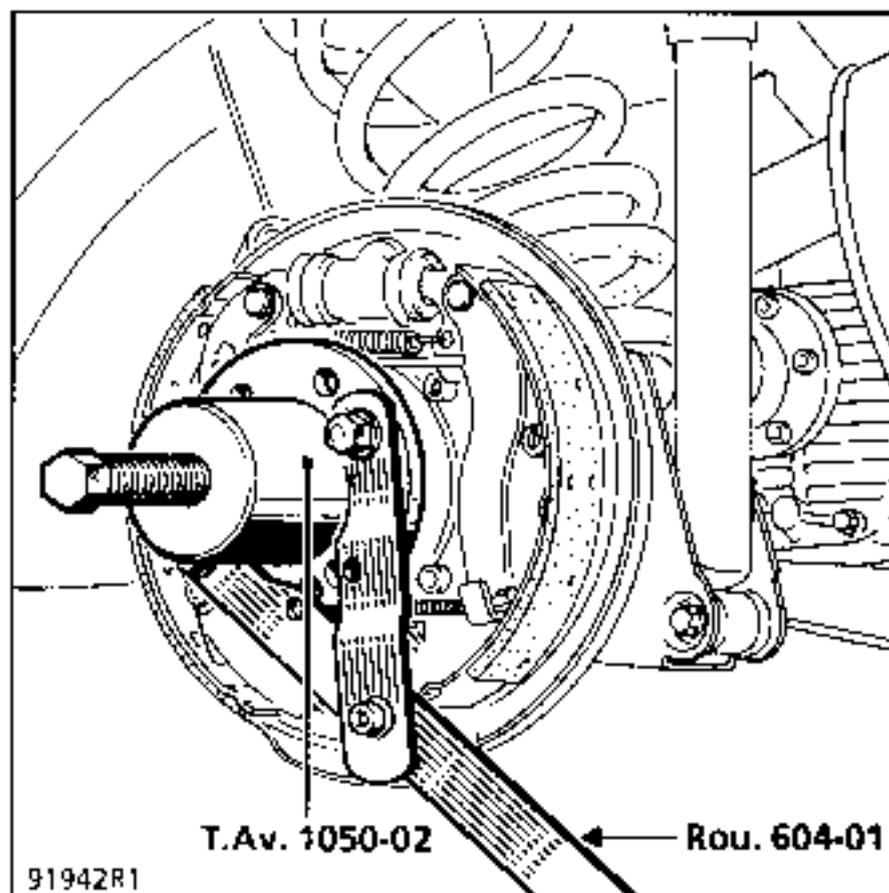


91979R

Push back the drive shaft and recover it using tools T.Av. 1050-02 + Rou. 604-01.

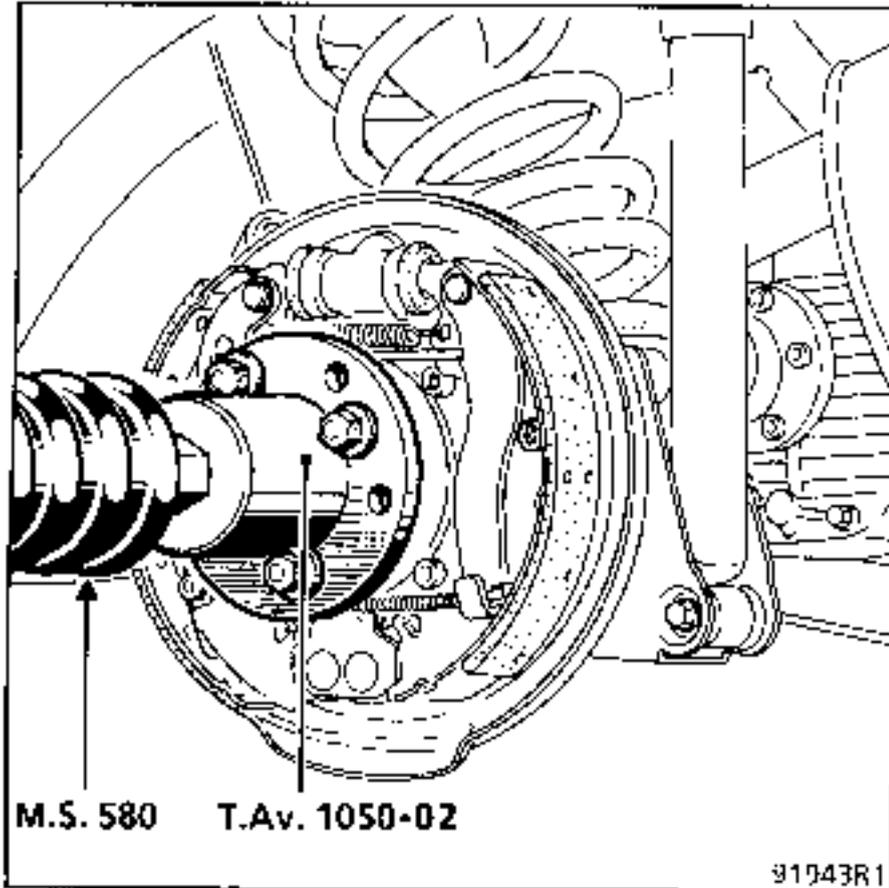


91941R



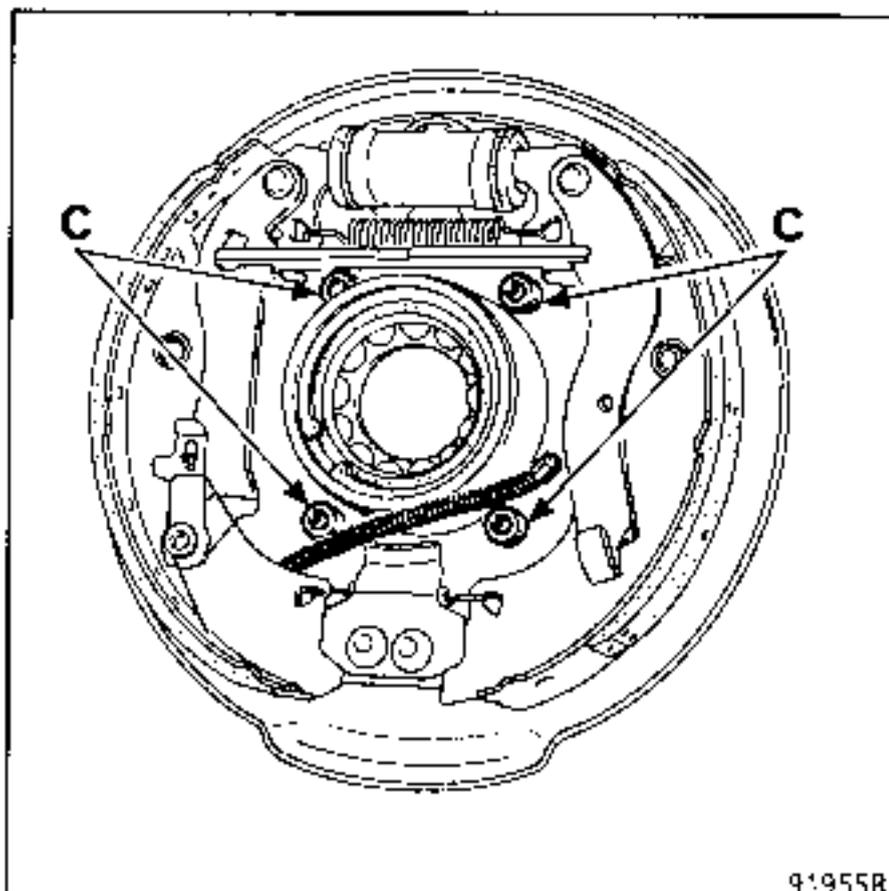
91942R1

Using tools T.Av. 1050-02 + M.S. 580 take out the hub and recover the bearing inner track ring.



Fit a pedal clamp and remove :

- the brake hose from the arm,
- the handbrake cable, and disengage it from these guides on the arm,
- the four bolts (C) from the brake anchor plate,



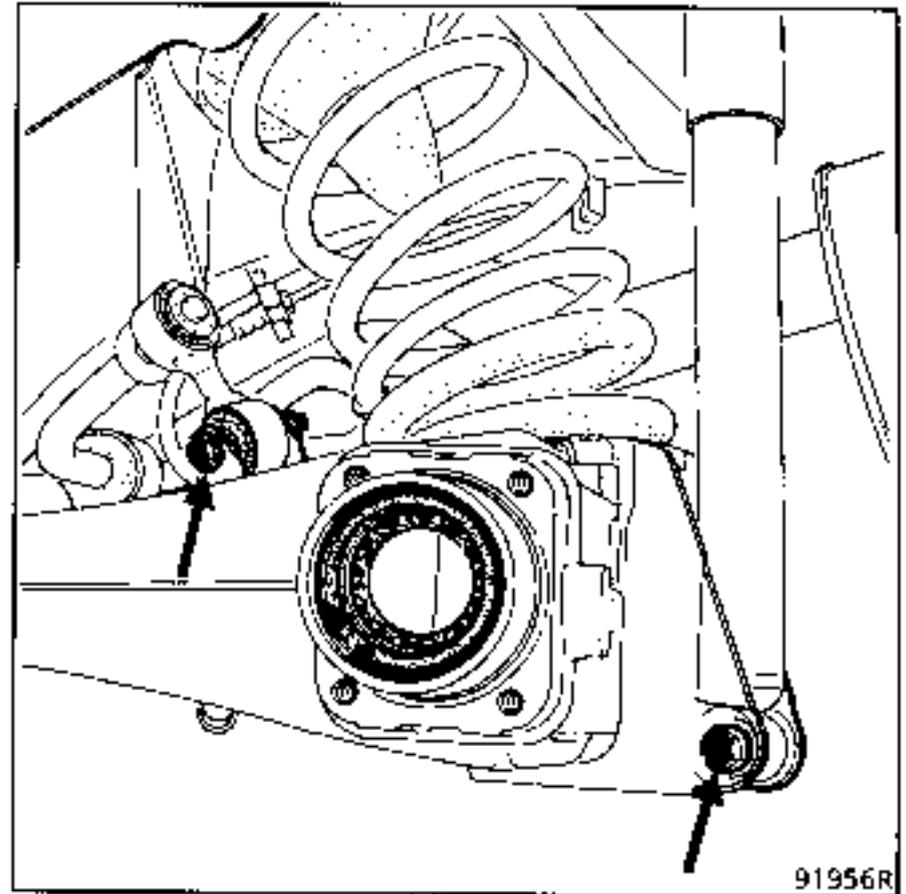
- the brake anchor plate.

Right-hand side :

Remove the compensator control.

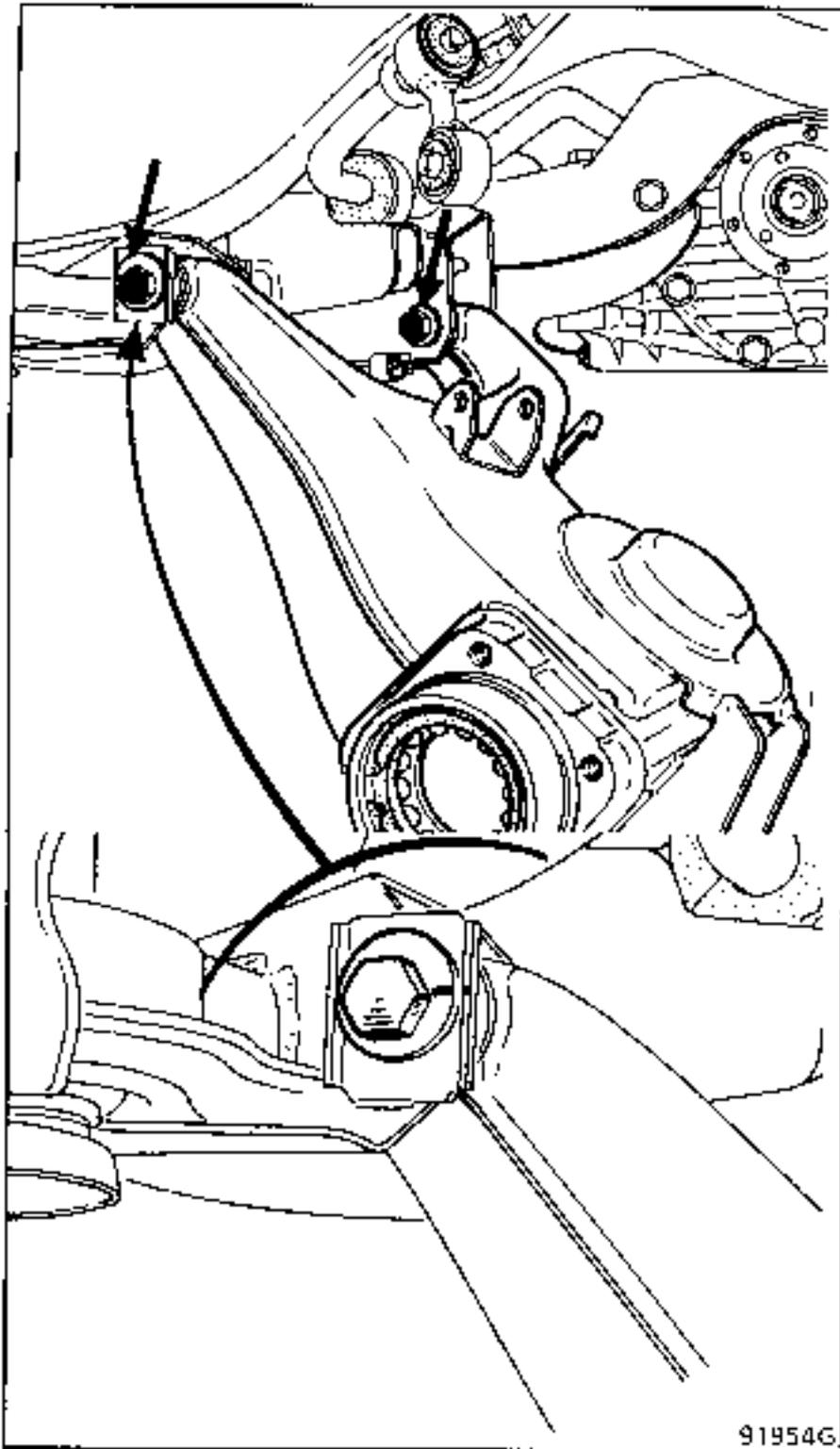
Use a jack to take the weight of the half-shaft assembly and remove :

- the shock absorber bottom mounting,
- the anti-roll bar link arm mounting.

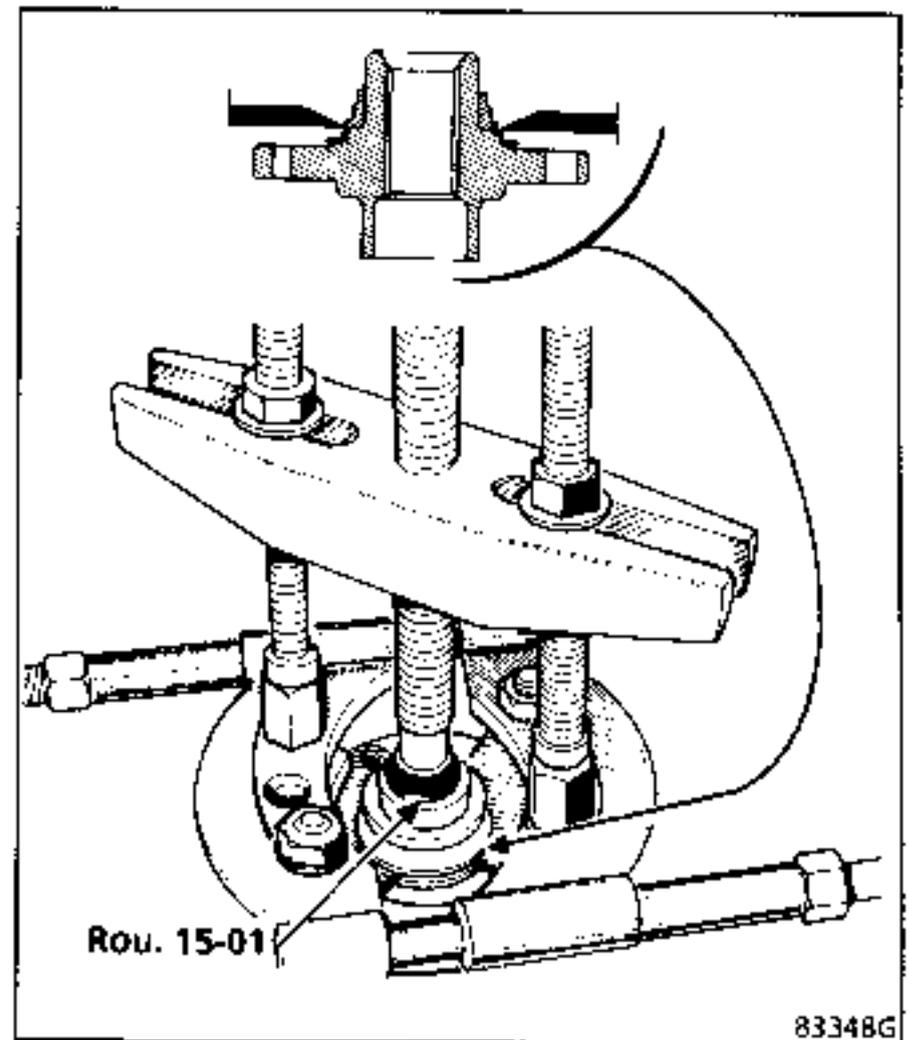


Lower the arm and remove

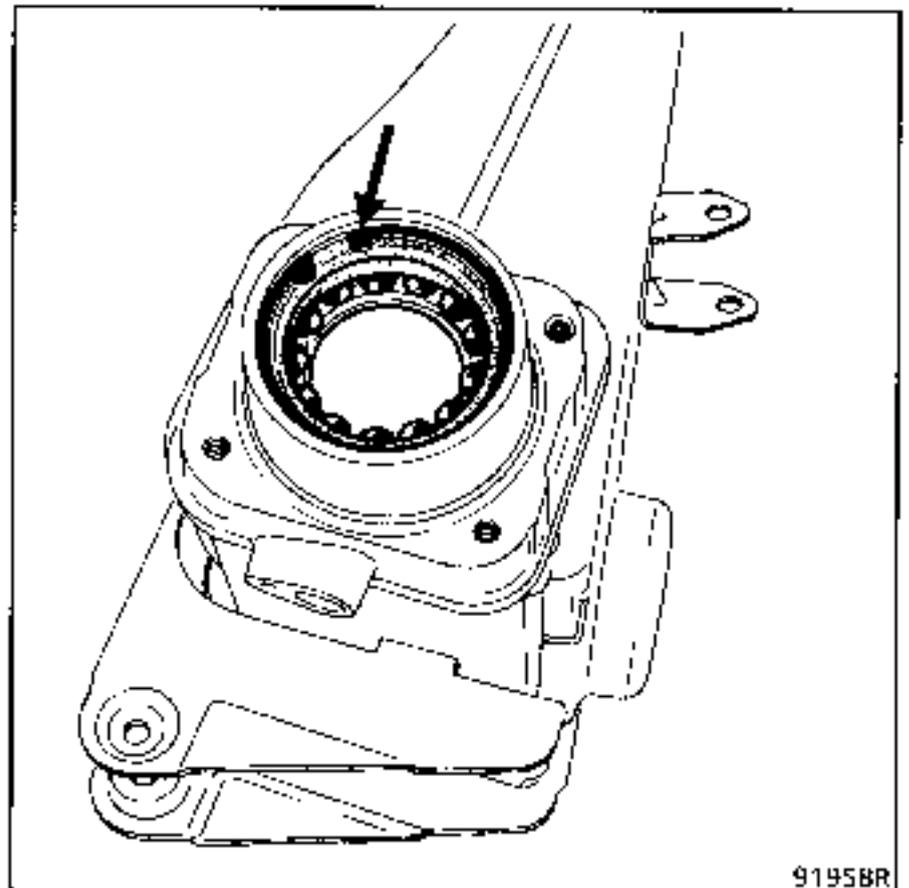
- the spring and its thrust block,
- the two bolts holding the arm, after first marking the position of the parallelism adjusting cam bolt,
- the rear swing arm.



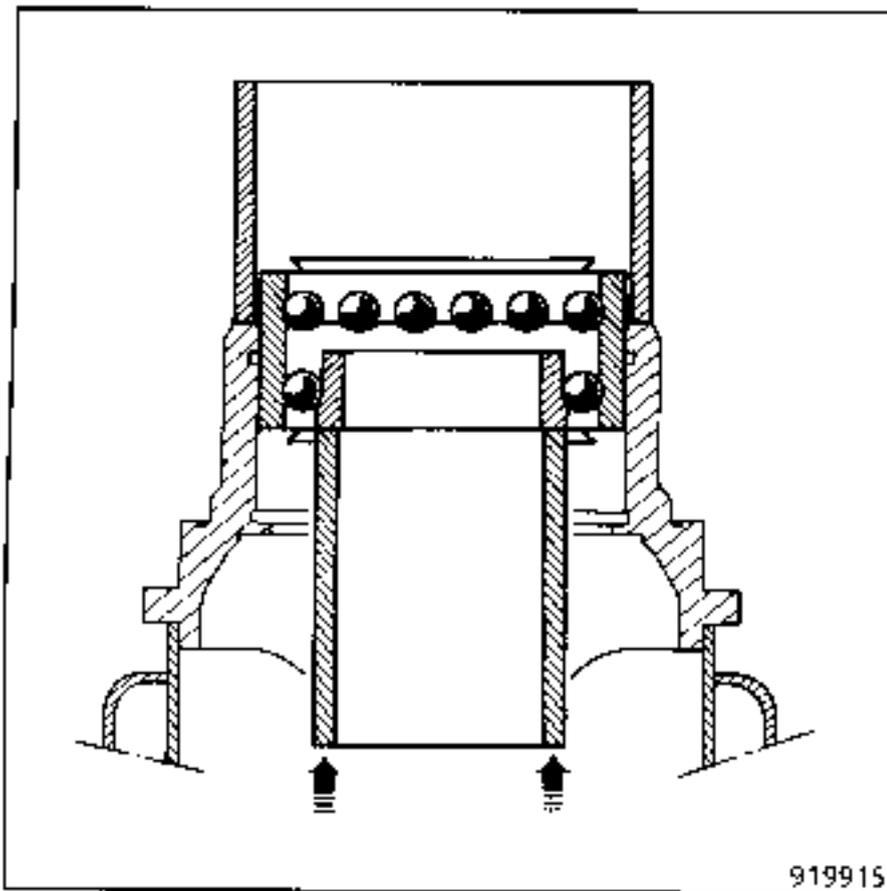
Remove the bearing inner track ring from the hub using an extractor with jaws of the FACOM U53G + U53E type and tool Rou. 15-01.



Remove the circlips holding the bearing on the arm.

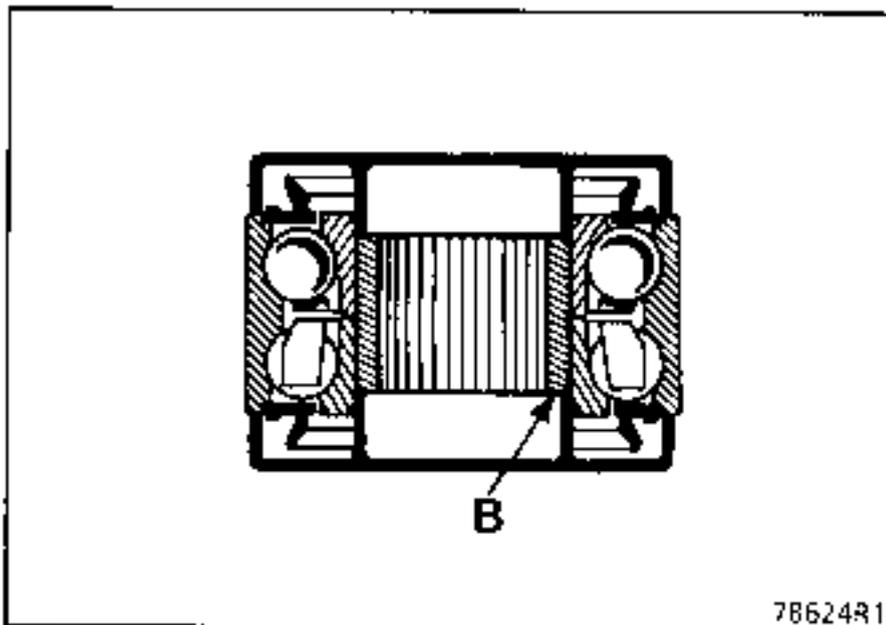


On the press, extract the outer track ring using one of the two inner track rings, leaving the ball races and seals in position.

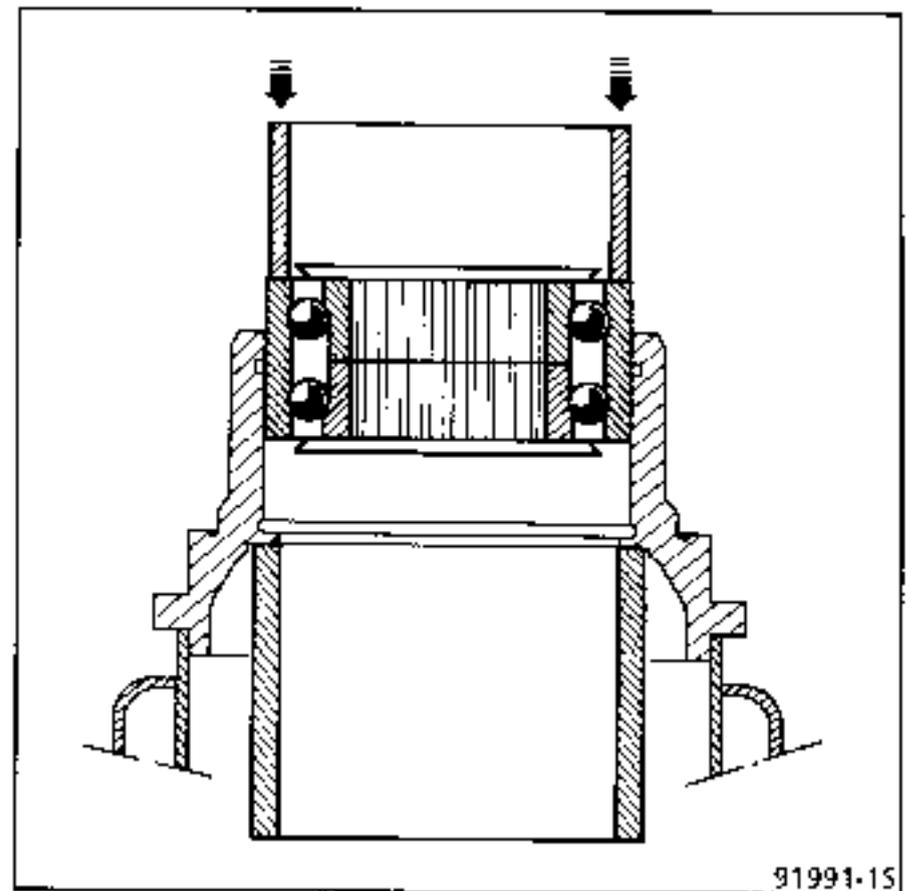


REFITTING

On the press, fit the bearing with its plastic ring (B) in the arm, using a piece of tubing with an outer diameter of 81 mm and a bore of 75 mm, taking the weight on the outer bush.



Do not rest on the inner track ring, otherwise the bearing might be damaged since great force is required to fit the bearing.



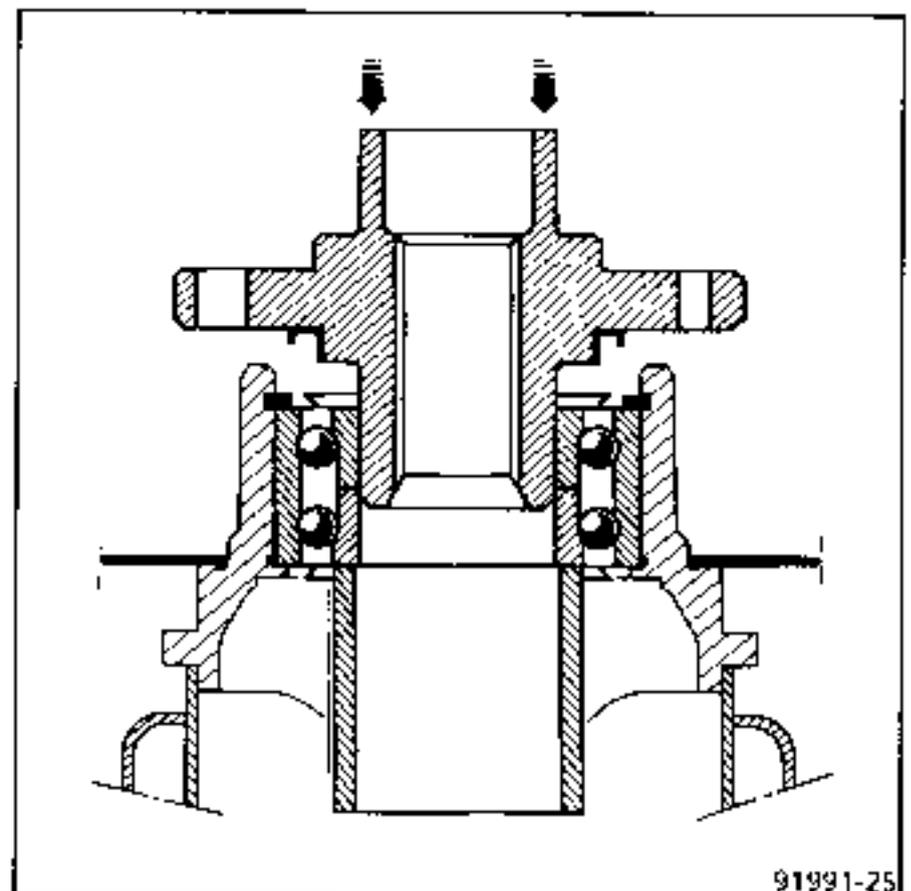
Fit the retaining circlips.

Coat each sealing lip.

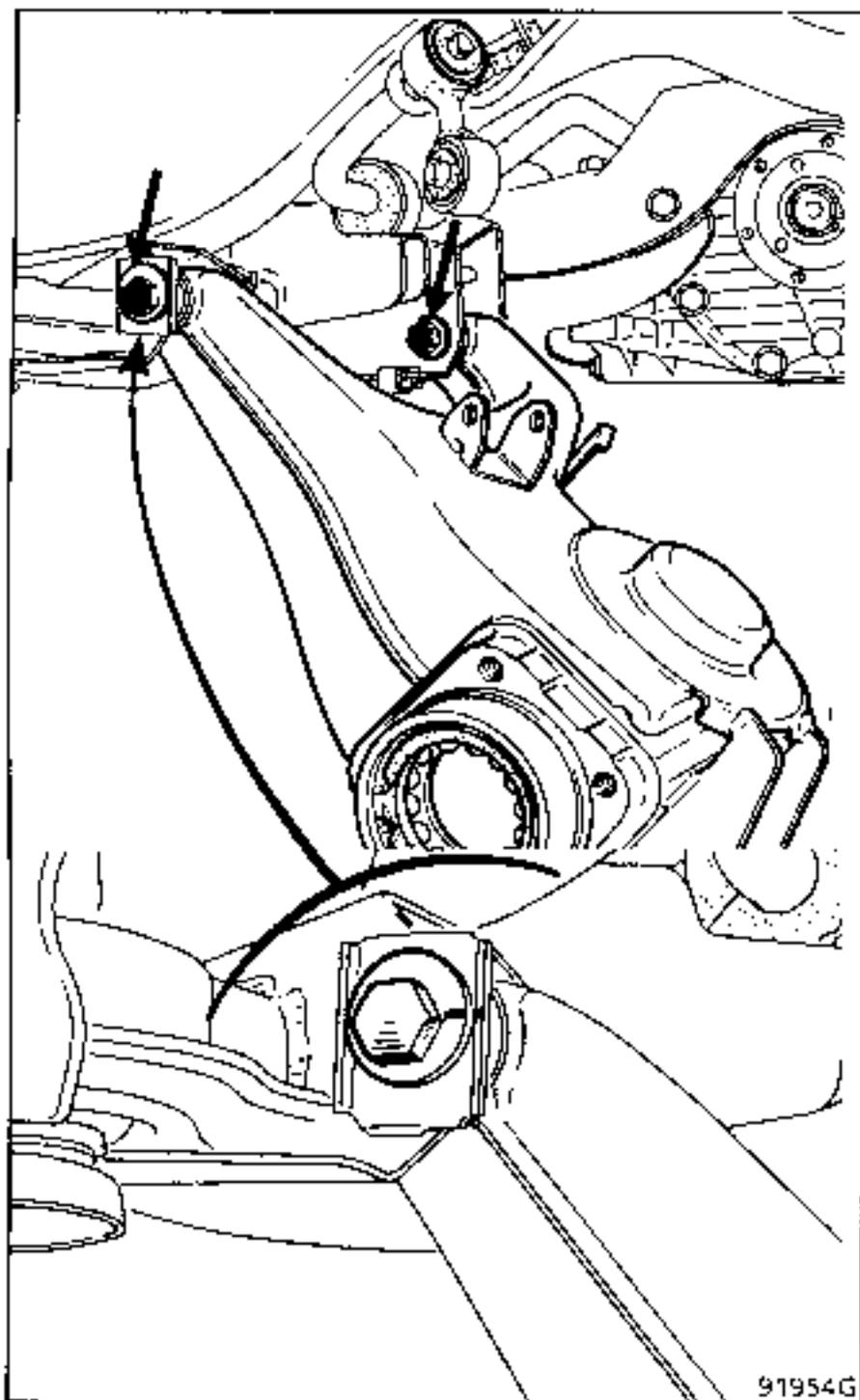
Remove plastic ring (B).

Fit in place:

- the brake anchor plate, torque tightening its mountings which have previously been coated with **LOCTITE FRENBLOC**,
- the hub, on the press, using a piece of tubing with a bore of 43 mm and outside diameter of 48 mm taking the weight on the bearing inner track ring.



Refit the swing arm on the vehicle positioning the cam bolt according to the marks made on removal.

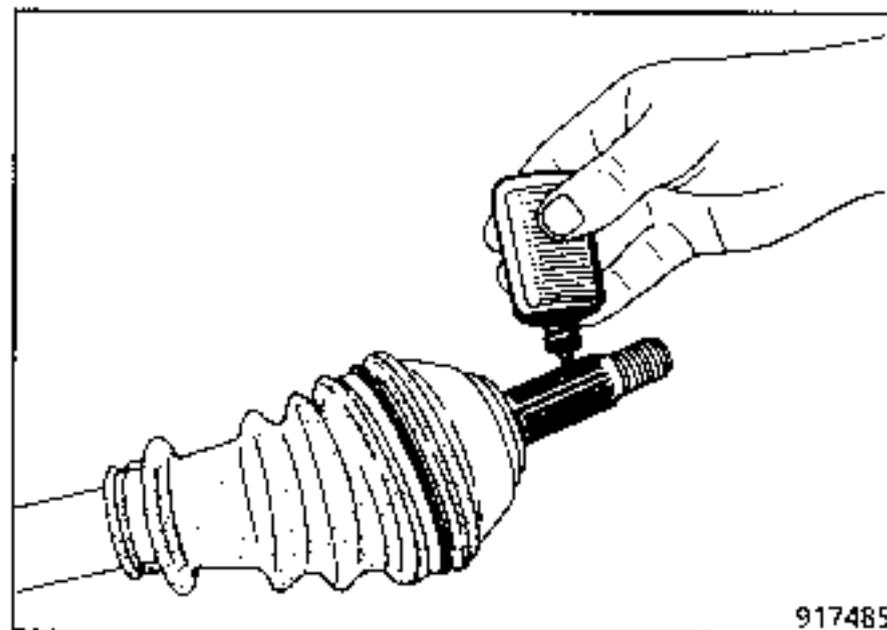


Fit a jack under the arm and fit the spring (see the instructions in the relevant paragraph).

Compress the half-shaft assembly engaging the bottom of the shock absorber and the anti-roll bar link arm in their locations.

Fit in place the bolts (previously coated with **MOLYKOTE BR2** grease) for the bottom of the shock absorber and the anti-roll bar link arm, but do not tighten them.

Coat the drive shaft stub axle with **LOCTITE SCELBLOC** and engage it in the arm.



Secure the drive shaft on the sun wheel (six bolts A) and torque tighten, using tool Rou. 604-01.

Fit in place:

- the handbrake cable,
- the brake hose.

On the right-hand side:
Fit the compensator control.

- Fit the brake drum or disc.

With the vehicle on its wheels, torque tighten the mountings for:

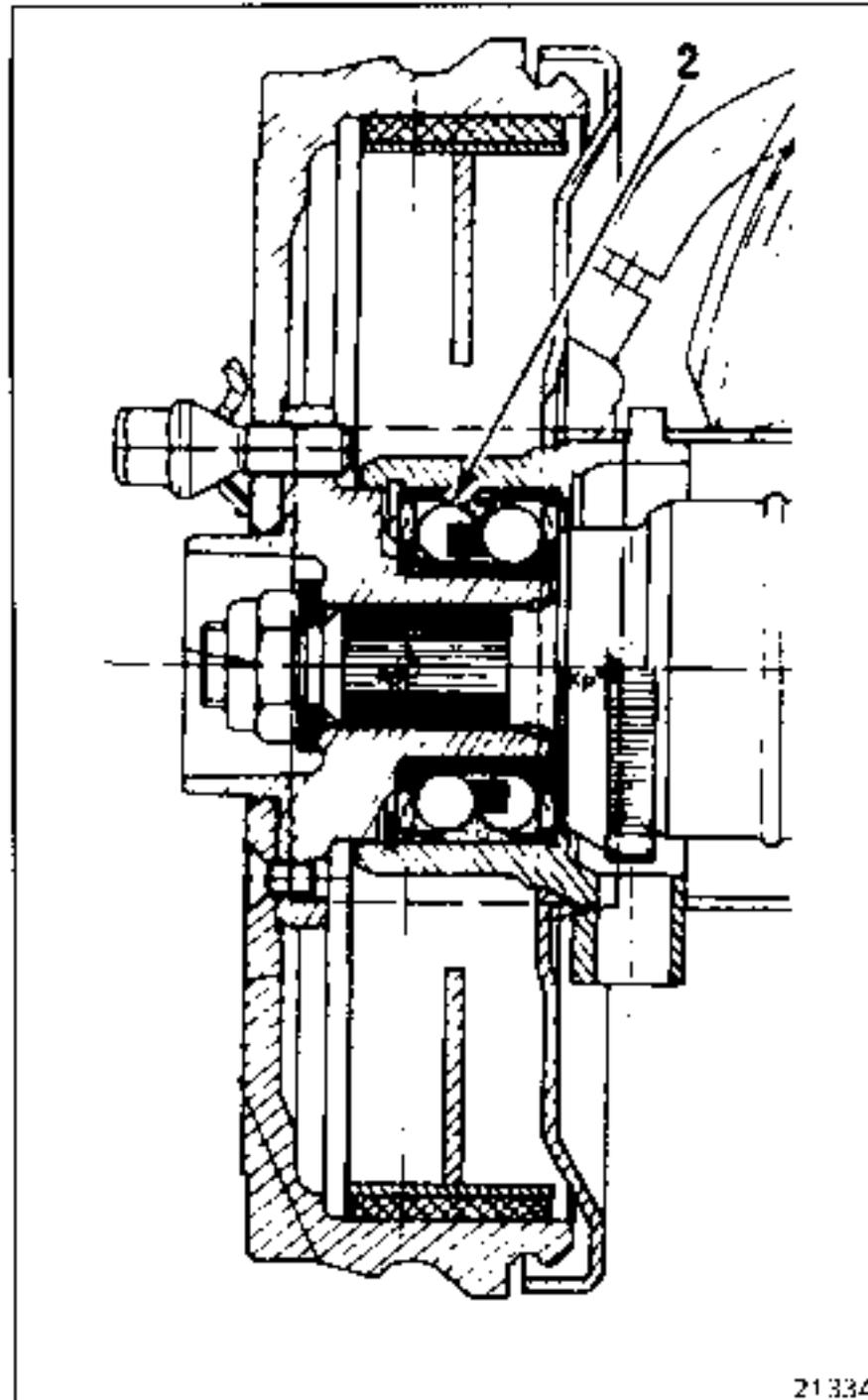
- the arm on the cross member,
- the anti-roll bar link arm,
- the bottom of the shock absorber.

Bleed the brake circuit.



The removing - refitting method is identical to the method for changing the bearing.

NOTE: As great force is needed to fit outer track ring (2) of the bearing in its bore, when this track is removed the complete bearing must be changed since the bearing will have marked a track in the bush.



TIGHTENING TORQUES (in daN.m)		
Upper securing bolt		8
Lower securing bolt		8.5
Wheel bolts	4 bolts	9
	5 bolts	10

NOTE: Estate L485 and L48L vehicles have a spring - shock absorber assembly.

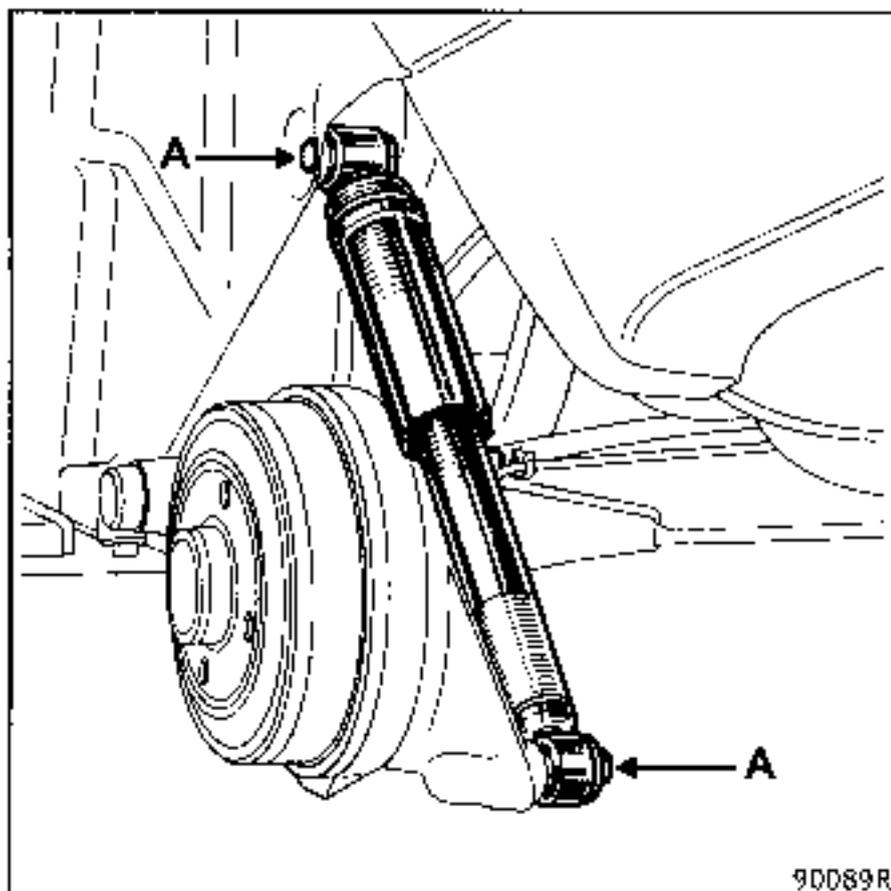
The spring cannot be dismantled - only the entire assembly can be changed.

REMOVING

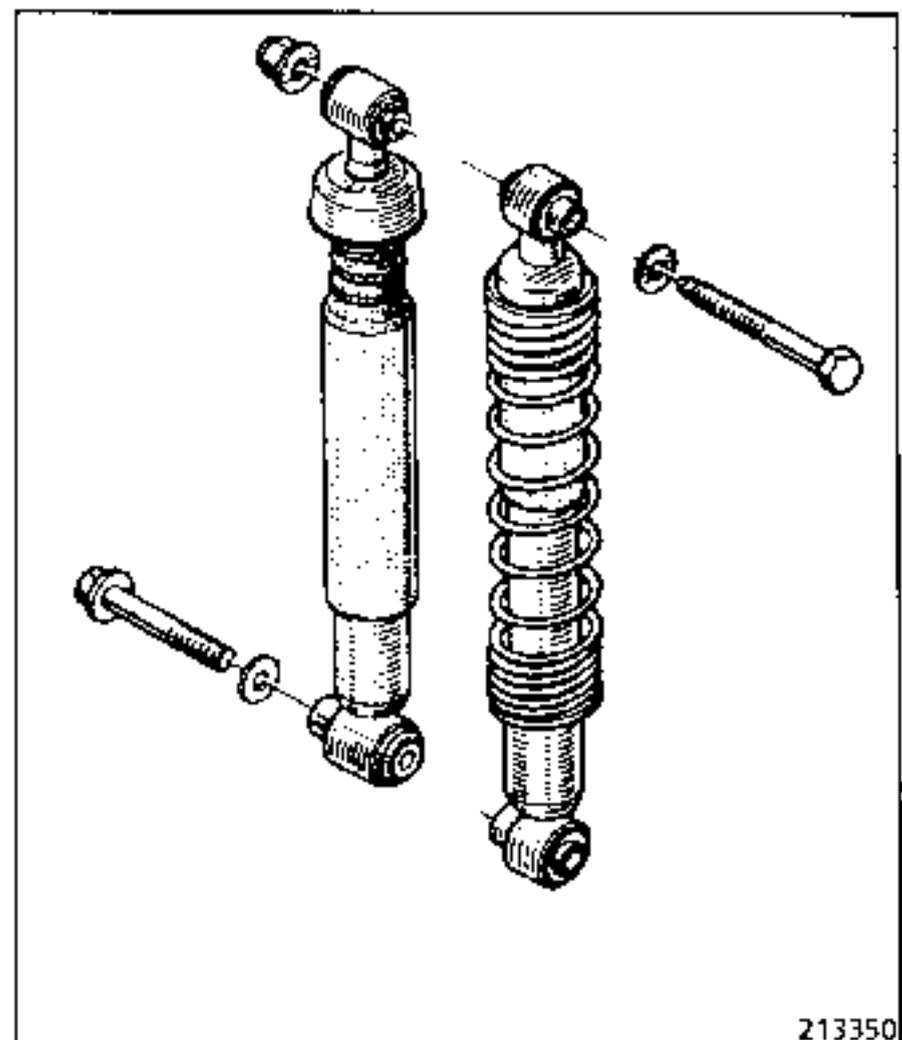
With the vehicle on axle stands and the wheels removed, support the rear arms with a jack.

Remove:

- bolts (A) for the upper and lower mountings;



- the shock absorber.



213350

Precautions to be taken before assembly:

In the Parts Department these shock absorbers are stored horizontally.

Under these conditions, it is possible that shock absorbers intended to function vertically become unprimed.

Therefore, before fitting them to the vehicle, they must be pumped manually several times in the vertical position.

REFITTING

Fit in place:

- the shock absorber,
- the upper and lower mounting bolts, smeared with **MOLYKOTE BR2** grease without tightening them.

With the vehicle on its wheels, torque tighten the two bolts.

TIGHTENING TORQUES (in daN.m)

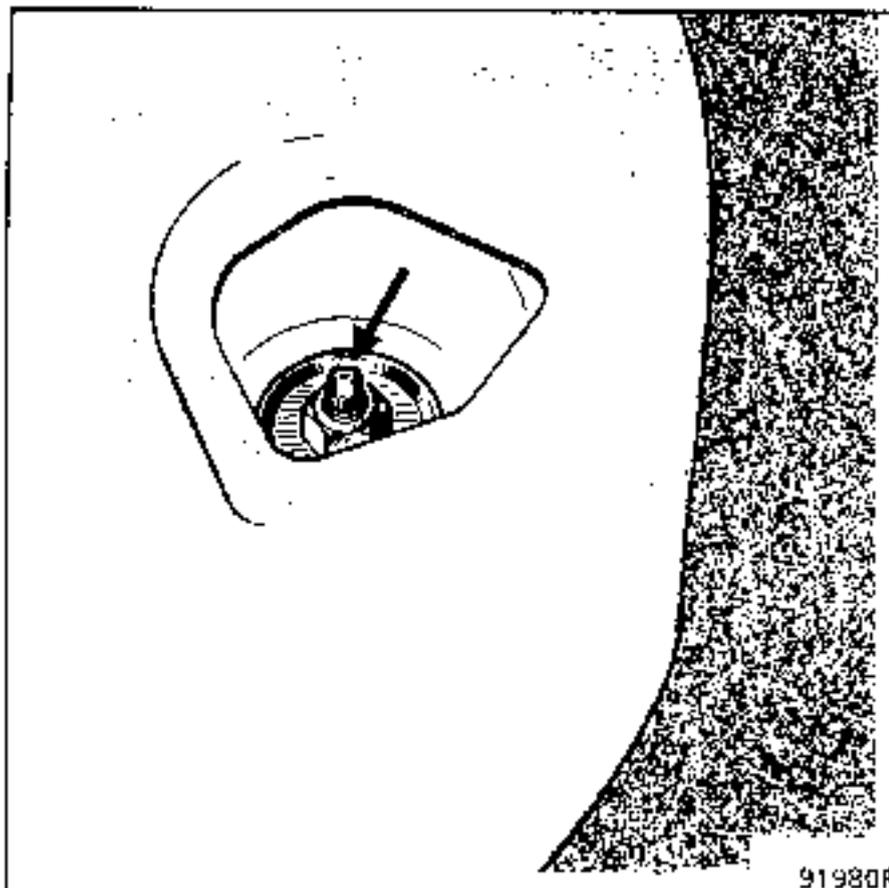


Upper securing bolts	4.5
Lower securing bolt	5.5
Wheel bolts	9
4 bolts	9
5 bolts	10

REMOVING

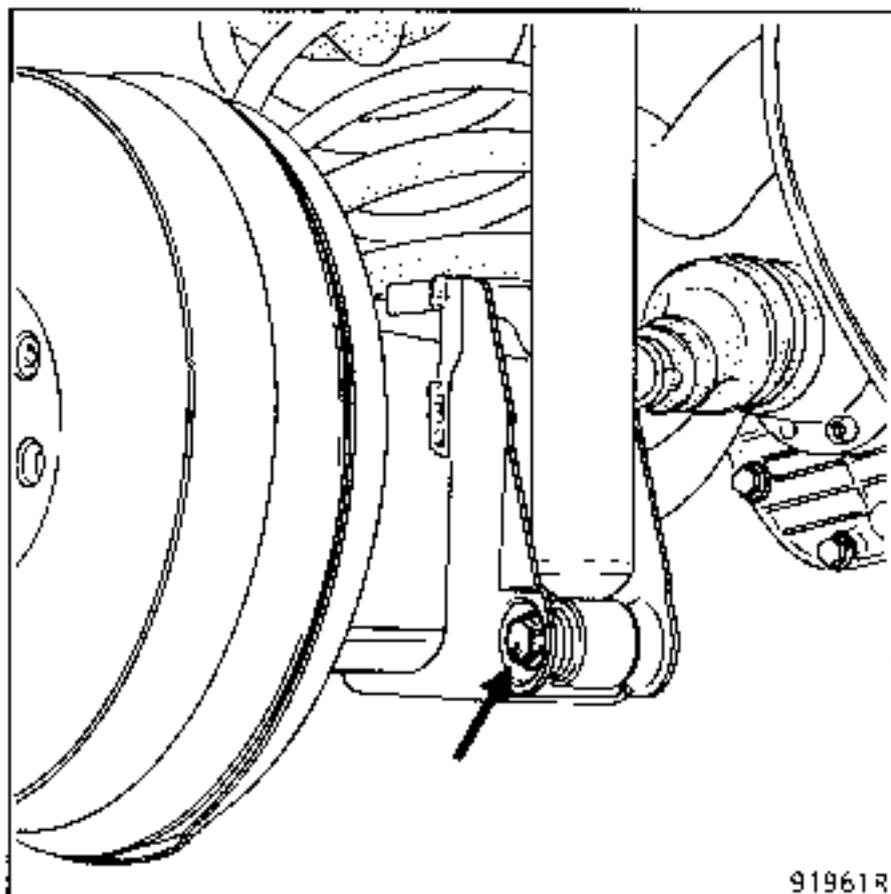
With the vehicle on its wheels remove :

- the upper mounting inside the vehicle,



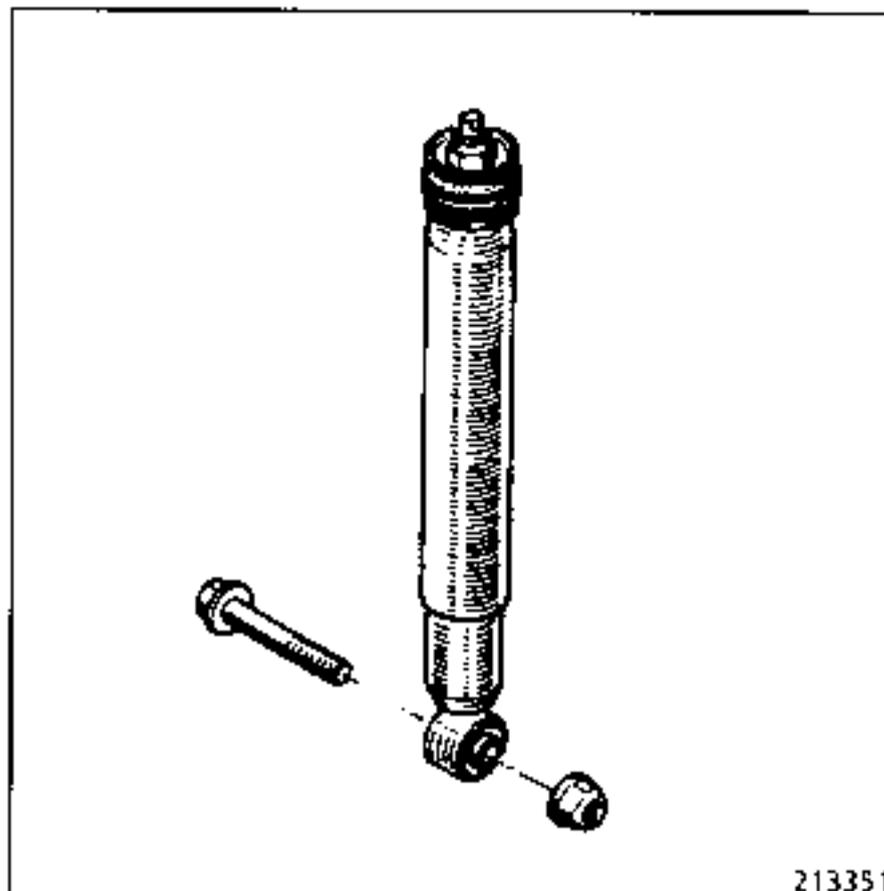
91980R

- the lower mounting,



91961R

- the shock absorber.



213351

Precautions to be taken before assembly:

In the Parts Department these shock absorbers are stored horizontally.

Under these conditions, it is possible that shock absorbers intended to function vertically become unprimed.

Therefore, before fitting them to the vehicle, they must be pumped manually several times in the vertical position.

REFITTING

Fit in place:

- the shock absorber,
- the upper and lower mounting nuts and bolts, smeared with MOLYKOTE BR2 grease.

Torque tighten the mountings.

ESSENTIAL SPECIAL TOOLING

Rou. 604-01 Hub locking tool

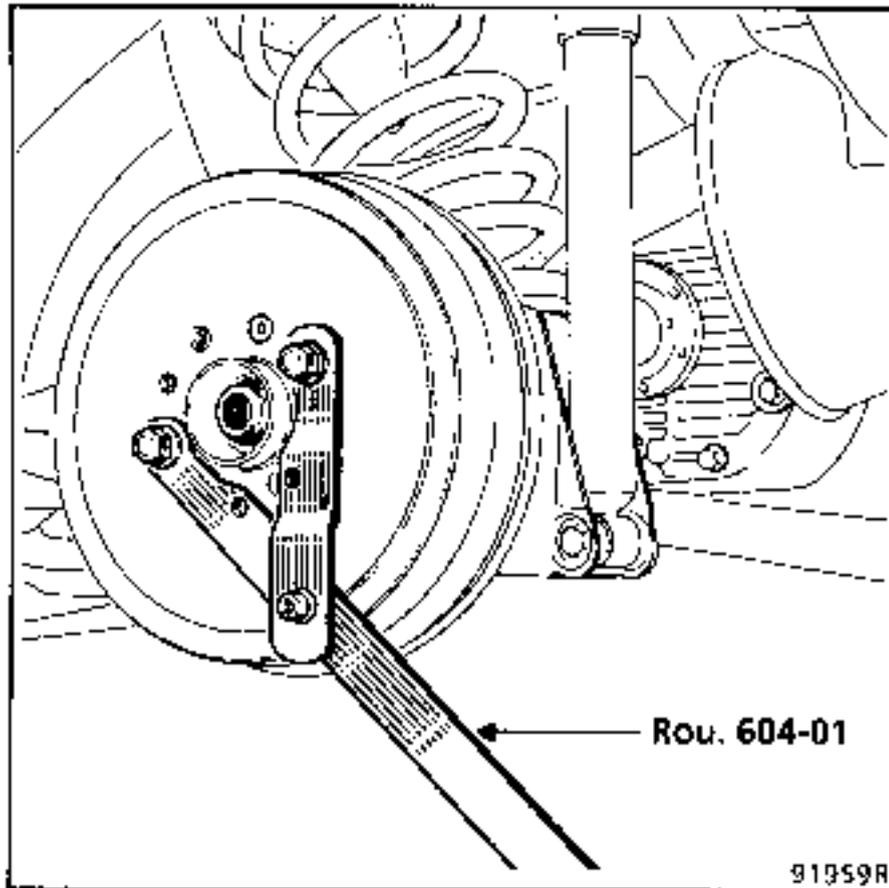
TIGHTENING TORQUE (in daN.m)



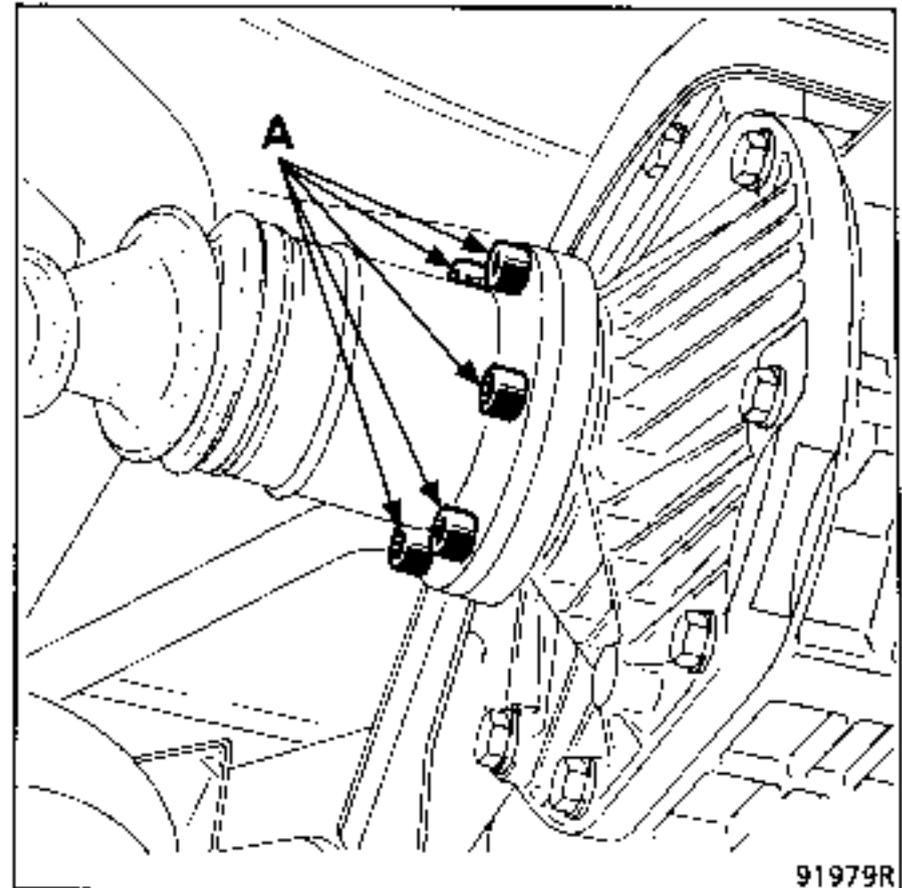
Shock absorber bottom bolts	5.5
Anti-roll bar securing bolts	5.5
Bolts securing drive shaft to sun wheel	6
Wheel bolts	9
5 bolts	10

REMOVING

Lock the hub using tool Rou. 604-01.



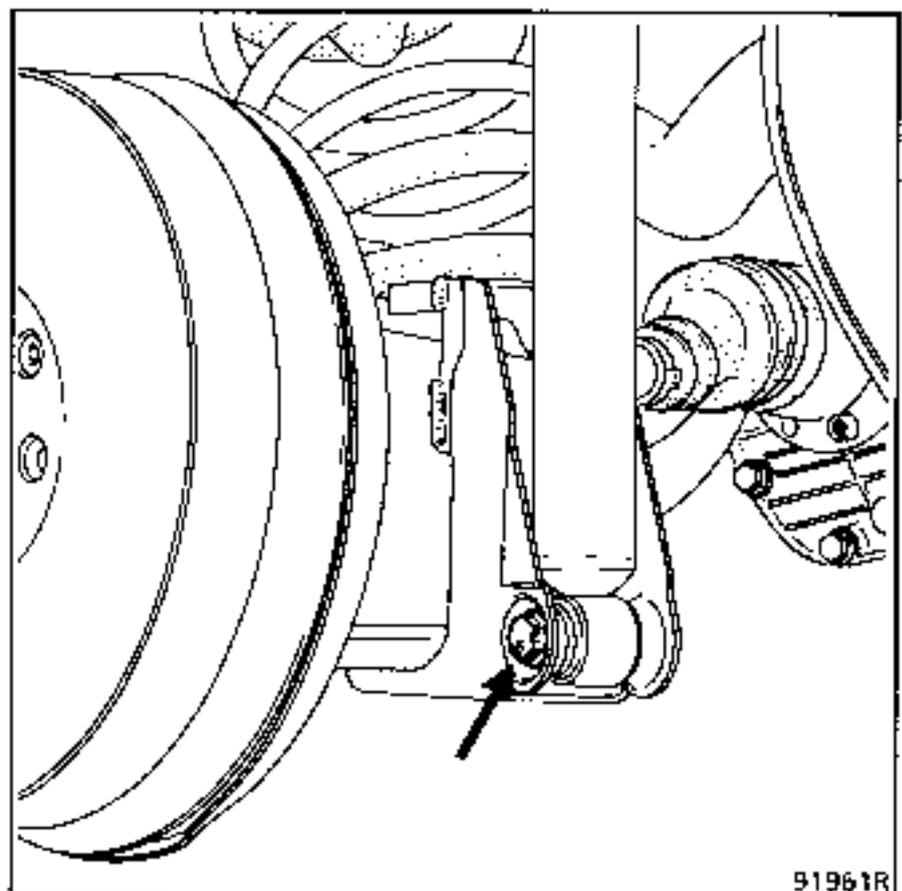
Remove the six bolts (A) securing the drive shaft on the sun wheel.



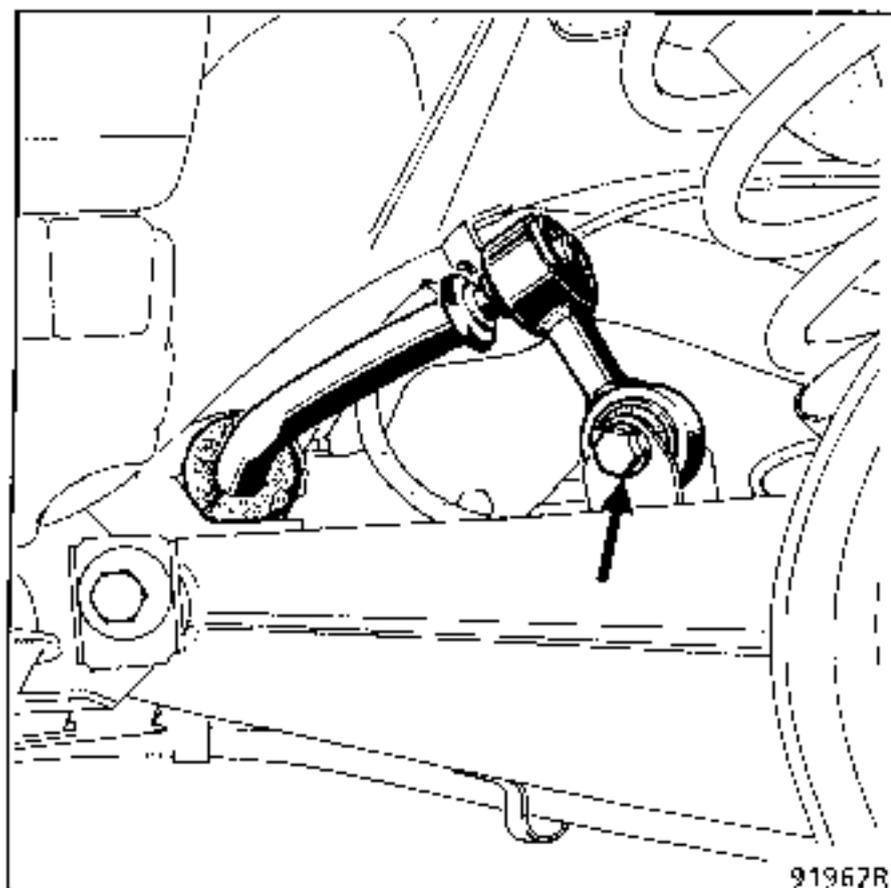
Disengage the drive shaft from the sun wheel and leave it suspended.

Support the half-shaft assembly with a jack and remove:

- the mounting from the bottom of the shock absorber,



- the mounting from the anti-roll bar link arm.

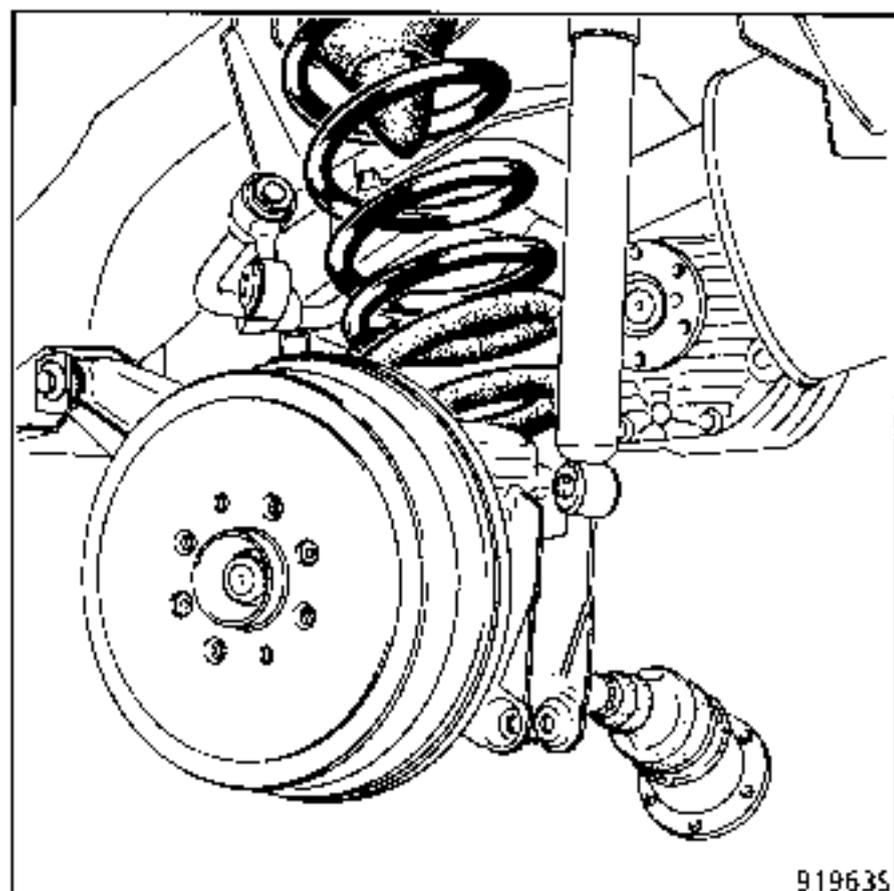


Fit a pedal clamp to the brake pedal and remove the brake hose from the arm.

Right-hand side :

Remove the compensator control.

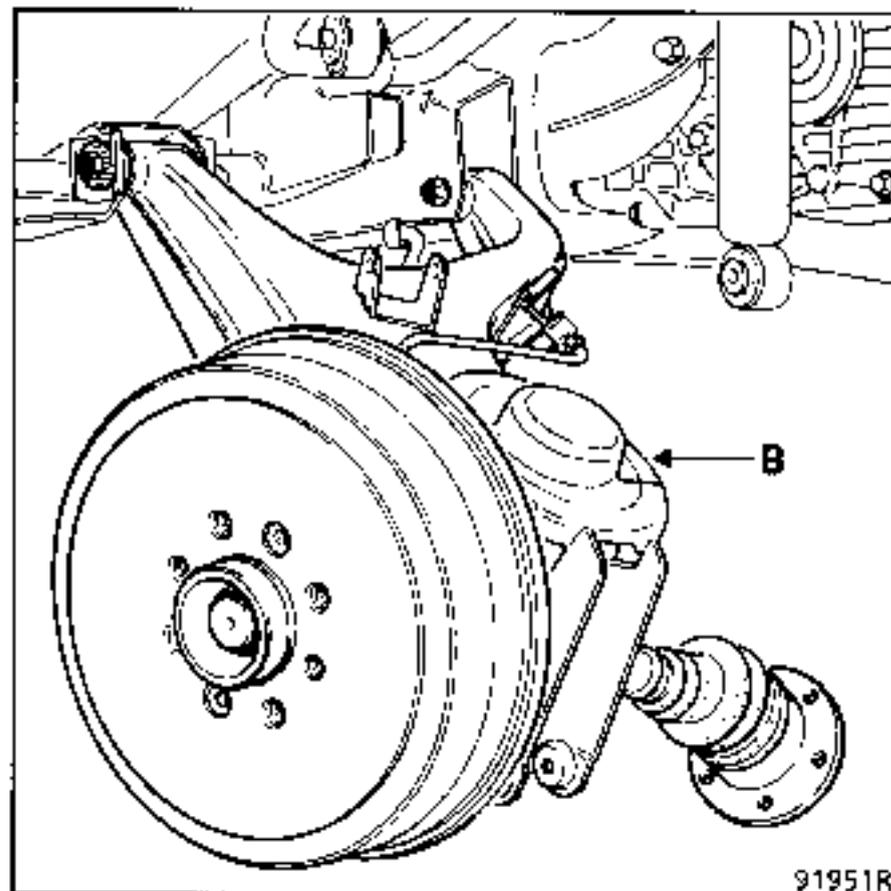
Lower the arm and remove the spring and impact damper.



REFITTING

Fit in place :

- the spring thrust block, directing the assembly so that the edge of the spring is opposite white mark (B) on the arm thrust cup;



- the block - spring assembly on the vehicle.

Compress the half-shaft assembly, engaging the bottom of the shock absorber and the anti-roll bar link arm in their locations.

Fit in place:

- the pins (previously smeared with **MOLYKOTE BR2** grease) for the bottom of the shock absorber and the anti-roll bar link arm, but do not tighten them,
- the brake hose.

On the right-hand side:

Refit the brake compensator control.

- the drive shaft on the sun wheel and torque tighten bolts (A) using tool Rou. 604-01.

With the vehicle on its wheels, torque tighten the pins on:

- the bottom of the shock absorber,
- the anti-roll bar link arm.

Bleed the brake circuit.

ESSENTIAL SPECIAL TOOLS

Rou. 604-01 Hub locking tool

TIGHTENING TORQUES (in daN.m)



Shock absorber bottom bolts	5.5
Anti-roll bar securing bolts	5.5
Anti-roll bar bearing bolts	3
Bolts securing drive shaft to sun wheel	6
Wheel bolts	4 bolts 9
	5 bolts 10

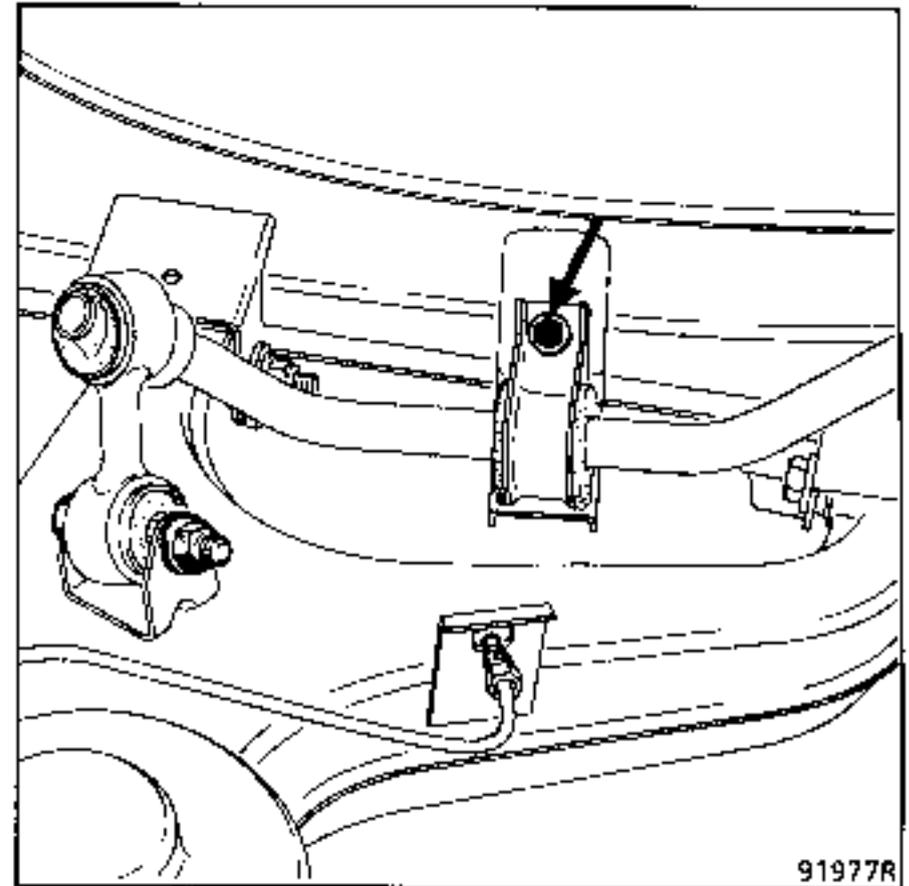
REMOVING

Right-hand side:

Remove the spring (see relevant section).

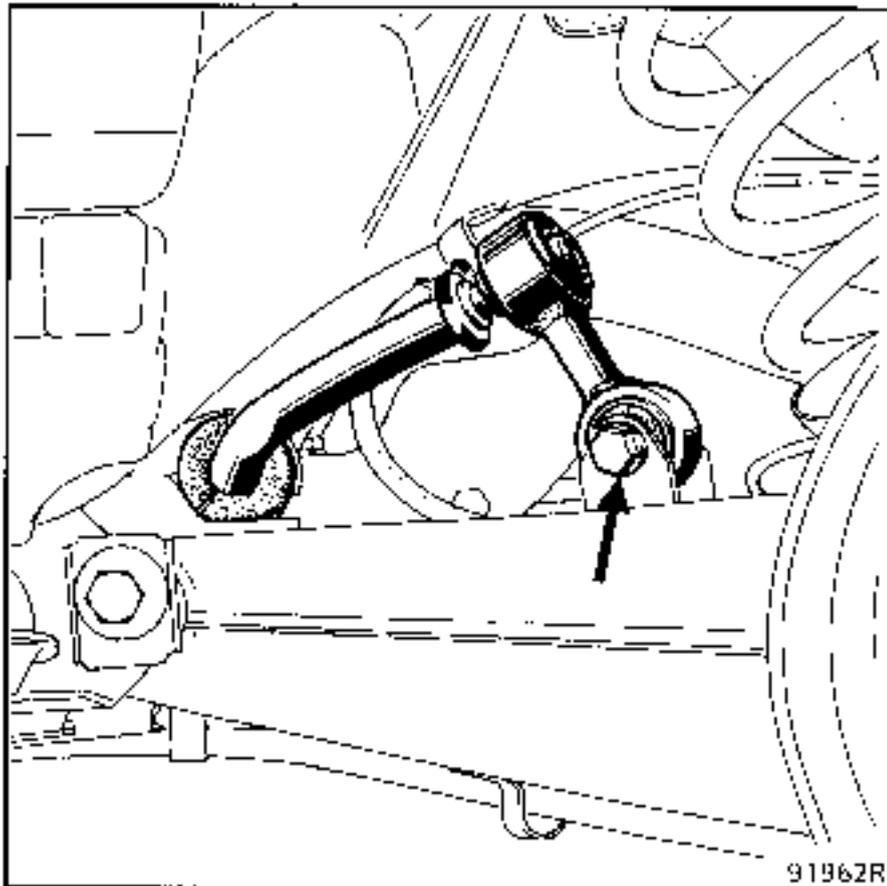
Left-hand side :

Place a jack under the half-shaft assembly and remove the anti-roll bar link arm mounting.



91977R

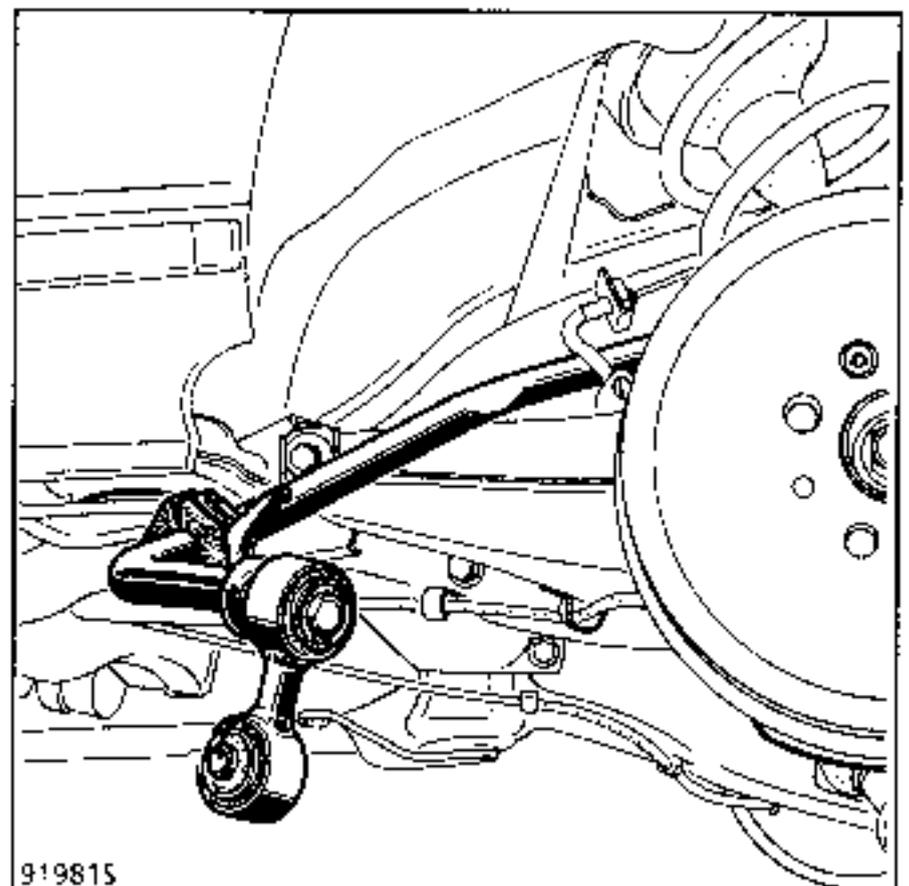
Take out the bar on the left-hand side, directing it as shown in the drawing.



91962R

On both sides :

Remove the anti-roll bar bearings.



919815

REFITTING

Fit in place:

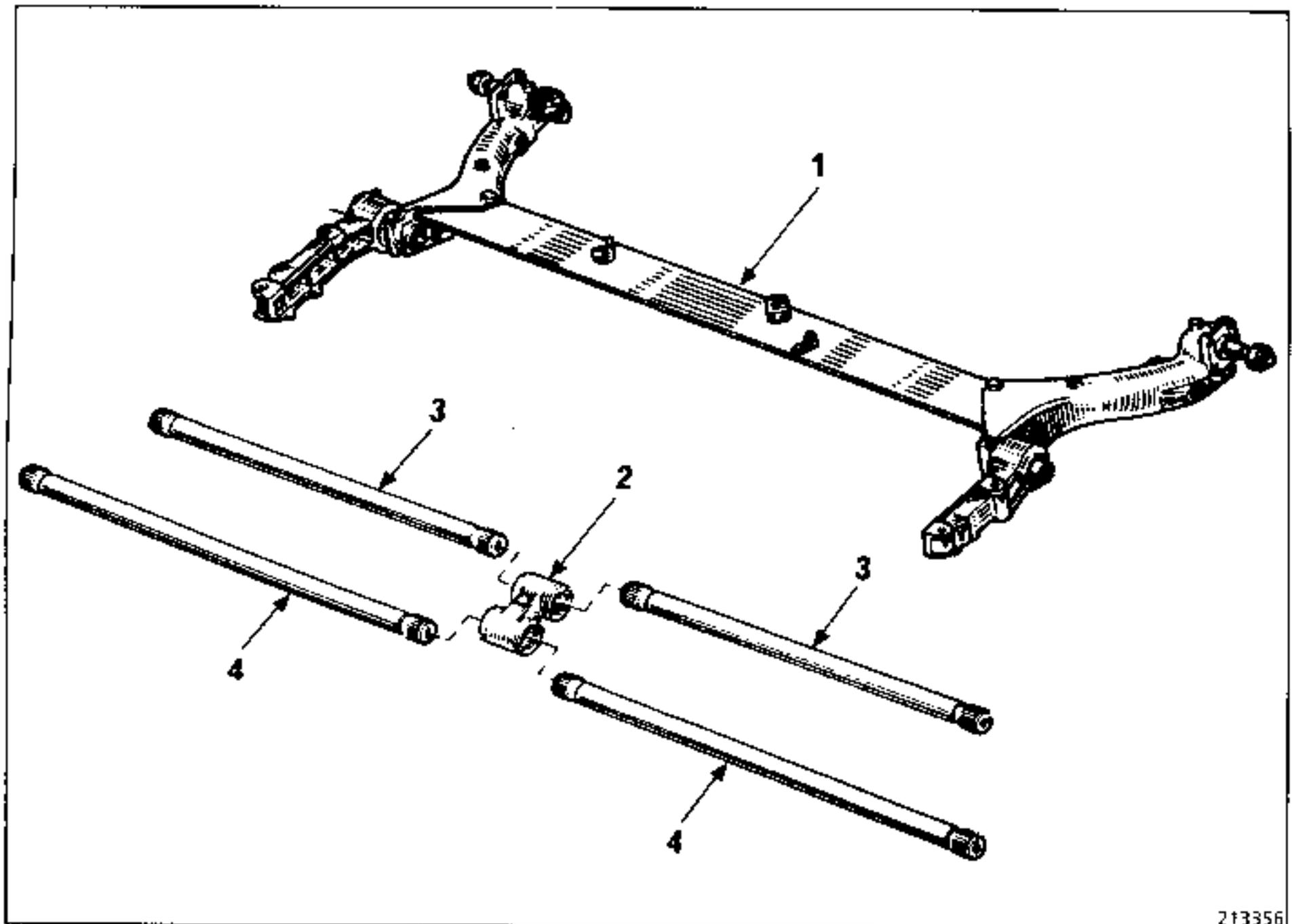
- the anti-roll bar from the left-hand side,
- the bearings on the cross member, but do not tighten them,
- the spring on the right-hand side (see corresponding section),
- the mountings holding the link arm on the arms, but do not tighten them.

With the vehicle on its wheels, torque tighten:

- the anti-roll bar bearings,
- the link arm mountings.

Bleed the brake circuit.

EXPLODED VIEW



213356

The rear axle consists of:

- two arms connected by an L-shaped section
This assembly (1) cannot be dismantled. If any components are deformed in any way, the entire assembly must be replaced,
- two anti-roll bars (3),
- two suspension bars (4),
- a link block (2) connecting the bars.

The assembly is connected to the body by means of two bearings fitted on silentblock bushes.

NOTE : It is prohibited to use a jack under the L-shaped section (1) to raise the vehicle.

REAR BEARING ELEMENTS

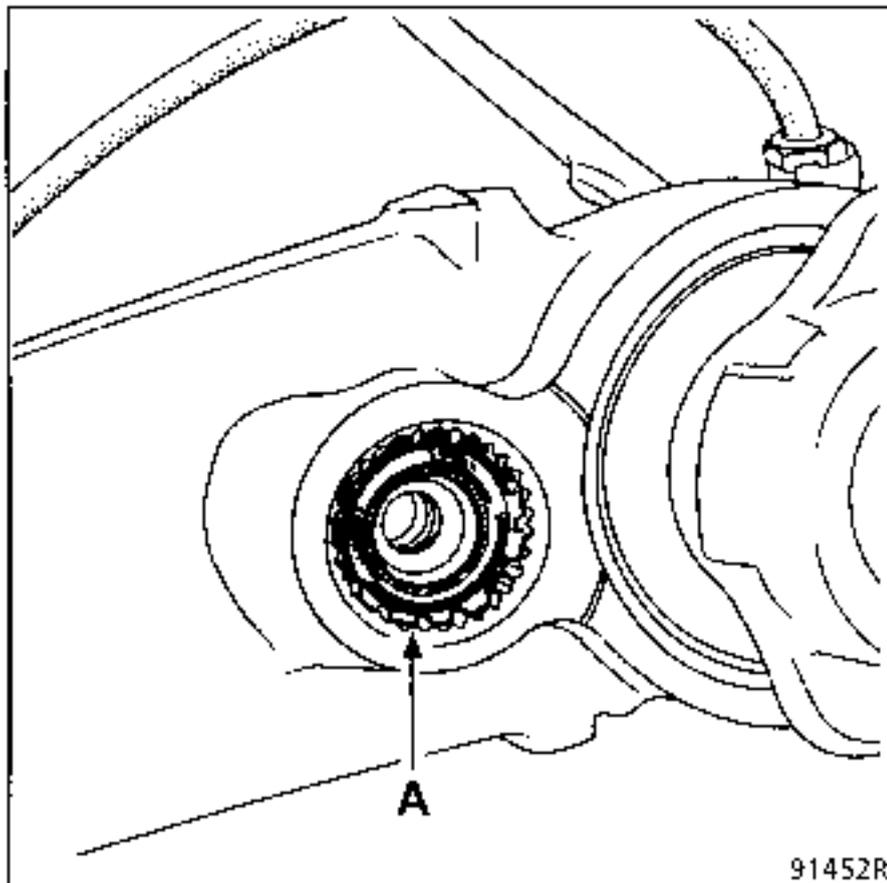
Emb. 880 Impact tool

REMOVING

Place the vehicle on a 2-post lift (see recommendations in the "General" section).

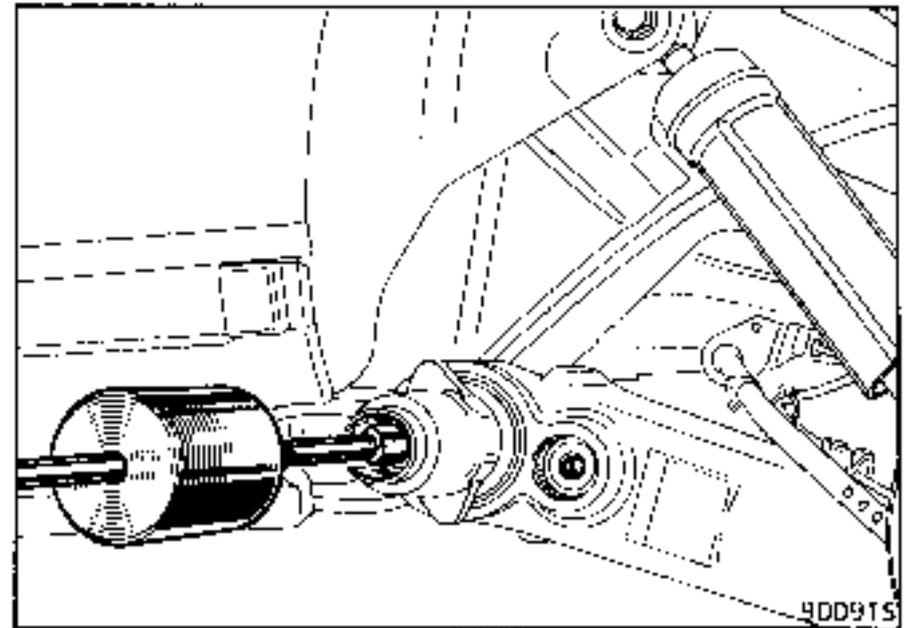
Special points

Depending on the version, the torsion bars are locked in their anchorages by means of clips (A) which have been destroyed in order to be removed.

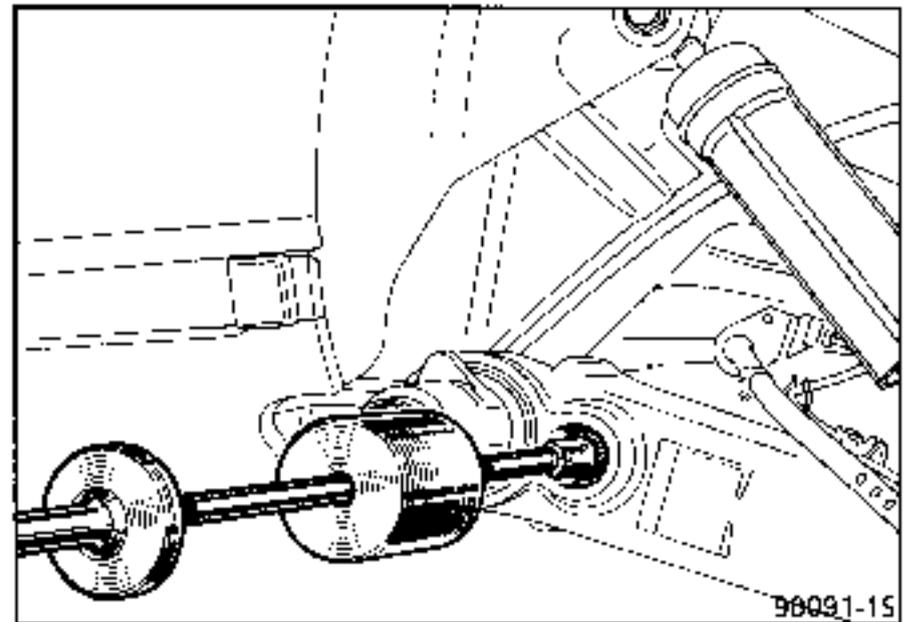


Remove:

- the wheels,
- the shock absorbers,
- the two suspension arms using tool Emb. 880,



- one anti-roll bar using tool Emb. 880,
- the link block,
- the second anti-roll bar using tool Emb. 880.

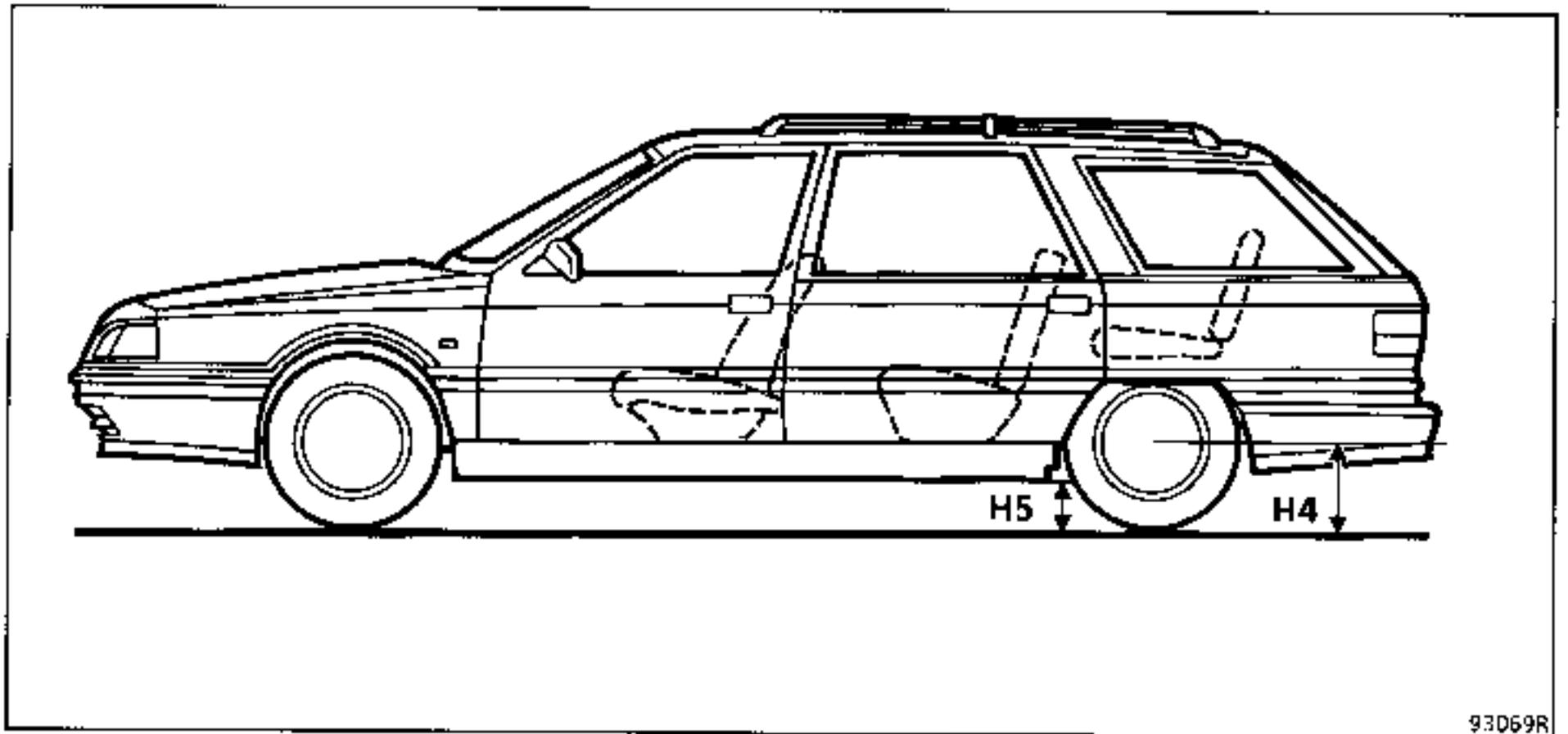
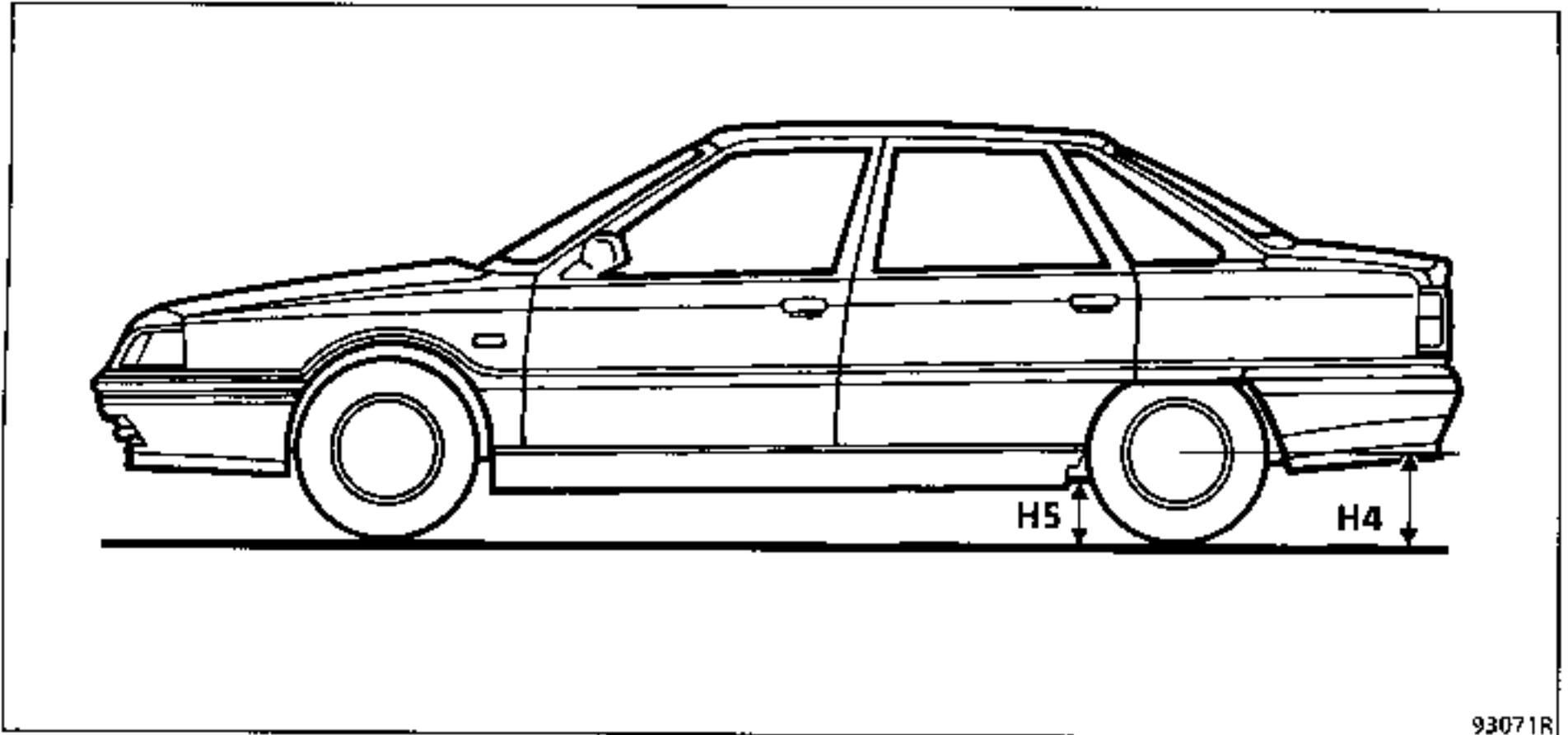


Then :

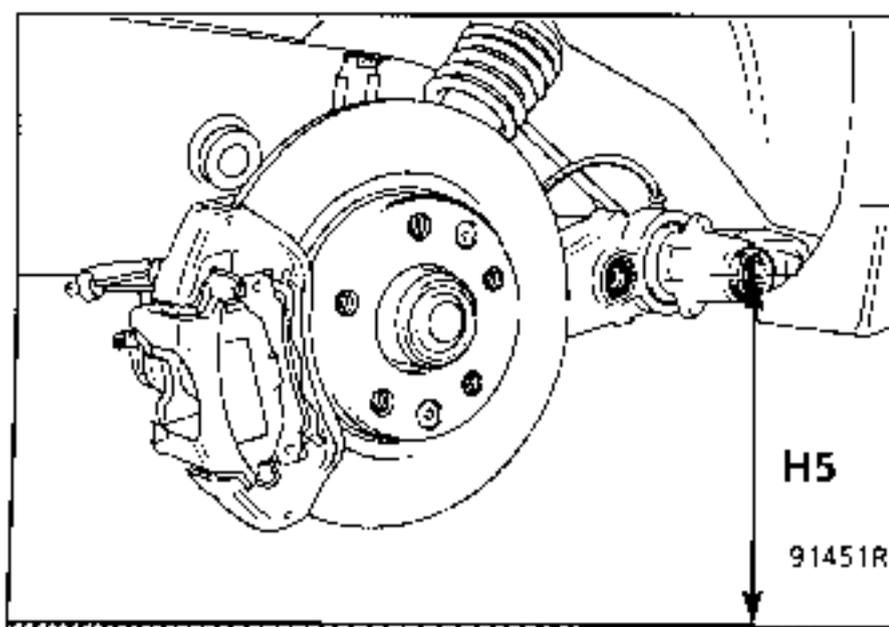
- either replace the rear axle (see section headed "Rear axle - removing - refitting" and the paragraph on "Changing"),
- or adjust the entire rear axle (see the section on "Changing").

CHECKING

Place the vehicle, unladen, with a full fuel tank, on a flat surface.



Measure dimensions H4 and H5 and calculate the difference.



GOOD ROADS

TYPE			Dimension H4-H5	X
B481 L481 B482 L482 B48D L48D B48E L48E	B48F L48F B48H L48H B48J L48J L48M L48N	B484 L484 B48I L48I	28	496
B483 L483 B488 L488 L489	B48K L48K L48W B48W B48P	B487 L487 B48C L48C L48P	30	485
B480 L486 B48O L48O	L480 B48V B48A	B486 L48V L48A	23	485
L485	L48L		52	445
B48Y L48R	L48Y B48Q	B48R L48Q	38	480
K481 S482 K48E S48H K488 K48K K480 K48O K48R	S481 K486 K48F K48J K48V K48M K48A K487	K482 S486 K48H K483 S48V K48N K481 K489	10	475

Tolerances : ± 7.5 mm

UNMADE ROADS

TYPE	Dimension H4-H5	X
L481 L48J	0 - 7.5 mm	508
K48J	10 \pm 7.5 mm	475

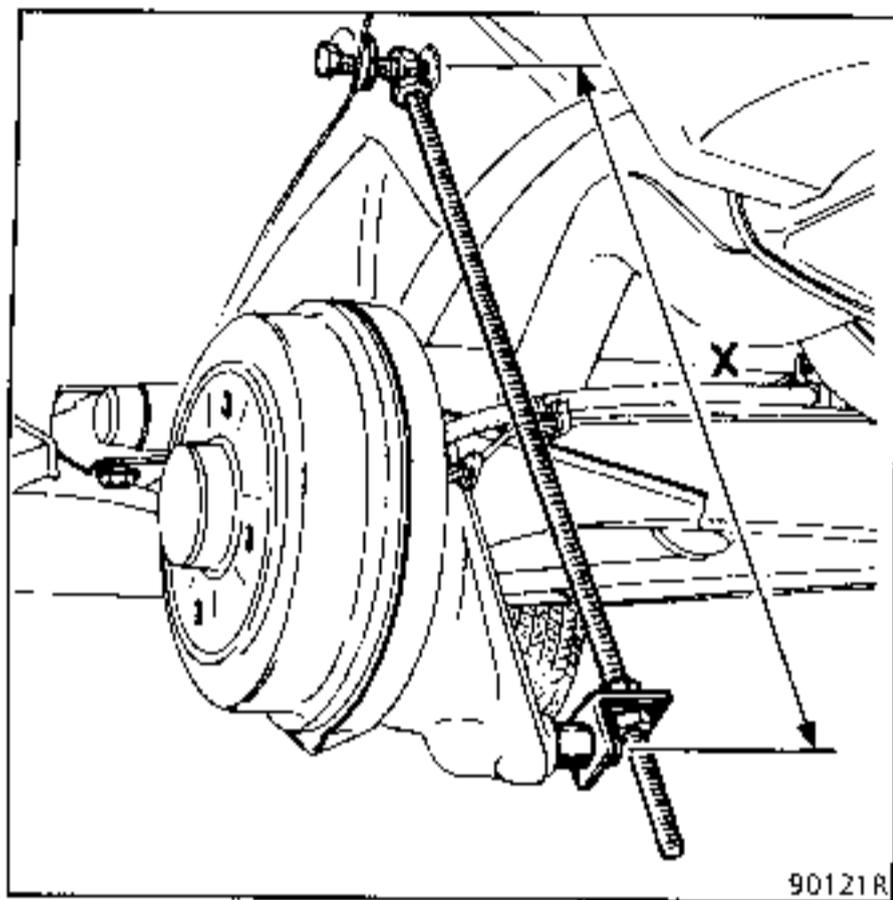
There are three possible cases where adjustment is required:

1. Heights correct on one side but difference between RH/LH too great.
2. Heights incorrect and difference between RH and LH too great.
3. Heights incorrect but difference between RH and LH correct.

ADJUSTMENT

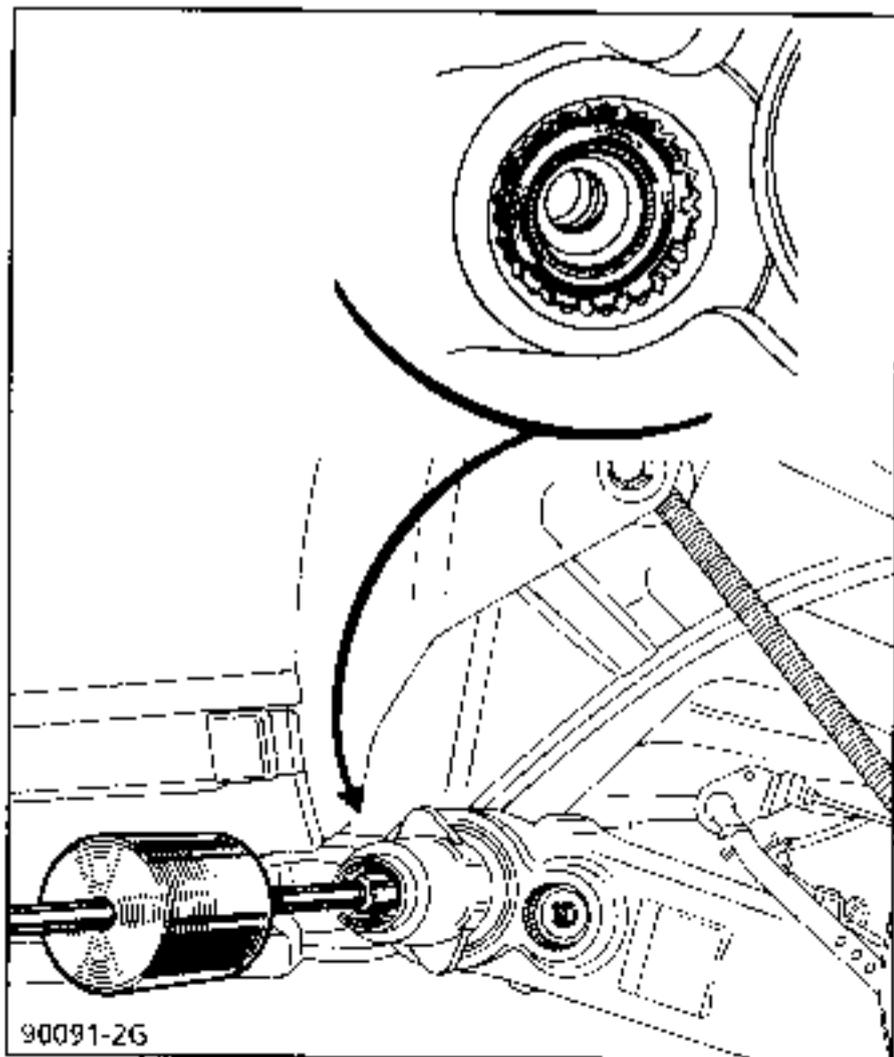
The underbody height is adjusted by acting SOLELY on the rotation of the suspension bars.

Remove the wheels and shock absorbers, position the tools in place of the shock absorbers with dimension X at value previously set.



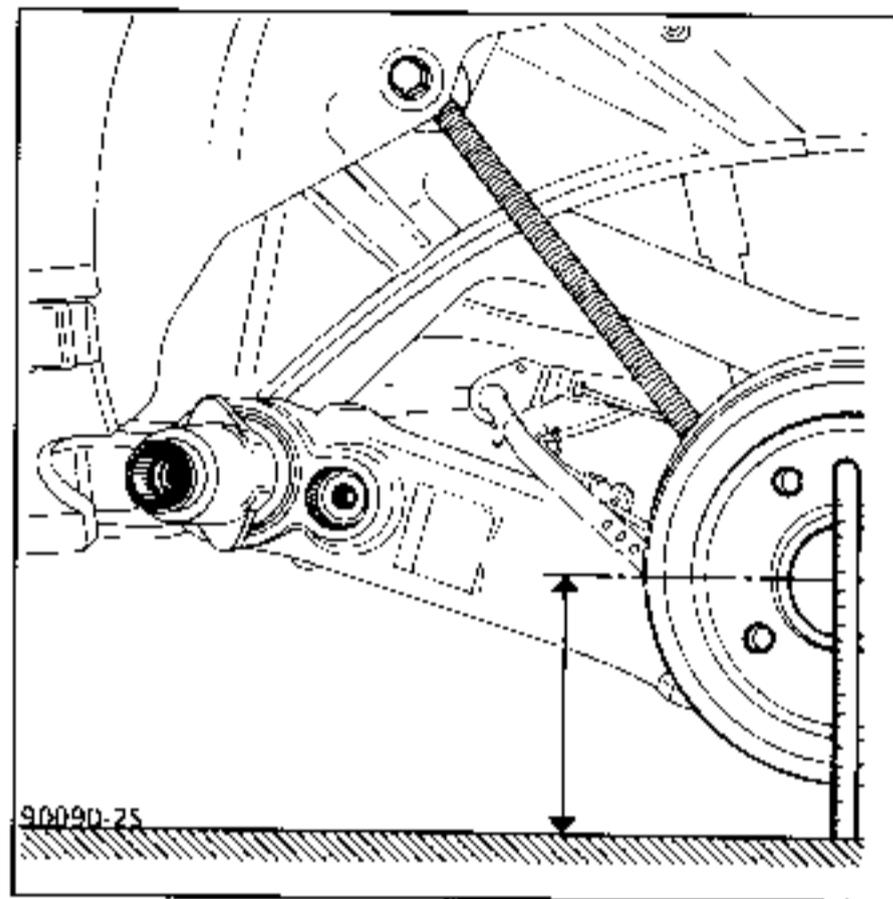
Remove:

- the two clips from the suspension bar anchorages,



- the two suspension bars using tool Emb. 880.

Measure the distance between the wheel centre line and the ground (on both sides).



Then, by moving both tools, decrease or increase the distance between the centre line and the ground at the same time on both sides by the difference in height measured when the vehicle was checked.

Fit in place:

- the suspension bars in their new position bearing in mind that: 1 notch = 3 mm variation in underbody height,
- the shock absorbers,
- the wheels.

With the vehicle on its wheels, check and if necessary adjust:

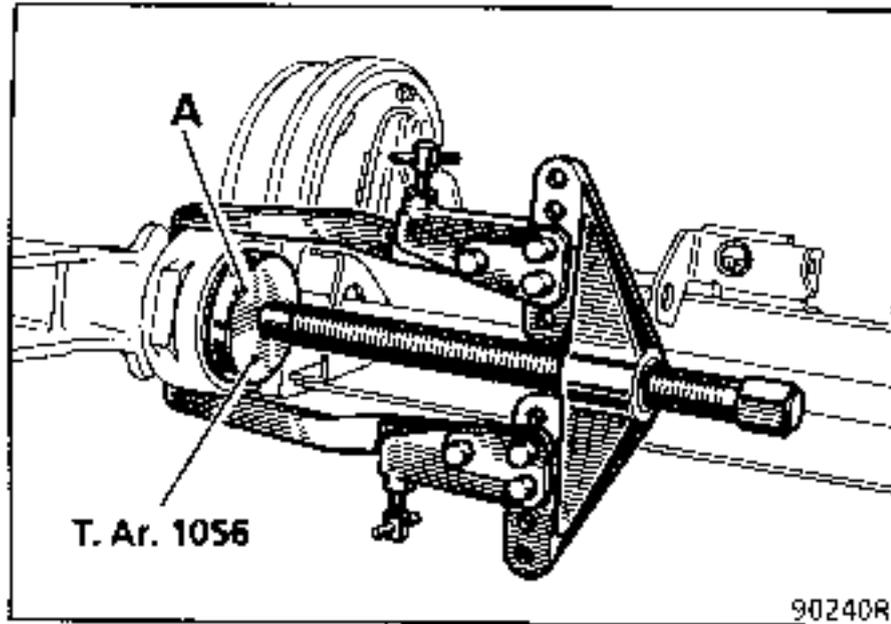
- the brake compensator (depending on version),
- the headlight beam settings.

This operation is performed with the rear axle and suspension bars removed.

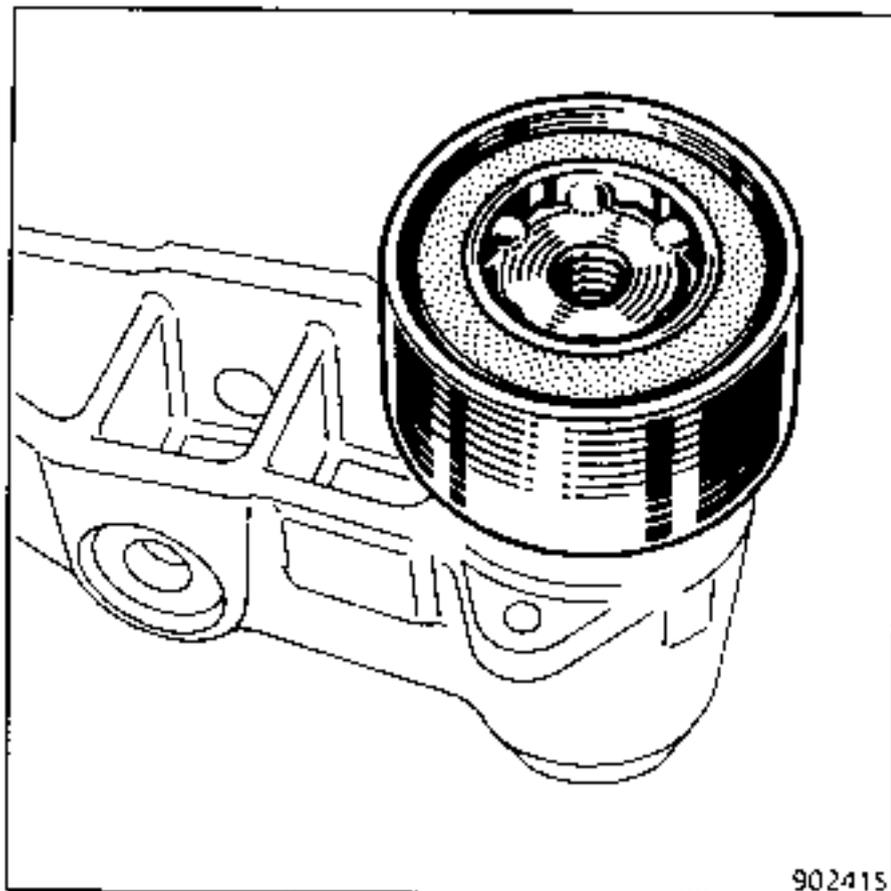
ESSENTIAL SPECIAL TOOLING	
T.Ar. 1056	Tooling for replacing rear axle rubber bush

DISMANTLING

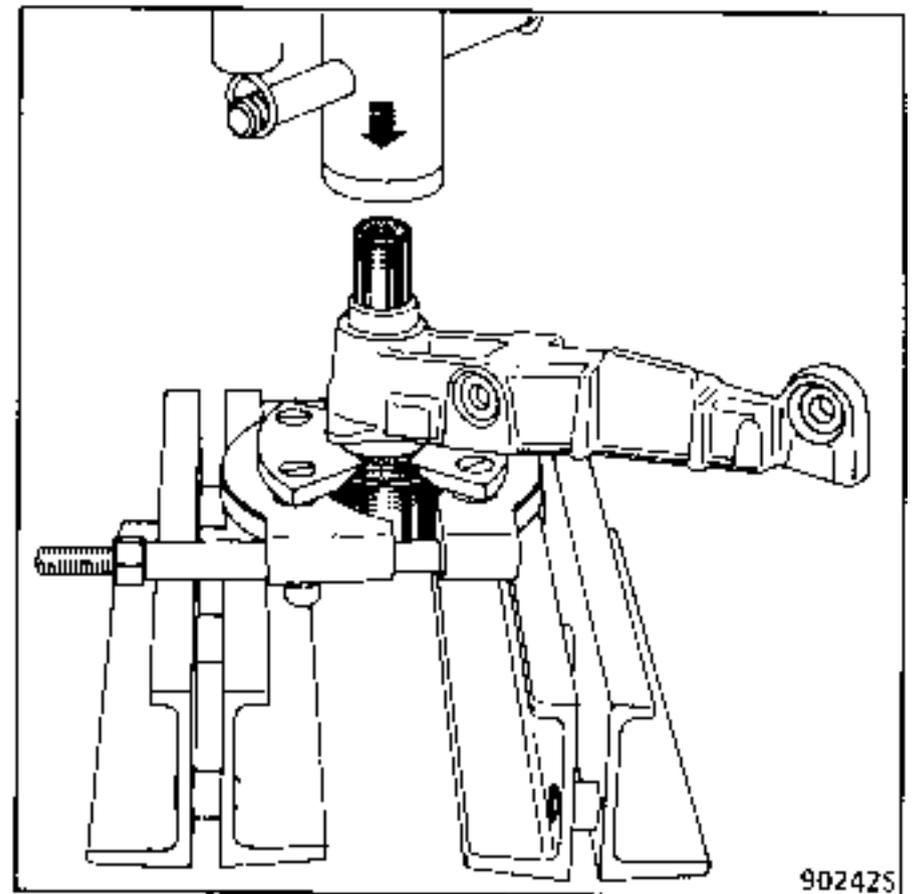
Take out the bearing - bush assembly from the rear arm using component (A) from tool T.Ar. 1056.



Weld on a spacer (e.g. a nut 26 mm across flats) in the bush central tube.

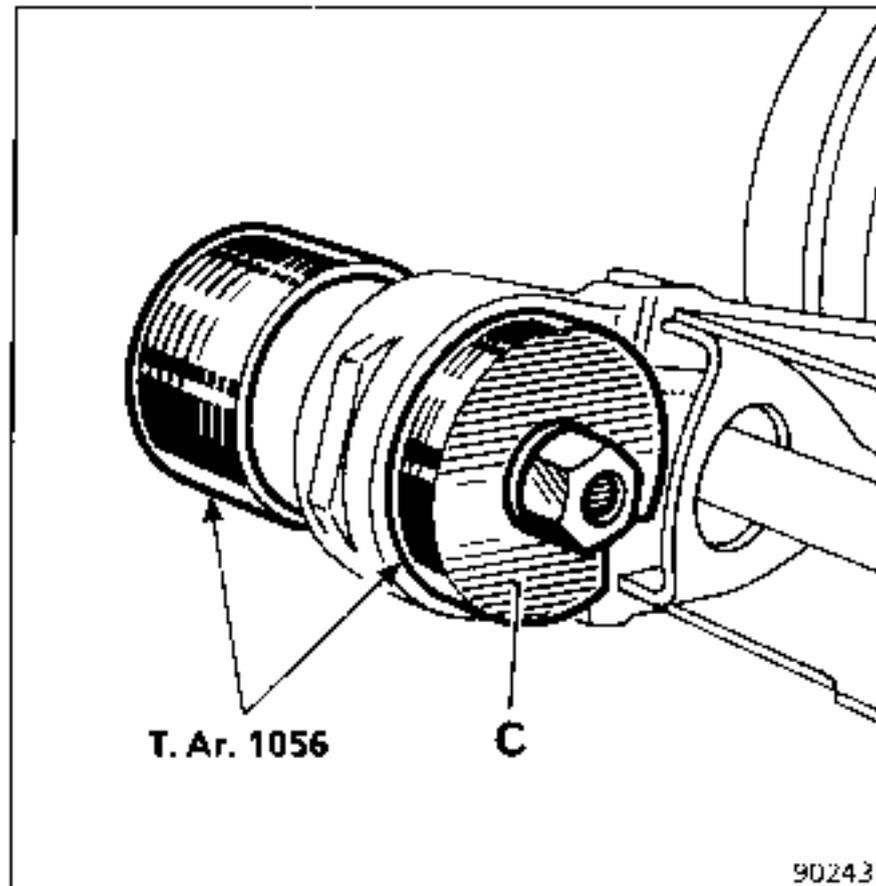


Take out the bush on the press, taking the weight on a FACOM U53G extractor.

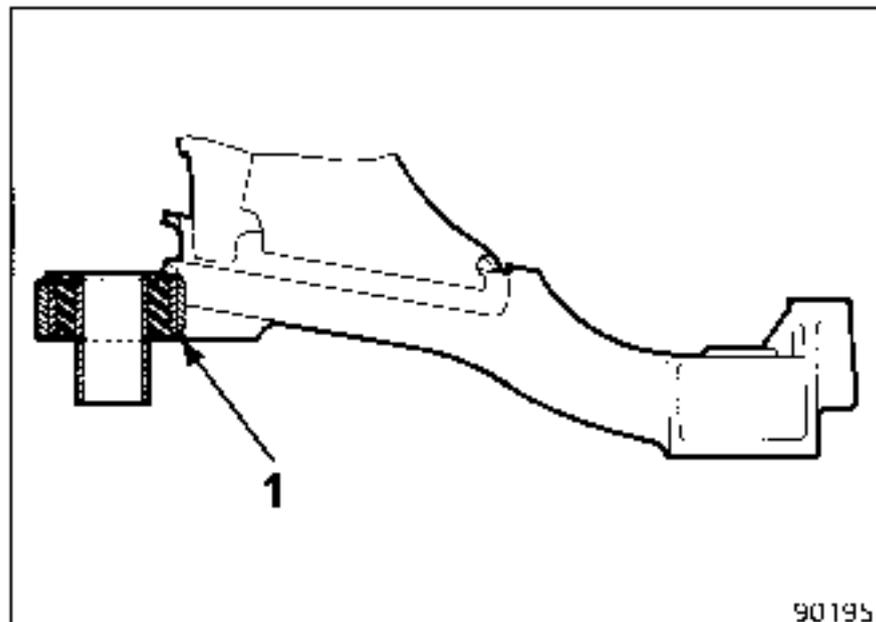


REASSEMBLY

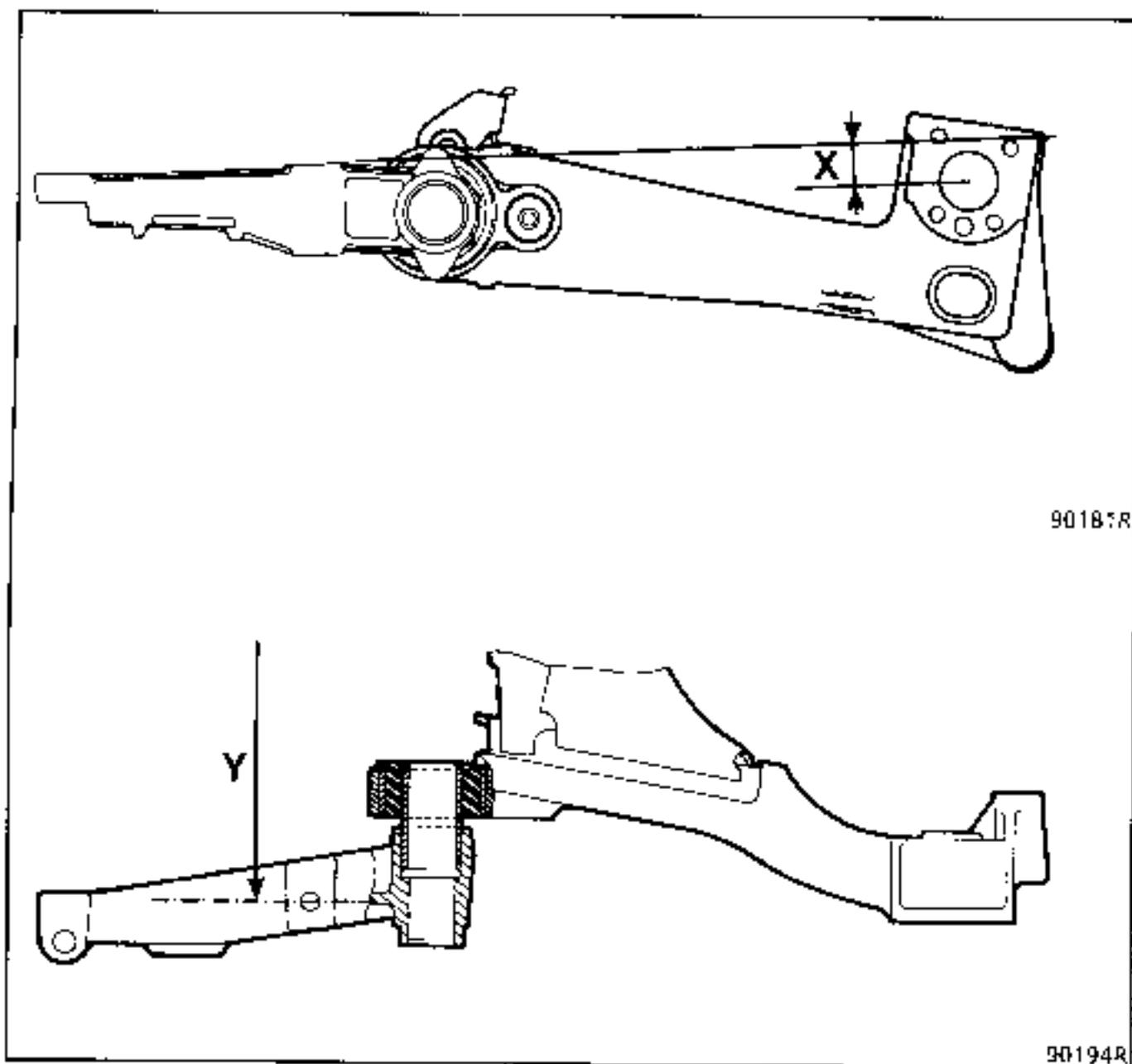
Fit the bush in place in the rear arm using components (B), (C) and the threaded rod from tool T.Ar. 1056, positioning component (C) as shown in the drawing.



NOTE : Fit on the bush until edge (1) is flush with the arm.

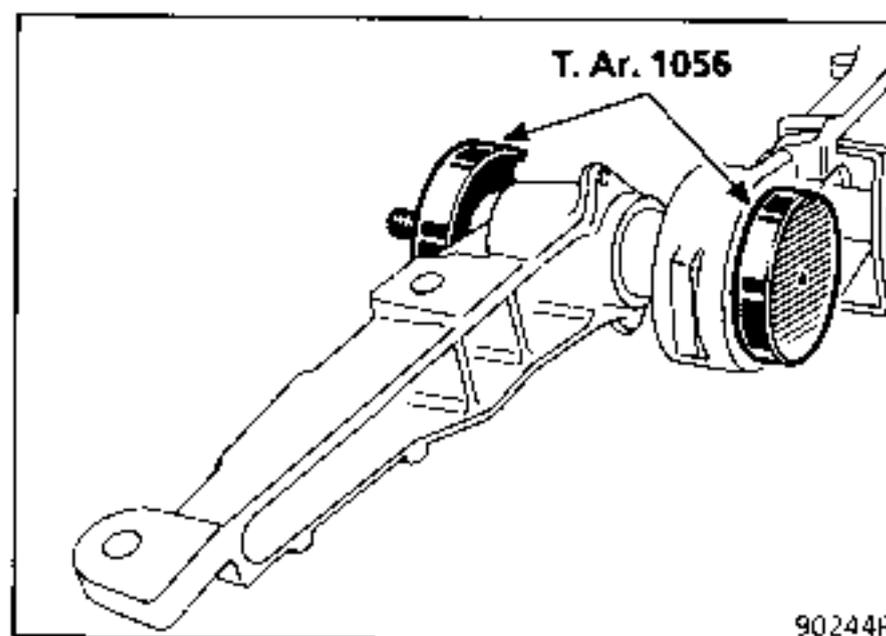


Fit in place the bearing on the bush ensuring dimension $X = 24 \pm 1$ mm between the bearing face and stub axle shaft.



In this position, fit the bearing using components (A) and (C) from tool T.Ar. 1056 until dimension $Y = 1285 \pm 1$ mm is obtained between the bearing centre lines

Fit the rear axle in place on the vehicle and refit the suspension bars (see relevant section).



This operation is performed in situ.

TIGHTENING TORQUES (in daN.m)



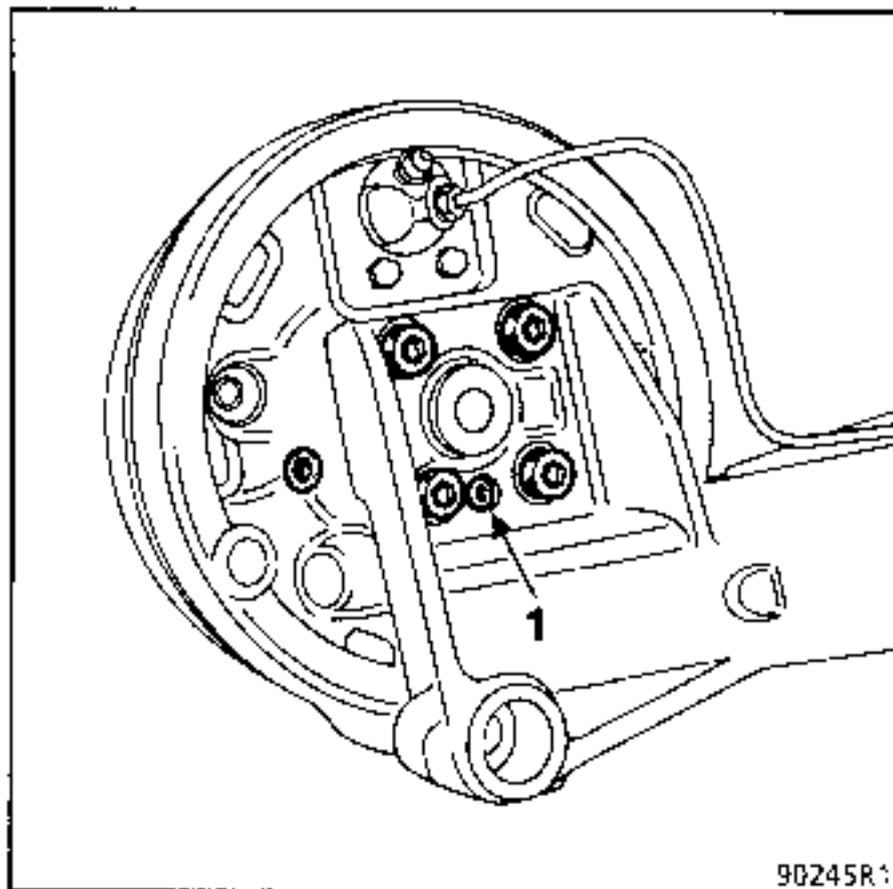
Bearing securing nut	8.5
Hub nut	16
Stub axle securing bolts	7.5
Wheel bolts	9
5 bolts	10

REMOVING

Place the rear of the vehicle on axle stands.

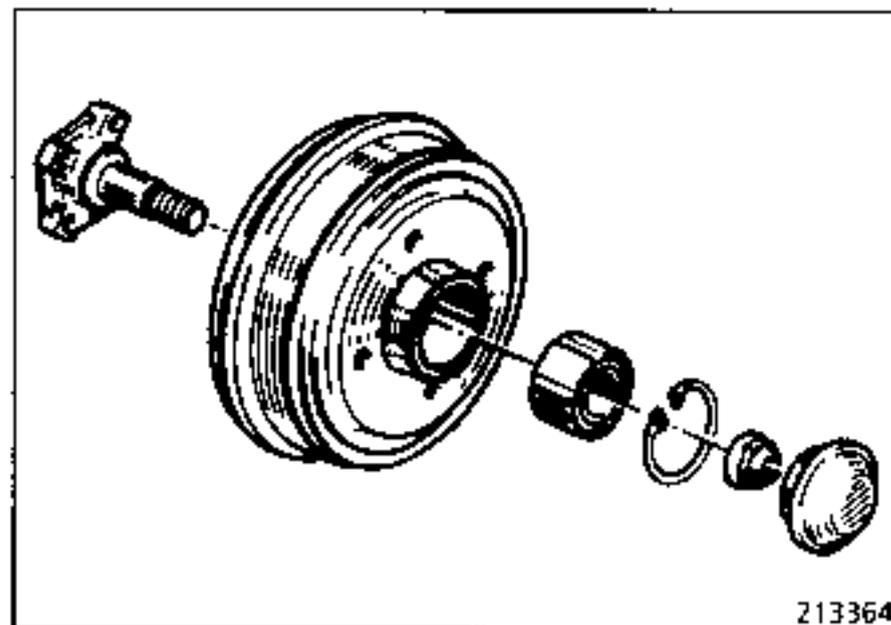
Remove:

- the drum (see the corresponding section),
- the four bolts holding the stub axle on the arm,
- the bolt (1) holding the brake back plate on the stub axle,



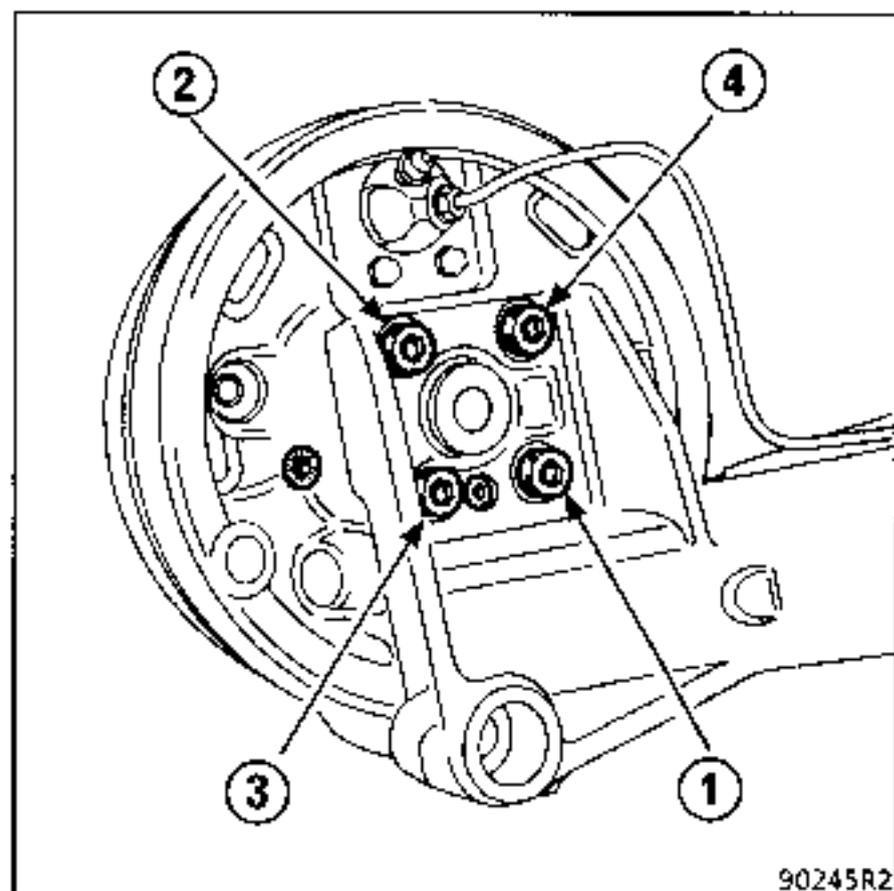
- the stub axle.

REFITTING



Fit in place:

- the stub axle and tighten bolt (1),
- four new arm mounting bolts and torque tighten them in the order (1), (2), (3) and (4) according to the diagram.



NOTE: If the stub axle mounting bolts are re-used, they must be smeared first with **LOCTITE FRENBLOC** or a new spring lock (grower) washer must be fitted.

Refit the drum (see the relevant section).

ESSENTIAL SPECIAL TOOLING

Rou. 604-01	Hub locking tool
T.Av. 1050-02	Hub extractor

TIGHTENING TORQUE (in daN.m)

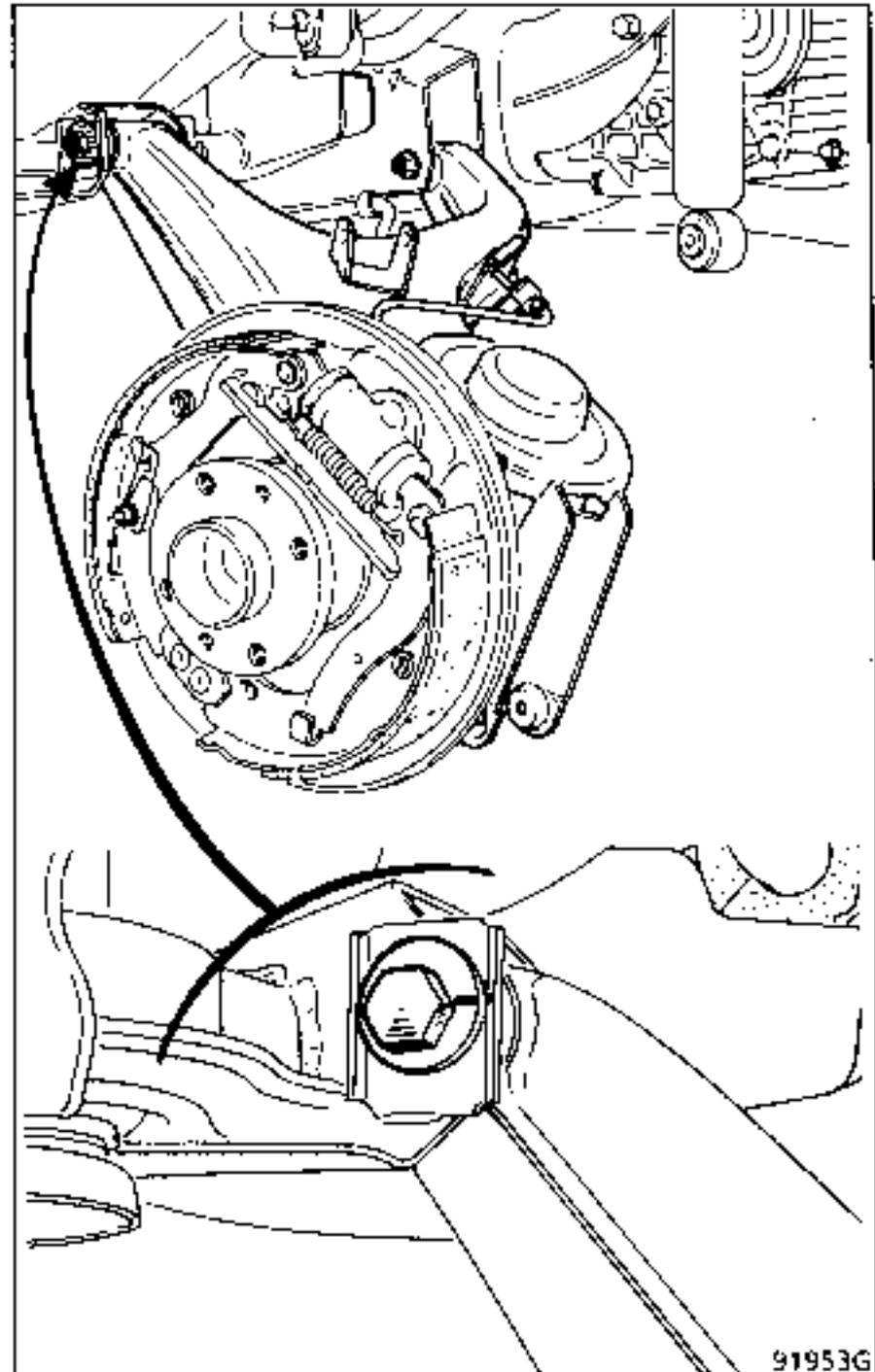


Shock absorber bottom mounting bolt	5.5
Anti-roll bar mounting bolt	5.5
Bolts securing drive shaft to sun wheel	5
Drive shaft nut	21
Swing arm mounting bolt	7
Wheel bolts	4 bolts 9
	5 bolts 10

REMOVING

Remove:

- the brake drum (see relevant section);
- the handbrake cable and free it from its guides on the arm;
- the drive shaft (see relevant section);
- the spring (see relevant section);
- the two mounting bolts from the arm after marking the position of the parallelism adjusting cam bolt;
- the swing arm.



Replacing the bushes

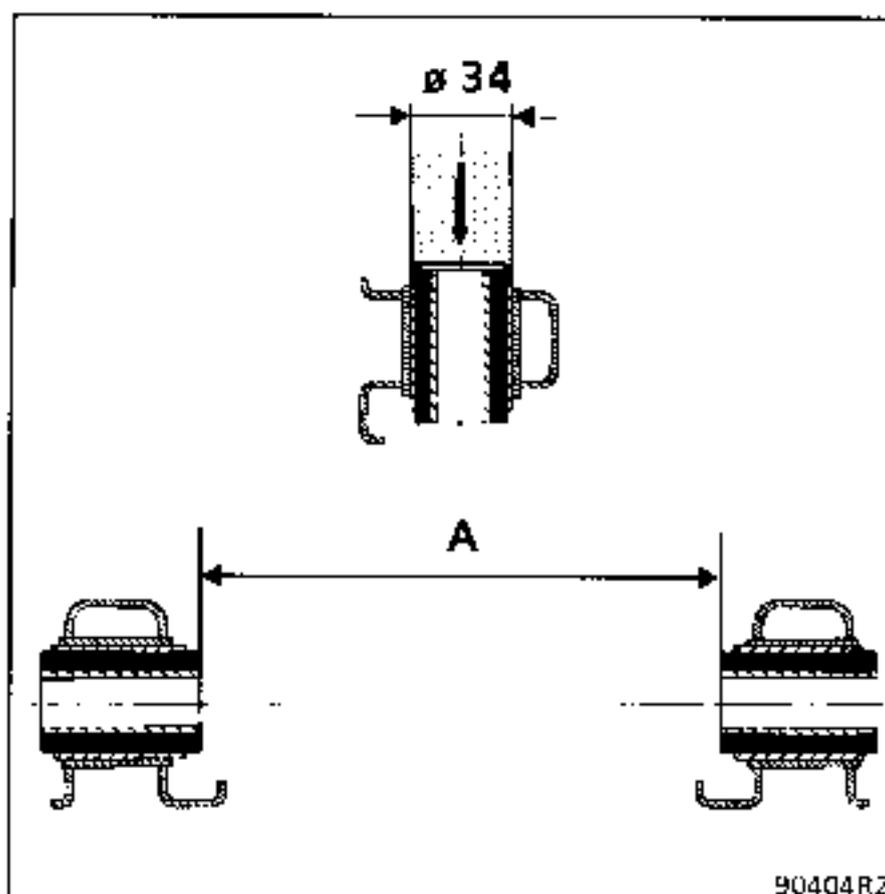
In order to keep the bushes centred in relation to the swing arm centre line, they must be replaced one after the other.

On the press knock out one of the worn bushes using a piece of tubing with an outer diameter of 34 mm.

Refit a new bush until dimension A = 262 ± 0.5 mm.

On the press, knock out the second bush and proceed in the manner as above in order to retain dimension $A = 262 \pm 0.5$ mm.

NOTE : The inner and outer bushes of the swing arms are not identical (please see the PR for the vehicle in question).



REFITTING

Refit the swing arm to the vehicle, positioning the cam bolt so that it is aligned with the markings made on removal.

Place a jack under the arm and fit in place:

- the spring (see relevant section),
- the drive shaft (see relevant section),
- the handbrake cable,
- the brake drum.

With the vehicle on its wheels, torque tighten the following:

- the mounting securing the arm to the cross member,
- the anti-roll bar link arm mounting,
- the shock absorber base.

Bleed the brake system; check and if necessary adjust the parallelism.

ESSENTIAL SPECIAL TOOLING

Rou. 604-01 Hub locking tool

TIGHTENING TORQUES (in daN.m)

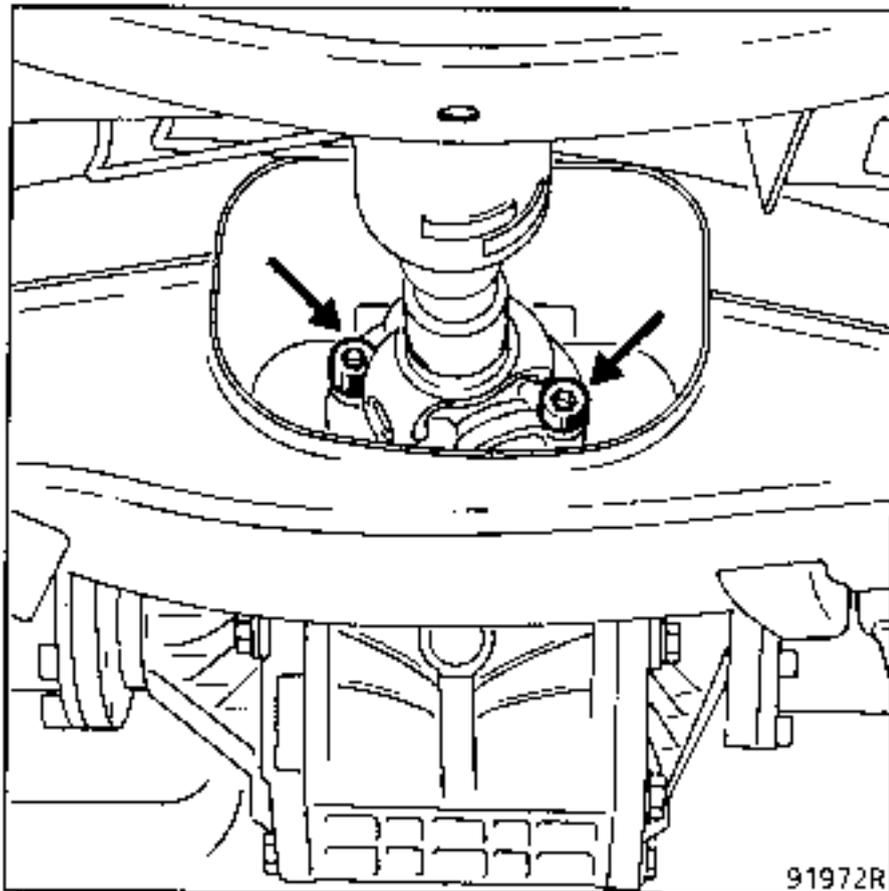


Shock absorber bottom bolts	5.5
Anti-roll bar securing bolts	5.5
Bolts securing drive shaft to sun wheel	6
Bolts securing arm	7
Anti-roll bar bearing bolt	3
Final drive flange bolt	5
Final drive securing bolt on cross member	8
Final drive rear mounting	8
Cross member mounting on bush	12
Cross member mounting on support panel	8
Wheel bolts	9
4 bolts	9
5 bolts	10

REMOVING

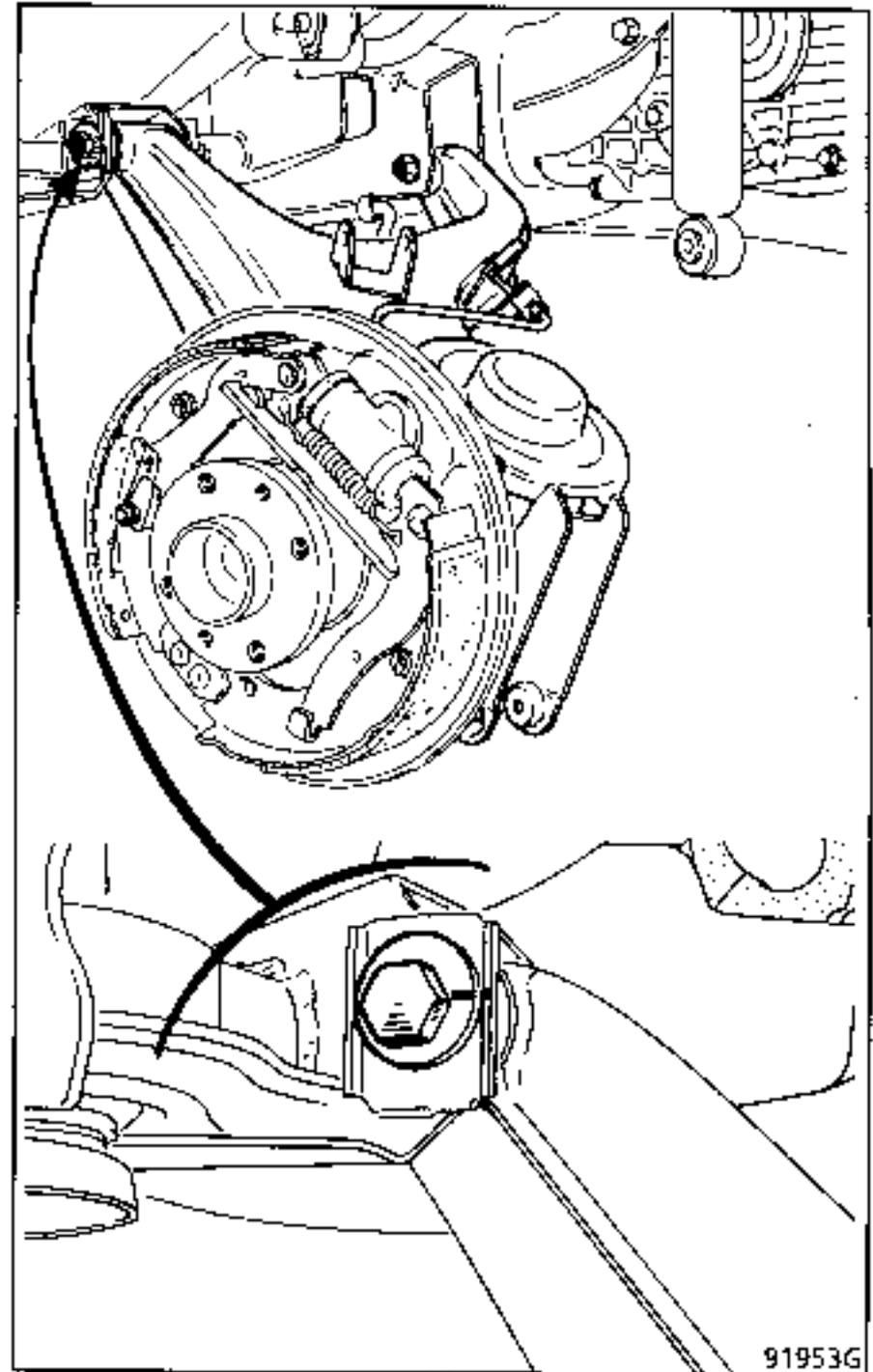
With the vehicle on its wheels remove :

- the mounting bolts from the final drive flange,



91972R

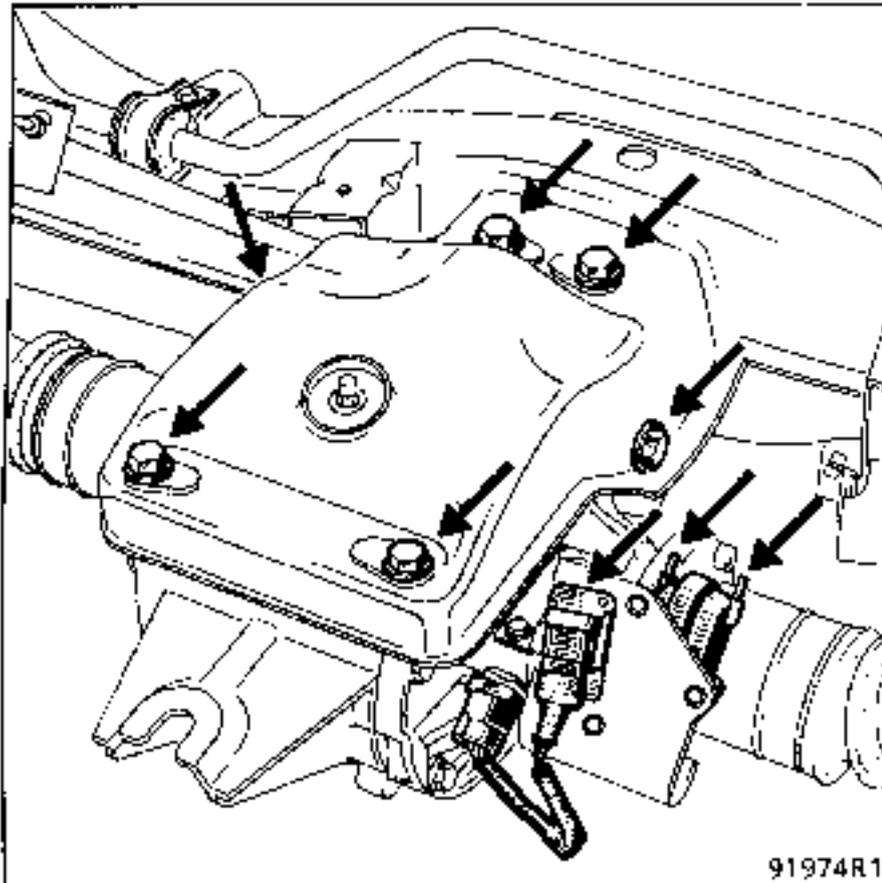
- the brake drums (see relevant section),
- the handbrake cables, disengaging them from the guides on the arms,
- the springs (see relevant section),



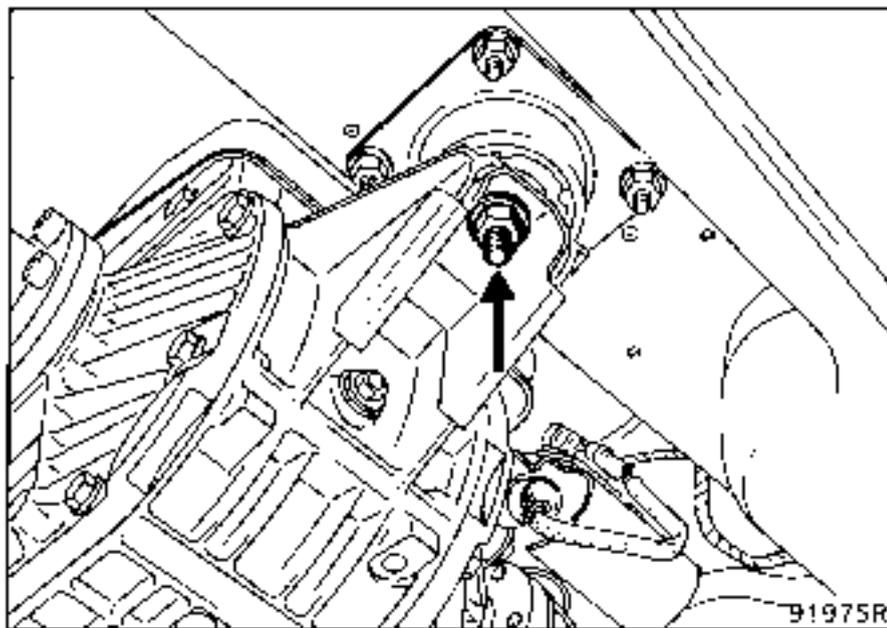
91953G

- the two arm mounting bolts, after first marking the position of the cam bolt for adjusting the parallelism,
- the rear swing arms.

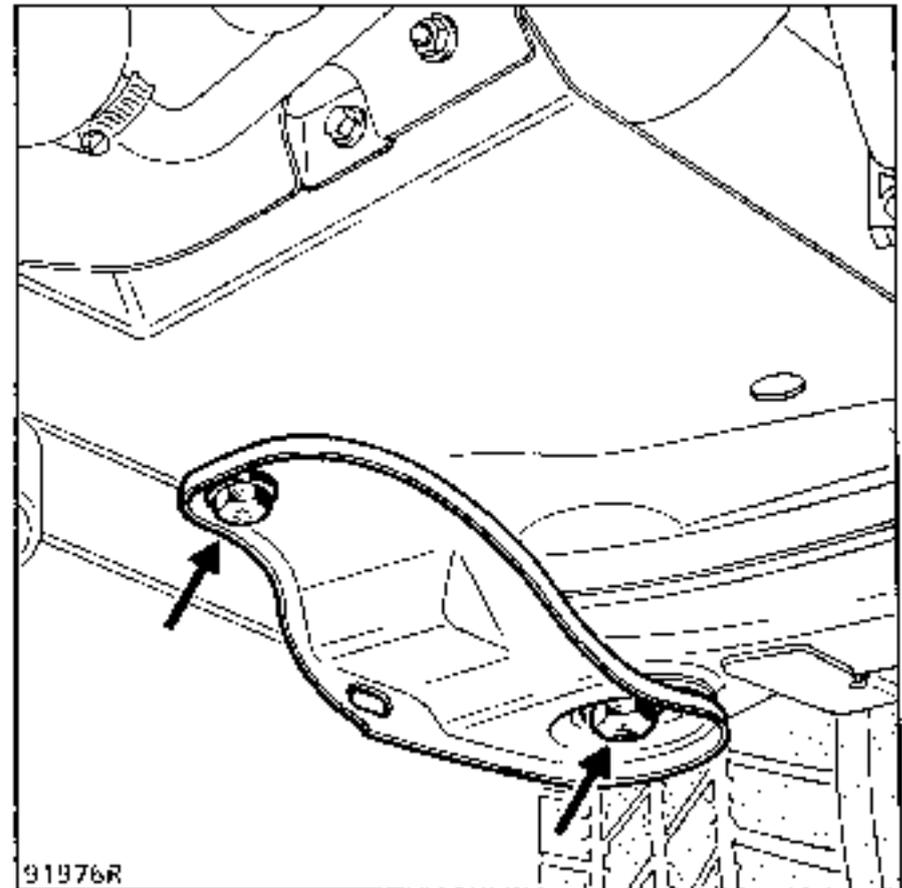
- Place a jack under the final drive and remove:
- the pneumatic controls for the dog clutch and the switch connector,



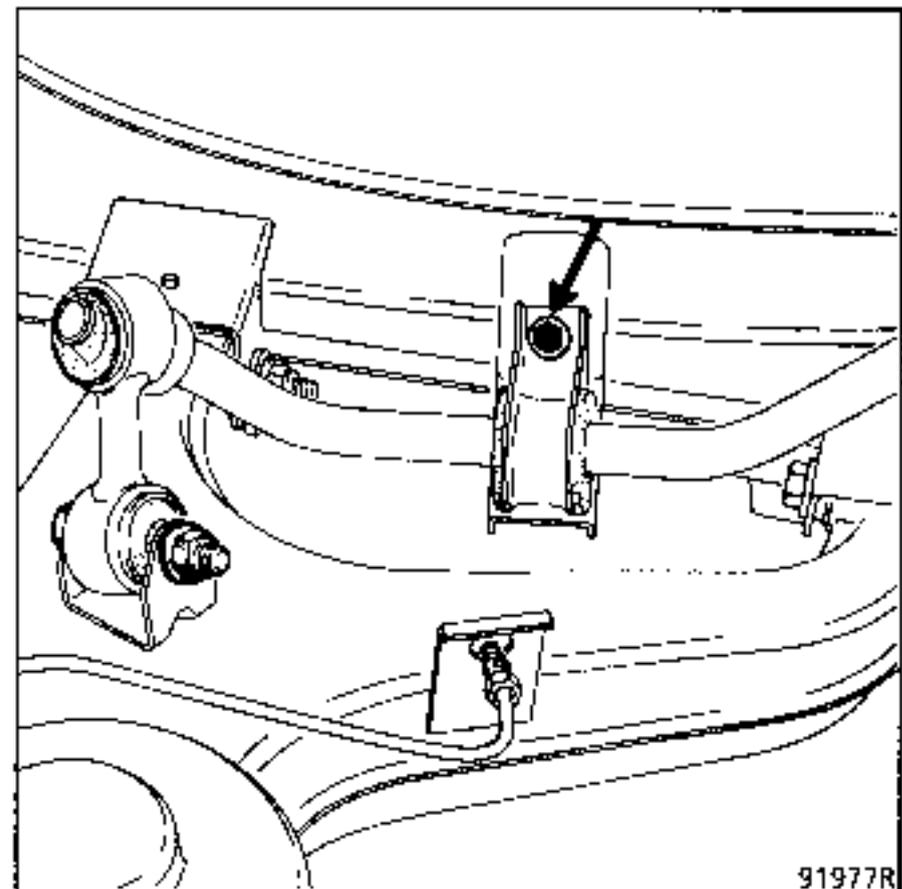
- the final drive rear mounting from the body,



- the six bolts holding the final drive on the cross member,
- the final drive,
- the front mountings for the final drive cross member,
- the cross member.



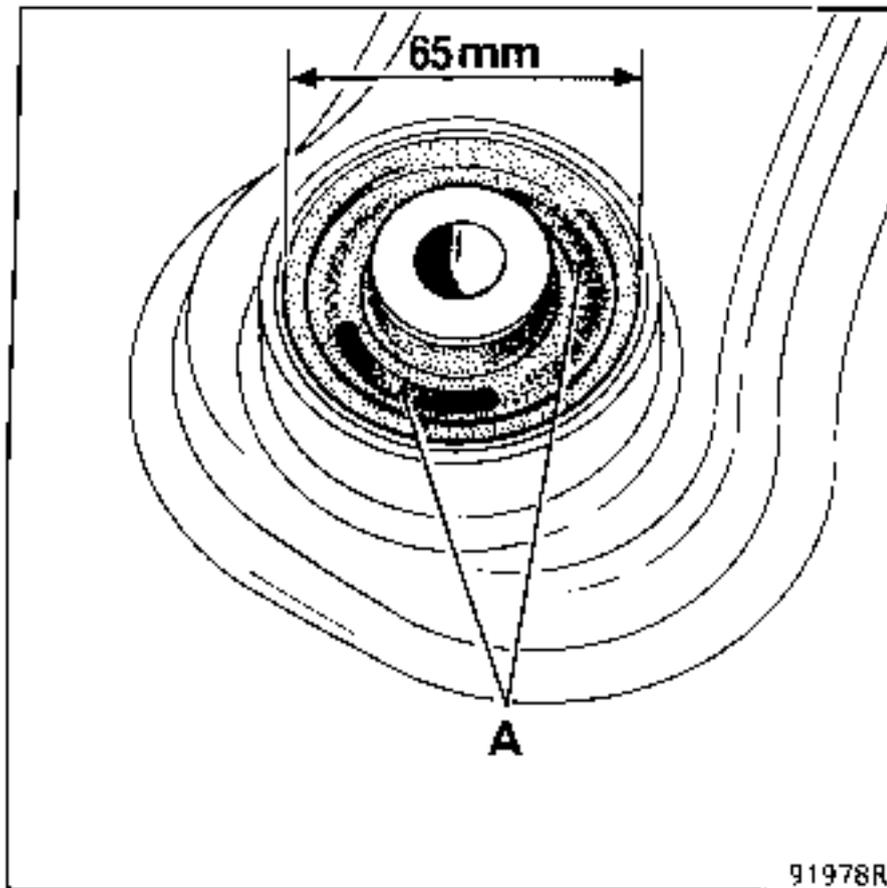
NOTE: If the final drive mounting cross member is being replaced, remove the anti-roll bearings.



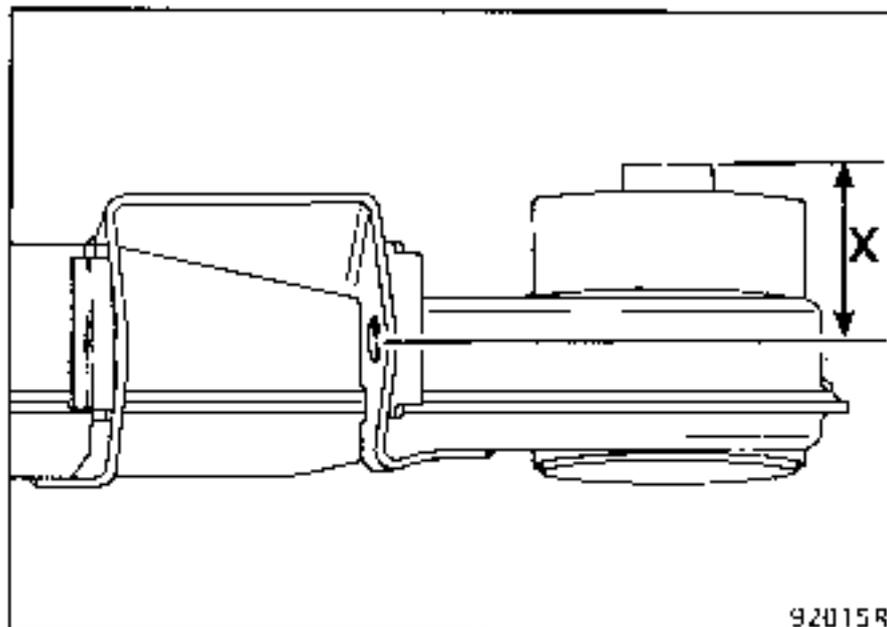
CHANGING THE RUBBER BUSHES

On the press:

- extract the worn bush using a piece of tubing with an outside diameter of 65 mm,



- using the same piece of tubing, fit the new bush, directing gaps A as shown in the drawing above, until dimension $X = 43.5 \pm 0.5$ mm is obtained.

**REFITTING**

If the bushes are being replaced, fit:

- the anti-roll bar on the cross member without tightening its bearings.

Fit in place and torque tighten:

- the cross member on the vehicle,
- the final drive and its mounting on the body-work.

Reconnect:

- the dog clutch control and the connector.

Fit in place :

- the rear swing arms on the vehicle, positioning the cam bolt according to the marks made on removal.

Place a jack under the half shafts and refit:

- the springs (see the relevant section),
- the final drive flange,
- the handbrake cables,
- the drums.

With the vehicle on its wheels, torque tighten:

- the anti-roll bar bearings,
- the final drive flange,
- the rear swing arm mounting bolts.

Bleed the brake circuit. Check and if necessary adjust the braking compensator.

WHEELS

There are two types of identity marks for the road wheels :

- Stamped mark for steel wheels,
- Casting mark for light alloy wheels.

The marks enable the main dimensions to be recognised and may be of the complete type :

Example : **5 1/2 J14.4CH.36**

or of the simplified type :

Example : **5 1/2 J14**

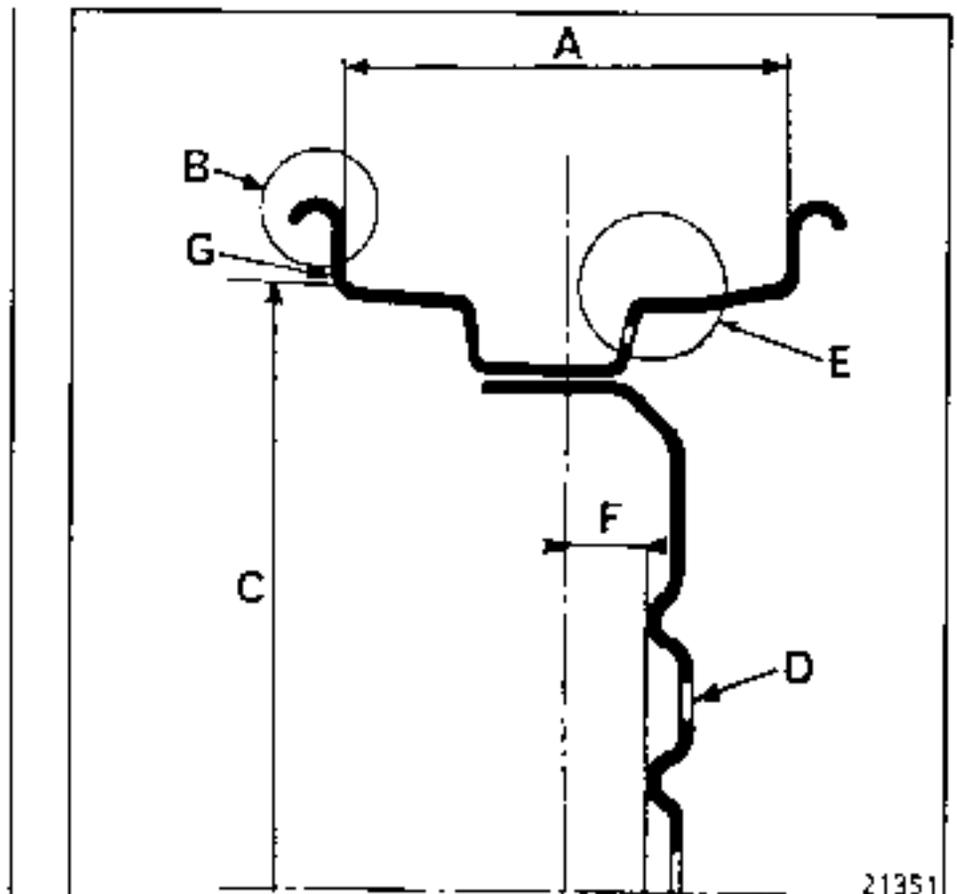
	A	B	C	D	E	F
ROAD WHEEL PATTERN	WIDTH (in inches)	RIM PROFILE	NOMINAL DIA. (in inches)	Number of holes	Bead locating flange	Off-set in mm
5 1/2 J14 4 CH.36	5 1/2	J	14	4	CH	36

The wheel bolts are on a p.c.d. of :

- 4 wheel bolts: 100 mm
- 5 wheel bolts: 108 mm

Maximum run-out : 1.2 mm measured on rim profile (at G).

Maximum out-of-round : 0.8 mm measured on bead locating flange.



The tyres are of the **Tubeless** type.

Tyre inflation pressures must be checked when cold. During normal running, pressures may increase by **0.2** to **0.3** bars.

If a check has to be made when the tyres are hot, take into account this increase in pressure and **NEVER** deflate the tyre.

For **4 x 4** vehicles, it is essential that the tyres are identical (circumference the same length).

Type	Rim	Rim run-out (mm)	Wheel bolts tightening torque in (daN.m)	Tyres	Inflation pressure (bars)				
					FRONT	REAR			
B481 B48D L481 L48D	5 x 13 5 1/2 x 13	1,2	9	155R13T 175/70R13T	2.0	2.2			
L481 D.A.I.	5 x 13			165/80R13T					
B482 B484 L482 L484	5 1/2 x 13 5 1/2 x 14			175/70R13H 175/70R13T 175/65R14H 175/65R14T					
B483 B48C L489 L483 L48C	5 1/2 x 14			185/65R14H					
B48K L48K							2.3	2.3	
L485 L48L	6 1/2 x 15			10			195/55R15V 195/55R15Z	2.5	2.3
B486 B48V L486 L48V	5 1/2 x 13 5 1/2 x 14			9			175/70R13T 175/65R14T	2.3	2.3
L48A B48O B488 B48A L48O L488 B48I B48P B487 L48I L48P L487 B48W L48W	5 1/2 x 13 5 1/2 x 14						185/70R13T 185/65R14T		
B48E L48N L48E	5 1/2 x 13 5 1/2 x 14						175/70R13H 175/65R14H		
B48F L48F	5 1/2 x 13 5 1/2 x 14						155R13T 175/70R13T 175/65R14T		
B48J L48J	5 x 13 5 1/2 x 13 5 1/2 x 14		165/80R13T 175/70R13T 175/65R14T						
L48M	5 x 13		155R13T 175/70R13T 175/65R14T						
B48H B480 L48H L480	5 1/2 x 13 5 1/2 x 14		9		175/70R13T 175/65R14T	2.3	2.3		
B48R 4 x 4 L48R 4 x 4 B48 Y 4 x 4 L48 Y 4 x 4	6 1/2 x 15					175/70R13T	2.0		

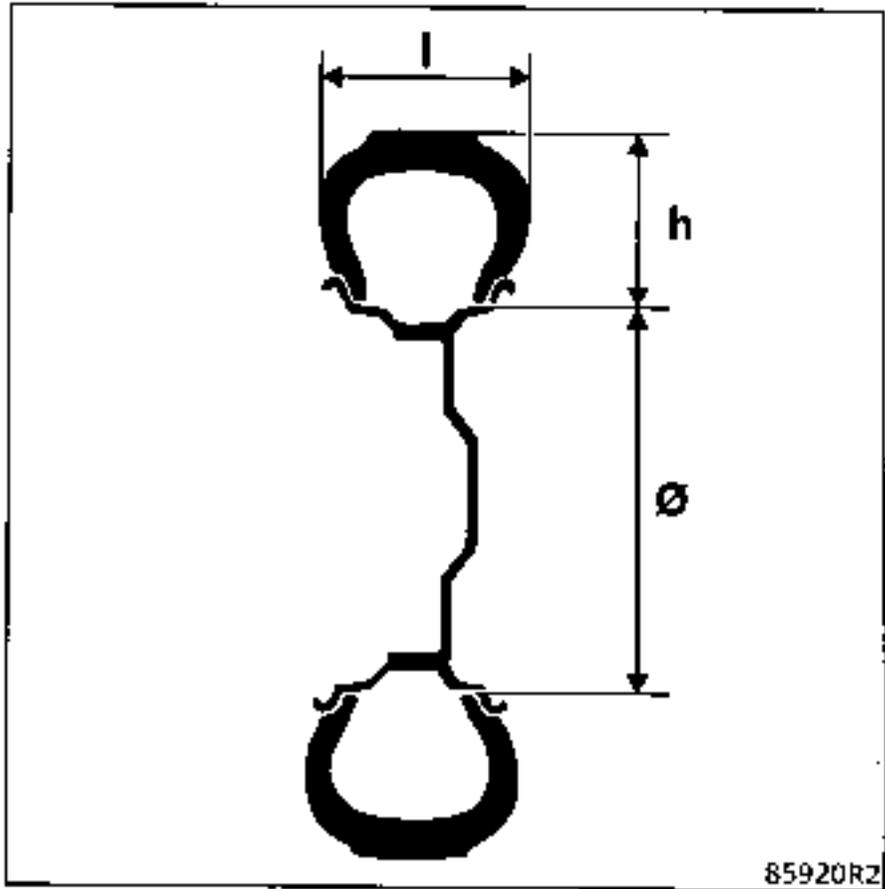
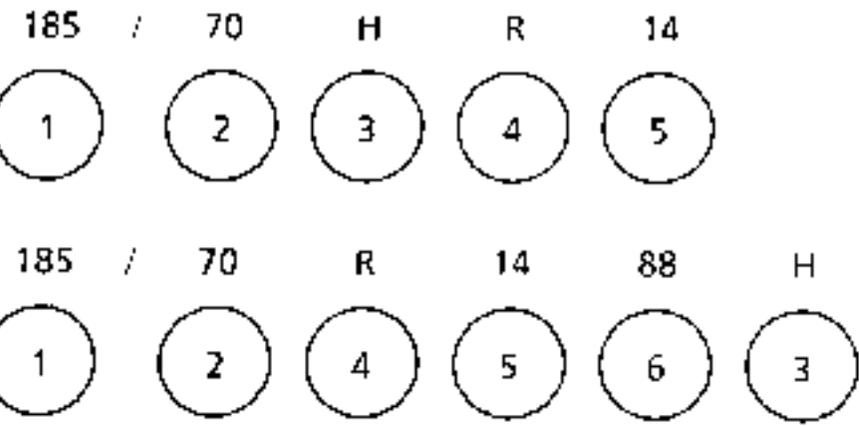
Type	Rim	Rim run-out (mm)	Wheel bolts tightening torque in (daN.m)	Tyres	Inflation pressure (bars)			
					FRONT	REAR		
K481	5 1/2 x 13	1.2	9	175/70R14T	2.0	2.6		
K482 K484	5 1/2 x 13 5 1/2 x 14			175/70R13T 175/65R14T 175/65R14H				
K483 K489 K48K K48B K48C	5 1/2 x 14			185/65R14H	2.3	2.6		
K486 K48V	5 1/2 x 13 5 1/2 x 14			175/70R13T 175/65R14T				
K487 K488 K48W K48A K48I K48O K48P	5 1/2 x 14			185/65R14T	2.3	2.6		
K483 4 x 4 K486 4 x 4 K48K 4 x 4 K48V 4 x 4	5 1/2 x 14			185/65R14H				
K48E K48F	5 1/2 x 14			175/65R14T	2.0	2.6		
K48J	5 x 13 5 1/2 x 14			165/80R13T 175/65R14T				
K48M	5 1/2 x 13			175/70R13H	2.3	2.6		
K48N K48H	5 1/2 x 13 5 1/2 x 14			175/70R13T 175/65R14H 175/65R14T				
S481 S482	5 1/2 x 13 5 1/2 x 14			175/70R13T 175/65R14T	2.0	2.6		
S486 S48H S48V	5 1/2 x 13 5 1/2 x 14			175/70R13T 175/65R14T	2.3	2.6		
B48Q L48Q B48Y L48Y B48R L48R	6 1/2 x 15			10	185/55R15V	2.3	2.3	
K48R	6 1/2 x 15			1.2	10	185/55R15V	2.5	2.5

Add 0.1 bar for vehicles with automatic transmission.

TYRES

The same type of tyre may have two different identification marks.

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



85920R2

1	185	Width of tyre wall in mm (S) section
2	70	h/w ratio $\frac{\text{height}}{\text{width}}$
4	R	Radial structure
5	14	Inside diameter expressed in inches.
6	88	Suffix giving maximum load per tyre 88 (560 kg)
3	H	Maximum speed suffix 210 km/h max.

Some speed symbols :	Max. Speed	km/h
	R	170
	S	180
	T	190
	U	200
	H	210
	V	240
	ZR	+ 240

Types of structure :	
Cross-ply	No marking
Radial	R
Bias belted	B (Bias belted)

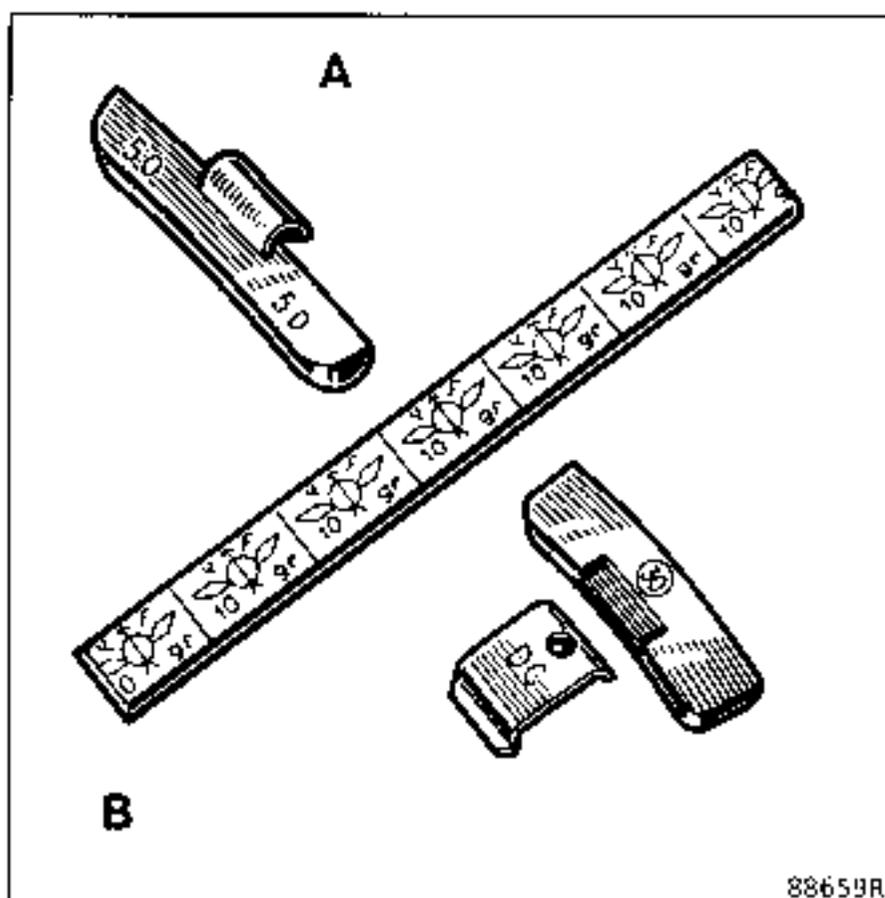
BALANCE WEIGHTS

Use only those weights supplied as RENAULT replacement parts :

- They are fastened to the rims with clips on steel wheels (clips integral with weights),
- They are fastened with flat clips of self-adhesive on light alloy wheels.

A Steel wheel

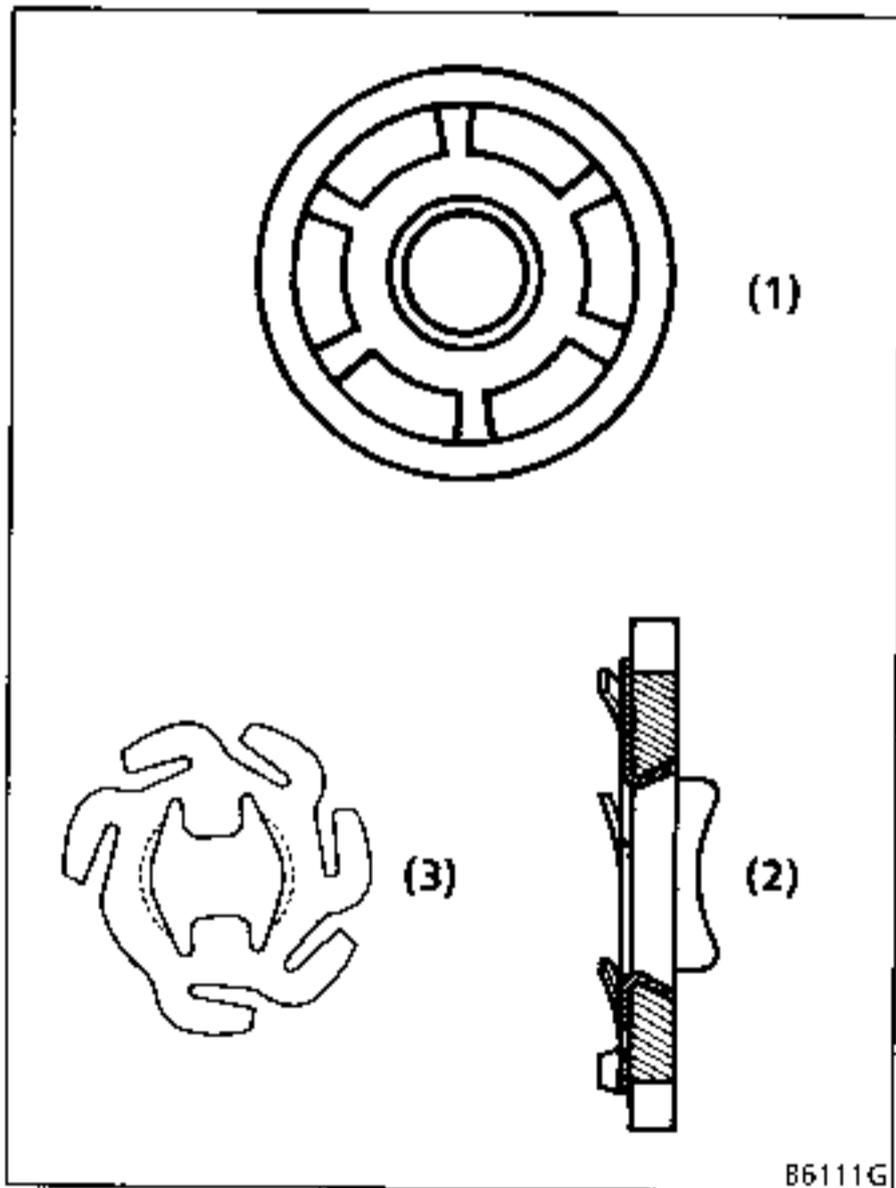
B Aluminium wheel



ESSENTIAL SPECIAL TOOLING		
Dir.	812-01	Axial ball joint wrenches
	or	
Dir.	832-01	
T.Av.	476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)		
Ball joint nuts	3.5	
Axial ball joint	5	
Wheel bolt	9	
Link arm sleeve lock nut	3.5	

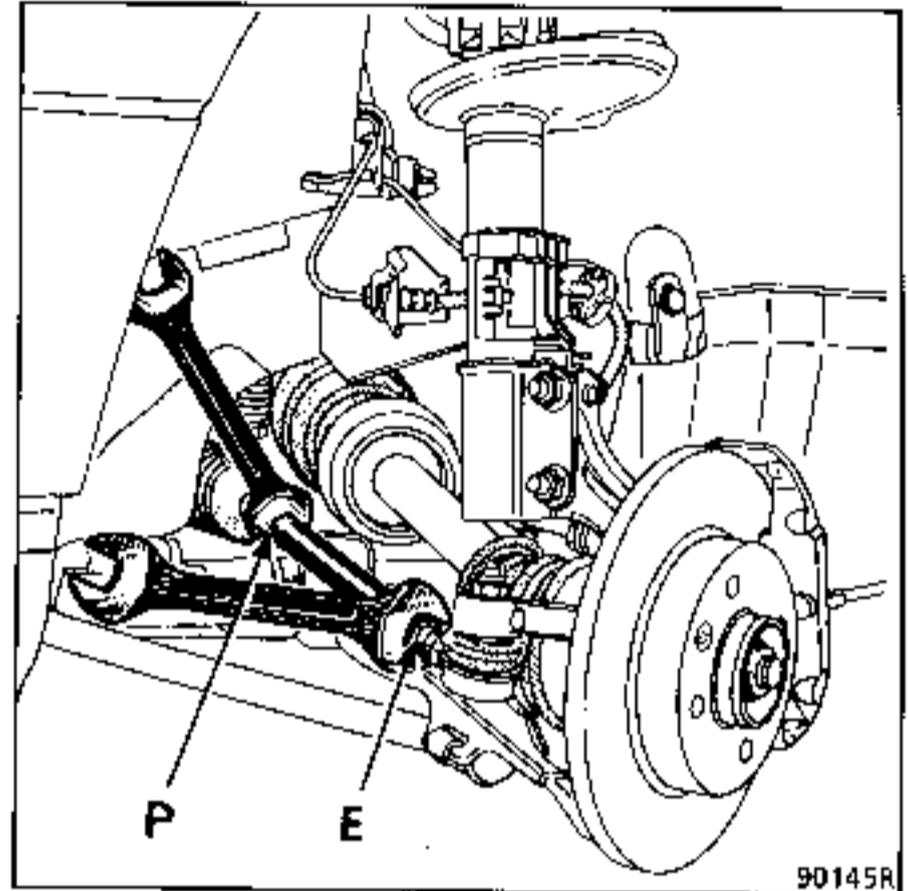
Axial ball joint with flat lock washer.



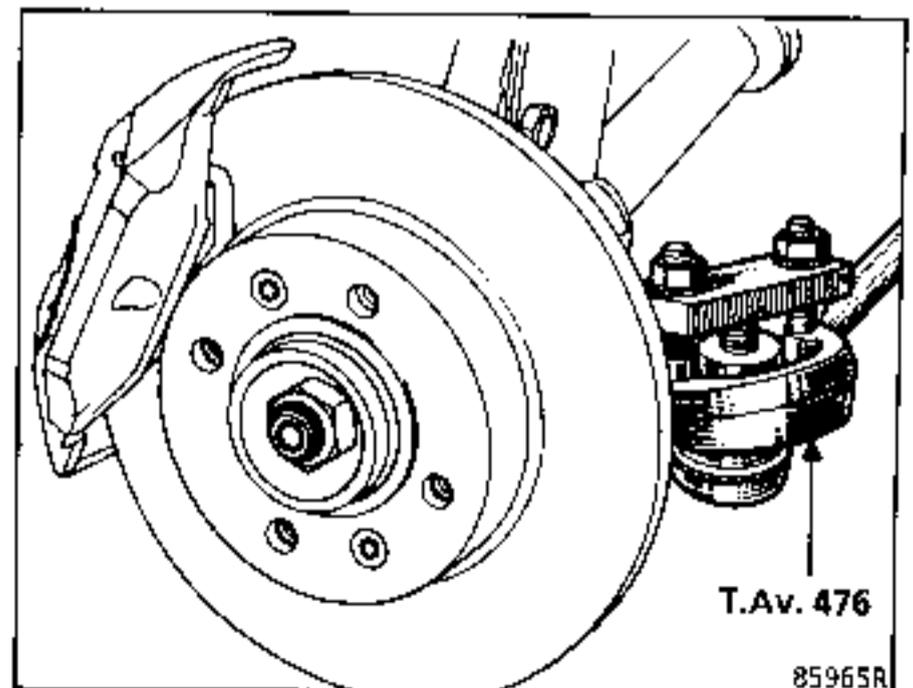
REMOVING THE BALL JOINT : Assembly (2) must be changed systematically at each dismantling. The ball joint itself may be used again if the notches are undamaged.

REMOVAL

Loosen lock nut (E) holding the axial ball joint at (P) with an flat wrench.



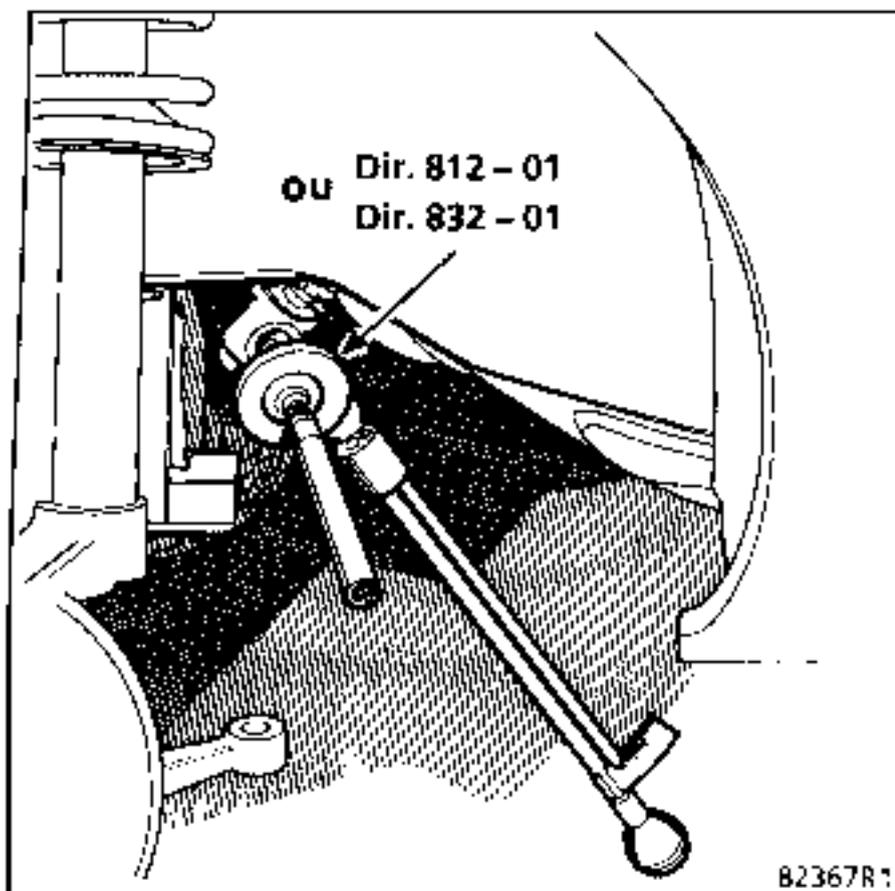
Disconnect the steering arm ball joint using tool T.Av. 476.



Remove:

- the axial ball joint, counting the number of turns needed to clear the threads. Make a note of the number for refitting as it will assist pre-adjustment of the parallelism,
- the steering rack gaiter.

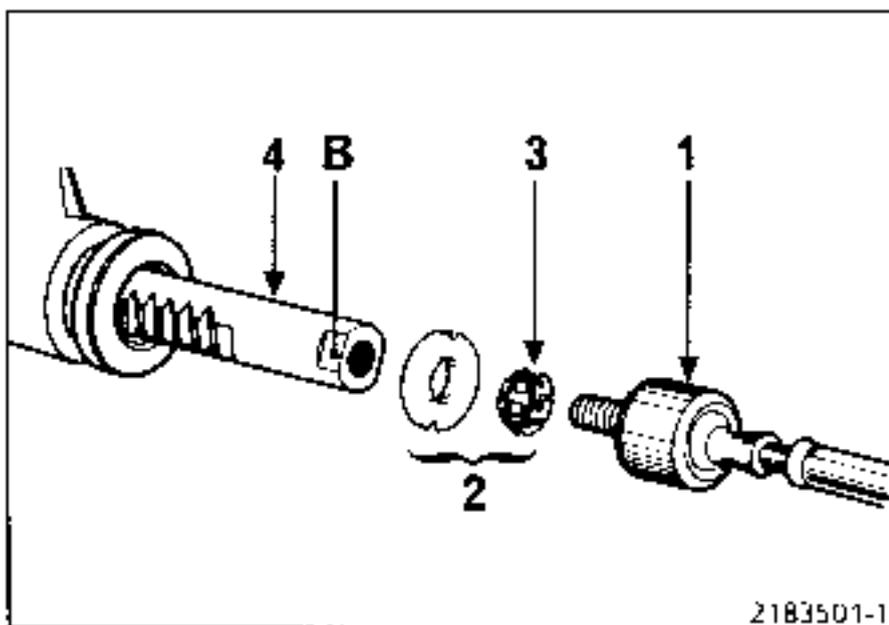
Loosen the axial ball joint using tool Dir. 812-01 or Dir. 832-01 and hold stop washer (2) with a pair of vice grips to prevent the rack from turning.



REFITTING

Refit the following to the rack (4) :

- the stop washer-lock washer assembly (2),
- the new axial ball joint (1) having previously smeared the threads with LOCTITE FRENBLOC.



NOTE : Make sure that the two tabs on lock washer (2) are in line with flats (B) on the rack before tightening with wrench tool Dir. 812-01 or Dir. 832-01

Refit the gaiter and its clip.

Screw the axial ball joint onto the rack end, turning it by the number of turns made on dismantling.

Reconnect the steering arm to the stub axle carrier.

Check the parallelism and adjust if necessary. Then tighten the rack lock nut.

ESSENTIAL SPECIAL TOOLING

T.Av. 476 Ball joint extractor

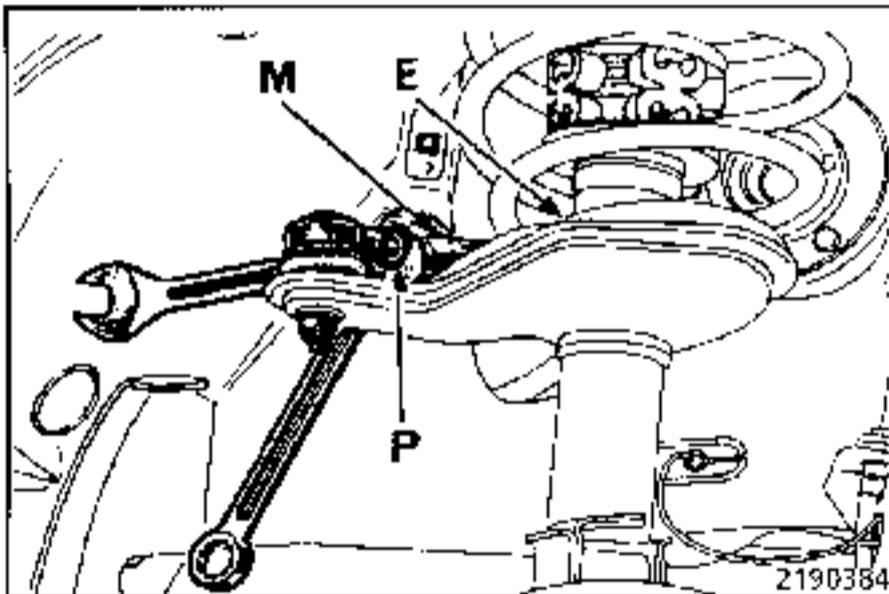
TIGHTENING TORQUES (in daN.m)



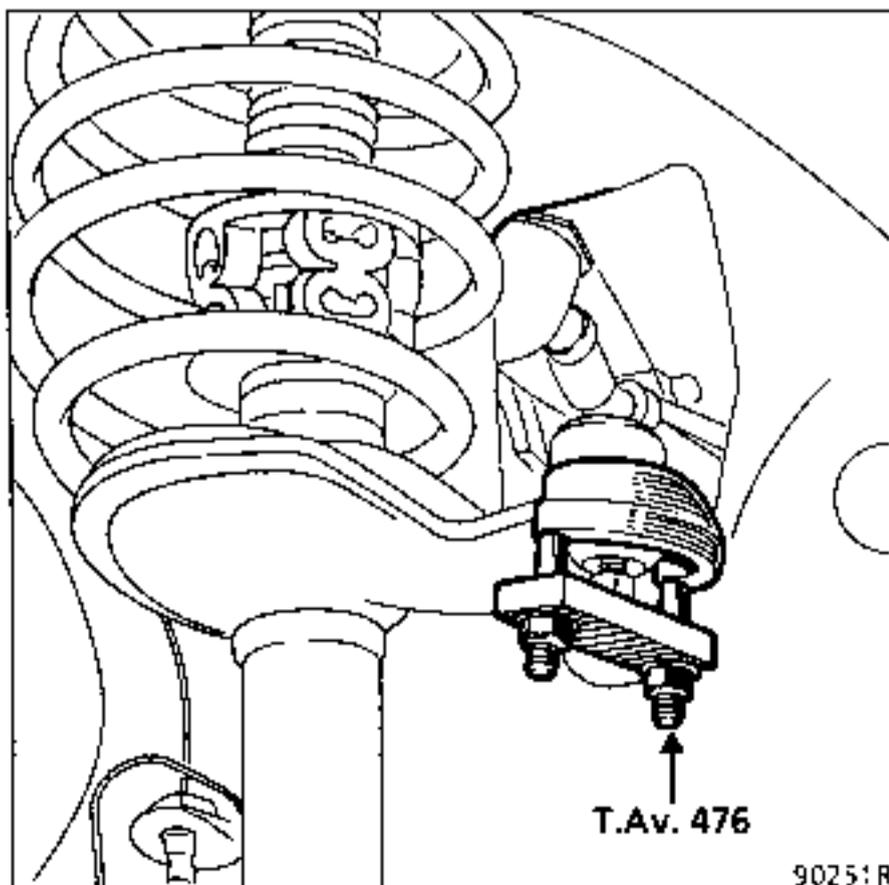
Bolts securing link to the rack	4
Link bolt lock nut	3.5
Arm securing nut	3.5
Steering ball joint nut	4
Steering arm sleeve lock nut	3.5
Wheel bolts 4 bolts	9
5 bolts	10

REMOVAL

Loosen lock nuts (P) and (E), holding sleeve (M) with a flat wrench.

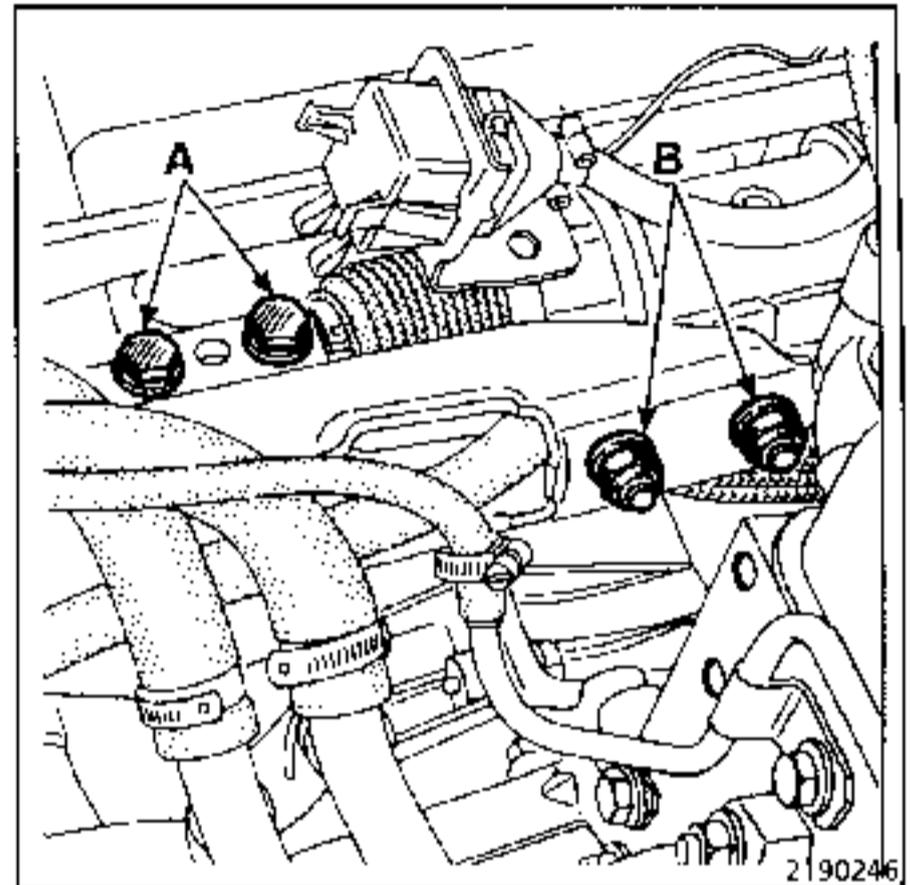


Disconnect the steering ball joint using tool T.Av. 476.



Remove:

- the ball joint housing by unscrewing sleeve (M) and counting the number of turns needed to clear the threads, so that the parallelism can be preset on refitting,
- nuts (B) securing the arms to the link,



- bolts (A) securing the steering arm link.

NOTE : As the steering rack end has threaded bolt holes, it is essential first of all to remove the lock nuts from bolts A.

Take apart the link/steering arm assembly and remove the steering arm on the side in question.

REFITTING

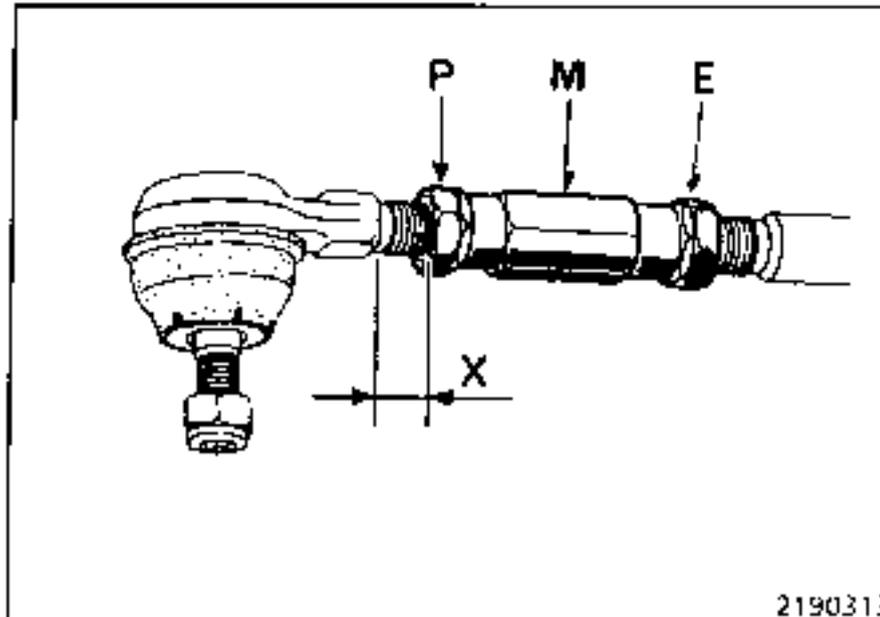
Fit the steering arm in place in the link and secure the assembly on the end of the rack without tightening it.

Screw up sleeve (M) by two turns on the arm, engage the ball joint then screw up sleeve (M) by the number of turns counted on dismantling.

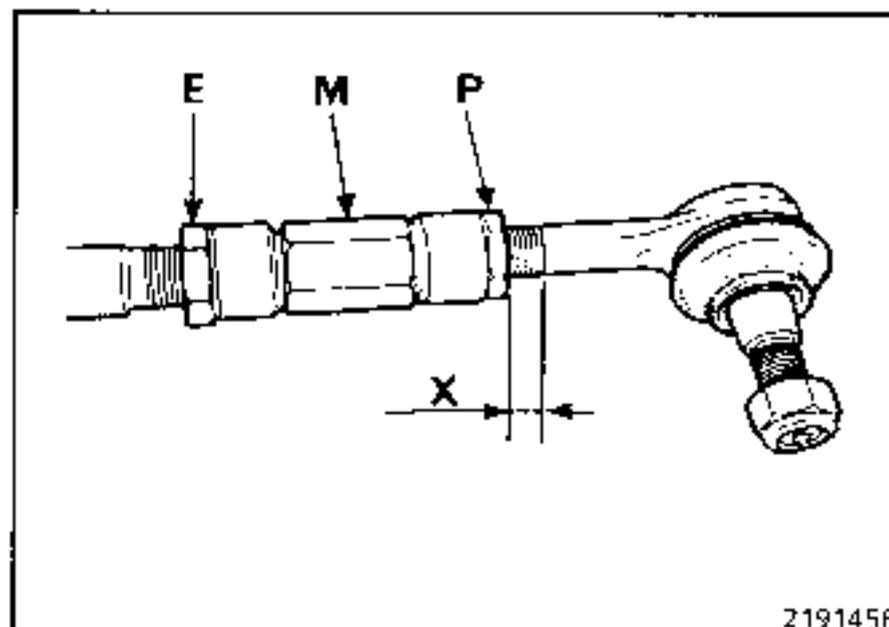
NOTE : Sleeve (M) has a lefthand and a righthand thread.

Measure length X between the edge of the thread and lock nut (P). Make sure it is symmetrical on both sides, otherwise correct it when adjusting the parallelism.

1st TYPE



2nd TYPE



Reconnect the ball joint in the stem of the shock absorber.

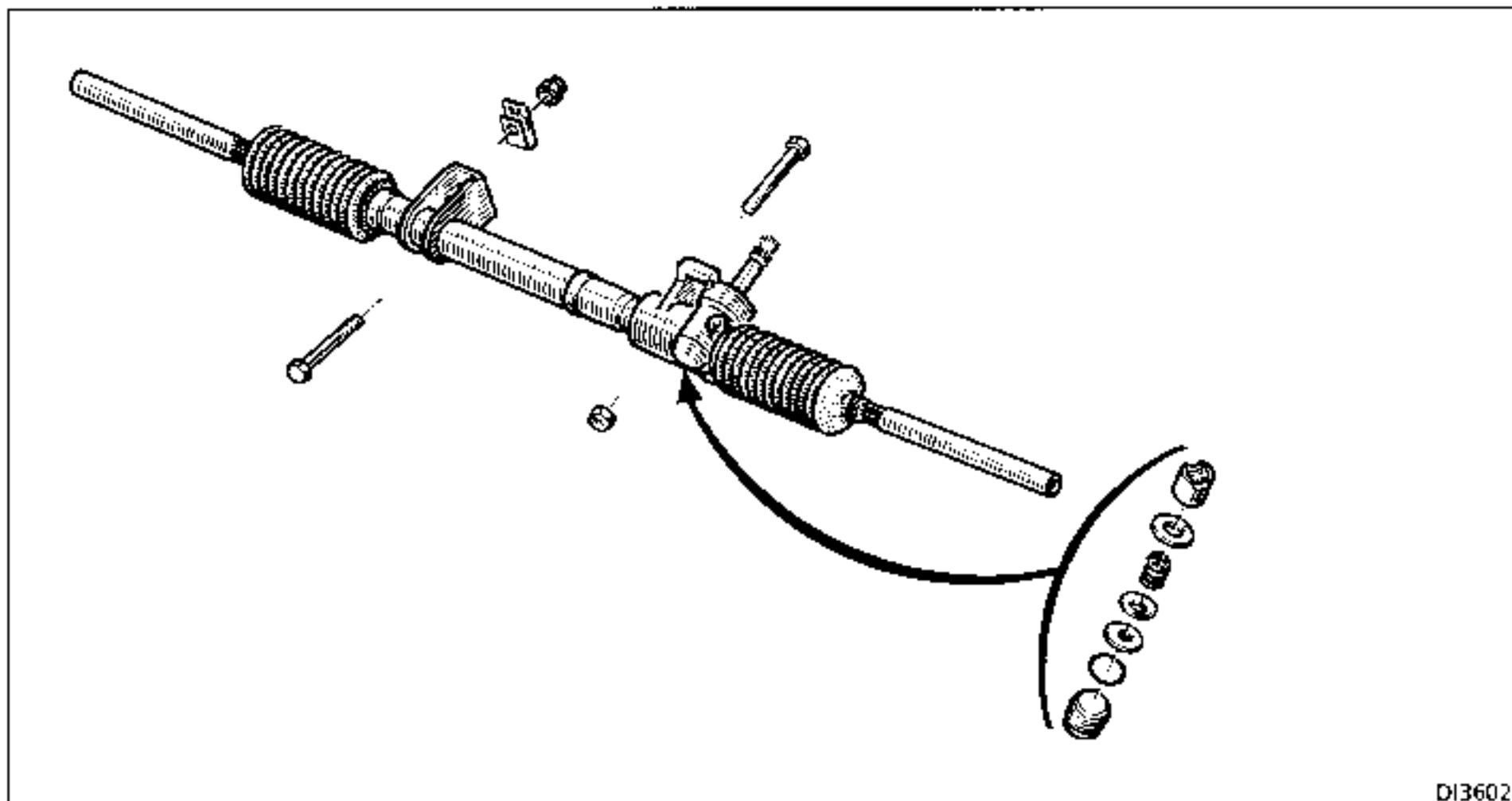
Vehicle unladen

Torque tighten :

- the link and steering arm bolts and nuts,
- the ball joint nut in the shock absorber stem.

Check the parallelism and adjust if necessary.

Torque tighten lock nut (E) and lock nut (P) in order and whilst holding sleeve (M) :



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ESSENTIAL SPECIAL TOOLING

T.Av. 476 Ball joint extractor

TIGHTENING TORQUES (in daN.m)



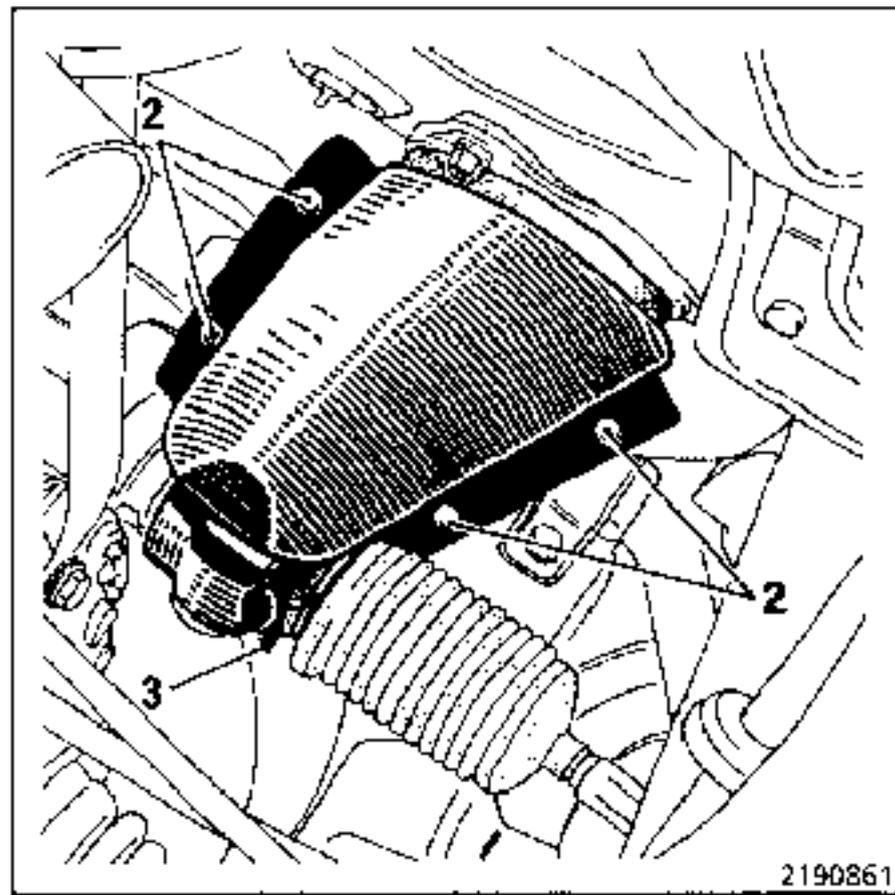
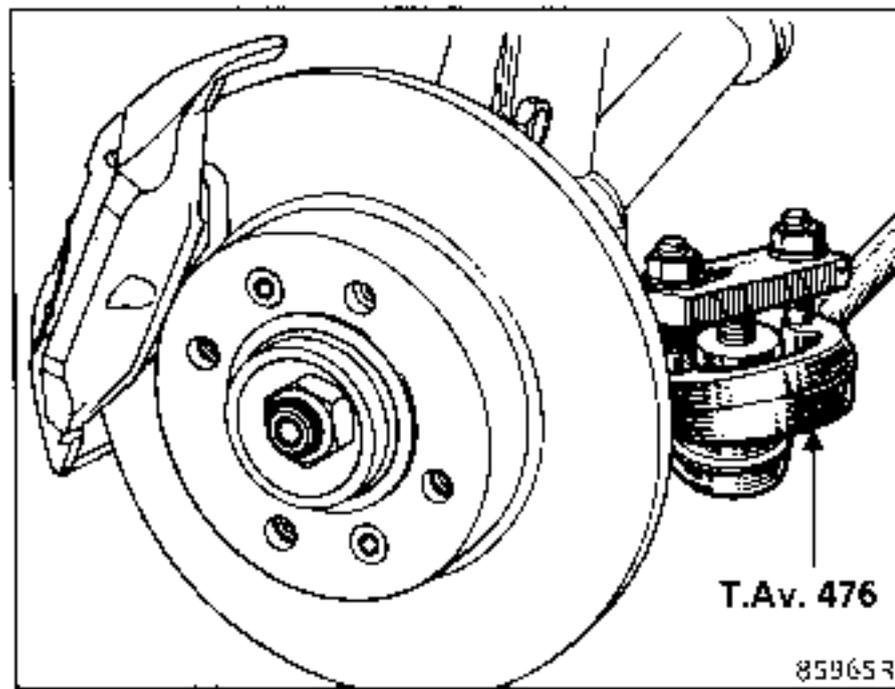
Steering ball joint nuts	4
Axial ball joint	5
Steering box securing bolts	5
Wheel bolts	9

Remove:

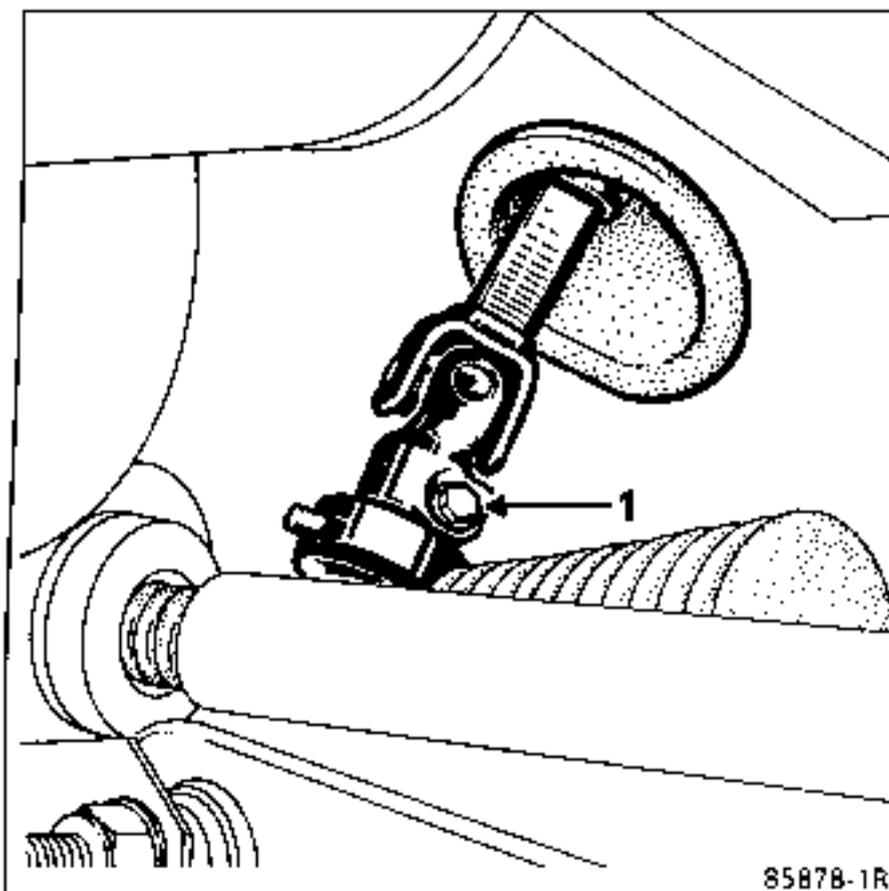
- the plastic protector, unclipping the four rivets (2) and by cutting retaining collar (3),

REMOVAL

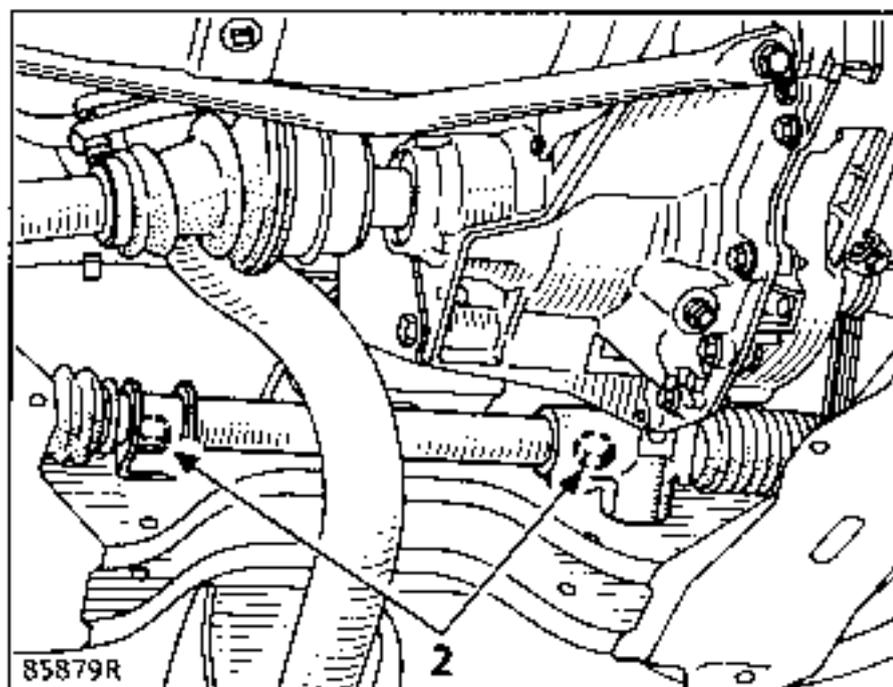
Disconnect the ball joints using tool T.Av. 476.



- the universal joint securing bolt (1), marking its position on the steering box,



- the two bolts (2),



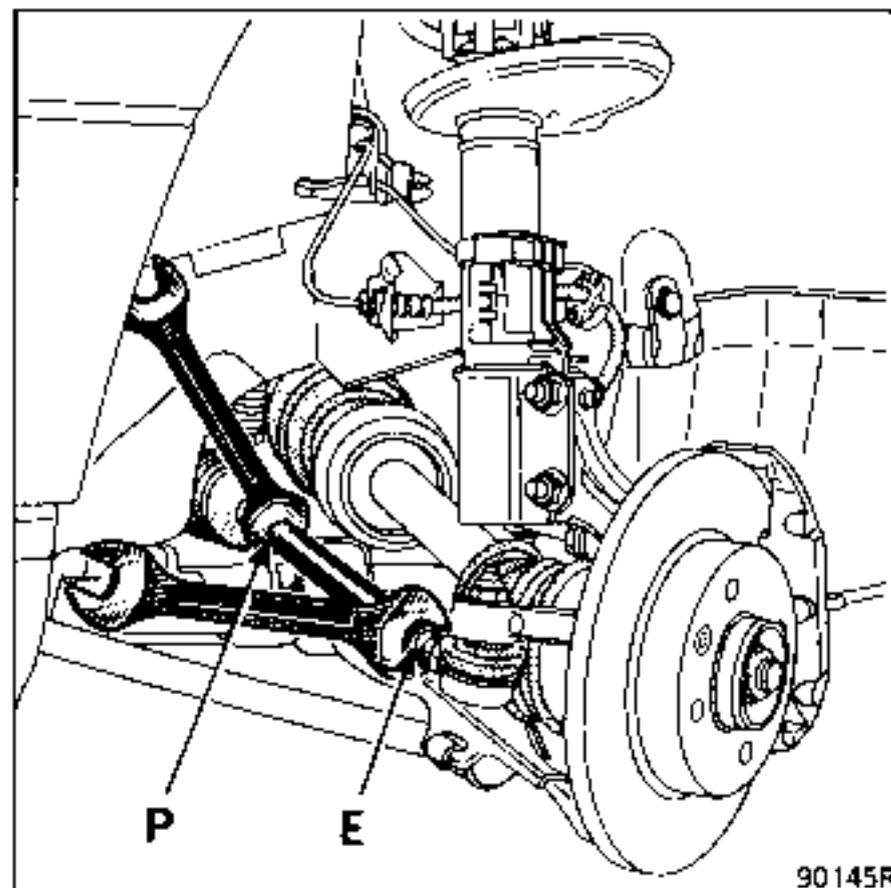
- the steering box.

The axial ball joints must only be unscrewed from the rack if they are going to be changed.

If the steering box is being changed, the ball joint housings at the stub axle carrier end must be recovered.

To do this :

- loosen lock nut (E), holding the axial ball joint with a flat wrench at (P),
- unscrew the ball joint housings, noting the number of turns needed to clear the threads.



REFITTING

Proceed in reverse order to removal.

If a new steering system is being fitted, fit the ball joint housings in the position marked on dismantling.

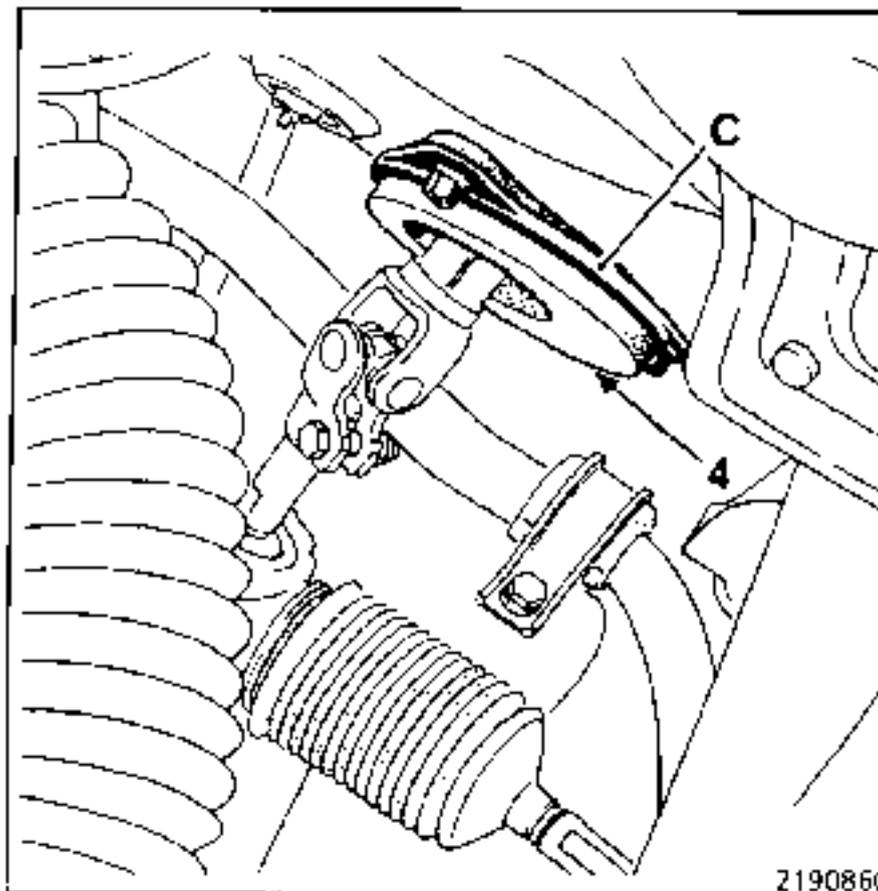
Refit the housing-arm assembly to the vehicle, making sure that the universal joint is in the position marked on dismantling. If it is not, realign the steering wheel.

NOTE : If the steering universal joint is impossible to fit, disconnect the collapsible steering wheel shaft.

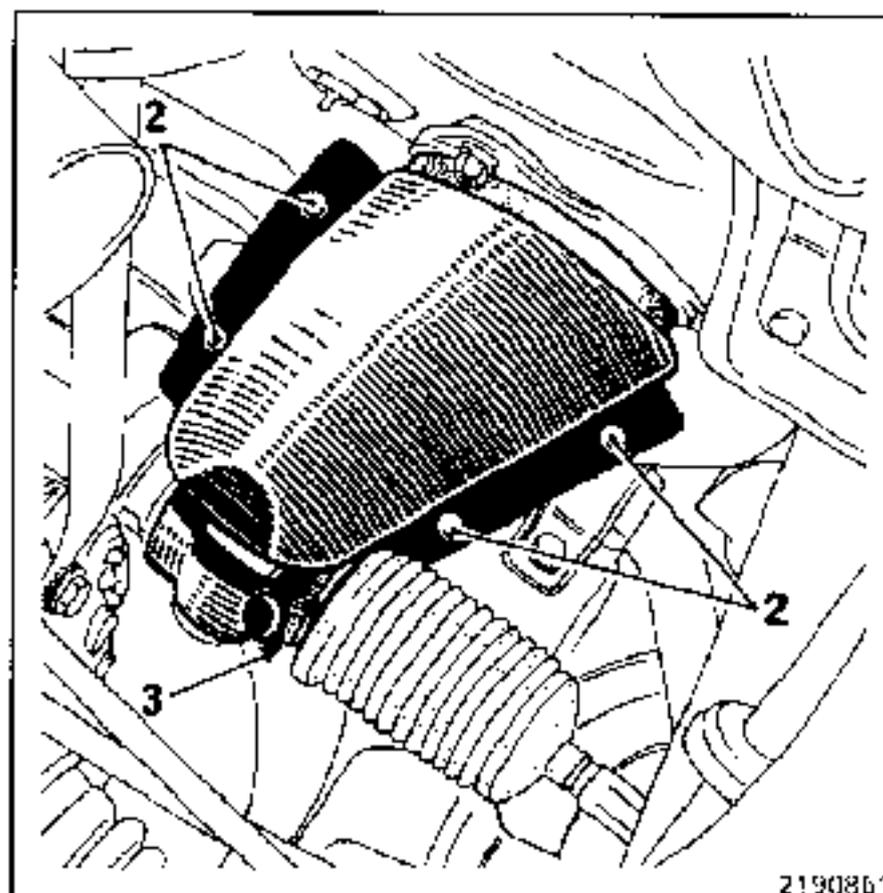
Fit the plastic protector.

To do this :

- ensure that sealing foam (4) is stuck to the backing (C),



- assemble the two half shells by clipping rivets (2) in place,
- fit a new retaining collar (3) in its groove and tighten it.



Check the parallelism.

ESSENTIAL SPECIAL TOOLING

Dir.	812-01	Axial ball joint wrenches
	or	
Dir.	832-01	
T.Av.	476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)



Wheel bolts	9
Steering ball joint nuts	4
Axial ball joint	5

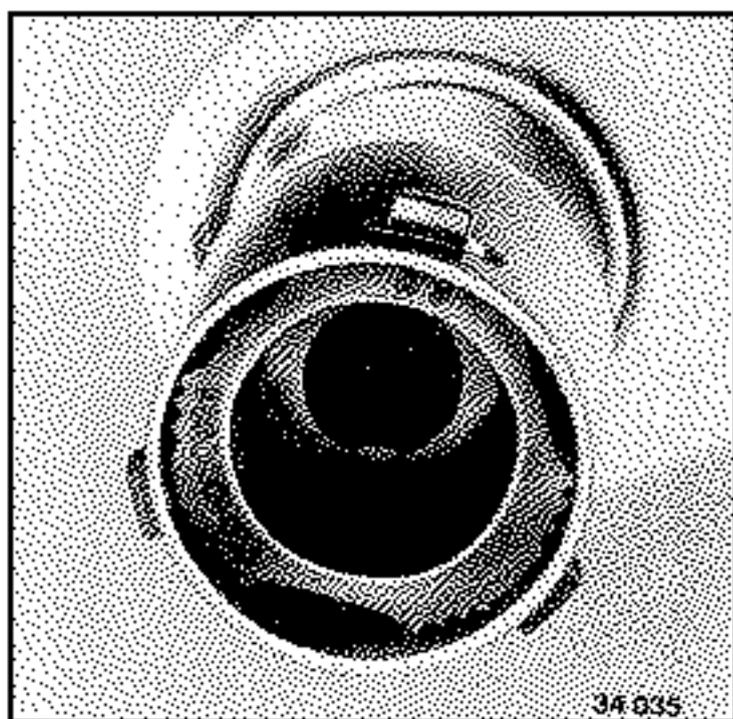
REMOVAL

Place the front of the vehicle on axle stands and remove the wheel on the side opposite the steering column.

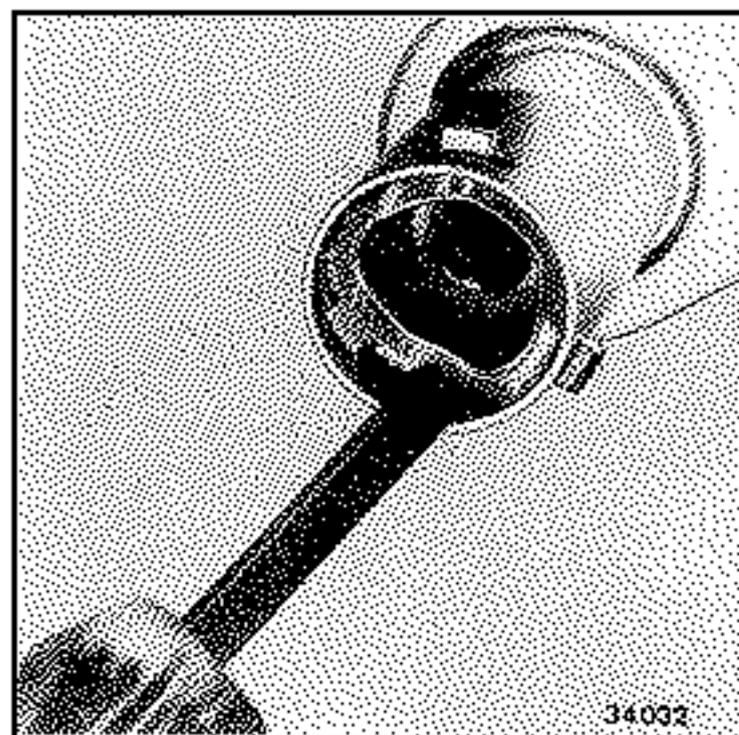
Remove:

- the steering rack gaiter,
- the axial ball joint (see relevant section).

Turn the steering wheel completely so that the rack no longer extends beyond the box and free the anti-noise bearing.



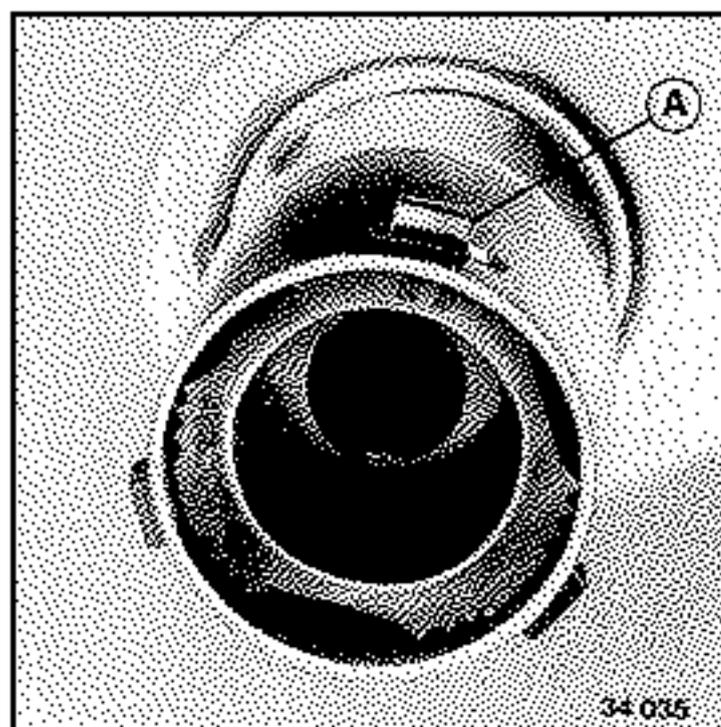
Using a flat-ended screwdriver, the cutting end of which has been removed, extract the anti-noise bearing.



REFITTING

Carefully clean the rack and anti-noise bearing location. Coat them with **MOLYKOTE BR2** grease.

In the same ways as on removal, refit the anti-noise bearing in place, taking care to fit the three lugs in notches (A).

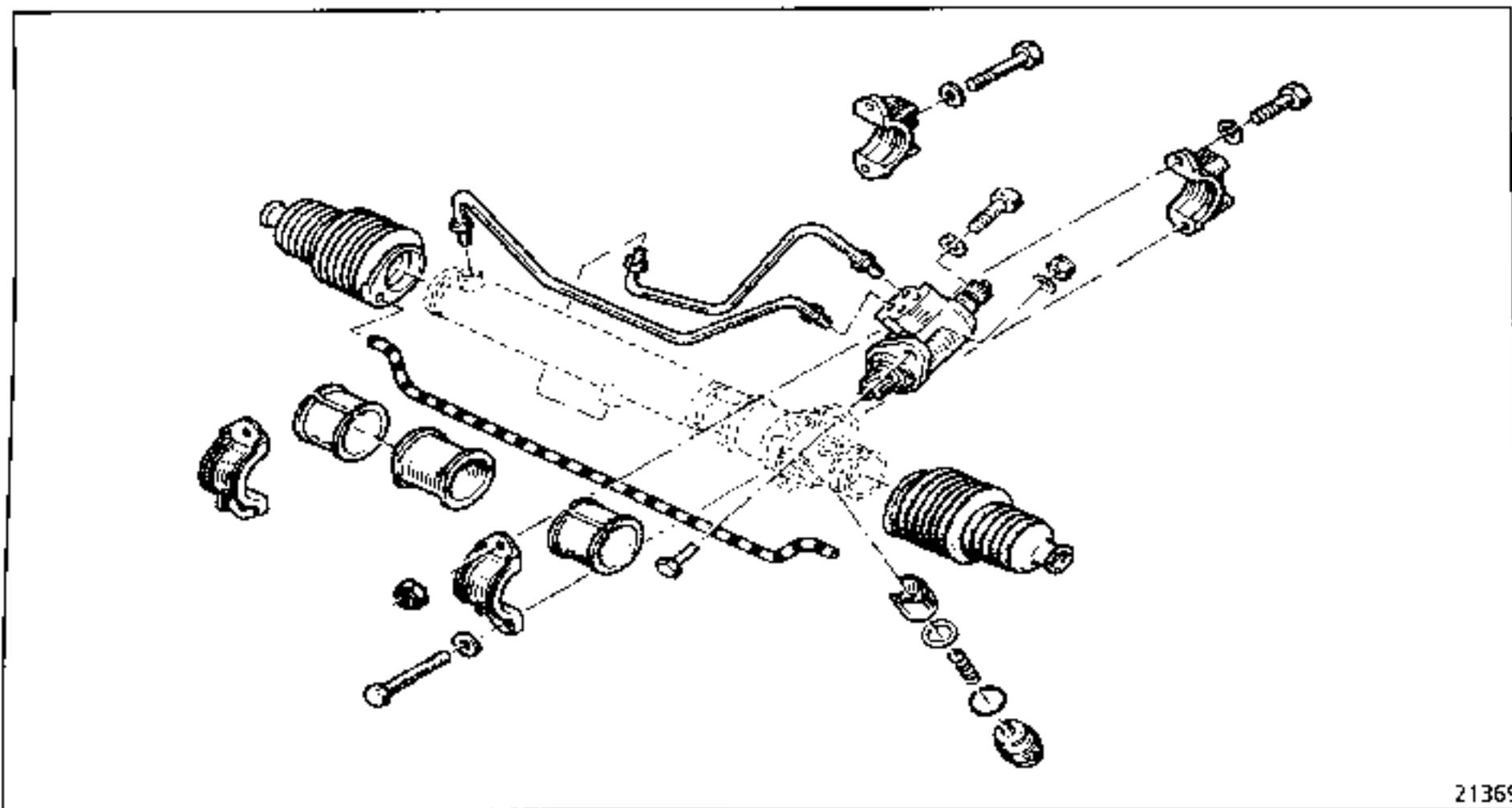


Engage the rack in the bearing.

On the rack, refit :

- the thrust washer together with a new lock plate,
- the axial ball joint,
- the steering ball joint housing at the stub axle carrier end.

Check and if necessary, adjust the parallelism.



21369

ESSENTIAL SPECIAL TOOLING	
Mot. 453-01	Hose clamps
T.Av. 476	Ball joint extractor

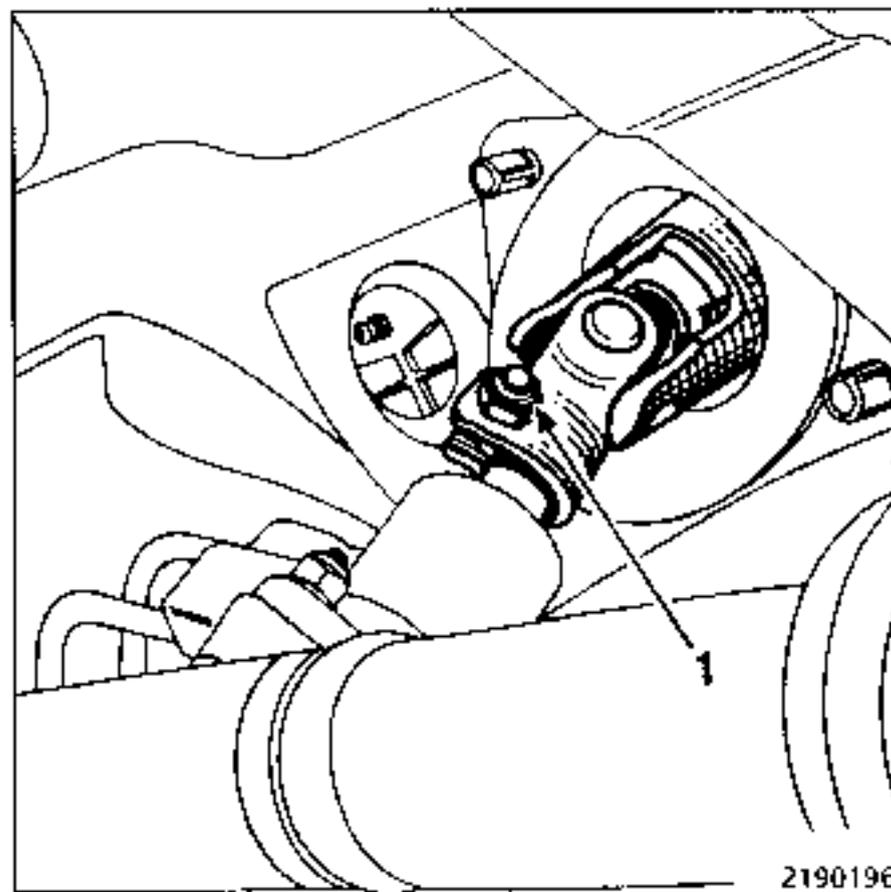
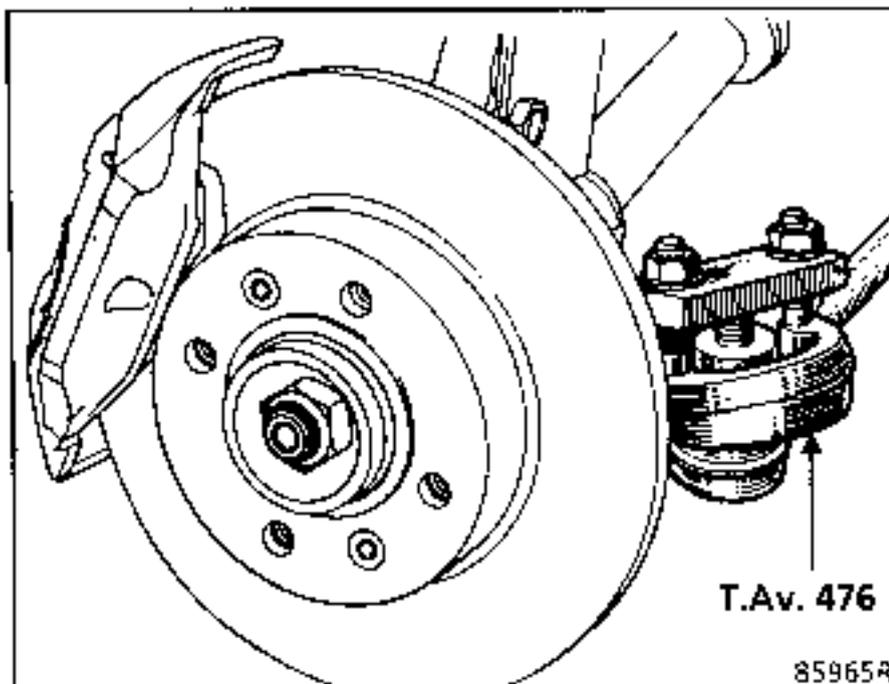
TIGHTENING TORQUES (in daN.m)		
Steering ball joint nuts	4	
Axial ball joint	5	
Steering box securing bolts	5	
Wheel bolts	9	

Remove:

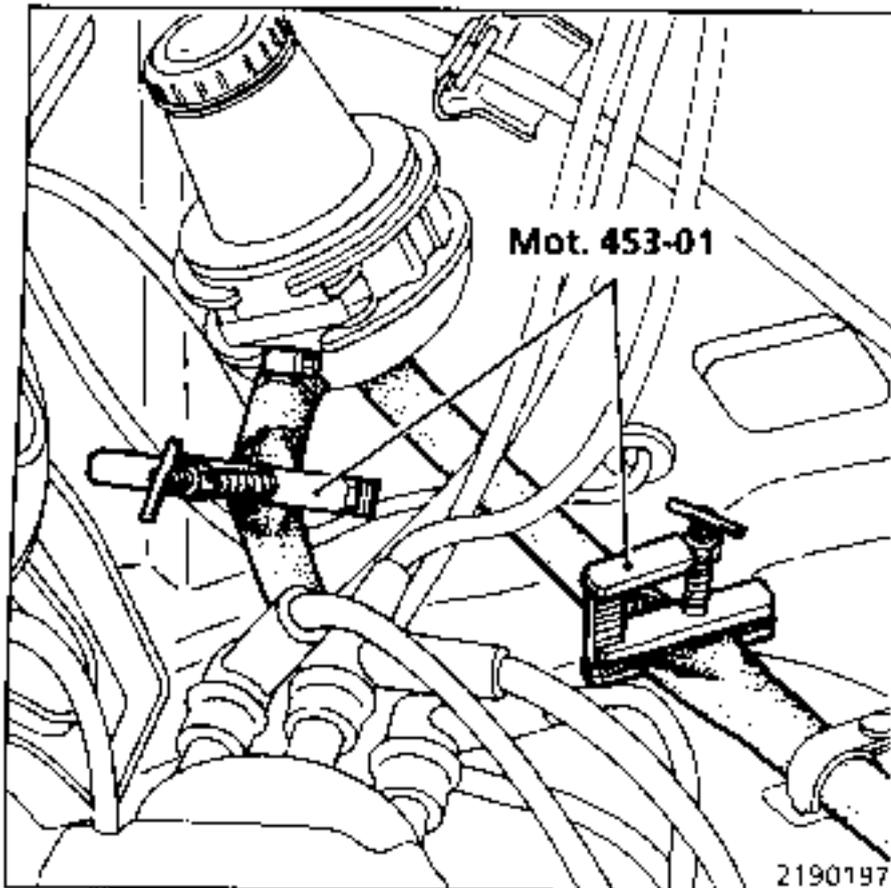
- bolt (1) securing the universal joint, marking its position on the box.

REMOVAL

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

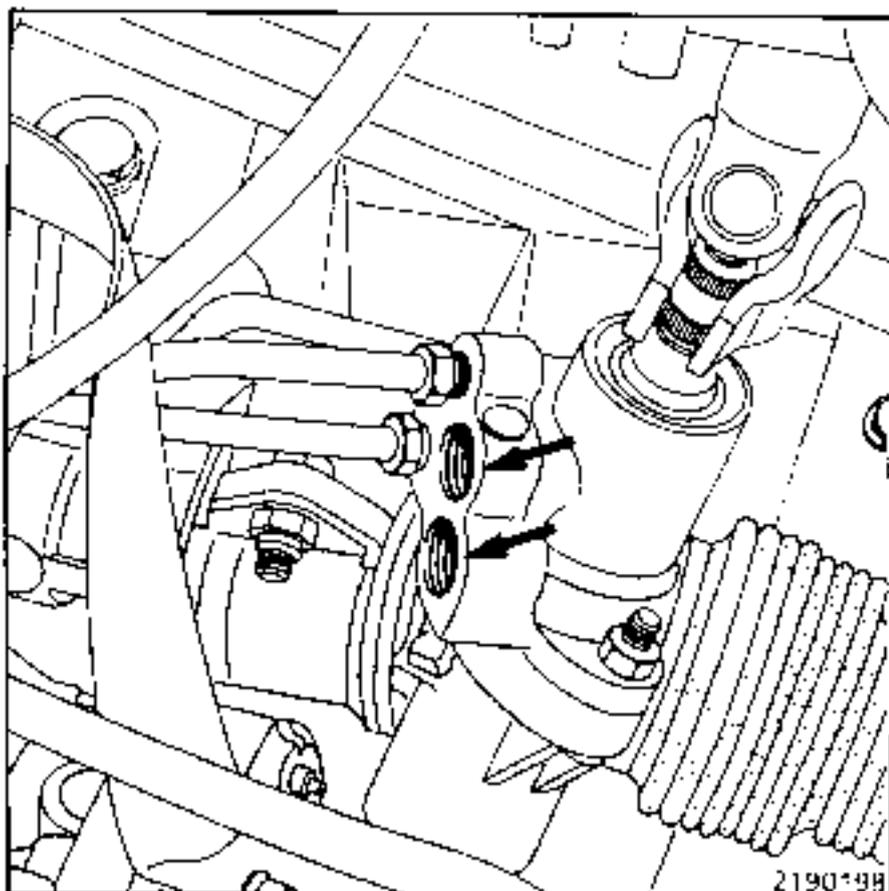


Place a clamp Mot. 453-01 on each of the hoses coming from the oil reservoir.

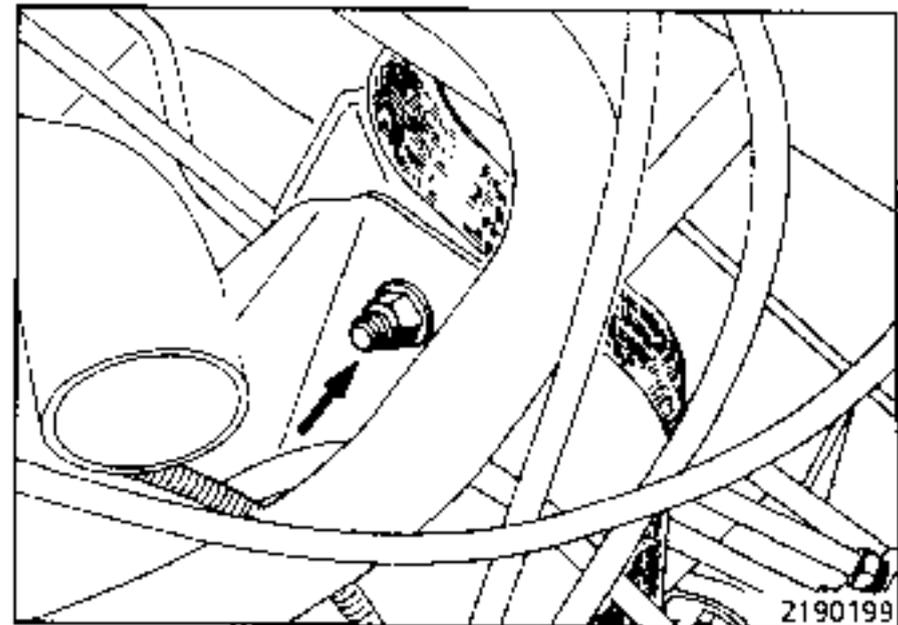


Remove:

- the hose support bracket,
- the pipes coming from the oil reservoir and the high pressure pump on the rotary valve,

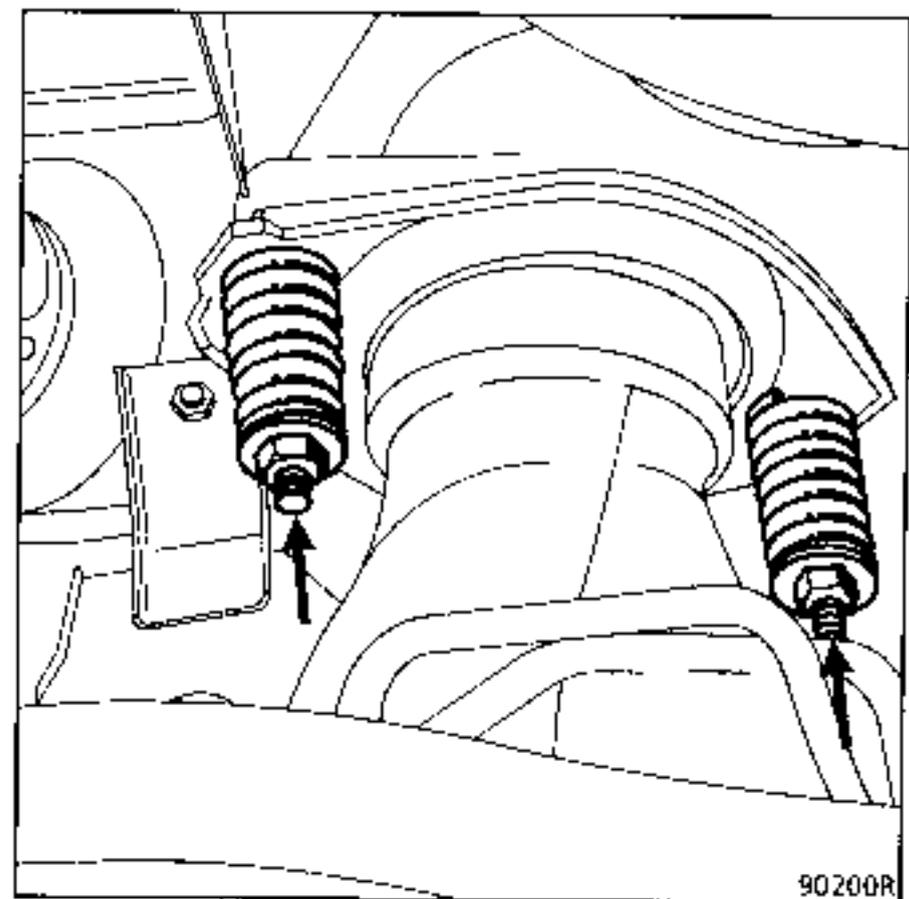


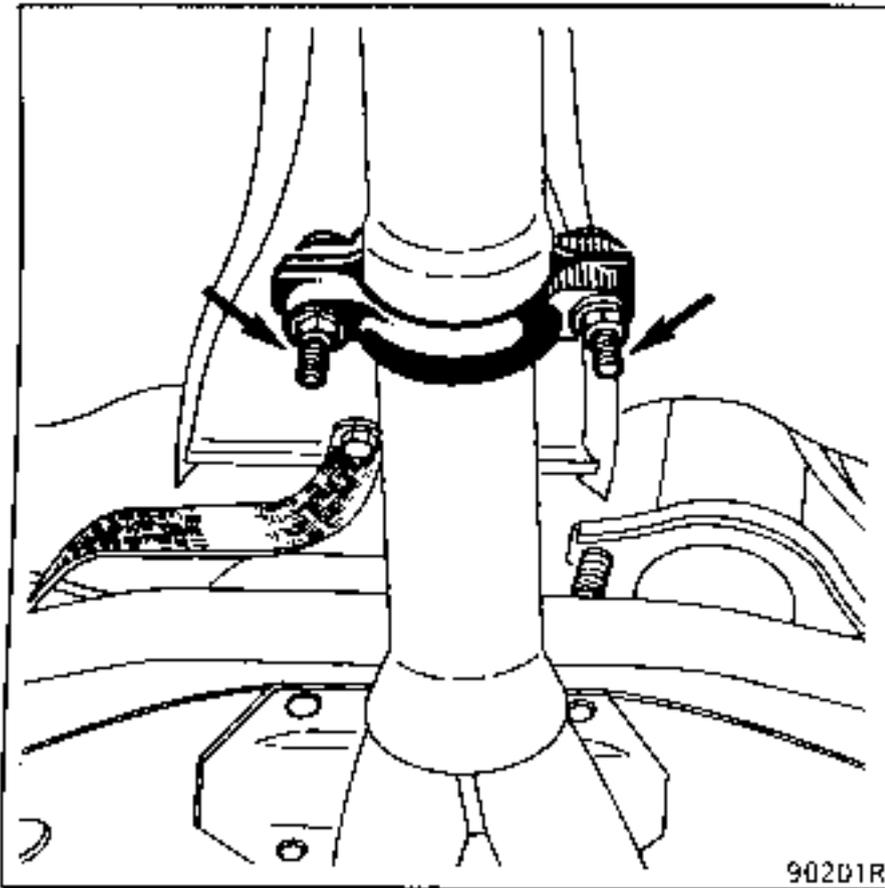
- the nut securing the engine rear mountings.



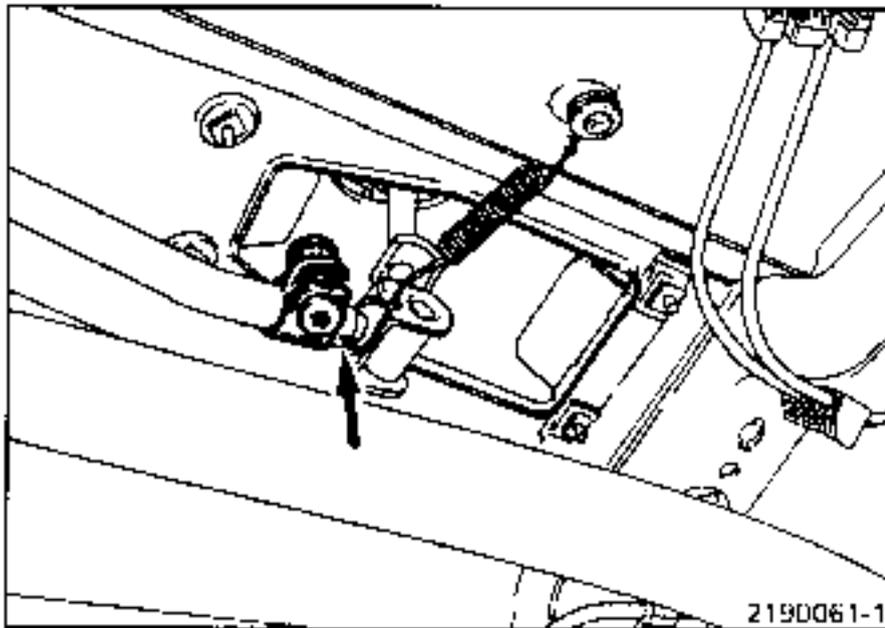
Underneath the vehicle remove :

- the exhaust downpipe from the manifold and the central connection under the vehicle,



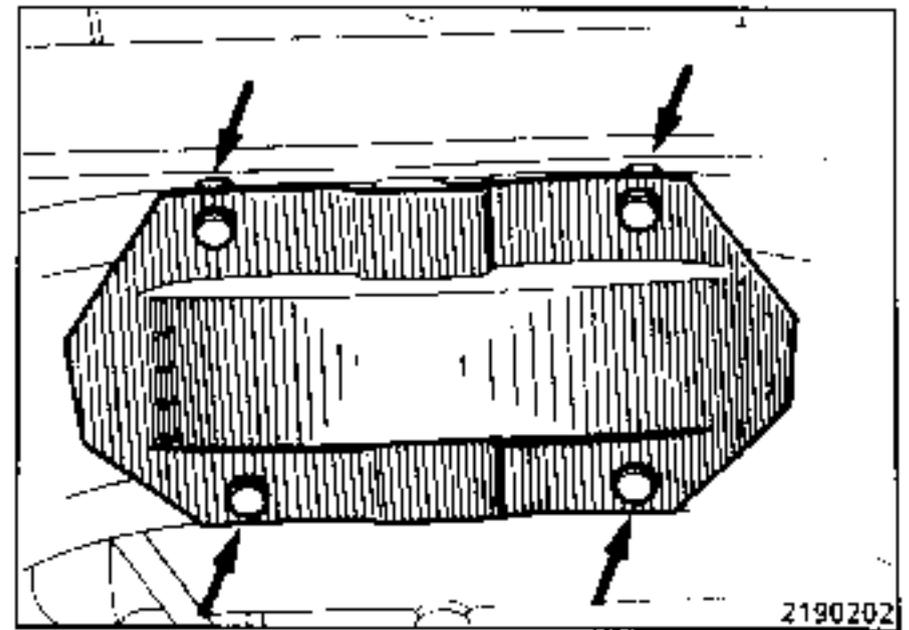


- the gear selector control from under the lever, marking its position.

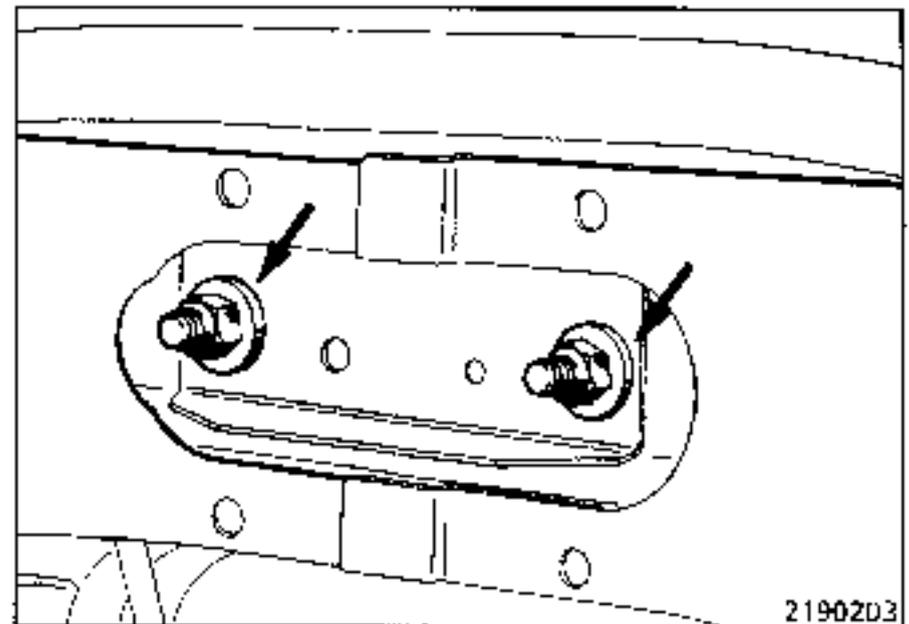


Raise the engine-gearbox assembly as high as possible and remove :

- the plate giving access to the bolts securing the engine mounting to the cradle,

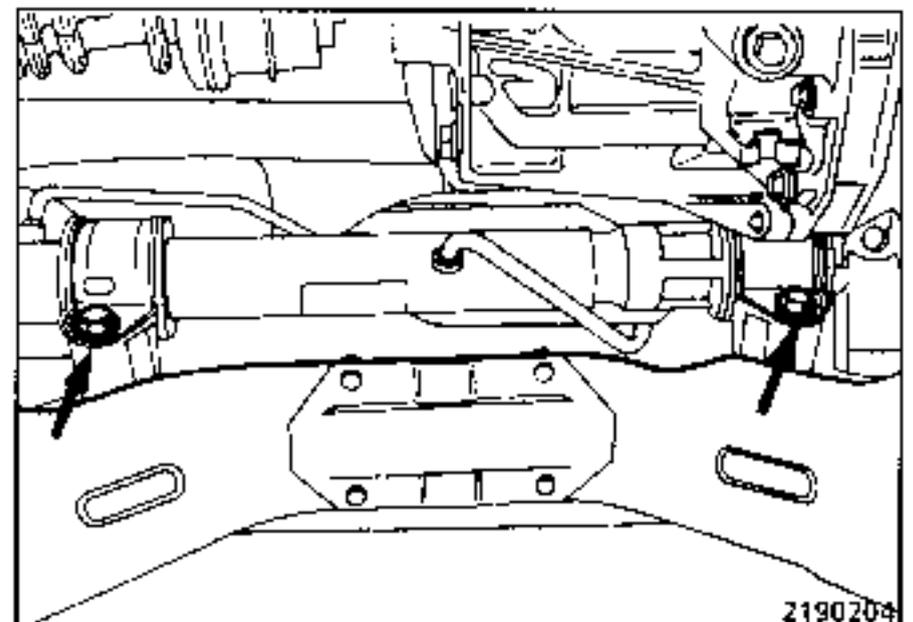


- the two bolts securing the engine mounting.

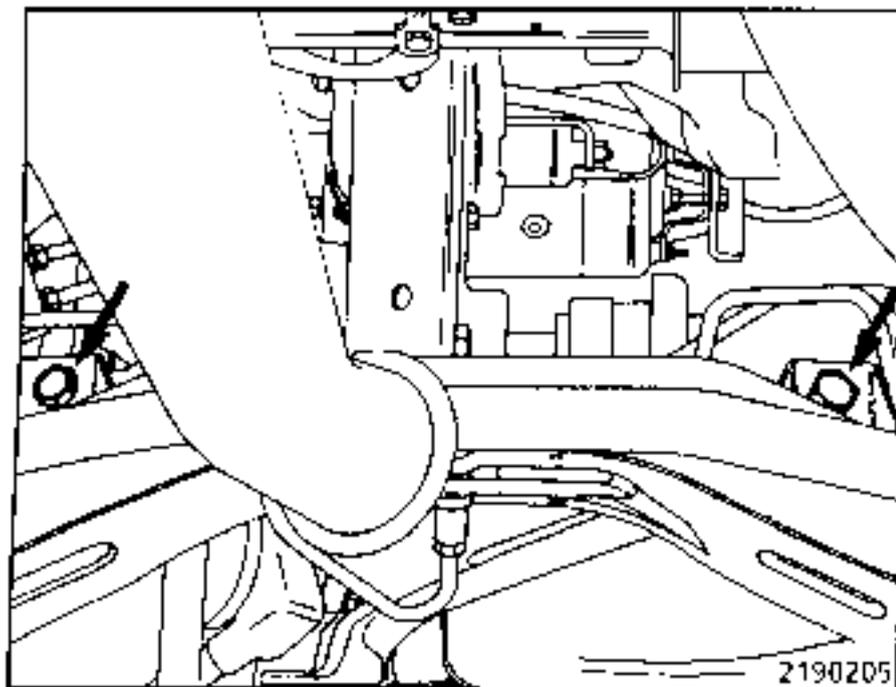


Move the steering rack towards the lefthand side and remove :

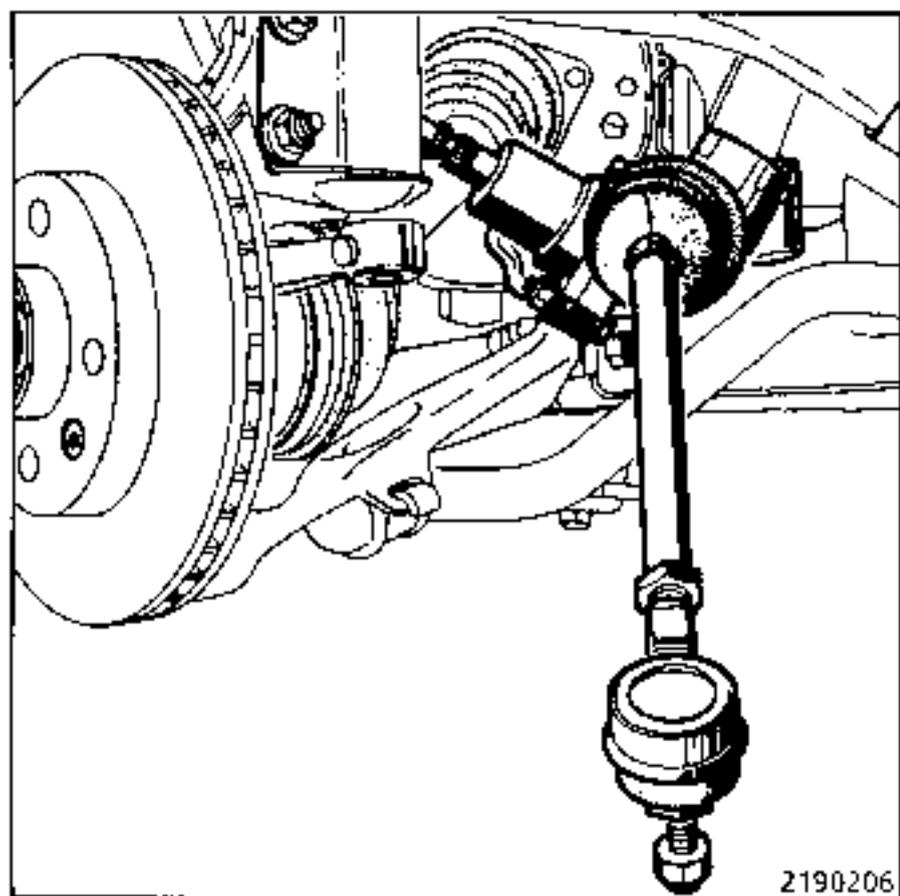
- the two steering box lower securing bolts,



- the two steering box upper securing bolts.



Remove the steering box from the lefthand side inner wing panel side.

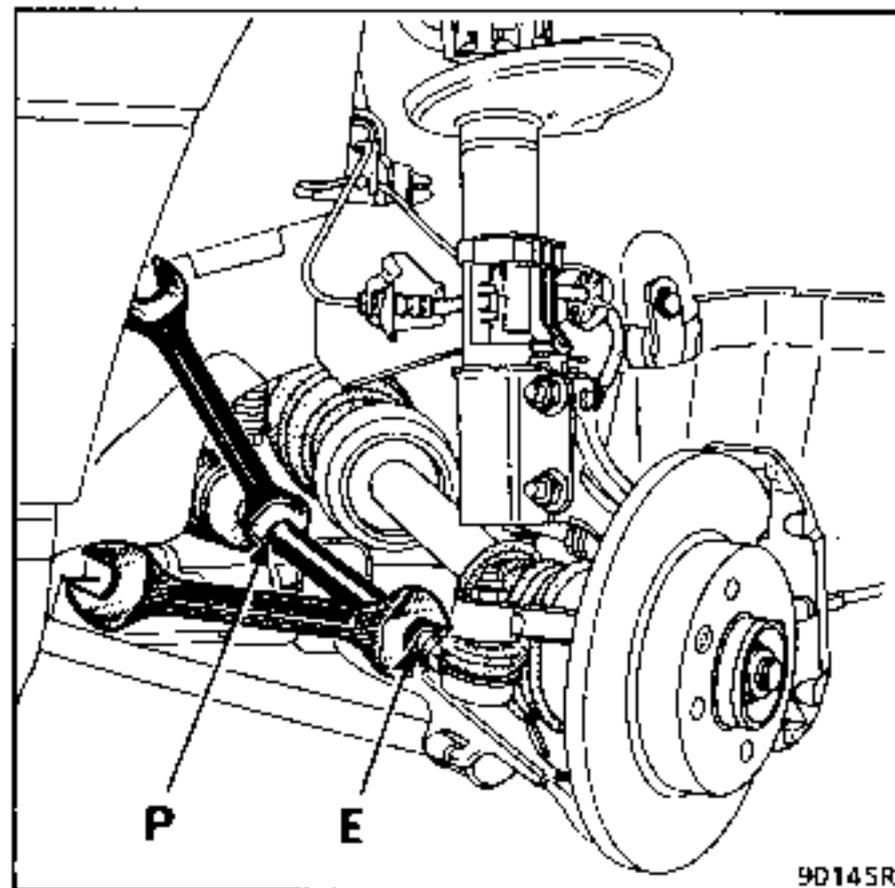


The axial ball joints must only be unscrewed from the rack if they are going to be changed.

If the steering box is being changed, the ball joint housings at the stub axle carrier end must be recovered.

To do this :

- loosen lock nut (E), holding the axial ball joint with a flat wrench at (P),
- unscrew the ball joint housings, noting the number of turns needed to clear the threads.



REFITTING

If a new steering system is being fitted, fit the ball joint housings in the position marked on dismantling.

The engine-gearbox assembly must be raised as high as possible.

Fit in place the steering box and secure it.

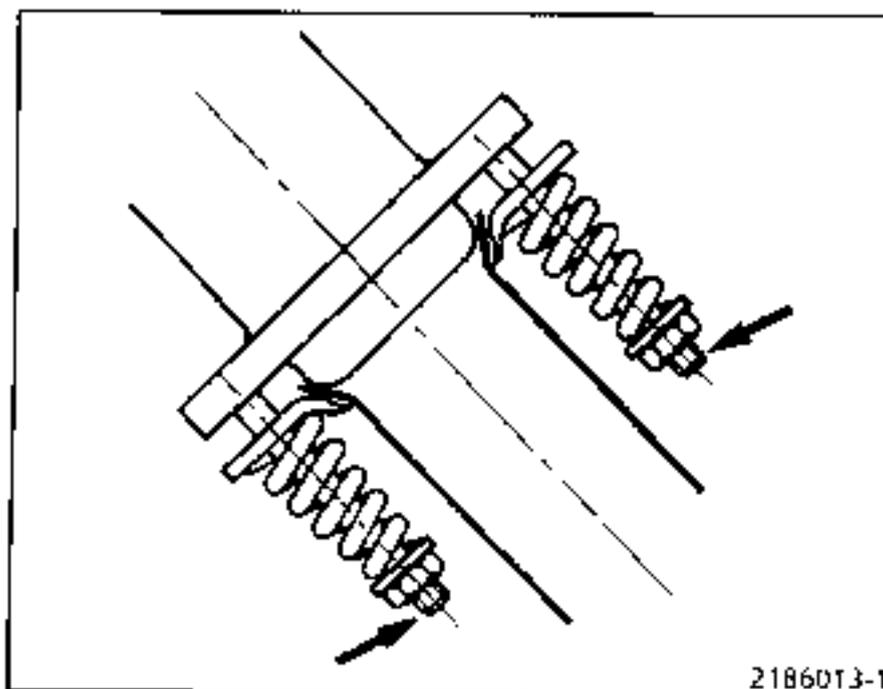
Refit:

- the engine rear mounting to the cradle,
- the closure plate.

Lower the engine-gearbox assembly and fit it in place.

Refit :

- the exhaust downpipe.



Reconnect :

- the selector control, aligning it with the marks made on removal,
- the ball joints to the stub axle carrier.

Position the steering universal joint according to the marks made on removal and tighten it.

Fit in place and tighten the nut securing the engine rear mounting.

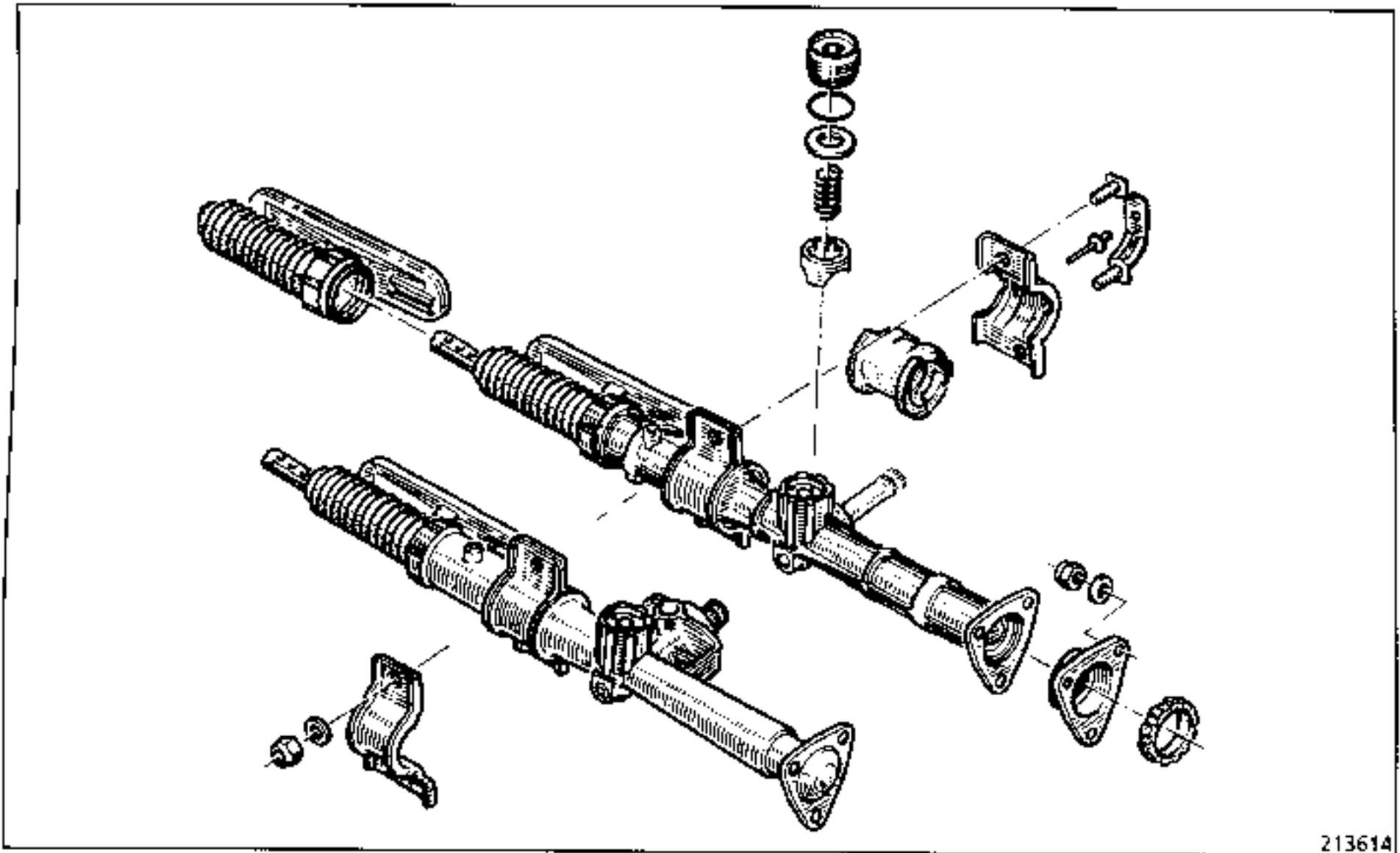
Reconnect the rotary valve feed pipes and remove clamps **Mot. 453-01**.

Fill the circuit with oil, up to the level of the grille in the chamber.

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

Repeat this operation with the engine running and then top up the level (see section on "Refilling the system").

Check and, if necessary, adjust the parallelism.



ESSENTIAL SPECIAL TOOLING	
Mot. 453-01	Hose clamps
T.Av. 476	Ball joint extractor
Dir. 1067	Parallelism adjusting tool

TIGHTENING TORQUES (in daN.m)		
Centre bearing securing nut	5	
Securing nuts on shock absorber turret	3	
Bolts securing link to rack	4	
Steering arm securing nuts	3.5	
Link bolt lock nut	3.5	
Ball joint nuts	4	
Wheel bolts 4 bolts	9	
5 bolts	10	

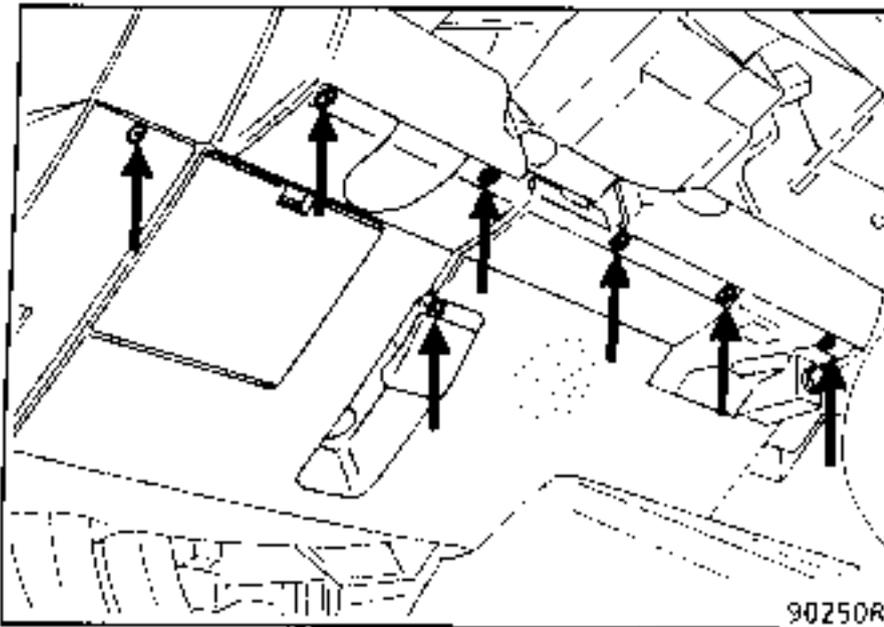
Special features of vehicles with ABS option.

NOTE : The steering box is removed after the removal of the ABS hydraulic assembly. The method is then identical to X48 vehicles with in-line engines.

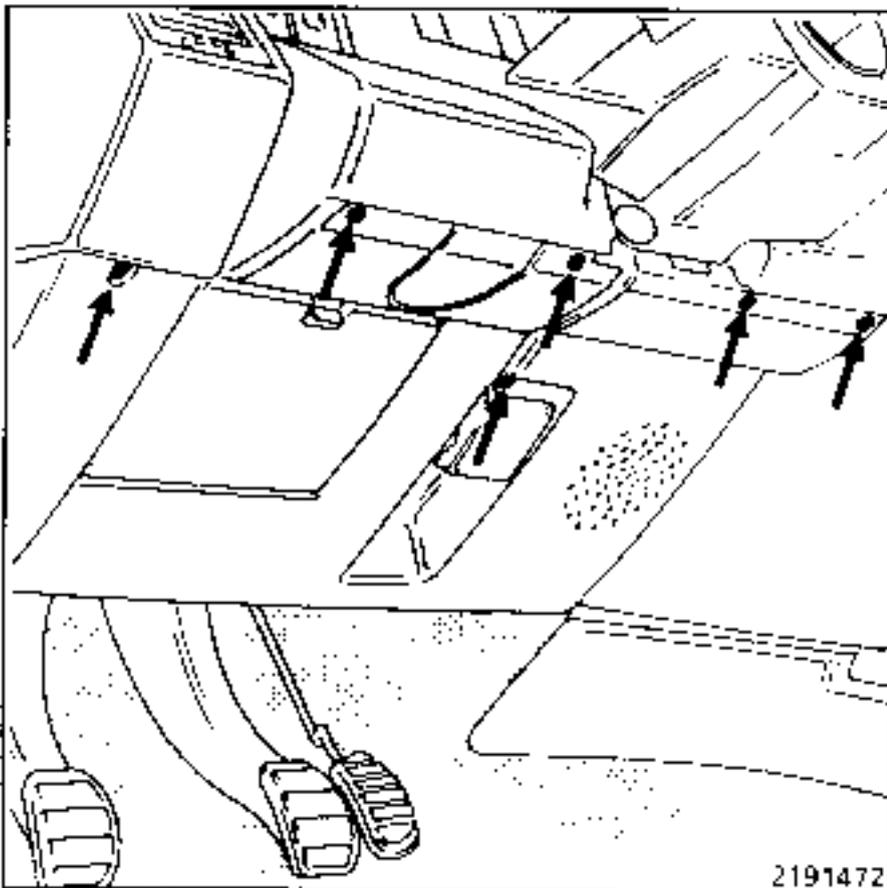
REMOVAL

Remove the cover under the steering wheel and the sound-deadening cover.

1st TYPE



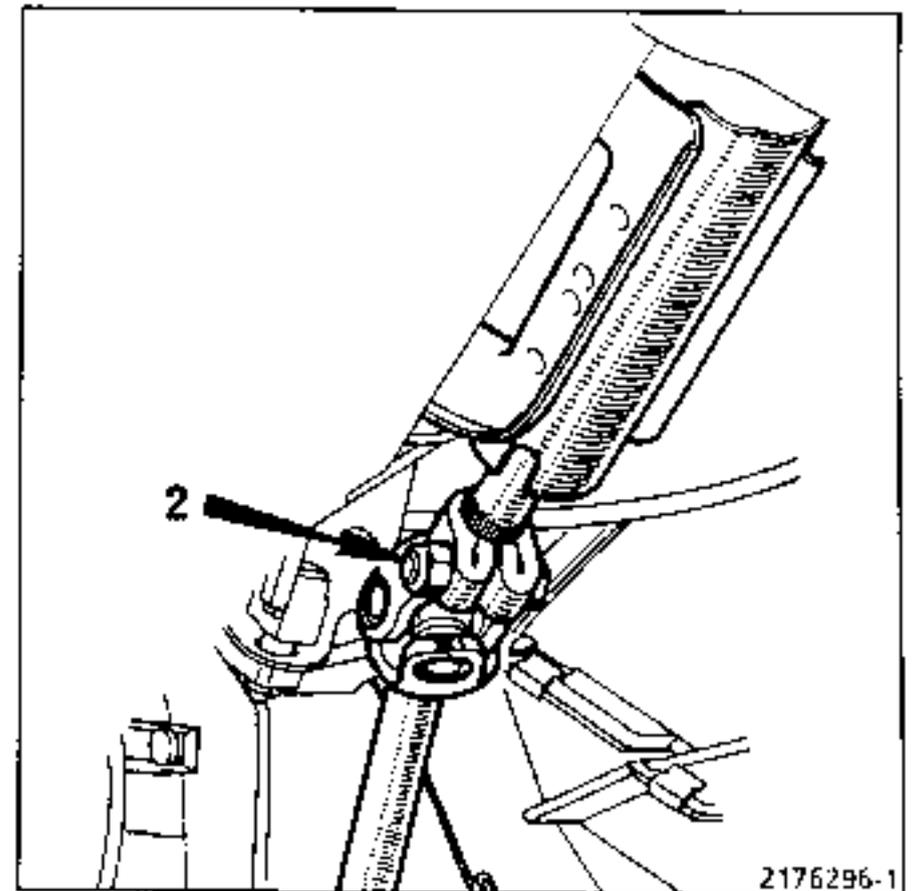
2nd TYPE



NOTE : On the 1st type, the glove compartment must be opened to remove the cover under the steering wheel.

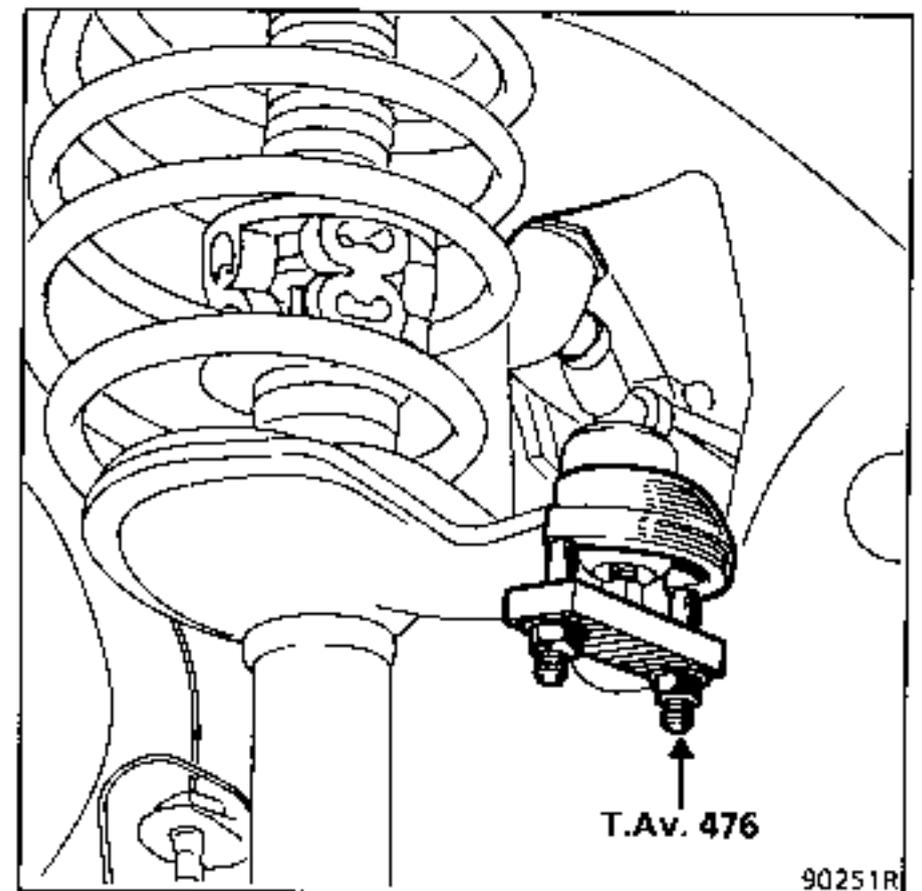
In all cases, remember to remove the bolt located under the steering column adjusting lever.

Move the steering rack to the righthand side and remove bolt (2) securing the intermediate shaft to the steering wheel shaft.



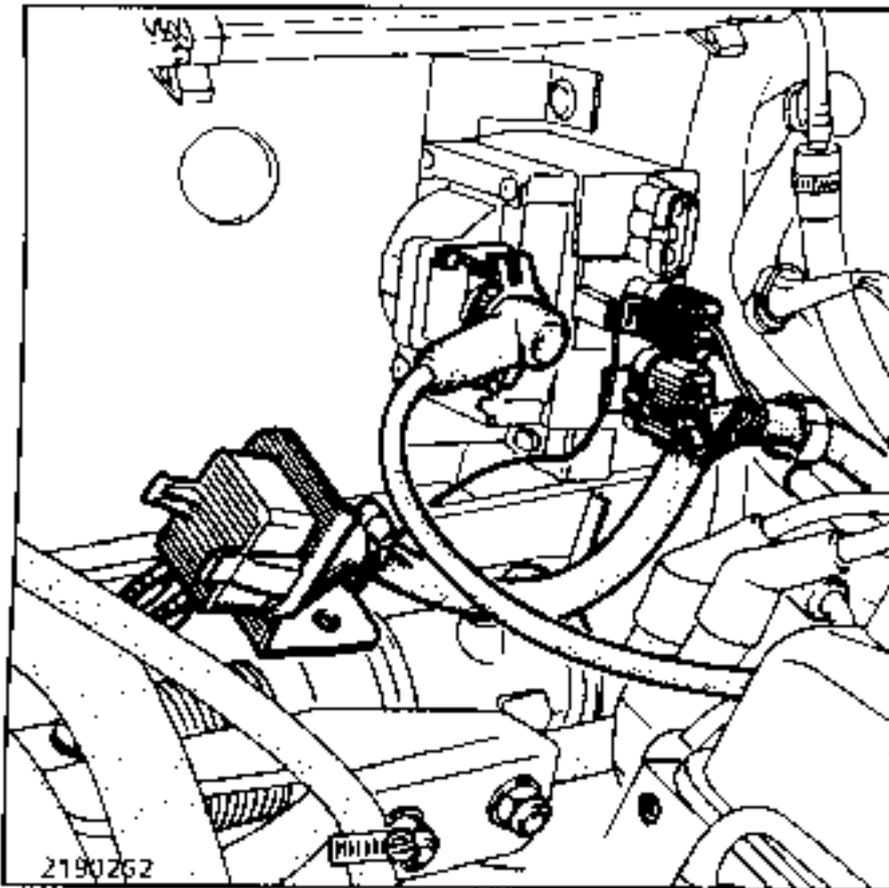
Disconnect :

- the ball joints using tool T.Av. 476.



Depending on engine type

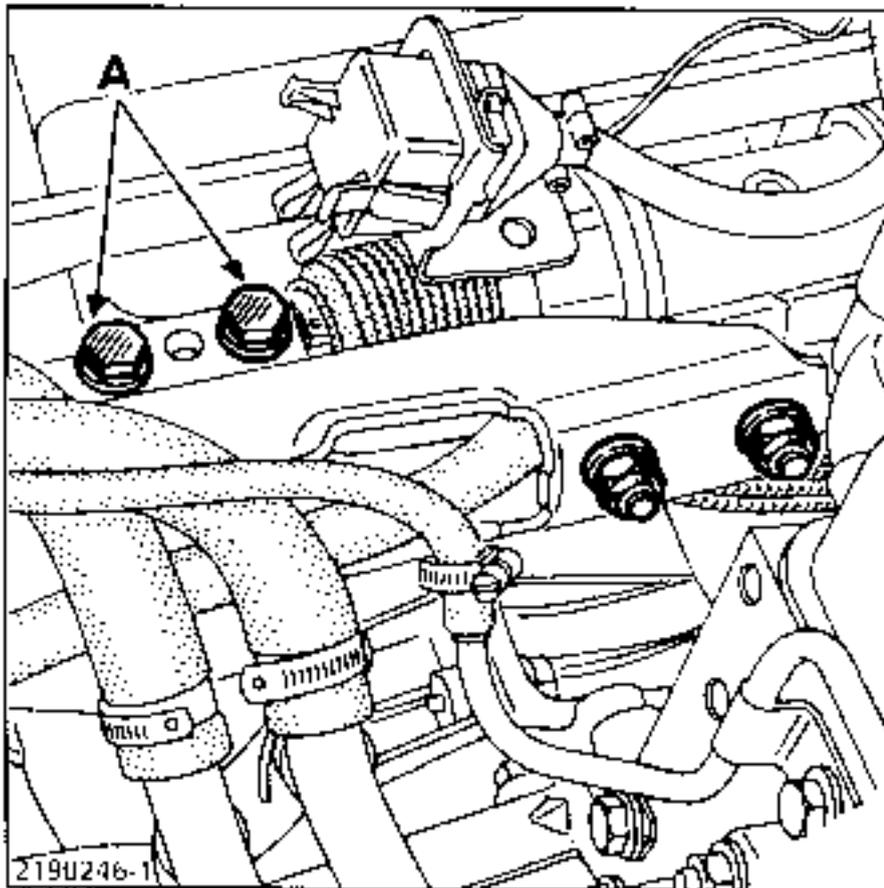
- disconnect the power module leads,



- the diagnostic plug and its mounting.

All types

- bolts (A) securing the steering arm link.



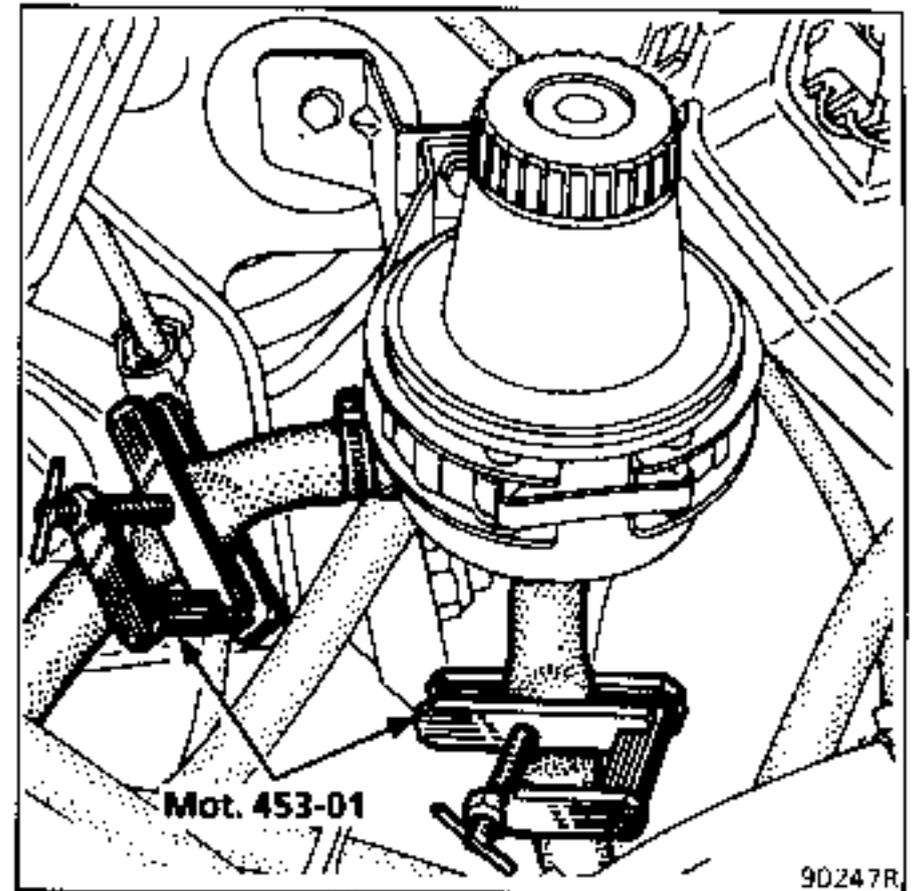
NOTE : As the steering rack nose has threaded bolt holes, the lock nuts must first be removed from bolts (A).

- free the link/arm assembly from the righthand side.

Move the steering rack to the lefthand side.

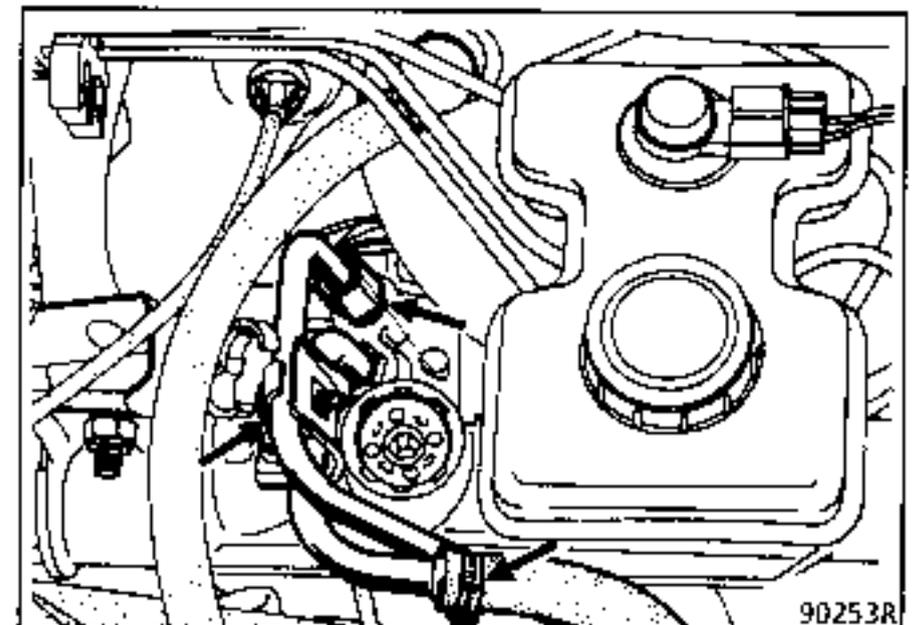
Power-assisted steering

Fit a clamp Mot. 453-01 to each of the hoses coming from the oil reservoir.



Remove:

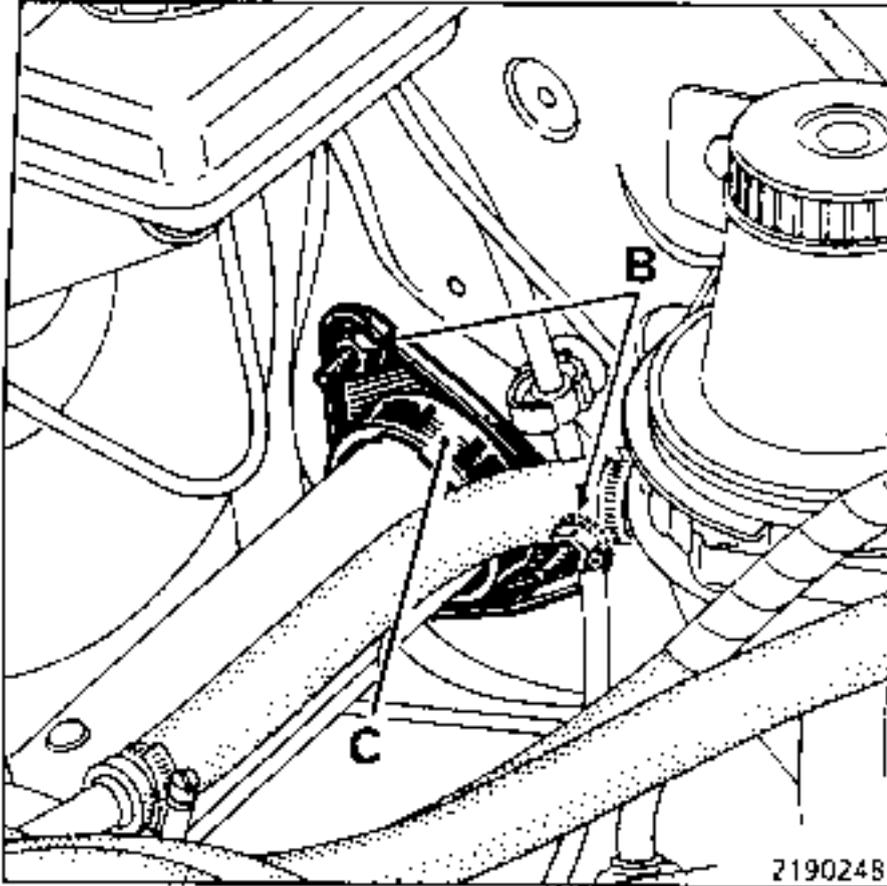
- the hose mounting bracket,
- the high pressure lines from the valve union,
- the low pressure lines from the hose union.



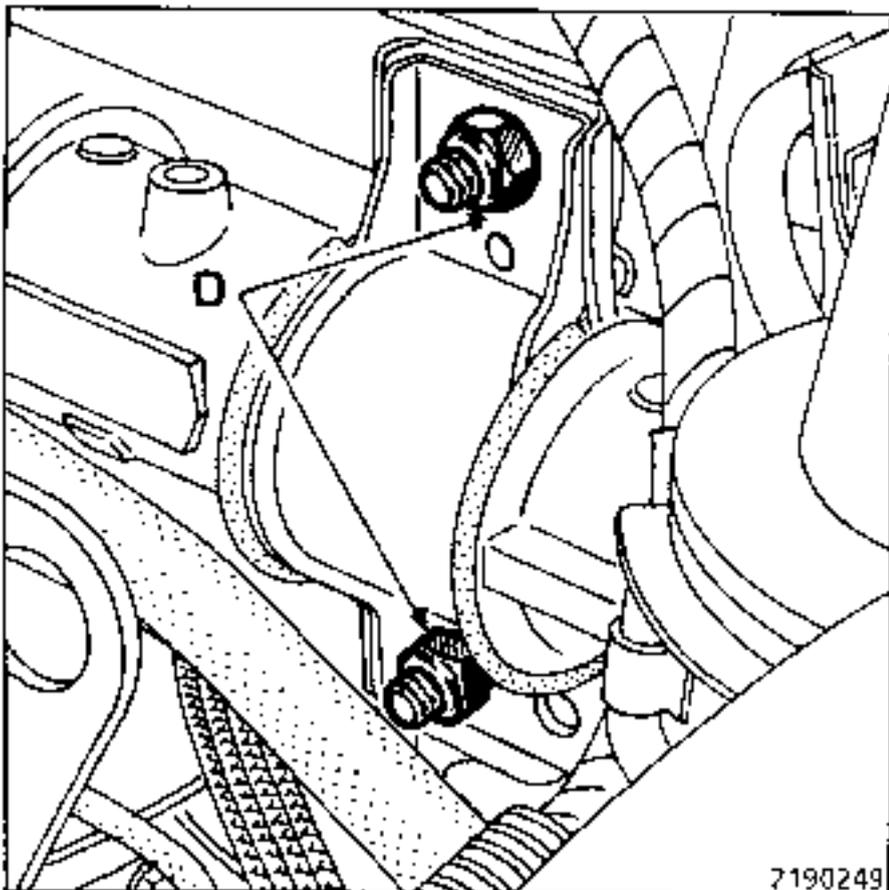
All types

Remove:

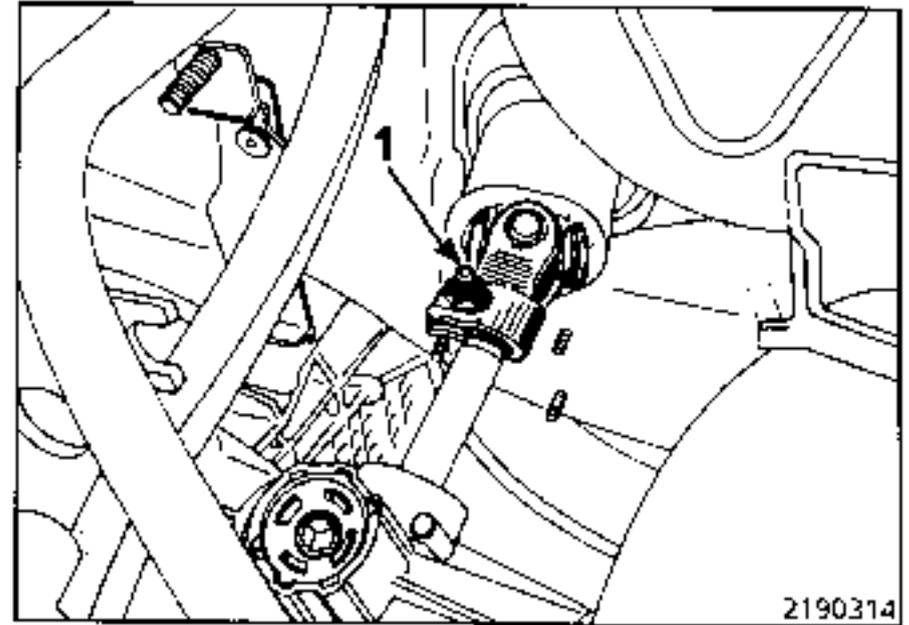
- the three nuts (B) securing the steering body to the shock absorber turret and free securing flange (C) from the studs on the body shell,
- the PVC collar holding the bulkhead gaiter on the steering box,



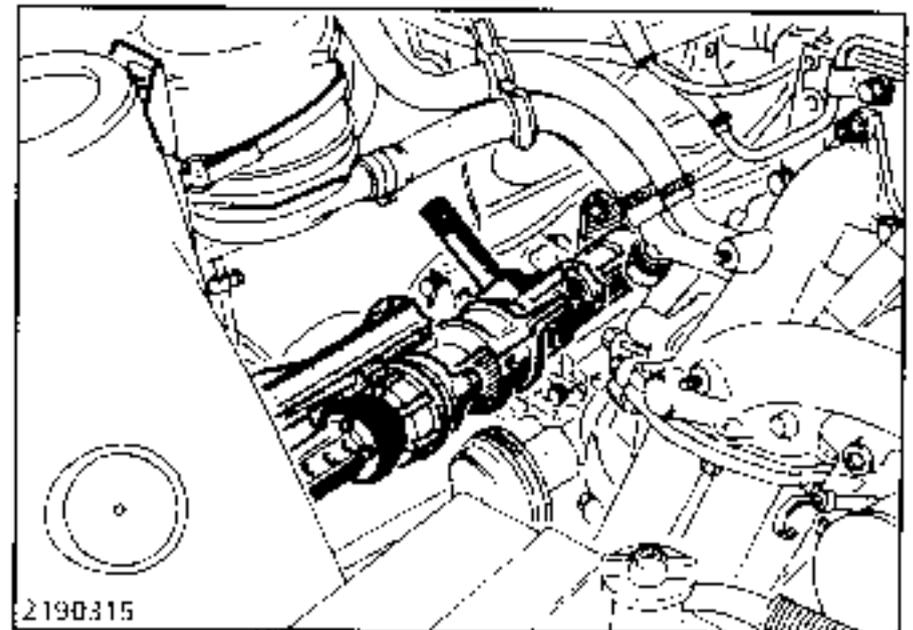
- the two centre bearing nuts (D).



Free the steering box, moving it forward and remove bolt (1) securing the universal joint.



Tilt the steering box downwards and remove it from the righthand side.



Depending on engine type

NOTE : Take care not to damage the TDC sensor.

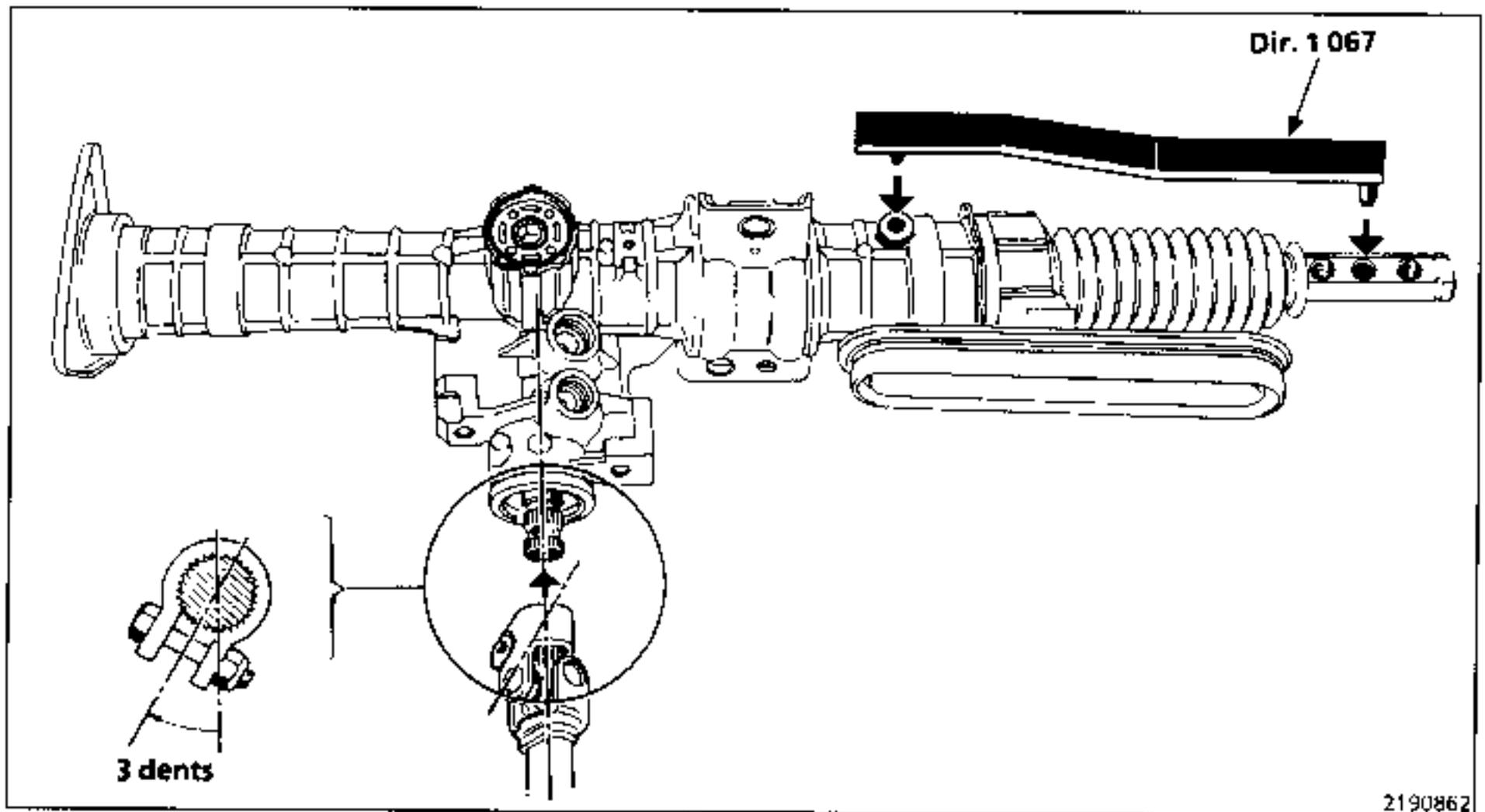
REFITTING

All types - conventional and power-assisted steering - right and lefthand drive.

The coupling universal joint must be positioned correctly so as to prevent any disturbance of the vehicle's roadholding.

Fit tool Dir. 1 067 to the steering box.

Bring the steering box, without fitting it, onto the centre bearing studs then engage the universal joint so that the mounting bolt centreline is in the lower horizontal position, then offset it by 3 teeth in the clockwise direction, as shown in the diagram below.



In this position, fit bolt (1) and tighten it.

Fit in place :

- the steering box on its anchorages, making sure that the intermediate shaft is properly positioned in its location,
- the centre bearing securing nuts,
- the flange and securing nuts on the shock absorber turret,
- a new PVC collar for holding the bulkhead gaiter on the steering box.

Torque tighten the securing points.

Power-assisted steering

Reconnect the pipes and the pipe mounting bracket.

All types

Move the steering rack to the righthand side.

Fit in place :

- the link/arm assembly.

NOTE : As the steering rack nose has threaded bolts, the bolts must be torque tightened.

Fit :

- the link securing bolts,
- the lock nuts on these bolts.

Depending on engine type

Refit :

- the power module leads,
- the diagnostic plug with its mounting.

All types

- the intermediate shaft in the steering wheel shaft,
- the sound-deadening cover,
- the cover under the steering wheel,
- the ball joints to the stem of the shock absorber.

Power-assisted steering

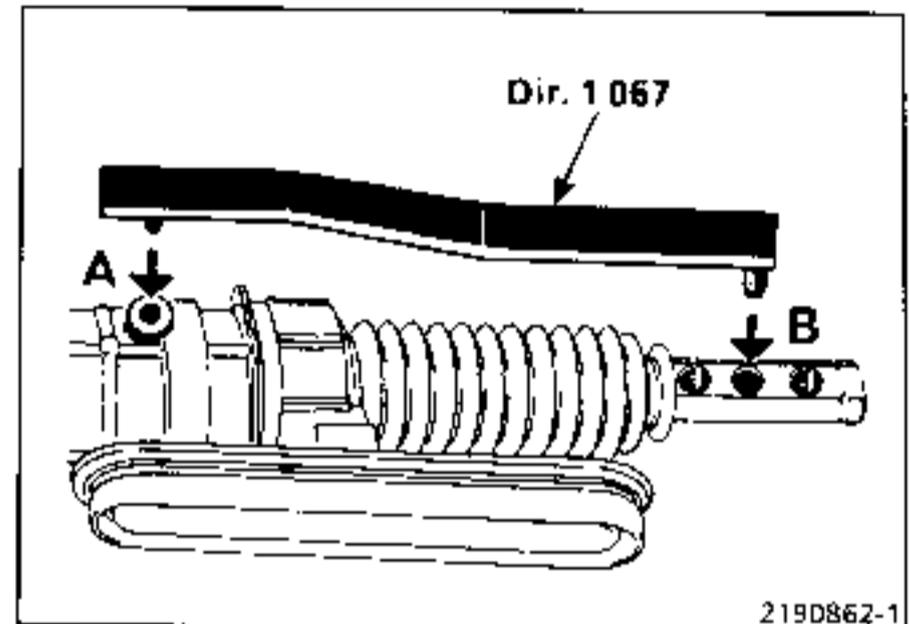
Fill the oil system with oil up to the level of the grille in the chamber. Turn the wheels from left to right (engine not running) so as to distribute the oil in the system. Repeat the operation with the engine running, then top up the oil (see section on "Refilling the system").

All types

check and, if necessary, adjust the parallelism.

To do this :

fit tool Dir. 1 067 in holes(A) and (B) of the steering box and rack.



In this position, fit the measuring equipment and check the parallelism.

If the steering plunger is knocking, before the steering box is replaced, it is essential to check that the plunger is properly set.

DETERMINING THE SOURCE OF THE KNOCKING

Take the rack bar on the side where the plunger is located and find the axial clearance (from front to rear). If there is knocking, adjust the plunger.

ADJUSTING THE VEHICLE

Unlock adjusting nut (1) by tapping back flanged portion (A).

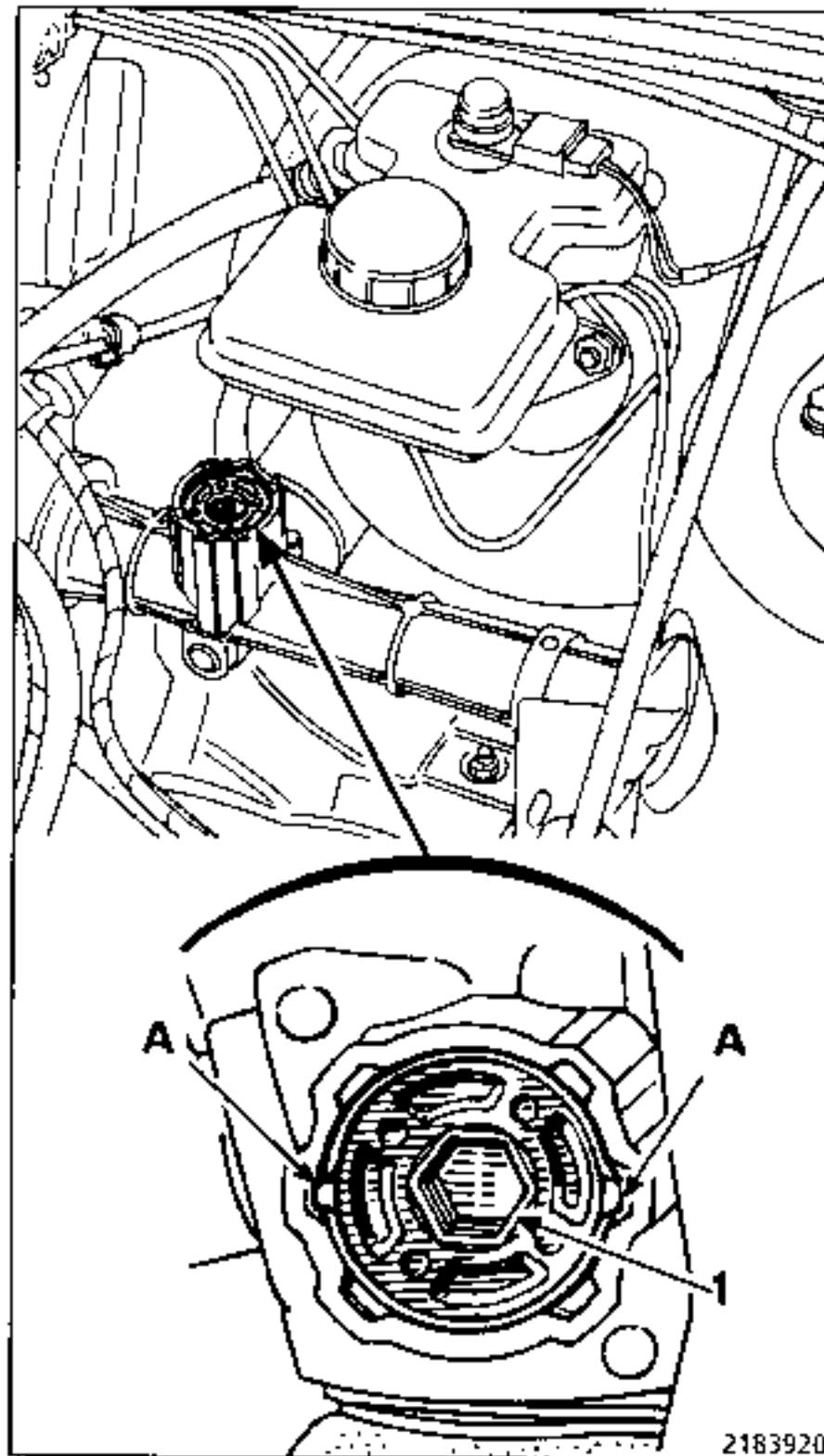
Tighten the adjusting nut by 2 notches using a 10 mm male hexagon head key. Check that the clearance has disappeared.

Maximum permissible clearance : 3 notches.

Relock the nut using two opposite recesses in the steering box and folding down the nut flange.

This operation is performed :

- After removing the steering on all transverse engines.
- In-situ without removing the steering on all in-line engines.

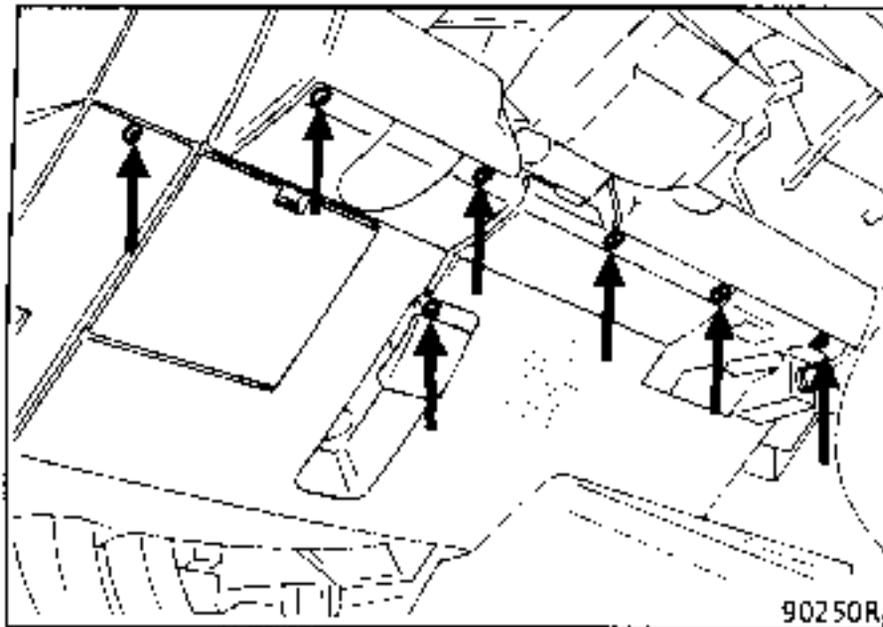


A locking lever located below the steering column enables the height of the steering wheel to be adjusted to suit the driver. In some cases, the tightness of this locking mechanism has to be adjusted.

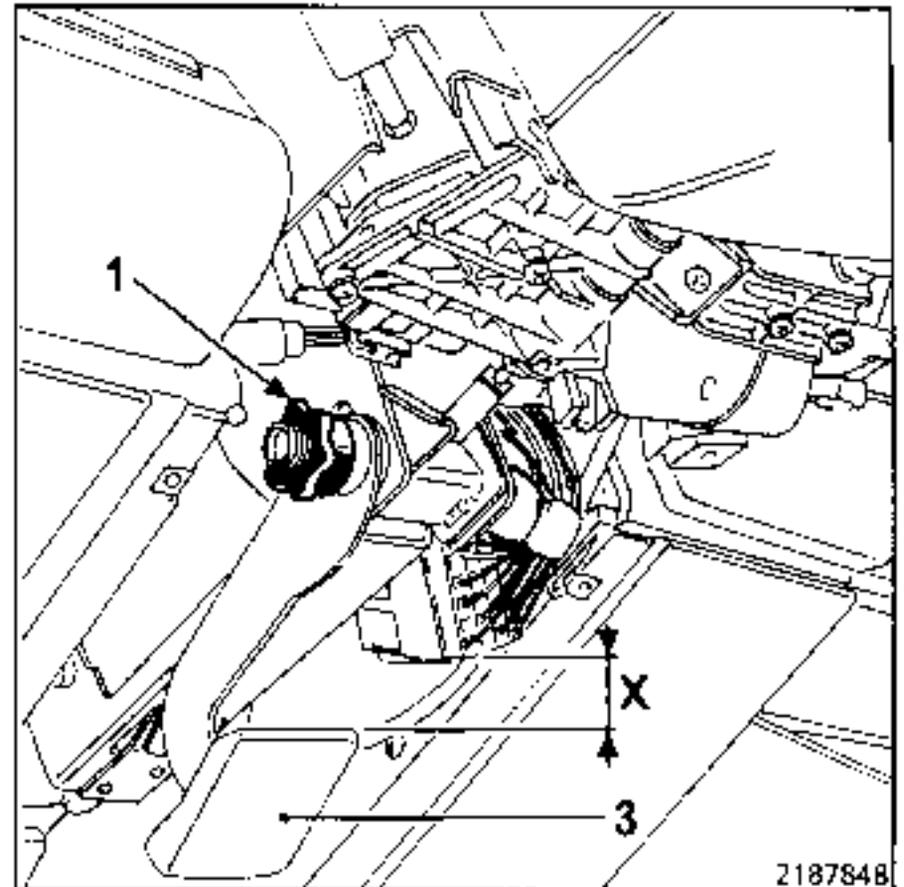
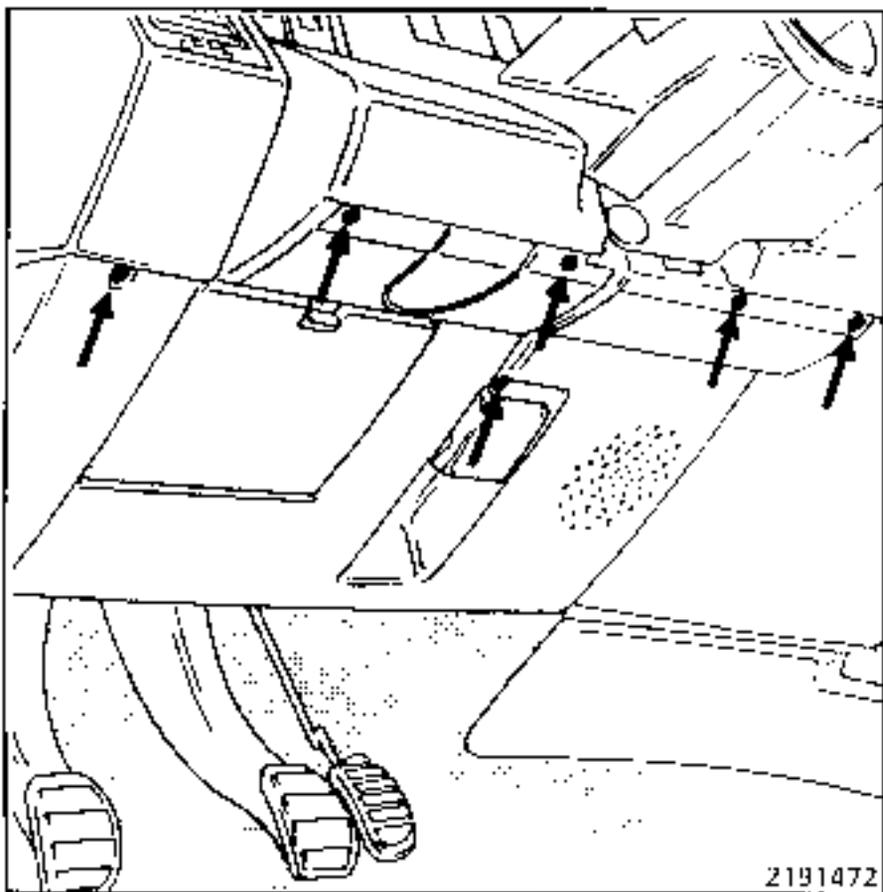
ADJUSTING THE DEGREE OF TIGHTNESS

Remove: the lower cover under the steering wheel.

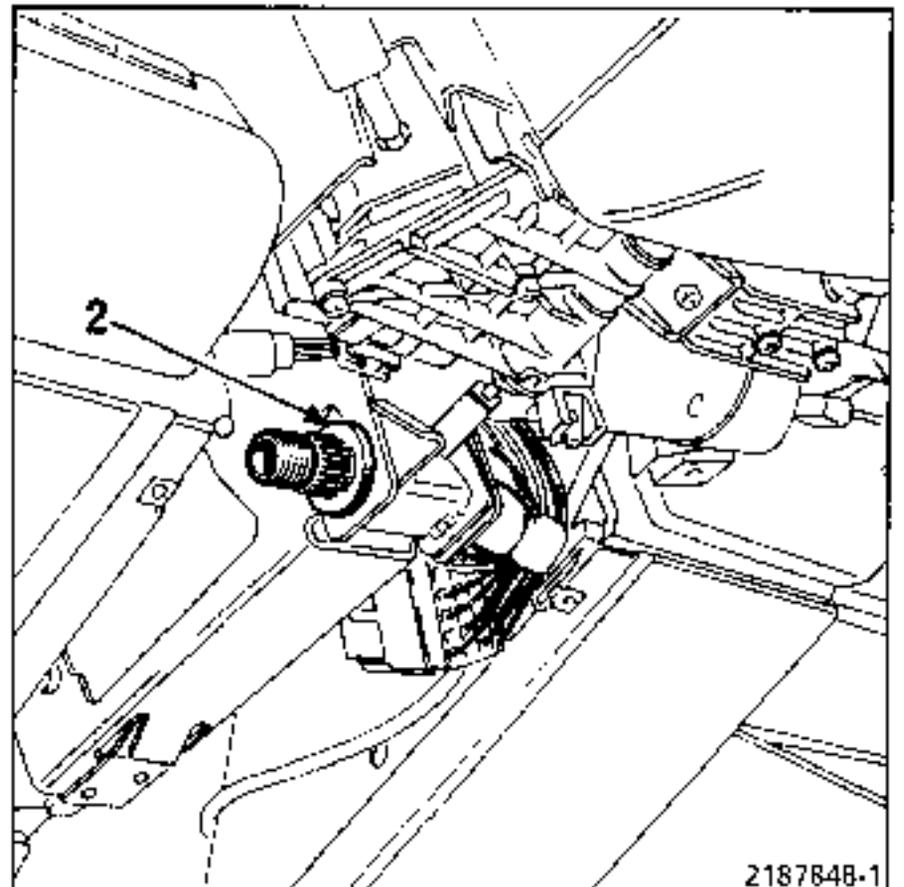
1st TYPE



2nd TYPE



Lock the steering column by tightening nut (2) using locking lever (3).



Position the locking lever (3) so that $X = 30$ mm away from the steering mounting.

Refit:

- nut (1),
- the lower cover under the steering wheel.

Check that the lever is accessible. If it is not, increase or reduce the distance by 10 mm.

NOTE : To remove the cover under the steering wheel on type 1 vehicles, the glove compartment has to be opened.

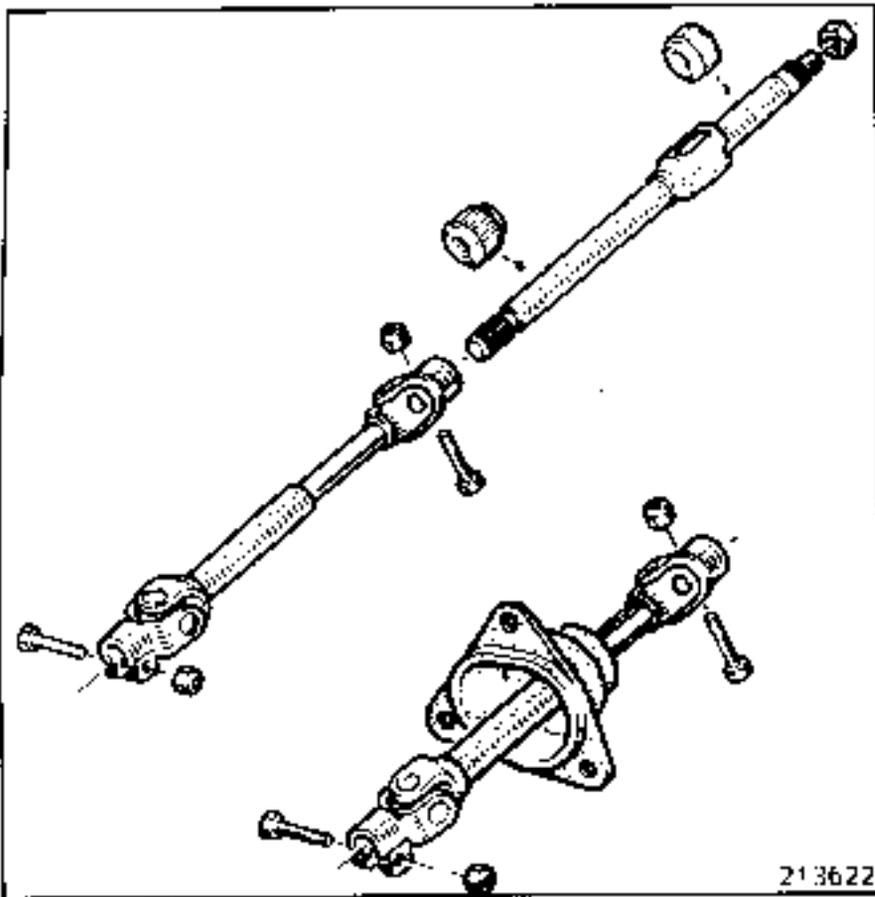
Slacken nut (1) locking the lever.

Move the steering wheel shaft to the lowest position possible.

TIGHTENING TORQUES (in daN.m)



Steering wheel nuts	4
Steering universal joint nuts (suggested torque)	2.5

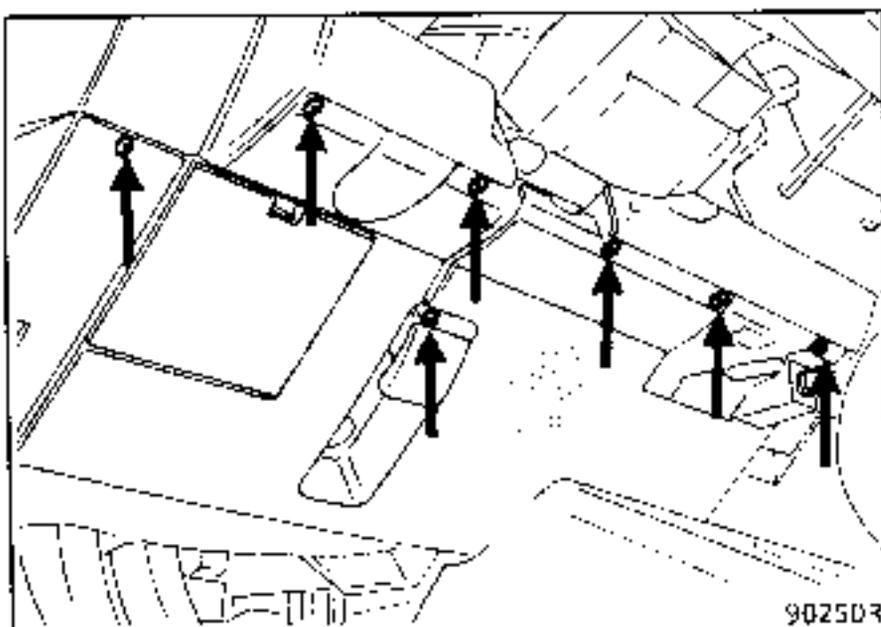


213622

REMOVAL

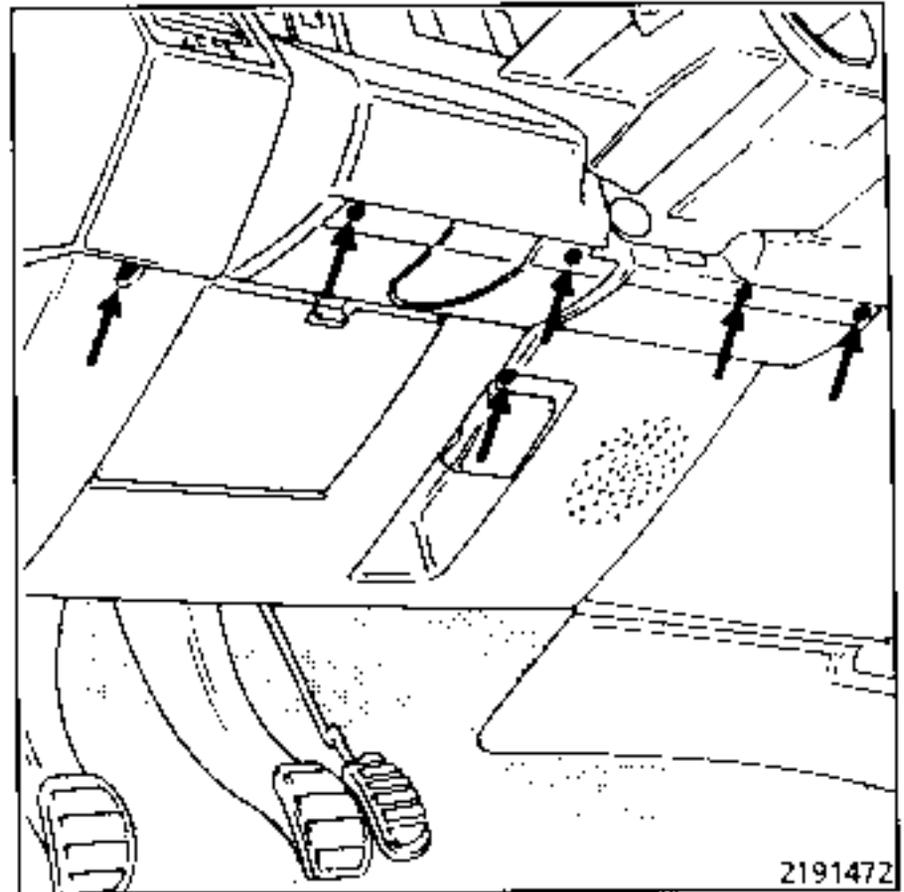
- Remove :
- the lower cover under the steering wheel.

1st TYPE



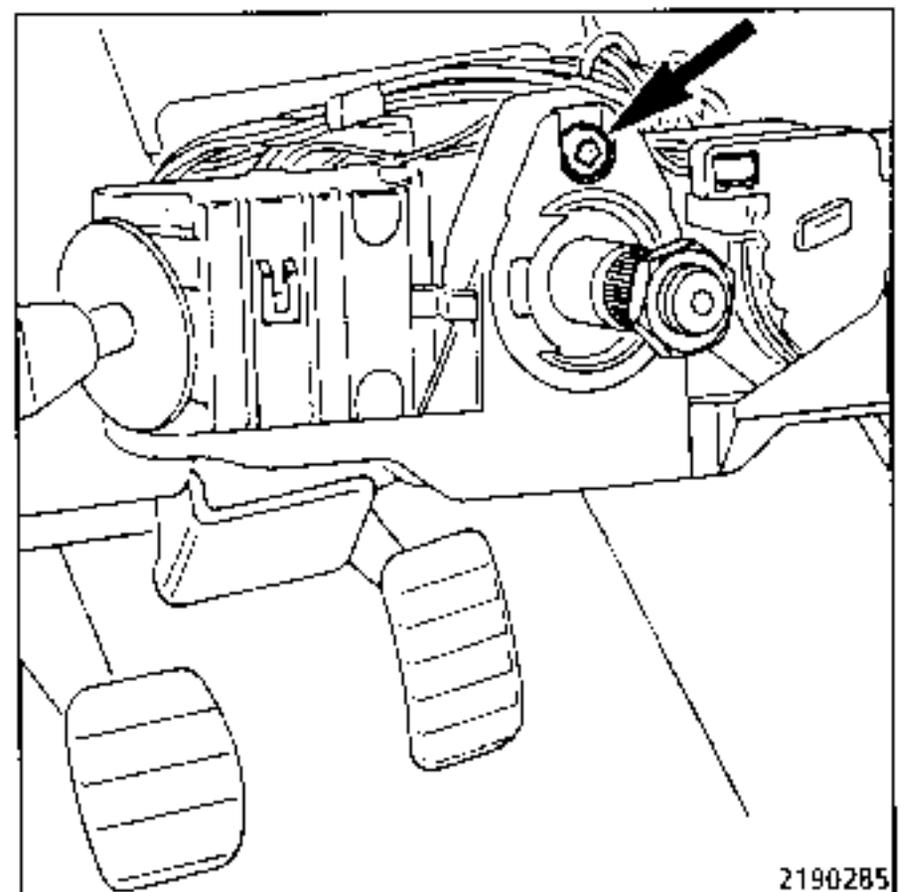
902503

2nd TYPE



2191472

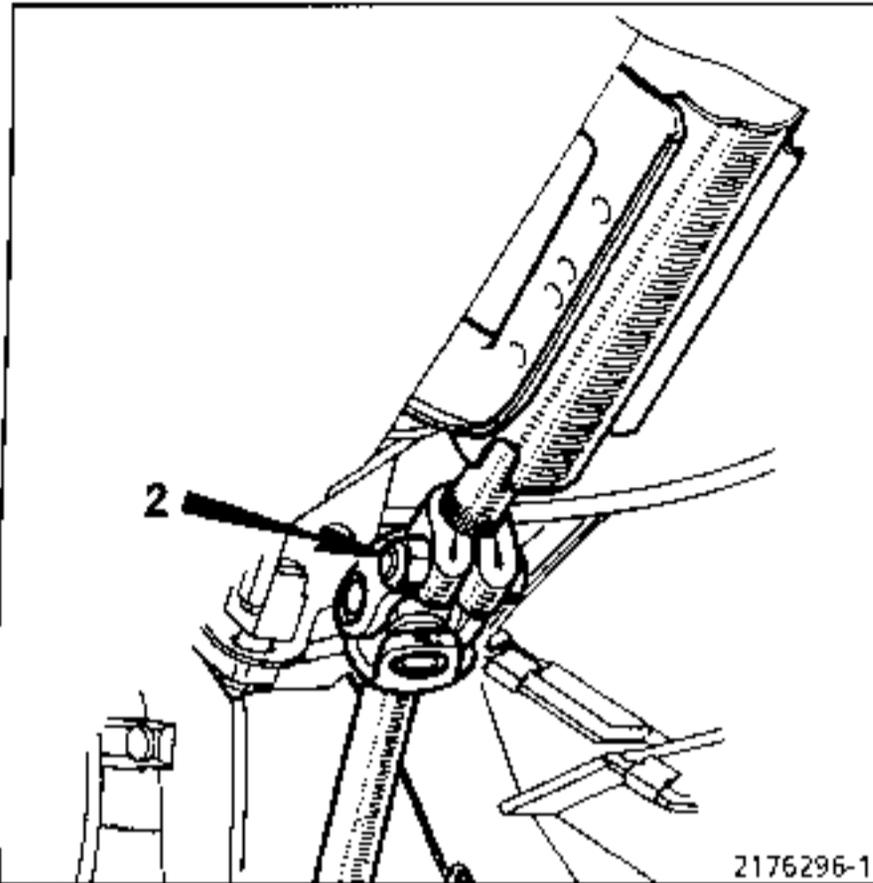
- the lower and upper steering wheel half shells,
- the steering wheel, after marking its position,
- the screw from the control switch on the steering wheel,



2190285

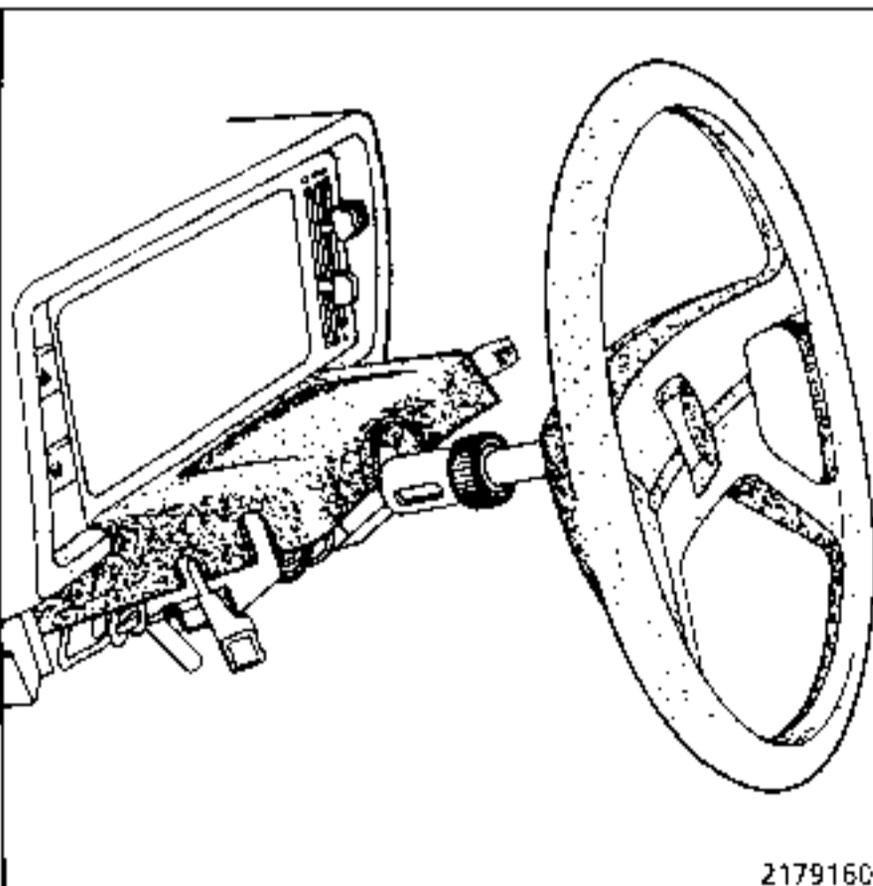
NOTE : Open the glovebox.

- bolt (2) securing the intermediate shaft and the steering wheel shaft.

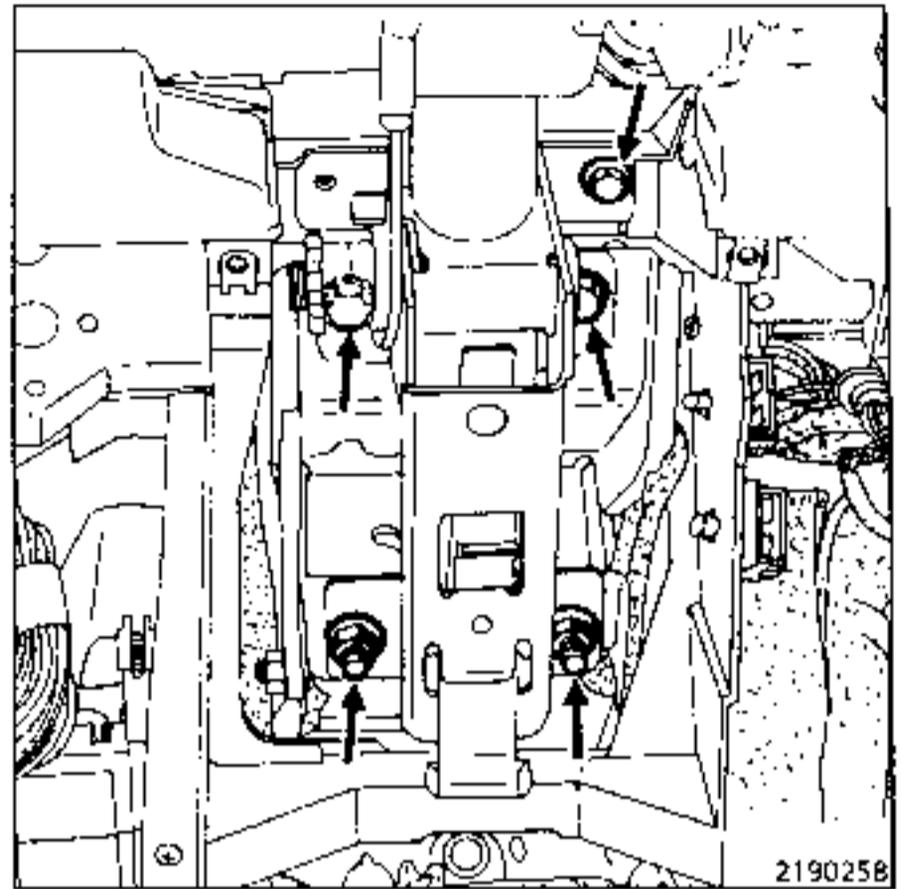


Temporarily refit the steering wheel with its nut, but do not tighten it.

Pull on the steering wheel to free the shaft and upper bush (make sure that the steering lock is completely free).



- Remove :
- the bolt securing the dashboard to the steering column,
 - the four bolts securing the steering column.



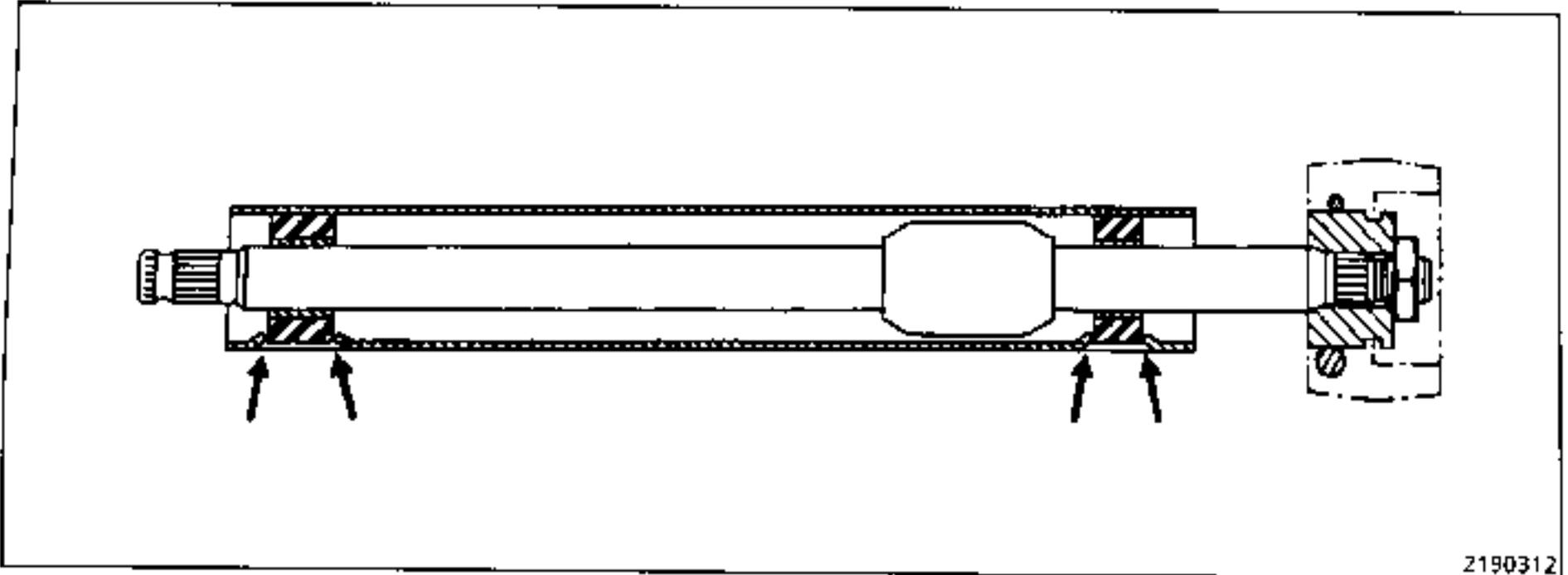
Disconnect the steering lock switch and remove the steering column.

Extract the lower bush using a piece of tubing with a 35 mm outside diameter.

REFITTING

Fit in place :

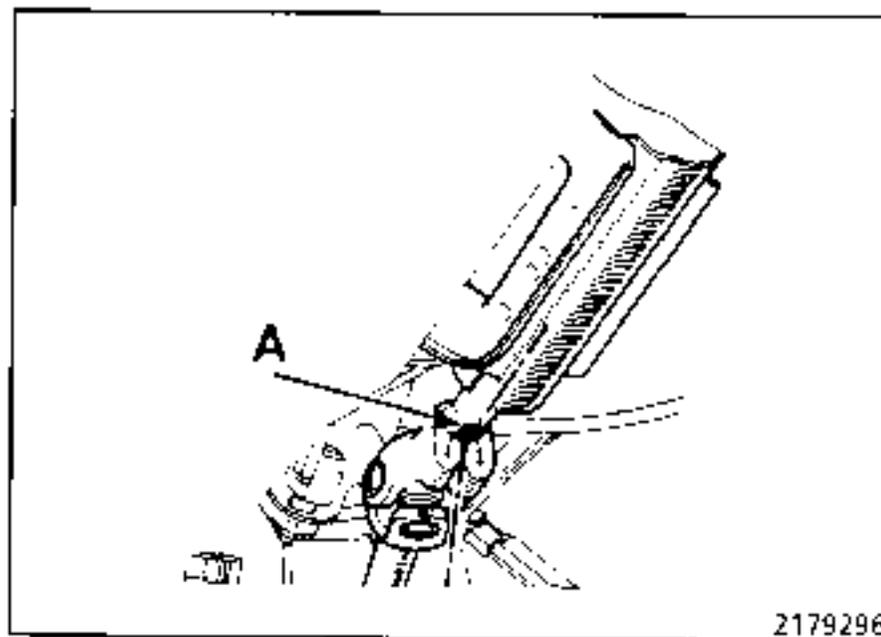
- the NEW lower bottom bush, using a piece of tubing 35 mm outside diameter, after first smearing it with grease,
- the NEW top bush using a piece of tubing 35 mm outside diameter, after first smearing it with grease,



- the steering column.

Reconnect the steering wheel ignition switch.

Insert the steering wheel shaft in the steering universal joint, aligning flat portion (A) on the centreline of the slot and refit the key bolt.



Fit in place :

- the control switch on the steering wheel,
- the steering wheel half shells,
- the lower cover under the steering wheel,
- the steering wheel in the position marked on dismantling.

TIGHTENING TORQUES (in daN.m)



Steering universal joint bolt
(suggested torque)

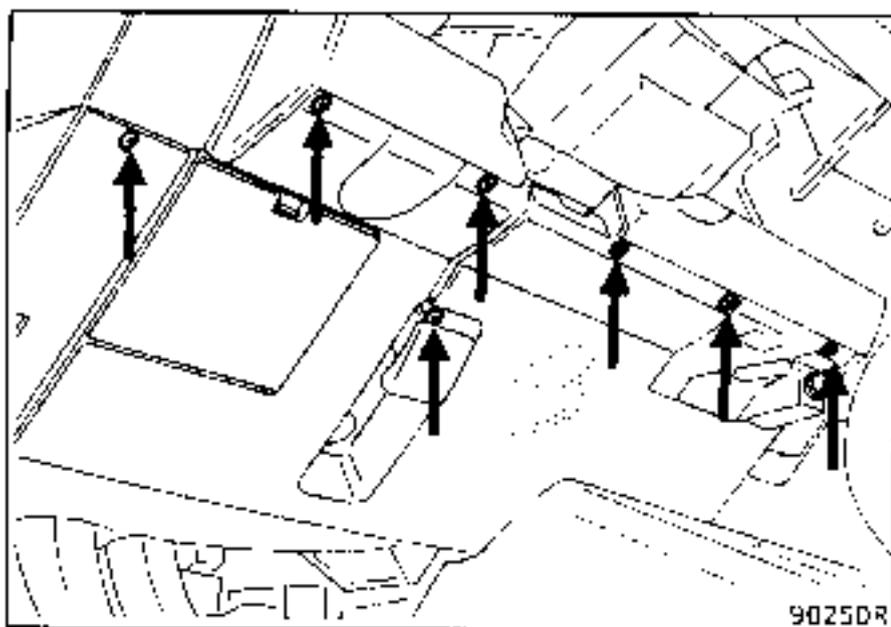
2.5

REMOVAL

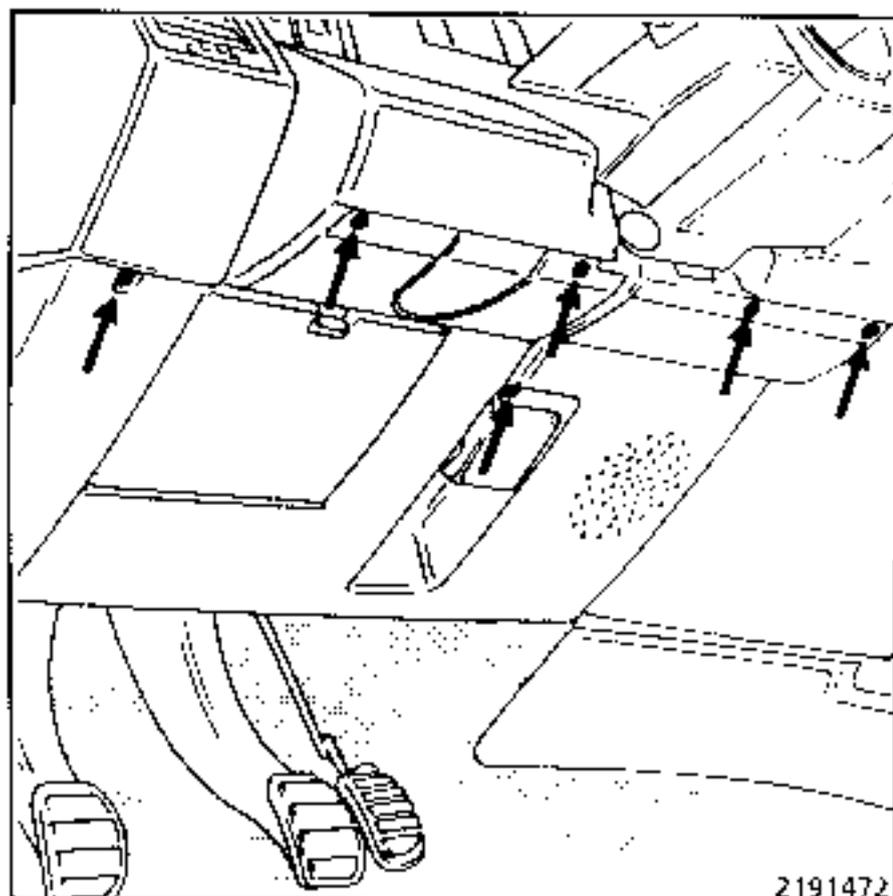
Remove:

- the cover under the steering wheel and the sound-deadening protector,

1st TYPE

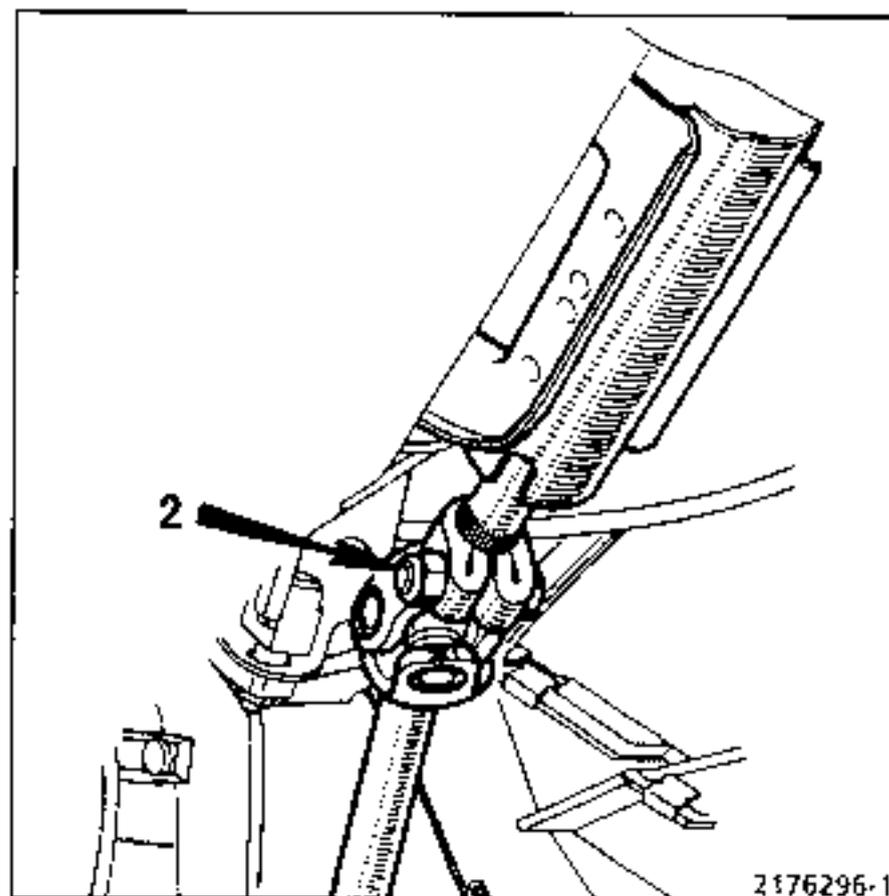


2nd TYPE

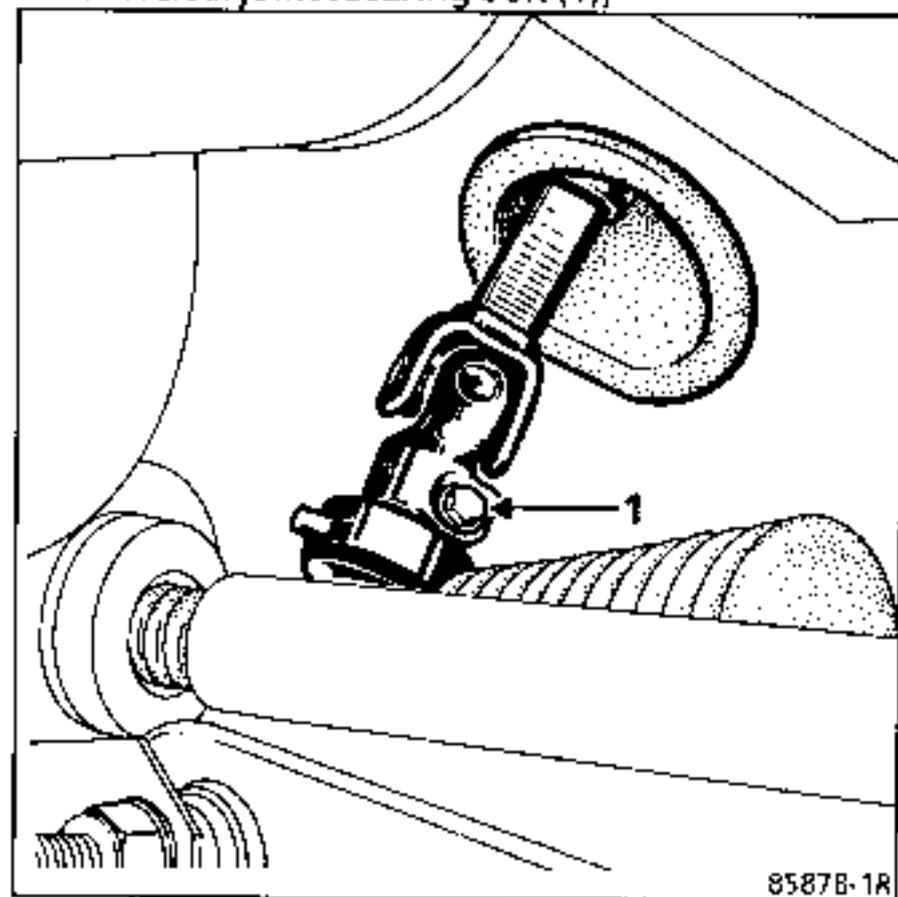


NOTE : To remove the cover under the steering wheel on vehicles of the first type, the glovebox must be opened.

- screw (2) securing the intermediate shaft to the steering wheel shaft,



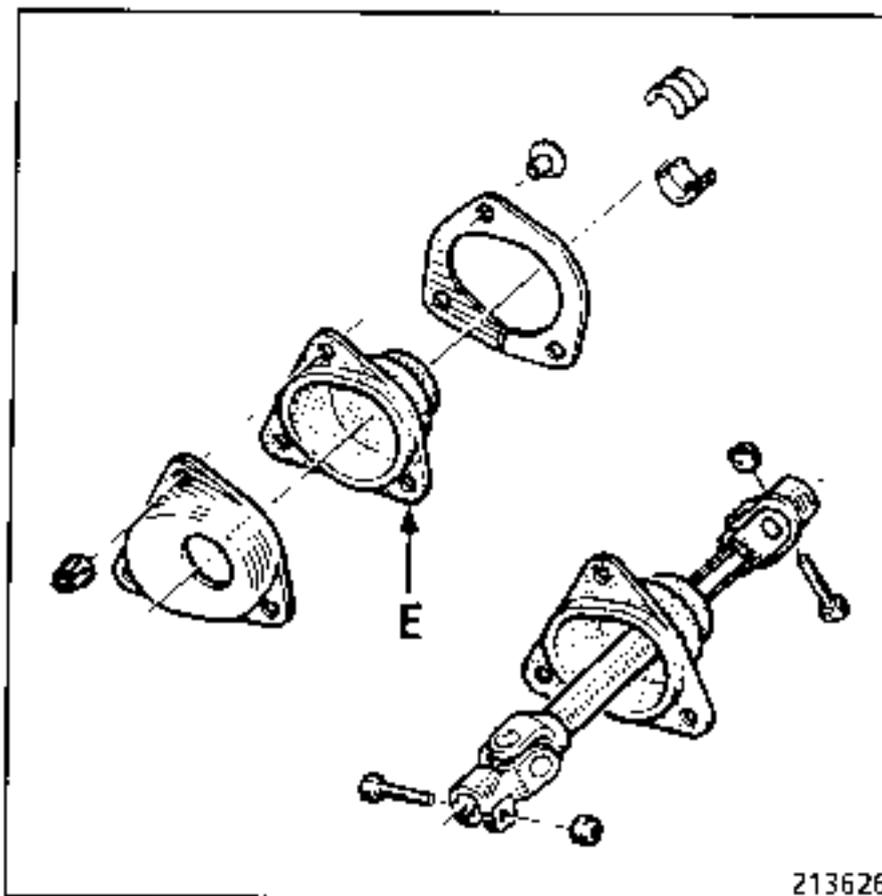
- the plastic protector (on vehicles with conventional steering),
- universal joint securing bolt (1),



- the collapsible steering wheel shaft.

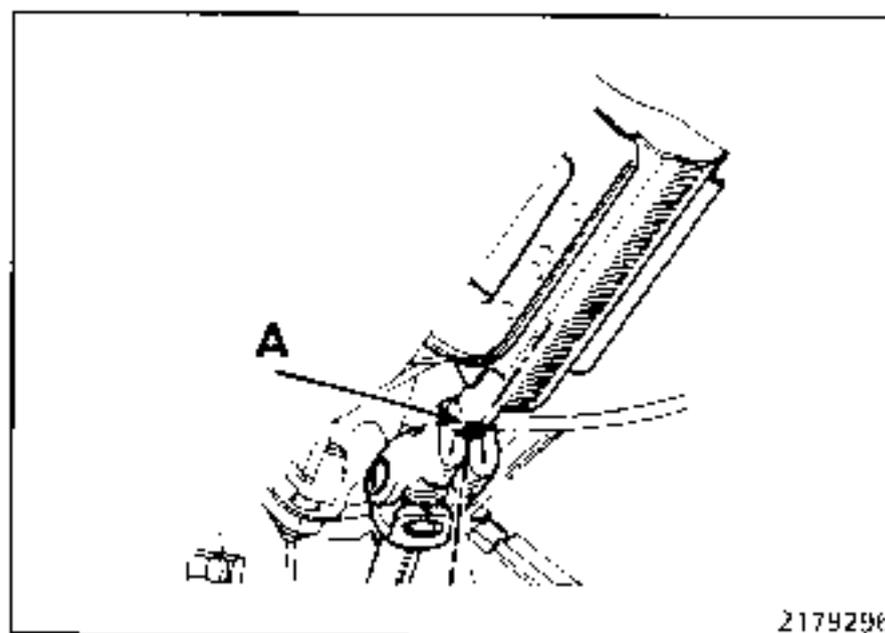
REFITTING

If necessary, change gaiter (E) on the bulkhead.



Fit in place :

- the collapsible steering wheel shaft and tighten universal joint bolt (1),
- the steering wheel shaft in the steering universal joint, aligning flat portion (A) on the centre-line of the slot and refit the key securing bolt,



- the sound-deadening protector,
- the cover under the steering wheel,
- the plastic protection (conventional steering).

The steering box assembly must be released and moved towards the front of the vehicle in order to remove the bolt connecting the collapsible intermediate shaft and the steering wheel shaft.

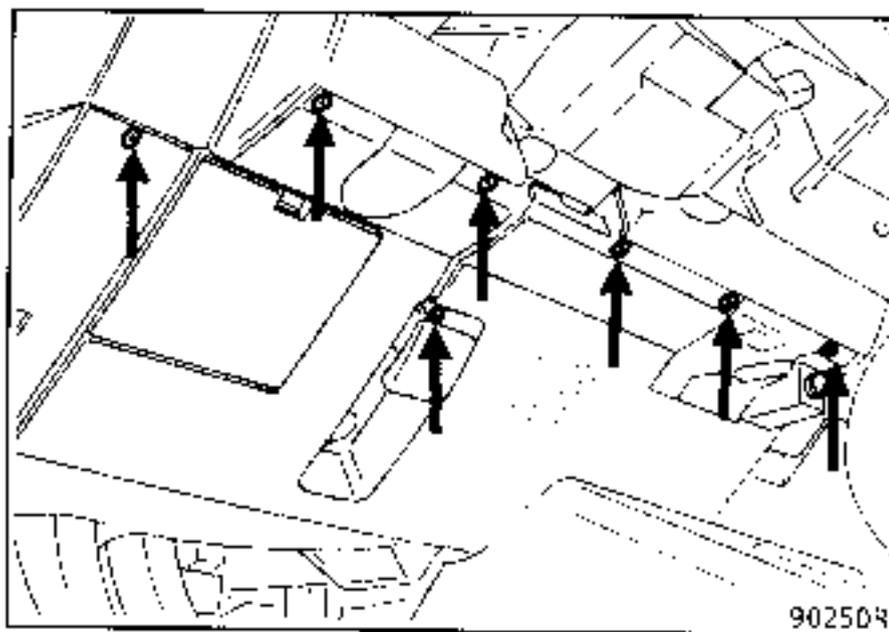
ESSENTIAL SPECIAL TOOLING			
T.Av.	476	Ball joint extractor	
Dir.	1 067	Parallelism adjusting tool	

TIGHTENING TORQUES (idaN.m)		
Centre bearing securing nut	5	
Securing nuts on shock absorber turret	3	
Steering ball joint nut	4	
Bolts securing link to rack	4	
Link bolt lock nut	3.5	
Wheel bolts 4 bolts	9	
5 bolts	10	

REMOVAL

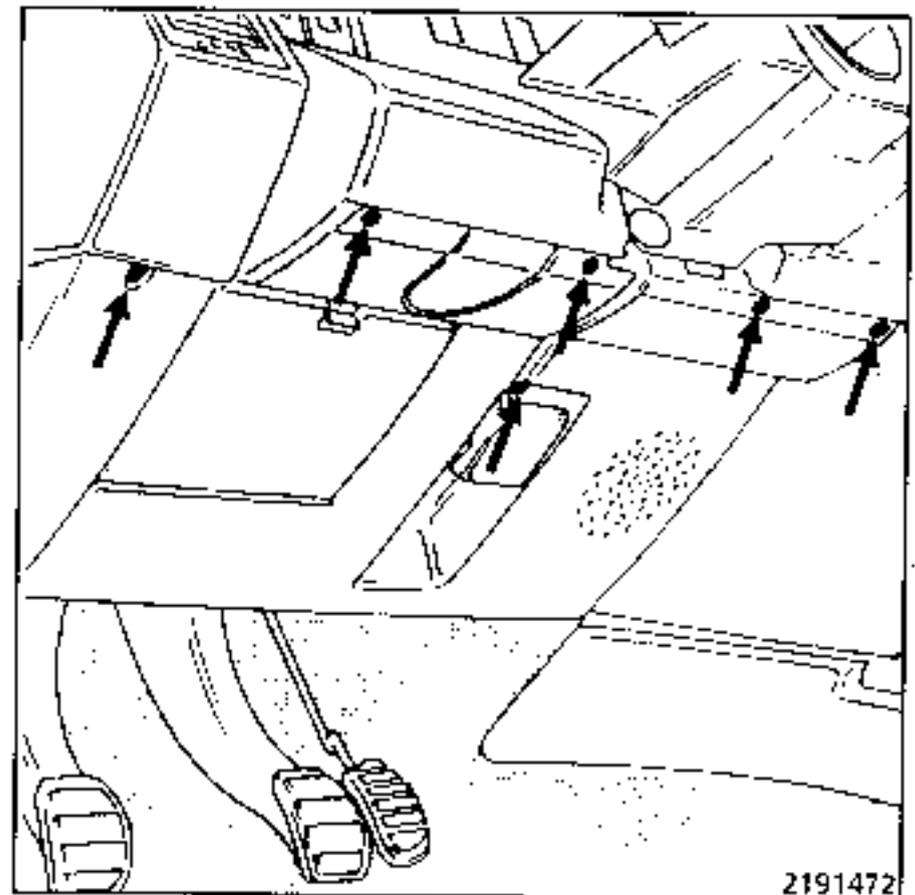
Remove the cover under the steering wheel and the sound-deadening protection.

1st TYPE



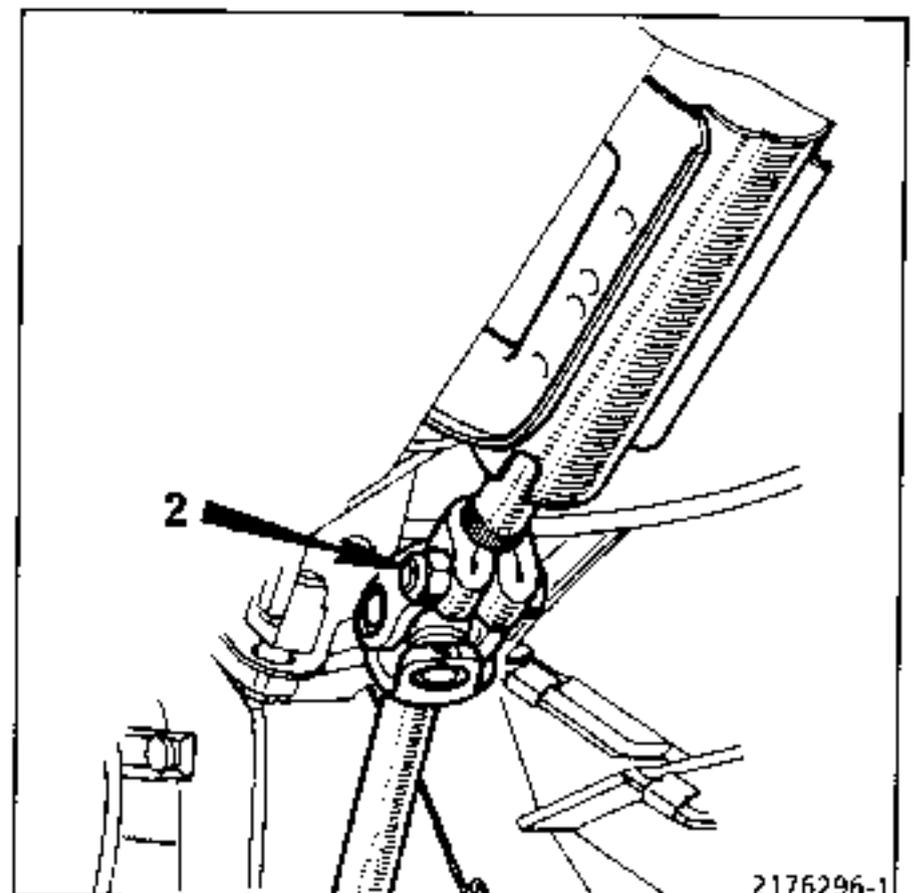
NOTE : On vehicles of the 1st type, the glovebox must be opened in order to remove the cover under the steering wheel.

2nd TYPE

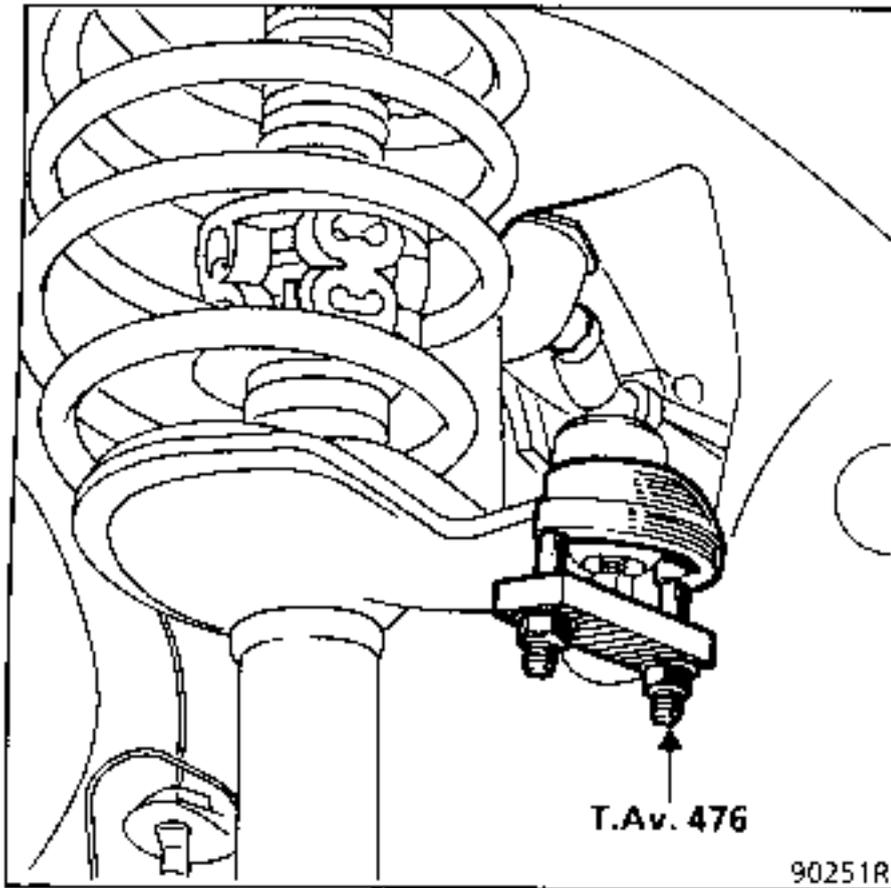


Move the steering rack to the righthand side and remove :

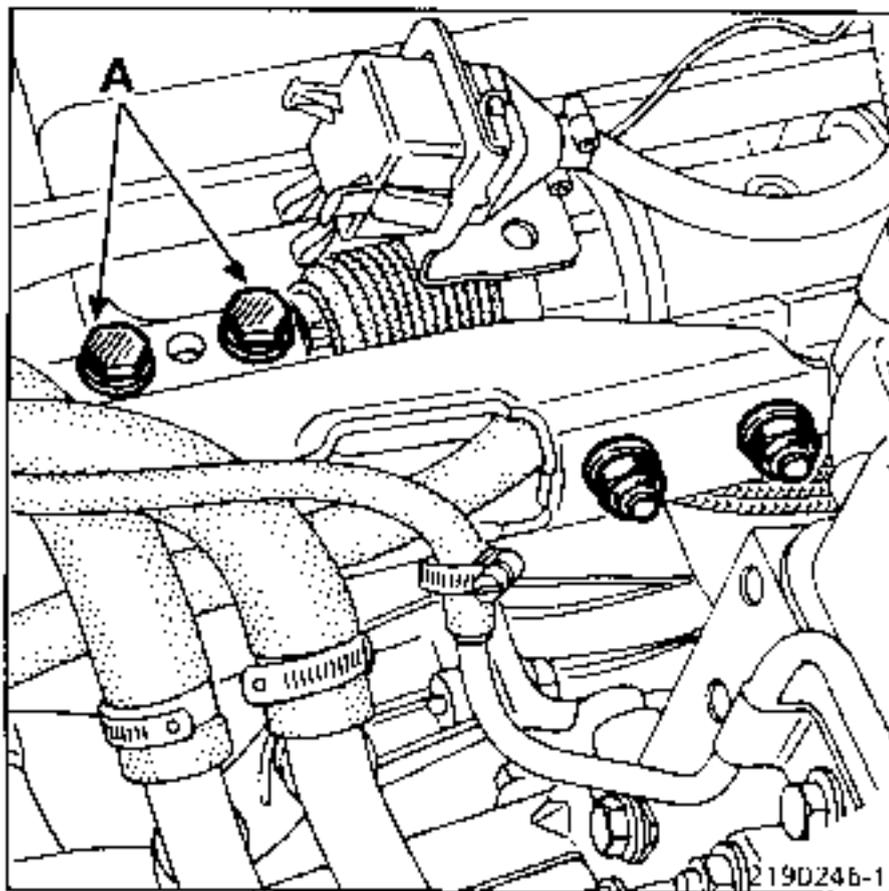
- bolt (2) securing the intermediate shaft to the steering shaft.



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



Remove the bolts (A) securing the steering arm link.

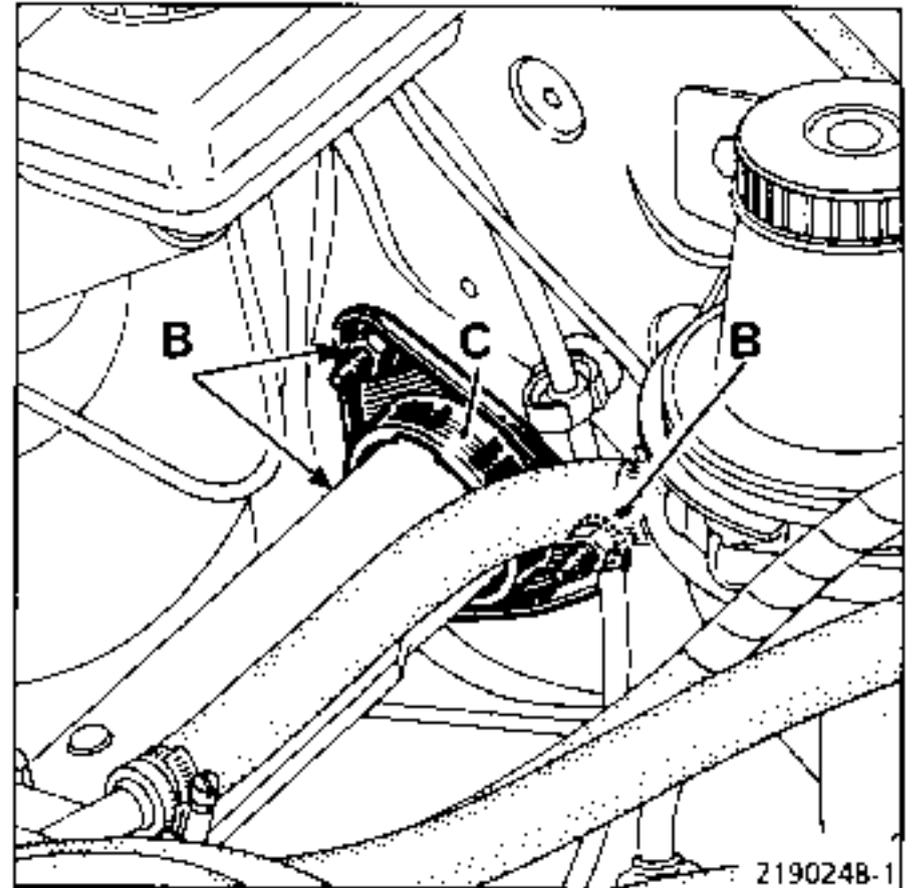


NOTE : As the steering rack nose has threaded bolt holes, the lock nuts must first be removed from bolts (A).

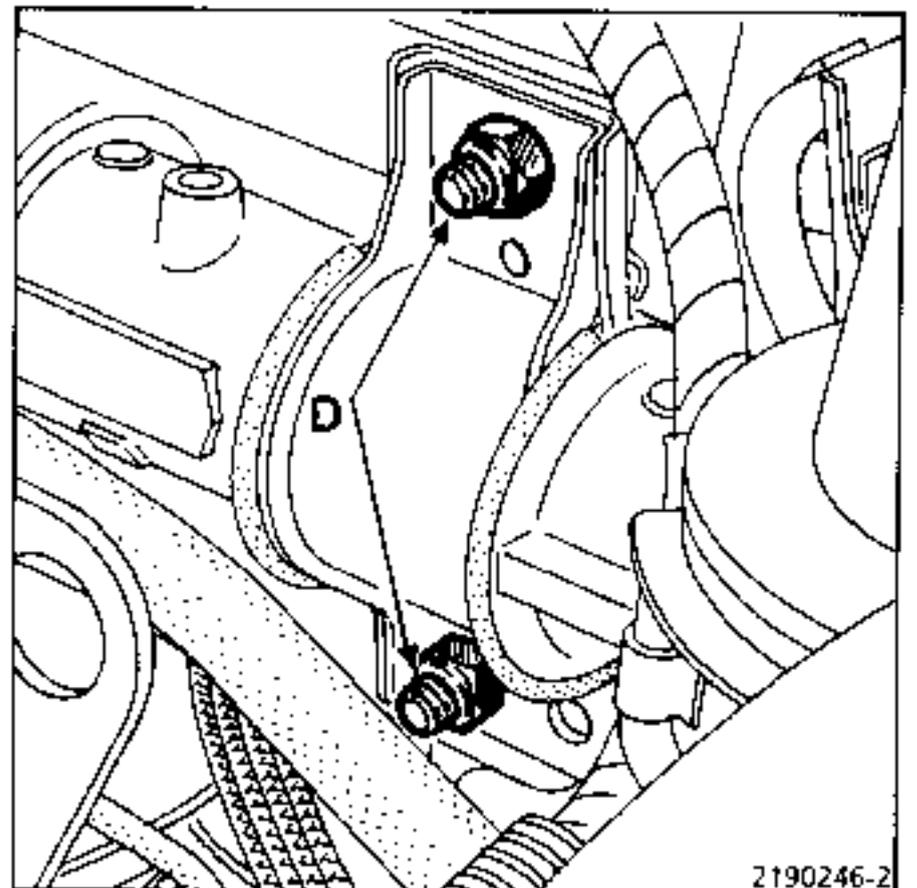
Free the link-steering arm assembly from the right-hand side.

Remove :

- the three nuts (B) securing the steering body on the shock absorber turret and release the securing flange (C) from the studs on the body,



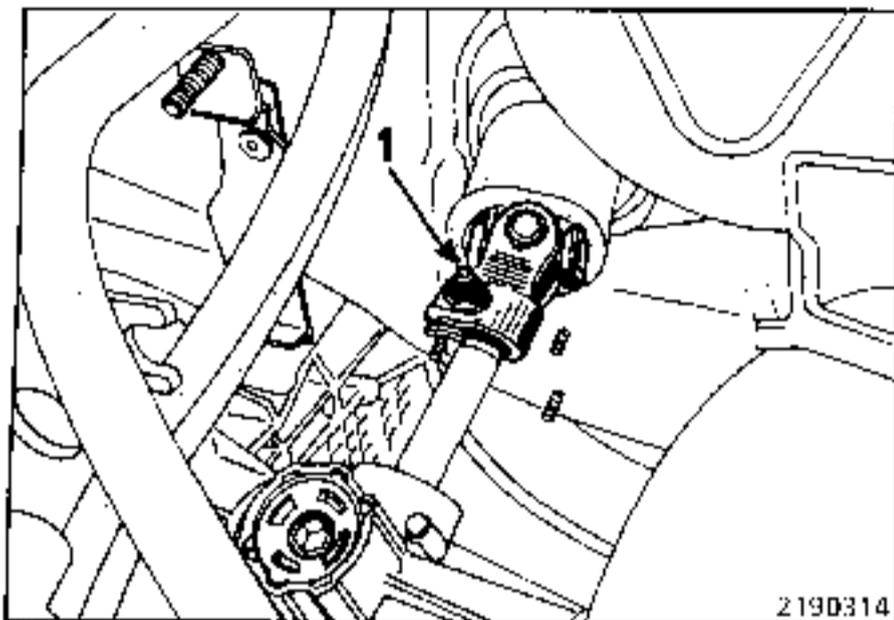
- the two nuts (D) from the centre bearing,



- the PVC collar holding the bulkhead gaiter on the steering box.

Free the steering box, moving it towards the front and remove :

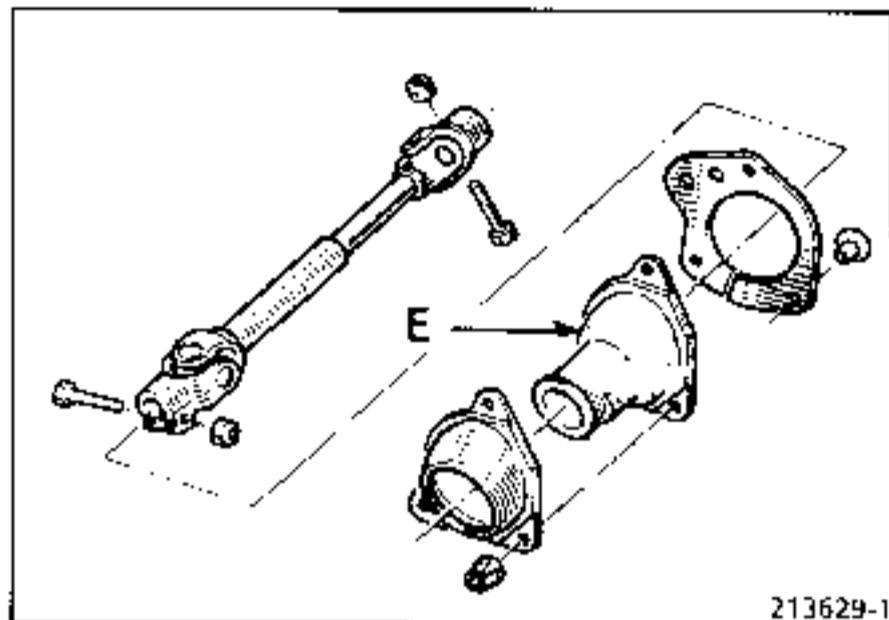
- bolt (1) securing the universal joint,



- the collapsible steering wheel shaft.

REFITTING

Change the gaiter (E) on the bulkhead, if necessary.

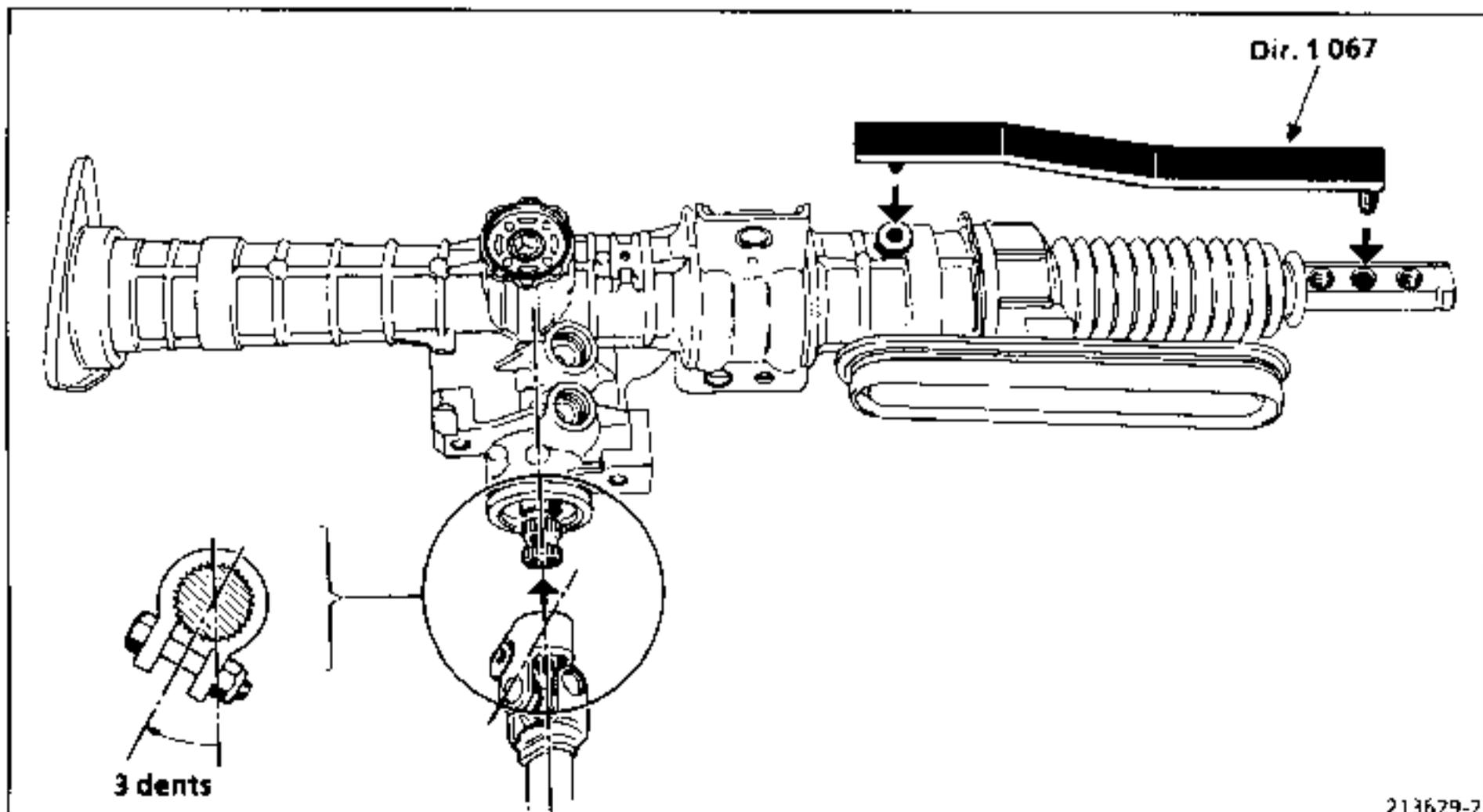


All types - conventional and power-assisted steering - right and lefthand drive.

The steering universal joint must be positioned correctly in order to avoid disturbing the vehicle's roadholding.

Fit tool Dir. 1 067 to the steering box.

Move the steering box, without fitting it, onto the centre bearing studs then engage the universal joint so that the mounting bolt centreline is in the lower horizontal position, then offset it by 3 teeth in the clockwise direction, as shown in the diagram below.



In this position, fit :

- the collapsible steering wheel shaft and secure universal joint securing bolt (1),
- the steering box on its anchorages, making sure that the collapsible shaft is correctly positioned in its location in the passenger compartment,
- the centre bearing securing nuts,
- the flange and securing nuts on the shock absorber turret,
- a new PVC collar, for holding the bulkhead gaiter on the steering box.

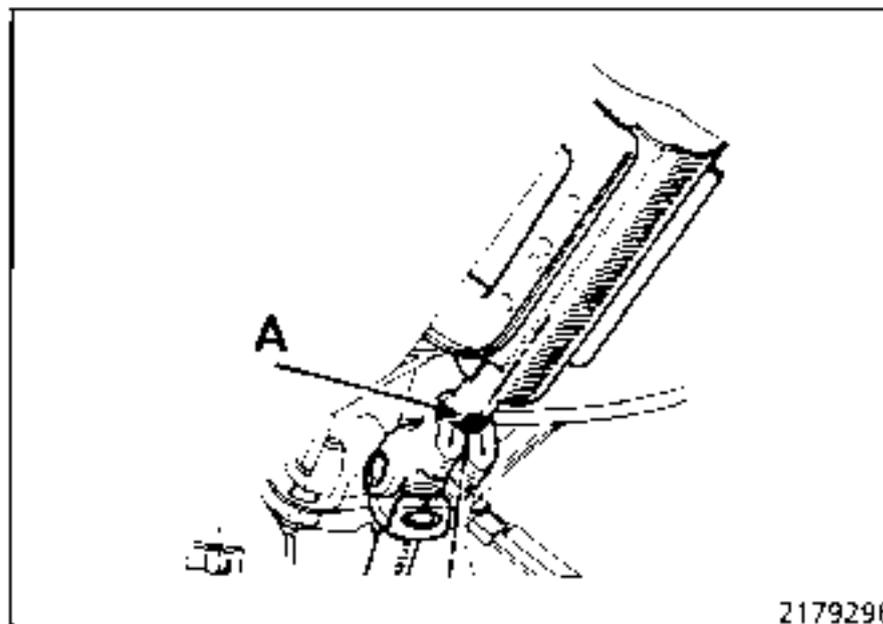
Torque tighten the mounting points.

Fit in place :

- the link steering arm assembly,

NOTE : The bolts in the steering rack end with threaded holes must be torque tightened.

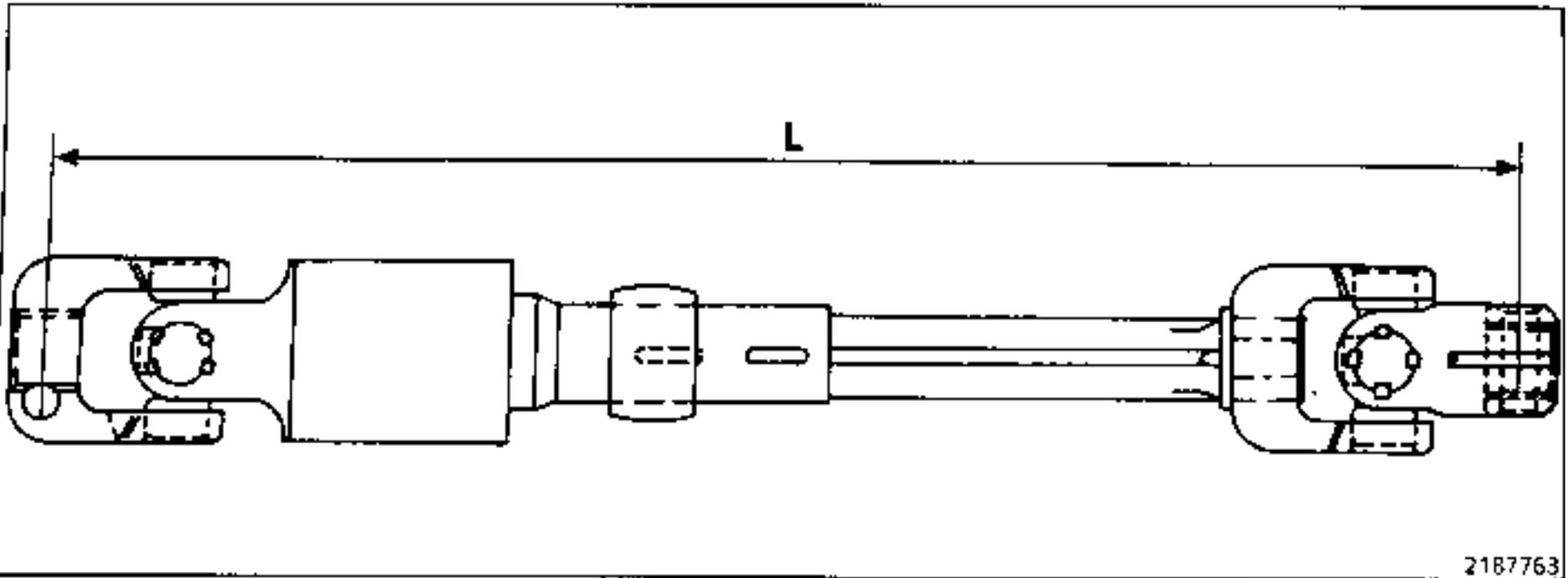
- the bolts securing the link,
- the lock nuts on these bolts,
- the steering wheel shaft in the steering universal joint, aligning flat portion (A) on the centre-line of the slot and refit the key bolt,



- the sound-deadening protection,
- the cover under the steering wheel,
- the ball joints on the shock absorber stem.

CHECKING

When changing the steering, if the splines cannot be fully engaged, check the shaft length and change it if it is incorrect.



2187763

Transverse engine

Conventional steering, righthand drive and lefthand drive :

$$L = 456.5 \pm 1 \text{ mm}$$

Power-assisted steering, righthand drive and lefthand drive :

$$L = 426.5 \pm 1 \text{ mm}$$

In-line engine

Conventional and power-assisted steering, righthand drive and lefthand drive :

$$L = 307.5 \pm 1 \text{ mm}$$

TIGHTENING TORQUES (in daN.m)



M 10 x 100 Bolts securing master cylinder to brake servo	1.3
	1.3

REMOVING

Drain the brake fluid reservoir then pull it upwards and remove.

Remove:

- the brake pipes, first marking their position,
- remove the two brake servo mounting nuts.

REFITTING

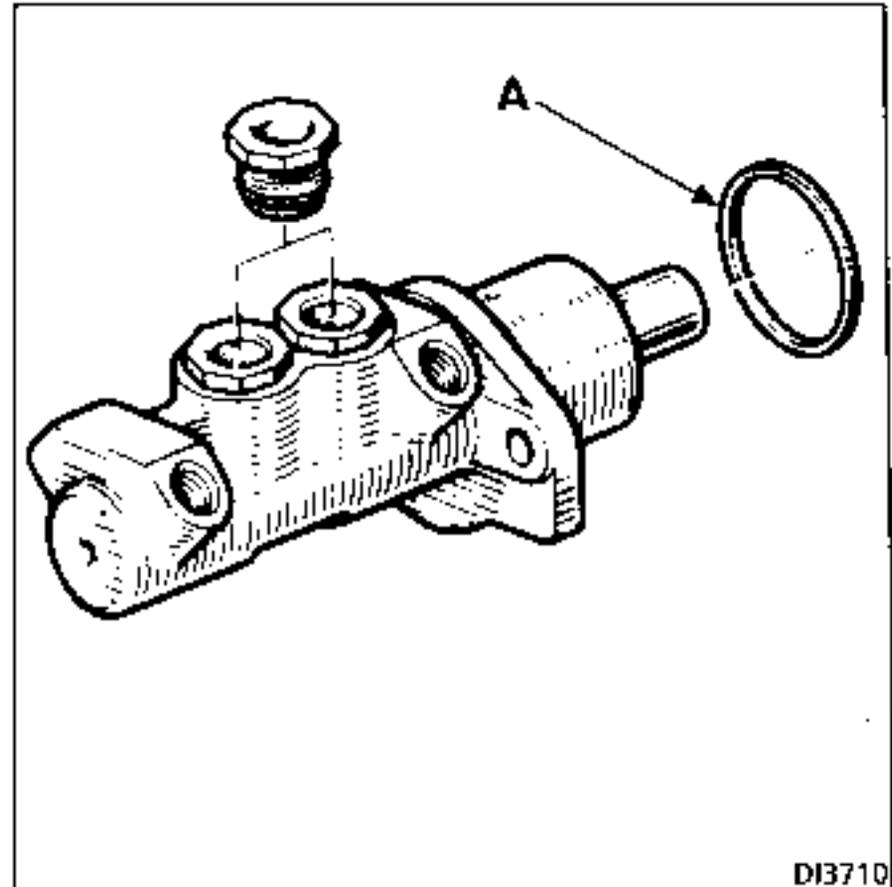
Check the length of the pushrod.

All engine types, transverse and longitudinal, right-hand and left-hand drive.

Dimension X = 22.3 mm.

Adjust according to model by rod (P).

Fit the new master cylinder, aligning it with the brake servo so that pushrod (P) correctly enters its housing on the master cylinder.

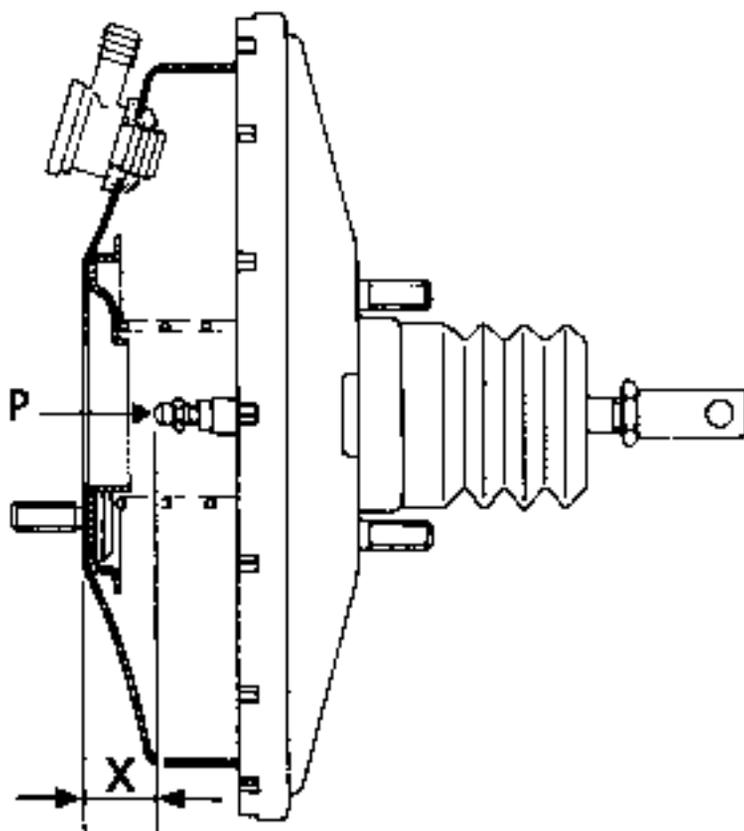


DI3710

Reconnect :

- the brake pipes in the correct position,
- the compensator reservoir, pressing on it so that it clips into place in the master cylinder.

Bleed the brake circuit.



91101R

NOTE: These vehicles are equipped with a master cylinder integral with the brake servo. The sealing of the brake servo is directly connected with the master cylinder. A new seal (A) must be fitted whenever any work is performed on these parts.

TIGHTENING TORQUE (in daN.m)		⚠
Bolts securing master cylinder to brake servo	1.3	
Bolts securing brake servo to bulkhead	2	

The brake servo unit cannot be repaired. Only the following items may be touched:

- the air filter,
- the check valve.

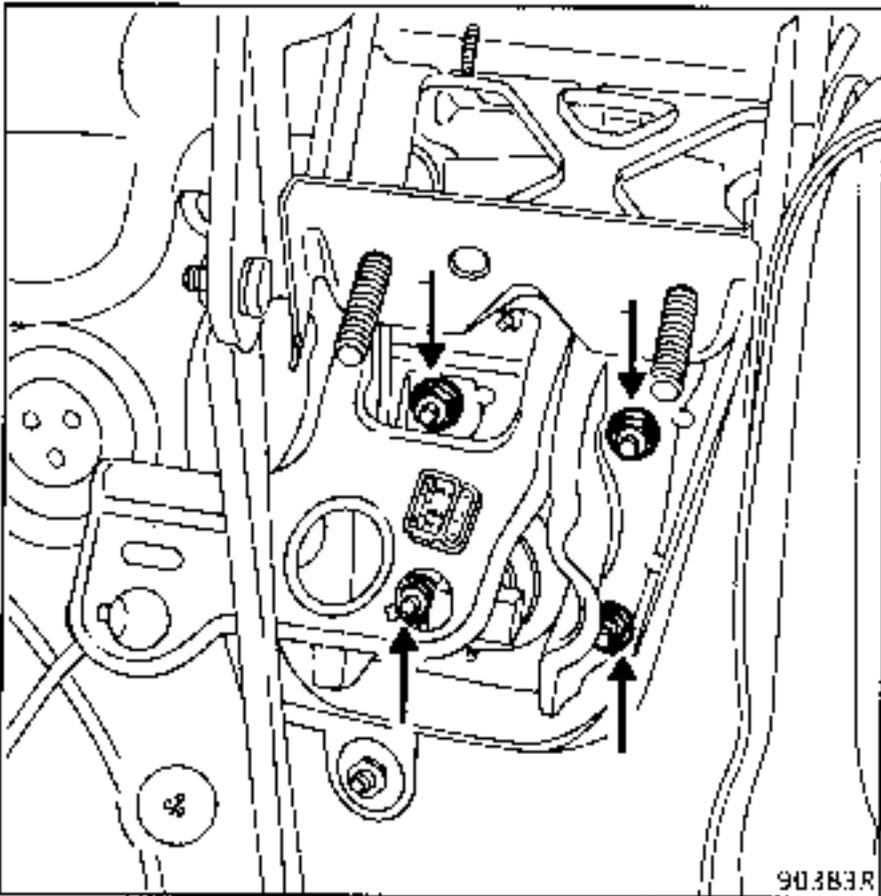
REMOVING

Disconnect the battery.

Remove the master cylinder.

Remove the clevis pin connecting the brake pedal to the pushrod.

Unscrew the brake servo mounting nuts and remove it.

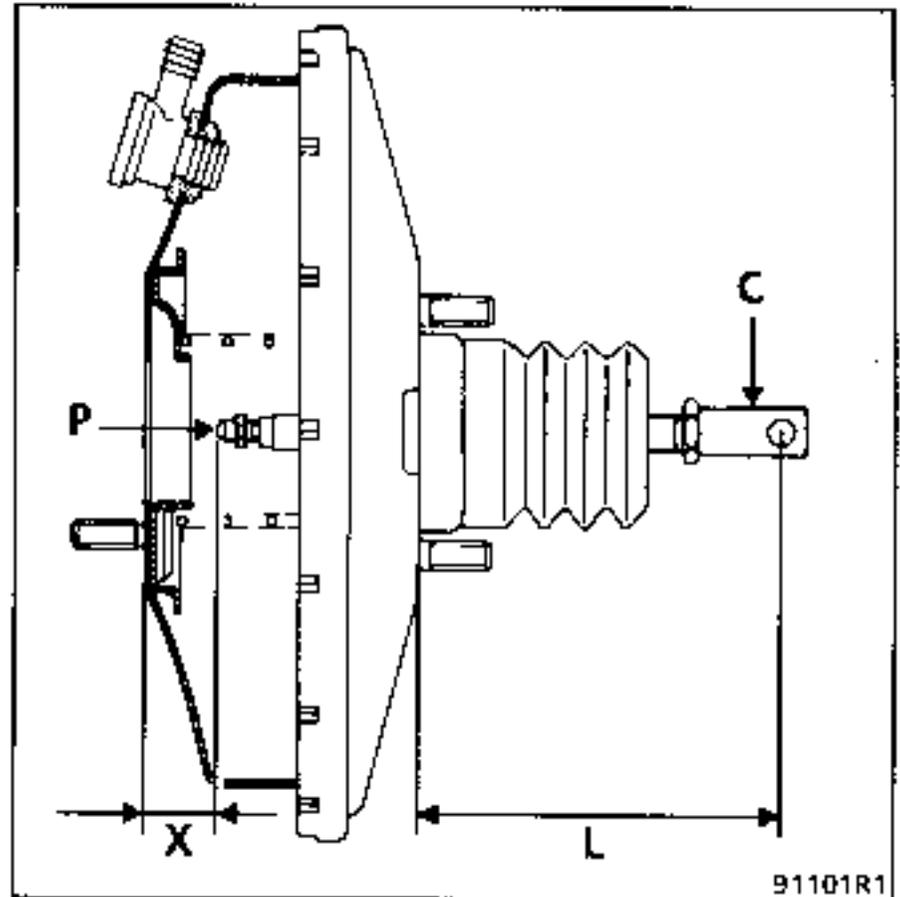


REFITTING

Transverse and in-line engines, right-hand and left-hand drive.

The following distances must be checked before refitting the brake servo:

- $L = 105$ mm
adjustable according to model via rod (C),
- $X = 22.3$ mm
adjustable according to model via rod (P).



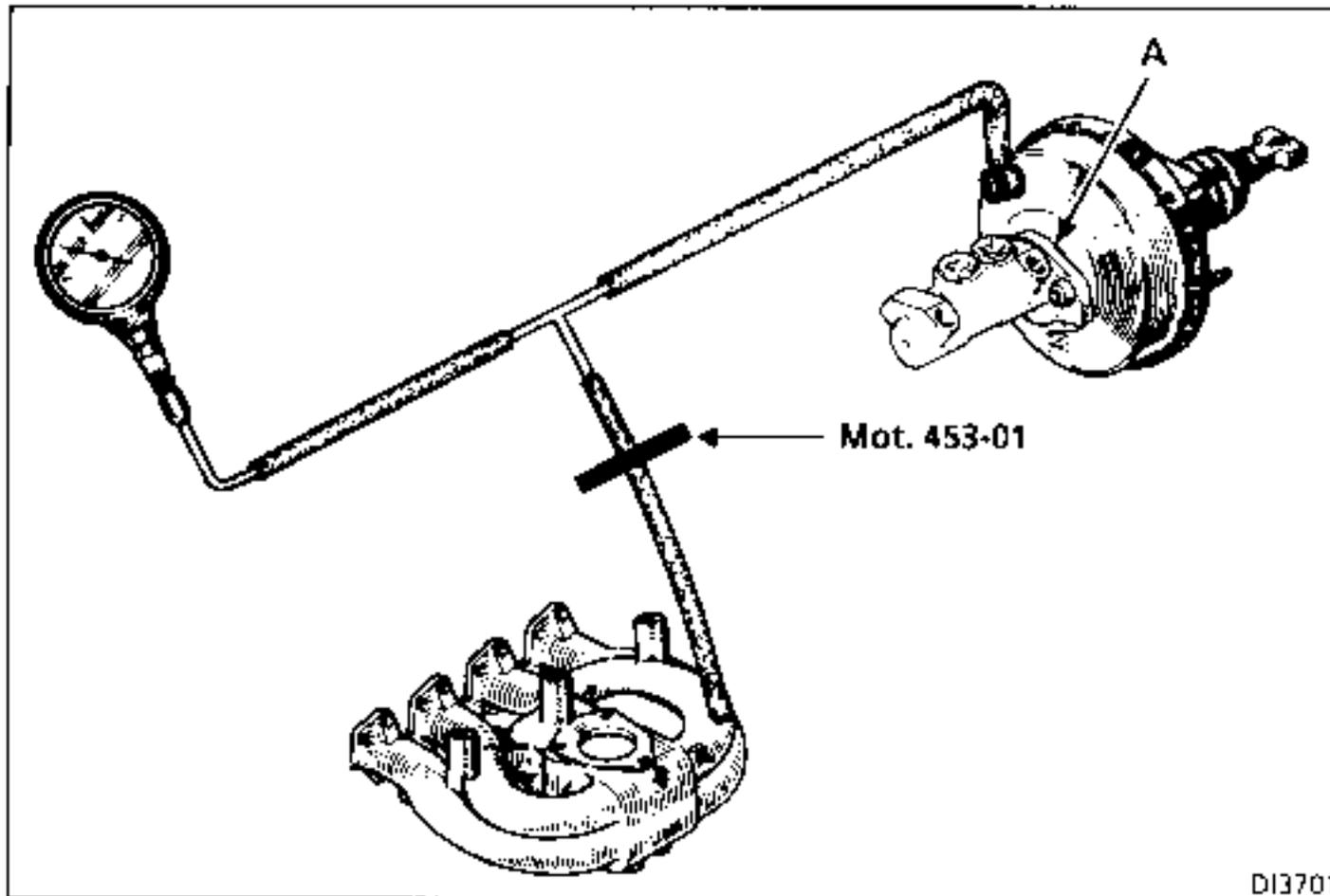
Fit the master cylinder (see instructions in relevant section).

Bleed the brake circuit.

ESSENTIAL SPECIAL TOOLING	
Mot.453-01	Hose clamp
ESSENTIAL SPECIAL TOOLS	
Vacuum pump (e.g. NAUDER* 7059-2)	

CHECKING FOR LEAKS

When testing a brake servo for vacuum loss, make sure that the lines between the servo and master cylinder are perfectly tight. If there are any leaks, replace seal (A).



The test for loss of vacuum in the brake servo must be carried out with the unit on the vehicle and with the brake hydraulic circuit operating correctly.

Using a "T" union and a piece of tubing which should be as short as possible, connect the NAUDER* vacuum pump into the line between the brake servo and the vacuum source (intake manifold).

Run the engine at idling speed for one minute.

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

Stop the engine.

If the vacuum drops by more than 33 mbar (25 mm/Hg) in 15 seconds, there is a leak which can be situated:

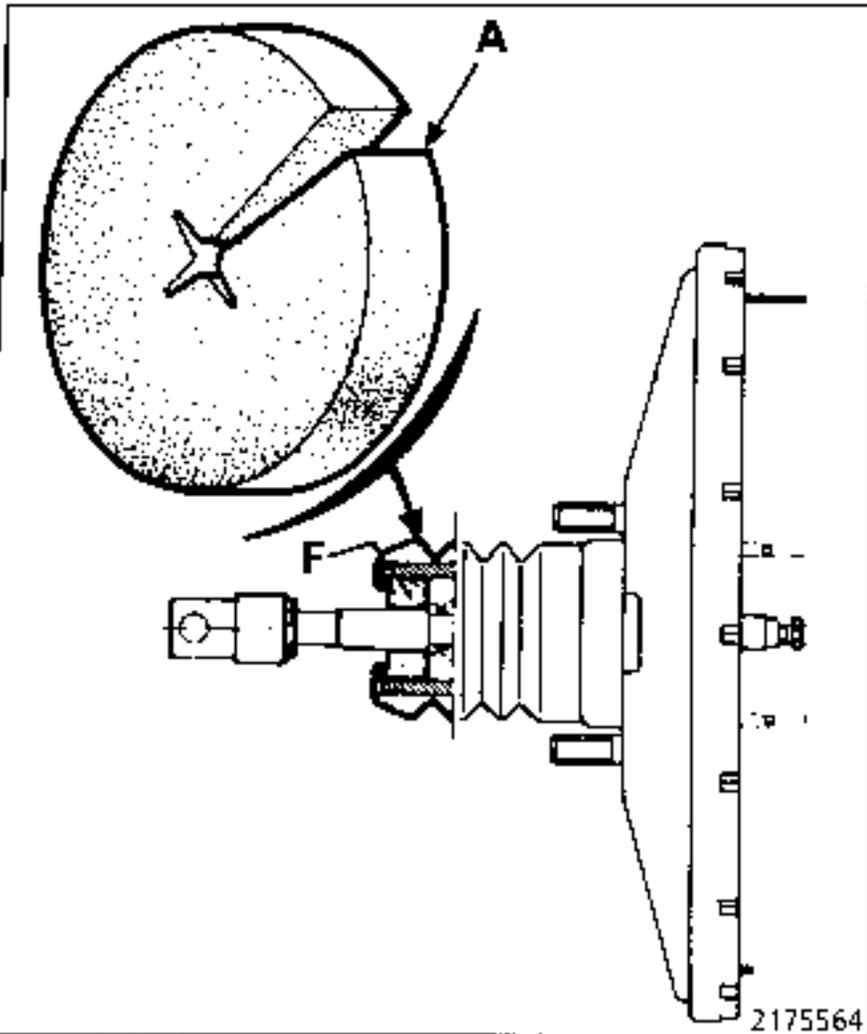
- either in the check valve (change it),
- or in the pushrod diaphragm (in which case the servo unit must be changed).

Should the brake servo cease to function, the braking system will continue to operate. However, considerably more pedal effort will be required to obtain the equivalent servo-assisted braking effect.

(*) Use it in the same way as a vacuum gauge.



CHANGING THE AIR FILTER



It is not necessary to remove the servo unit in order to change the air filter (F).

Remove the old filter (F) from behind the brake pedal, using a screwdriver or metal hook. Cut the new filter (see figure) as in (A), fit it around the pushrod and then push it into its location. Ensure that the filter spreads around the complete bore, thus preventing the entry of unfiltered air into the unit.

Brake servo check valve

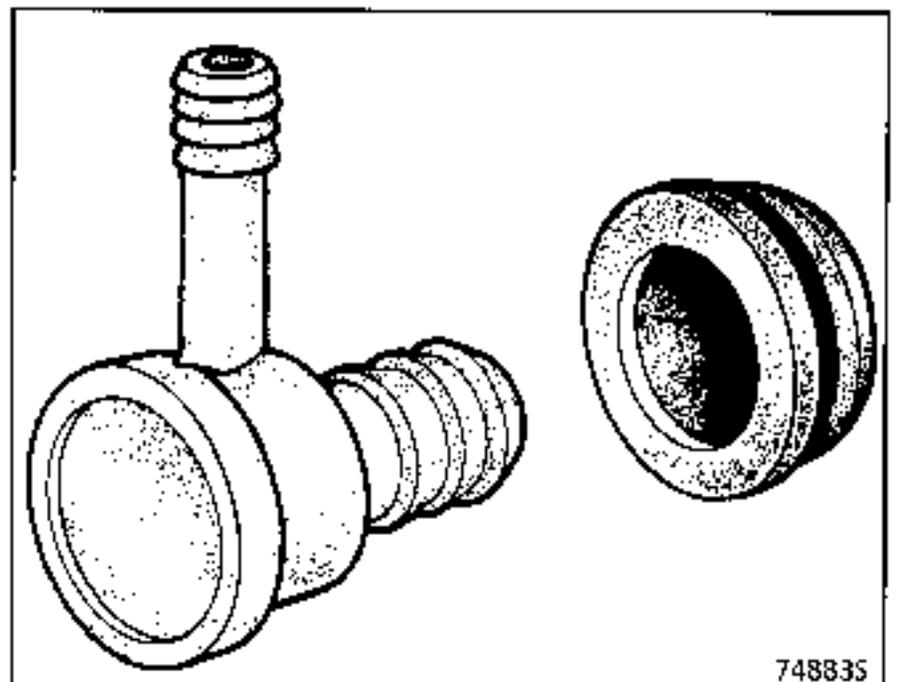
CHANGING THE CHECK VALVE

This operation may be carried out in situ.

REMOVING

Disconnect the vacuum inlet pipe from the servo unit.

Remove the valve from the rubber seal by pulling and turning at the same time.



REFITTING

Check the condition of the rubber sealing ring and the check valve.

Change if faulty.

Refit both parts.

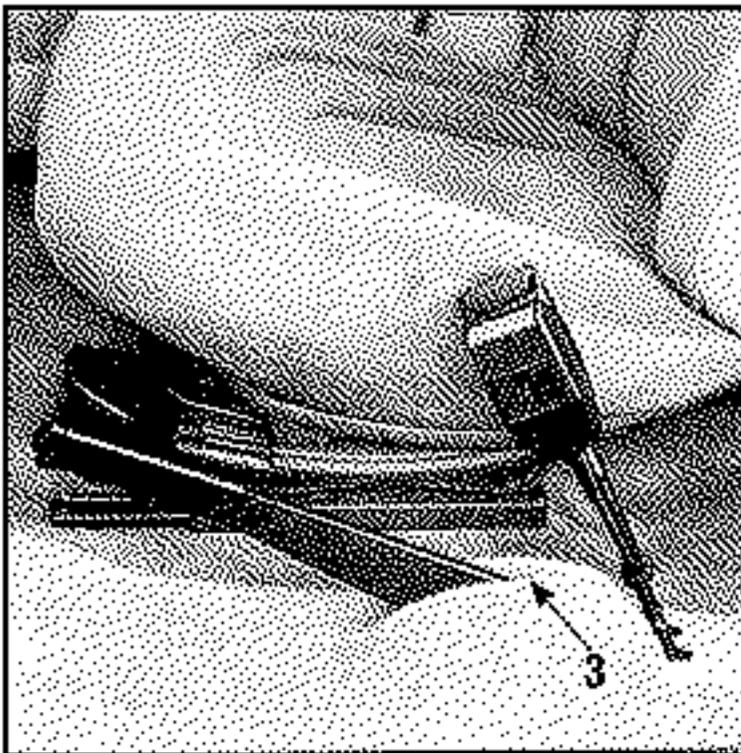
Release the handbrake, remove the pin from the central linkage (1).

Free the control rod from clip (2).

Remove:

- the cover from the base of the safety belts,
- the two bolts from the base of the safety belts.

Make a small slit in the carpet (3).



Disconnect the handbrake switch wire.

Unscrew the two bolts securing the lever mounting to the floor.

Remove the handbrake lever.

When refitting the lever, adjust its travel.



ADJUSTING

Incorrect adjustment of the handbrake with the cable too taut:

- prevents the automatic wear take-up system of the shoes operating properly,
- causes a "long" brake pedal.

Under no circumstances should the cables be re-tensioned to overcome this defect since it will reappear rapidly.

The handbrake is not an automatic wear take-up system, it must only be adjusted when the following are replaced:

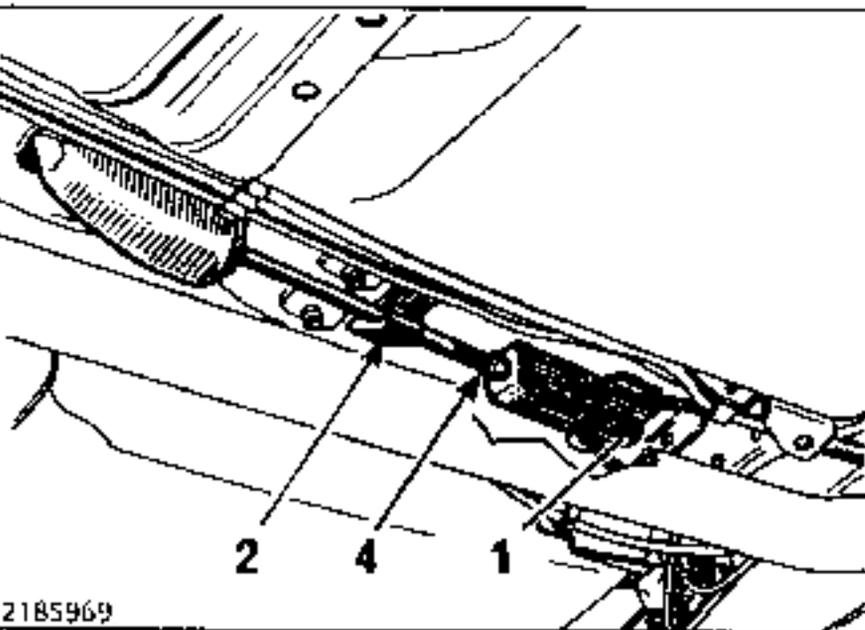
- the pads,
- the cables,
- the control lever.

Adjustment at any other time is not allowed.

I - DRUM BRAKES

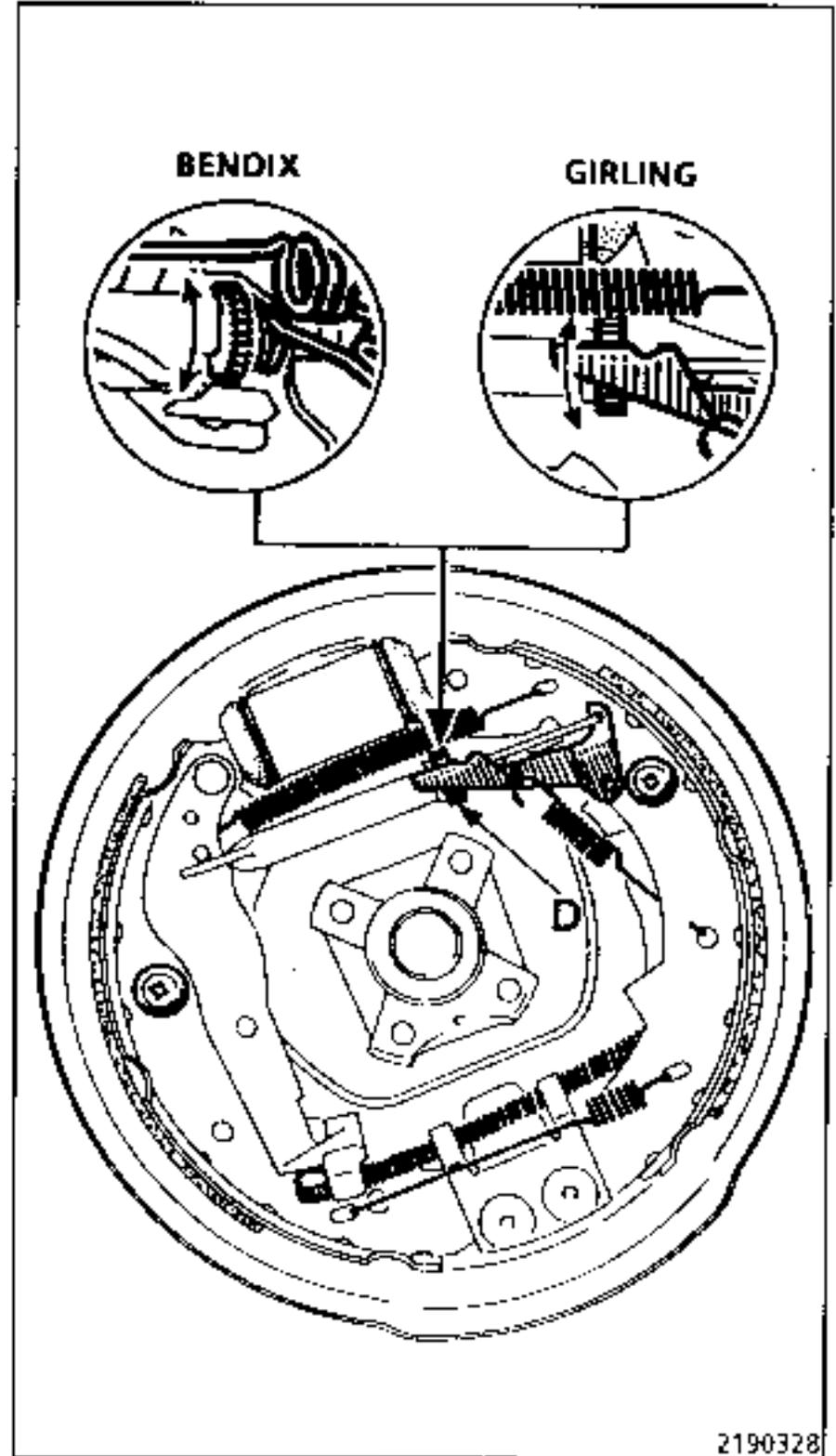
With the vehicle on a lift taking the weight under the body :

Release lock nut (4) and unscrew the central linkage completely.

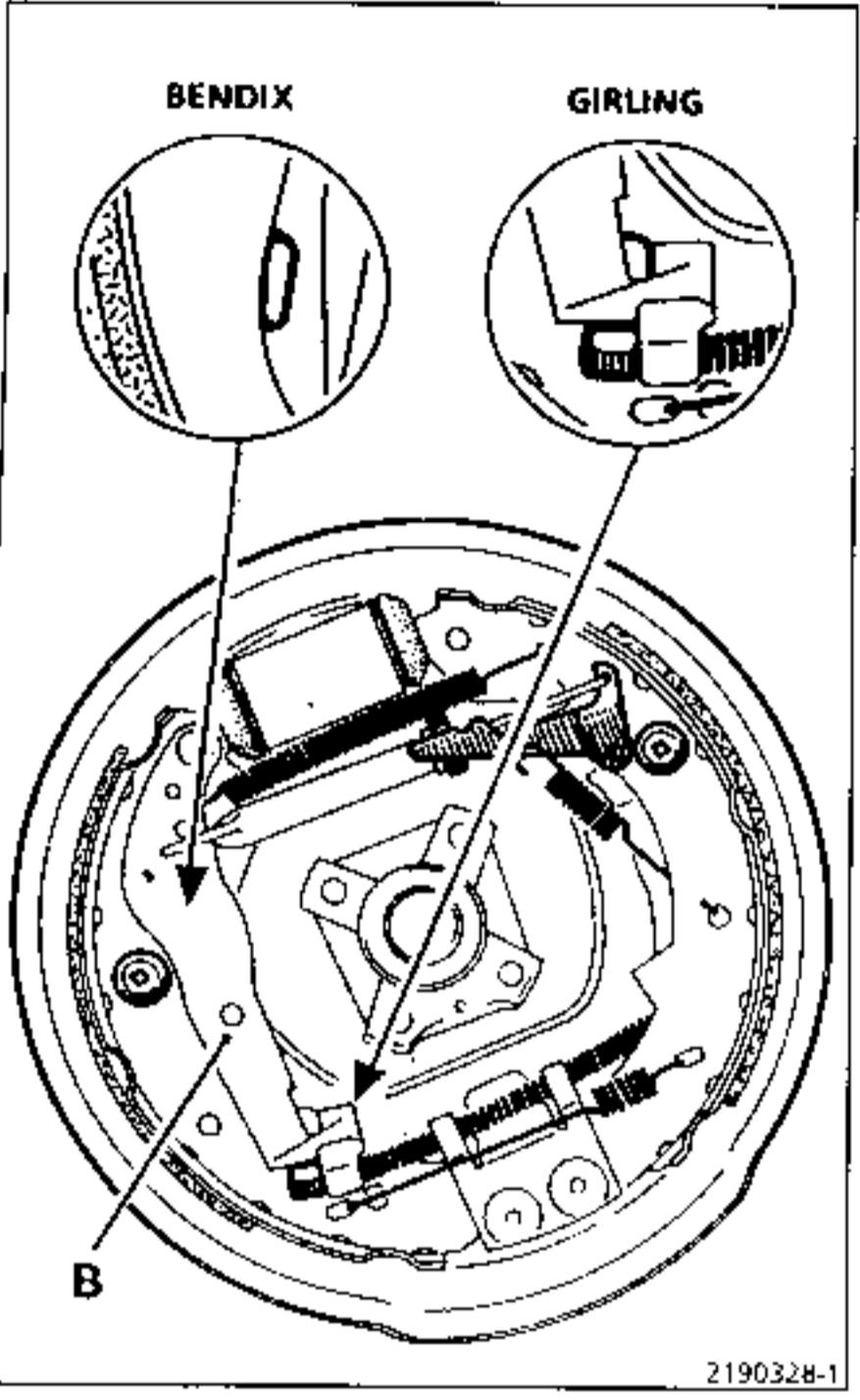


- Remove:
- the two rear wheels,
 - the two drums.

Check the operation of the automatic wear take-up system by moving round notched sector (D) (make sure that it turns properly in both directions), then slacken it by 5 to 6 teeth.



- Make sure that:
- the cables slide properly,
 - levers (B) of the handbrake bear correctly on the shoes.



Gradually tension the cables at the central adjustment point so that levers (B) lift off between the 1st and 2nd notches of the control lever travel and stay lifted off at the 2nd notch.

Tighten lock nut (4).

Fit the drums in place.

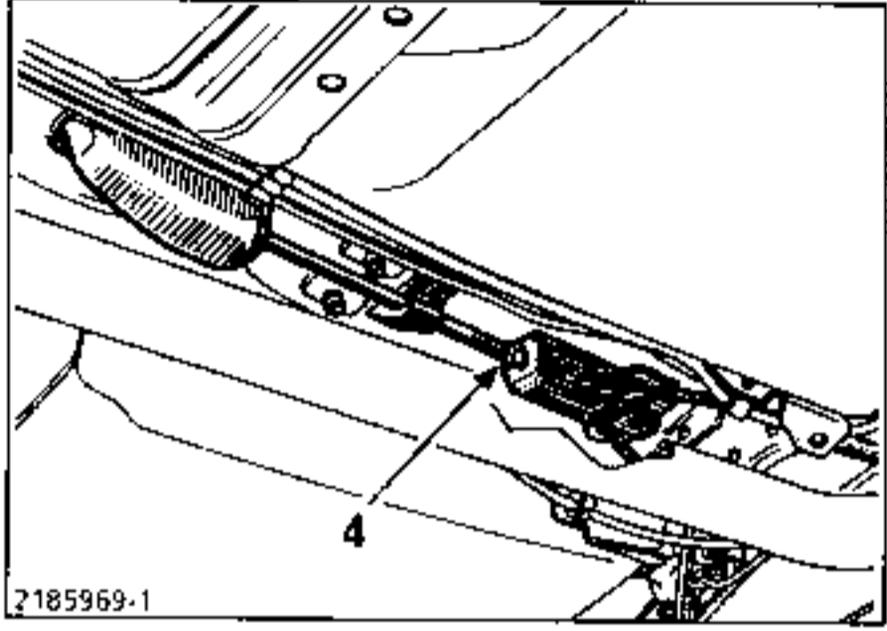
With the vehicle on its wheels:

Adjust the linings by depressing the brake pedal firmly and progressively several times and listen to the operation of the wear take-up system.

II - DISC BRAKES

With the vehicle on a lift, take the weight under the body:

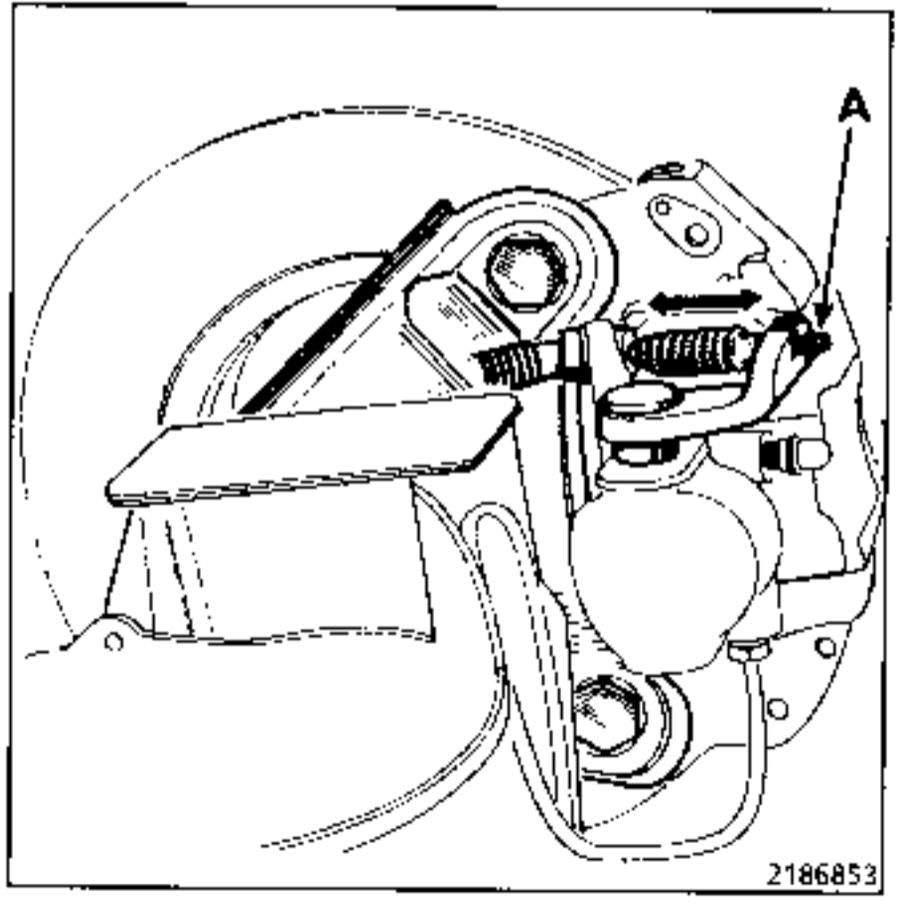
Release lock nut (4) and completely unscrew the central linkage.



Remove the two rear wheels.

Make sure that :

- the cables slide properly
- the handbrake levers move freely and move them right back towards the rear of the vehicle.



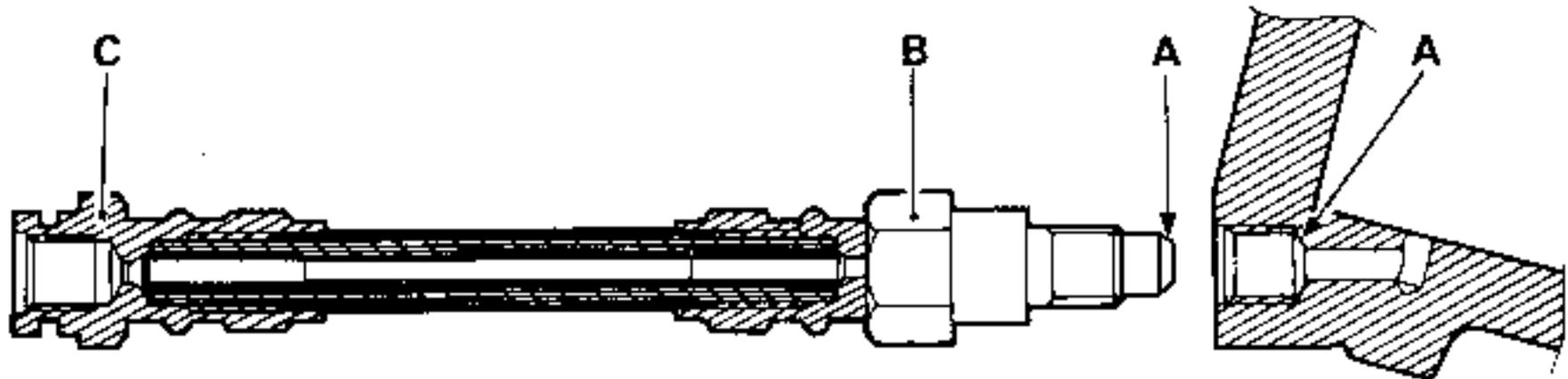
Gradually tension the cables at the central adjustment point so that end piece (A) comes into contact with the lever but does not move it.

Continue the adjustment procedure until the levers move away between the 1st and 2nd notch of control lever travel and at the 2nd notch still do not make contact.

Lock nut (4).

These vehicles are fitted with brake hoses which do not have copper sealing washers. Fluid tightness is achieved by the "taper-seating" between shoulder (A) of the union and the cylinder body.

TIGHTENING TORQUES (in daN.m) 
B = 1.3
C = 1.3



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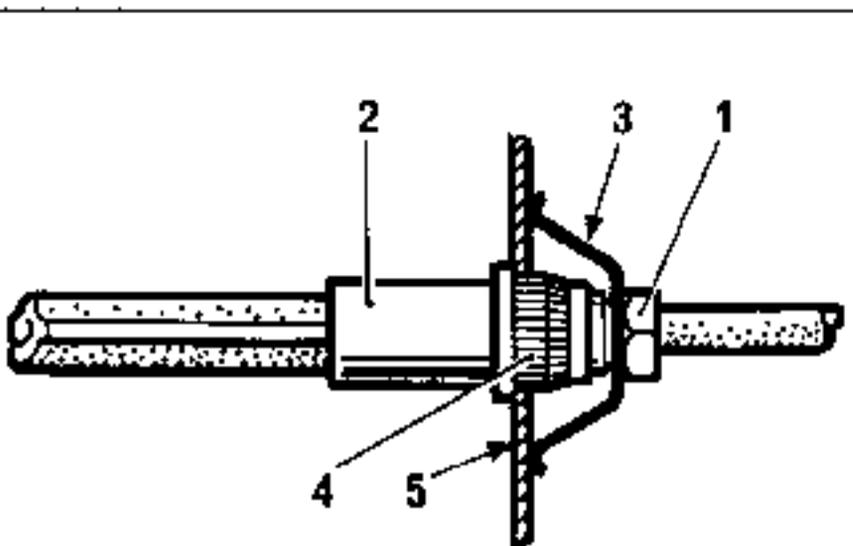
Changing

PRECAUTIONS TO BE TAKEN WHEN REMOVING AND REFITTING A WHEEL OR CALLIPER CYLINDER OR A BRAKE HOSE

In the interest of safety, it is essential that the following operations be carried out in the correct order to prevent the brake hoses becoming twisted and to avoid any risk of their coming into contact with any part of the suspension:

REMOVING

Unscrew the brake pipe union (1) from hose (2) until spring (3) slackens sufficiently to free the hose from the splines (4).



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Unscrew the hose from the calliper. Release the calliper if necessary.

REFITTING

Refit the calliper and screw in the hose.

Tighten to a torque of 1.3 daN.m.

With the wheels hanging free and the steering centred, locate the female end of the hose in the retaining plate (5), ensuring that it is not twisted, then fit:

- the spring (3),
- the brake pipe to the hose making sure that the hose does not turn while the union is being tightened.

Bleed the brake circuit.

Testing principle

Depending on the version, these vehicles are equipped with a brake compensator which is either controlled by or is independent of the load.

The pressure is measured in an X formation by comparing the pressure on the rear wheels with a given pressure on the front wheels.

These double compensators have two completely separate circuits which act in an X formation on one front wheel and one rear wheel.

It is essential to check both circuits:

- I : front right-hand wheel/rear left-hand wheel
- II : front left-hand wheel/rear right-hand wheel

Load-controlled compensator

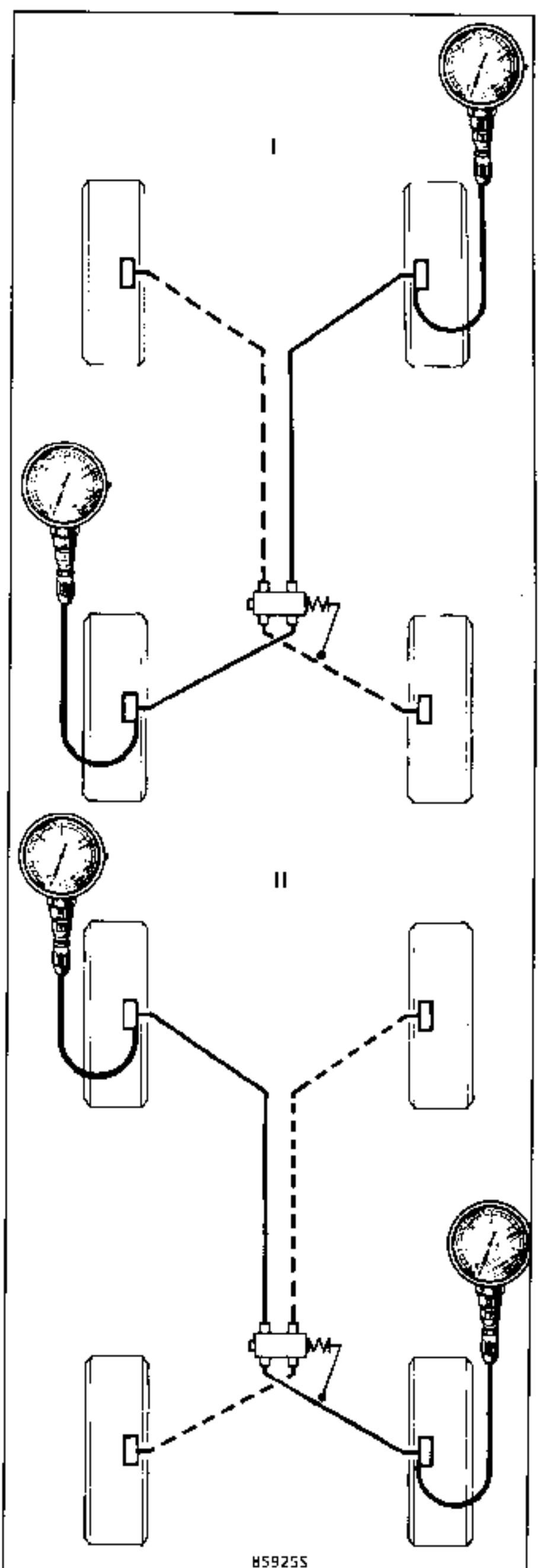
On load-controlled compensators, adjustment enables the pressure at the rear to be altered in accordance with the pressure at the front.

Fixed compensator (not controlled by load)

This type of compensator can only be checked. If the pressure on one or both circuits is incorrect, the assembly must be changed.

Fixed compensator integral with wheel cylinder

This type of compensator can only be checked. If the pressure is incorrect, the compensator - wheel cylinder assembly must be replaced.



SETTING VALUES

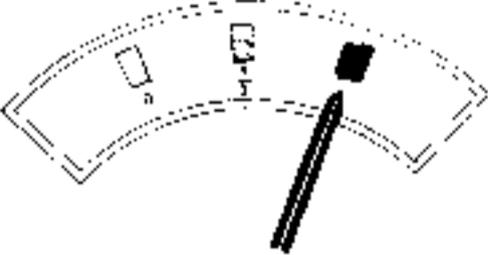
The vehicles designated below, depending on assembly, are equipped:

- either with a fixed brake compensator,
- or with a fixed brake compensator integrated in the wheel cylinder.

No adjustment can be made.

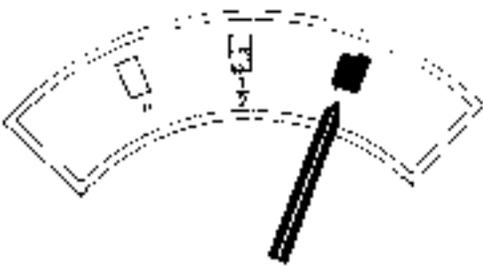
Type			Control pressure (1) (Bar)	
			FRONT	REAR
B481	B48D	B48H	60 \longrightarrow 34 $\begin{matrix} +0 \\ -4 \end{matrix}$	
L481	L48D	L48H		
B482	B48E	B48I		
L482	L48E	L48I		
B484	B48F	B48V		
L484	L48F	L48V		
K484	B48J			
L486	L48J			

The following vehicles are equipped with load-dependent compensators. These are checked and adjusted with the vehicle unladen, fuel tank full and driver on board.

Type			Amount of fuel in tank (driver in vehicle)	Control pressure (1) (Bar)	
				FRONT	REAR
B480	B48A	L48P		100 \longrightarrow 43 $\begin{matrix} +0 \\ -9 \end{matrix}$	
L480	L48A	B48R			
B483	B48C	L48R			
L483	L48C	B48Y			
B487	B48K	L48Y			
L487	L48K	B48W			
B488	B48O	L48W			
L488	L48O				
L489	B48P				
L485					100 \longrightarrow 39 $\begin{matrix} +0 \\ -8 \end{matrix}$
L48L					
L485 4 x 4			100 \longrightarrow 49 $\begin{matrix} -0 \\ -9 \end{matrix}$		
L48L 4 x 4					
B483*	L488*		100 \longrightarrow 38 $\begin{matrix} +0 \\ -9 \end{matrix}$		
L483*	B48P*				
B487*	L48P*				
L487*	B48K*				
B488*	L48K*				
B48R*			100 \longrightarrow 39 $\begin{matrix} +0 \\ -8 \end{matrix}$		
L48R*					
B48Y*					
L48Y*					

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SETTING VALUES (continued)

Type	Amount of fuel in tank (driver in vehicle)	Control pressure (1) (Bar)	
		FRONT	REAR
K480 K487 K48I K481 K48B K48J S481 K489 K48K K482 K48A K48O S482 K48E K48P K483 K48F K48V K486 K48H S48V S486 S48H K48W		100	43 ⁺⁰ ₋₉
K483* K48K* K487* K488*		100	43 ⁺⁰ ₋₉
K48R K48R*		100	39 ⁺⁰ ₋₉
K483 4 x 4 K486 4 x 4 K48K 4 x 4 K48V 4 x 4		100	56 ⁺⁰ ₋₈

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(1) A dual brake compensator is tested with two pressure gauges arranged in X formation.

(*) Vehicles equipped with ABS.

The checking and adjusting of the brake compensator must be carried out with the vehicle on the ground, one person on board, luggage compartment laden according to version (see paragraph on setting values).

ESSENTIAL SPECIAL TOOLING

Fre. 244-04 Pressure gauge for checking limiter calibration

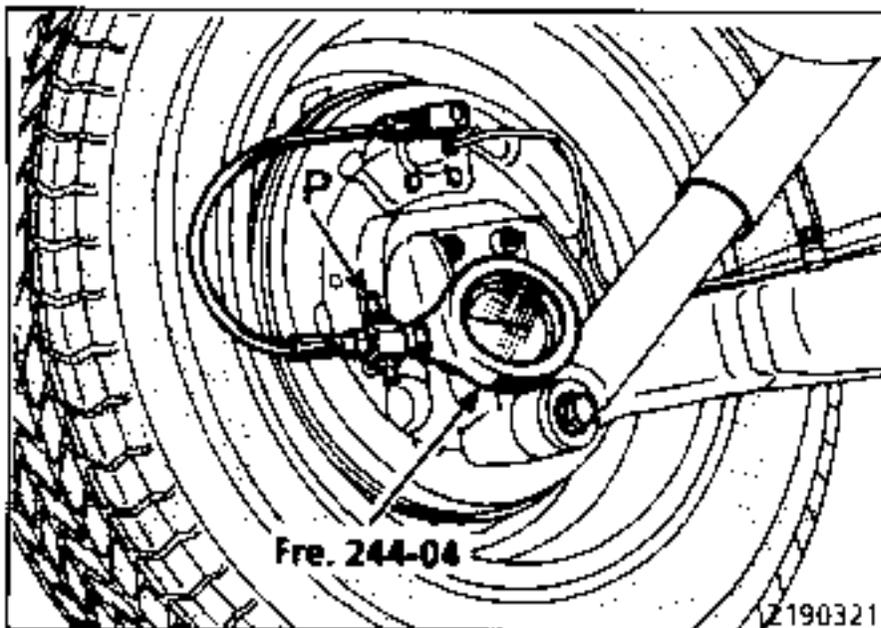
CHECKING

Load the luggage compartment according to the version.

Connect two pressure gauges, Fre 244-04 :

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

Bleed the gauges through screw (P).



Operate the brake pedal progressively until the correct pressure setting is obtained on the front wheels (see table).

Then read off the corresponding pressure at the rear wheel and adjust if necessary.

Proceed in the same way for the other circuit, i.e.:

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

If there is a great difference (values outside given tolerances) after the adjustment has been made, change the compensator.

ADJUSTING

1st TYPE OF ASSEMBLY

L481 - L482 - L486 - L48E - L48F - L48J

This compensator is not controlled by the load and cannot be adjusted.

2nd type of assembly

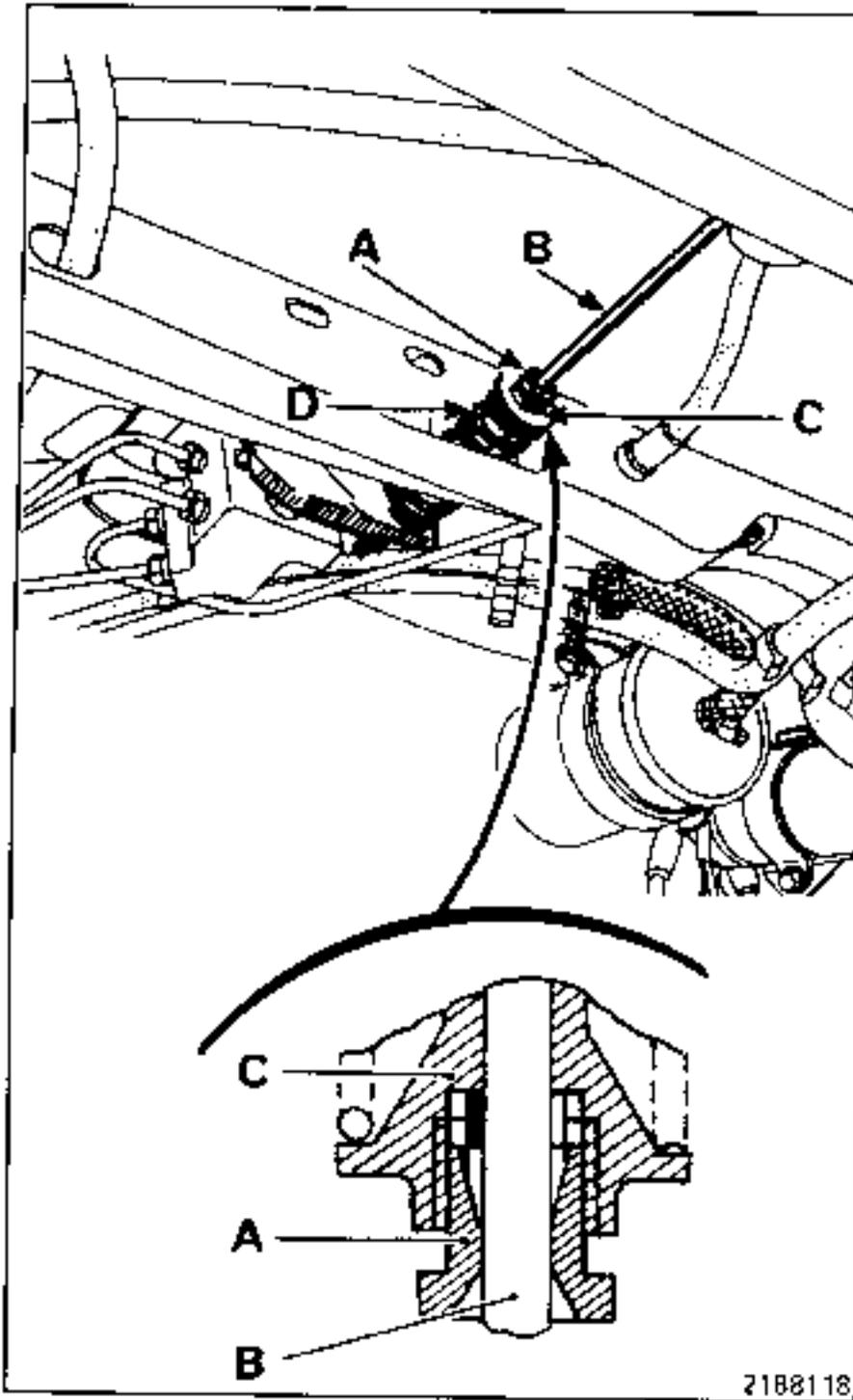
B481 - L481 - B482 - L482 - L486 - B48D - L48D - B48E - L48E - B48F - L48F - B48J - L48J - B48H - L48H - L48M - L48N - B48V - L48V - L48U - B48U

This compensator is integral with the wheel cylinder and cannot be adjusted.

LOAD-CONTROLLED COMPENSATOR (vehicles listed on previous page).

The adjustment is made by modifying the compression of spring (D).

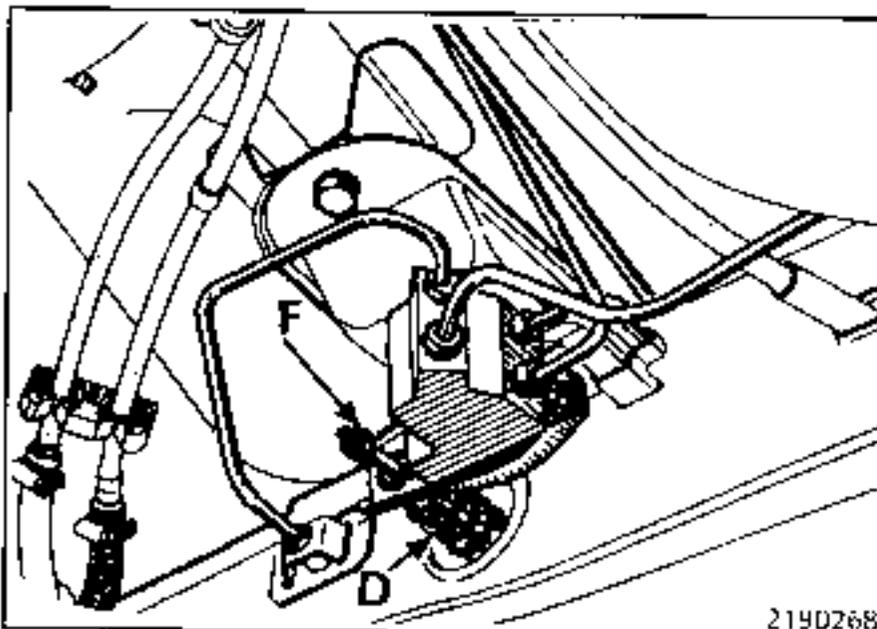
CHECKING - ADJUSTING



To adjust:

- Unscrew lock nut (A) and alter the position of rod (B) in sleeve (C).

NOTE: The position of nut (F) must not be altered.

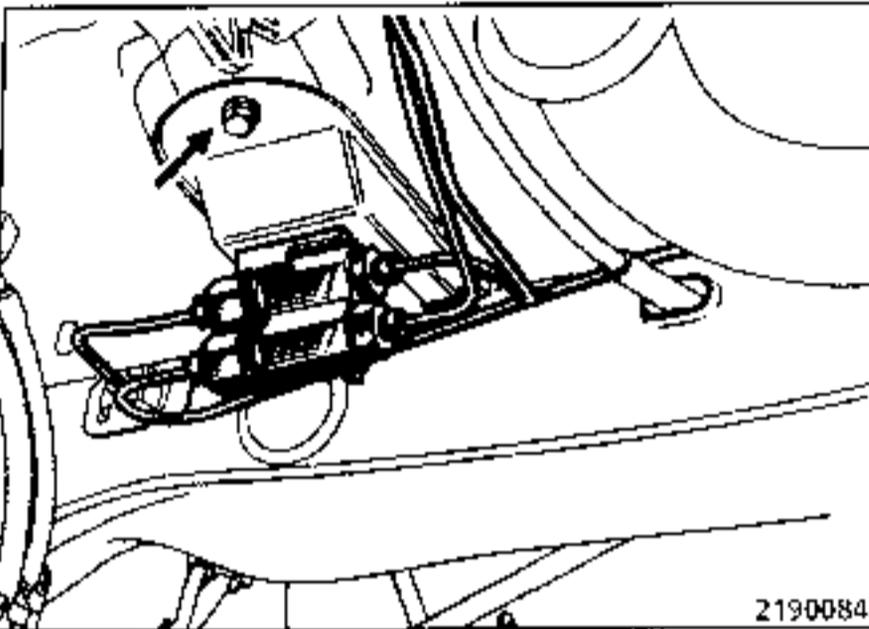


REMOVING

Disconnect :

- the pipes,
- the bolt securing it to its support.

1st TYPE OF ASSEMBLY - Fixed compensator



Tilt the support - compensator assembly then remove it.

Uncouple the compensator from its support.

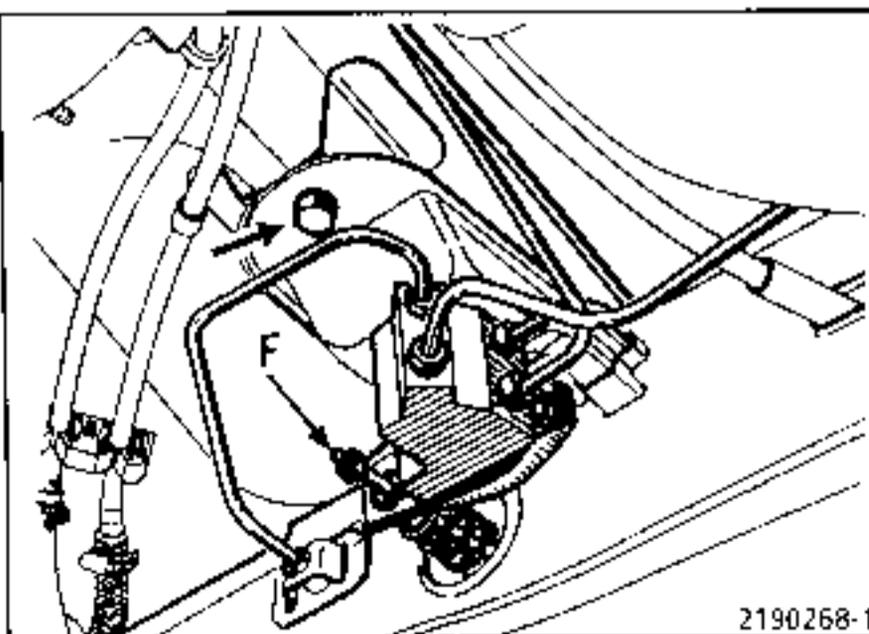
2nd TYPE OF ASSEMBLY - Fixed compensator

Integral with wheel cylinder (see "Rear wheel cylinder, Removing - refitting").

LOAD-CONTROLLED COMPENSATOR

Unhook the control spring from the V-shaped profile. Tilt the support - compensator assembly then remove it.

NOTE : Do not alter the position of nut (F).



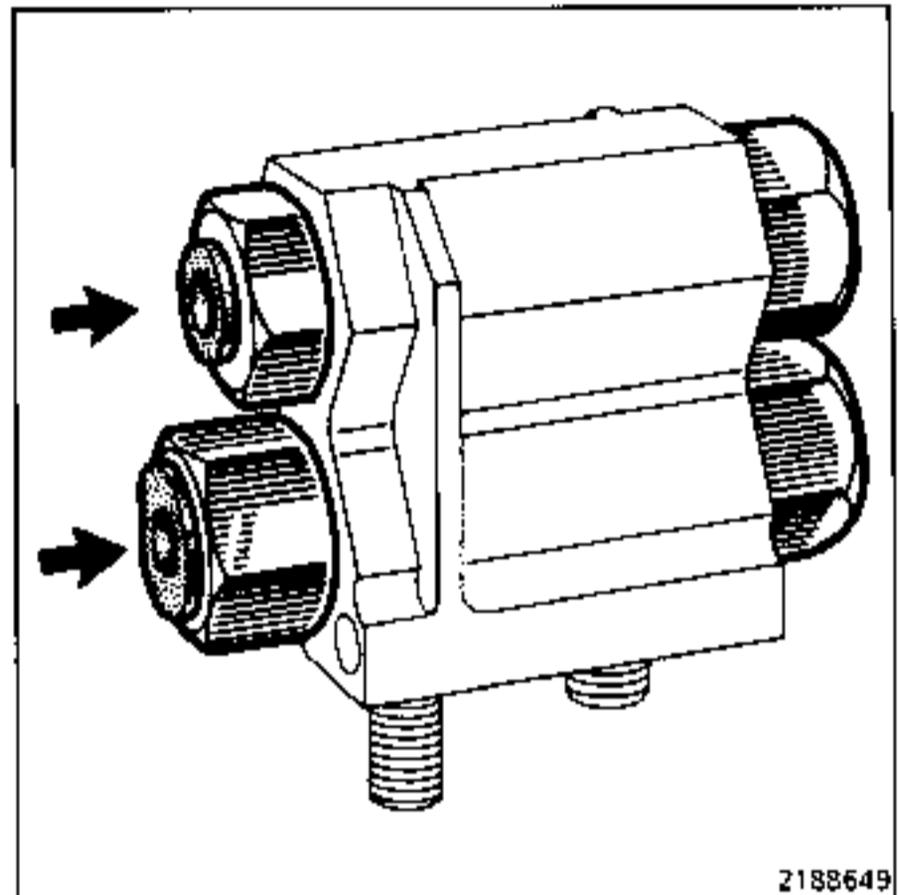
Uncouple the compensator from its support.

REFITTING

Special points

1st TYPE OF ASSEMBLY - Fixed compensator

The compensator inputs are on the side which has the small unions (of different heights).



All types

Bleed the brake system.

Check and, if necessary, adjust the pressure (see section entitled "Checking - Adjusting").

REPLACING

ESSENTIAL SPECIAL TOOLING

Mot. 453-01	Hose clamp
M.S. 815	Bleeding apparatus
Emb. 1082	Tool for removing and refitting spring - activating capsule assembly

TIGHTENING TORQUES (in daN.m)



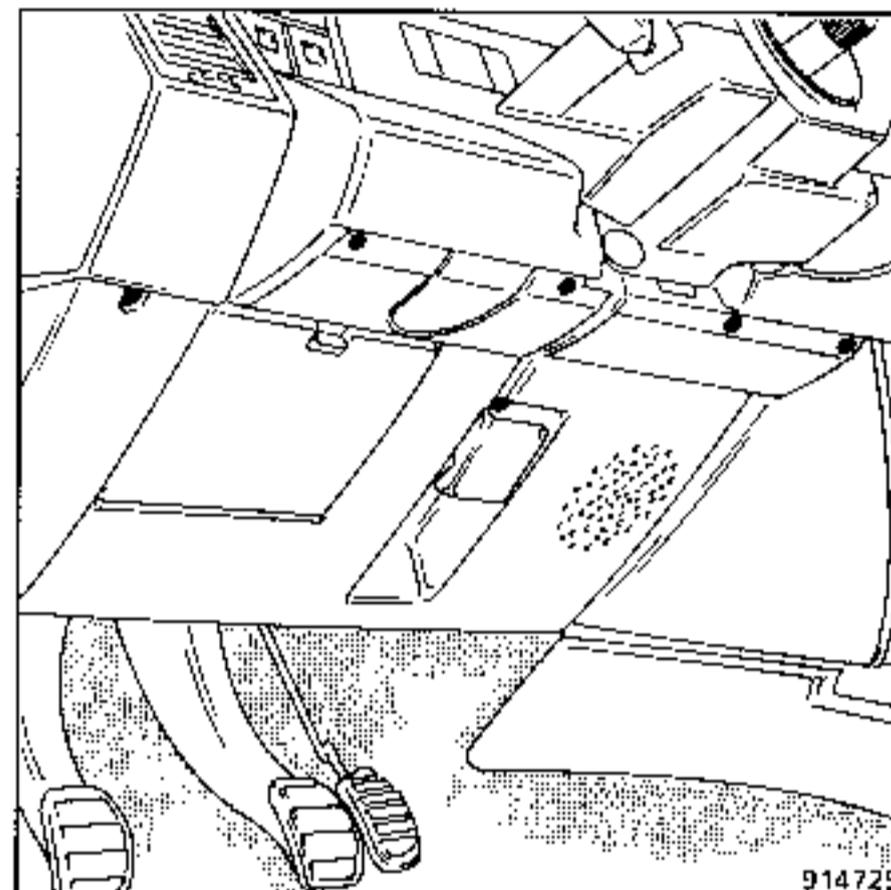
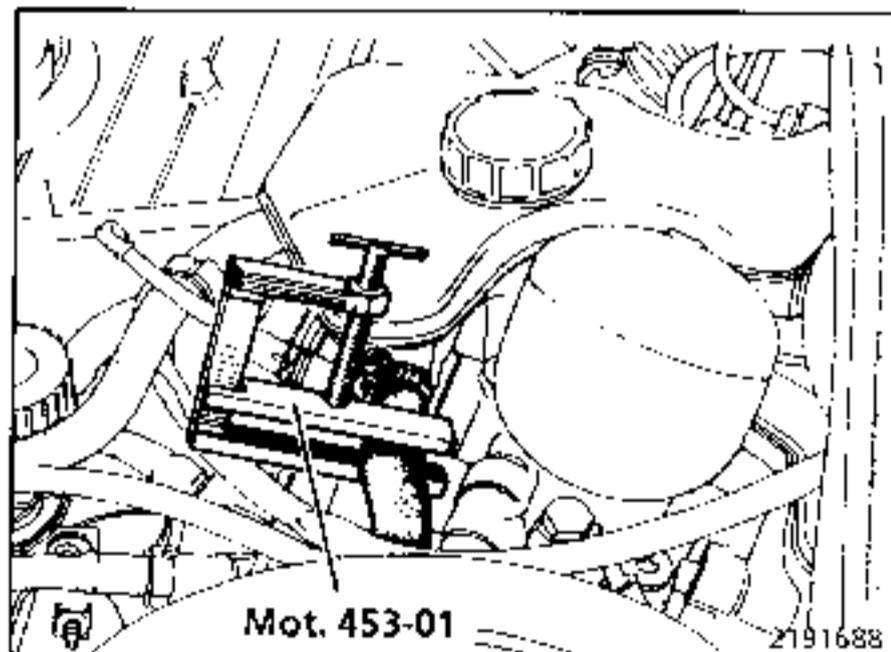
Master cylinder securing nut	1.5
Union bolt	1.8

REMOVING

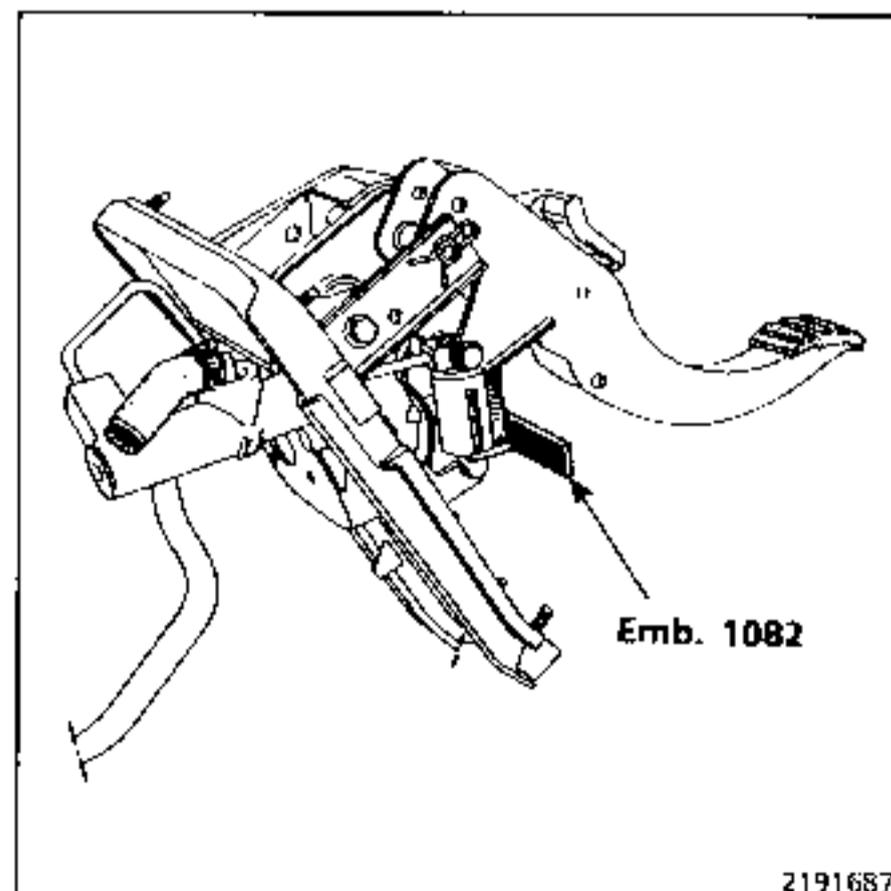
Disconnect the battery.

Fit clamp Mot. 453-01 to the master cylinder feed hose.

Unscrew the master cylinder outlet hose union.



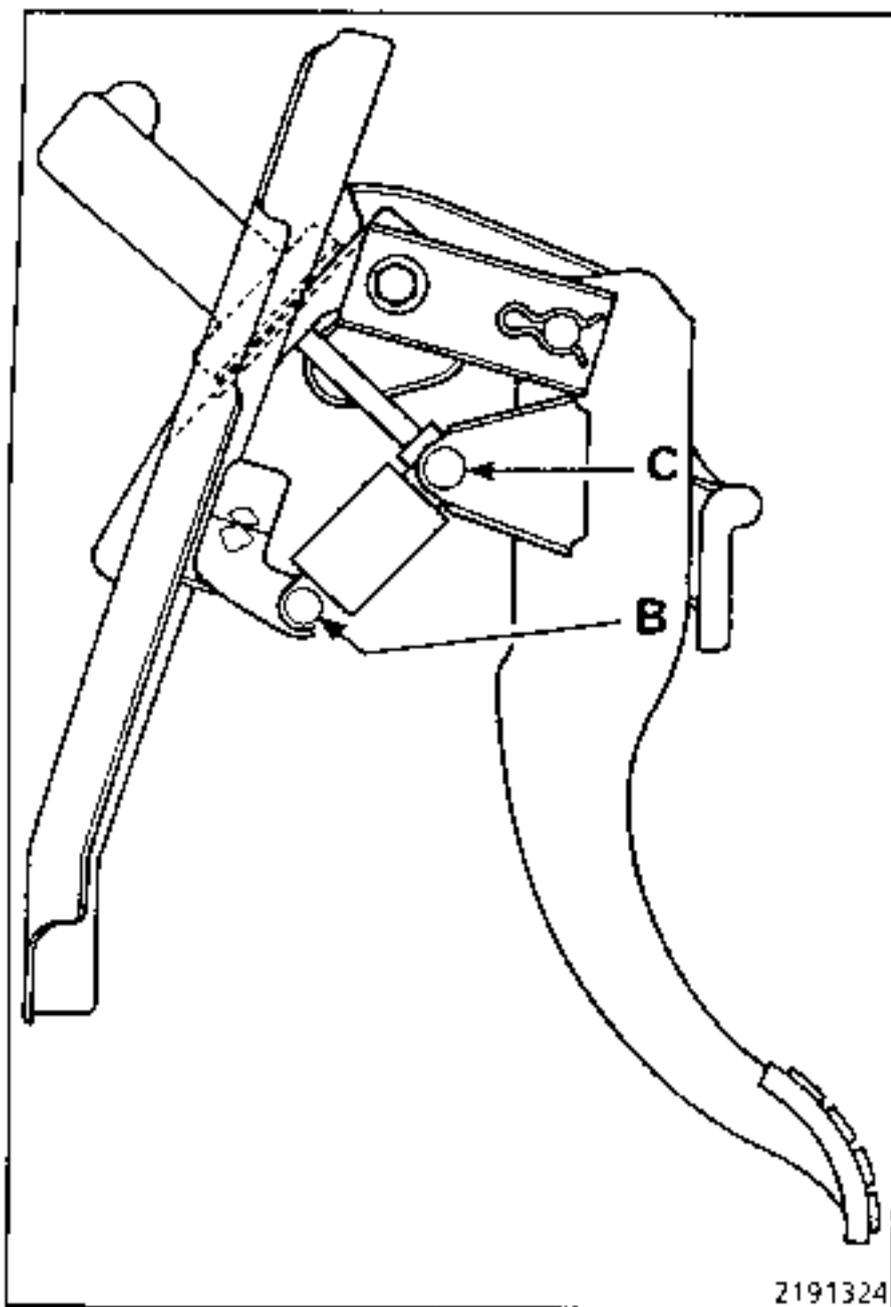
Fit tool Emb. 1082 on the spring - activating capsule assembly.



REPLACING (continued)

Remove the circlip and rollpin from shafts (B) and (C).

Press down lightly on the pedal to extract shaft (B).



Free the unit.

Take out shaft (C) and remove the spring - activating capsule assembly.

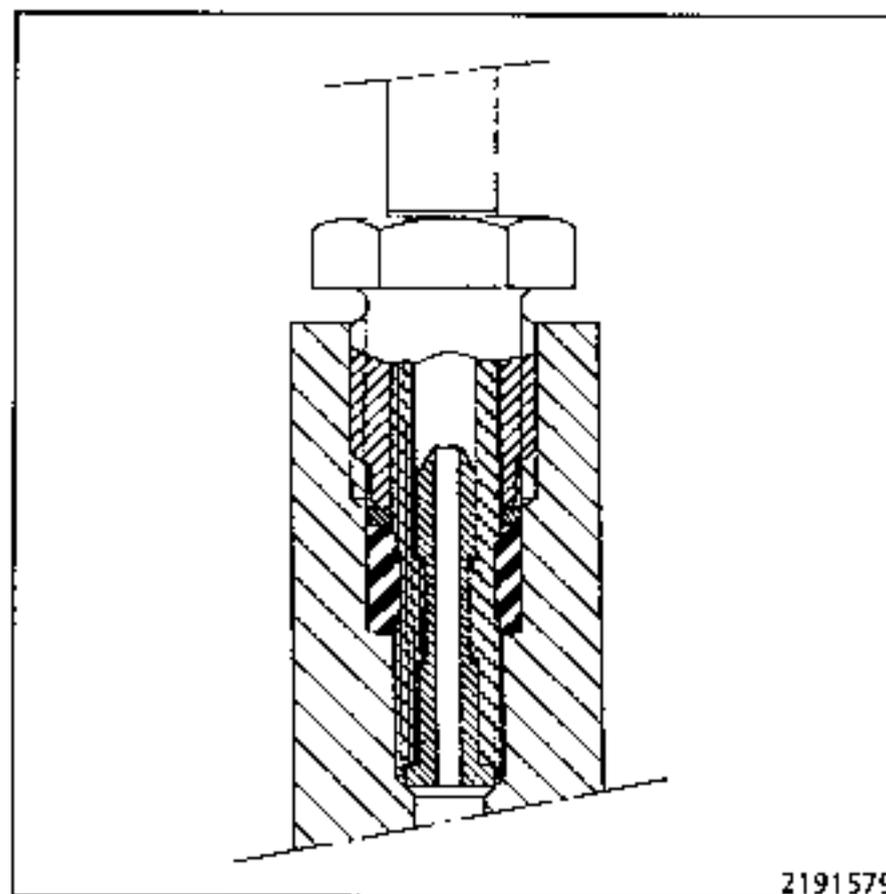
Remove the two nuts from the master cylinder mounting.

Disconnect the outlet and feed pipes from the master cylinder and remove it.

REFITTING - Special points

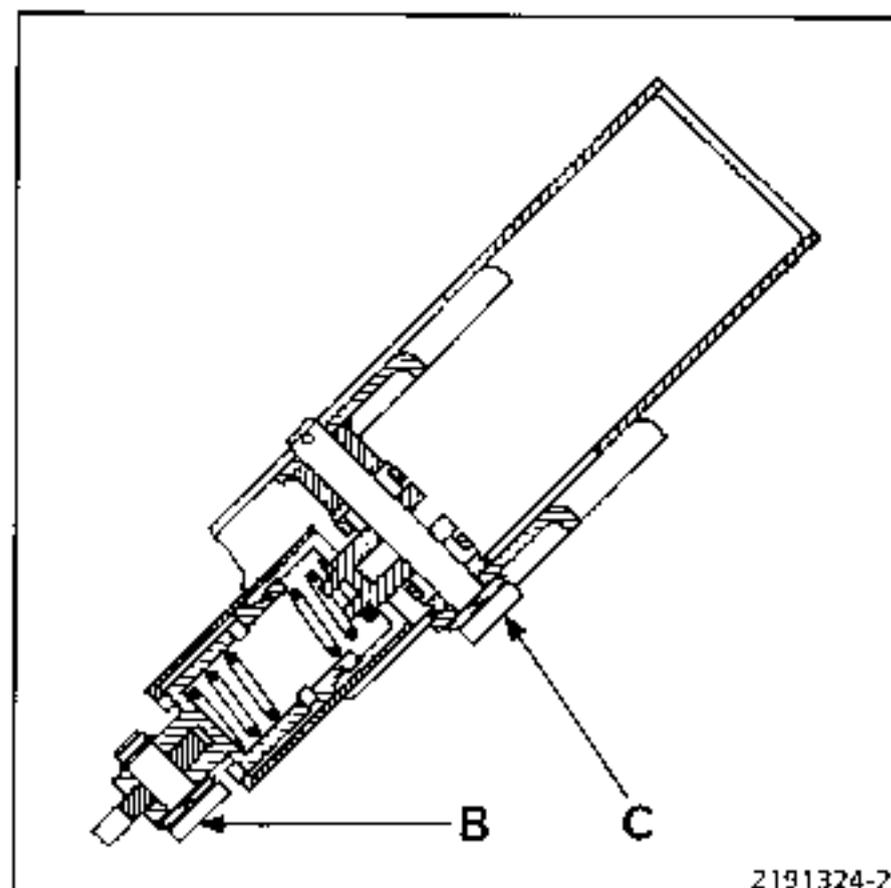
Fit in place the master cylinder pushrod assembly equipped with a new seal.

Connect the outlet hose equipped with the washer and a new seal.

**ENSURE :**

- the position of the seal and the flat washer,
- the tightening torques,
- the fitting direction of the spring - activated capsule assembly diameter at pushrod calliper end.

Coat the shafts with grease.



REPLACING (continued)

Place the pushrod calliper (equipped with the plastic bearings) between the spring - activating capsule assembly and the pedal.

Fit shaft (C).

Press down the pedal slightly to fit the assembly and shaft (B).

Remove the clamp from the feed hose.

Using apparatus M.S. 815 or the like, bleed the hydraulic circuit.

NOTE : The clutch pedal must be in its uppermost position when the bleeding operation is performed.

Bleeding the system by depressing the pedal :

1. Bleed the feed hose (screw P).
2. Connect a hose immersed in a receptacle filled with brake fluid to the bleed screw and bleed the circuit.

As the assistance device holds the pedal on the floor, the pedal will have to be refitted each time.

Check the travel of the slave cylinder. It should be:

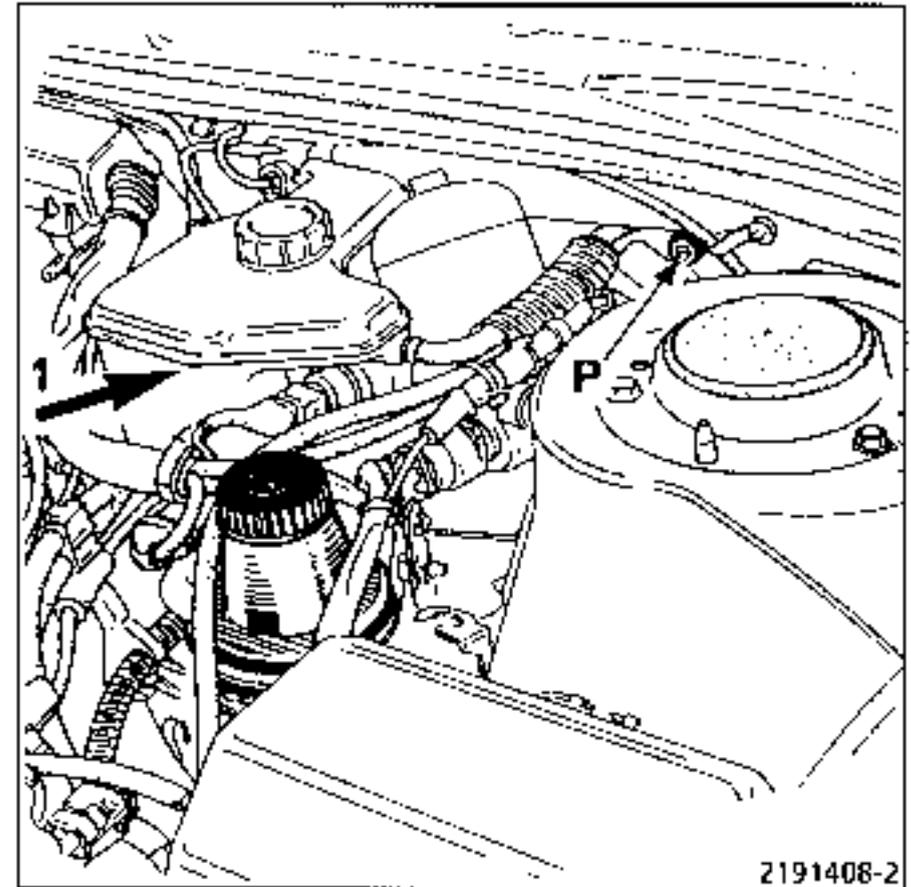
$$D = 11 \text{ mm minimum}$$

Check the brake fluid level.

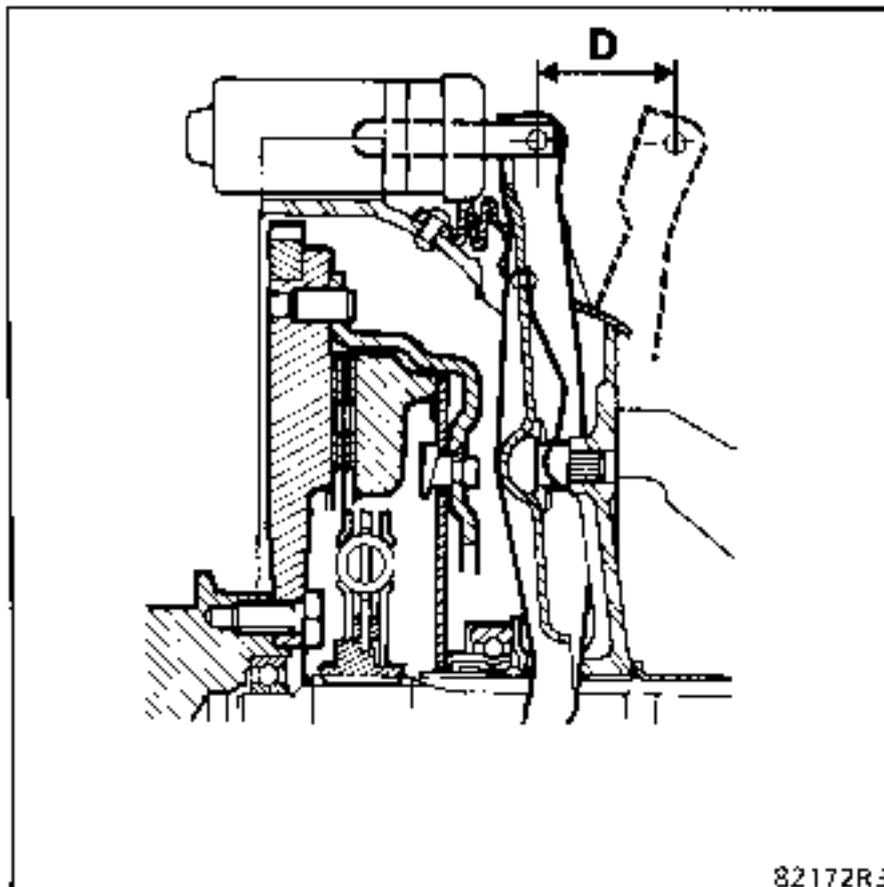
NOTE: The brake fluid level must be checked with the ignition switched on. When the fluid reaches the **MAX** mark, the accumulator is full.

Switch on the ignition and wait for the pump to stop.

If necessary, top up the brake fluid to the **MAX** mark (1).



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REPLACING

ESSENTIAL SPECIAL TOOLING

Mot. 453-01 Hose clamp

M.S. 815 Bleeding apparatus

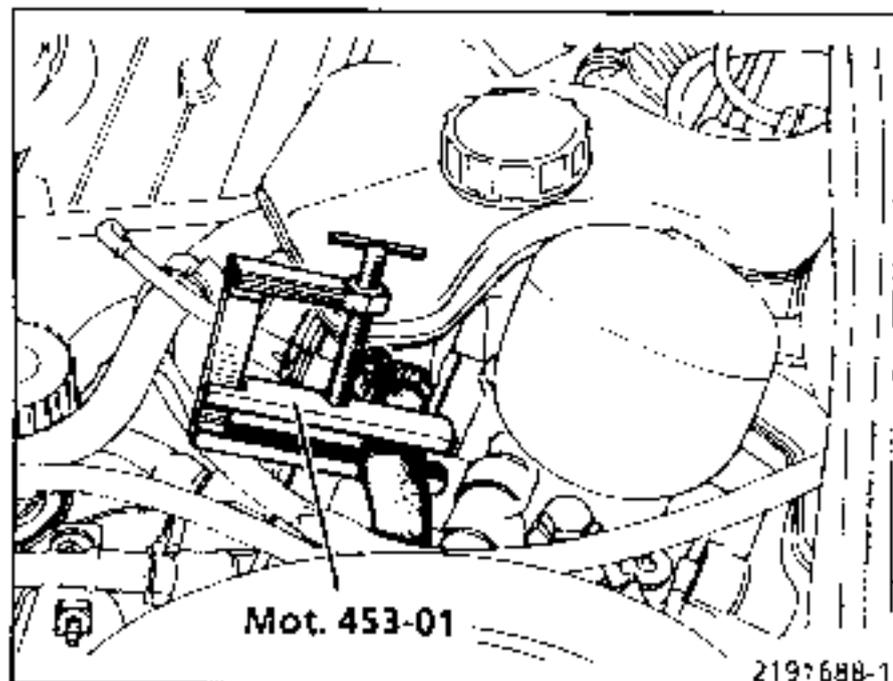
TIGHTENING TORQUES (in daN.m)



Slave cylinder securing nut	1.5
Union bolt	1.8

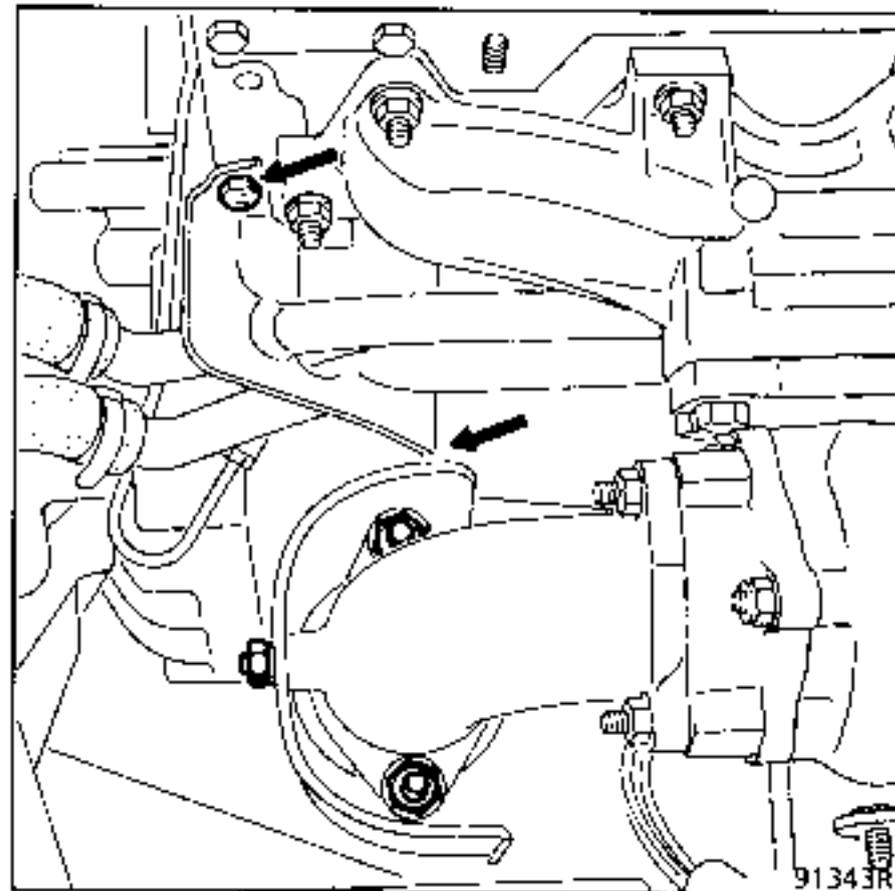
REMOVING

Fit a clamp Mot. 453-01 to the master cylinder feed hose.



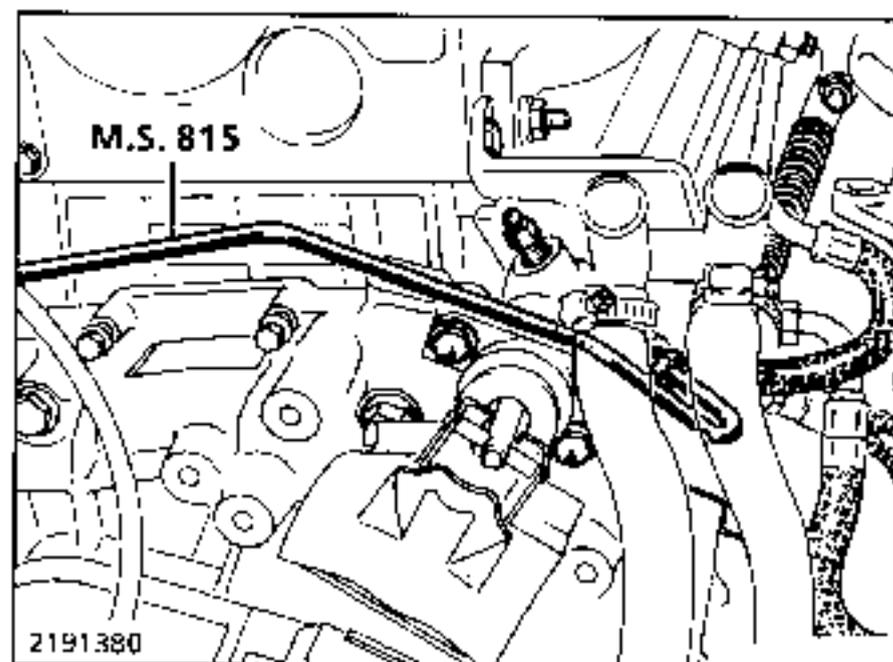
Remove :

- the turbo heat shield,
- the heat shield mountings from the slave cylinder.



Disconnect the feed hose from the slave cylinder.

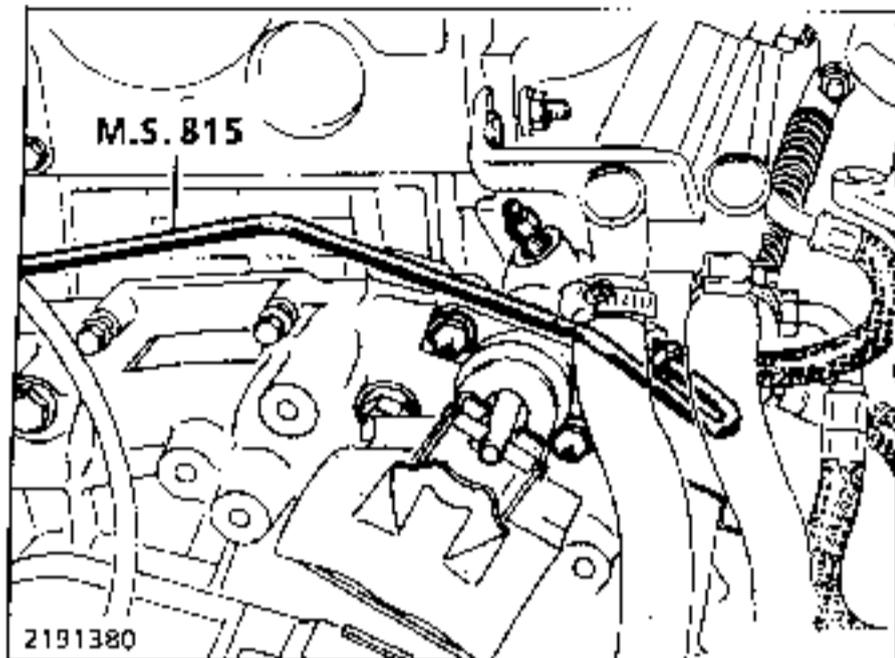
Remove the two mounting bolts from the slave cylinder and then remove the slave cylinder.



REFITTING

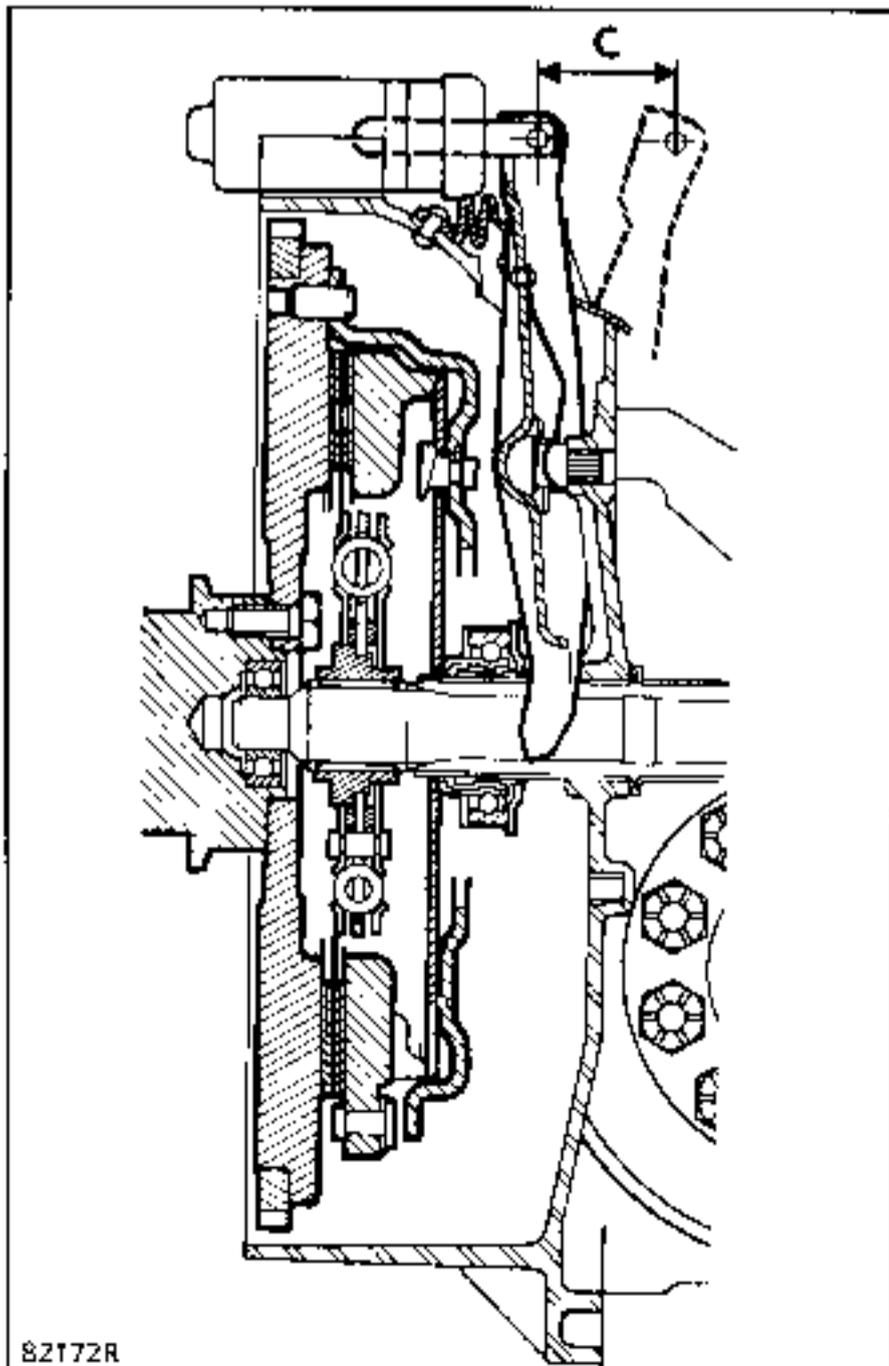
Secure the slave cylinder and reconnect its feed hose.

Bleed the circuit.



Check the travel of the slave cylinder. It should be:

$$C = 11 \text{ mm minimum}$$

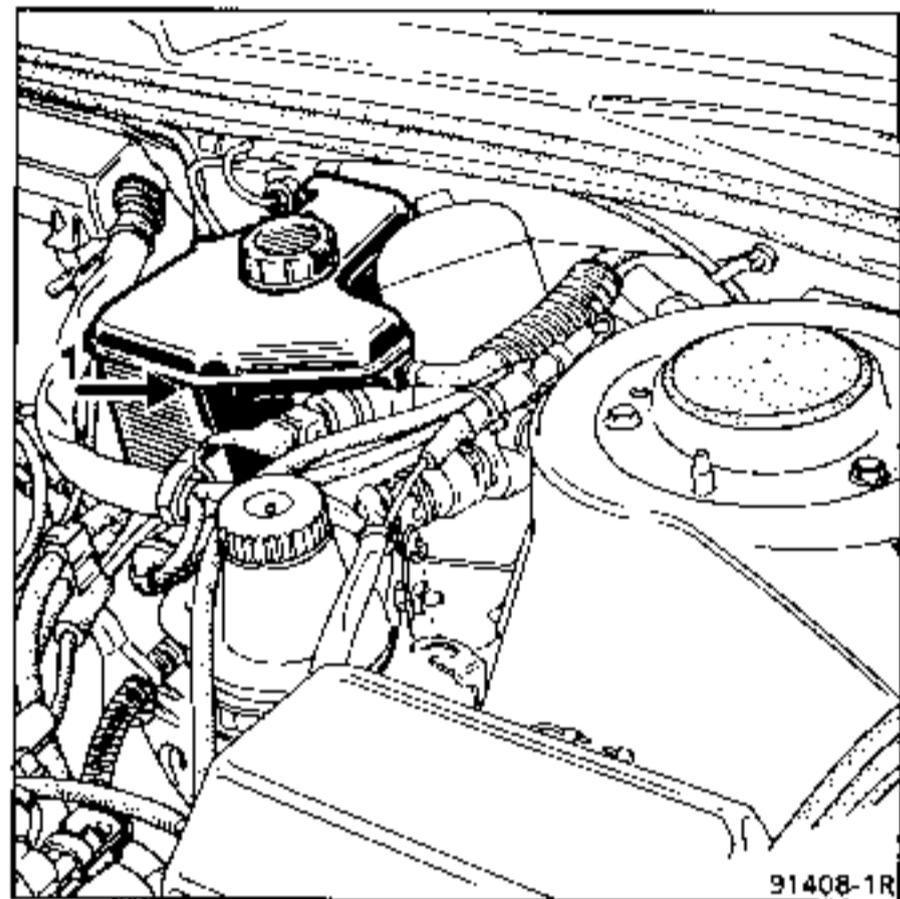


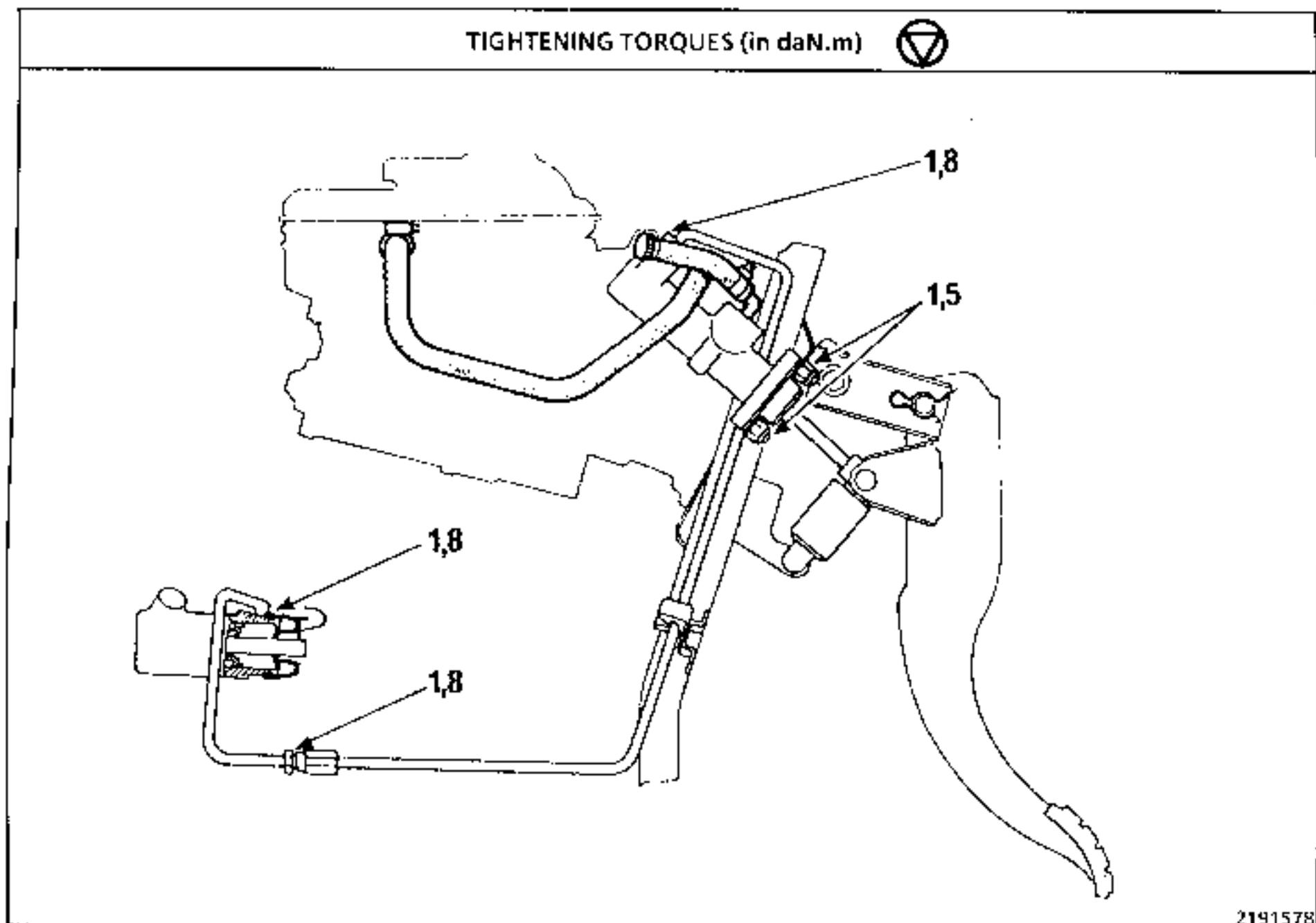
Check the brake fluid level.

ATTENTION: The brake fluid level must be checked with the ignition switched on. When the fluid reaches the MAX (1) the accumulator is full.

Switch on the ignition and wait for the pump to stop.

If necessary, top up the brake fluid to the MAX mark (1).





- The principle of this control system is the same as that for a brake control system.
- The clutch pedal acts on a master cylinder which causes the slave cylinder piston to move and act on a fork.

The clearance of the pedal cannot be adjusted.

Clutch control mechanical assistance.

"Bendix" control :

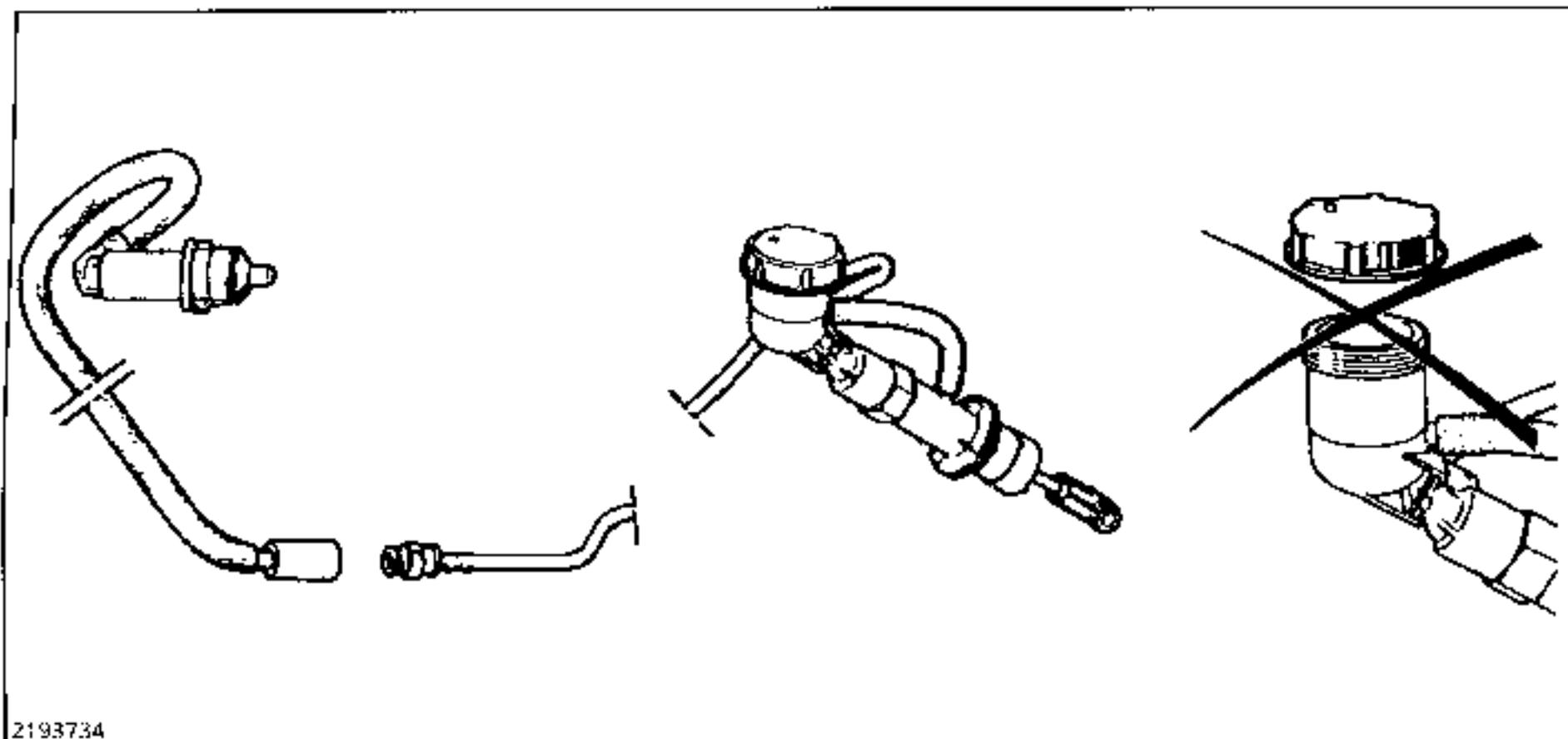
- The hydraulic circuit is supplied with a liquid contained in the brake fluid reservoir.

"Automotive Products" control :

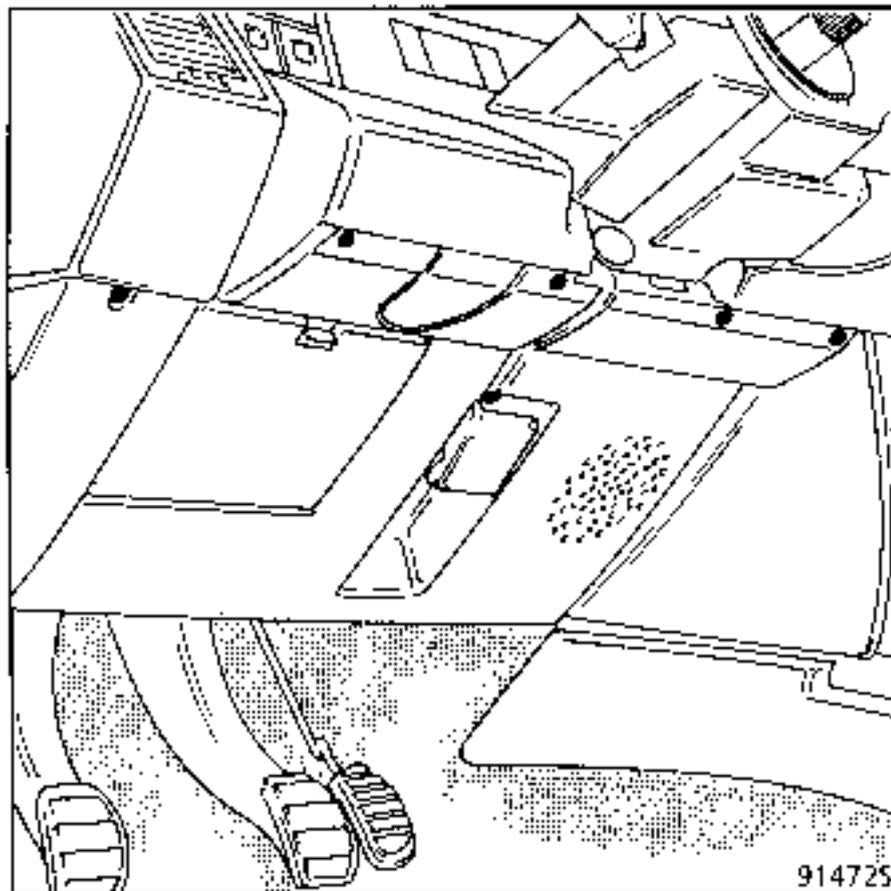
- The liquid reservoir is integral with the master cylinder.
- This equipment is supplied ready filled and bled.

REMOVING - REFITTING :

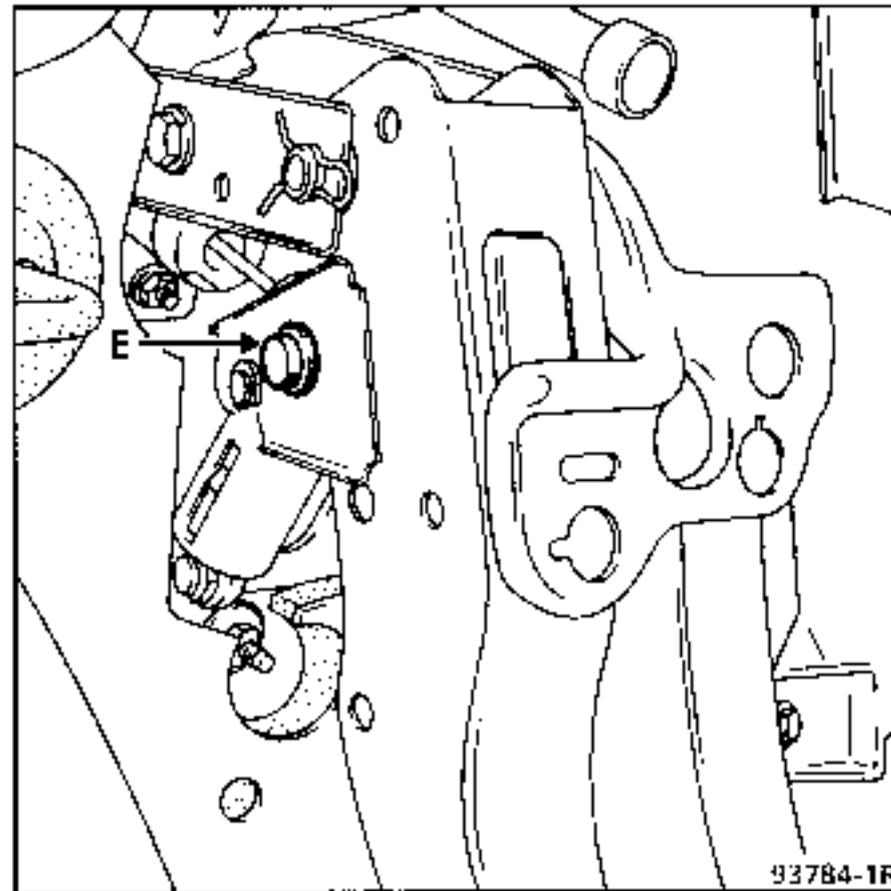
This equipment is supplied, prefilled and bled in two parts (master cylinder and slave cylinder).
Consequently, if one part is replaced then the other part also has to be replaced.

**REMOVING****Removing:**

- the lower cover from the dashboard (unclip the fuse holder connector),
- the ventilation duct.

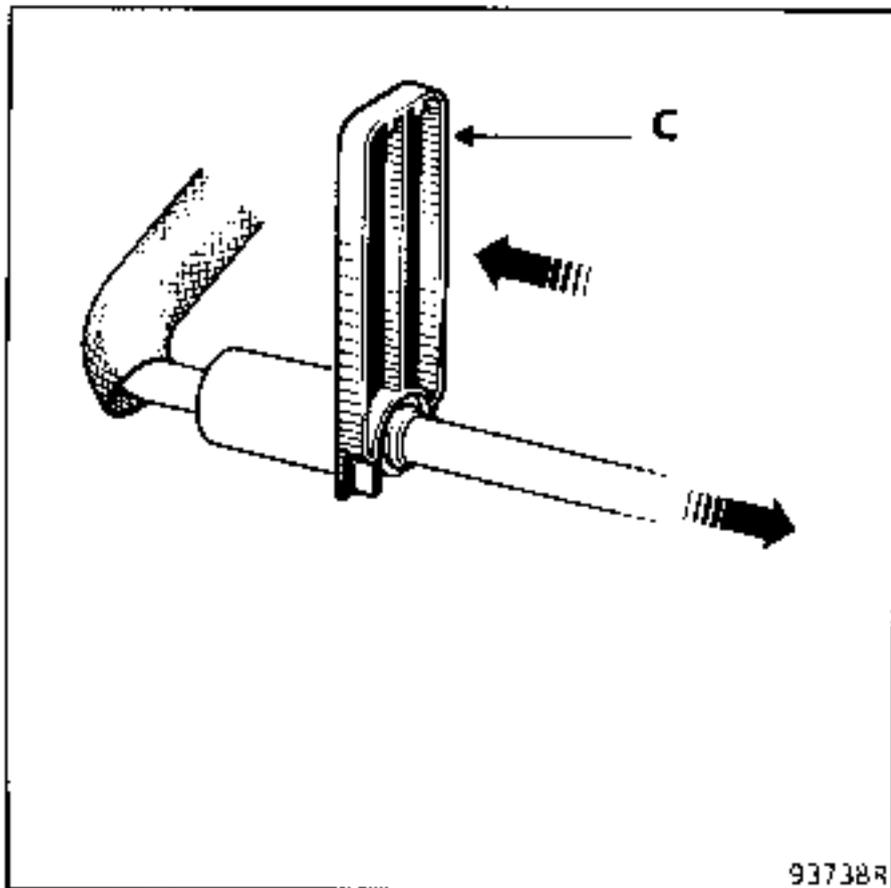
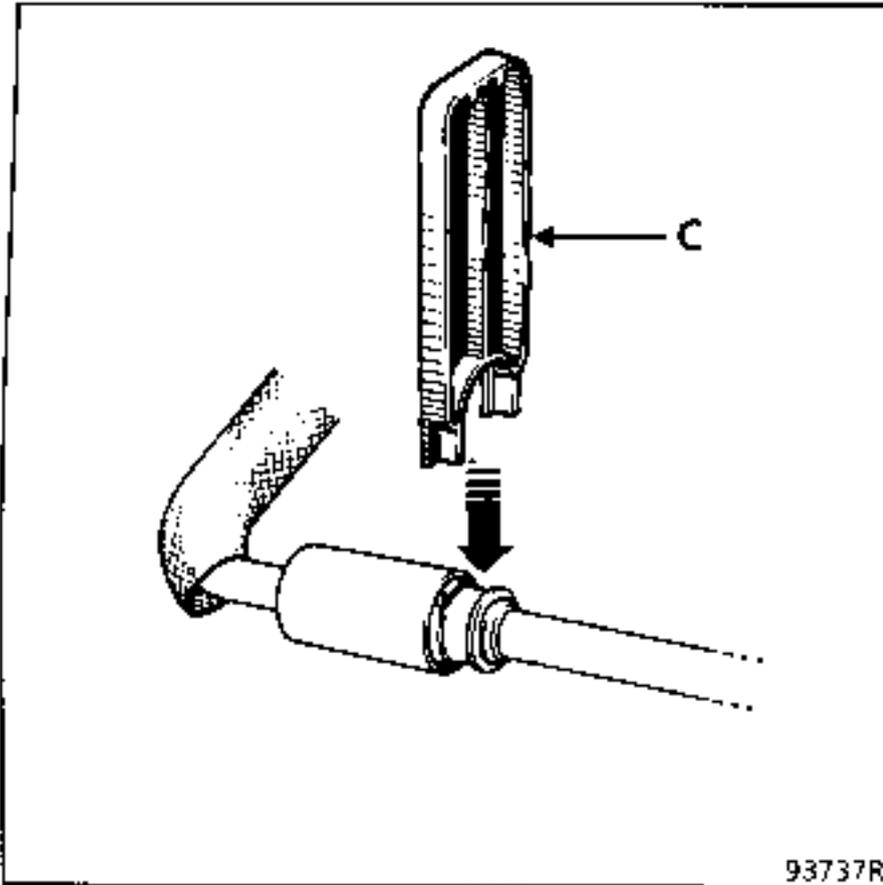


Remove the rollpin and shaft (E) from the master cylinder pushrod.



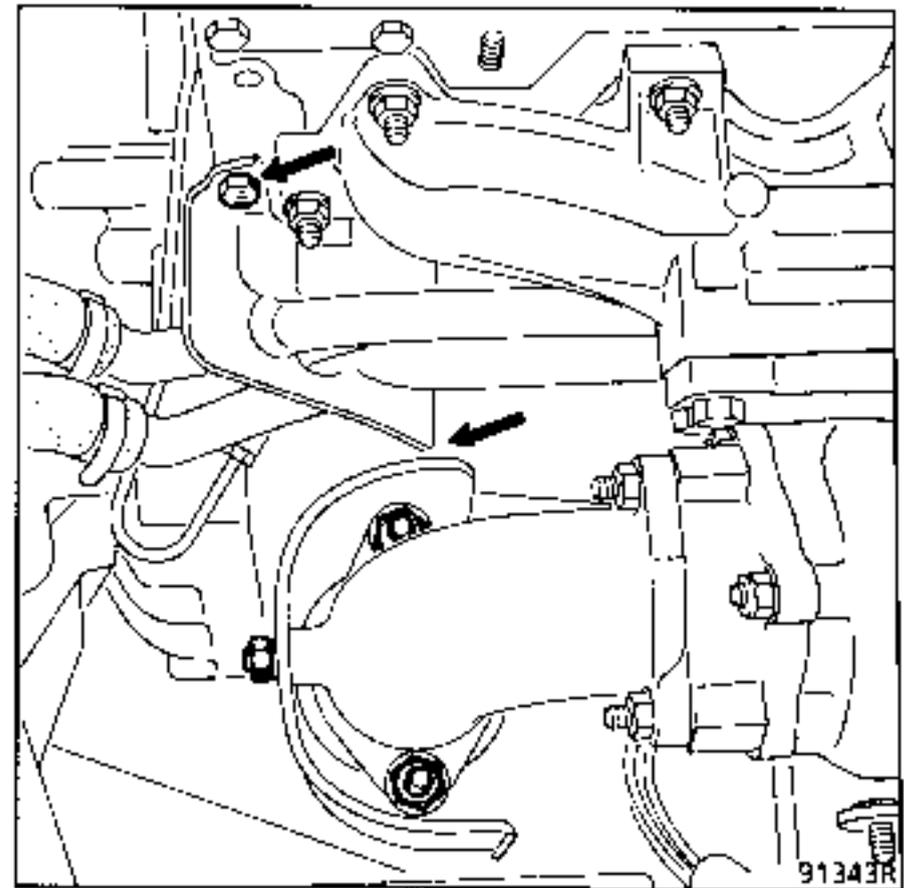
REMOVING (continued)

Using tool (C) supplied in the kit, disconnect the snap fastener from the master cylinder - slave cylinder connection hoses located on the top of the clutch casing on the left-hand side.

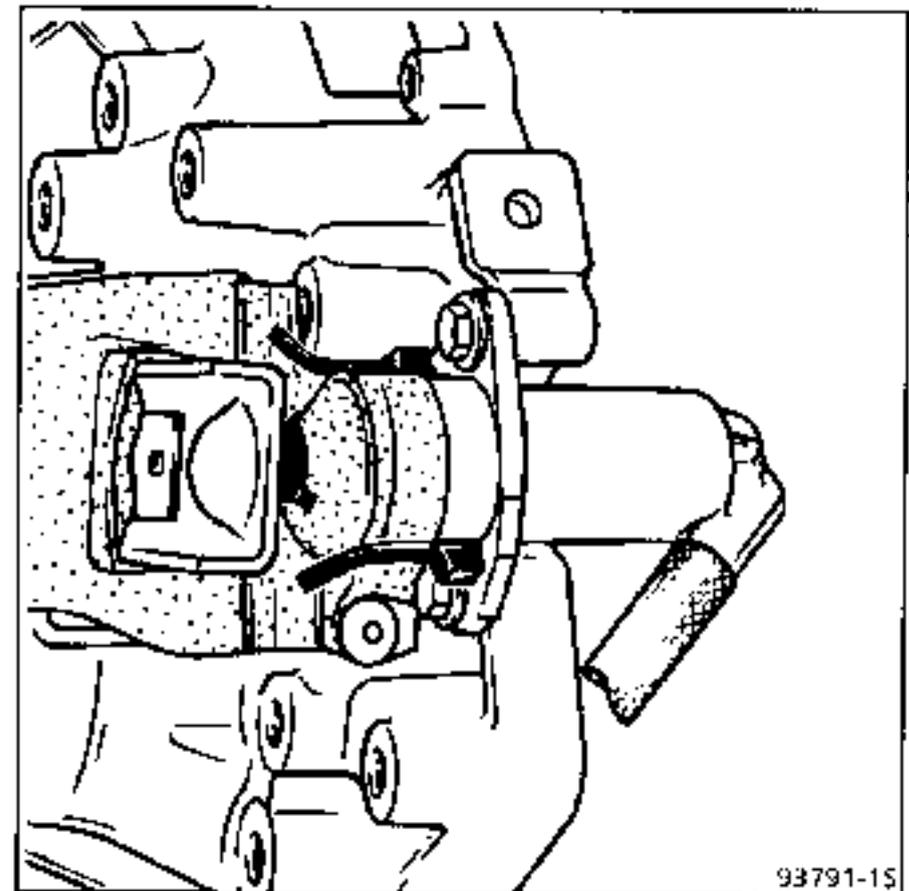


Remove:

- the heat shield from the turbo,
- the hose mounting and mounting from the slave cylinder heat shield,



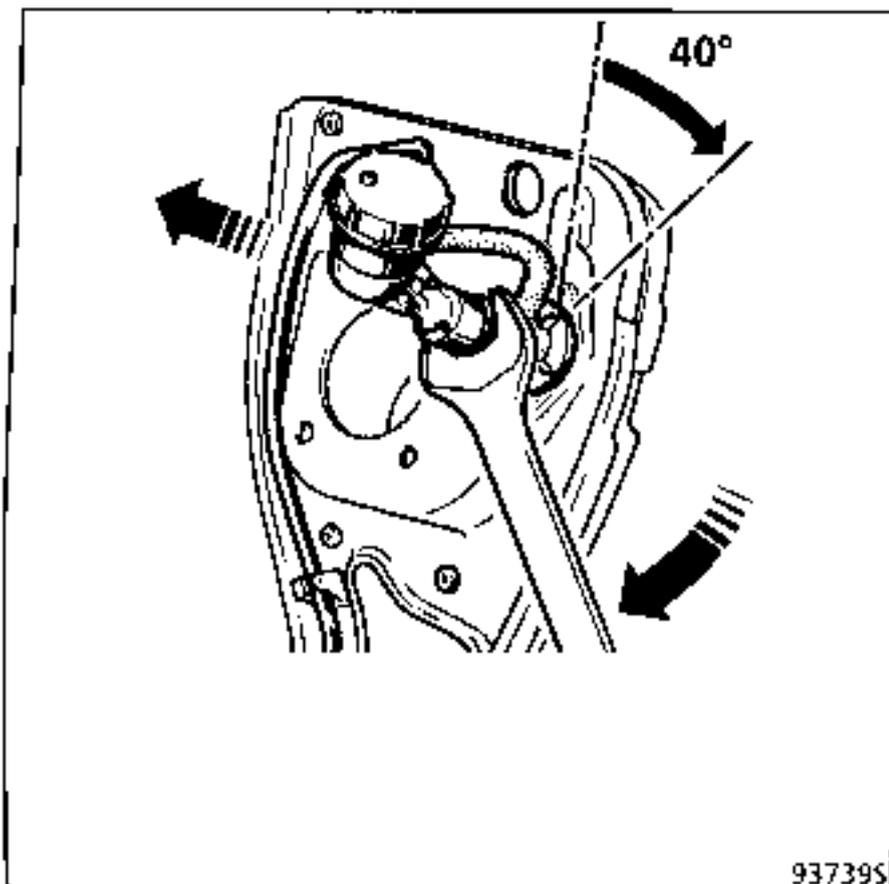
- the two bolts securing the slave cylinder.



Move the hoses away and remove the slave cylinder.

REMOVING (continued)

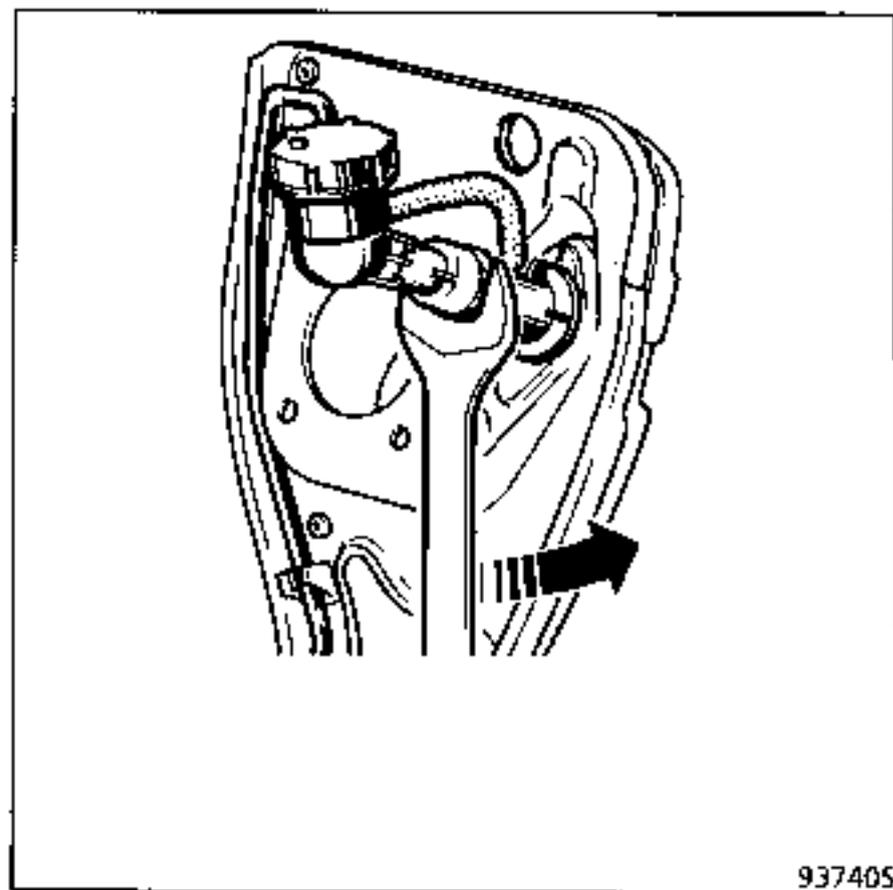
The master cylinder mounting is of a bayonet type; to remove it, turn the master cylinder body approximately 40° (arrow).



Free the hose line from its mounting on the plate and remove it together with the master cylinder.

REFITTING

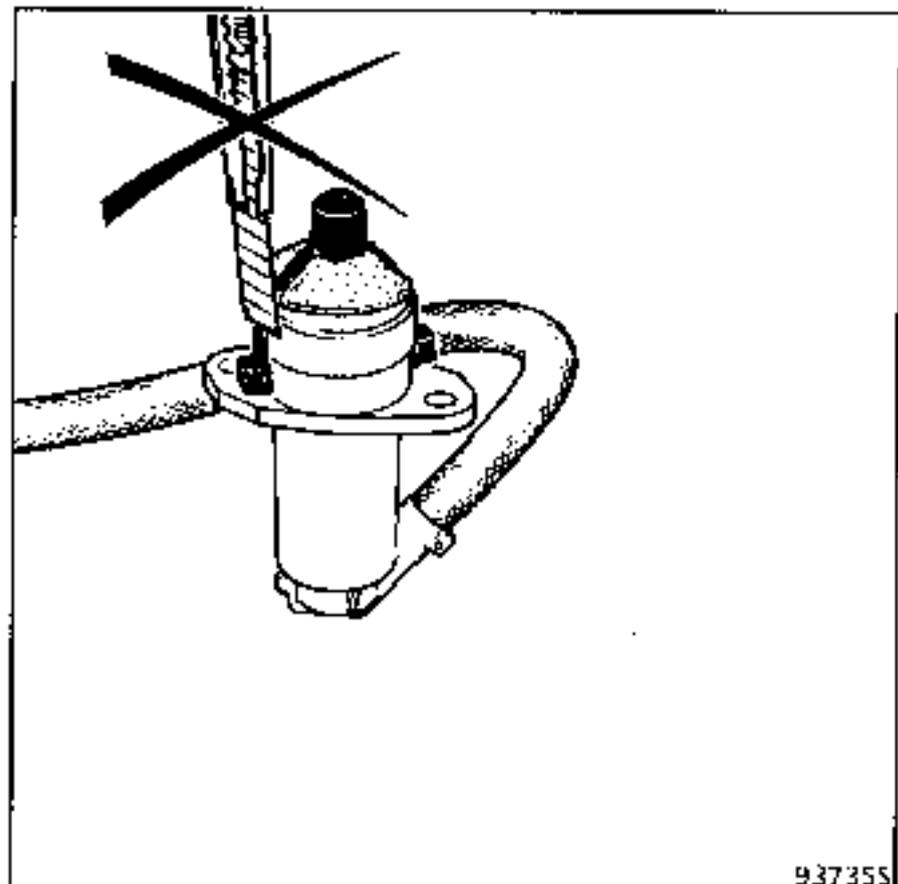
Fit in place the hose line and the new master cylinder.



Check that the position of the markings of the master cylinder and plate are opposite one another.

Slave cylinder:

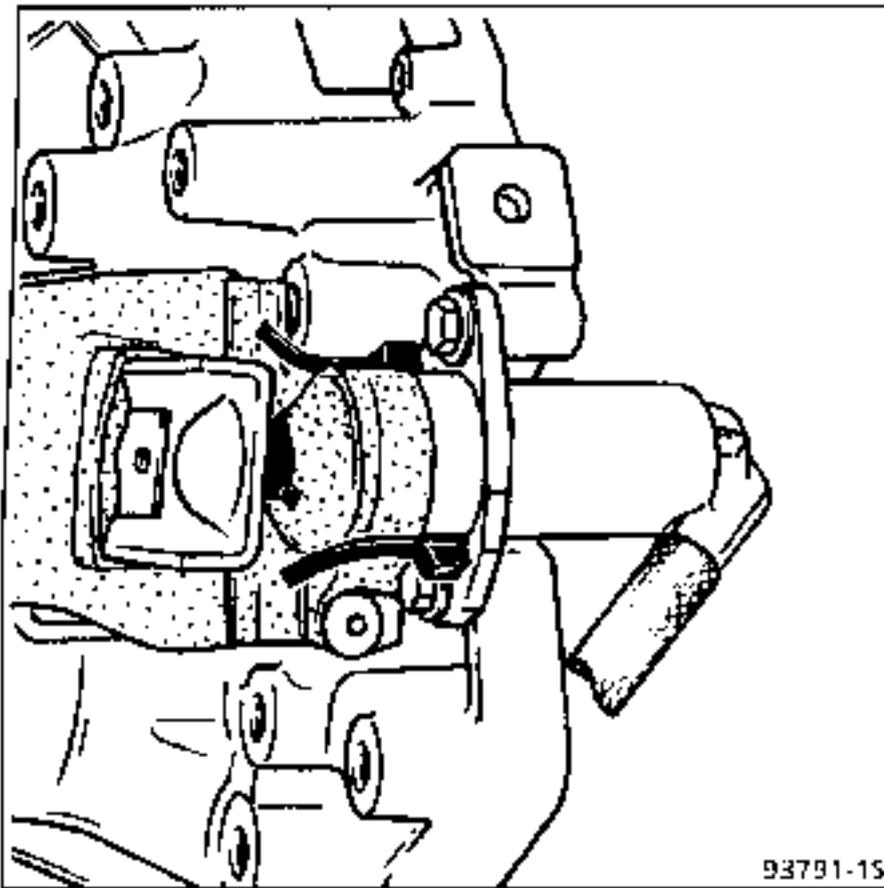
Ensure that the retaining tabs on the pushrod are in place, do not cut them or remove them.



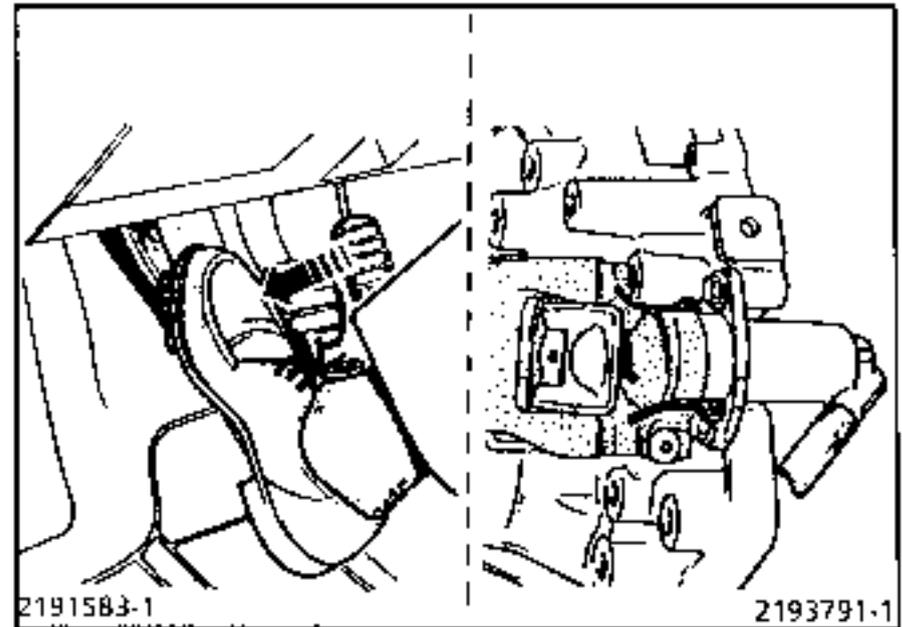
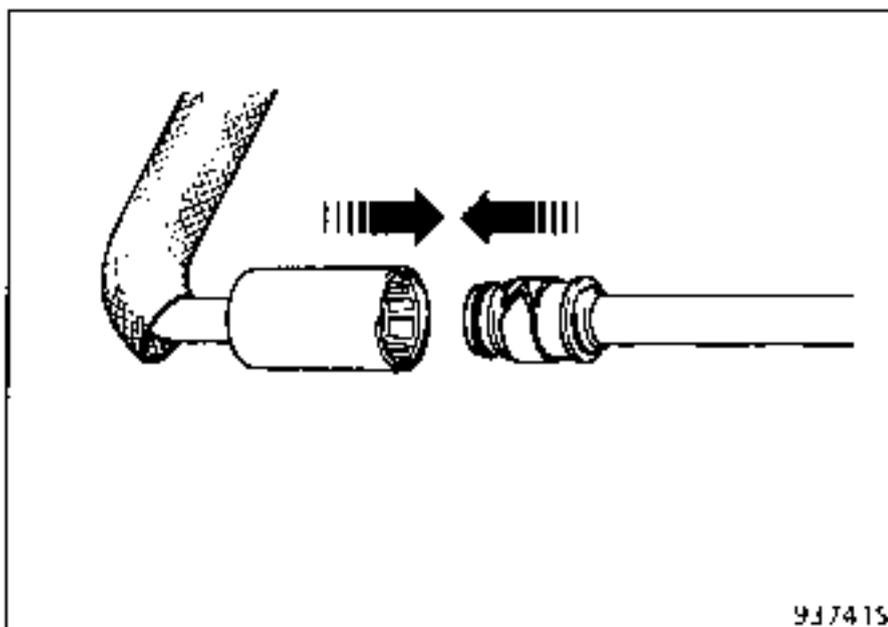
Take care not to damage or foul the quick-release connections.

REFITTING (continued)

Mount the slave cylinder and its hose line.

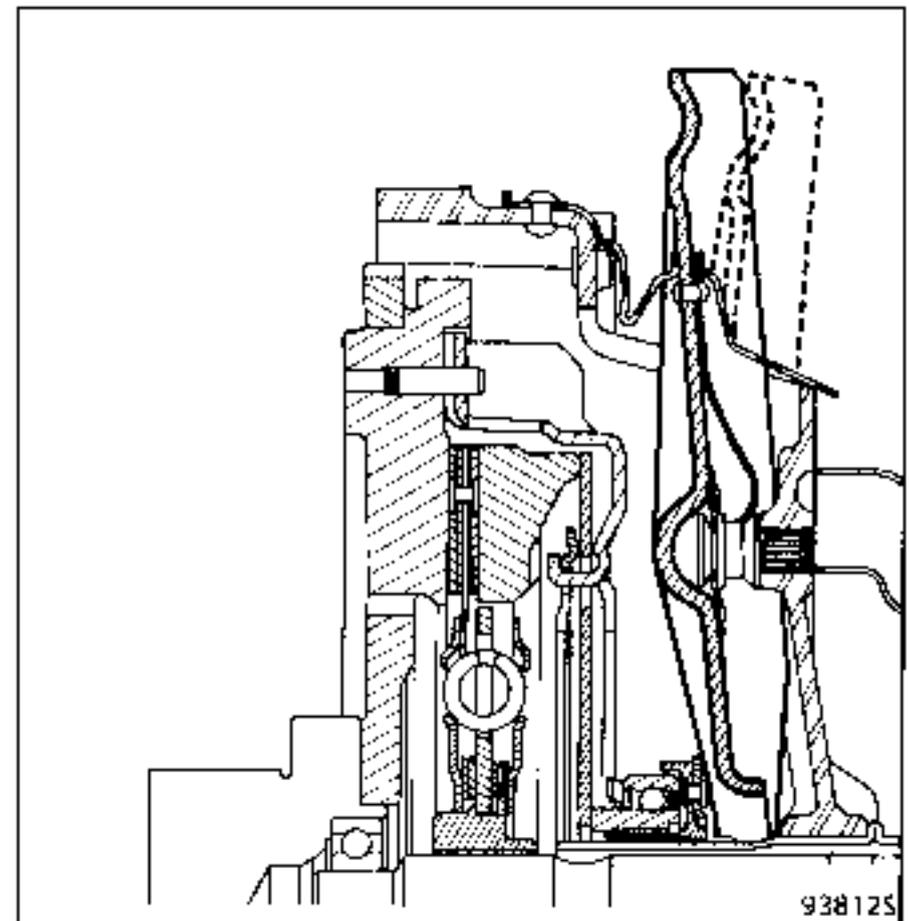


Connect the quick-release connections.



Press down fully on the clutch pedal and allow it to return gently to its top stop (2 or 3 times).

Check the fork movement travel. It should be:
 $X = 11$ to 12 minimum.



It is **not** permissible to top up the fluid. The unit is supplied as two units (master cylinder and slave cylinder) and is already filled with fluid.

REPLACING

REMOVING

The lower part of the dashboard must be removed in order to remove the clutch cable.

Remove:

In the engine compartment unfasten the cable from the fork.

In the vehicle remove the mounting bolts from the dashboard lower cover.

Disconnect the cigar lighter.

Unfasten the fuse holder connectors.

Open the glove compartment.

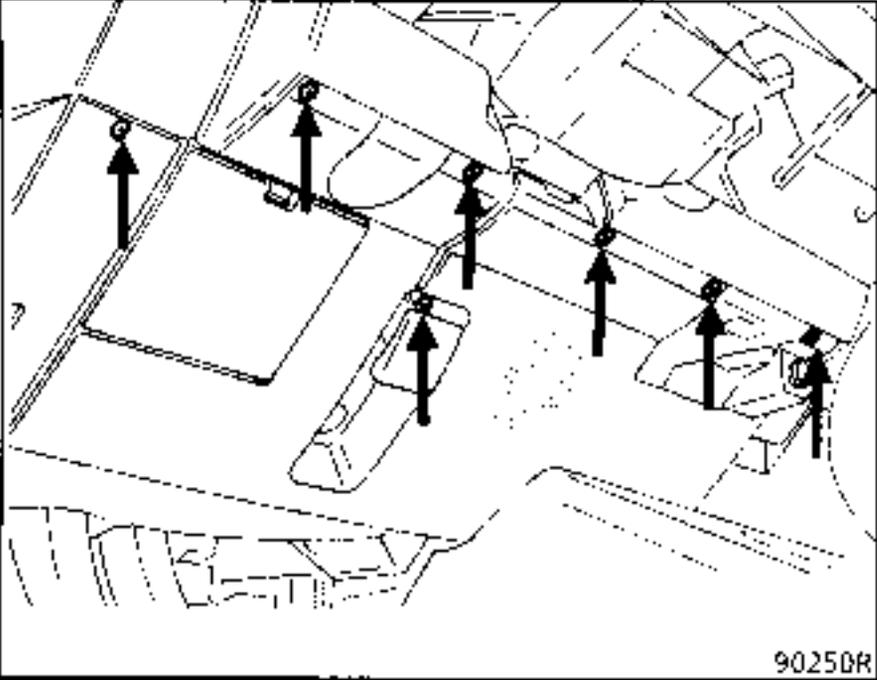
Remove the lower cover.

Release the pedal, take the cable stop out of its housing.

Release the cable from the pedal assembly.

Remove the sheathing stop from the bulkhead.

Take out the complete cable via the engine compartment.



Press the pedal to tension the cable.

Hold the cable in its sector housing (S).

REFITTING

Via the engine compartment, pass the cable into the passenger compartment.

In the vehicle:

Place the cable on sector (S) and fit the cable stop in its housing.

Fit the cable in place at the clutch fork.

Ensure that the sheathing stop is aligned on the bulkhead.

Press on the clutch pedal to clip the sheathing stop on the bulkhead. It will adjust automatically.

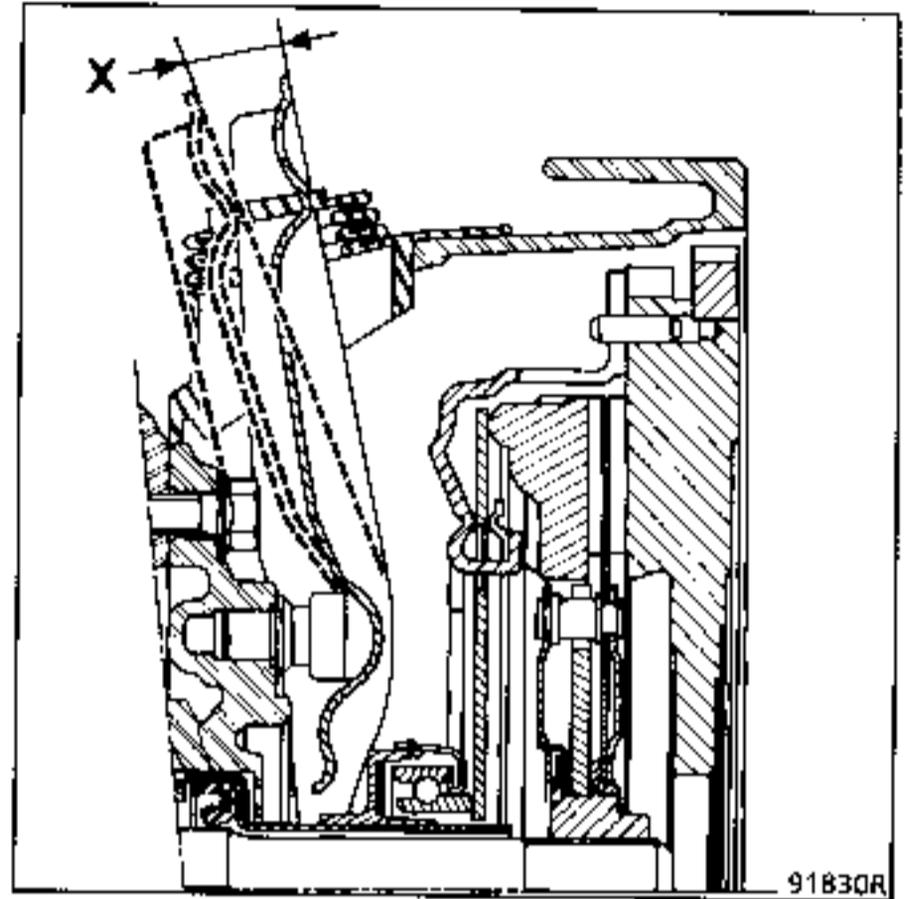
In order to ensure that the assembly is operating correctly:

1. Check that notched cam (C) pivots about its shaft.
2. Pull on the cable at the clutch fork on the gearbox.

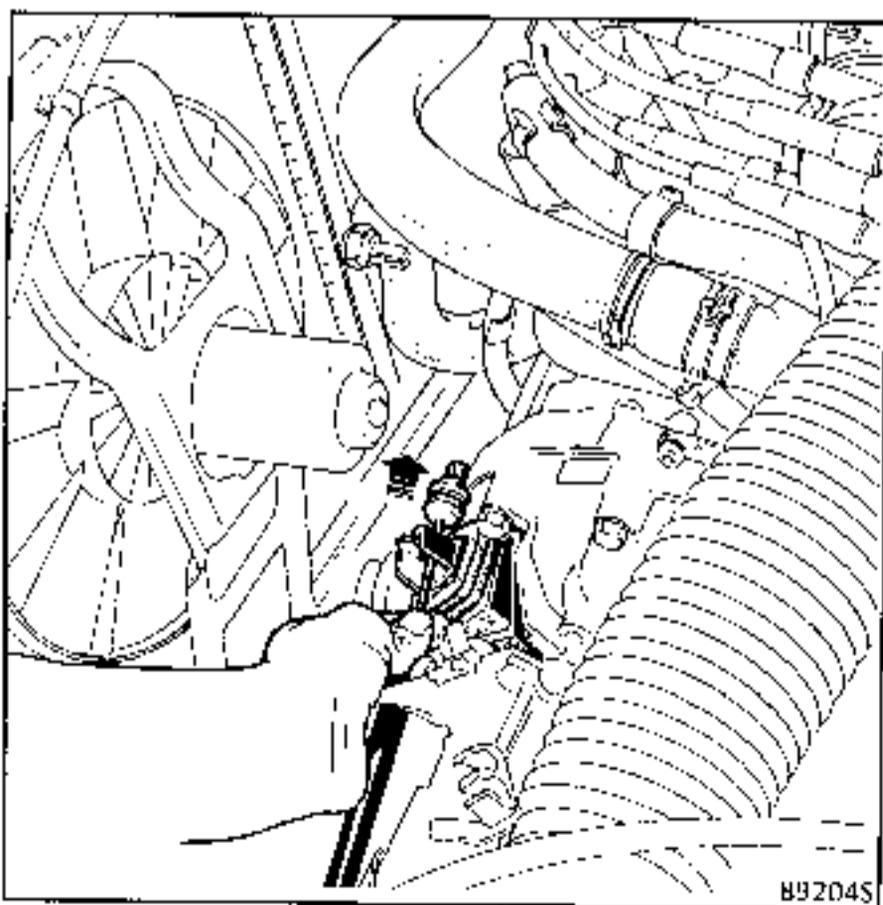
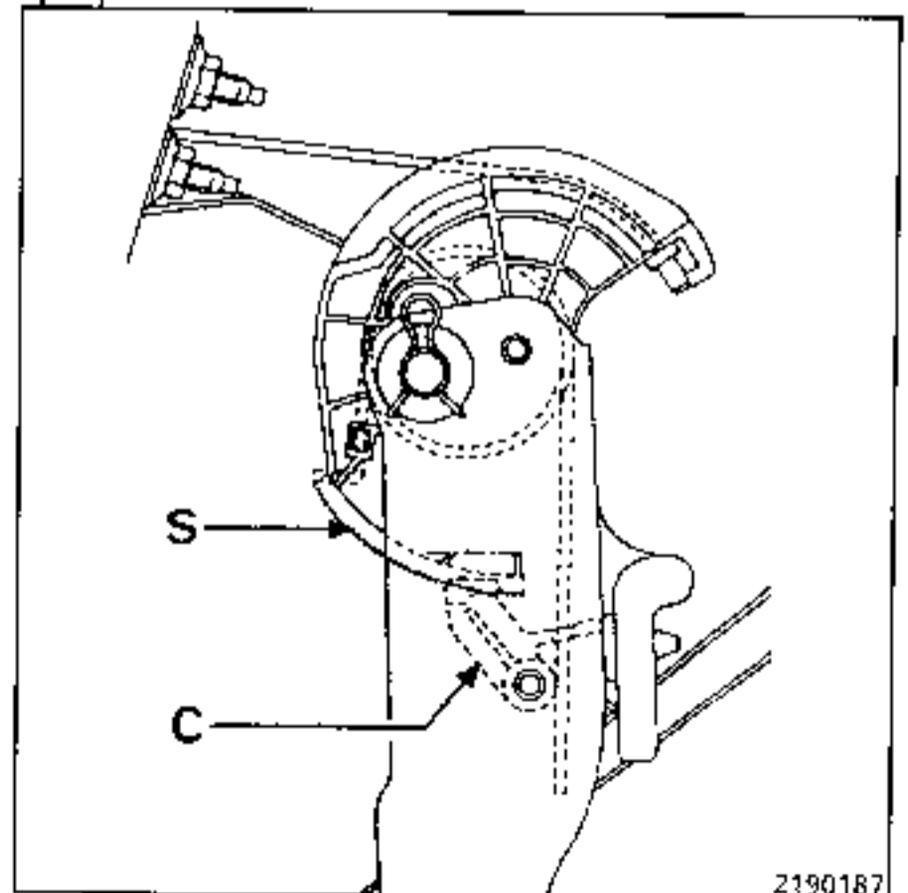
The cable should have at least 2 cm "slack".

In-line engine: Special points

3. Check the clutch fork movement travel. It should be $X = 17$ to 18 mm.

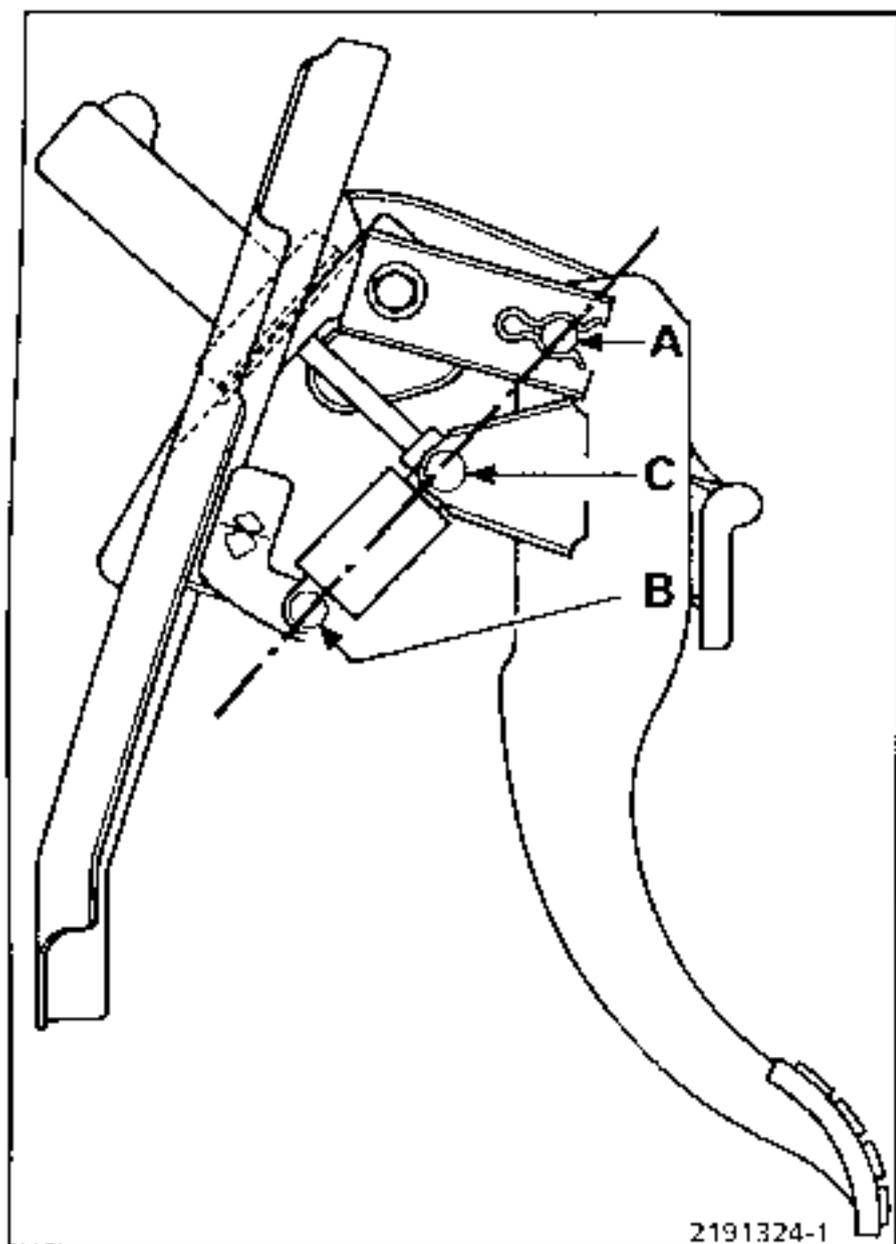


These are preliminary checks to be performed before any operation is performed on the clutch proper.



These checks enable you to check that notched cam (C) and toothed sector (S) are free in the "clutch engaged" position.

This device consists of a spring - activating capsule assembly located between the clutch pedal and the pedal assembly mounting.

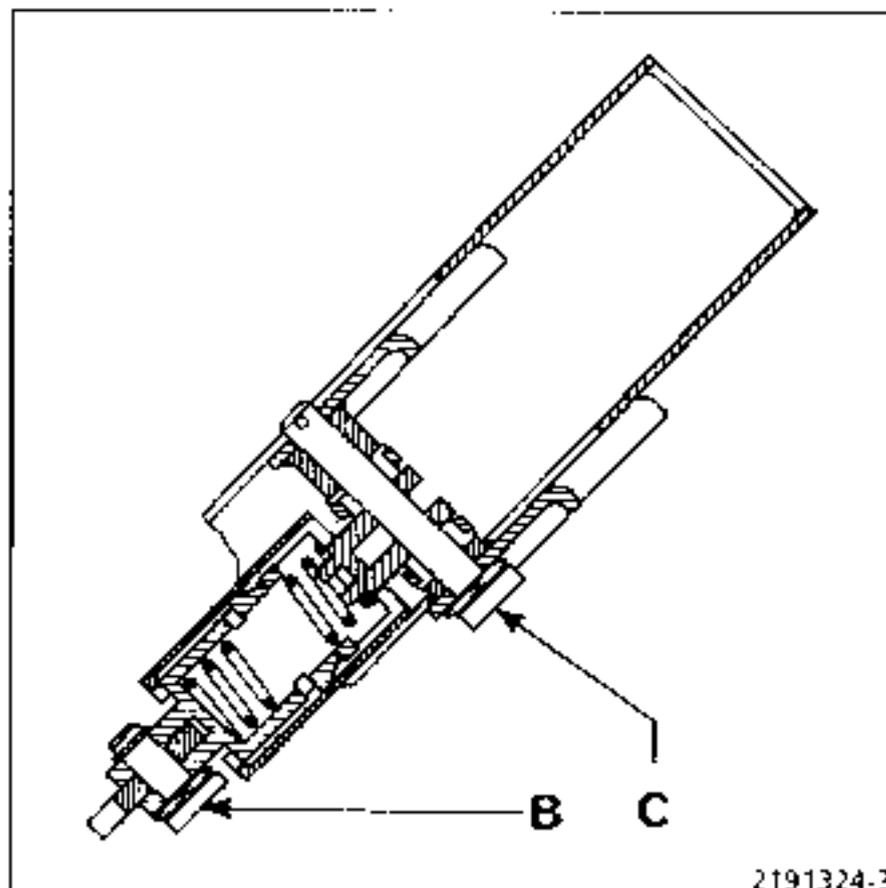


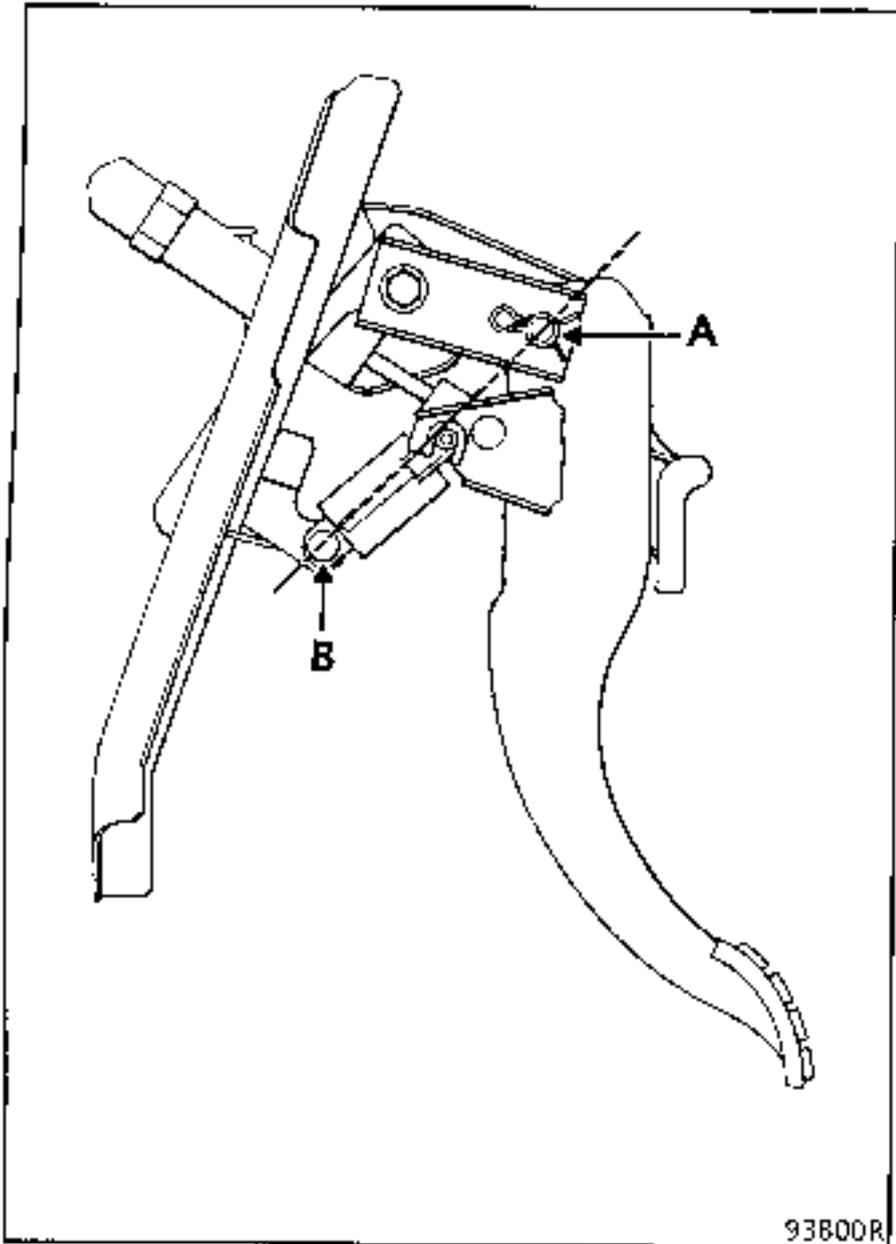
OPERATION

In the rest position, the assistance keeps the pedal in the upper stopping position.

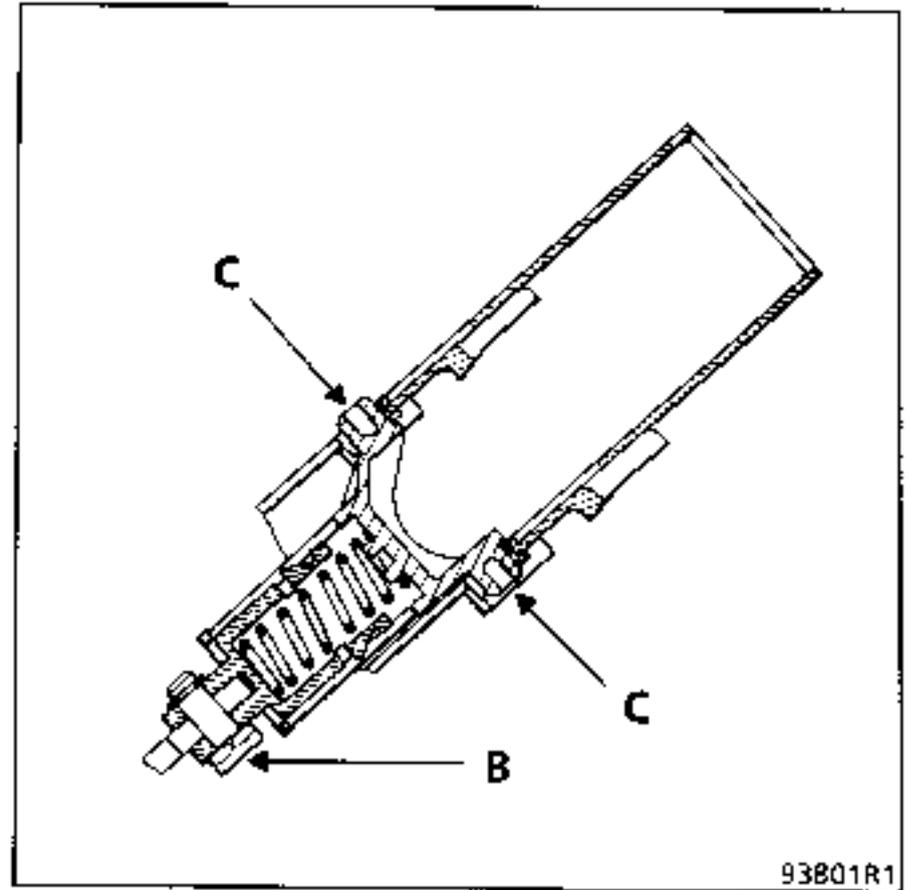
After crossing the inversion threshold (straight line AB), the spring slackens, thus decreasing the effort the driver needs to exert on the pedal (by approx. 18 %).

SECTION THROUGH THE SPRING - ACTIVATING CAPSULE ASSEMBLY





CROSS SECTION OF SPRING - ACTIVATING
CAPSULE ASSEMBLY



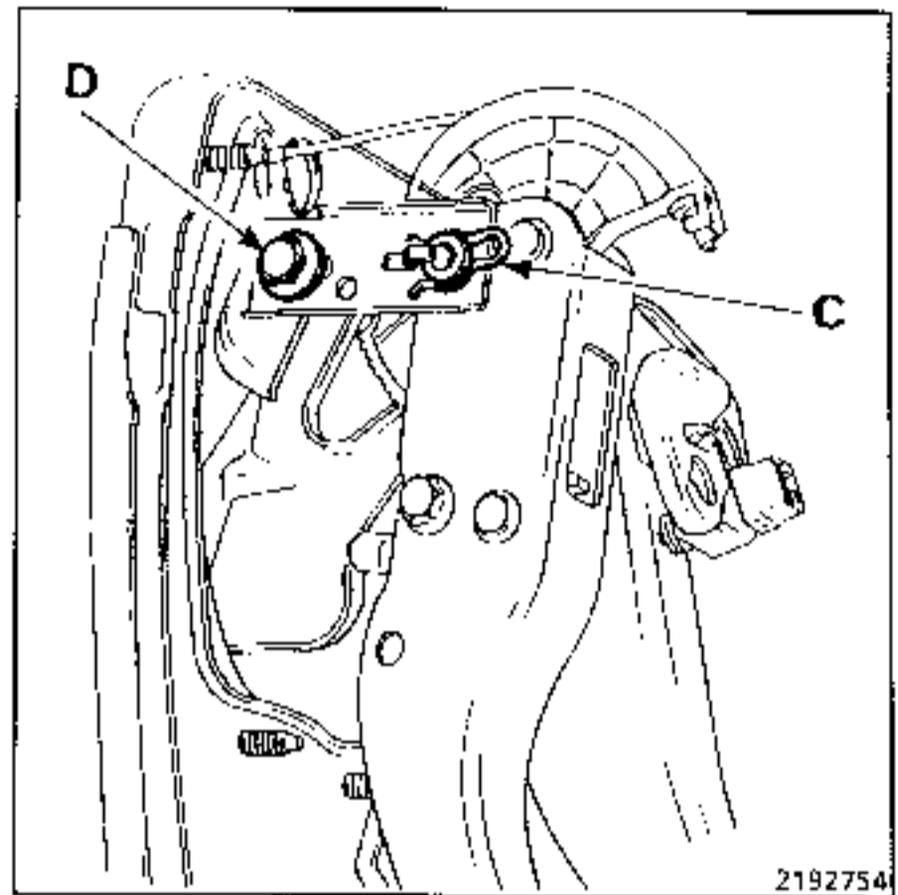
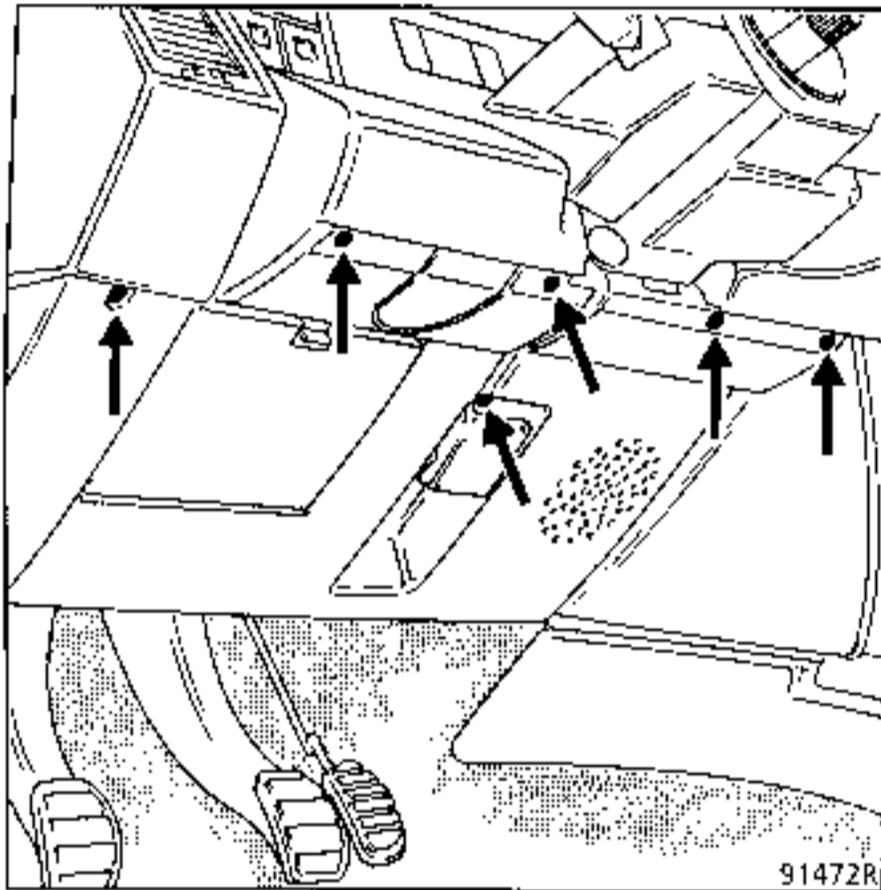
REMOVING

Disconnect the battery.

Remove:

- the cover under the steering wheel (remember to remove the bolt located under the steering wheel column adjusting lever).

Using a hook remove clip (C).



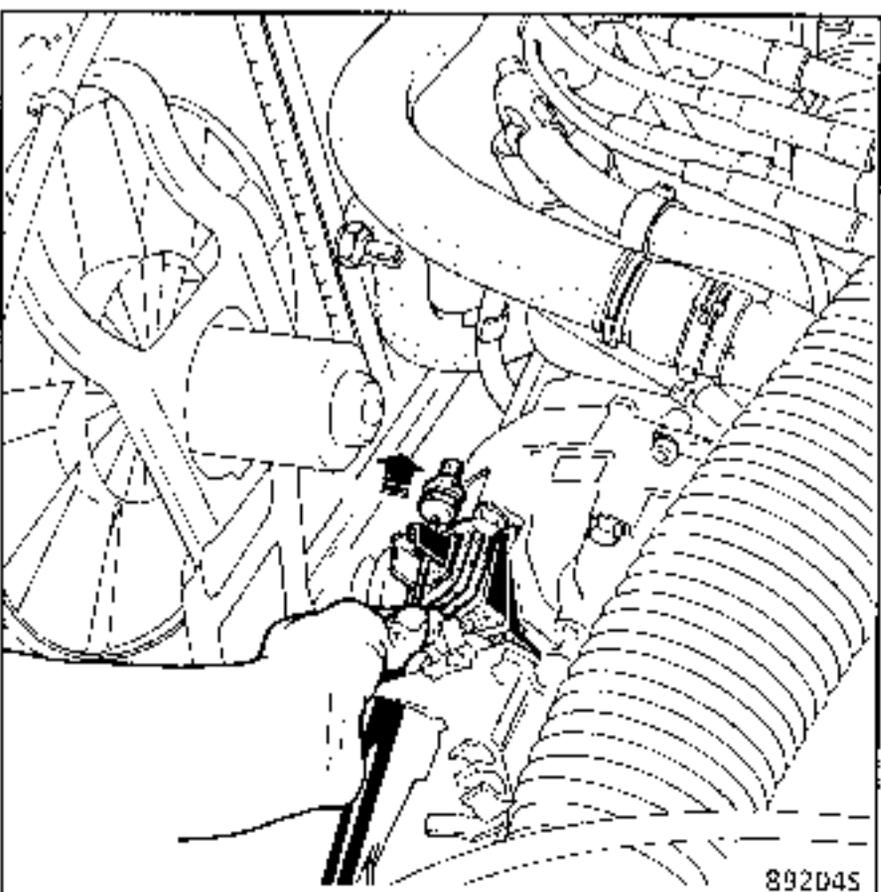
Slacken bolt (D) and release the stiffener.

Free the cable from segment.

Take the pedal off the shaft.

Recover the elastic washer and plastic bearings.

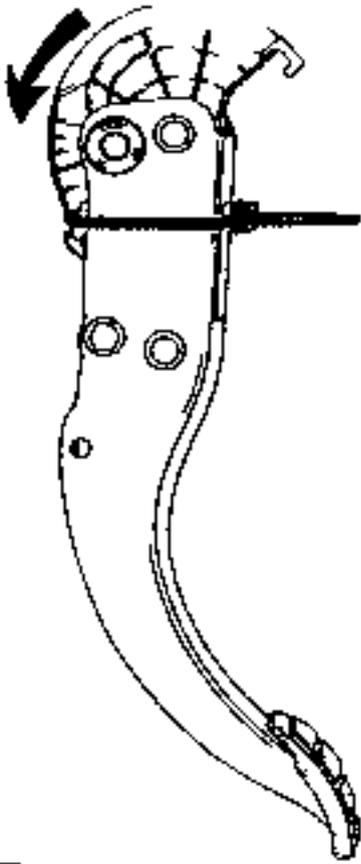
- Unfasten the fuse holder connectors.
- Remove the ventilation duct.
- Free the cable at the clutch fork end.



REFITTING - Special points

Check that the notched cam pivots freely about its shaft.

Compress the spring (arrow) on the wear take-up sector so that the aperture through which the pin passes in the sector coincides with those in the pedal.

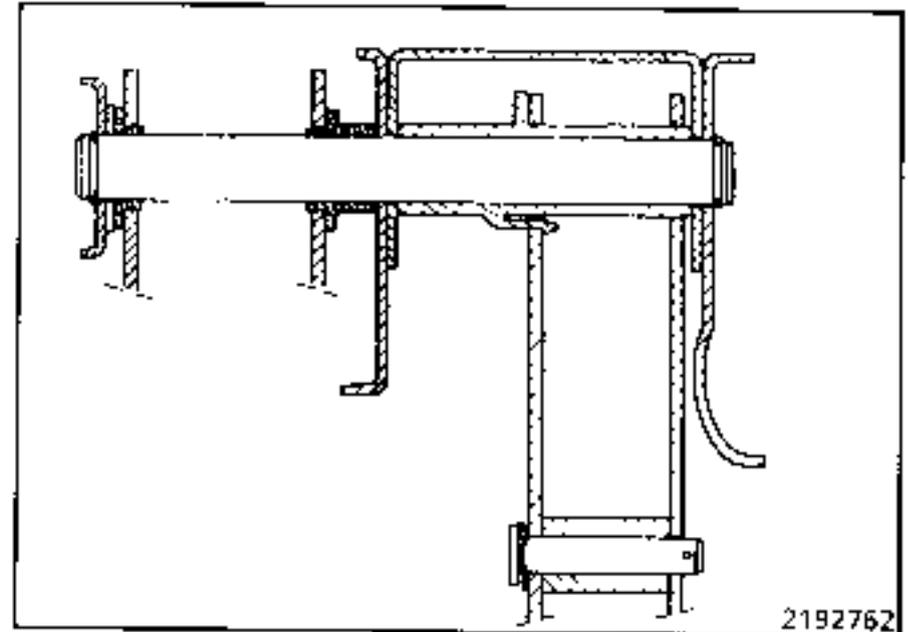


2192752

Using the clip immobilise the sector in this position.

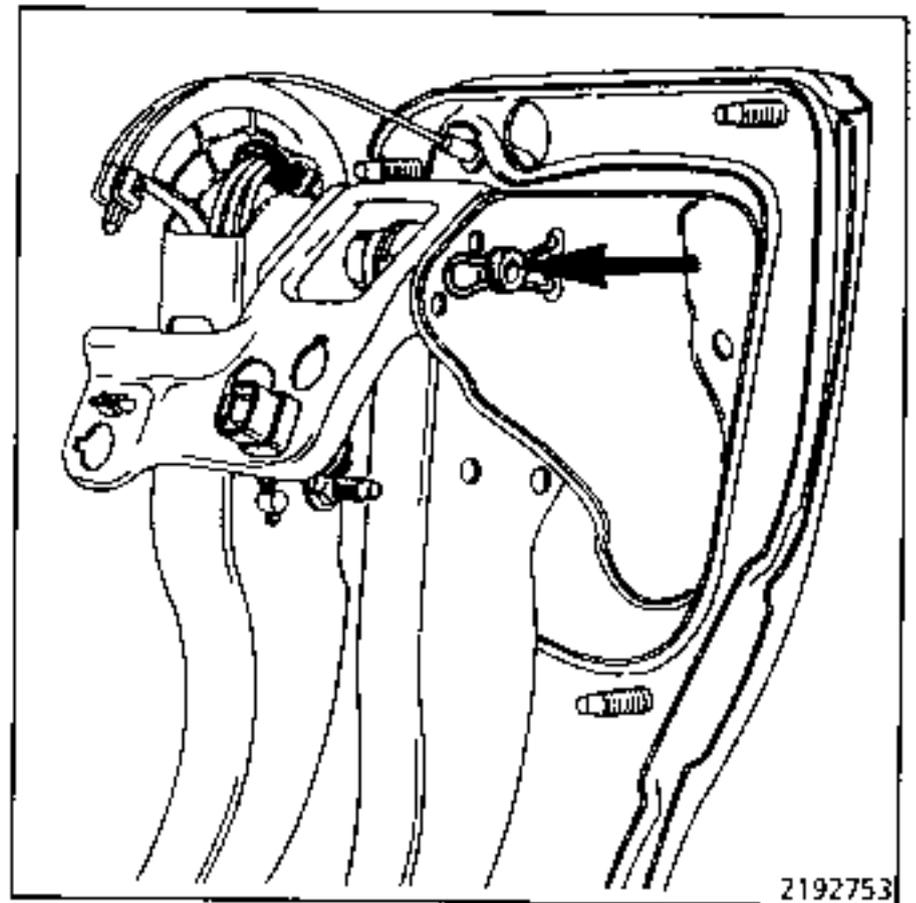
Fit in place the plastic bearings, with the largest at the brake pedal end.

Coat the shaft, bearings, teeth of sector (S) and cam (C) with grease.



2192762

Fit the pedal in place, holding the shaft at the right-hand end.



2192753

NOTE : Never hit the shaft with a hammer to refit it.

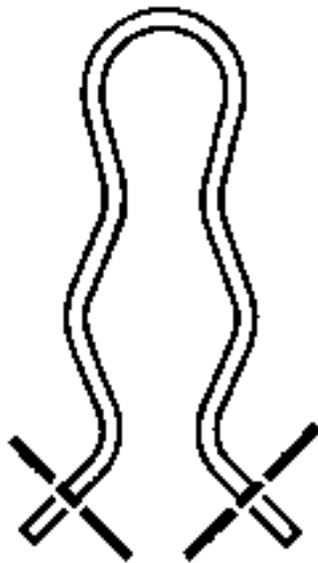
Fit:

- the plastic washer,
- the stiffener and tighten its mounting bolt (D),
- the cable stop on the sector.

REFITTING (continued)

Fit the clip in the groove on the shaft.

To make it easier to fit the clip, shorten the ends by 5 mm.



92751S

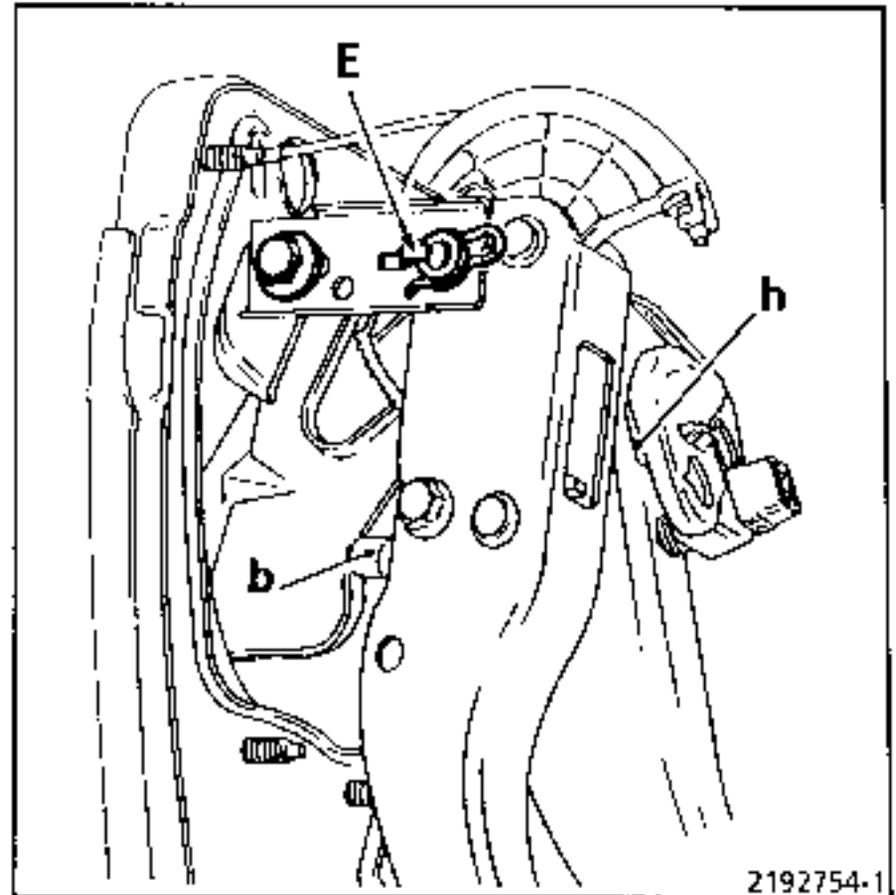
Remove the locking clip from the wear take-up sector.

Ensure:

- that the clips are correctly positioned in the shaft grooves;
- the bottom stop (b) and top stop (h) are fitted on the plate,
- that clip (L) retaining the return spring coils is fitted.

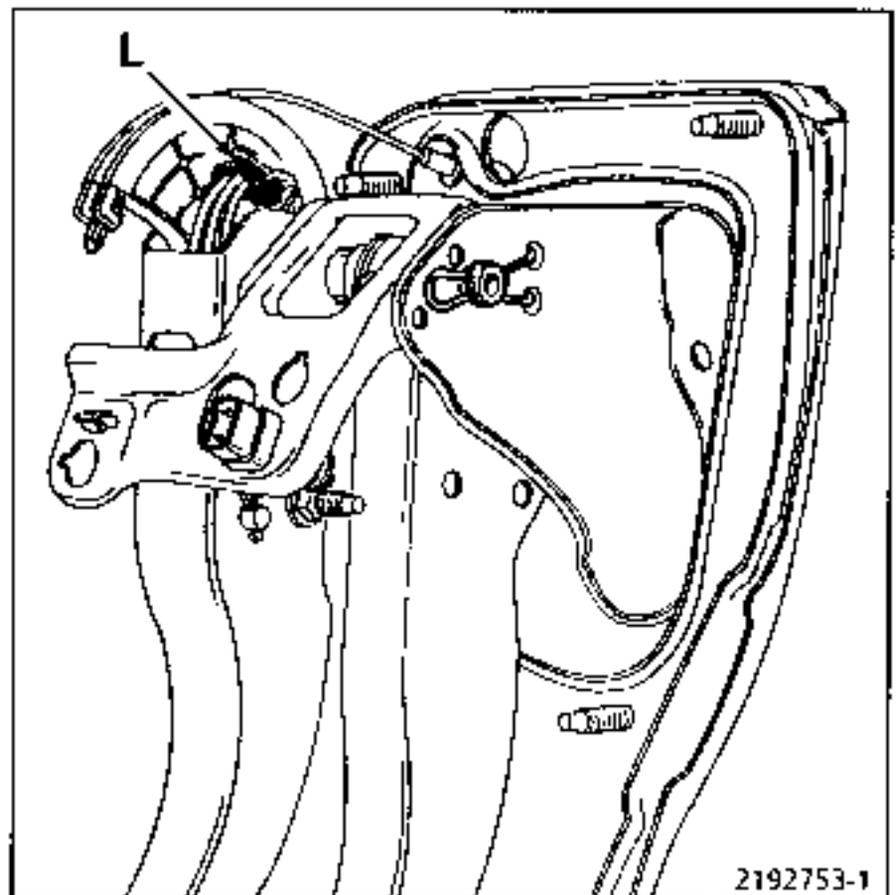
Fit the cable in place on the sector.

Check that the sheathing stop is correctly clipped on the plate.



2192754-1

NOTE : From now onwards the stiffener has a locking spur (E) preventing all risk of the shaft moving.



2192753-1

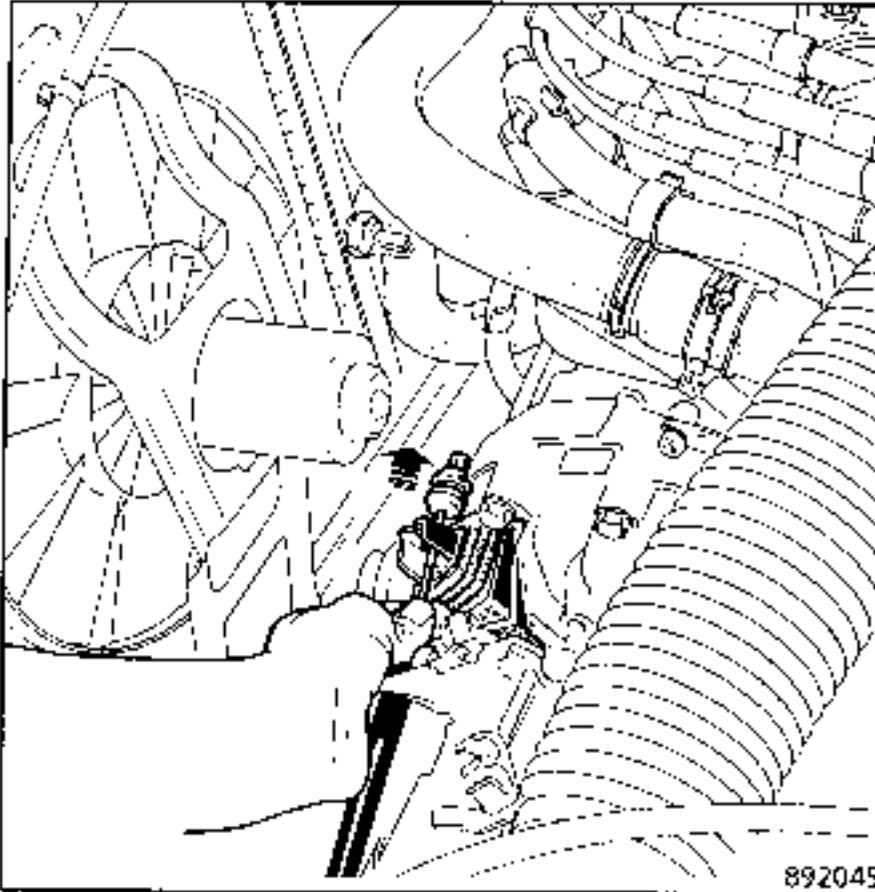
Fit the cable in place at the fork end.

Check that the assembly operates correctly.

With the pedal in the rest position and clutch in the engaged position.

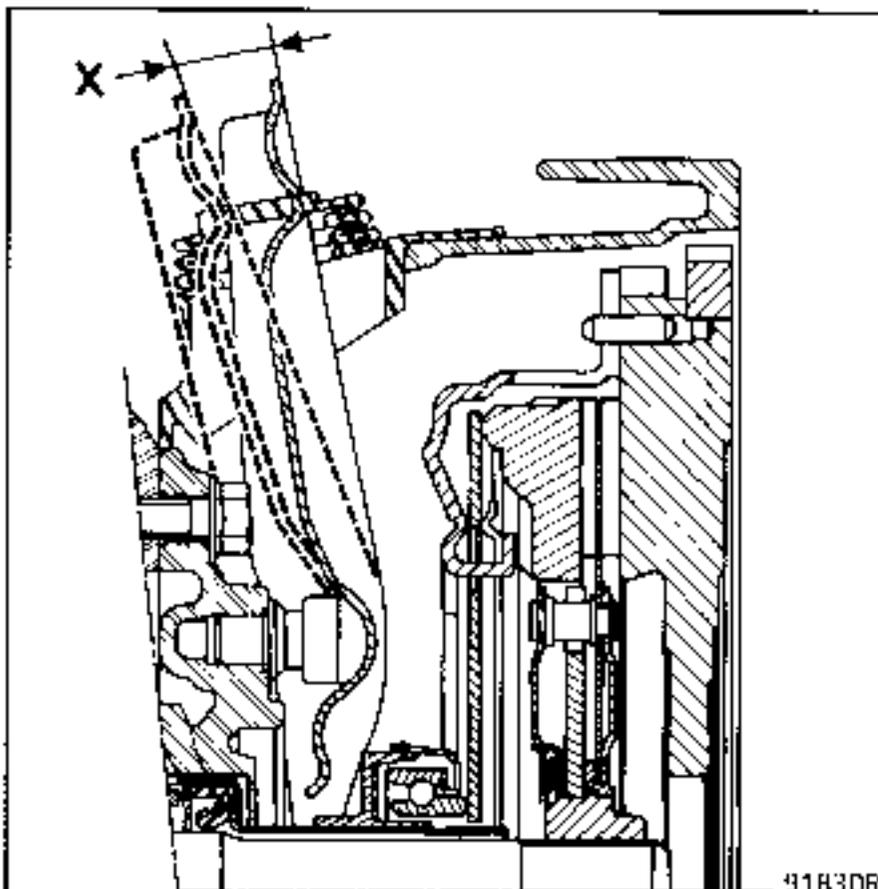
Pull on the cable at the level of the clutch fork on the gearbox.

The cable should have at least 2 cm "slack".

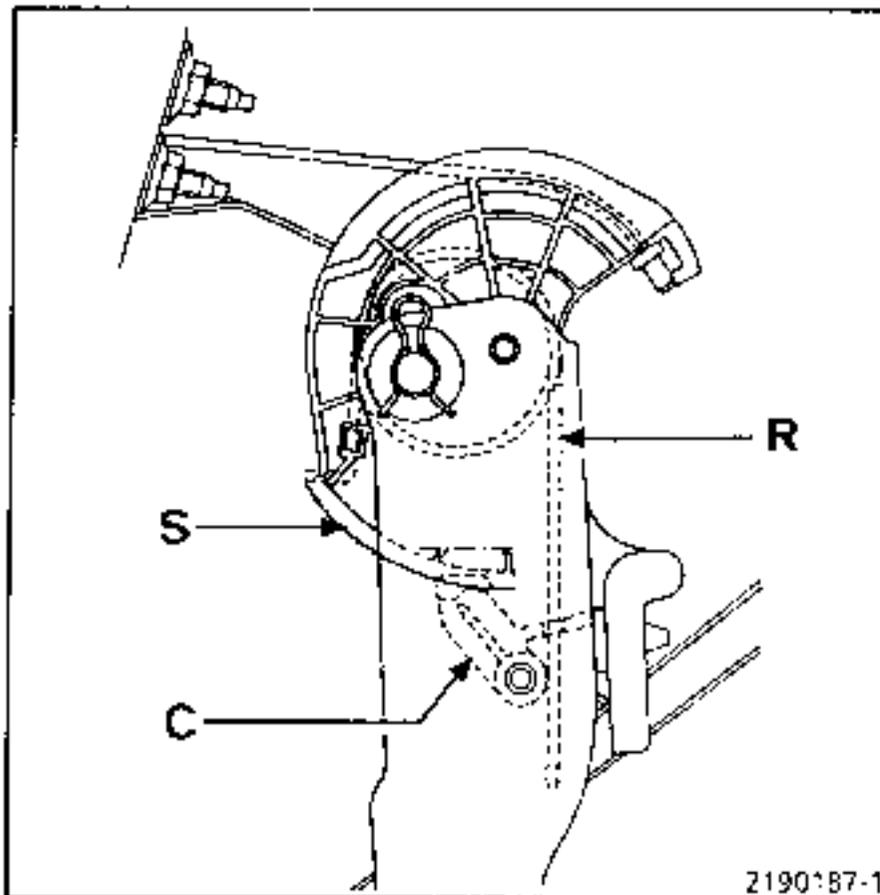


Check the fork movement travel. It should be:

$$X = 17 \text{ to } 18 \text{ mm minimum}$$



CROSS SECTION



OPERATION

WEAR TAKE-UP

Spring (R) permanently pulls on wear take-up segment (S).

The cable is always taut, which entrains the fork and thus causes the stop to **bear constantly** on the diaphragm.

Adjustment is automatic.

CLUTCH "DISENGAGEMENT" FUNCTION

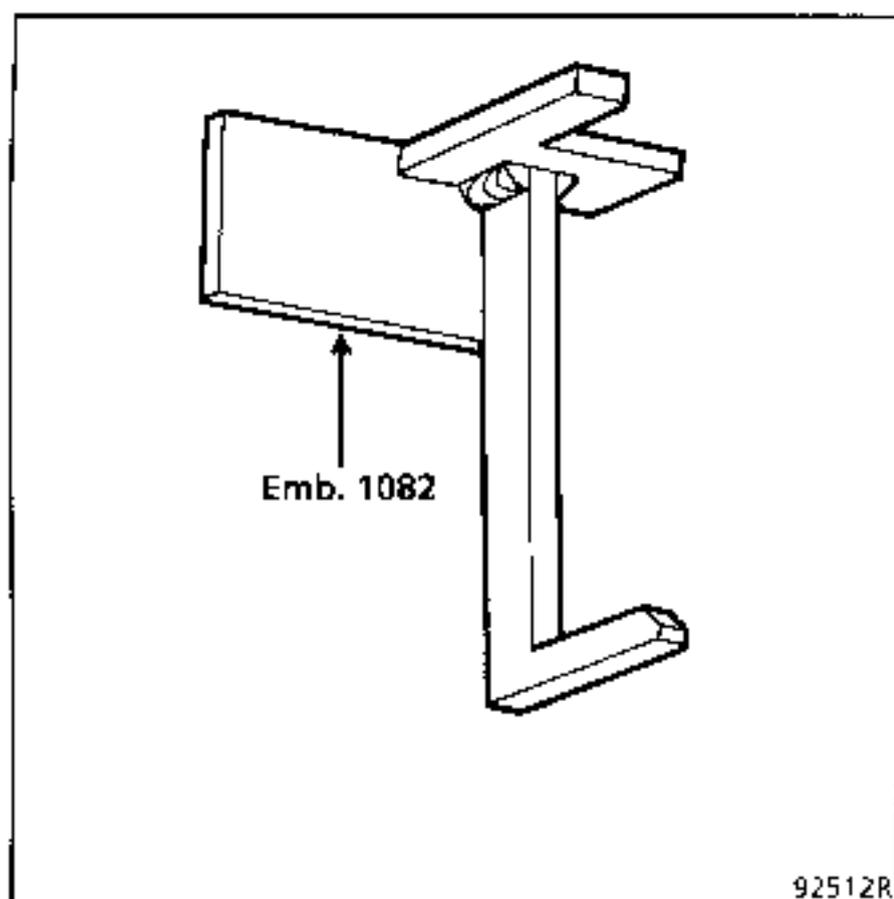
By depressing the pedal, the teeth on the wear take-up segment (S) of the pedal mesh on the toothed cam (C) to prevent its pivoting and enable the cable to be pulled.

REMOVING - REFITTING

ESSENTIAL SPECIAL TOOLS

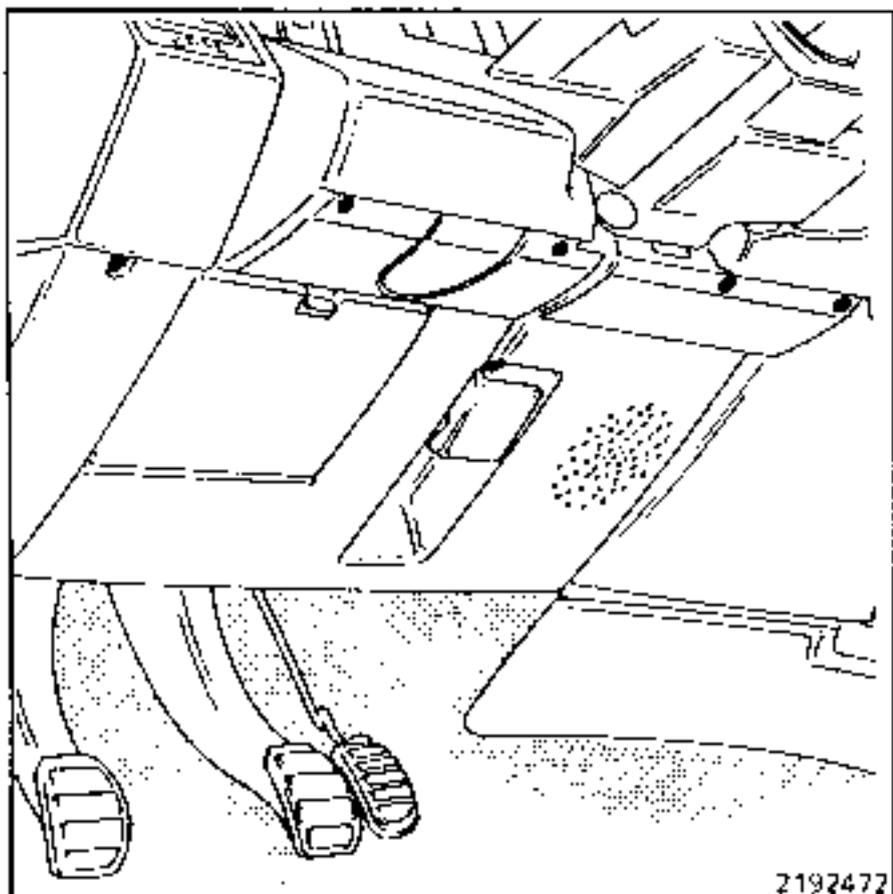
Emb. 1082 Tool for removing - refitting
spring - activating capsule
assembly

In order to remove and refit the spring - activating capsule assembly, it **must** be locked in the compressed position using tool Emb. 1082.

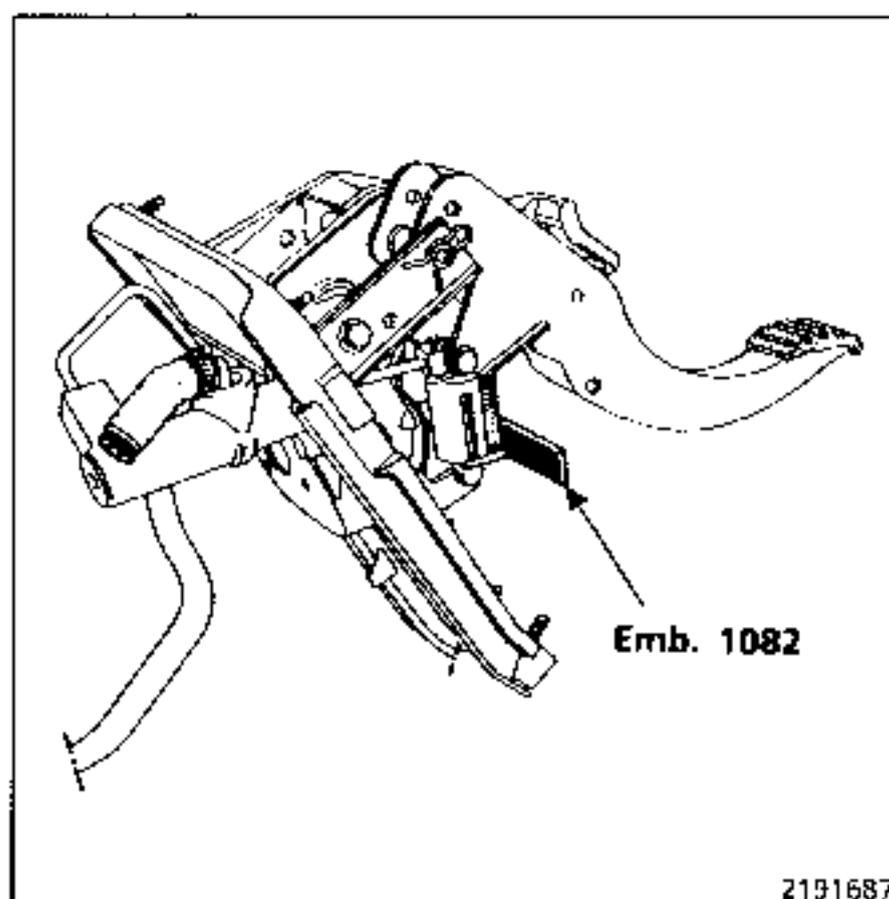


Remove:

- the lower cover from the dashboard (unclip the fuse-holder connectors),
- the ventilation duct.



Fit tool Emb. 1082 in place on the spring - activating capsule assembly.



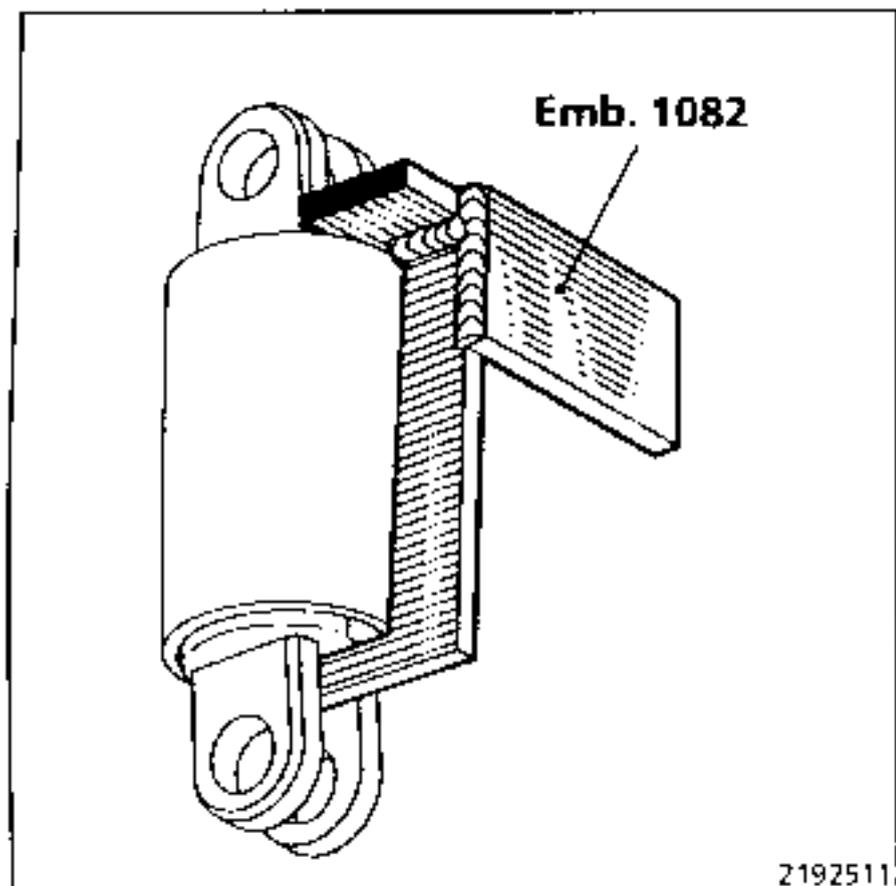
Remove the circlip and rollpin from shafts (B) and (C).

Press down on the pedal to extract shafts (B) and (C).

Take out the spring - activating capsule assembly and the tool.

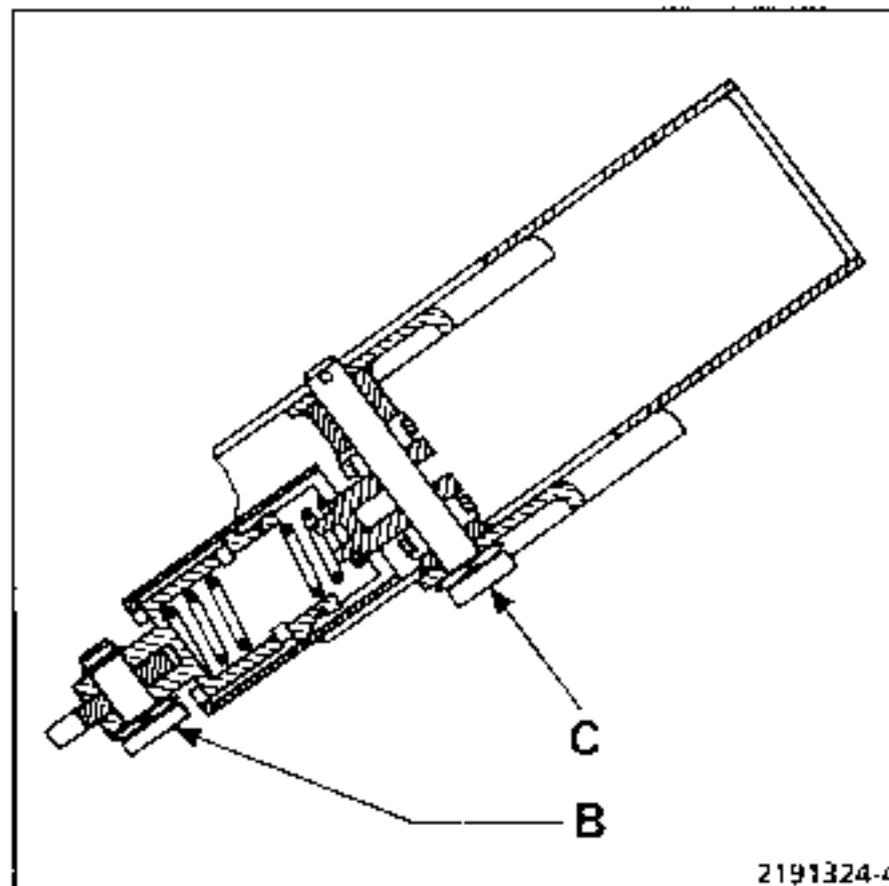
REFITTING - Special points :

If a new part is being fitted, compress the spring - activating capsule assembly in a vice and fit tool Emb. 1082.



Fit the parts the correct way round: the section of the capsule with the larger diameter must be at the pushrod end).

Coat the shafts with grease.



Fit the pushrod calliper (equipped with its plastic bearings) between the spring - activating capsule assembly and the pedal.

Fit shaft (C).

Depress the pedal slightly so that the capsule and shaft (B) can be fitted.

Remove tool Emb. 1082 and refit the circlip and rollpin.

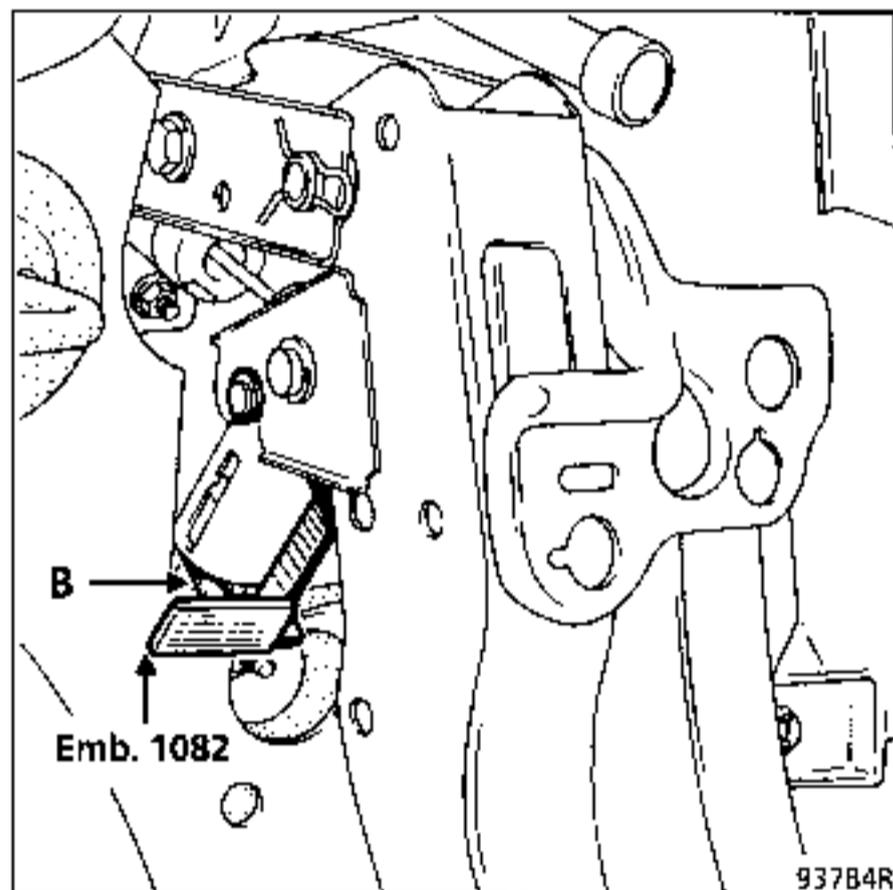
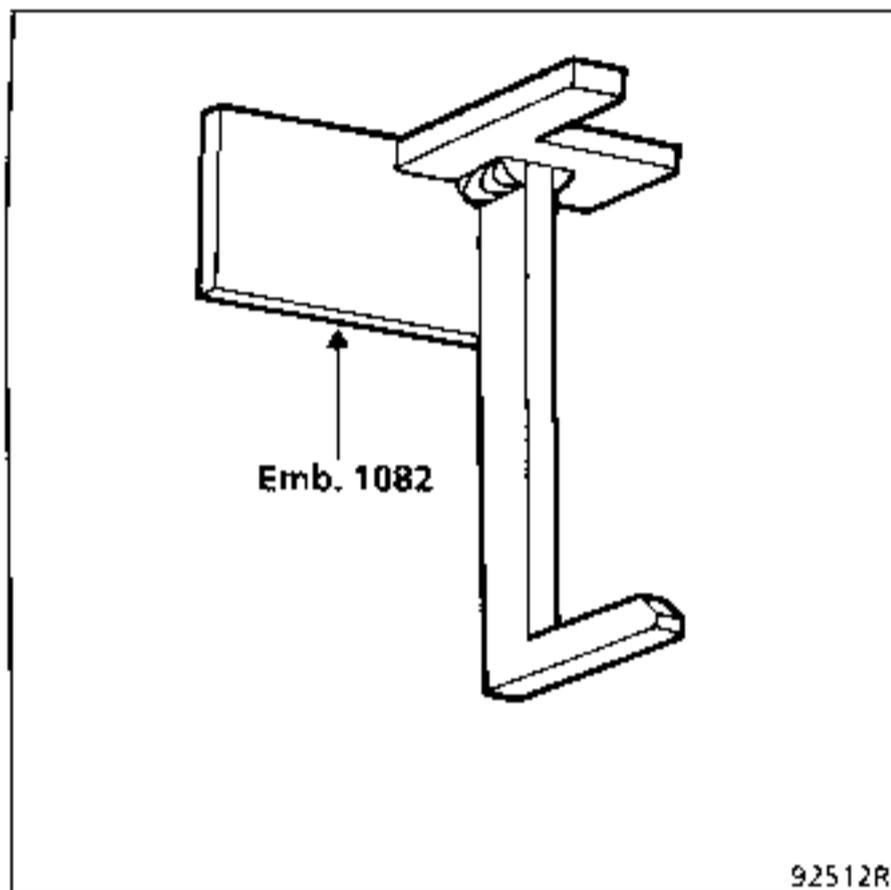
REMOVING - REFITTING

ESSENTIAL SPECIAL TOOLING

Emb. 1082 Clutch control spring - activating capsule assembly fitting and removal tool

In order to remove and refit the spring activating capsule assembly it must be locked in the compressed position using tool Emb. 1082.

Fit tool Emb. 1082 in place of the spring activating capsule assembly.



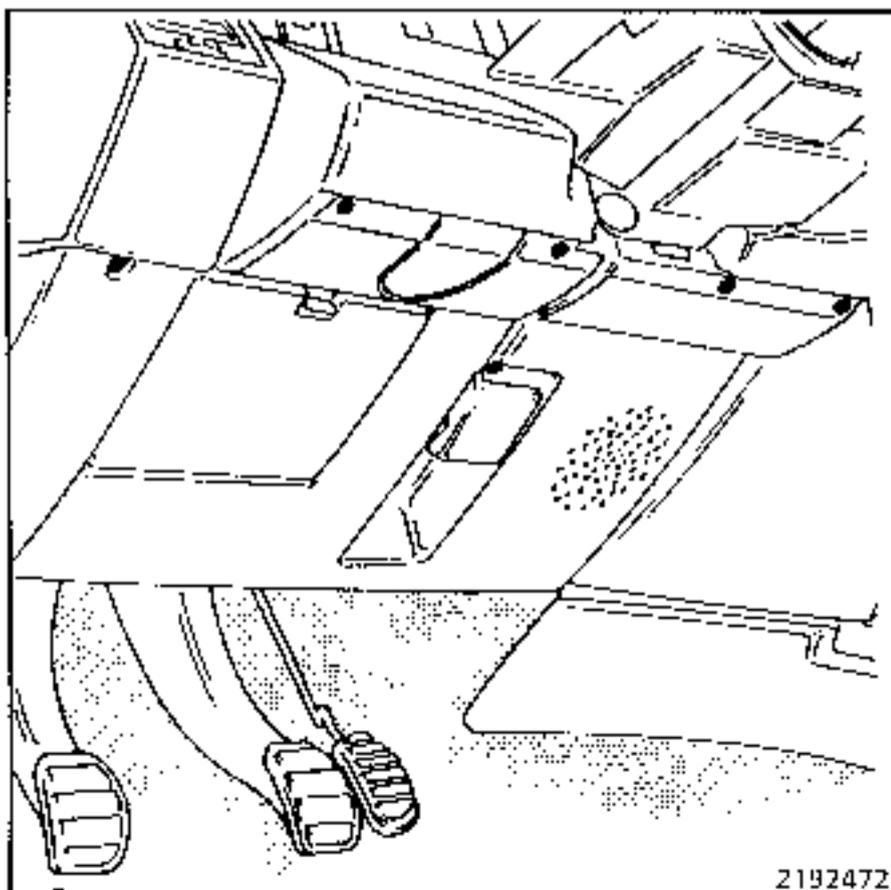
Remove:

- the lower cover from the dashboard (unfasten the fuse holder connectors);
- the ventilation duct.

Remove the circlips and shaft (B).

Press on the pedal to remove the shaft.

Take out the spring activating capsule assembly and tool.



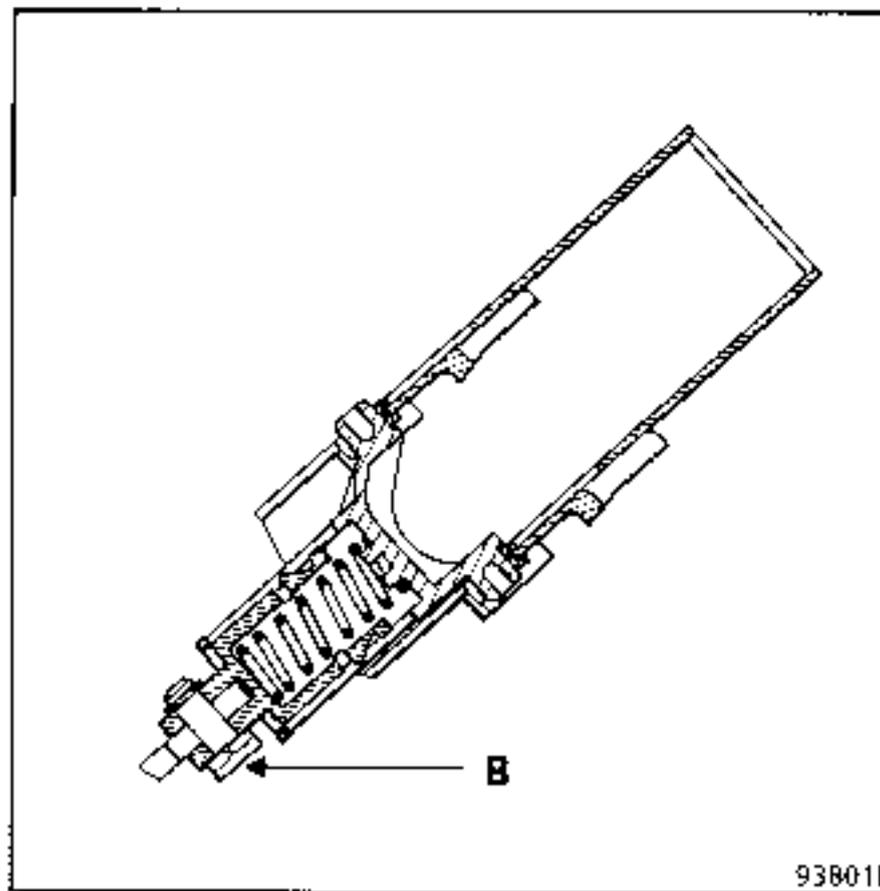
REFITTING - Special points:

If a new part is to be fitted, compress spring - activated capsule assembly in a vice and fit in place tool Emb. 1082.

At the pedal end, check the condition and the position of the plastic bearings.

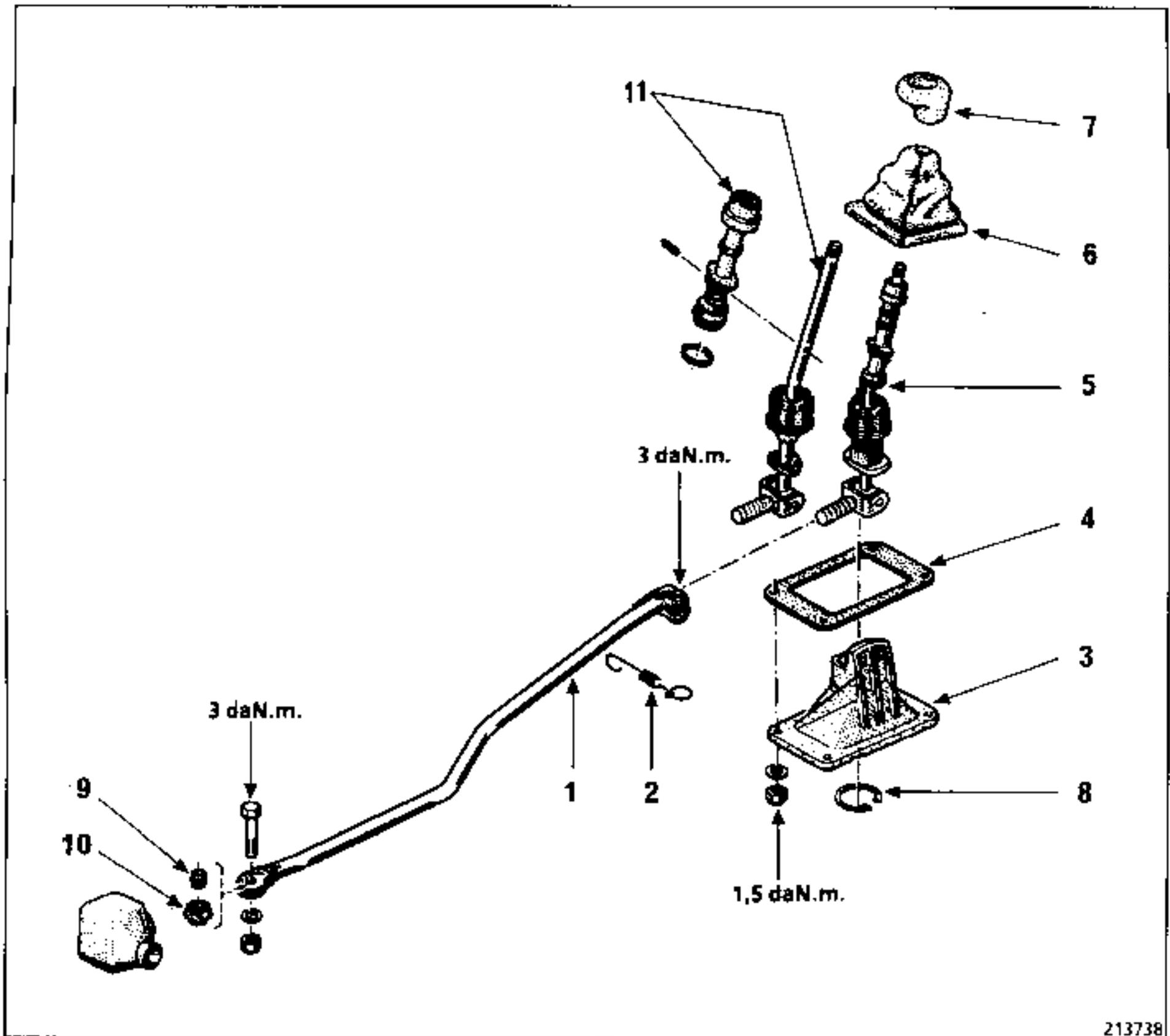
Coat the shafts with grease.

Fit the unit shafts in their bearing on the pedal then press it in slightly to fit shaft (B) in place.



Remove tool Emb. 1082 and refit the circlips on the shaft.

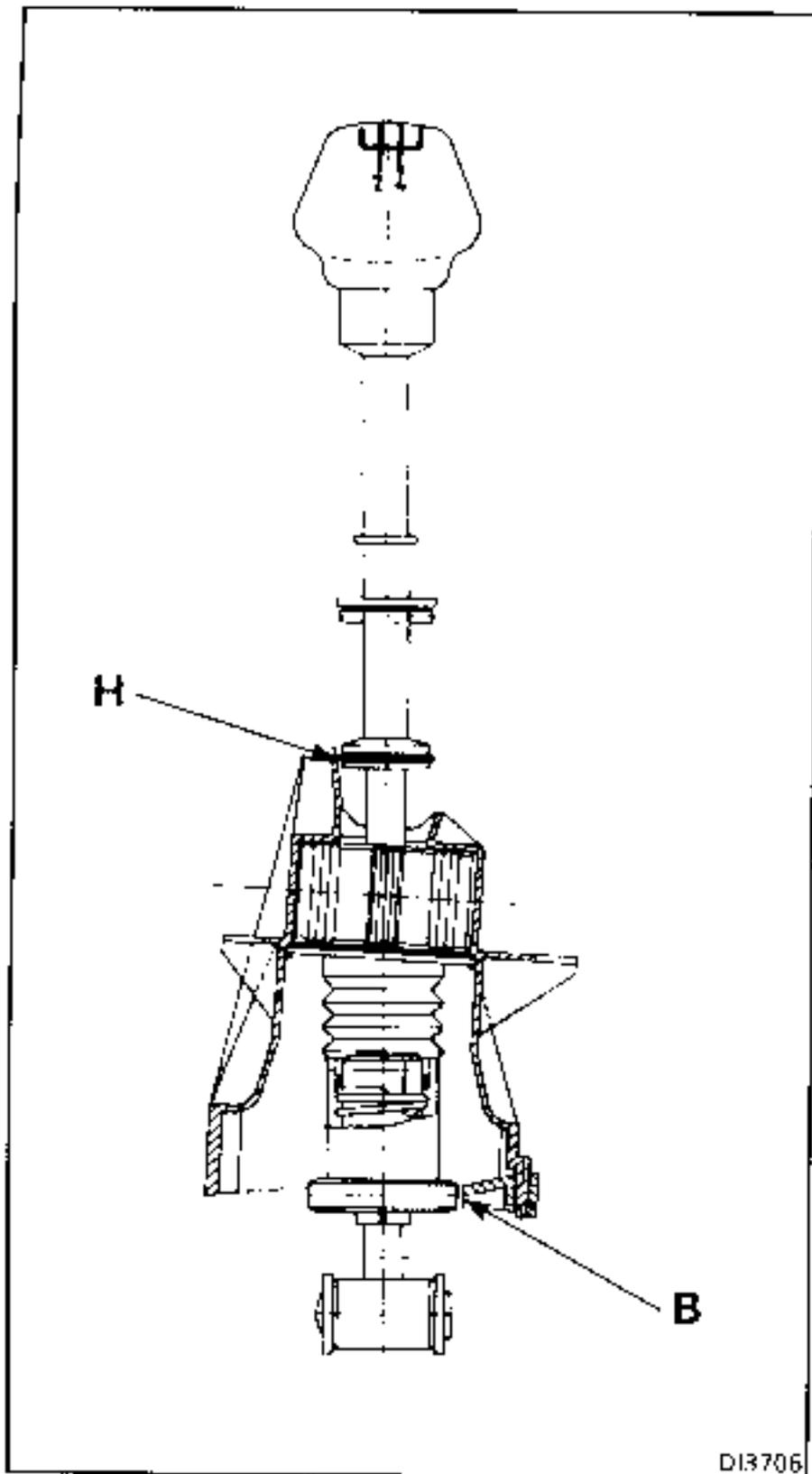
EXPLODED VIEW AND TIGHTENING TORQUE



213738

- 1 Connection rod
- 2 Return spring on third speed/fourth speed line
- 3 Housing
- 4 Base
- 5 Assembled lever and rings (double lock control)
- 6 Gaiter
- 7 Knob
- 8 Stop ring
- 9 Bush
- 10 Sleeve
- 11 Lever and ring (single lock control)

Since May 1988, X48 vehicles have been equipped with a double lock external gear control which prevents reverse gear being selected at the wrong time instead of first gear without unlocking the ring.

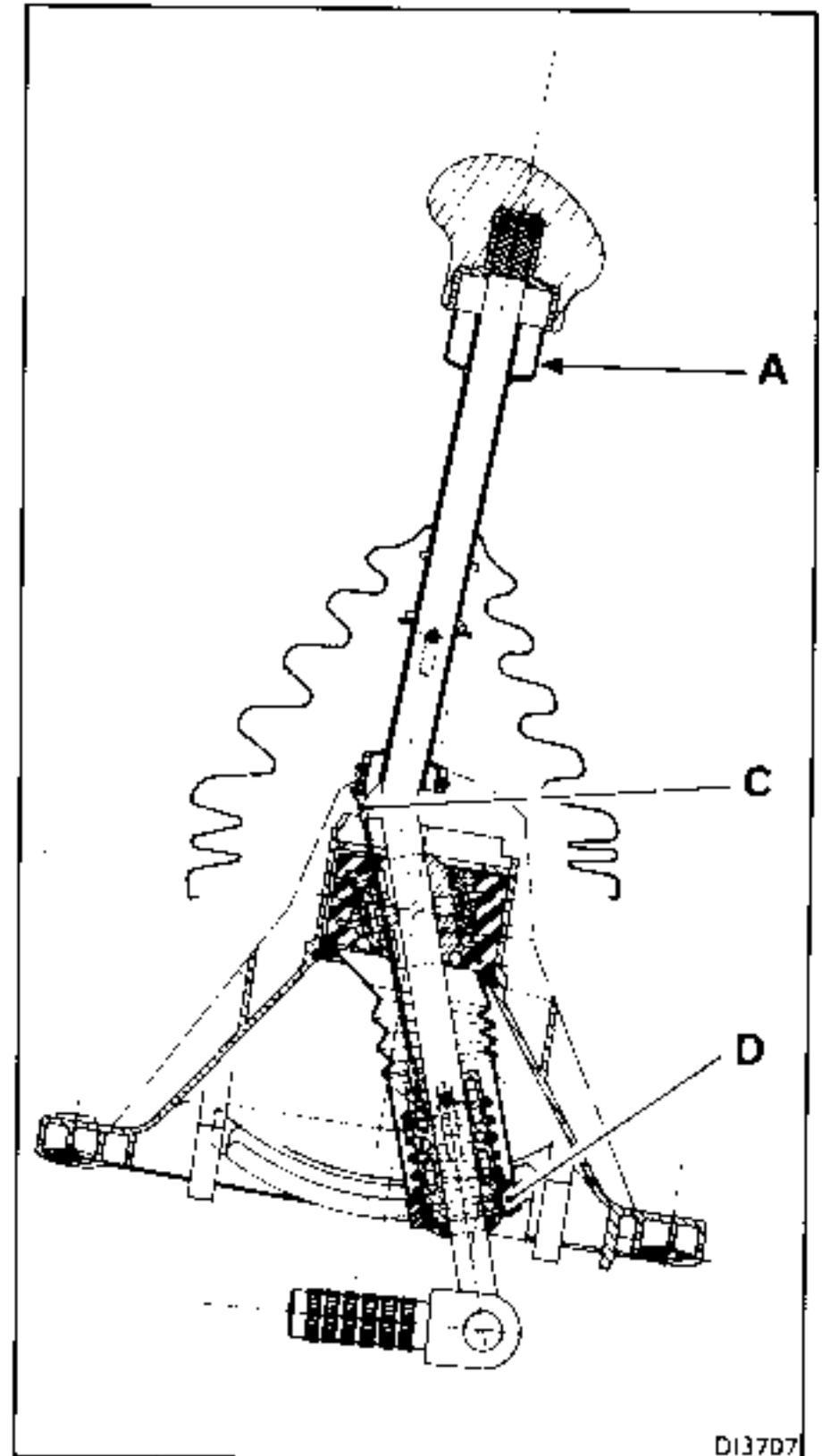


OPERATION

Upper ring (A) acts by means of a cable (C) and a second ring (D) located on the lower part of the lever.

Reverse gear is therefore prevented from being selected via the lower stop (B) and upper stop (H) acting synchronously.

NOTE: This control must be adjusted with first gear engaged.



TIGHTENING TORQUES (in daN.m)



Nut securing unit to body	1.5
Bolt on clip securing connecting rod to clevis	3

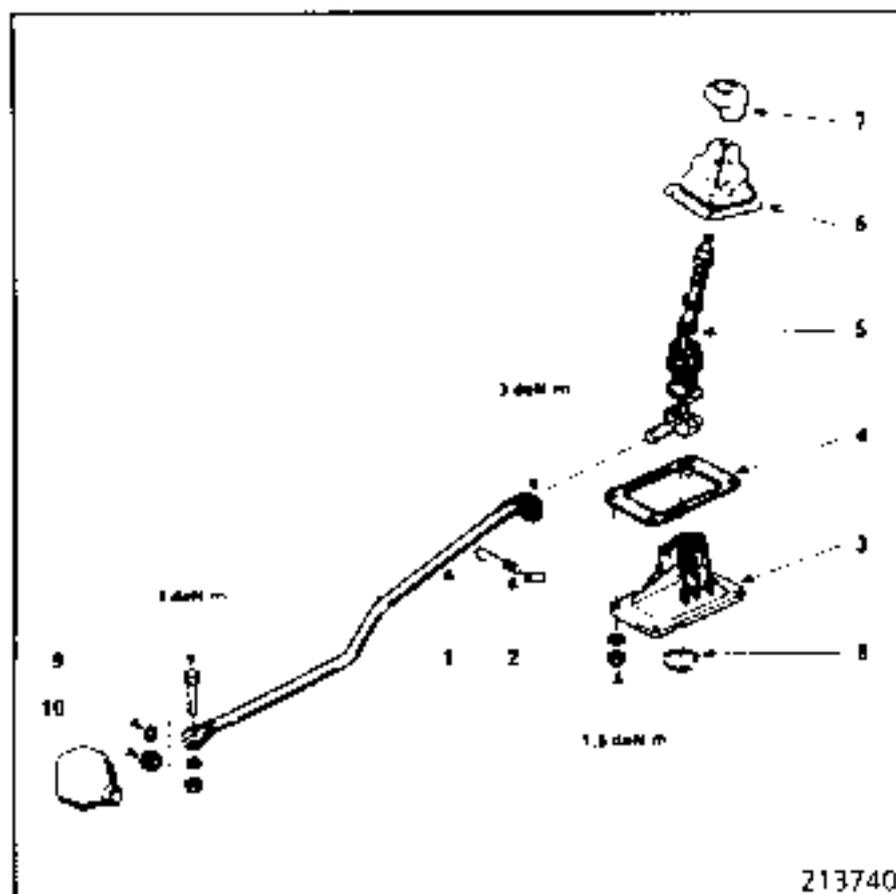
REMOVING

In the vehicle, release gaiter (6) from the console.

Under the vehicle, disconnect:

- the flexible mountings from the exhaust pipe,
- return spring (2),
- connection rod (1) from the lever clevis.

Remove the nuts securing the casing and take out the assembled casing - lever assembly, moving aside the exhaust pipe.



213740

Fit the gear lever clevis in a vice fitted with soft jaws and remove:

- knob (7),
- gaiter (6),
- stop ring (8).

Take out the assembled ring and lever assembly from the casing.

NOTE: The Parts Department supplies in exchange the assembled ring and lever assembly.

CONSUMABLES

33 Medium grease : Control lever articulation

REFITTING - Special points :

Coat the lever articulations with **33 Medium** grease.

Bond knob (7) on to lever.

Adjust the control.



Torque tighten the nuts and bolts as specified.

ADJUSTING

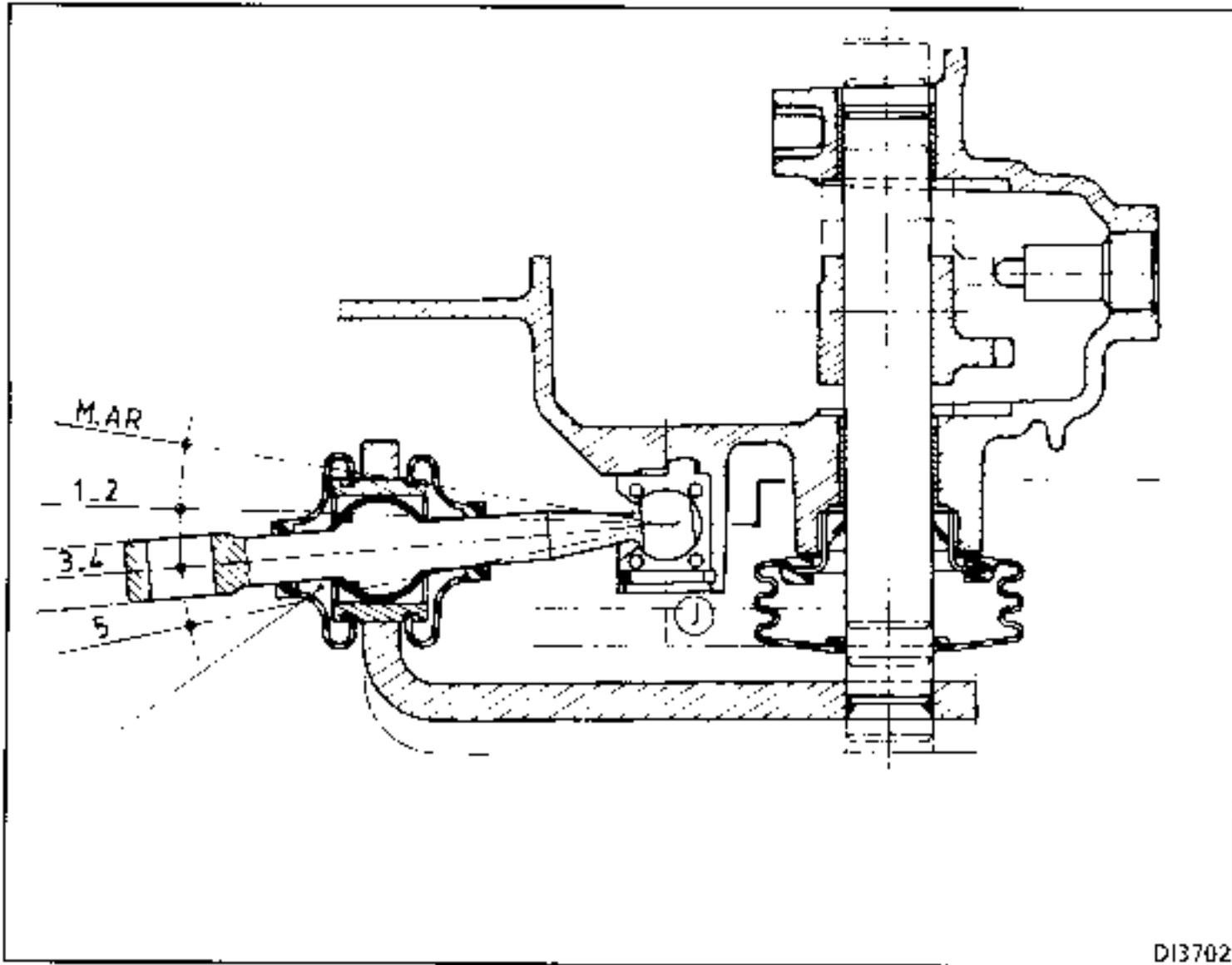
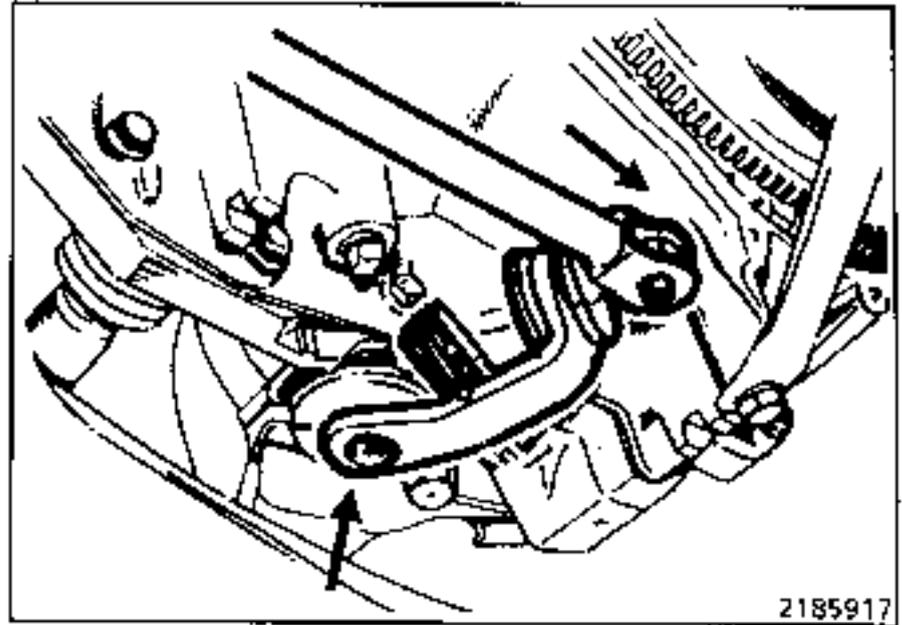
TIGHTENING TORQUE (in daN.m)



Bolts on clip securing connecting rod to clevis 3

Select second gear at the gearbox and lock the gearbox input lever in its end position.

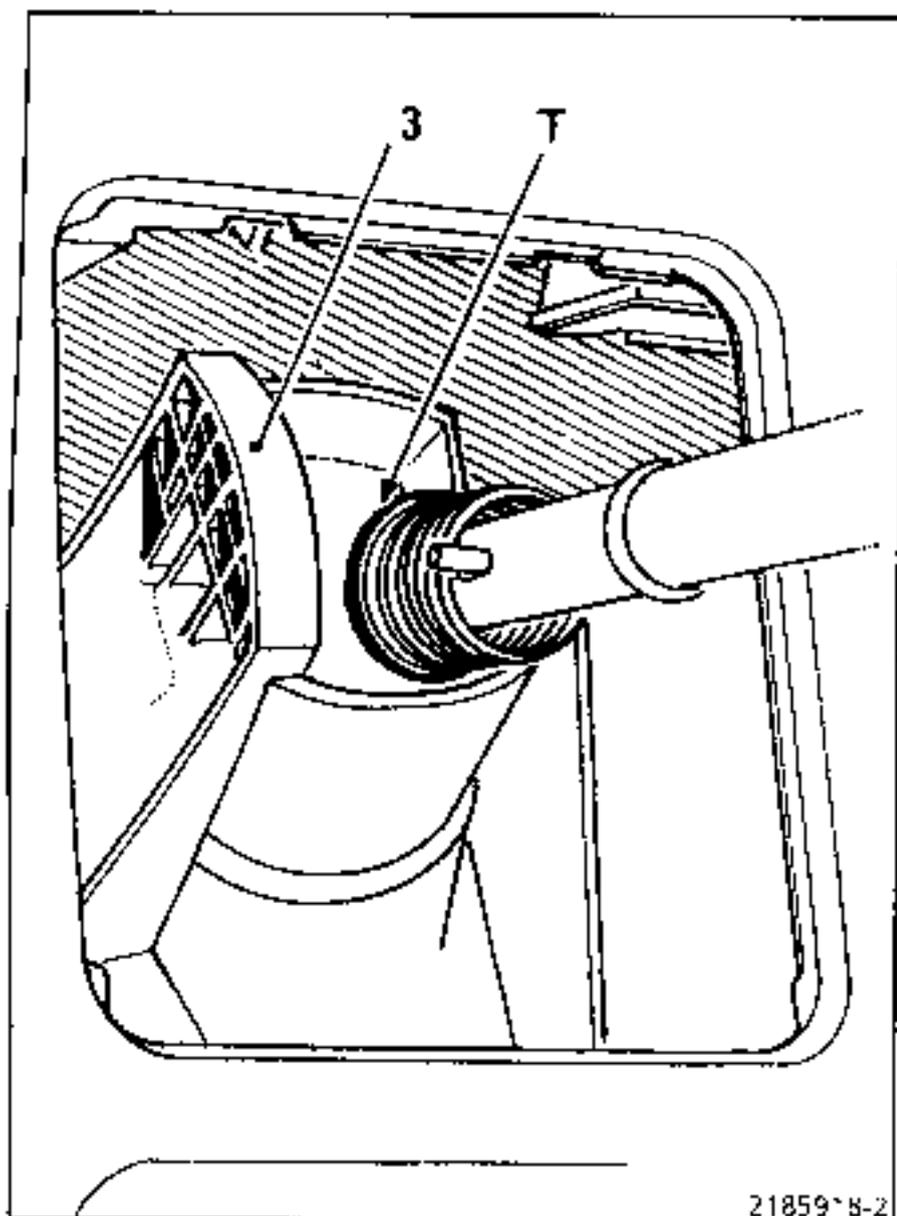
In the vehicle: unclip the gaiter from the console.



Under the vehicle: disconnect spring (2) then slacken bolt (V) securing the clip to connecting rod (1).

ADJUSTING (continued)

Place O-ring (T) right up against casing ramp (3).

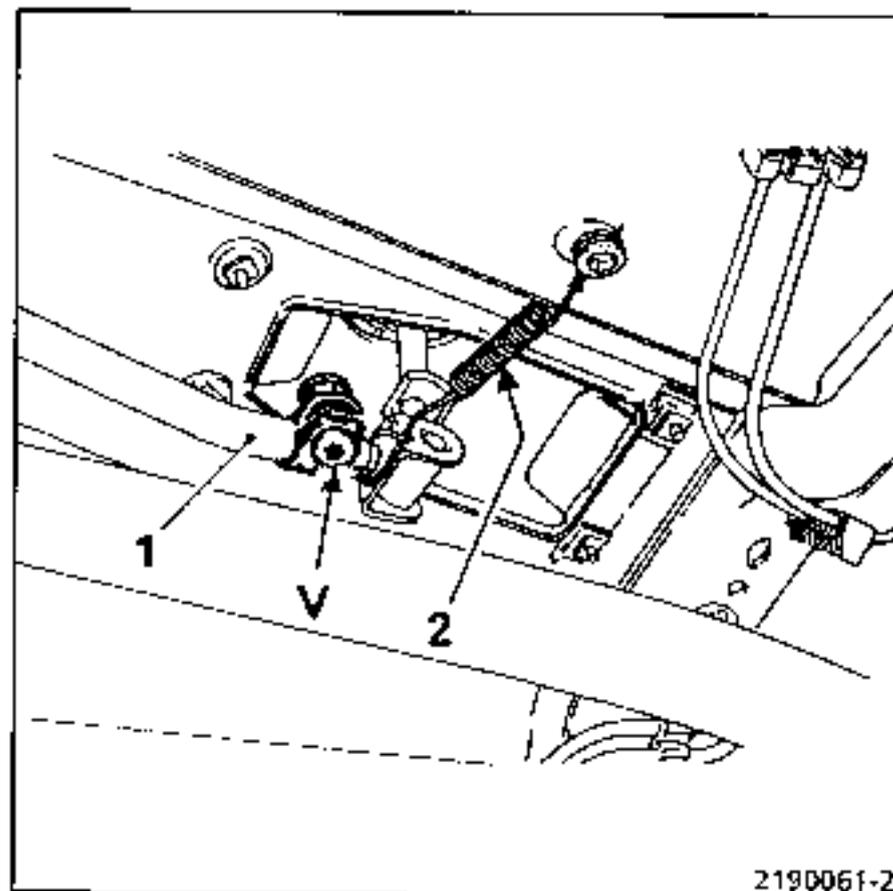


Note: In order to prevent the parts returning automatically to the earlier setting, it is sometimes necessary to turn the lever clevis in the connection rod.

Leave a space of 5 mm between the connecting rod and the clevis.

In this position:

- Tighten bolt (V).
- Check that the clip is correctly tightened on connecting rod (1).
- Refit spring (2) and the gaiter.



Check that the gears can be selected.

ADJUSTING

ESSENTIAL SPECIAL TOOLING

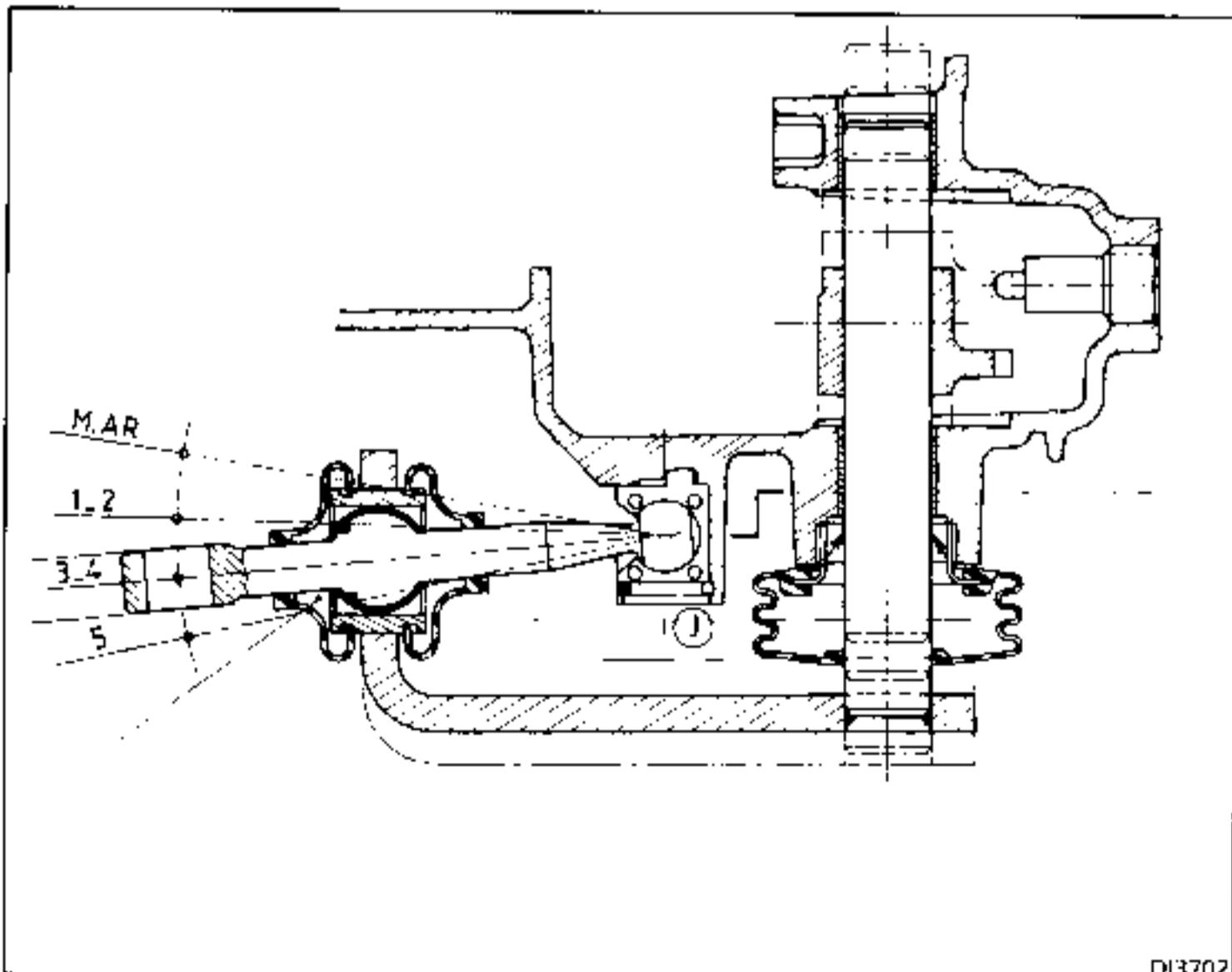
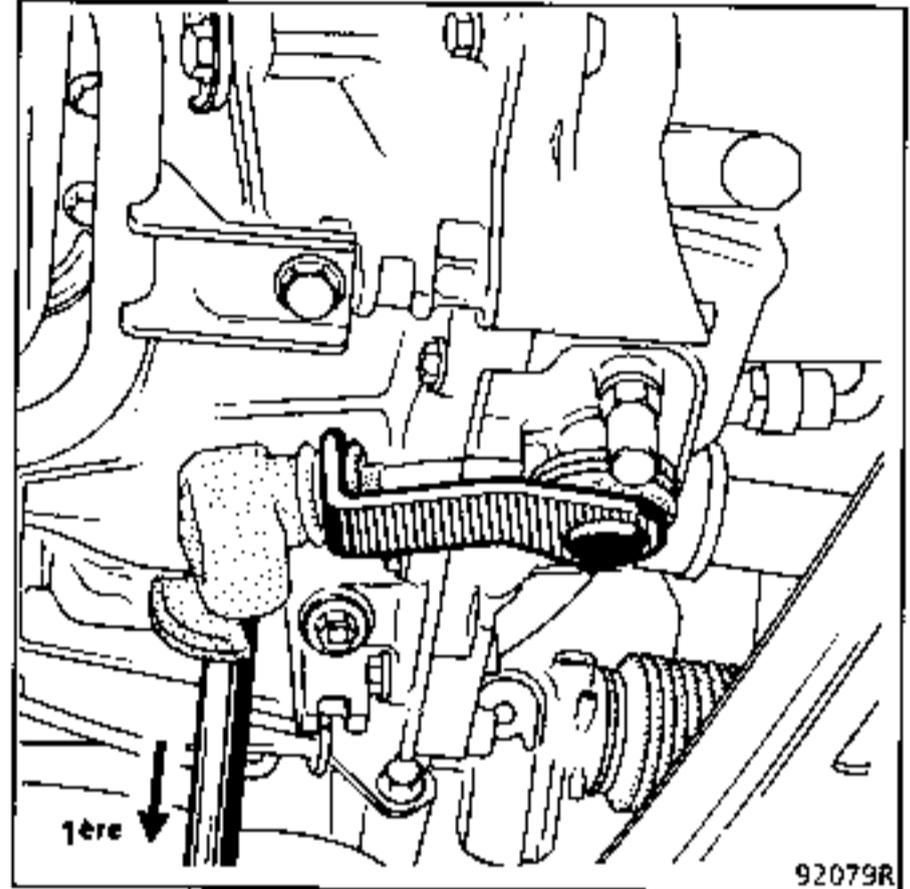
B.Vi. 1133 Block for locking JB gearbox input lever in 1st gear

TIGHTENING TORQUE (in daN.m)



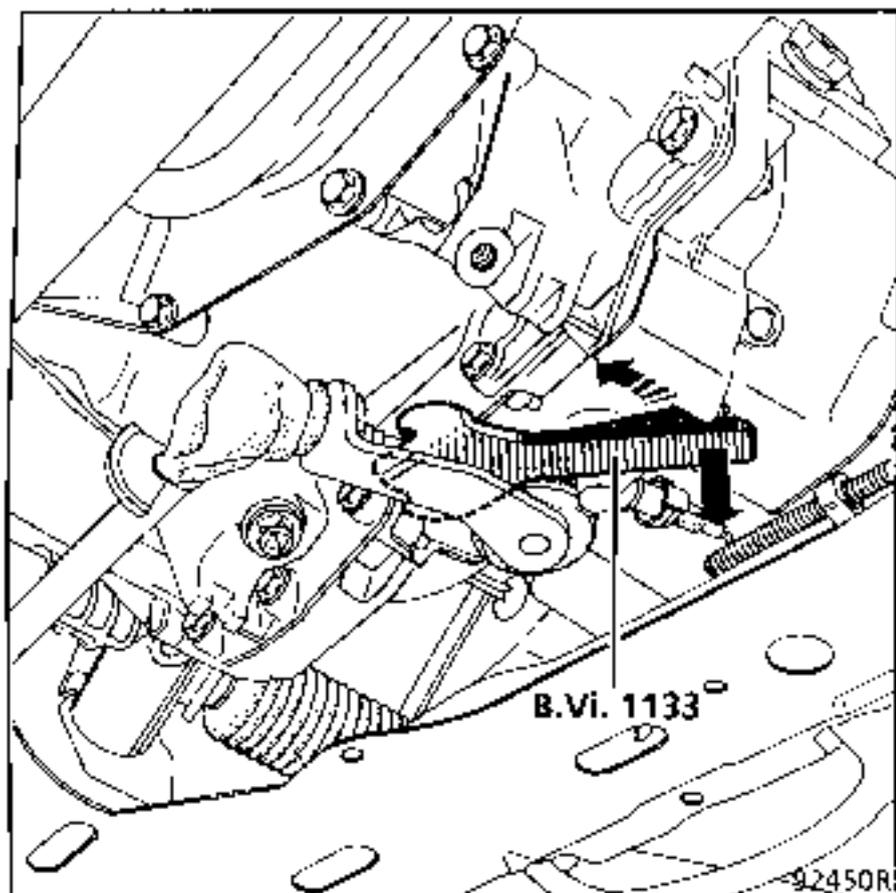
Bolts on clip securing connecting rod to clevis 3

Select 1st gear at the gearbox.

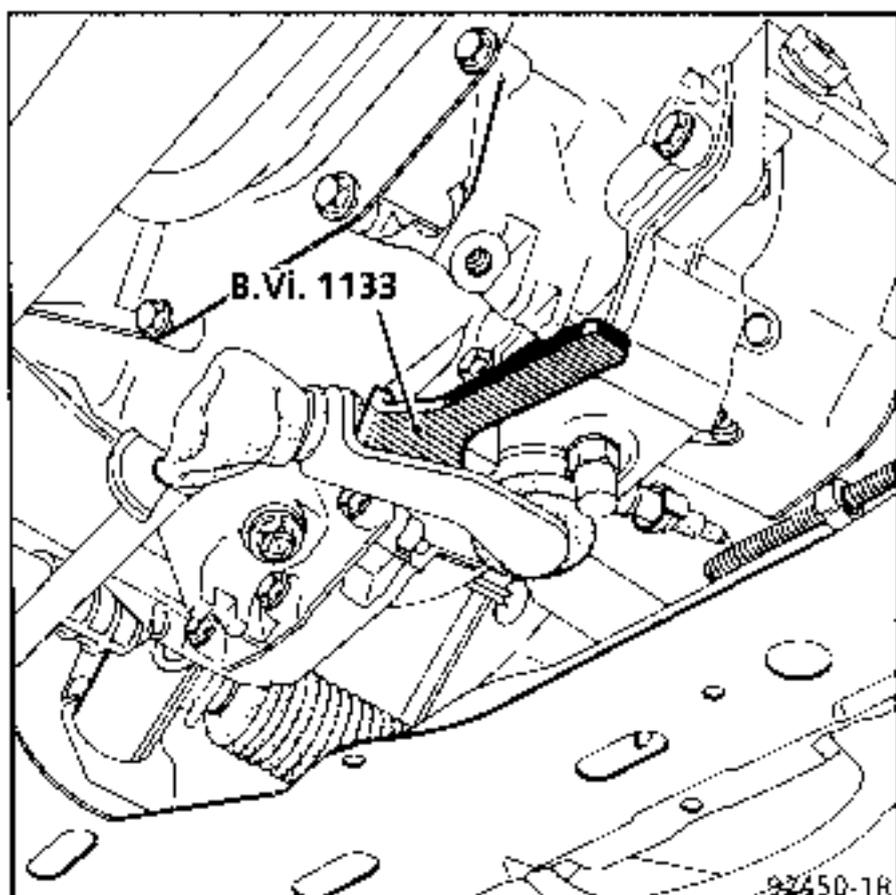


ADJUSTING

Fit in place tool B.Vi. 1133 in order to take up the clearance.

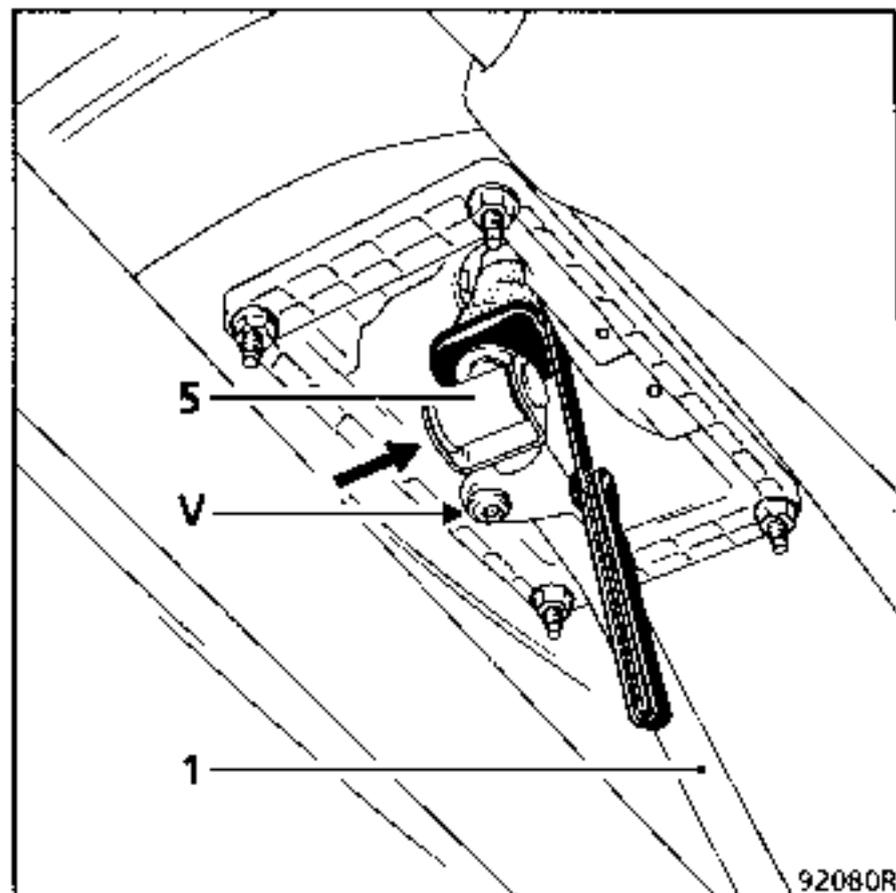


At the same time, pull the end of the tool downwards and pivot it through approximately 45° until it is up against the spur on the casing.



Fit connecting rod (1) on lever clevis (5), leaving a space of approximately 5 mm between the connecting rod and clevis.

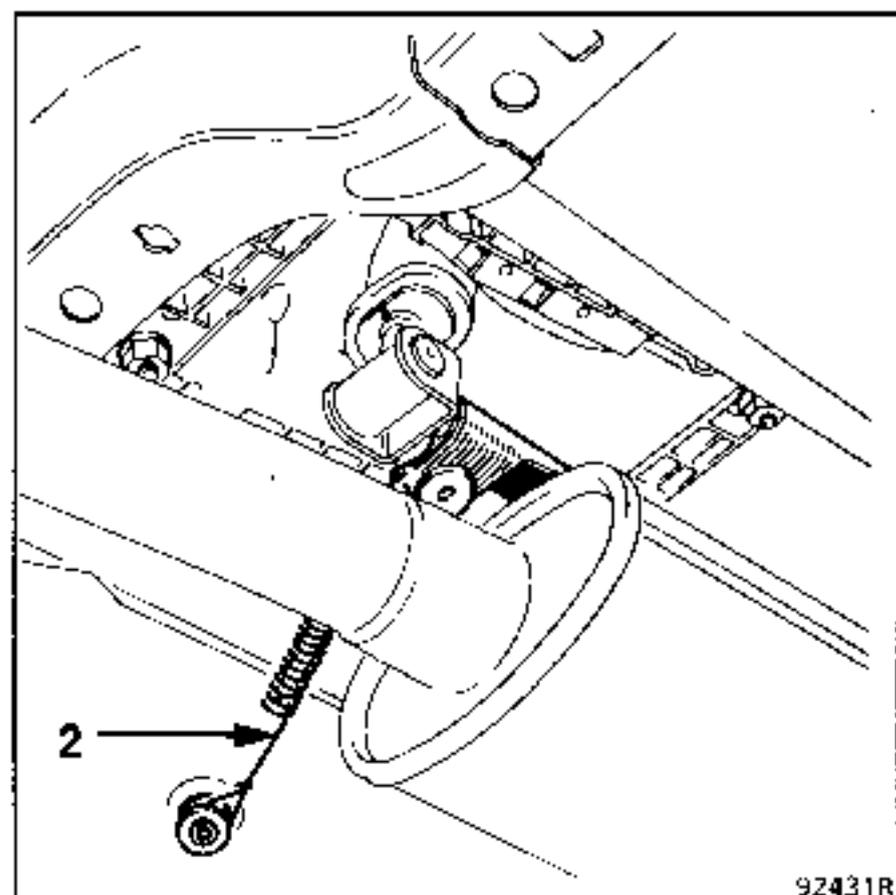
Press the lower lever spring against the casing ramp, fitting a 2 mm shim.



In this position, tighten bolt (V).

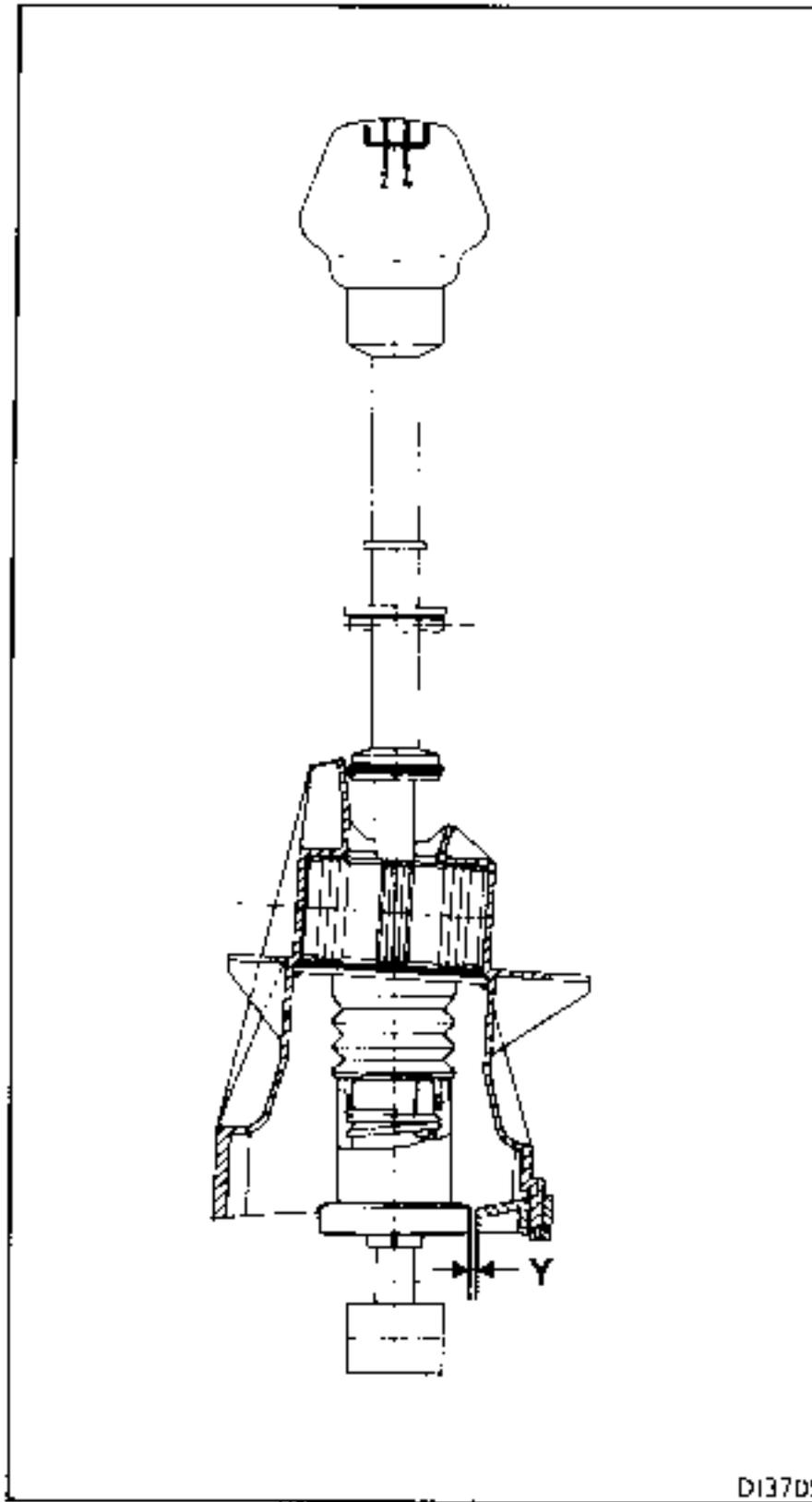
NOTE: In order to avoid the parts returning to an earlier setting, it is sometimes necessary to turn the lever clevis in the connecting rod.

Remove the tool and fit in place return spring (2).



ADJUSTING

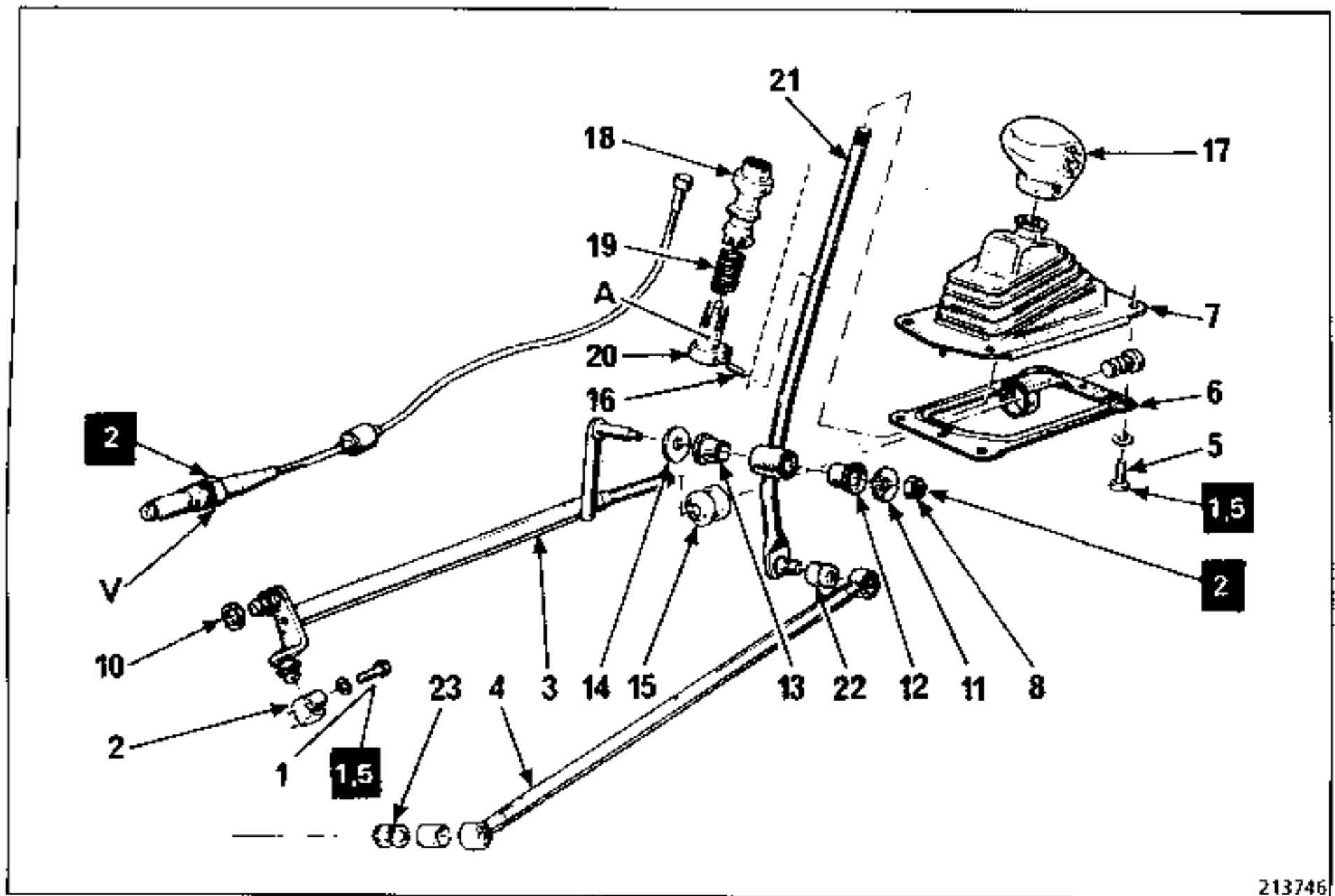
Check the resultant clearance "Y" which should be between 2 and 5 mm.



Remove tool B.Vi. 1133.

Check that the gears can be selected.

DOUBLE BAR CONTROL



DISMANTLING

Remove parts (1) to (8) in order.

Recover parts (9) to (14).

Remove part (15) from part (6).

Remove the roll pins from (16).

Remove parts (17) to (20) in order.

Recover part (21).

If necessary, replace (22) and (23) :

- green part fitted at gearbox end,
- natural colour part mounted at lever end.

REASSEMBLY - Special points :

Bond (17) to lever (21).

Place a few drops of 33 Medium grease inside (15), (22) and (23).

Torque tighten the nuts.

NOTE: This type of control system cannot be adjusted.

Tightening torques in daN.m.

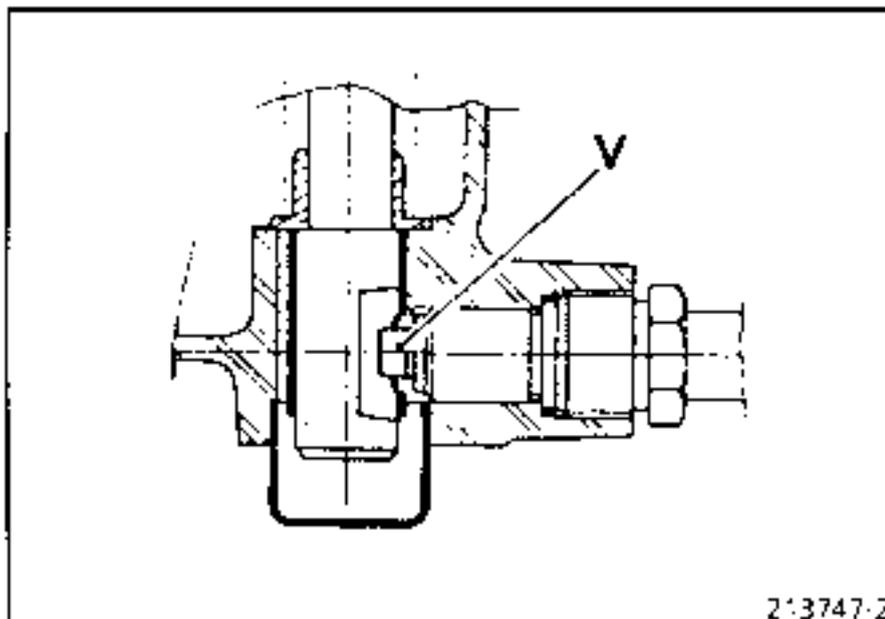
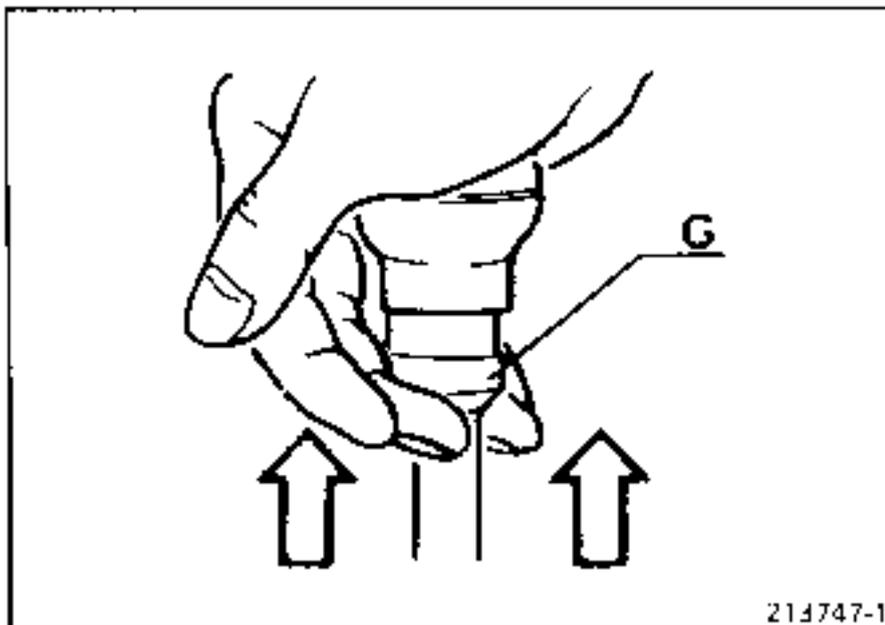
REMOVING - REFITTING**REVERSE GEAR POSITIVE LOCKING SYSTEM**

This system prevents reverse gear being selected at the wrong time when changing rapidly from 3rd to 2nd gear.

Operation

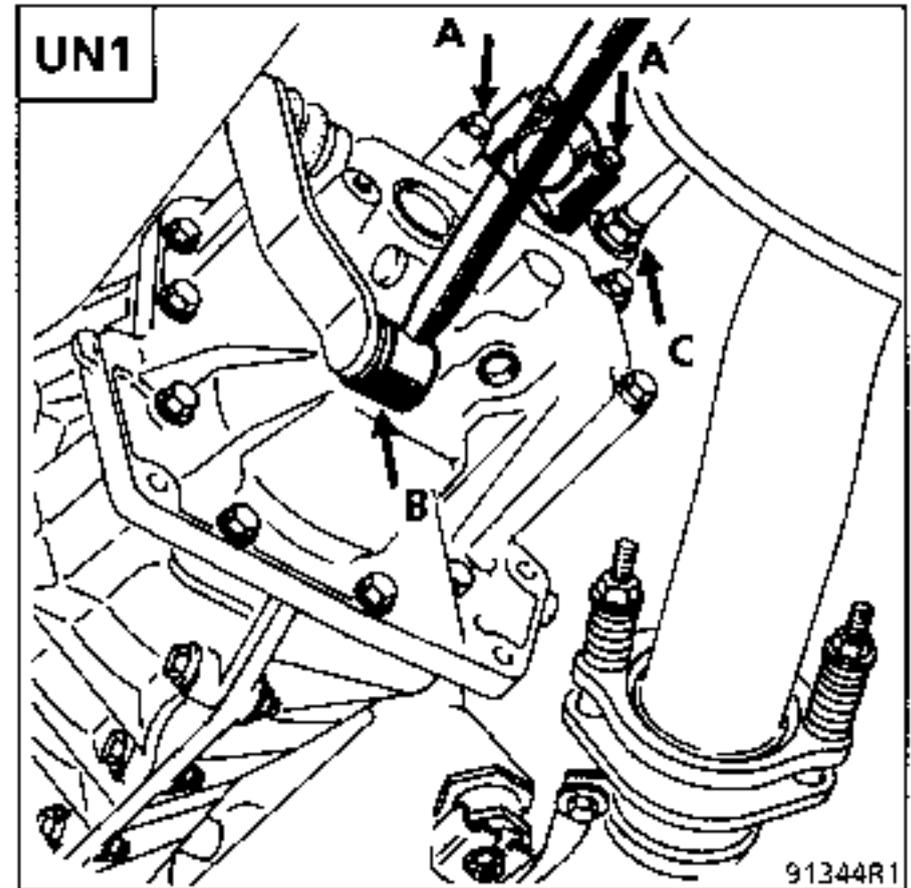
To select reverse gear, lift ring (G) and move the lever; by means of a cable, the ring acts on the finger of a lock (V) mounted on the gearbox rear casing.

As this finger moves aside, it enables reverse gear to be selected.

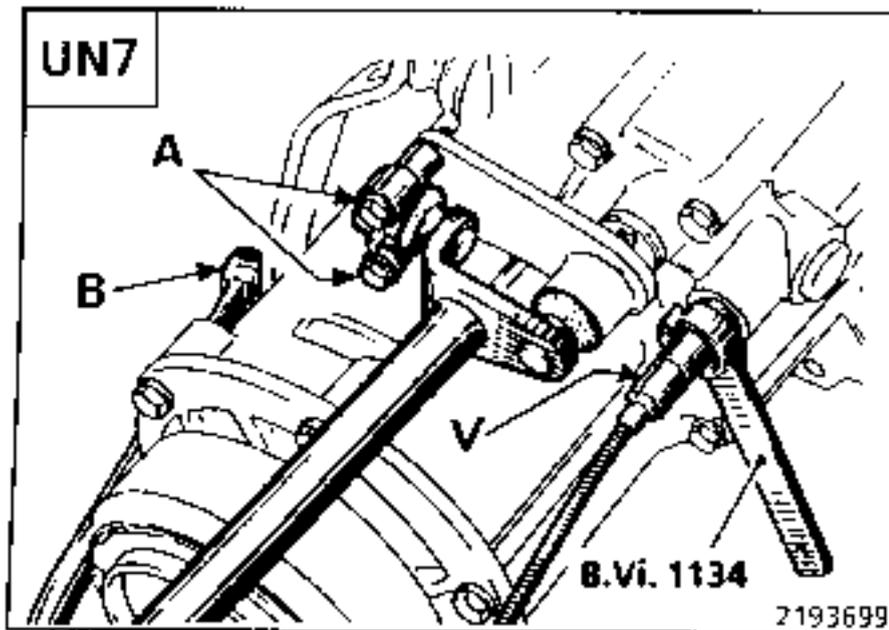


Remove:

- At (A) the two bolts from the ball joint cover
- At (B) uncouple the ball joint
- At (V) remove the reverse gear lock (using a locally manufactured spanner).

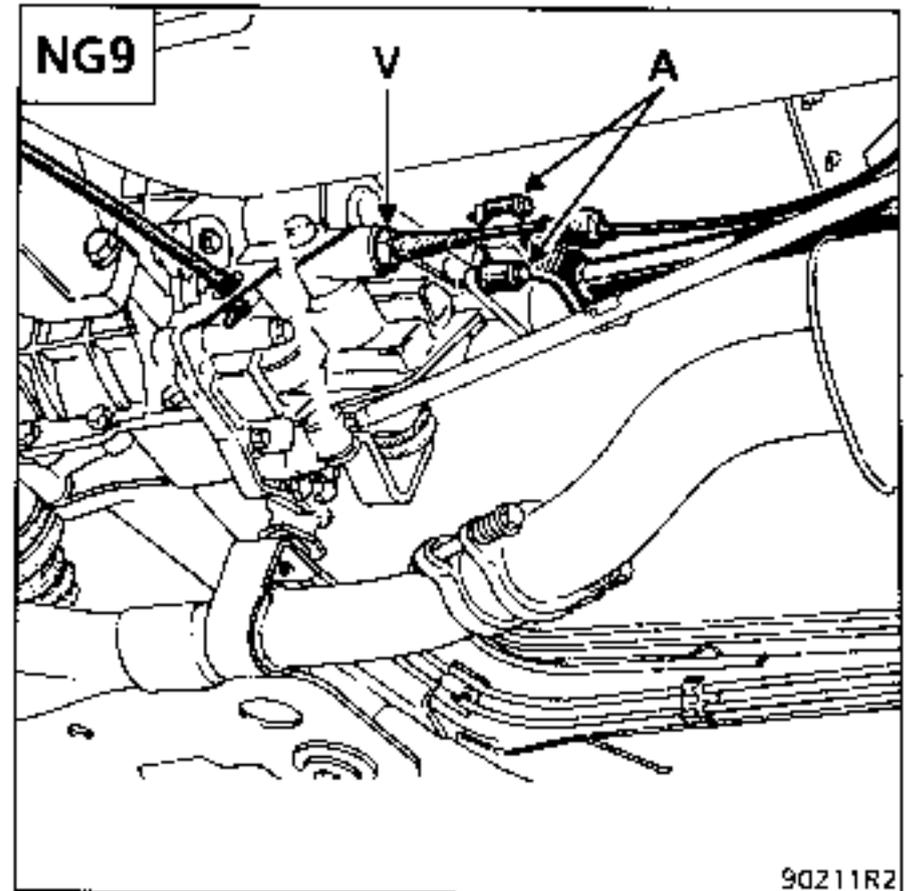
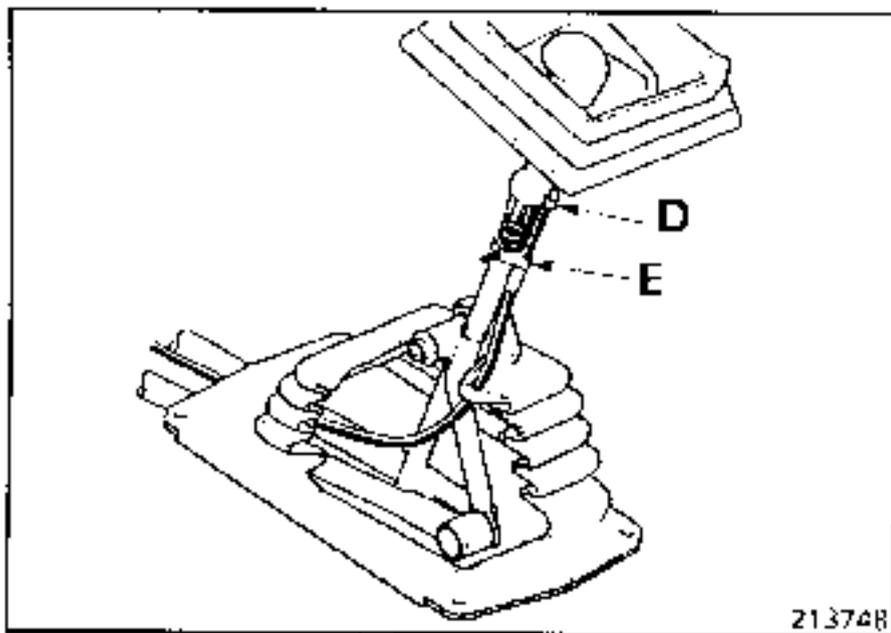


REMOVING - REFITTING



Removing the cable :

- Raise the gaiter in the passenger compartment.
- Unfasten end piece (D) and sheathing stop at (E).



REFITTING

Place a bead of RHODORSEAL 5661 paste (e.g. CAF 4/60 THIXO) on the lock threads and torque tighten to 2 daN.m.



Tighten the bolts and nuts to the recommended torque.

Reminder: This control cannot be adjusted in any way.

K48 4 x 4 vehicles are equipped with a **pneumatic dog clutch control** for the prop shaft and for locking the rear differential.

The control lever (pneumatic valve) located on the central console enables the following three positions to be selected:

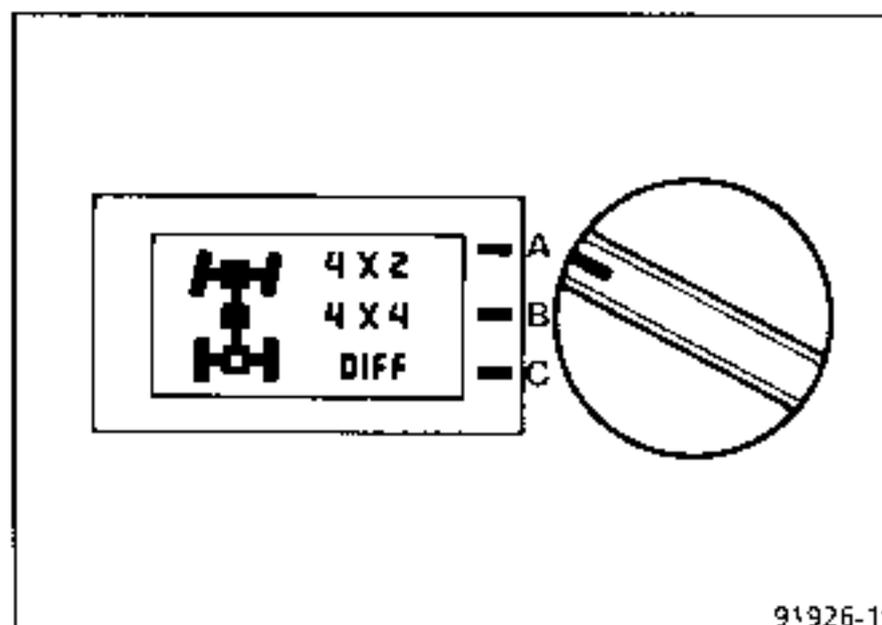
- at **(A)**: **4 x 2** position: normal running, front wheel drive for using the vehicle on ground with a good grip;
- at **(B)**: **4 x 4**: 4-wheel drive via dog clutch connection of prop shaft, **4 x 4** warning light illuminated on centre console;
- at **(C)**: **DIFF**: 4-wheel drive with in addition a blocked differential by dog clutch engagement. **4 x 4** and **DIFF** warning lights illuminated on console and **DIFF** illuminated on instrument panel.

This latter position to be used in exceptional circumstances enables difficult cases to be overcome when one of the two rear wheels can no longer transfer any torque owing to the wheels spinning. It is essential to release the rear differential as soon as the vehicle is freed.

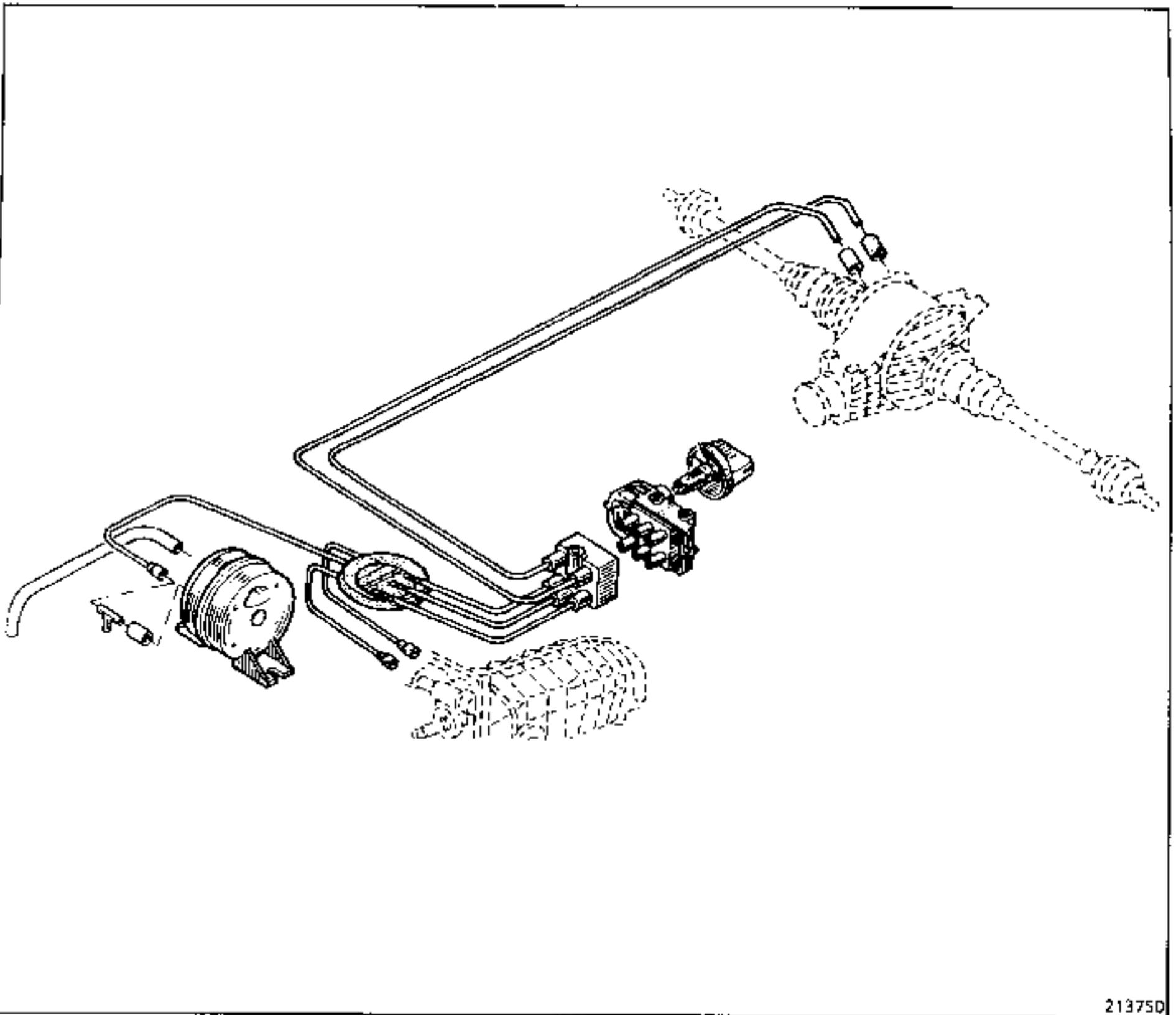
Parking manoeuvres :

On ground with good adhesion, these must be performed with the vehicle in **4 x 2**.

In effect, in the 4-wheel drive position, the scuffing of the tyres resulting from parking manoeuvres causes the steering to harden and harmful stresses to be applied to the drive shafts which would render it difficult or even impossible to release the dog clutch connection to the prop shaft.

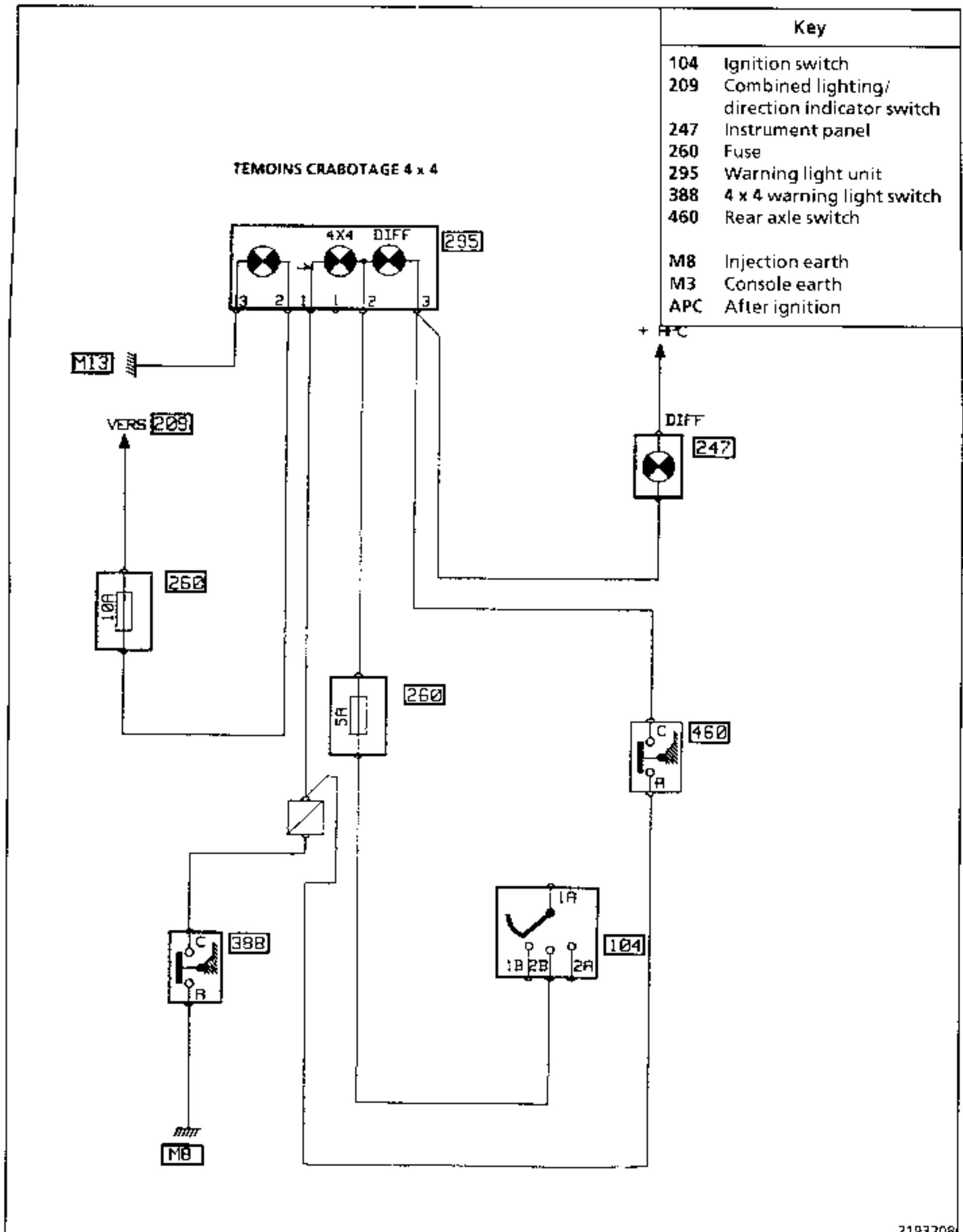


EXPLODED VIEW

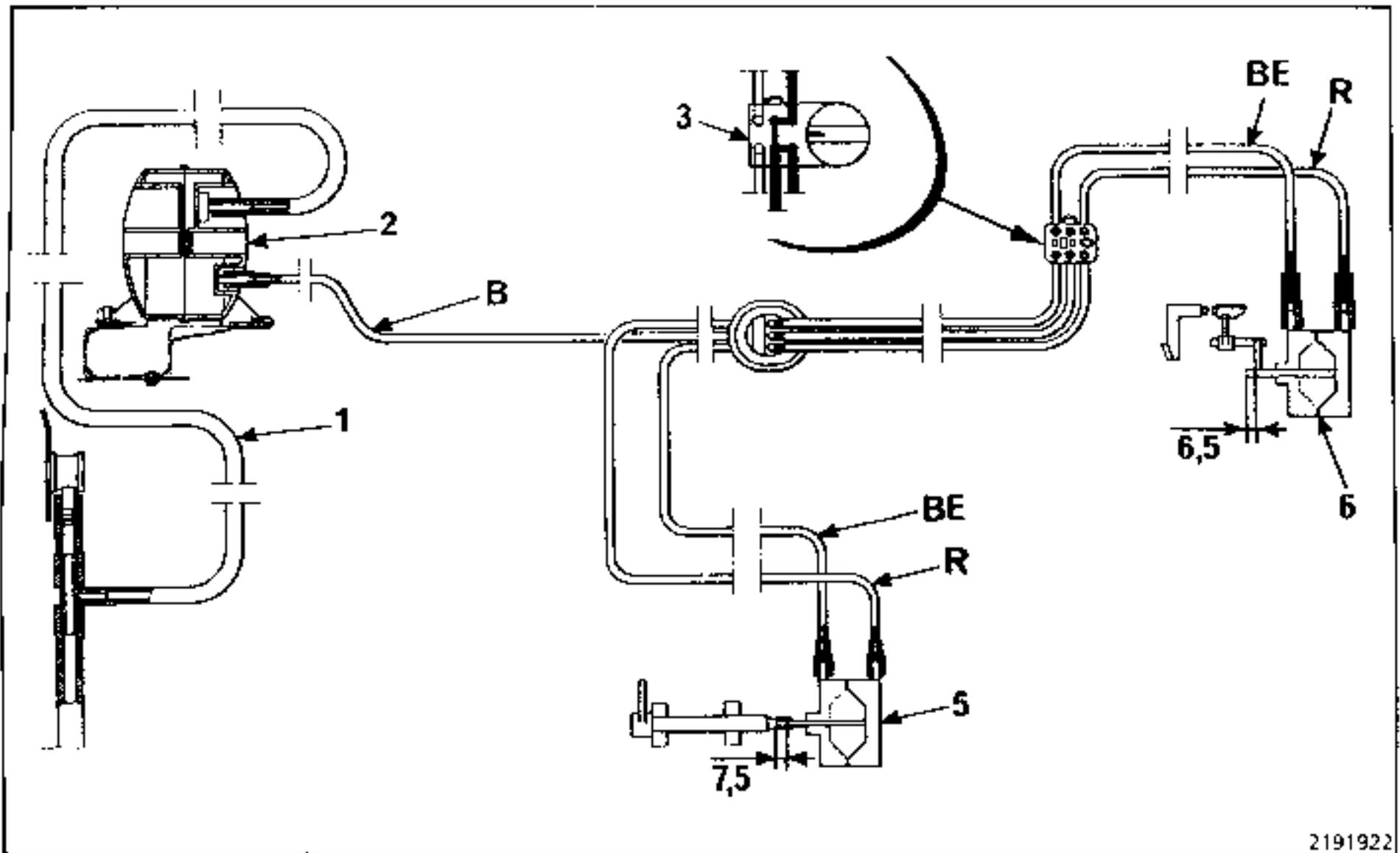


213750

OPERATING DIAGRAM



PNEUMATIC CONTROL : servo-system assembly



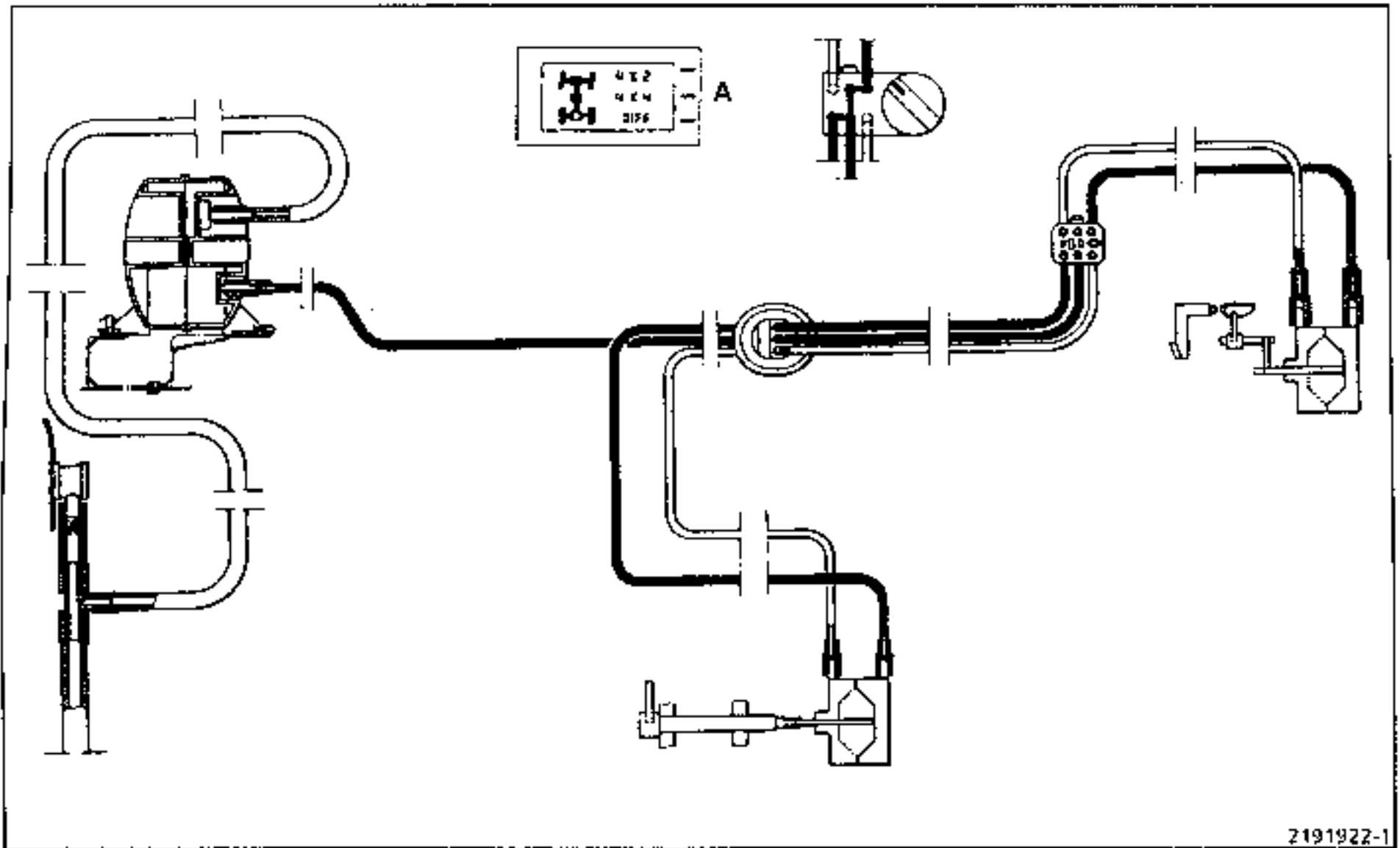
Hose colours :

B : White
BE : Blue
R : Red

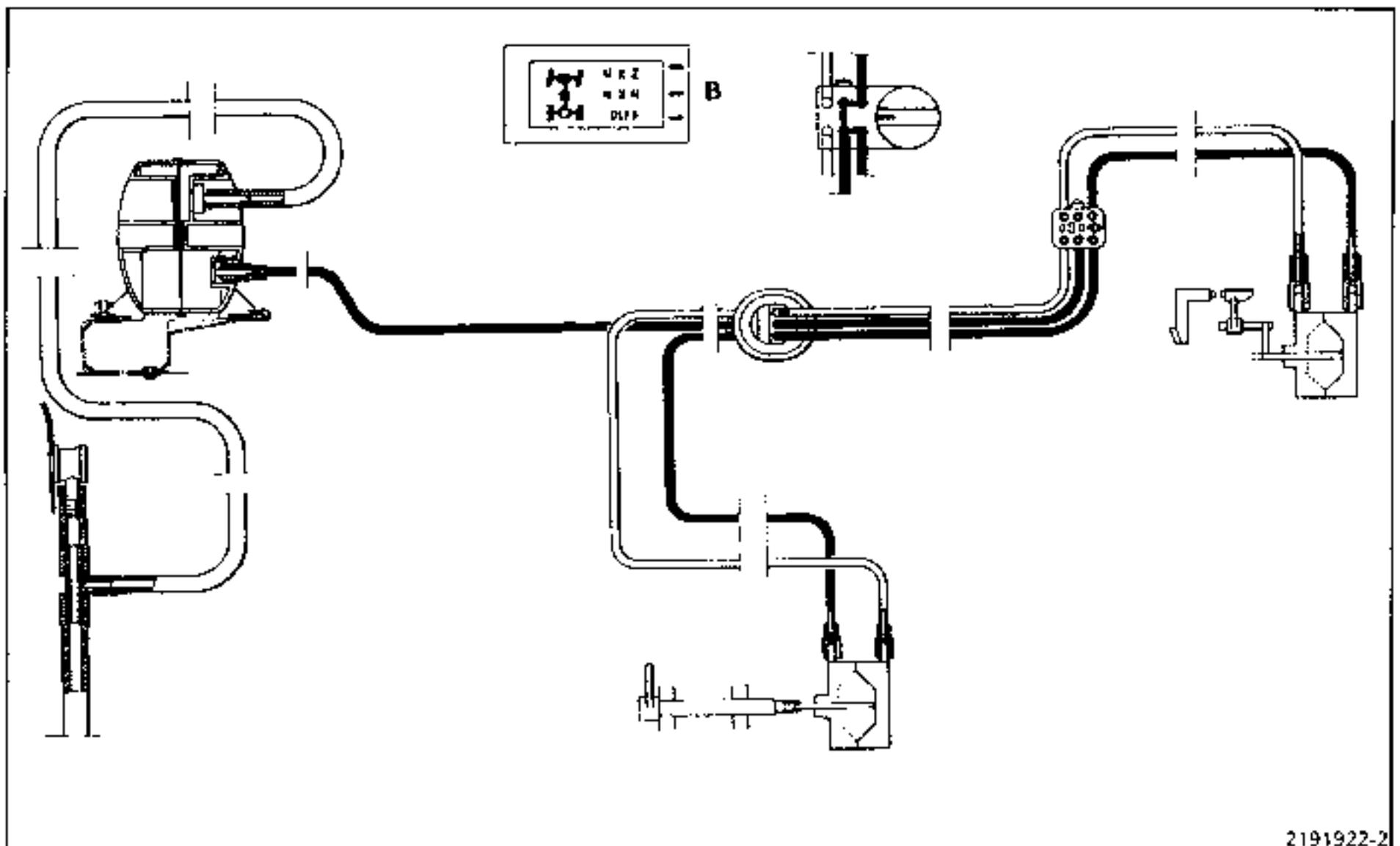
1. Vacuum supply hose coming from manifold on petrol engine or vacuum pump on diesel engine
2. Vacuum reservoir
3. Pneumatic control valve

4. Connector on pneumatic valve
5. Vacuum capsule for dog clutch engagement of prop shaft on NG7 gearbox
6. Vacuum capsule for locking rear differential on OT2.

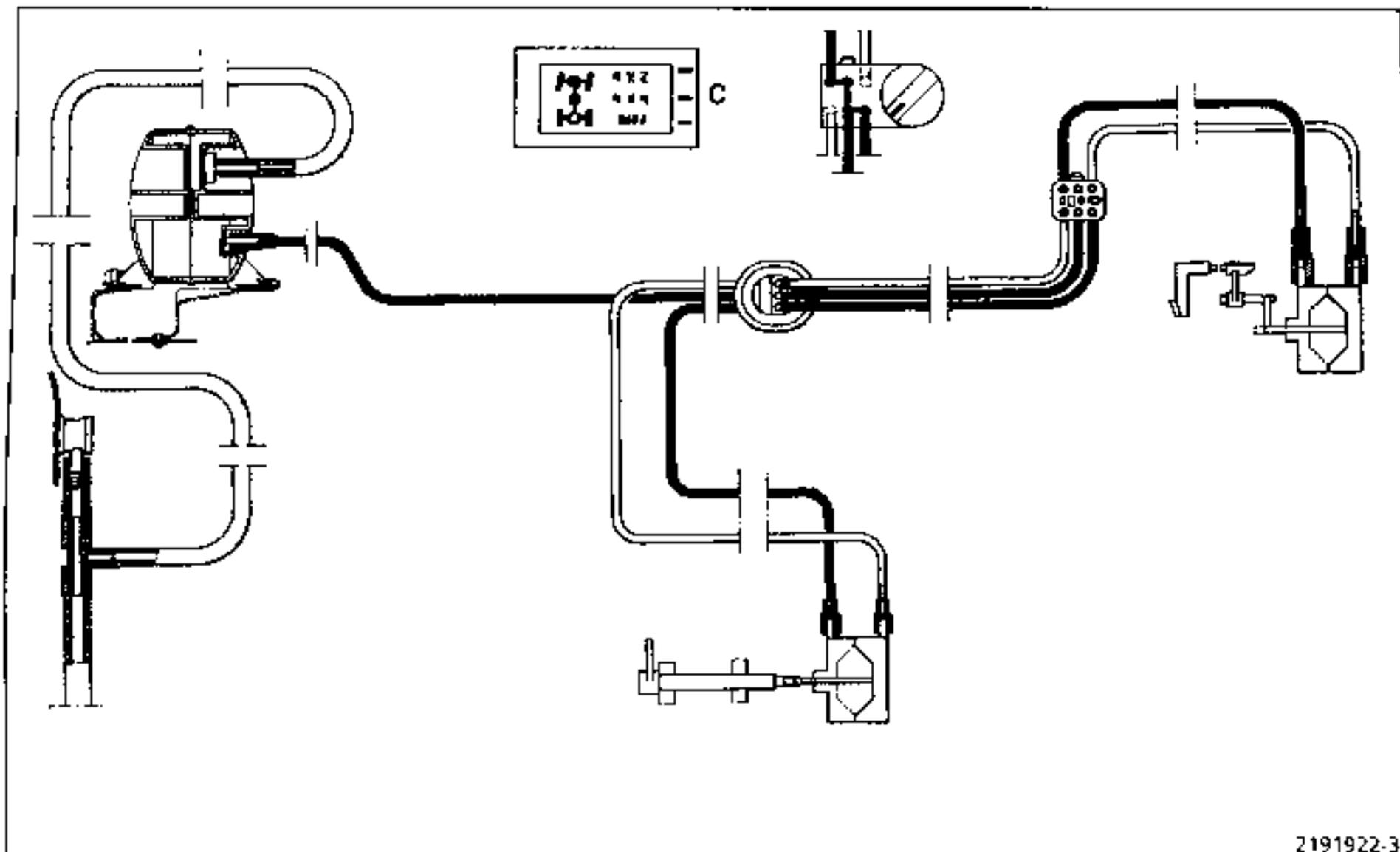
A : 4 x 2 position



B : 4 x 4 position



C : 4 x 4 with locked differential position



NOTE

The dog clutch locking the differential cannot be engaged in the tooth on tooth position with the control in position C; in this case the warning light does not illuminate either. Dog clutch engagement occurs at the moment when the wheels turn at different speeds.

CHECK

In the event of any operating incidents check:

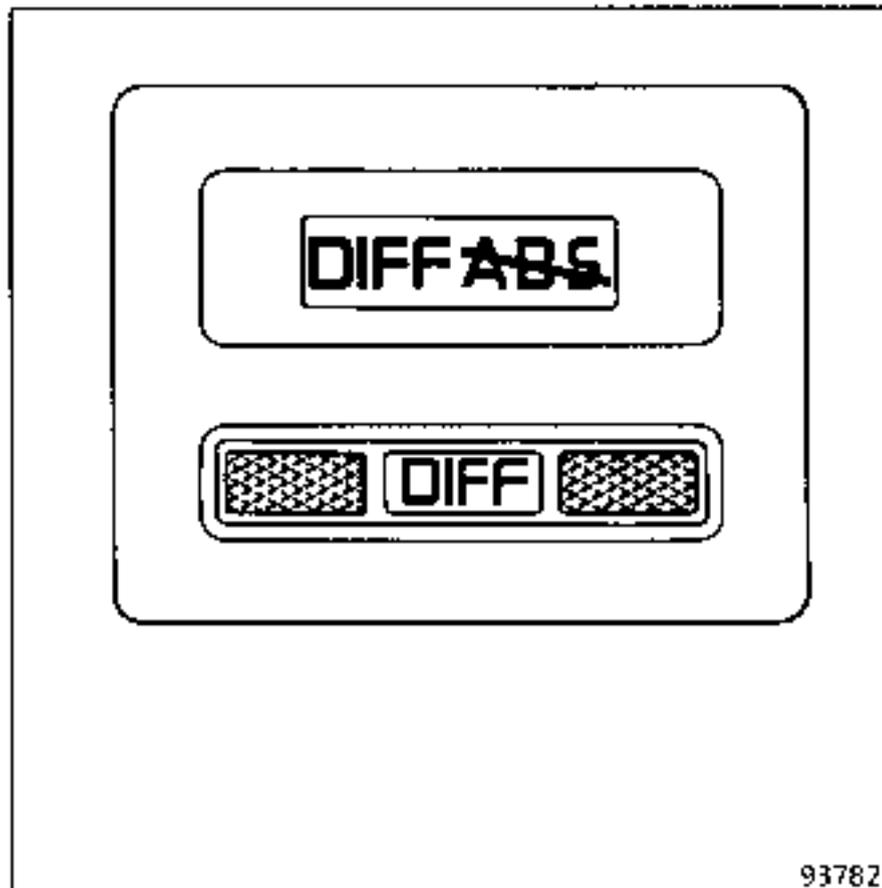
- that the hoses are in good condition and correctly connected;
- with the engine idling, check alternately the vacuum in the three positions of the control lever;
- disconnect a vacuum hose and in its place connect vacuum gauge M.S. 870; the value of the vacuum obtained should be greater than 300 mbar;
- the operation and sealing of the vacuum capsules.

ELECTRO-PNEUMATIC CONTROL FOR LOCKING THE REAR DIFFERENTIAL

Two special points accompany the blocking of the rear differential:

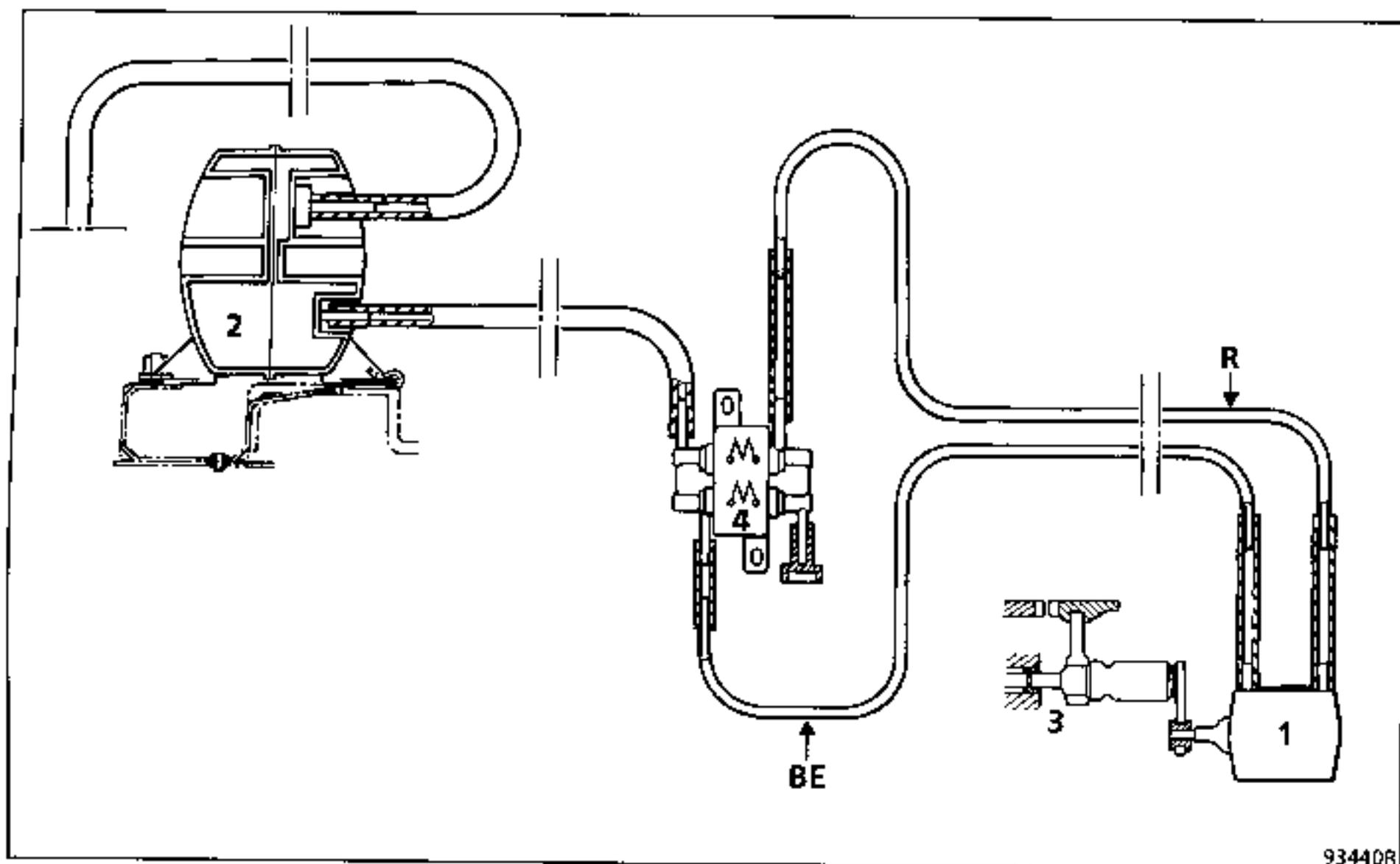
- Cancellation of the operation of the ABS
- Exclusive use in 1st and reverse, unblocking being automatic in any gear other than these two

The system is controlled by means of a push button located on the dashboard below a display which is connected electrically to it:



- Push button depressed, the display is blank and the rear differential is free.
- Push button released, two particular cases may arise:
 - Display shows "DIFF ABS": the rear differential is locked and the ABS cancelled when 1st gear or reverse are engaged.
 - The display flashes: blocking is requested but not carried out.

Electro-pneumatic control : assembly



The pneumatic control essentially comprises:

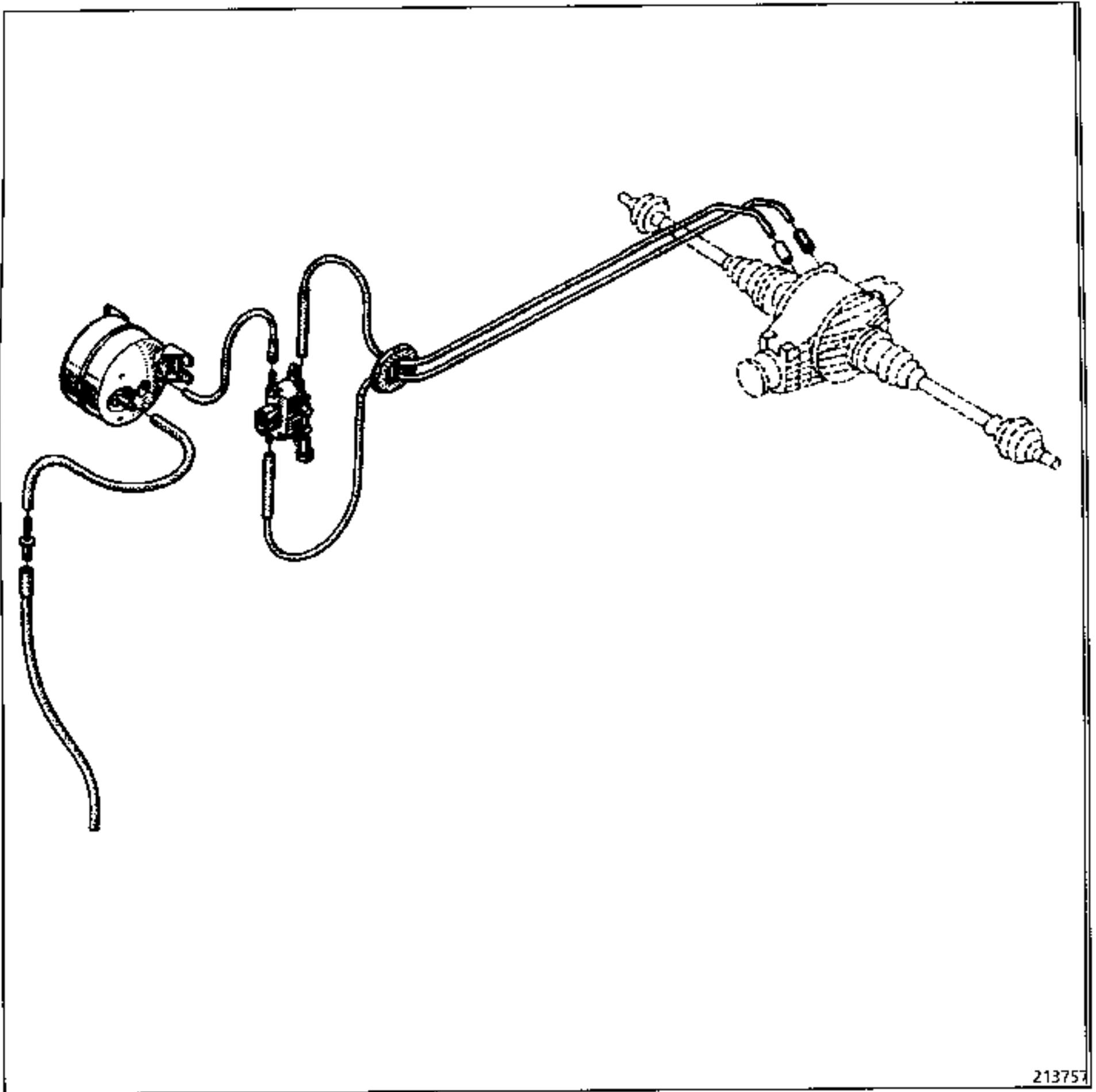
- A vacuum capsule (1), subject to the engine vacuum via a vacuum reservoir (2) so as to move dog clutch fork (3) on the OT2 axle
- A solenoid valve (4) supplied with positive power via the push button on the dashboard
- Two switches connected to 1st gear and reserve gear which earth the solenoid valve; at the same time electrical data is sent to the ABS computer

Hose colours:

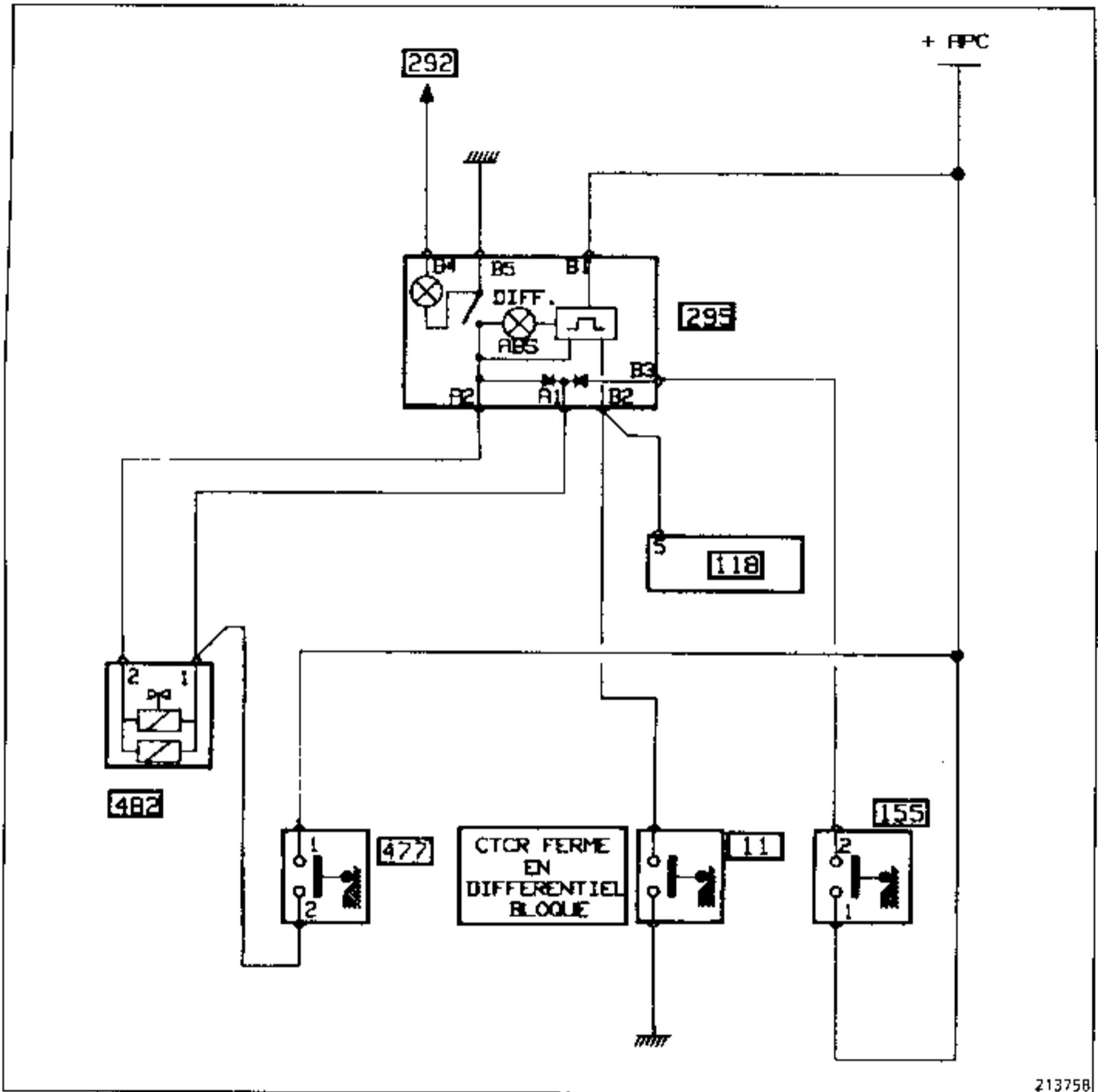
BE : Blue

R : Red

Electro-pneumatic control : assembly



4 x 4 WIRING DIAGRAM



213758

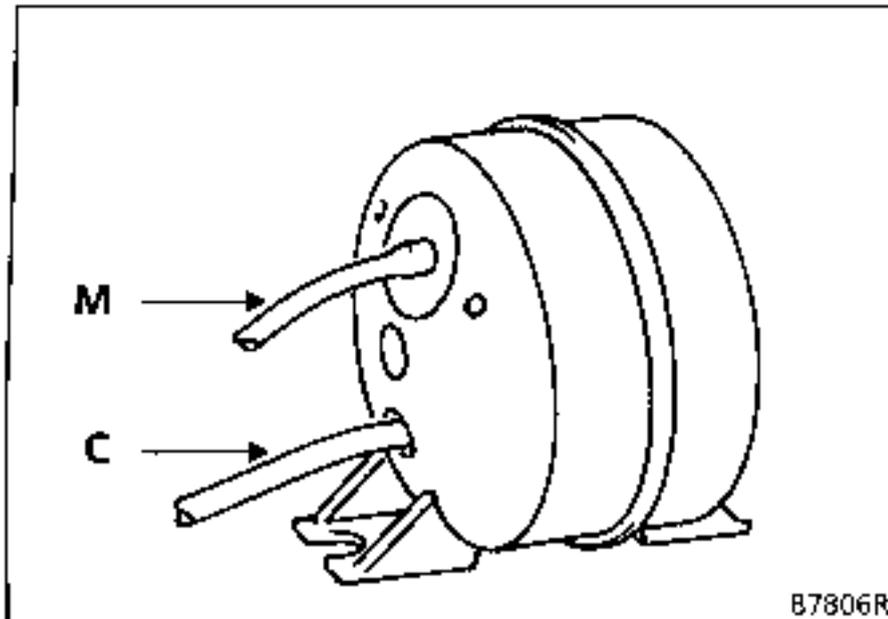
Key

- 11 Dog clutch switch
- 118 ABS computer
- 155 Reverse light switch
- 292 Lighting rheostat relay
- 295 4 X 4 control unit
- 477 1st speed switch
- 482 Dog clutch control solenoid valve
- APC After ignition

Vacuum reservoir :

It is secured on the closure panel above the bulkhead on the right-hand side.

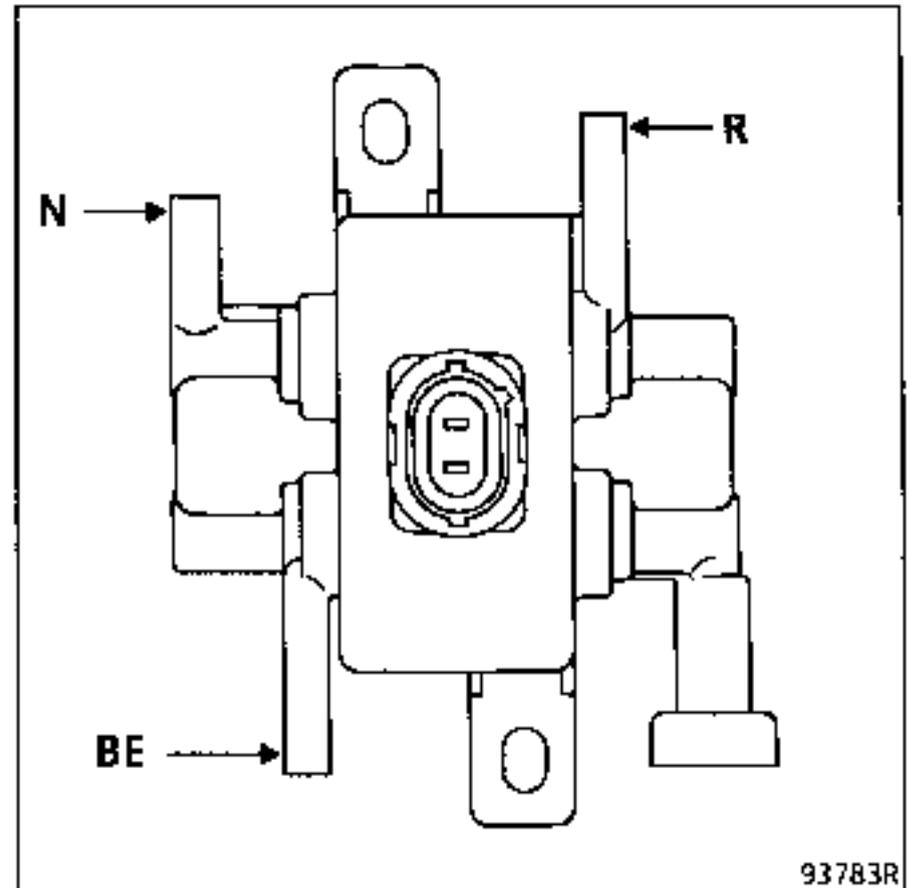
It is connected at (M) to the inlet manifold connection hose and at (C) to the solenoid valve.



Solenoid valve :

It is located next to the vacuum reservoir, behind the coolant reservoir chamber.

Ensure that the hoses are connected correctly.



BE : Blue

N : Black

R : Red

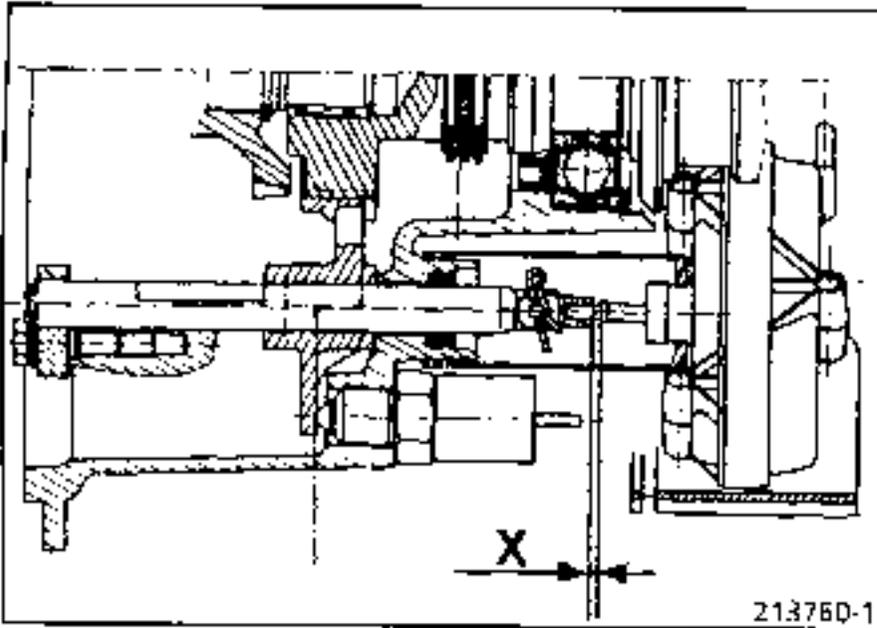
SPECIAL POINTS

Fitting the clevis to the vacuum capsule:

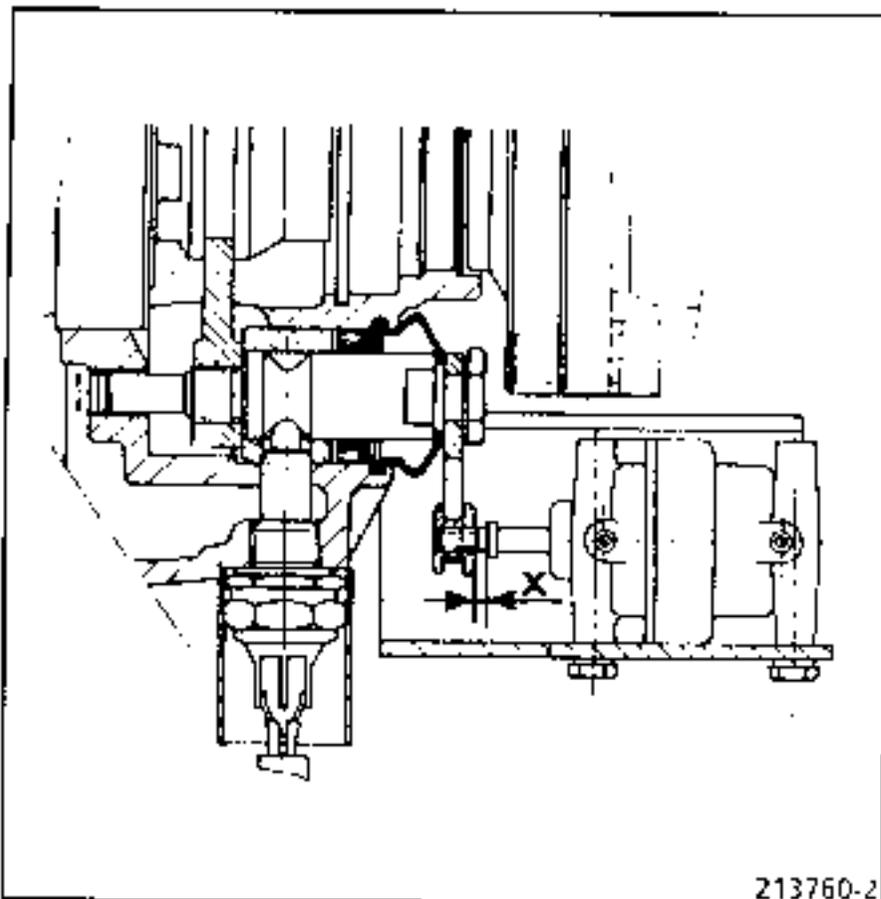
When replacing the vacuum capsule, ensure that the distance for positioning the clevis on the control rod is correct.

$X = 2$ to 3 mm.

On NG7 gearbox.

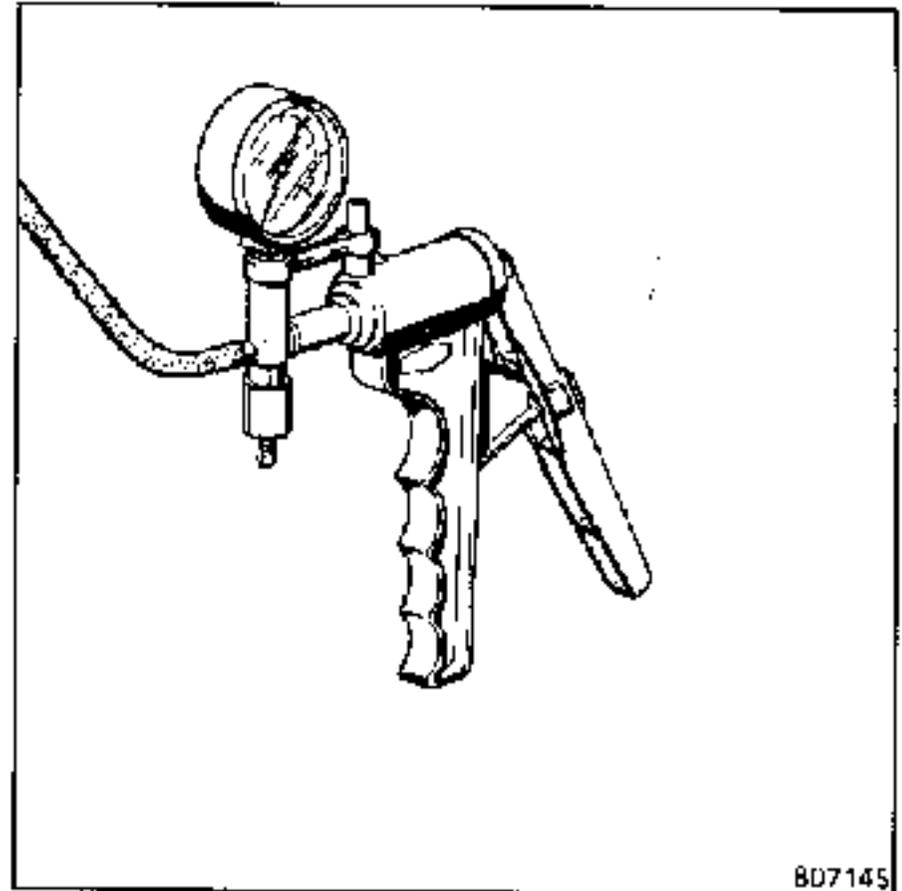


On OT2 rear axle



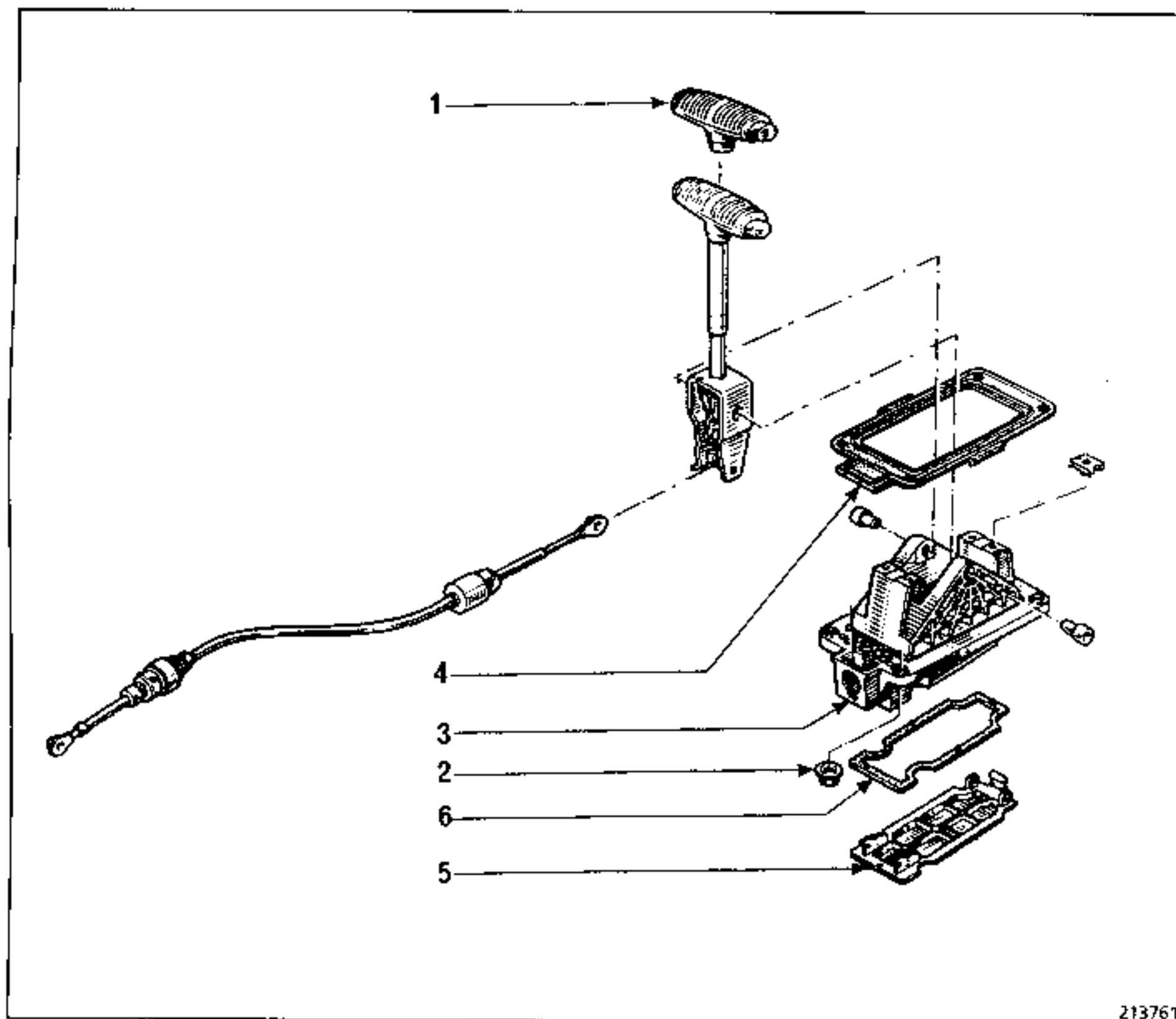
CHECKING THE VACUUM CAPSULE

Connect a manual vacuum pump alternately to the two capsule inlets.



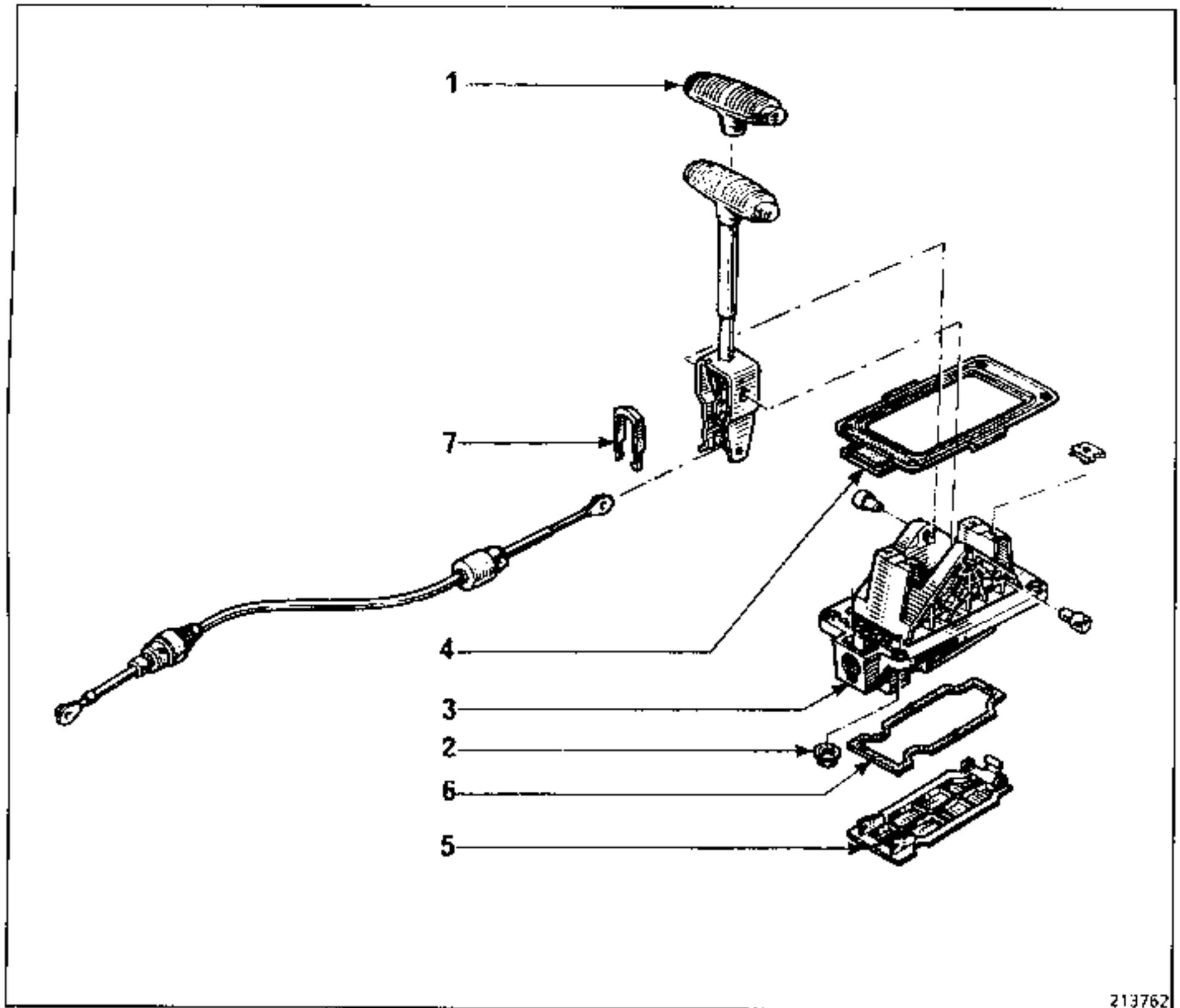
Vacuum to be applied	After needle controlling rod has moved:	
	STABLE	DROPS
0.3 to 0.8 bar	GOOD	INCORRECT

EXPLODED VIEW



- 1 Control lever handle
- 2 Nut retaining lever under floor panel
- 3 Control unit
- 4 Seal on control unit under floor panel
- 5 Lower flap
- 6 Seal

EXPLODED VIEW

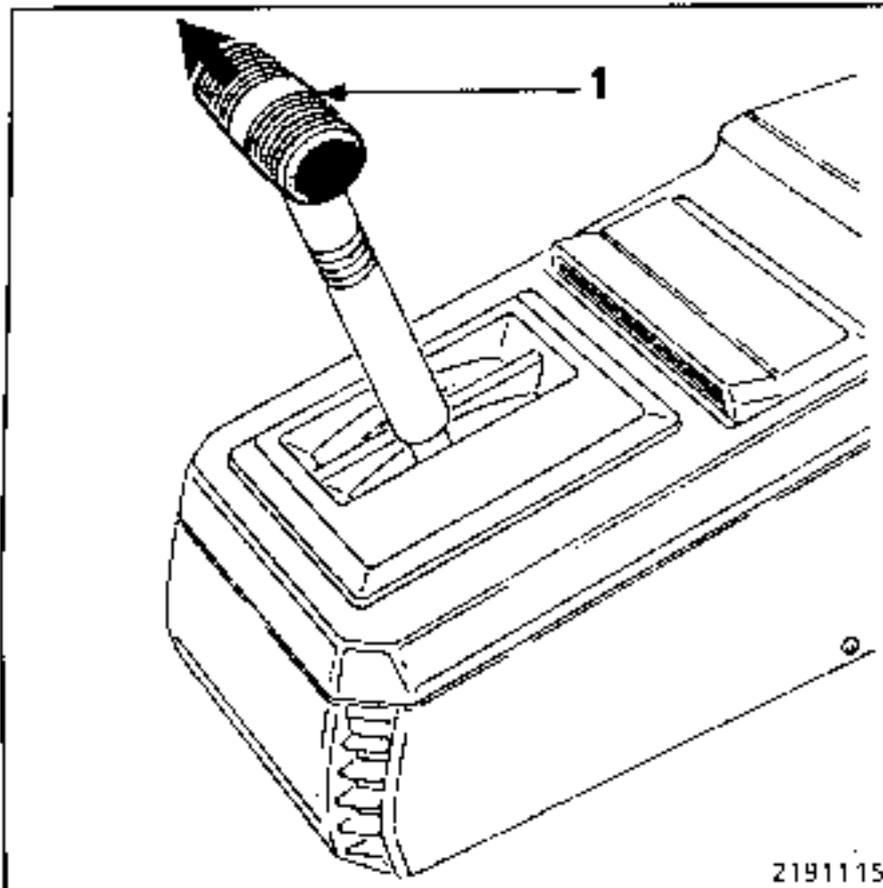


213762

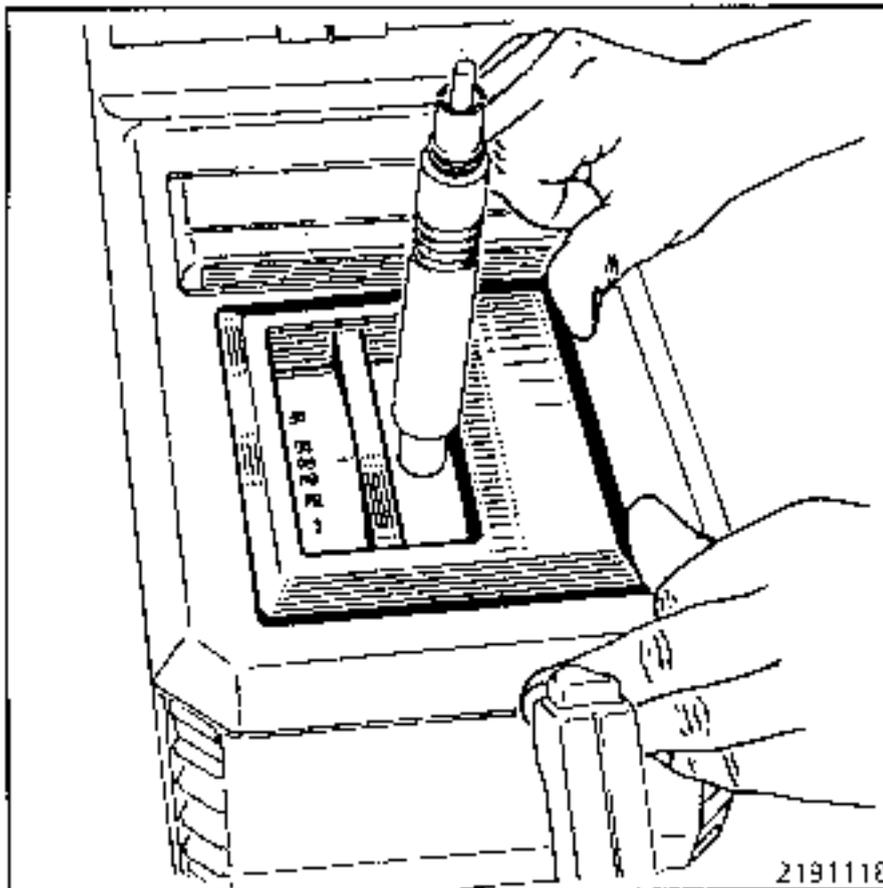
- 1 Control lever handle
- 2 Nut securing control lever under floor panel
- 3 Control unit
- 4 Seal on control unit under floor panel
- 5 Lower flap
- 6 Seal
- 7 Locking key

REMOVING

Remove handle (1) from the control lever, moving it upwards.



Remove the console embellisher by pressing on the left-hand side and raise it to free the grips.

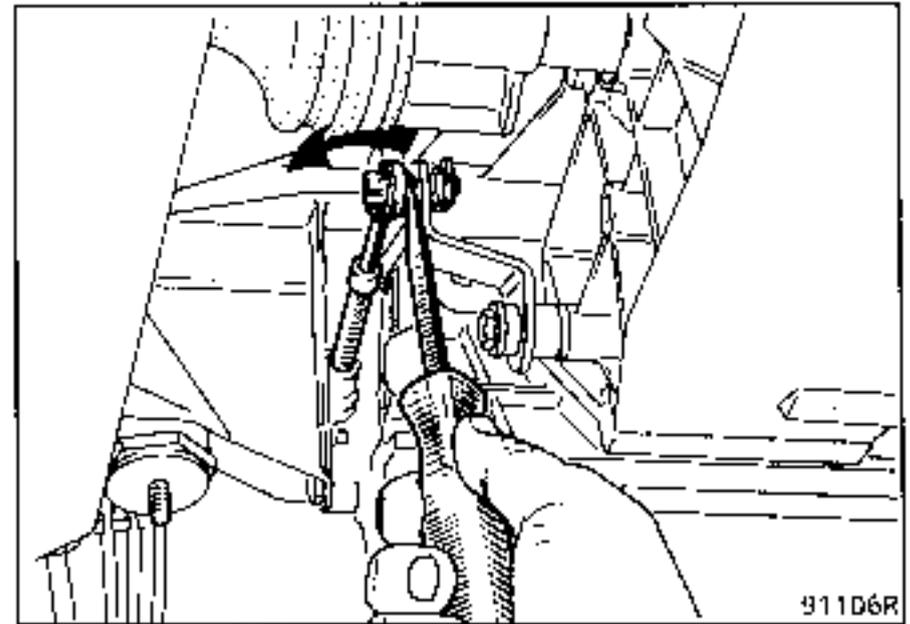


Remove the exhaust primary down pipe coupled to the intermediate pipe.

Remove the 4 nuts holding the control lever under the floor panel.

Disconnect the light from the repeater.

Unclip the control cable from the relay outer ball joint.



Lower the engine/gearbox cradle by 15 mm by unscrewing the two rear mountings.

Remove the right-hand mounting from the automatic transmission.

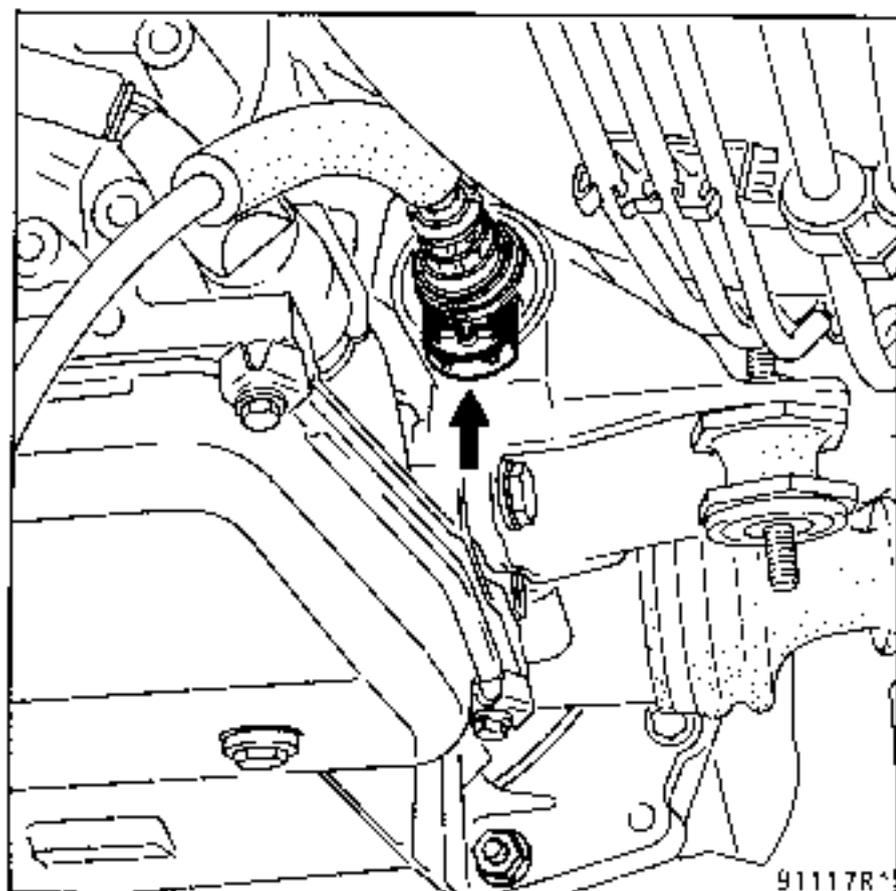
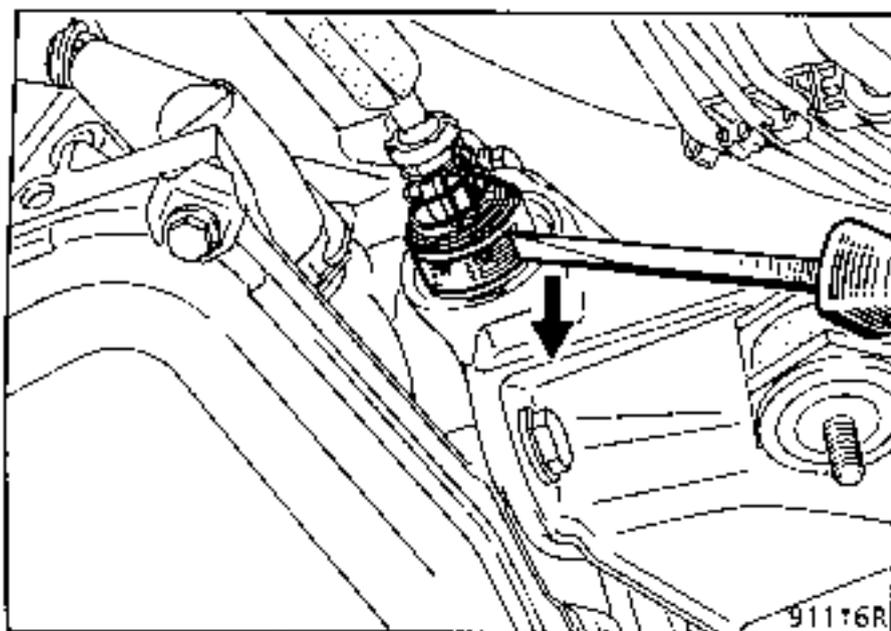
Free the complete control assembly (mounting, cable and lever).

REFITTING - ADJUSTING

Fit in place the right-hand transmission mounting coupled to the control cable and lever.

Tighten the cradle rear mounting bolts.

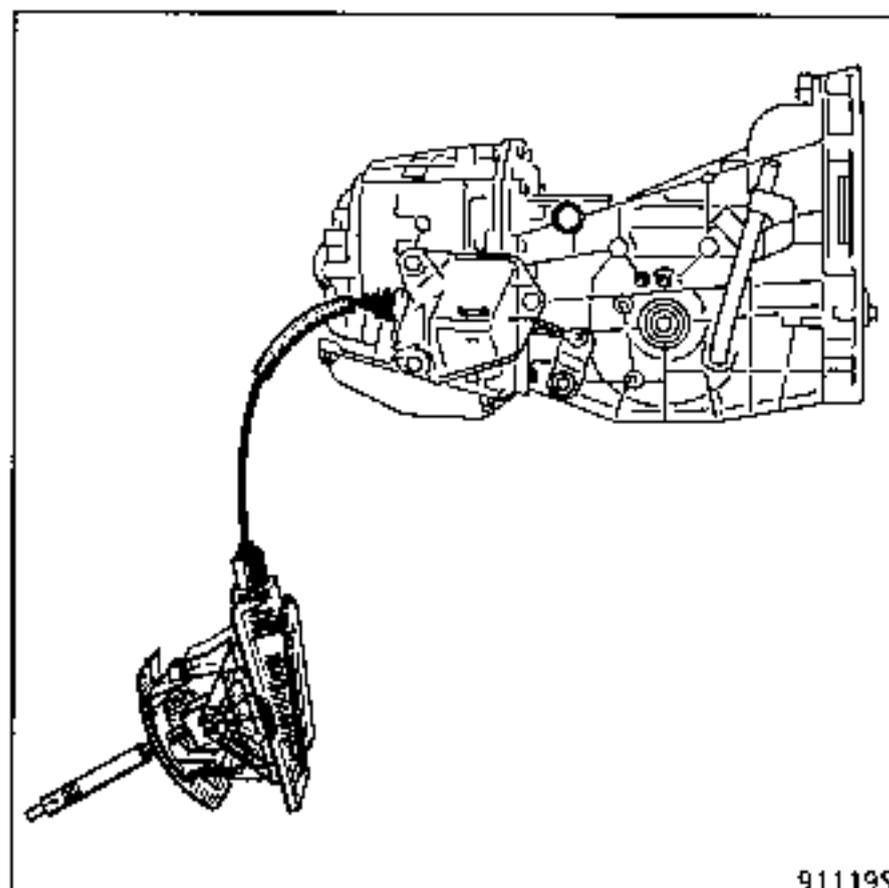
Release the control cable setting and free it sufficiently to release the setting device.



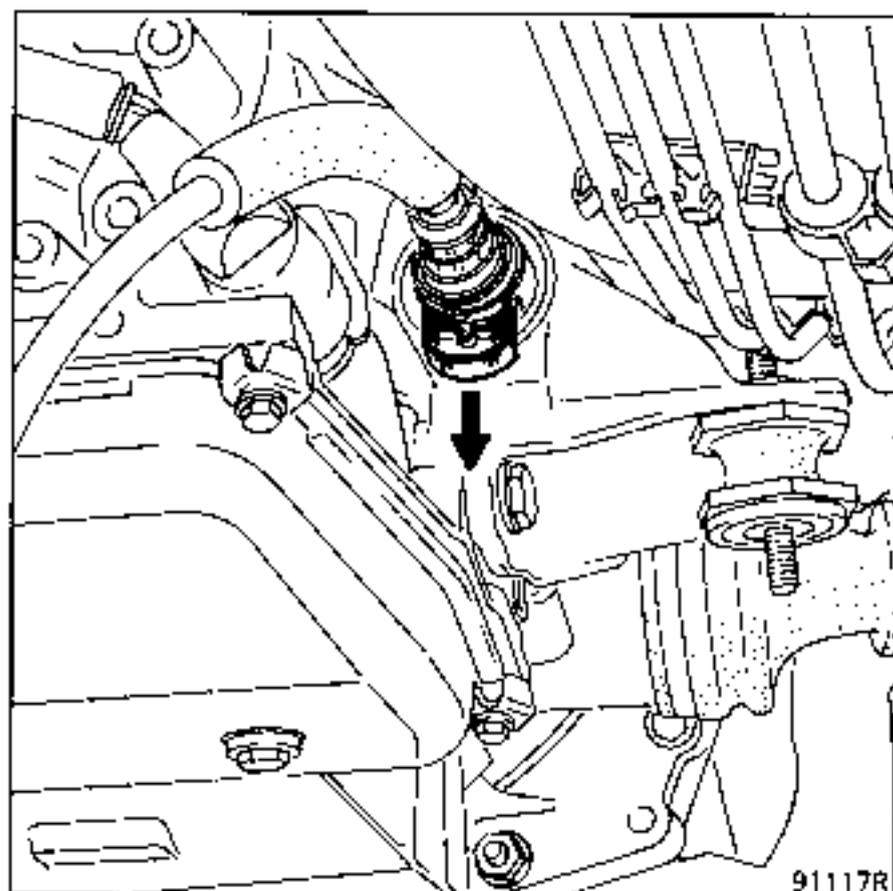
Place the control lever in (D) and the automatic transmission.

Clip the cable ball joint on to the swivel lever.

In this position, with the control assembly hanging under the vehicle, clip the adjusting latch in place.



91119S



91117R

Under the floor panel, engage the control unit equipped with its seal.

Connect the repeater light.

Screw the four mounting nuts under the body.

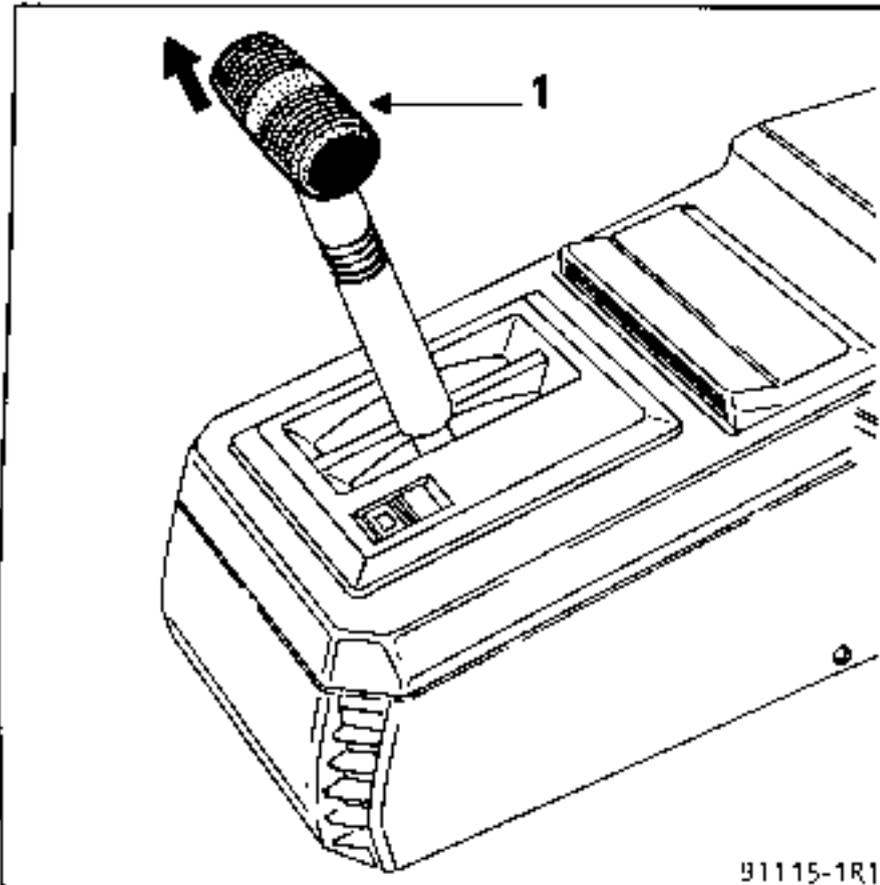
Refit the exhaust.

Clip on the console embellisher and control lever handle.

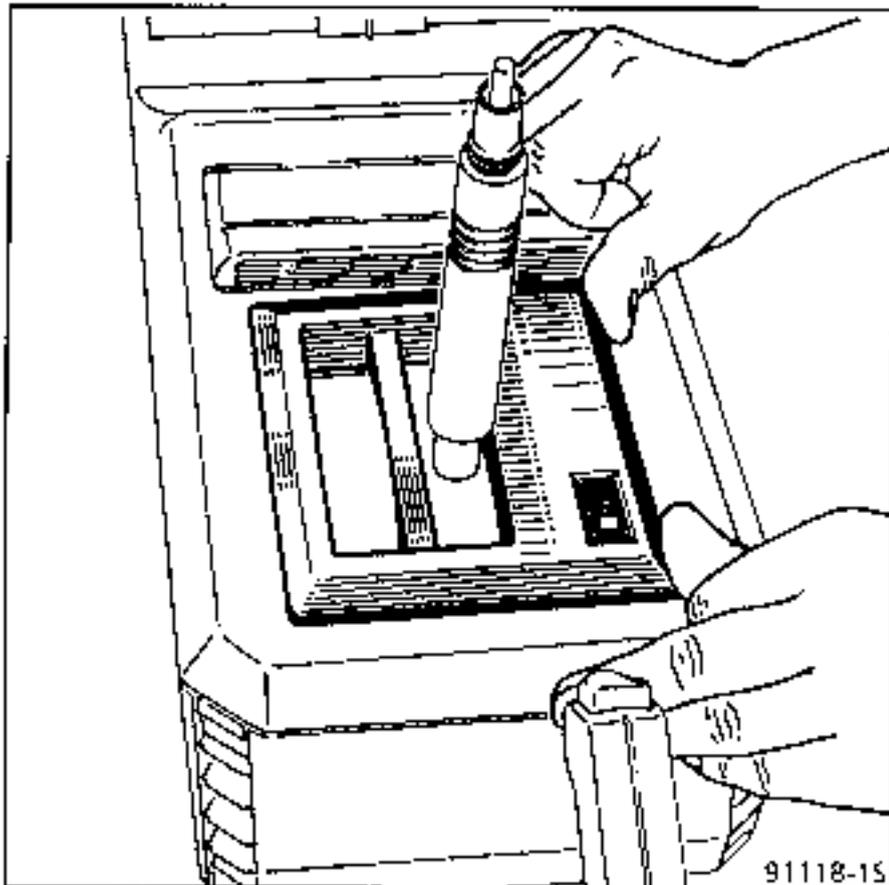
Check the controls operate correctly.

REMOVING

Remove handle (1) from the control lever by moving it upwards to free it.

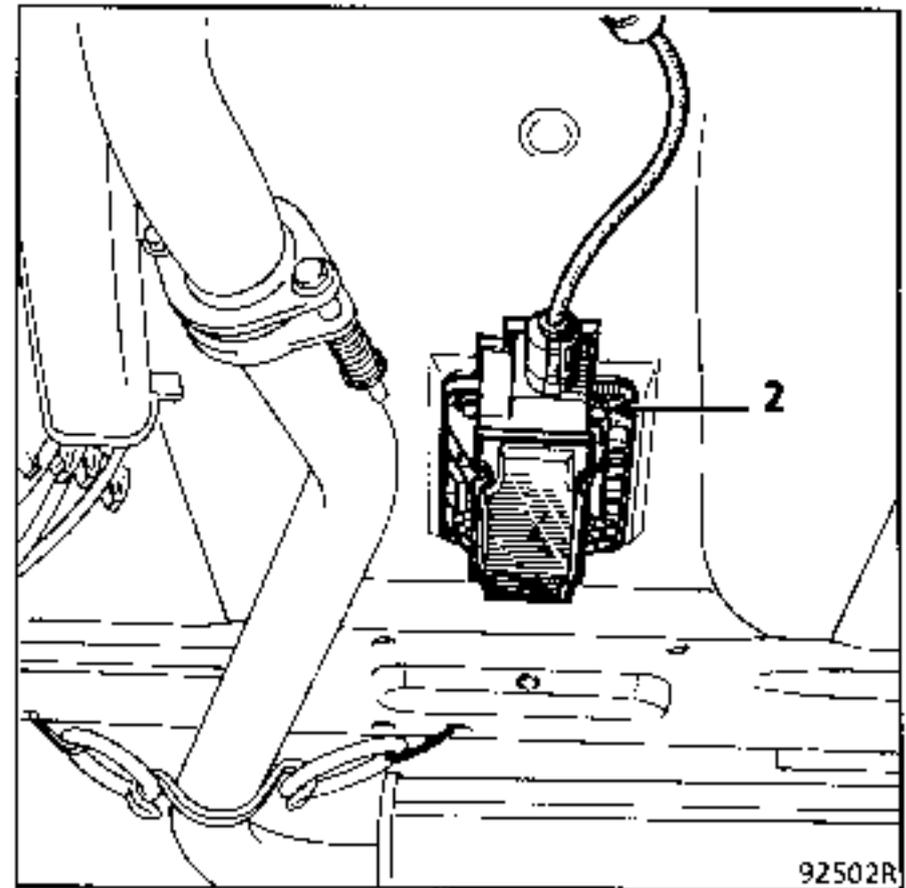


Remove the console embellisher pressing on the left-hand side and raise it to free the grips.



Remove the exhaust primary down pipe coupled to the intermediate pipe.

Remove the four nuts holding the control lever under the floor panel (2).



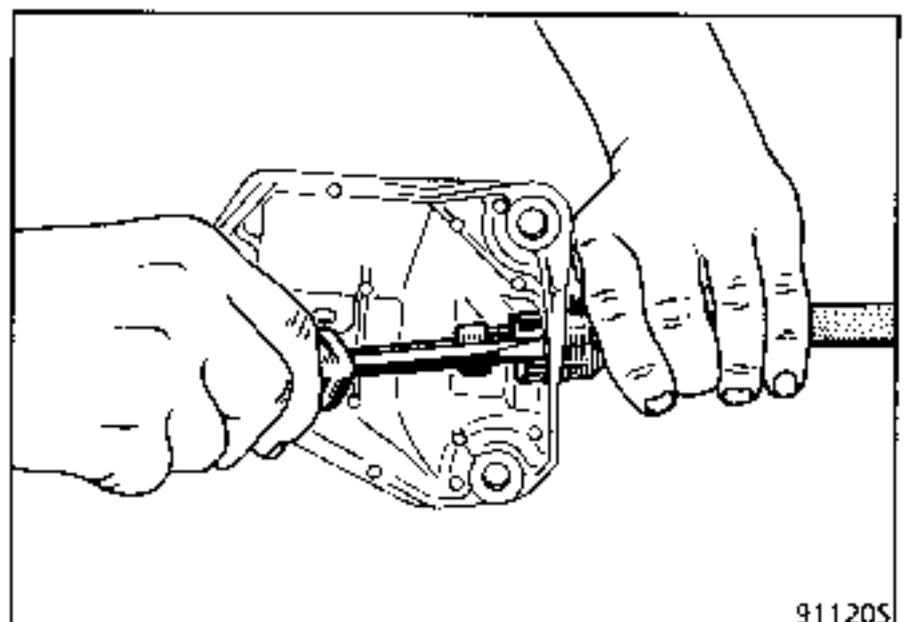
Disconnect the light from the repeater.

Unclip the control cable from the lever ball joint on the transmission.

Remove the right-hand mounting from the automatic transmission.

Free the complete control assembly (mounting, cable and lever).

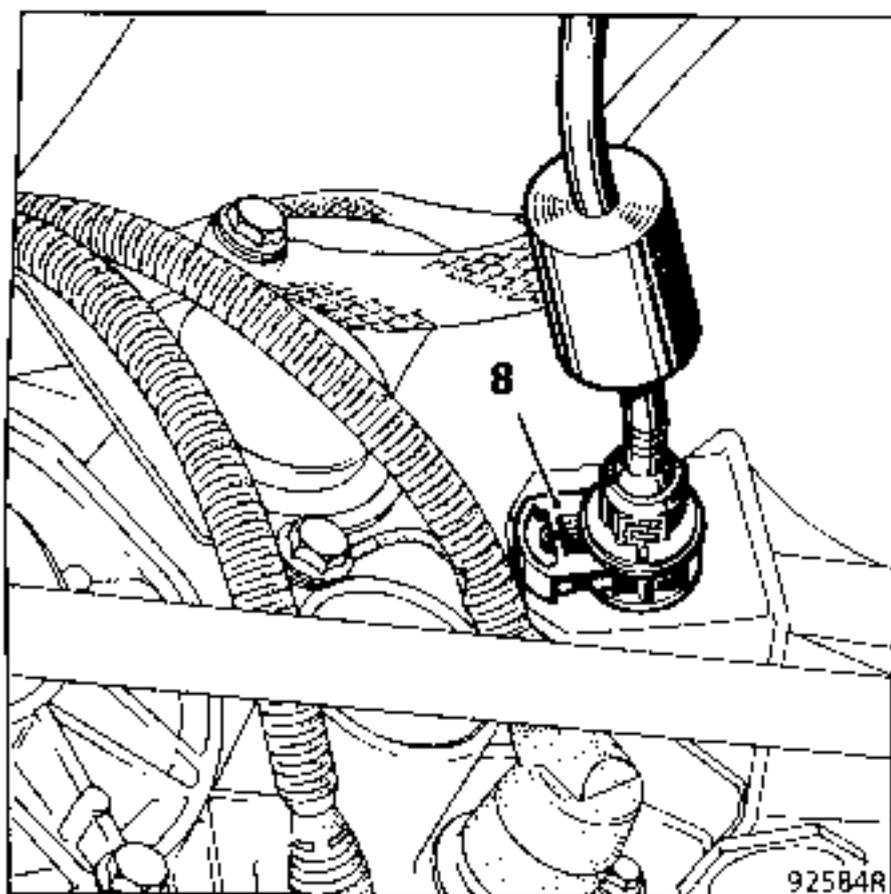
Separate the control from the right-hand transmission mounting.



REFITTING - ADJUSTING

Fit in place the right-hand transmission mounting coupled to the control cable.

Release the control cable setting and free it sufficiently to release the setting device.



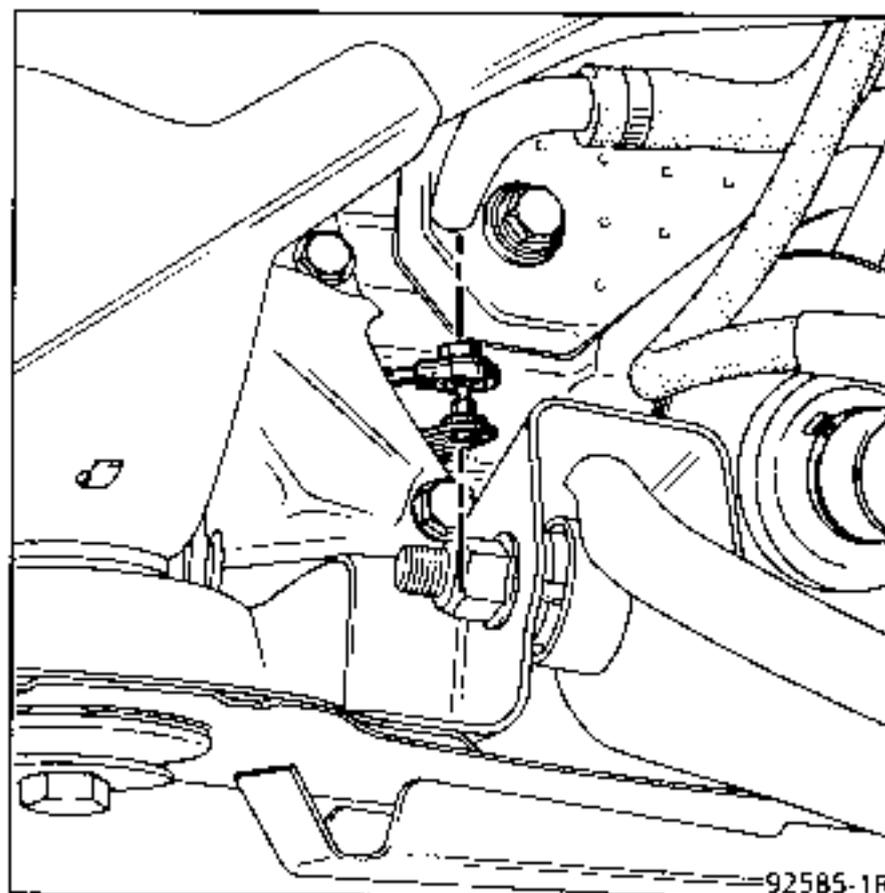
Under the floor engage the control unit equipped with its seal.

Connect the repeater light.

Screw up and tighten the four mounting nuts (2) under the body.

Clip on the console embellisher and control lever handle.

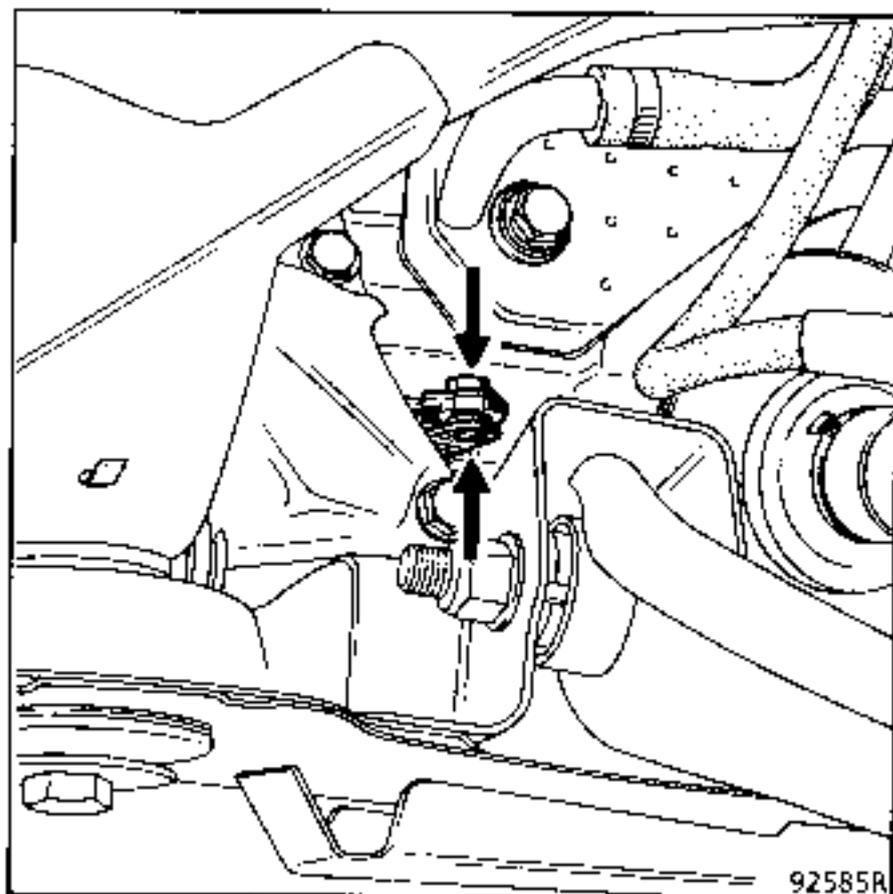
Place the control lever in 1st gear "hold" as well as the automatic transmission (gearbox lever as far as it will go on drive shaft side).

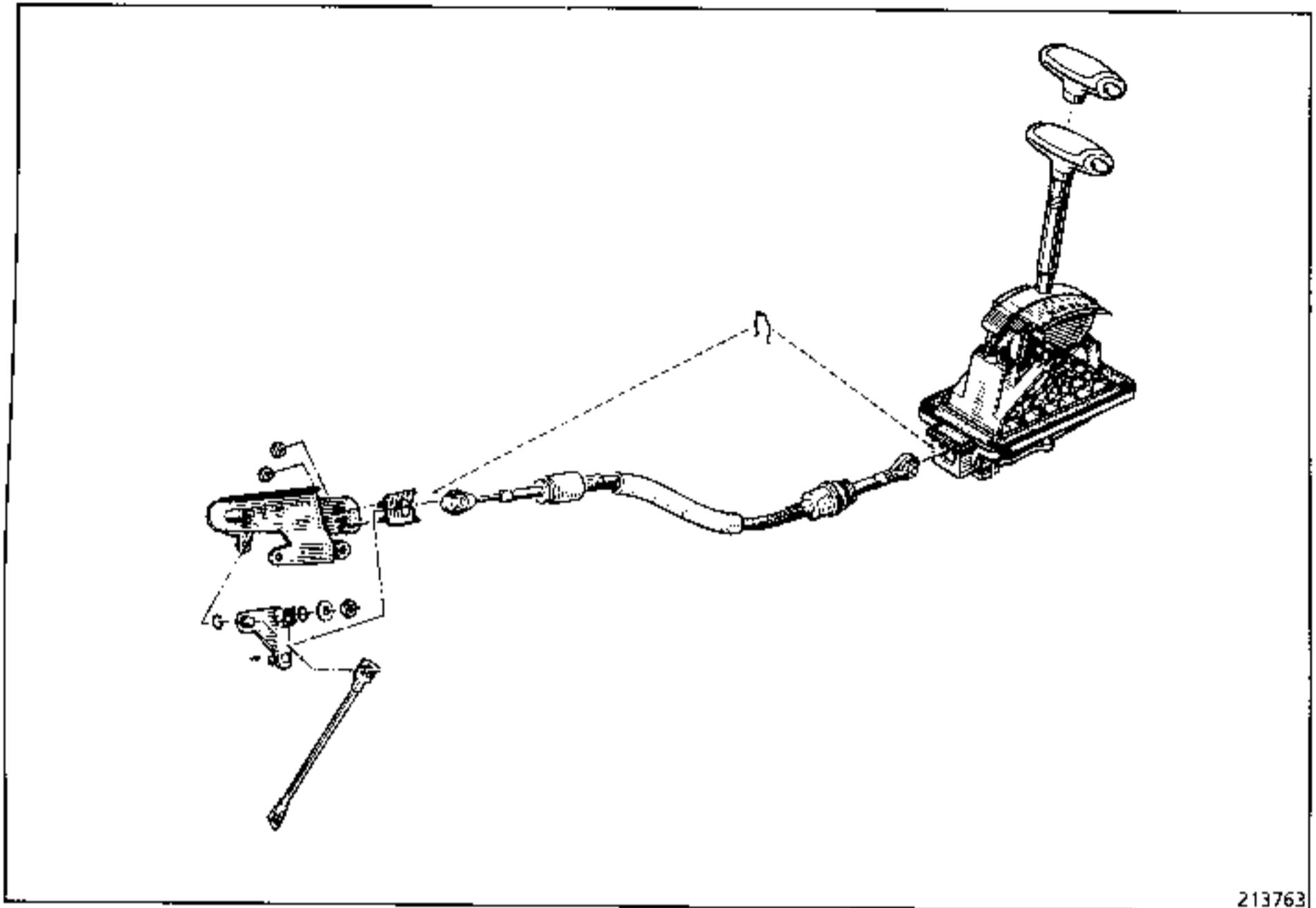


Align the cable ball joint with the ball joint on the gearbox lever, adjusting the position of the sheathing.

Lock the sheathing by pushing back catch (8).

Clip the control cable on to the gearbox lever using multi-socket pliers.

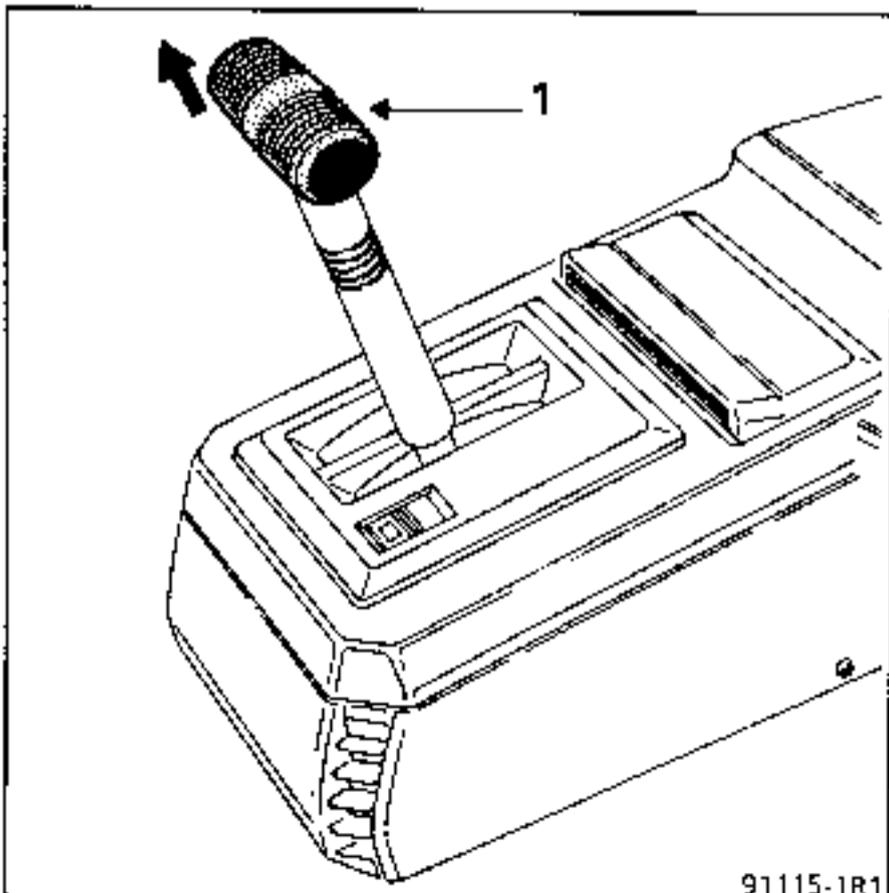




213763

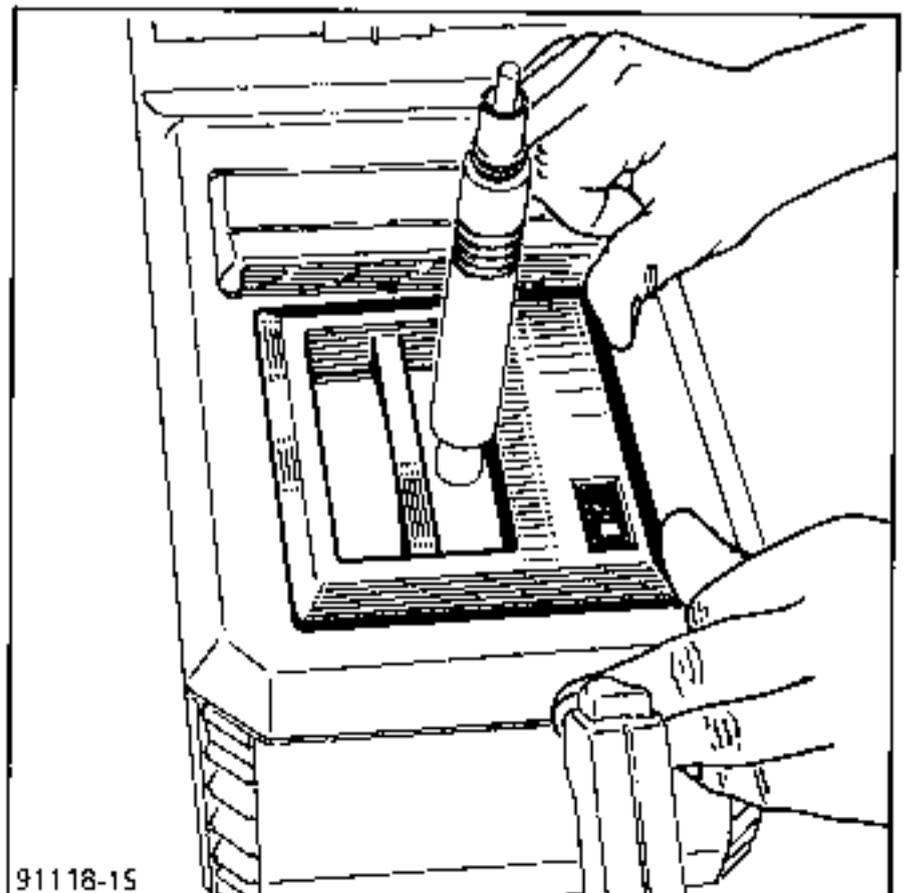
REMOVING**Passenger compartment side:**

Remove the control lever handle (1) by moving it upwards to free it.



91115-1R1

Remove the console embellisher pressing on the left-hand side and raise it to free the grips.



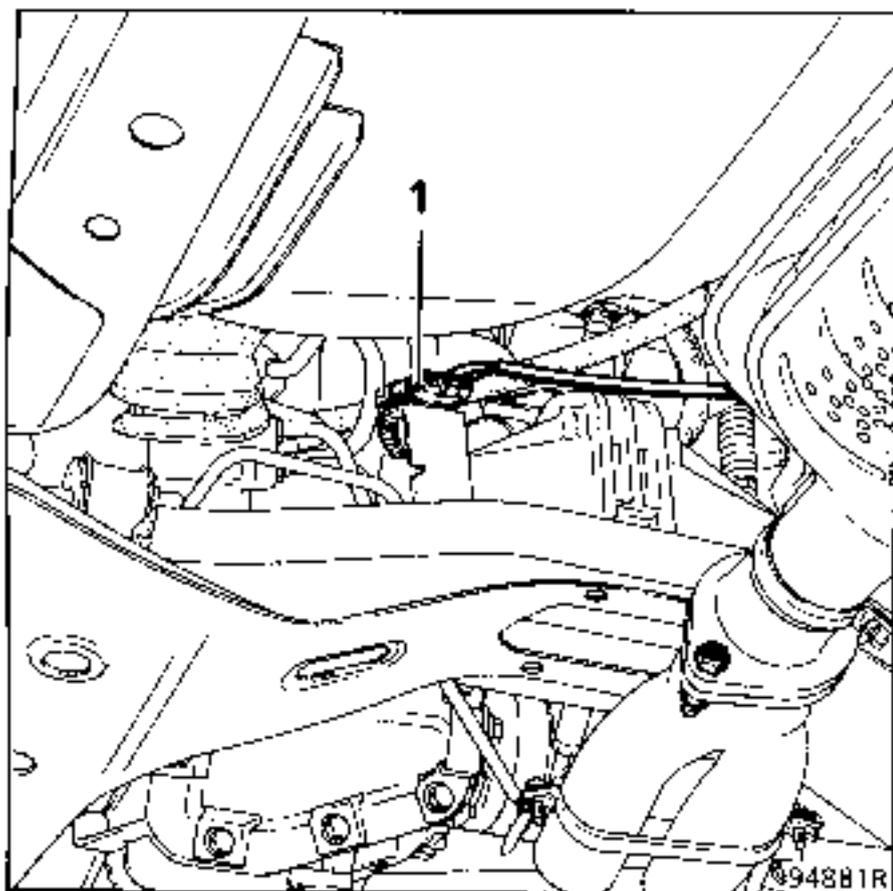
91118-1S

Disconnect the light from the repeater.

Under the vehicle :

Disconnect the oxygen sensor connector (1).

Remove the two bolts securing the flange. Save the seal to be used again.



Remove the protective cover (6).

Disconnect the ends of the cable.

Remove:

- the four retaining nuts on the control unit and take it out to move it downwards,
- the cable retaining clips.

REFITTING - ADJUSTING

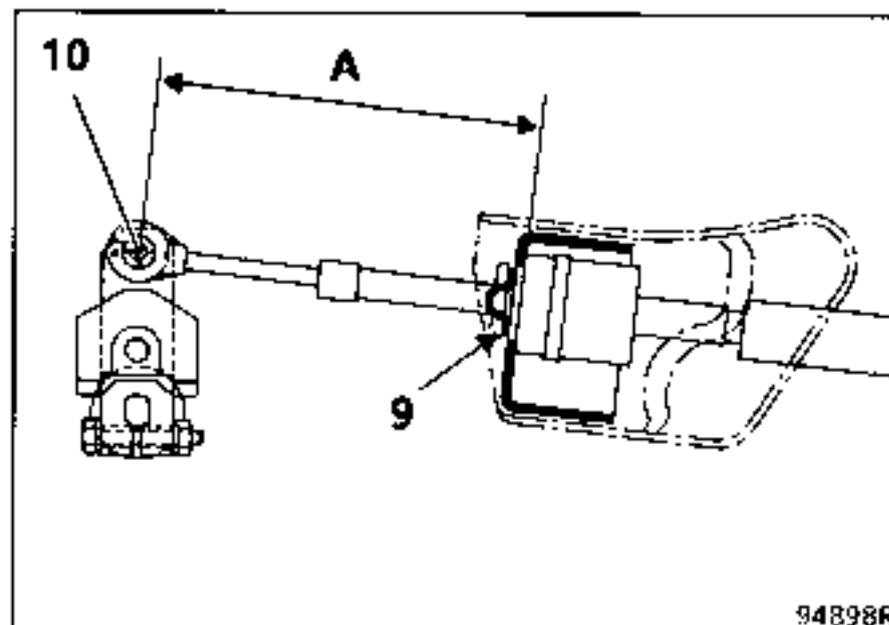
The automatic transmission must be in position (D).

Automatic transmission :

Before refitting the cable, check dimension (A) between surface where the cable makes contact with the sheath stop (9) and the locking ball joint (10).

$$A = 131 \text{ mm}$$

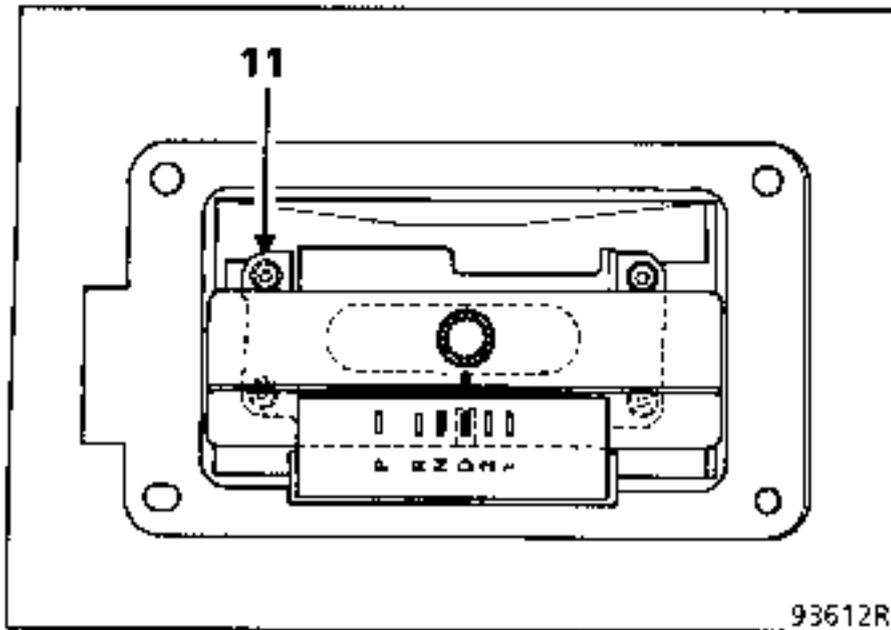
If necessary, slacken off screw (12) to obtain this dimension.



Control unit side (5) :

Place the selector in **(D)** (Drive) position.

Before tightening the four bolts **(11)** align the two marks on the surround and the repeater.

**CHECKING THE CABLE**

Release the sheath stop by moving it a quarter of a turn and make sure that the cable can slide easily.

FITTING

Fit the cable:

- to the automatic transmission with **D** still selected,
- on the control unit (with **D** still engaged) and turn the sheath stop a quarter of a turn to lock it.

Replace the control unit on the vehicle.

Remount the flange, using a new seal.

Reconnect the oxygen sensor connector.

Refit the console embellisher and the control lever handle.

Check the gear lever action, check that the ignition engages in position **(P)** and **(N)** and operation **(Park)**.

If adjustment is incorrect, release the sheath stop by turning it a quarter of a turn and pull or push the cable, depending on the adjustment required.

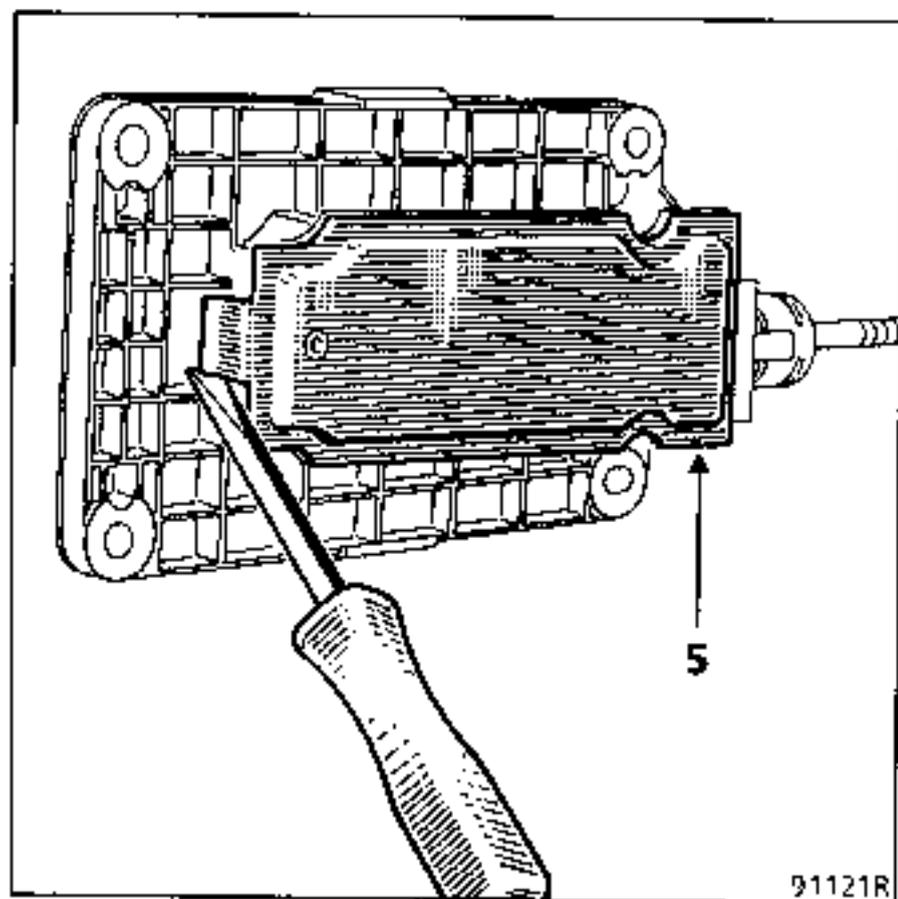
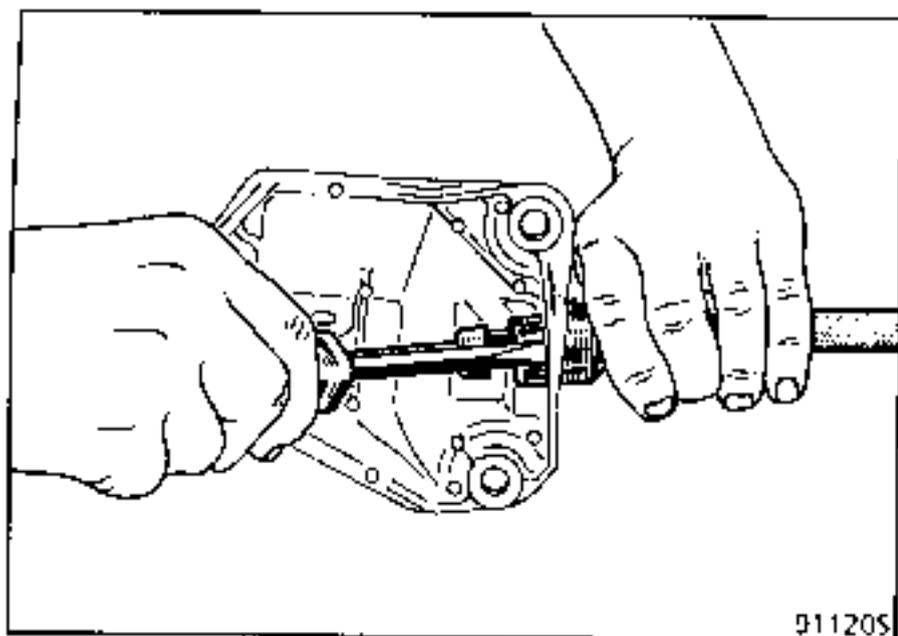
Do not forget to secure the sheath stop **(8)** again at the end of the operation.

REPLACING

The control cable can only be removed when the control assembly has been removed (see section entitled "Removing the control cable").

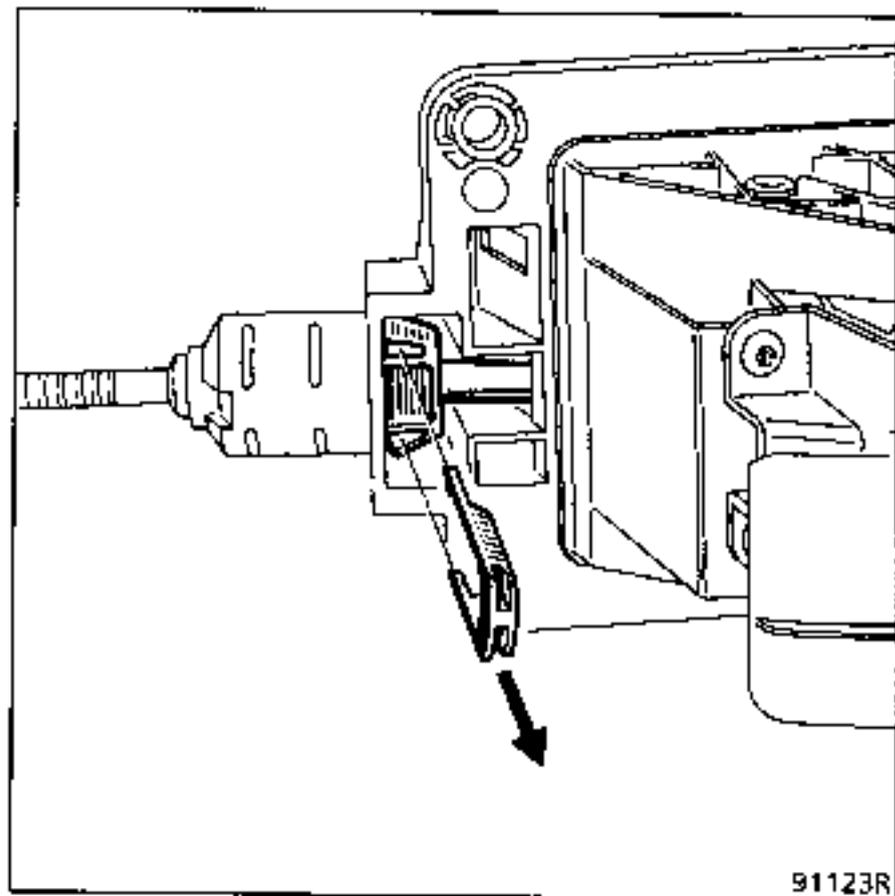
Unclip the cable from the transmission right-hand mounting.

Open the lower flap (5) on the control unit using a screw driver.

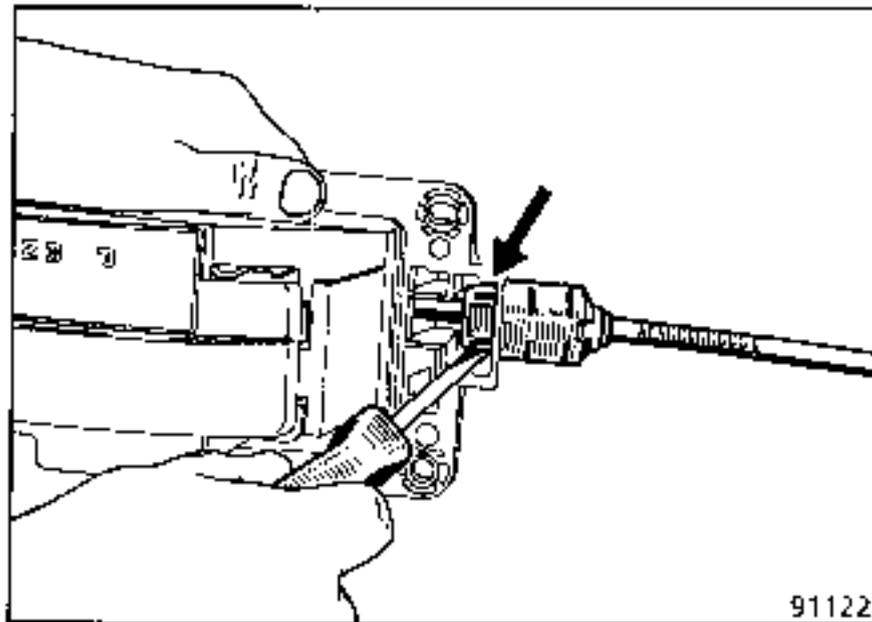


Unclip the ball joint from the base of the lever.

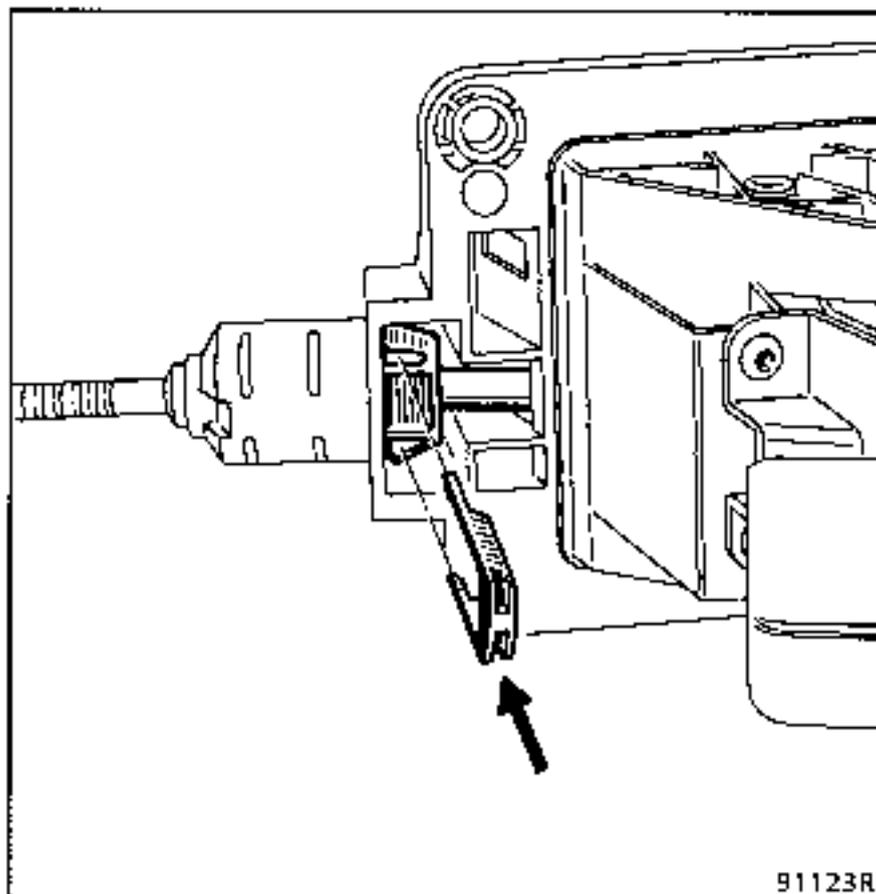
Remove the key locking the cable in the casing.



Release the cable by pressing on the two locking catches in the casing.



On reassembly, assemble the cable on the casing.
(Ensure the key is placed in the correct direction.)



Clip the ball joint on the base of the lever.

Close the base of the casing using the seal and flap.

Clip the cable on to the transmission mounting.

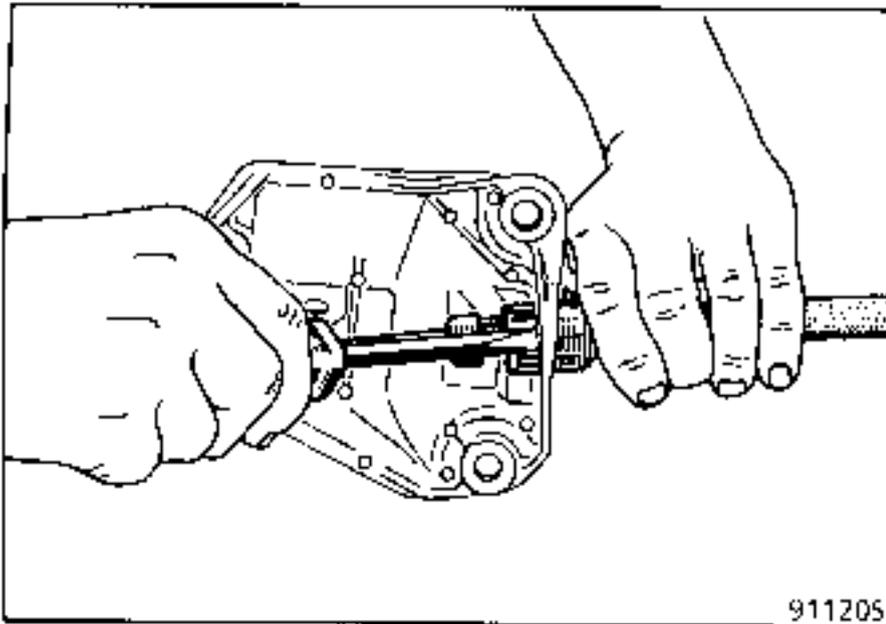
Proceed as in the section for "Reassembling and adjusting the control assembly".

REPLACING

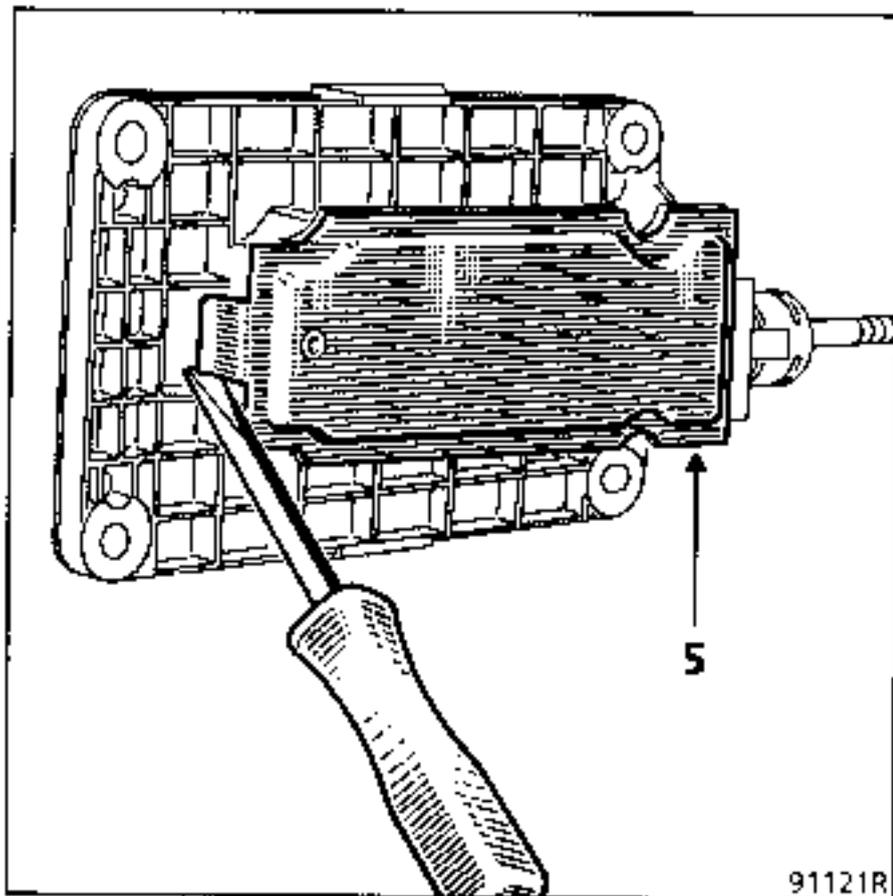
The control cable can only be removed when the control assembly has been removed (see section entitled "Removing the control").

Unclip the cable from the transmission right-hand mounting.

Open the lower flap (5) on the control casing using a screwdriver.

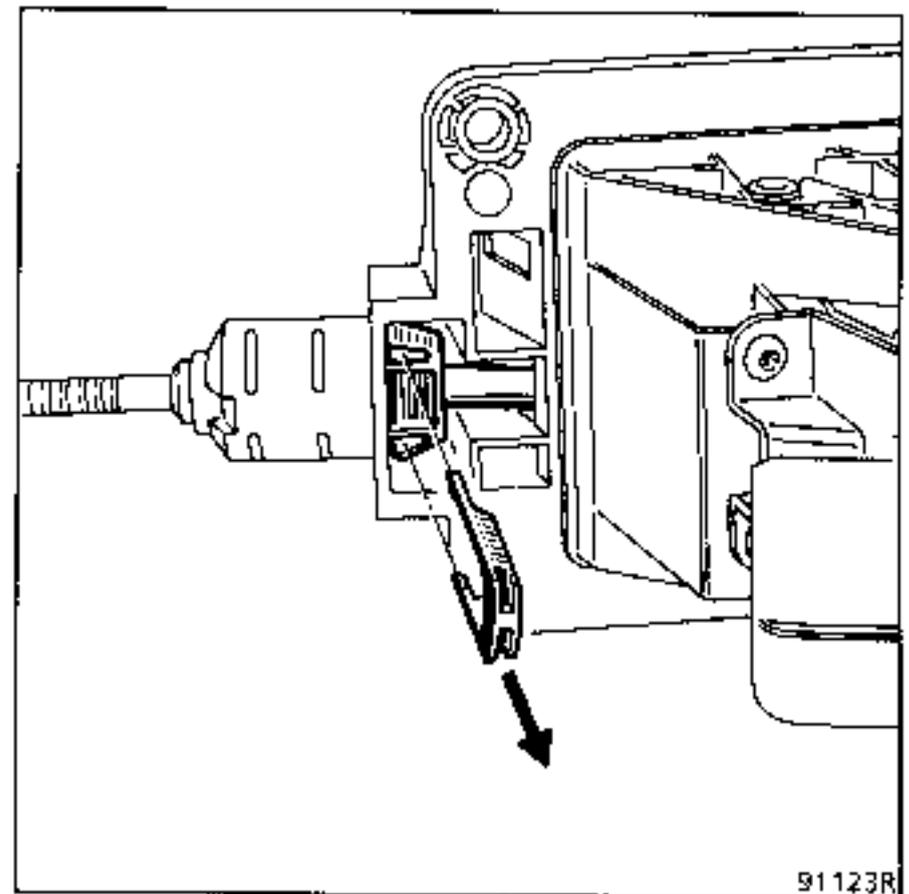


91120S



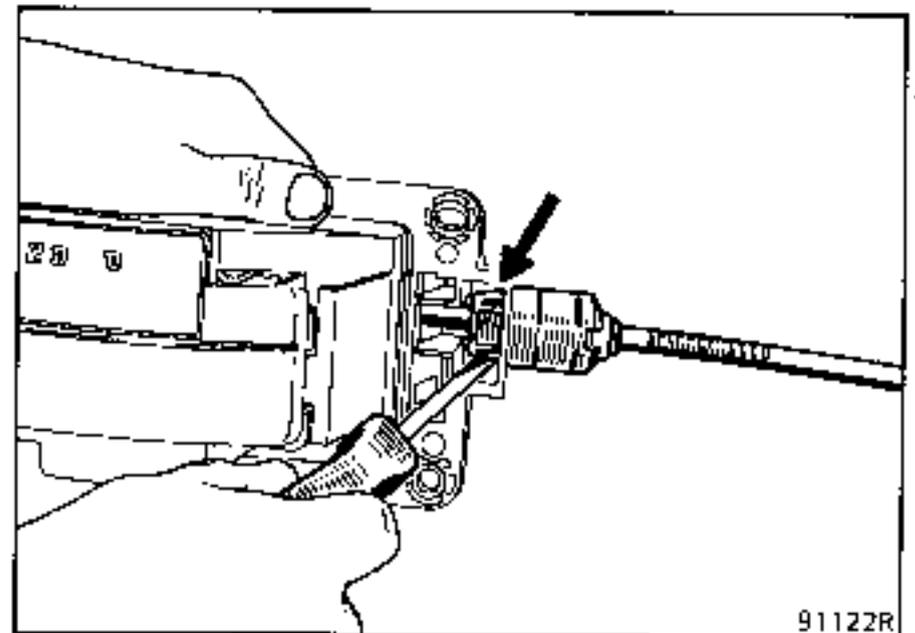
91121R

Unclip the ball joint from the base of the lever.
Remove the key locking the cable in the casing.



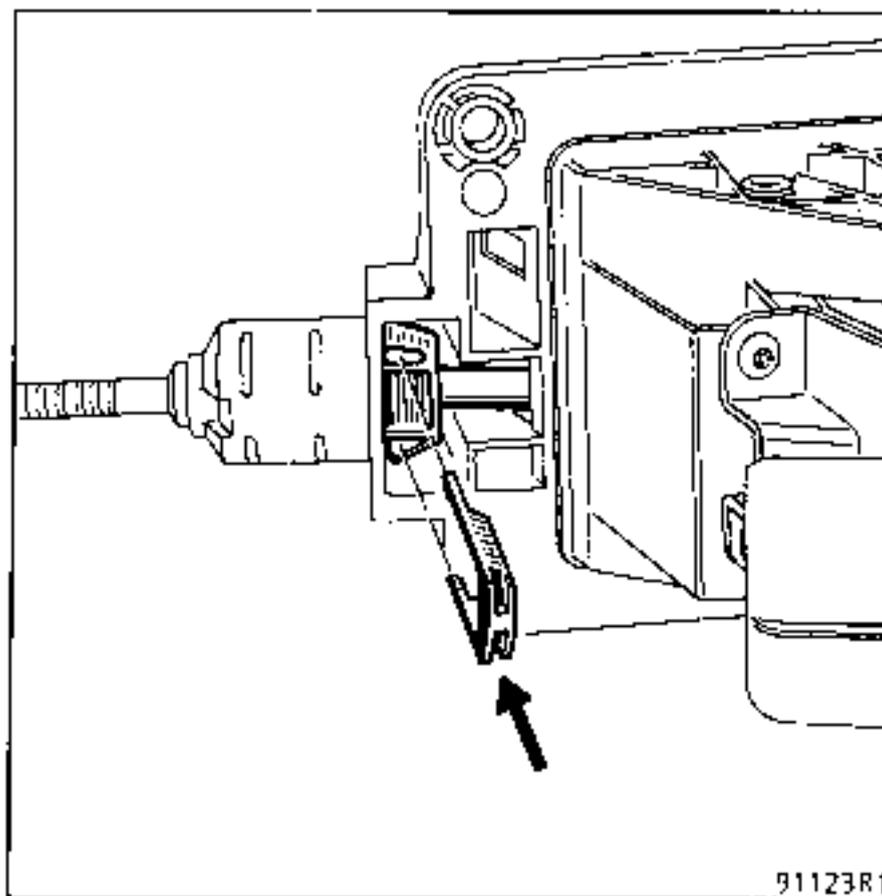
91123R

Free the cable by pressing on the two locking catches in the casing.



91122R

On reassembly, assemble the cable on the casing.
(Place the key in the correct direction.)



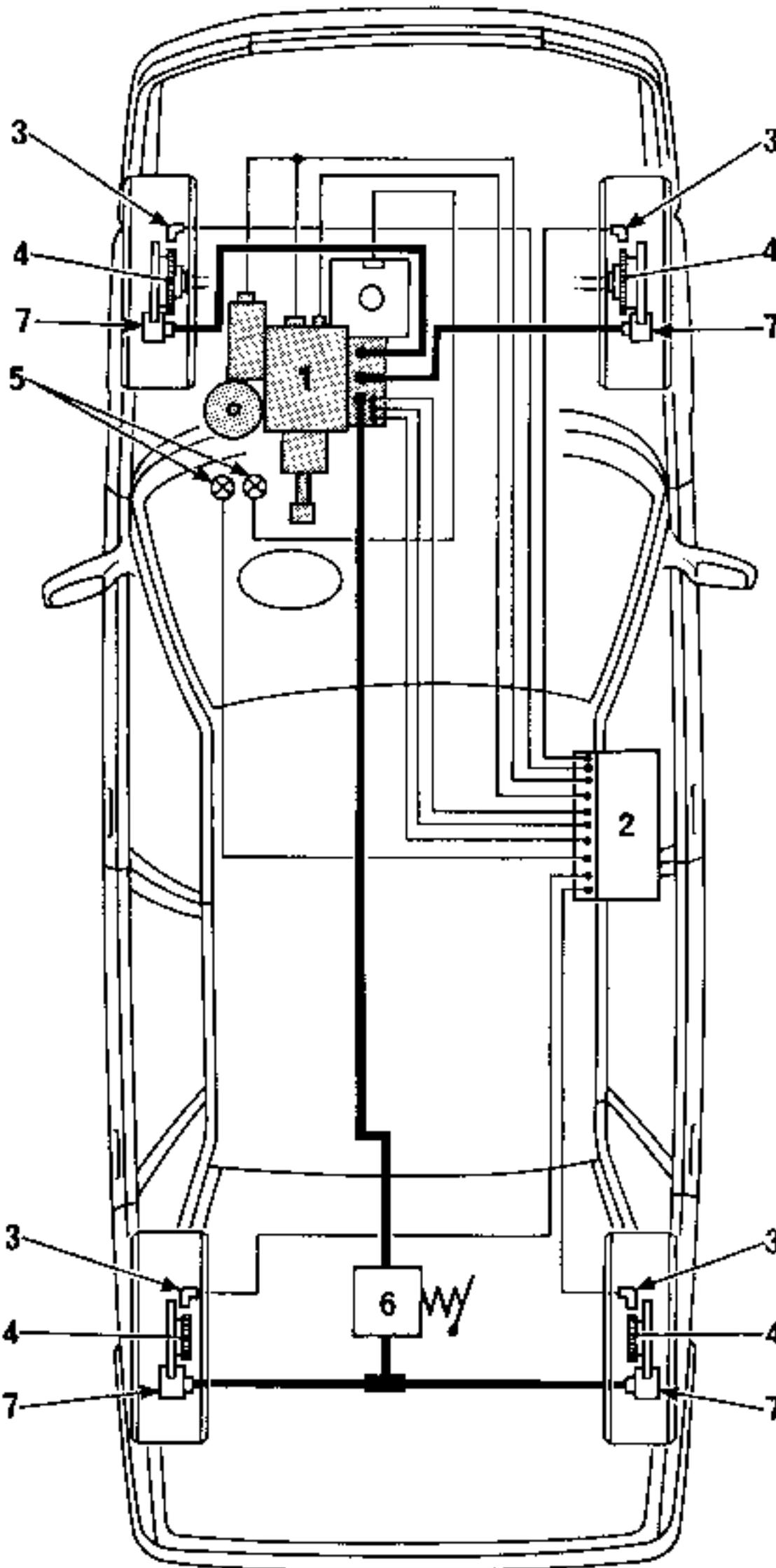
Clip the ball joint on to the base of the lever.

Close the bottom of the casing using the seal and flap.

Clip the cable on to the transmission mounting.

Proceed as in the section for "Reassembling and adjusting the control assembly".

LOCATION AND COMPOSITION



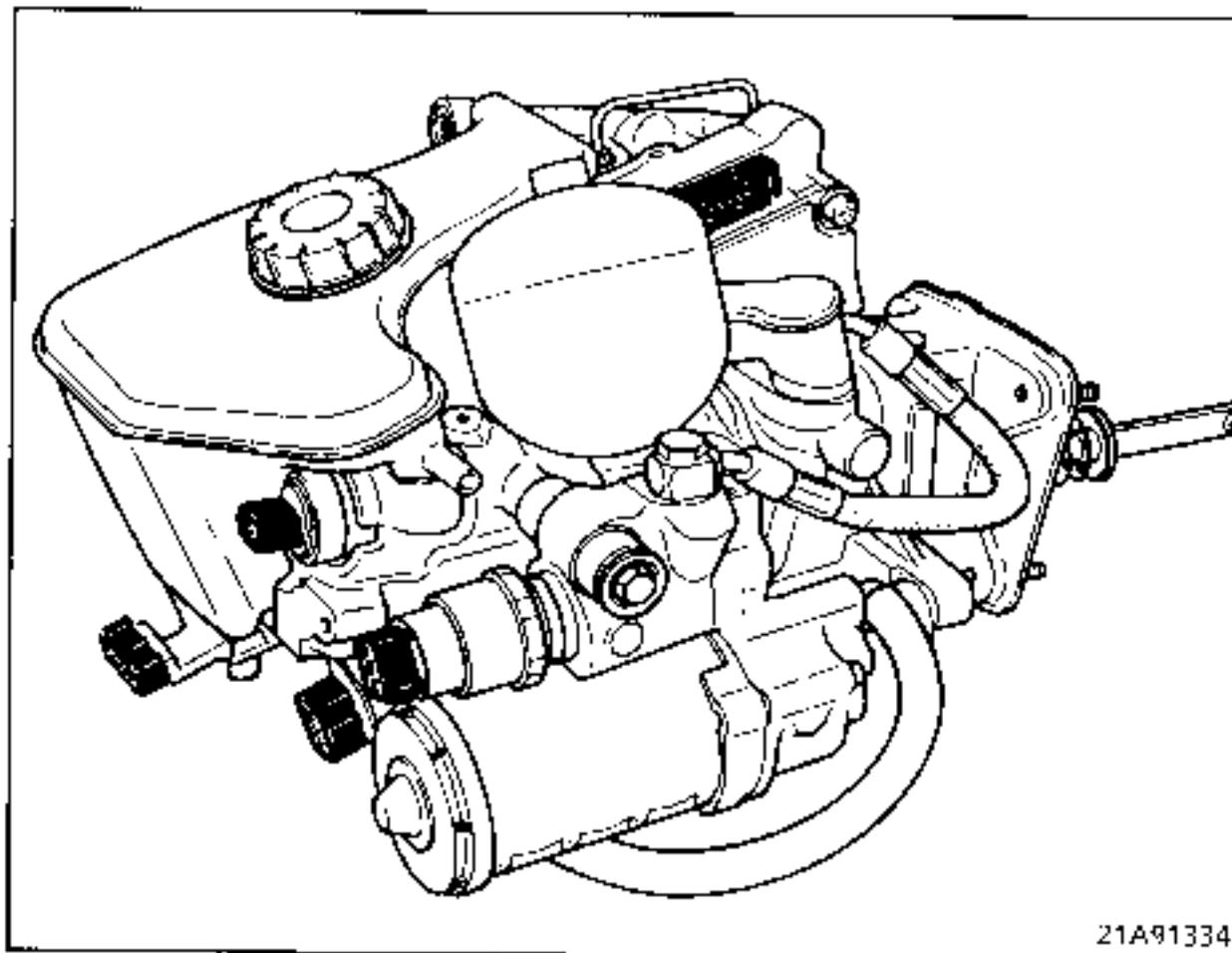
LOCATION AND COMPOSITION

The ABS consists of:

- a hydraulic unit (1) comprising: a tandem master cylinder, a hydraulic unit for assisting braking and a regulating unit,
- a computer (2) comprising a self-test device,
- a rotational speed sensor (3) for each wheel,
- four sensor targets (4), press-fitted on the drive shafts at the front and on the wheel hubs at the rear,
- two control warning lights (5) on the instrument panel.

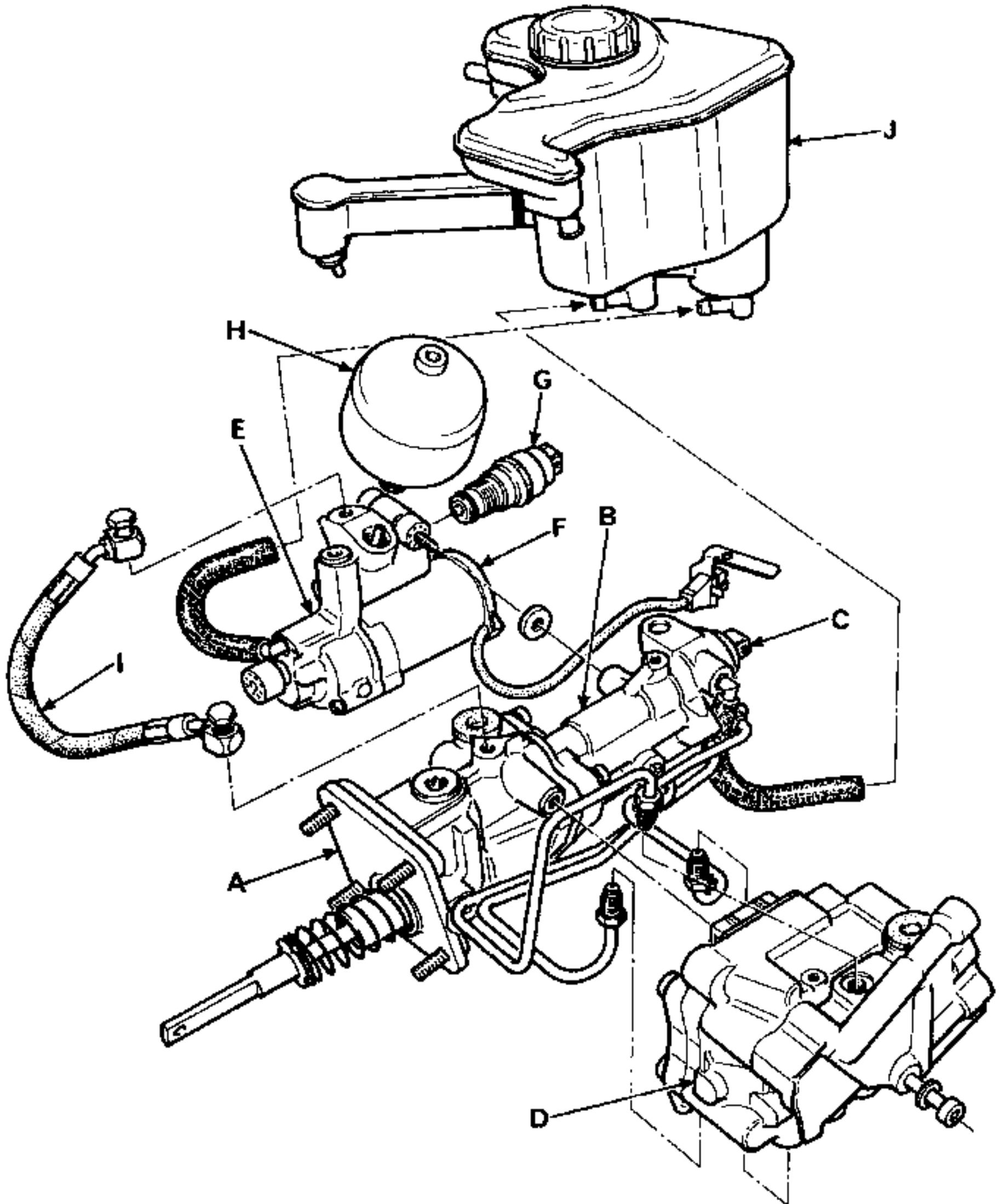
The remainder of the braking system consists of:

- a single braking compensator (6),
- a delay valve mounted on a bracket near the compensator on the feed circuit,
- four disc brakes (7).

HYDRAULIC UNIT (1)

21A91334

LOCATION AND COMPOSITION



LOCATION AND COMPOSITION

The hydraulic unit is of a modular design and is mounted in place of the brake servo/master cylinder assembly.

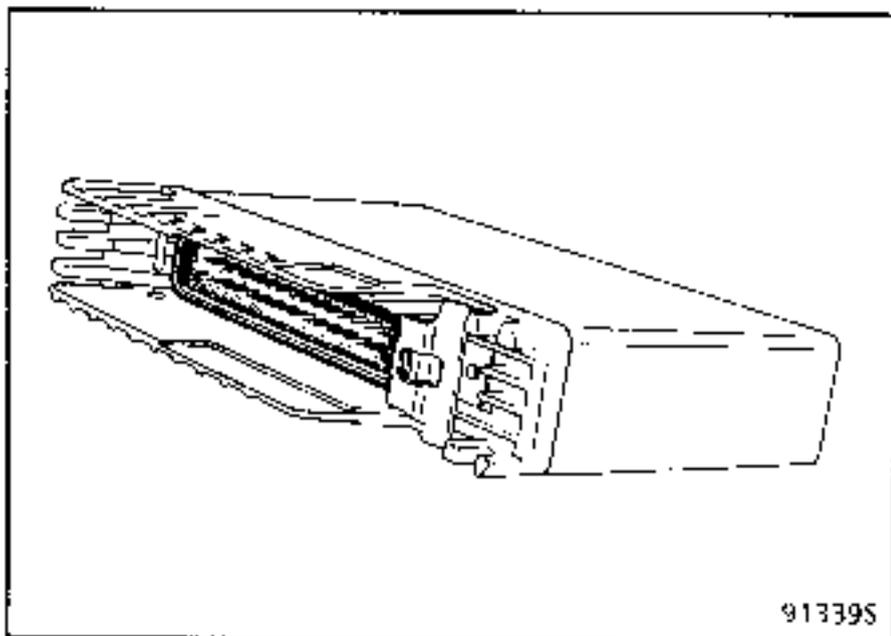
It comprises:

- the hydraulic amplifier (A) which assists braking on the rear wheels (dynamic circuit);
- tandem master cylinder (B) acting on each of the front wheels (static circuit);
- main solenoid valve (C);
- regulating unit (D) comprising three inlet solenoid valves and three outlet solenoid valves (one front right-hand circuit, one front left-hand circuit and one rear circuit), the role of which is to modulate the pressure when the wheels are on the verge of locking;
- feed unit (E) consisting of a high pressure electric pump (F), a pump control pressostat (G), pressure accumulator (H) and a high pressure hose (I),
- reservoir (J) with integrated nivocode which has a 10 μ filter on the pump low pressure feed circuit.

This system operates without a vacuum servo assistance.

COMPUTER (2)

This is mounted under the front right-hand seat.

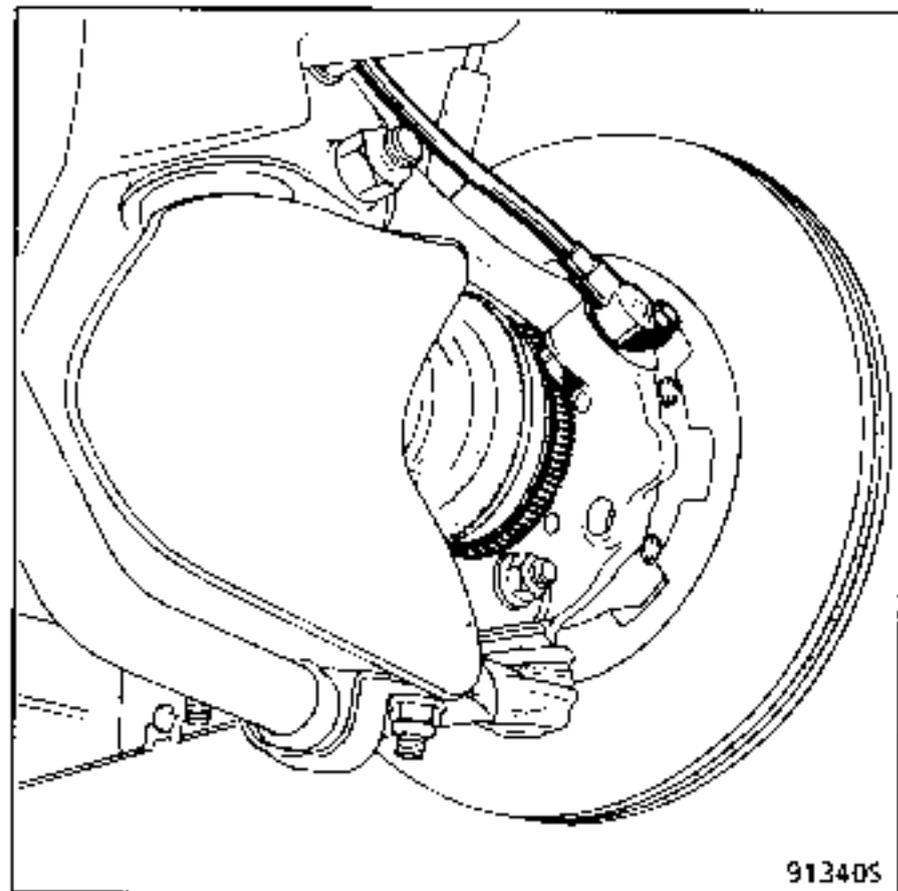


It analyses the data from the wheel sensors and controls the inlet and outlet solenoid valves according to this data.

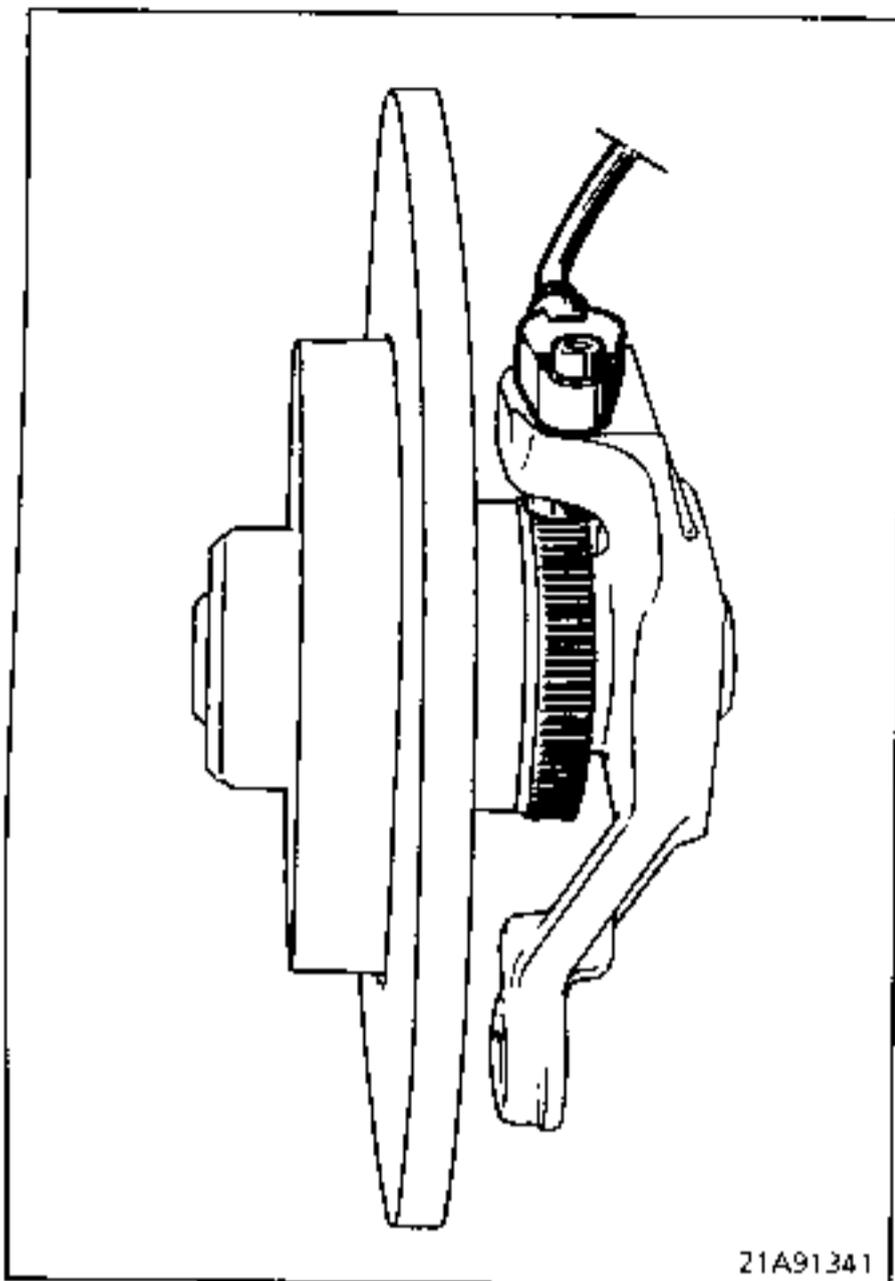
SPEED SENSORS (3) AND SENSOR TARGETS (4)

The speed sensors are mounted on the stub-axle carriers and receive data via the toothed sensor targets.

For the front wheels the targets are press-fitted on the drive shafts.

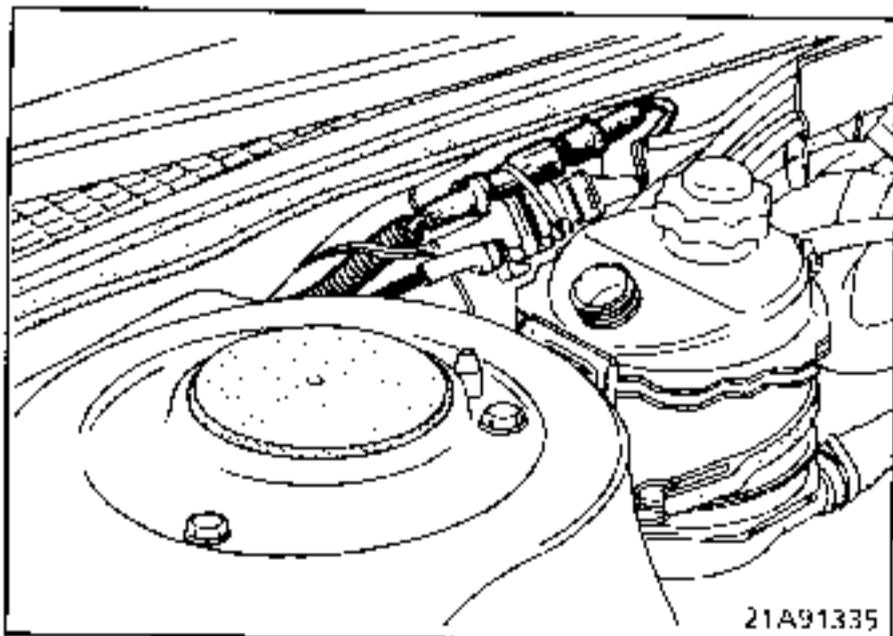


For the rear wheels, the targets are press-fitted on the hubs (cannot be dismantled).

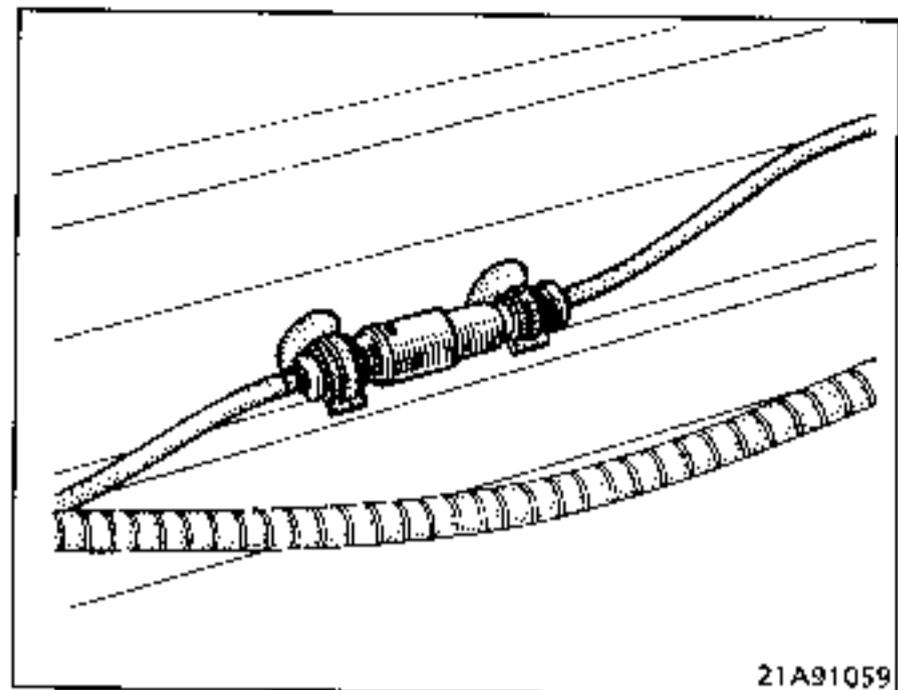


The speed sensors are connected to the computer wiring by means of connectors located:

- under the bonnet at the front;



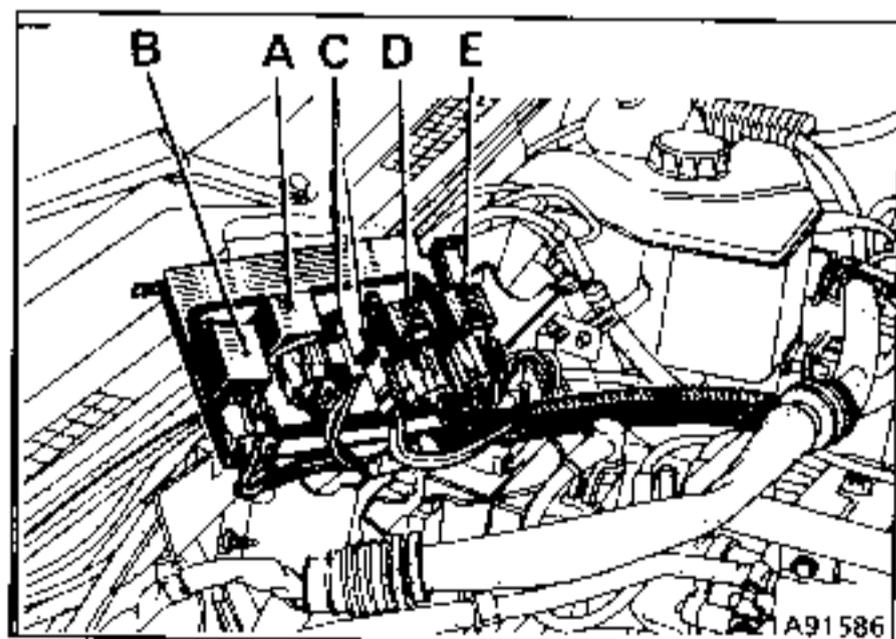
- under the rear axle fairing at the rear.



ABS DEVICE MAIN CONTROL RELAY (5)

The relay plate is in the central housing mounted in the centre of the bulkhead. It consists of:

- main relay (A),
- auxiliary relay (B),
- protective fuses (30 amps) (C),
- two protective diodes in a casing with a red base (D),
- pump relay (E).

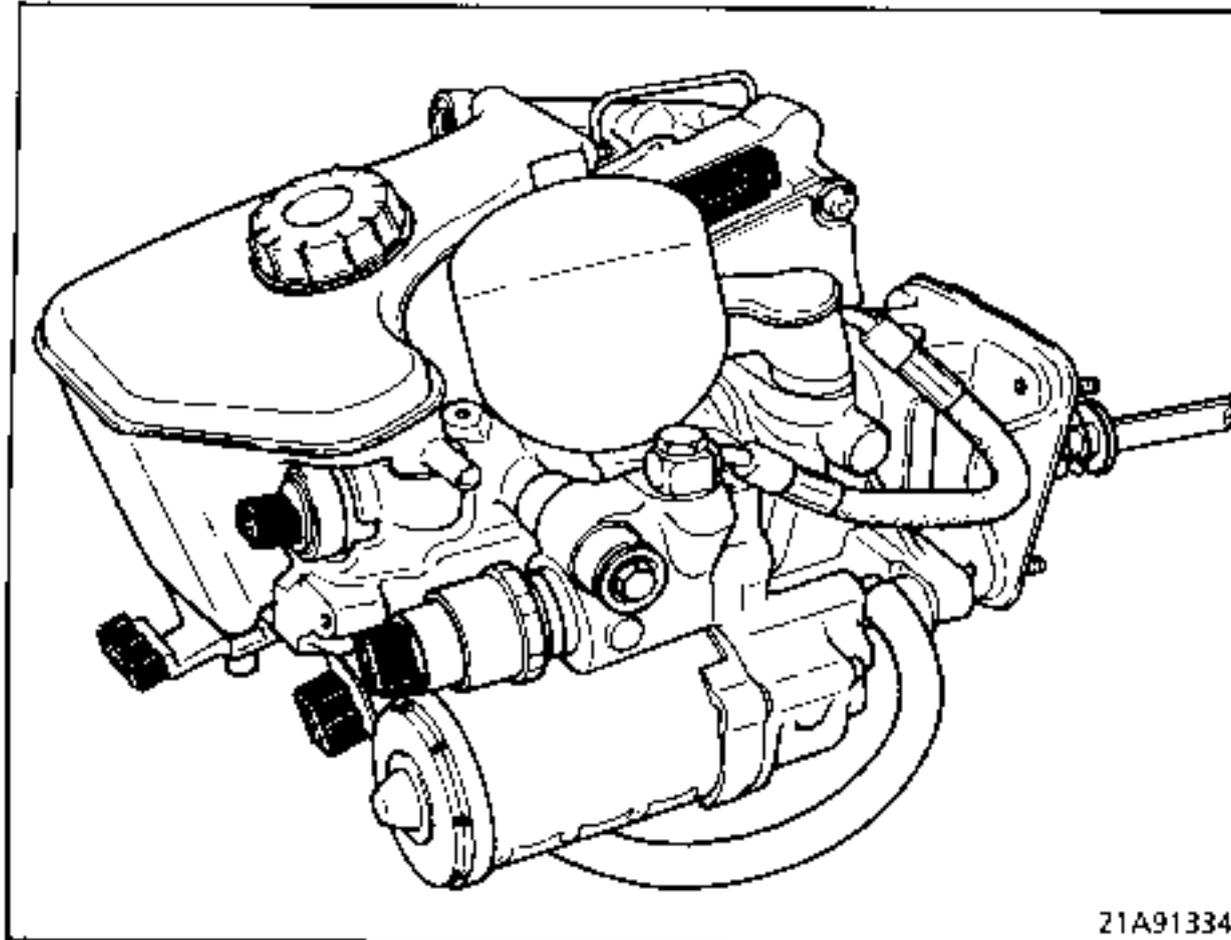


This casing bears two ABS symbols.



LOCATION AND COMPOSITION

The ABS hydraulic unit is based on a hydraulic braking amplifier with a separate feed. The conventional tandem master cylinder is replaced by a special master cylinder with a solenoid valve unit, so producing the ABS hydraulic unit.



The main components of this unit are :

- a hydraulic braking amplifier,
- a tandem master cylinder with a main solenoid valve and locating pin,
- a solenoid valve unit with six solenoid valves for modulating the braking pressure on the wheels,
- a feed unit with electric motor, pump, pressure accumulator, cut-off pressostat and discharge valve,
- a reservoir with a warning device.

The role of the hydraulic amplifier is to assist braking and control the circuit for the two rear wheels when they are moving.

The tandem master cylinder statically controls the two front wheel circuits and is re-supplied during the anti-lock regulation phase via the main solenoid valve.

The solenoid valve comprises six solenoid valves (three inlet valves and three outlet valves). The rest position corresponds to the position in which the inlet solenoid valves are open and the outlet valves closed.

LOCATION AND COMPOSITION

The pressure accumulator is at a constant pressure of between 140 and 180 bars. If the pressure in this accumulator drops to below 140 bars, the cut-off pressostat reacts and controls the activation of the pump until the pressure reaches 180 bars when it stops. A discharge valve restricts the pressure to 210 bars if the cut-off pressostat fails to operate.

The reservoir has a "level warning" device. If the brake fluid level drops, the device illuminates the  warning light on the instrument panel. If the level drops again, the anti-lock braking system goes into defect mode and the  warning light will illuminate in turn. The reservoir also has a filtering device for feeding the pump. The filtering and warning light illuminating devices are inaccessible, being an integral part of the reservoir.

OPERATION

As soon as the vehicle's speed reaches 4 mph (7 km/h), the ABS self-tests and is ready to come into operation. Action on the brake pedal causes the amplifier regulation valve to open, on the one hand, and the tandem master cylinder to move, on the other. The pressure in the static circuits (at the front) and the dynamic circuit (at the rear) increases in proportion to the force applied by the driver's foot to the brake pedal.

During braking, if the computer receives information from the sensor on one or more wheels that there is sharp deceleration and if it observes that the wheel or wheels is/are starting to lock, it will trigger the following sequence:

- closure of the brake fluid inlet solenoid valve for the hydraulic cylinders in question,
- opening of the brake fluid exhaust solenoid valve for the same cylinders.

If the wheels pick up speed again:

- the inlet solenoid valve on the cylinders in question will open again.

The process is repeated in this way until the vehicle stops.

In order to prevent the brake pedal moving down during this ABS regulation phase, the main solenoid valve connects the dynamic circuit with the static circuit producing a pumping effect at the brake pedal.

Moreover, it is to be noted that the rear axle is regulated by the "select low" system, i.e. the wheel having the lowest degree of adherence produces the same degree of regulation on the two rear wheels. Any incident likely to render the regulation device inoperative is signalled to the driver by the illumination of the warning light on the instrument panel.

In such a case, the vehicle behaves in one of the two following ways according to the type of incident detected by the computer:

- conventional braking without the ABS,
- braking in the defect mode; at this point the regulation on the front wheels and the energising of the main solenoid valve will be interrupted but the anti-lock braking system will continue to operate on the rear wheels.

If the pump no longer turns, the pressure in the accumulator will enable the system to brake twenty times. Then there will only be braking on the front wheels (static circuits controlled by the tandem master cylinder) in a similar situation to braking without the servo.

REMOVING - REFITTING THE CONSTITUENT COMPONENTS

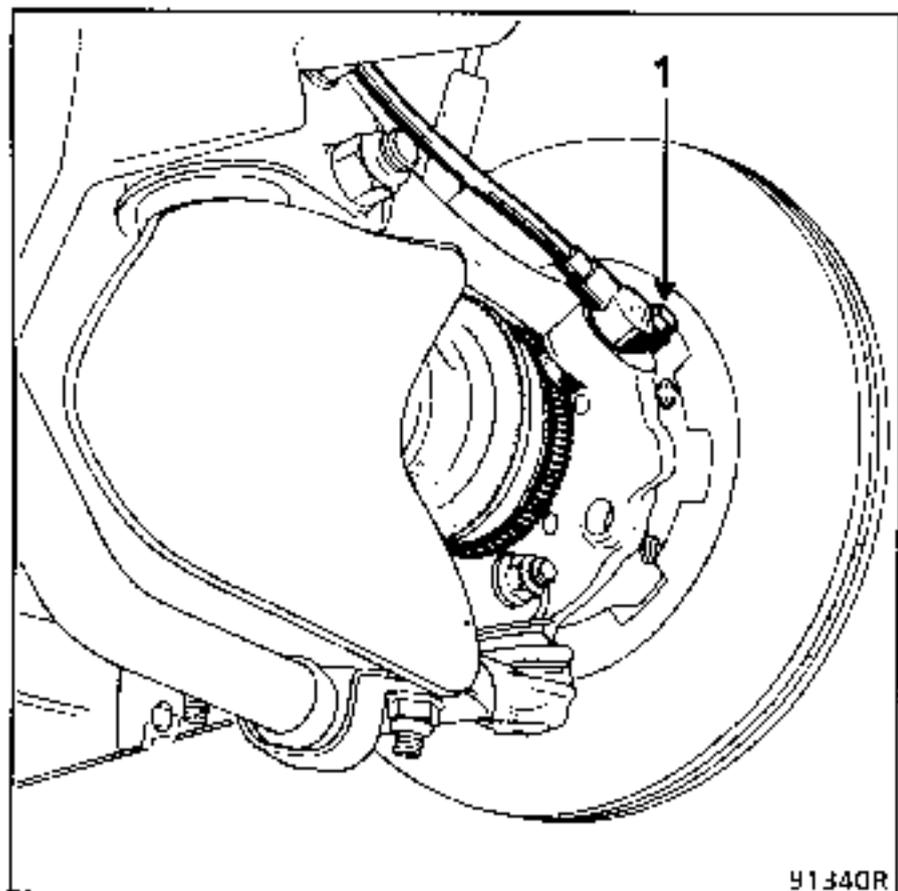
I - FRONT WHEEL SENSOR

TIGHTENING TORQUES (in daN.m)		
Sensor mounting bolt	0.8	

DEPOSE

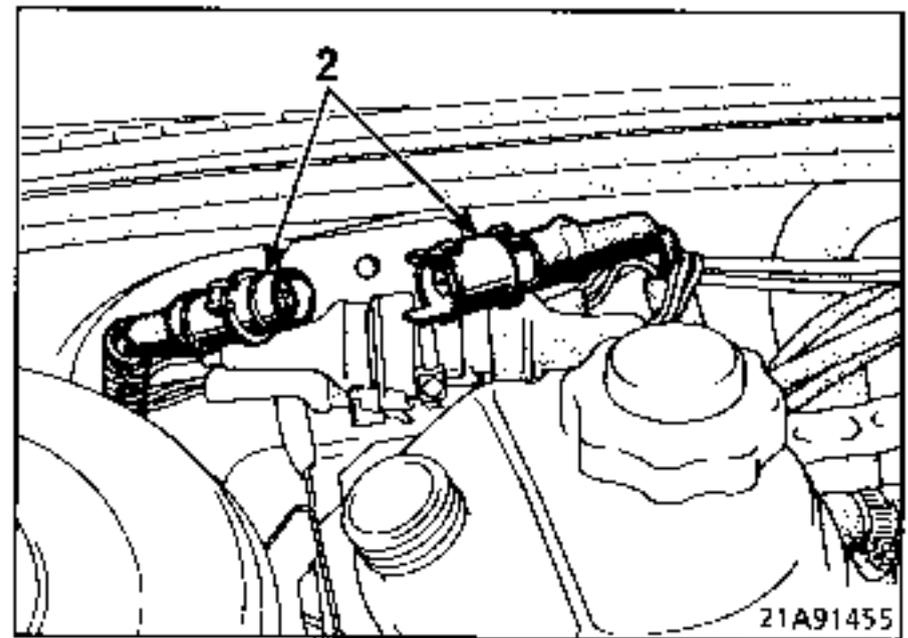
Remove:

- bolt securing the sensor (1);
- the sensor.



Unfasten the lead from its supports.

Disconnect the sensor from its connector (2) under the bonnet near the top of the shock absorber turrets.



Remove the assembly.

REFITTING

Fit in place the sensor, after first smearing it with multi-function grease, Part No. 77 01 422 308 then reconnect it.

NOTE: To avoid risks of failure, ensure that the connector is correctly connected.

II - FRONT WHEEL SENSOR TARGET

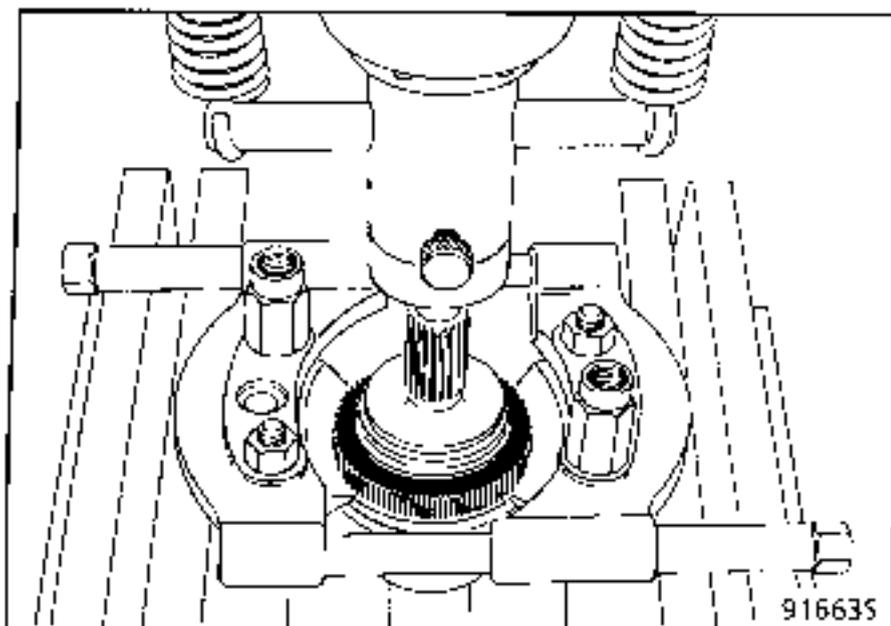
TIGHTENING TORQUES (in daN.m)		
Wheel bolts	4 bolts	9
	5 bolts	10
Drive shaft nut		25

As the sensor target is press-fitted on the drive shaft, this operation is performed after removal of the drive shaft.

REMOVING - REFITTING THE CONSTITUENT COMPONENTS

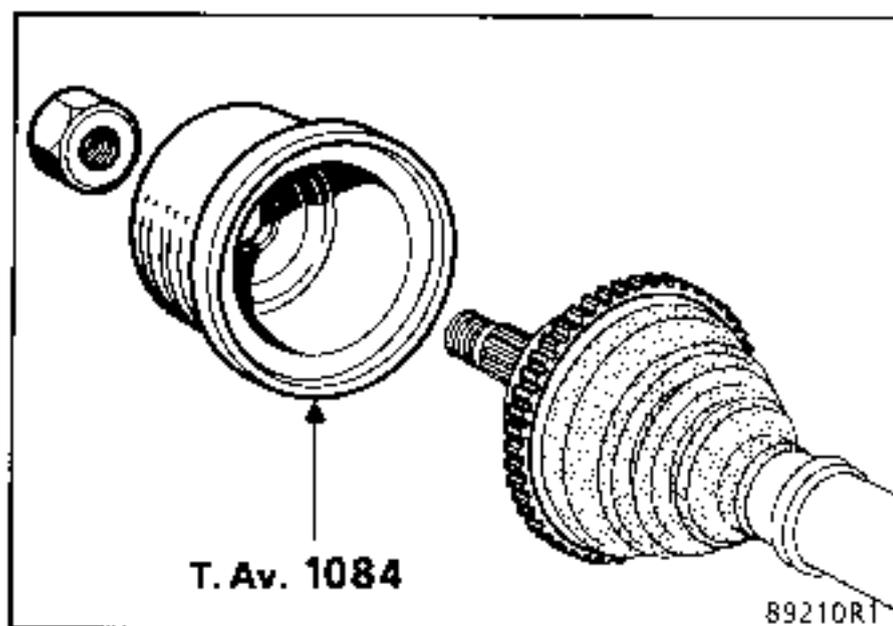
REMOVING

Take out the sensor target on the press, using a FACOM U53G type extractor.



REFITTING

Smear the sensor target with LOCTITE SCELBLOC and refit it, using tool T.Av. 1084 and re-using the old drive shaft nut.



NOTE: In future, the Parts Department will only supply in service exchange machined drive shaft not equipped with the anti-lock braking sensor targets. The sensor targets must therefore be retained in order to be realigned on the drive shafts. The sensor targets alone, however, are available from the Parts Department.

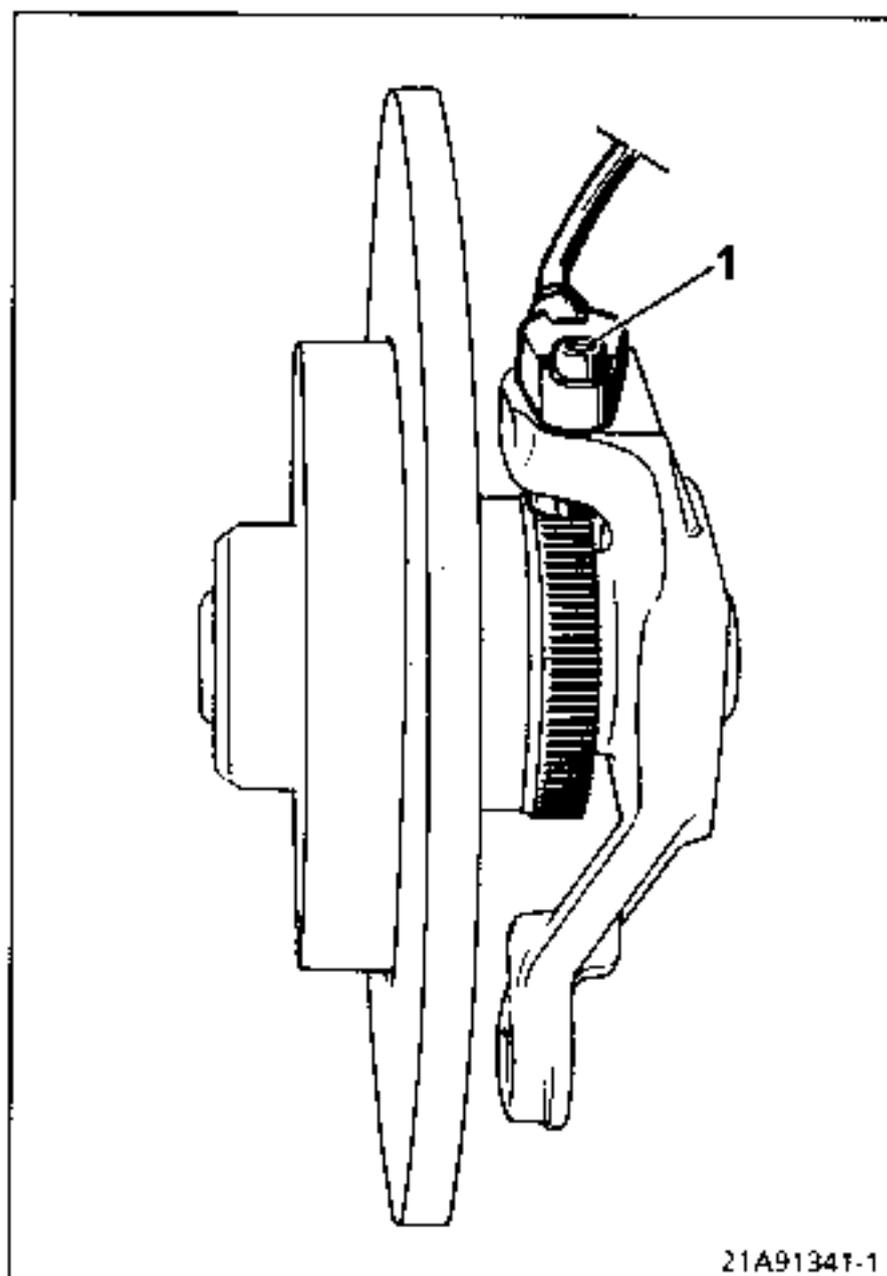
III - REAR WHEEL SENSOR

TIGHTENING TORQUES (in daN.m)		
Wheel bolts	4 bolts	9
	5 bolts	10
Sensor mounting bolt		0.8

REMOVING

Remove:

- the wheel,
- bolt (1) securing the sensor,
- the sensor and its mounting.

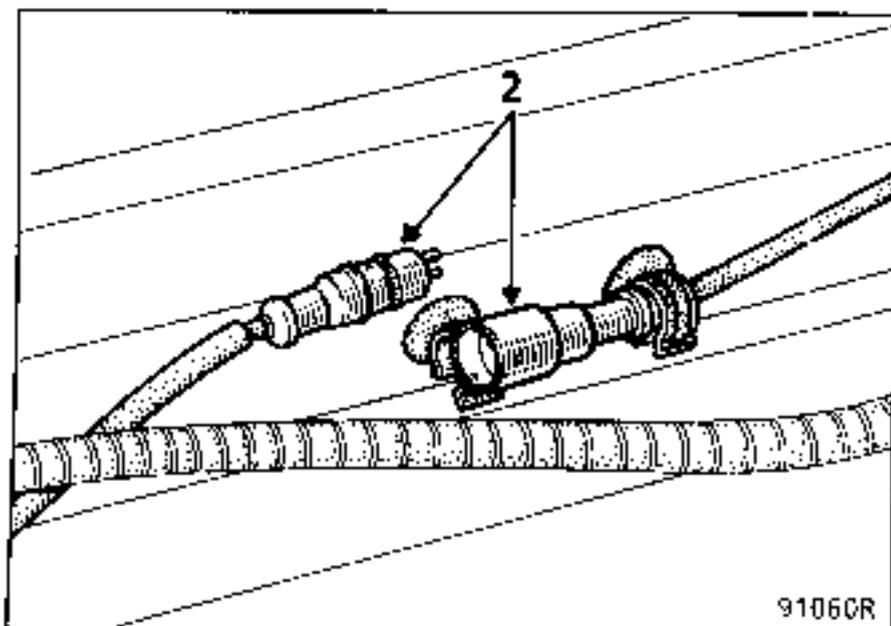


Unclip the lead from its mounting.

Disconnect the sensor from its connector (2) under the vehicle, after first removing the rear axle fairing.

Remove the assembly.

REMOVING - REFITTING THE CONSTITUENT COMPONENTS



REFITTING

Fit in place the sensor, after first coating it with multi-function grease, Part No. 77 01 422 308, and then reconnect it.

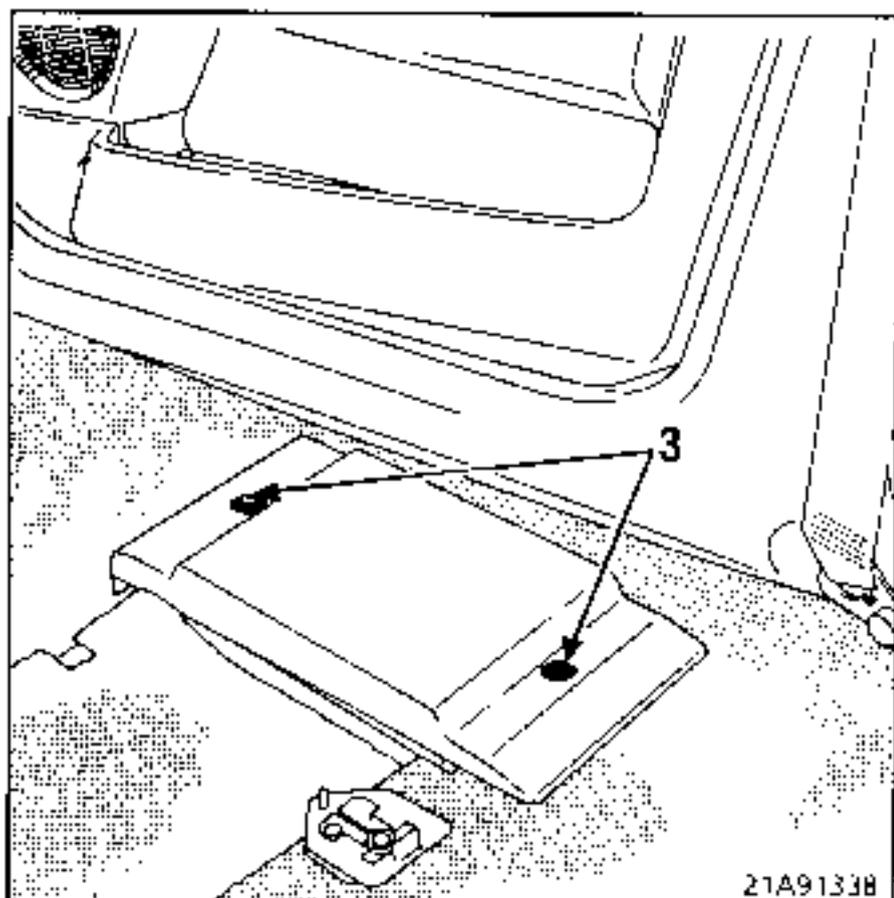
NOTE: To avoid risks of failure, ensure that the connector is correctly connected.

IV - COMPUTER

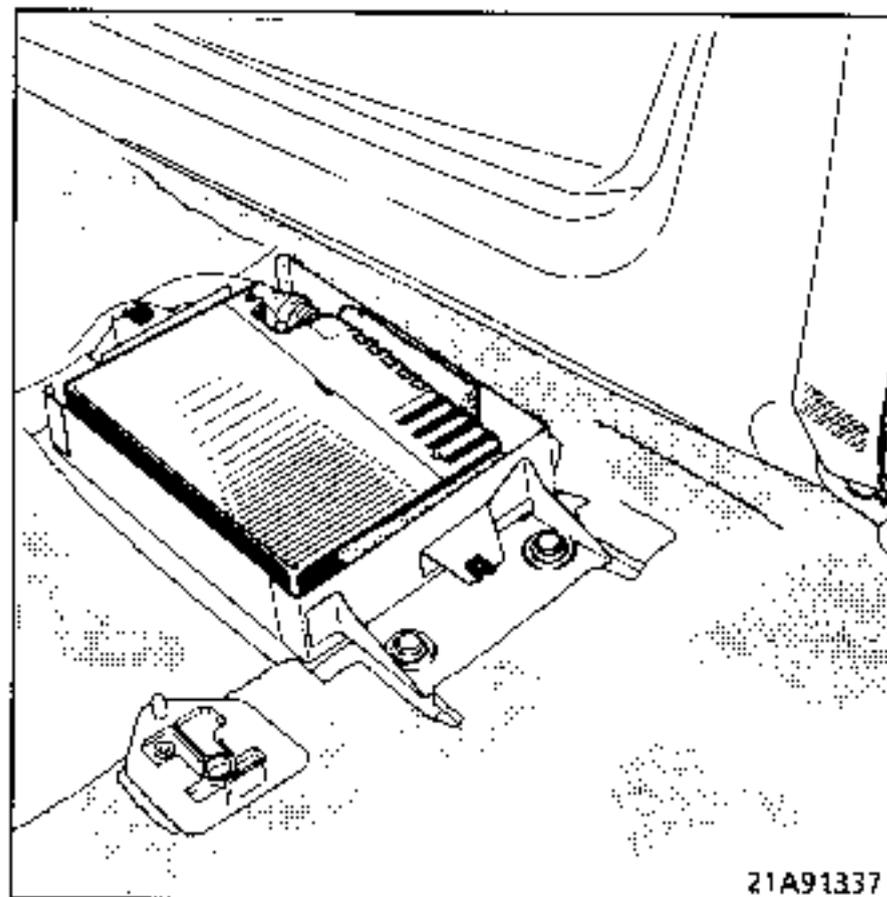
This is under the front right-hand seat.

REMOVING

Remove:
 - the two bolts (3),



- the protective cover,
- the computer from its housing then disconnect it.



REFITTING

Refit the computer in place, ensuring that the 35-way connector is properly connected.

V - HYDRAULIC UNIT

TIGHTENING TORQUES (in daN.m)	
Bolts for mounting on bulkhead	2
Hose union bolts	1.3

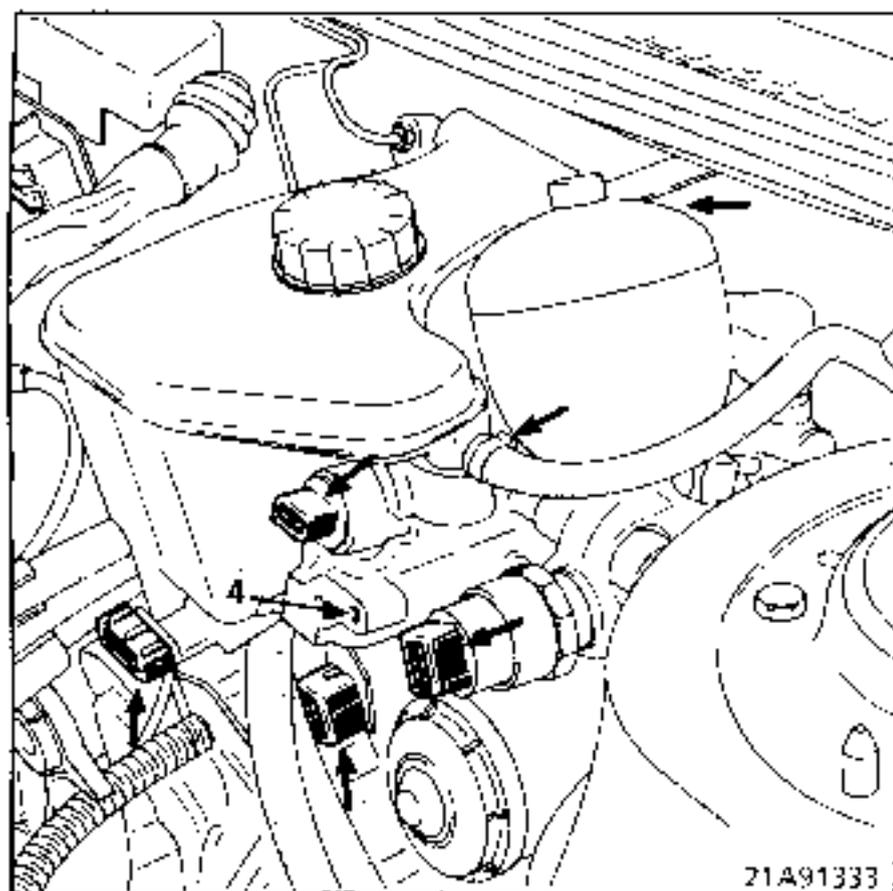
REMOVING

- Disconnect the battery.
- Pump the brake pedal approximately 20 times (until it becomes hard) to make the pressure drop.
- Empty the reservoir using a syringe.
- Unclip the fastening of the power assisted steering fluid chamber and free the chamber by moving it downwards.

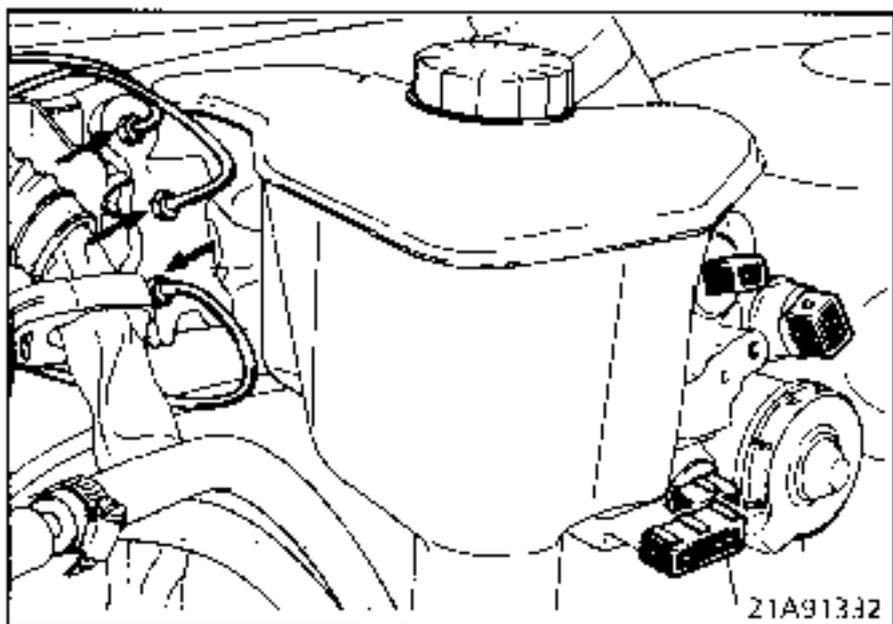
REMOVING - REFITTING THE CONSTITUENT COMPONENTS

Remove:

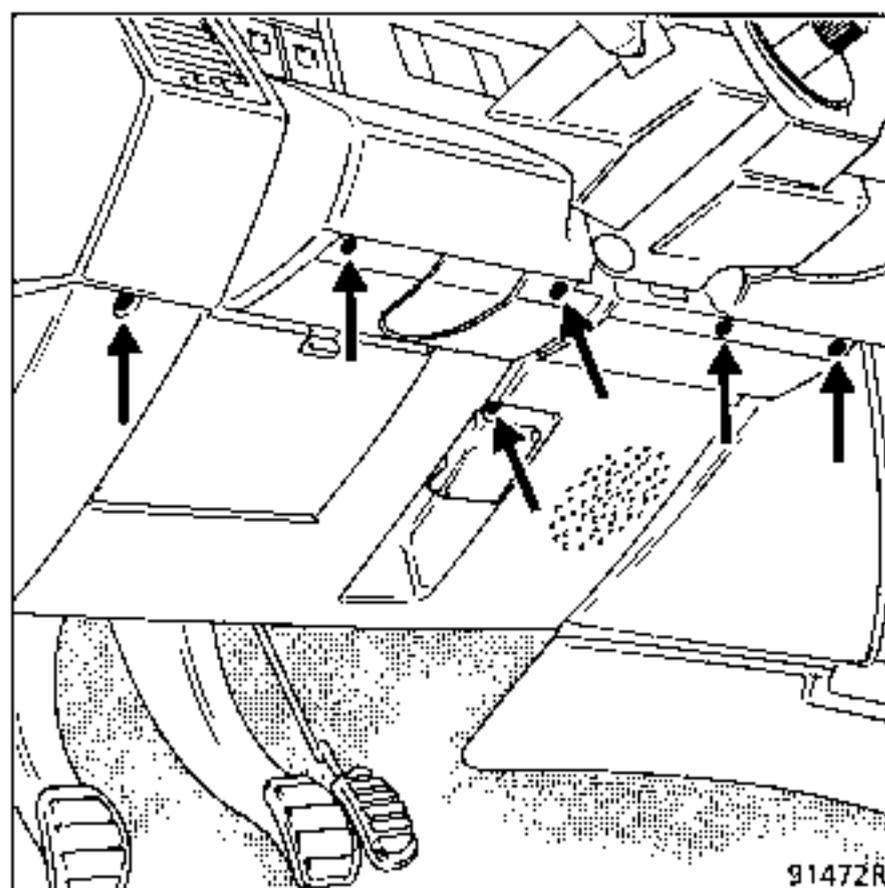
- the plastic mounting from the PAS fluid chamber;
- the five electrical connectors;
- the earth lead and wiring mounting lug at (4);



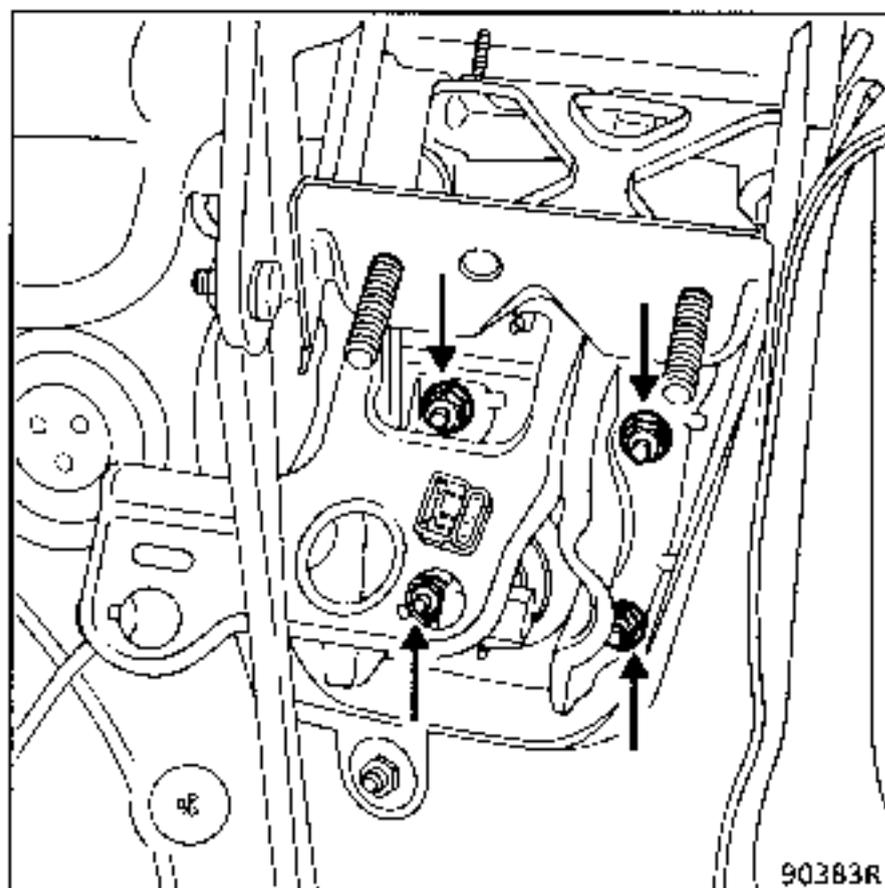
- the clutch master cylinder feed hose;
- the rigid outlet pipes;



- the cover under the steering wheel (remember to remove the bolt under the steering column adjustment lever);



- the clevis pin connecting the brake pedal to the pushrod;
- the nuts holding the hydraulic unit on the bulkhead;



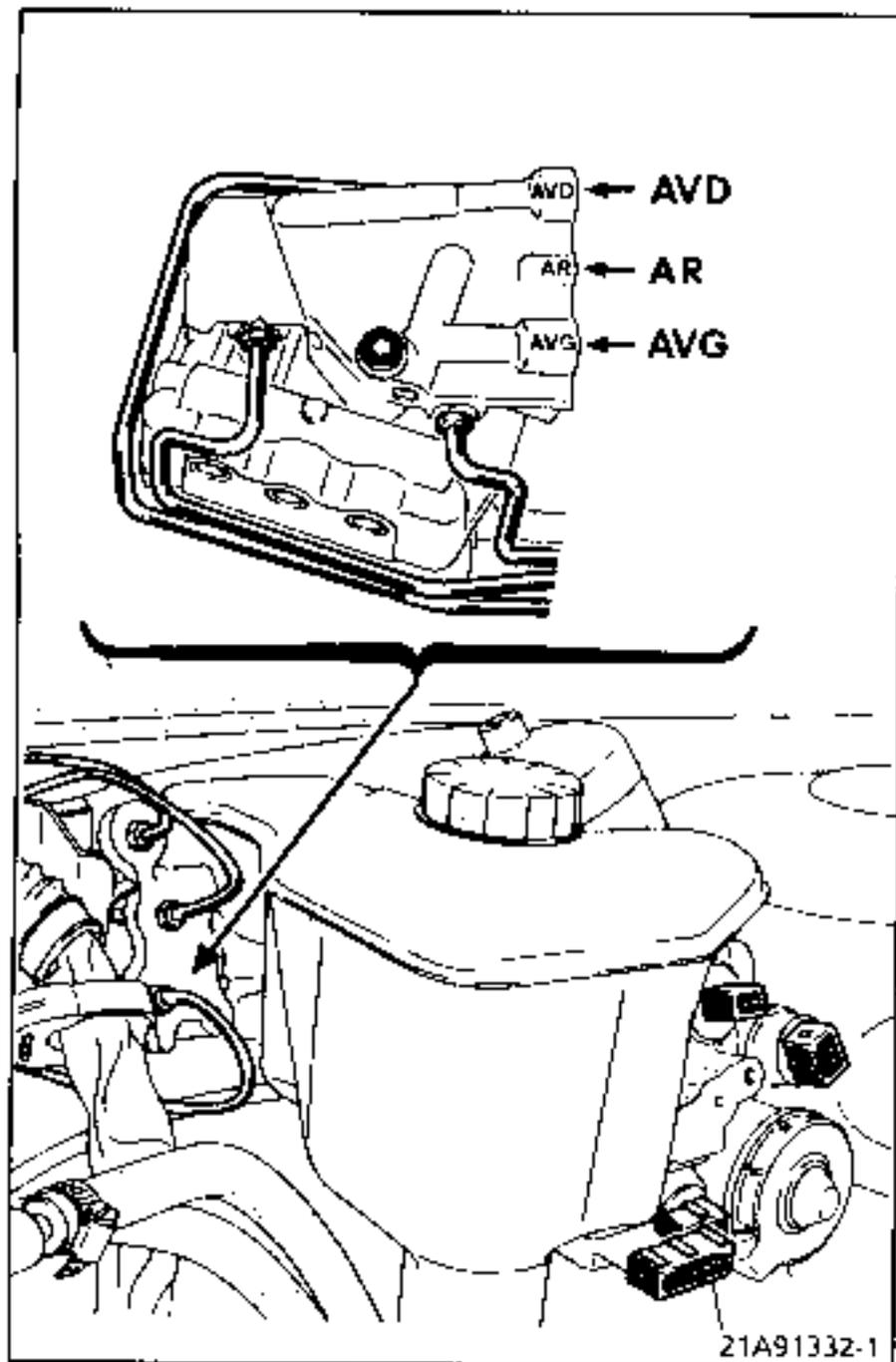
- the hydraulic unit, retrieving the bulkhead connection seal.

REMOVING - REFITTING THE CONSTITUENT COMPONENTS

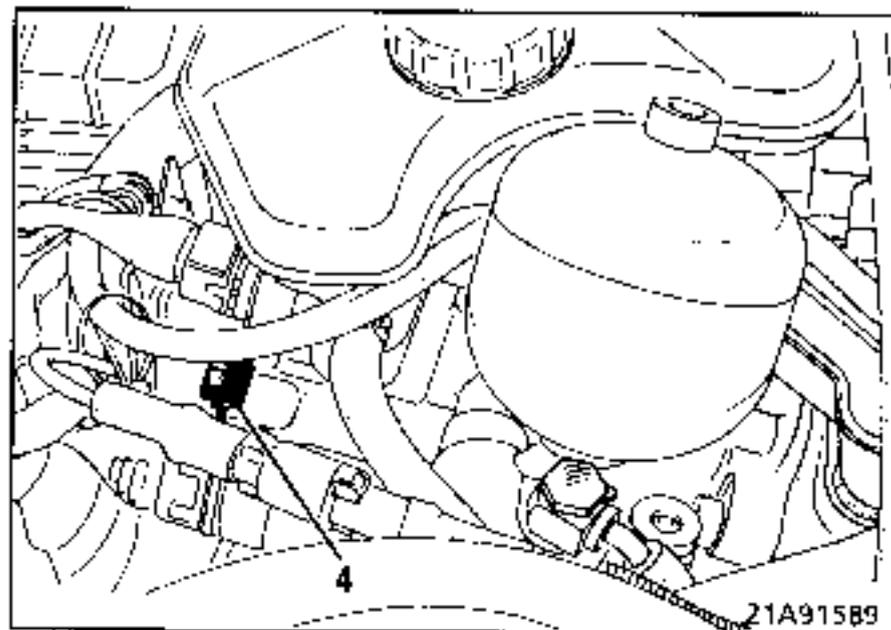
REFITTING

Fit in place:

- the hydraulic unit with its connection seal;
- the four mounting nuts on the bulkhead;
- the brake pedal clevis pin;
- the cover under the steering wheel;



- the rigid outlet pipes, ensuring the take-offs are facing the correct direction;
- the clutch master cylinder feed hose;
- the electrical connectors;
- the mounting lug and earth lead at (4);



- the power assisted steering fluid chamber.

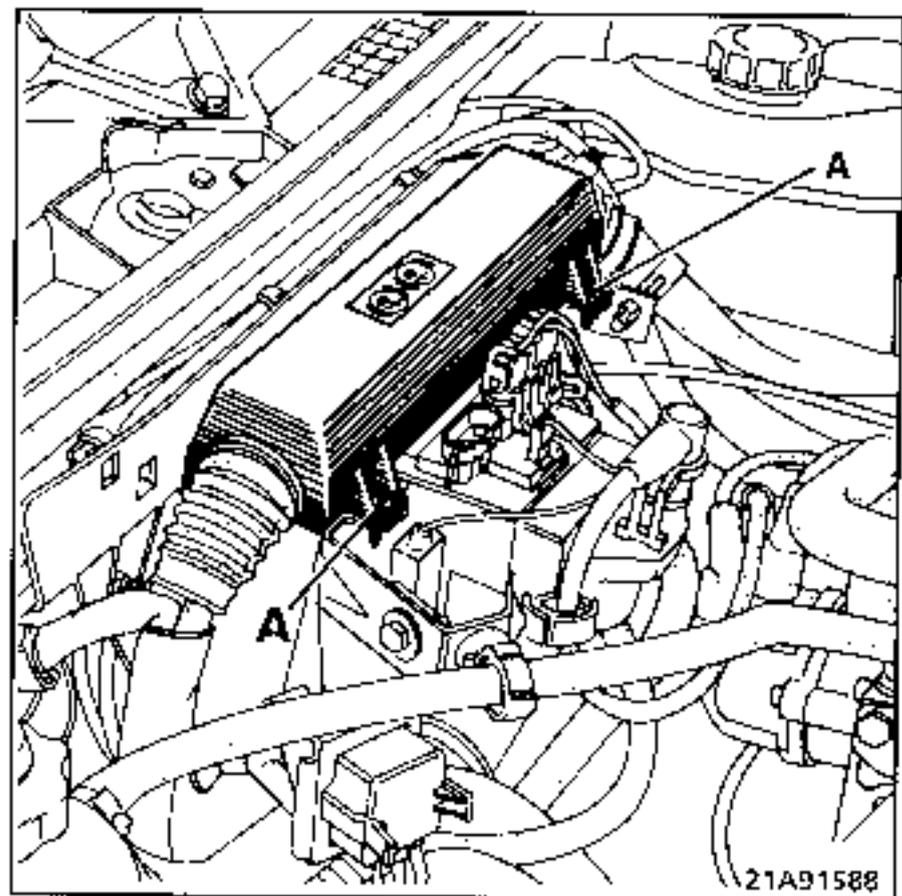
Fill the brake circuit with brake fluid and bleed the system (see the relevant paragraph).

VI - RELAY PLATE

REMOVING

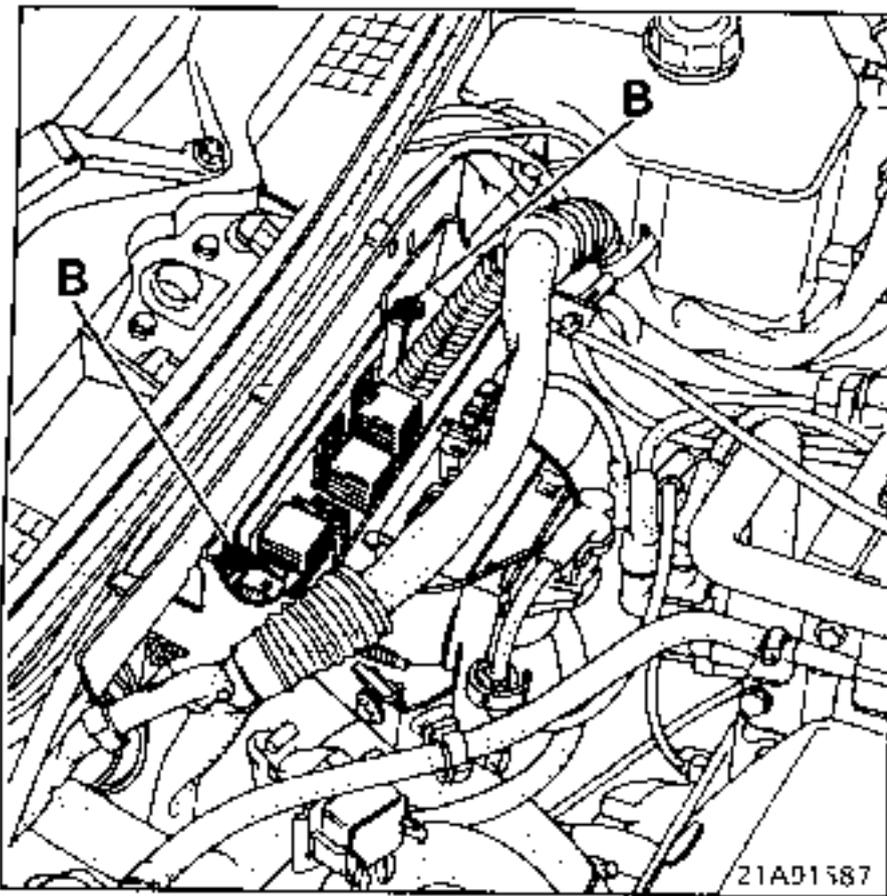
Remove:

- the two bolts (A),
- the cover,



REMOVING - REFITTING THE CONSTITUENT COMPONENTS

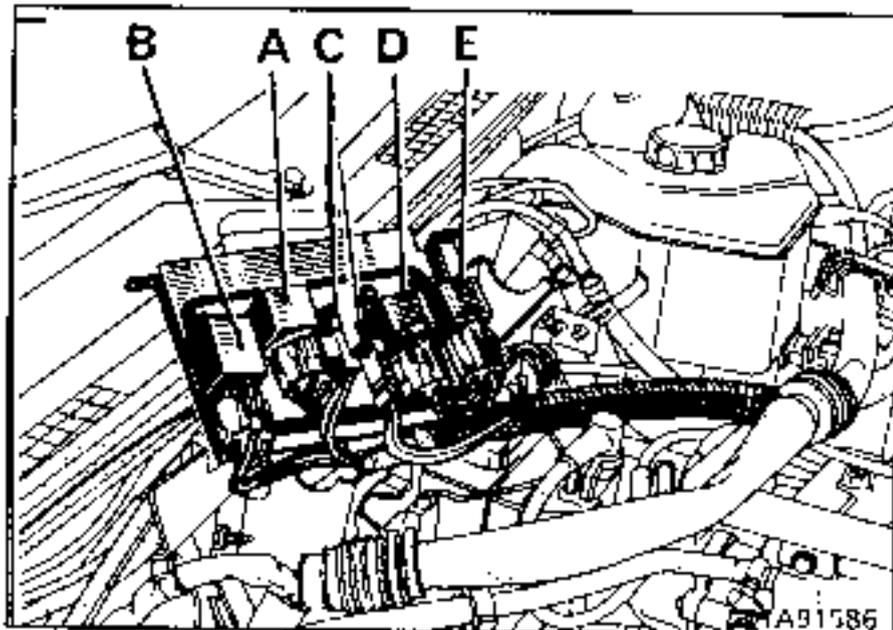
- The two bolts (B).



Move the wiring loom away and take out the relay plate.

The plate comprises:

- main relay (A);
- auxiliary relay (B);



- the two protective fuses (30 amps) (C),
- the two protective diodes in a casing with a red base (D),
- pump relay (E).

REFITTING

Proceed in the reverse order to removal, ensuring that the various components are properly connected.

REPLACING THE VARIOUS COMPONENTS OF THE HYDRAULIC UNIT

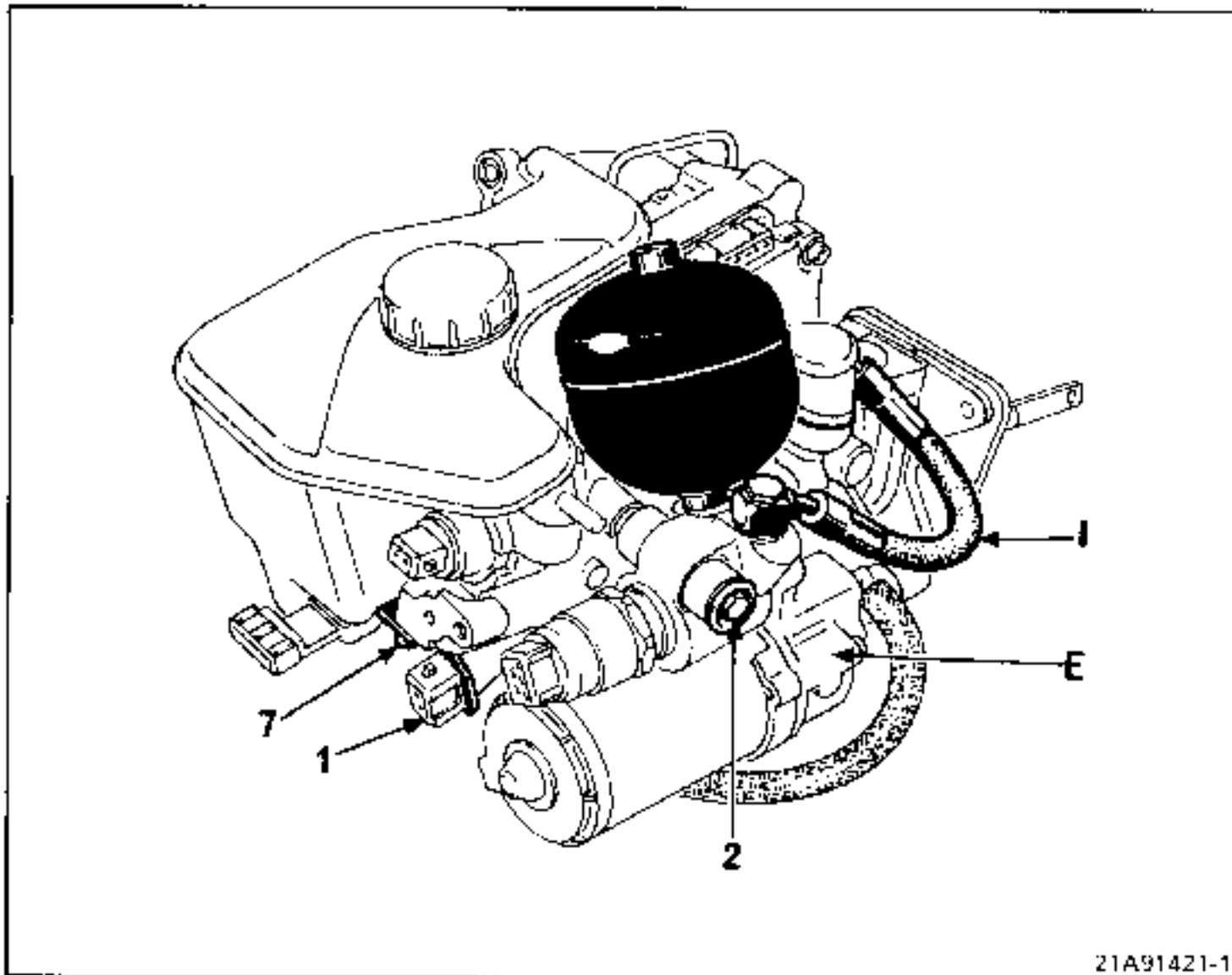
All these operations are performed when the hydraulic unit has been removed.

I - REPLACING THE MASTER CYLINDER - AMPLIFIER ASSEMBLY

REMOVING

Remove:

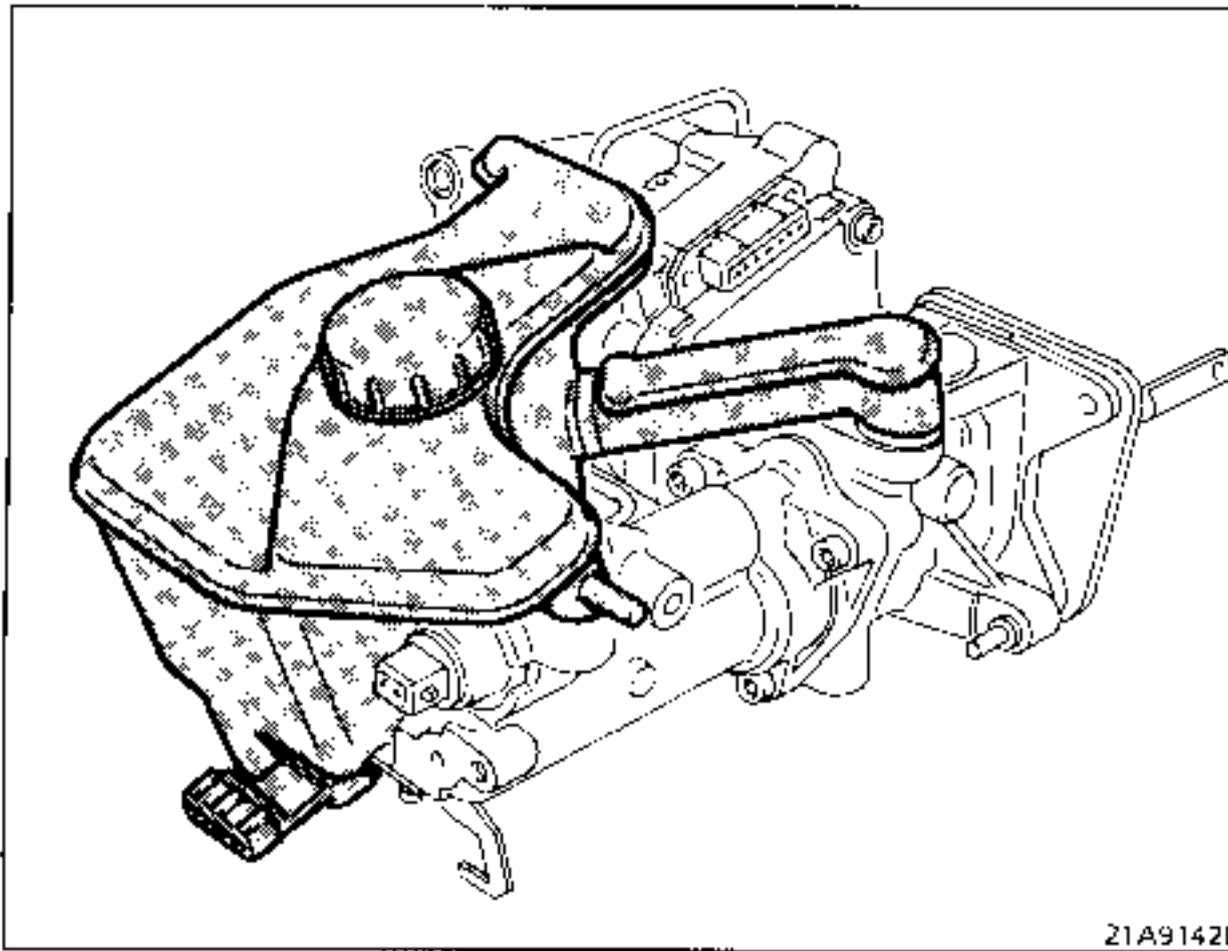
- the low pressure feed hose in the reservoir;
- the high pressure hose (I)(plug the take-offs);
- hydraulic connector (1);
- bolt (2) securing the pump;
- the feed unit assembly (E);



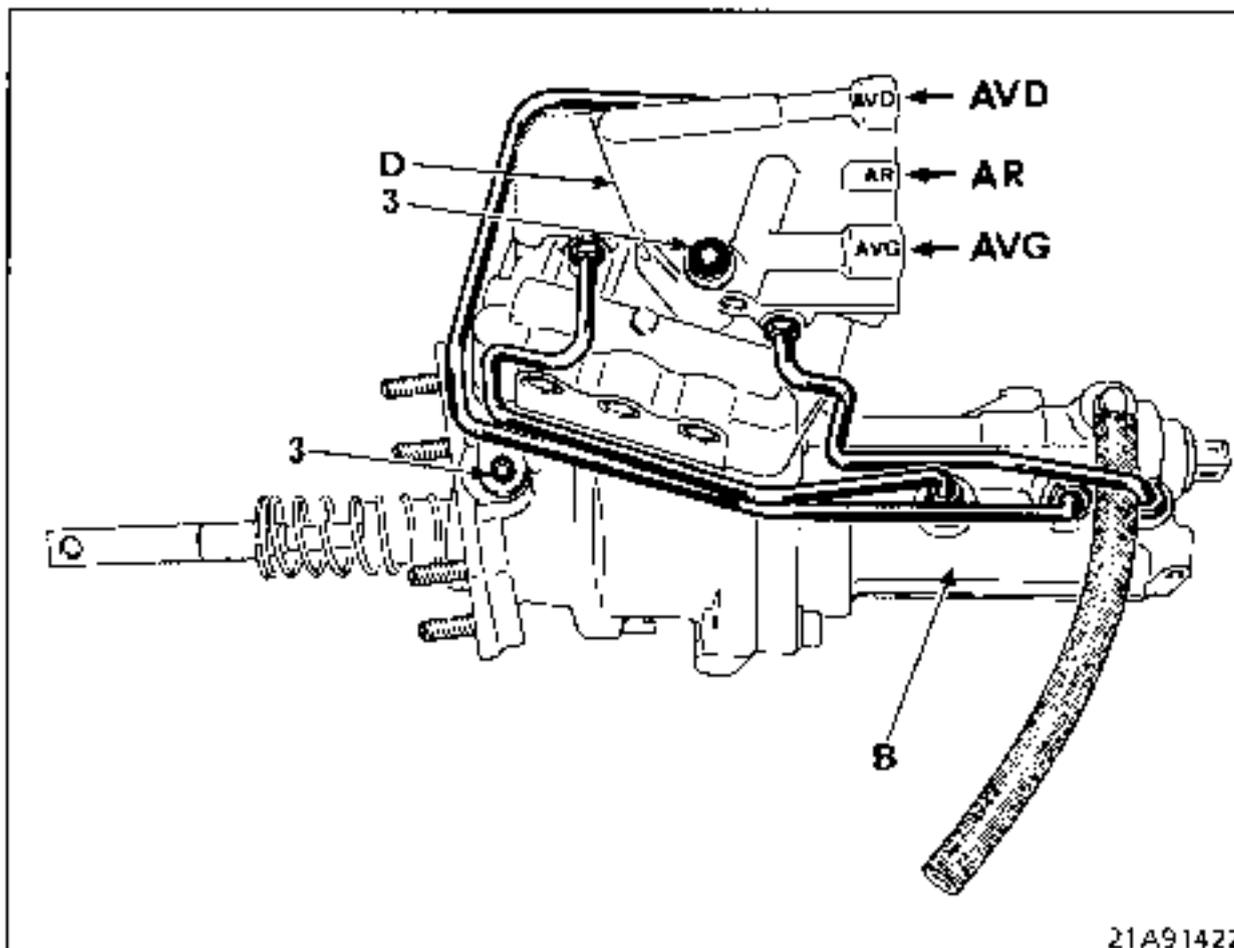
21A91421-1

- the master cylinder low pressure hose;
- the reservoir, unclipping it from its anchorages after removing mounting lug (7).

REPLACING THE VARIOUS COMPONENTS OF THE HYDRAULIC UNIT



- Remove the rigid pipes connecting the master cylinder (B) and regulating unit (D). (Plug the take-offs.)
- Remove the two mounting bolts (3) from the regulating unit.



- Remove the regulating unit.

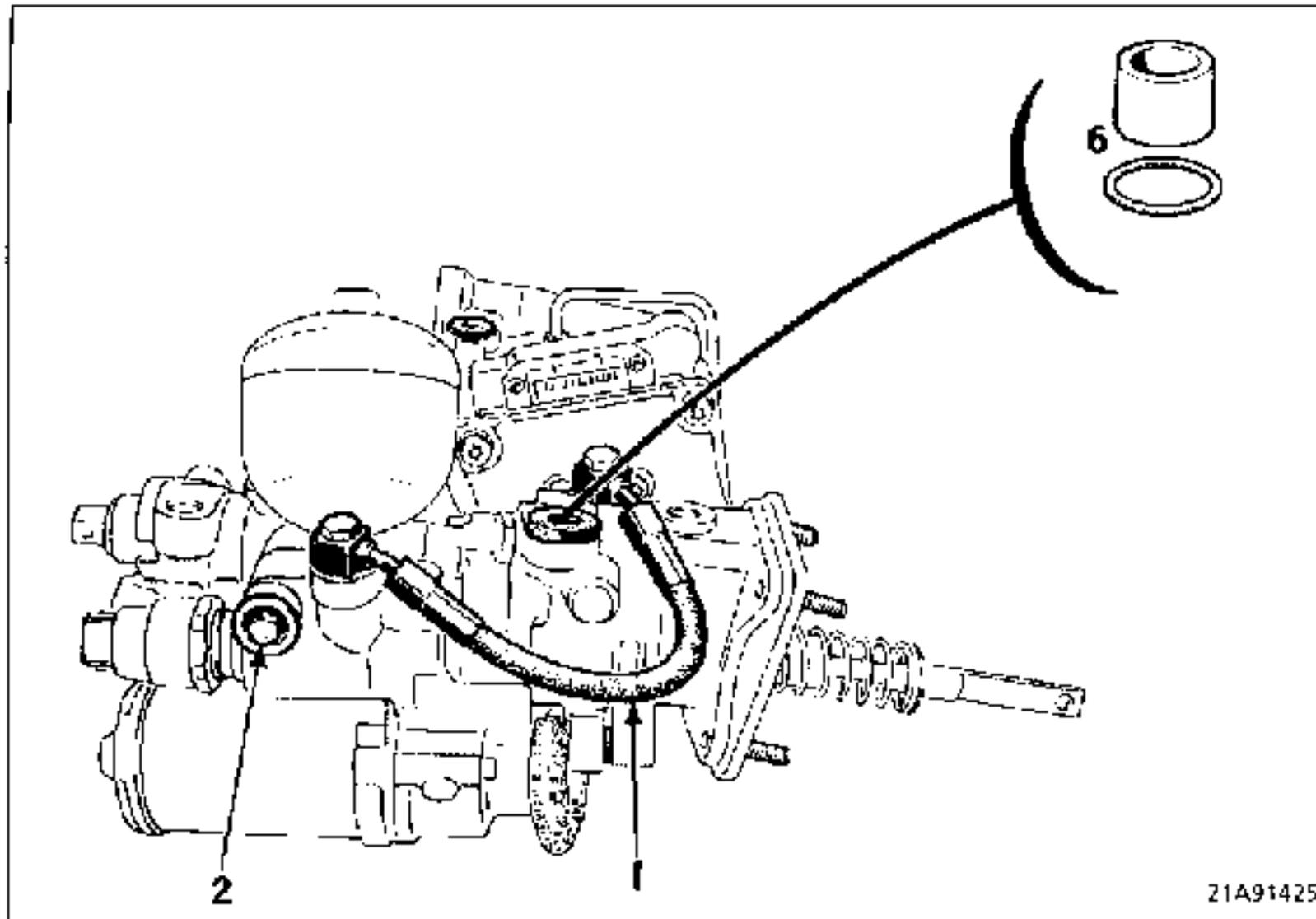
AVD = FRONT RIGHT
AR = REAR
AVG = FRONT LEFT

REPLACING THE VARIOUS COMPONENTS OF THE HYDRAULIC UNIT

REFITTING

Fit in place:

- the low pressure hose on the master cylinder;
- the regulating unit and its rigid connection pipes (coat the mounting bolts with **LOCTITE FRENETANCH**);
- the feed unit (bolt (2) should first be smeared with **LOCTITE FRENETANCH**), making sure that the silent-bloc bushes are in good condition, otherwise replace them;



- high pressure hose (1) with new O-ring seals;
- the reservoir - make sure that the anchorage cups are in good condition - remember to fit the small spacer and a new O-ring seal in take-off (6);
- the reservoir mounting lug (smear the bolt with **LOCTITE FRENETANCH**),
- the hydraulic pump and master cylinder low pressure hoses on the reservoir.

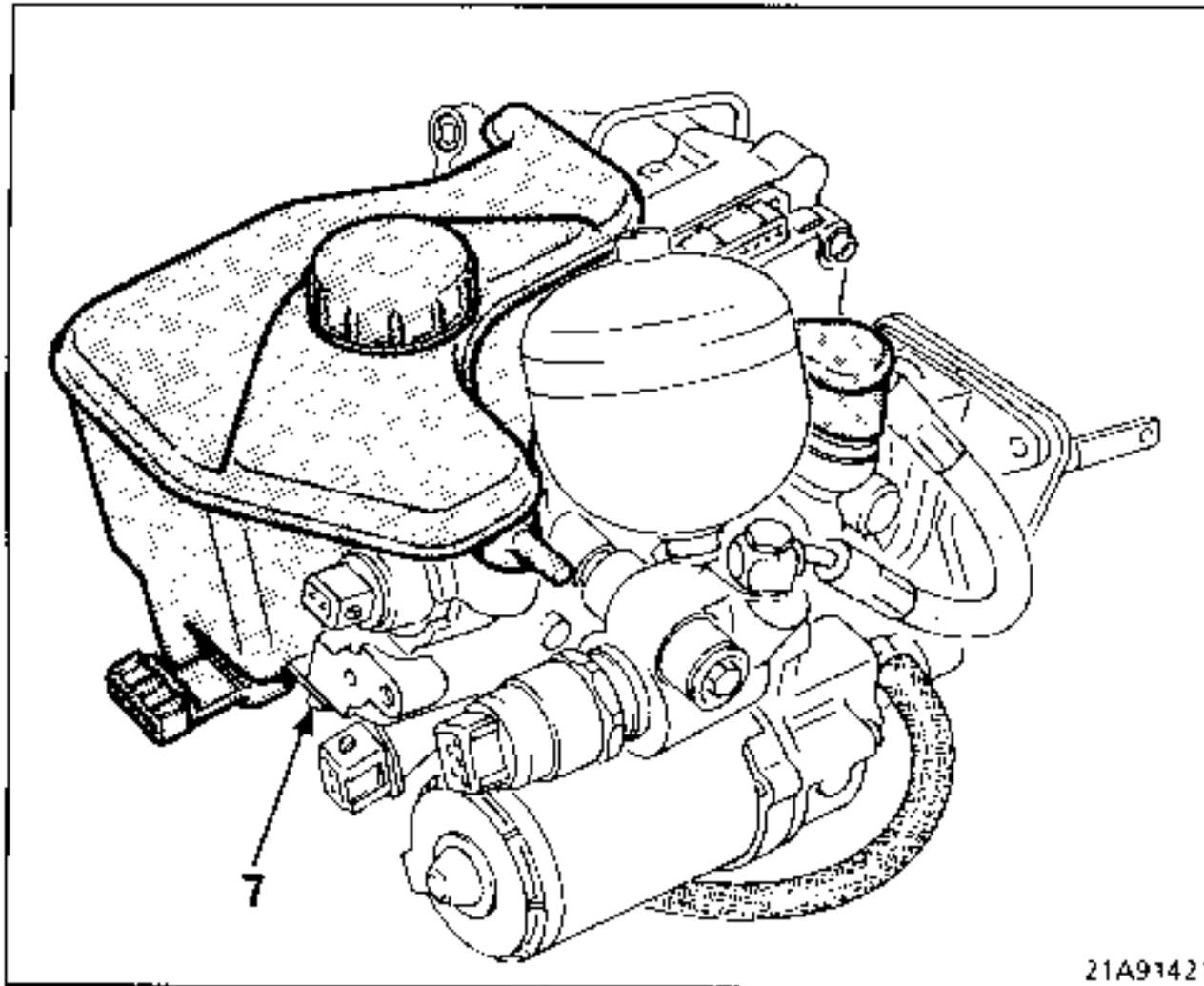
REPLACING THE VARIOUS COMPONENTS OF THE HYDRAULIC UNIT

II - REPLACING THE REGULATING UNIT

REMOVING

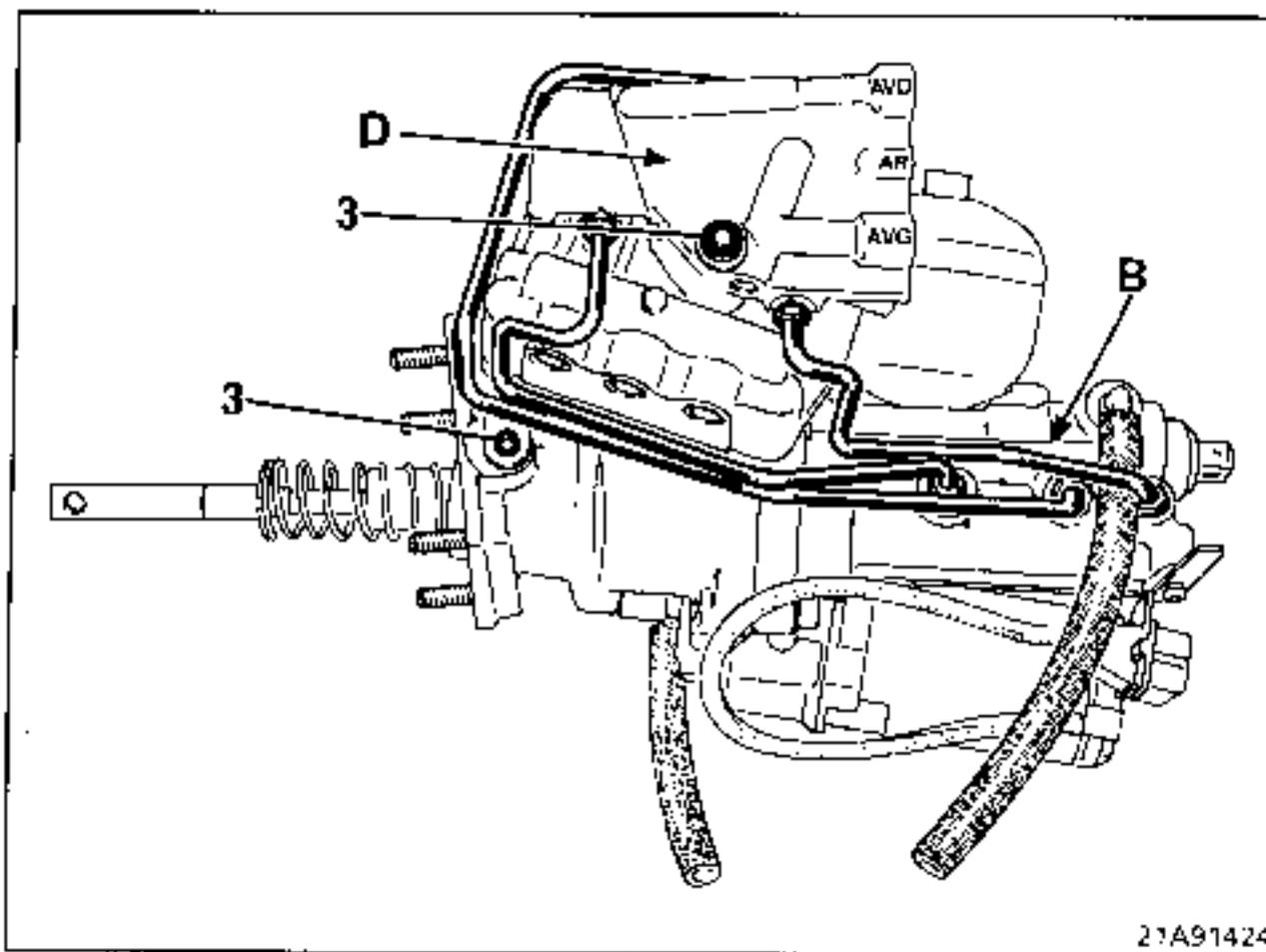
Remove:

- mounting lug (7) from the reservoir;



- the reservoir, unclipping it from its anchorages, after first disconnecting the two low pressure hoses;
- the rigid pipes connecting master cylinder (B) to regulating unit (D) (plug the take-offs);
- the two bolts (3) securing the regulating unit,
- the regulating unit.

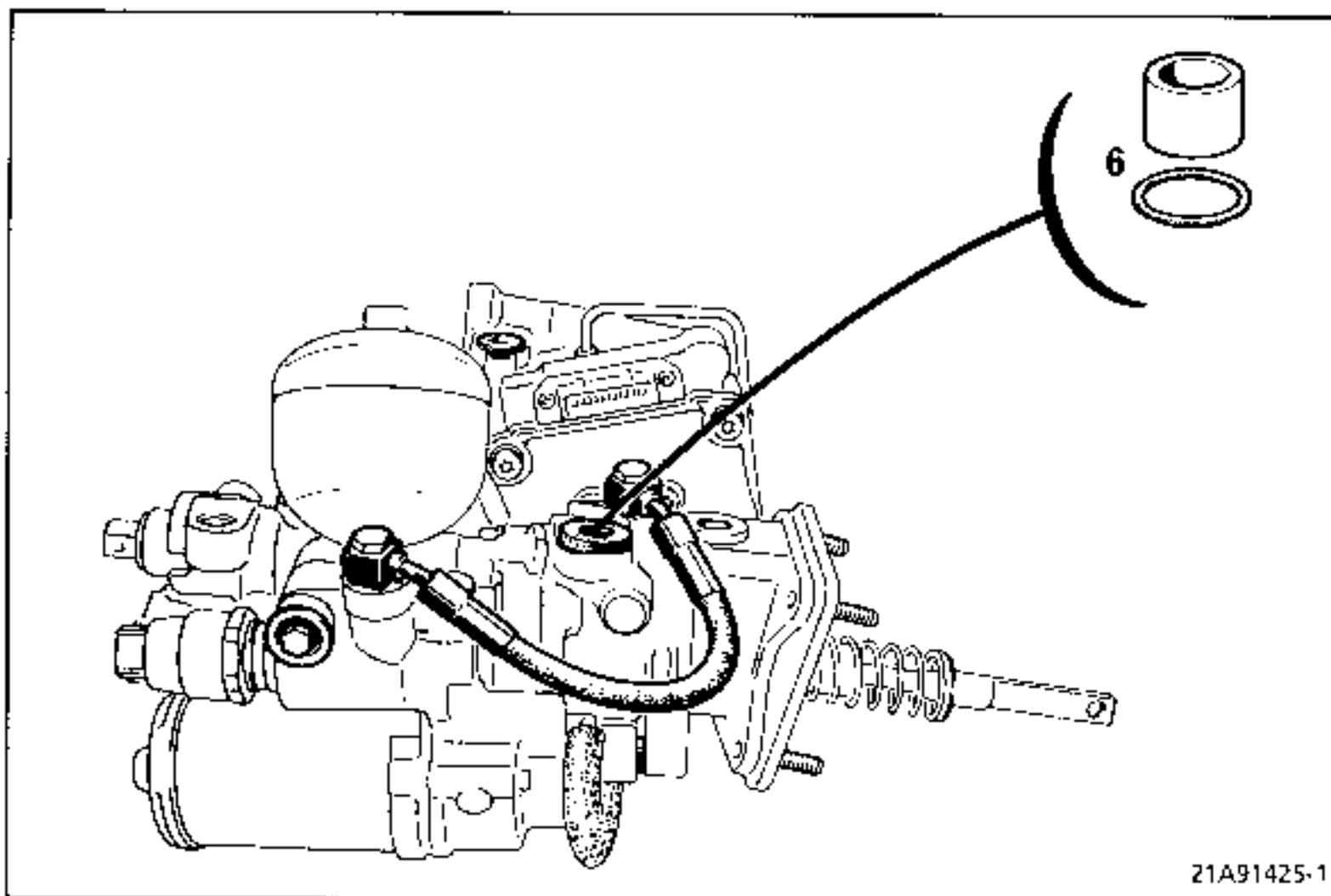
REPLACING THE VARIOUS COMPONENTS OF THE HYDRAULIC UNIT



REFITTING

Fit in place:

- the regulating unit and its rigid connection pipes. (Smear the mounting bolts with **LOCTITE FRENETANCH.**)



REPLACING THE VARIOUS COMPONENTS OF THE HYDRAULIC UNIT

- Fit the reservoir, making sure that the anchorage cups are in good condition. Remember to fit the small spacer and a new O-ring seal in the take-off (6).
- Fit mounting lug (7) for the reservoir. (Smear the bolt with LOCTITE FRENETANCH.)
- Fit the hydraulic pump and master cylinder low pressure hoses on the reservoir.

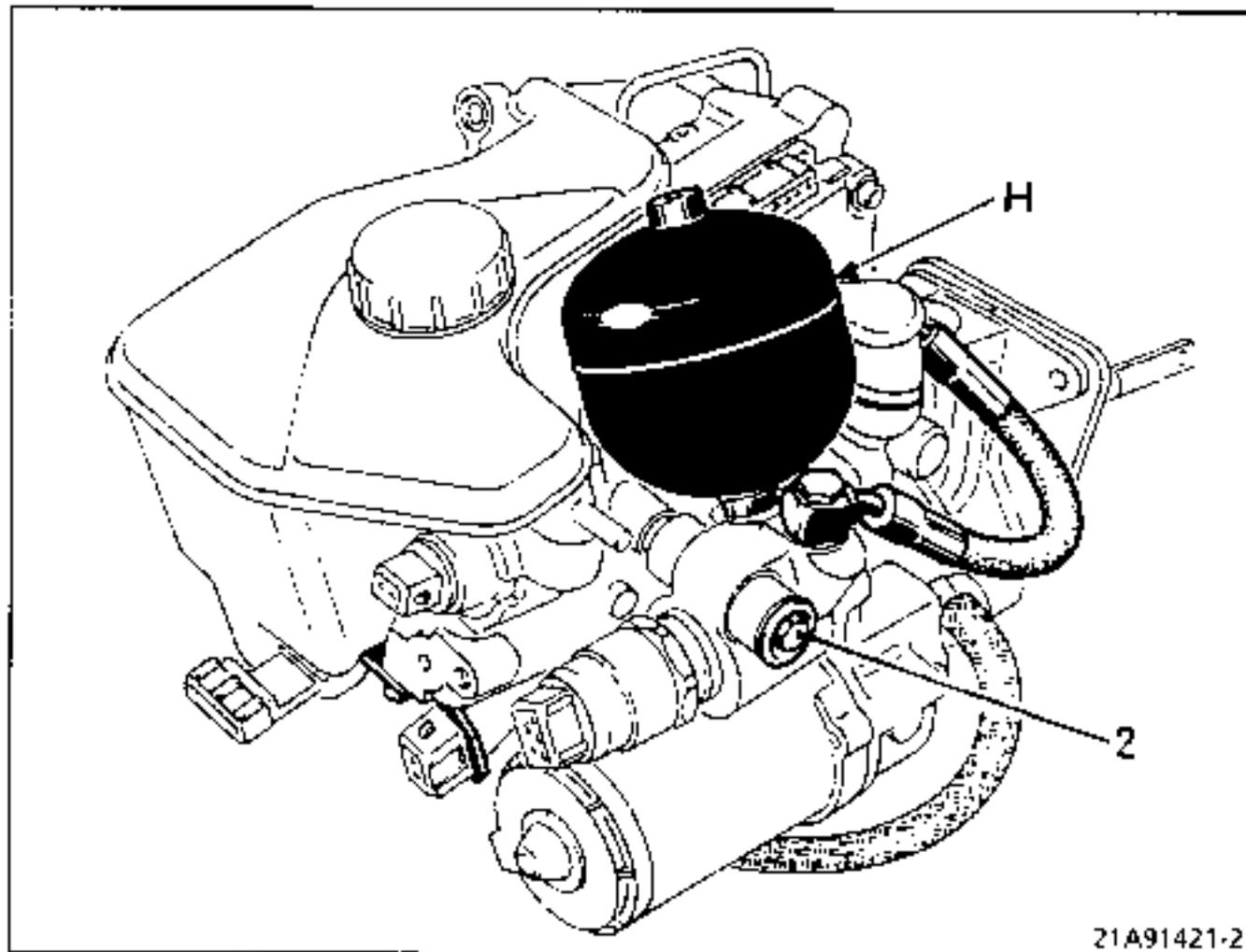
III - REPLACING THE FEED UNIT

This operation may be performed in situ; for this purpose and in order to facilitate the removal of bolt (2) from the pump, the four nuts securing the hydraulic unit to the bulkhead must be unscrewed completely.

REMOVING

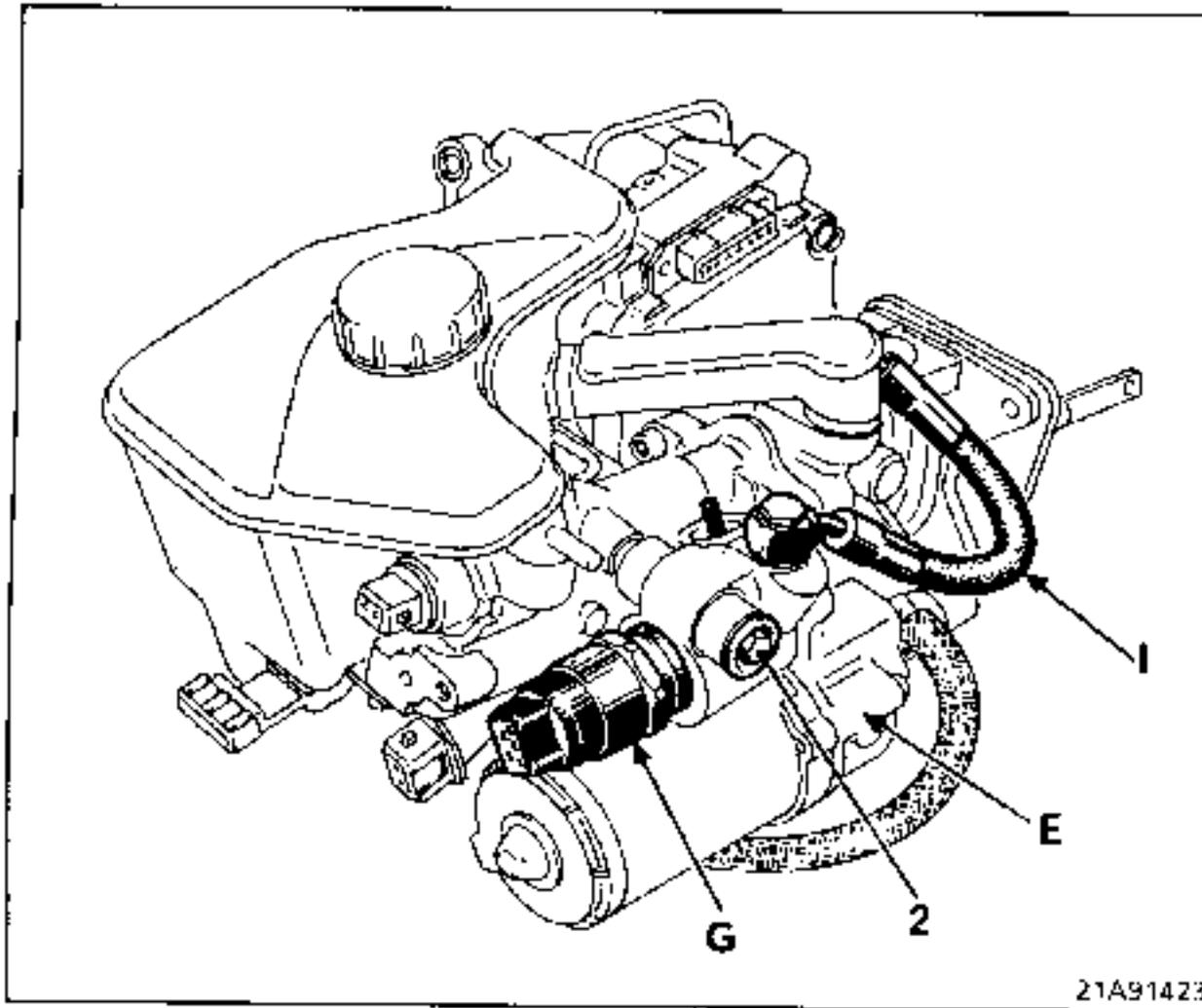
Remove:

- accumulator (H);



- pressostat (G);
- high pressure hose (I) (plug the take-offs);
- bolt (2) securing the pump.

REPLACING THE VARIOUS COMPONENTS OF THE HYDRAULIC UNIT



- Remove feed unit (E), disconnecting the feed hose between the pump and reservoir.

REPOSE

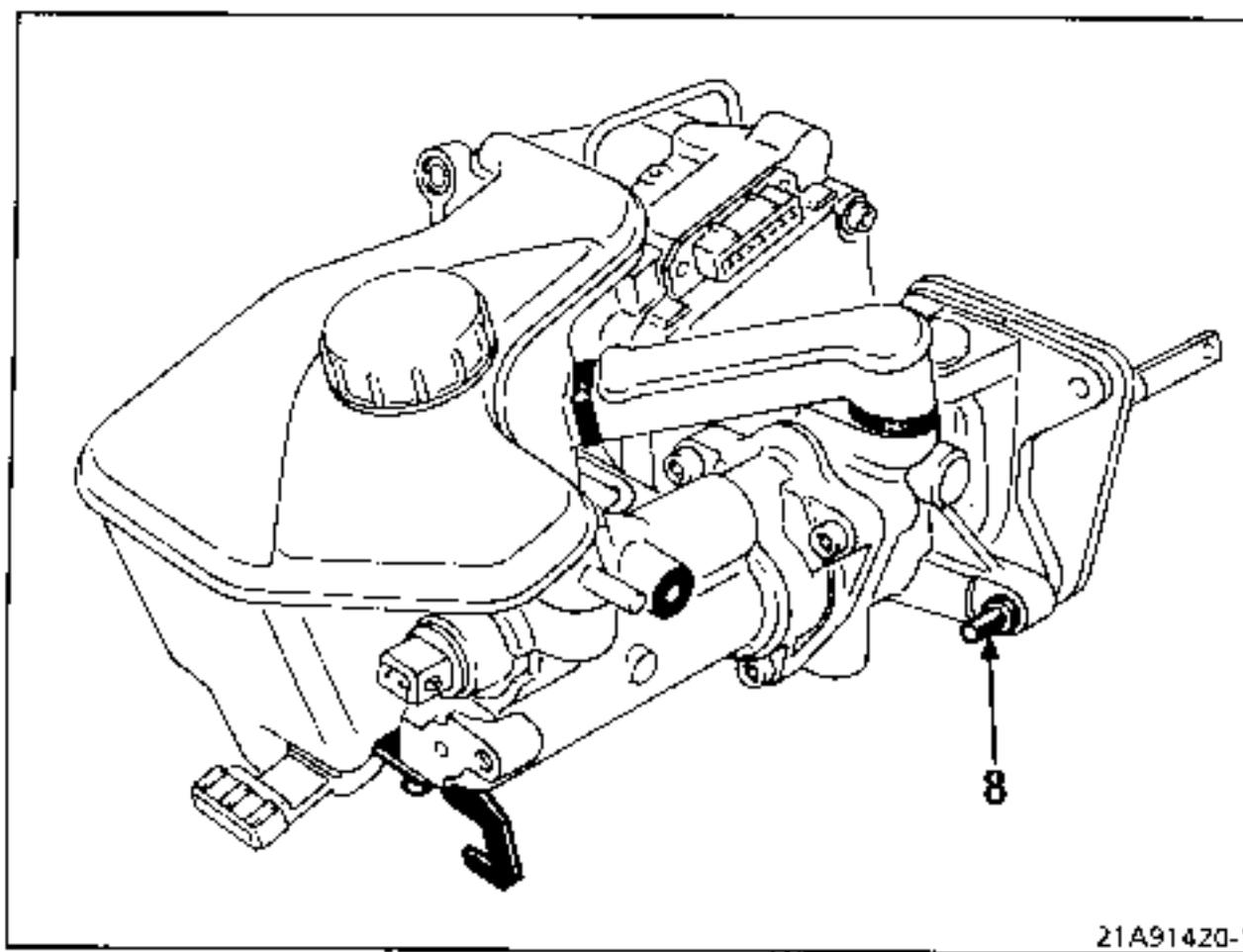
Ensure that the following are in good condition:

- locating pin (8) on the amplifier body,
- the feed unit silent-bloc bushes.

If any part is defective, it must be replaced.

REPLACING THE VARIOUS COMPONENTS OF THE HYDRAULIC UNIT

Fit in place:



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- the feed unit (smear bolt (2) with **LOCTITE FRENETANCH**);
- the low pressure hose in the reservoir take-off;
- high pressure hose (f) equipped with new O-ring seals;
- pressostat (G) with a new seal;
- accumulator (H) with a new seal.

IV - REPLACING THE RESERVOIR

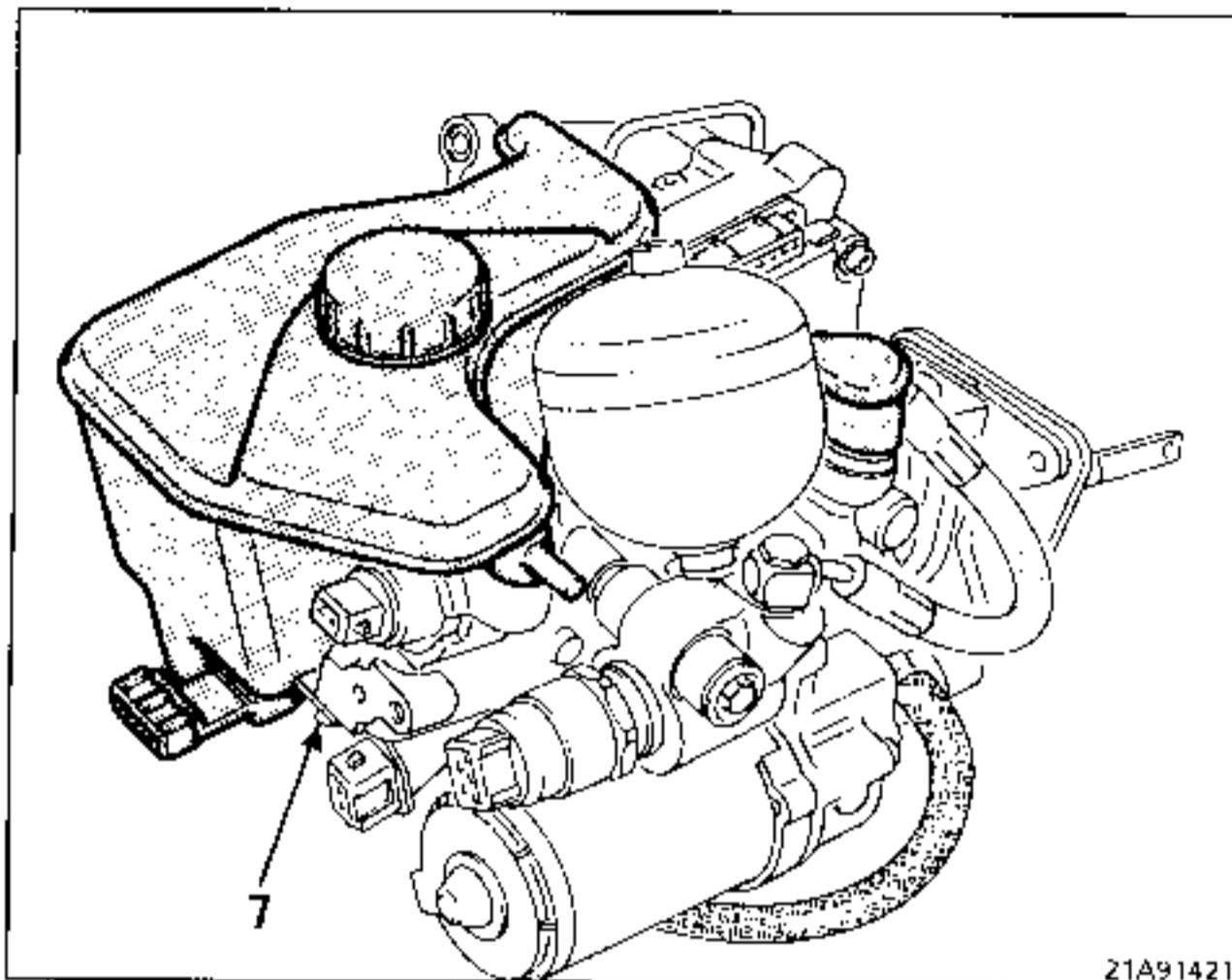
This operation can be performed in situ.

REMOVING

Remove :

- reservoir mounting lug (7),
- the reservoir, by undipping it from its anchorages after disconnecting the two low pressure hoses.

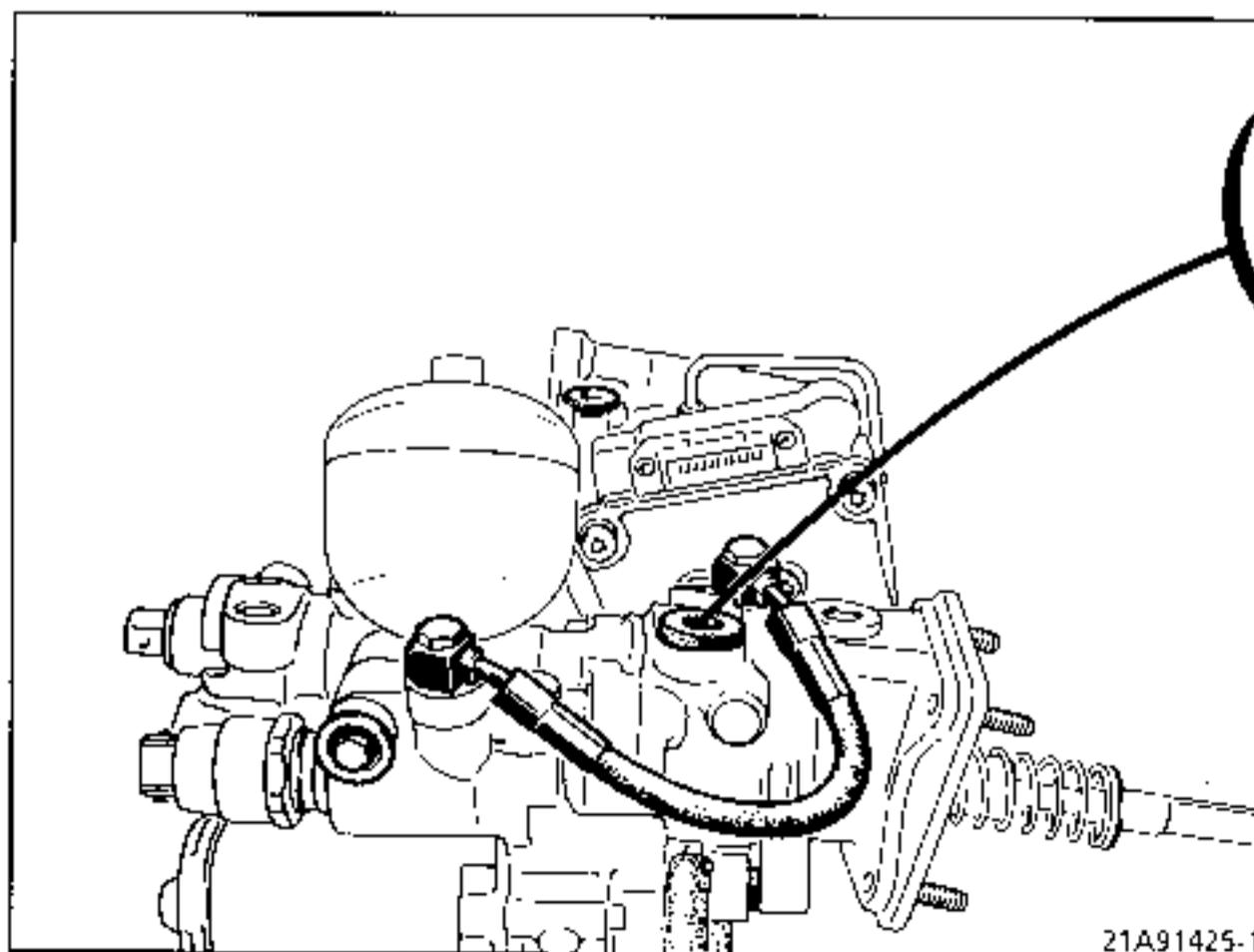
REPLACING THE VARIOUS COMPONENTS OF THE HYDRAULIC UNIT



REFITTING

Fit in place:

- the reservoir, making sure that the anchorage cups are in good condition. Remember to fit the small spacer and a new O-ring seal in take-off (6).



- Fit the reservoir mounting lug (7). (Smear the bolt with LOCTITE FRENETANCH.)
- Fit the hydraulic pump and master cylinder low pressure hoses on the reservoir.

REMOVING - REFITTING - CHECKING THE ACCUMULATOR

ESSENTIAL SPECIAL TOOLING

Mot.	445	Strap wrench
Fre.	1085	Braking system pressure testing kit

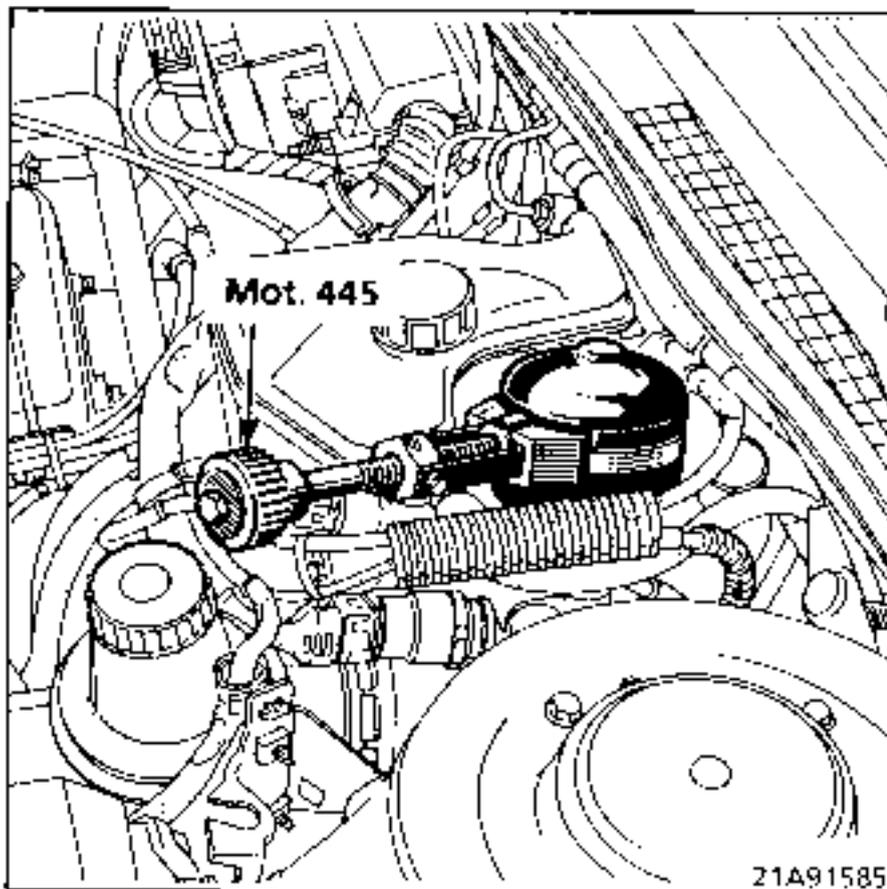
NOTE: The ABS operating pressure is between 140 and 180 bars. Therefore, before working on the accumulator, it must be emptied by allowing the pressure to drop after depressing the brake pedal 20 times (until it becomes hard). Do not switch on the ignition as activating the hydraulic pump causes the accumulator to fill.

REFITTING

Accumulator empty.

Ignition switched off.

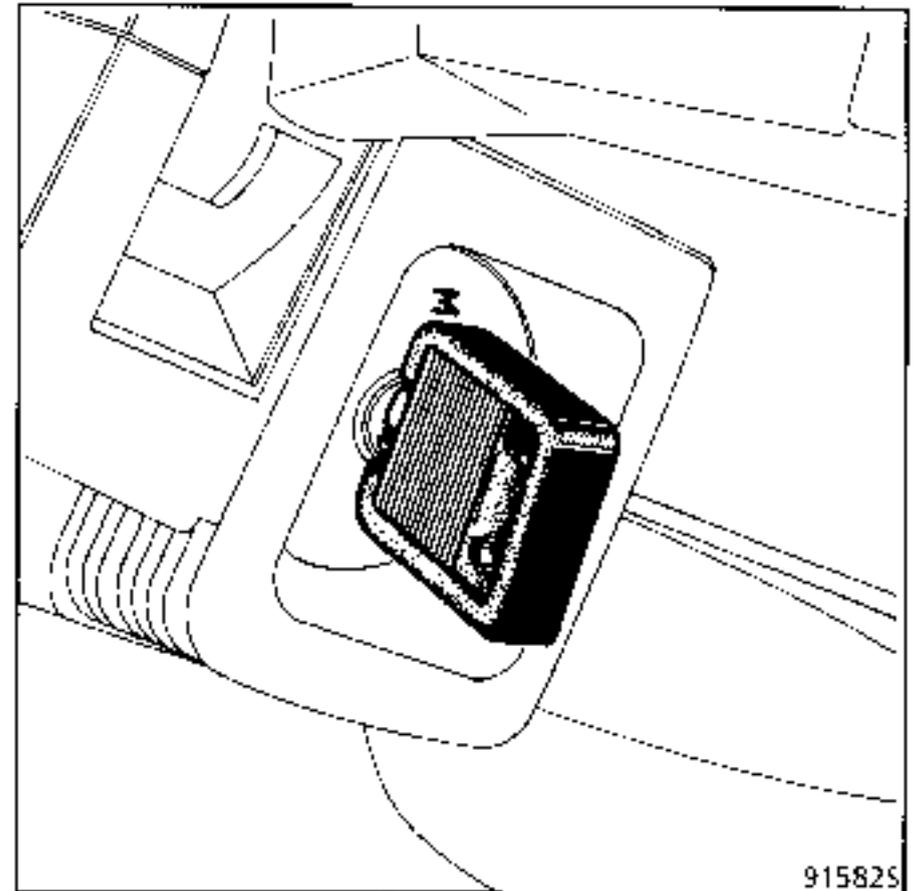
Remove the accumulator using a Mot. 445 wrench.



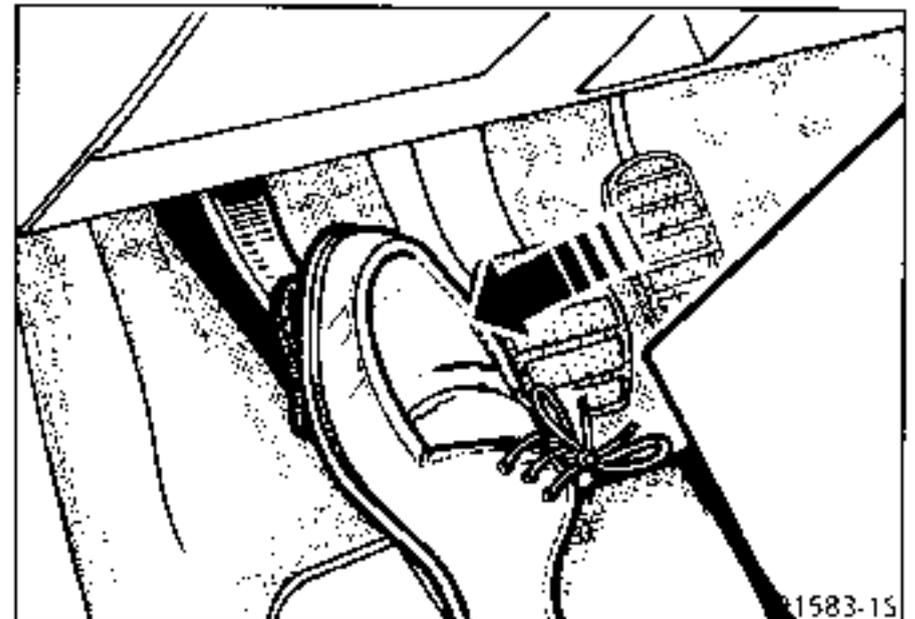
REFITTING

Fit in place the accumulator with a new O-ring seal and tighten it.

Switch on the ignition.



Wait for the pump to stop then press the brake pedal several times.



Wait for the pump to stop again.

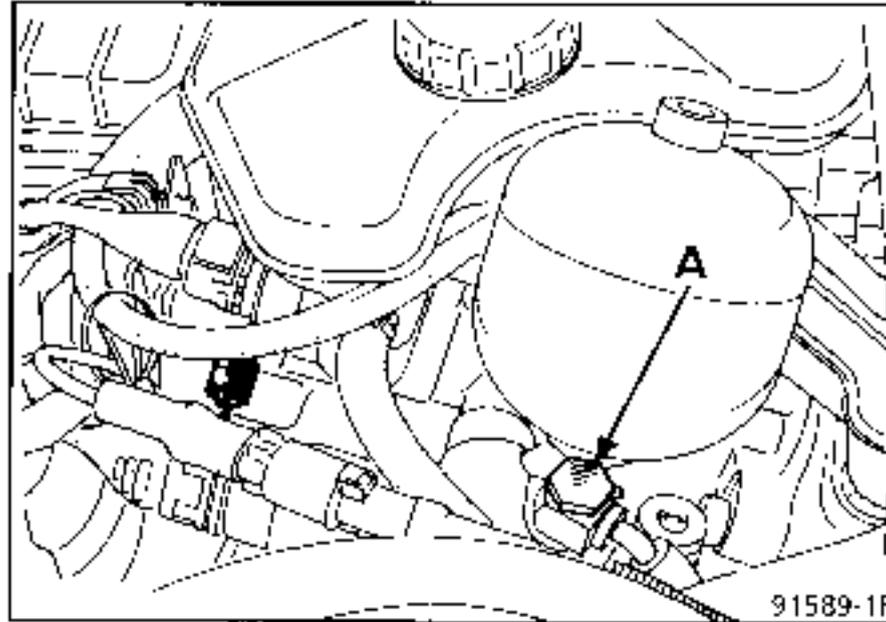
If necessary, top up the fluid level in the chamber. (See the relevant paragraph.)

REMOVING - REFITTING - CHECKING THE ACCUMULATOR

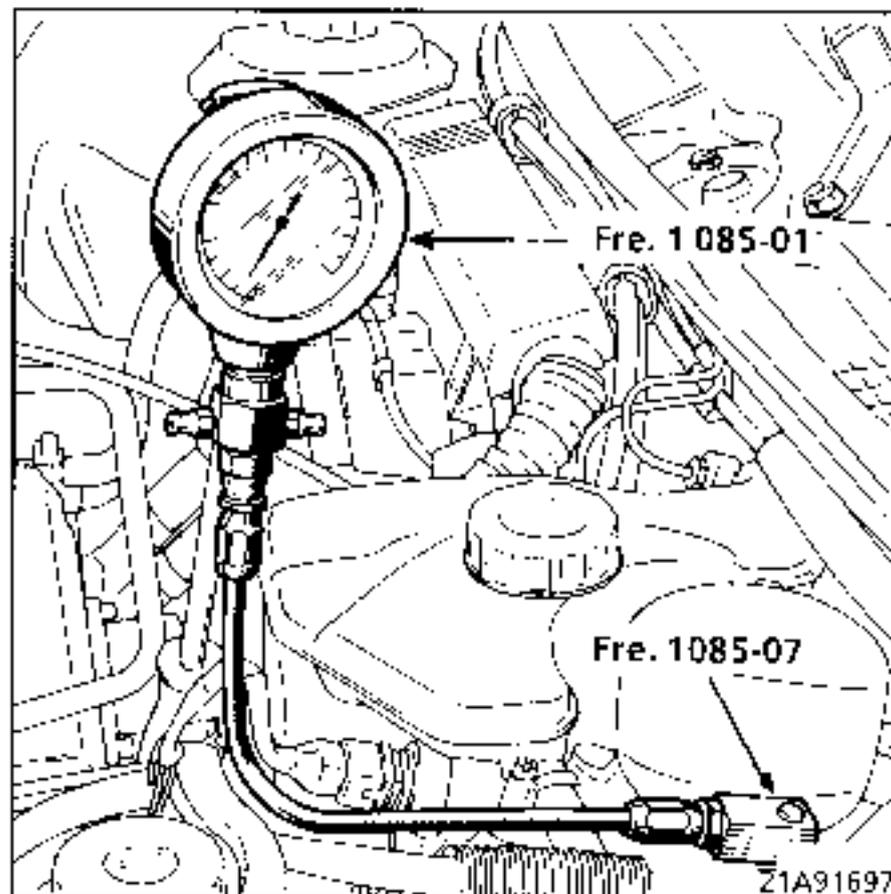
CHECKING

Accumulator empty (see NOTE on previous page).

Remove bolt (A) from the hose take-off.

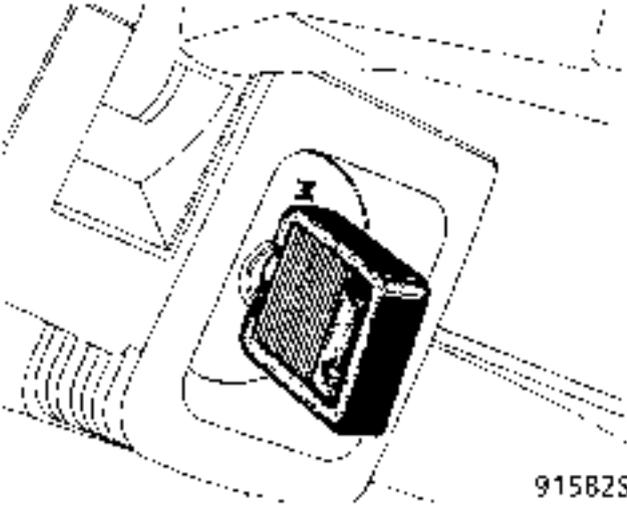
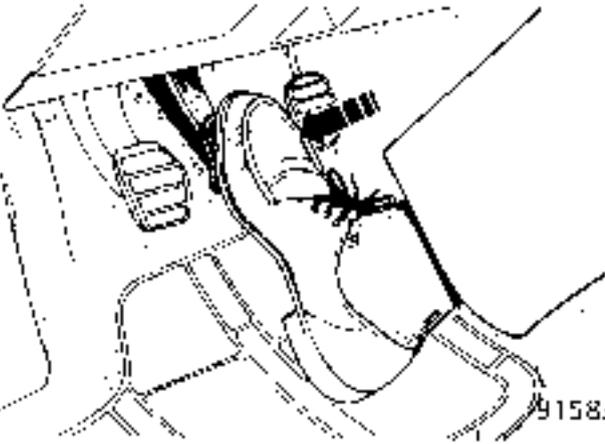
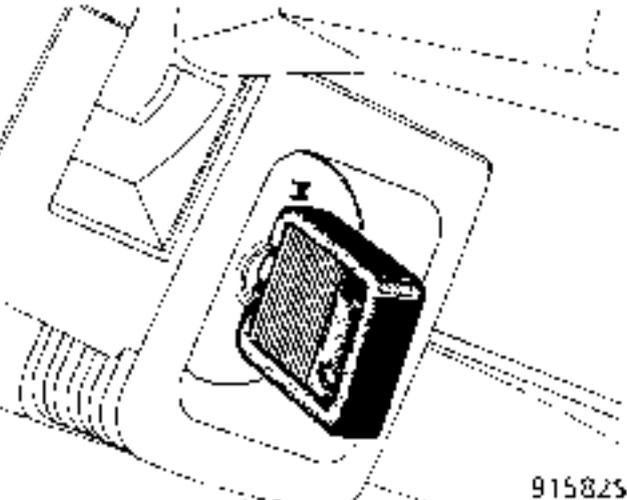


Fit in place tool Fre. 1085-01 and end piece
Fre. 1085-07.

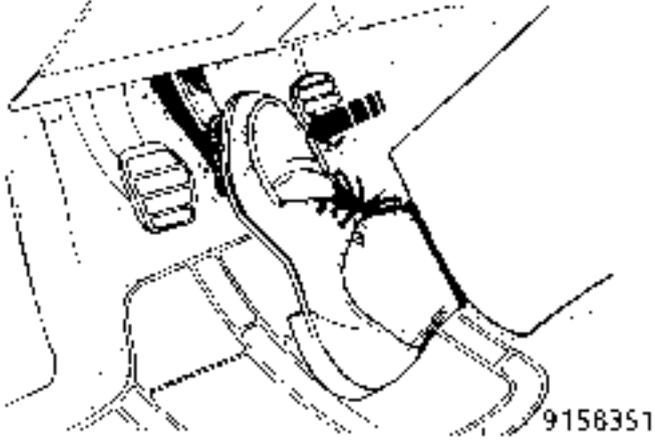
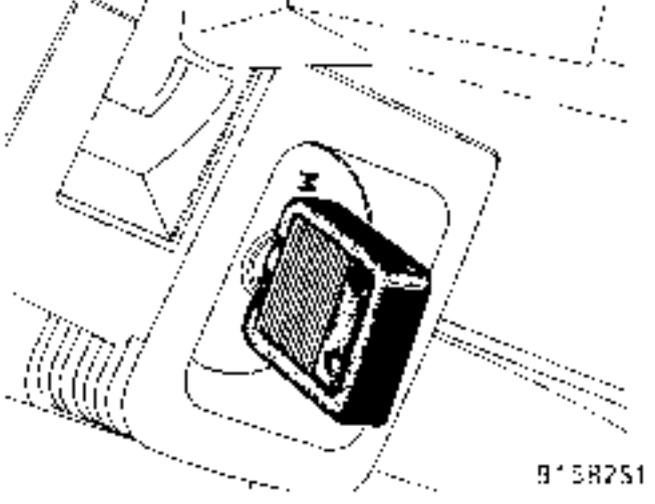
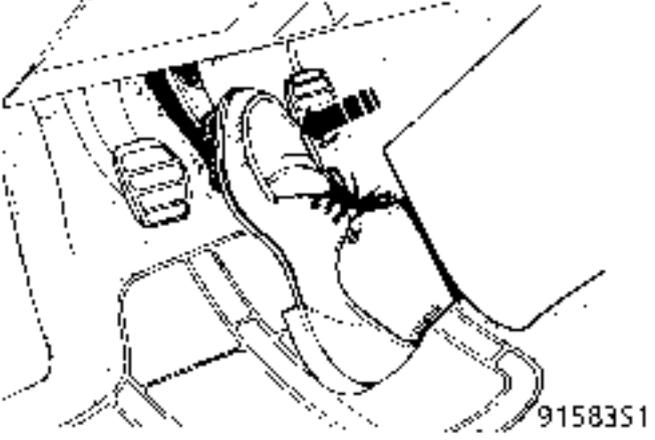


Proceed with the check (see the paragraph on
"Checking the accumulator and pressostat").

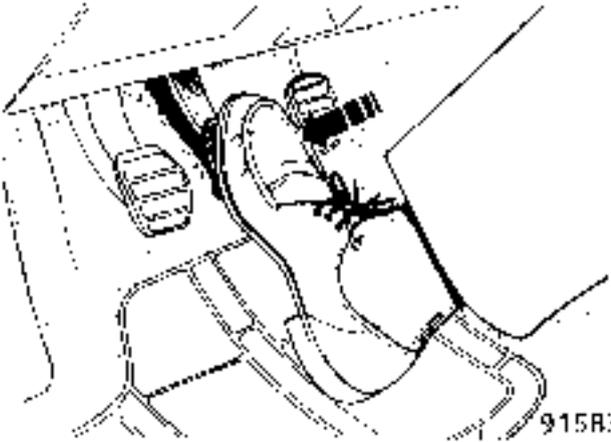
REMOVING - REFITTING - CHECKING THE ACCUMULATOR AND PRESSOSTAT

Tests	Correct values	Additional checks
<p>1 - Accumulator test</p> <ul style="list-style-type: none"> - System not pressurised. - Switch on the ignition.  <p>9158251</p>	<p>Pressure increases to between 40 and 90 bars.</p>	<p>If value incorrect, replace accumulator.</p>
<p>2 - Length of time taken for accumulator to fill</p> <ul style="list-style-type: none"> - Switch off ignition. - Activate brake pedal 20 times (until it becomes hard).  <p>9158351</p> <ul style="list-style-type: none"> - Switch on the ignition.  <p>9158251</p> <ul style="list-style-type: none"> - Measure time taken for accumulator to fill. 	<p>Time taken for accumulator to fill should be 60 seconds maximum.</p>	<p>Check:</p> <ul style="list-style-type: none"> - pump operation, - condition of high pressure hose and its take-offs, - condition of filter in reservoir.

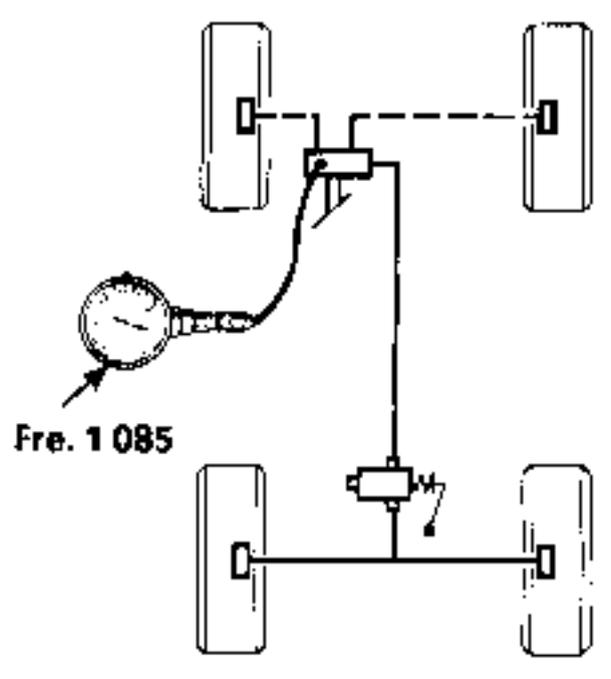
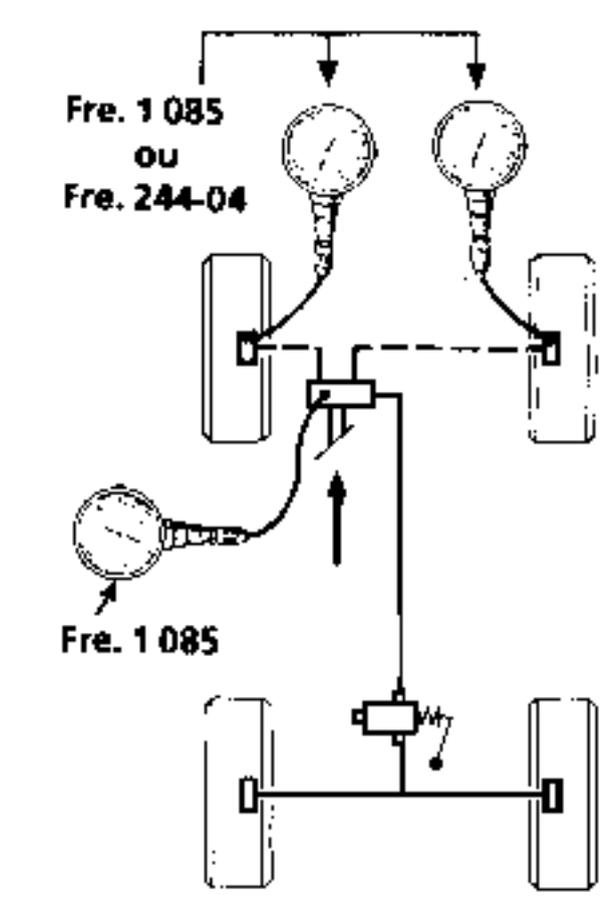
REMOVING - REFITTING - CHECKING THE ACCUMULATOR AND PRESSOSTAT

Tests	Correct values	Additional checks
<p>3 - Pressostat operation</p> <ul style="list-style-type: none"> - Switch off ignition. - Activate brake pedal 20 times (until it becomes hard).  <ul style="list-style-type: none"> - Switch on ignition.  <ul style="list-style-type: none"> - Check pressure when pump stops. 	<p>The pressure should be between 174 and 188 bars when pump stops.</p>	<p>Replace pressostat if values incorrect.</p>
<ul style="list-style-type: none"> - Activate brake pedal.  <ul style="list-style-type: none"> - Check pressure at which pump cuts in again. 	<p>The pressure should be between 130 and 150 bars.</p>	

REMOVING - REFITTING - CHECKING THE ACCUMULATOR AND PRESSOSTAT

Tests	Correct values	Additional checks
<p>4 - Pressostat warning function</p> <ul style="list-style-type: none"> - Disconnect motor feed. Activate brake pedal.  <p>915R351</p> <ul style="list-style-type: none"> - Check point at which warning lights illuminate. 	<p>Warning lights</p> <p> + </p> <p>should illuminate at a pressure of between 100 and 110 bars.</p>	<p>If values incorrect, replace pressostat.</p>

CHECKING FOR LEAKS

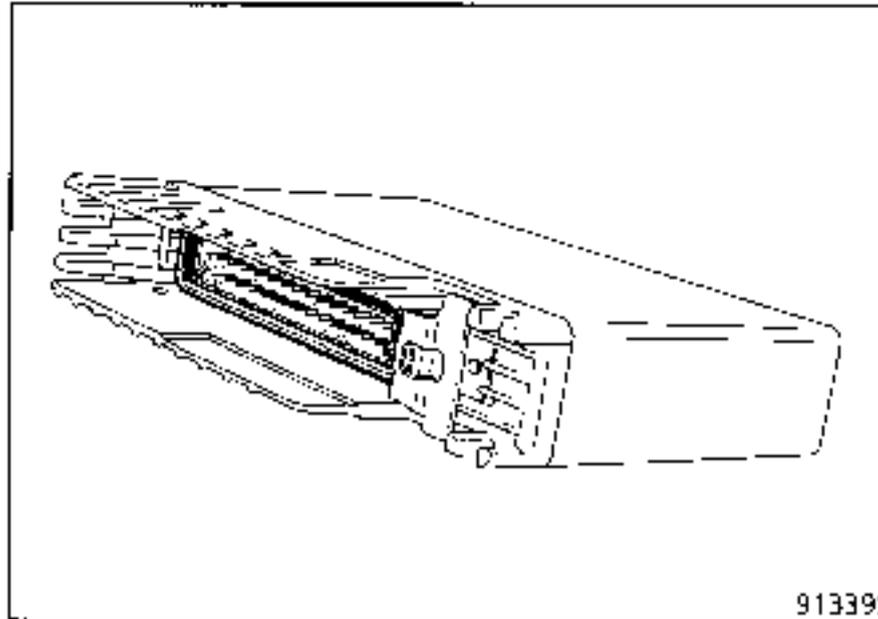
Checks	Correct values	Additional checks
<p>1 - Accumulator test</p>  <p>Fre. 1 085</p> <p>91563-4R1</p> <ul style="list-style-type: none"> - Accumulator full. - Brake in rest position. 	<p>Pressure loss should be less than 10 bars in 5 minutes.</p>	<ul style="list-style-type: none"> - Check absence of external leaks. - Replace amplifier/master cylinder assembly.
<p>2 - Circuit test</p> <ul style="list-style-type: none"> - Connect two pressure gauges Fre. 1085 or Fre. 244-03 to front wheels.  <p>Fre. 1 085 ou Fre. 244-04</p> <p>Fre. 1 085</p> <p>91563-4R</p> <ul style="list-style-type: none"> - Accumulator full. - Adjust pressure on front wheels to 100 bars with pedal clamp. 	<p>Pressure loss should be less than:</p> <ul style="list-style-type: none"> - at pump: 10 bars in 5 minutes, - at callipers: 5 bars in 5 minutes. 	<ul style="list-style-type: none"> - Check there are no external leaks. - Replace amplifier/master cylinder assembly.

IF WARNING LIGHTS ILLUMINATE

The control warning light(s) illuminate(s) when an incident has been detected.

Several components in the anti-lock braking system are equipped with incident sensing means.

1 - The computer



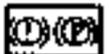
913395

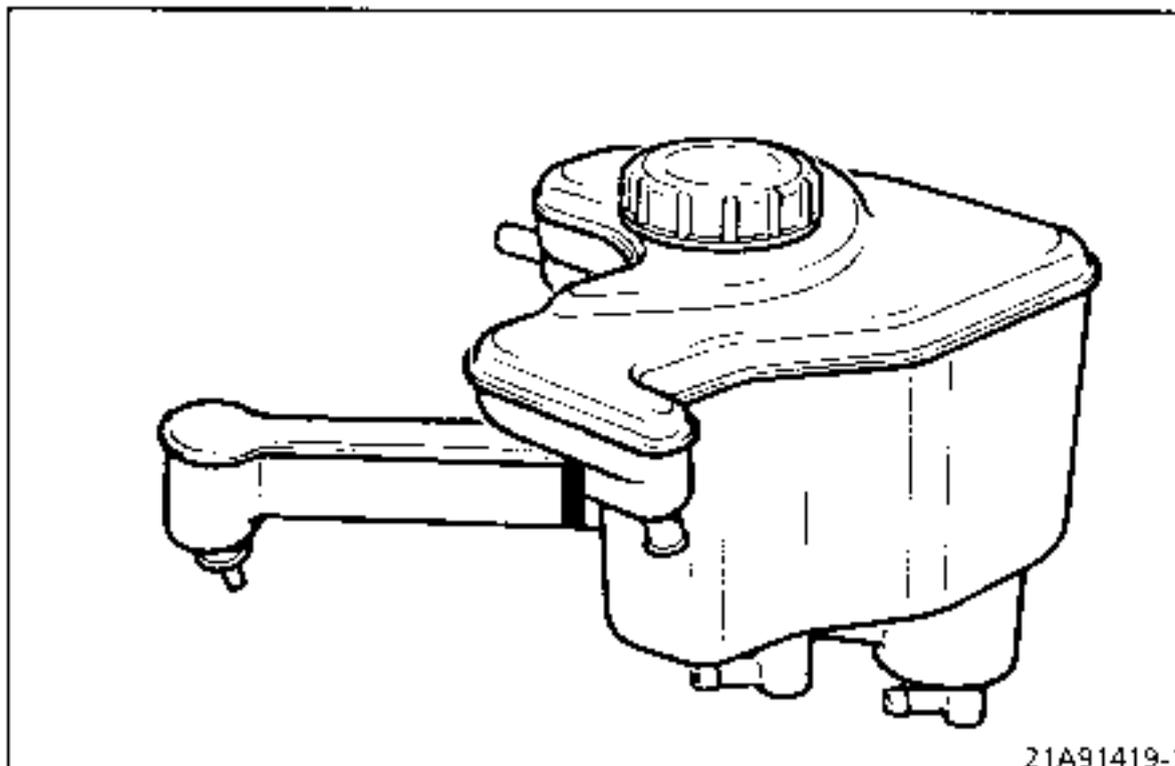
It continuously tests all its peripheral units; if it detects a problem, it instructs warning light to illuminate.



2 - The brake fluid reservoir

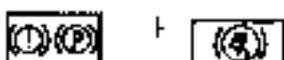
The reservoir has a double warning device with two thresholds :

First threshold : If the brake fluid level drops, the "level warning" device illuminates the warning light .



21A91419-1

Second threshold : If the level drops still further, the device illuminates the second warning light, i.e.



IF WARNING LIGHT ILLUMINATES

3 - Cut-off pressostat



2" A9" 419-2

The pressostat has a dual function:

a) Service function

- 140 bars : activates pump.
- 180 bars : stops pump.

b) Warning function

- 105 bars : Activation of "defect" mode: anti-lock braking retained only for rear wheels.
- 130 bars : Warning device and downgraded mode deactivated.

Only the warning functions illuminate the warning lights.

1st case : ignition on with pressure between 105 and 180 bars: pump activated and warning light  illuminates during activation phase.

2nd case : ignition on with pressure lower than 105 bars : pump activated and warning lights  +  illuminate until pressure reaches 130 bars.

4 - Phase during which warning lights are fed during starting

a) Accumulator empty

NOTE 1: The hydraulic accumulator operates at a pressure between 140 and 180 bars, internal sealing is performed solely by machining tolerances. Therefore, after the vehicle has not been used for a long time, the accumulator discharges and the illumination of the test warning lights is modified.

Pressure less than 105 bars.

Ignition switched on: Pump activated and warning lights  +  illuminates until pressure reaches 130 bars (see NOTE 1).

Starting : Warning light  illuminates again.

NOTE 2 : The computer is cut off during the starting phase to prevent a defective signal being detected owing to the drop in battery voltage resulting in the warning light illuminating again. To meet these requirements an auxiliary relay is used.

Engine running: Warning light  remains illuminated during test cycle.

IF WARNING LIGHT ILLUMINATES

b) Accumulator full

Ignition switched on : Warning light  illuminates during activation phase.

Starting: Warning light  comes on again (see NOTE 2).

Engine running: Warning light  stays on during test cycle.

5 - Warning lights illuminate following an incident when travelling or when starting

a) Warning light  illuminates.

Depending on the type of incident detected by the computer, the vehicle:

- either has conventional braking, without ABS,
- or has anti-lock braking system in the "defect" mode (regulation only on rear wheels).

b) Warning light  illuminates.

Apart from meaning that the handbrake has not been fully released, the illumination of this warning light alone indicates a drop in the fluid level in the brake fluid reservoir.

c) Warning lights  +  illuminate

A brake fluid leakage causes warning light , to illuminate; if the fluid level continues to drop, warning light  illuminates in turn and the system goes into "defect" mode (pressure regulation only on rear wheels).

If the pump stops operating, warning lights  +  will illuminate simultaneously when the pressure drops to below 105 bars. The system then goes into defect mode (pressure regulation only on rear wheels).

DIAGNOSIS

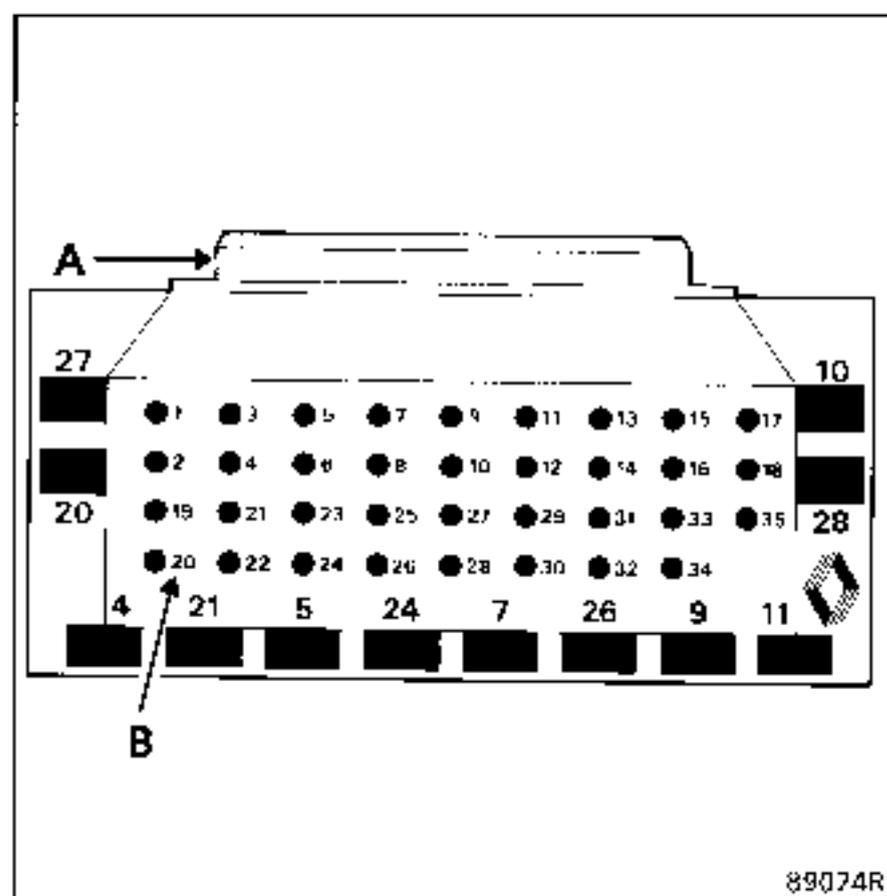
ESSENTIAL SPECIAL TOOLING

M.S. 1048 Borrier for testing wiring using XR 25 or multimeter

This consists of a base with 35 contact points identical to that for the anti-lock braking system computer and integral with a printed circuit equipped with electrical contact points numbered from (1) to (35).

Each number corresponds to an electrical connection on the vehicle wiring and is indicated on the operating diagram.

By rapid access and preventing errors in matching reference marks, it enables all the electrical connectors arriving at the anti-lock braking system main connector to be checked.

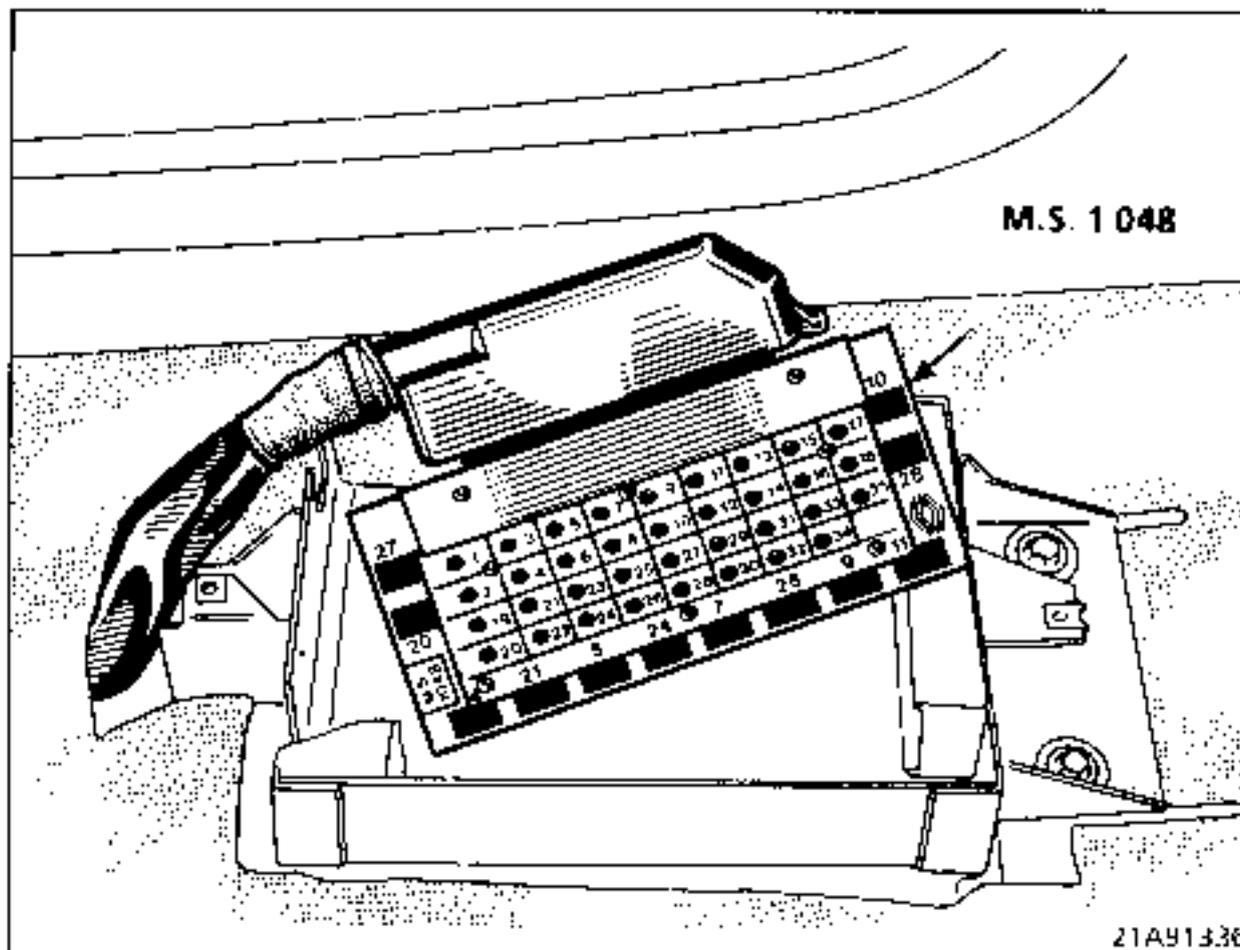


- A Vehicle wiring harness.
B Contact points for probe tips
Checking points

DIAGNOSIS

Connection on vehicle

Ignition off : Disconnect the anti-lock braking system computer from its base and connect the bornier in its place.

**Checking method principle**

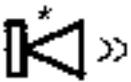
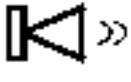
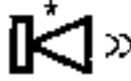
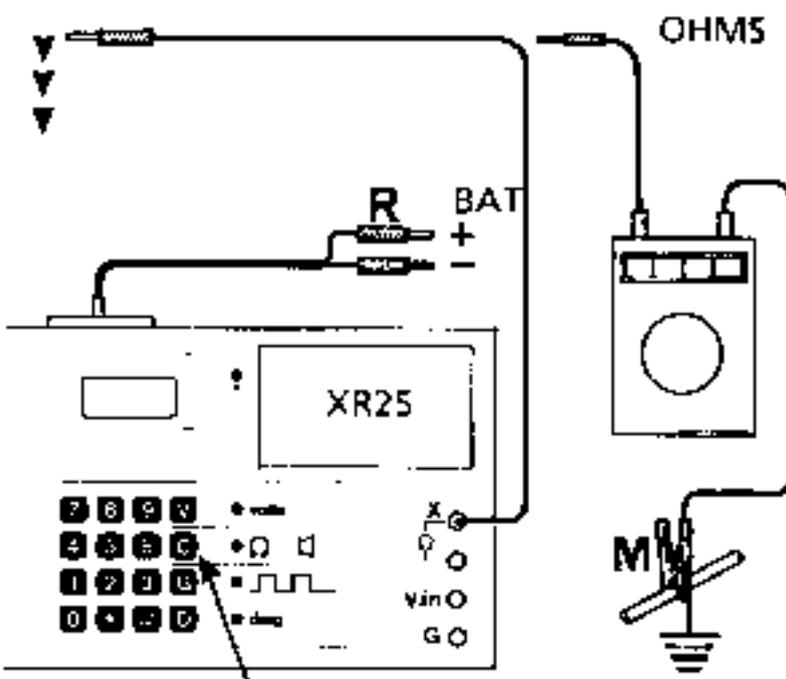
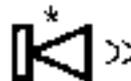
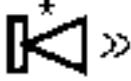
Place the probe tip of the XR25 or multimeter in contact with the numbers indicated on the bornier and corresponding to the letters **DIAG A** → **B** → **C** to **Y** on the test tables, paying attention to the conditions given in the left-hand column of these tables on pages 38-34 to 38-38.

Test apparatus which may be used

- **XR25** : Measurement of continuity using the buzzer
Measurement of voltage using the voltmeter
- **Multimeter** : Resistance measurement
Voltage measurement

DIAGNOSIS

CHECKING CONTINUITY

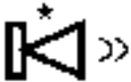
MEASURING CONDITIONS	DIAG	TEST APPARATUS		BORNIER NO.	CONNECTIONS	
		XR 25	OHMMETER		XR 25	MULTIMETERS
VEHICLE IGNITION OFF Key:  >> THE BUZZER BUZZES  >> BUZZER DOES NOT BUZZ	A	 >>	0 to 0.5 Ω	1		
	B			3		
	C			11		
	D			20		
	E	 >>	50 to 100	8		
	F	 >>	5 to 7 Ω	15		
	G			17		
	H			35		
	I	 >>	3 to 5 Ω	33		
	J			34		
	K			16		
	L	 >>	2 to 5 Ω	18		
	M	 >>	> 20 kΩ	4		
	N			5		
	O			6		
	P			7		
	Q			9		
	R			10		

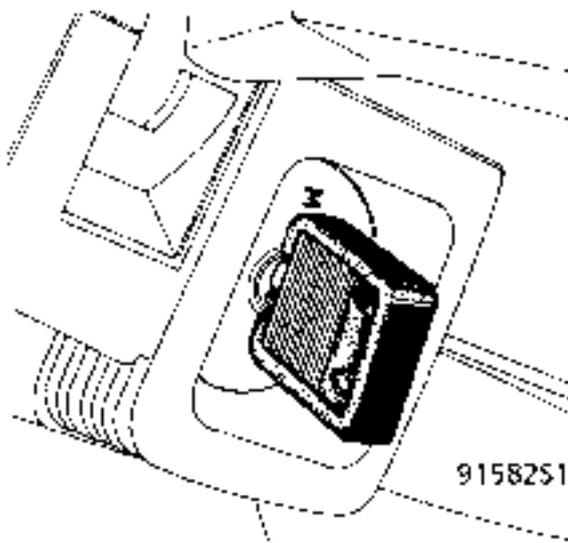
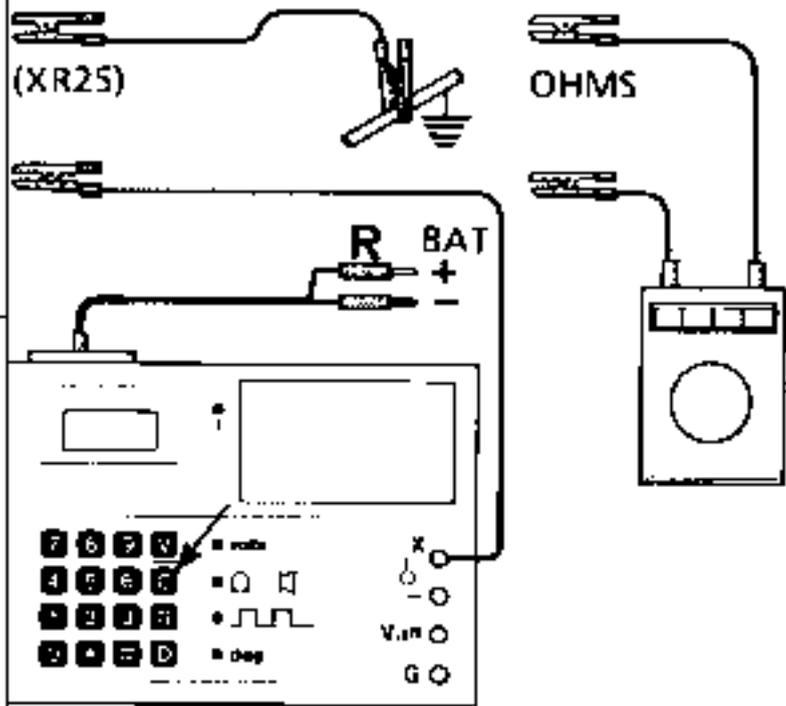
 – Key pressed
 R = Red connected to battery
 M = Crocodile clip connected to brake pipe

BB158-3R

DIAGNOSIS

CIRCUIT CHECK : Switch B of NIVOCODE 207 and 105 bar switch of PRESSOSTAT 434 .

Key:  BUZZER BUZZES

MEASURING CONDITIONS	TEST APPARATUS		BORNIER NO.	CONNECTIONS	
	XR 25	OHMMETER		XR 25	MULTIMETERS
- Ignition on.  9158251 - System pressurised (180 bars). - Fluid level correct.		0 to 0.5 Ω	9 } 10 }		88158-85
		⊗		Key C pressed : R : red terminal connected to battery –	

⊗ If incorrect: check continuity between terminal (9) of computer, terminal (1) of connector A, terminal (2) of connector A, terminal (3) of connector D (105 bar switch pressostat), terminal (5) of connector D and terminal (10) of computer.

DIAGNOSIS

CHECKING VOLTAGE

MEASURING CONDITIONS	DIAG	XR 25 / MULTIMETER	N°	CONNECTIONS	
				XR25	MULTIMETER
IGNITION ON <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> Ignition on Shunt 2 and 8 </div>	S	> 10 V	2		VOLTS
	T	> 10 V	3		
	U	> 10 V	20		
	V	0.5 V to 1.5 V	27		

V = Key pressed

R = Red terminal connected to battery +

M = Crocodile clip connected to brake line

8B158-4R

DIAGNOSIS

WHEEL SENSOR TEST

Measuring the voltage:

* Turn the wheel in snatches and watch the voltmeter.

Key : Multimeter on alternating current.

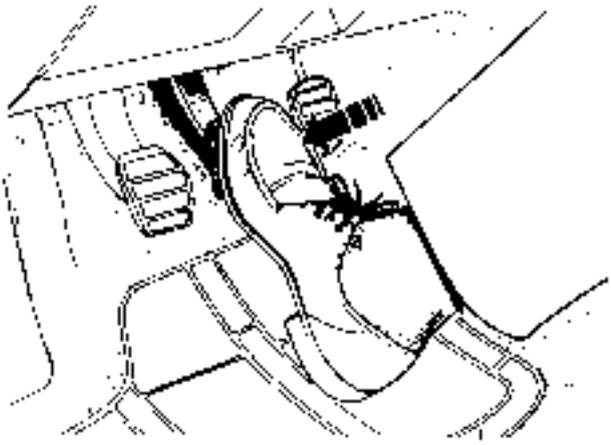
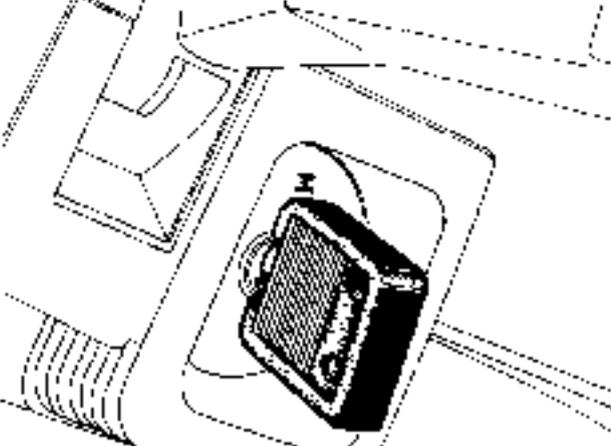
MEASURING CONDITIONS	XR 25 / MULTIMETER		N°	CONNECTIONS	
	XR25	MULTIMETER		XR25	MULTIMETER
TURN* FRONT LEFT-HAND WHEEL.	Y1	V > 0.1 V ... R – 0.6 to 1.6 kΩ	5 } 23 }		
TURN* FRONT RIGHT-HAND WHEEL	Y2	V > 0.1 V ... R – 0.6 to 1.6 kΩ	7 } 25 }		
TURN* REAR LEFT-HAND WHEEL	Y3	V > 0.1 V ... R – 0.6 to 1.6 kΩ	6 } 24 }		
TURN* REAR RIGHT-HAND WHEEL	Y4	V > 0.1 V ... R – 0.6 to 1.6 kΩ	4 } 22 }		

88158-5R

Key V pressed
R = Red terminal connected to battery +

DIAGNOSIS

HYDRAULIC FEED UNIT TEST (MOTOR)

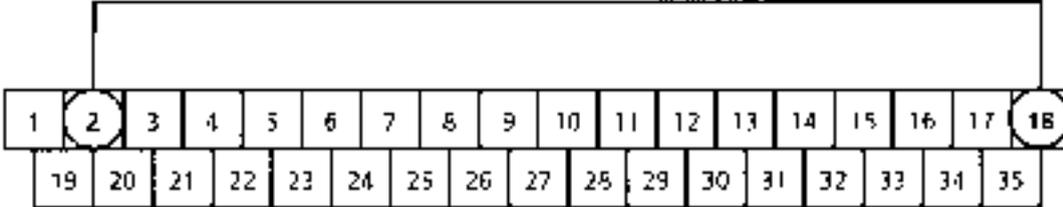
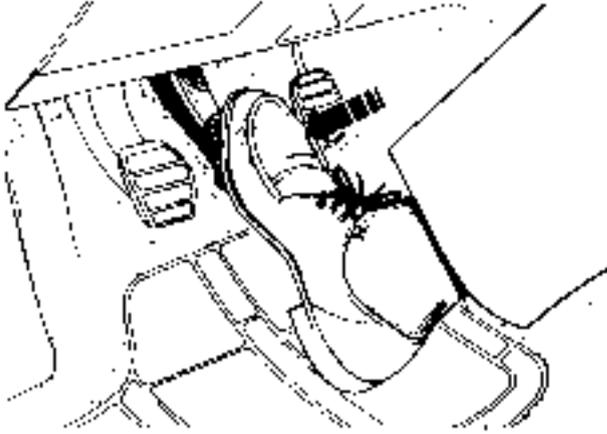
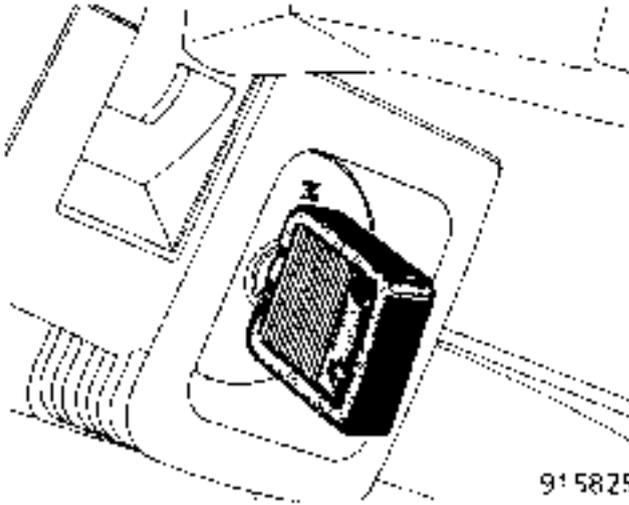
MEASURING CONDITIONS	CORRECT VALUES	ADDITIONAL CHECKS
<ul style="list-style-type: none"> - Ignition off. - Depress* brake pedal 20 times.  <p style="text-align: right;">9158351</p> <ul style="list-style-type: none"> - Switch on ignition.  <p style="text-align: right;">9158251</p>	<p>Pump motor should turn.</p>	<ul style="list-style-type: none"> - Motor feed voltage (10 volts). - Fuse 30A. - Pump motor relay 301. - Connector C. - Wiring. <p>* This enables the 140 - 180 bars switch of pressostat 434 to close, as a result of which relay 301 is fed and motor 186 operates up to the 180 bars threshold.</p>

DIAGNOSIS

CHECKING THE OPERATION OF THE MAIN SOLENOID VALVE

- Switch on the ignition until the pump stops, then switch off the ignition.

NOTE : Use tongues, Part No.: 77 01 997 033, to shunt the computer connectors.

TEST	MEASURING CONDITIONS	CORRECT VALUE
1	<ul style="list-style-type: none"> - Ignition off. Shunt terminals (2) and (18).  <ul style="list-style-type: none"> - Depress brake pedal (medium force).  <p style="text-align: right;">9158351</p> <ul style="list-style-type: none"> - Switch on ignition.  <p style="text-align: right;">9158251</p>	<p>Pedal returns abruptly and hardens.</p>

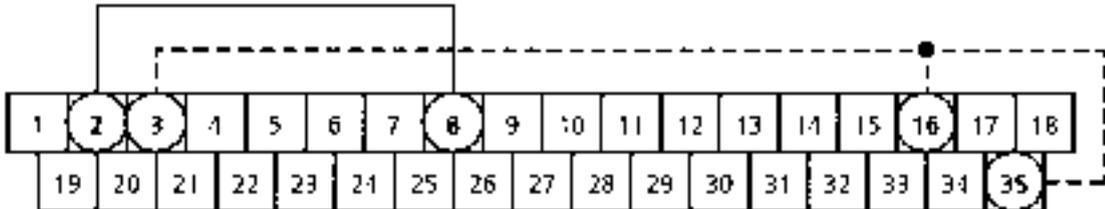
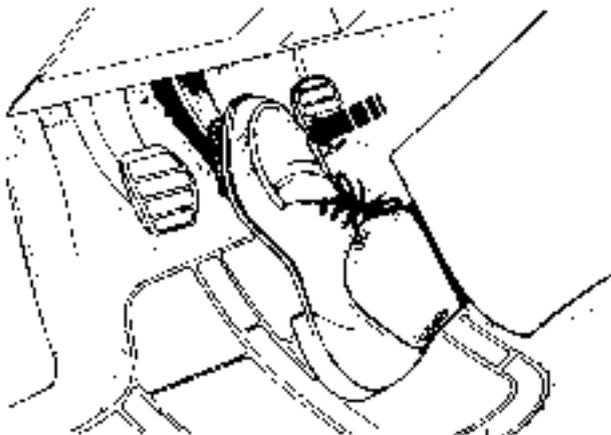
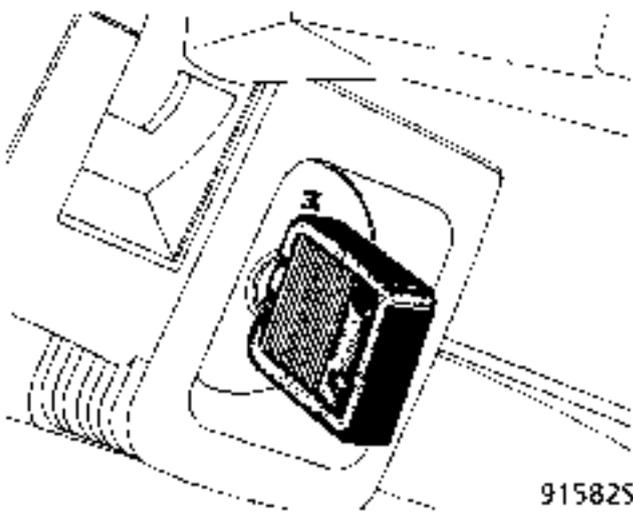
DIAGNOSIS

CHECKING THE OPERATION OF THE ROADWHEEL SOLENOID VALVES

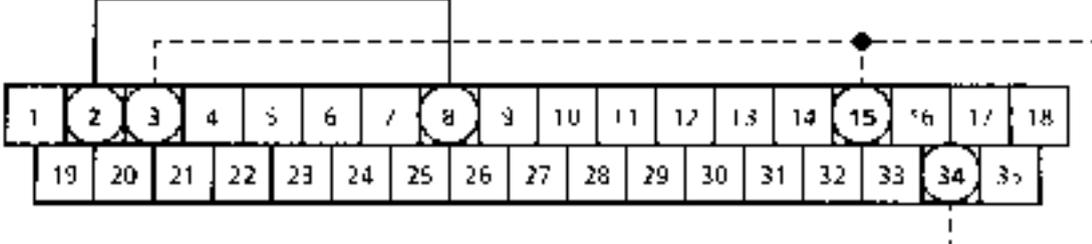
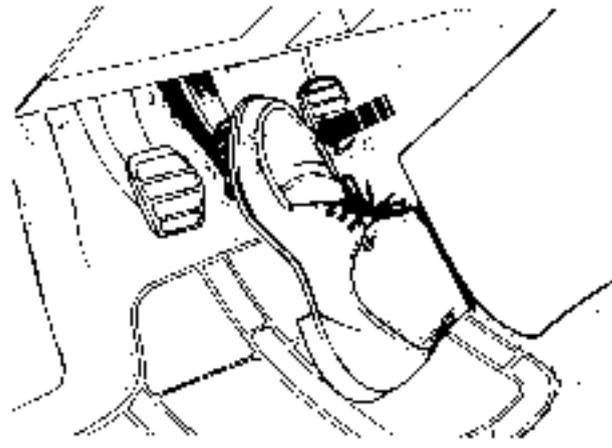
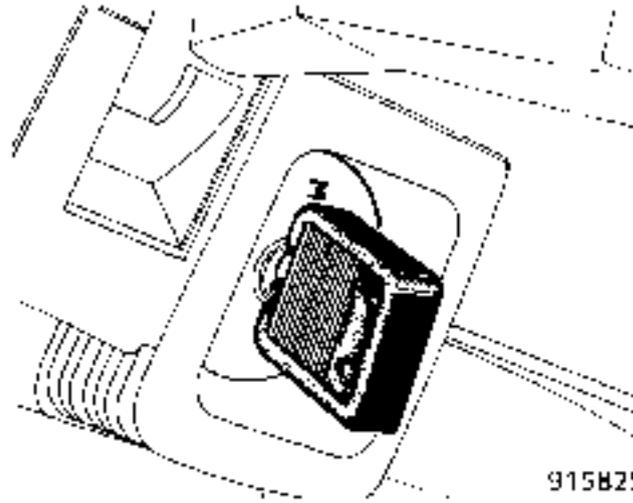
With the vehicle on a two-post lift, check that the wheels turn freely.

- Switch on the ignition until pump stops, then switch off ignition.

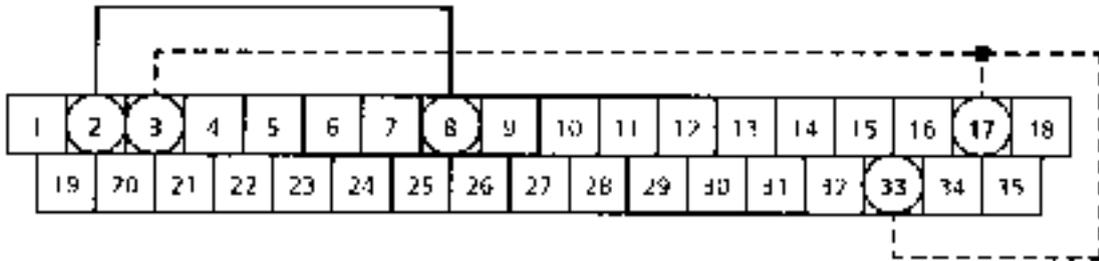
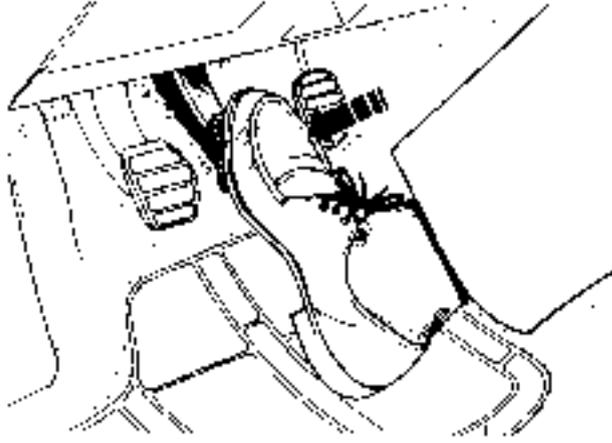
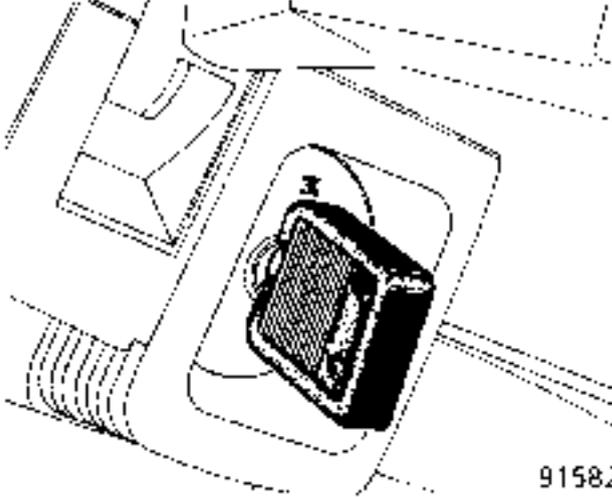
NOTE: Do not energise solenoid valves for longer than 60 seconds; for shunting in computer connector, use tongues, Part No.: 77 01 997 033.

TEST	MEASURING CONDITIONS	CORRECT VALUE
<p>1</p> <p>Front left-hand wheel</p>	<ul style="list-style-type: none"> - Ignition off, terminals (2) and (8) shunted : Shunt terminals (3), (16) and (35).  <ul style="list-style-type: none"> - Depress brake pedal (wheel locks).  <p style="text-align: right;">9158351</p> <ul style="list-style-type: none"> - Switch on ignition.  <p style="text-align: right;">9158251</p>	<p>Wheel turns freely.</p>

DIAGNOSIS

TEST	MEASURING CONDITIONS	CORRECT VALUE
<p>2</p> <p>Front right-hand wheel</p>	<ul style="list-style-type: none"> - Ignition off, terminals (2) and (8) shunted : Shunt terminals (3), (15) and (34).  <ul style="list-style-type: none"> - Press brake pedal (wheel locks).  <p style="text-align: right;">9158351</p> <ul style="list-style-type: none"> - Switch on ignition.  <p style="text-align: right;">9158251</p>	<p>Wheel turns freely.</p>

DIAGNOSIS

TEST	MEASURING CONDITIONS	CORRECT VALUE
Rear wheels	<p data-bbox="425 524 1196 608">- Ignition off, terminals (2) and (8) shunted : Shunt terminals (3), (17) and (33).</p>  <p data-bbox="425 918 1057 961">- Depress brake pedal (wheels lock).</p>  <p data-bbox="1148 1496 1262 1523">9158351</p> <p data-bbox="425 1586 788 1629">- Switch on ignition.</p>  <p data-bbox="1148 2140 1262 2167">9158251</p>	Wheels turn freely.

DIAGNOSIS

COMPONENTS TESTED		DIAGNOSIS	
CHASSIS EARTH	A	Wiring terminal (1) to chassis earth (M19)	
Main relay 428	B	Wiring terminal (3) to terminal (30) of main relay terminal (87a) of main relay to earth (M18)	
HYDRAULIC EARTH	C	Wiring terminal (11) to terminal (7) of connector E, to earth (M18)	
Main relay: rest switch to hydraulic unit earth	D	Wiring terminal (20) to terminal (30) of main relay terminal (87a) of main relay to earth (M18)	
Main relay: coil	E	Wiring terminal (8) to terminal (86) of main relay terminal (85) of main relay to chassis earth (M19)	Main relay coil cut
Front RH wheel inlet solenoid valve	F	Wiring terminal (15) to terminal (6) connector E to earth (M18)	Coil cut
Rear wheel inlet solenoid valve	G	Wiring terminal (17) to terminal (3) connector E to earth (M18)	Coil cut
Front LH wheel inlet solenoid valve	H	Wiring terminal (35) to terminal (1) connector E to earth (M18)	Coil cut
Rear wheel outlet solenoid valve	I	Wiring terminal (33) to terminal (4) connector E to earth (M18)	Coil cut
Front LH wheel outlet solenoid valve	J	Wiring terminal (16) to terminal (2) connector E to earth (M18)	Coil cut
Front RH wheel outlet solenoid valve	K	Wiring terminal (34) to terminal (5) connector E to earth (M18)	Coil cut
Main solenoid valve	L	Wiring terminal (18) to terminal (1) connector B terminal (2) connector B to earth (M18)	Coil cut
Rear RH wheel sensor insulation	M	Check insulation on sensor and wiring	
Front LH wheel sensor insulation	N	Check insulation on sensor and wiring	
Rear LH wheel sensor insulation	O	Check insulation on sensor and wiring	
Front RH wheel sensor insulation	P	Check insulation on sensor and wiring	

DIAGNOSIS

COMPONENTS TESTED		DIAGNOSIS
Circuit : level switch	Q	Check insulation in relation to earth connection: terminal (9) to terminal (1) connector A → terminal (2) connector A → terminal (3) connector D → terminal (5) connector D and terminal (10)
Pressure switch (check insulation)	R	
Auxiliary relay 429 (battery feed)	S	Wiring terminal (2) to terminal (87a) of auxiliary relay terminal (30) of auxiliary relay to 3A fuse
Main relay 428 (operating switch)	T	Battery voltage
	U	30A fuse to terminal (87) of main relay: terminal (27) main relay to terminal (2)
Diode 2	V	Check ABS warning light - terminal (27) connection to bulb Faulty diode Note : Test B should be good
Wheel sensor signal	Y1	If the voltage does not exceed 0.1 volts when the wheel corresponding to the measuring points is turned (abruptly): Check the condition of the connectors/play in wheel hubs
	Y2	
	Y3	
	Y4	

KEY TO OPERATING DIAGRAM ON PAGE 38-45:

TABLEAU = INSTRUMENT PANEL

PDB/POUTRE CHAUFF = DASH/HEATER

POUTRE-ABS = DASH/BULKHEAD/ABS

PDB/LG = DASH/LH SIDE MEMBER

BATTERIE = BATTERY

VERS RELAY DEMARREUR = TO STARTER RELAY

VERS MASSE BLOC HYDRO LG MOTEUR = TO HYDR. UNIT EARTH LH SIDE MEMBER/ENGINE

ANTIVOL = ANTI-THEFT

VERS INFO CONTACT STOP = TO STOP LIGHT SWITCH DATA

RELAY AUX ABS = ABS AUX. RELAY

BOITIER HYDRAULIQUE = HYDRAULIC UNIT

GROUPE ELECTRO MOTEUR POMPE = PUMP ELECTRIC MOTOR ASSEMBLY

RELAIS MOTEUR POMPE = PUMP MOTOR RELAY

MASSE SUR BLOC HYDRAU = EARTH ON HYDRAULIC UNIT

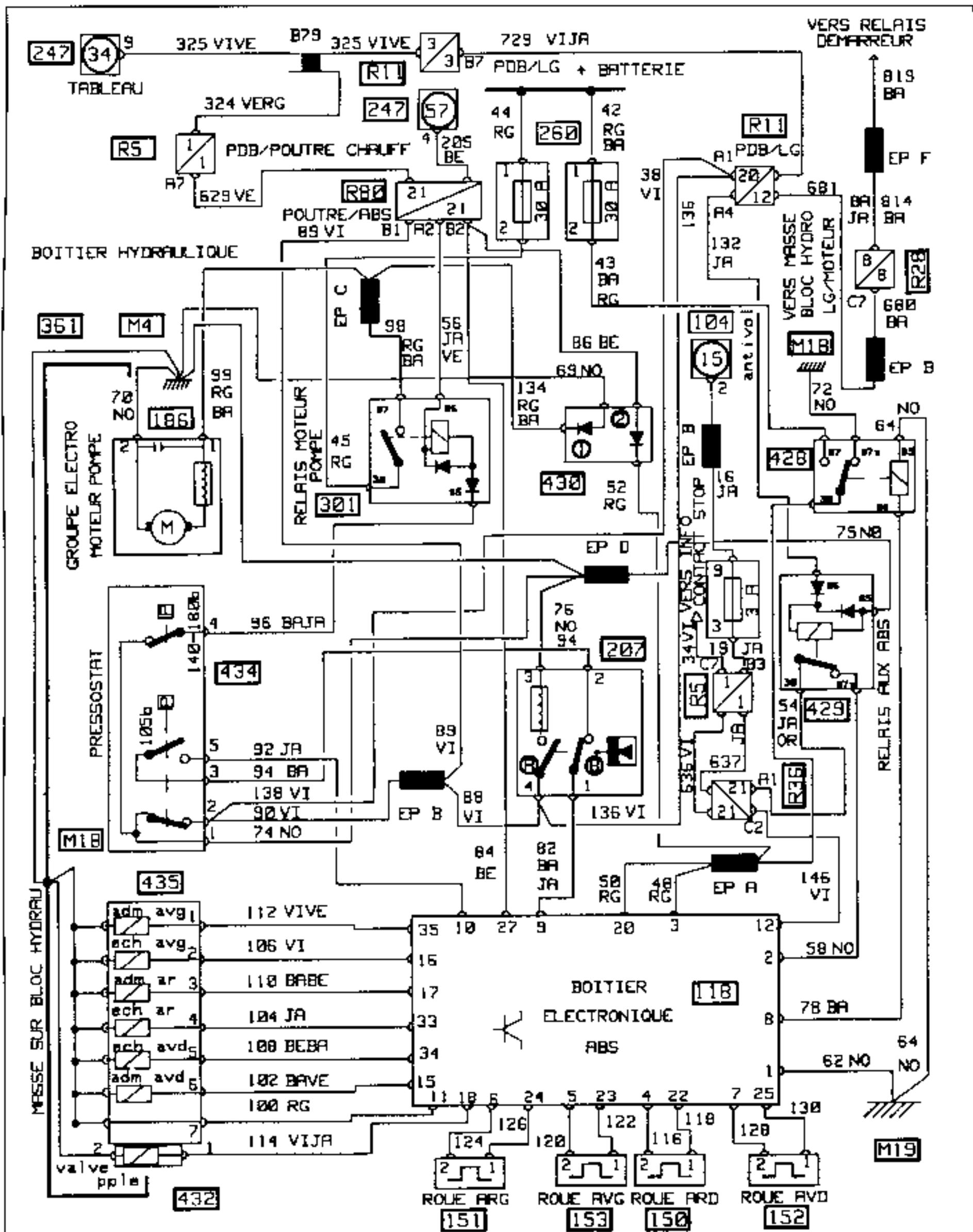
BOITIER ELECTRONIQUE ABS = ABS COMPUTER

VALVE PPLE = MAIN VALVE

ADM. - INLET ECH. = OUTLET ROUE = WHEEL

AVG = FRONT LEFT AVD = FRONT RIGHT ARG = REAR LEFT ARD = REAR RIGHT AR = REAR

OPERATING DIAGRAM



KEY TO WIRING DIAGRAM

- 34** : Brake fluid level warning light
- 57** : ABS voltage
- 104** : Anti-theft switch
- 118** : ABS computer
- 150** : Rear right hand wheel sensor
- 151** : Rear left-hand wheel sensor
- 152** : Front right-hand wheel sensor
- 153** : Front left-hand wheel sensor
- 186** : ABS electric pump assembly
- 207** : Nivocode sensor
- 247** : Instrument panel
- 260** : ABS fuse (30 amps)
- 301** : ABS pump motor relay
- 361** : ABS hydraulic assembly
- 428** : ABS main relay
- 429** : ABS auxiliary relay
- 430** : ABS diode casing
- 432** : Main valve
- 434** : ABS cut-off pressostat
- 435** : ABS solenoid valve unit
- M4** : Bodywork earth
- M18** : ABS earth
- M19** : ABS electronic earth
- R5** : Junction block: dashboard to heater bulkhead
- R11** : Dashboard to left-hand side member
- R28** : Junction block: engine to right-hand side member
- R36** : Junction block: ABS to dashboard
- R80** : Junction block: heater bulkhead to ABS

Special points:

Renault 21, L48 5RYL and B48 RY vehicles with permanent 4-wheel drive and Teves ABS are equipped with a fault finding system incorporated in the computer.

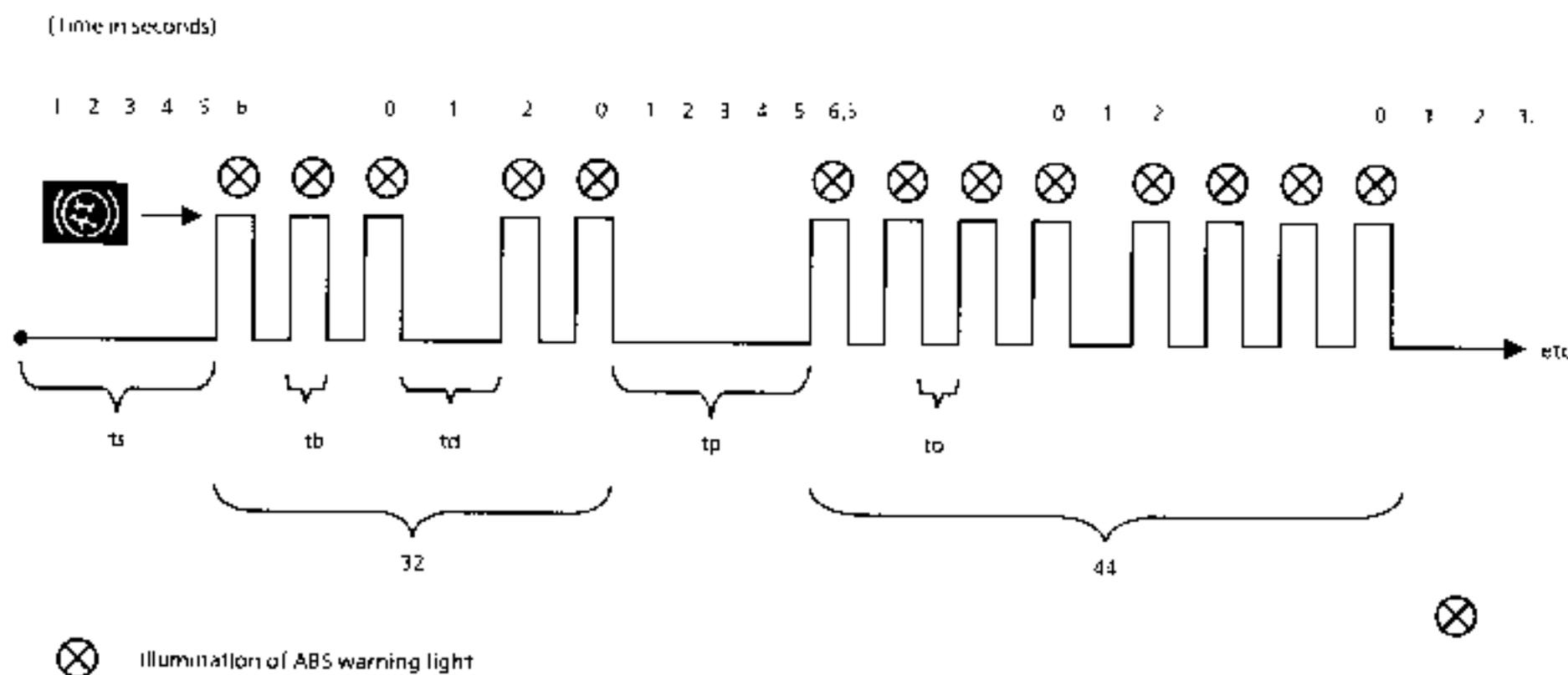
The incident codes are displayed by the ABS warning light on the instrument panel flashing.

To start this light flashing, a shunt must be produced between tracks 2 and 11 of the diagnostic socket 225, then switch on the ignition; if incidents have been stored, the flashing sequence will start 6 seconds later.

DIAGNOSIS**GENERAL**

The codes consist of two figures: tens and units (for example: 32 and 44).

Identifying codes  warning lights flashing.

**Lights flash for:**

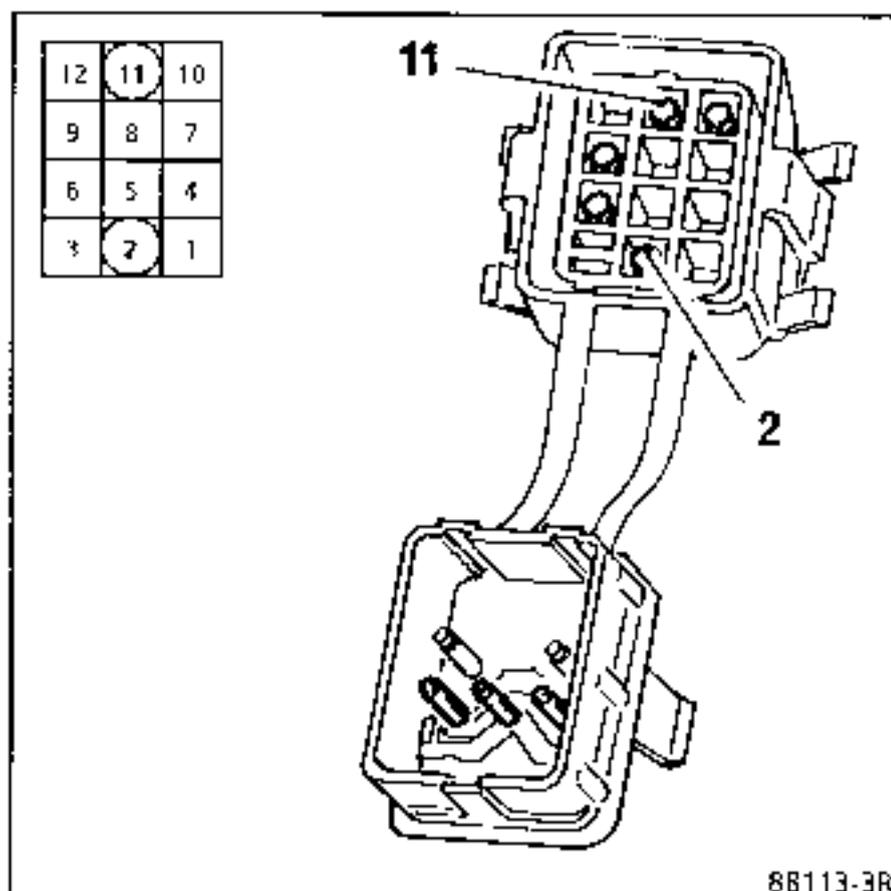
- ts 6.0 seconds : Start time after ignition switched on.
- tb 0.5 seconds : Duration of pulses (warning light illuminates) 
- td 2.0 seconds : Interval between tens and units.
- tp 6.5 seconds : Pause between codes.
- to 0.5 seconds : Interval between two flashes 

The monitoring system detects incidents and intermittent defects either during the normal operation of the ABS system or during a reading and fault finding procedure. This information is then stored and saved in a memory which is not erased when the electrical supply is interrupted (see following pages).

DIAGNOSIS

CODE READING PROCEDURE

- 1 - Have a pen and paper available.
- 2 - Vehicle stopped, ignition off.
- 3 - Make a shunt with the two "PACKARD"  terminals and a lead approx. 8 cm. in length.
- 4 - On diagnostic socket 225, connect tracks 2 and 11 with this shunt shunt (this earths track 11).



- 5 - Switch on the ignition and watch warning light  .
- 6 - After 6 seconds, the flashing sequence for the first code starts.
 Watch warning light  flash, count the pulses and write down the 2-figure number obtained. Each time there is a 6.5 second pause between the codes flashing to enable you to note down the number.
 After each pause, warning light  indicates the following code number and so on until all the codes stored have been read, which is signalled by the warning light  staying extinguished.
- 7 - To conclude the reading procedure, disconnect the shunt from diagnostic socket 225 and switch off the ignition.
- 8 - Compare the codes noted with the reference list below and perform the additional checks and any repairs indicated.

DIAGNOSIS

ATTENTION

If the codes have not all been noted down correctly, the reading procedure may be repeated. Nevertheless, avoid travelling with the vehicle at more than 18 mph (30 km/h) between two reading procedures so as not to erase the data stored in the computer.

EXCEPTIONS TO THE NORMAL READING PROCEDURE

- 1 - If warning light  illuminates for 1.7 seconds and then goes out permanently after the reading procedure has started, no incident/defect has been recorded in the memory and the system is operating correctly.
- 2 - If a high priority solenoid valve incident occurs during the reading procedure, the monitor is made aware of this incident and stops after displaying the first code (if this was a code indicating a solenoid valve incident, this data will be overwritten by the new solenoid valve incident code). If a solenoid valve incident occurs later during the continuous code sequence, the monitor stops but only when it has finished displaying the current code. In both cases, the solenoid valve incident which has occurred must be remedied and it is recommended that the complete reading procedure be repeated from the beginning.
- 3 - If the car is driven during the fault-finding reading procedure, the monitor stops as soon as the vehicle speed exceeds 5 mph (8 km/h) or if three wheels have rotated at more than 5 mph (8 km/h). This may lead to incorrect interpretation of the codes interrupted during the reading procedure.

ERASING THE COMPUTER MEMORY

The ABS system monitor has an automatic memory cancelling function. Erasure is triggered in two stages as follows:

- 1 - The reading procedure must reach its conclusion in the normal manner, i.e. all the codes stored have been displayed. To prepare the computer for erasure, a normal reading procedure merely has to be triggered.
- 2 - Then remove the shunt from the diagnostic socket, switch on the ignition and drive the vehicle at a speed above 19 mph (30 km/h). This will erase all the information stored and the car will return to normal ABS operating mode.

DIAGNOSIS

LIST OF INCIDENT CODES : High priority incidents

CODE (1)	COMPONENT	INCIDENT	REPAIR (2)
11	Harness.	Electrical interference.	Check harness correctly fitted.
12	Computer.	Faulty.	Replace computer.
21 22 23 24 25 26 27	Main solenoid valve. Front left-hand inlet solenoid valve. Front left-hand outlet solenoid valve. Front right-hand outlet solenoid valve. Front right-hand outlet solenoid valve. Rear inlet solenoid valve. Rear outlet solenoid valve.	Harness solenoid valve or power transistor in computer incident.	Check solenoid valve indicated, its harness and connector terminals (cut, shorting). If correct, change computer.
31 32 33 34	Front left-hand sensor Front right-hand sensor Rear right-hand sensor Rear left-hand sensor	Winding or sensor cable cut, connector open.	Check sensor indicated, its harness and connector (open circuit or shorting). If correct, change computer.
35 36 37 38	Front left-hand sensor. Front right-hand sensor. Rear right-hand sensor. Rear left-hand sensor.	Sensor winding or cable circuit open or intermittent shorting. Air gap between sensor and target not to specification. Sensor incident detected by continuity test (open circuit or shorting) of wheel speed at speeds above 25 mph (40 km/h).	Check sensor indicated, its harness and connector. Check sensor/target air gap at several points on the sensor target. Check sensor earth lead, computer earthing, hub vibration and sensor mounting.

DIAGNOSIS

LIST OF INCIDENT CODES : High priority incidents (continued)

CODE (1)	ELEMENT	INCIDENT	REPARATION (2)
41 42 43 44	Front left-hand sensor. Front right-hand sensor. Rear right-hand sensor. Rear left-hand sensor.	No sensor signal, sensor/target air gap too large. This fault is detected by comparing the wheel speeds.	Check that sensor target is fitted and check air gap.
51 52 53 54	Front left-hand outlet solenoid valve. Front right-hand outlet solenoid valve. Rear outlet solenoid valve. (Identical to 53).	Drop in pressure and wheels reacting at speeds greater than 25 mph (40 km/h). Defect resulting from incorrect hydraulic operation of valve.	Check sensor leads corresponding to solenoid valve and computer earth.
55 56 57 58	Front left-hand sensor. Front right-hand sensor. Rear right-hand sensor. Rear left-hand sensor.	Sensor signal absent long time (long-term monitoring of duration of test).	Check position of sensor target fitted and air gap (sensor detached).
61	Nivocode sensor. Pressostat.	Earth shorting on leakage current between battery positive terminal and cut-off pressostat (434) or (207).	Check nivocode sensor, pressostat and their harness.
65	Longitudinal acceleration sensor.	Circuit open or shorting.	Check sensor, its harness, connector and mounting.

DIAGNOSIS

LIST OF INCIDENT CODES : Low priority incidents

CODE (1)	COMPONENT	INCIDENT	REPAIR (2)
71 72 73 74	Front left-hand sensor Front right-hand sensor Rear right-hand sensor Rear left-hand sensor	Drop in pressure and wheels reacting at speeds of less than 25 mph (40 km/h). Long-term detection of electrical interference.	Check earth lead of sensor indicated, computer earth and solenoid valve corresponding to sensor.
75 76 77 78	Front left-hand sensor Front right-hand sensor Rear right-hand sensor Rear left-hand sensor	Hub vibrating, excessive play or air gap too small. Sensor incident detected by checking speed continuity of wheel at speeds less than 25 mph (40 km/h).	Check earth lead of sensor indicated, computer earth hub vibrations, sensor mounting, its air gap and harness.

- 1 - If warning light  remains permanently illuminated without indicating an incident code, it is likely that the computer is faulty. Check first of all the electrical supply, if this is correct, replace the computer.
- 2 - If the recommended repairs are not successful, replace the computer.

COMMENT:

Codes 71 and 78 indicate low priority incidents which only cause temporary and/or partial malfunctions. It is possible that the driver is not even aware of these incidents but they are nevertheless stored in the computer memory.

DIAGNOSIS

WARNING LIGHT  indication

WITHOUT PRODUCING AN INCIDENT CODE

The on-board fault finding system can only check incidents or errors producing an electrical signal. Processing of the error code is triggered by the input of the fault finding triggering process and is displayed by warning light  .

In order to avoid incorrect fault finding results, all the components concerned must operate correctly.

Cases when the lighting-up of the warning light does not correspond to an error code are listed below :

1 - ALARM COMMUTATOR TEST CYCLE

When the ignition has been switched on warning light  illuminates for approximately 1.7 seconds, then flashes for approximately 1 second to check the connection to the level and pressure alarm commutators.

In this case, warning light  continues to flash, this connection to the commutators has been interrupted or is shorting with the vehicle earth.

2 - INCORRECT ASSEMBLY

If the computer is not fitted correctly to the main connector (or if the connection is faulty), the main relay stays on the normally closed contact while the ignition is switched on.

In this case, warning light  illuminates permanently via the normally closed contact of main relay 428.

3 - COMPUTER INCIDENTS

3.1 Incident detected by internal time check

Some hardware errors cause the computer to be deactivated after an internally set time period has elapsed. Warning light  illuminates simultaneously.

As this action cuts off the main computer feed, it can neither record nor output the error codes.

3.2 Short circuit when fault finding trigger instruction input

If the fault finding trigger input is earthed (shunt tracks 2 to 11) via the diagnostic socket, the computer switches to reading the error codes stored when the ignition is switched on and if one or more error code(s) has (have) been stored in the memory. If the vehicle accelerates and reaches a speed of 5 mph (8 km/h) whilst there is still a short circuit on the trigger input earth, the computer is deactivated and warning light  illuminates.

DIAGNOSIS

3.3 Warning light  connection defects

3.3.1 Warning light  illuminates if there is a short circuit on its earth lead, without however, impeding the operation of the anti-lock braking system. The computer cannot detect this short circuit.

3.3.2 Warning light  feed circuit faulty

If there is a defect on the feed circuit inside the computer, the warning light  will either be illuminated or permanently extinguished depending on the type of internal defect.

3.4 Warning light incorrectly activated (without incident detected)

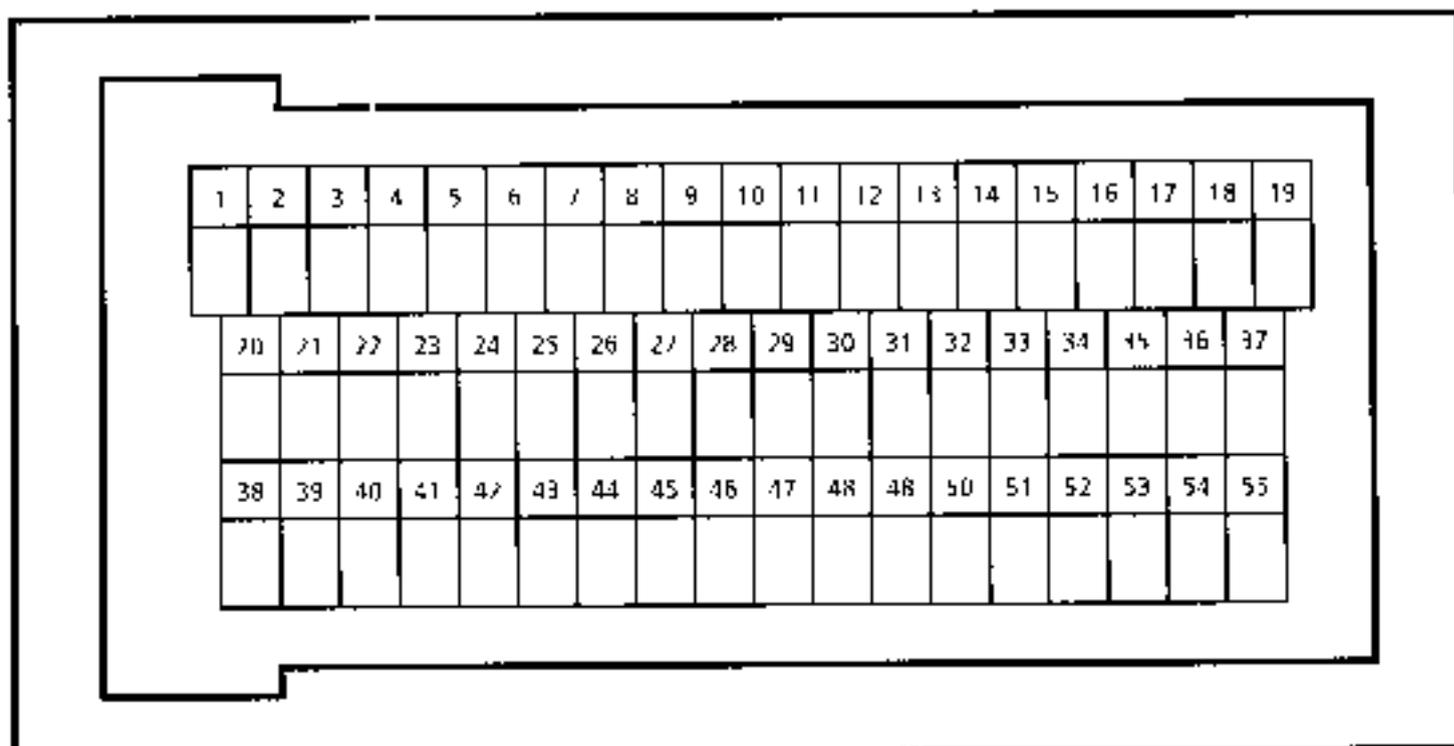
3.4.1 If there are intermittent transitory interruptions on the contacts or feed wires of warning light , it may flash erratically.

3.4.2 If warning light  bulb is burnt out or damaged in any way, it is impossible for the data contained in the computer to be displayed.

ELECTRICAL TESTS TO BE PERFORMED ACCORDING TO DIAGNOSTIC CODE

Connector (118)

The tests are performed at the terminal end (the drawings shows the harness end).



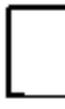
1 - SWITCHES OPEN

Connector (118)

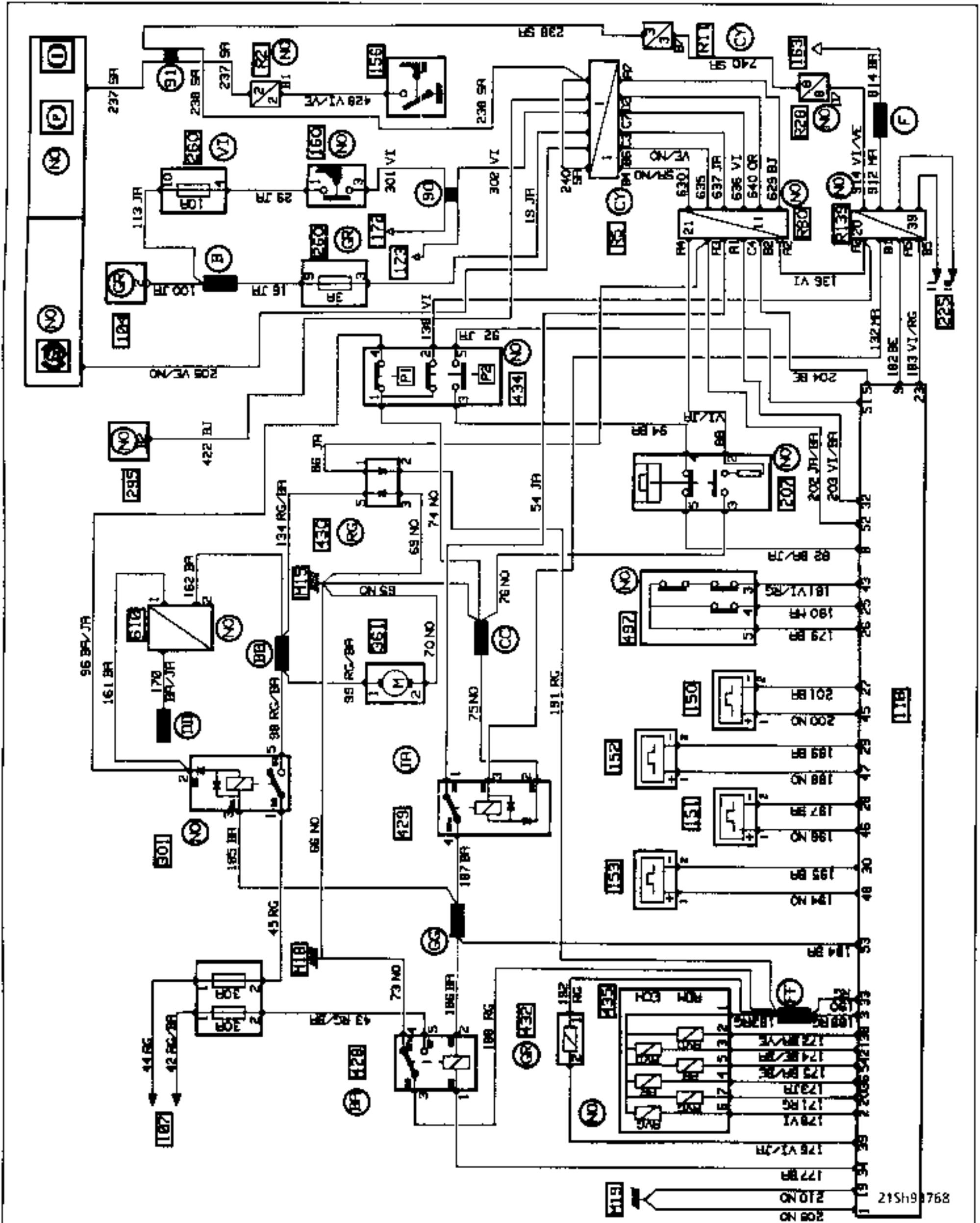
TESTS	TERMINALS (118)	VALUES	CODE NUMBER
EARTH	1 	0 to 1 Ω	
EARTH	19 	0 to 1 Ω	
Rear RH sensor (150)	27 45	800 to 1400 Ω	33 37 57
Rear LH sensor (151)	28 46	800 to 1400 Ω	34 38 58
Front RH sensor (152)	29 47	800 to 1400 Ω	32 36 56
Front LH sensor (153)	30 48	800 to 1400 Ω	31 35 55
Relay coil (428)	34 53	50 to 100 Ω	
Harness	3 33	0 to 1 Ω	
Relay normally closed contact (428)	3 	0 to 1 Ω	
Main solenoid valve (432)	3 39	2 to 6 Ω	21
Front LH solenoid valve	3 2	3 to 5 Ω (outlet)	23
Front LH solenoid valve	3 20	5 to 7 Ω (inlet)	22
Rear solenoid valve	3 36	3 to 5 Ω (outlet)	26
Rear solenoid valve	3 54	5 to 7 Ω (inlet)	27
Front RH solenoid valve	3 21	3 to 5 Ω (outlet)	25
Front RH solenoid valve	3 38	5 to 7 Ω (inlet)	24
Accelerator sensor (497)	26 43 26 25	0 to 1 Ω Note : Vehicle to 1 Ω must be horizontal	65
Pressostat circuit (434) and minimum level (207)	8 51 8 51	0 to 1 Ω : With pressure present > 20 kv : When pressure absent	61

DIAGNOSIS

2 - SWITCHES CLOSED

TESTS	TERMINALS (118)	VALUES
Diode circuit (430)	52 3	0.5 to 1V ABS warning light should be illuminated
Brake circuit (switch) (610)	32 32	0 v brake raised 12 v brake depressed
Dog clutch warning light circuit (295)	5 and 	<p>Position of dog clutch switch C</p> <p>1 Raised → Read 12 volts</p> <p>2 Depressed  → If dog clutch warning light permanently illuminated: read 0 V</p> <p>→ If dog clutch warning light flashes: variable voltage to illuminate warning light C permanently. Place vehicle in first or reverse (press vehicle gently if necessary): read 0 V.</p>

WIRING DIAGRAM



KEY TO WIRING DIAGRAM

- 104 : Ignition switch
- 107 : Battery
- 118 : ABS computer
- 150 : Rear right-hand wheel sensor
- 151 : Rear left-hand wheel sensor
- 152 : Front right-hand wheel sensor
- 153 : Front left-hand wheel sensor
- 156 : Handbrake switch
- 160 : Stop light switch
- 163 : Starter (data)
- 172 : Rear right-hand stop
- 173 : Rear left-hand stop
- 207 : Low brake fluid level
- 225 : Diagnostic socket
- 247 : Instrument panel
- 260 : Fuse box
- 295 : Dog clutch control warning light unit
- 301 : ABS electric pump assembly relay
- 361 : ABS hydraulic assembly
- 428 : ABS main relay
- 429 : ABS auxiliary relay
- 430 : Diode unit
- 432 : Main solenoid valve
- 434 : Cut-off pressostat
- 435 : Solenoid valve unit
- 497 : 4 x 4 ABS acceleration sensor
- 610 : ABS diagnostic switch

Junctions

- R2 : Dashboard/rear left-hand
- R5 : Dashboard/heater bulkhead
- R11 : Dashboard/left-hand side member
- R28 : Engine/left-hand side member
- R80 : Heater bulkhead, ABS
- R139 : Engine/ABS

Earth

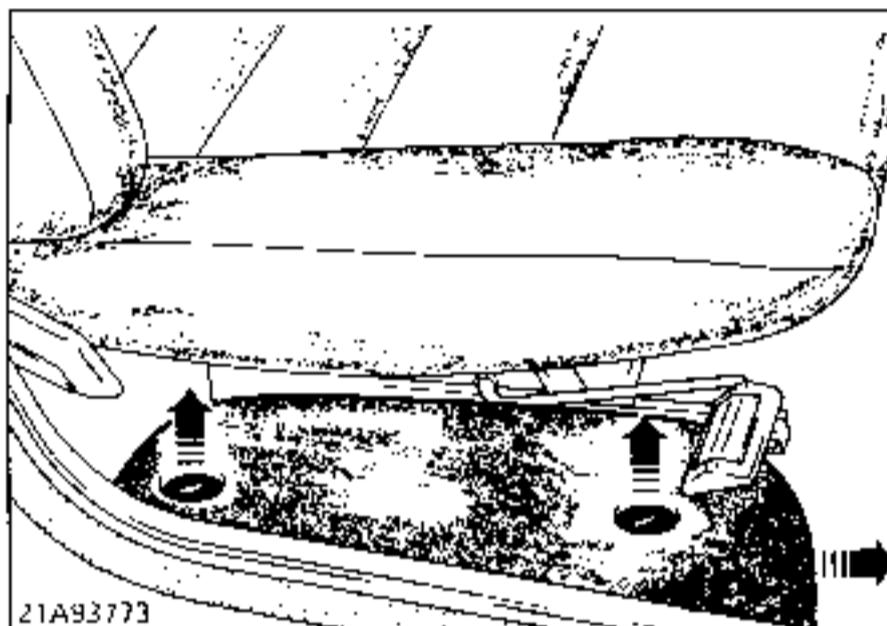
- M15 : Heater bulkhead earth
- M18 : ABS earth
- M19 : ABS electronic earth

CONSTITUENT COMPONENTS (specific to 4 x 4)**1) 55-track computer :**

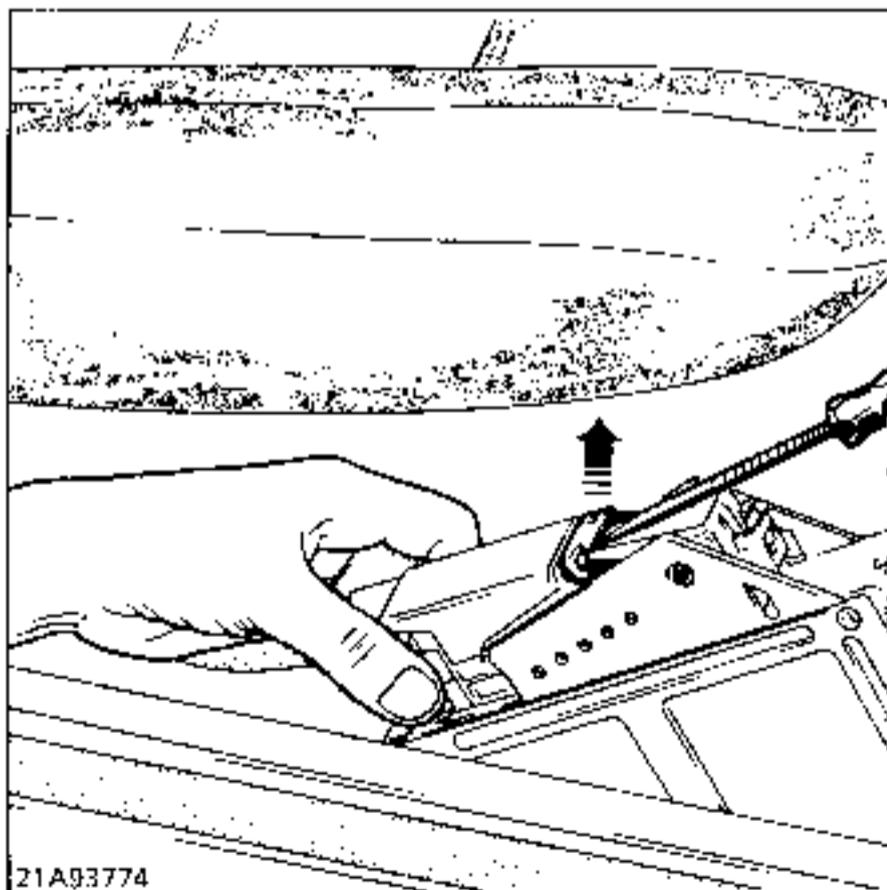
It is located under the front RH seat.

REMOVING

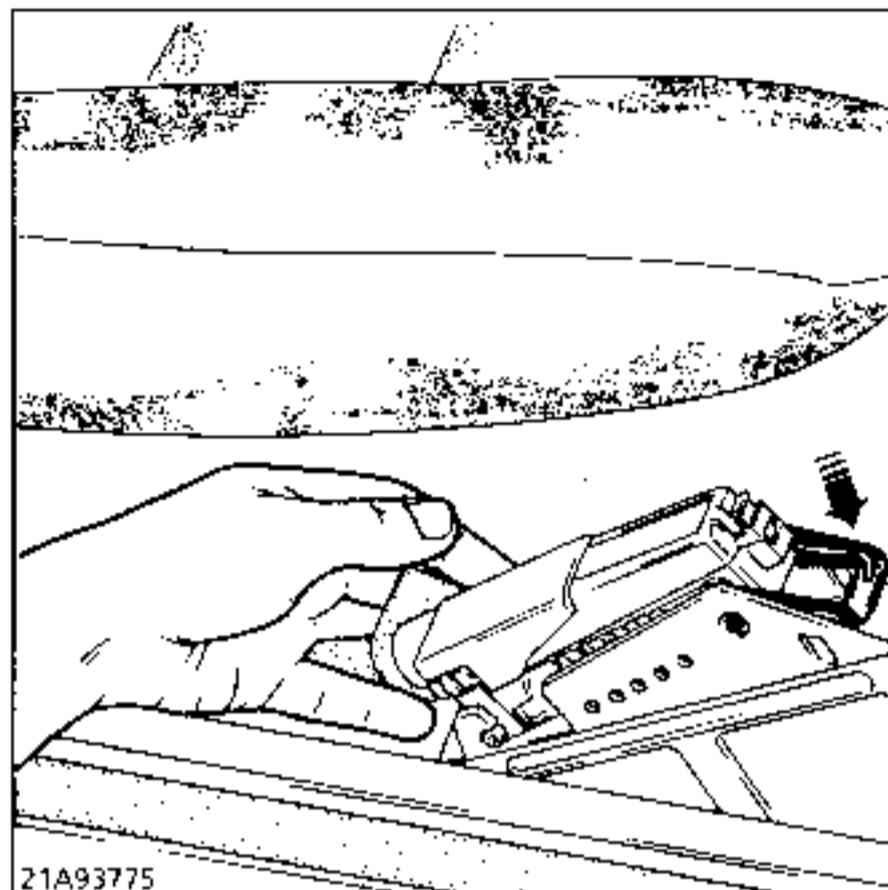
Unclip the protective cover by pulling it upwards then release it by moving it towards the front of the vehicle.



Release the computer and raise the catch with a screwdriver.



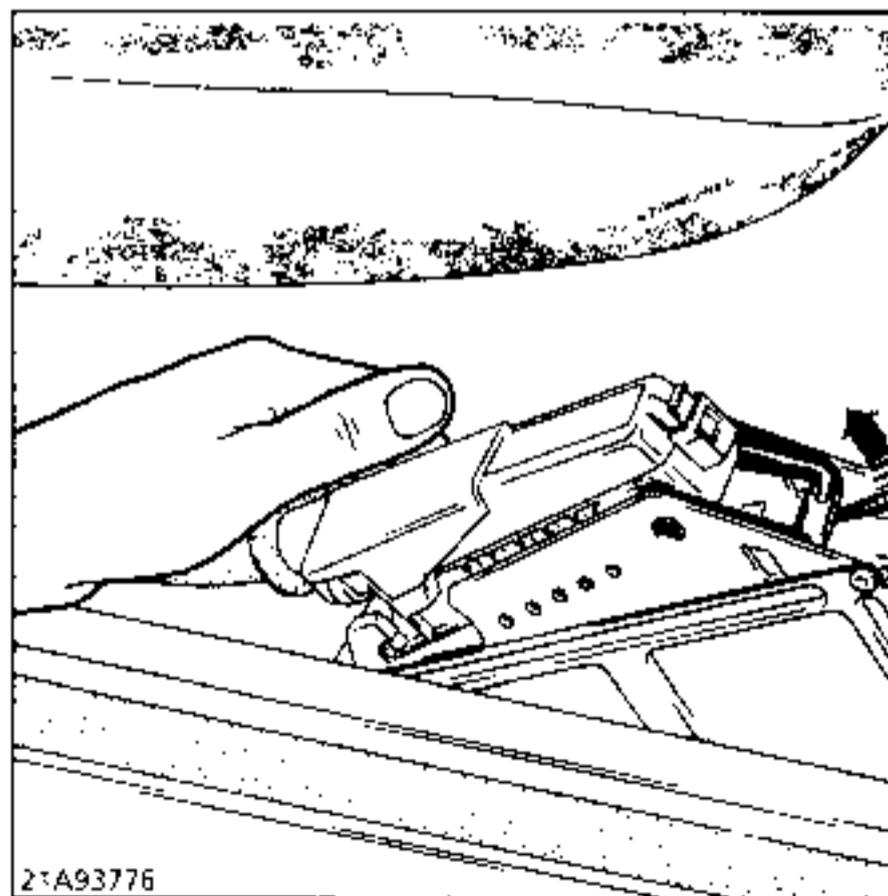
Turn the catch and press.



Remove the computer.

REFITTING

Position the connector, lift the catch with a screwdriver and turn it completely



Fit the computer and protective cover in place.

2) Longitudinal acceleration sensor

It is located under the radio or radio compartment in the centre console.

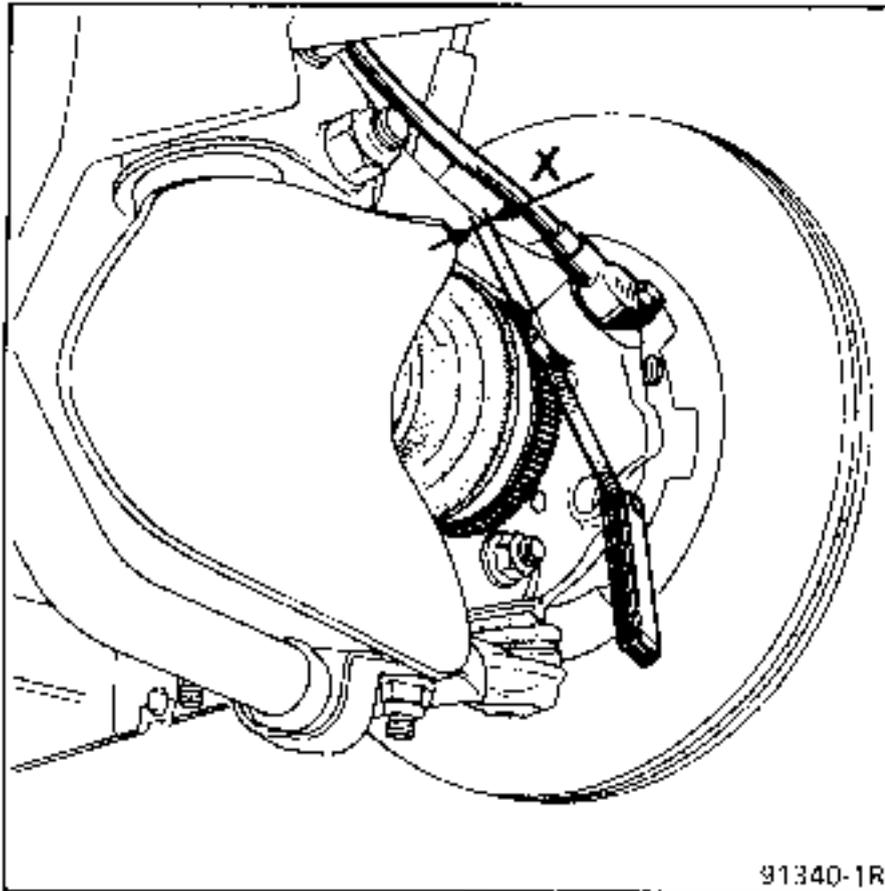
ATTENTION : It must be mounted facing the correct direction (→ facing front of vehicle).

ADDITIONAL CHECKS

I - CHECKING THE SENSOR AIR GAP

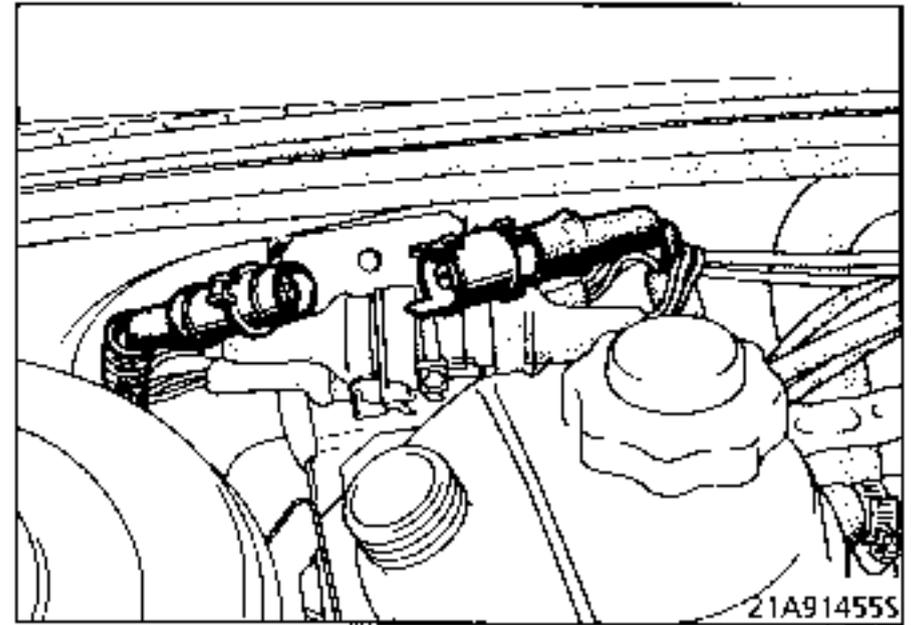
Target / sensor air gap

X = 0.6 mm

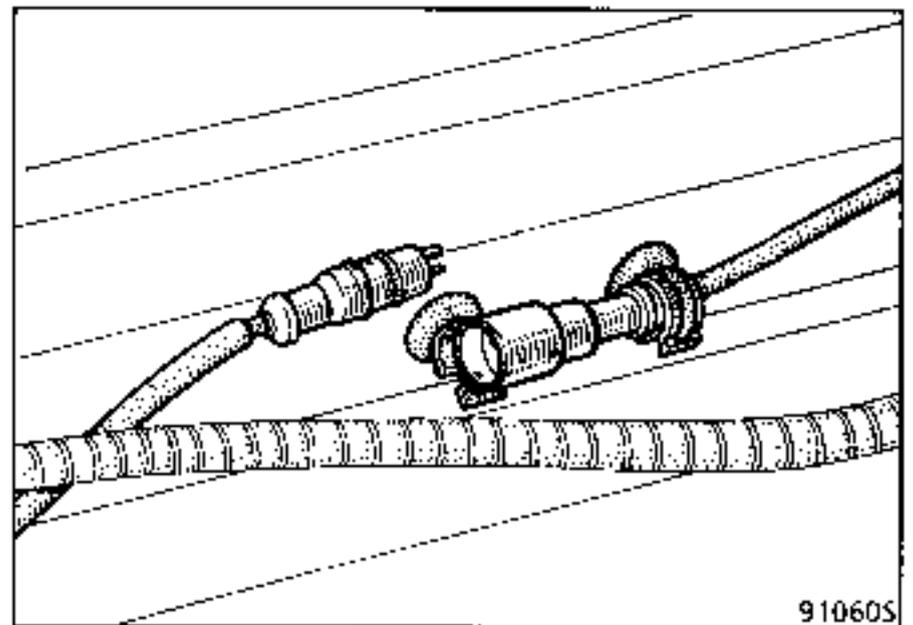


II - CHECKING THE WHEEL SENSOR CONNECTORS

Front connectors



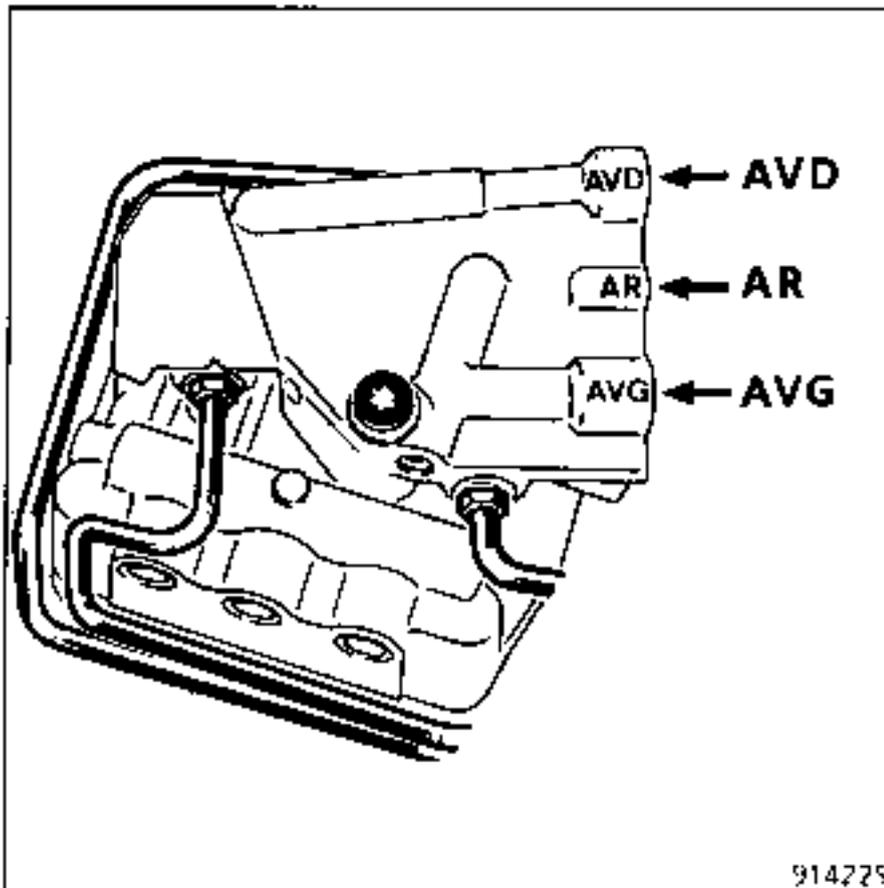
Rear connectors



If the ABS warning light illuminates intermittently, check first of all the wheel sensor connectors and clean them with **NETELEC**, Part No. 77 01 408 464.

ADDITIONAL CHECKS

III - REFERENCE MARKS ON HYDRAULIC UNIT HOSES



V - HYDRAULIC UNIT CONNECTOR PINS

"Nivocode" connector (A)

- 1 : ABS computer track 9
- 2 : Cut-off pressostat track 3
- 3 : Cut-off pressostat track 1, chassis earth and terminal 85 of auxiliary relay
- 4 : Cut-off pressostat track 2 and illumination of warning light 
- 5 : Not used

"Main solenoid valve" connector (B)

- 1 : ABS computer track 18
- 2 : Hydraulic assembly earth

"Pump motor" connector (C)

- 1 : Pump relay terminal 87
- 2 : Chassis earth

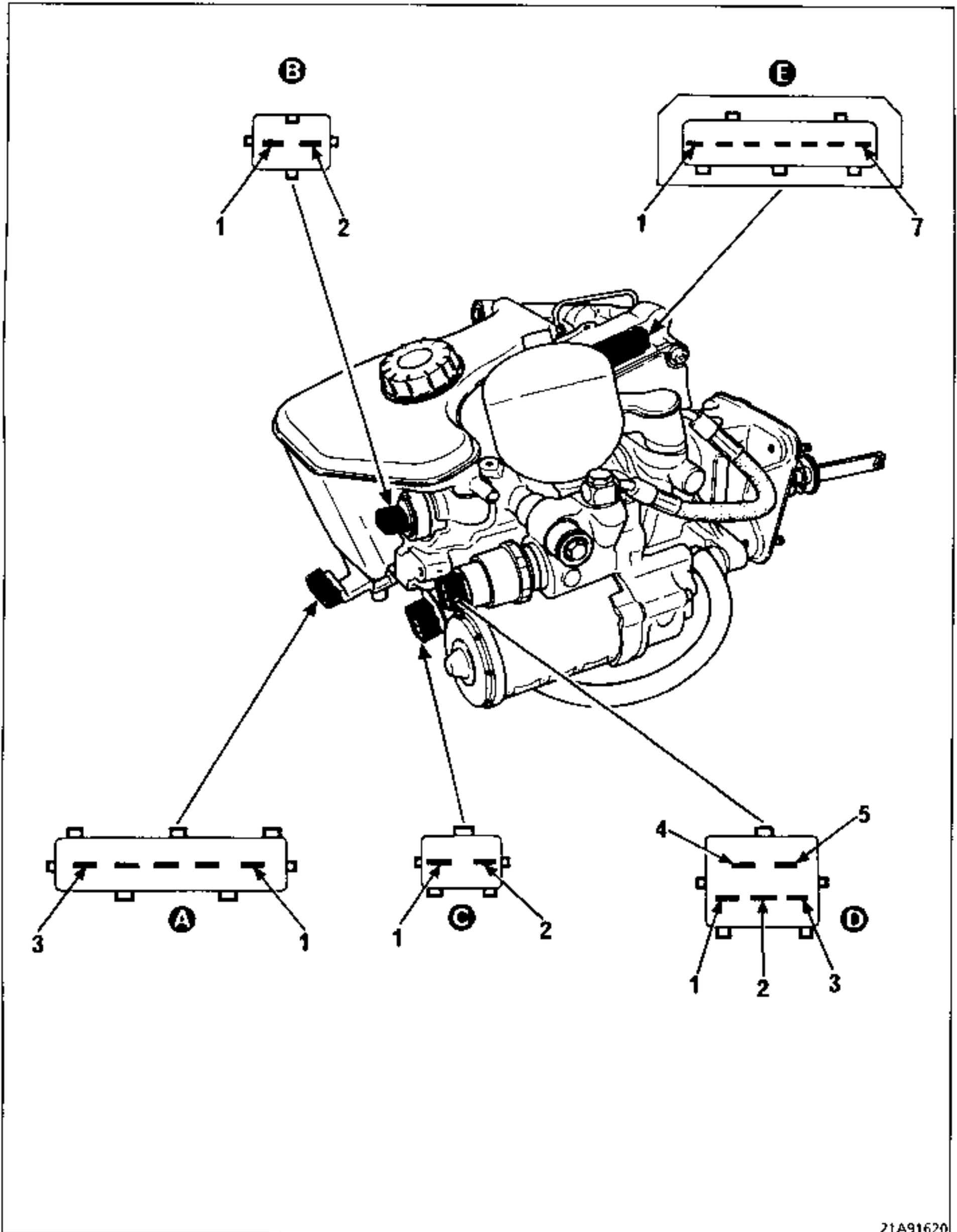
"Cut-off pressostat" connector (D)

- 1 : Nivocode track 3, chassis earth and auxiliary relay terminal 85
- 2 : Nivocode track 4 and illumination of warning light 
- 3 : Nivocode track 2
- 4 : Pump relay terminal 85
- 5 : ABS computer track 10

"Solenoid valve unit" connector (E)

- 1 : ABS computer track 35
- 2 : ABS computer track 16
- 3 : ABS computer track 17
- 4 : ABS computer track 33
- 5 : ABS computer track 34
- 6 : ABS computer track 15
- 7 : ABS computer track 11

ADDITIONAL CHECKS



ADDITIONAL CHECKS

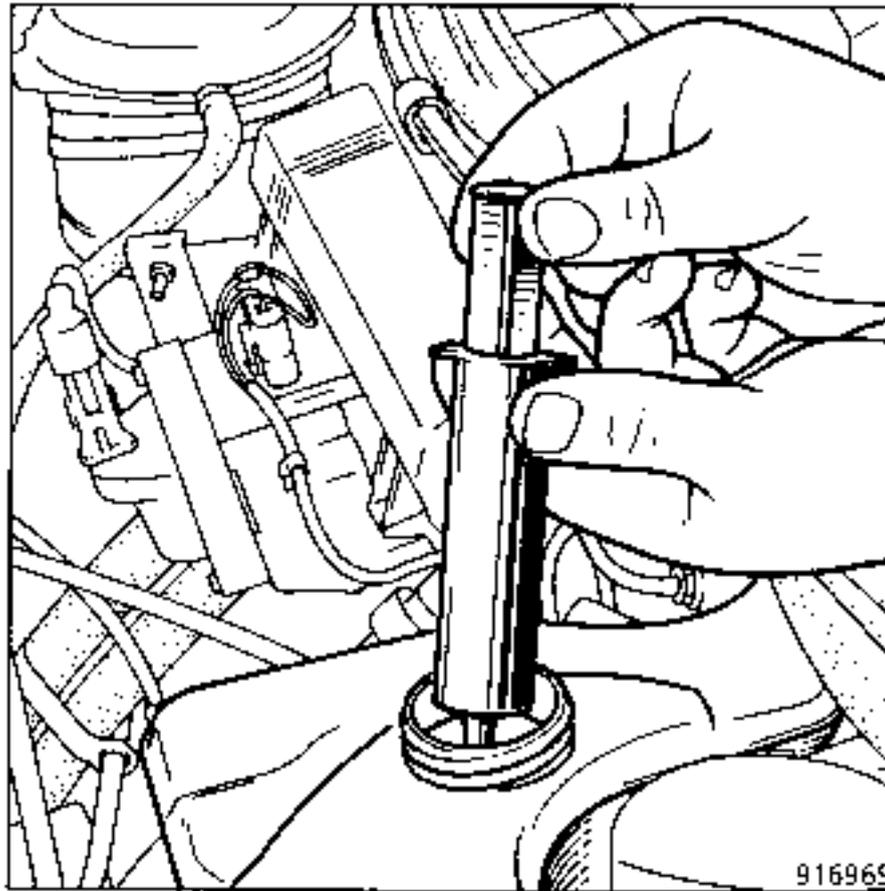
VI- OPERATION OF DOUBLE WARNING DEVICE
INCORPORATED IN THE BRAKE FLUID
RESERVOIR

NOTE: The double warning device is incorporated in the reservoir, if it does not operate, replace the entire reservoir.

CHECKING

Switch on the ignition.

Drain the reservoir using a clean syringe until the fluid is below the MIN mark.



-  warning light illuminates.

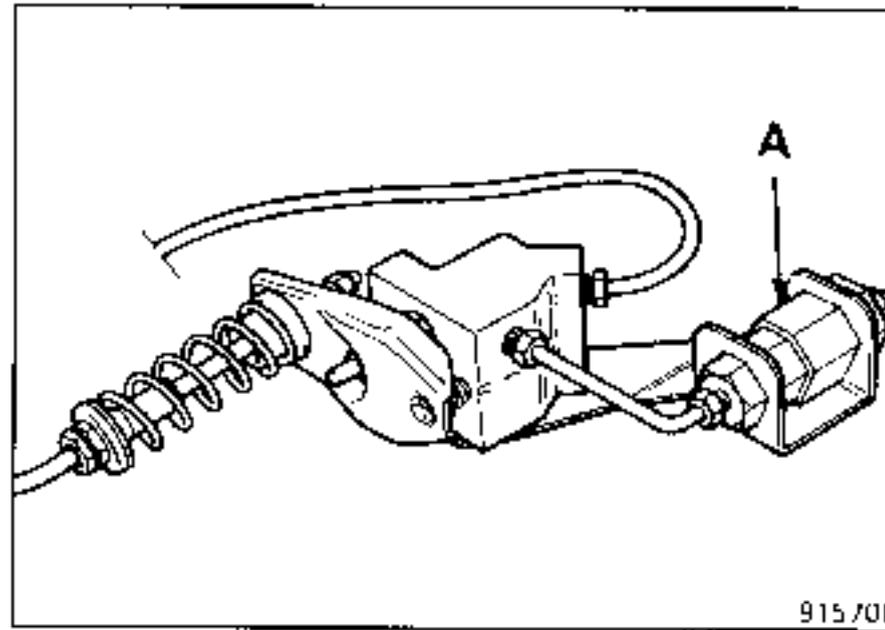
Continue to remove the fluid.

-  illuminates in turn.

If there is a defect: one or other of the warning lights fails to illuminate, check the wiring (see paragraph IV). If the wiring is good, replace the reservoir.

SPECIAL POINT CONCERNING BRAKE COMPENSATOR

Vehicles fitted with the Teves ABS have a delay valve (A) near the compensator, on a mounting lug.



This valve enables the increase in pressure on the rear axle to be slightly offset.

The method for removing the compensator-delay valve assembly is identical to the method described in section 37.

BRAKE COMPENSATOR SETTING VALUES

Vehicles are equipped with a delay valve and single compensator which is dependent on the load. They are checked and adjusted with the vehicle unladen, fuel tank full and driver on board.

Vehicle type	Amount of fuel in tank	Test pressure (Bar)	
		Front	Rear
B48W B488 B483 L48L B48K B48Y B48Q B487 B48P	L48W L488 L483 L485 L48K L48Y L48Q L487 L48P	<p>The diagram shows a gauge needle with a black adjustment cap. A tool is shown adjusting the cap. The diagram is labeled '9D9665'.</p>	100 → 38 ⁺⁰ - 9
B48R B48Y	L48R L48Y		100 → 39 ⁺⁰ - 8
K483 K487 K48W	K48K K488		100 → 43 ⁺⁰ - 9
K48R			100 → 39 ⁺⁰ - 9

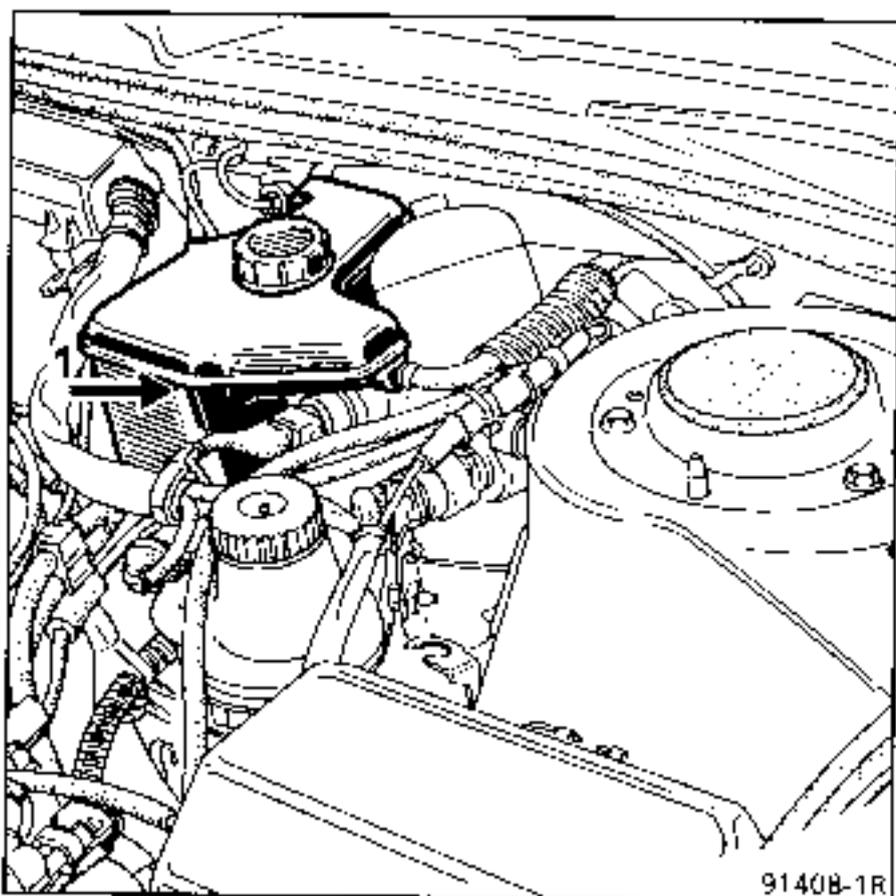
CHECKING THE LEVEL - BLEEDING

I CHECKING THE LEVEL

The brake fluid level is checked with the ignition switched on. When the fluid is at the MAX level it means that the accumulator is full.

Switch on the ignition and wait for the pump to stop.

If necessary, top up the brake fluid level to the MAX mark (1) (vehicle with new brake pads).



NOTE: The brake fluid reservoir capacity is designed to compensate the liquid from the accumulator when it has been emptied.

II BLEEDING

ESSENTIAL SPECIAL TOOLING

M.S. 815	Bleeding apparatus
----------	--------------------

The ABS consists of two types of quite distinct circuits:

- static circuit for the front wheels controlled by a tandem master cylinder;
- dynamic circuit for the rear wheels controlled by the hydraulic amplifier.

Precaution to be taken before operating on the bleed screws.

NEVER open the rear wheel cylinders when the brake pedal is depressed and the accumulator full.

The accumulator, which controls the dynamic circuit of the rear brakes, is loaded at 180 bars. It **MUST** be emptied by allowing the pressure to drop by pumping the brake pedal 20 times (until it becomes hard), before undertaking any work on the system.

- Do not switch on the ignition as starting the hydraulic pump will cause the accumulator to fill.

1) Bleeding the front static circuit

- Accumulator empty
- Ignition switched off

Fill the reservoir and fit in place the container from tool **M.S. 815**.

Connect two lines of tool **M.S. 815** to the bleed screws on the two front hydraulic cylinders.

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

Open:

- the supply;
- the compressed air valve;
- the bleed screw on the front right-hand wheel and wait approximately 20 seconds for the liquid to drain out;

CHECKING THE LEVEL - BLEEDING

Open:

- the bleed screw on the front left-hand wheel and wait approximately 20 seconds for the liquid to drain out.
- Take no account of air bubbles in the bleed apparatus hoses.

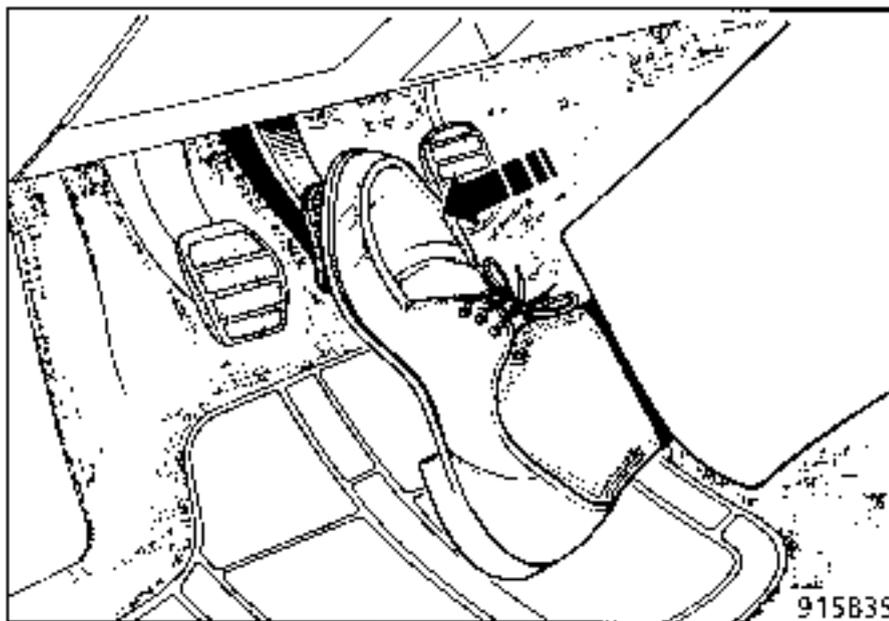
2) Bleeding the rear dynamic circuit:

- accumulator empty
- ignition switched off

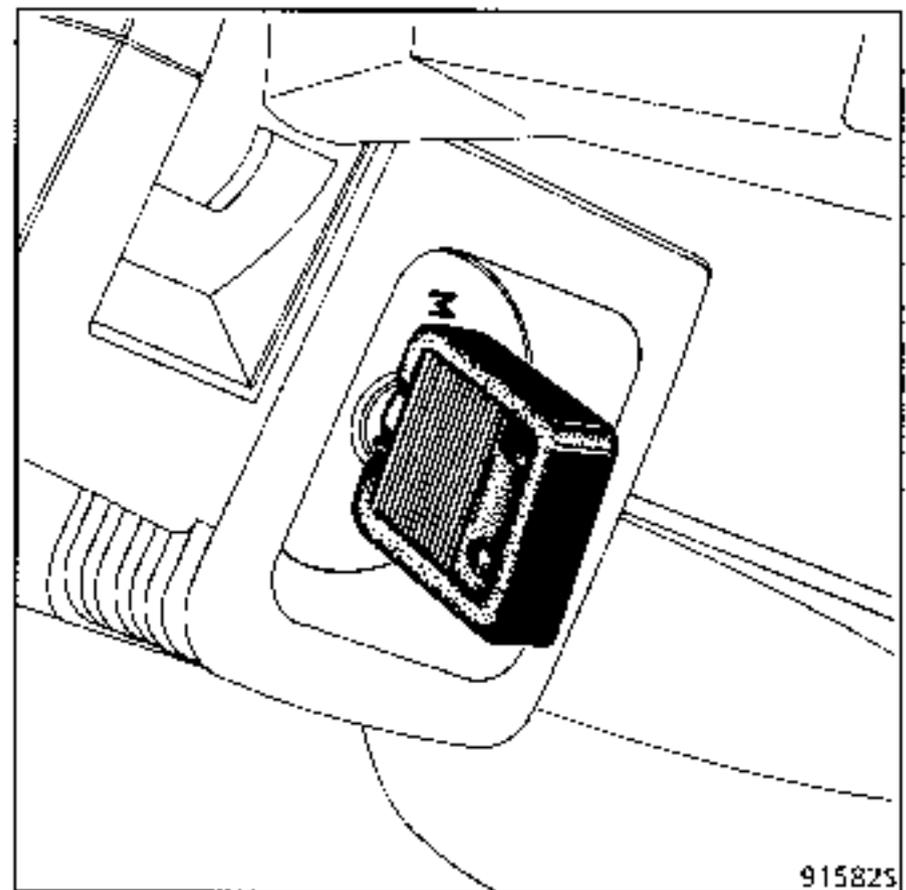
Place a hose connected to a container on the rear right-hand wheel.

Open the bleed screw.

Press down lightly on the brake pedal.



Switch on the ignition.



NOTE : Starting the hydraulic pump causes the brake fluid to flow.

Wait for a continuous stream of liquid to flow out without any bubbles then release the pedal.

Tighten the bleed screw and switch off the ignition.

Proceed in the same way on the other side.

Switch on the ignition and wait for the pump to stop.

If necessary, top up the brake fluid level to the MAX mark (1) (vehicle with new pads).

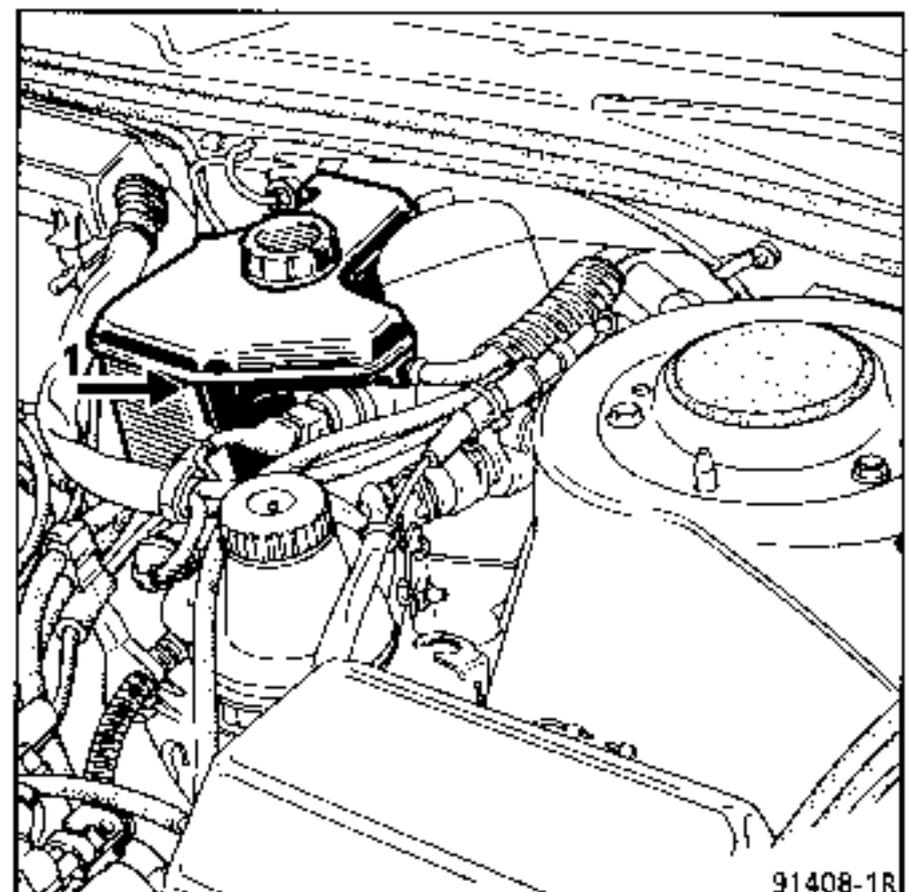


DIAGRAM SHOWING CONNECTIONS FOR BLEEDING OPERATION

I FRONT CIRCUIT

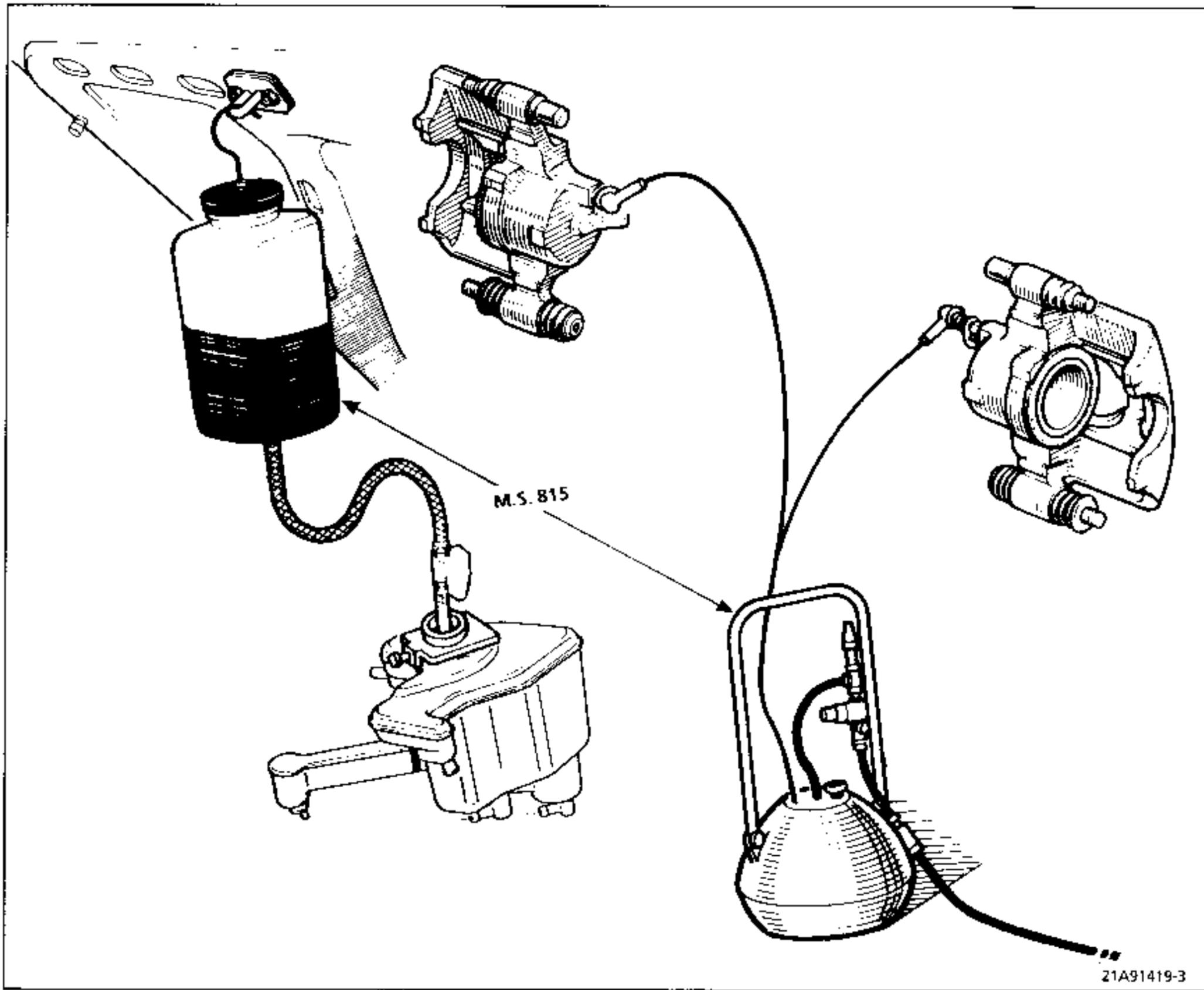


DIAGRAM SHOWING CONNECTIONS FOR BLEEDING OPERATION

II REAR CIRCUIT

