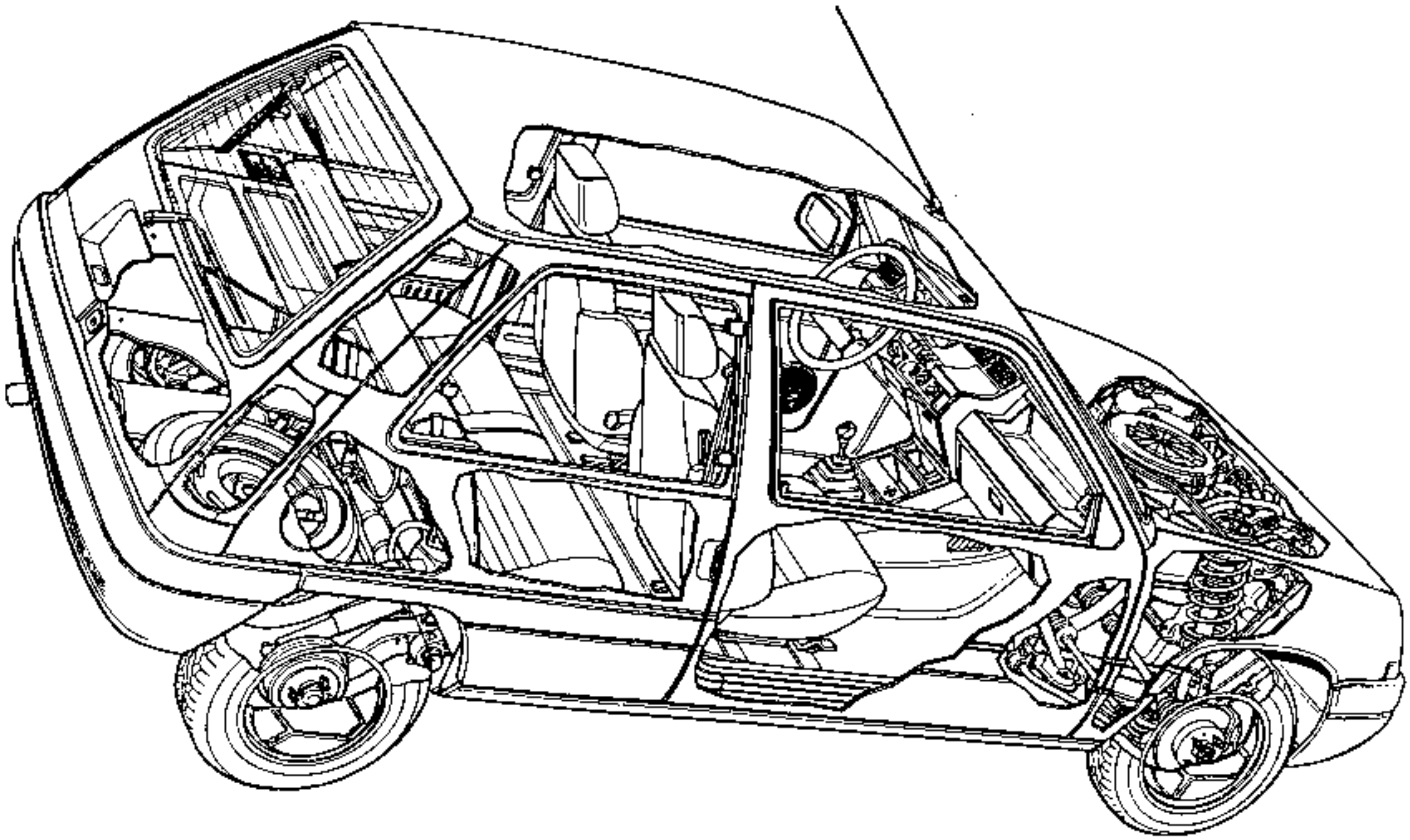
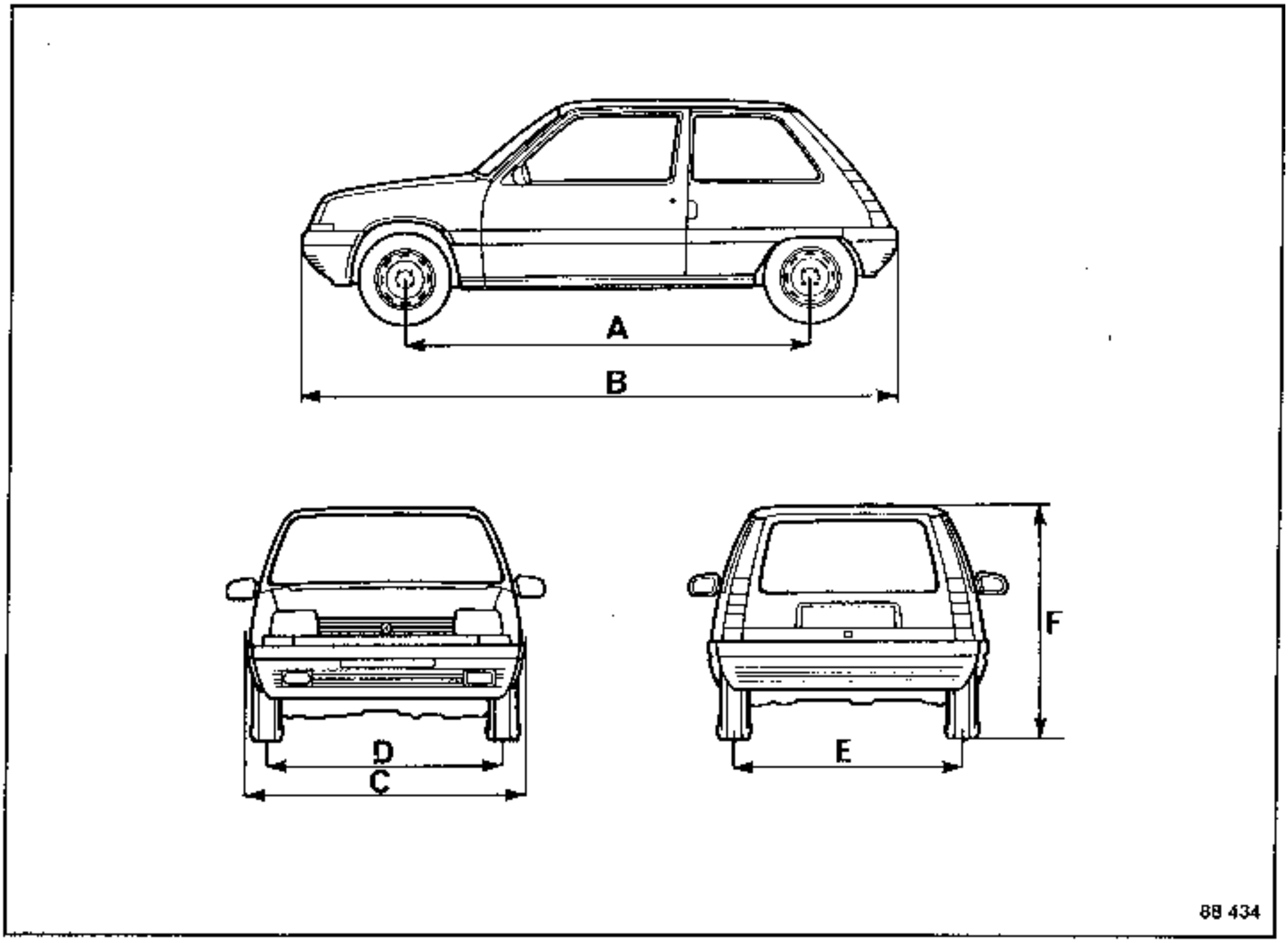
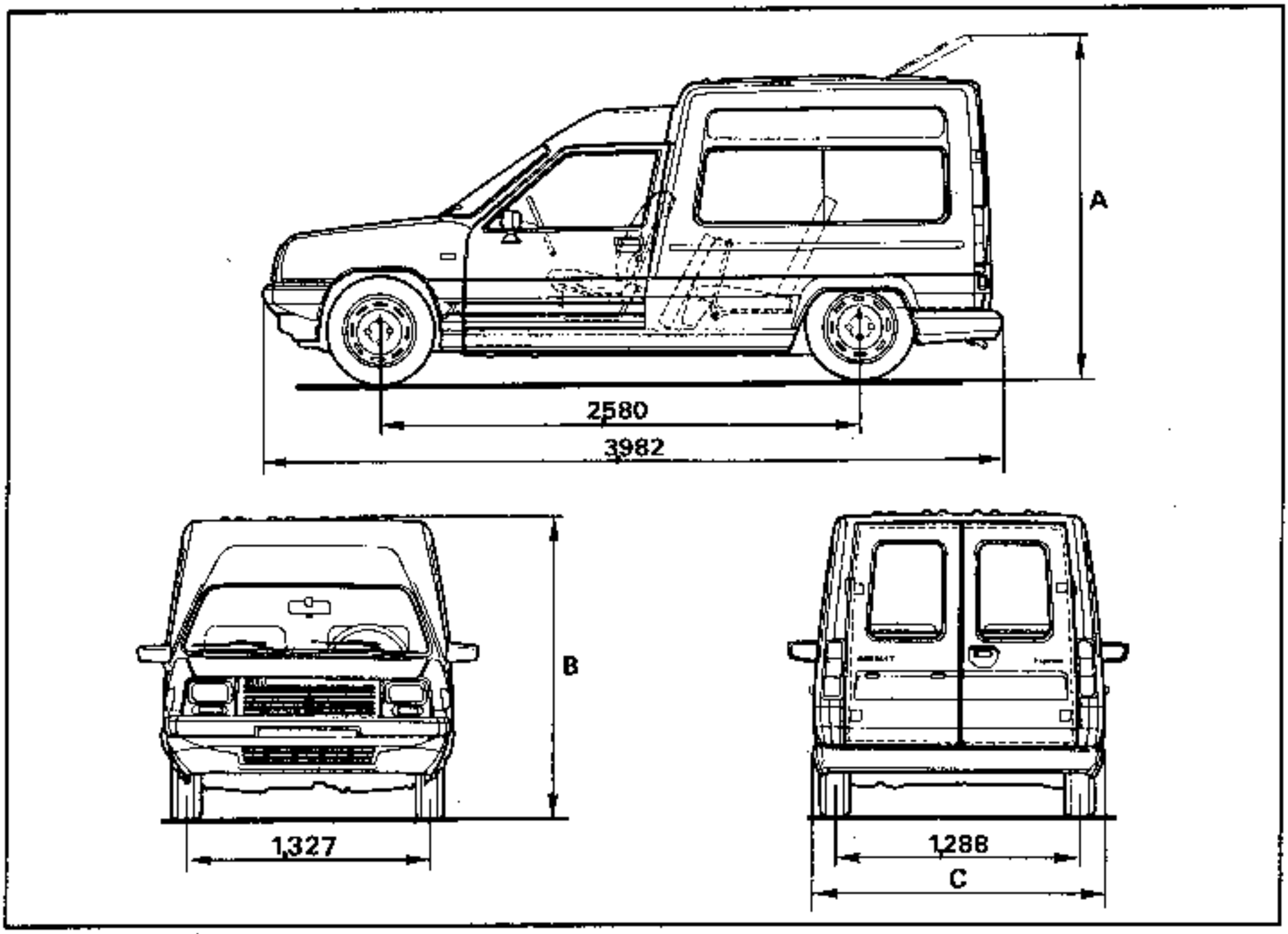




Average values for vehicles as marketed in France

Type	Wheelbase A	Length B	Width C	Track Front D	Track Rear E	Height, unladen F
C xxx S xxx	2,407	3,591	1,584	1,323	1,290	1,393
B xxx	2,467	3,651	1,584	1,323	1,290	1,393
C 405	2,407	3,591	1,596	1,323	1,280	1,367

All these values are expressed in metres.

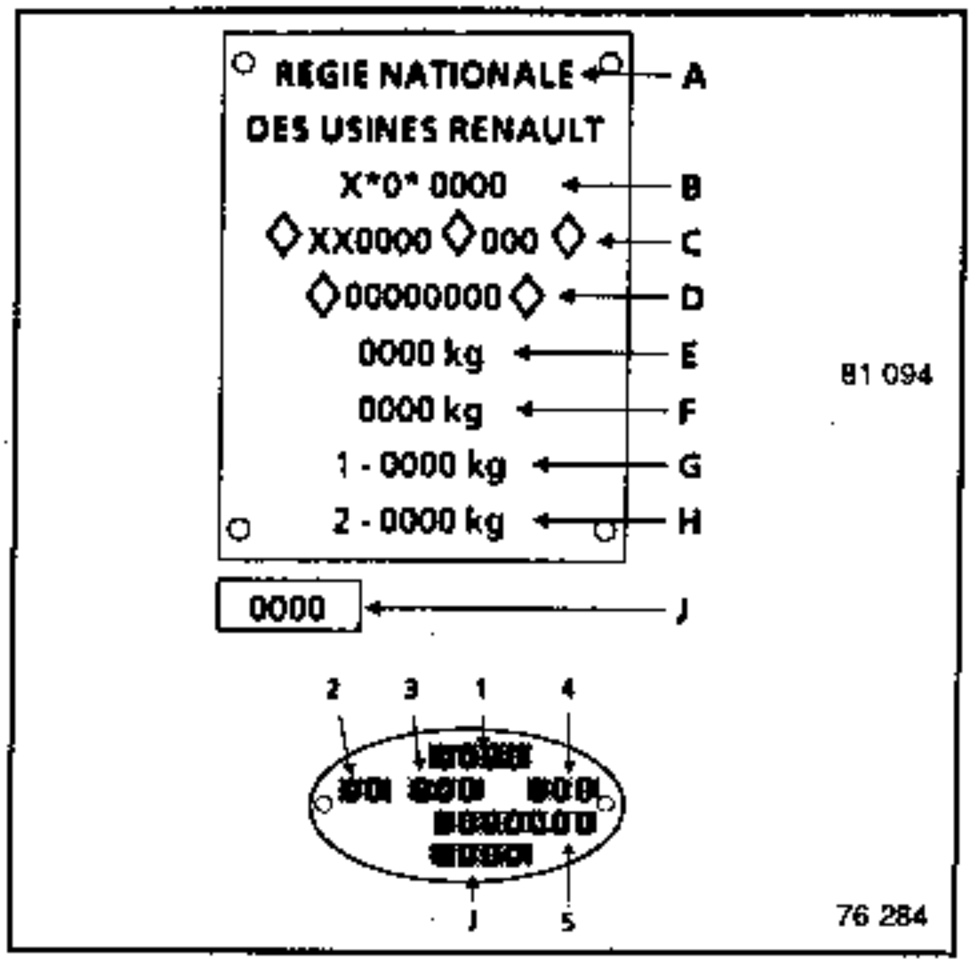


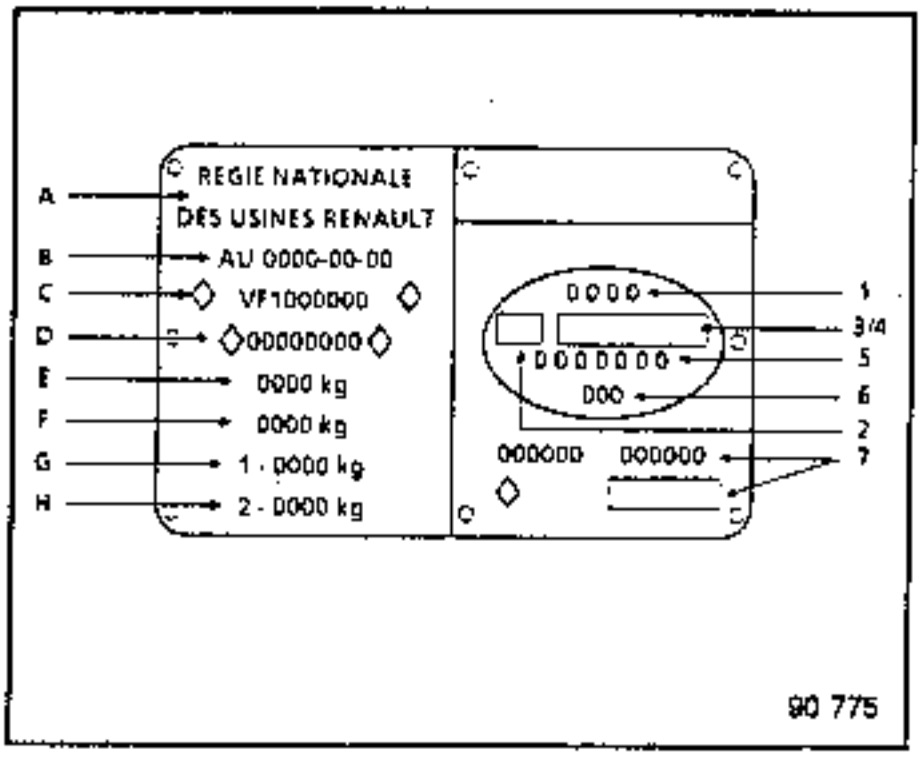
A : from 2.030 to 2.053 depending on the version - B : from 1.745 to 1.805 depending on the version - C : 1.564 or 1.588. These values are expressed in metres.

ENGINES - CLUTCHES - GEARBOXES

Vehicle type		Engine Type	Capacity (cm³)	Clutch type	Gearbox type
B, C, F, S	400	C1C	956	180 CP 335	JB0 - JB1 JB4 - JB5
B, C, F, S	401	C1E	1108		
B, C, F	402	C1J	1397		
B, C	403	C2J	1397		
B, C, F, S	404	F8M	1595		
C	405	C1J	1397	200 CP 425	JB3
B, C, F	407	C3J	1397	180 CP 335	JB5 - JB1
B, C, F	407	C3J	1390		
B, C	408	F3N	1721	200 CP 425	JB3
C	409	F3N	1721		
B, C, S	40F	C1G	1237	180 CP 335	JB4 - JB5
B, C	40G	F2N	1721	200 CP 425	JB3
B, C, F	40H	C1E	1108	180 CP 335	JB4 - JB5
B, C	40J	C2J	1397		
B, C	40K	F2N	1721	200 CP 425	JB3
B, C, F	40M	C2J	1397	180 CP 335	JB5

This is by means of two plates secured to the same support.





At A : The manufacturer's name
At B : The E.E.C. approval number
At C : The French official type code for the vehicle preceeded by the manufacturer's world identification code (VF1 is the code for Renault France)
At D : The chassis no.
At E : The maximum authorised laden weight (GVW)
At F : The authorised total train weight (TTW)
At G : The total authorised front axle loading
At H : The total authorised rear axle loading
At J : The model year (this is optional. There are three possible locations. See above)

At 1 : The vehicle type
At 2 : The vehicle special features
At 3 and 4 : The equipment version number and options
At 5 : A letter identifying the factory at which the vehicle was manufactured followed by the fabrication number
At 6 : The original paint reference
At 7 : Any additional marking

NOTE : Certain of these items are not shown on vehicles intended for some export markets. The plates illustrated above show the maximum number of tiems displayed.

Equipment version numbers

Good road versions		Poor road versions	Special equipment versions
Steering		Steering	Steering
LH drive	RH drive	LH drive	LH drive
100 series	600 series	200 series	500 series

ESSENTIAL SPECIAL TOOLS
Cha.280-02 Pad for fitting to trolley jack
Cha.408-01 Socket for fitting to trolley jack
Cha.408-02 Socket for fitting to trolley jack

When the car is lifted with a trolley jack, axle stands must be fitted before work commences.

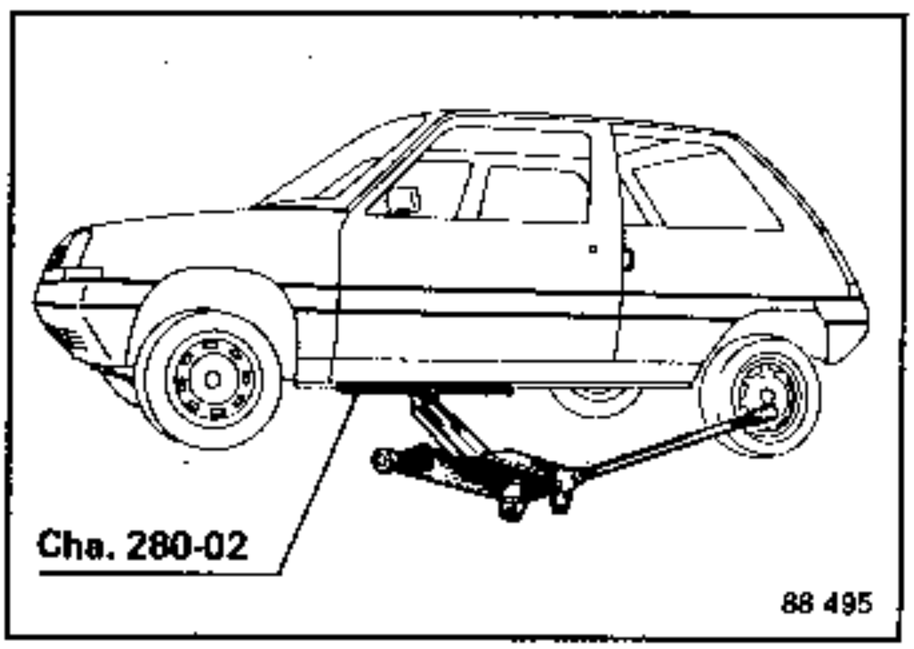
It is forbidden to lift the vehicle by taking the load under the suspension arms, at the front or at the rear, under the front cross member between the side members or under the rear axle assembly.

Depending on the type of trolley jack, use sockets Cha.408-01 or Cha.408.02 as adaptors for pad Cha.280-02.

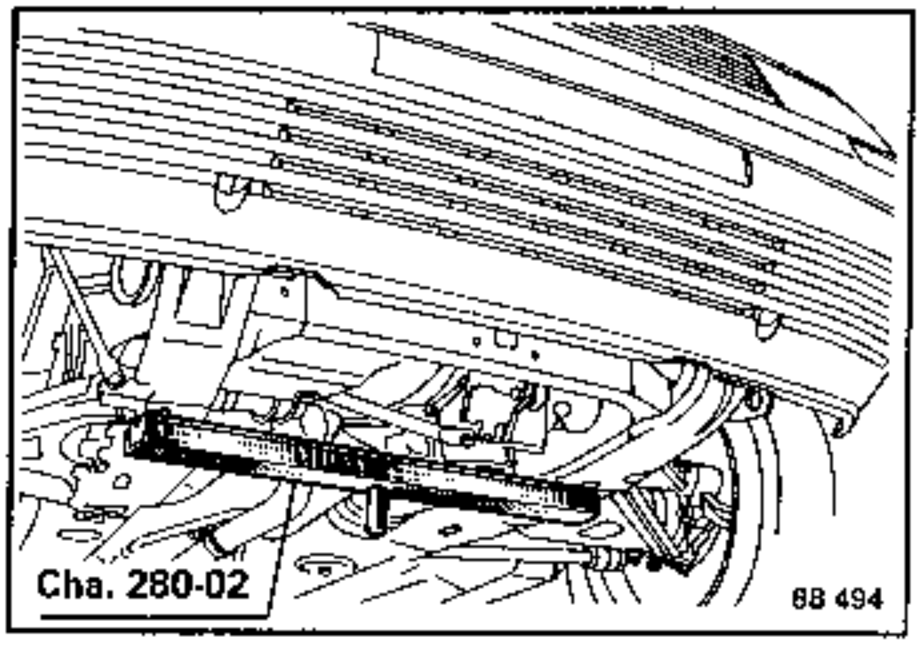
To lift the front or the rear of the vehicle, take the load under the jacking points provided for the vehicle's own jack.

LIFTING WITH A TROLLEY JACK FROM THE SIDE

- Use pad Cha.280-02.
- Take the load under the body sill in line with the front door.
- Ensure that the flange edge on the panelling locates correctly in the groove in the pad.

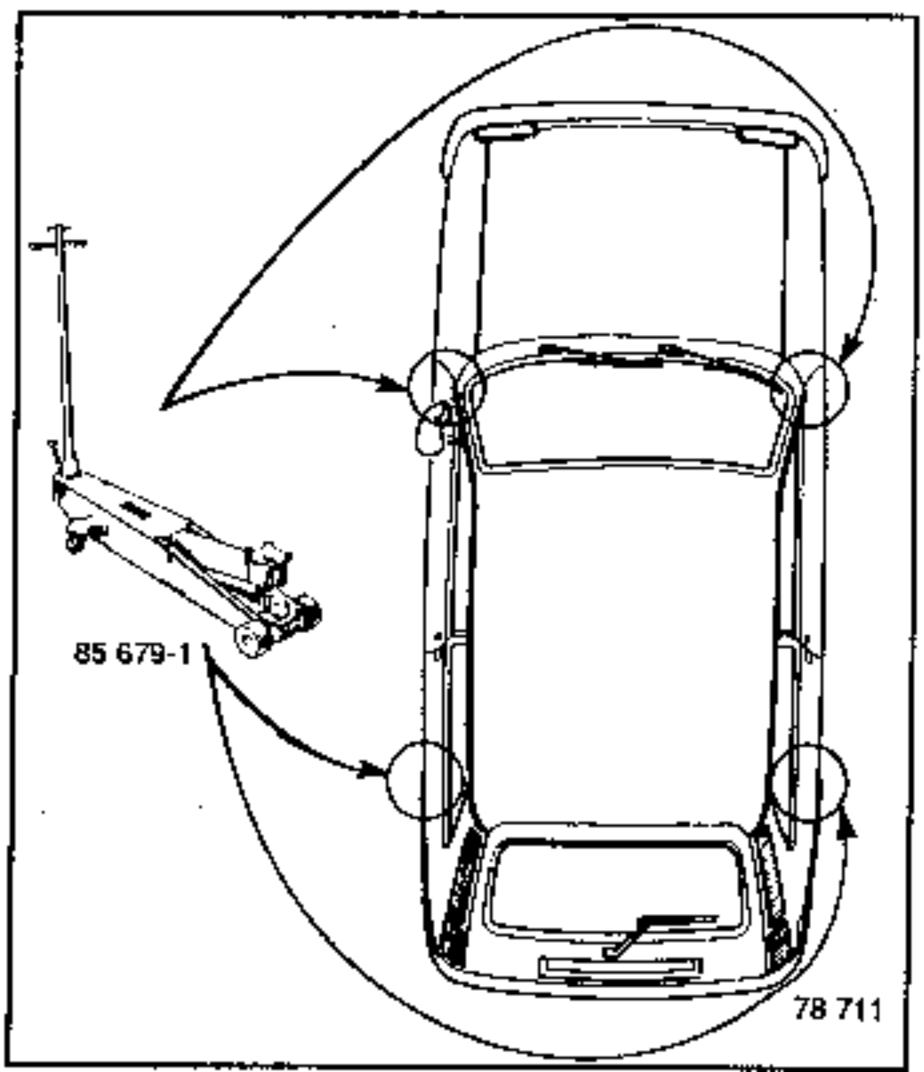


USING A TROLLEY JACK FROM THE FRONT



AXLE STANDS

When the vehicle is supported by axle stands, they must be placed under the jacking points provided for the vehicle's own jack.
The axle stands are to be placed under the rear end by lifting the vehicle from the side.



SAFETY INSTRUCTIONS :

Several cases have to be considered :

1 - THE CASE WHEN COMPONENT UNITS ARE TO BE REMOVED :

Generally speaking, never use a 2 column lift, if a four column lift is available.

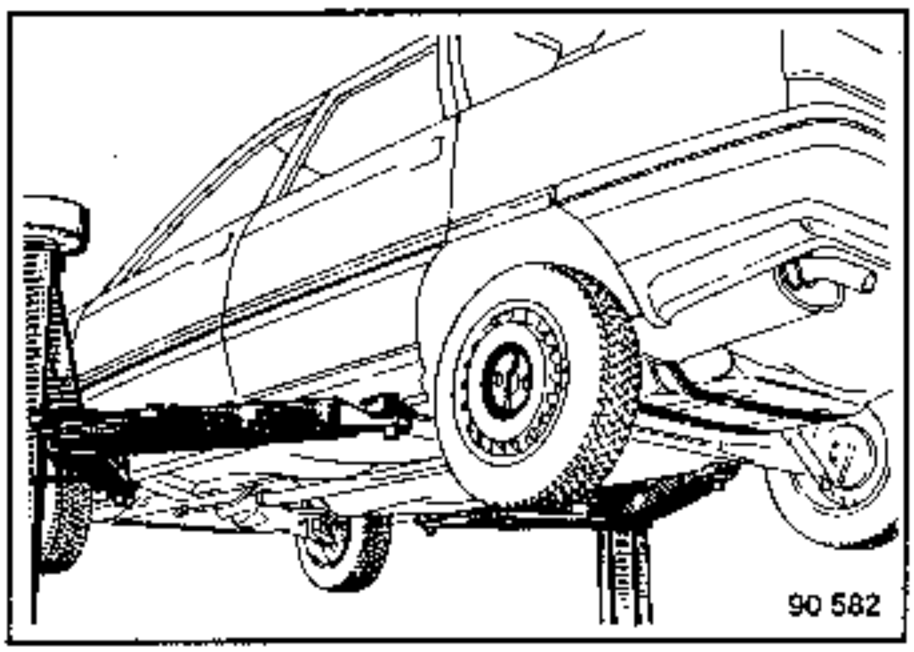
2 - THE SPECIAL CASE OF REMOVING AND REFITTING A POWER UNIT ASSEMBLY SECURED TO ITS SUB-FRAME

Before stating anything else we must point out that this operation is only to be carried out when body repair operations require it (the replacement, for example, of side members, that is to say the placing of the vehicle on the jig bench).

In this precise case, the body of the vehicle must be secured to the arms on the two column lift.

The FOG Company markets a set of special pads Ref. : FOG 449 8111 for this purpose. They must be placed at the vehicle jacking points and must clip into the apertures in the body sill flanges.

NOTE : The FOG pads cannot be used on vehicles equipped with body sill widening trim.



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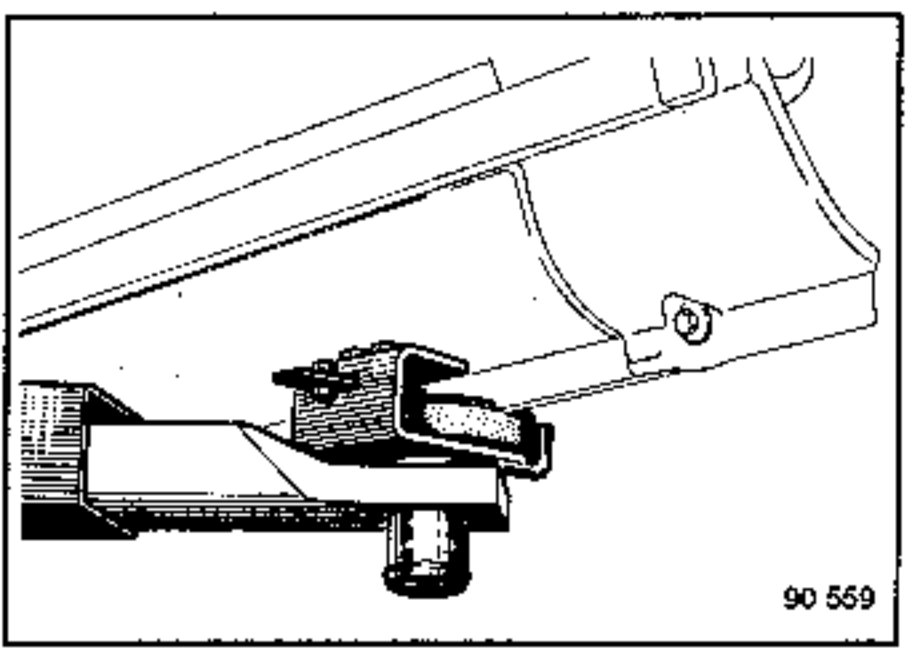

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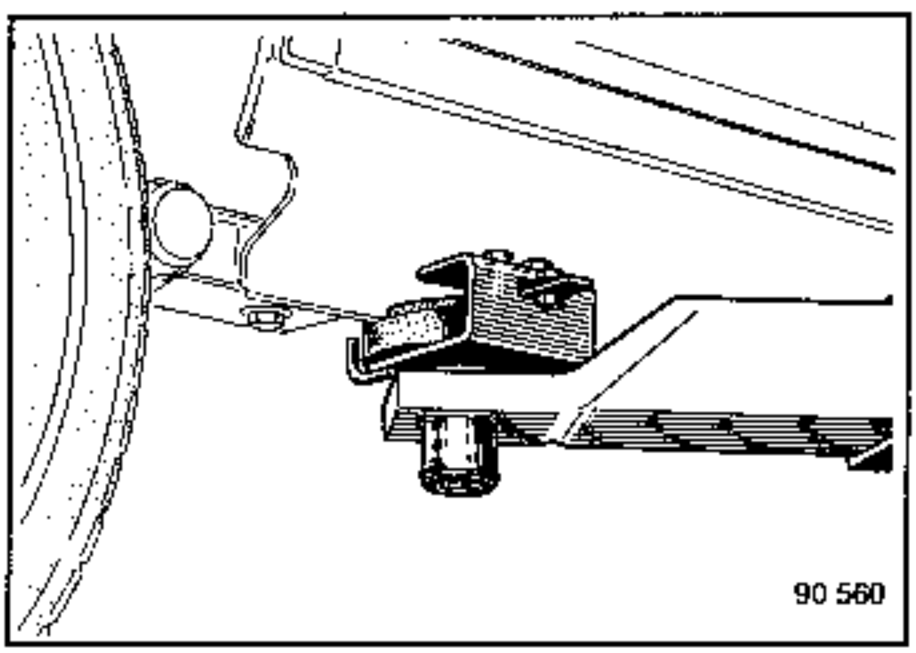

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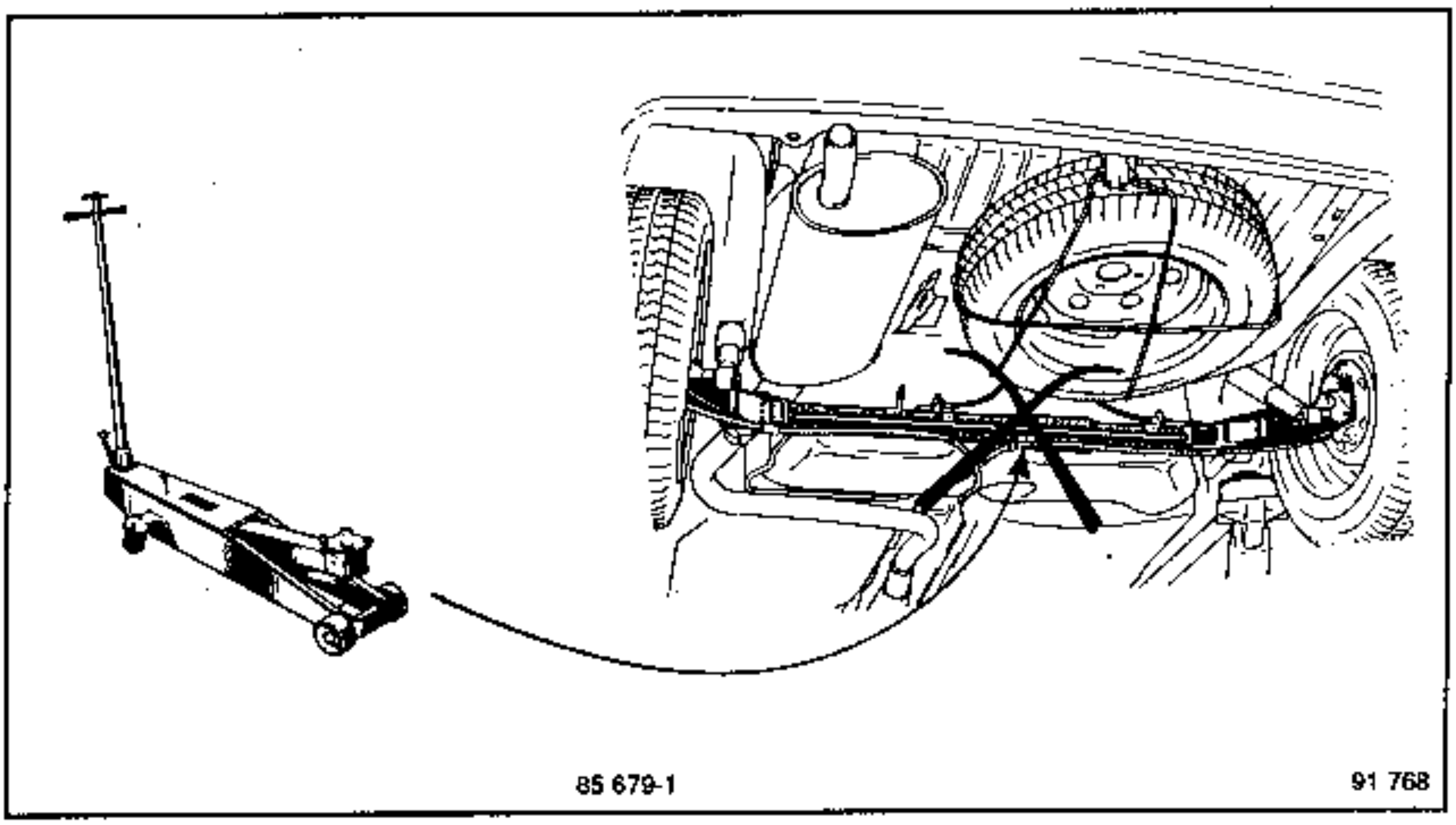
3 - FOR OTHER CASES OF LIFTING THE VEHICLE (operations to be carried out under the body without removing any units)

One must always position the lifting pads at the vehicle jacking points.

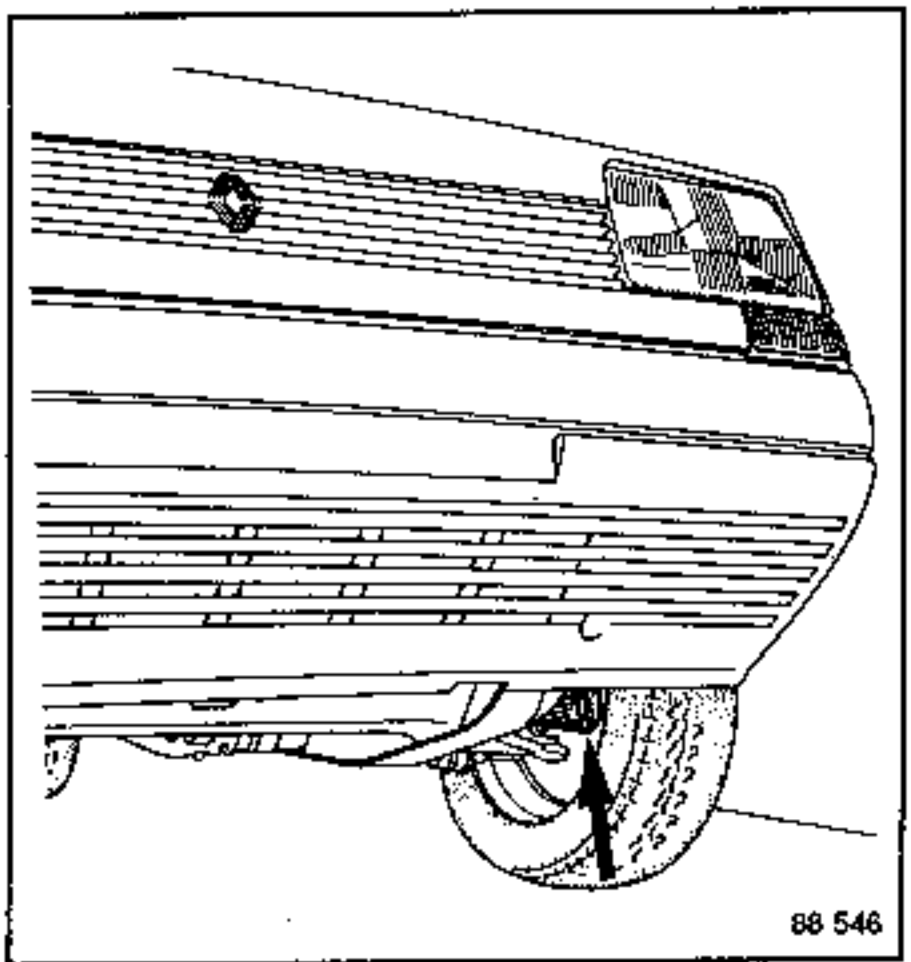
It is forbidden to lift the vehicle by placing a jack under the rear axle L section (or the rear axle tube).



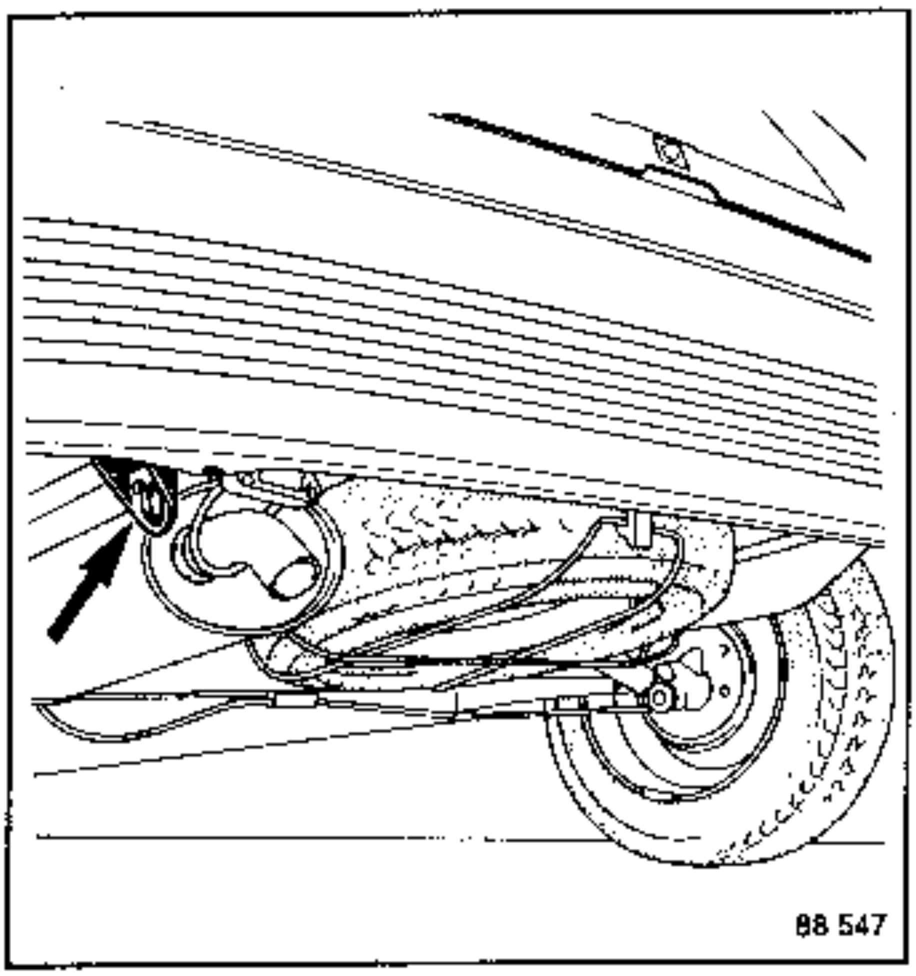
NEVER SECURE THE VEHICLE BY THE DRIVE SHAFT TUBES

The towing points are only to be used to tow the vehicle on the road. Under no circumstances are they to be used to drag the vehicle out of a ditch or some other similar operation or for lifting the vehicle directly or indirectly.

FRONT



REAR



DRIVING

The automatic transmission is pressure lubricated, that is to say only when the engine is running.

Consequently, there is a risk of severe damage if the following instructions are not observed :

- Never allow the vehicle to coast with the ignition switched off (down an incline for example). We cannot emphasise too much the dangers of this practice.

- Never have the vehicle pushed (for example to reach a filling station) unless the precautions taken in the "Towing the vehicle" section have been carried out.

Furthermore, the engine is only driven by the wheels, in overrun, if the engine is running. It is therefore impossible to start a vehicle with automatic transmission by pushing it.

Furthermore, the operation of dynamically balancing the wheels, still on the vehicle is forbidden.

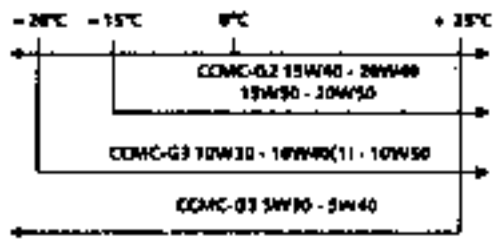
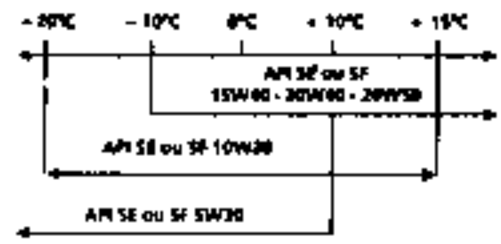
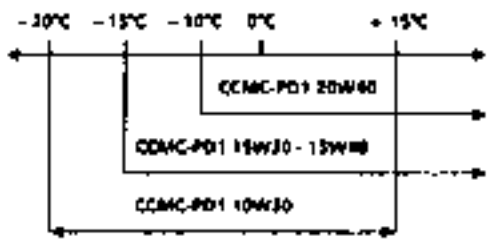
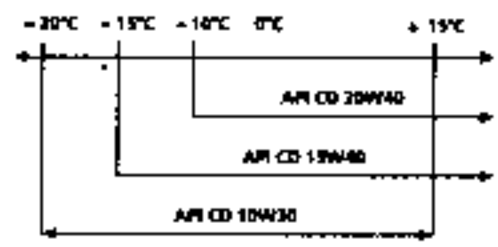
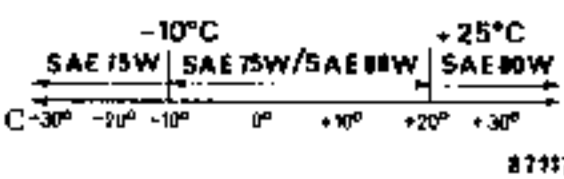
TOWING THE VEHICLE

The front end of the vehicle should be lifted. However, if this is impossible, under exceptional conditions the vehicle can be towed with its wheels on the ground under the following conditions :

1. Pour an additional two litres of fluid into the transmission (ELF Renaultmatic D2 or Mobil ATF 220).

2. Do not tow the vehicle at a speed of more than 30 km/h (20 mph) or over a distance of more than 50 km (30 miles) (with the lever in N).

<u>Do not forget to drain off the excess oil after this operation.</u>

Unit	Capacity in litres	Grade	Special features
Engines	After draining	E.E.C. Countries	Other countries
		PETROL	PETROL
C1C C1E C1G C1J C2J C3J	3 (+0.5 filter)		
		DIESEL	DIESEL
C1J Turbo	2,6 (+0.25 filter)		
F2N F3N	4,7 (+0.5 filter)		
F8M	4,8 (+0.5 filter)		
Gearboxes JB0 JB1 JB3 JB4 JB5	 3,25 3,40 2,75 2,90	API GL5 or MIL L 2105 B or C 	Except Petrol Engined Turbo Models
	Tranself	Tranself TRX 80 W for Petrol Engined Turbo models	
Automatic transmission	4,5 total 2 after draining	Elf Renaultmatic D2 Mobil ATF 220 Total DEXRON	
Power steering	1,1 (1 for diesel engined versions)	Elf Renaultmatic D2 Mobil ATF 220 Total DEXRON	
Braking system	0,7	SAE J 1703 and DOT 3 or DOT 4	Any brake fluid used must have been officially approved by our design office

Unit	Capacity in litres	Grade	Special features
Engine cooling systems		Glaceol AL anti-freeze (type C)	Protection down to -23°C for hot, temperate and cold climates. Protection down to -40°C for intensely cold climates.
C1C C1E C1G C1J C2J C3J F2N	5,5		
F3N F8M	6,5		
Fuel tank	43 Except : C405 : 50 C409 : 50 (since June 1987)	Super or Diesel	

(1) We do not recommend the use of 10 W 40 mineral based oils as they are not covered by CCMC-G3.

List of the products recommended for mechanical repair operations.

Description	Pack size	Part no.
GREASES		
. MOLYKOTE "BR2" for trunnion and clutch fork bearing areas, lower suspension arm bearings, torsion bar splines, steering boxes and drive shaft splines.	1 kg tin	77 01 421 145
. MOLYKOTE "33 Medium" bushes on tubular rear axles anti-roll bar bushes.	100 gr tube	77 01 028 179
. "ELF MULTI" for the lips of seals, drive shaft stub axle splines, threads on studs and on wheel bolts.	1 kg tin	77 01 022 166
. "ELF Staterma MD2" for lower suspension arm bearings, splines and steering column bushes.	1 kg tin	To be ordered from ELF
. "MOBIL CVJ" 825 Black star	180 gr sachet	77 01 366 100
. GREASE No. 20 for sun wheel splines, fork shafts, clutch release bearing guides.	1 gr sachet	77 01 032 832
. "ELF Multi MOS2" for anti-roll bar bearing bushes.	1 kg tin	To be ordered from ELF
MECHANICAL SEALING COMPOUNDS		
. Perfect-seal "LOWAC" liquid jointing compound	100 gr tube	77 01 417 404
. Mastic for sealing exhaust pipe joints	1.5 kg tin	77 01 421 161
. CAF 4/60 THIXO for drive shaft pins	100 gr tube	77 01 404 452
. KIT OF "CAF 4/60 THIXO" HARDENER for sealing the sides of bearing caps.	Kit	77 01 421 080
. AUTO joint bleu jointing paste.	100 ml tube 45 gr tube Cartridge	77 01 396 227 77 01 397 027 77 01 417 649
. LOCTITE 518 for sealing gearbox housings.	24 ml syringe	77 01 421 162
. DOSE CURIT for sealing the fuel gauge tank unit.	60 cm^3 tube	77 01 421 164

List of the products recommended for mechanical repair operations.

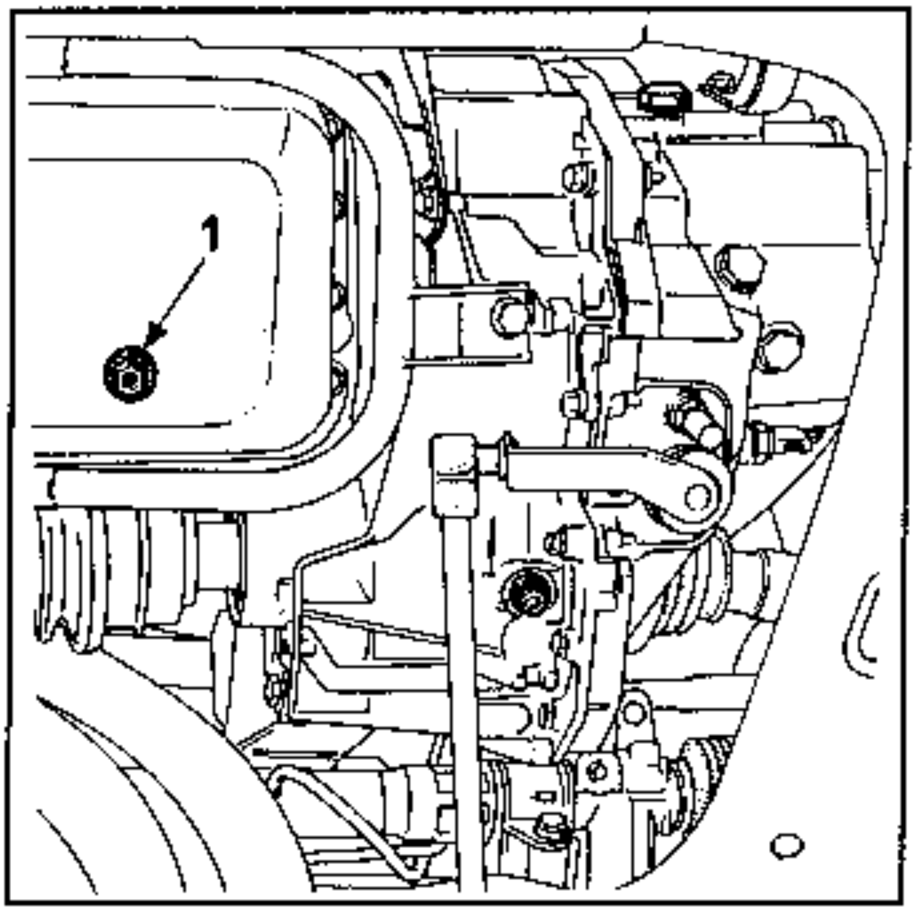
Description	Pack size	Part no.
ADHESIVES		
. "LOCTITE-FRENETANCH" to prevent nuts and bolts coming loose but still permit their release.	24 cc bottle	77 01 394 070
. "LOCTITE-FRENBLOC" for locking bolts.	24 cc bottle	77 01 394 071
. "LOCTITE SCELBLOC" for bonding bearings	24 cc bottle	77 01 394 072
. "LOCTITE AUTOFORM" for bonding the fly-wheel to the crankshaft.	50 cc bottle	77 01 400 309
. "LOCTITE 275" for bonding steering links.	50 ml bottle	77 01 418 252
CLEANERS - LUBRICANTS		
. "SAFCA" lubricant, specially for door lock barrels.	20 gr aerosol	77 01 400 097
. "ELECTRONEX" (SEMME) release, lubricating agent.	250 gr aerosol	77 01 403 517
. "AGIR 40" release, lubricating agent.	140 ml aerosol	77 01 421 140
. RAVITOL PLUS	2 l, 20 l, 30 l, 60 l	77 01 417 424 - 5 - 6 - 7
. Carburettor cleaner	250 ml aerosol	77 01 393 112
. Super concentrated release agent	420 ml aerosol	77 01 393 109
. "DECAPLOC 88" (FRAMET) for cleaning aluminium cylinder head gasket faces.	2 l can 385 ml aerosol	77 01 396 228 77 01 405 952
VARNISH		
. "CIRCUIT PLUS" Varnish for the repair of heated rear screens.	2 gr bottle	77 01 421 135
TYRES		
. "TIP TOP" products for repairing tubeless tyres.	Combi A kit	77 01 417 243
BRAKES		
. Brake fluid	0.5 l bottle	77 01 394 499 77 01 395 435
TURBO		
. High temperature paint for marking after repair operations.		77 01 407 679

ESSENTIAL SPECIAL TOOLS	
Mot. 445	Oil filter spanner Engine drain plug spanner

DRAINING : plug (1)

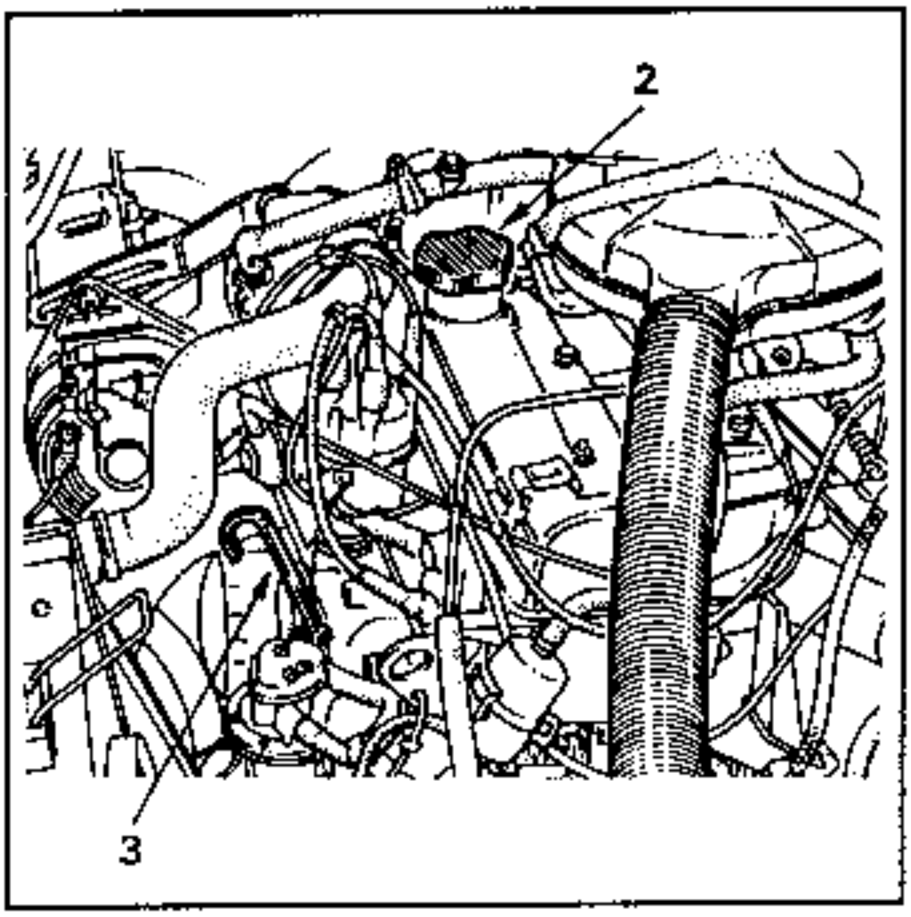
	Petrol versions	Versions with water-cooled turbo	Versions with conventional turbo	Diesel versions
1st oil change	500-2000 miles	500-2000 miles	500-2000 miles	500-2000 miles
Oil change every	6 000 miles	6 000 miles	3 000 miles	5 000 miles
Oil filter replacement	12 000 miles	6 000 miles	6 000 miles	5 000 miles

It is possible to empty the sump with a suction system, see MR 500.

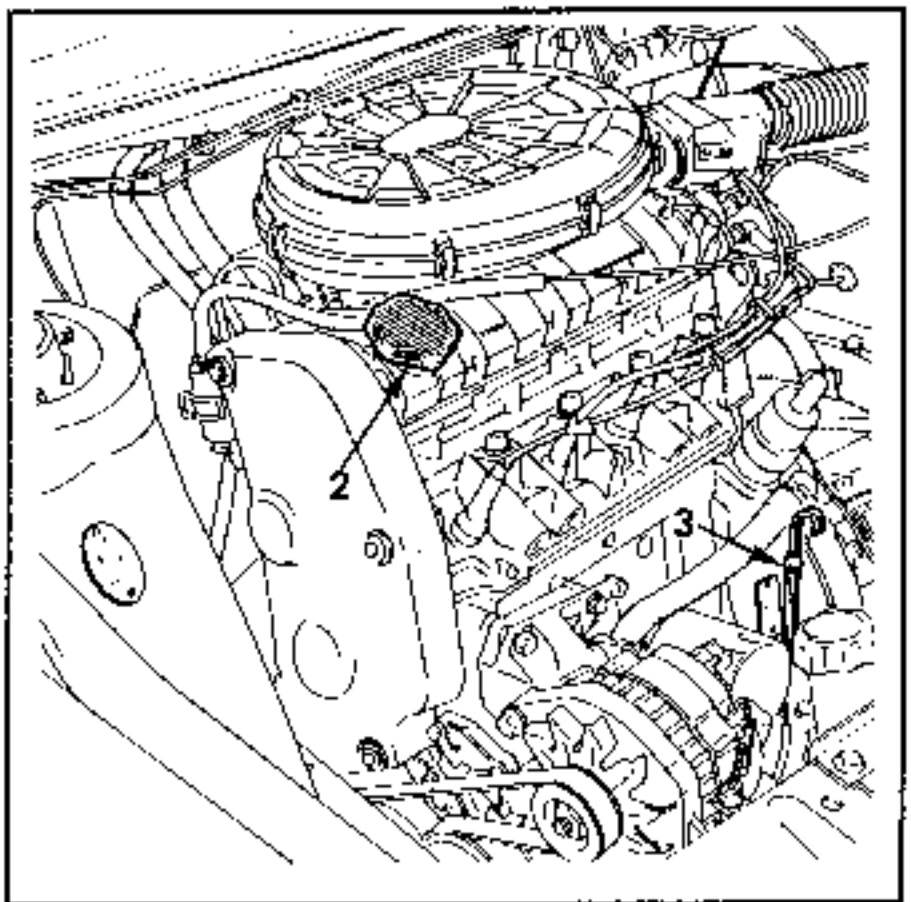


FILLING : cap 2

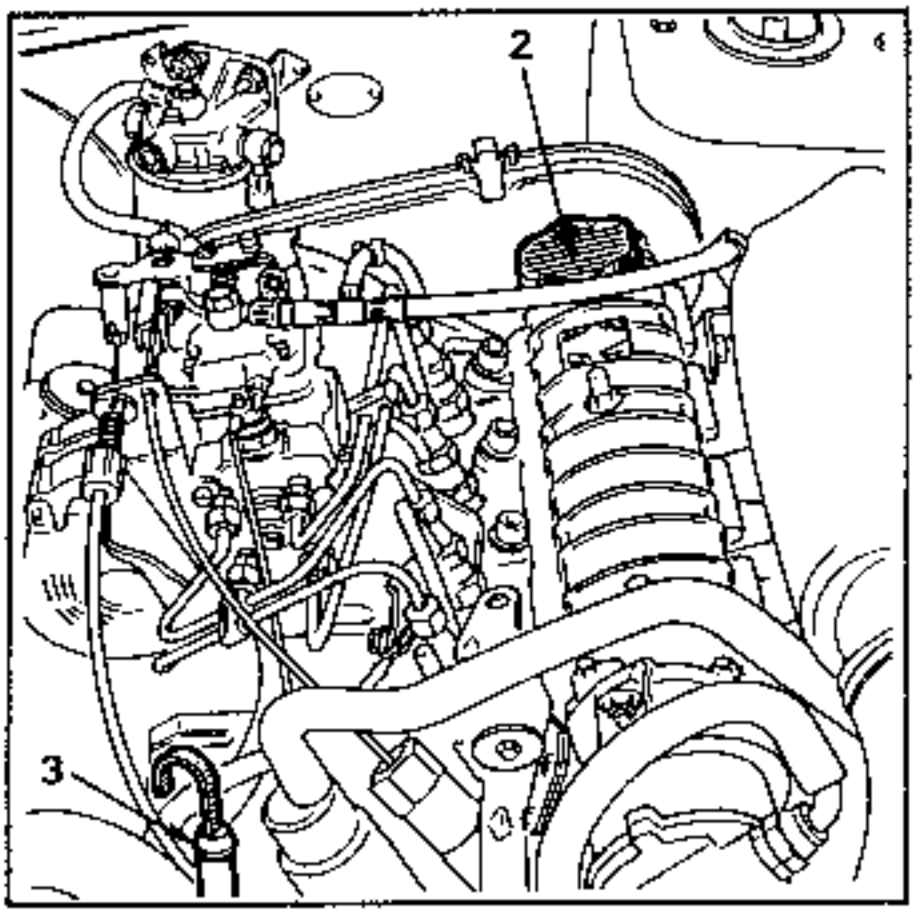
C xx engine



F xx petrol engine



F8M engine

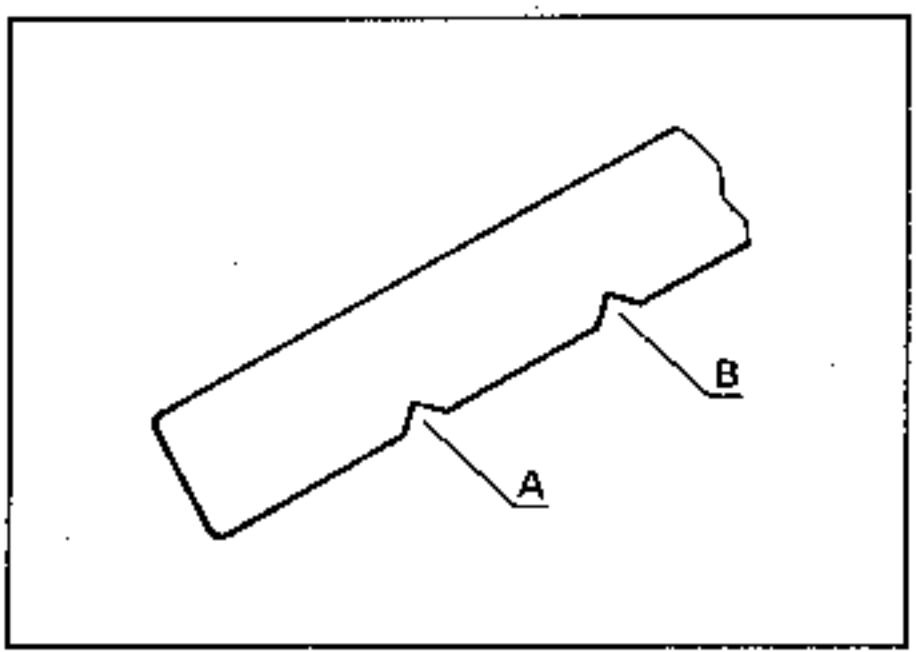


DIPSTICK 3

A - Min. level
B - Max. level

The difference between the max. and min. levels corresponds to approximately :

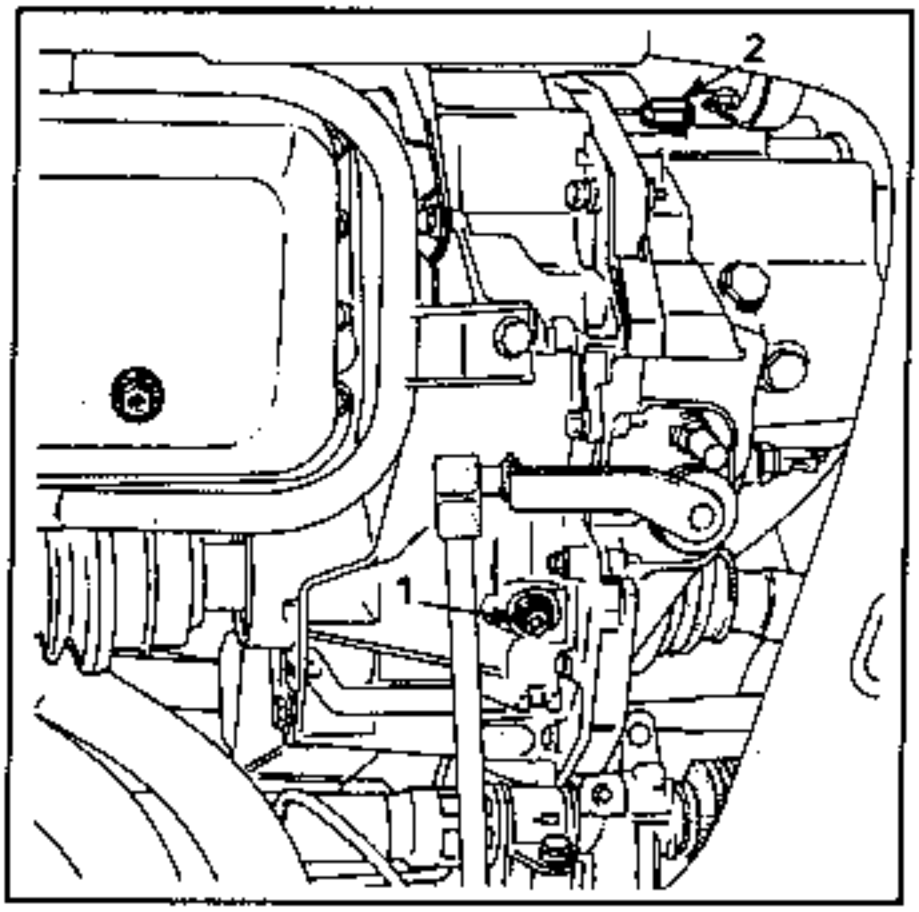
- On C xx engines : 1 litre
- On F xx engines : 2 litres



ESSENTIAL SPECIAL TOOLS
Gearbox drain plug spanner

The first oil change is carried out at between 1 000 and 3 000 km (600 and 1800 miles) and then every 50 or 60 000 km (30 or 40 000 miles).

DRAINING : plug 1



FILLING : plug 2

There are two types of arrangement :

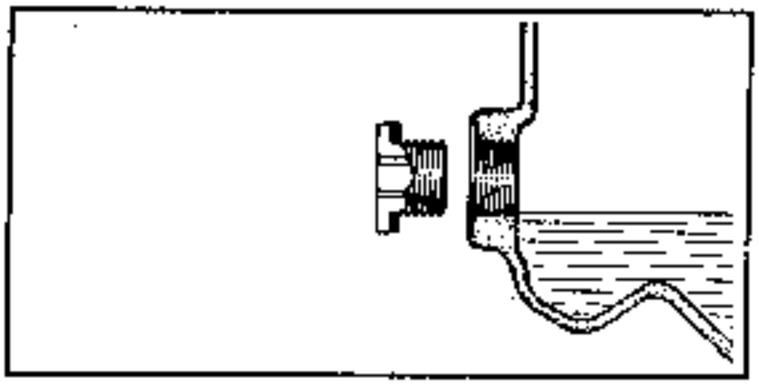
- plug (2) without a dipstick
- plug (2) with a dipstick

CAPACITY : (in litres)

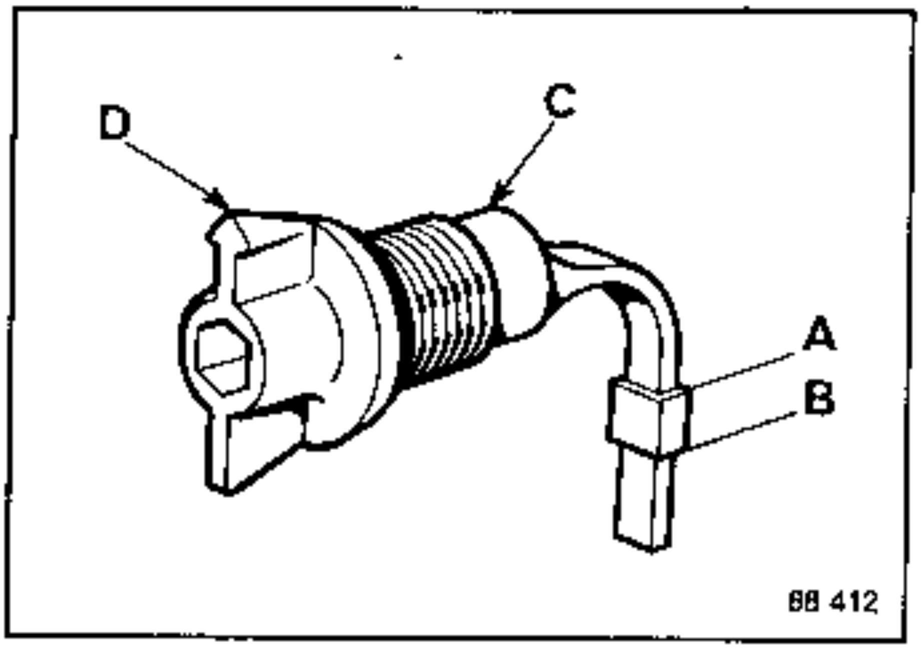
Plug without dipstick normal level	Plug with dipstick low level
4 speed	
3,25	2,75
5 speed	
3,40	2,90

Plug without a dipstick :

Fill the gearbox until the oil is flush with the lower part of the plug hole.

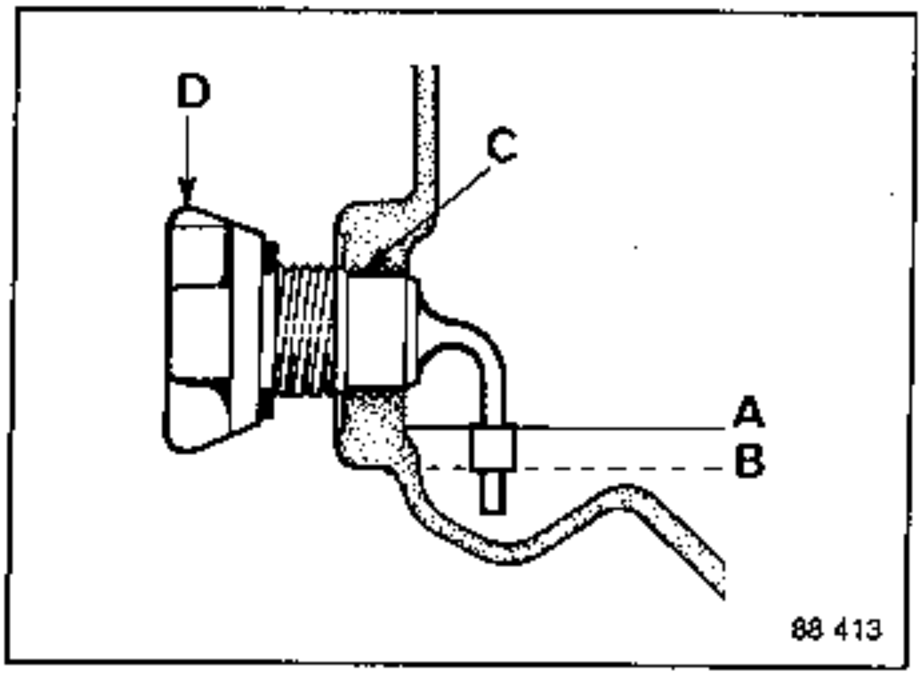


Plug with a dipstick :



A = maximum level
B = minimum level
C = locating shoulder
D = positioning arrow

When checking the level, do not screw in the plug. It will be correctly positioned by the locating shoulder (C).

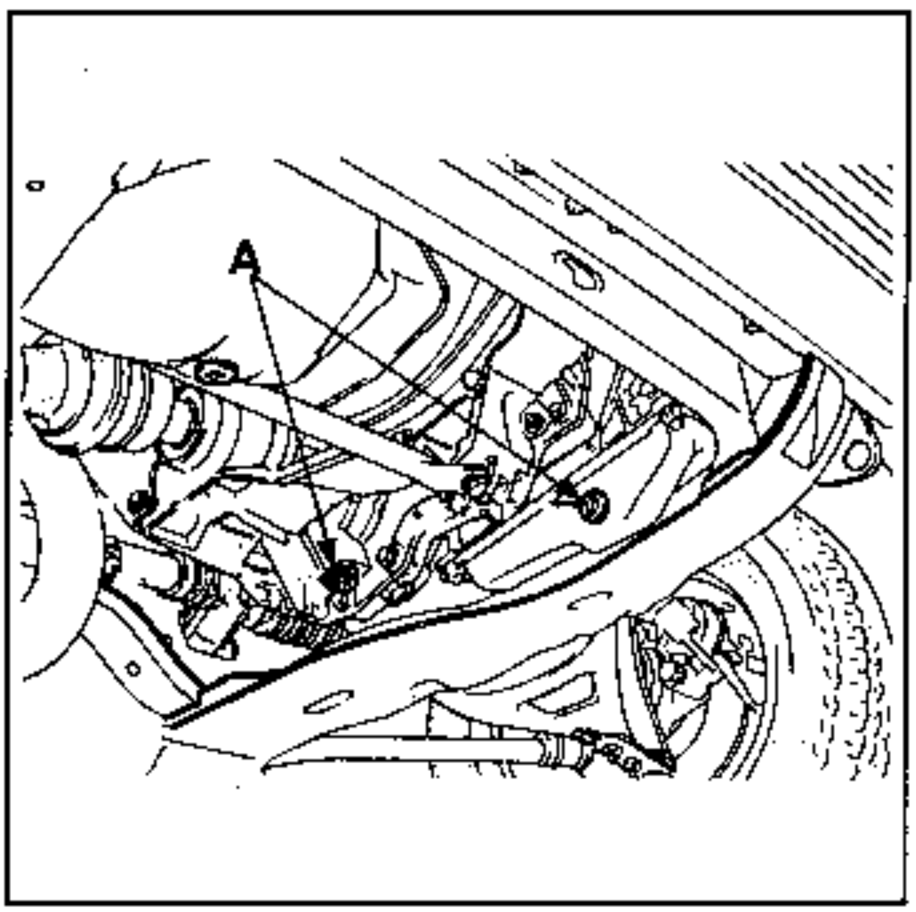


ESSENTIAL SPECIAL TOOLS
Automatic transmission drain plug spanner

The fluid is changed every 50 000 km (30 000 miles) and the oil pump filter is replaced at the same time. There is no fluid change at between 1 000 and 3 000 km (600 and 1 800 miles).

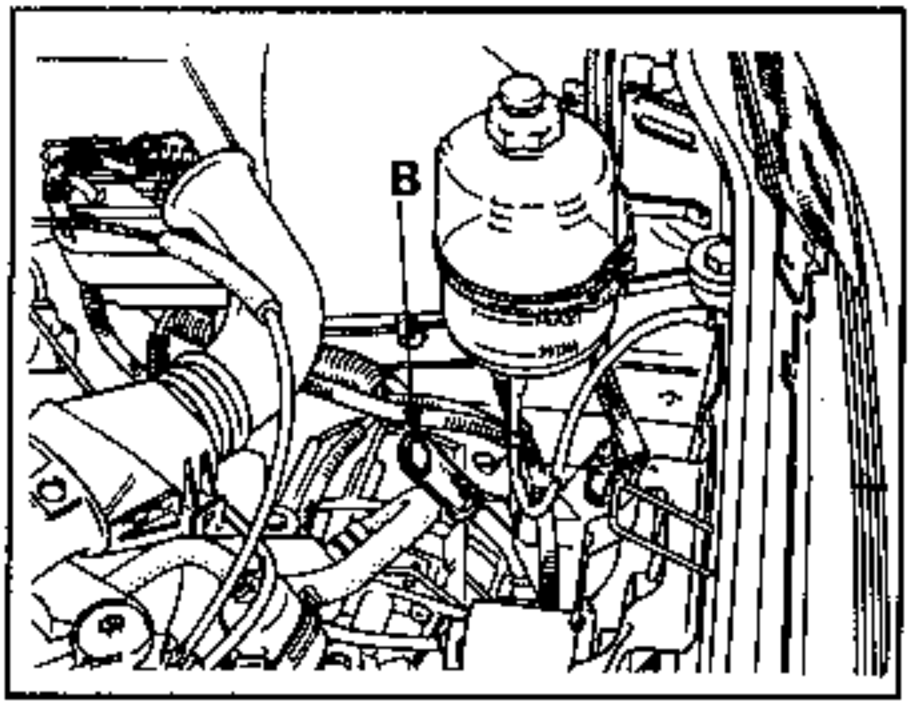
DRAINING

The unit is to be drained when cold, with the dipstick and plugs (A) removed.



Use new seals when refitting the plugs.

FILLING



The unit is filled through the dipstick tube (B).

Use a funnel equipped with a 15/100 filter, to avoid any dirt entering the unit.

Use only the recommended fluid.

Start the engine, run it at idling speed, check the level and top-up if necessary.

CHECKING THE FLUID LEVEL WHEN THE UNIT IS COLD

The vehicle is to be unladen.

Park it on a flat horizontal surface.

Place the selector lever in the "PARK" position (P).

Start the engine and wait from one to two minutes for the convertor and cooler to fill.

The fluid is at ambient temperature (20°C).

Take out the dipstick with the engine still running.

The level must not be lower than mark (1) MIN. COLD (below this there is a risk of damage) and must not be above mark (2) MAX. COLD (there is also a risk of damage).

Never fill the unit above the "MAX. COLD" limit.

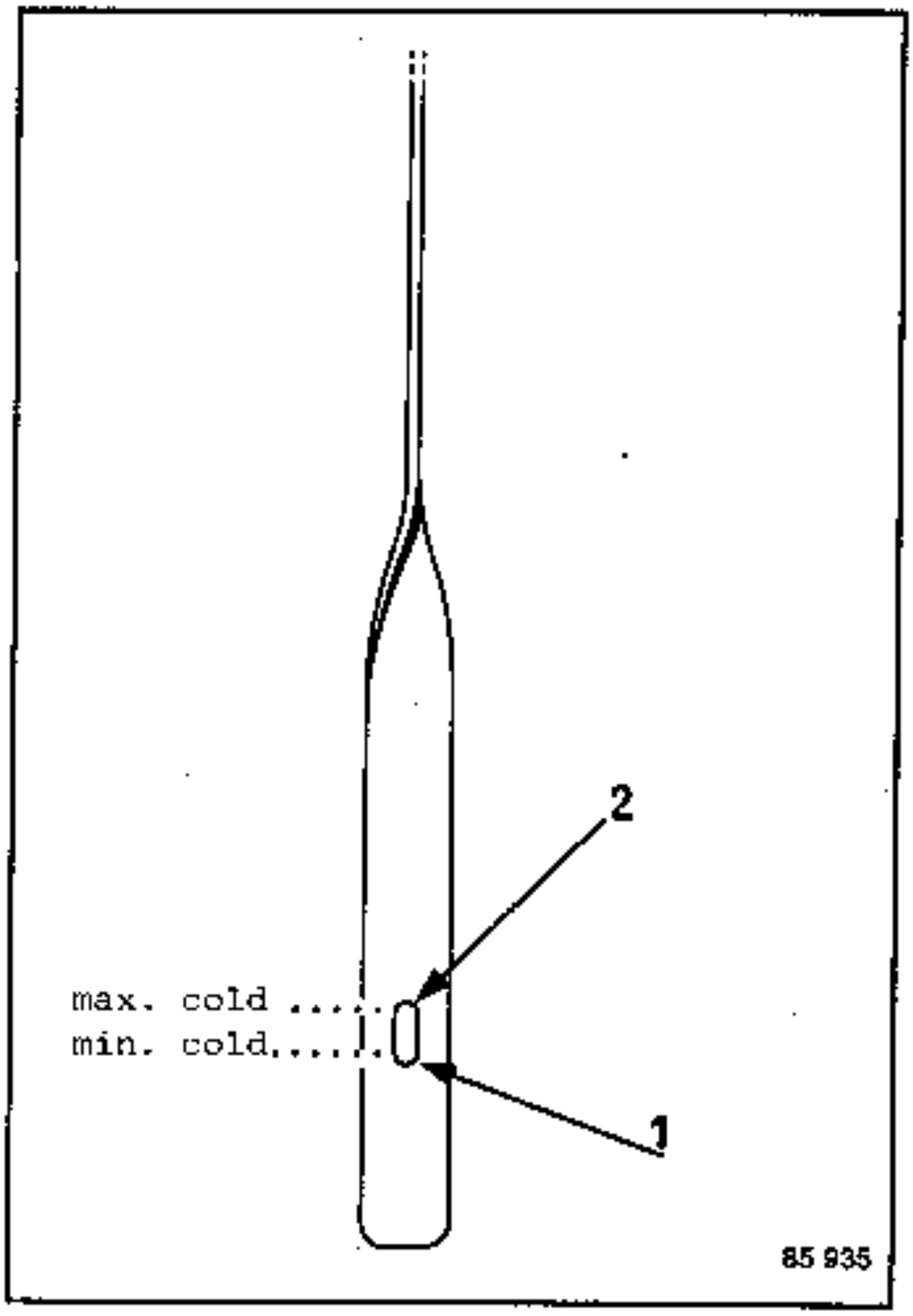
WARNING :

Too much fluid causes :

- overheating of the fluid.
- leakage.

Too little fluid results in :

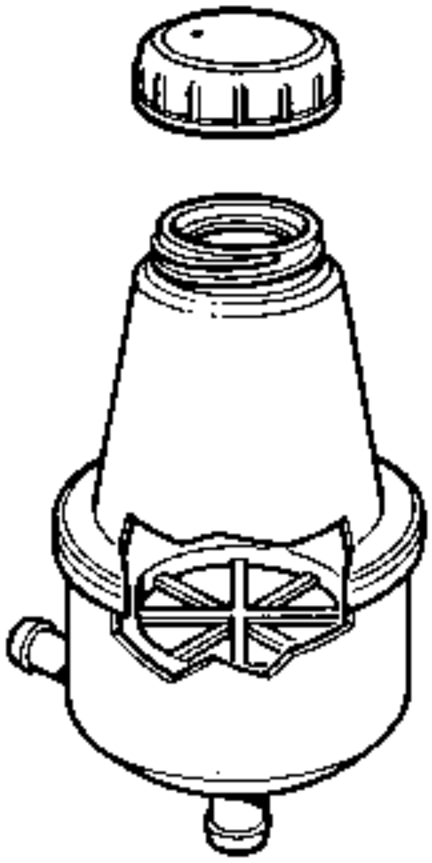
- damage to the mechanisms.



WARNING :
TOP-UP THE LEVEL WHEN THE TRANS. IS COLD

Check the fluid level, every 10 000 km (6 000 miles) with the engine running.

Early type :



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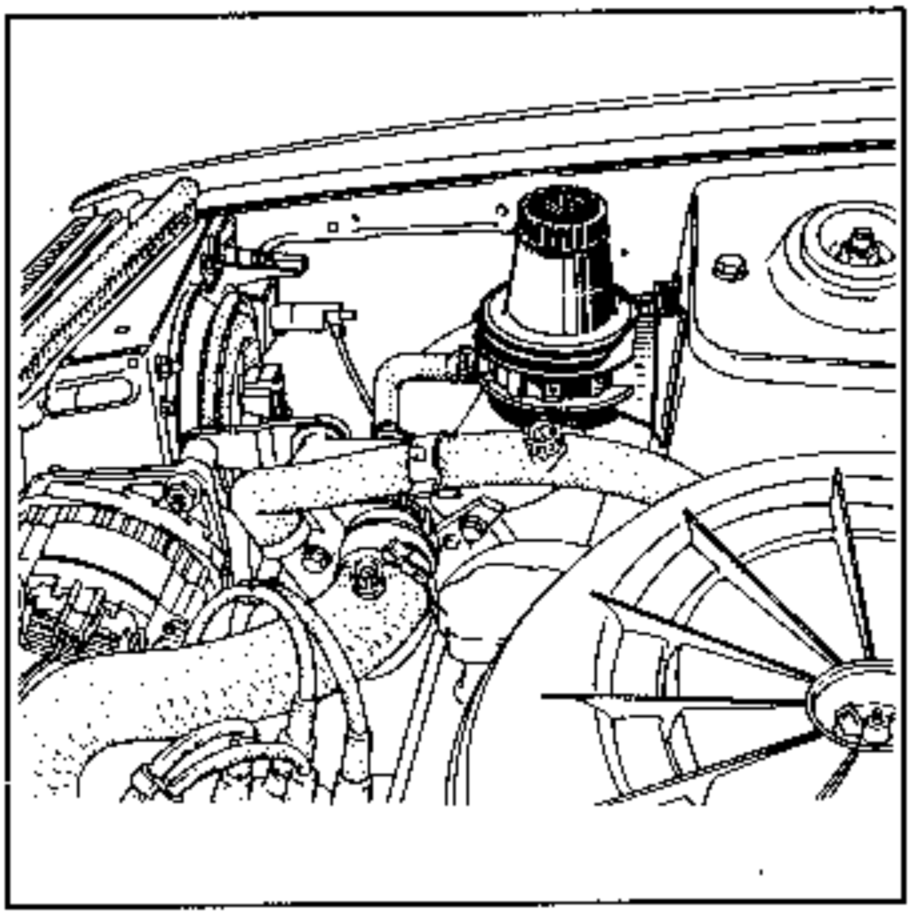
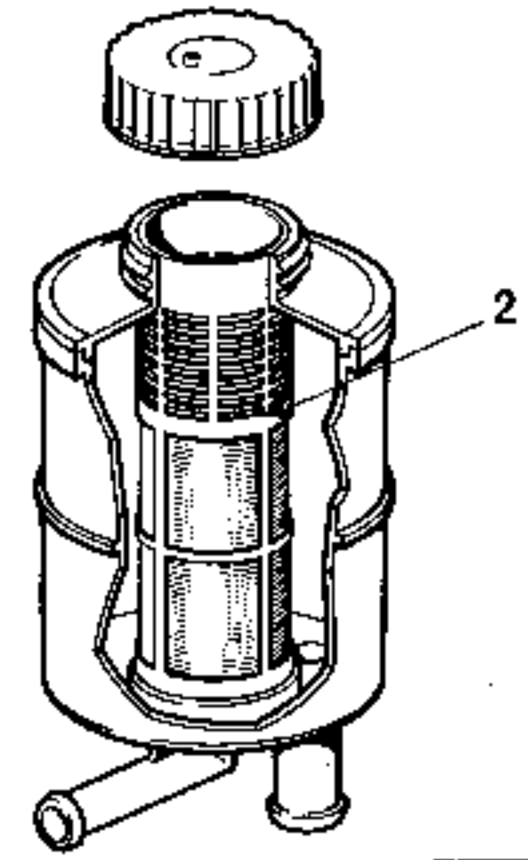


The fluid should be visible over the grille.

Later type :



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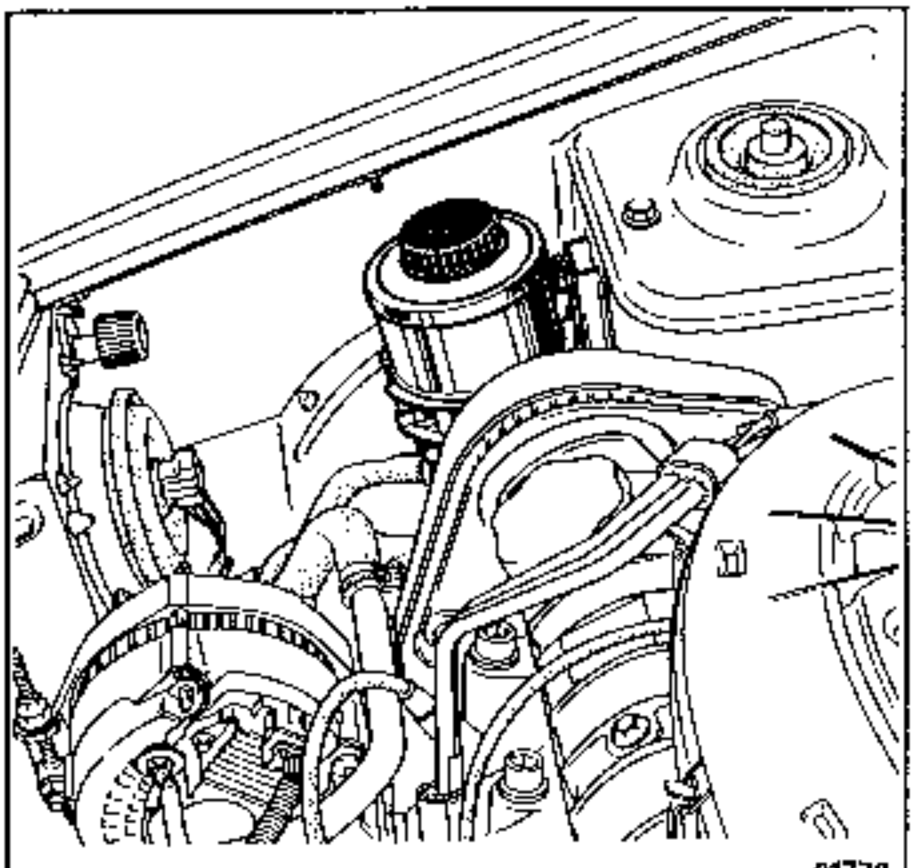

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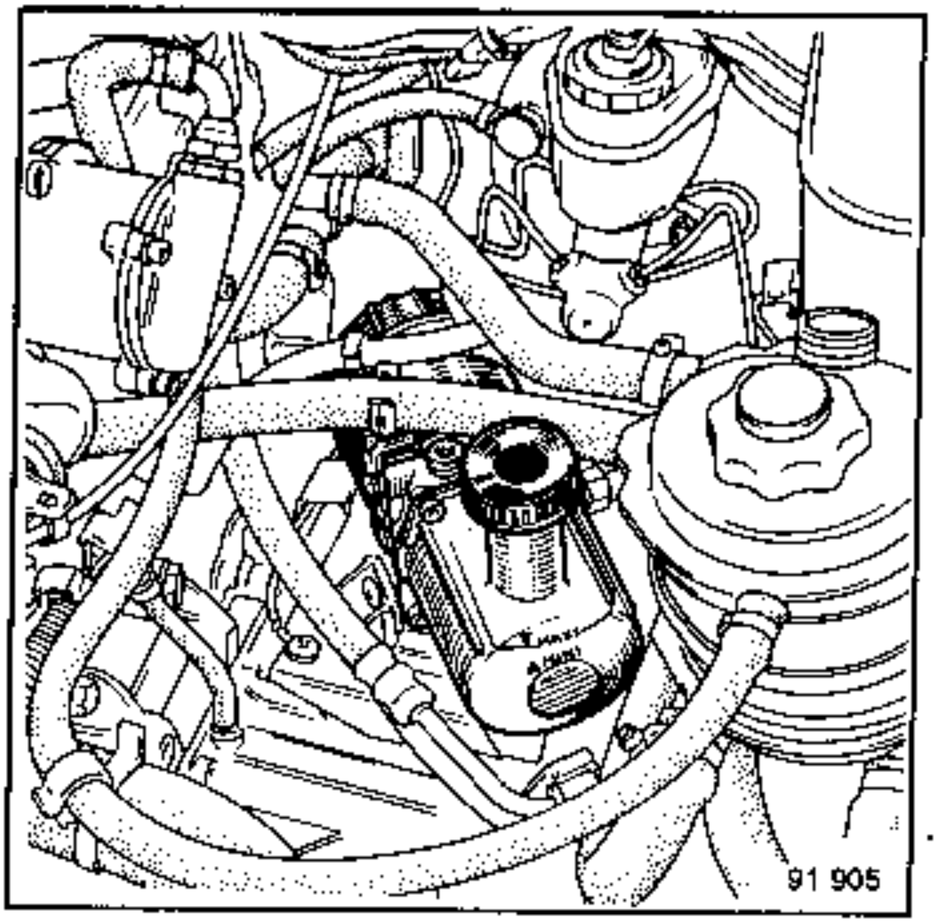
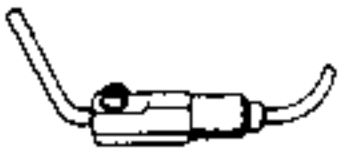
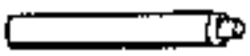
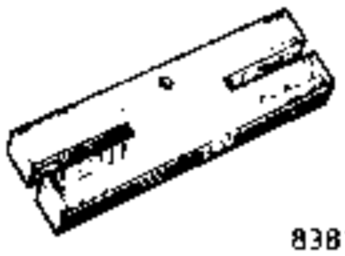
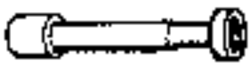
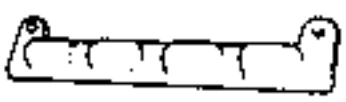
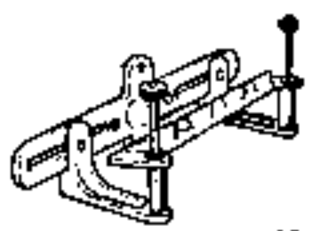
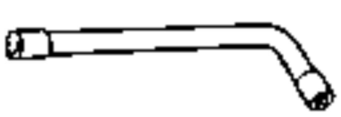
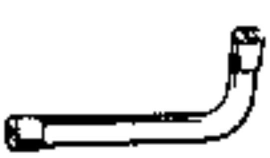
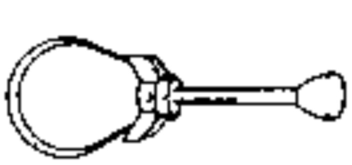
The fluid should be up to the pad (2) on the filter sleeve.

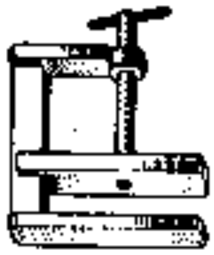
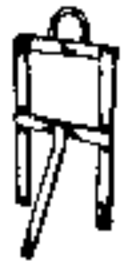
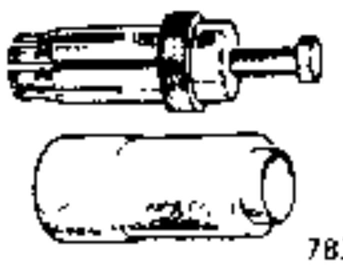
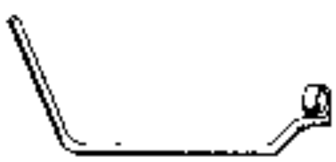
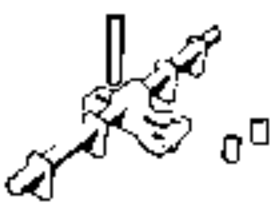
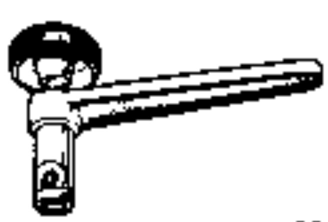
Diesel engined vehicles :

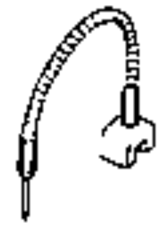
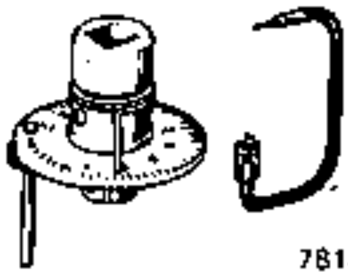
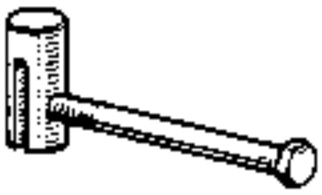


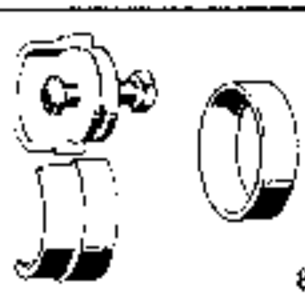
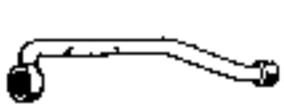
The fluid should be visible between the Max. and Min. levels.

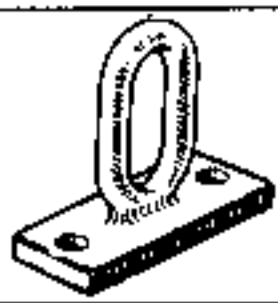
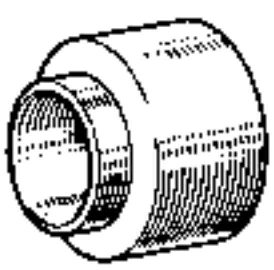
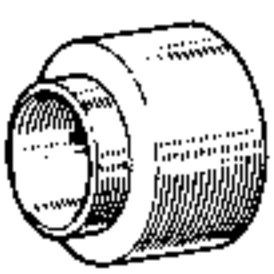
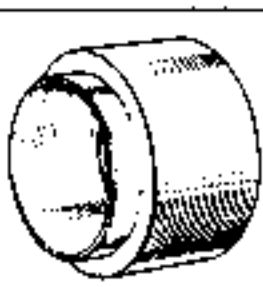
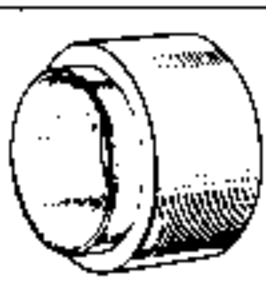
Illustrated symbol	Methods Reference	Part no.	Description
 68616	**Mot. 61**	00 01 199 900	Valve retainer
 68621	**Mot. 104**	00 01 309 900	Cylinder head and cylinder head gasket locating dowels
 68625	**Mot. 111**	00 01 320 300	Drift for crimping the oil gallery plugs
 68658	**Mot. 131-02**	00 01 326 202	Plug for fitting the crankshaft bearing seal inside Ø of seal 72.6 mm
 68641-1	**Mot. 213-01**	00 00 021 301	Pressure gauge for checking the fuel pump pressure (0 to 5 bars)
 83812	**Mot. 251-01**	00 00 025 101	Dial indicator support used with Mot.252-01
 83812	**Mot. 252-01**	00 00 025 201	Locating plate for measuring the cylinder liner projection. Used with Mot.251-01
 68653	**Mot. 253**	00 00 025 300	Wrench, 17 mm across flats, for disconnecting the gearbox from the engine

Illustrated symbol	Methods Reference	Part no.	Description
 68658	**Mot. 259-01**	00 00 025 901	Plug for fitting the crankshaft bearing seal - inside Ø of seal 80 mm
 68663	**Mot. 320**	00 00 032 000	Valve retaining plate. Used with Mot.382
 68666	**Mot. 330-01**	00 00 033 001	Cylinder head support
 68668	**Mot. 336**	00 00 033 600	Wrench for P.C. type hose clips. (large model)
 68677	**Mot. 382**	00 00 038 200	Valve spring compressor. Used with Mot.320 and Mot.331
 68681	**Mot. 400**	00 00 040 000	Wrench for P.C. hose clips (small model)
 68682	**Mot. 401**	00 00 040 100	Equipment for filling the cooling system under a positive head (vehicles with glass expansion bottles)
 69716	**Mot. 445**	00 00 044 500	Oil filter spanner

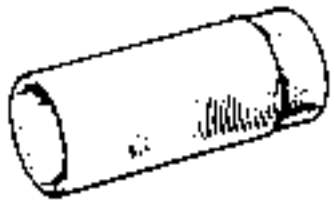
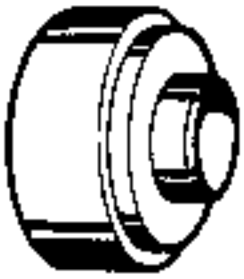
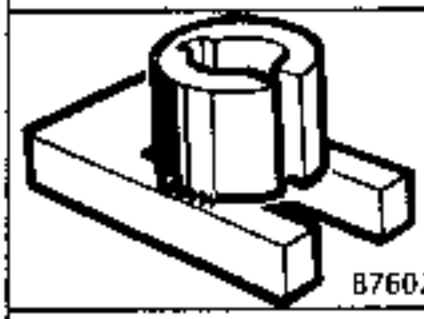
Illustrated symbol	Methods Reference	Part no.	Description
 85654	**Mot. 453-01**	00 00 045 301	Set of 2 hose clamps
 71259	**Mot. 475**	00 00 047 500	Offset ratchet wrench for tightening cylidner head bolts
 73285	**Mot. 498**	00 00 049 800	Equipment for lifting the engine - gearbox assembly (vehicles equipped with type 354 gearboxes)
 78324 1	**Mot. 500-03**	00 00 050 003	Tools for replacing the camshaft seal (vehicles equipped with type 354 gearboxes)
 73106	**Mot. 503**	00 00 050 300	Spanner for nuts on carburettor base (12 mm across flats)
 83390	**Mot. 521-01**	00 00 052 101	Liner retaining clamp
 68605	**Mot. 567**	00 00 056 700	Rocker arm adjusting spanner
 77121	**Mot. 582**	00 00 058 200	Flywheel retainer

Illustrated symbol	Methods Reference	Part no.	Description
 77669	Mot. 587	00 00 058 700	Seal extractor
 77889	Mot. 591-02	00 00 059 102	Magnetic cable for cylinder head angle tightening spanner
 78181	Mot. 591-03	00 00 059 103	Angle tightening spanner for tightening cylinder head bolts (1/2" drive square)
 78618	Mot. 597	00 00 059 700	Equipment for lifting the engine - gearbox assembly
 78785	Mot. 720	00 00 072 000	Cylinder head locating tool (for type 840 engines only)
 79923	Mot. 761	00 00 076 100	Tools for replacing the mechanical timing gear chain tensioner
 82919	Mot. 792-01	00 00 079 201	Engine support plate for the desvil stand
 75723-1	Mot. 828-01	00 00 082 801	Flexible screwdriver for carburettor screws fitted with tamperproof caps

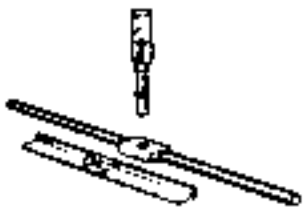
Illustrated symbol	Methods Reference	Part no.	Description
 82258	**Mot. 836-06**	00 00 083 606	Set of replacement connectors for kit Mot.836-05
 83289	**Mot. 855**	00 00 085 500	Timing sprocket retaining tool
 83375	**Mot. 856**	00 00 085 600	Dial indicator support for setting the timing on BOSCH injection pumps
 83394	**Mot. 861**	00 00 086 100	Top dead centre dowel
 83657	**Mot. 867**	00 00 086 700	Pressure testing kit for fuel systems
 84431	**Mot. 876**	00 00 087 600	Camshaft bearing extractor (5 bearing type)
 84122	**Mot. 877**	00 00 087 700	Tools for setting the timing on the ROTO-DIESEL injection pump
 84747	**Mot. 909-01**	00 00 090 901	Spanner for injection pump securing nuts

Illustrated symbol	Methods Reference	Part no.	Description
 84757	**Mot. 923**	00 00 092 300	Cylinder head lifting ring
 86422	**Mot. 930**	00 00 093 000	ROTO-DIESEL injection centre tool kit
 86675	**Mot. 964**	00 00 096 400	Tool for locating the timing gear casing and fitting the seals
 86893	**Mot. 988**	00 00 098 800	Plug for fitting the camshaft seal*
 86893	**Mot. 988-01**	00 00 098 801	Plug for fitting the camshaft seal
 86888	**Mot. 989**	00 00 098 900	Plug for fitting the intermediate shaft housing seal
 86892	**Mot. 990**	00 00 099 000	Plug for fitting the crankshaft seal (at the timing gear end)*
 86892	**Mot. 990-01**	00 00 099 001	Plug for fitting the crankshaft seal at the timing gear end

Illustrated symbol	Methods Reference	Part no.	Description
 68658	**Mot. 991**	00 00 099 100	Plug for fitting the crankshaft seal (at the flywheel end)
 87531	**Mot. 992-01**	00 00 099 201	Additional thrust plate for tool Mot.992
 88986	**Mot. 992-03**	00 00 099 203	Plate and pin for removing valve pads (additional to Mot.992-02)
	Mot. 992-04	00 00 099 204	Tool for removing and refitting the valve clearance adjusting pads (replacing Mot.992-02)
 86887	**Mot. 993**	00 00 099 300	Plug for fitting the intermediate shaft inner bush
 86889	**Mot. 994**	00 00 099 400	Plug for fitting the intermediate shaft outer bush
 84900	**Mot. 995**	00 00 099 500	Set of 2 rods (used with engine support plate Mot.792-01)
 87164	**Mot. 996**	00 00 099 600	Tool for retaining the injection pump drive sprocket

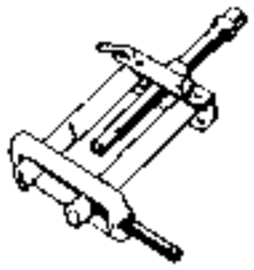
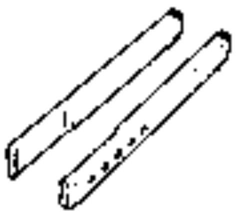
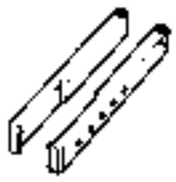
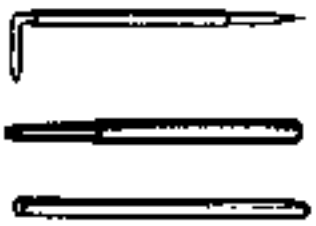
Illustrated symbol	Methods Reference	Part no.	Description
 86890	**Mot. 997**	00 00 099 700	Injector holder spanner
 86891	**Mot. 998**	00 00 099 800	Intermediate shaft bush extractor
 86977-1	**Mot. 999**	00 00 099 900	Union for checking compression pressures (used with the Moto-meter NAUDER compression pressure indicator).
 B7569	**Mot. 1010**	00 00 101 000	Plug for fitting the camshaft seal (at the clutch end)
 B7602	**Mot. 1011**	00 00 101 100	Injector holder support for dismantling and testing injectors. ROTO-DIESEL equipment
 88024	**Mot. 1014**	00 00 101 400	Kit for checking and adjusting the turbo charger pressure and for checking the engine for leaks
 90185	**Mot. 1040**	00 00 104 000	Dummy sub-frame for removing and refitting the power unit assembly
 90185	**Mot. 1040-01**	00 00 104 001	Dummy sub-frame for removing and refitting the power unit assembly

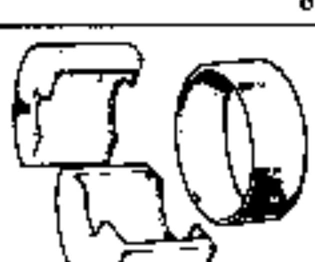
Illustrated symbol	Methods Reference	Part no.	Description
 90097	**Mot. 1053**	00 00 105 300	Injection pump sprocket extractor
 90277	**Mot. 1054**	00 00 105 400	Top dead centre pin
	**Mot. 1079**	00 00 107 900	Equipment for setting the timing of the new ROTO-DIESEL pumps with access through the cover
	**Mot. 1079-01**	00 00 107 901	Equipment for setting the timing of the new ROTO-DIESEL pumps used with the 30 mm travel dial indicator Mot.1079-02
 91285	**Mot. 1079-02**	00 00 107 902	Dial indicator for Mot.1079-01 for setting the timing on ROTO-DIESEL DPC injection pumps

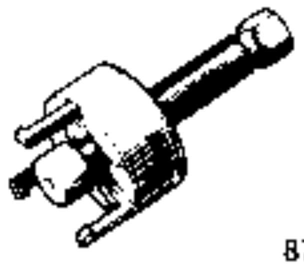
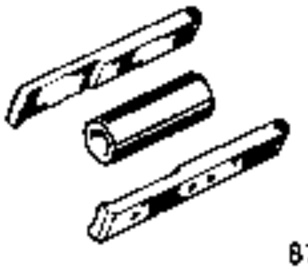
Illustrated symbol	Methods Reference	Part no.	Description
 68982	**Ele. 15**	00 01 323 300	Test light
 68973	**Ele. 22-01**	00 01 331 001	Shaft end protector (for extracting bearings)
 87217-1 +	**Ele. 346-04**	00 00 034 604	Belt tension tester Kit Ele.346-02 + Ele.346-03
 75742	**Ele. 556**	00 00 055 600	Cranked spanner for the distributor securing nut
 88284	**Ele. 1023**	00 00 102 300	Grips for type M.T.I.S. electrical connectors
	Ele. 1044	00 00 104 400	Tool for removing the clips from PACKARD connectors

Illustrated symbol	Methods Reference	Part no.	Description
 84328	Emb. 880	00 00 088 000	Pin extractor

Gearbox

Illustrated symbol	Methods Reference	Part no.	Description
 71625	B. Vi. 28-01	00 01 227 301	Extractor with inter-changeable jaws
 71806	B. Vi. 28-02	00 01 244 000	Set of 2 jaws 196 mm long. Replacemetn for B.Vi.28-01
 71806	B. Vi. 28-03	00 01 244 001	Set of 2 jaws 146 mm long. Replacemetn for B.Vi.28-01
 68997-1	B. Vi. 31-01	00 01 259 401	Set of 3 punches for fitting spring pins 5 mm Ø
 68997	B. Vi. 31-02	00 01 332 600	Replacement punch for set B.Vi.31-01

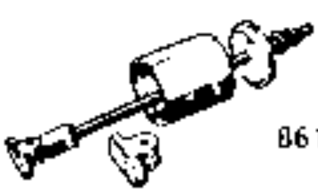
Illustrated symbol	Methods Reference	Part.no.	Description
 69006	B. Vi. 48	00 01 330 300	Set of 2 wide ended jaws (additional to B.Vi.28-01)
 84519-1	B. Vi. 902-01	00 00 090 201	Tool for fitting circlips to primary and secondary shafts
 86095	B. Vi. 945	00 00 094 500	Plug for fitting the sun wheel seal
 86096	B. Vi. 946	00 00 094 600	Plug for fitting the circlip to the sun wheel
 86097	B. Vi. 947	00 00 094 700	Plug for fitting bearings to the gearbox housing
 86062	B. Vi. 948	00 00 094 800	Plug for fitting the 5th speed gear wheel circlip
 86098	B. Vi. 949	00 00 094 900	Tool for fitting and removing spring pins in the shift fork shafts
 87213	B. Vi.1000	00 00 100 000	Extractor for removing the 5th speed hub from the secondary shaft (used with B.Vi.22-01)

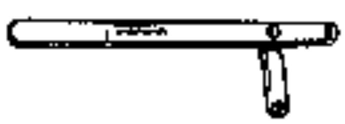
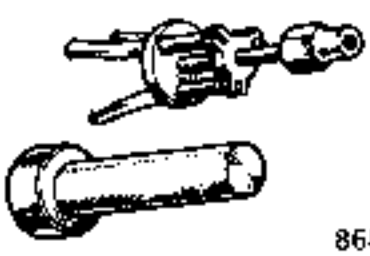
Illustrated symbol	Methods Reference	Part no.	Description
 87216	B. Vi. 1003	00 00 100 300	Extractor for removing the 5th speed hub from the primary shaft
 87571 +	B. Vi. 1007	00 00 100 700	Set of 2 jaws and a protective end for extracting gears (used with B.Vi.28-01)
 86097	B. Vi. 1030	00 00 103 000	Plug for fitting bearings to the gearbox housing
88689	B. Vi. 1031	00 00 103 100	Tool for fitting the circlips to the primary and secondary shafts
 90594	B. Vi. 1057	00 00 105 700	Tool for locking the differential
90592	B. Vi. 1058	00 00 105 800	Tool for fitting the gearbox outlet seal at the differential end
 90588	B. Vi. 1059	00 00 105 900	Rings for fitting the differential bearings

Illustrated symbol	Methods Reference	Part no.	Description
 72161	T. Av. 476	00 00 047 600	Ball joint extractor
 69128-1	T. Av. 537-02	00 00 053 702	Expander for fitting the drive shaft bellows (type GE 86 joint)
 69128-1	T. Av. 586-01	00 00 058 601	Expander for fitting the drive shaft bellows (type GE 76 joint)
 85894	T. Av. 944	00 00 094 400	Tool for fitting the bearing to the drive shaft
 88639	T. Av. 1034	00 00 103 400	Grips for tightening the drive shaft bellows clip (type GE 76 - GE 86 - Lobro RF 95 drive shafts)
 89214	T. Av. 1050	00 00 105 000	Thrust screw for 4 and 5 hole wheels (for R.18-Fuego-R.20-R.30 vehicles with negative offset front axles only)

Illustrated symbol	Methods Reference	Part no.	Description
 77840	Dir. 803	00 00 080 300	Union for measuring the power steering fluid pressure. Metric thread (Renault 17)F
 81638	Dir. 812-01	00 00 081 201	Tool for tightening and releasing the steering axial ball joint - Ø 36 and 37 mm
	Dir. 832-01	00 00 083 201	Tool for tightening and releasing the steering axial ball joint - Ø 41 mm
 88078	Dir. 1083	00 00 108 300	Tools for refitting the power steering pump pulley. Replaces set Dir.1017

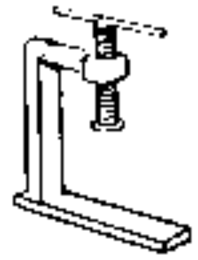
Rear axle

 86182-1	T. Ar. 960-01	00 00 096 001	Set for extracting the first bush from the rear bearing (additional to T.Ar.960)
	T. Ar. 960-02	00 00 096 002	Tool set for replacing the rear bearing bushes (combining T.Ar.960 + 960-01)

Illustrated symbol	Methods Reference	Part no.	Description
 69306-1	**Rou. 015-01**	00 01 331 601	Shaft end protector inside Ø 16 mm
 74923	**Rou. 541**	00 00 054 100	Dial indicator support for checking the play in the hubs
 77672	**Rou. 604-01**	00 00 060 401	Hub locking tool
 86831	**Rou. 943**	00 00 094 300	Tools for replacing the hub plugs

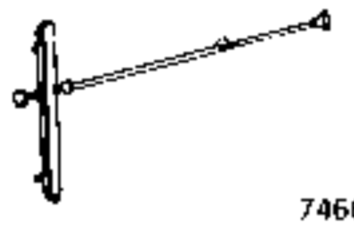
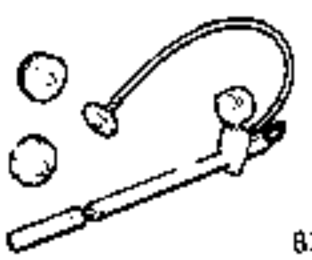
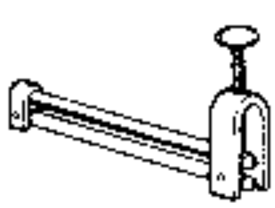
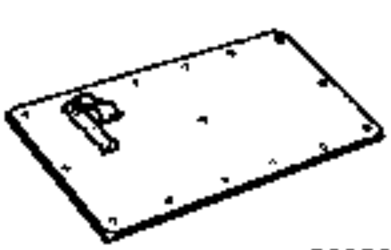
Suspension

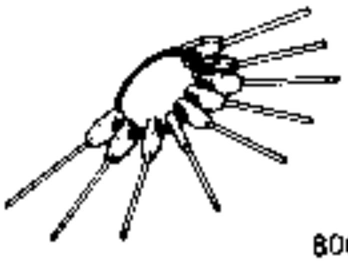
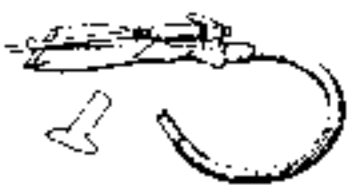
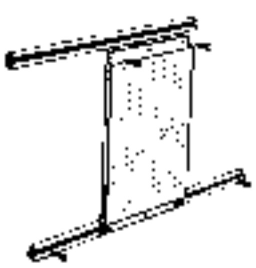
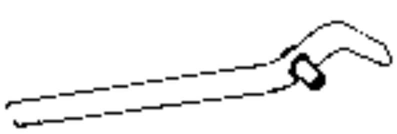
 90100	**Sus. 1052**	00 00 105 200	Tools for working on front springs and shock absorbers
	Sus. 1052-01	00 00 105 201	Intermediate plate for Sus.1052 for replacing the springs and shock absorbers of the 5 GT TURBO

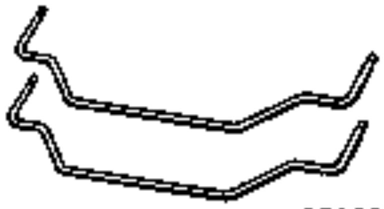
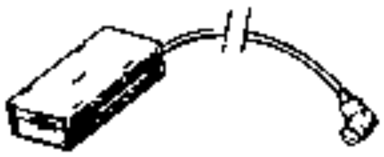
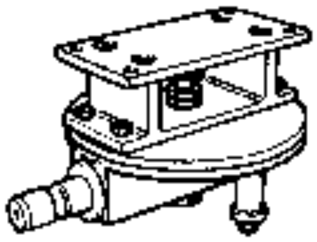
Illustrated symbol	Methods Reference	Part no.	Description
 82072	**Fre. 573-01**	00 00 057 301	Grips for hooking the hand brake cable to the shoe operating lever
 82071	**Fre. 823**	00 00 082 300	Brake caliper piston pusher (vehicles equipped with disc brakes)
 81813	**Fre. 826**	00 00 082 600	Tool for removing the brake lateral retaining spring (BENDIX rear brakes)
 89034	**Fre. 1047**	00 00 104 700	Bridge piece for removing the hand brake control from the rear caliper (R.5 Turbo)
	Fre. 1085	00 00 108 500	Complete kit for testing the braking system

Special equipment

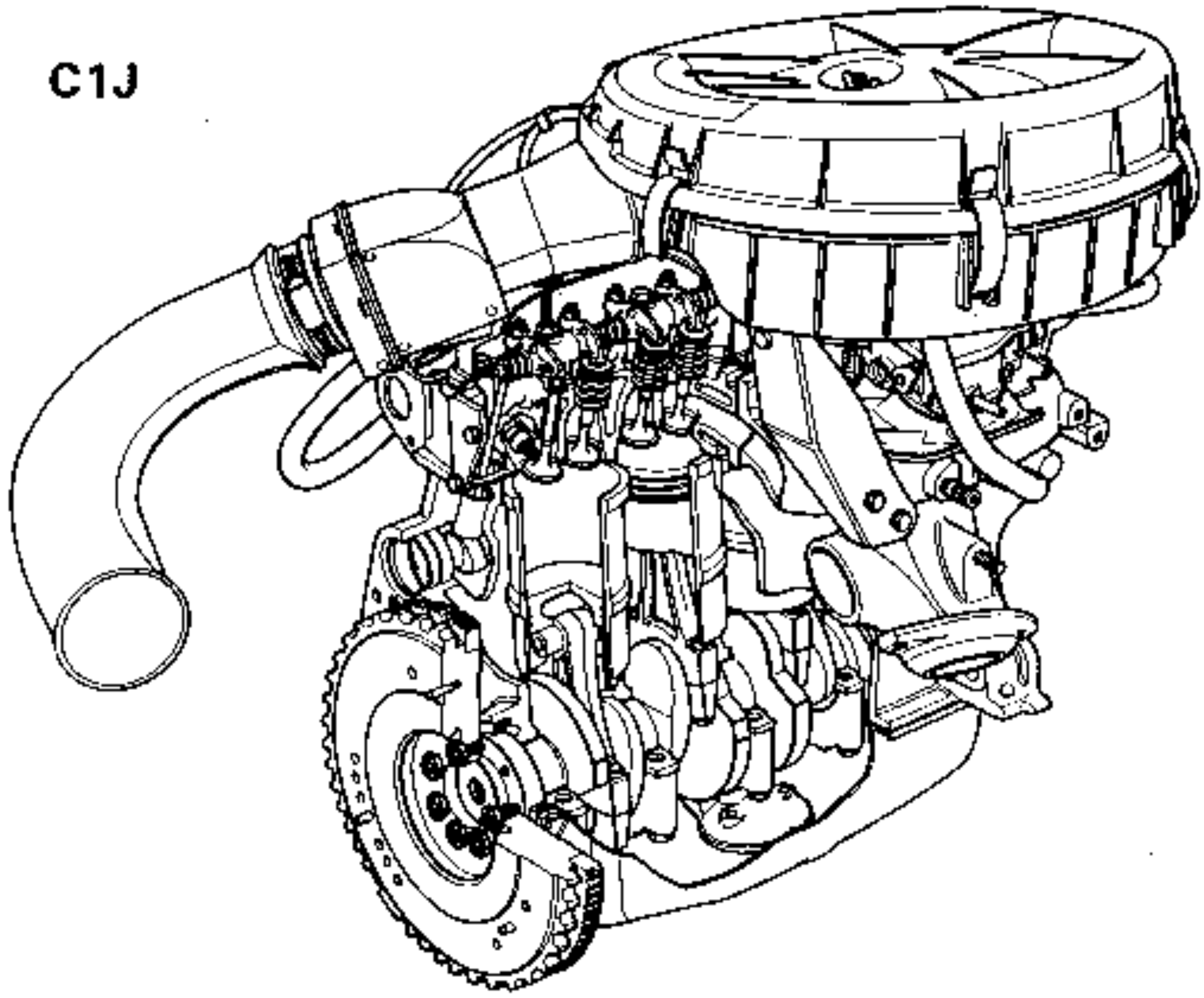
 75124	**Ms. 504-01**	00 00 050 401	Steering clamping tool
 82900	**Ms. 511-01**	00 00 051 101	Starter remote control

Illustrated symbol	Methods Reference	Part no.	Description
 74663	**Ms. 533**	00 00 053 300	Removable hand throttle
 82999-1	**Ms. 554-01**	00 00 055 401	Plug for fitting to expansion bottle
 82999-1	**Ms. 554-03**	00 00 055 403	Equipment for testing the cooling system and the expansion bottle valve
 82999-1	**Ms. 554-04**	00 00 055 404	Plug for testing expansion bottle valves (additional to Ms.554-03)
 77070	**Ms. 580**	00 00 058 000	Inertia weight
 77125	**Ms. 583**	00 00 058 300	Hose clamp
 78707	**Ms. 760**	00 00 076 000	Tester for checking and adjusting ignition systems
 79970	**Ms. 782**	00 00 078 200	Anti-fire protection plate 40 x 20 cm

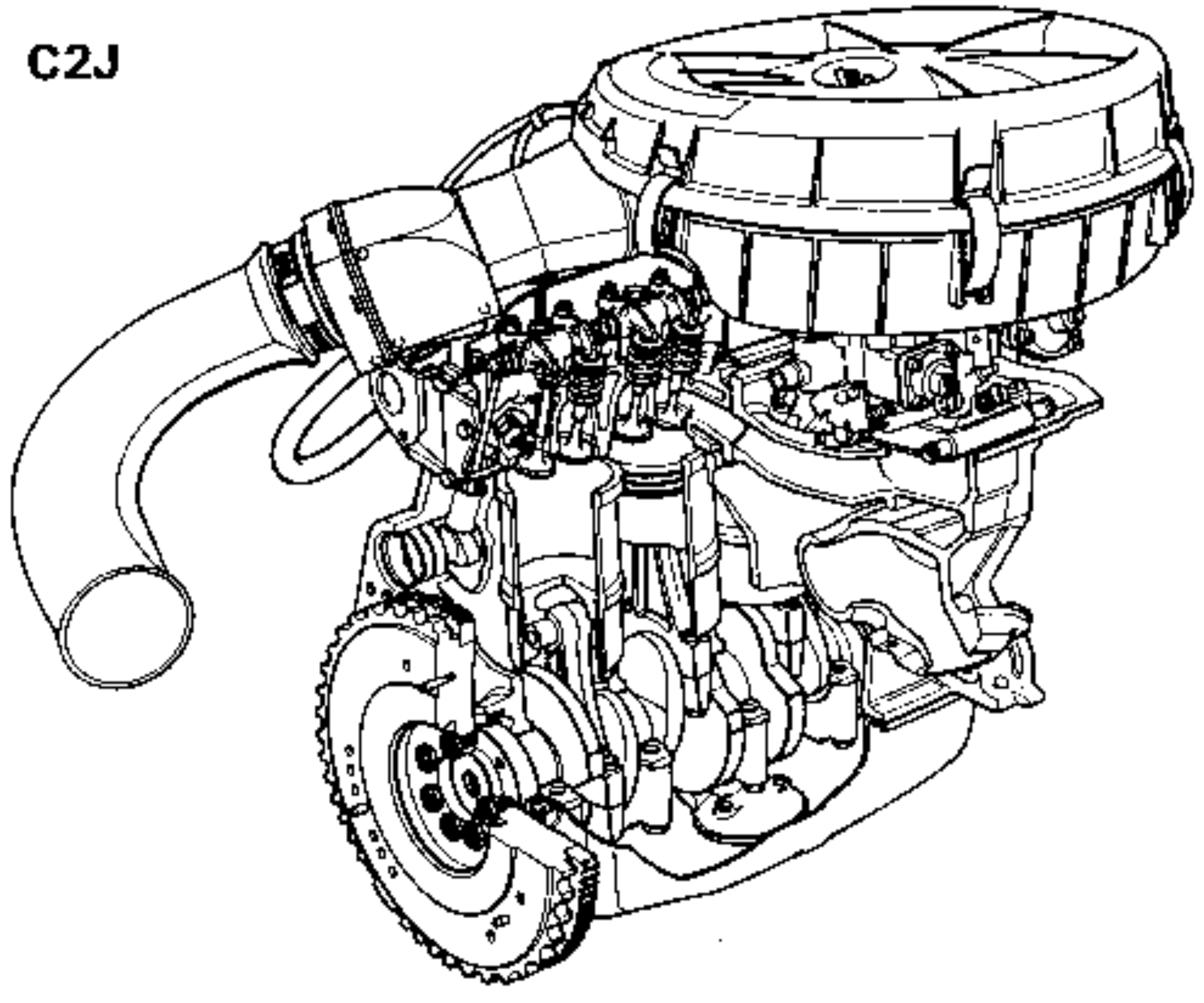
Illustrated symbol	Methods Reference	Part no.	Description
 80079	Ms. 787	00 00 078 700	Set of gauge rods for adjusting carburettors
 81854	Ms. 815	00 00 081 500	Equipment for bleeding the braking system and the clutch system
 82502	Ms. 815-01	00 00 081 501	Replacement pipettes for fitting to bleed equipment Ms.815, sold in sets of 6
 81782	Ms. 821	00 00 082 100	Vacuum cleaner for removing dust from brakes
 82310	Ms. 841	00 00 084 100	Set of 2 rails for mounting tool support panels
 84901	Ms. 847	00 00 084 700	Lever for fitting "tubeless" valves
 84253	Ms. 860-01	00 00 086 001	Strobe light kit for Ms.760 (except for diesel engines)
 83660	Ms. 870	00 00 087 000	Vacuum gauge for checking the exhauster (diesel engines)

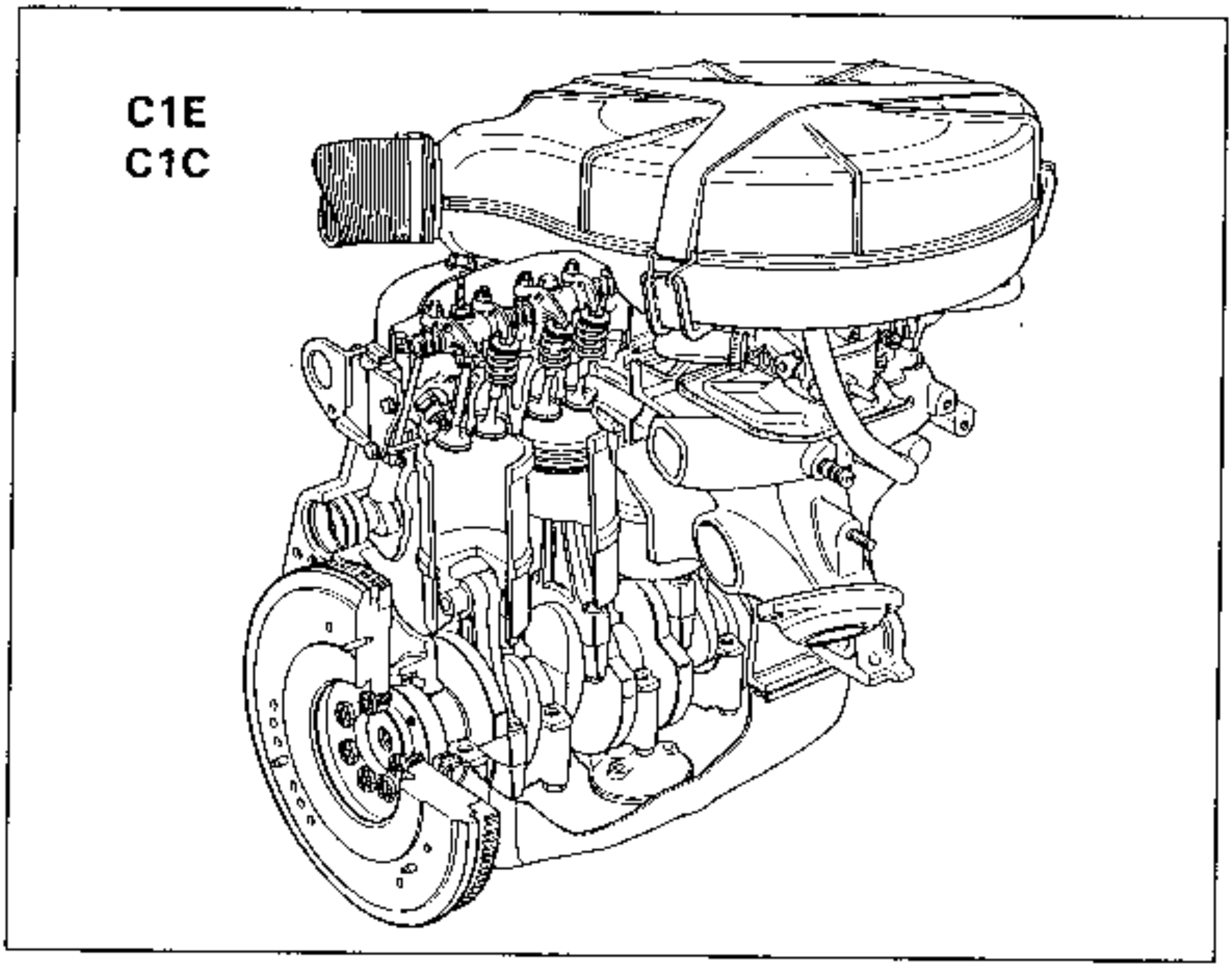
Illustrated symbol	Methods Reference	Part no.	Description
 87289	Ms. 1005	00 00 100 500	Set of 2 extractors for removing the "Audio" unit
 87268	Ms. 1006	00 00 100 600	Service connector for radio installation
 87995	Ms. 1008	00 00 100 800	Removable head for the DESVIL stand (used with Mot.792-01)

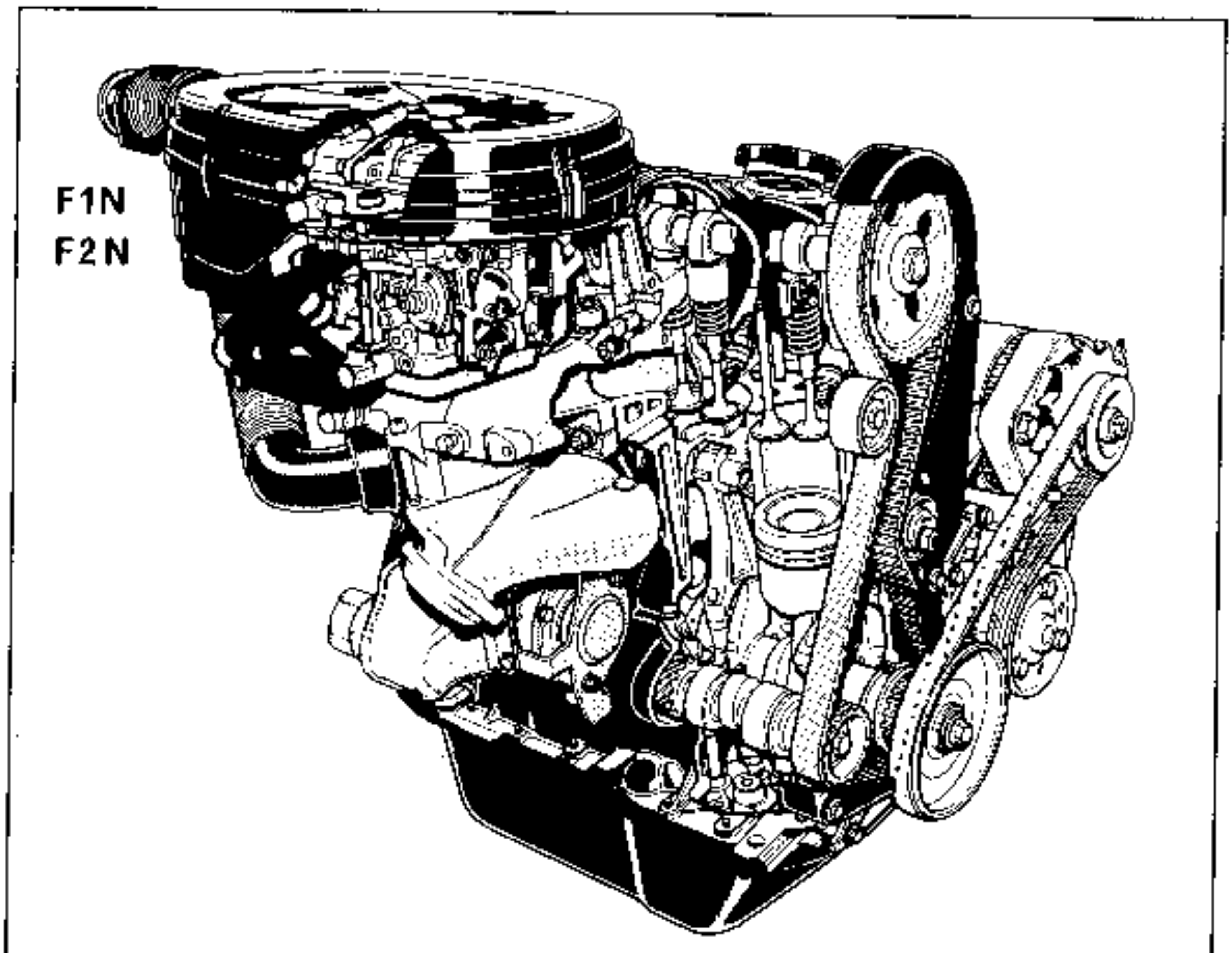
C1J

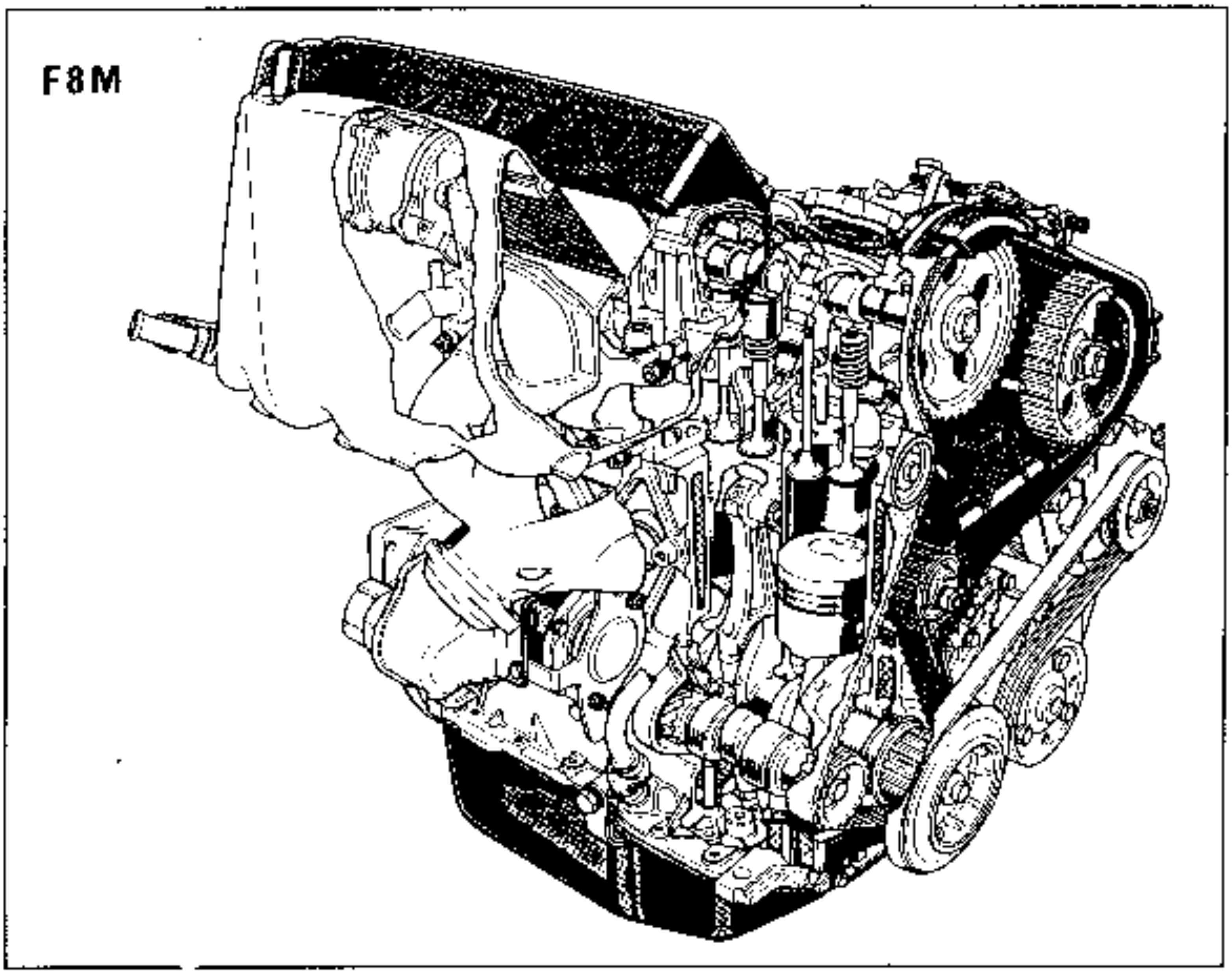


C2J




C1E
C1C


F1N
F2N



Consumables

Type	Quantity	Units concerned
Molykote BR2	Coating	- Drive shaft splines at gearbox end - Clutch shaft splines
CAF 4/60 THIXO	Coating	Drive shaft pin holes
Loctite FRENBLOC (Locking and sealing resin)	Coating	Brake caliper securing bolts
Loctite FRENETANCH (Locking and sealing resin)	Coating	Crankshaft pulley securing bolts
ELF. Multi	Coating	Wheel bolts
Molykote CU. 7439	Coating	Wheel locating shoulders only

Vehicle type	Engine	Index no.	Capacity (cm³)	Bore (mm)	Stroke (mm)	Comp. ratio
B.C.S.400	C1C	A.700	956	65	72	9,7
F400	C1C	B.706	956	65	72	8,6
B.C.F.S.401	C1E	G.750	1108	70	72	9,5
B.C.F.401	C1E	752 *	1108	70	72	9,5
B.F.401	C1E	754	1108	70	72	8,3
B.C.F.402	C1J	A.768 ***	1397	76	77	9,2
B.F.402	C1J	780	1397	76	77	9,2
B.C.403	C2J	M780 Q781 788 * 798 *	1397	76	77	9,2
B.C.F.S.404	F8M	D720 730	1596	78	83,5	22,5
C.405	C1J	782 G788	1397	76	77	7,9
C.405	C1J	784 *	1397	76	77	8,0
B.C.F.407	C3J **	700 702	1397	76	77	9,0
		760	1390	75,8	77	9,0
B.C.408	F3N **	H717 G716	1721	81	83,5	9,5
C.409	F3N **	702	1721	81	83,5	9,5
B.C.S.40F	C1G	702 720	1237	71,5	77	9,2
B.C.40G	F2N	H740	1721	81	83,5	10
B.C.F.40H	C1E **	B756	1108	70	72	8,8
B.C.40J	C2J	G782 ** V789	1397	76	77	9 9,2
B.C.40K	F2N **	G742	1721	81	83,5	9,5
B.C.F.40M	C2J **	T784	1397	76	77	9

* Switzerland - Germany
** Unleaded fuel
*** Non-premium fuel

ESSENTIAL SPECIAL TOOLS	
Mot. 1014	Pressure gauge

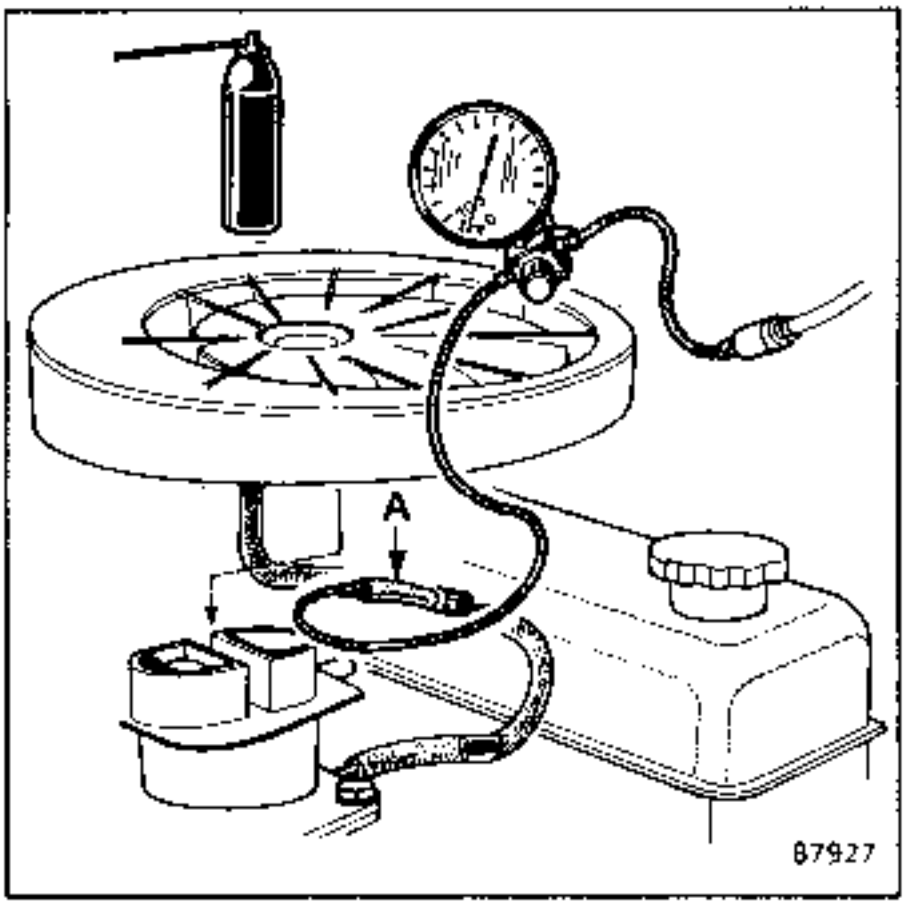
CONSUMABLES
Gas leak detector : 1000 bulles (L'AIR LIQUIDE) MOUSS MM2 (Huiles LUBRO) or an equivalent. (These products are sold in aerosol cans of approximately 400 ml).

The detection of external oil leakage is facilitated by pressurising the inside of the engine and spraying a "gas leak detector" over roughly the area on the engine from which the leakage is coming.

CONNECTIONS :

Connect into the oil vapour re-intake system : (This permits one to check all that part of the engine which is not subject to oil pressure).

Example of connection :



- Pressure gauge Mot.1014 with end fitting (A) that can be connected into the oil vapour re-intake system.

METHOD :

NEVER EXCEED A PRESSURE OF 80 MILLIBARS.

Above this pressure, the lips on the seals fold back.

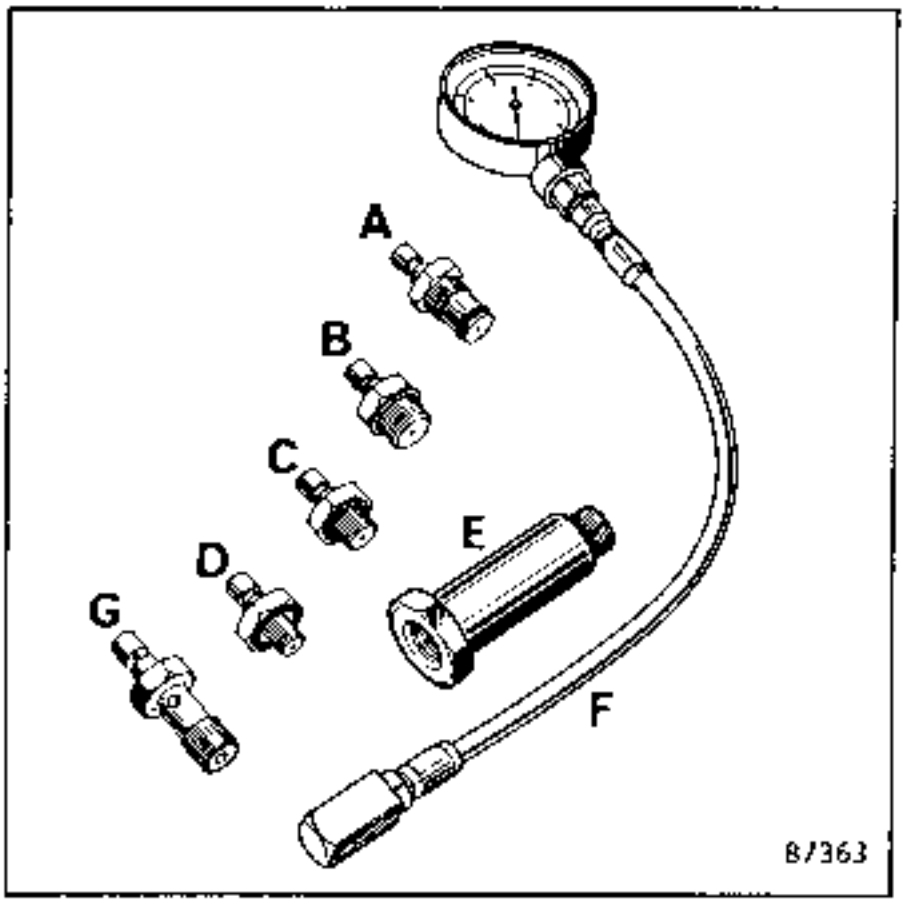
- Fully unscrew the screw on pressure gauge Mot.1014 before connecting it to the re-intake system.
- Very gradually raise the pressure to 80 millibars and check :
  - that the filler cap and the dipstick are air tight,
  - for any air leakage on the air intake system (if the re-intake system is not blocked).
- Spray a considerable quantity of the leak detection product over the suspect area and check for the formation of soapy bubbles.

NOTE :

- In certain cases the removal of adjacent parts will be necessary, for example : the flywheel cover plate.
- This operation can also be undertaken after an engine has been repaired but it will cause jointing compounds to harden and is only to be carried out for a short period to avoid the compounds being blown out.

ESSENTIAL SPECIAL TOOLS	
Mot.836-05	Oil pressure gauge kit.
Mot.836-06	Complete set of unions.

Composition of kit Mot.836-05.



Test method :

Engines : C1C-C1E-C1G-C1J-C2J and C3J : E + C + F

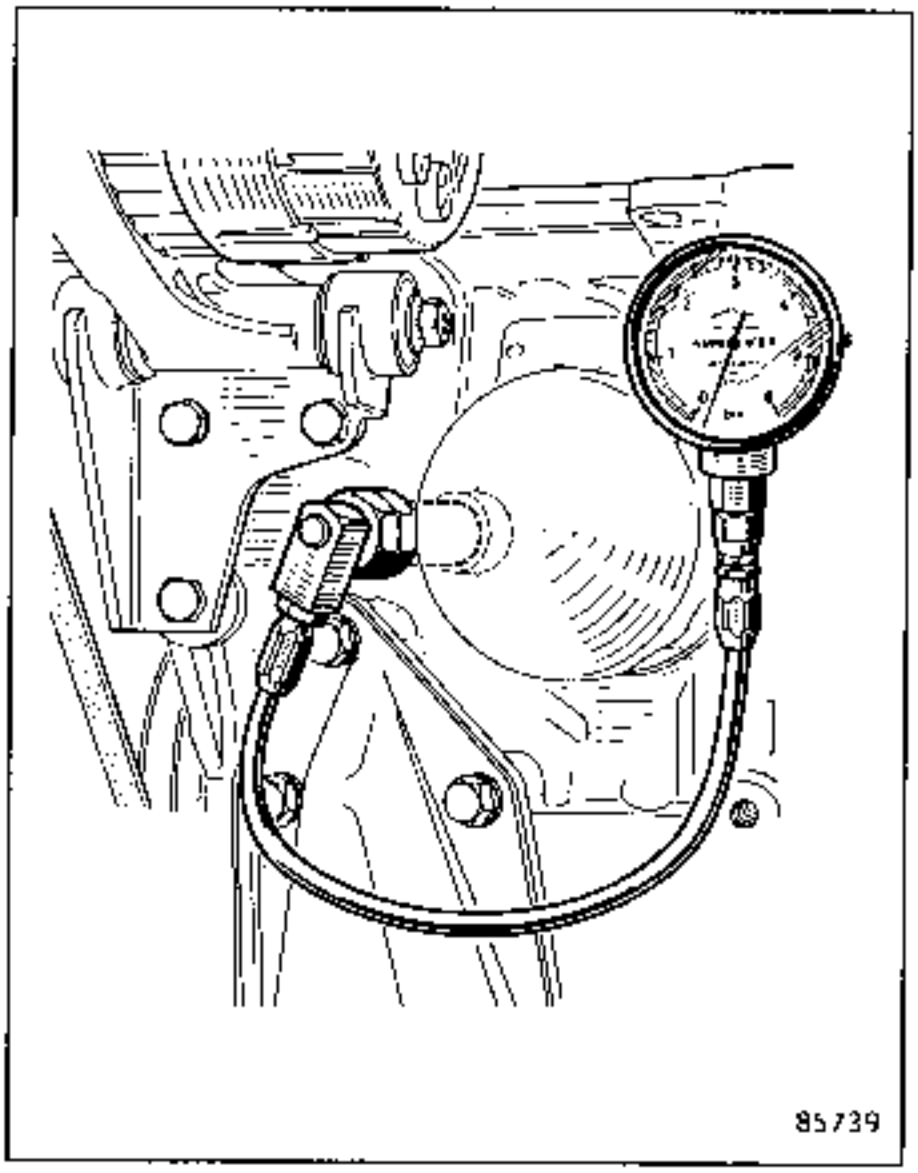
Engines C1J Turbo : G + F

Engines : F2N-F3N and F8N : B + F

The test is to be carried out at the normal engine operating temperature (of approximately 80°C).

Connect the pressure gauge to the switch tapping.

ENGINES : C1C-C1E-C1G-C1J-C2J and C3J



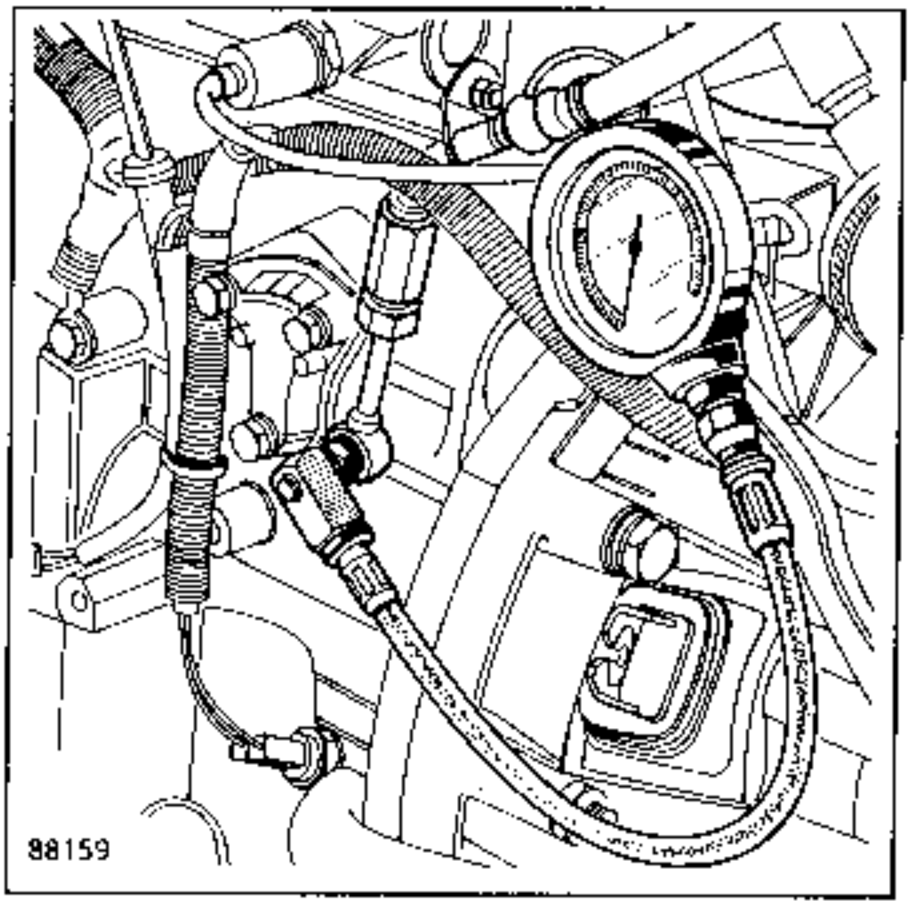
Testing :

Min. pressure in bars

- at idling ..0,7

- at 4000 rpm ..3,5.

ENGINES C1J Turbo



88159

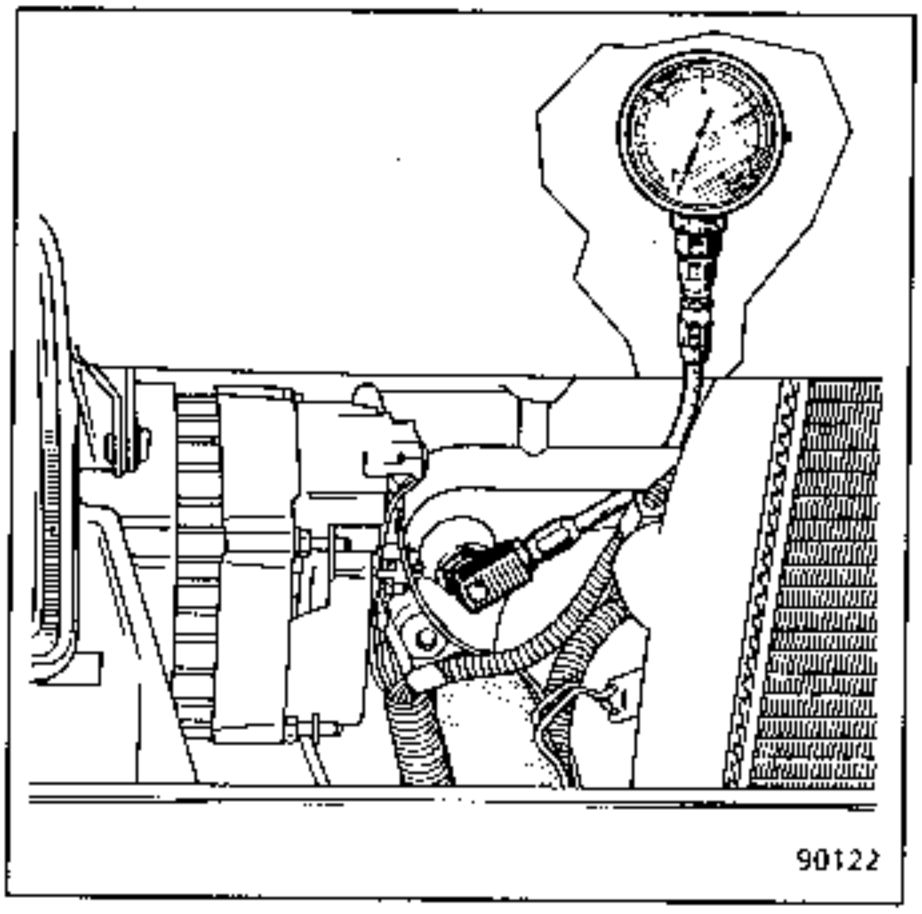
Testing :

Min. pressure (bars)

- at 750 rpm 1.3
- at 4000 rpm 3.2

ENGINES : F2N-F3N and F8M

This operation is made easier by removing the radiator grille and air baffle (on certain versions)



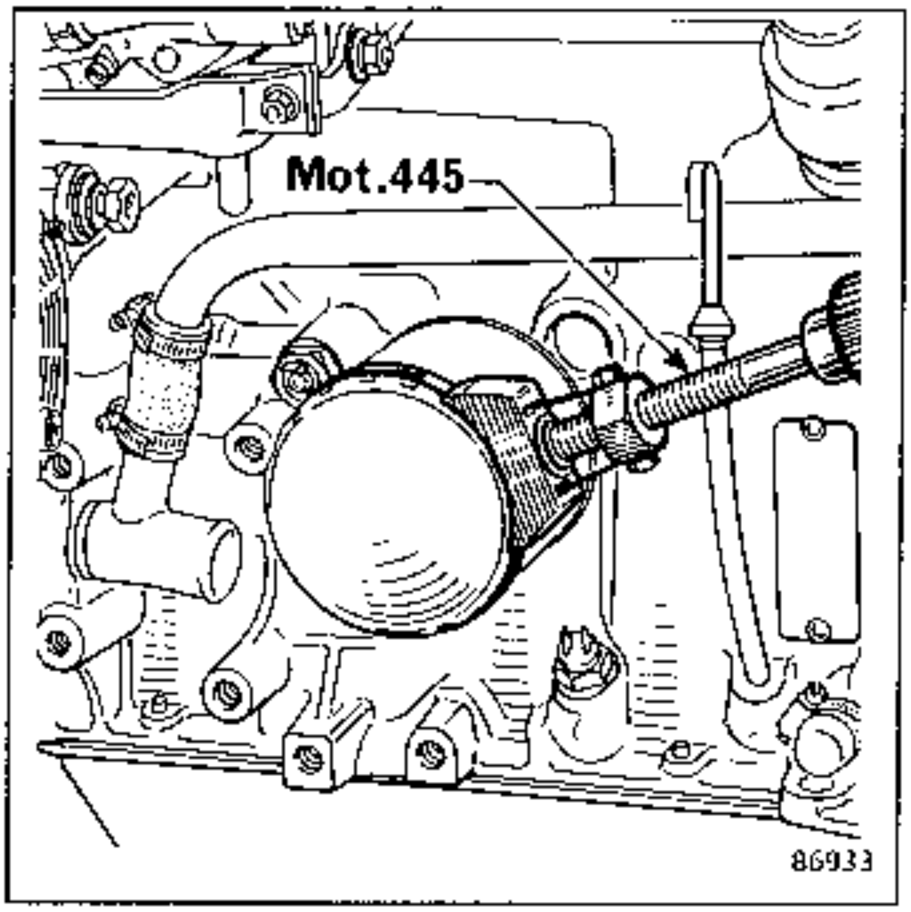
90122

Testing :

Min. pressure in bars

- at 1000 rpm 2
- at 3000 rpm 3.5

ESSENTIAL SPECIAL TOOLS	
Mot. 445	Oil filter spanner



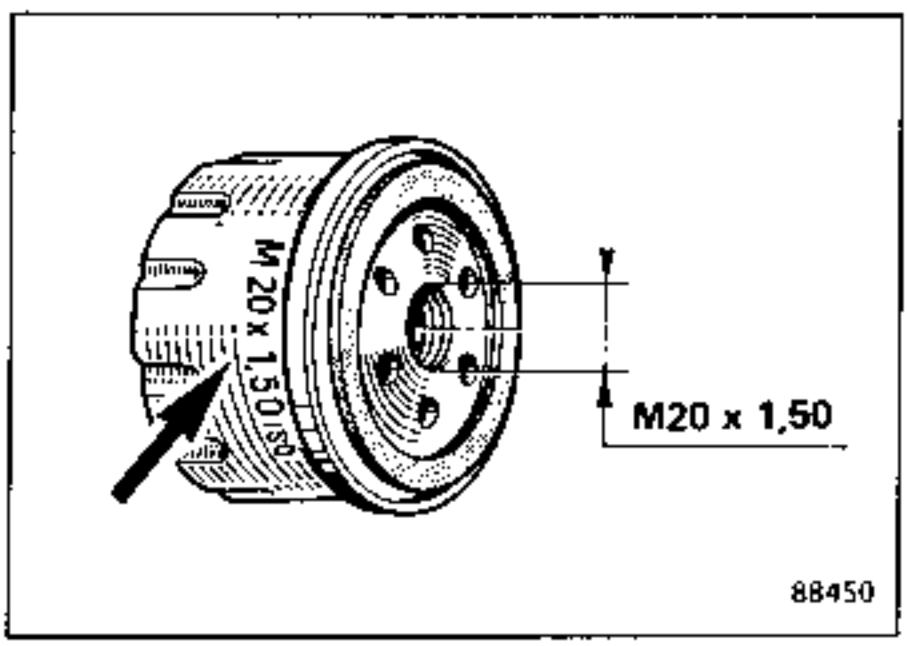
Check that the nipple is fully screwed in and that the old seal is not still in place on the cylinder block.

Oil the seal on the new filter with engine oil.

Fit the filter.

Fill the engine with oil or top-up the oil level.

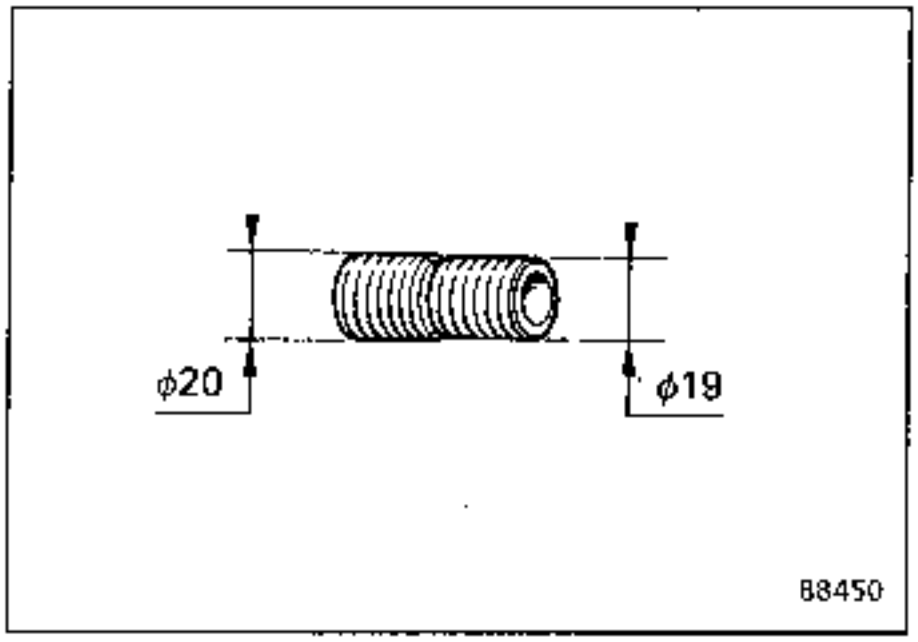
THESE VEHICLES ARE FITTED WITH FILTERS WITH AN ISO THREAD (M20 x 1.50).



OIL FILTER NIPPLE

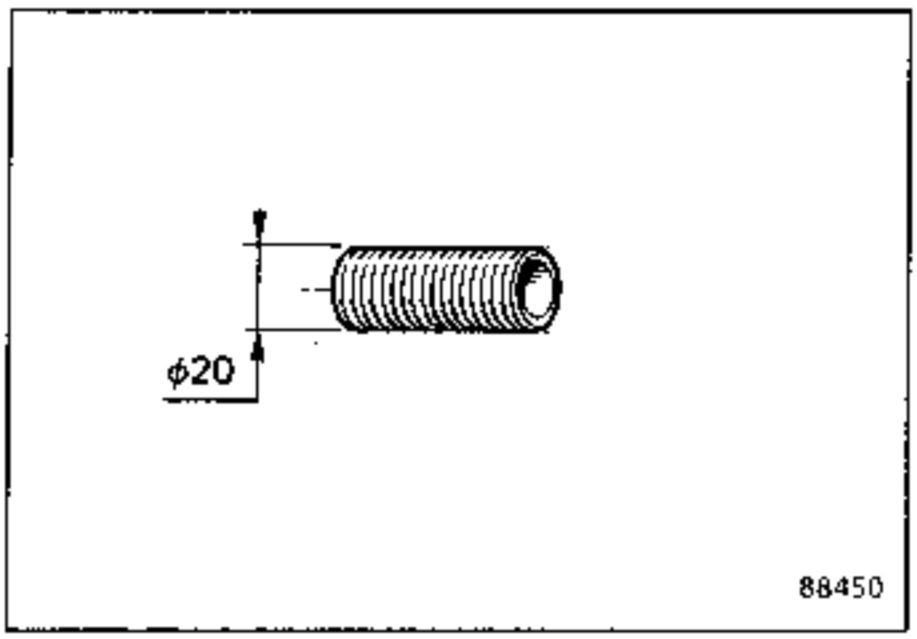
There are 2 types of oil filter nipple.

1st type : 2 diameter nipple



Ø 19 mm pitch 1.587 (cylinder block side)
Ø 20 mm pitch 1.50 (oil filter side)

2nd type :Single diameter nipple



Ø 20 mm pitch 1.50

NOTE :

NEVER FIT A 2 DIAMETER NIPPLE TO A CYLINDER BLOCK WITH A 20 MM x 1.50 PITCH THREAD - IT MAY COME LOOSE.

ONLY THE TYPE "C" ENGINE CAN BE REMOVED WITHOUT THE GEARBOX, EXCEPT ON THE TURBO MODELS.

ESSENTIAL SPECIAL TOOLS		
Elé.	346-04	Tool for checking the belt tension.
Mot.	878	Tool for lifting the engine with a chain.

TIGHTENING TORQUES (in daN.m)	
Crankshaft pulley securing bolts	11
Engine mounting securing nuts	4

CONSUMABLES
Loctite FRENETANCH : crankshaft pulley securing bolts.
Molykote BR2 : clutch shaft splines.

REMOVING ALL TYPE "C" ENGINES

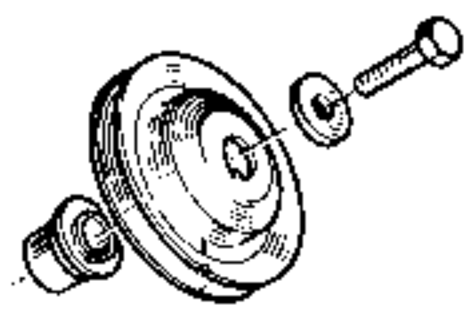
Except on the Turbo models and vehicles with power steering or air conditioning.

REMOVING :

Disconnect the battery.

Remove :

- the bonnet,
- the air filter,
- the radiator, after draining the cooling system,
- the coolant pump - alternator belt,
- the tie rod between engine and gearbox,
- the flywheel protection plate,
- the crankshaft pulley. Place the crankshaft key at the top and remove the pulley hub,



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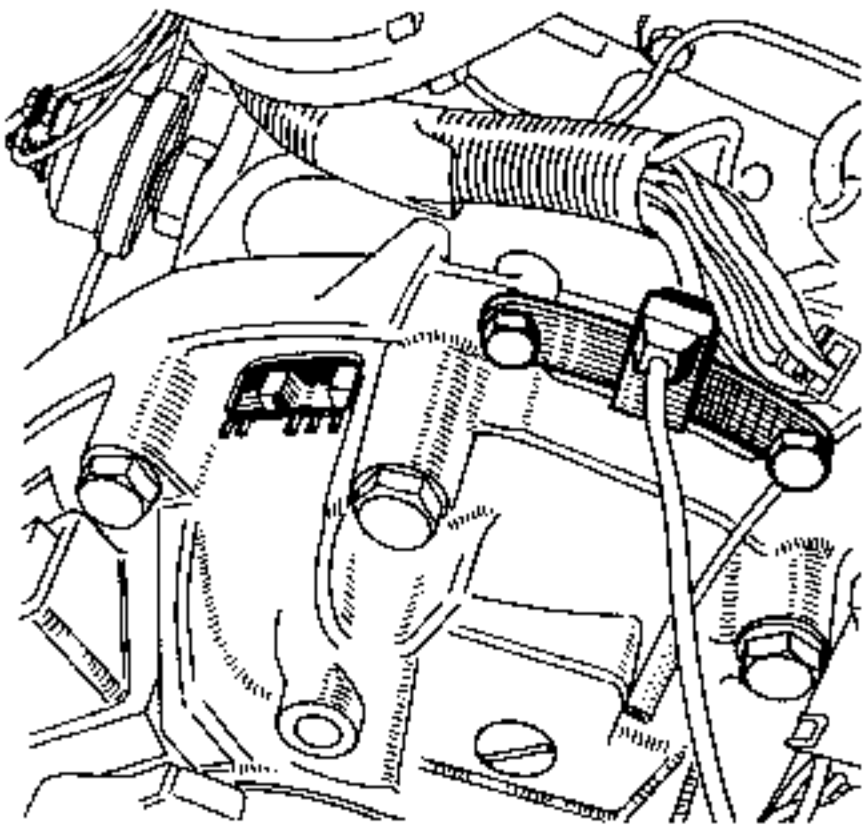
- remove the rear fastenings from the starter and take it out,
- the accelerator and choke cables,
- the electrical junction blocks,
- the heater hoses,
- the electronic ignition sensor on vehicles equipped with this system,



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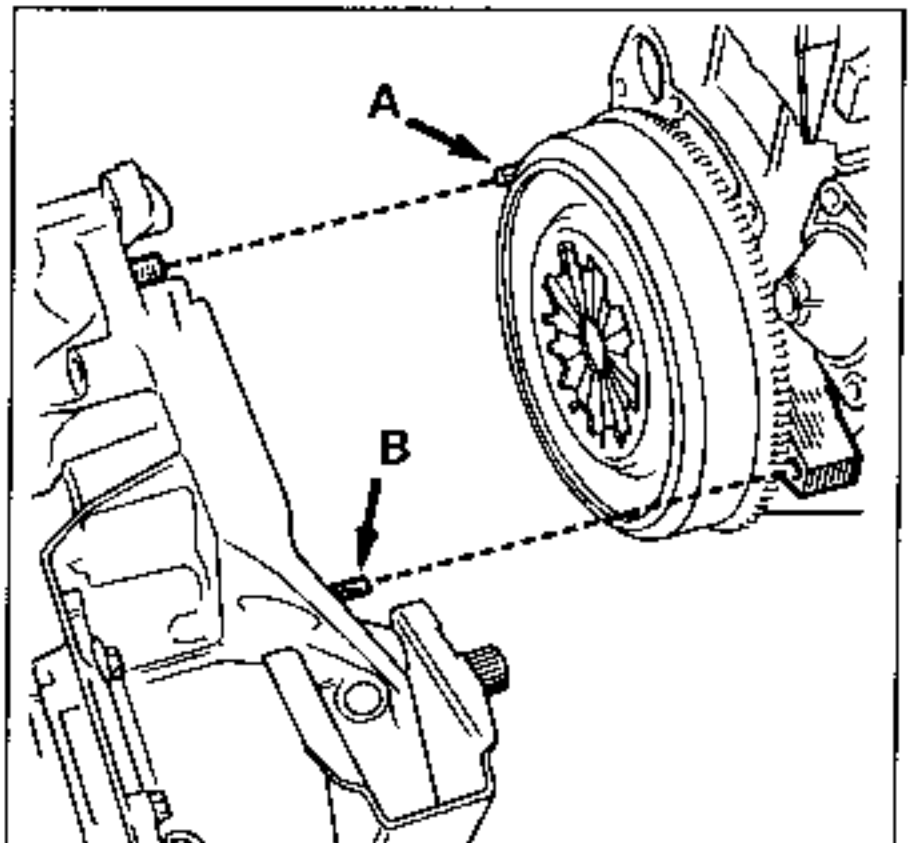
REMOVING (continued)

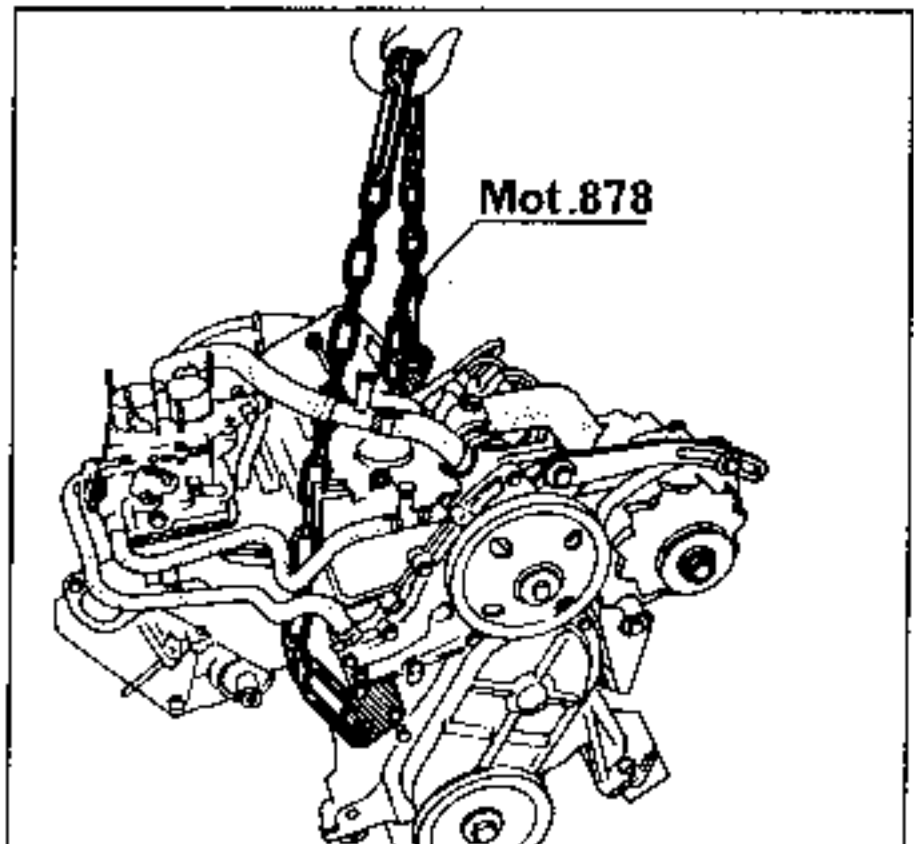
- the engine to gearbox securing bolts,
- the two studs A and B,



86308

- the lower securing nut from the RH engine mounting pad,
- the exhaust pipe flange,
- Using a lifting hook and the chain from tool Mot.878, gradually lift the engine, whilst checking the position of the right hand drive shaft, as it rises, to ensure it does not come out of place.

Place a jack under the gearbox to hold it in position.



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Take out the engine.

VEHICLES WITH AIR CONDITIONING

Follow the previous section, paying attention to the following points.

REMOVING

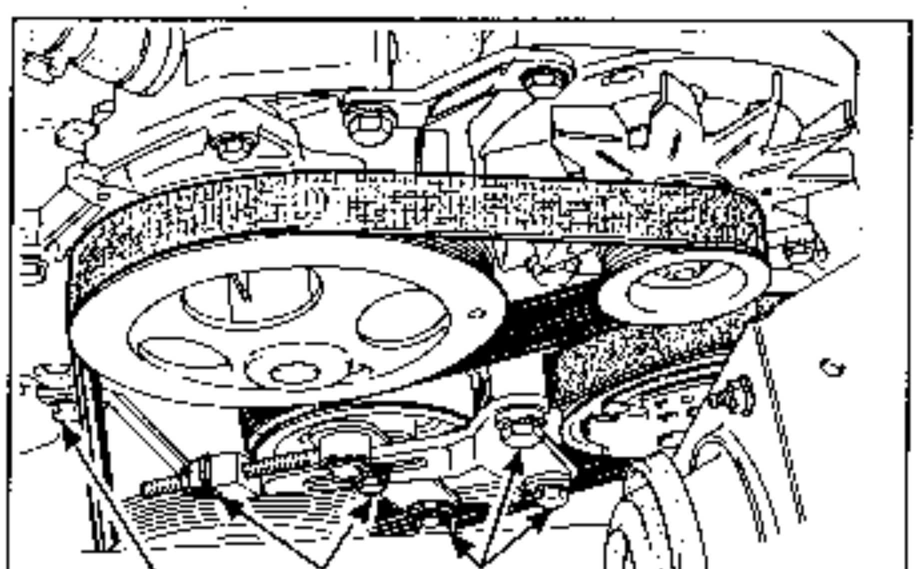
It is essential, before carrying out the operations described above, to drain the freon system.

Loosen bolts (A) and remove bolts (B) and (C) from the belt tensioner.

Remove :

- the belt,

- the alternator.



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REMOVING (continued)

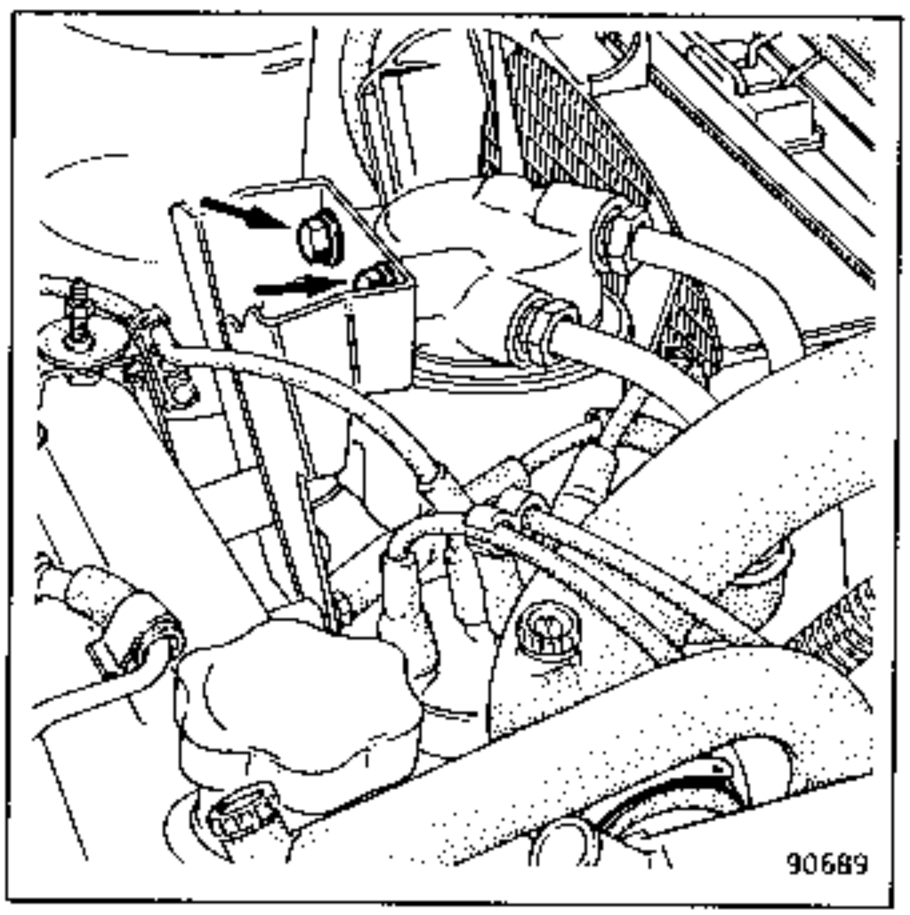
After the belt tensioner assembly has been removed, refit bolt (C) which also secures the engine lifting hook.

Remove :

- the right hand side protector,
- the radiator grille,
- the crankshaft pulley.

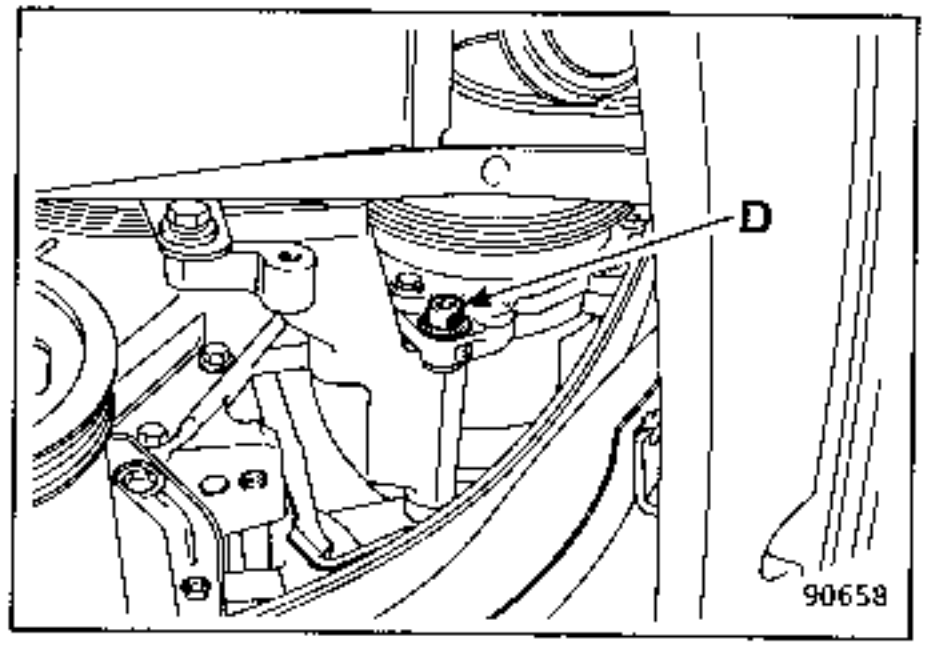
Unscrew the freon pipes from the compressor.

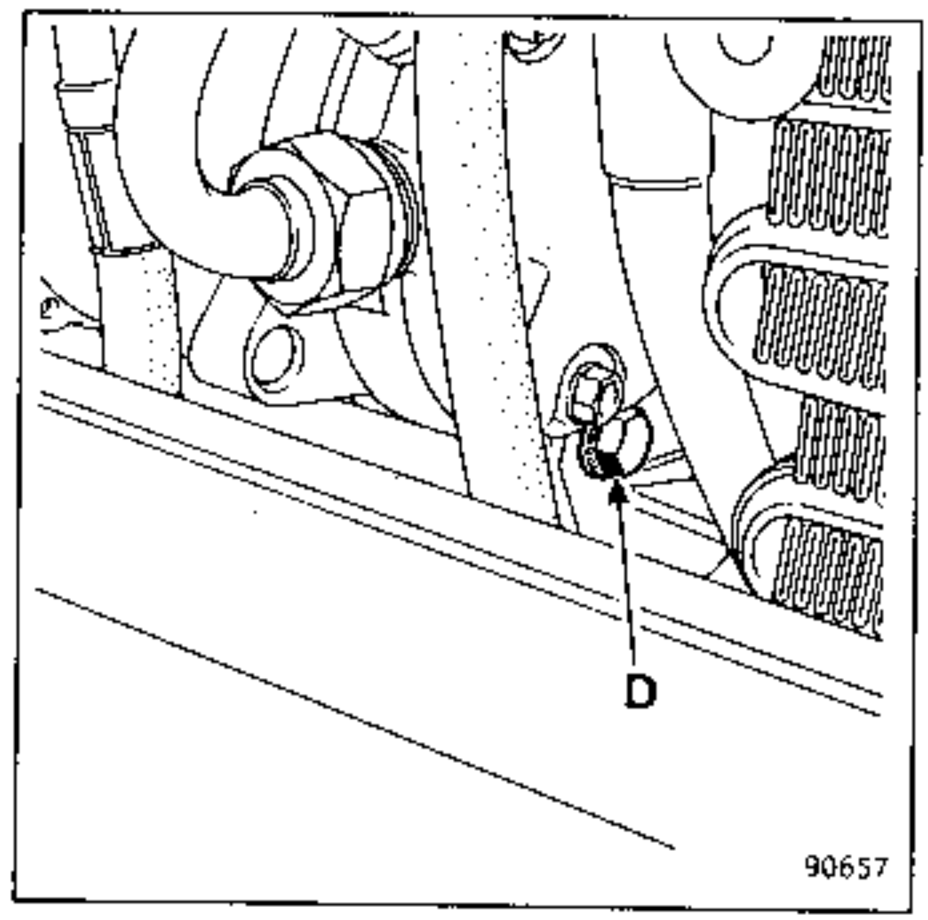
Remove the two bolts that secure the oil filter support.

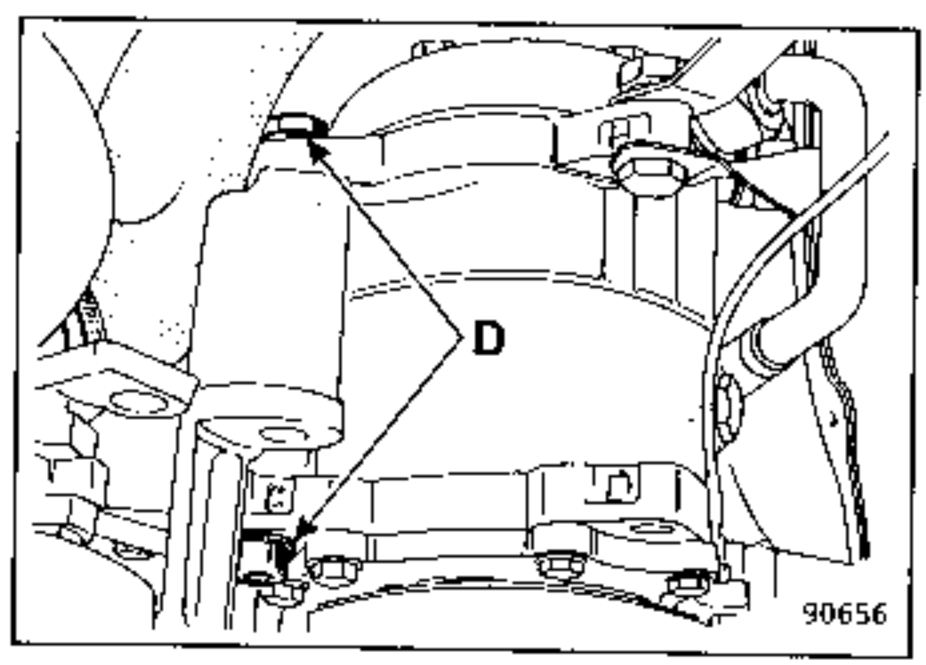


With the assembly in this position, remove the radiator, condenser, dryer bottle assembly.

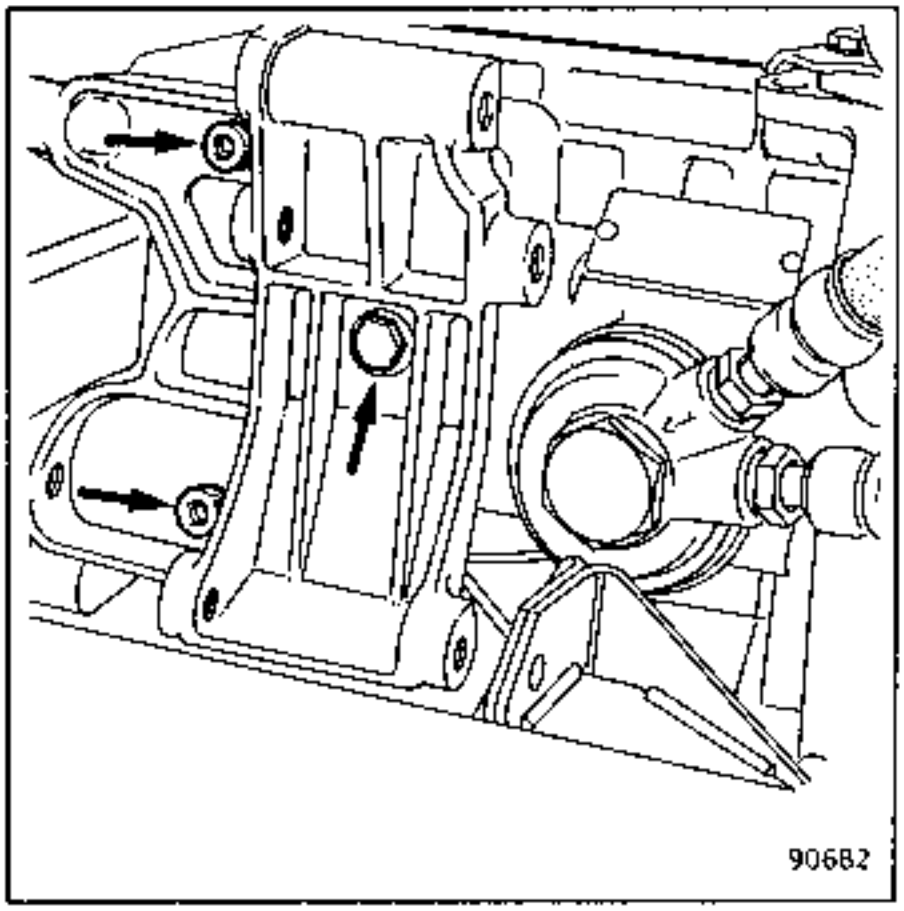
Remove the compressor at points D.







Remove the securing bolts from the compressor support.



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REMOVING (continued) REFITTING

From this point onwards, the operations of removing and refitting the engine or the gearbox become the same as those on vehicles without air conditioning.

VEHICLES WITH POWER STEERING

See the section entitled removing all type "C" Engines and add the following special features.

REMOVING

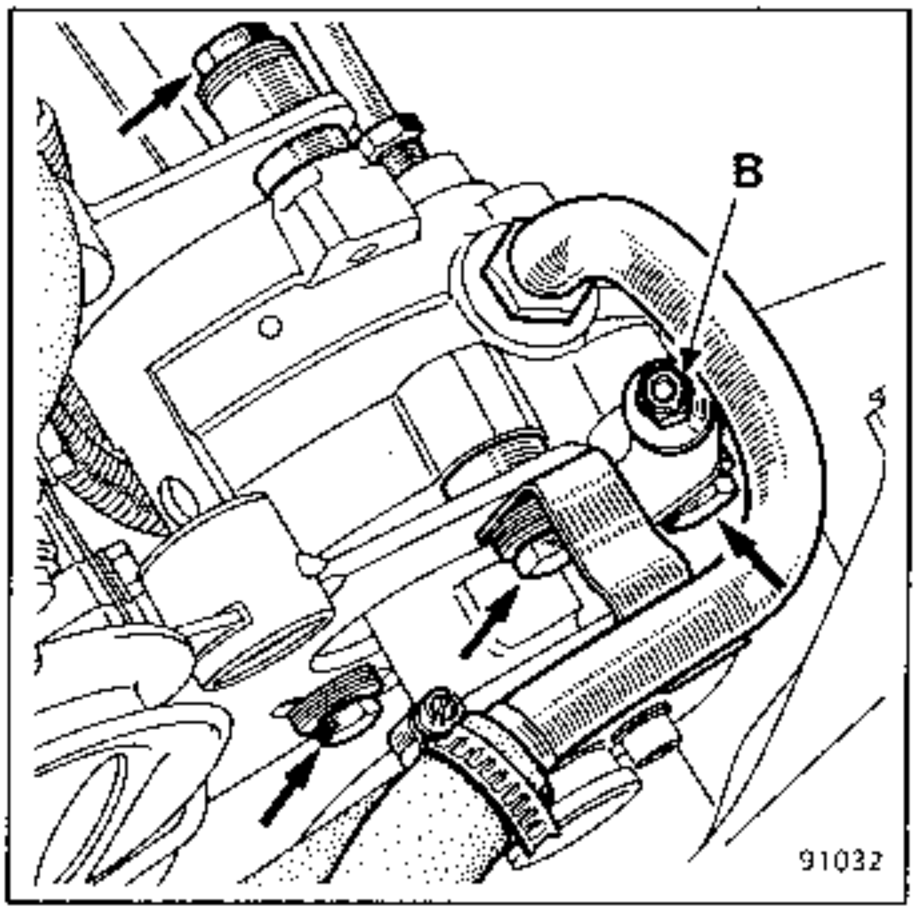
Remove the alternator.

Place a clamp Mot.453-01 on the input pipe.

Loosen the 4 pump and tensioner securing points.

Completely slacken off the belt at (B).

Disconnect the pressure switch from its connector.



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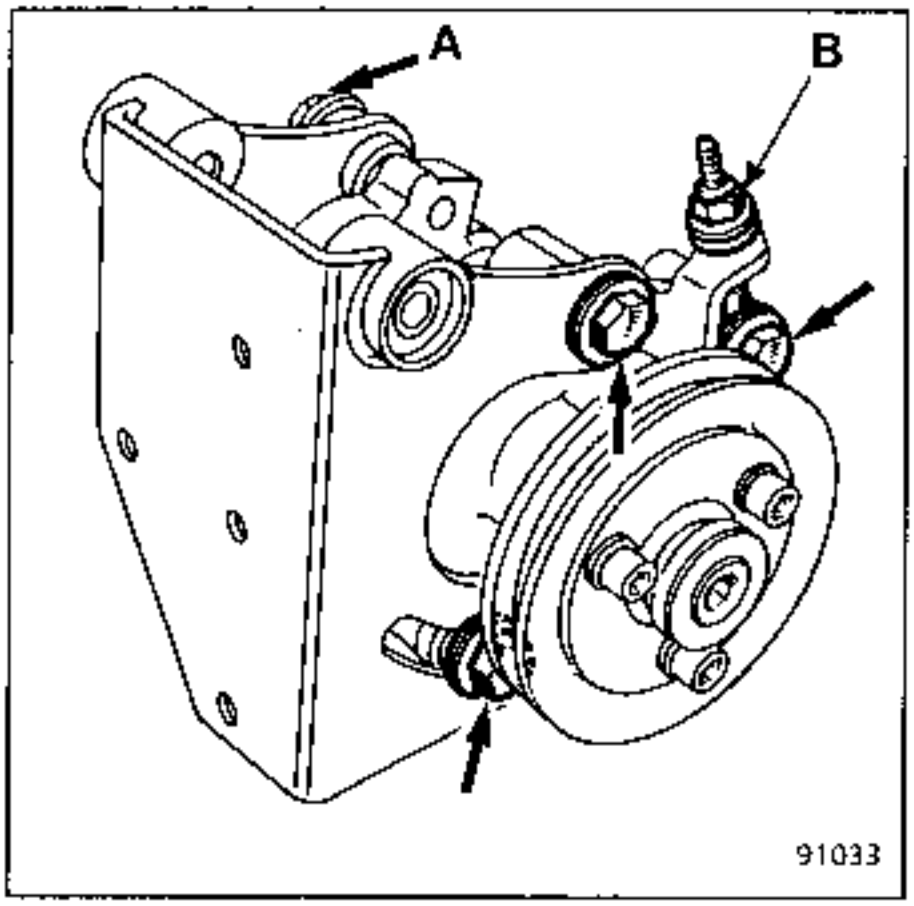
Disconnect and remove the following pipes:

- the input pipe,
- the high pressure pipe by removing bolt (A) (take care not to lose the spacer).

Remove :

- the 3 other securing bolts from the pump and the tensioner taking care not to lose the spacers.



91033

- the pump after first removing the belt.

VEHICLES FITTED WITH TURBO ENGINES.

The engine cannot be removed alone. The complete engine-gearbox assembly must be removed.

REFITTING ALL TYPE "C" ENGINES.

Except for turbo vehicles and vehicles with power steering or air conditioning.

CHECKING :

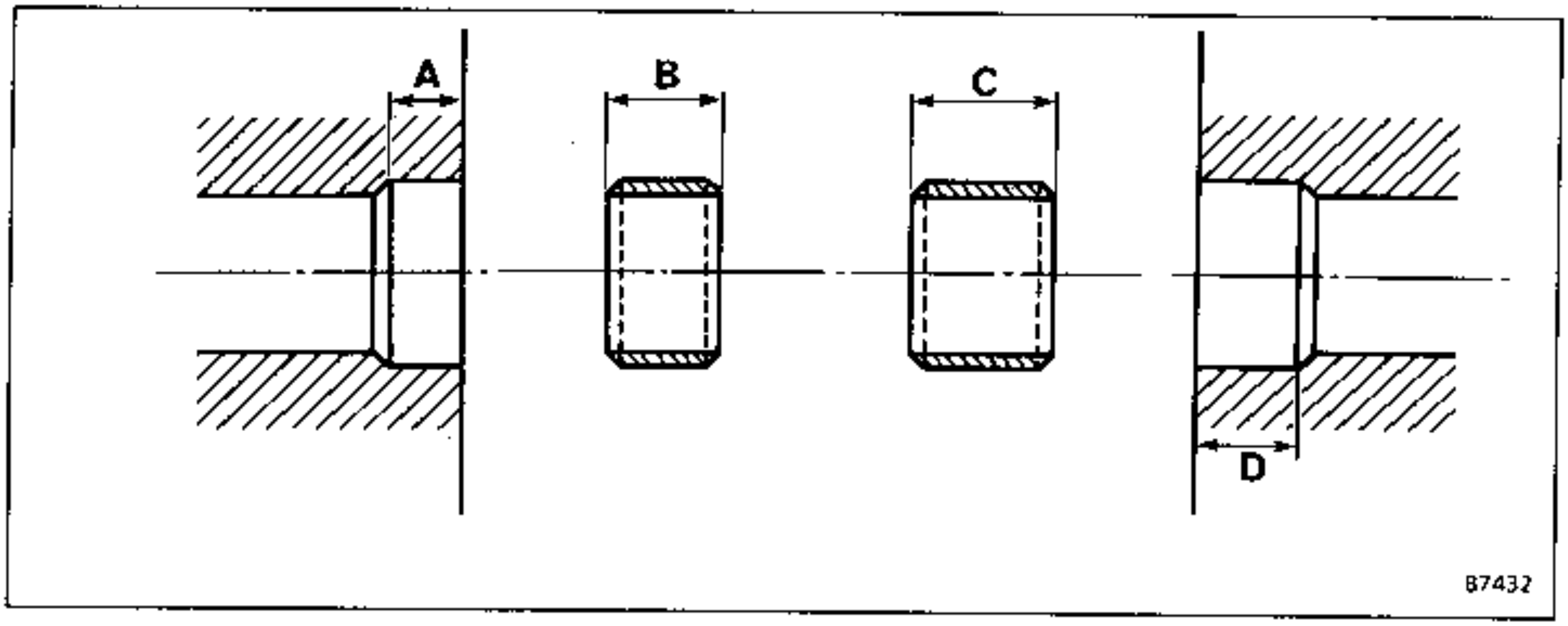
When replacing an engine or a gearbox, one must check the length of the locating dowel bushes and their locations.

Depending on the type of engine to gearbox securing system, one of 2 types of dowel bush is fitted :

1 medium length bush (dimension B)
2 long bush (dimension C)

From now on, to facilitate connecting the gearbox to the engine (types C and F), the dowel bushes have been lengthened.

The fitting of these new dowel bushes has been accompanied by a modification of their locations in the cylinder blocks of types C and F engines.



Location in cylinder block of type C or F engine		Dowel bush	Location in clutch housing
First type	A = 3,5 ± 0,25 mm	B = 9,5 mm	D = 6,75 7,5 mm
		C = 23,45 mm	D = 20,5 mm
Second type	A = 6 ± 0,25 mm	B = 12 mm	D = 6,75 7,5 mm
		C = 25,9 mm	D = 20,5 mm

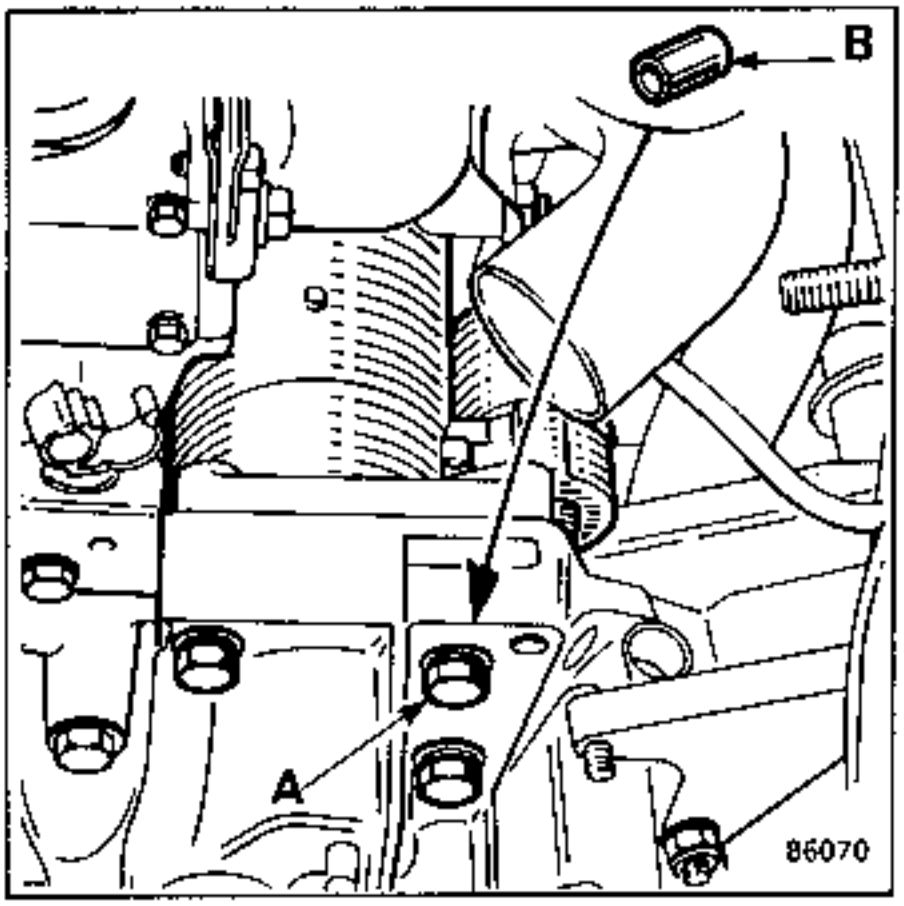
Consequently, it is essential to fit a dowel bush of the correct length for the locations in the cylinder block and in the clutch housing.

REFITTING (Special features)

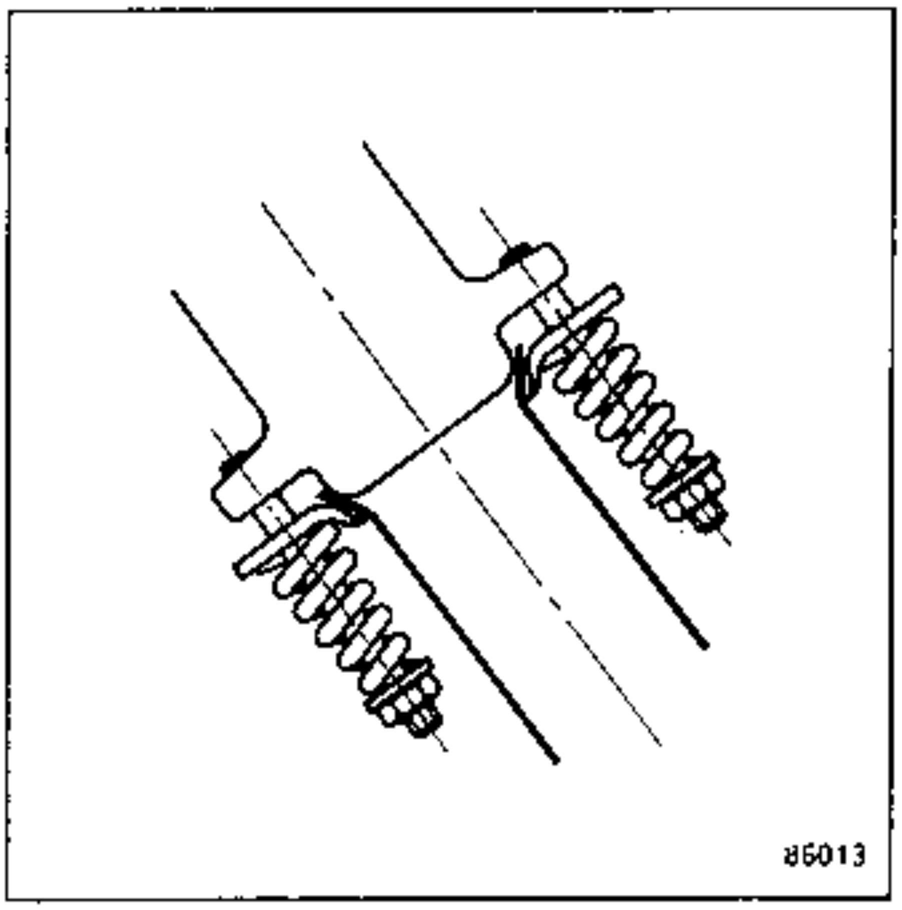
Grease the splines on the clutch shaft.

Ensure :

- that the starter is in the correct position,

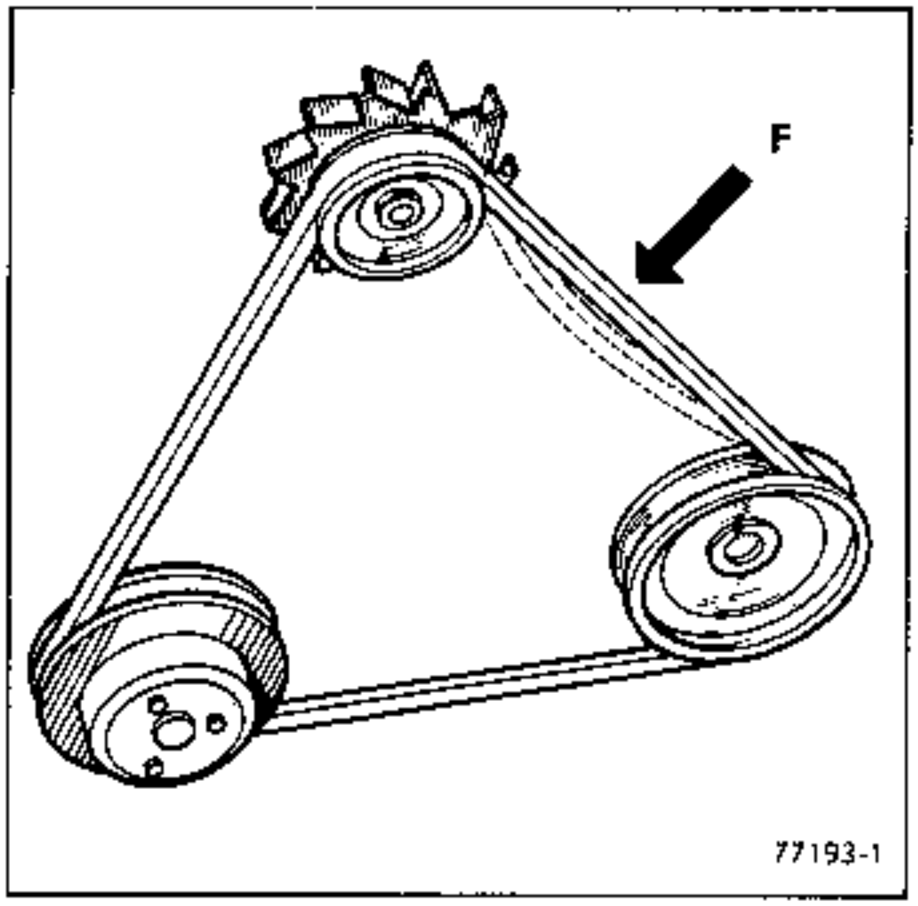


- the exhaust flange is correctly tightened : tighten until the springs are coil bound then loosen by one and a half turns.



- fill the engine with oil,
- fill and bleed the cooling system,
- correctly tension the belt using tool Ele.346-04 (Deflection F = 4 mm).

Adjust the choke cable travel.

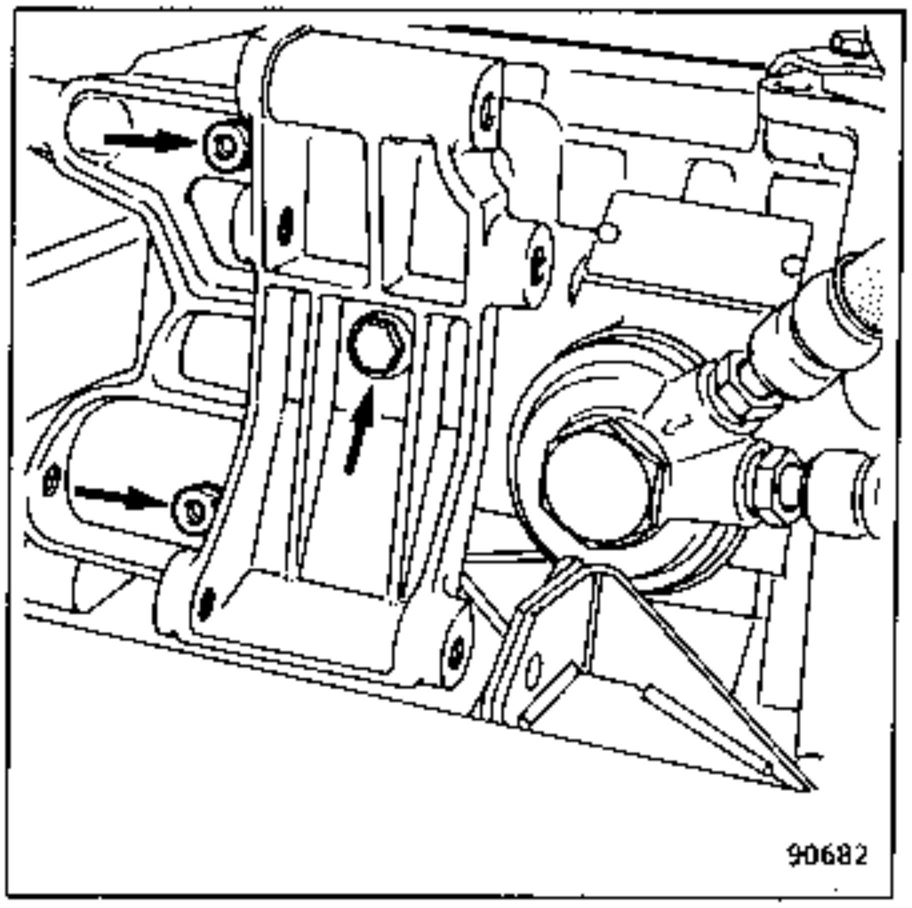


VEHICLES WITH AIR CONDITIONING.

As described in the preceeding section except for the following special points.

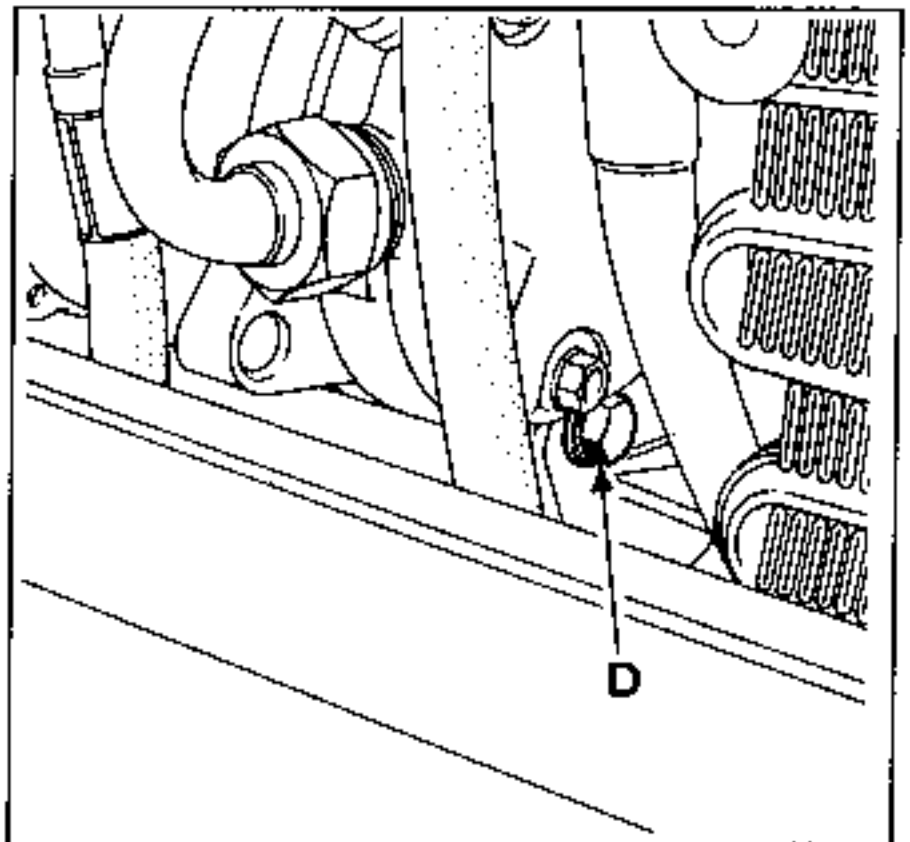
REFITTING (continued)

Refit the compressor support securing bolts.

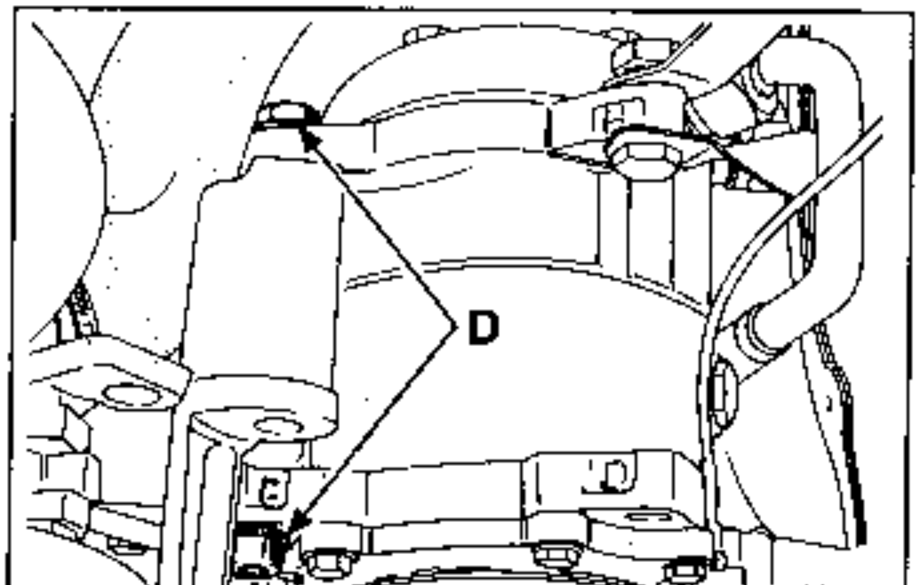


90682

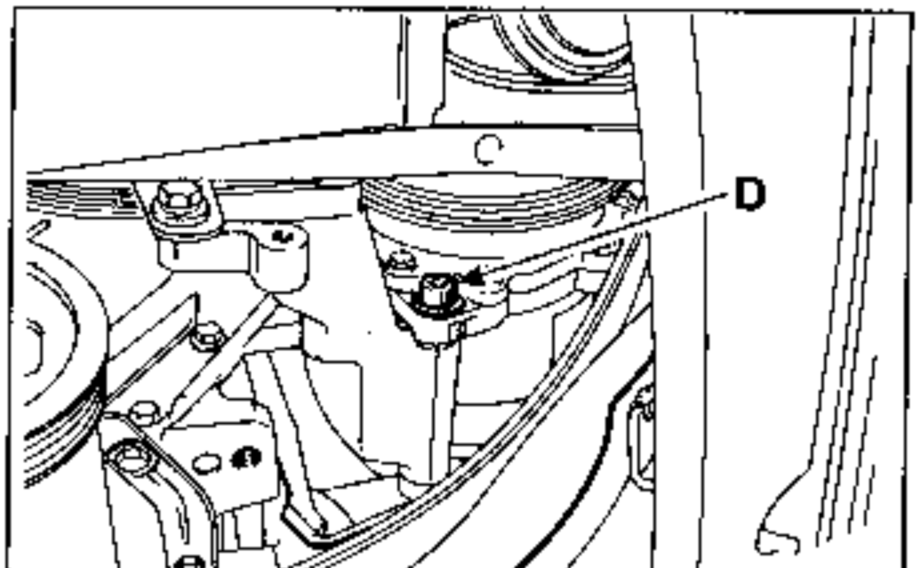
Refit the compressor at points D.



90657



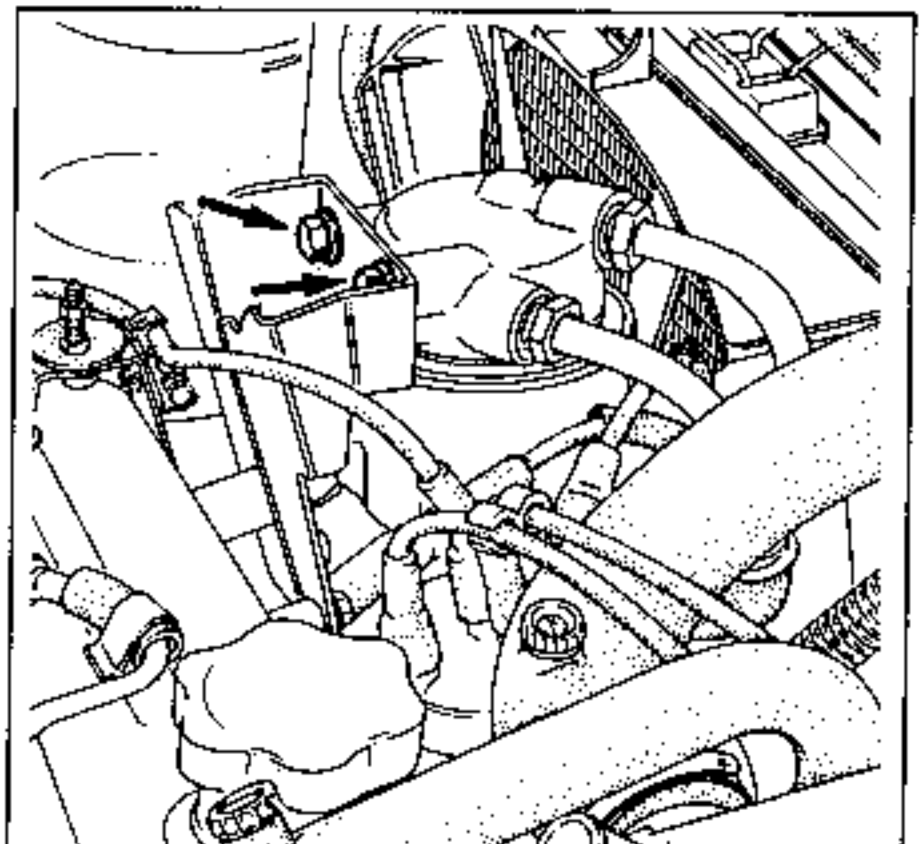
90656



90658

Refit the radiator, condenser, dryer bottle assembly.

Refit the two oil filter support securing bolts.



90689

REFITTING (continued)

Screw the freon pipe unions into the compressor.

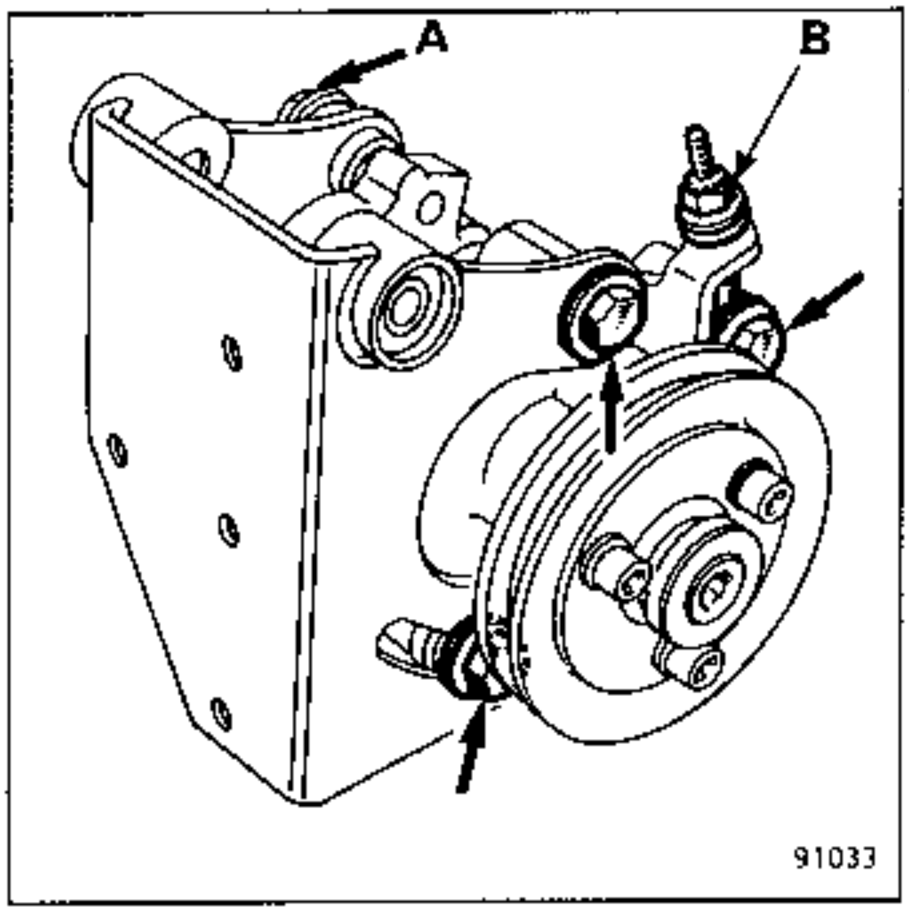
Refit :

- the crankshaft pulley,
- the radiator grille,
- the right hand side protector,
- the belt,
- fill and bleed the freon system.

VEHICLES WITH POWER STEERING.

See the section on refitting all type "C" engines plus the following special points.

Refit the pump, the tensioner and the 3 other tensioner securing bolts.



Refit the piping.

Reconnect the pressure switch.

Refit the alternator.

Refit the belt.

ESSENTIAL SPECIAL TOOLS	
B. Vi. 31-01	Punches for spring pins.
Mot. 878	Lifting chain and rings.
T. Av. 476	Ball joint extractor.

TIGHTENING TORQUES (in daN.m)	
Brake caliper securing bolts	10
Shock absorber securing bolts	8
Steering ball joints	4
Wheel bolts	8
Drive shaft bellows securing screw	2,5

CONSUMABLES
Loctite FRENBLOC : brake caliper securing bolts.
CAF 4/60 THIXO : drive shaft pins.
Molikote BR2 : drive shaft splines.
Loctite FRENETANCH : crankshaft pulley securing bolts.

Removing - Refitting the engine - gearbox assembly, all type "C" engines.

REMOVING

Disconnect the battery.

Drain :

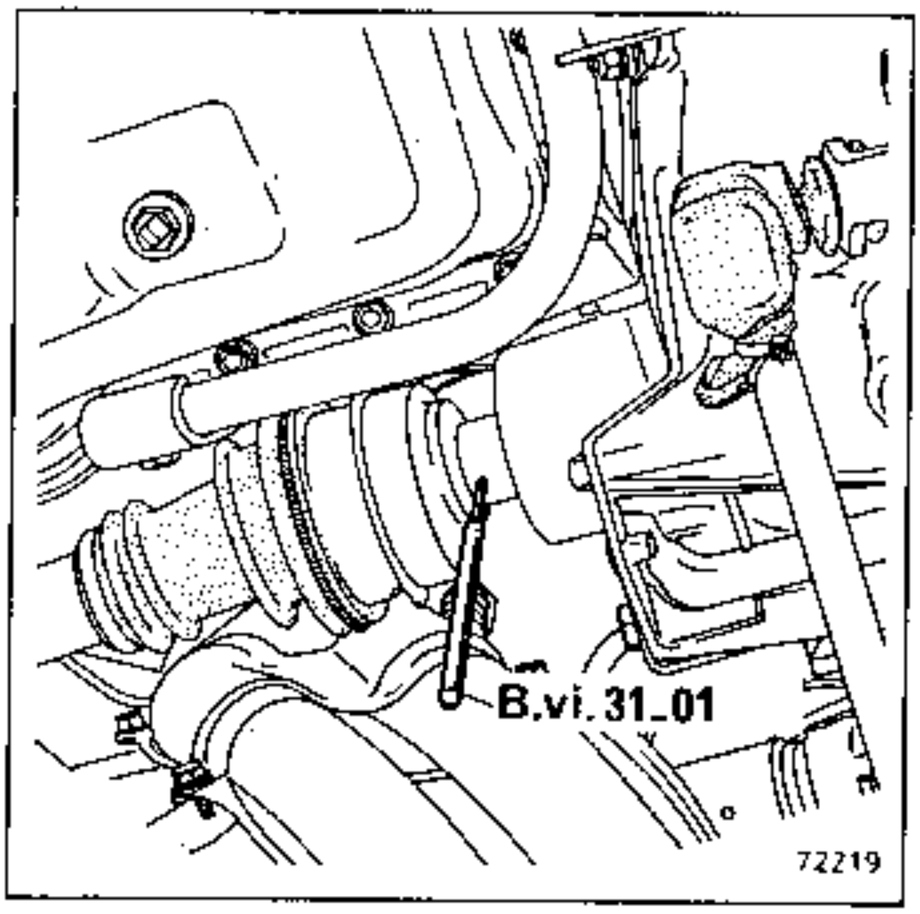
- the cooling system (at the lower radiator hose),
- the gearbox oil,
- the engine oil, if necessary,
- the freon system for vehicles with air conditioning,
- the power steering system for vehicles with power steering.

Remove :

- the bonnet,
- the radiator,
- the wheels.

On the right hand side of the vehicle :

- the drive shaft pin using punches B.Vi. 31-01.

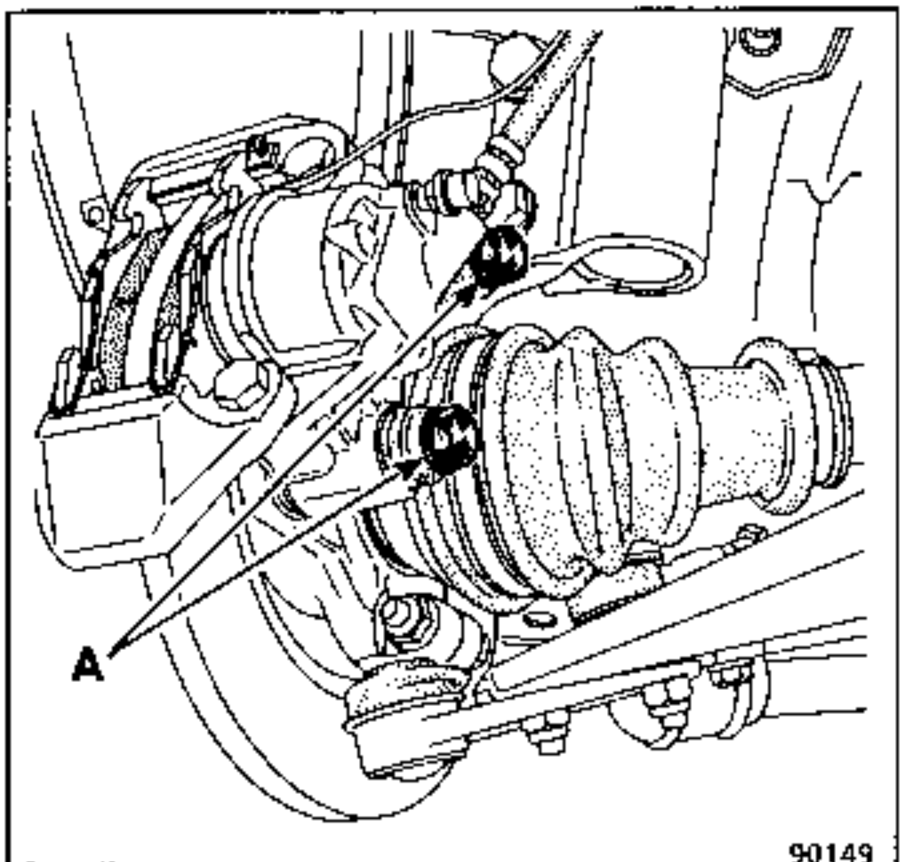


REMOVING (continued)

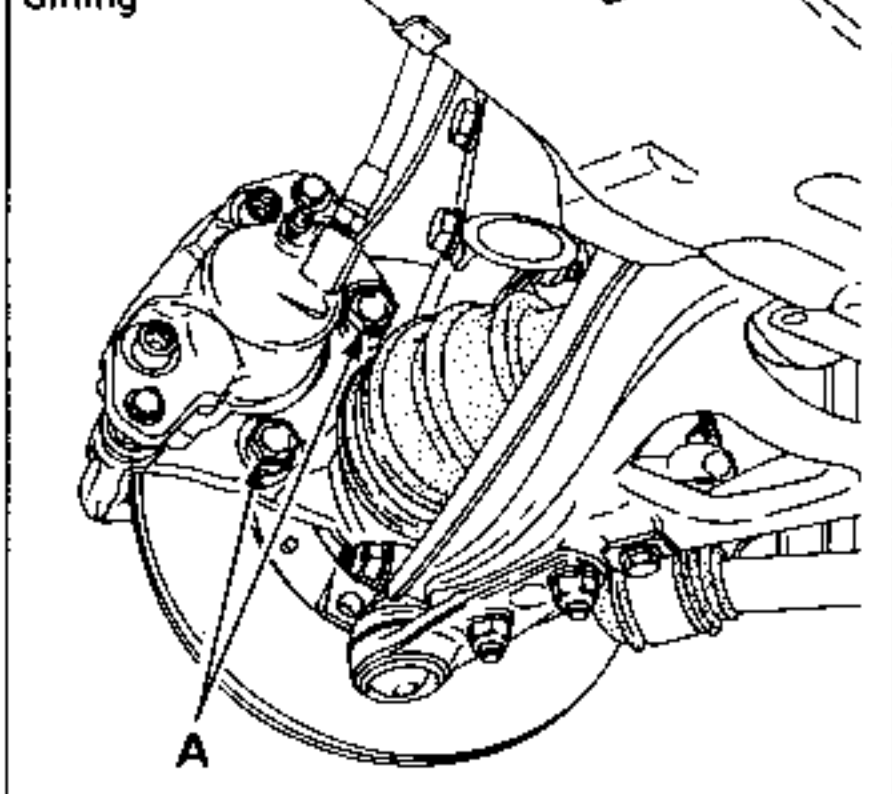
- the two bolts that secure the lower end of the shock absorber and free the drive shaft taking care not to catch the bellows. Secure the stub axle carrier to avoid tension being applied to the brake hose.

On the left hand side of the vehicle :

- the two caliper securing bolts : secure the caliper to the suspension spring to avoid applying tension to the hose,

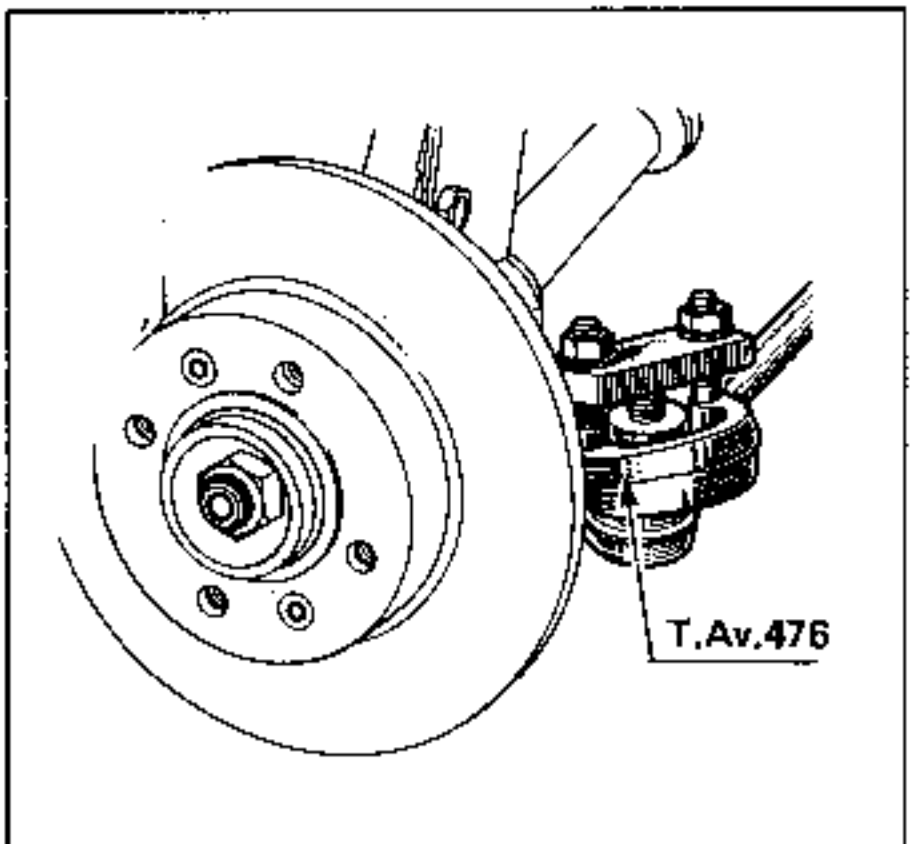


Bendix 90149



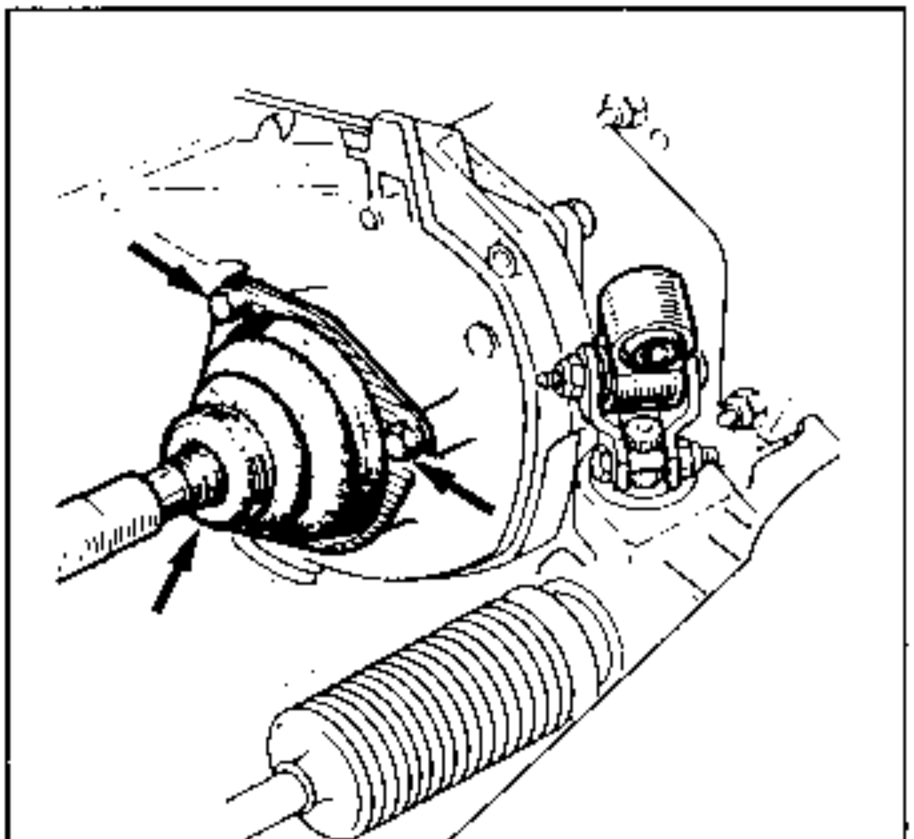
Girling 91758

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



85965

- the three screws that secure the drive shaft bellows,



85678

- the two bolts that secure the lower end of the shock absorber and free the drive shaft.

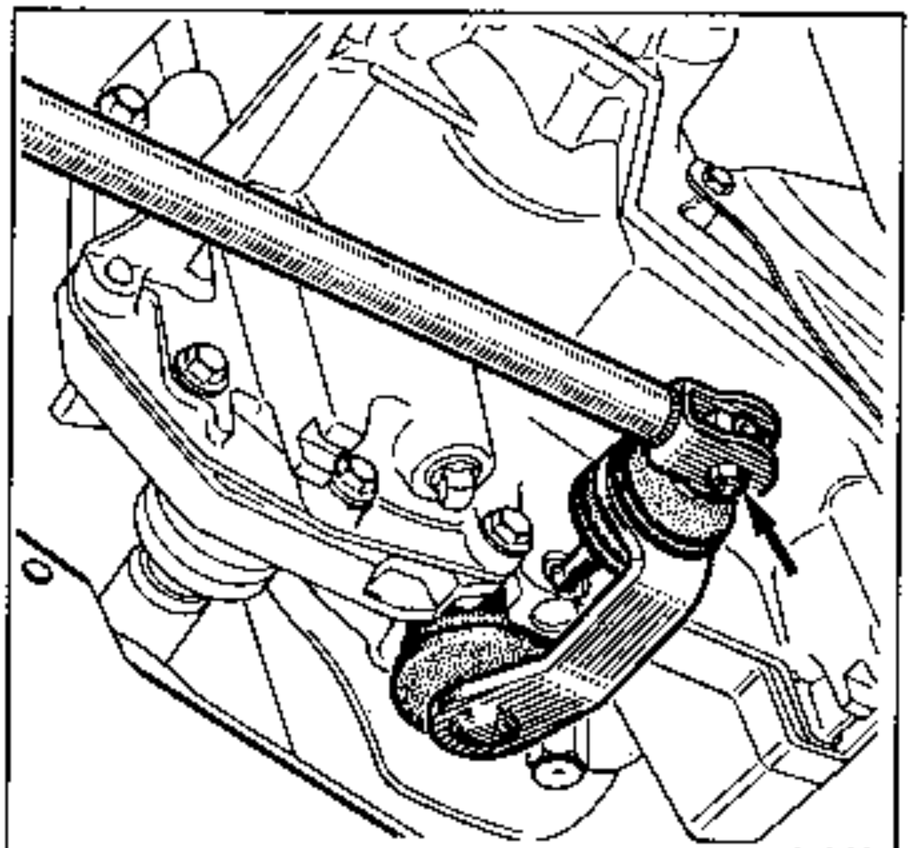
REMOVING (continued)

Disconnect :

- the heater hoses at the coolant pump, the fuel system hoses and the vacuum hose from the brake servo,
- the positive cable between the starter and the battery, freeing it from the heater partition,
- the electrical junction blocks,
- the electronic ignition unit,
- the accelerator, choke and speedometer cables,
- the engine and gearbox earthing braids, if the vehicle has any.

Remove :

- the gear shift control,



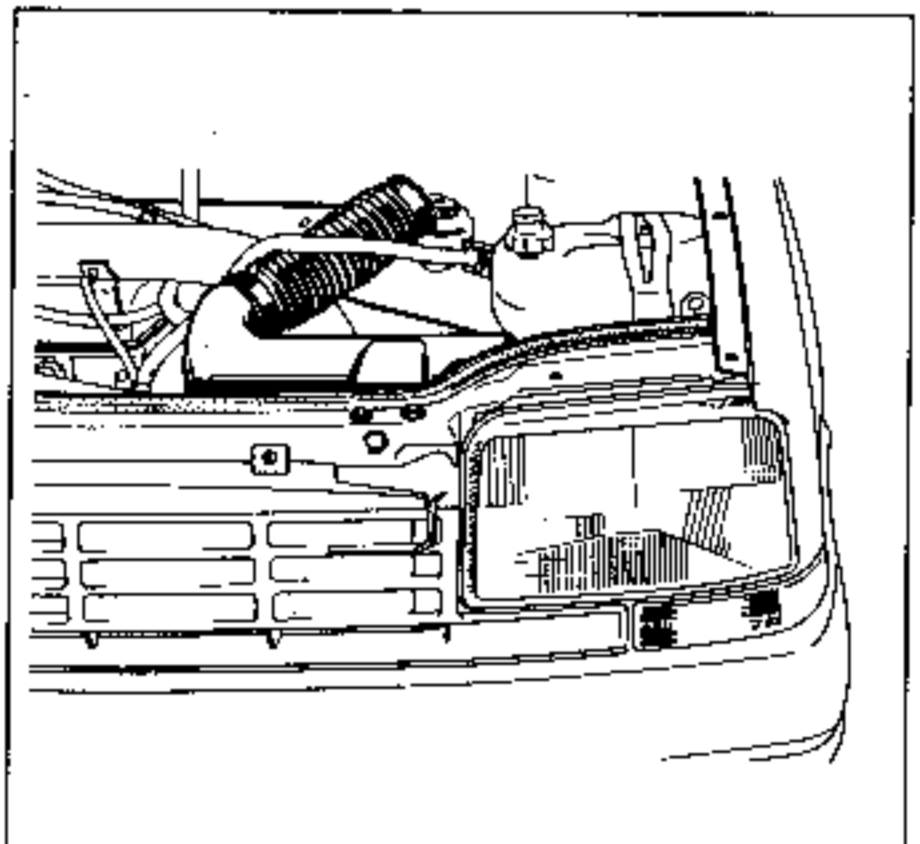
85966

- the exhaust pipe flange,
- the nuts and bolts that secure the engine flexible mountings,
- the engine-gearbox assembly using the chain from tool Mot.878.

Special features of Turbo vehicles

Remove :

- the air intake duct from the air filter,



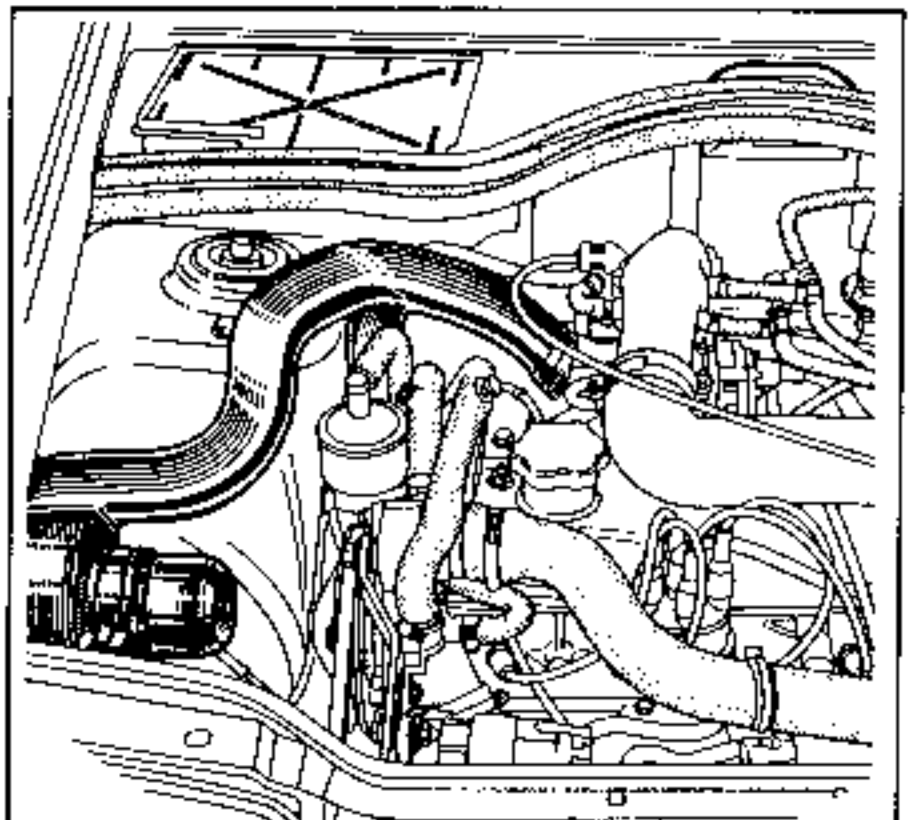
88965

- the intercooler and its support,
- Drain the cooling system by disconnecting the lower hose from the expansion bottle and moving it downwards.
- Disconnect the engine oil input pipes from the radiator.

Remove :

- the radiator,
- the anti-percolation system (the fuel input pipe passes through the cooling duct).

REMOVING (continued) REFITTING



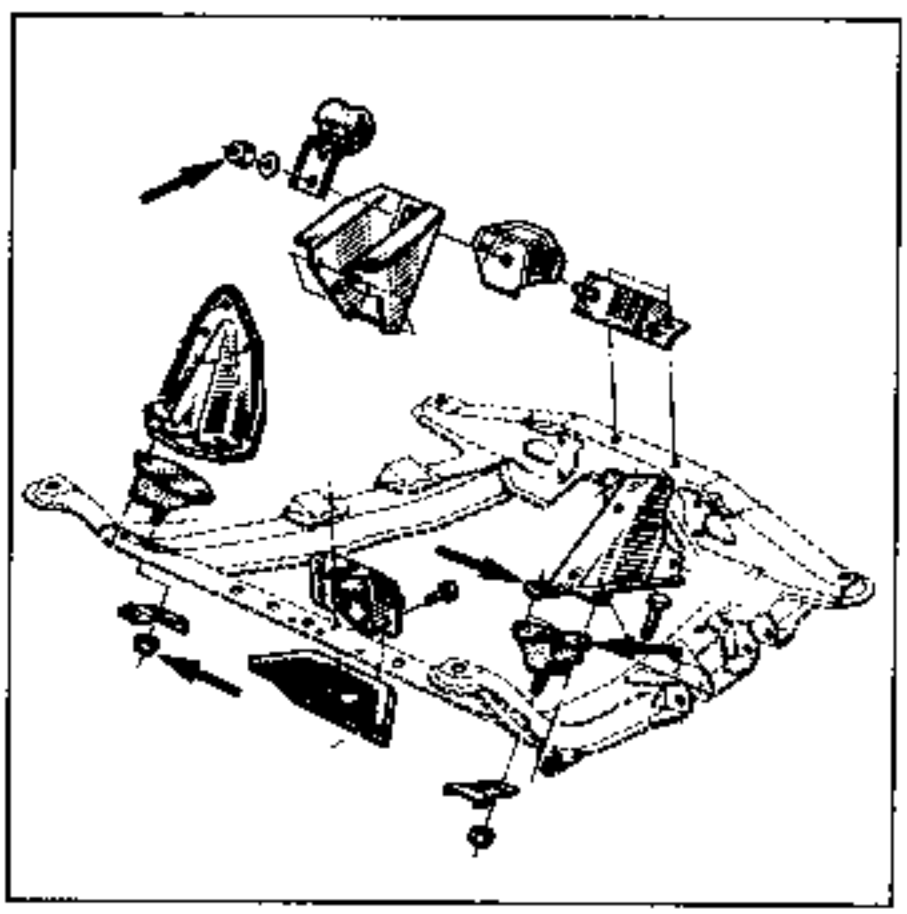
88920-1

- the securing bolts from the engine movement limiter, leaving the limiter in position.

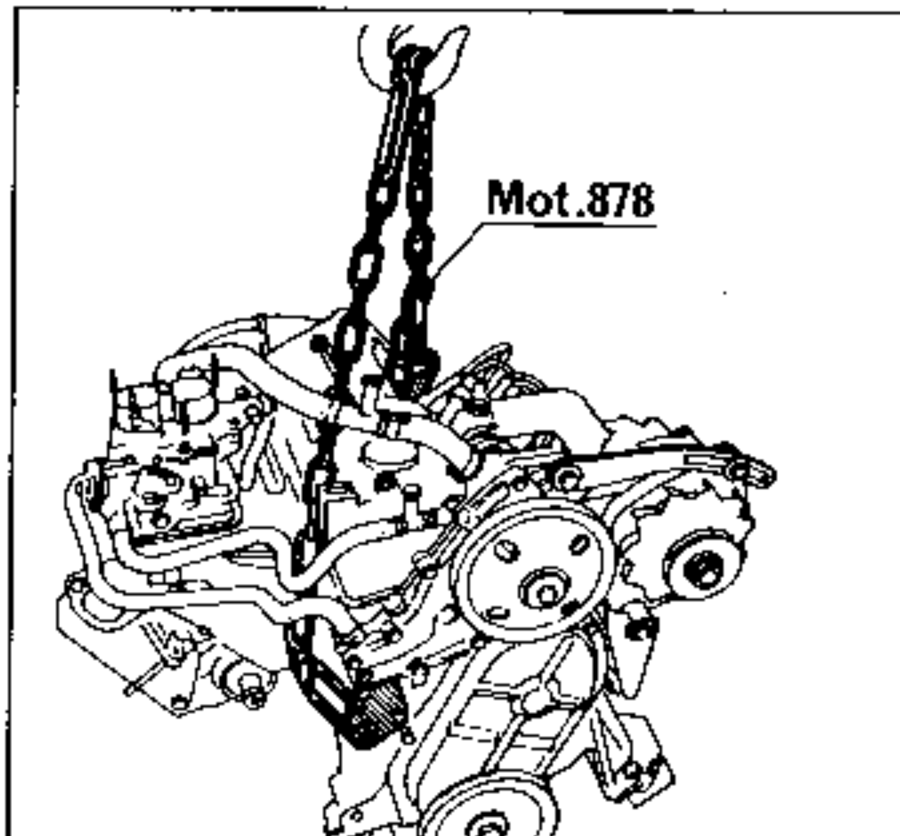
- Release the tension in the alternator belt.

Remove :

- the fastenings from the engine mountings (it is not necessary to remove the bumper shield).



Using a lifting hook and tool Mot.878, lift the engine-gearbox assembly out of the engine compartment.



85740

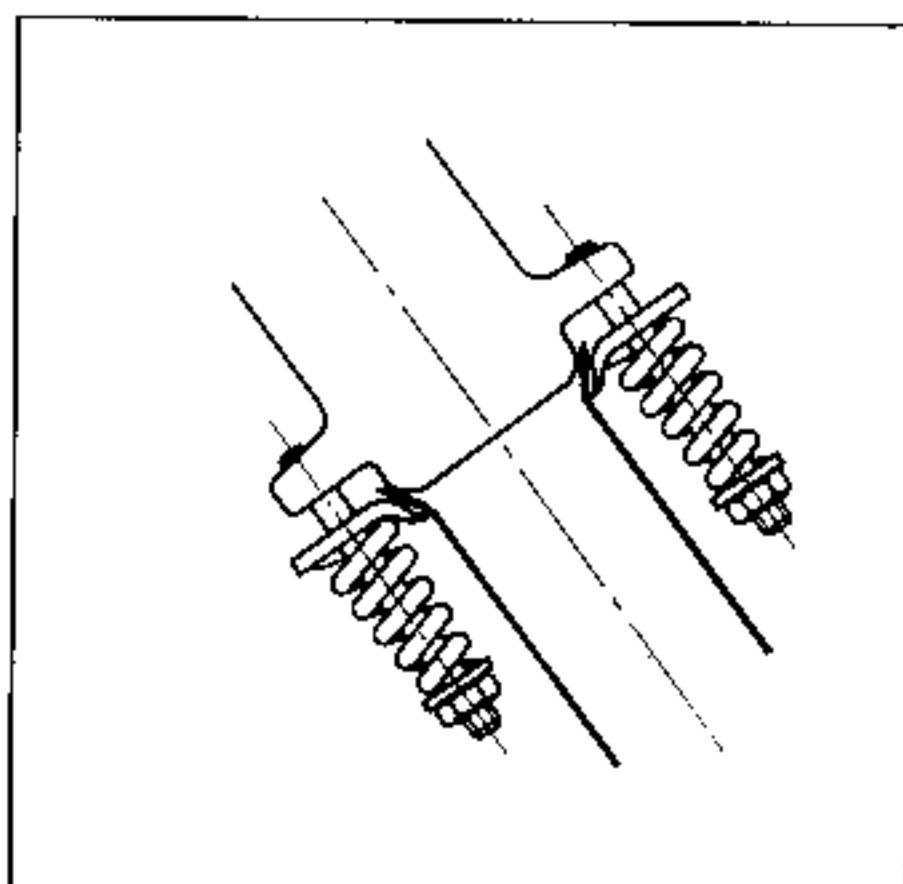
REFITTING, ALL TYPES

Fit the caliper securing bolts after first coating them with Loctite FRENBLOC and tighten them to torque.

Press the brake pedal a number of times to bring the pistons into contact with the brake pads.

Retighten :

- the exhaust pipe flange.



REFITTING (continued)

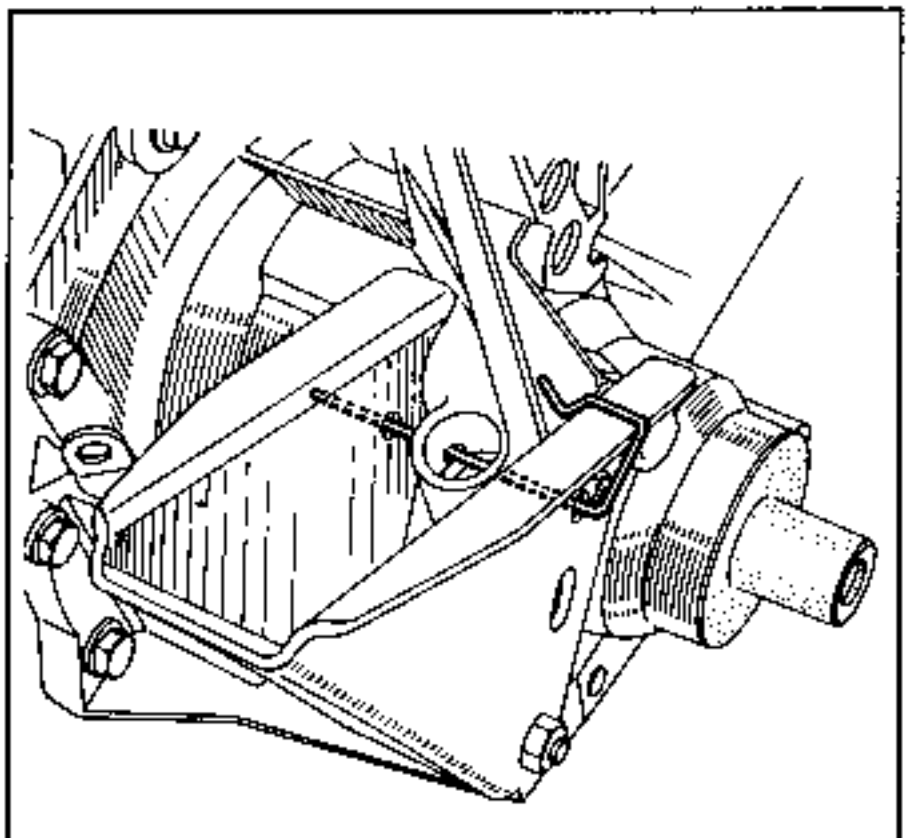
Tighten the springs until they are coil bound and loosen them by 1 and a half turns, never leave the springs coil bound.

- fill the engine and gearbox with oil,
- fill and bleed the cooling system,
- fill and bleed the freon system (when applicable),
- fill the power steering system (when applicable.

Adjust the accelerator and choke cable travels.

Apply CAF 4/60 THIXO to the drive shaft pin holes.

Fit the speedometer drive cable securing clip.



85915-1

Special features on Turbo vehicles

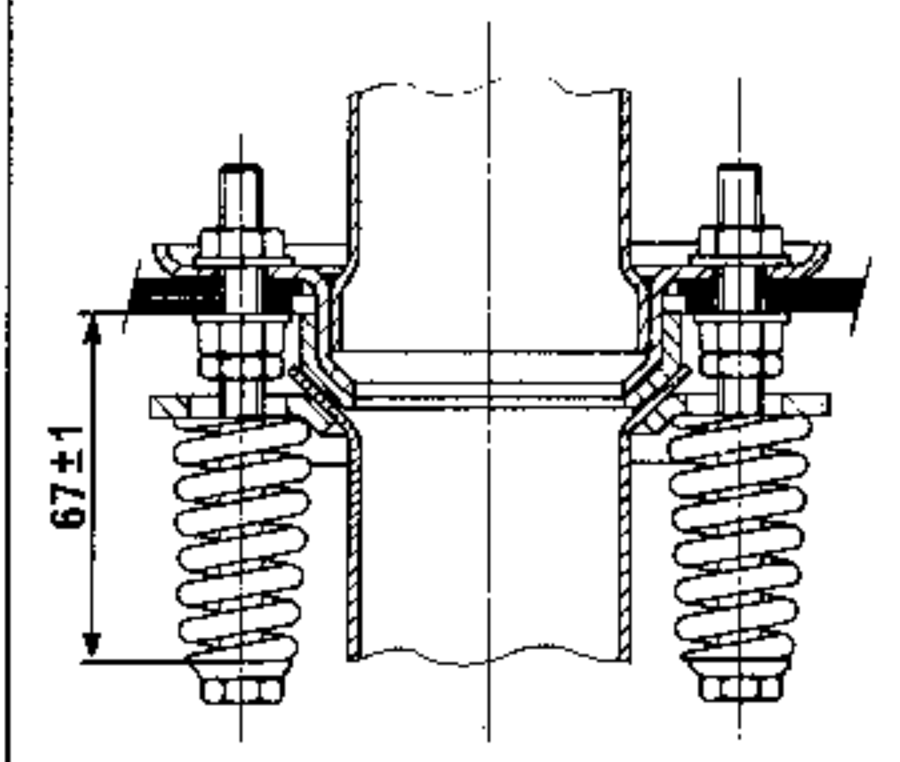
REFITTING

Fit the engine movement limiting stop and place the engine-gearbox assembly in the engine compartment.

Position the assembly carefully to avoid damaging the non-return valve tube, the various pipes, the electrical cables.

When fitting the electronic ignition unit, do not forget the earthing braid and the condenser wire on the lower securing point.

Refit, correctly, the exhaust pipe flange.

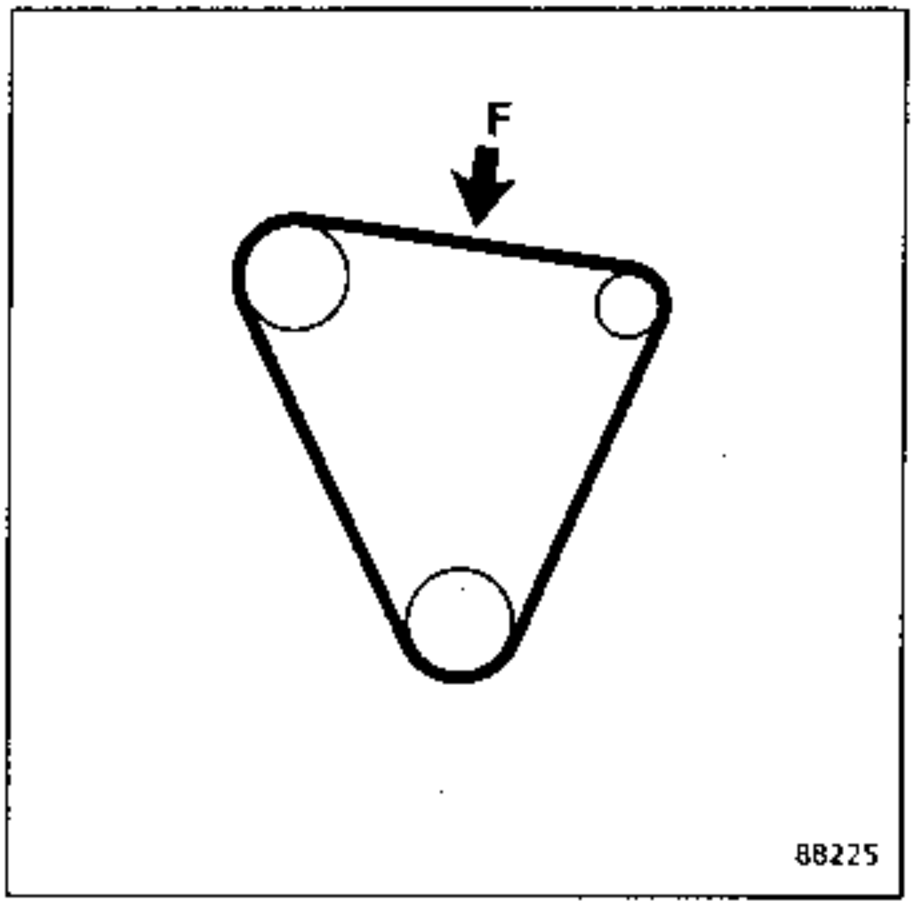


88171

- fill the engine and gearbox with oil,
- fill and bleed the cooling system.

REFITTING (continued)

Check the belt tension.



Deflection F : 2.5 to 3, when the belt is cold.

ESSENTIAL SPECIAL TOOLS	
B.Vi. 31-01	Punches for spring pins.
Mot.878	Lifting chain and rings.
T.Av. 476	Ball joint extractor.

TIGHTENING TORQUES (in daN.m)	
Caliper securing bolts ..	10
Shock absorber securing bolts	8
Steering ball joints	6
Support securing bolts.........	4 - 5
Wheel bolts......................	8
Drive shaft bellows securing screws	2,5

To remove Engine types F2N-F3N-F8M

THE ENTIRE ENGINE-GEARBOX ASSEMBLY MUST BE REMOVED

Removing the complete unit presents no particular difficulty, however attention should be paid to the following points :

REMOVING

Disconnect the battery.

Drain :

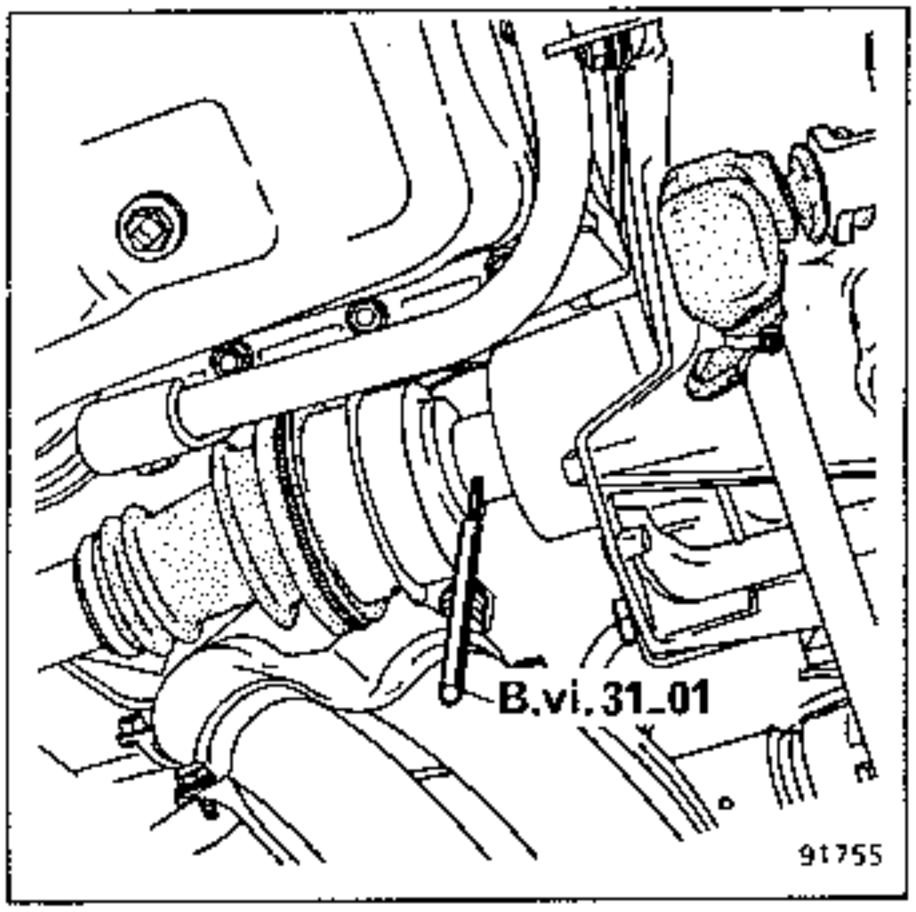
- the gearbox,
- the engine if necessary,
- the cooling system.

Disconnect :

- the accelerator cable,
- the clutch cable,
- the electrical connectors,
- the gear shift control.

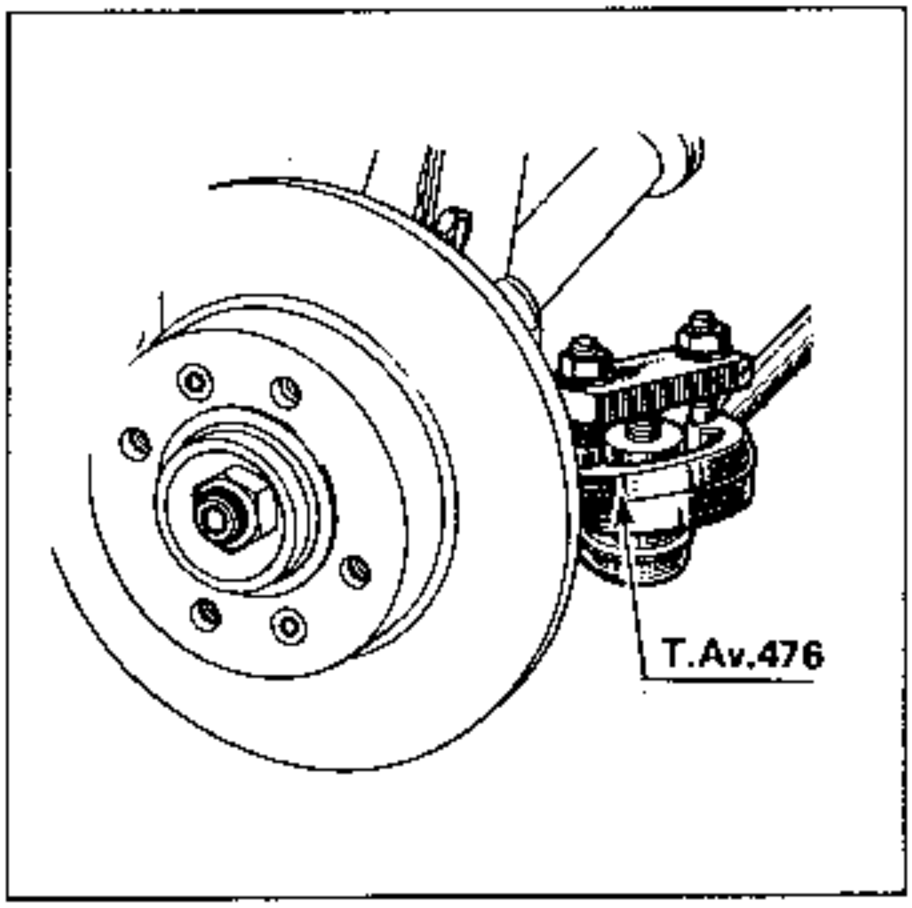
Remove :

- the bumper shield,
- the bonnet,
- the resonator on those vehicles equipped with one,
- the radiator,
- the drive shaft pin, using punches B.Vi.31-01.



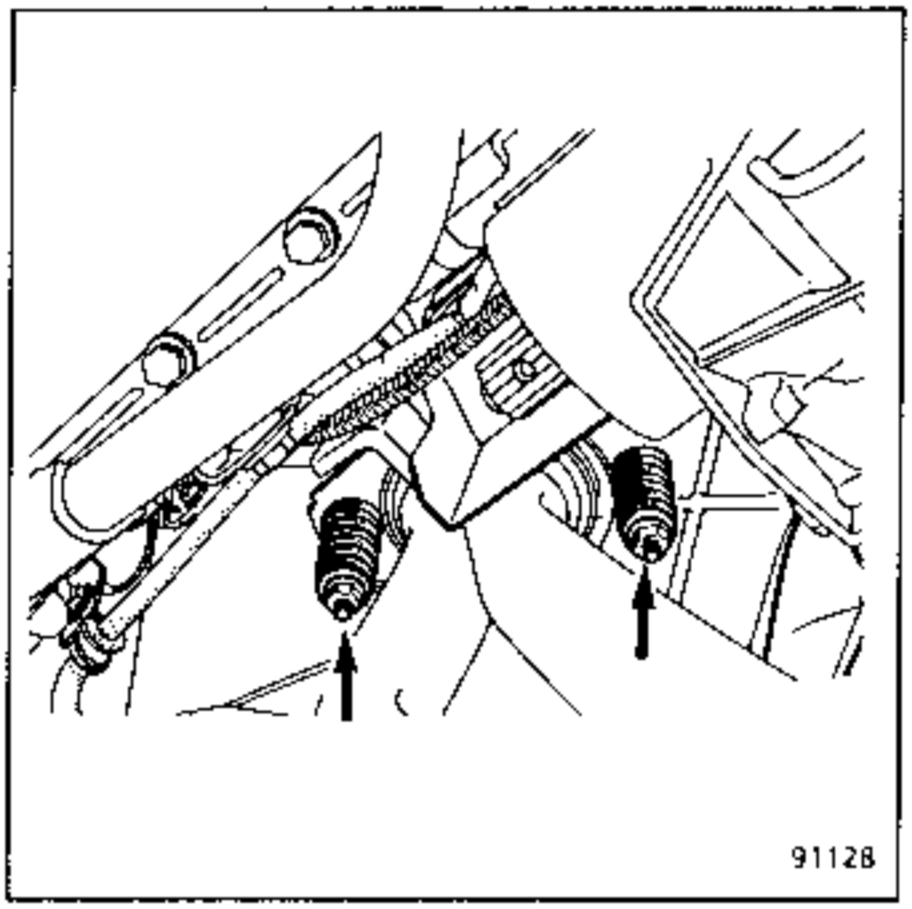
Free the drive shaft, protecting the bellows at the wheel end so that it is not damaged.

- the steering ball joints using extractor T.Av.476.



REMOVING (continued)

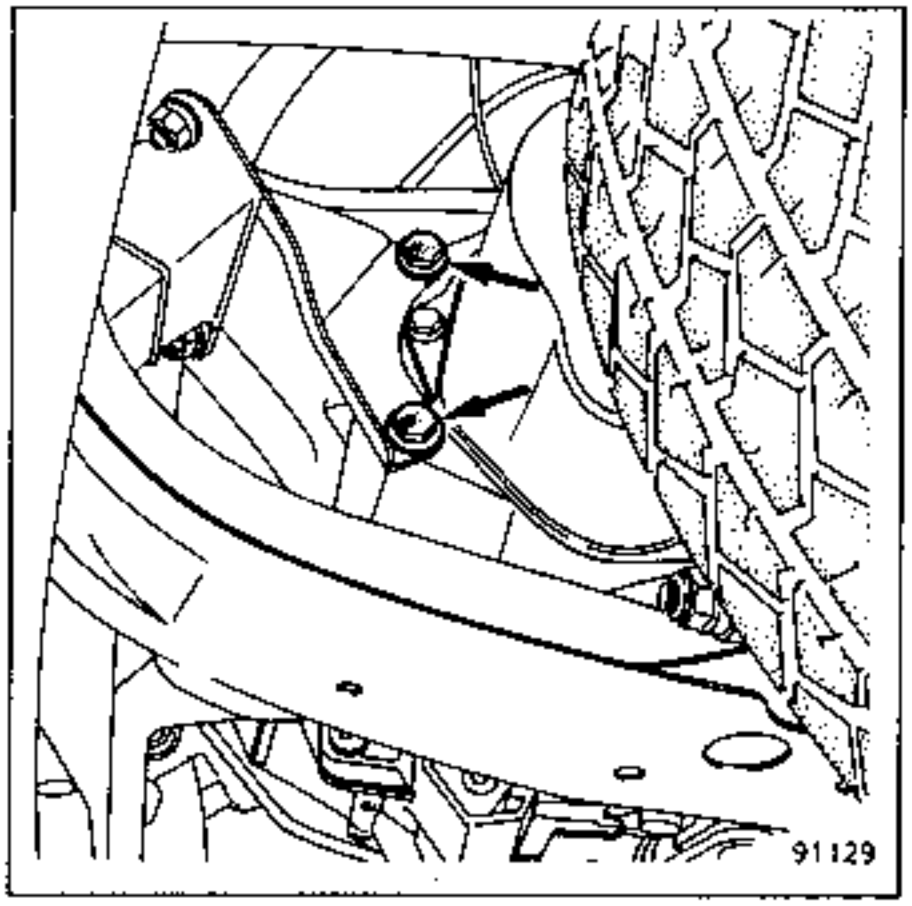
- the exhaust pipe flange.



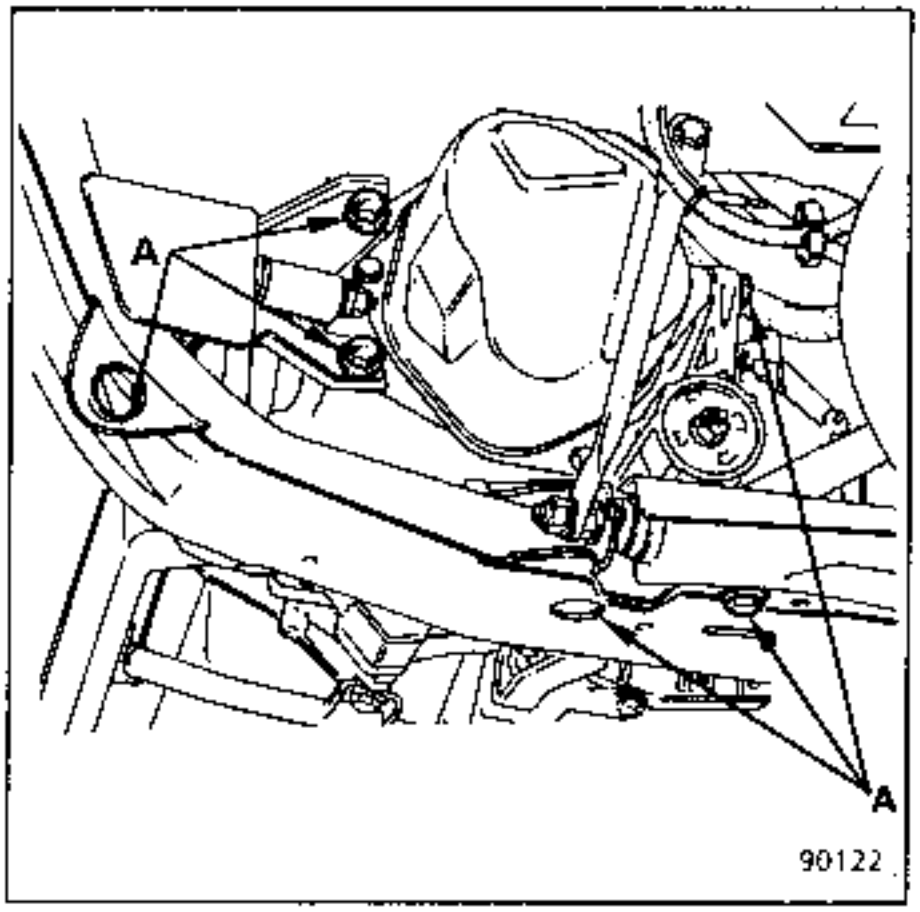
91128

Remove :

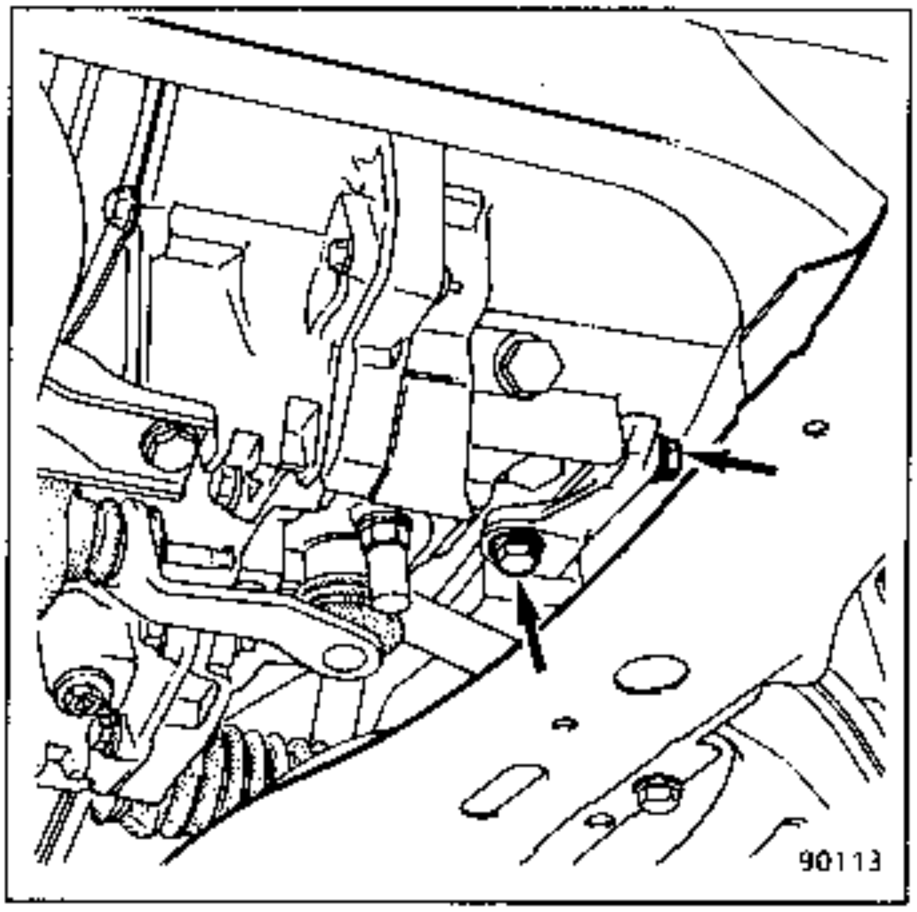
- the gearbox front mounting pad.



91129



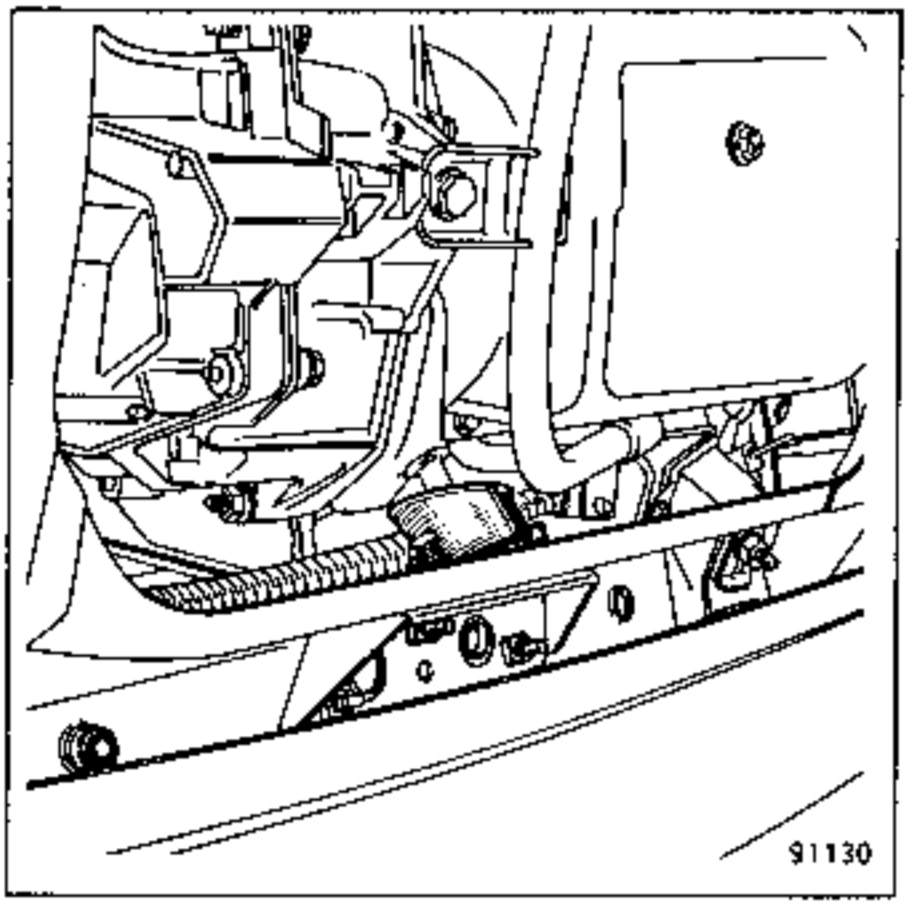
90122



90113

REMOVING (continued) REFITTING

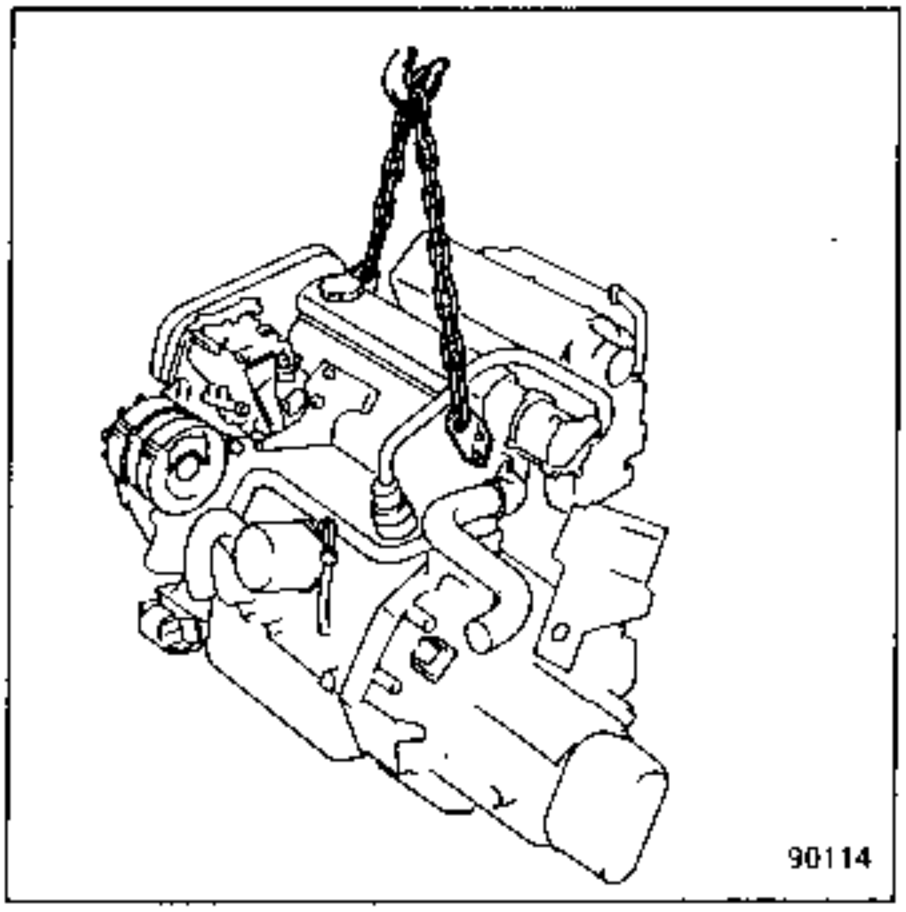
- the front anti-movement support for those vehicles equipped with them.



91130

- slide the Engine-Gearbox between the side member and the sub-frame to be able to lift the front of the engine by its maximum extent,

- take out the Engine-Gearbox assembly.

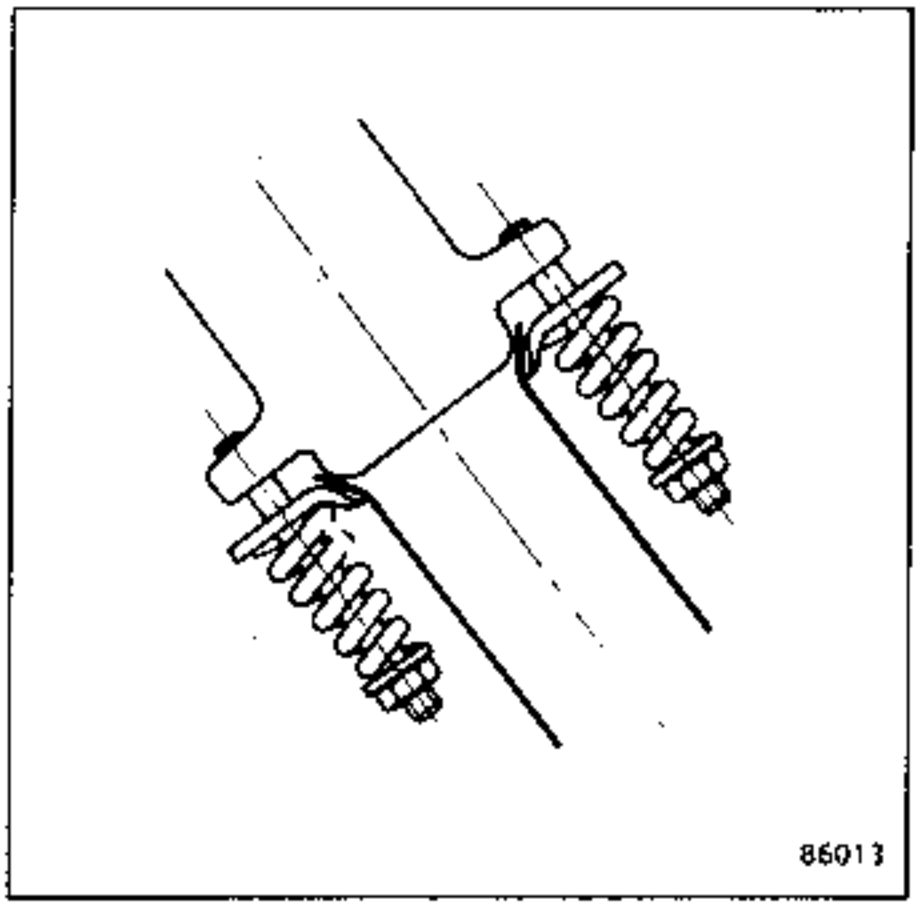


90114

The assembly is lifted out using lifting chain and rings Mot.878.

REFITTING

- tighten the nuts and bolts to the specified torques.
- fit the caliper securing bolts and tighten them to torque.
- Press the brake pedal a number of times to bring the pistons into contact with the brake pedals.
- fill the engine and, if necessary, the gearbox with oil,
- fill and bleed the cooling system,
- tighten the exhaust pipe flange by tightening the springs until they are coil bound and then loosening them by 1 and a half turns.



86013

Adjust the gear shift control (see "GEARBOX" section).

Apply CAF4/60 THIXO to the pin holes.

Adjust :

- the accelerator cable.

ESSENTIAL SPECIAL TOOLS	
Mot. 1040-01	Dummy sub-frame for removing and refitting the power unit assembly.

TIGHTENING TORQUES (in daN.m)	
- Sub-frame securing bolts :	
10 mm Ø	4,5
12 mm Ø	10
- Shock absorber upper cup securing bolts	2,5
- Brake caliper securing bolts	10
- Steering column universal joint securing bolt	3
- Wheel bolts	8

Removing all type "C" engined power unit assemblies

REMOVING

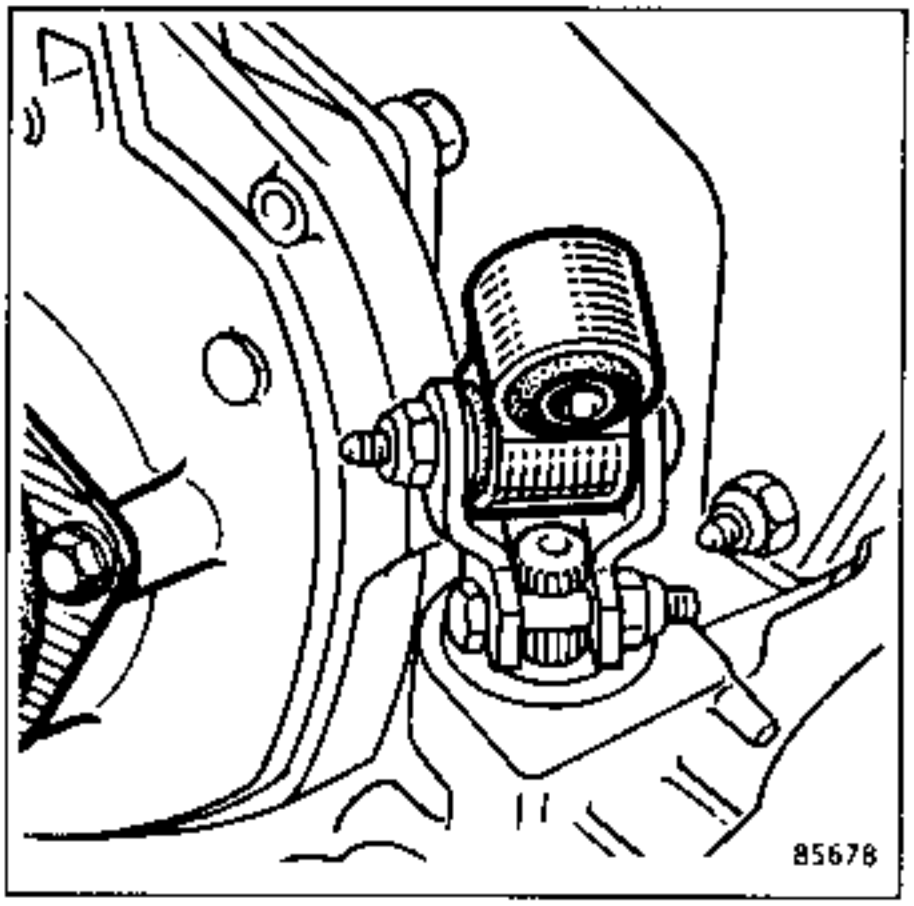
Disconnect the battery.

Remove :

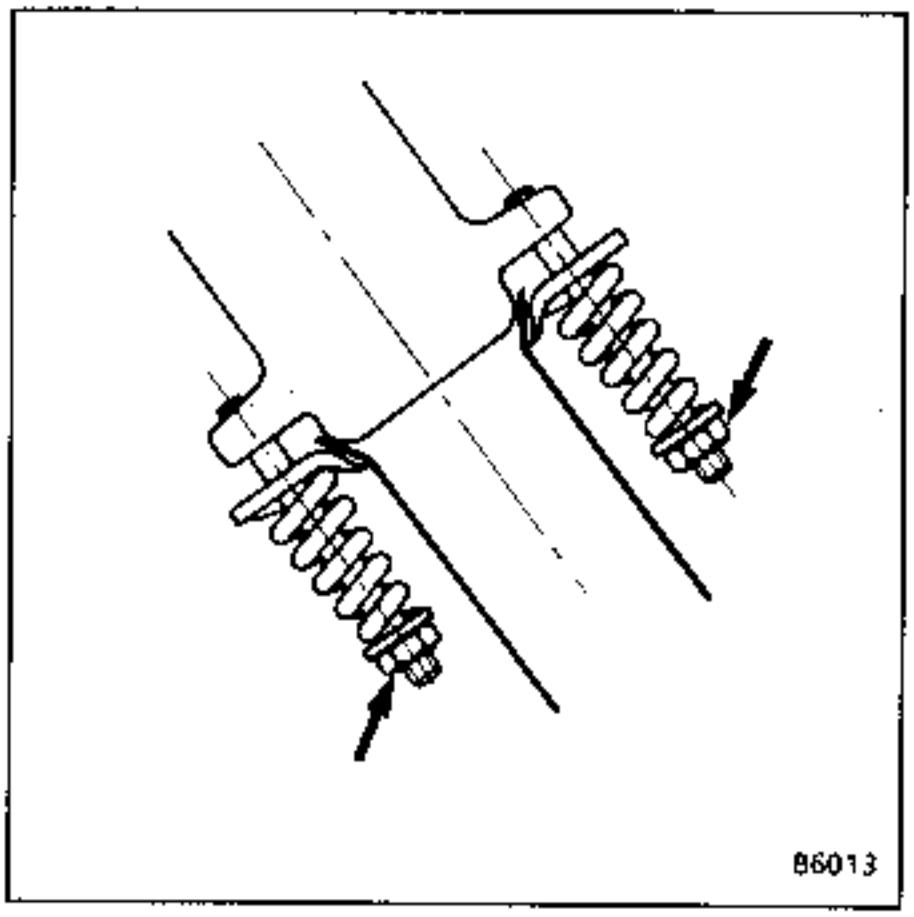
- the bumper shield,
- the radiator grille,
- the radiator air baffle.

Disconnect :

- the speedometer drive cable. It is retained by a clip,
- the steering column universal joint.



- the pipe flange from the manifold and remove the down pipe.



REMOVING (continued)

Remove :

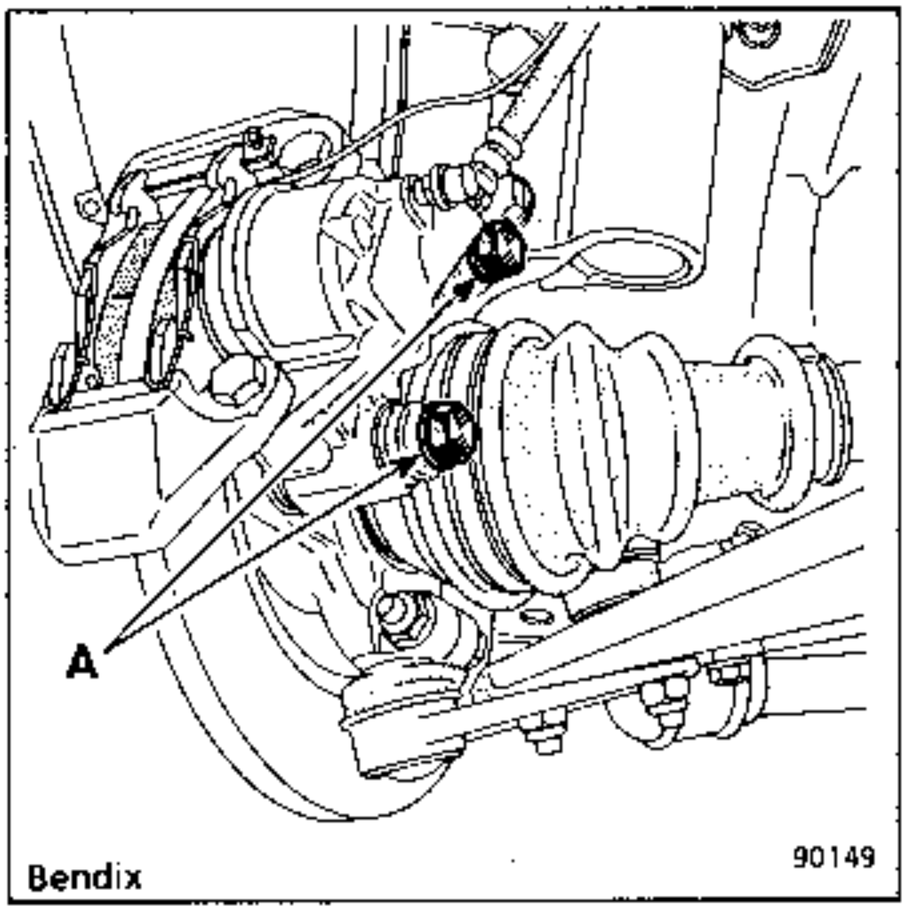
- the air filter,
- the engine accessories :

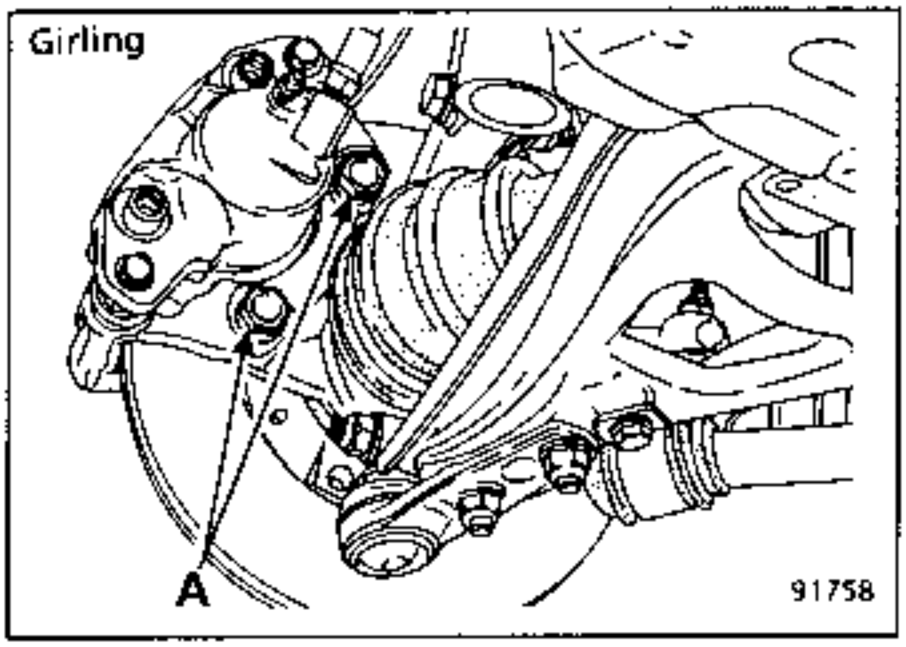
  The cables, hoses, electrical connections, gear shift control and earthing braids.

Fit clamps Mot.453-01 to the heater hoses then disconnect the hoses at the scuttle.

Remove :

- the brake calipers and attach them to the body shell,

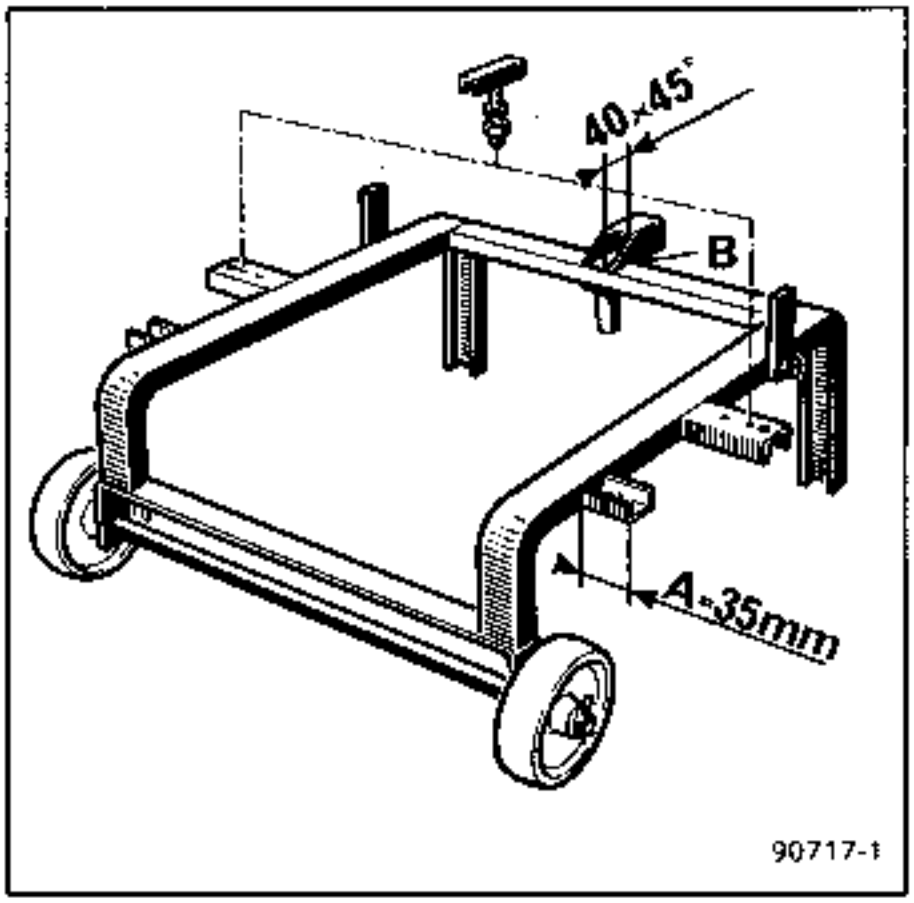




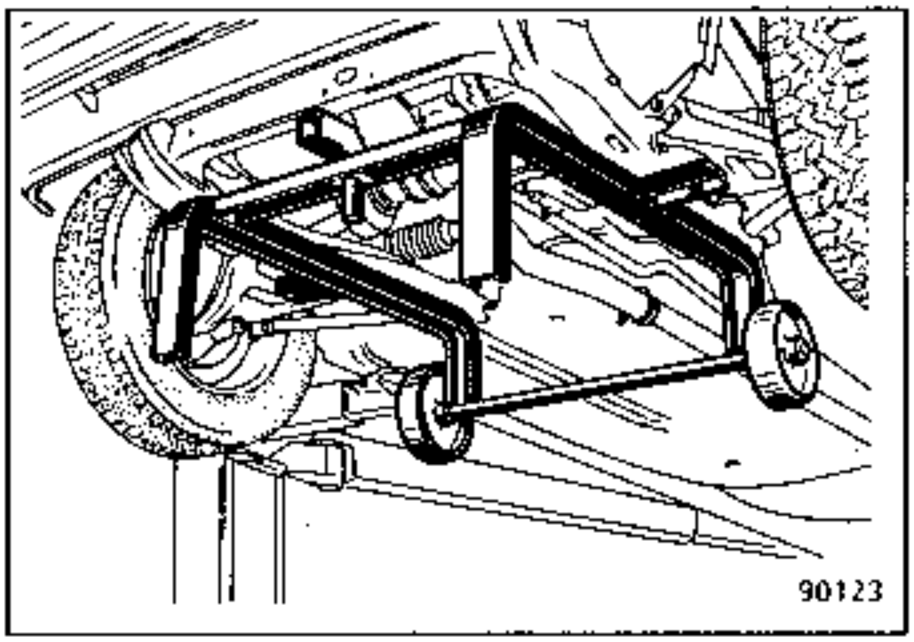
- the tie rods connecting the sub-frame to the body.

This operation involves modifying tool Mot.1040-01 as follows :

Cut the 2 rear fastenings on the tool, at A, at a length of 35 mm and the front fastening B at 4o mm and 45°.



- position tool Mot.1040-01.

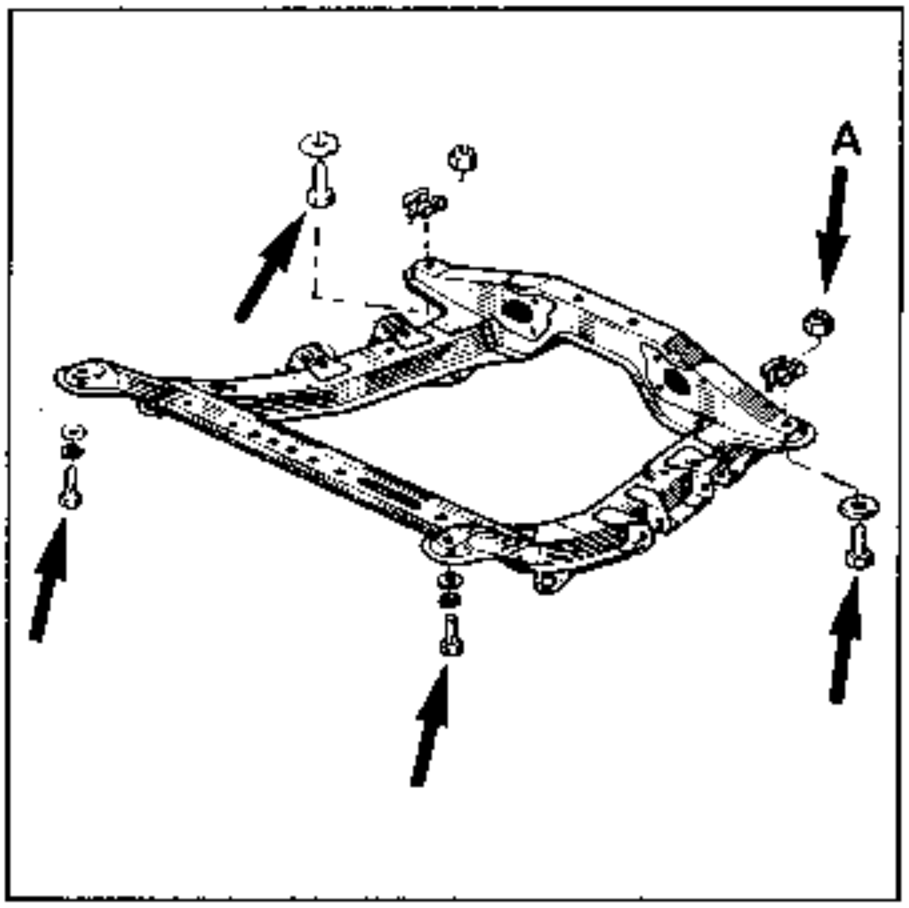


Lower the vehicle to the floor.

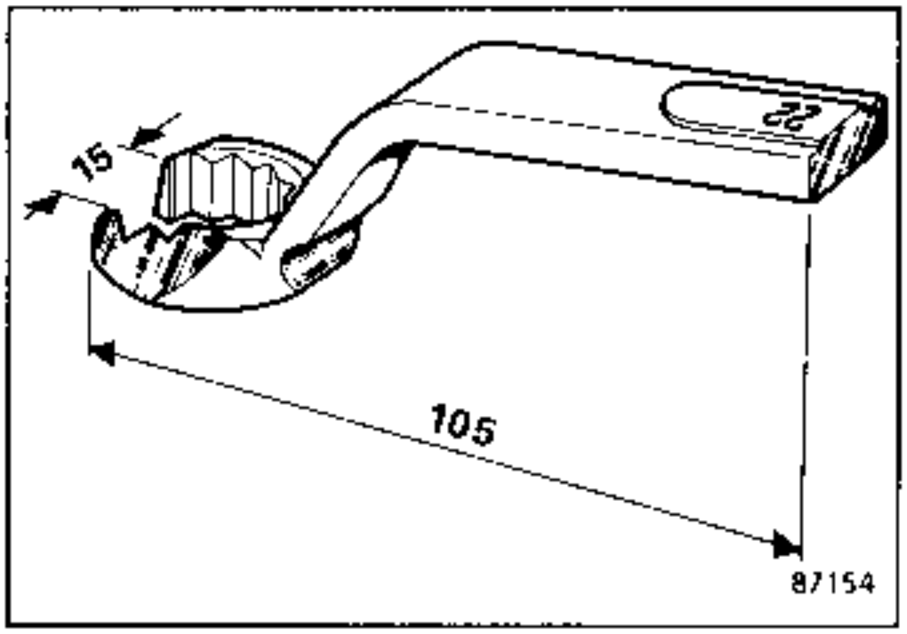
REMOVING (continued) REFITTING

Remove :

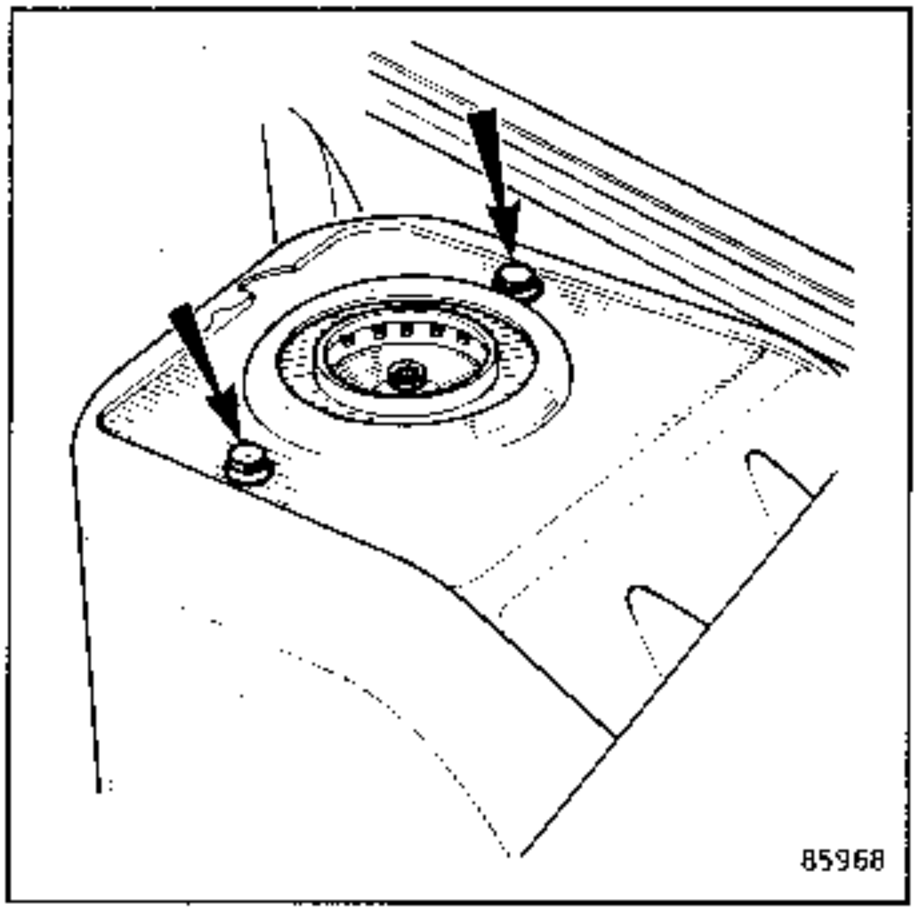
- the four bolts that secure the sub-frame.



If there are no sheet steel locking washers on nuts A, lock the sub-frame nuts A using a ring spanner ground open and shortened as shown below.



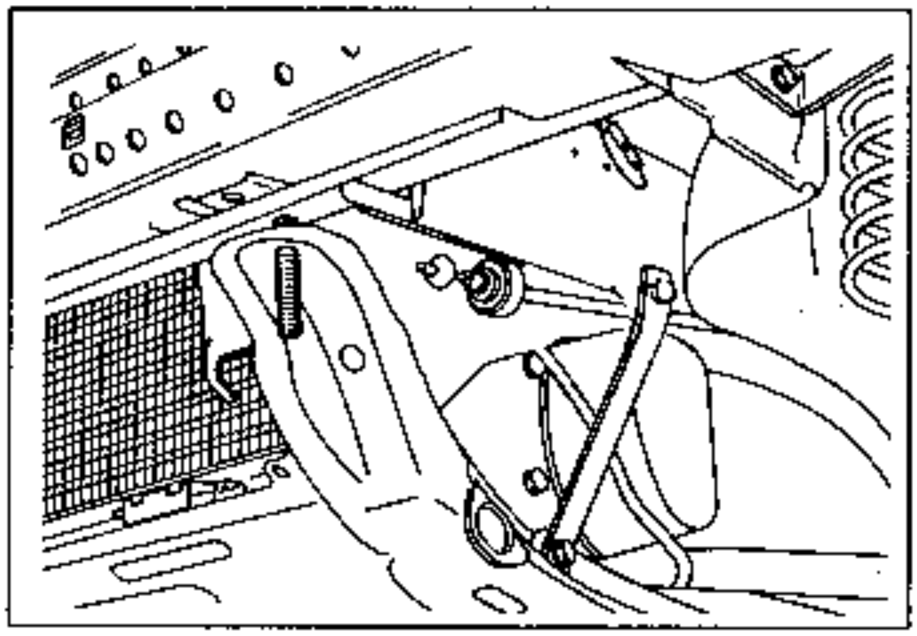
- the bolts on the shock absorber upper cup,



- lift the body shell and remove the power unit assembly.

REFITTING (Special points)

Aligning the body shell with the engine sub-frame will be made easier by fitting the screwed rods approximately 100 mm long.



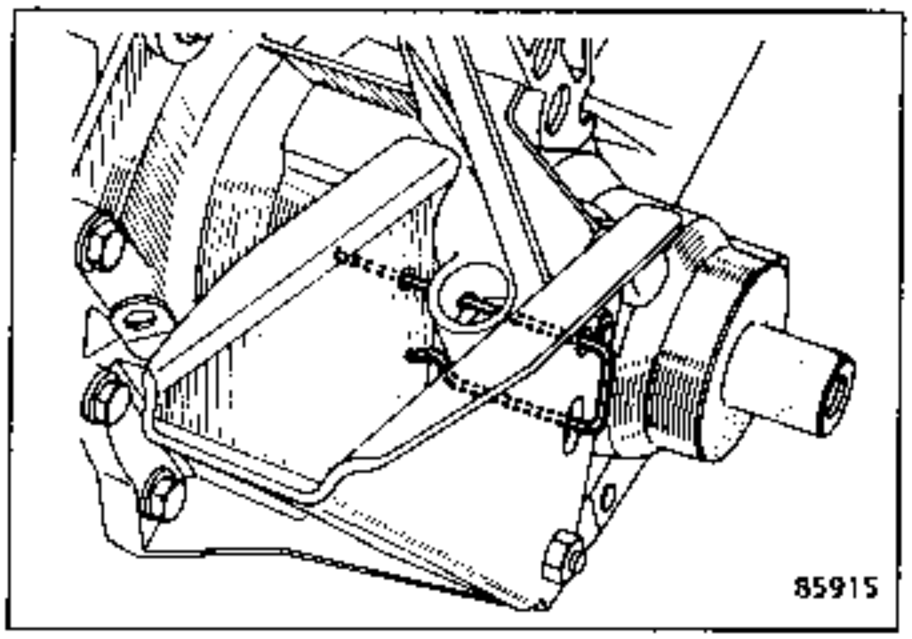
REFITTING (continued)

To obtain the correct clutch clearance, see the "CLUTCH" section of M.R.257.

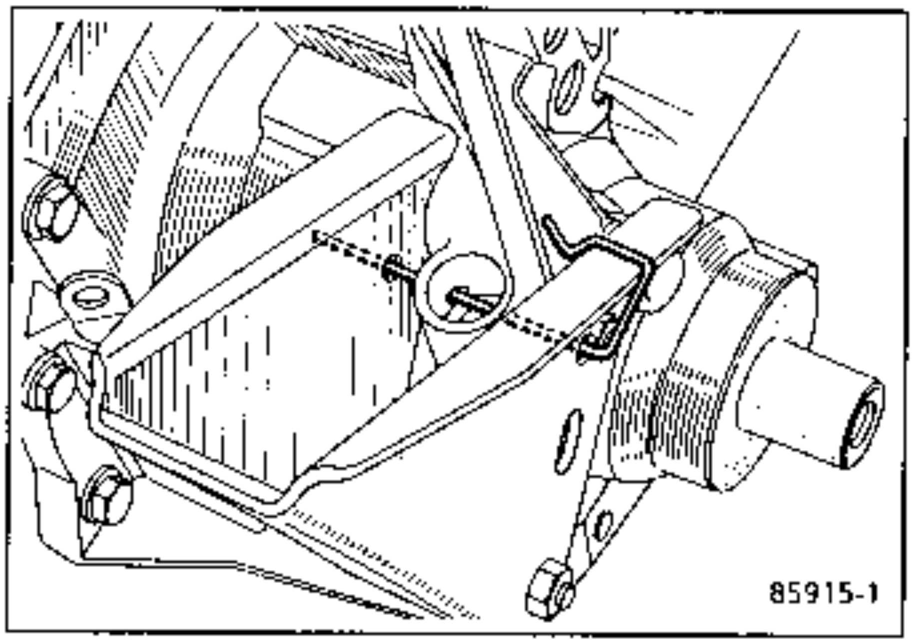
- Tighten the brake caliper securing bolts to a torque of 10 daN.m.

Press the brake pedal a number of times to bring the caliper pistons into contact with the brake pads.

- fill the engine and gearbox with oil (when applicable),
- fill and bleed the cooling system,
- fill and bleed the freon system (when applicable),
- fill the power steering system (when applicable),
- adjust the gear shift control,
- reconnect the speedometer drive cable ensuring that the clip is in the correct position.



85915



85915-1

- tighten the steering column universal joint in the correct position (see the "Front Axle" section).

ESSENTIAL SPECIAL TOOLS	
Mot.1040-01	Dummy sub-frame for removing and re-fitting the power unit assembly.

TIGHTENING TORQUES (in daN.m)	
- Sub-frame securing bolts :	
10 mm ø........................	**4,5**
12 mm ø........................	**10**
- Shock absorber upper cup securing bolts	**2,5**
- Brake caliper securing bolts	**10**
- Steering column universal joint securing bolts	**3**
- Wheel bolts.......	**8**

Removing the power unit assembly, all type "F" engines

REMOVING

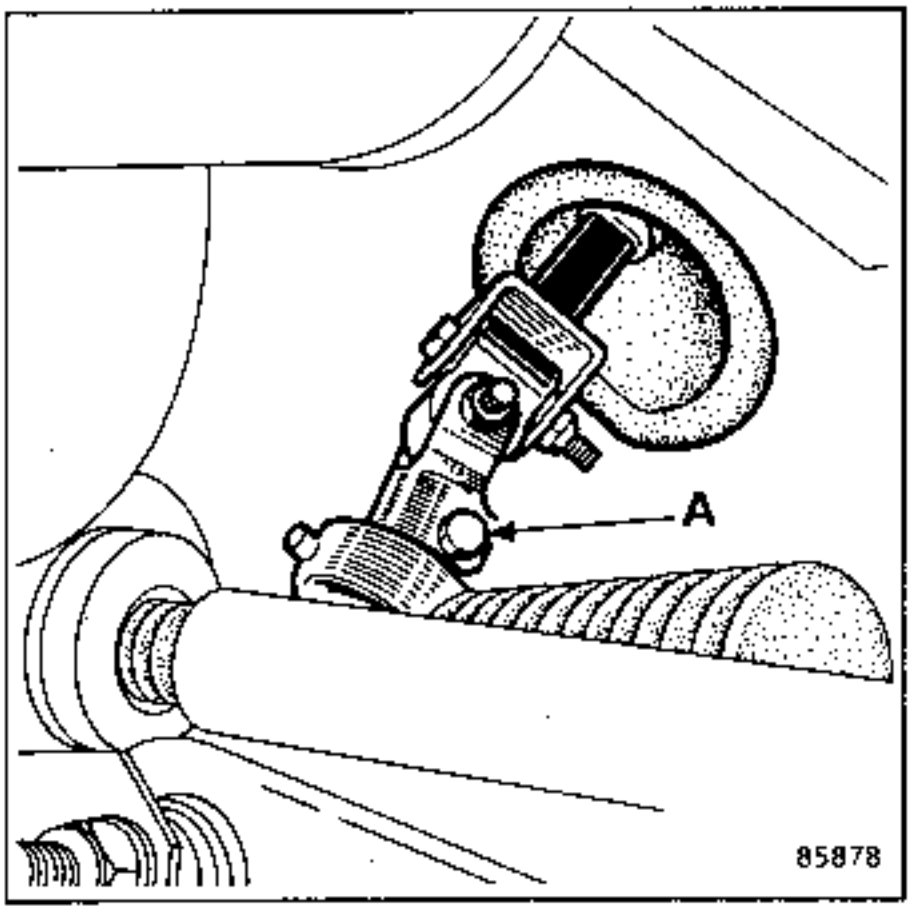
Disconnect the battery.

Remove :

- the bumper shield,
- the two steering protection plastic half shells.

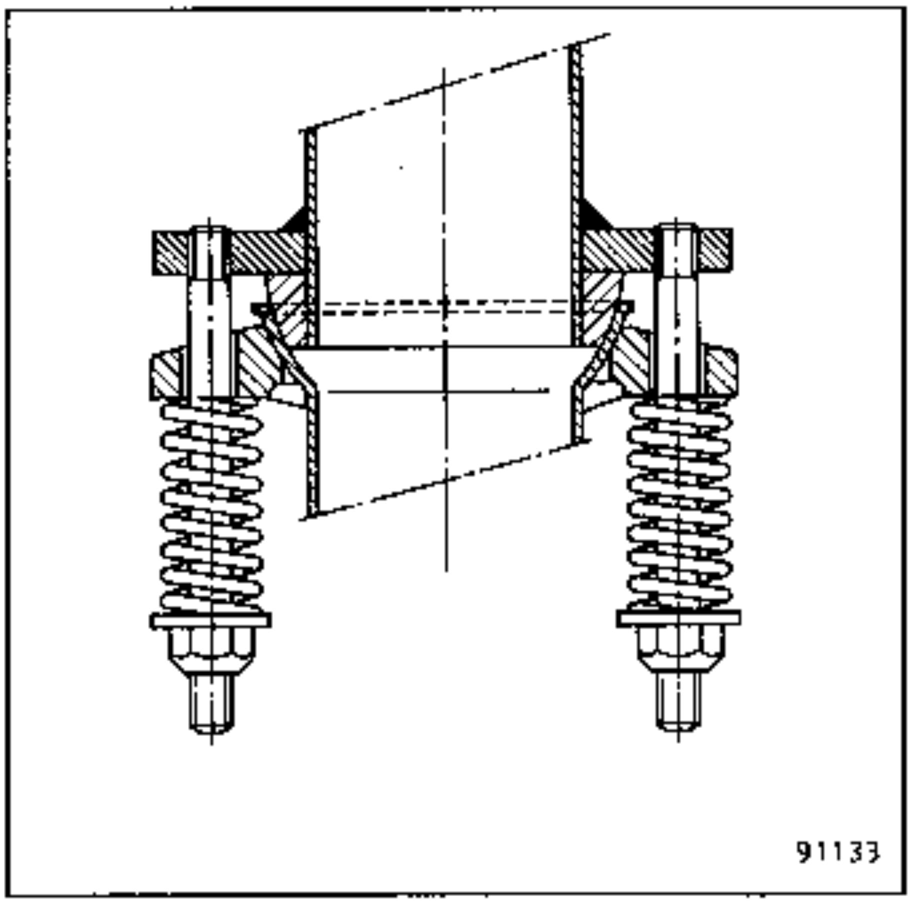
Disconnect :

- the speedometer drive cable which is retained by a clip,
- the steering column universal joint at (A),
- the earthing braid,
- the accelerator cable,
- the clutch cable,
- the electrical connectors.



85878

The exhaust pipe flange and remove the down pipe.

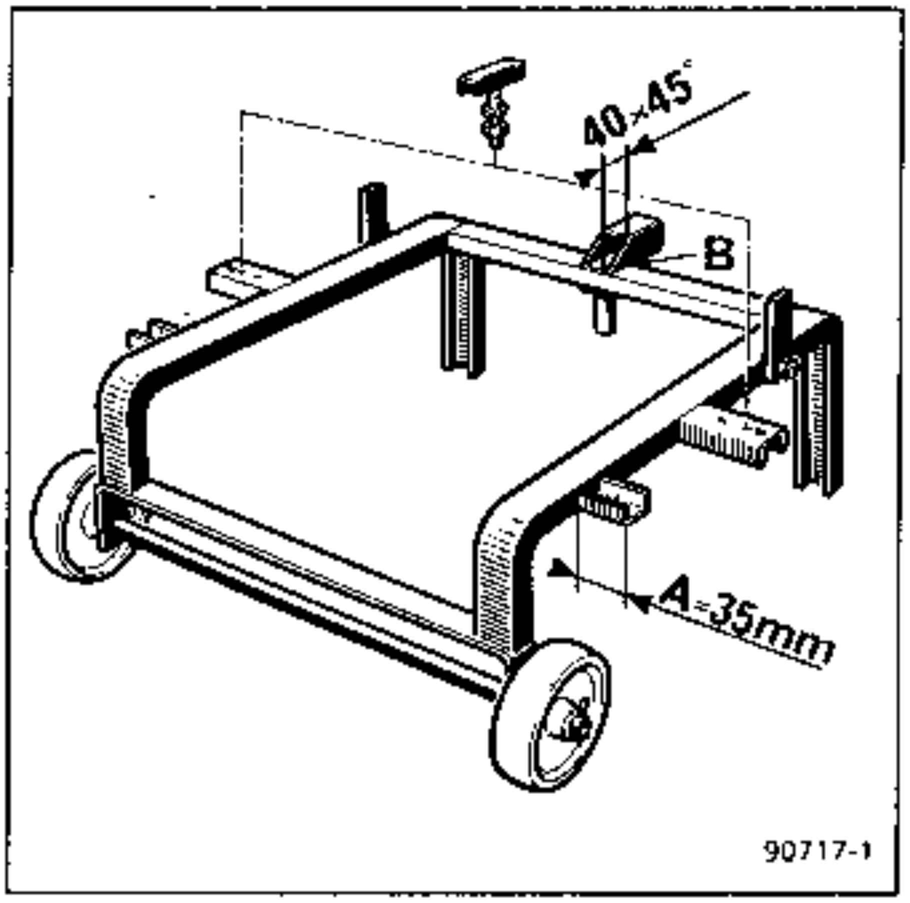


91133

REMOVING (continued)

This operation involves modifying tool Mot.1040-01 as follows :

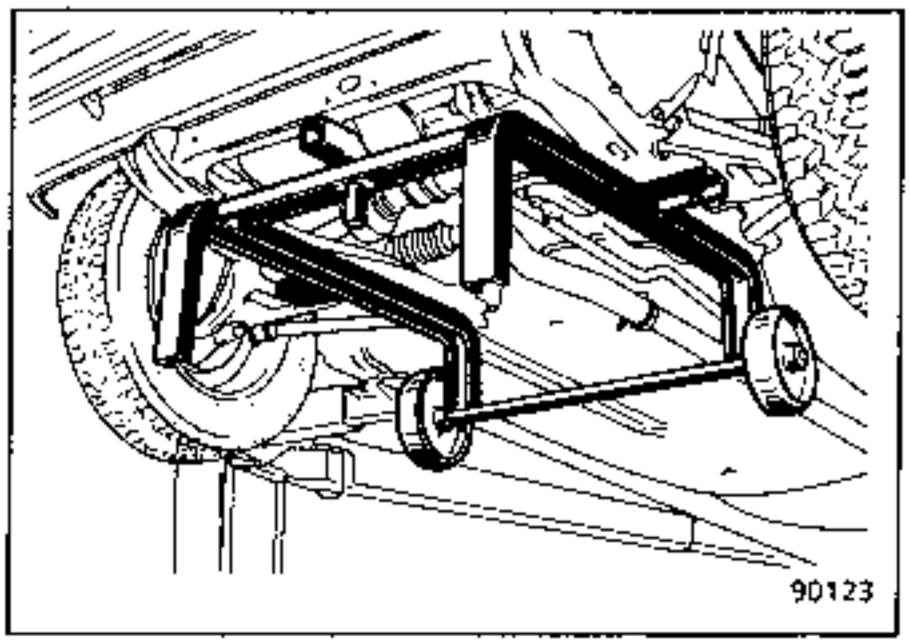
Cut the 2 rear fastenings on the tool A at 35 mm and the front fastening, B at 40 mm and 45°.



90717-1

Remove :

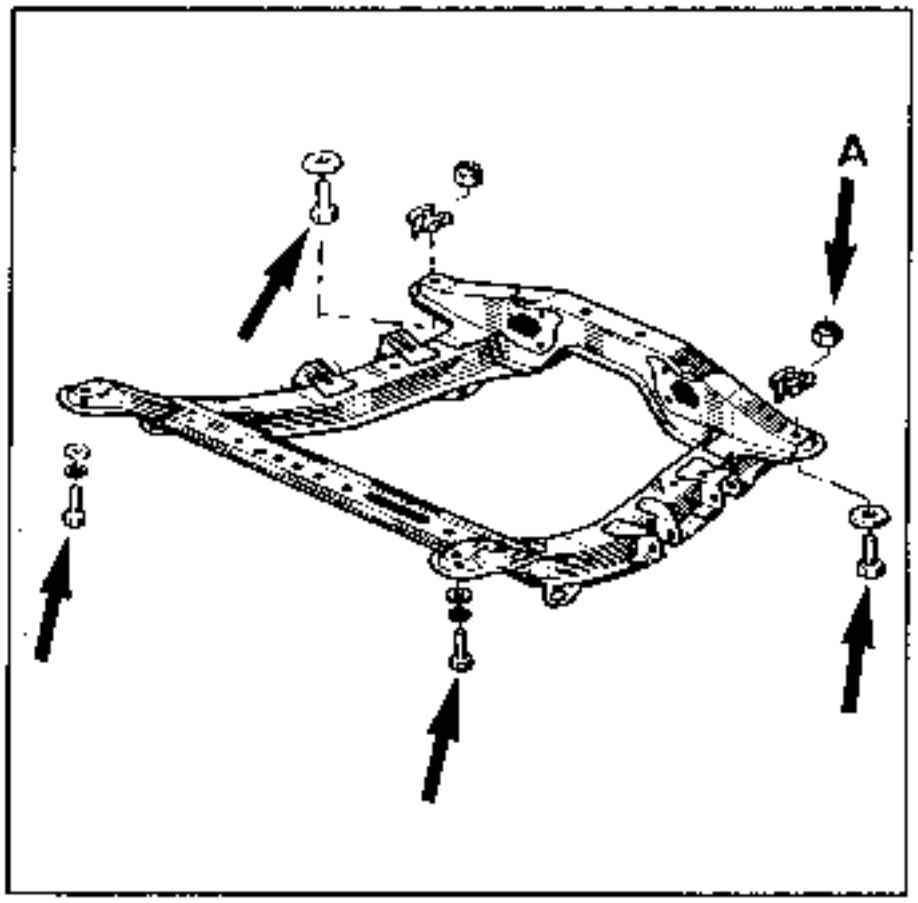
- the brake calipers and secure them to the body,
- the tie rods that connect the sub-frame to the body shell,
- place tool Mot.1040-01 in position.


90123

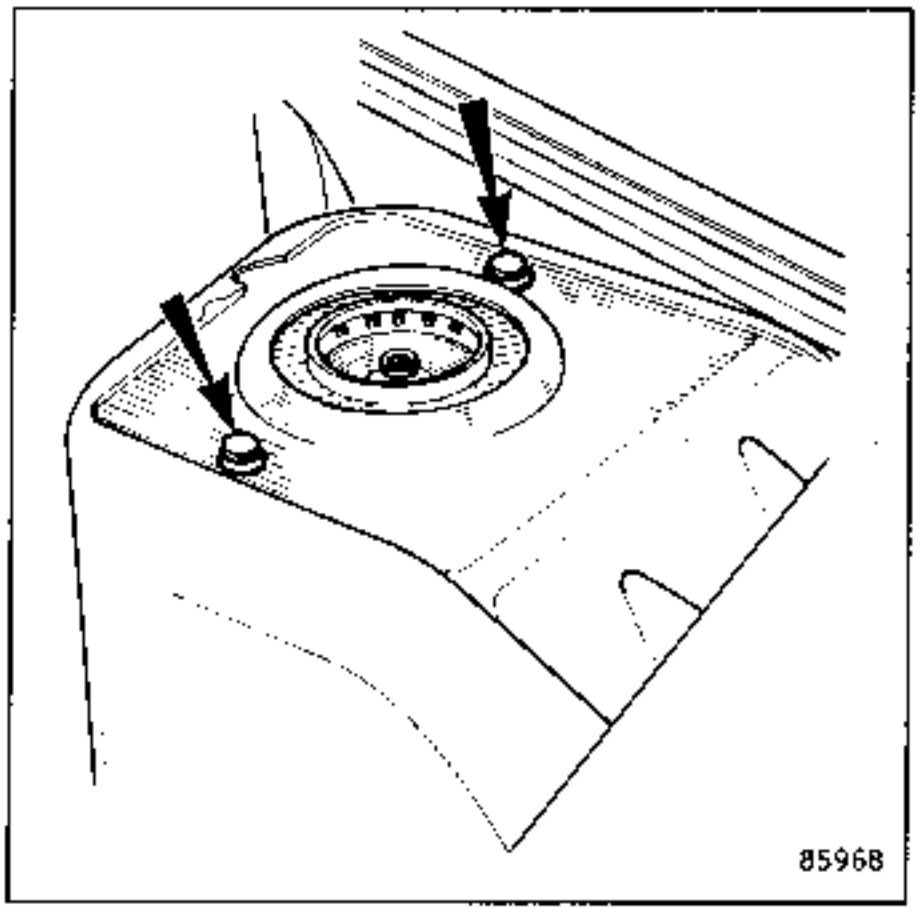
Lower the vehicle to the ground.

Remove :

- the four sub-frame securing bolts.



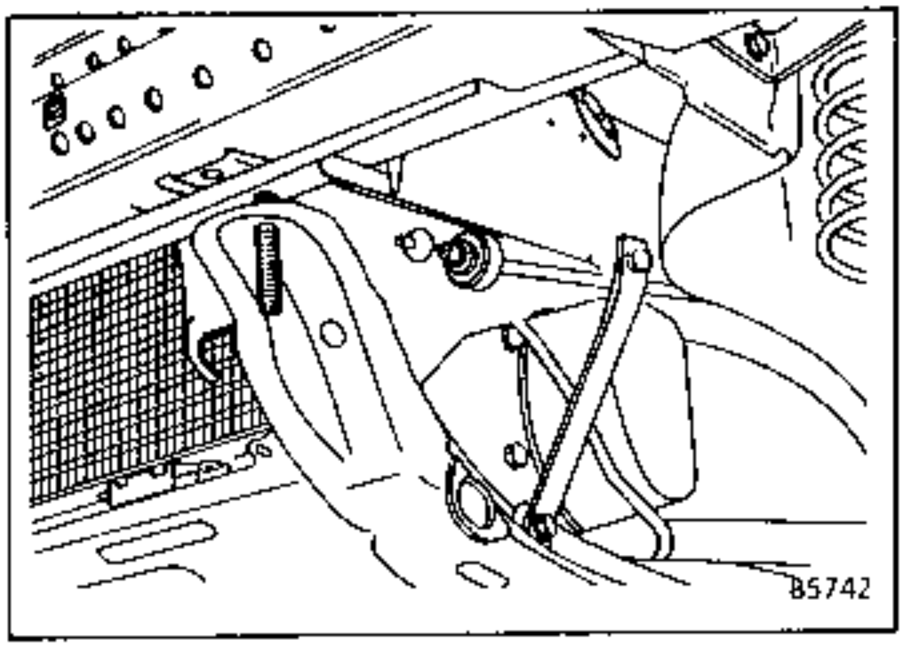
- the bolts on the shock absorber upper cup.


85968

- lift the body shell and remove the power unit assembly.

REFITTING (Special points)

Aligning the body shell with the engine sub-frame can be made easier by using screwed rods approximately 100 mm long.



To obtain the correct clutch clearance, see the "CLUTCH" section of M.R. 257.

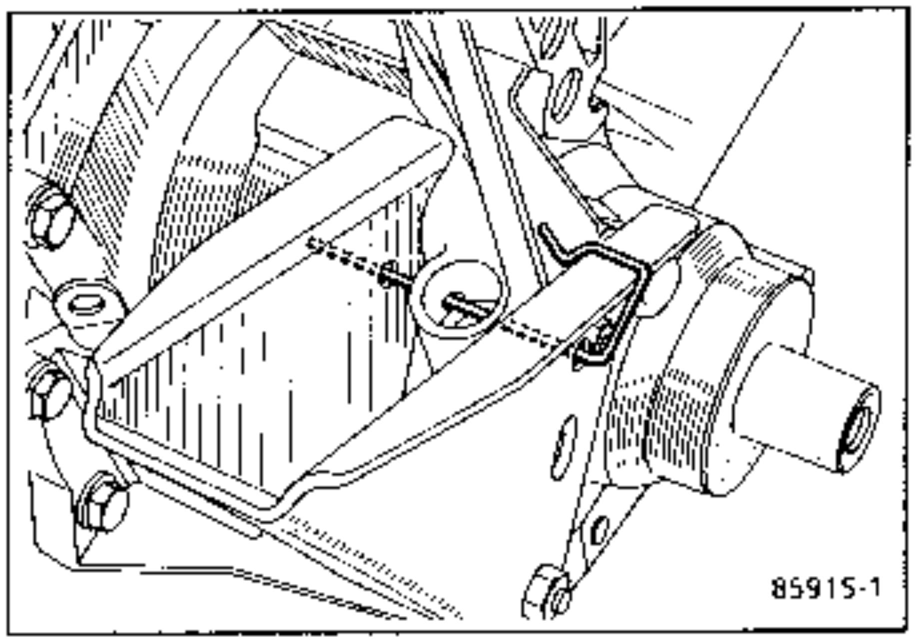
- tighten the brake caliper securing bolts to a torque of 10 daN.m.

Press the brake pedal a number of times to bring the caliper pistons into contact with the brake pads.

- fill the engine and gearbox with oil (when applicable),
- fill and bleed the cooling system.

Adjust the gear shift control (see the "GEARBOX" section of M.R.257).

- reconnect the speedometer drive cable ensuring that the clip is in the correct position.



Adjust :

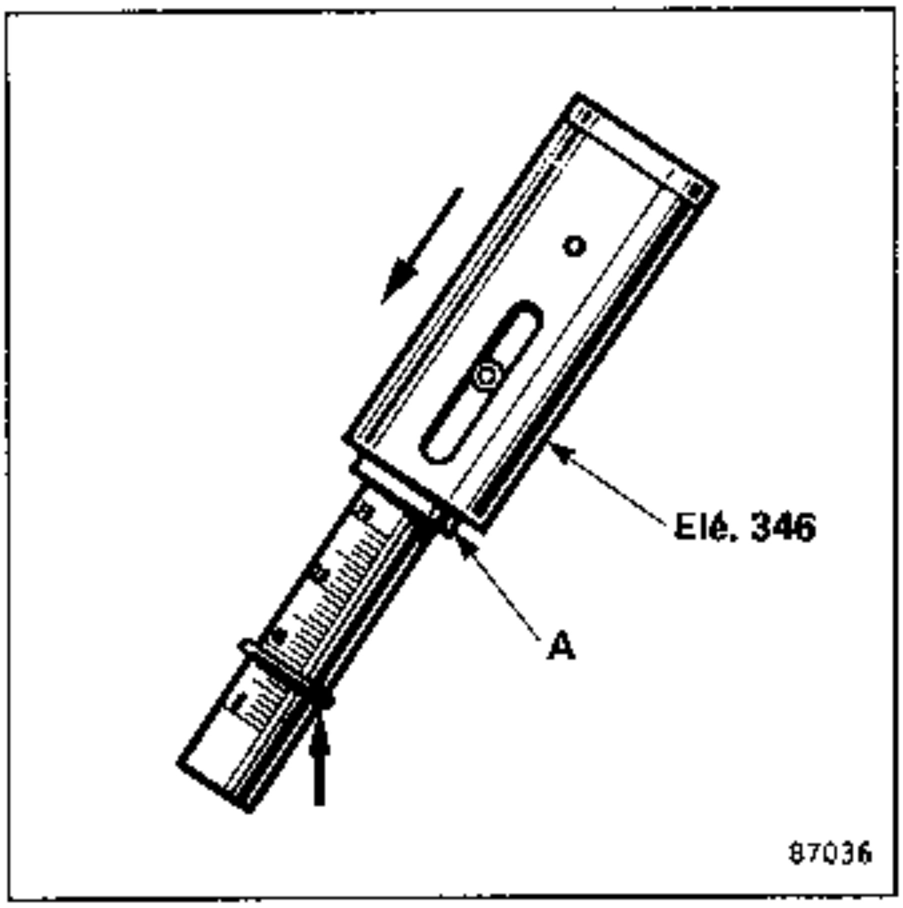
- the accelerator cable.

CHECKING THE TENSION

ESSENTIAL SPECIAL TOOLS		
Elé.	346	Belt tension tester
Elé.	346-04	Kit consisting of
		Elé 346 + Elé 346-01 + Elé 346-03

A belt msut always be fitted with the tensioner in the released position so as not to apply force to the pulleys and the belt.

CHECKING METHOD



Check that the lower part of the rubber ring is in line with the zero on the plunger scale.

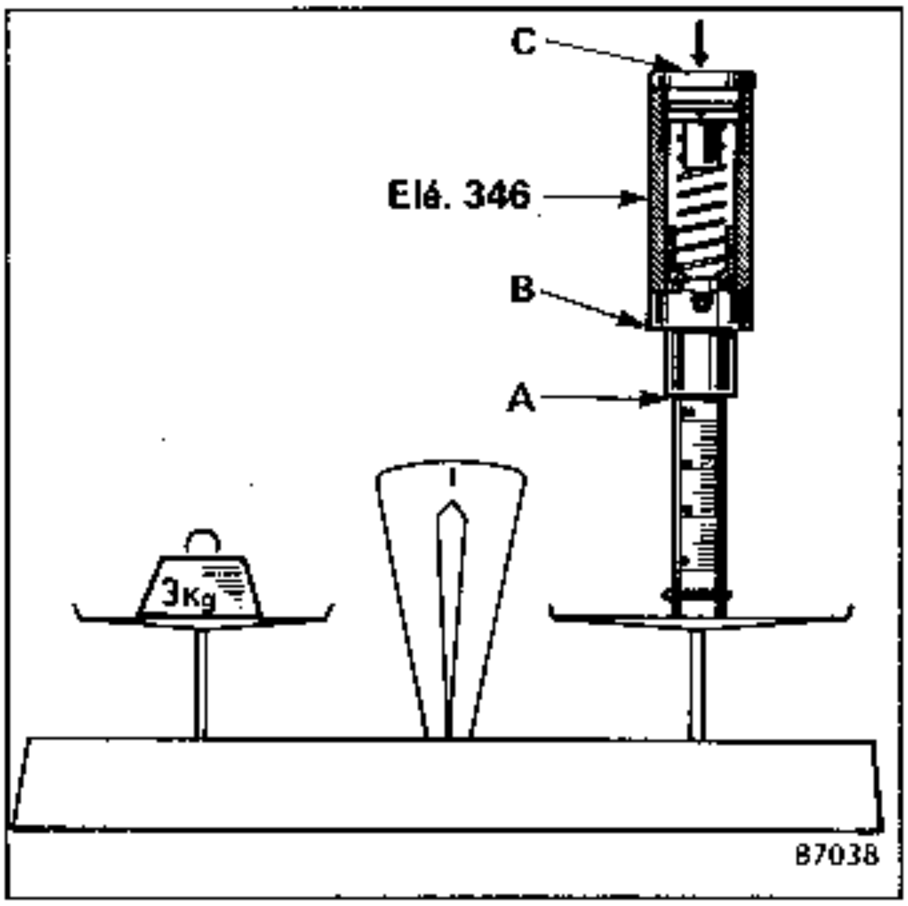
Place the bar against the belt with the plunger halfway between the centres of the two pulleys.

Press the sliding part of the plunger until the shoulder (A) is flush with the plunger body.

Remove the tool and read the deflection from the bottom edge of the rubber ring.

ZEROING TOOL Ele.346

From time to time the accuracy of tool Ele.346 must be checked.



Apply a force of 3 daN (a weight of 3 kg) to the tool. Shoulder (A) should be flush with the body of plunger (B). If it is not, turn screw (C) to increase or reduce the spring pressure.

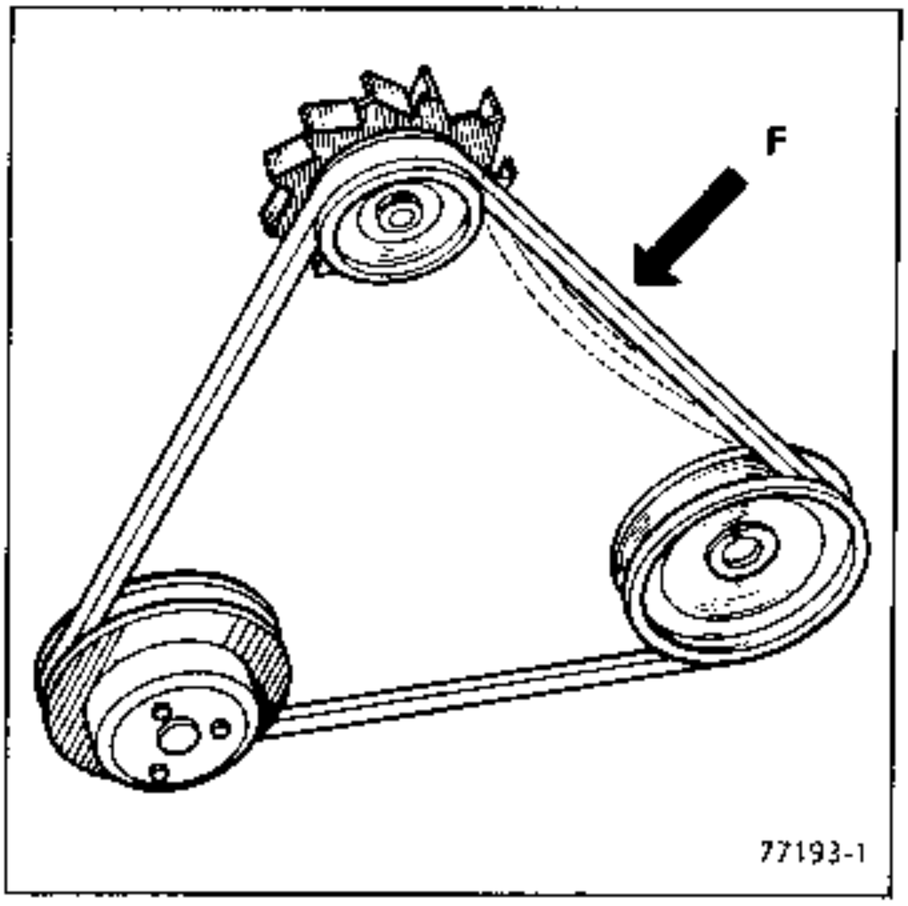
CHECKING THE TENSION

ARRANGEMENT ON TYPE "C" ENGINES

CHECKING

The deflection (F) :

A new belt or one that has run for 10 minutes.



Alternator drive belt : F = 4 mm.

A. Crankshaft pulley

B. Tensioner roller

C. Coolant pump pulley

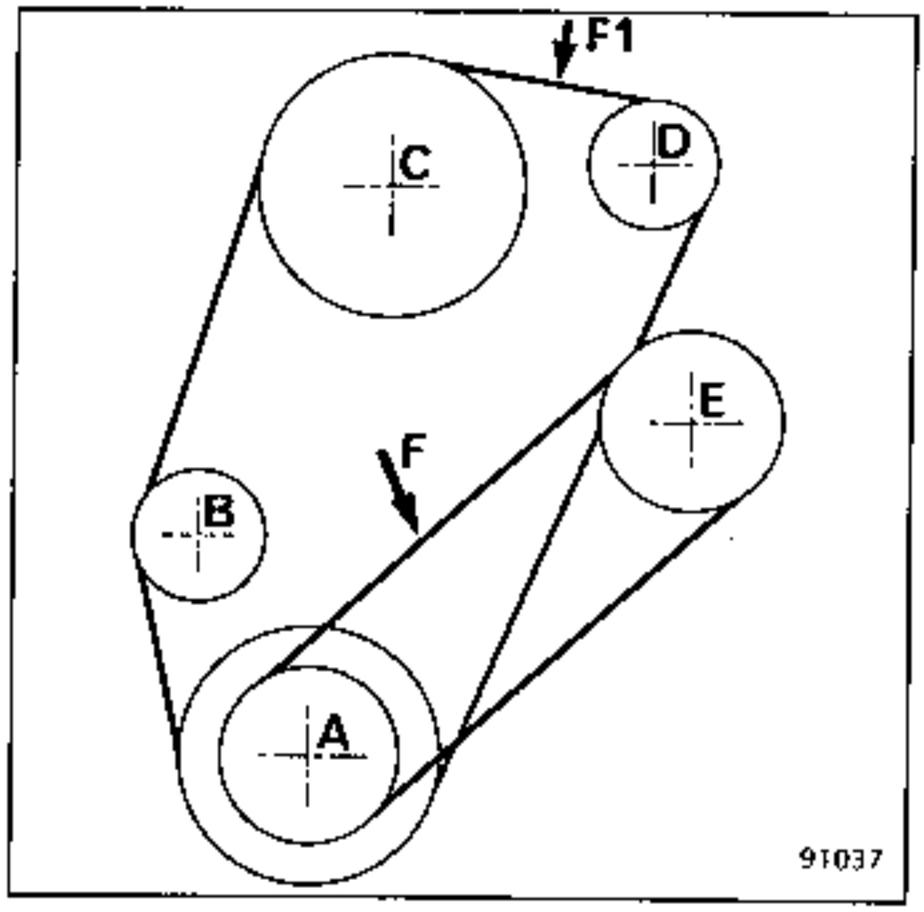
D. Alternator pulley

E. Power steering pump pulley

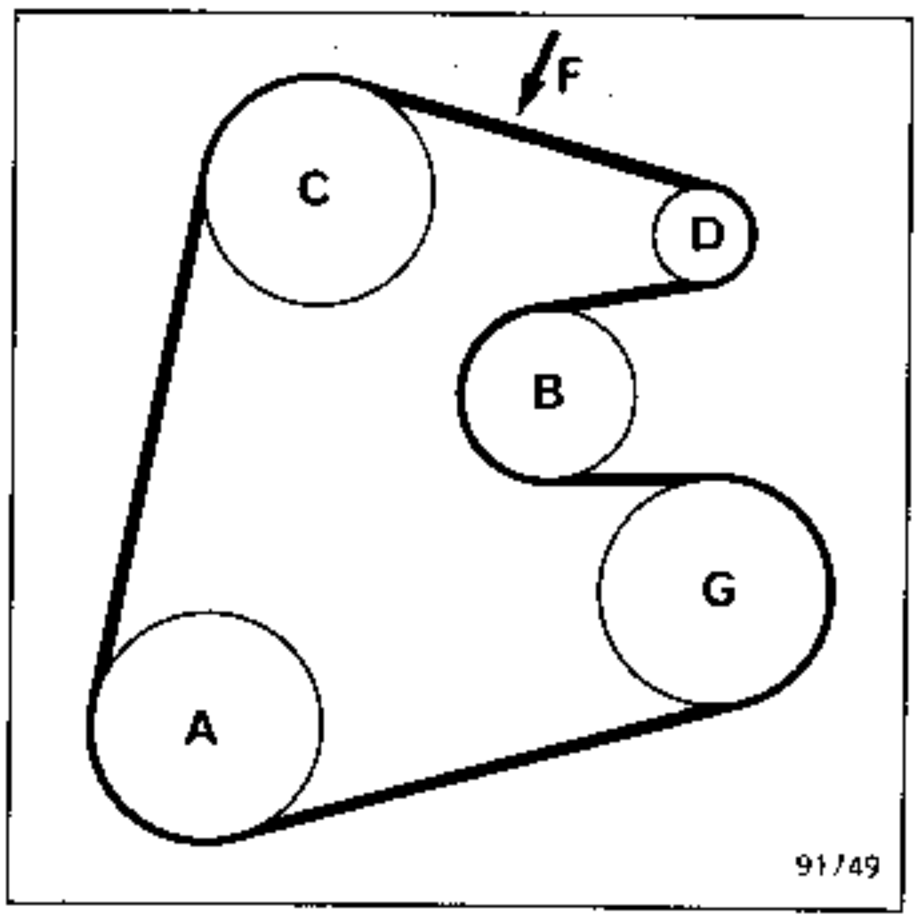
G. Compressor pulley

Checking :

F = 3.5 to 4.5 mm when cold
F1 = 4 mm when cold



Vehicle with power steering



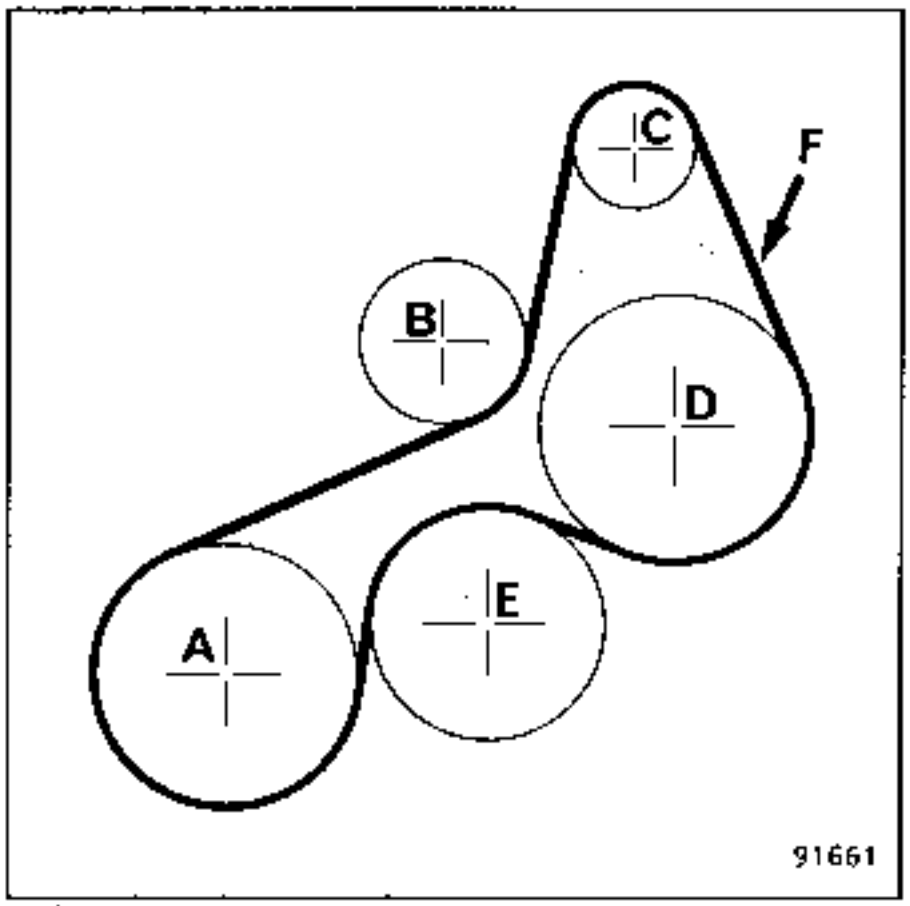
Checking :

vehicle with air conditioning

F = 3 to 4 mm (when cold)

CHECKING THE TENSION

TYPE F .. (e) ENGINES



A. Crankshaft pulley

B. Tensioner roller

C. Alternator pulley

D. Power steering pump pulley

E. Coolant pump pulley

Checking :

F = 3.5 to 4.5 mm when cold

Market :	Europe

Vehicle	Engine: Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio	Gearbox	Carburettor	Ref.
B 400 C 400 S 400	C1C	A 700	65	72	956	9,7	Manual	ZENITH 32IF2	V10508

Idling speed: Speed (rpm)	Mixture (CO)	Conditions :	Tamperproofing cap: Part no.	Fast idling: Speed (rpm)
700 ± 25	1 ± 0,5	After E.F. has cut in	77 01 200 835	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	
EXHAUST	Conventional

Market :	Europe

Vehicle	Engine: Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio	Gearbox	Carburettor	Ref.
B 400 C 400	C1C	E 700	65	72	956	9,2	Manual	ZENITH 32 IF2 SOLEX 32 BIS	V10508 885

Idling speed: Speed (rpm)	Mixture (CO)	Conditions :	Tamperproofing cap: Part no.	Fast idling: Speed (rpm)
700 ± 50	1,5 ± 0,5	After E.F. has cut in	ZENITH : 77 01 200 835 SOLEX : 77 01 200 831	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	
EXHAUST	Conventional

Market :							Europe		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
F 400	C1C	8 706	65	72	956	8,6	Manual	ZENITH 28IF	V05085

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 50	1,5 ± 0,5		77 01 200 834	

Fuel :	Grade	Octane rating
	Non-premium	I.O.92
Emission control system :		
EXHAUST	Conventional	

Market :						Europe			
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B401 C401 F401 S401	C1E	G 750	70	72	1 108	9,5	Manual	ZENITH 32 IF2 SOLEX 32 BIS	V10509 836

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
625 ± 50 (1) 700 ± 50 (2)	1 ± 0,5 (1) 1,5 ± 0,5 (2)	After E.F. has cut in	ZENITH : 77 01 200 835 SOLEX : 77 01 200 831	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	
EXHAUST	Conventional

Market :						COLD CLIMATE Sweden, Norway, Finland			
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B401 C401 S401	C1E	A 752	70	72	1108	9,5	Manual	ZENITH 32 IF2	V10513

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
650 ± 25 (1) 700 ± 50 (2)	1 ± 0,5 (1) 1,5 ± 0,5 (2)	After E.F. has cut in	77 01 200 835	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	
EXHAUST	Conventional

(1) - Phase I up to during 1987 model year
(2) - Phase II from during 1987 model year

Market :							Israel		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
B401 F401	C1E	754	70	72	1 108	8,3	Manual	ZENITH 32IF2	V10524

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
650 ± 50	1,5 ± 0,5	After E.F. has cut in	77 01 200 835	

Fuel :	Grade	Octane rating
	Non-premium	I.O.85

Emission control system :	
EXHAUST	Conventional

Market :							Sweden		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B401 C401 S401	C1E	752	70	72	1 108	9,5	Manual	ZENITH 32 IF2	V10513
Idling speed							Tamperproofing cap	Fast idling	
Speed (rpm)		Mixture (CO)		Conditions :			Part no.	Speed (rpm)	
650 ± 25 (1) 700 ± 50 (2)		1 ± 0,5 (1) 1,5 ± 0,5 (2)		After E.F. has cut in			77 01 200 835	1 700 ± 100	
Fuel :					Grade			Octane rating	
					Super			I.O.98	
Emission control system :									
EXHAUST					Conventional				

Market :							SWITZERLAND		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B401 C401	C1E	752	70	72	1 108	9,5	Manual	ZENITH 32 IF2	V10514
Idling speed							Tamperproofing cap	Fast idling	
Speed (rpm)		Mixture (CO)		Conditions :			Part no.	Speed (rpm)	
650 ± 25		1 ± 0,5		After E.F. has cut in			77 01 200 835	1 700 ± 100	
Fuel :					Grade			Octane rating	
					Super			I.O.98	
Emission control system									
EXHAUST					Conventional				

(1) - Phase I up to during 1987 model year
(2) - Phase II from during 1987 model year

Market :	Germany - Holland

Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
B40H C40H F40H	C1E	B 756	70	72	1 108	8,8	Manual	ZENITH 32 IF2	V10521

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 50	1,5 ± 0,5	After E.F. has cut in	77 01 200 835	1 700 ± 100

Fuel :	Grade	Octane rating
	Ordinary unleaded	I.O.91

Emission control system :	
EXHAUST	Conventional

Market :	Spain

Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
B40F C40F	C1G	702	71,5	77	1 237	9,2	Manual	SOLEX 32 BIS ZENITH 32 IF2	869 V10517

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions	Part no.	Speed (rpm)
650 ± 25	1,5 ± 0,5	After E.F. has cut in	SOLEX : 77 01 200 831 ZENITH : 77 01 200 835	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	
EXHAUST	Conventional

Market :	Europe

Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
B40F C40F	C1G	E 720	71,5	77	1 237	9,2	Manual	SOLEX 32 BIS	907

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 50	1,5 ± 0,5	After E.F. has cut in	77 01 200 831	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	
EXHAUST	Conventional

Market :							Europe		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B402 C402 F402	C1J	A 768	76	77	1 397	9,2	Manual	ZENITH 32 IF2 SOLEX 32 BIS	V10511 849
Idling speed							Tamperproofing cap		Fast idling
Speed (rpm)		Mixture (CO)		Conditions			Part no.		Speed (rpm)
625 ± 25		1 ± 0,5		After E.F. has cut in			ZENITH : 77 01 200 835 SOLEX : 77 01 200 831		
Fuel :					Grade			Octane rating	
					Super			I.O.98 (1)	
Emission control system :									
EXHAUST					Conventional				

Market :							Germany		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B402 C402 F402	C1J	E 768	76	77	1 397	9,2	Manual	ZENITH 32 IF2 SOLEX 32 BIS	V10511 849
Idling speed							Tamperproofing cap		Fast idling
Speed (rpm)		Mixture (CO)		Conditions :			Part no.		Speed (rpm)
625 ± 25		1 ± 0,5		After E.F. has cut in			ZENITH : 77 01 200 835 SOLEX : 77 01 200 831		
Fuel :					Grade			Octane rating	
					Non-premium			I.O.92 (2)	
Emission control system :									
EXHAUST					Conventional				

(1)- Including regulation RE 204
(2)- Including regulation Re 211

Market :							COLD CLIMATE Norway, Sweden, Finland		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B402 C402	C1J	A 768	76	77	1 397	9,2	Manual	ZENITH 32 IF2	V10512

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions	Part no.	Speed (rpm)
625 ± 25	1 ± 0,5	After E.F. has cut in	77 01 200 835	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	
EXHAUST	Conventional

Market :							Israel		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B402 F402	C1J	M 780	76	77	1 397	9,2	Manual	SOLEX 32 BIS	849.c

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 25	1 ± 0,5	After E.F. has cut in	77 01 200 831	1 050 ± 50 (1)

Fuel :	Non-Prem. Grade	Octane rating
	(2)	I.O.89

Emission control system :	
EXHAUST	Conventional

(1) - With air conditioning
(2) - Including regulation RE 211

Market :						Europe : up to during 1987 model year Germany only from 88 onwards			
Vehicle	Engine						Gearbox	carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
C405	C1J	C 782	76	77	1 397	7.9	Manual	SOLEX 32 BIS	854

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions	Part no.	Speed (rpm)
650 ± 50	$1.5 \pm ^{0}_{0.5}$	After E.F. has cut in	77 01 200 831	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	
EXHAUST	Conventional
Electric fuel pump (against rear cross member)	: Output 60 l/hr at a pressure of 2.5 bars
Speedometer relay	: on accessories plate
Fuel filter	: Paper type : to be replaced every 20 000 km
Air filter with paper cartridge	: To be replaced every 20 000 km
Fuel pressure regulator	: Engine at idling speed:275±25 mbars Fuel pressure = Turbocharge pressure + fuel pressure at idling
Antipercolation system : - Fan temperature switch - Relay - Fan	 : 95 - 89°C : Skirted type : Type : A.E.G.
Turbocharger, water cooled during 86 model year	: GARRETT type T2 with pressure limiting valve : Opening pressure 590 to 650 mbars at a valve lift of 0.36 to 0.40 mm
Turbocharging pressure at a speed of	: Take-off in parallel with Elec. ign. 3 500 rpm : 680 ± 30 mbar 5 500 rpm : 700 ± 30 mbar
Engine safety pressure switch	: Cut-out pressure : 1 100 ± 50 mbar
Intercooler	: Air-air type Thermostatic flap 43°-47°

Market :						Europe			
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
C405	C1J	G 788	76	77	1 397	7,9	Manual	SOLEX 32 BIS	931

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions	Part no.	Speed (rpm)
650 ± 50	1,5 ± 0,5	After E.F. has cut in	77 01 200 831	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	
EXHAUST	Conventional
Electric fuel pump (against rear cross member)	: Output 60 l/hr at a pressure of 2.5 bars
Speedometer relay	: on accessory plate
Fuel filter	: Paper type : to be replaced every 20 000 km
Air filter with paper cartridge	: To be replaced every 20 000 km
Fuel pressure regulator	: Engine at idling speed: 275 ± 25 mbars Fuel pressure = Turbocharge pressure + fuel pressure at idling
Antipercolation system : - Fan temperature - Relay - Fan	 : 90 - 84°C : Skirted type : Type : A.E.G.
Turbocharger, water cooled - Static opening pressure - Test at travel of 0.38	: GARRETT type T2 with a pressure limiting valve : 770 + 30 mbars for a lift of 4 ± 0.02 mm : Reading at a travel of 4 ± 0.02 mm - 200 ± 25 mbar
Turbocharging pressure at a speed of	: Take-off in parallel with Elec. ign. 3 500 rpm : 680 ± 30 mbar 5 500 rpm : 700 ± 30 mbar
Engine safety pressure switch	: Cut-out pressure : 1 100 ± 50 mbar
Intercooler	: Air-air type Thermostatic flap 43° - 47°C

Market :							Switzerland		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
C405	C1J	784	76	77	1 397	8	Manual	SOLEX 32 BIS	860

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
650 ± 50	$1.5 \pm {}^{0.5}_{0}$	After E.F. has cut in	77 01 200 831	1 800 ± 100

Fuel :	Grade	Octane rating
	Super	I.O.98
Emission control system :	Air drawn into exhaust	
EXHAUST	Conventional	

Electric fuel pump (against rear cross member)	:Output 60 l/hr at a pressure of 2.5 bars
Speedometer relay	:on accessory plate
Fuel filter	:Paper type : to be replaced every 20 000 km
Air filter with paper cartridge	:To be replaced every 20 000 km
Fuel pressure regulator	:Engine at idling speed:275±25 mbars Fuel pressure - Turbocharge.pressure + fuel pressure at idling
Antipercolation system : - Fan temperature - Relay - Fan	 :95-89°C :Skirted type :Type : A.E.C.
Turbocharger, water cooled during 86 model year	:GARRETT type T2 with pressure limiting valve :Opening pressure 590 to 650 mbars at a valve lift of 0.36 to 0.40 mm
Turbocharging pressure at a speed of	:Take-off in parallel with Elec. ign. 3 500 rpm : 680 ± 30 mbars 5 500 rpm : 700 ± 30 mbars
Engine safety pressure switch	:Cut-out pressure : 1 100 ± 50 mbars
Intercooler	: Air-air type Thermostatic flap 43°-47°

NOTE : Without system for drawing air into the exhaust.

Market :									
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B403 C403	C2J	F 700	76	77	1 397	9,2	Manual	WEBER 32 DRT	21 Ind 100

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 50	1,5 ± 0,5	After E.F. has cut in	77 01 200 833	

Fuel :	Grade	Octane rating
	Super	I.O.98
Emission control system		
EXHAUST	Conventional	

Market	Europe								
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B403 C403	C2J	M 780	76	77	1 397	9,2	Manual	WEBER 32 DRT	7

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 25	1,5 ± 0,5	After E.F. has cut in	77 01 200 833	

Fuel	Grade	Octane rating
	Super	I.O.98
Emission control system		
EXHAUST	Conventional	

Market :									
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B403 C403	C2J	Q 781	76	77	1 397	9,2	Automatic	WEBER 32 DRT	8

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
600 ± 25	1 ± 0,5	After E.F. has cut in	77 01 200 833	

Fuel :	Grade	Octane rating
	Super	I.O.98
Emission control system		
EXHAUST	Conventional	

Market :					COLD CLIMATE Norway, Finland				
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B403 C403	C2J	M 780	76	77	1 397	9,2	Manual	WEBER 32 DRT	13

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 25	1,5 ± 0,5	After E.F. has cut in	77 01 200 833	

Fuel :	Grade	Octane rating
	Super	I.O.98
Emission control system :		
EXHAUST	Conventional	

Market :	Spain

Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B403 C403	C2J	798	76	77	1 397	9,2	Manual	WEBER 32 DRT	12

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 25	1,5 ± 0,5	After E.F. has cut in	77 01 200 833	

Fuel :	Grade	Octane rating
		I.O.98

Emission control system :	
EXHAUST	Conventional

Market :	Switzerland

Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
C403	C2J	788	76	77	1 397	9,25	Manual	WEBER 32 DRT	5

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 25	1 ± 0,5*	After E.F. has cut in	77 01 200 833	1 800 ± 100

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	Air drawn into exhaust. Exhaust gas recirculation (E.G.R.)
EXHAUST	Conventional

Market	Switzerland

Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
C403	C2J	789	76	77	1 397	9,25	Automatic	WEBER 32 DRT	6

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
600 ± 25	1 ± 0,5 *	After E.F. has cut in	77 01 200 833	

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	Air drawn into exhaust Exhaust gas recirculation (E.G.R.)
EXHAUST	Conventional

* Mixture adjustment without air drawn into exhaust

Market :	Sweden

Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
C403	C2J	788	76	77	1 397	9,25	Manual	WEBER 32 DRT	5

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 25	1,5 ± 0,5 *	After E.F. has cut in	77 01 200 833	1 800 ± 100

Fuel :	Grade	Octane rating
	Super	I.O.98

Emission control system :	Air drawn into exhaust Exhaust gas recirculation (E.G.R.)
EXHAUST	Conventional

* Mixture adjustment without air drawn into exhaust

Market :							Germany-Holland		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B 40J C 40J	C2J	G 782	76	77	1 397	9	Manual	WEBER 32 DRT	18

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 50	1,5 ± 0,5	After E.F. has cut in twice	77 01 200 833	1 700 ± 100

Fuel :	Grade	Octane rating
	Ordinary unleaded	I.O.91

Emission control system :	Advance correction between 15 and 70° in oil
EXHAUST	Conventional

Market :							Germany-Holland		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B 40M C 40M F40M	C2J	T 784	76	77	1 397	9	Manual	WEBER 32 DRT	20

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
700 ± 50	1,5 ± 0,5	After E.F. has cut in twice	77 01 200 833	1 700 ± 100

Fuel :	Grade	Octane rating
	Ordinary unleaded	I.O.91

Emission control system :	Advance correction between 15 and 70° in oil
EXHAUST	Conventional

Markets : Germany, Austria, Switzerland									
Vehicle	Engine						Gearbox	Injection type	Ignition type
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
B407 C407 F407	C3J	A 700	76	77	1 397	9	Manual	Single point + mixture regulation	A.I.E.

Engine	Idling speed		Fuel	
	Speed (rpm)	Mixture (CO)	Grade	Octane rating
C3J A 700	850 ± 50 (non-adjustable)	0,5% maxi (non-adjustable)	Unleaded	I.O.92

Fuel system type	Bendix regulated single point injection
Fuel pump : on rear cross member	Voltage: 12 volts Pressure: 3 bars Output : 130 l/h
Fuel filter : on rear cross member	To be replaced every : 20 000 km
Air filter with paper cartridge	To be replaced every : 20 000 km
Pressure regulator (integral part of throttle unit)	Pressure : 1 ± 0.05 bars
Solenoid injector	Voltage : 12 volts Resistance : 1.4 Ω. Must be less than 10 Ω
Catalyser (mounted under floor)	C03 N° 89 33 001 421
Oxygen sensor	Make : Autolite no. 89 33 000 596 At 800°C : - Rich mixture : 625 to 1 100 mV - Lean mixture : 0 to 150 mV
E.G.R.	Fitted valve no. 89 33 003 208
Anti-evaporation system	

Computer (in passenger compartment)	Computer reference	Fault finding	REMARKS
	BENDIX : N° A.M.C : 89 33 002 473	With Multimeter	- Mixture regulation by oxygen sensor - Speed regulation by electric motor

Markets : Germany, Austria, Switzerland									
Vehicle	Engine						Gearbox	Injection type	Ignition type
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B407 C407 F407	C3J	B 702	76	77	1 397	9	Manual	Single point + mixture regulation	Ignition power module (M.P.A.)

Engine	Idling speed		Fuel	
	Speed (rpm)	Mixture (CO)	Grade	Octane rating
C3JB 702	850 ± 50 (non-adjustable)	0,5% maxi (non-adjustable)	Unleaded	I.O.92

Fuel system type	Renix regulated single point injection
Fuel pump : on rear cross member	Voltage : 12 volts Pressure : 3 bars Output : 130 l/h
Fuel filter : on rear cross member	To be replaced every : 20 000 km
Air filter with paper cartridge	To be replaced every : 20 000 km
Pressure regulator (integral part of throttle unit)	Pressure 1 ± 0,05 bar
Solenoid injector	Voltage : 12 volts Resistance : 1.4 Ω. Must be less than 10 Ω
Catalyser (mounted under floor)	C03 N° 89 33 001 421
Oxygen sensor	Make : Autolite no. 89 33 000 596 At 800°C : - Rich mixture : 625 to 1 100 mV - Lean mixture : 0 to 150 mV
E.G.R.	Fitted valve no. 89 33 003 208
Anti-evaporation system	

Computer (in passenger compartment)	Computer reference	Fault finding	REMARKS
	N° Renix : S1 00 813 101 Official approval no 77 00 735 140 N° R.N.U.R. 77 00 731 801	- Using tester XR25 - Cassette no. 4 or following 150.3	- Mixture regulation by oxygen sensor - Speed regulation by electric motor - Transitory defects not held on memory - Injection warning light does not operate

Markets : Sweden, Switzerland									
Vehicle	Engine						Gearbox	Injection type	Ignition type
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
B407 C407 F407	C3J	E 760	75,8	77	1 390	9	Manual	Single point + mixture regulation	Ignition power module (M.P.A.)

Engine	Idling speed		Fuel	
	Speed (rpm)	Mixture (CO)	Grade	Octane rating
C3JE 760	850 ± 50 (non-adjustable)	0,5% maxi (non-adjustable)	Unleaded	I.O.92

Fuel system type	Renix regulated single point injection
Fuel pump : on rear cross member	Voltage : 12 volts Pressure : 3 bars Output : 130 l/h
Fuel filter : on rear cross member	To be replaced every : 20 000 km
Air filter with paper cartridge	To be replaced every : 20 000 km
Pressure regulator (integral part of throttle unit)	Pressure 1 ± 0,05 bar
Solenoid injector	Voltage : 12 volts Resistance : 1.4 Ω. Must be less than 10 Ω
Catalyser (mounted under floor)	C03 N° 89 33 001 421
Oxygen sensor	Make : Autolite no. 89 33 000 596 At 800°C : - Rich mixture : 625 to 1 100 mV - Lean mixture : 0 to 150 mV
E.G.R.	Fitted valve no. 89 33 003 208
Anti-evaporation system	FITTED : To certain versions GM canister

Computer (in passenger compartment)	Computer reference	Fault finding	REMARKS
	N° Rénix : 51 00 813 101 Official approval no 77 00 735 140 N° R.N.U.R. 77 00 731 801	- Using tester XR25 - Cassette no. 4 or following 150.3	- Mixture regulation by oxygen sensor - Speed regulation by electric motor - Transitory defects not held on memory - Injection warning light does not operate

Market :							Europe		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
B40G C40G	F2N	H 740	81	88,5	1 721	10	Manual	SOLEX 28x34 Z10	932(1) 932D(2)

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed)rpm)
800 ± 50	1,5 ± 0,5	After E.F. has cut in	77 01 200 831	1 050 ± 50 (2)

Fuel	Grade	Octane rating
	Super	I.O.98
Emission control system :		
EXHAUST	Conventional	

Market :							Germany-Holland		
Vehicle	Engine						Gearbox	Carburettor	Ref.
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
B/C 40K	F2N	G 742	81	88,5	1 721	9,5	Manual	SOLEX 28x34 Z10	923 923D(2)

Idling speed			Tamperproofing cap	Fast idling
Speed (rpm)	Mixture (CO)	Conditions :	Part no.	Speed (rpm)
850 ± 50	1,25 ± 0,5	Without air drawn into exhaust	77 01 200 831	1 500 ± 100 (3) 1 050 ± 50 (2)

Fuel :	Grade	Octane rating
	Unleaded	I.O.95
Emission control system :	Air drawn into exhaust system by blower	
EXHAUST	Catalyser CO 7 (mounted under floor)	

(1)- Vehicle without power steering or air conditioning
(2) - Vehicle with power steering
(3) - Emission control and air conditioning

Markets : Germany, Austria, Switzerland									
Vehicle	Engine						Gearbox	Injection type	Ignition type
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
B40805 C40805	F3N	G 716	81	83,5	1 721	9,5	Manual	Single point + mixture regulation	M.P.A. with pinking sensor

Engine	Idling speed		Fuel	
	Speed (rpm)	Mixture (CO)	Grade	Octane rating
F3NG 716	750 ± 50 * (non-adjustable)	0,5% max (non-adjustable)	Unleaded	I.O.92

(*) For a coolant temperature between 80 and 100°C

Fuel system type	Regulated single point injection
Fuel pump : on rear cross member	Voltage : **12 volts** Pressure : **3 bars** Output : **130 l/h**
Fuel filter : on rear cross member	To be replaced every : 40 000 km
Air filter with paper cartridge	To be replaced every : 20 000 km
Pressure regulator (integral part of throttle unit)	Pressure : 1.2 ± 0.050 bars
Solenoid injector	Voltage : 12 volts Resistance : 1.40 Ω. Must be less than 10 Ω
Throttle unit	Bendix N° 89 33 003 684
Regulator valve	
Catalyser (mounted under floor)	C02 N° 89 34 202 175
Oxygen sensor	Make : Autolite no. 89 33 002 455 At 800°C : - Rich mixture : 625 to 1 100 mV - Lean mixture : o to 150 mV
E.G.R.	Fitted valve no. 89 33 003 184
Anti-evaporation system	With, depending on version and mod. yr.

Computer (in passenger compartment)	Computer reference	Fault finding	REMARKS
	N° Rénix : 51 00 811 101 Official approval no 77 00 731 802 N° R.N.U.R. 77 00 738 169	- Using tester XR25 - Cassette no. 4 or following $\boxed{202.3}$	- Mixture regulation by oxygen sensor - Speed regulation by electric motor - Pinking sensor - Transitory defects not held on memory - Inj. warn. light does not op.

Markets : Germany, Austria, Switzerland									
Vehicle	Engine						Gearbox	Injection type	Ignition type
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm^3)	Comp. ratio			
B40801 C40801	F3N	H 717	81	83,5	1 721	9,5	Automatic	Single point + mixture regulation	M.P.A. with pinking sensor

Engine	Idling speed		Fuel	
	Speed (rpm)	Mixture (CO)	Grade	Octane rating
F3NH 717	700 ± 50 * (non-adjustable)	0.5% max. (non-adjustable)	Unleaded	I.O.92

(*) For a coolant temperature between 80 and 100°C

Fuel system type	Regulated single point injection
Fuel pump : on rear cross member	Voltage : 12 volts Pressure : 3 bars Output : 130 l/h
Fuel filter : on rear cross member	To be replaced every : 40 000 km
Air filter with paper cartridge	To be replaced every : 20 000 km
Pressure regulator (integral part of throttle unit)	Pressure : 1,2 ± 0,050 bar
Solenoid injector	Voltage : 12 volts Resistance : 1.40 Ω. Must be less than 10 Ω
Throttle unit	Bendix N° 89 33 003 685
Regulator valve	
Catalyser (mounted under floor)	C02 N° 89 34 202 175
Oxygen sensor	Make Autolite no 89 33 002 455 At 800°C : - Rich mixture : 625 to 1 100 mV - Lean mixture : 0 to 150 mV
E.G.R.	Fitted valve no. 89 33 003 184
Anti-evaporation system	With, depending on version and mod. yr.

Computer (in passenger compartment)	Computer reference	Fault finding	REMARKS
	N° Rénix : S1 00 811 201 Official approval no 77 00 736 763 N° R.N.U.R. 77 00 736 774	- Using tester XR25 - Cassette no. 5 or following 201.3	- Mixture regulation by oxygen sensor - Speed regulation by electric motor - Pinking sensor - Transitory defects not held on memory - Inj. warn. light does not op.

Markets : Germany, Austria, Switzerland

Vehicle	Engine						Gearbox	Injection type	Ignition type
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
C 409	F3N	J 702	81	83,5	1 721	9,5	Manual	Multipoint + mixture regulation	M.P.A. with pinking sensor

Engine	Idling speed		Fuel	
	Speed (rpm)	Mixture (CO)	Grade	Octane rating
F3N J 702	800 ± 50 * (non-adjustable)	0.5% max. (non-adjustable)	Unleaded	1.O.92/95

(*) For a coolant temperature between 80 and 100°C

Fuel system type	Renix multipoint regulated injection
Fuel pump : on rear cross member	Voltage : 12 volts Pressure : 3 bars Output : 130 l/h
Fuel filter : on rear cross member	To be replaced every : 40 000 km
Air filter with paper cartridge	To be replaced every : 20 000 km
Pressure regulator	Pressure : - At zero vacuum : 2,5 ± 0,2 bar - At vacuum of 500 mbars : 2 ± 0,2 bar
Solenoid injector : computer controlled	Voltage 12 volts Resist. : 2,5 ± 0,5Ω
Throttle unit	WEBER : doub. barrel Ø 32 x 36 CFR2 rep. 100 - N° 77 00 738 849
Regulator valve	BOSCH : 12 volts
Catalyser (mounted under floor)	C05 N° 77 00 774 984
Oxygen sensor	Make : BOSCH At 800°C : - Rich mixture : 625 to 1 100 mV - Lean mixture : 0 to 150 mV
E.G.R.	
Anti-evaporation system	

Computer (in passenger compartment)	Computer reference	Fault finding	REMARKS
	N° Rénix : 51 00 812 101 Official approval no 77 00 735 559 N° R.N.U.R. 77 00 736 401	- Using tester XR25 - Cassette no. 5 or following 210.3	- Mixture regulation by oxygen sensor - Speed regulation by electric motor - Pinking sensor - Transitory defects not held on memory - Inj. warn. light does not op.

Market : with anti-evaporation system									
Vehicle	Engine						Gearbox	Injection type	Ignition type
	Type	Suffix	Bore (mm)	Stroke (mm)	Capacity (cm³)	Comp. ratio			
C 409	F3N	J 702	81	83,5	1 721	9,5	Manual	Multipoint + mixture regulation	M.P.A. with pinking sensor

Engine	Idling speed		Fuel	
	Speed (rpm)	Mixture (CO)	Grade	Octane rating
F3N J 702	800 ± 50* (non-adjustable)	0.5% max. (non-adjustable)	Unleaded	I.O.92/95

(*) For a coolant temperature between 80 and 100°C

Fuel system	Renix multipoint regulated injection
Fuel pump : on rear cross member	Voltage : 12 volts Pressure : 3 bars Output : 130 l/h
Fuel filter : on rear cross member	To be replaced every : 40 000 km
Air filter with paper cartridge	To be replaced every : 20 000 km
Pressure regulator	Pressure : - At zero vacuum : 2,5 ± 0,2 bar - At vacuum of 500 mbars : 2 ± 0,2 bar
Solenoid injector : computer controlled	Voltage 12 volts Resist. : 2,5 ± 0,5Ω
Throttle unit	WEBER ; doub. barrel Ø 32 x 36 CFR2 103 - N° 77 00 740 554
Regulator valve	BOSCH : 12 volts
Catalyser (mounted under floor)	C05 N° 77 00 774 984
Oxygen sensor	Make : BOSCH At 800°C : - Rich mixture : 625 to 1 100 mV - Lean mixture : 0 to 150 mV
E.G.R.	
Anti-evaporation system	WITH GM canister

Computer	Computer reference	Fault finding	REMARKS
(in passenger compartment)	N° Rénix : S1 00 812 101 Official approval no 77 00 735 559 N° R.N.U.R. 77 00 740 149	- Using tester XR25 - Cassette no. 6 or following $\boxed{211.3}$	- Mixture regulation by oxygen sensor - Speed regulation by electric motor - Pinking sensor - Transitory defects not held on memory - Inj. warn. light does not op.

VEHICLES EQUIPPED WITH BOSCH SYSTEMS

Vehicle	Arrangement	Type	Engine
RENAULT 5	2 3	8 - C - S 404	F8M..720
EXTRA	2 3	F 404	F8M..720

Description	Make and type	Special features
Injection pump	BOSCH VE 4/9 F 2400 R95	Single piston rotary pump with a mechanical governor, automatic hydraulic advance, hydraulic choke system electrically operated and solenoid shut-off.
Pump timing (pump piston lift with engine at T.D.C.)	0,65 ± 0,02 mm	
Injector holders	BOSCH KCA 30 S 44	
Injectors	BOSCH DN OSD 189/	Setting 130 $^{+8}_{-5}$
Fuel filter	ROTO DIESEL 2 PURFLUX 3	With integral priming pump. With integral priming pump and fuel heater. Note : From 1987 onwards, these vehicles are equipped with filters that are heated by the engine cooling system.
Injector pipes		Outside Ø 6 mm Inside Ø 2.5 mm Length 275 mm
Thermostat (fast idling)	CALORSTAT	Lift 7 to 8.5 mm between 30° and 67°C.
Cold starting advance circuit supply thermo-stat-switch	EATON 45°C (1) EATON 60°C (2)	Cut-in temperature : circuit closed = 50 ± 3°C(1) 65 ± 3°C(2) Cut-out temperature : circuit open = 40 ± 3°C(1) 55 ± 3°C(2)
Cold starting system	Integral with pump	Operational for 0.30 minutes at + 20°C to 2.45 minutes at -20°C
Temperature element on injection pump		Resistance = 23 ohms.

SETTINGS

Idling speed .... 850 ± 25 rpm
Fast idling .... 1 150 ± 50 rpm
Max. speed .... 5 300 ± 100 rpm
Smoke density
Approval figure .... 1,20 m-1 : 39%
Maximum legal .... 2 m-1 : 55%

TIMING CHECK (on diagnostic bay)

Injection pump	Idling speed rpm	Injection commences Before T.D.C.
BOSCH VE...R95	850 ± 25	11,5° ± 1°

Reading taken with strobe light. Timing marks on flywheel/clutch housing.

For those items not dealt with in this Workshop Manual see :
Workshop Manual : INJ (D), latest edition.

VEHICLES EQUIPPED WITH ROTO DIESEL SYSTEMS

Vehicle	Arrangement	Type	Engine
RENAULT 5	2 3 A B	B - C - S 404	F8M..720
EXTRA	2 3 A B	F 404	F8M..720

Description	Make and type	Special features
Injection pump	ROTO DIESEL DPC R 8443 A 370 A 2 DPC R 8443 A 371 A 2 DPC R 8443 A 372 A 3	Single head rotary pump with two pistons, centrifugal governor, hydraulic automatic advance, automatic fast idling system and solenoid shut-off.
Pump timing at T.D.C. Retained by rod		1,60 ± 0,02 mm 2 Dim. "x" on pump 3
Injector holders	ROTO DIESEL LCR 67320	
Injectors	ROTO DIESEL RDN OSDC 6843 C 2 3	Setting 118 $^{+7}_{-5}$ bars, max. diff. 8 bars
Fuel filter	BOSCH ou A ROTO DIESEL A PURFLUX B	With integral priming pump. With integral priming pump and fuel heater. With integral priming pump and fuel heater. Note :From 1987 onwards, these vehicles are equipped with filters that are heated by the engine cooling system.
Injector pipes		Outside Ø 6 mm Inside Ø 2.5 mm Length 290 mm
Fast idling thermostatic unit	CALORSTAT	Lift 7 to 8.5 mm between 30 and 67°C

SETTINGS

Idling speed .... 850 ± 25 rpm
Max. speed .... 5 300 ± 100 rpm
Smoke density
Approval figure .... 1,11m-1 : 36%
Maximum legal .... 2 m-1 : 55%

TIMING CHECK (on diagnostic bay)

Injection pump	Idling speed rpm	Injection commences Before T.D.C.
ROTO DIESEL DPC R 8443..	850 ± 25	9° ± 1°

Reading taken with strobe light. Timing marks on flywheel/clutch housing.

For those items not dealt with in this Workshop Manual see :
Workshop Manual : INJ (D), latest edition.

SINGLE POINT INJECTION SYSTEM COMPONENT UNITS (Bendix* and Renix*).

I - THE FUEL SYSTEM :

- The electric fuel pump.
- The fuel pressure regulator (integral with the throttle unit).
- The injector.

II - THE INJECTION COMPUTER AND ITS PERIPHERALS :

- The injection and ignition computer.
- The coolant temperature or inlet manifold temperature sensor (B, C, F 407 Renix).
- The air temperature sensor.
- The flywheel and its target.
- The speed and position sensor.
- The pressure sensor.
- Switches
  - The full load
  - Pedal released
- The pinking detector (B, C 408).
- The oxygen sensor.
- The exhaust gas recirculation solenoid valve (E.G.R.) and the anti-evaporation canister bleed (1).
- The A.E.I. (Bendix Injection) system.

III - THE POWER SYSTEM :

- The ignition power module for Renix injection systems.
- The solenoid injector (that injects the fuel into the throttle unit on the input side of the throttle plate).

* Bendix injection on the B, C 407 with type C3J A 700 engine.

(1) Depending on the model year and the market.

INJECTION SYSTEM COMPONENT UNITS

I THE FUEL SYSTEM :

- The electric fuel pump.
- The fuel pressure regulator.
- The fuel filter.

II THE INEJCTION COMPUTER AND ITS PERIPHERALS :

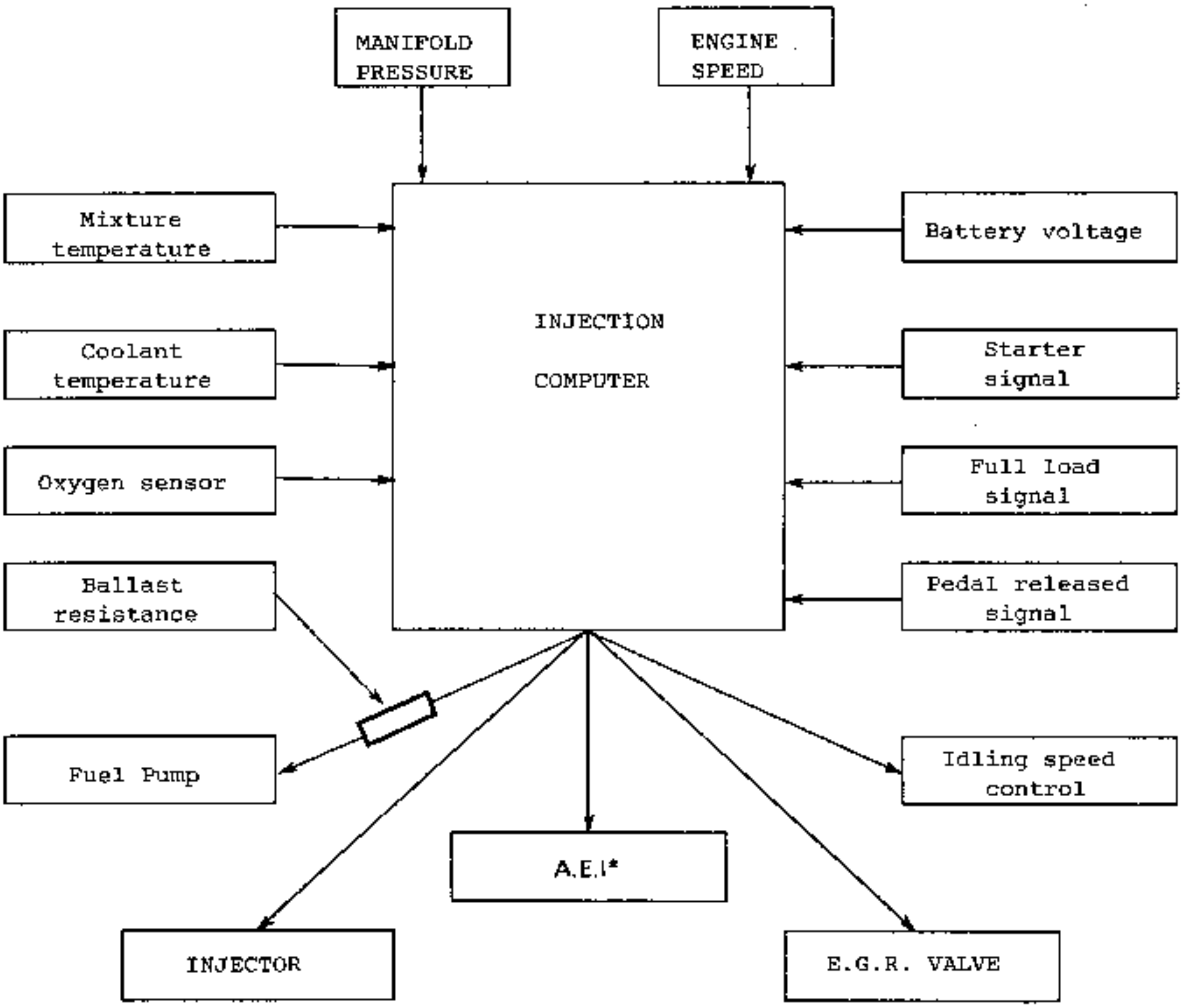
- The injection and ignition computer.
- The coolant temperature sensor.
- The air temperature sensor.
- The flywheel and its target.
- The speed and position sensor.
- The absolute pressure sensor.
- Switch : pedal released,
  full load.
- The pinking detector.
- The oxygen sensor.
- The idling speed regulator valve.
- The anti-evaporation system canister bleed solenoid valve (1).

III THE POWER SYSTEM :

- The ignition power module.
- The solenoid injectors.

(1) Depending on the model year and market.

THE PRINCIPLE OF OPERATION OF THE BENDIX SINGLE POINT INJECTION SYSTEM (Engine C3J A 700)



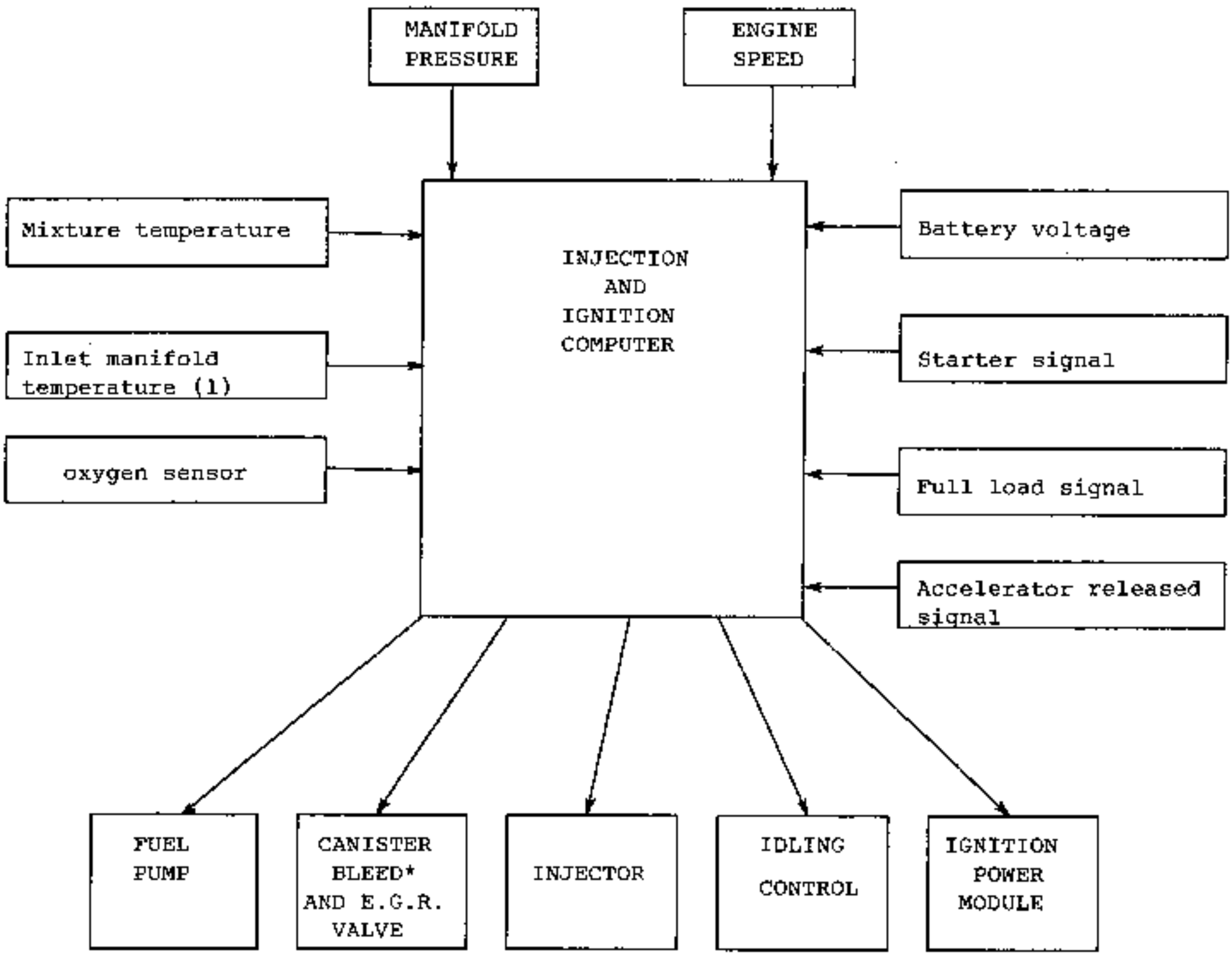
THE INJECTION COMPUTER

The computer, mounted on a printed circuit board, is a digital system the main component of which is a microprocessor.

The injection computer is mounted in the passenger compartment, under the glove box.

* The injection computer informs the A.E.I. (electronic ignition system) of certain corrections required under given engine operating conditions.

THE PRINCIPLE OF OPERATION OF THE RENIX SINGLE POINT INJECTION SYSTEM :



THE INJECTION AND IGNITION COMPUTER

The computer, mounted on a printed circuit board, is a digital system the main component of which is a microprocessor.

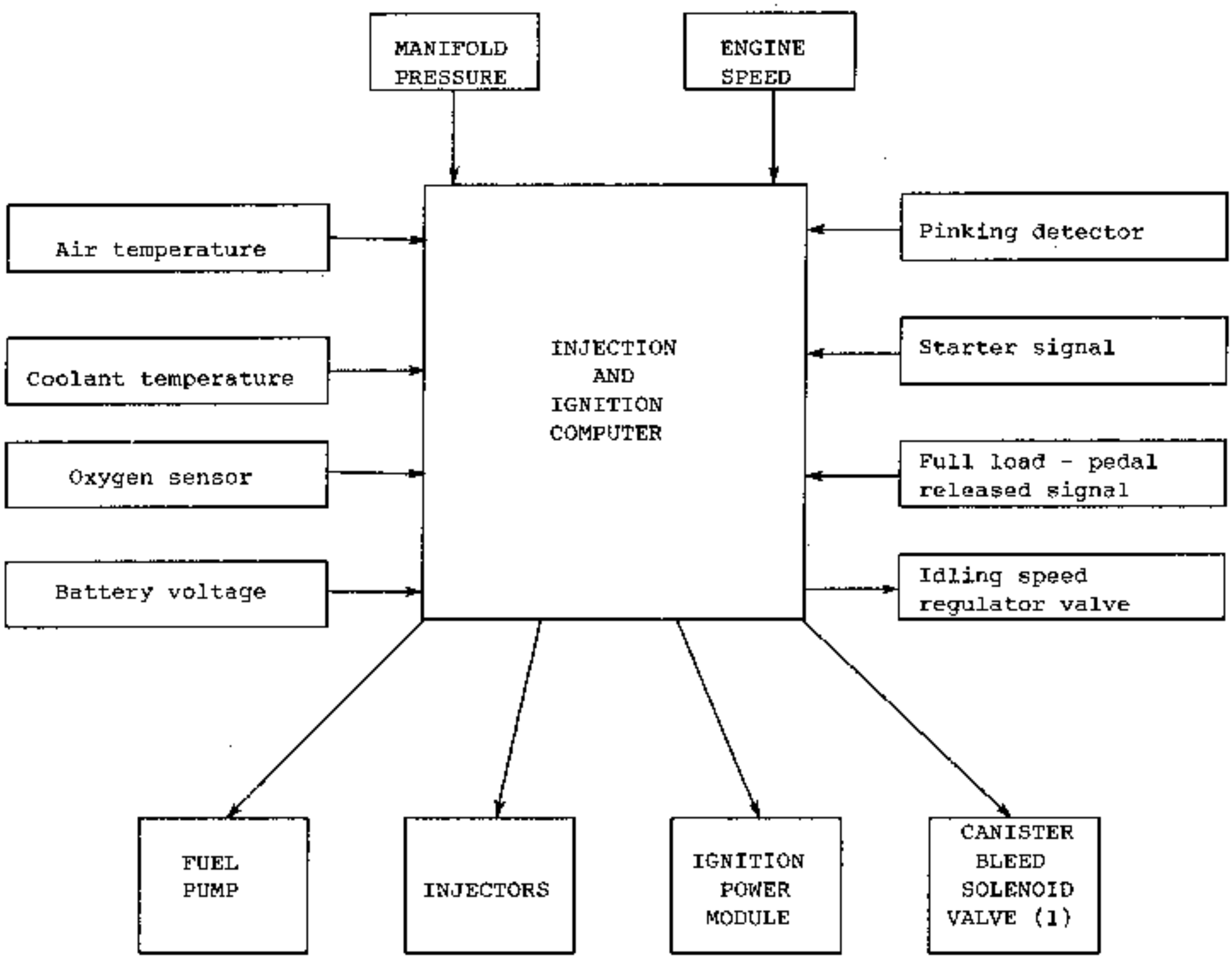
The injection computer also comprises 2 circuits that form part of the A.E.I. (electronic ignition) system which act as microprocessor peripherals.

The injection computer is mounted in the passenger compartment, under the glove box.

(1) On B/C 408 vehicles, the coolant temperature is used instead of the inlet manifold temperature.

*Depending on the market and the model year.

THE PRINCIPLE OF OPERATION OF THE MULTIPOINT INJECTION SYSTEM :



THE INJECTION AND IGNITION COMPUTER

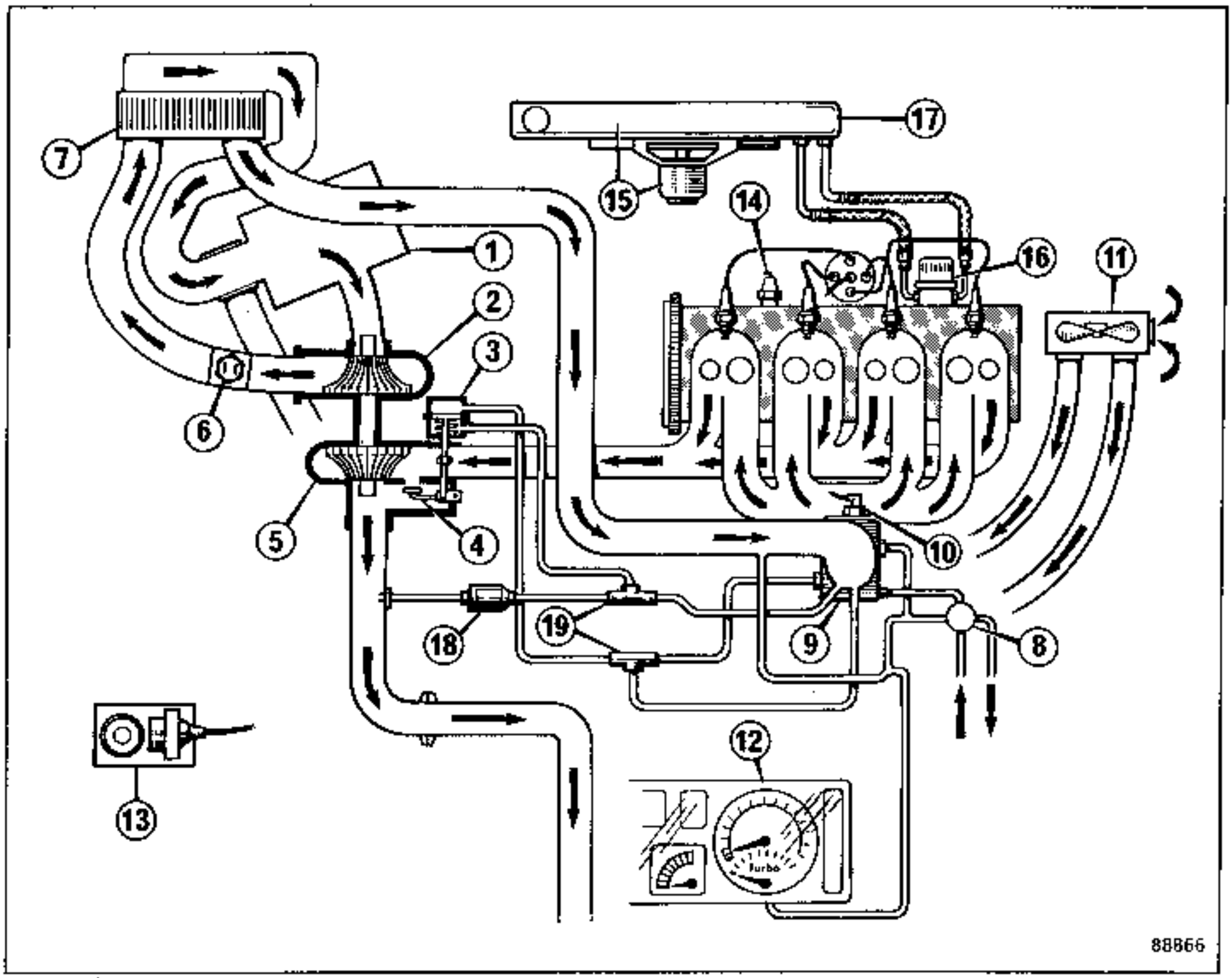
The computer, mounted on a printed circuit board, is a digital system the main component of which is a microprocessor.

The injection computer also comprises 2 circuits that form part of the A.E.I. (electronic ignition) system which act as microprocessor peripherals.

The injection computer is mounted in the passenger compartment, under the glove box.

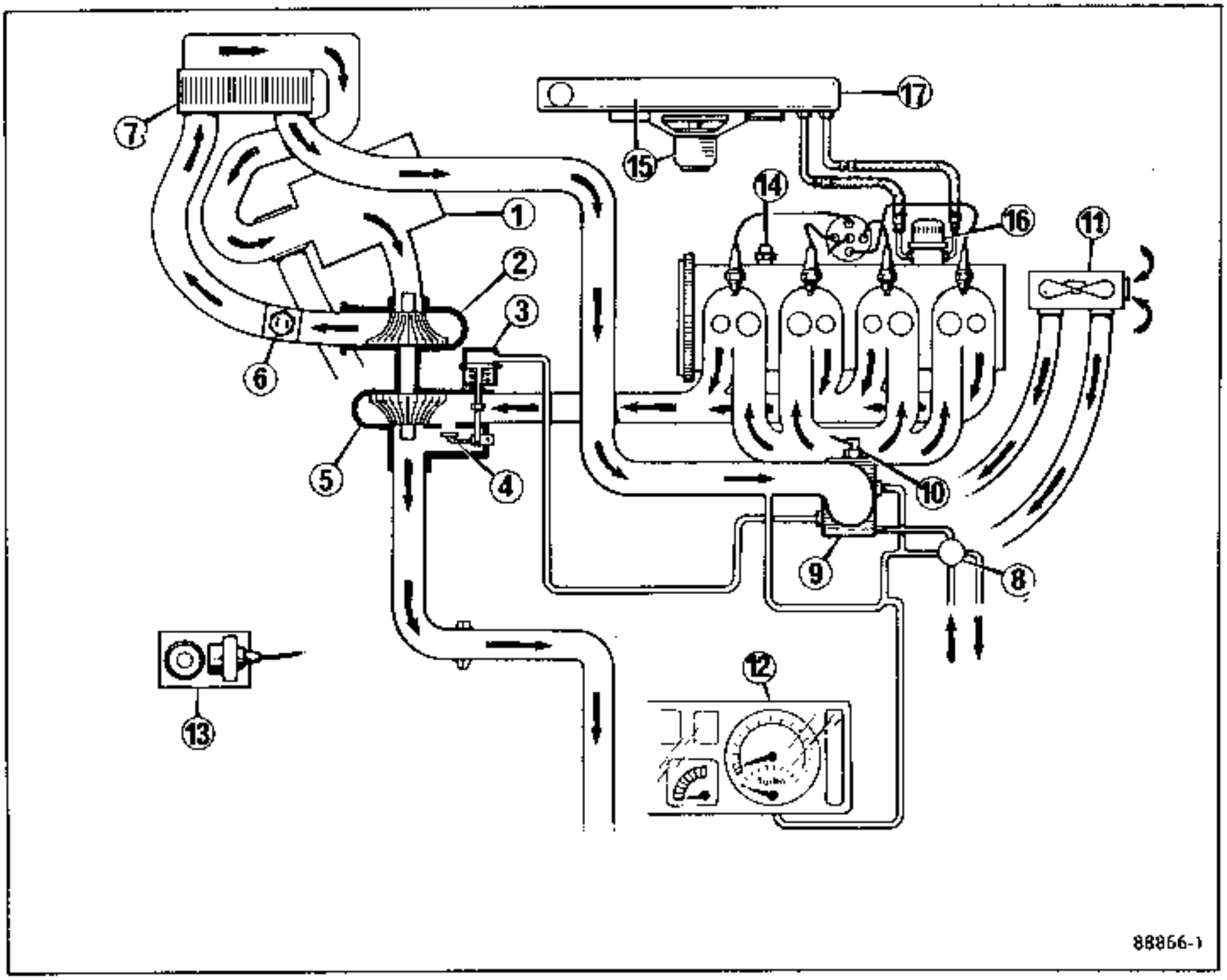
(1)Depending on the market and the model year.

Engine circuit diagram :
ENGINE C1J-C-782



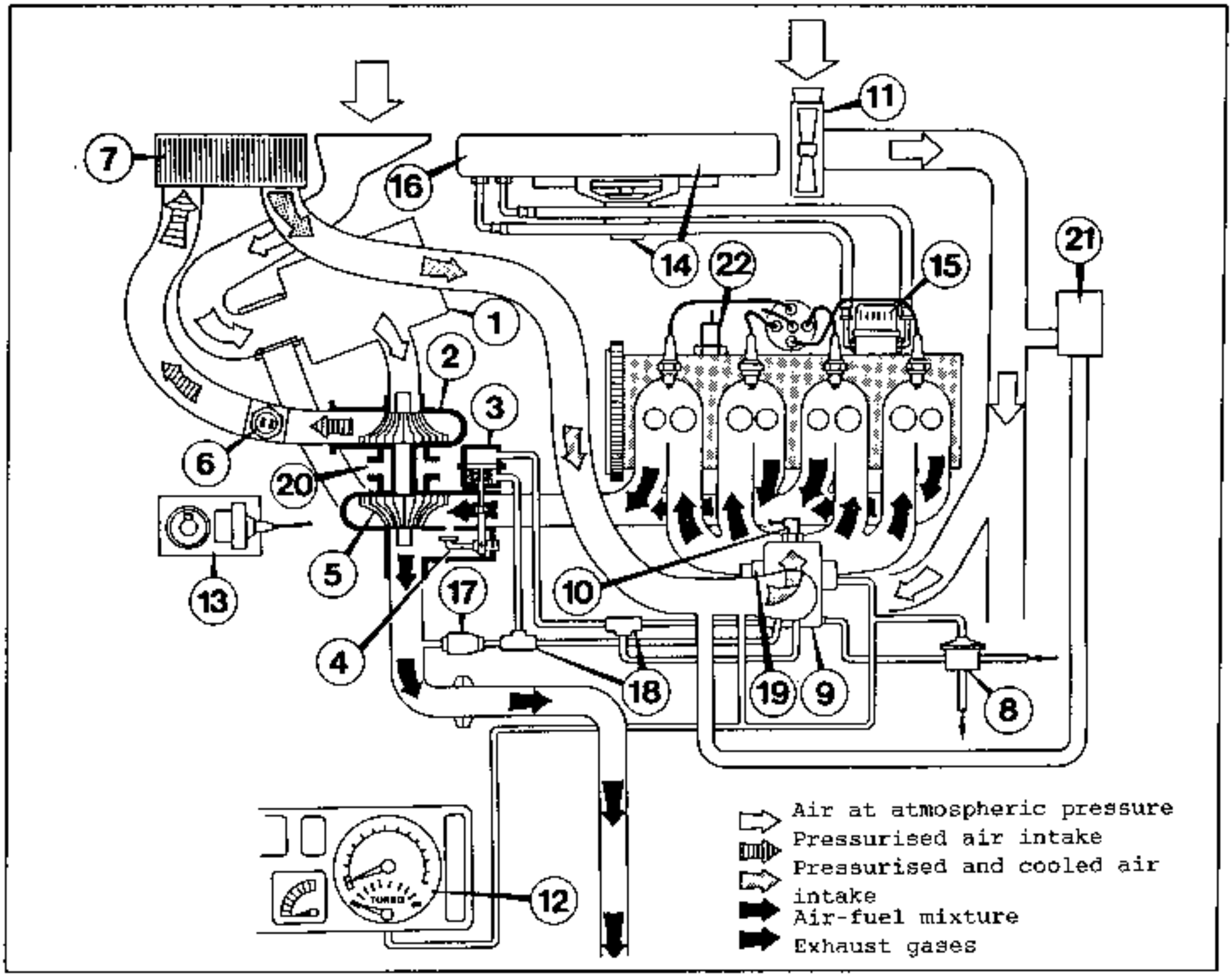
1. Air filter with thermostatic flap 26°-32°C
2. Compressor
3. Pressure regulator capsule
4. Exhaust gas by-pass valve
5. Turbine
6. Safety pressure switch
7. Intercooler with thermostatic flap 43°-47°C
8. Fuel pressure regulator
9. "Blown" carburettor
10. Anti-percolation system temp. switch
11. Anti-percolation fan unit
12. Pressure gauge on instrument panel
13. Integral electronic ignition system
14. Pinking detector
15. Radiator and fan unit
16. Oil filter
17. Oil cooler
18. Non-return valve
19. T union

Engine circuit diagram :
ENGINE C1J 784



1. Air filter with thermostatic flap 26°-32°C
2. Compressor
3. Pressure regulator capsule
4. Exhaust gas by-pass valve
5. Turbine
6. Safety pressure switch
7. Intercooler with thermostatic flap 43°-47°C
8. Fuel pressure regulator
9. "Blown" carburettor
10. Anti-percolation system temp. switch
11. Anti-percolation fan unit
12. Pressure gauge on instrument panel
13. Integral electronic ignition system
14. Pinking detector
15. Radiator and fan unit
16. Oil filter
17. Oil cooler

Engine circuit diagram :
ENGINE C1JG 788



1. Air filter with thermostatic flap
2. Compressor
3. Pressure regulator capsule
4. Exhaust gas by-pass valve
5. Turbine
6. Safety pressure switch
7. Intercooler with thermostatic flap
8. Fuel pressure regulator
9. "Blown" carburettor
10. Anti-percolation system temperature switch
11. Anti-percolation fan unit
12. Pressure gauge on instrument panel
13. Integral electronic ignition unit including pinking control for each cylinder
14. Radiator and fan unit
15. Oil filter
16. Oil cooler
17. Non-return valve
18. T unions
19. Staged enrichening units
20. Coolant flow through turbo
21. Solenoid valve operated by the ignition switch and by temperature switch 10
22. Pinking detector

Adjusting the idling speed :

This adjustment is to be carried out accurately to obtain a CO percentage that is stable between overhauls. The adjustment must be carried out under the following clearly defined conditions :

1) The vehicle must be run-in after a minimum of 600 miles (1000 km) (if the adjustment is carried out on a vehicle that has not been run-in it can change very quickly).
2) The choke must not be operating (check this).
3) The engine must be at its normal operating temperature. To obtain this run the engine at approximately 2000 rpm until the thermostat opens. Do not leave it to warm up at idling speed because if the engine is run for a few minutes at idling, the CO percentage reading is no longer valid.
4) The idling speed must be that specified by the manufacturer (see chart).
5) The air filter must be in position and its cartridge clean.
6) The ignition system must be in good condition and correctly adjusted.
7) No additional air should be leaking into the system (vacuum pipes, emission control system etc.)
8) There should be no extensive leaks on the exhaust system.
9) No large electrical consuming unit is to be operating (electric fan, headlights, heated rear screen etc.).

For the carburettor settings consult the charts in the following workshop manuals.

M.R. Carb S
M.R. Carb W
M.R. Carb Z

and the latest editions of their data sheets.

Adjusting using an exhaust gas analyser

In those markets where one is fitted, remove the tamperproofing cap from the mixture screw (B).

Turn screw (A) to obtain the average idling speed stated in the chart for the vehicle concerned.

Turn screw (B) to obtain the CO percentage stated on the chart.

Turn screw (A) to obtain the correct idling speed.

Repeat these operations until both the CO percentage and the idling speed are correct.

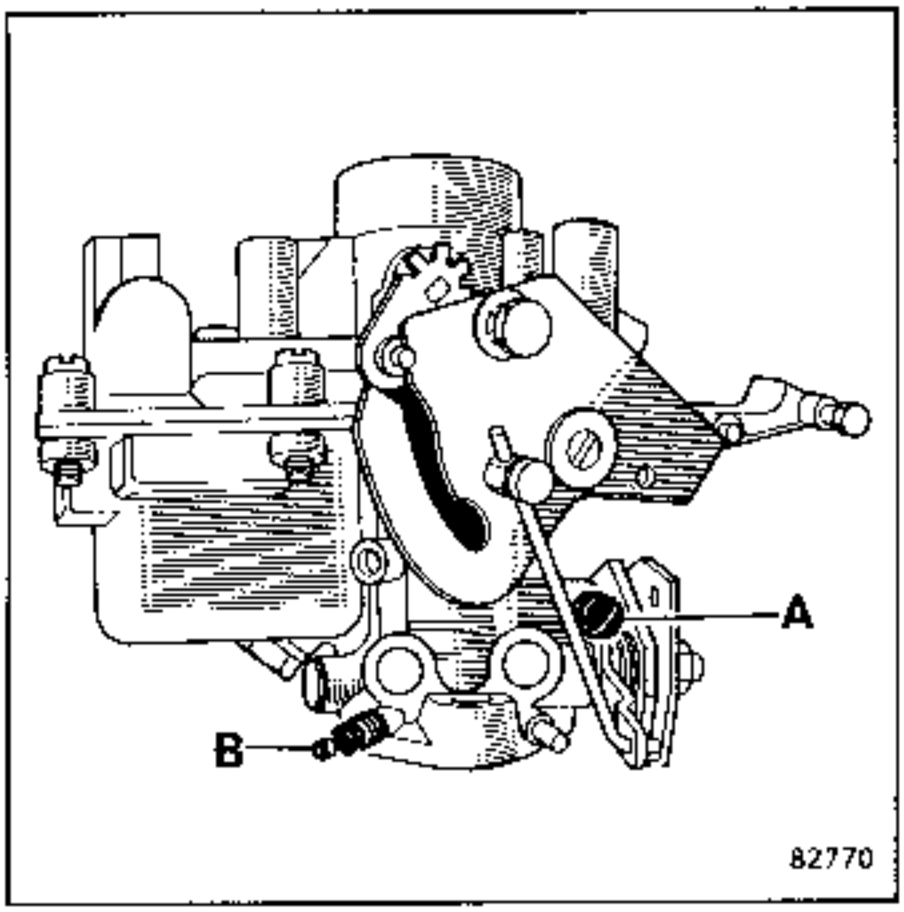
In those countries where the regulations require it, fit a new tamperproofing cap to screw (B) after the adjustment has been carried out.

Tamperproofing cap

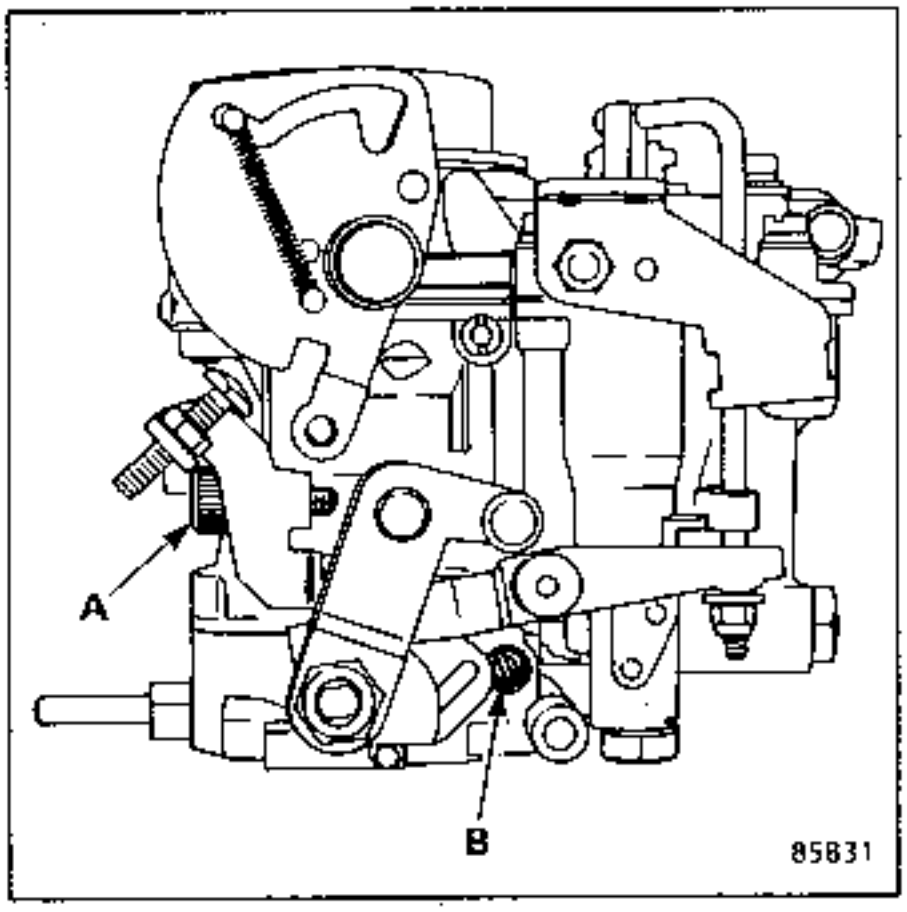
CARBURETTOR	Tamperproofing cap Part no.
ZENITH 28 IF	77 01 200 834
ZENITH 32 IF2	77 01 200 835
SOLEX 32 BIS	77 01 200 831
SOLEX 32 DIS	77 01 200 831
SOLEX 28 x 34 Z 10	77 01 200 831
WEBER 32 DRT	77 01 200 833

Method of adjusting the idling speed :

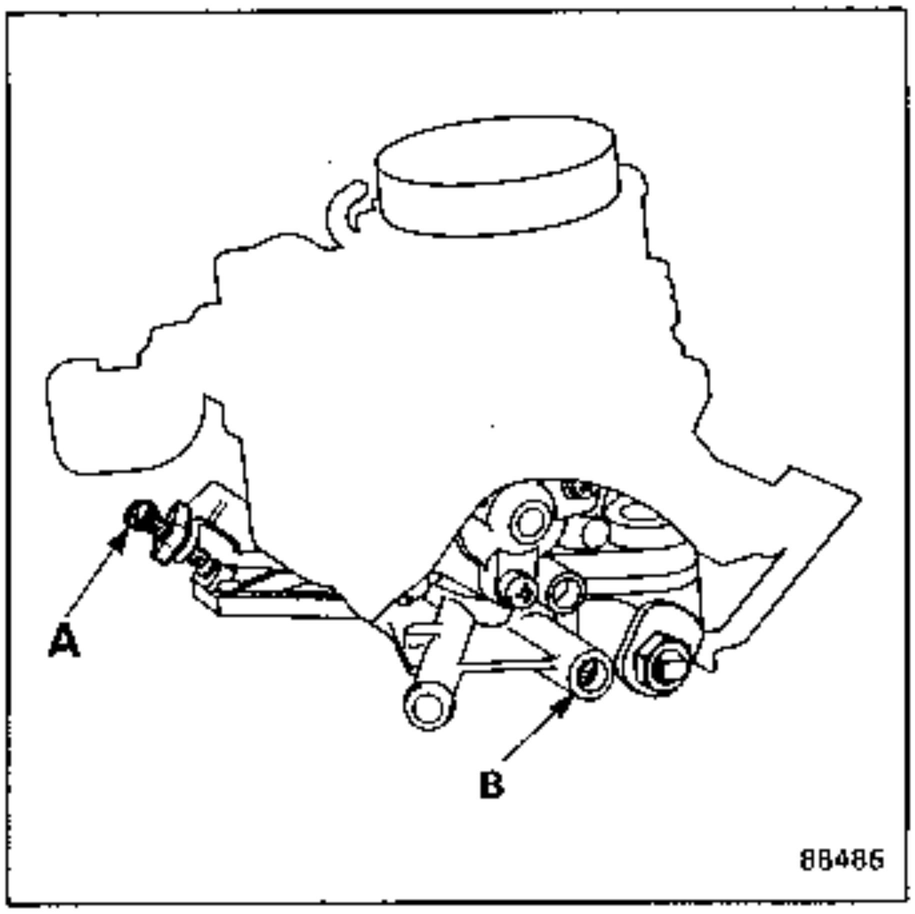
ZENITH 28 IF



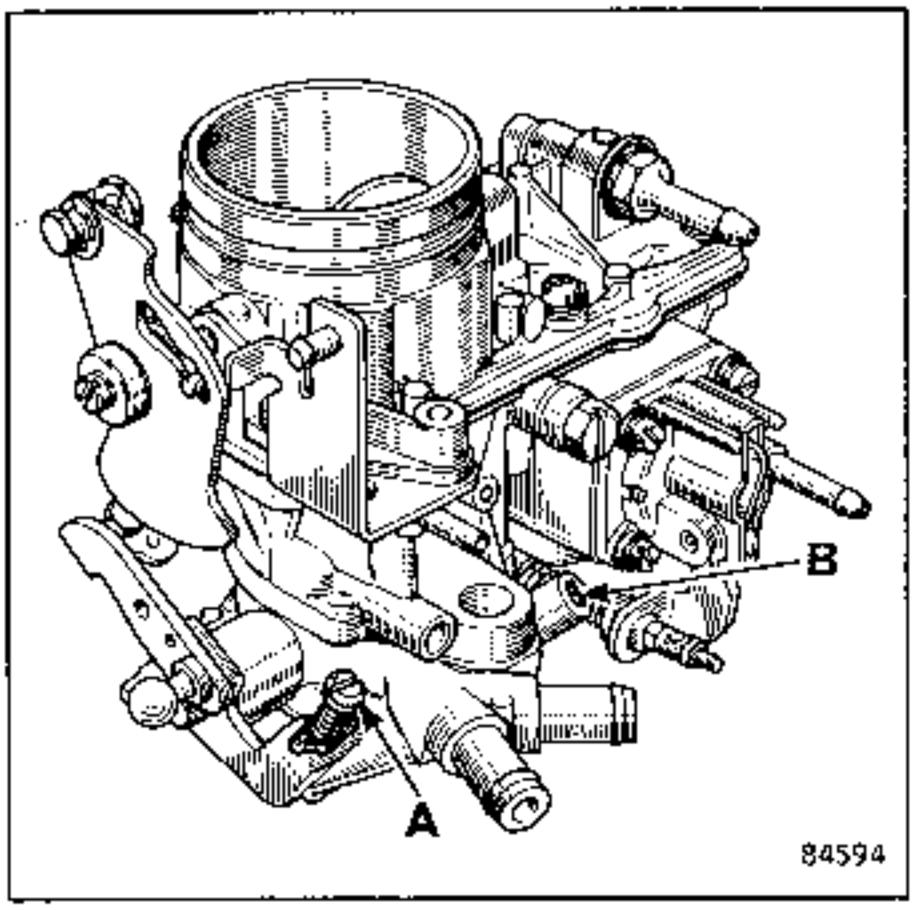
ZENITH 32 IF2



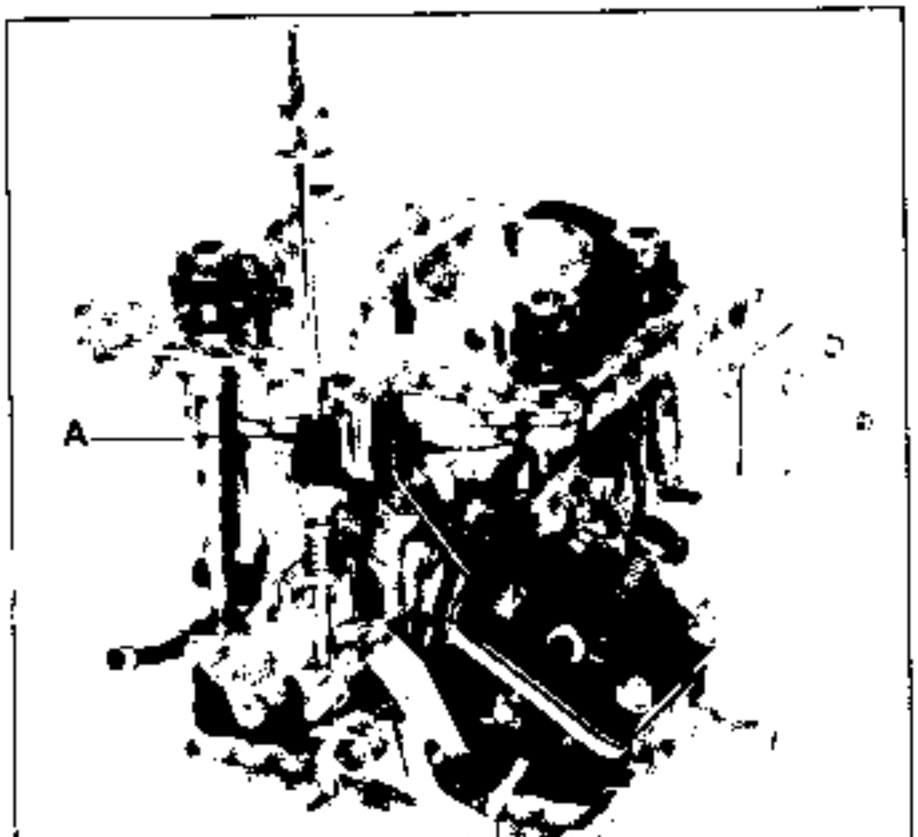
SOLEX 32 BIS



SOLEX 32 DIS



Method of adjusting the idling speed :
SOLEX 28 x 34 Z 10



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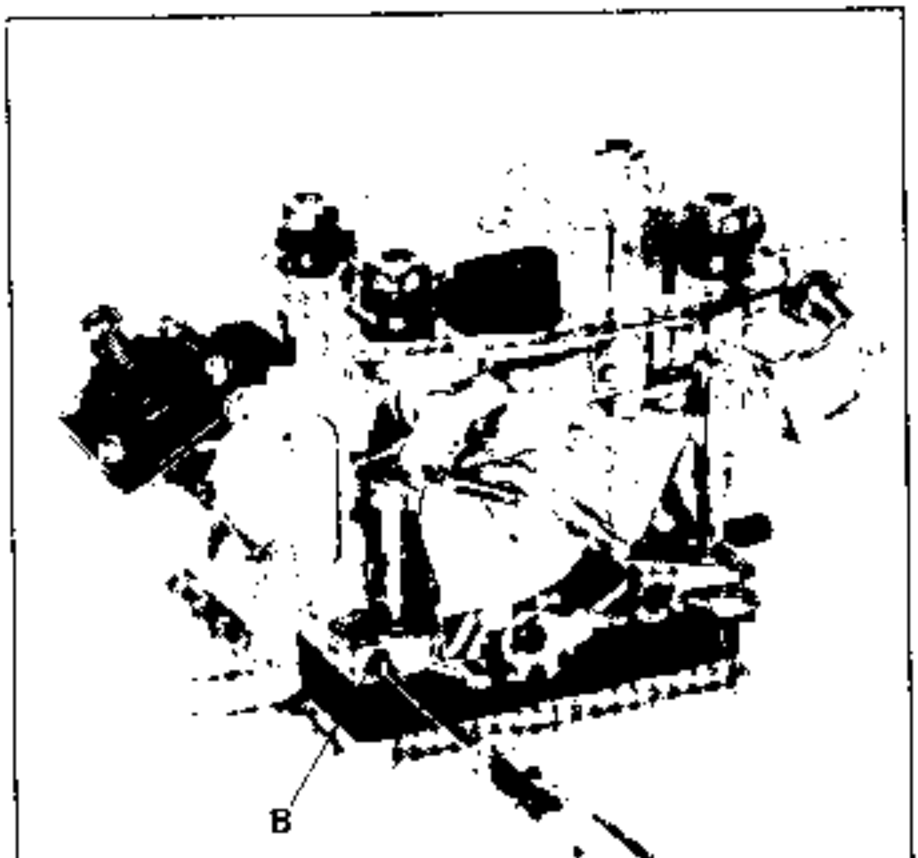

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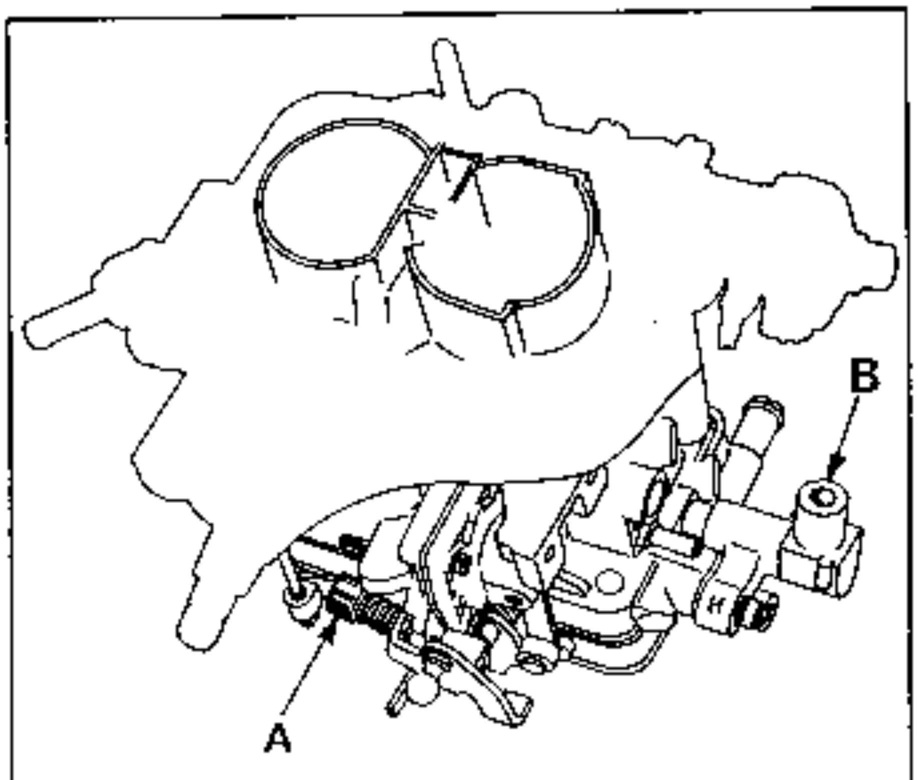
WEBER 32 DRT
Screw A - 1st type



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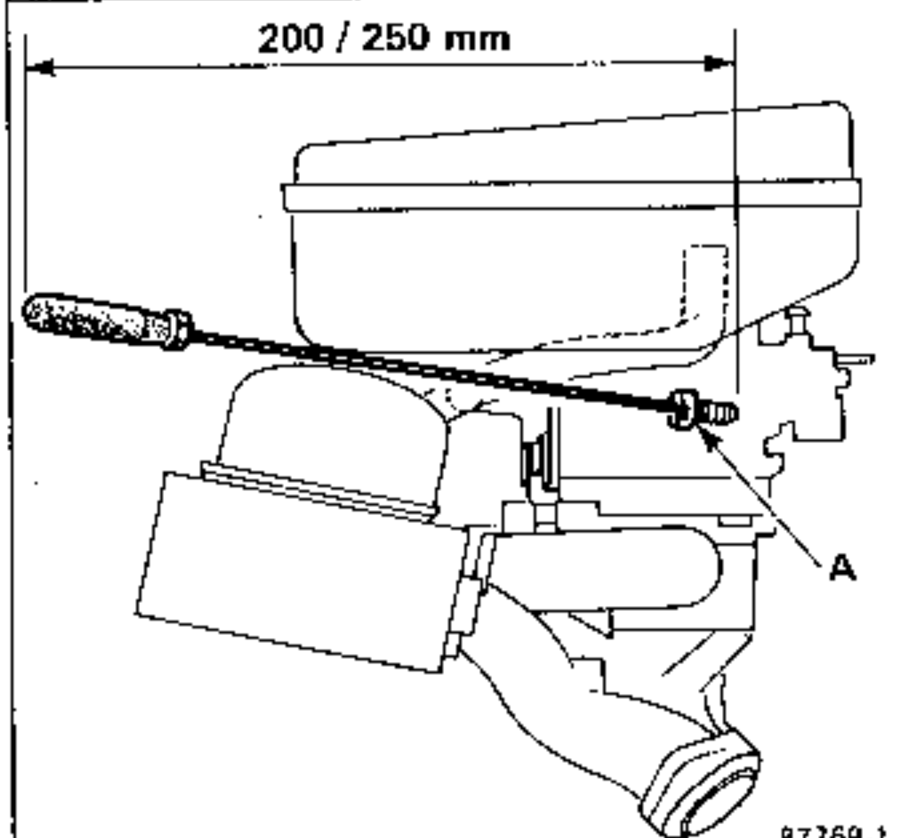

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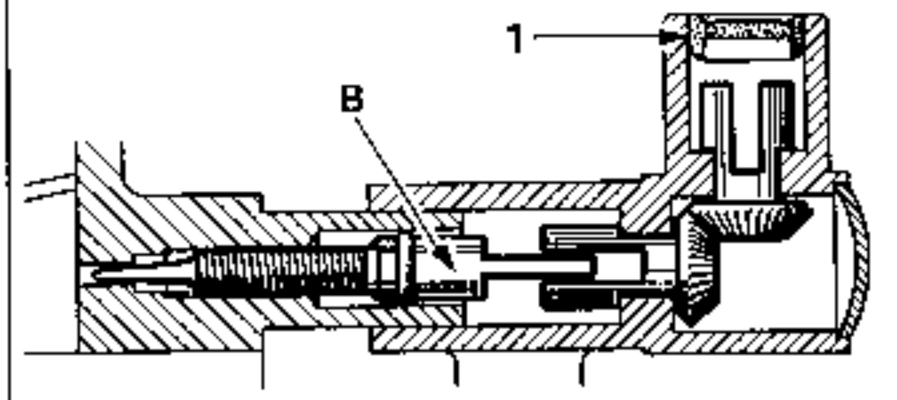

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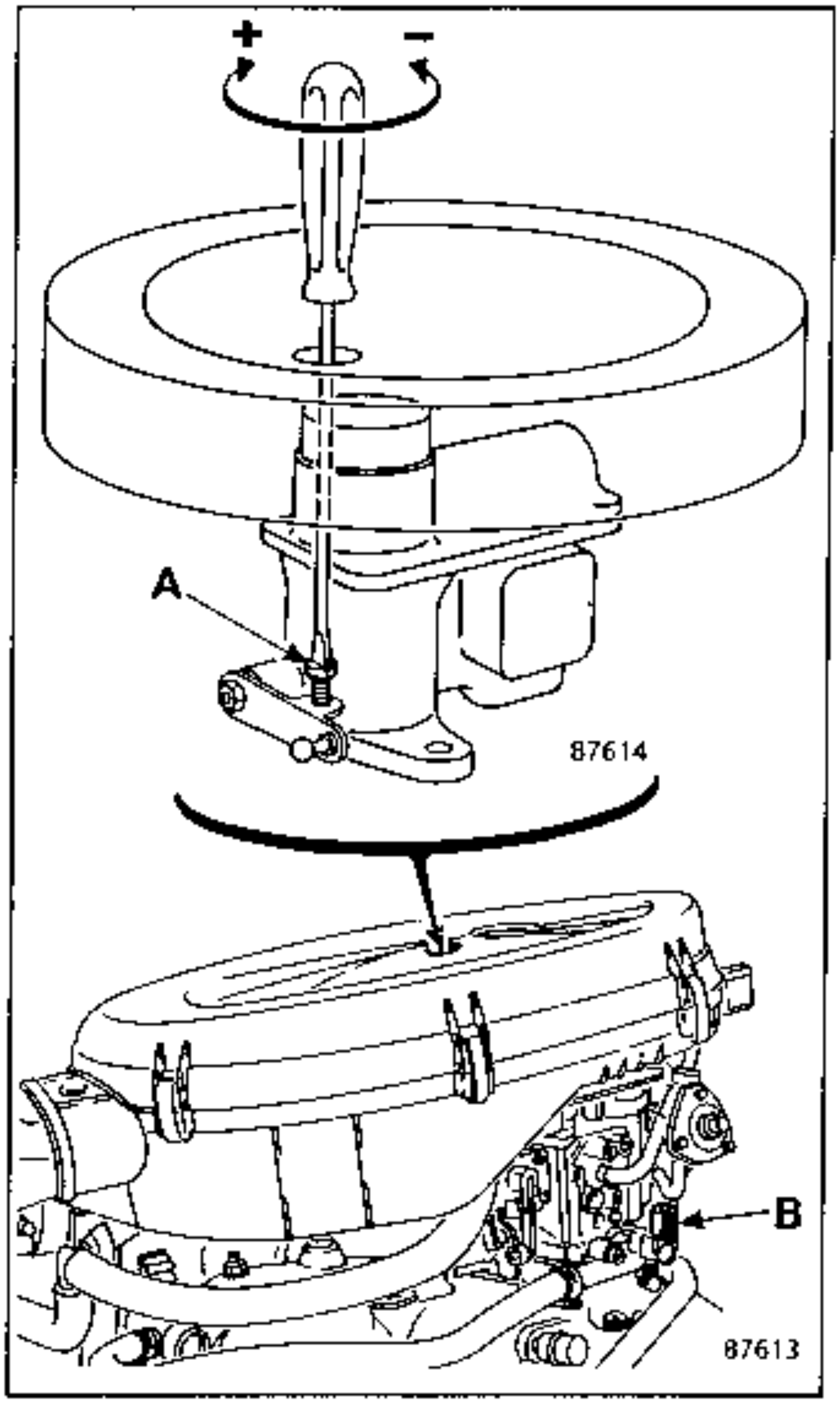
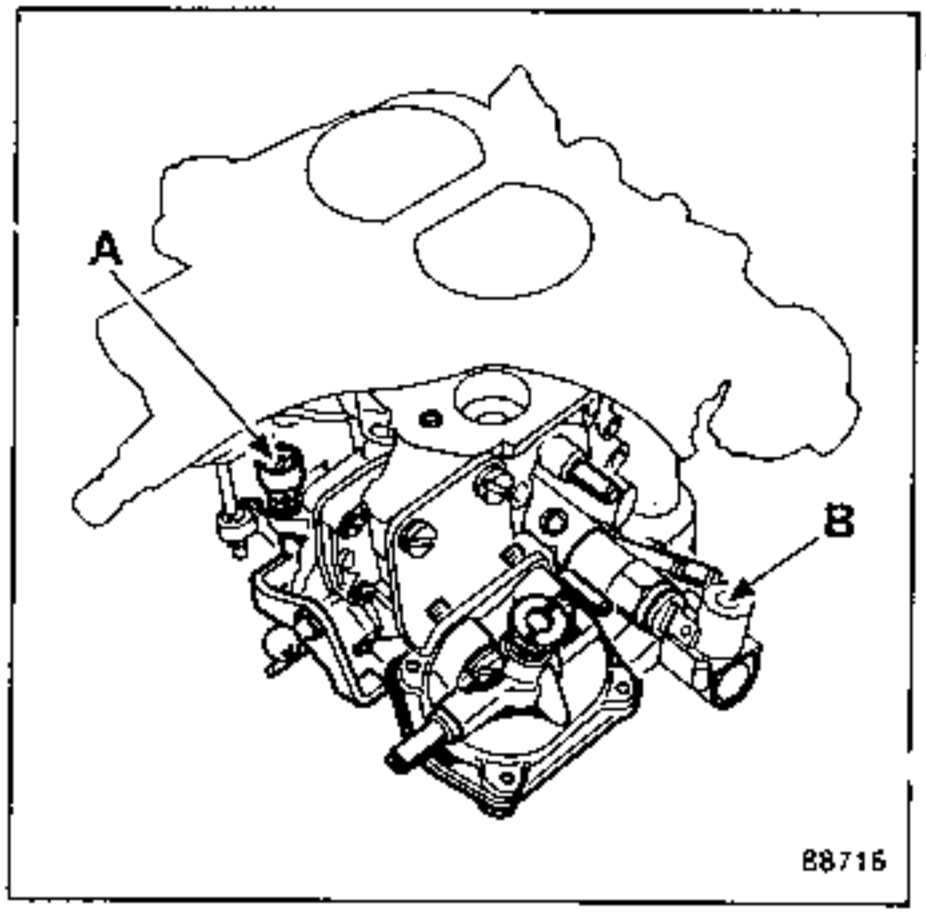
Method of adjusting the idling speed :
WEBER 32 DRT

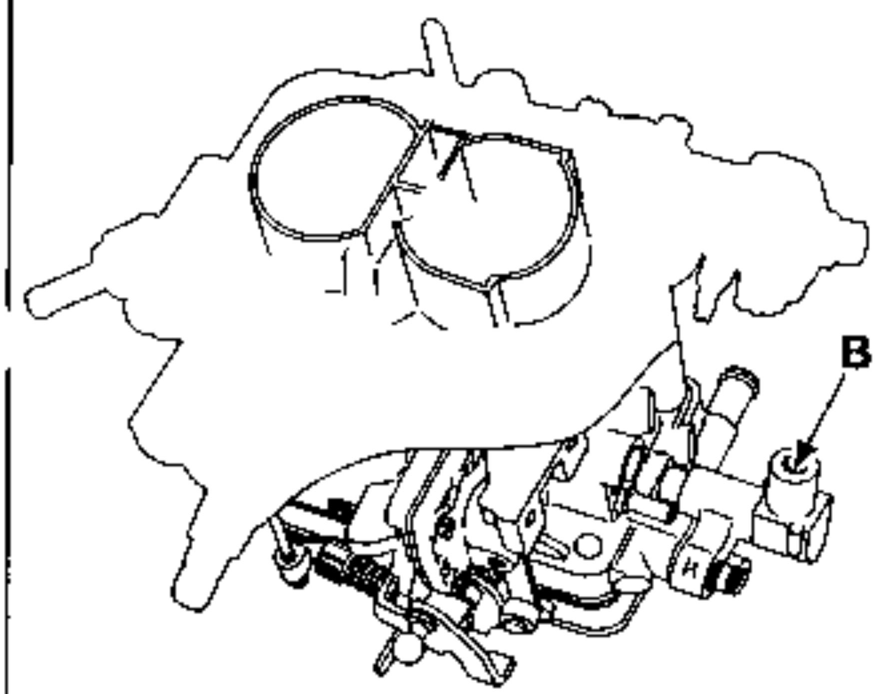
Screw A - 2nd type





Method of adjusting the idling speed :
WEBER 32 DRT

Screw B (all types)



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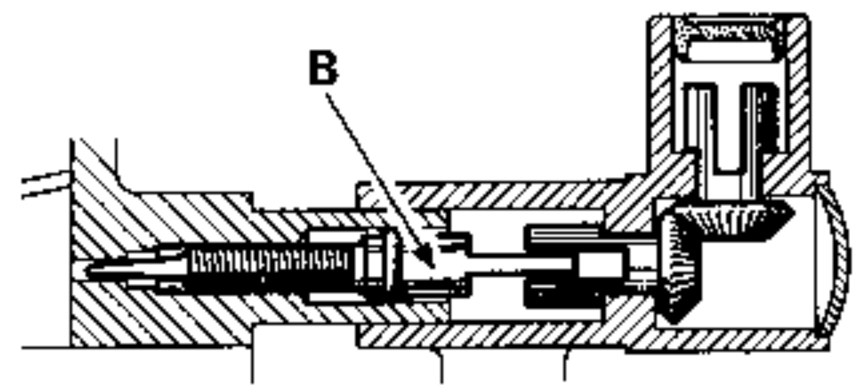

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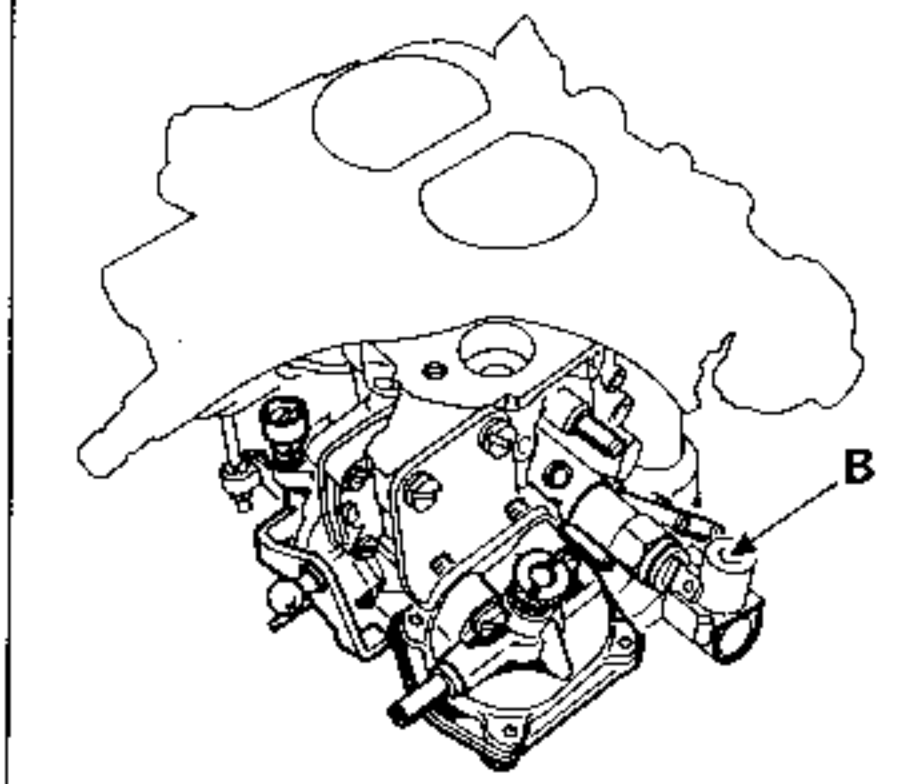

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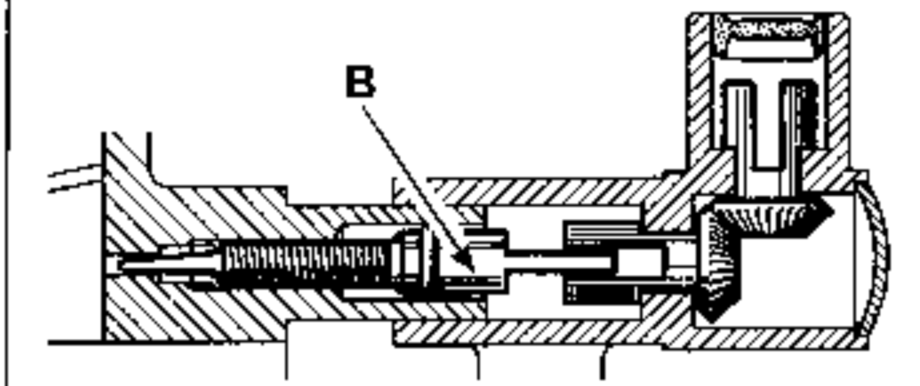

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For the carburettor settings see the charts in the workshop manuals

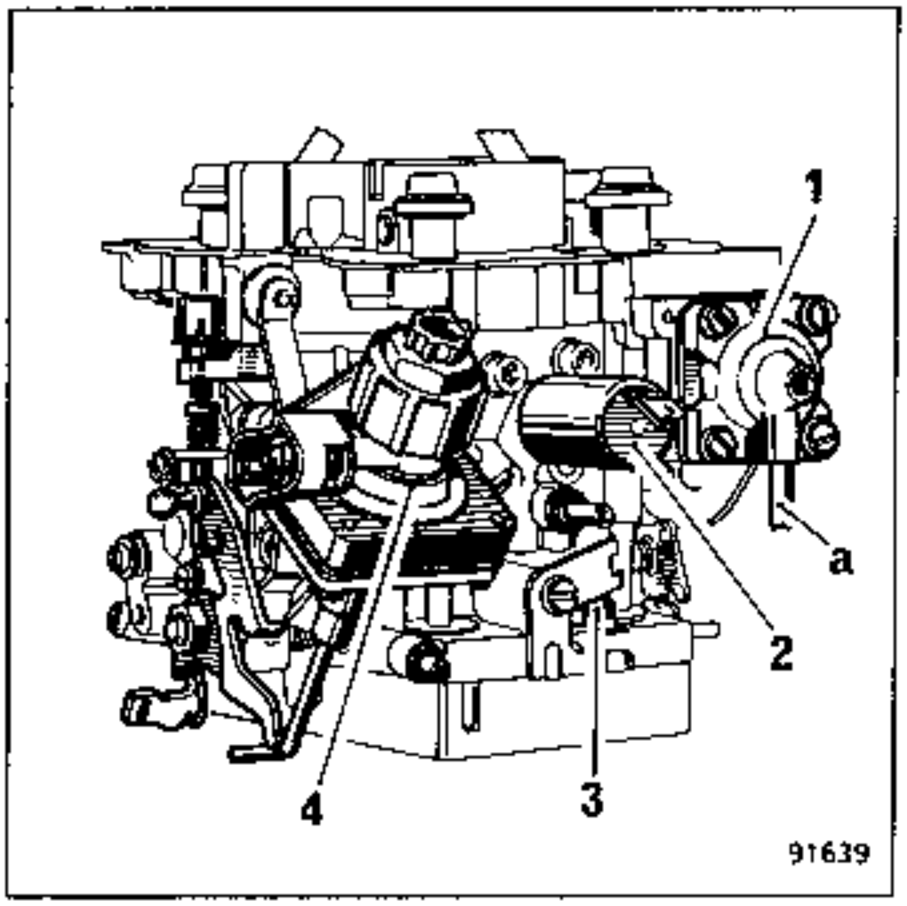
M.R. carb S
M.R. carb W
M.R. carb Z

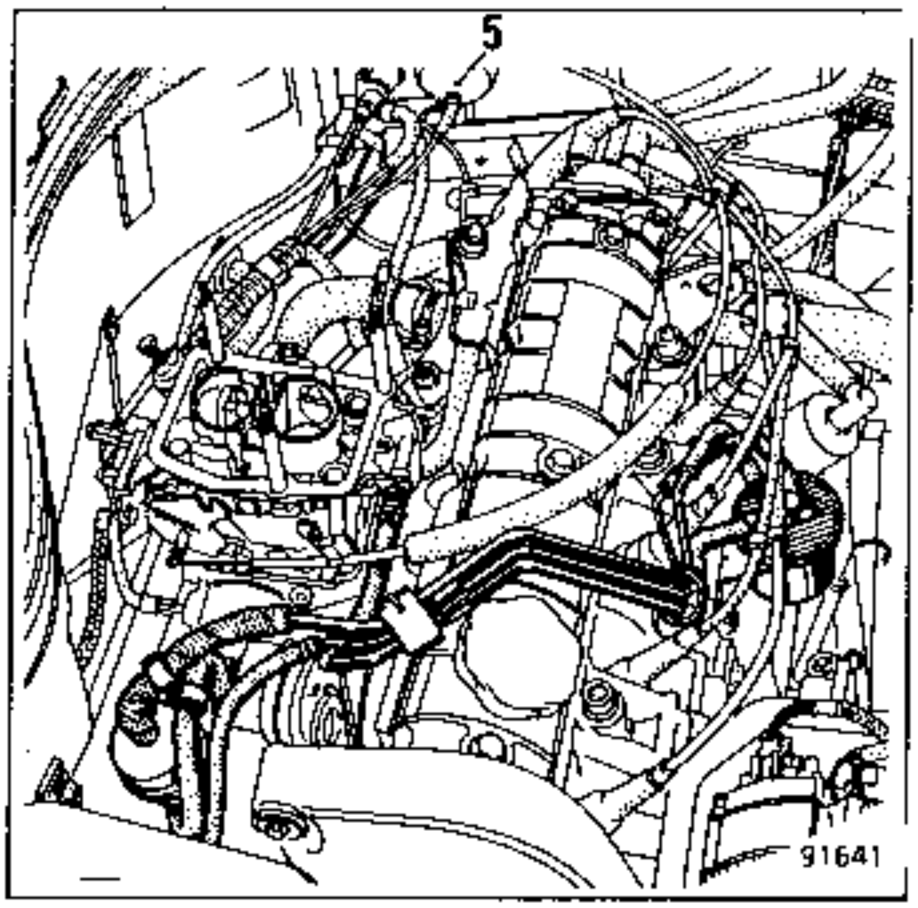
and the latest editions of their data sheets.

Special features of the SOLEX 28 x 34 Z 10 carburettor

On all versions, the SOLEX 28 x 34 Z 10 carburettor is equipped :

- with an idling speed shut-off on the first barrel idling circuit,
- with an electrical resistance on the first barrel idling circuit as a replacement for the hot water heating system,
- with an accumulator on the choke diaphragm to eliminate stalling after starting,
- a single or two stage throttle actuator depending on the version.

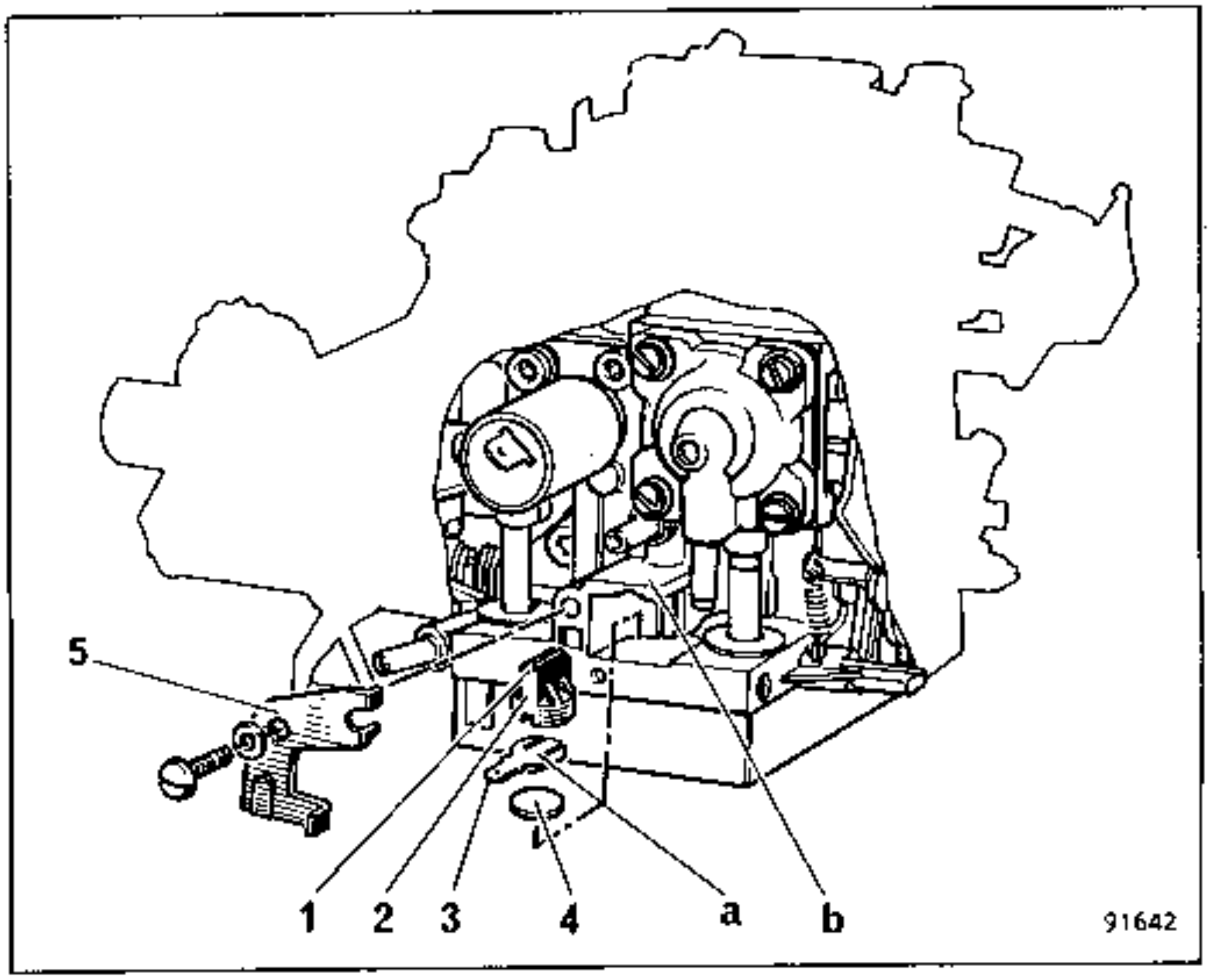




1. Choke diaphragm
   a-Connection between diaphragm and accumulator
2. First barrel idling circuit shut-off
3. First barrel idling circuit heater resistance
4. Two stage throttle actuator (on certain versions)
5. Choke diaphragm accumulator

Special features of the SOLEX 28 x 34 Z 10 carburettor

- Removing - Refitting the electrical heating resistance :



1. Positioning pin
2. Spacer
3. Connecting terminal
4. Resistance
5. Securing lug

If the resistance has been removed, pay particular attention on refitting to ensure that the component parts are fitted as shown in the drawing above and pay particular attention :

1. to the fitting of the terminal (3) into the spacer (2). The tab (a) must be on the same side as the resistance (4),
2. to the positioning of the pin (1) with reference to the spacer (2) and its location (b) on the carburettor.

WARNING : If instruction No. 1 is not obeyed, there is a risk of a short circuit.

Special features of vehicles equipped with power steering :
B and C 403 :

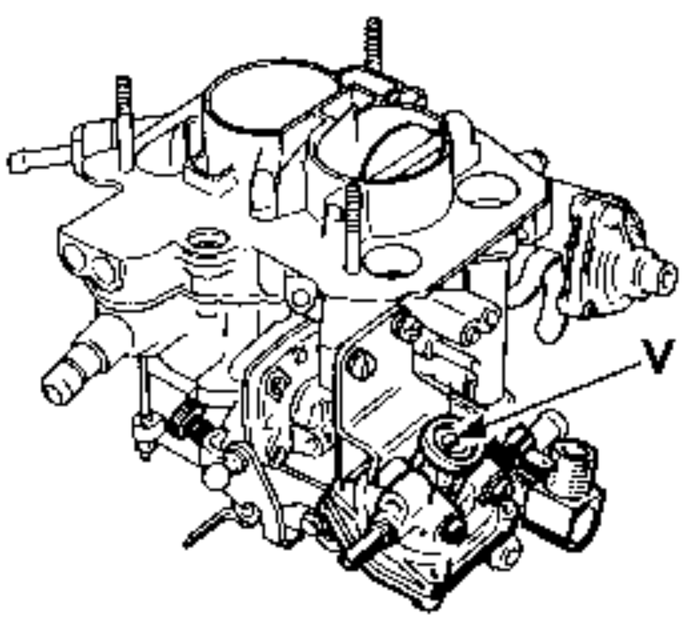
Vehicles with power steering :

On these vehicles, when the wheels are moved through full lock, a pressure switch on the power steering hydraulic circuit operates a solenoid valve to allow the manifold vacuum to reach the actuator. This adjusts the idling speed to prevent the engine stalling.

After adjusting the idling speed to the specified figure, operate the anti-stall system (without the wheels being moved through full lock) by one of the 3 methods described.

The engine speed should then be :
1050 ± 50 rpm.

Adjust it if necessary by turning screw (V).



Adjusting the fast idling on vehicles fitted with power steering :
- when the engine is warm,
- after adjusting the normal idling speed.

Remove the air filter.

1st method :

Disconnect the pipe from the actuator (the connection marked in blue).

Connect a hand operated vacuum pump to the actuator.

Run the engine at idling speed.

Apply a vacuum of 600 mbars to the actuator and maintain it.

Adjust the speed by turning screw (V).

2nd method :

Disconnect the pipe from the actuator (the connection marked in blue).

Disconnect the pipe identified in red from the carburettor.

Connect a pipe between these 2 connections (the one on the actuator and the other, red connection, on the carburettor).

Pinch flat the pipe using the clamp Mot. 453-01.

Run the engine at idling speed.

Remove the clamp Mot.453-01.

Adjust the idling speed by turning screw (V).

3rd method :

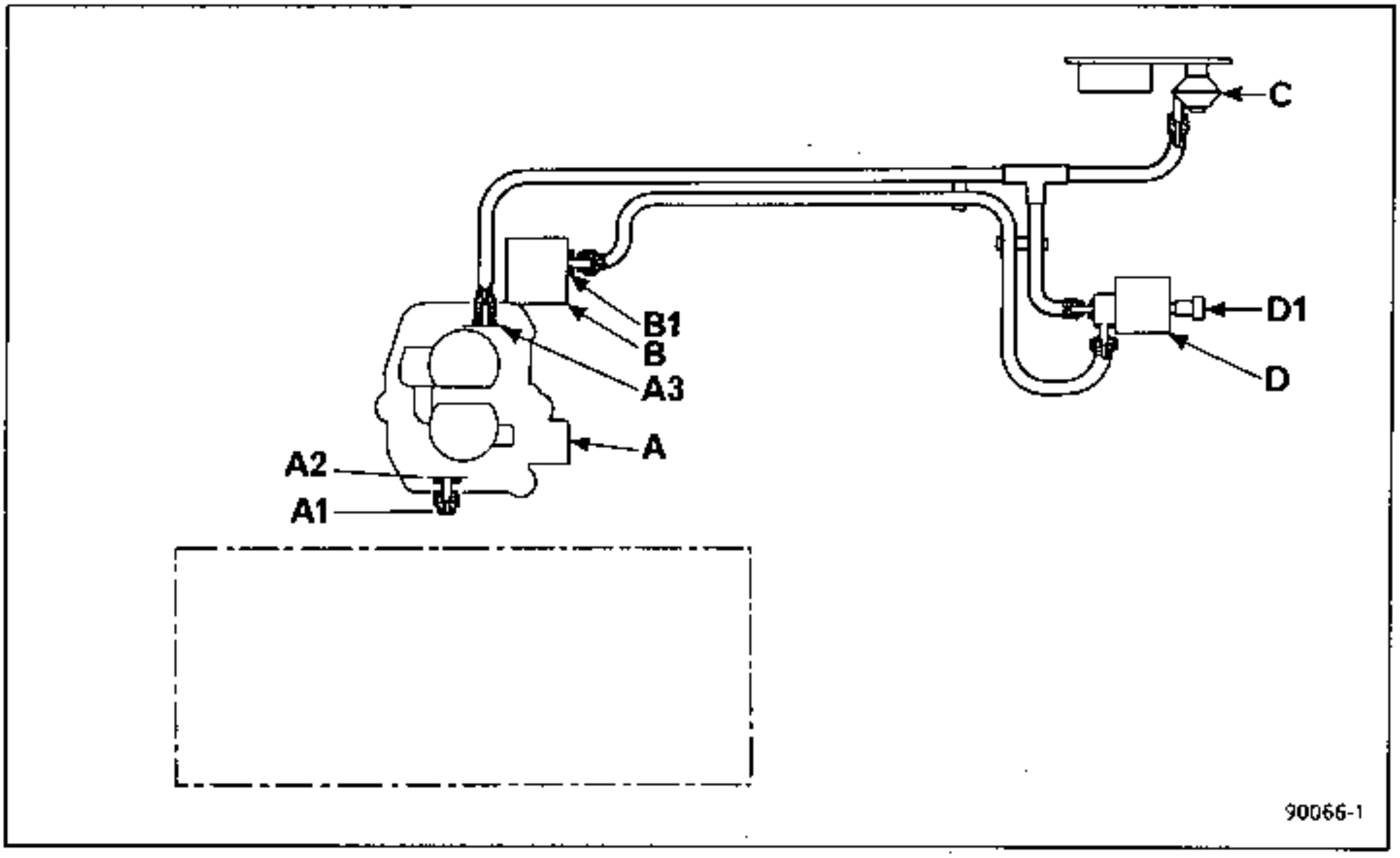
With the engine warm and running at idling speed.

Disconnect the pressure switch connector.

Interconnect the female terminals on the connector, on the wiring side. The engine speed should increase.

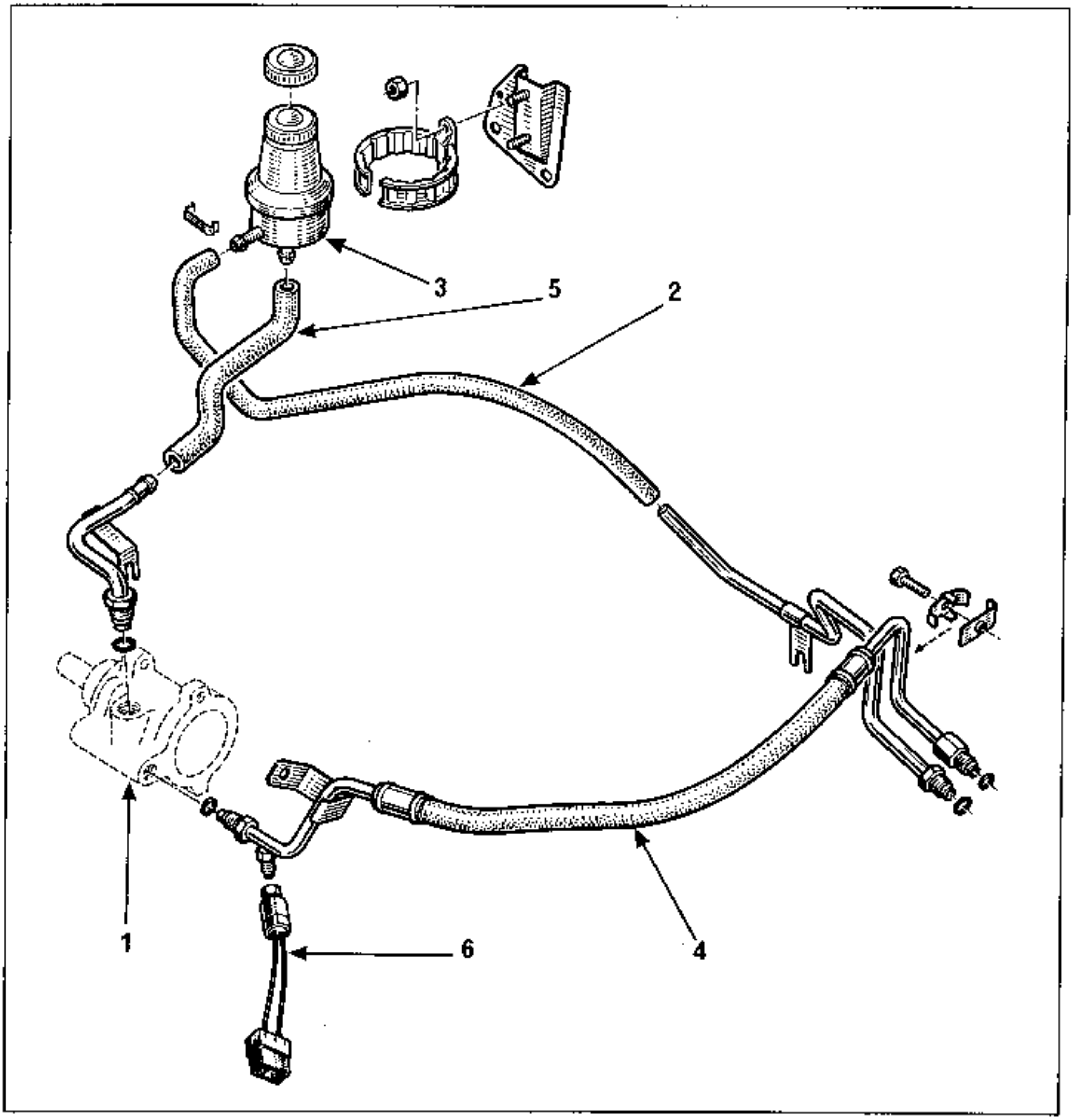
Adjust the speed, if necessary, by turning screw (V).

Pneumatic circuit diagrams for vehicles equipped with power steering : B and C 403



- **A** Carburettor
- **A1.** Plug on pipe, colour black
- **A2.** Locating ring on carburettor, colour red
- **A3.** Locating ring on carburettor, colour black
- **B.** Throttle actuator
- **B1.** Locating ring on actuator, colour dark blue
- **C.** A.E.I. (Electronic Ignition Unit) On A.E.I. : no identification
- **D.** Solenoid valve : near A.E.I. unit
- **D1.** Filter on solenoid valve

Positions of components



1. Power steering pump
2. Pipe from reservoir to steering box
3. Power steering reservoir
4. Pipe from power steering pump to steering box
5. Pipe from power steering pump to reservoir
6. Anti-stall system pressure switch

Solenoid valve :

The solenoid valve that controls the anti-stall system pneumatic circuit is on a bracket near the A.E.I. (Electronic ignition) unit. It is mounted on the vehicle scuttle.

Vehicles with power steering or air conditioning

Vehicles with air conditioning :

When the compressor starts, the manifold vacuum is passed to the actuator through a solenoid valve set up in the same way as on power steering versions. This compensates the idling speed to prevent the engine stalling.

Adjustment methods :

With the engine hot and the idling speed correctly adjusted.

The three first methods described for power steering versions also apply to vehicles with air conditioning. Only the speed is different.

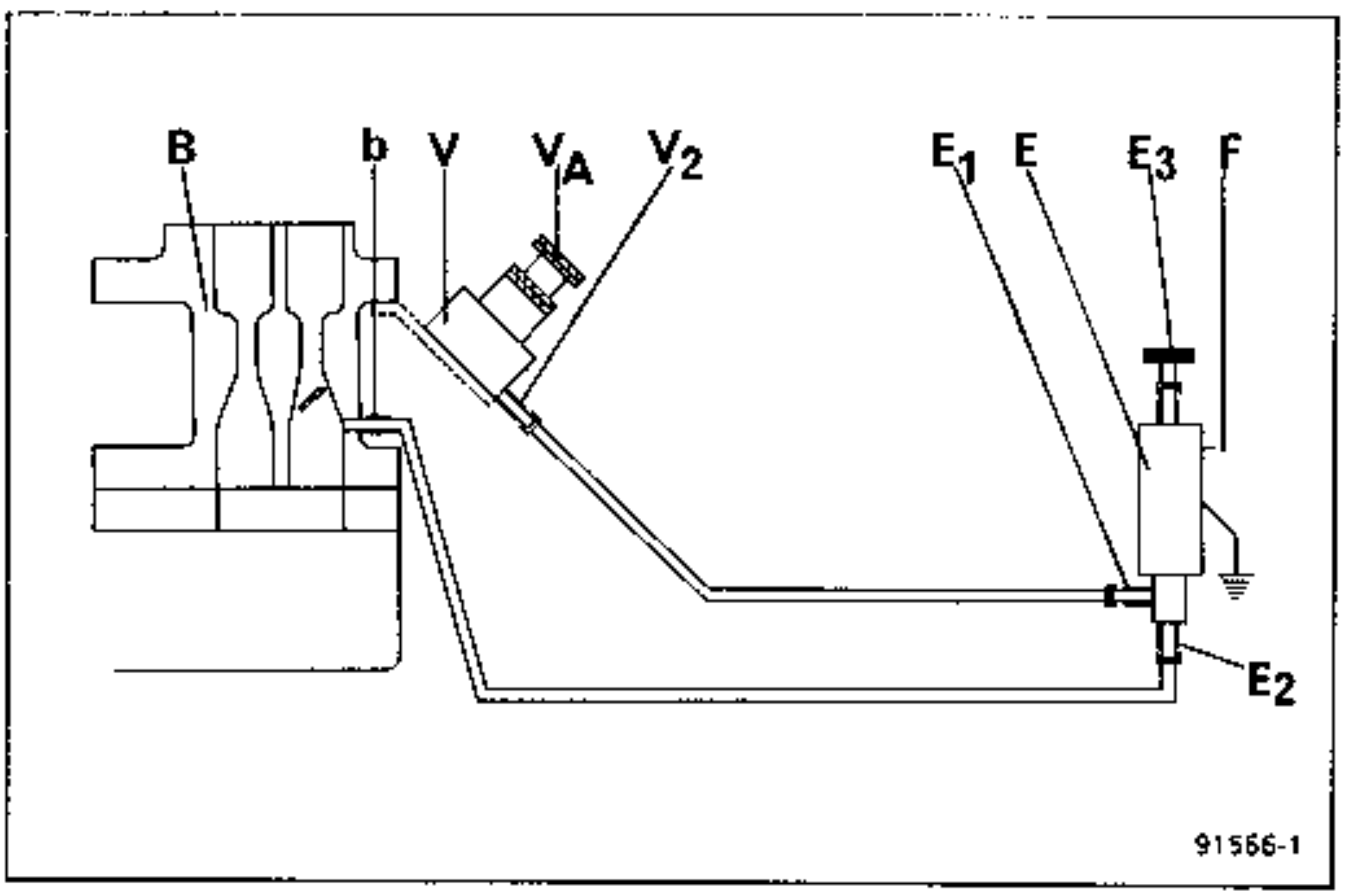
The engine speed should be : 1500 $\pm$ 100 rpm.

There is a fourth method which consists of carrying the battery + supply and an earth directly to the solenoid valve (it is essential to have disconnected the 2 solenoid valve terminals first).

Adjust the speed, if necessary, by turning screw (V_A).

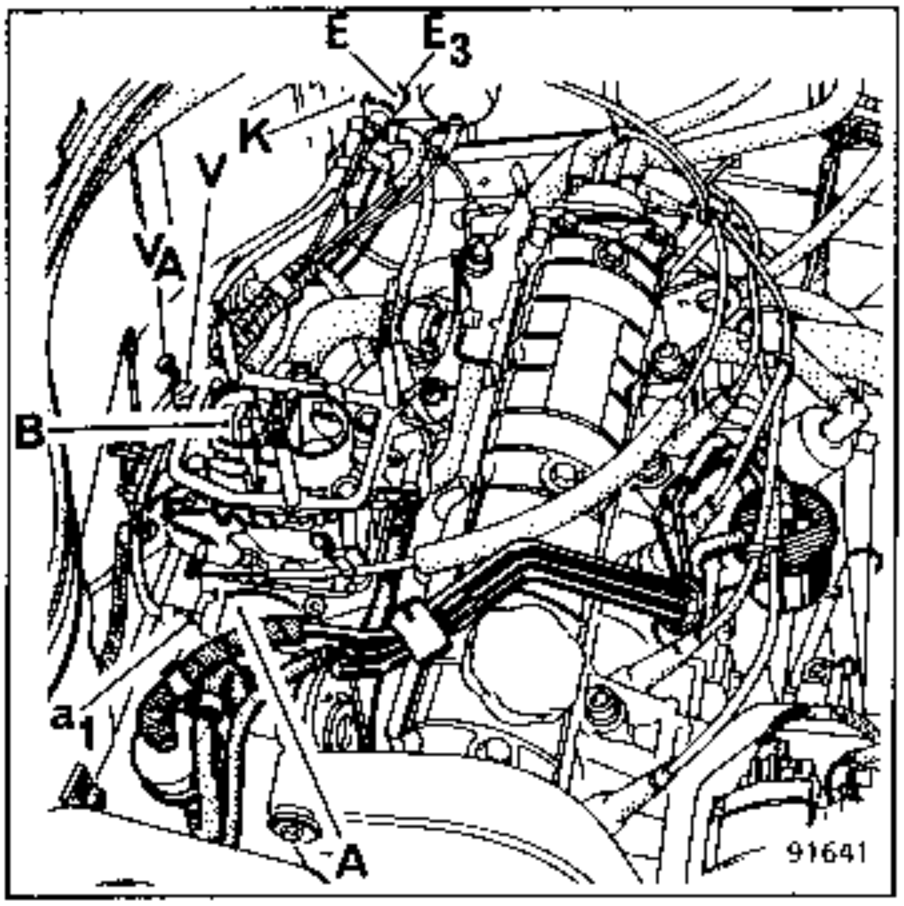
Vehicles with power steering or air conditioning :

Component identification :



- V. Single stage throttle actuator
  - V_A. Throttle actuator adjusting screw
  - V_2. Blue identification ring on the actuator and on the pipe
- E. Throttle actuator control solenoid valve
- F. Air conditioning or power steering signal.
  - E_3. Air vent filter
  - E_1. Blue identification ring on the solenoid valve and on its pipe
  - E_2. Red identification ring on the solenoid valve and on its pipe
- B. Carburettor SOLEX 28 x 34 Z 10
  - b. Red identification ring on the carburettor and on its pipe

These vehicles are equipped with a single stage throttle actuator.



- V. Single stage throttle actuator
  - V_A. Throttle actuator adjusting screw
- E. Throttle actuator control solenoid valve
  - E_3. Solenoid valve air vent filter
- B. Carburettors SOLEX 28 x 34 Z 10
- K. Throttle actuator control valve securing plate
- A. Inlet manifold
  - a_1. A.E.I. electronic ignition - manifold vacuum.

Adjusting the throttle actuator :

- Vehicles with power steering :

On these vehicles, when the wheels are moved through full lock, the pressure switch on the power steering hydraulic system passes the manifold vacuum through to the actuator via a solenoid valve. This maintains the engine speed and prevents it stalling.

After adjusting the idling speed to the specified figure, operate the anti-stall system (without moving the wheels through full lock) by one of the 4 recommended methods.

The speed should be : 1050 $\pm$ 50 rpm.

If necessary, adjust it by turning screw (VA).

Adjusting methods :

- The engine must be warm.
- The normal idling speed must be correctly adjusted.
- The engine must be running at idling speed.

1st method :

Disconnect the input pipe from the actuator (the blue coloured connection).

Connect a manual vacuum pump to the actuator.

Start the engine and run it at idling spee

Apply a vacuum of 600 mbars to the actuator and maintain it.

Adjust the speed by turning screw (VA).

2nd method :

Disconnect the input pipe from the actuator (the blue coloured connection).

Connect a T union between the A.E.I. electronic ignition pipe and the inlet manifold (shown as a_1 on the drawing).

Connect the T union to the throttle actuator and adjust the speed, if necessary, by turning screw (VA) or connect the actuator directly to the take-off point on the carburettor identified as (b) on the drawing on the following page.

3rd method :

Disconnect the filter E_3 from the solenoid valve (E).

Connect up a manual vacuum pump and adjust the speed, if necessary, by turning screw (VA).

Reconnect the filter E_3 after the adjustment.

4th method :

Disconnect the pressure switch connector.

Interconnect the female terminals on the connector, at the wiring end : the engine speed should increase.

Adjust the speed, if necessary, by turnin screw (VA).

MULTIPOINT INJECTION THROTTLE UNIT

Engine F3N J 702

ADJUSTING THE AIR FLOW

Connect up tester XR25 equipped with cassette no. 5, or above (with the engine running at idling speed and the coolant temperature above 80°C).

Enter D03 then no. 12 on the tester and note the figure shown on the central display.

Check the speed by entering no. 06 :
750 to 850 rpm.

Remove the tamperproofing cap.

Find the minimum speed by unscrewing screw (B) until the idling speed starts to increase.

Then screw in the screw (B) until this figure increases from 0.2 to 0.3 ms.

Example : min. reading : 2.3 ms
adjust to 2.55 ± 0.05 ms

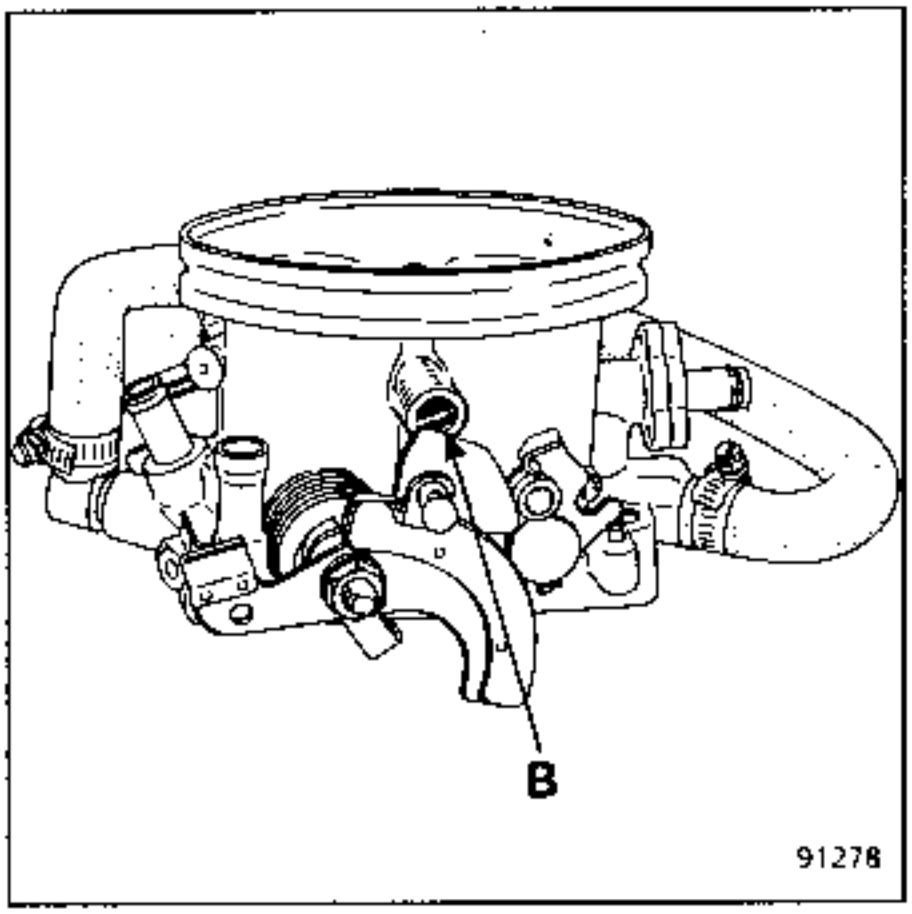
Note : on a new vehicle, screw (B) is screwed fully in.

After adjusting, plug the access to screw (B) by fitting a tamperproofing cap part no. 77 01 200 832.

CHECKING THE AIR FLOW

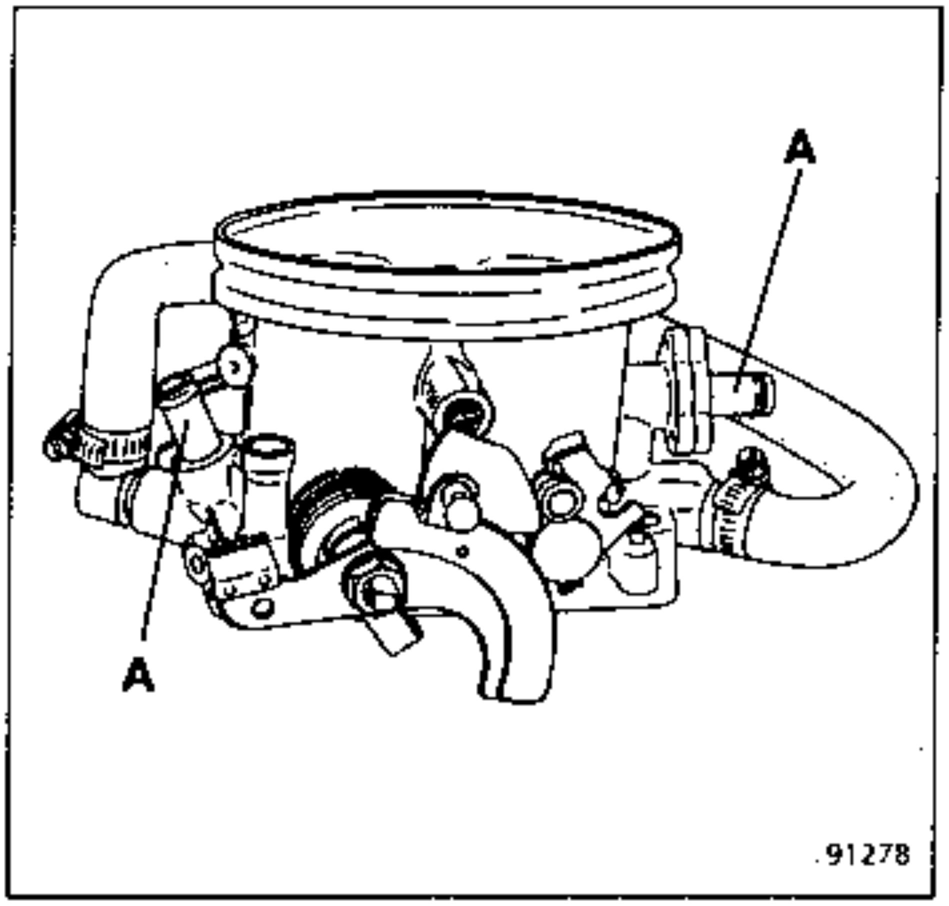
Pinch flat the hose that supplies the idling speed regulator valve which is connected between the filtered air duct and the throttle unit on one hand and the regulator valve on the other hand, using clamp Mot.453-01.

Check the speed, without the idling speed regulator operating, and adjust it by turning screw (B) until it is between 550 and 600 rpm.



REMOVING - REFITTING :

The throttle unit is heated by the engine coolant.
When removing it, do not forget to pinch flat the coolant hoses, using clamps Mot. 453-01 to prevent any loss of the coolant that enters and leaves the throttle unit through connections A.



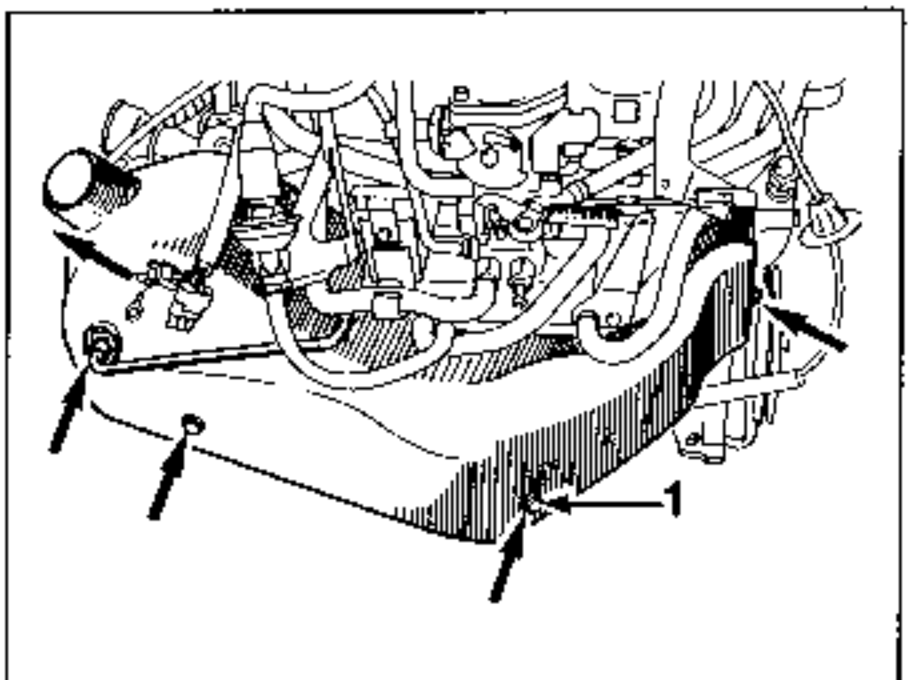
A : Coolant connections

REMOVING - REFITTING

Raise the vehicle on a lift and disconnect the battery.

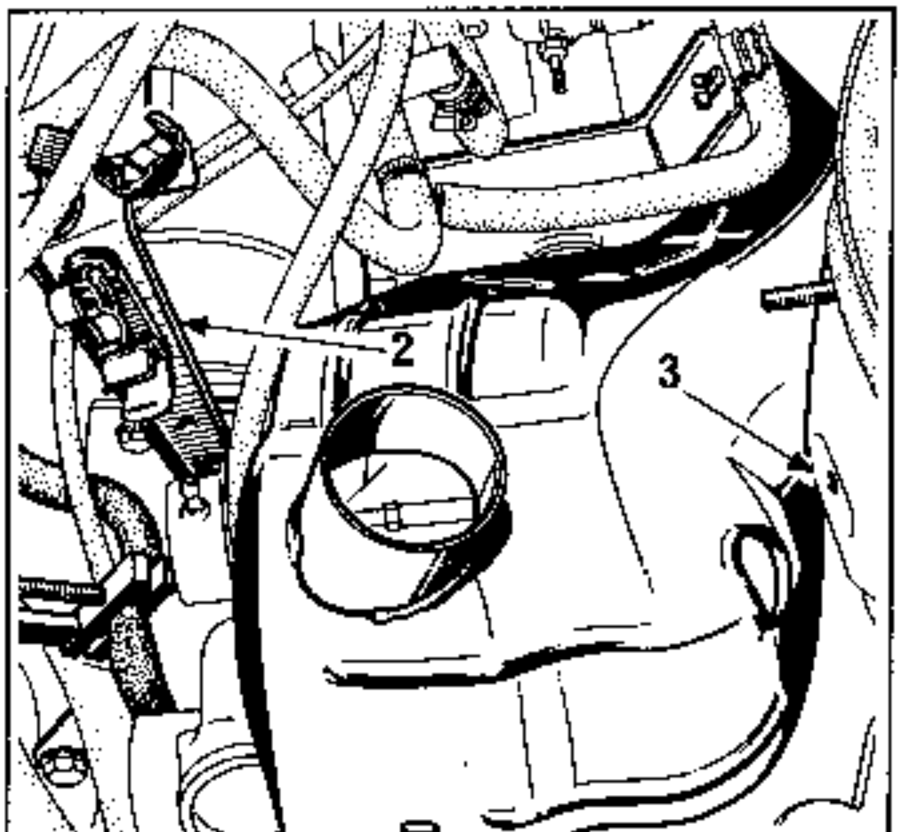
Disconnect and remove :

- the air filter,
- the intercooler and the pipes that connect it to the turbocharger,
- the A.E.I. ignition unit and the non-return valve.



88 929

Remove the screws that secure the heat shield in place. Screw 1 is accessible from underneath.
Tilt the pipe clip (2) forwards.



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On vehicles equipped with a water cooled turbocharger :
Pinch flat the water input pipe using clamp Mot.453.01.

Disconnect :

- The water output between the turbocharger and the hot bottle on vehicles equipped with a water cooled turbocharger.

- The turbocharger oil input.

Remove the A.E.I. ignition unit lower stud (3) and pass the securing strut for bolt (1) under the screen.

Then take out the screen from one side.

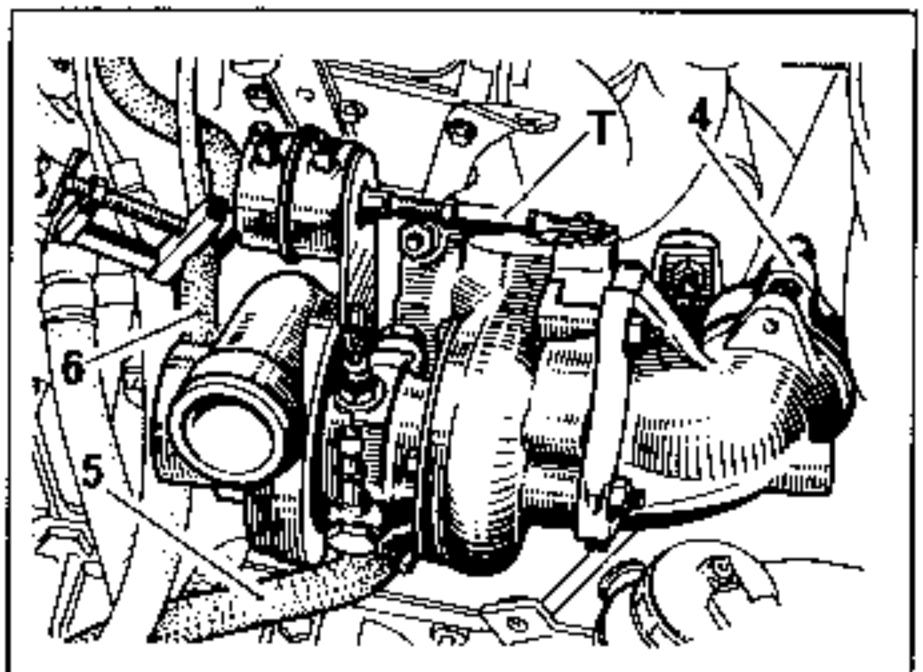
Disconnect :

- the exhaust clamp (4),
- the oil return pipe (5),
- the water input pipe (6).

NOTE : do not unscrew the water input and return banjo unions and banjo bolts.

Remove the securing nuts and take out the turbocharger.

IMPORTANT : Never grasp the turbocharger by rod T.



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NOTE : to gain access to the concealed turbocharger securing nut on the exhaust manifold, use a 13 mm combination spanner (ex : facom no. 40) or an open ended spanner (ex : facom no. 57) with area A ground off.

84760-1

REFITTING (Special features)

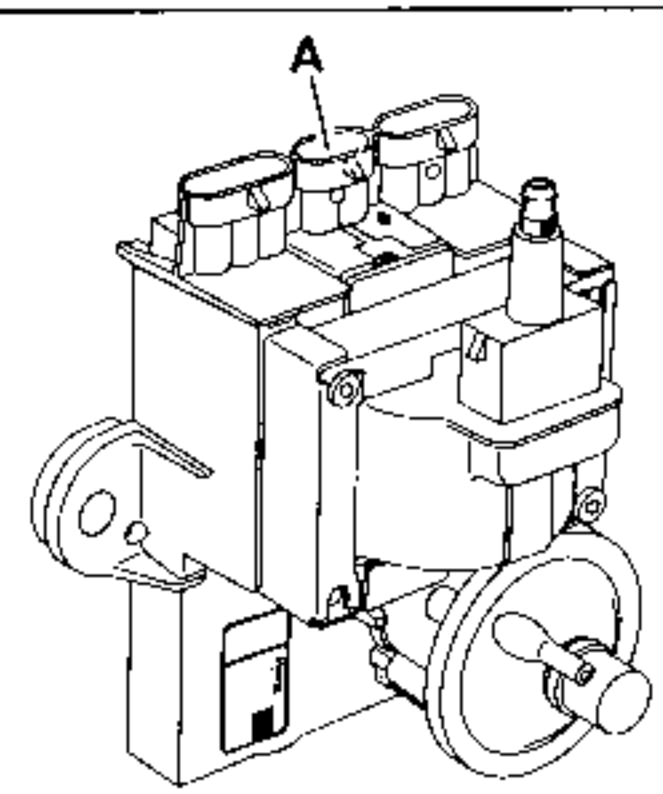
Thoroughly clean the exhaust manifold and turbocharger joint areas.
If necessary, replace the self-locking nuts that secure the turbocharger to the exhaust manifold.

Reconnect the oil input and return pipes and the air input duct.

WARNING : Never turn the engine over with the air intake ducts plugged.

Starting :

- Disconnect the central connector A from the electronic unit,
- Operate the starter to re-prime the turbocharger lubrication system until the oil pressure warning light goes out,
- Reconnect the connector (A),
- Start the engine and run it at idling speed to re-establish the oil flow through the turbocharger.



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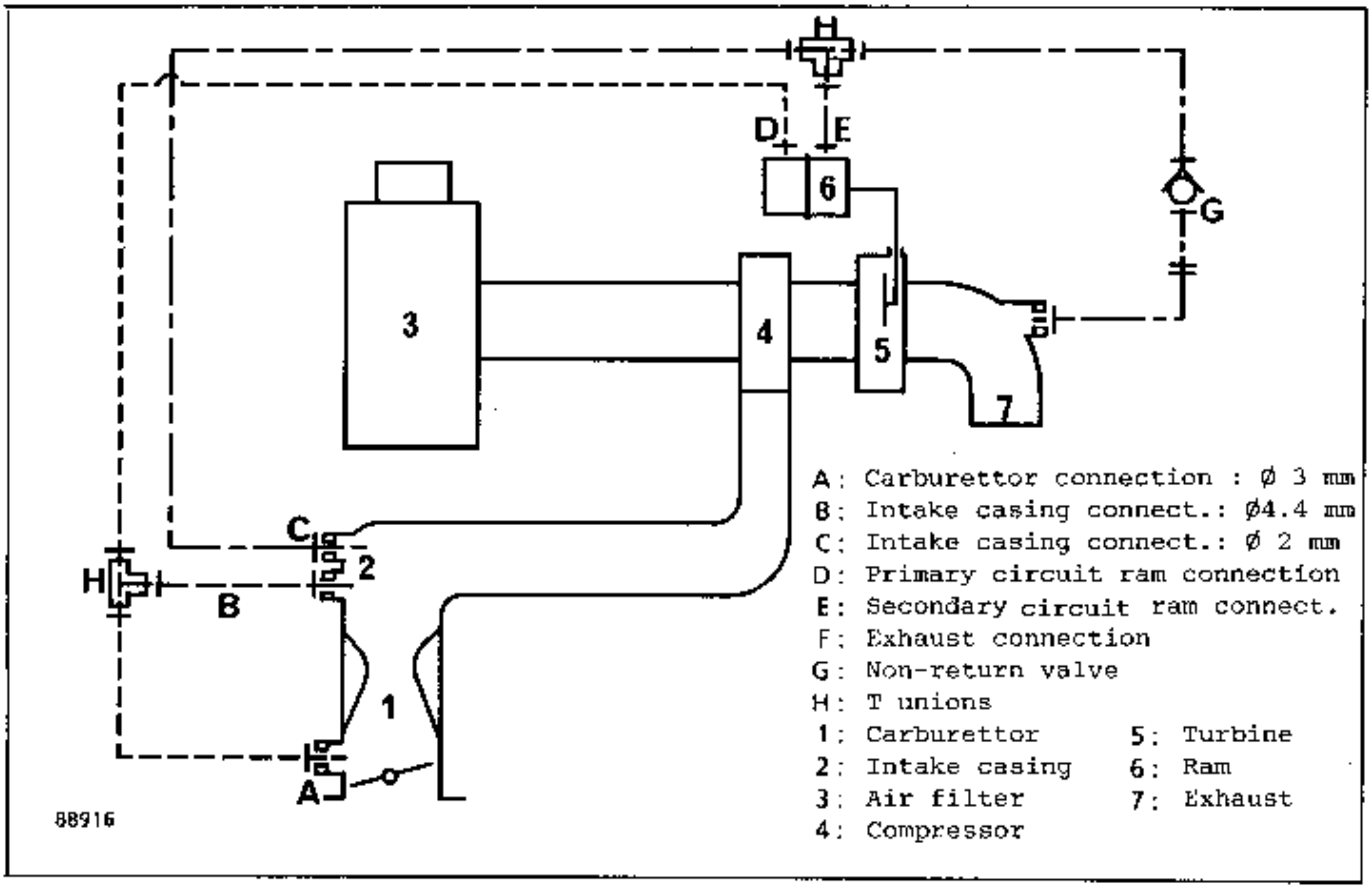
Checking, replacing and adjusting the turbocharging pressure regulator :

The performance and reliability of a turbocharged petrol engine depends directly on the correct adjustment of the turbocharging pressure regulator and it is essential that it should be adjusted to the correct figures.

Checking, adjusting or replacing the turbocharging pressure regulator can be carried out on the vehicle, with the turbocharger in position after removing the adjacent components such as the heat shield.

Before carrying out any check or removing the turbocharger, ensure that the turbocharging pressure regulator unit control circuits are correctly connected and absolutely leakproof.

Note : it is essential to identify the pipes before disconnecting them and to ensure that the calibrated connections A, B and C, in particular, are of the correct diameter to maintain full engine performance.



PRINCIPLE OF OPERATION OF THE TURBOCHARGER REGULATOR :

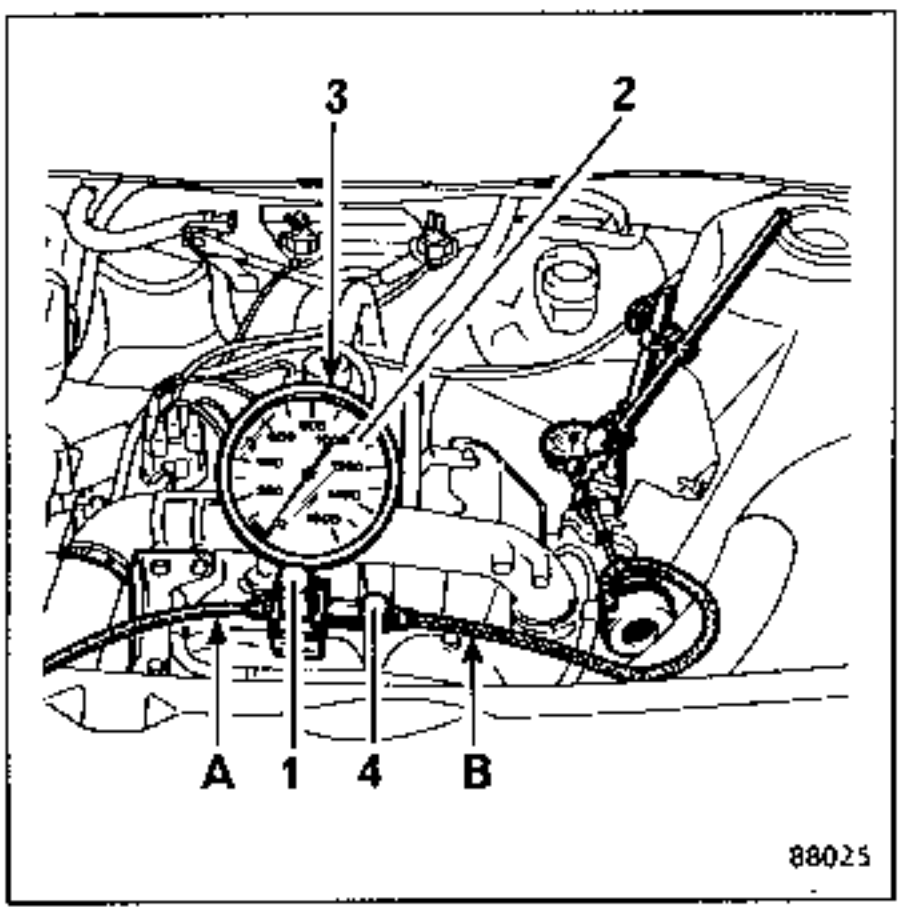
- The capsule regulation system consists of 2 circuits :
- A primary circuit between connection B on the intake casing (calibrated Ø 4.4 mm) and the connection A on the carburettor (calibrated Ø 3 mm) passing through a T union which is connected to the capsule at connection D.
- A secondary circuit between the connection C on the intake casing (calibrated Ø 2 mm) and the exhaust at connection F through a T union and a non-return valve G which are connected to the capsule at connection E.
- The capsule is regulated by means of the pressure differential between the primary circuit A, B and D and the secondary circuit E, F and G through which moves a pressure wave caused by the exhaust and regulated by the non-return valve G.

CHECKING AND ADJUSTMENT FIGURES

Vehicle	Type	Engine	Checking figure in mbars	Adjustment figure in mbars	Movement of rod in mm
RENAULT 5 GT Turbo	C 405	C.1.J -C- 782 C1J - 784	590 - 650	620 - 650	0,38 ± 0,02
		C.1.J G 788	740 - 800 ;value B	770 - 800 ;value B	4 ± 0,02 mm
			Value A	Value A	0,38 ± 0,02
			175 - 225 ;value C	175 - 200 ;value C	C = B-A

METHOD USING TOOL KIT MOT.1014

The kit consists of an adjustable pressure reducing valve (1), a pressure gauge (2) graduated from 0 to 1.6 bars with a zeroing screw (3) and a bleed screw (4).



Before using the equipment, zero the pressure gauge (screw 3), fully unscrew screw (1) on the pressure reducing valve and the bleed screw (4) and connect the inlet pipe (A) to the compressed air source.

Connect the output pipe (B) to the connection on the turbocharging pressure regulator to be tested, nearest the front, and tighten screw (4).
Then slowly screw in the screw on the pressure reducing valve (1) until the required air pressure or the regulator rod travel is obtained (slightly loosening screw (1) will stabilise the pressure).

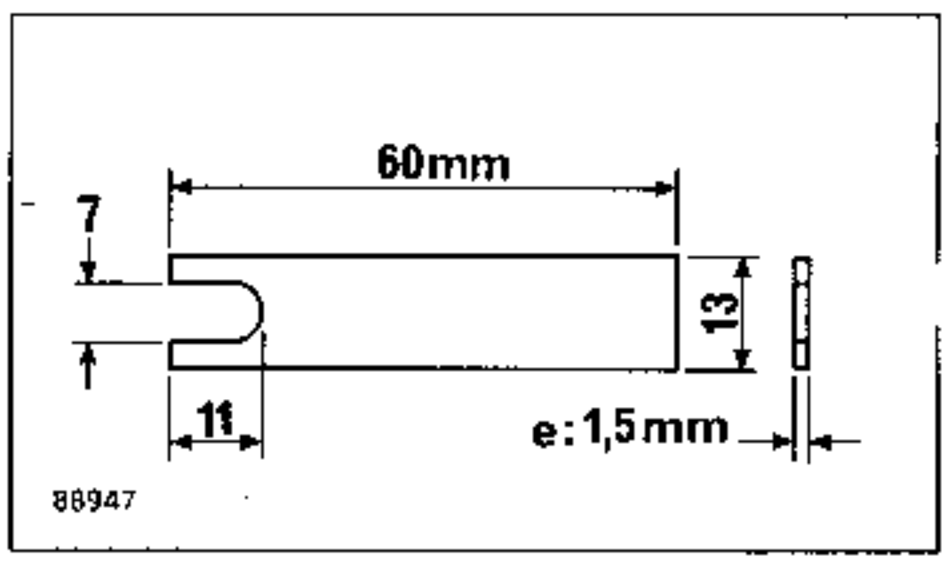
CHECKING THE CALIBRATION PRESSURE

Remove the A.E.I. electronic ignition unit after disconnecting it and the non-return valve.

Disconnect the hose from the connection on the regulator unit and connect equipment Mot.1014 to it.

Make up a spacer as shown in the drawing below and grip it, vertically, between the rod T and the nut (6).

Place a dial indicator against the spacer, mounting it on the exhaust shield by a magnetic base.



Progressively increase the pressure to obtain a movement of the adjusting rod of 0.38 ± 0.02 mm and note down the pressure reading on the pressure gauge, which should be within the specified test figures.

If the calibration pressure is outside the required tolerances, replace the entire regulator unit (punched end fitting and rod) or adjust it (rod which is "locked" with a dab of shellac).

Special operations involved in checking and adjusting C1j-G-788 units :

Connect up test equipment Mot.1014 as already described and set the dial indicator on zero.

1° Increase the pressure to obtain a movement of 0.38 $\pm$ 0.02 mm and note the pressure A.

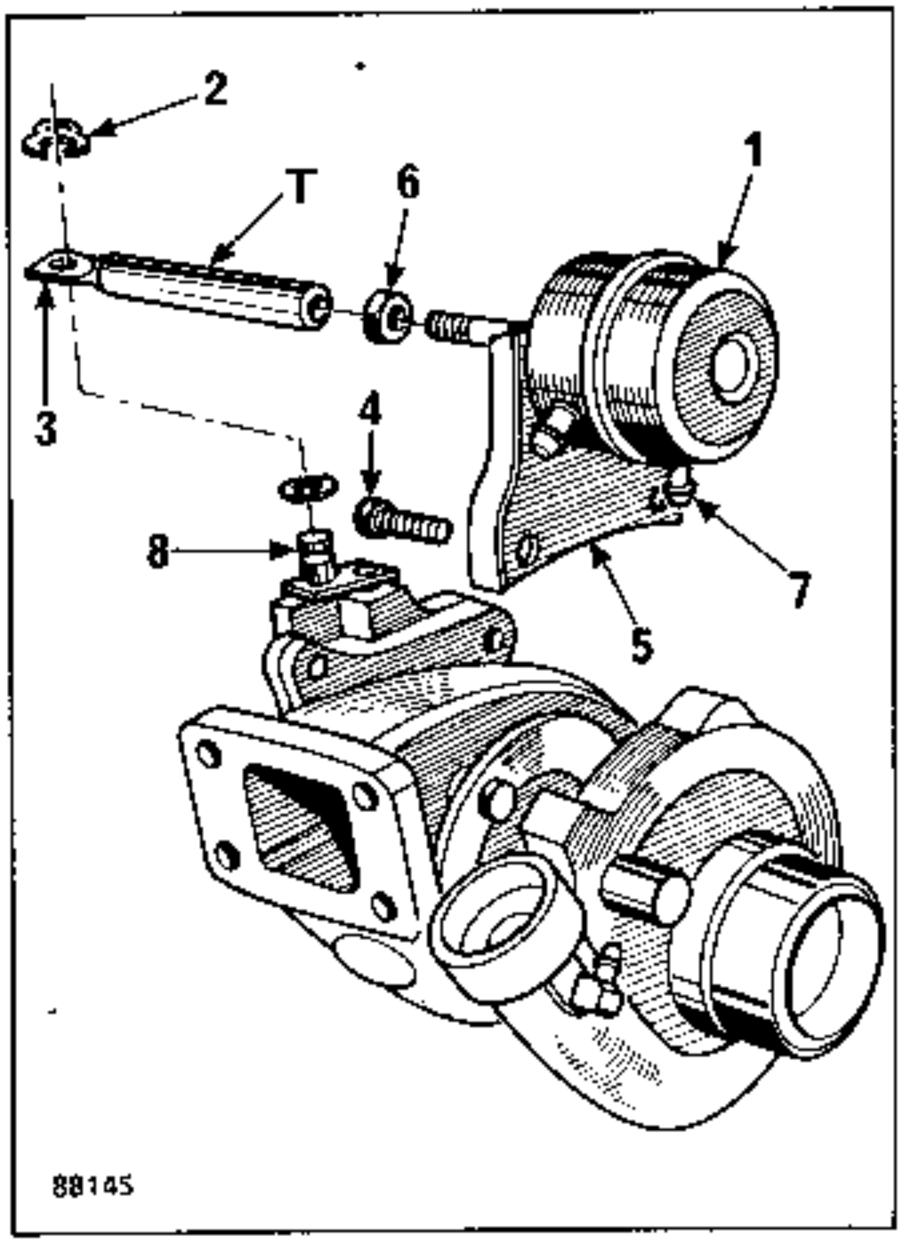
2° Increase the pressure to obtain a movement of 4 $\pm$ 0.02 mm and note the press- B.

- Pressure B = 770 ± 30 mbar
- Pressure A = 580 mbar
- Pressure C = B-A = 200 ± 25 mbar

Sample readings :

A = 580 mbar B = 775 mbar
(B) 775 mbar - (A) 580 = (C) 175 mbar

REPLACING THE REGULATOR UNIT



Disconnect the hose or hoses from the regulator unit (1).

Remove the circlip (2) and take off the screwed end (3).

Remove the securing bolt (4) and take off the regulator unit.

Place the new regulator unit in position and secure it with new bolts (tightened to 1.65 to 1.85 daN.m).
Screw the lock nut (6) and the screwed end fitting (3) on to the rod.

ADJUSTING THE CALIBRATION PRESSURE

Connect equipment Mot.1014 to connection (7) and apply the adjustment air pressure stated in the chart.

WARNING : Ensure that there is no air leak between the pressure gauge and the regulator unit.

Apply force to the valve control arm (8) to keep the valve closed.

Under these conditions, adjust the position of the end fitting (3) so that the clevice hole will just fit over the control arm (8) which is still held in the valve closed position.

Drop the pressure at connection (7) to zero.

Mount a dial indicator with a magnetic base on the end of the adjusting rod and set it on zero.

Progressively increase the pressure to obtain a movement of the adjusting rod of 0.38 $\pm$ 0.02 mm and note the pressure reading on the pressure gauge. It should be within the adjustment pressure limits stated on the chart.

On C1J-G-788 engines, check figures A and B and, finally, obtain figure C from them.

If the pressure is outside tolerances, alter the position of the screwed end fitting (3) (screw it in to increase and screw it out to reduce the pressure) to obtain the specified adjustment pressure.

Bring the lock nut (6) against the screwed end fitting (3) and tighten it to between 0.6 and 0.7 daNm.

Apply a dab of paint to the lock nut and to the screwed end fitting.

WARNING : Do not apply any paint to the smooth part of the regulator rod.

CARBURETTOR VERSIONS (EXCEPT THE C405).

ESSENTIAL SPECIAL TOOLS	
Mot. 213 -01	Pressure gauge
Mot. 453 -01	Hose clamp

METHOD OF CHECKING

Before disconnecting the pipe between the fuel pump and the carburettor, run the engine at idling speed to ensure that the carburettor float chamber is at maximum level.

Stop the engine.

Disconnect the pipe at the pump output.

Connect pressure gauge Mot.213-01 in place (provide a 6 x 8 connector and a pipe with an inside Ø of 8 mm).

Pinch flat the pipe returning to tank using clamp Mot.453-01.

The pipe should be :

- transparent,
- as short as possible.

Holding the pressure gauge as high as possible (with its pipe roughly vertical) start the engine and run it at idling speed.

When the fuel level in the pipe stabilises, lower the gauge until the fuel level is the same height as the pump diaphragm.

Note the static pressure reading.

Static pressure of pump with no output :

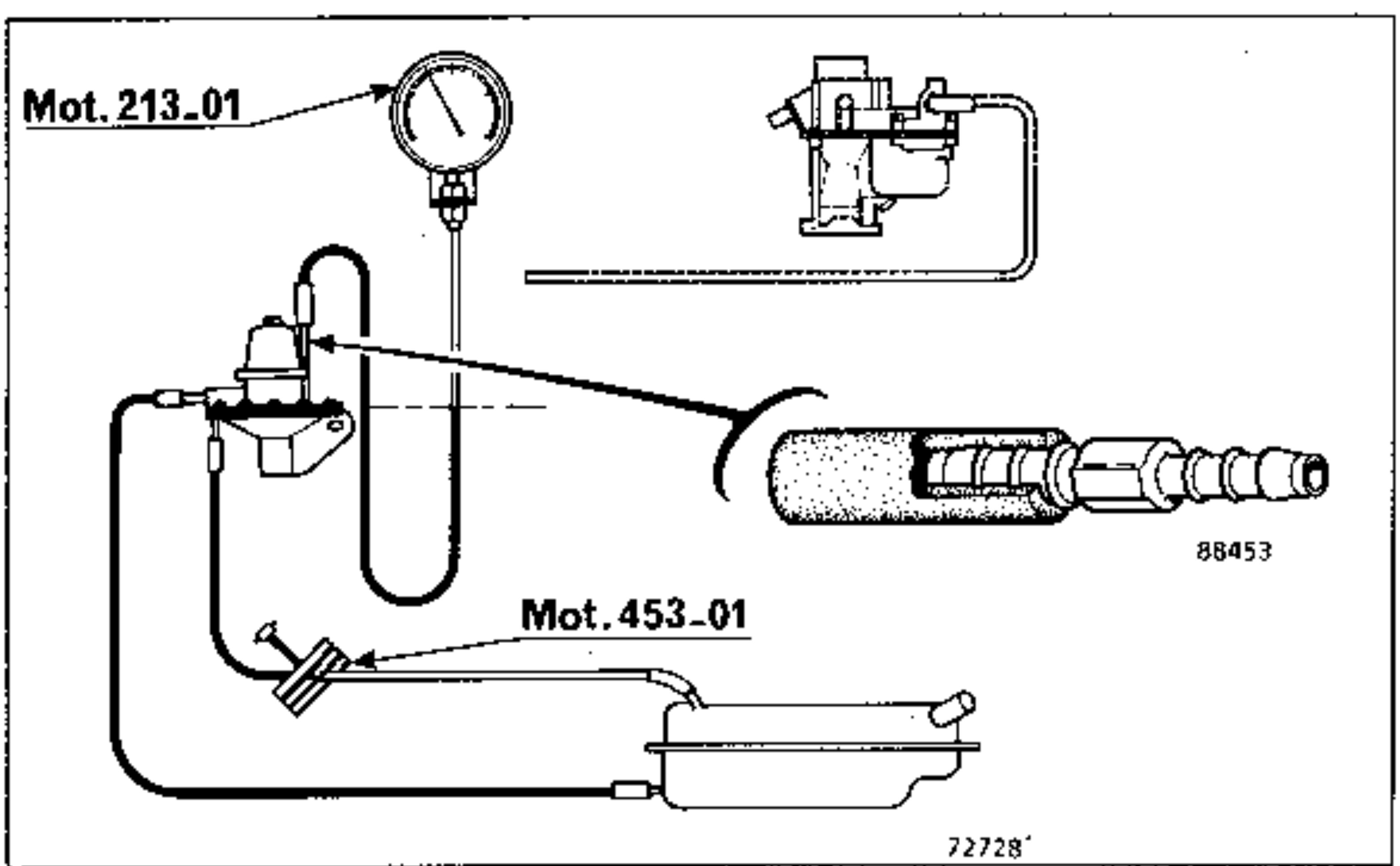
- min : 0.170 bars,
- max : 0.320 bars.

PRECAUTIONS

The pressure gauge must never be connected on a "by-pass" circuit.

Check the return to tank.

Ensure that the circuit is not blocked by unscrewing clamp Mot.453-01. The pressure should then drop by 0.01 to 0.02 bars.



C405

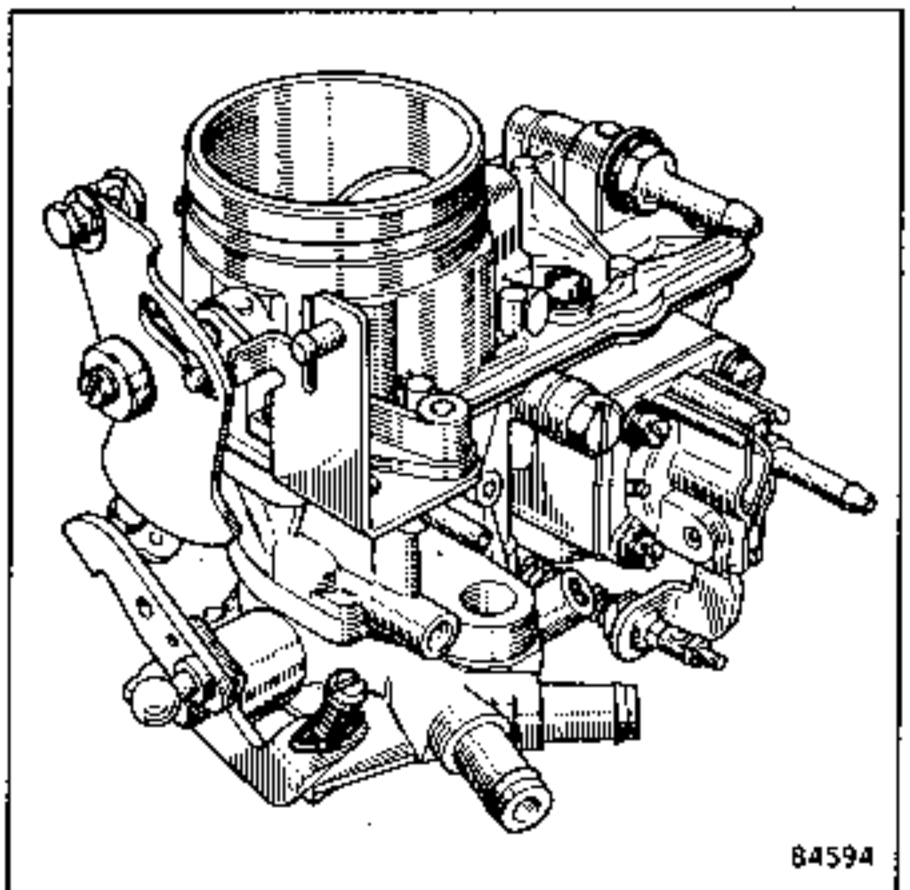
GENERAL

This single barrel carburettor is mounted on the output side of the turbocharger. All its circuits are therefore subject to turbocharging pressure.

The float chamber has no external vent. All the internal components are subject to turbocharging pressure and this means that the carburettor msut be absolutely leak-proof.

More effective seals are fitted at the following points :

- the magnesium cover and float chamber,
- the reinforced rubber float chamber gasket (0.6 mm thick),
- the throttle shaft bearings which have lip seals,
- the idling jet that has an insert equipped with a seal,
- the mixture screw which is in a well (for tamperproofing purposes) and has an O ring,
- the accelerator and enrichener pump diaphragms which are stronger,
- the gasket face between the cover and the float chamber which are stronger than those on the naturally aspirated carburettor 32 DIS.


84594

FUEL SUPPLY

The fuel is supplied by an electric pump capable of producing 60 lit/hr at a pressure of 2.5 bars and a regulator which adjusts the pressure at the needle valve to suit the turbocharging pressure.

The regulator consists of :

A : a fuel input connection bringing pressurised fuel from the electric pump.

B : an outlet carrying fuel to the carburettor.

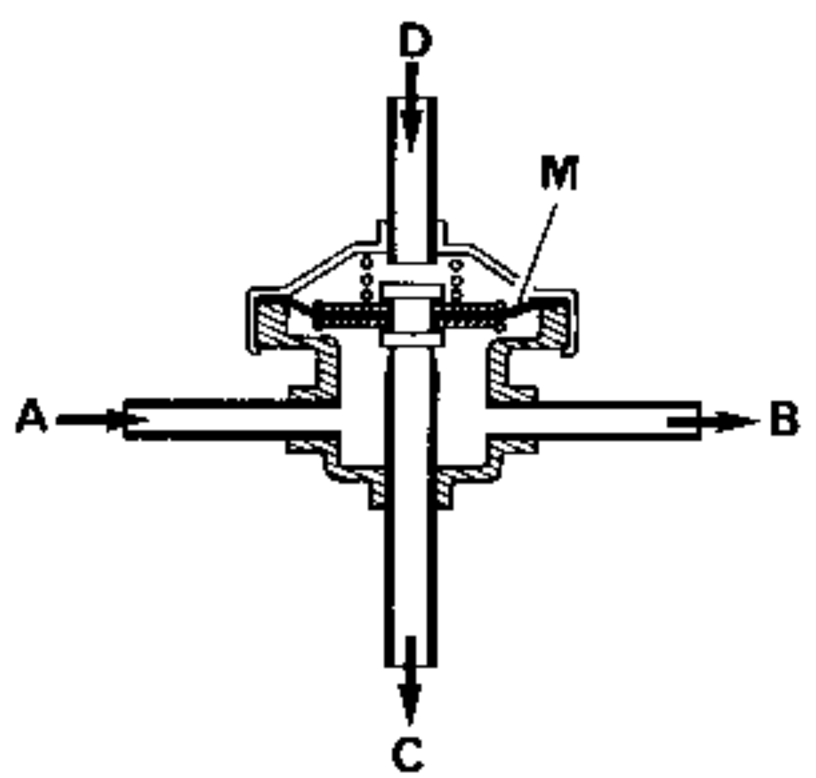
C : a return to tank connection.

D : an air intake pressure connection.

PRINCIPLE OF OPERATION

Diaphragm (M) is held down by a spring and this determines the minimum fuel pressure by blocking the return to tank. As soon as the fuel pressure rises above this figure, the diaphragm lifts and the excess fuel is returned to the tank.

When the engine is running at full load, the turbocharging pressure acts on the diaphragm to block off the return to tank until a fresh pressure balance is established between the fuel pressure and the pressure on the diaphragm.



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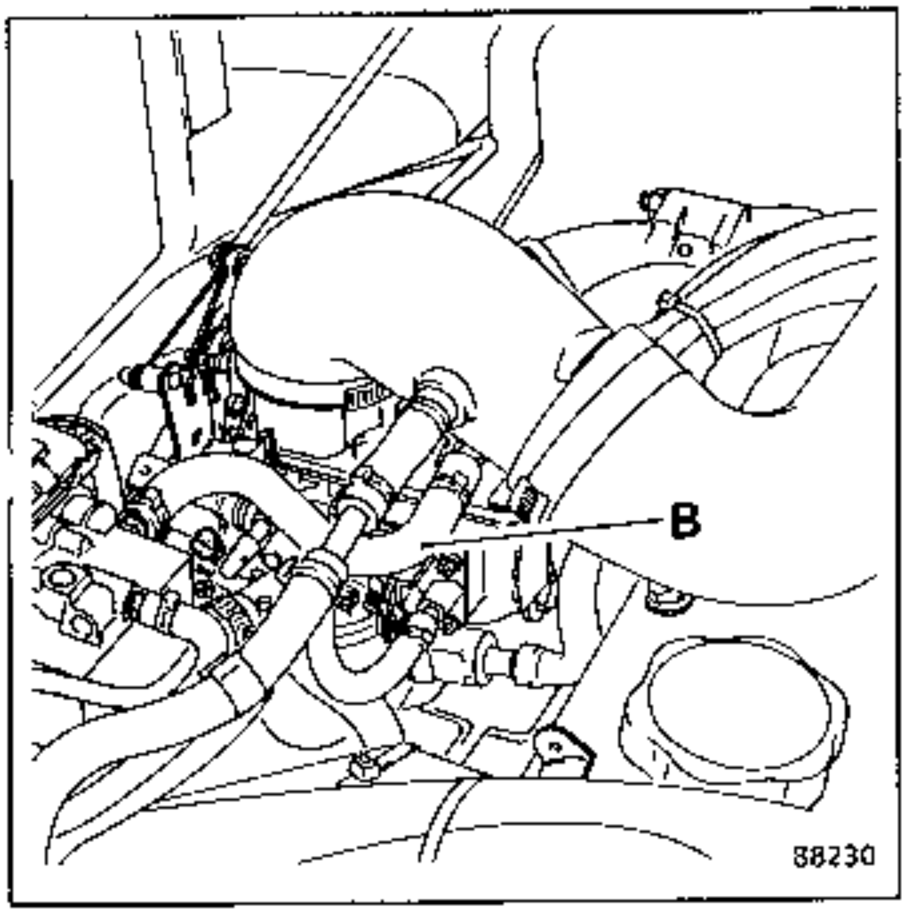
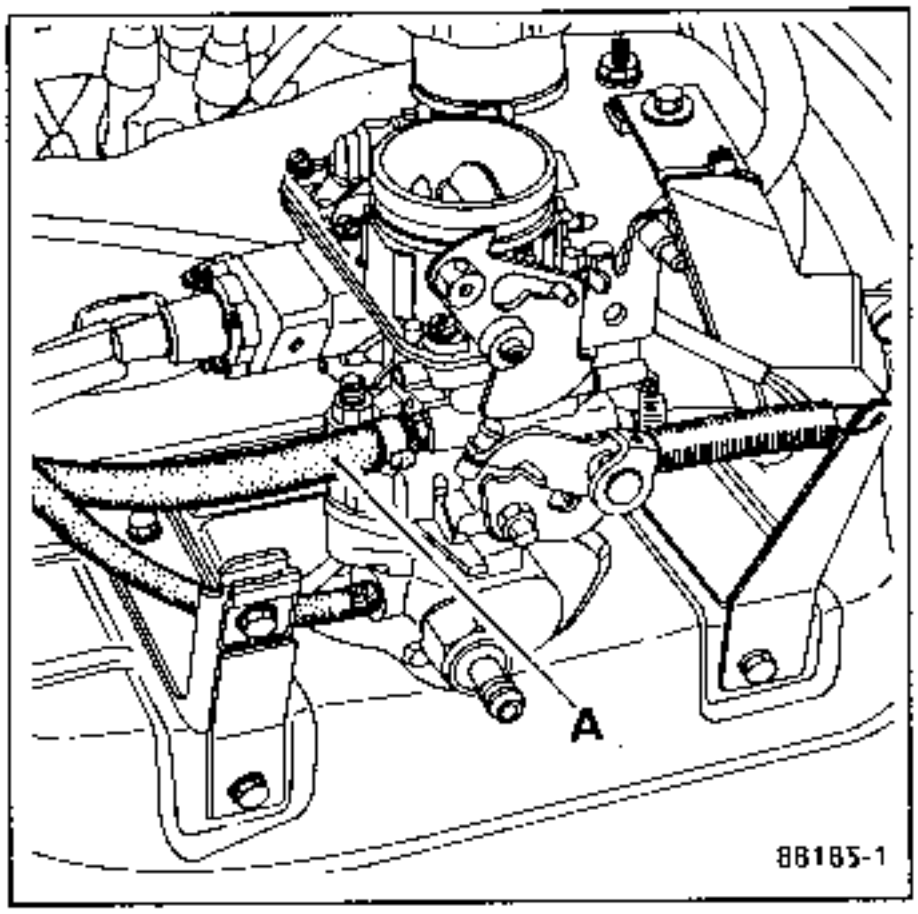
Connect pipes Mot.904 at one end to the carburettor fuel input (at B) and at the other end to the turbocharging pressure input on the carburettor (at A).
Connect the pipes of equipment Mot.904 to the pressure gauges of equipment (Mot.867 and Mot.836-05).
Bleed the air from the gauge that is to measure the fuel pressure and check that the circuit is in good condition and leakproof.





WARNING : for the fuel pressure to be correct, the pressure gauge must be roughly on the same level as the fuel pressure regulator.
Lay out the pipes so that they avoid any projections that could cut them.

- Note the fuel pressure (without any turbocharging pressure)

  Run the engine at idling speed and note down the following pressures :

  . the turbocharging pressure : zero
  . the fuel pressure : 275 $\pm$ 25 mbars

- Note down the fuel pressure and the turbocharging pressure

  Turbocharging pressure with the engine at full load. On the road with the engine speed more than :

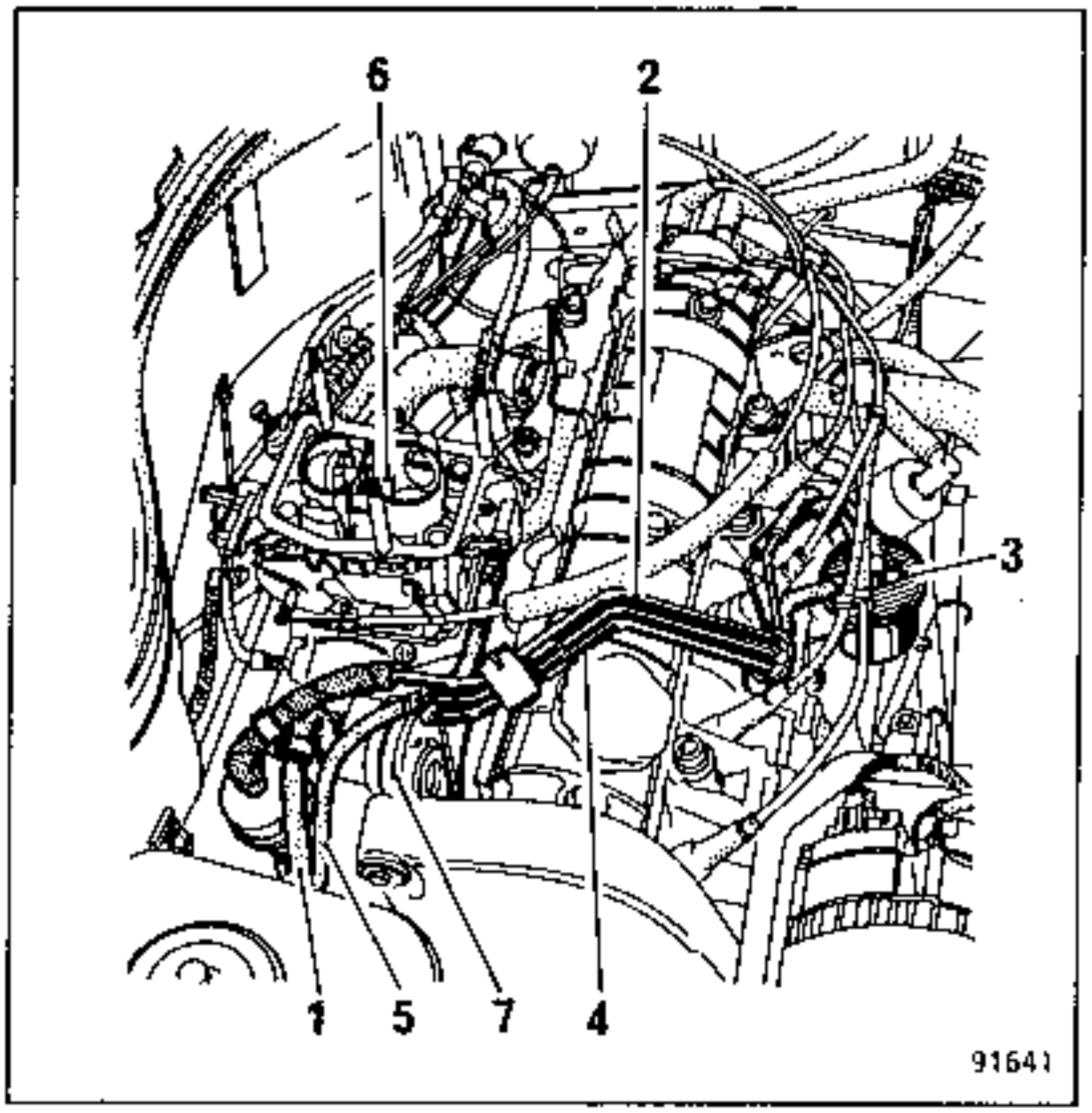
  . 3 500 rpm 680 mbars) Pressures measured at
  . 5 500 rpm 700 mbars) the A.E.I. ignition unit connection

The fuel pressure = The turbocharging pressure + the fuel pressure at idling speed.

Example :
Turbocharging pressure : 650 mbars.
The fuel pressure should be between :

650 + 275 $\pm$ 25 mbars
that is to say 900 to 950 mbars

To facilitate starting when the engine is hot, an accumulator is mounted between the fuel pump and the carburettor.



1. Input pipe chassis - fuel pump
2. Connection pipe between fuel pump and accumulator (carries the fuel filter)
3. Accumulator
4. Pipe connecting the accumulator (3) to the carburettor (6)
5. Return pipe (to tank)
6. Carburettor
7. Fuel pump

REMOVING

B, C, F 407 - B, C 408 - C 405 - C 409

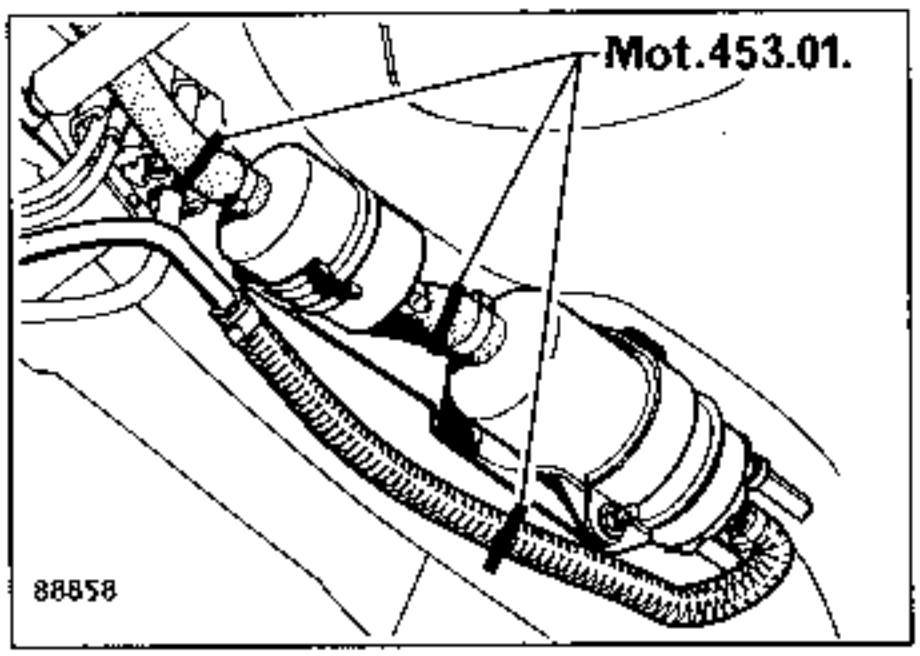
The filter is next to the fuel pump.
Fit clamps Mot.453-01 to the hoses.
Loosen the fuel pipe clips and disconnect the pipes.
Remove the fuel filter from its retaining clips.
When refitting, ensure that the direction of the fuel flow is correct.
Reconnect the hoses and refit their clips.
Remove clamps Mot.453-01.
The fuel filter is to be replaced every 20 000 km (12 000 miles) or every 40 000 km (24 000 miles) in the case of the large capacity filter (this depends on the model year).

Fuel pump

REMOVING

B, C, F 407 - B, C 408 - C 405 - C 409

This pump is mounted on the rear cross member, on the right hand side.
Fit clamps Mot. 453-01 to the fuel input and output hoses.
Disconnect the electrical wires.
Unscrew the fuel pump securing clip.
When refitting, ensure that the pipes and electrical cables are fitted the correct way round (the positive and negative terminal ends are of different cross sectional areas). Remove clamps Mot.453-01.

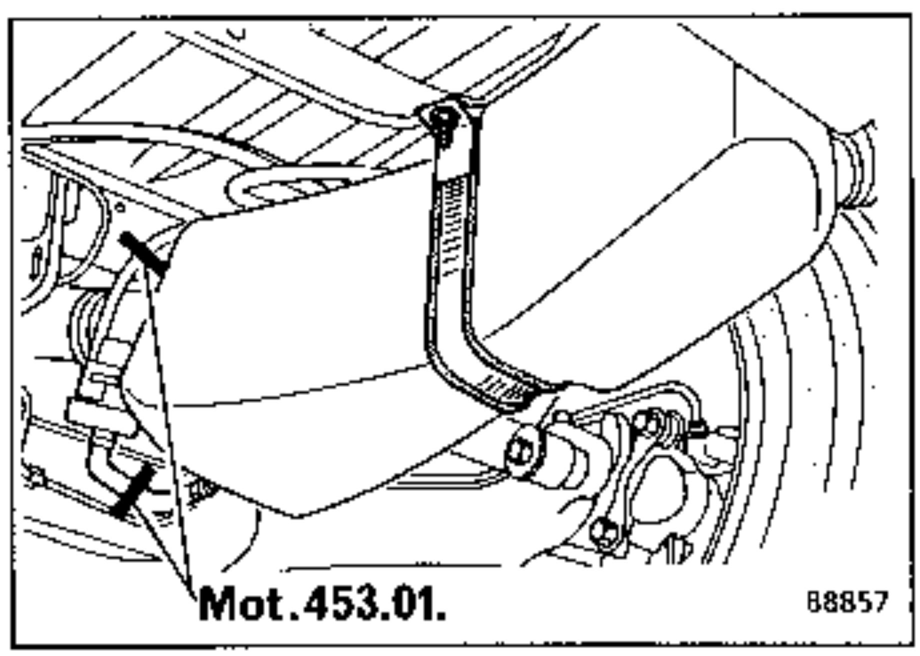


Pump on auxiliary tank

REMOVING

C 405 - C 409

This pump is mounted on the auxiliary tank.
Fit clamps Mot.453-01 to the input and output pipes.
Loosen the hose clips and disconnect the hoses.
Unplug the electrical connector.
Release the pump securing clip.
On refitting, ensure that the pump is correctly fitted into its locating slot.



REMOVING

C405

The regulator is mounted on the front right hand side member.

A : fuel supply.

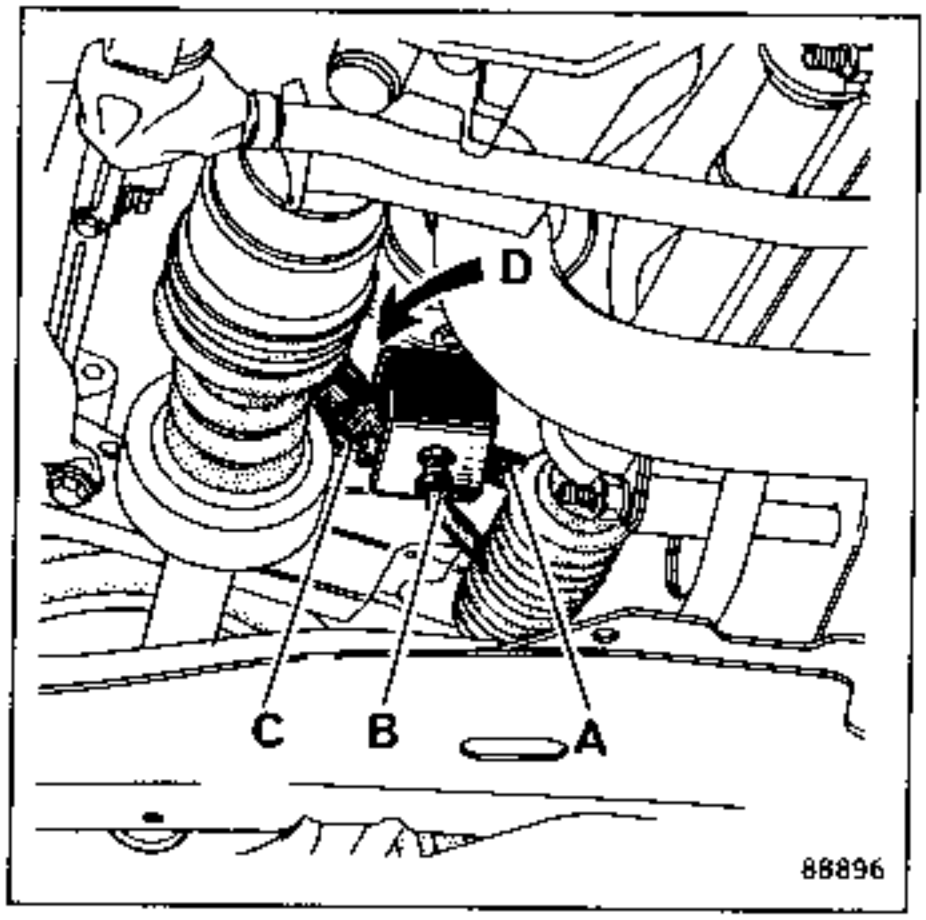
B : fuel return to tank.

C : supply to carburettor.

D : turbocharging pressure.

Remove the regulator from its support.

When refitting, replace the clips.



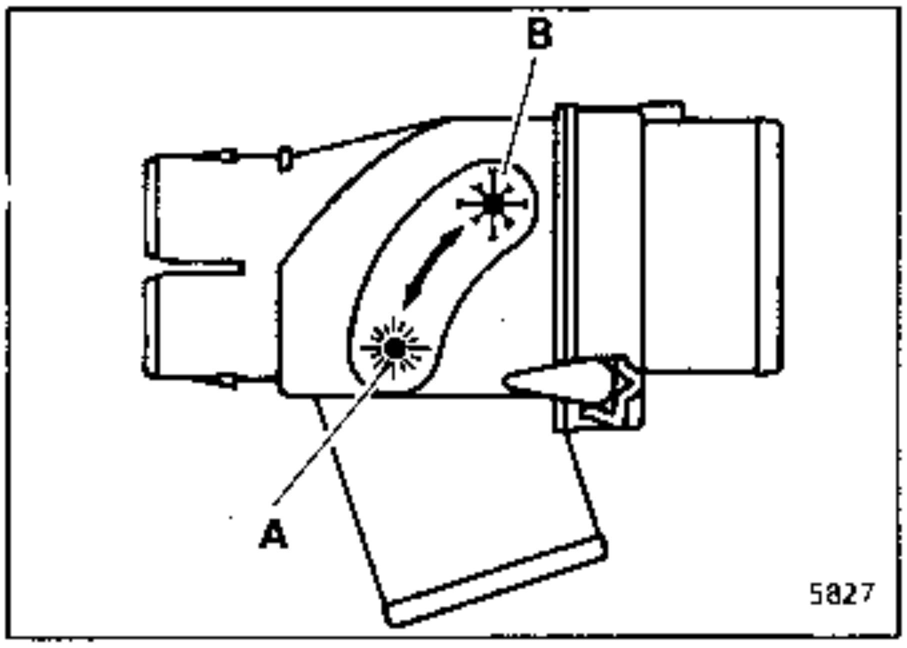
AIR INTAKE HEATING

Depending on the version, the heating system is either manual or automatic.

Manual system

This system consists of :

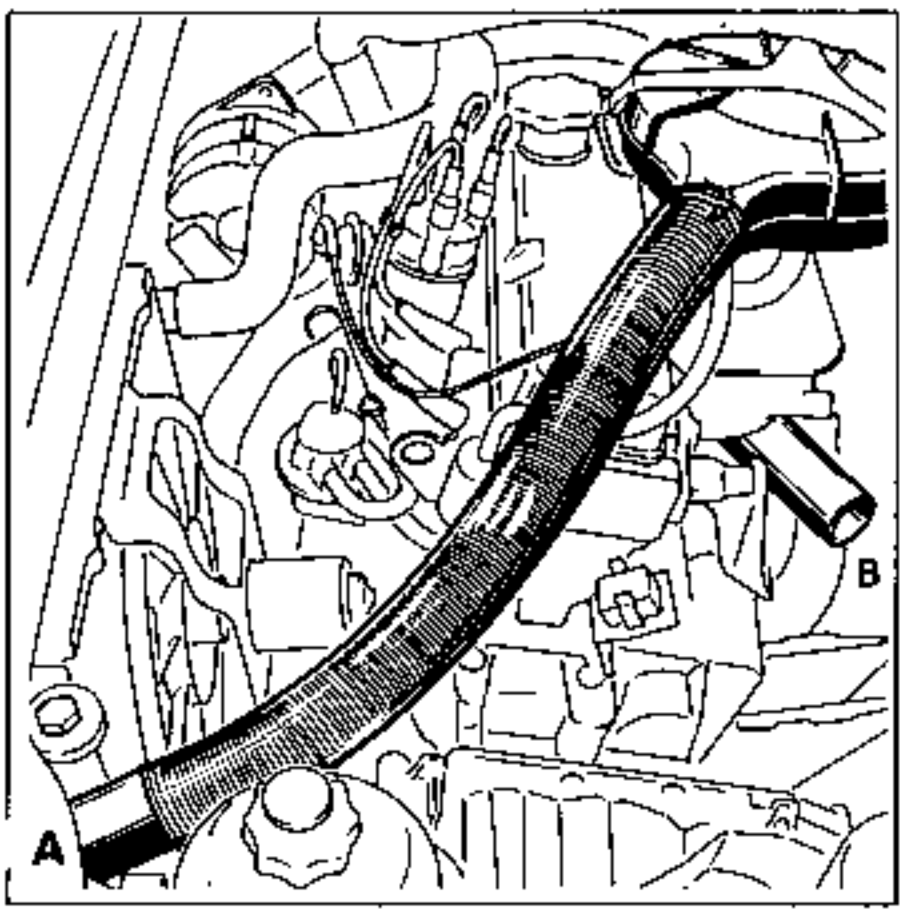
- either an air filter, with a double intake and a distribution flap for metering the amount of warm air and cold air.



A : SUMMER position (cold air).

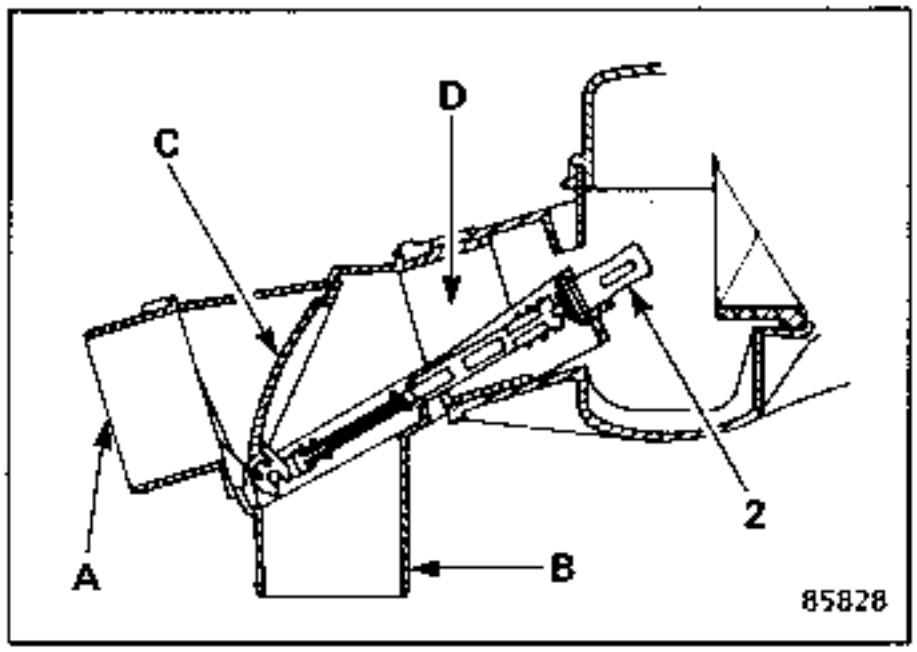
B : WINTER position (warm air).

- or a filter of the "throwaway" type comprising a pipe which is connected to point A in the SUMMER or to point B in the WINTER.



Automatic system

On this the distribution flap is controlled by a wax element (2) thermostatic system mounted on the air filter body, in the mixed air flow.



A : cold air intake.

B : warm air intake.

C : flap.

D : cold/warm air mixture to carburettor.

CHECKING

Immerse the air filter body in water up to the filter element.

After 5 minutes immersion :

- with the water at a temperature of 26°C, the flap should close off the cold air input,

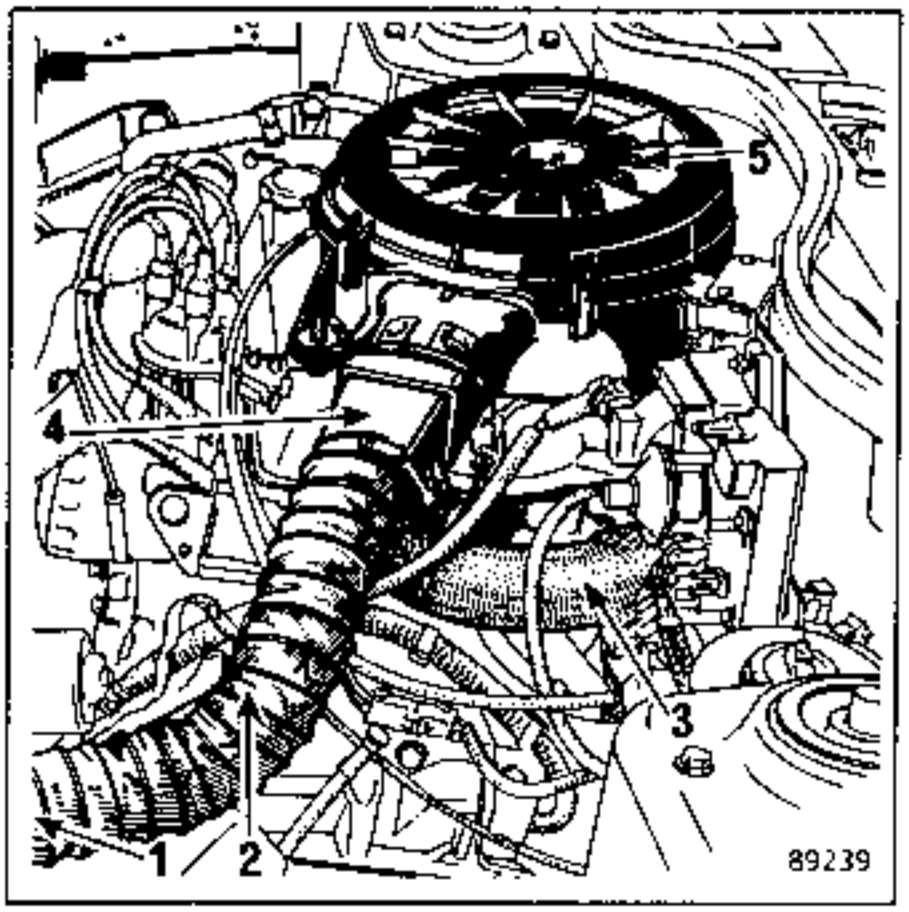
- with the water at 36°C, the flap should close off the warm air input.

ADJUSTING

The flap opening is not adjustable.

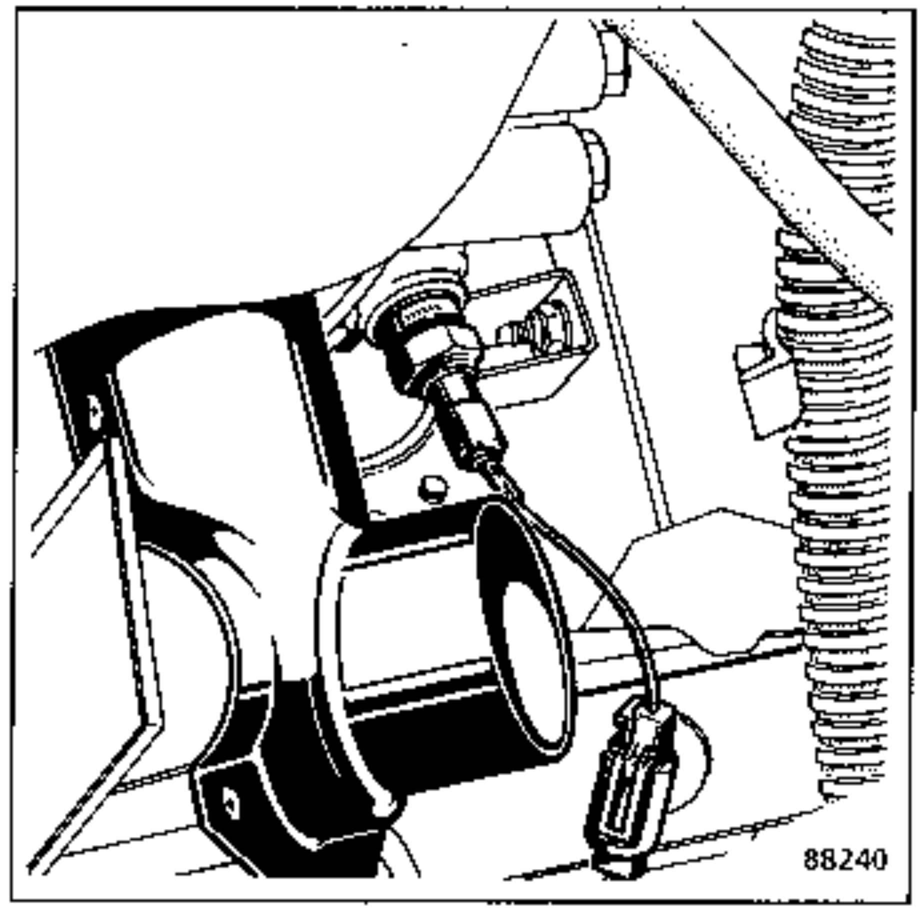
Replace the distributor flap/thermostatic element assembly in case of defect.

SPECIAL FEATURES :
C3J engine.



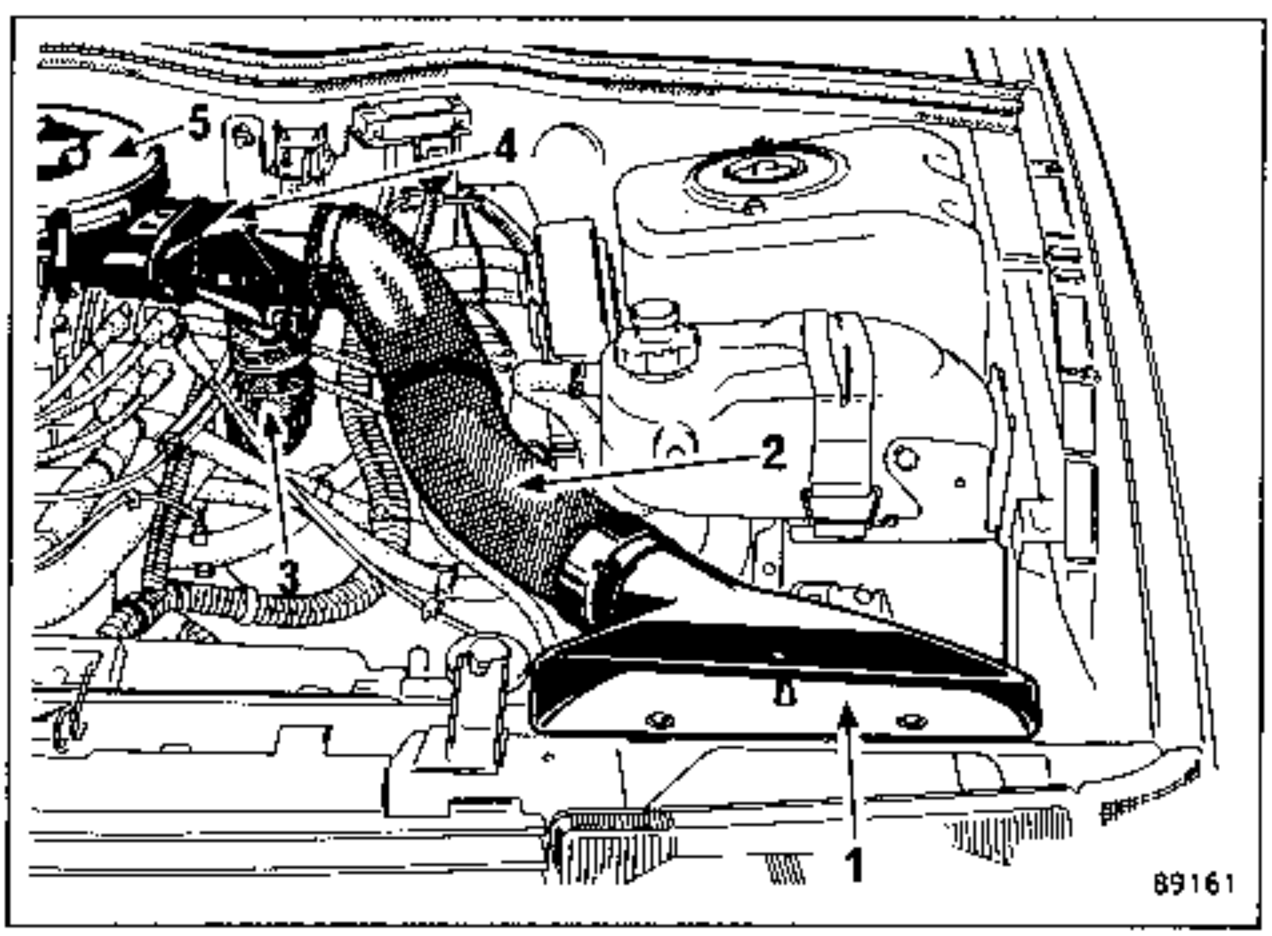
1. To cold air intake
2. Cold air ducting
3. Warm air ducting
4. Regulator unit
5. Air filter

C3J, F3N single point injection engines.
Warm air intake casing.



NOTE : the warm air intake casing is crimped to the manifold.

F3N single point injection engines

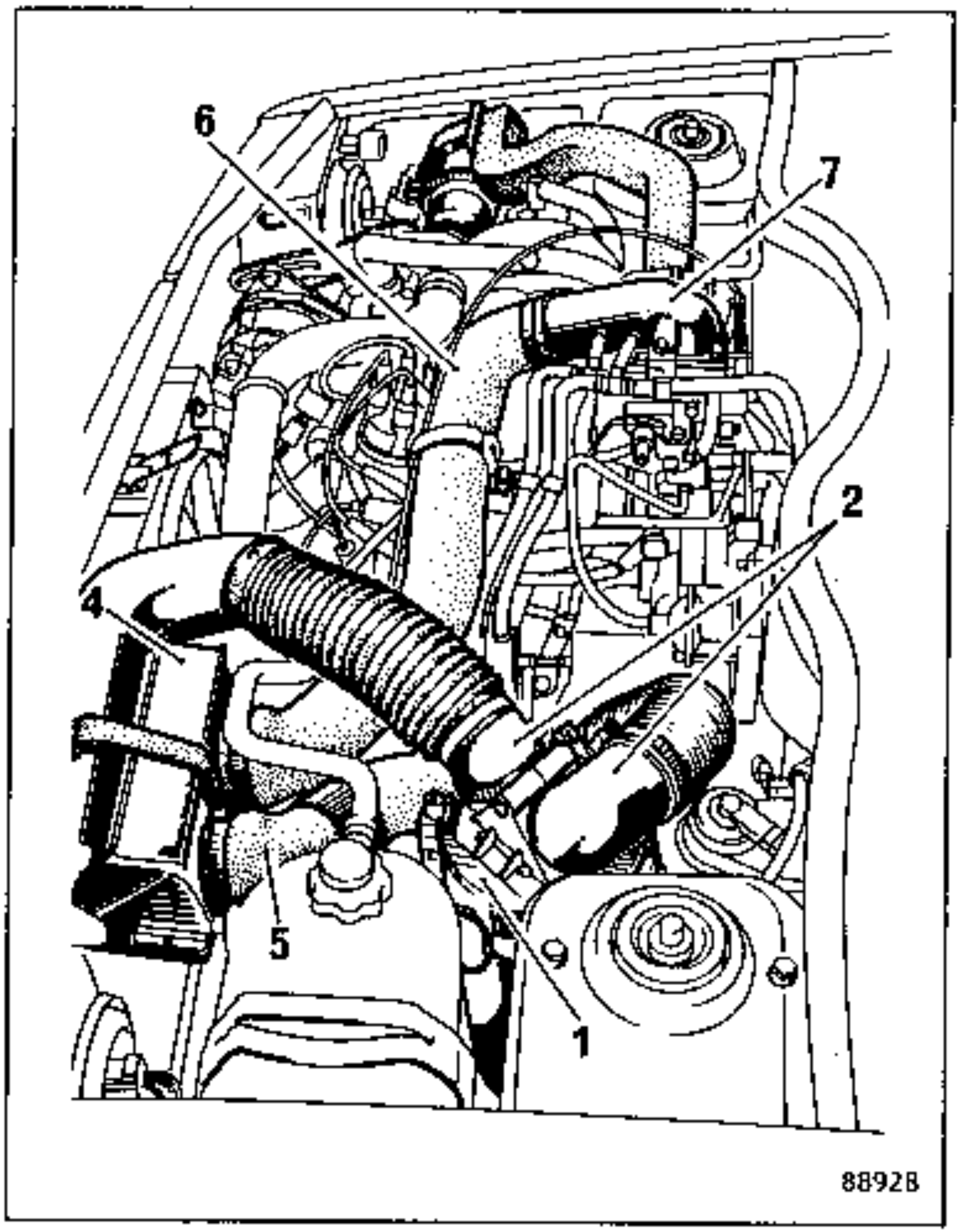


1. Intake casing
2. Cold air ducting
3. Warm air ducting
4. Regulator unit
5. Air filter

The air intake system consists of :

- a thermostatically controlled air filter (1) with a double warm air/cold air system (2), 26-32°C.
- a turbocharger that blows air into the intercooler (4) down ducting (5),
- an intercooler (4) with a thermostatic capsule that closes off the air flow through the intercooler when its temperature is lower than 43 ± 2°C. When the temperature of the air is above 47 ± 2°C, all the air passes through the intercooler,
- the air ducting (6) is secured to the casing (7) which is, in turn, secured to the carburettor at 3 points. The seal between the casing and the carburettor cover consists of an O ring.

NOTE : as the circuit between the turbocharger and the carburettor is subject to turbocharging pressure, the hose clips must be correctly tightened. After removing or replacing a pipe, ensure that it is absolutely dry before fitting.

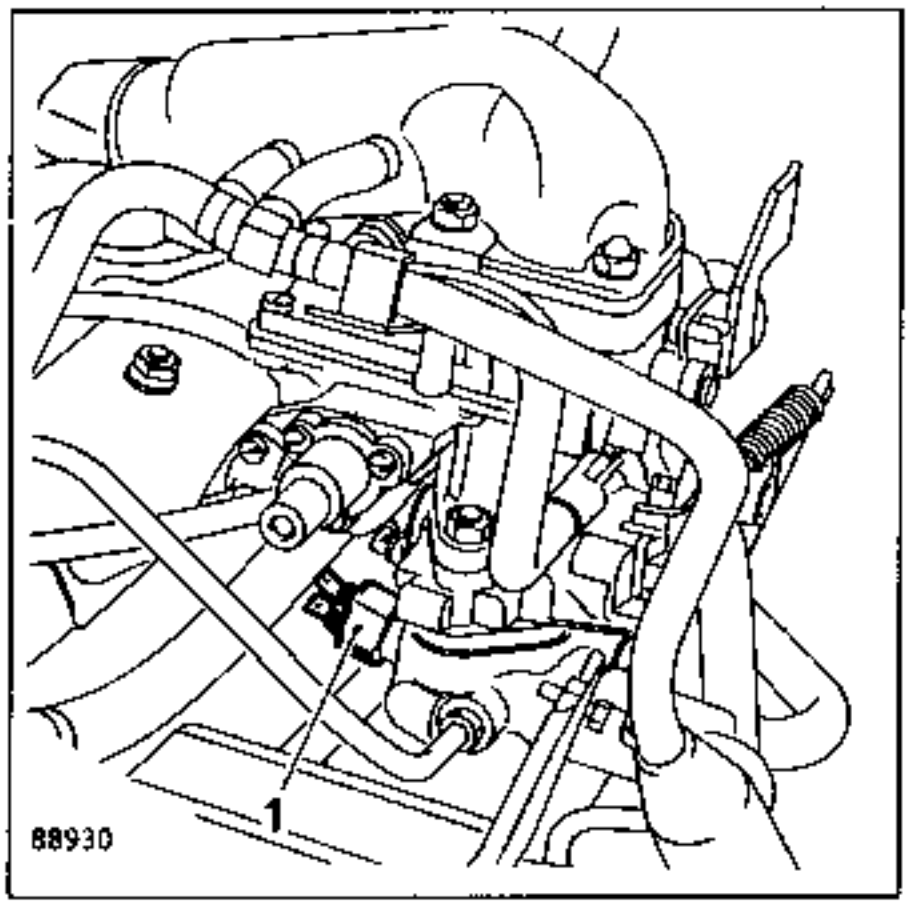


Engines C1J-C-782 and 784

The vehicle is equipped with a carburettor ventilation and pressure regulator system.

A 95/89°C temperature switch mounted on the inlet manifold, near the carburettor, controls the switching on and off of an anti-percolation fan mounted on the right hand inner wing of the vehicle and supplied with current taken before the ignition switch.

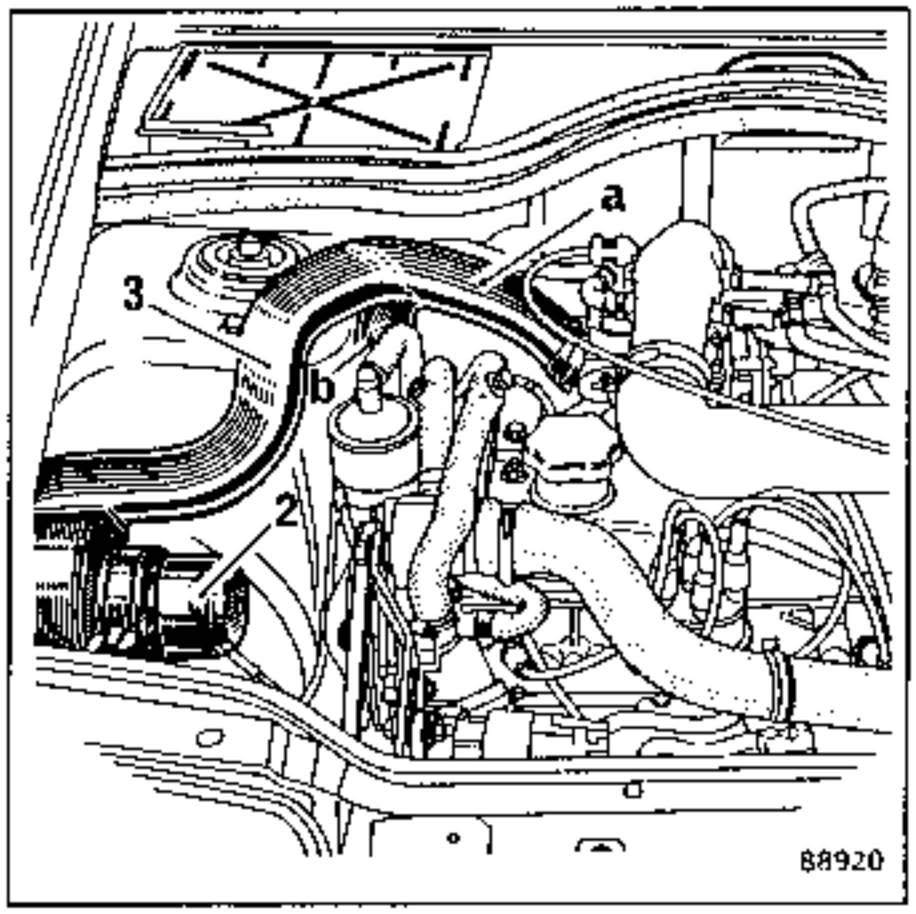
Whenever carrying out any work on the system, disconnect the battery.



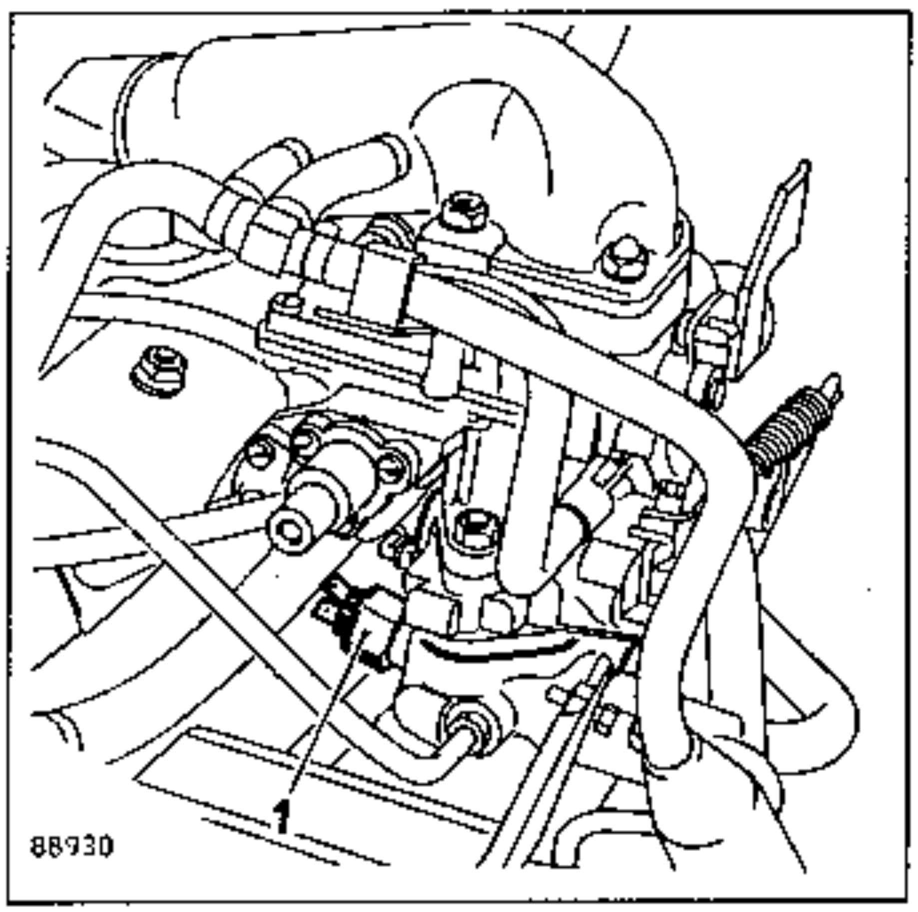
Engine C1J-G-788

The vehicle is equipped with a system for ventilating the carburettor and the air intake ducting on the input side of the carburettor.

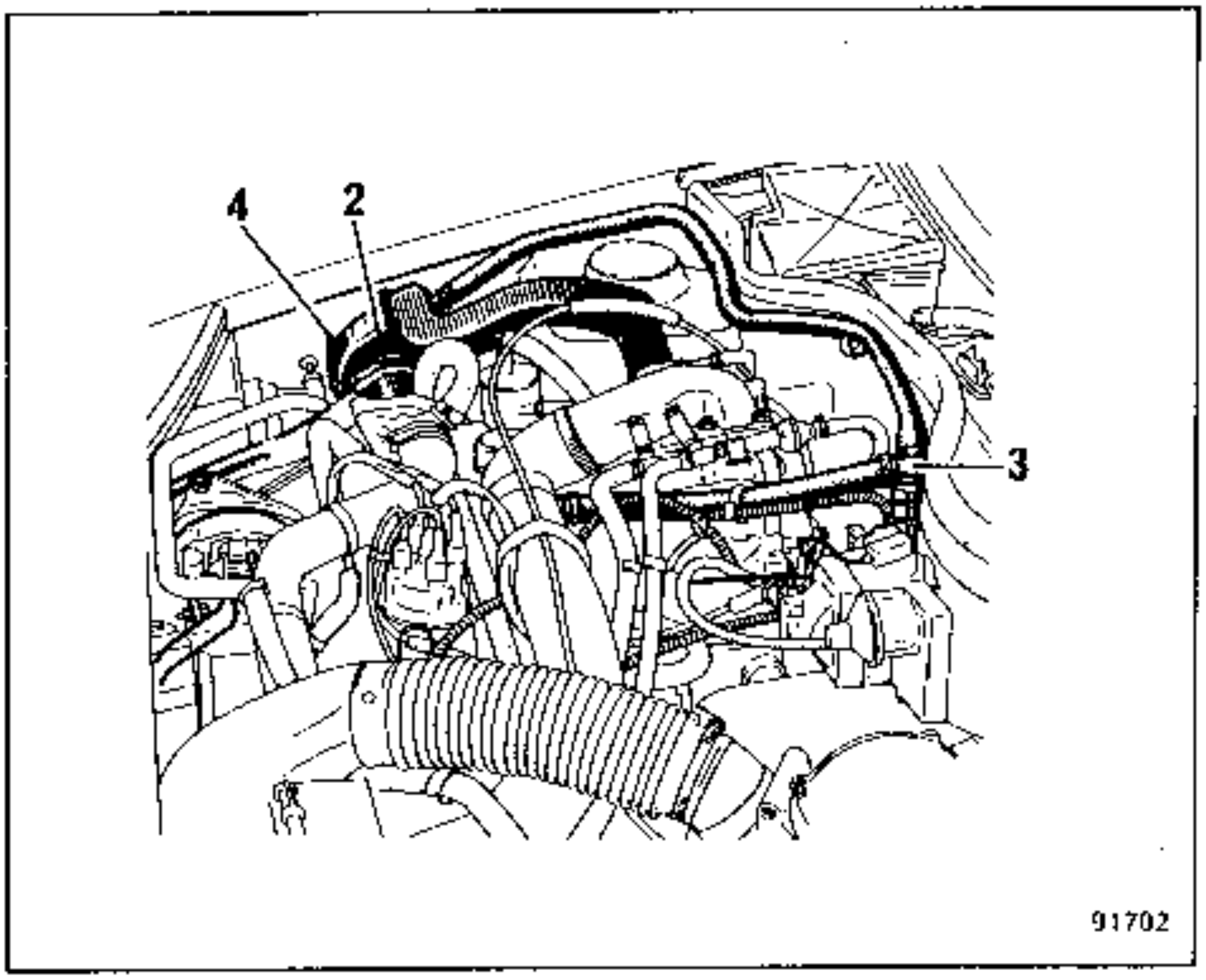
A 90/84°C temperature switch (1) mounted on the inlet manifold near the carburettor switches on and off an anti-percolation fan (2) mounted on the right hand inner wing of the vehicle and supplied from the input side of the ignition switch.



1. 95/89°C temperature switch
2. Anti-percolation fan unit
3. Ventilation ducting
   a : to carburettor
   b : to fuel pressure regulator



Engine C1J-G-788 (continued)

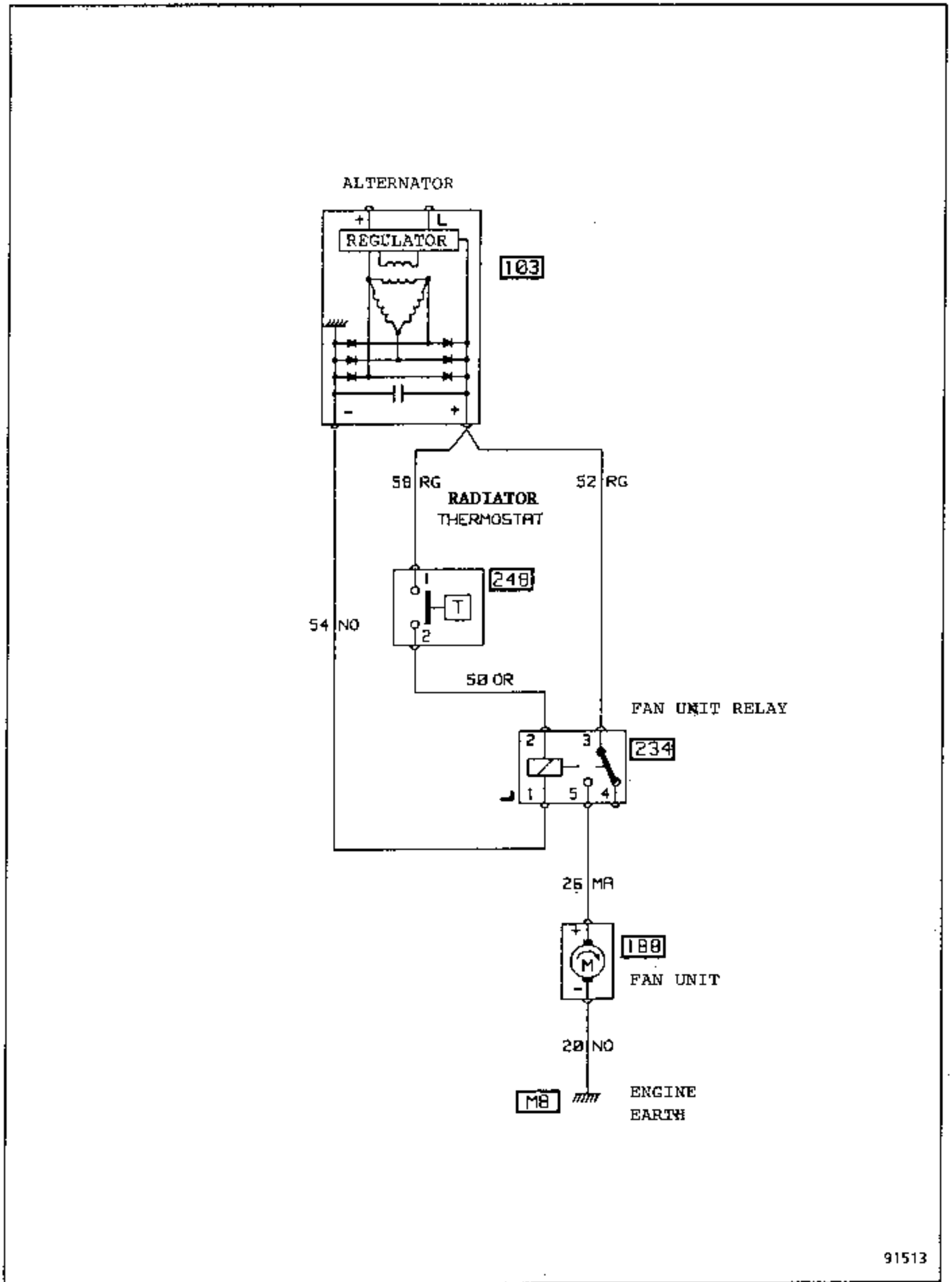


A - When the engine is not running, the anti-percolation relay 279 supplies solenoid valve 169 with current to provide an air flow through the intake ducting.

B - When the engine is running, relay 279 cuts off the supply to the solenoid valve 169 and the air ventilation circuit is shut off.

NOTE : if the temperature in the inlet manifold is lower than 84°C, temperature switch 272 cuts off the supply to fan unit 188 and to solenoid 169 whether the engine is running or not.

1. Temperature switch (item 272) see preceeding page
2. Electric fan (item 188)
3. Solenoid valve (item 169)
4. Anti-percolation relay (item 279).


ALTERNATOR
+
L
REGULATOR
103
-
+
58 RG
52 RG
RADIATOR
THERMOSTAT
1
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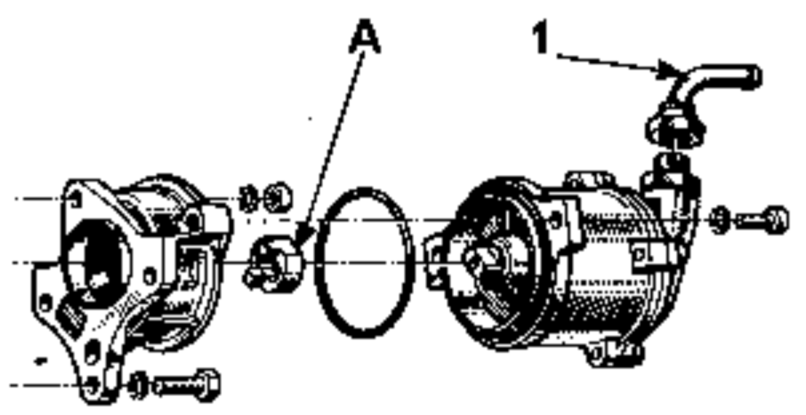
54 NO
50 OR
FAN UNIT RELAY
2
3
234
1
5
4
26 MA
+
M
-
188
FAN UNIT
20 NO
M8
ENGINE
EARTH
91513

ESSENTIAL SPECIAL TOOLS	
M.S. 870	Vacuum gauge

This operation is carried out on the vehicle

CHECKING

Disconnect the pipe (1) from the suction side of the pump and connect vacuum gauge M.S.870 in its place.



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CHECKING

With the engine warm and running at 4 000 rpm, the minimum vacuum should be 700 mbar. (525 mmHg) after 3 seconds.

Replace the drive dog (A) whenever replacing the exhauster pump.

NOTE : the complete servo system is checked in exactly the same way as on the other vehicles in the range.

Oil grade to be used in the system :

ELF RENAULTMATIC D2
or MOBIL ATF 220
or TOTAL DEXTRON

CAPACITY : 1.1 litres

Filling the system :

Fully fill the reservoir.

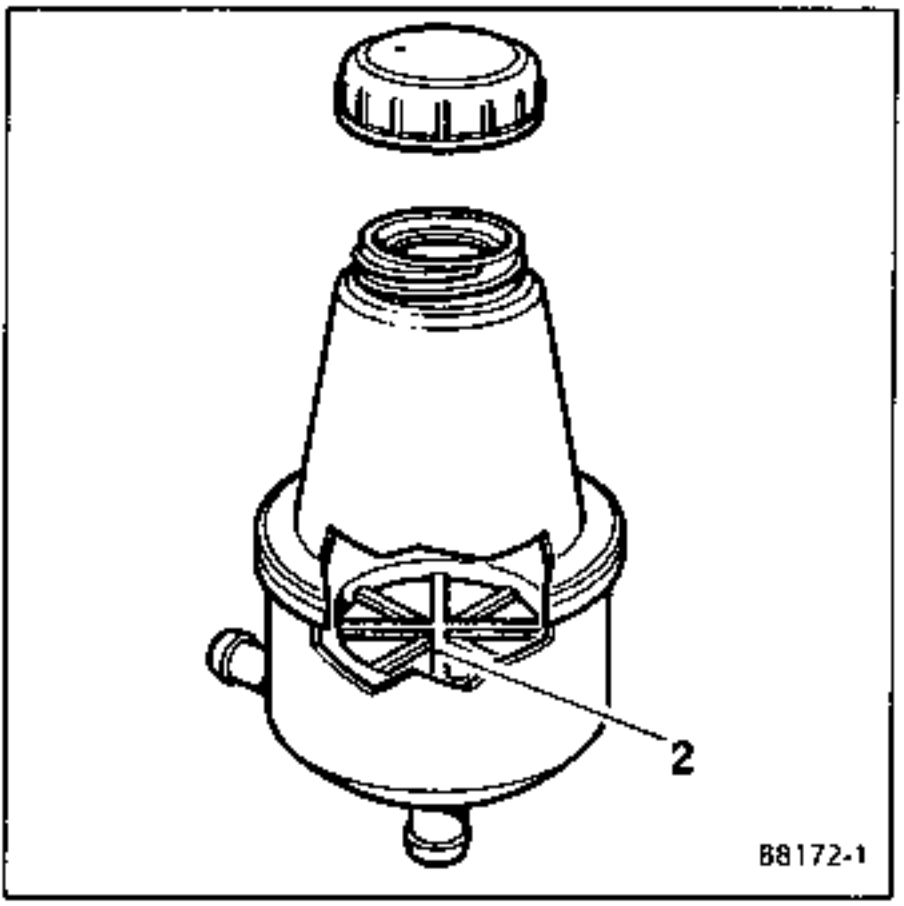
Gently turn the steering in both directions.

Top-up the level.

Start the engine and gently move the steering from one full lock stop to the other.

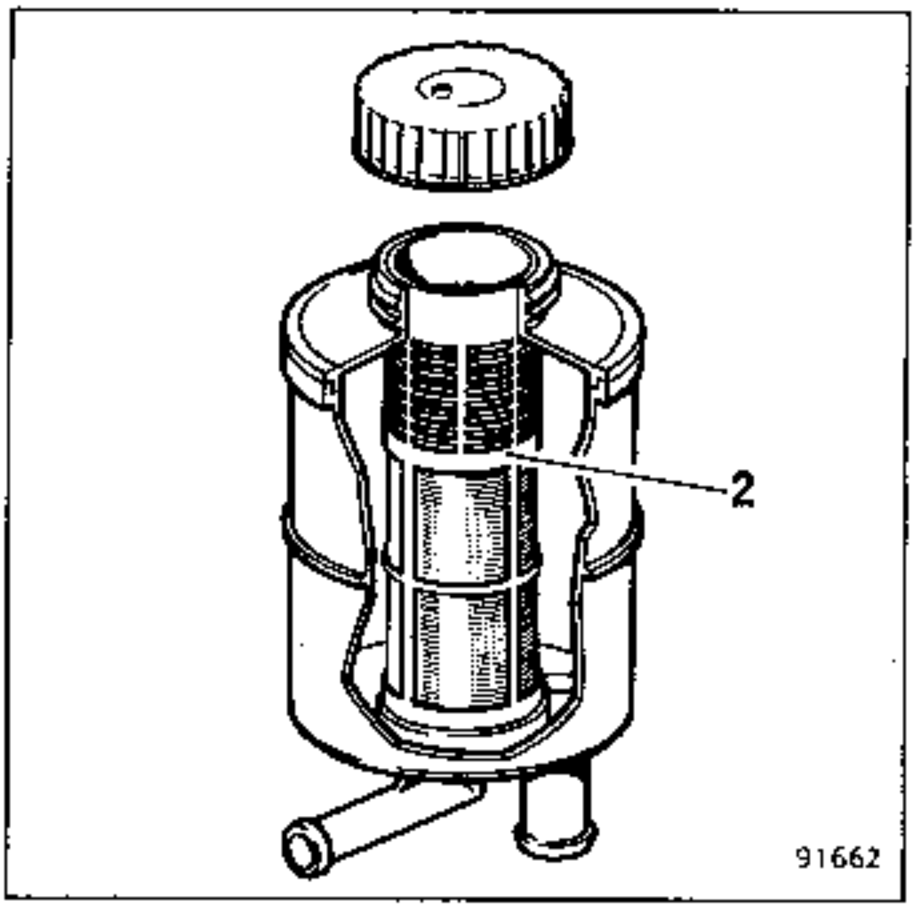
Top-up the system.

1st arrangement



The oil should come up to the grille (2).

2nd arrangement



The oil should come up to the pad (2) on the filter sleeve.

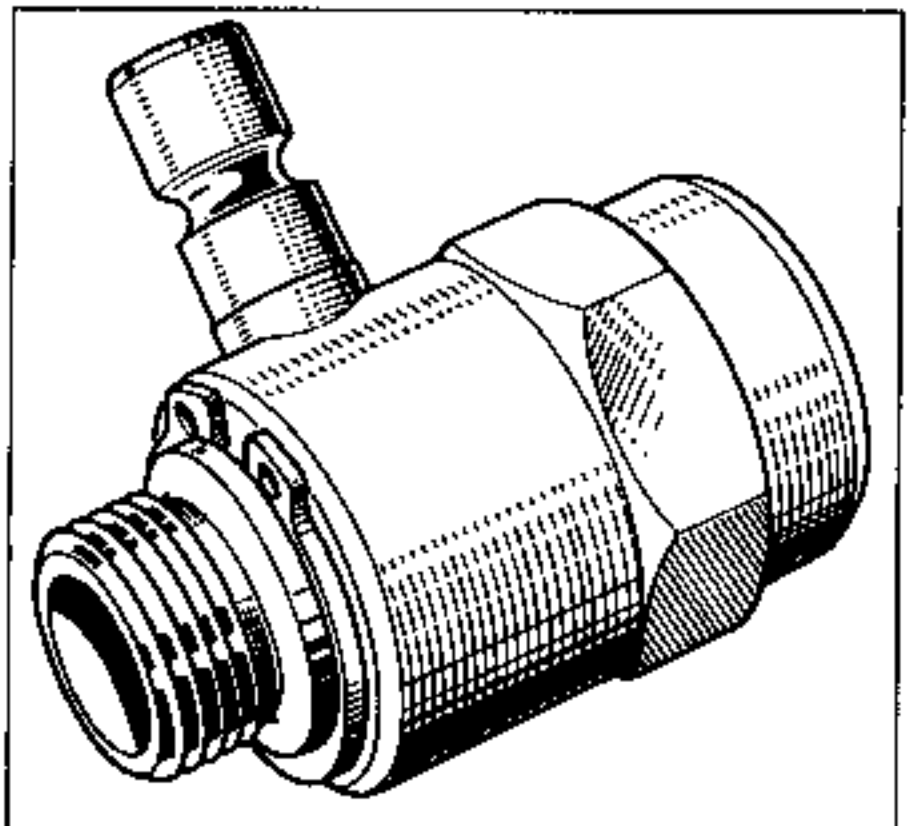
CHECKING THE OIL PRESSURE

ESSENTIAL SPECIAL TOOLS	
Mot. 453 -01	Hose clamps
Dir. 803	Union with metric thread
Fre. 1085	Pressure gauge
or	
Fre. 244 -04	

Place one clamp Mot.453-01 on the pump low pressure hose.

Disconnect the high pressure hose (provide a container to catch the oil).

Place union Dir.803 (with a metric thread) between the hose and the pump.



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Connect in pressure gauge Fre.1085 or Fre. 244-04.

Remove clamp Mot.453-01.

Top-up the pump oil level and run the engine to check the pressure.

The wheels must be in the straight ahead position :

Whatever the engine speed, the pressure must not exceed 5 to 7 bars.

With the wheels turned through full lock to one side :

Hold the wheels at full lock to one side. The maximum pressure should be 79 to 86 bars.

This operation is not to be prolonged as this could cause the oil to overheat.

Remove union Dir.803 and pressure gauge Fre.1085 or Fre.244-04 after cutting off the supply to the pump with clamp Mot.453-01.

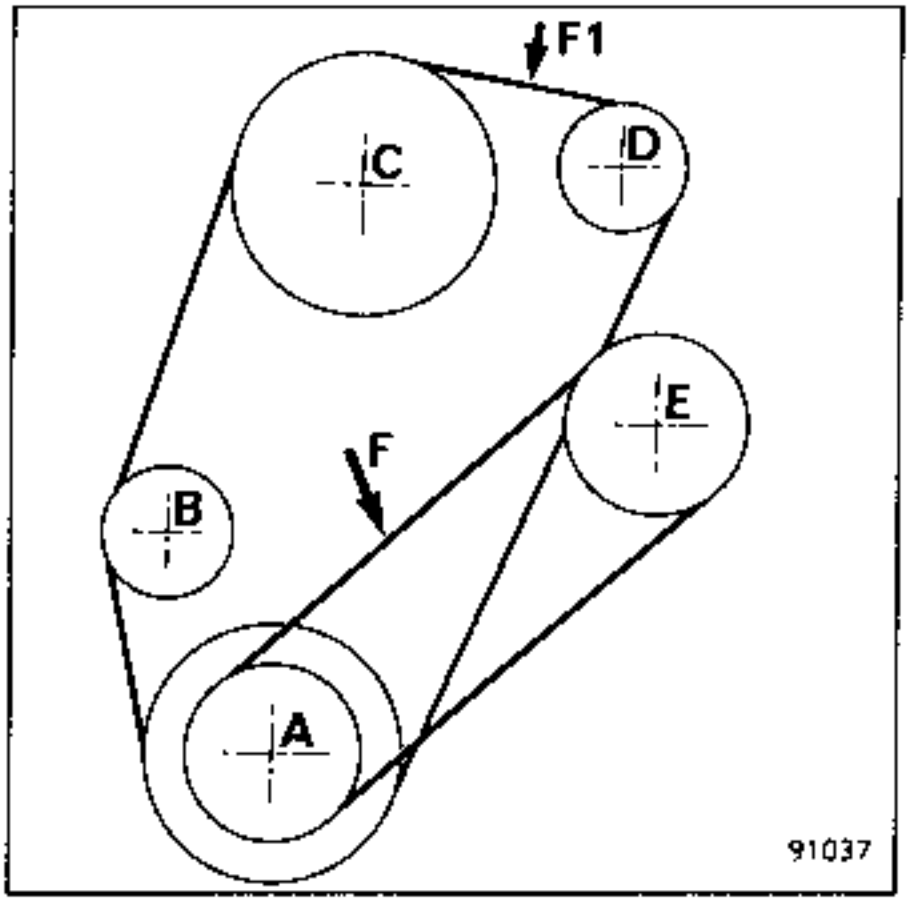
Reconnect the high pressure hose and remove clamp Mot.453-01.

Top-up the level of the oil in the reservoir.

ADJUSTING THE BELT TENSION

ESSENTIAL SPECIAL TOOLS	
Elé. 346-04	Belt tension tester

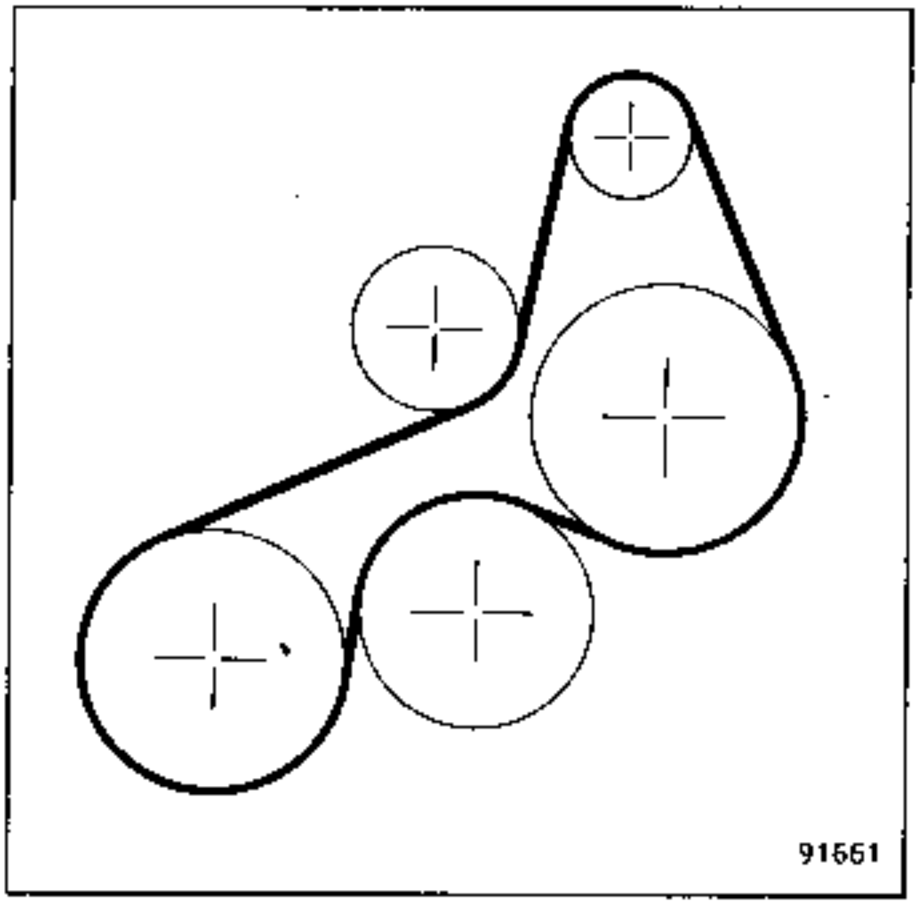
ARRANGEMENT ON TYPE C ENGINES



A. Crankshaft pulley
B. Tensioner roller
C. Coolant pump pulley
D. Alternator pulley
E. Power steering pump pulley

Required deflection :
- cold → 3.5 to 4.5 mm
- warm → 5.5 to 6.5 mm

ARRANGEMENT ON TYPE F ENGINES (petrol)



A. Crankshaft pulley
B. Tensioner roller
C. Alternator pulley
D. Power steering pump pulley
E. Coolant pump -pulley

Required deflection :
- cold → 3.5 to 4.5 mm

ESSENTIAL SPECIAL TOOLS	
Mot. 453-01	Hose clamps

REMOVING

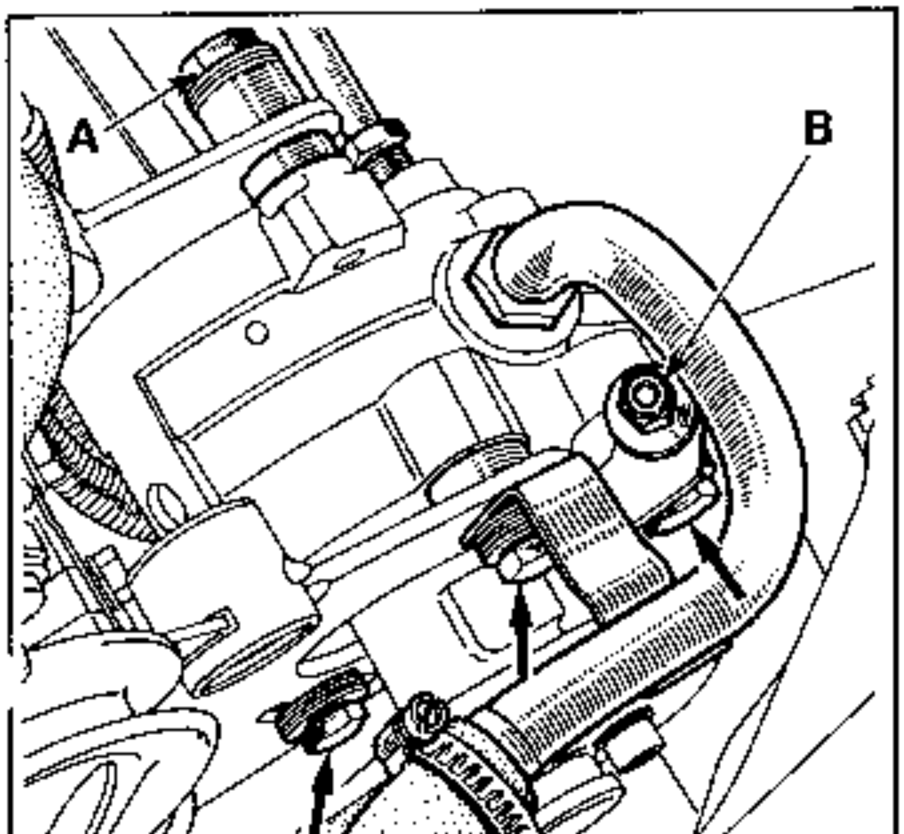
Remove the alternator (see section 16).

Place a clamp Mot.453-01 on the supply hose.

Loosen the four pump and tensioner securing points.

Fully slacken off the belt at (B).

Disconnect the pressure switch from its connector.



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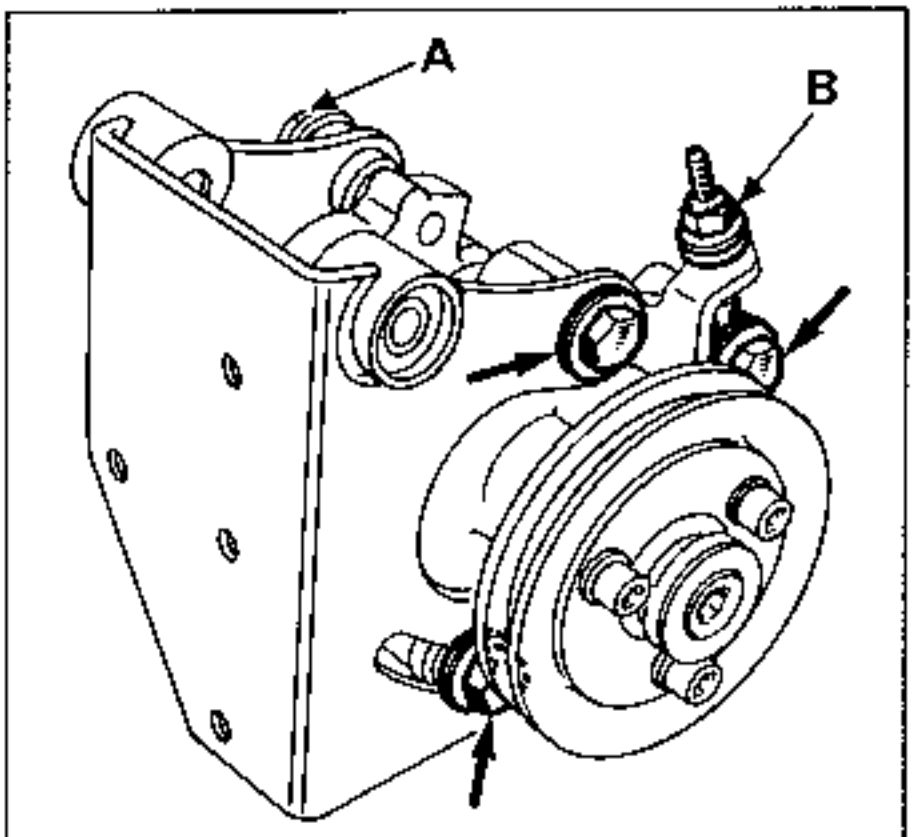
Disconnect and remove the following pipes :

- supply,
- high pressure, removing screw (A) and taking care not to lose the spacer.

Remove :

- the three other pump and tensioner securing bolts, taking care not to lose the spacers.



91033

- the pump, after first taking off its belt.

If the pump is to be replaced, remove the pulley (see the corresponding section).

REFITTING

If the pump is being replaced, fit :

- the pulley (see the corresponding section),
- the pump and the tensioner,
- the supply and high pressure pipes (reconnect the pressure switch).

Remove the clamp Mot.453-01.

Adjust the belt tension (see the corresponding section).

Fill and bleed the system (see the corresponding section).

ESSENTIAL SPECIAL TOOLS	
Mot. 453-01	Hose clamps

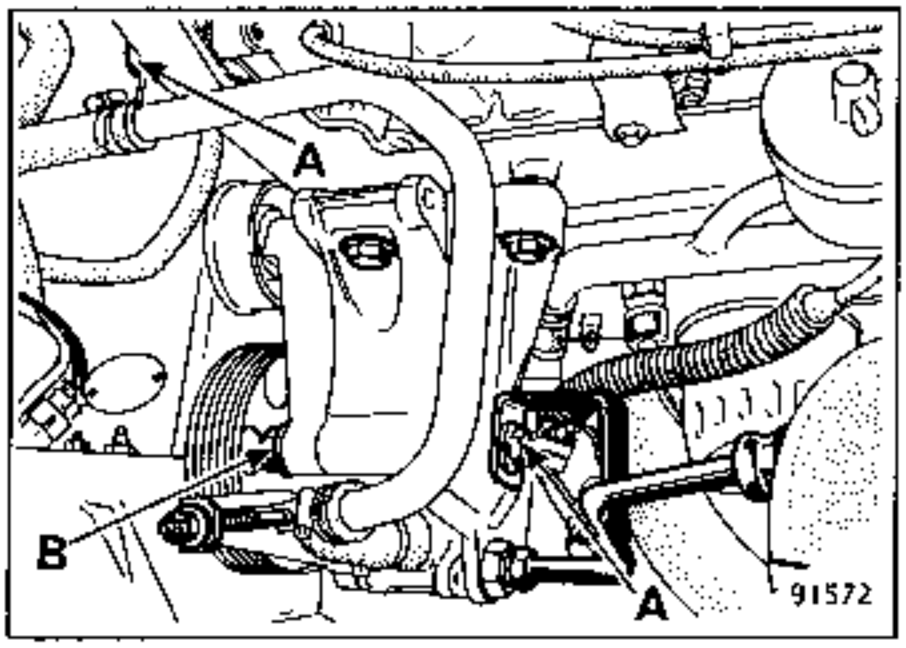
REMOVING

Remove the alternator (see section 16).

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

Remove the two screws (A).

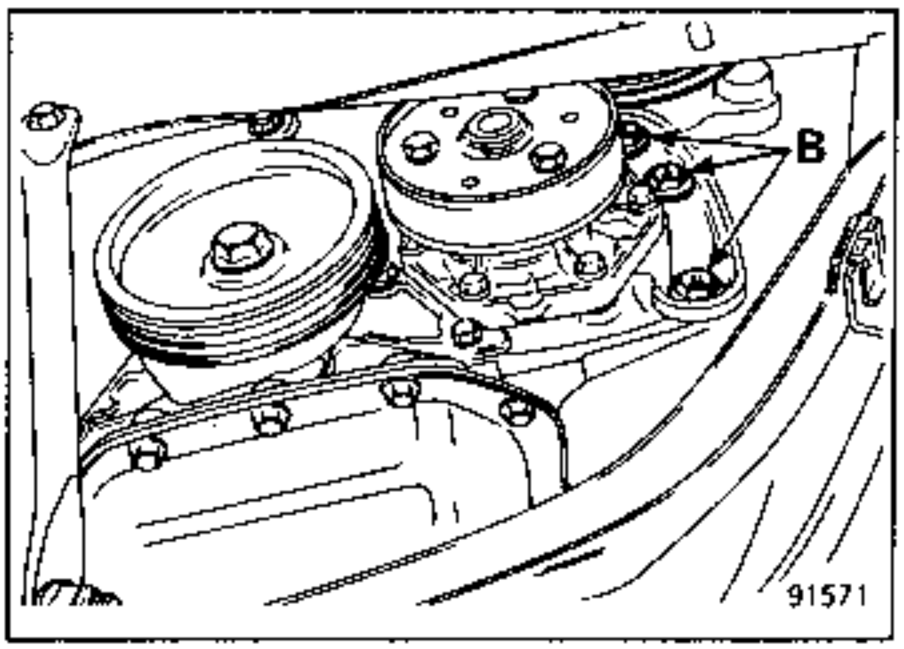
Disconnect the pressure switch from its connector.



Disconnect and remove :
- the supply hose,
- the high pressure hose.

Remove :

- the four bolts (B) from the pump supports,



- the power steering pump.

If the pump is to be replaced, remove the pulley (see the corresponding section).

REFITTING

If the pump is being replaced, fit :

- the pulley (see the corresponding section),
- the pump,
- the supply and high pressure hoses (reconnect the pressure switch).

Remove clamp Mot.453-01.

Refit the alternator (see section 16).

Adjust the belt tension (see the corresponding section).

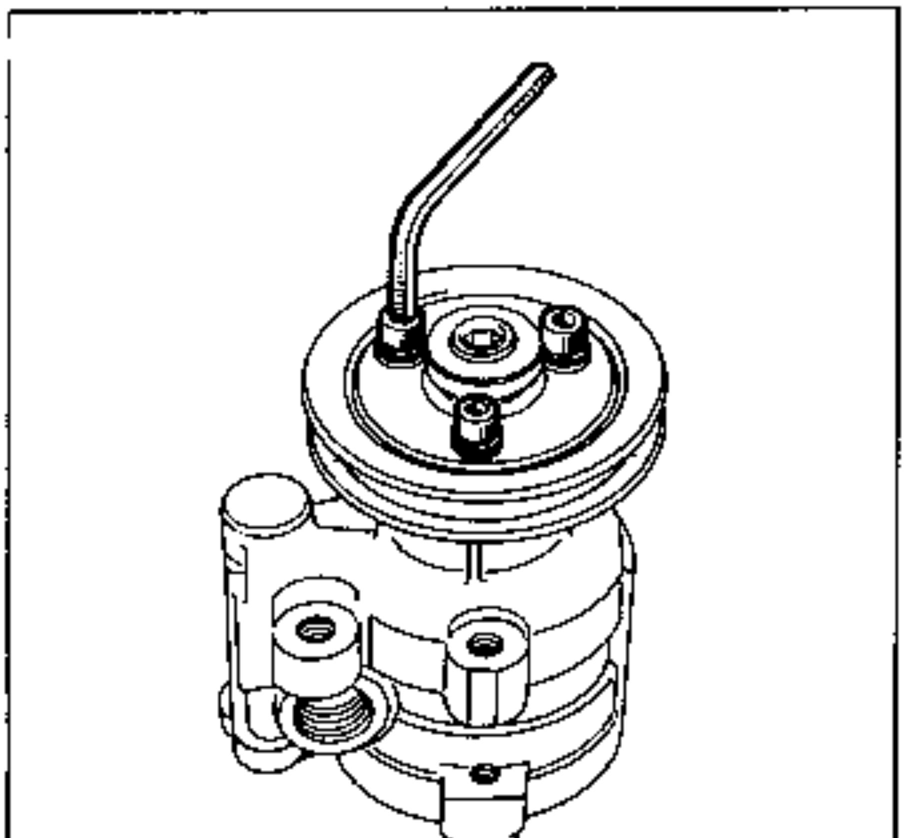
Fill and bleed the system (see the corresponding section).

REPLACING THE PULLEY

ESSENTIAL SPECIAL TOOLS	
Mot. 49	Extractor
Dir 1083	Tooling for refitting the power steering pump pulley

REMOVING

Remove the pulley with an allen key.



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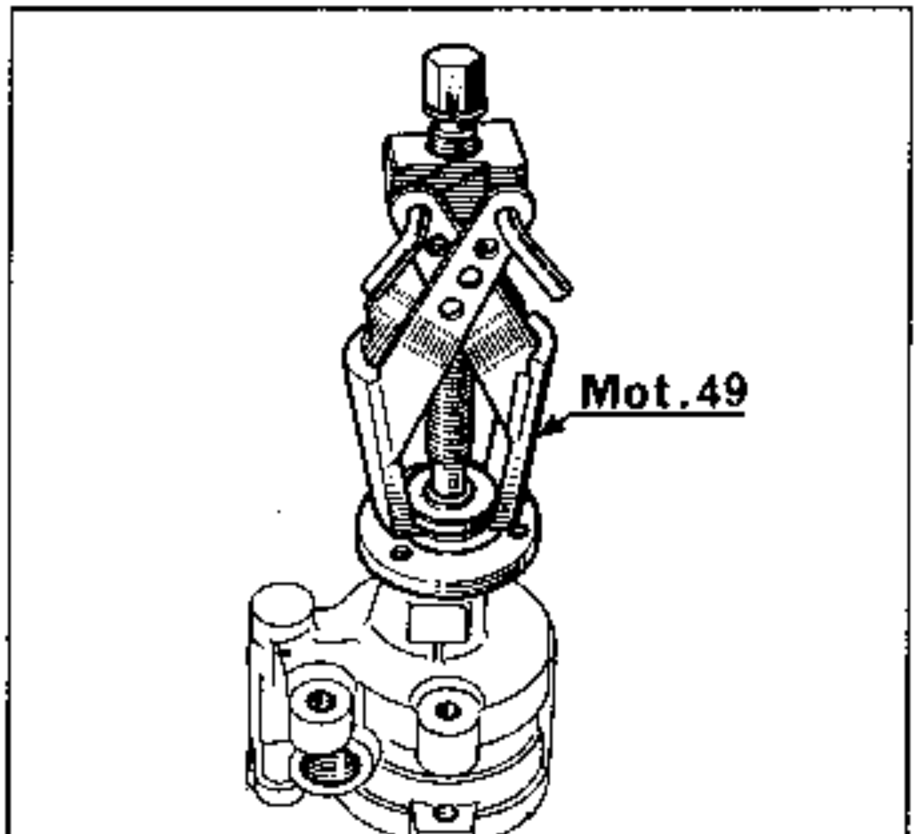
Measure the dimension between the upper edge of the hub and the end of the shaft.

Extract the hub using tool Mot.49.



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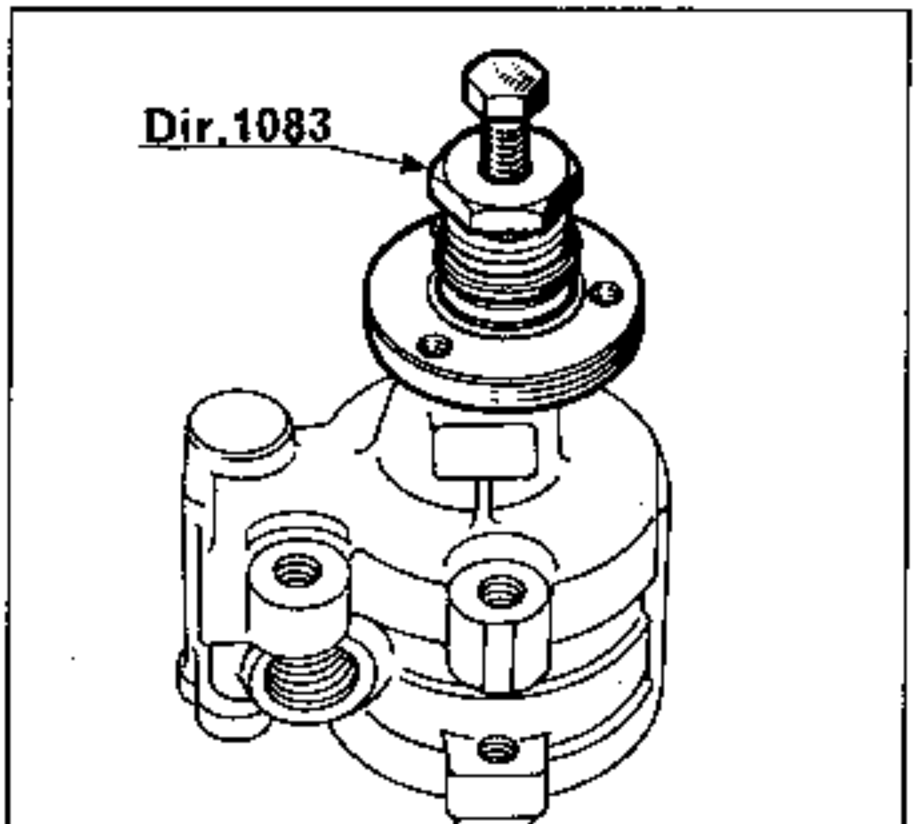
REFITTING

Push on the pulley using tool Dir.1083 until the dimension measured during removing is obtained.



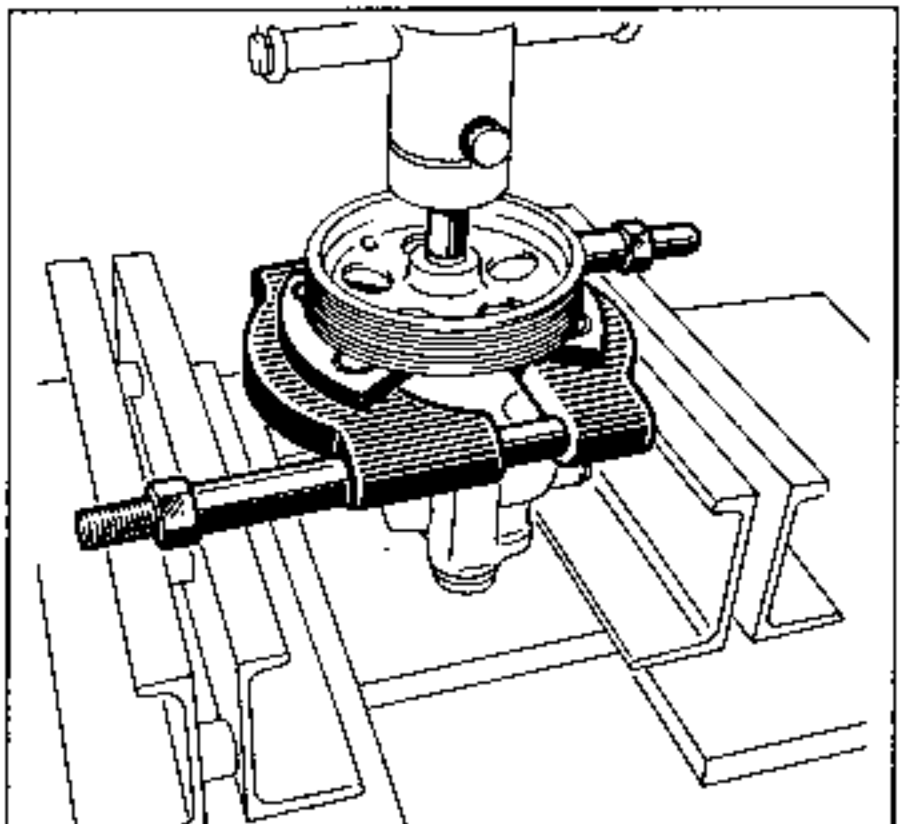
91036

REPLACING THE PULLEY

ESSENTIAL SPECIAL TOOLS	
Dir. 1083	Tooling for refitting the power steering pump pulley

REMOVING

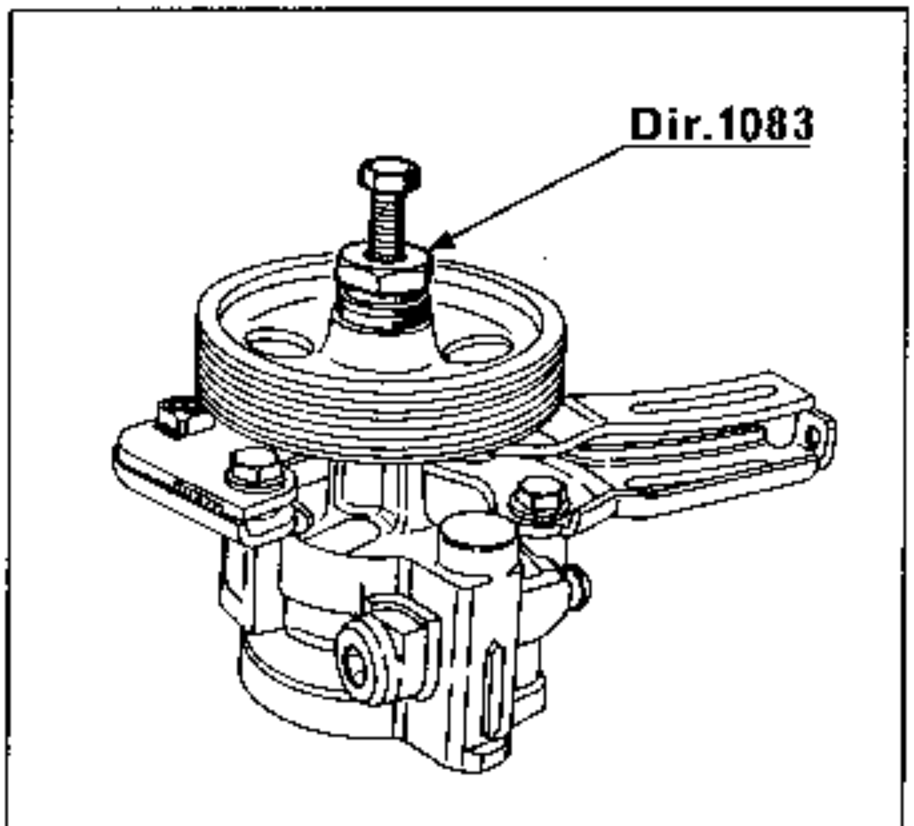
Extract the pulley on the press using a jaw extractor of the FACOM U53G type, after first measuring the distance between the pulley and the end of the shaft.



91581

REFITTING

Push on the pulley using tool Dir.1083 until the dimension measured during removing is obtained.



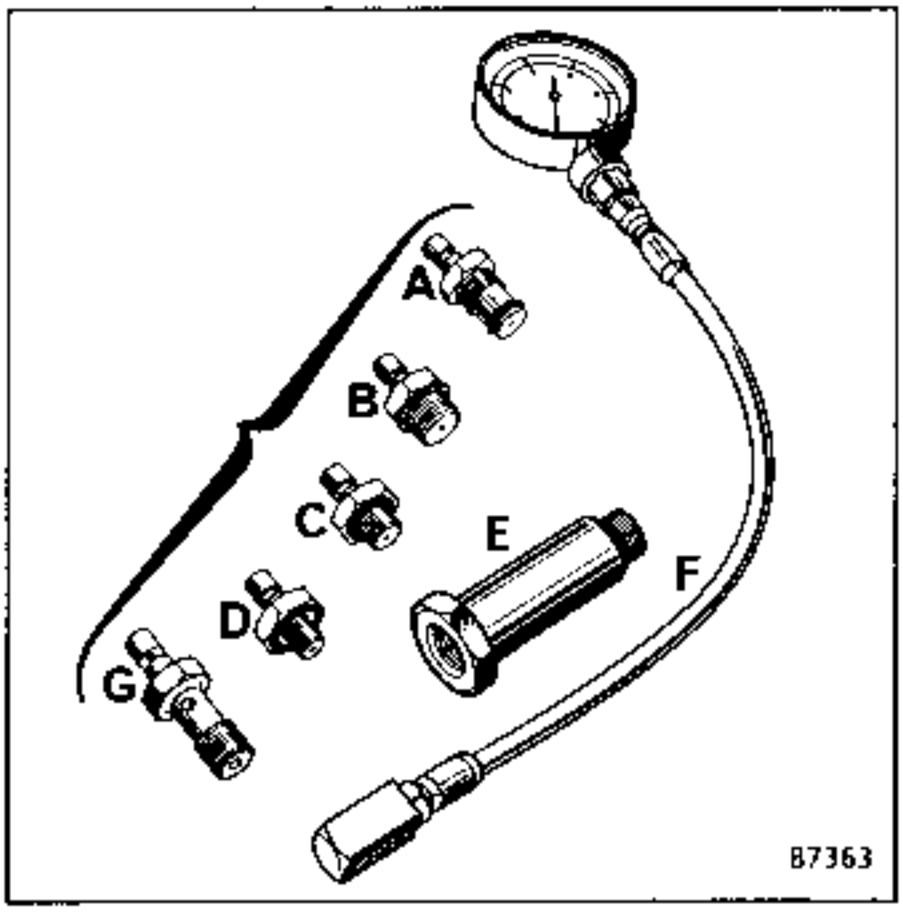
90317

CHECKING THE OIL PRESSURE

ESSENTIAL SPECIAL TOOLS	
Mot. 836-05	Oil pressure connection kit
Fre. 244-05	
or	Oil pressure gauge
Fre. 1085	

Remove the plug from the pressure take-off (using an allen key).

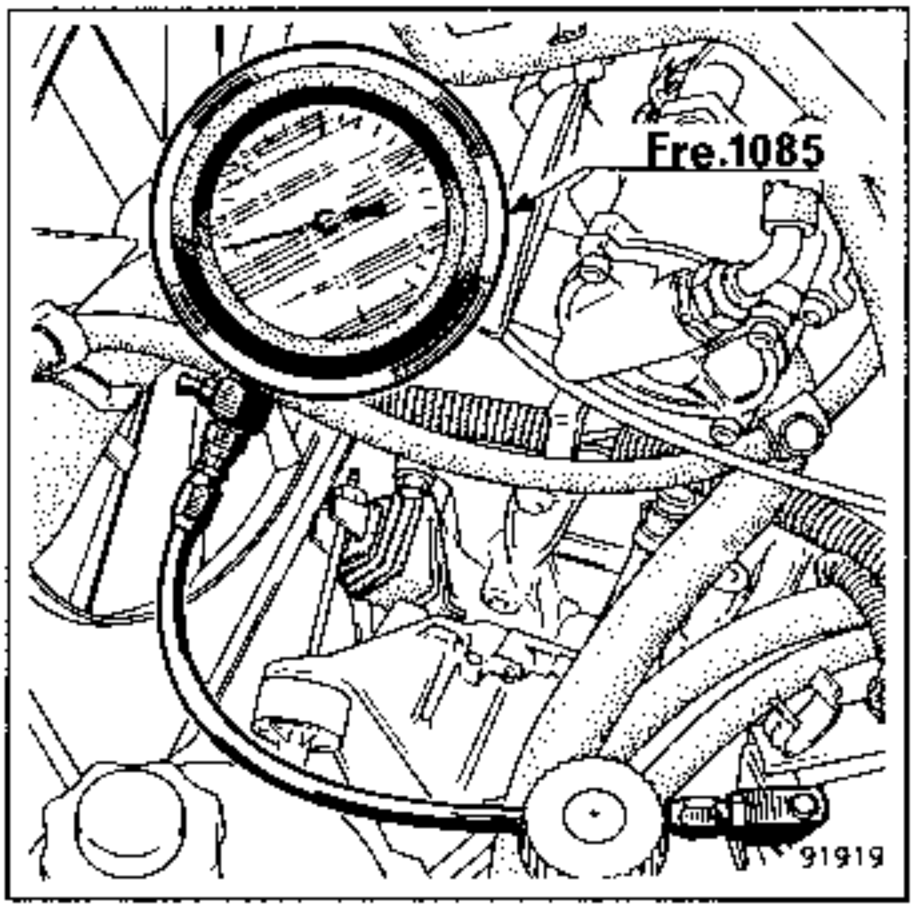
Connect union C from kit Mot.836-05 in its place.



Connect the pressure gauge Fre.1085 or Fre.244-04 to the union.

Wheels in the straight ahead position :

With the engine running at slightly above idling speed, approximately 1 500 rpm, to obtain sufficient output from the alternator, the pressure should not exceed 5 to 7 bars.



With the wheels moved through full lock to one side :

Under the same conditions, hold the wheels at full lock to one side. The maximum pressure should be 79 to 86 bars.

This operation should not be prolonged to avoid overheating the oil.

Remove the pressure gauge and the union.

Refit the plug to the take-off.

Top-up the level of the oil in the reservoir.

Grade of oil to be used in the system :

ELF RENUALTMATIC D2
or MOBIL ATF 220
or TOTAL DEXTRON

CAPACITY : 1 litre

Filling the system

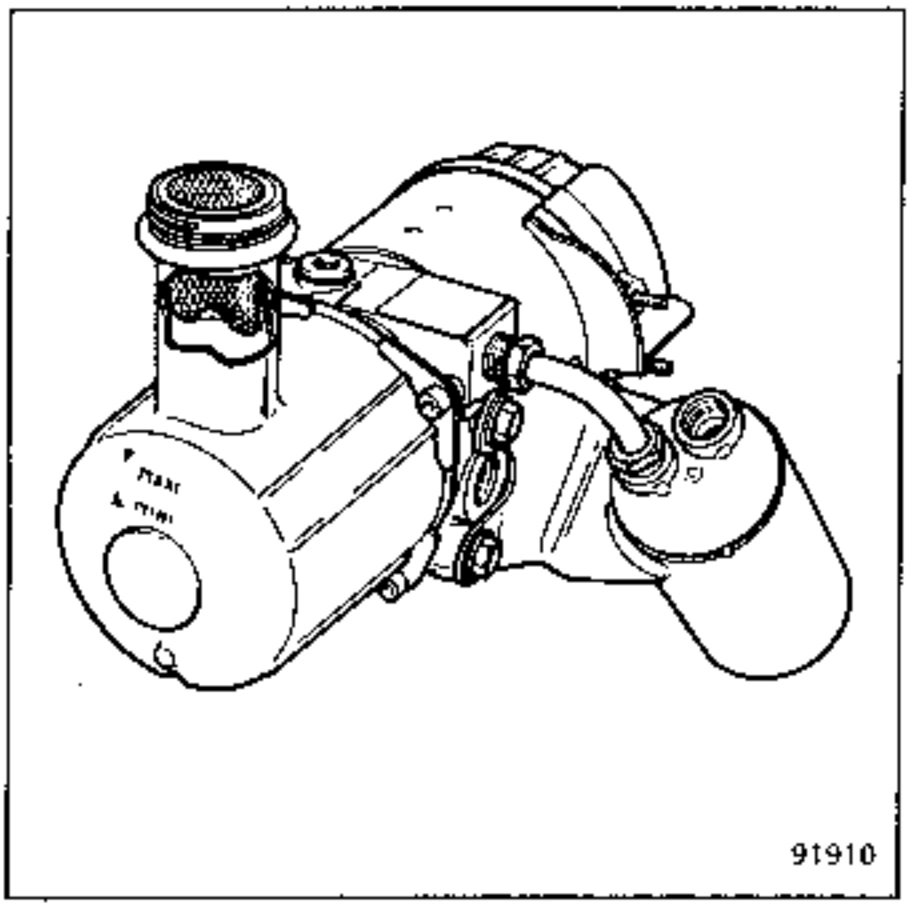
Fill the reservoir to the MAX level mark.

Slowly move the steering in both directions.

Top-up the level.

With the pump running, slowly move the steering from one lock stop to the other.

Top-up the level.



The oil should be visible in line with the MAX level mark.

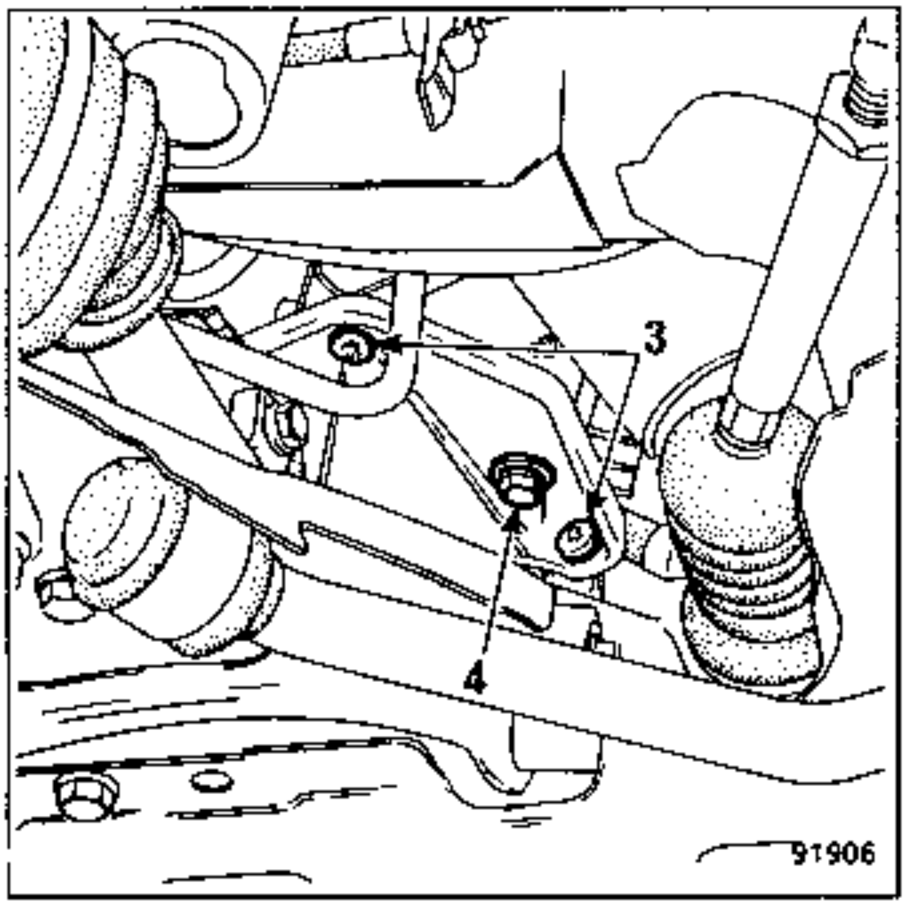
ESSENTIAL SPECIAL TOOLS	
Mot. 453-01	Hose clamps

REMOVING

disconnect the battery.

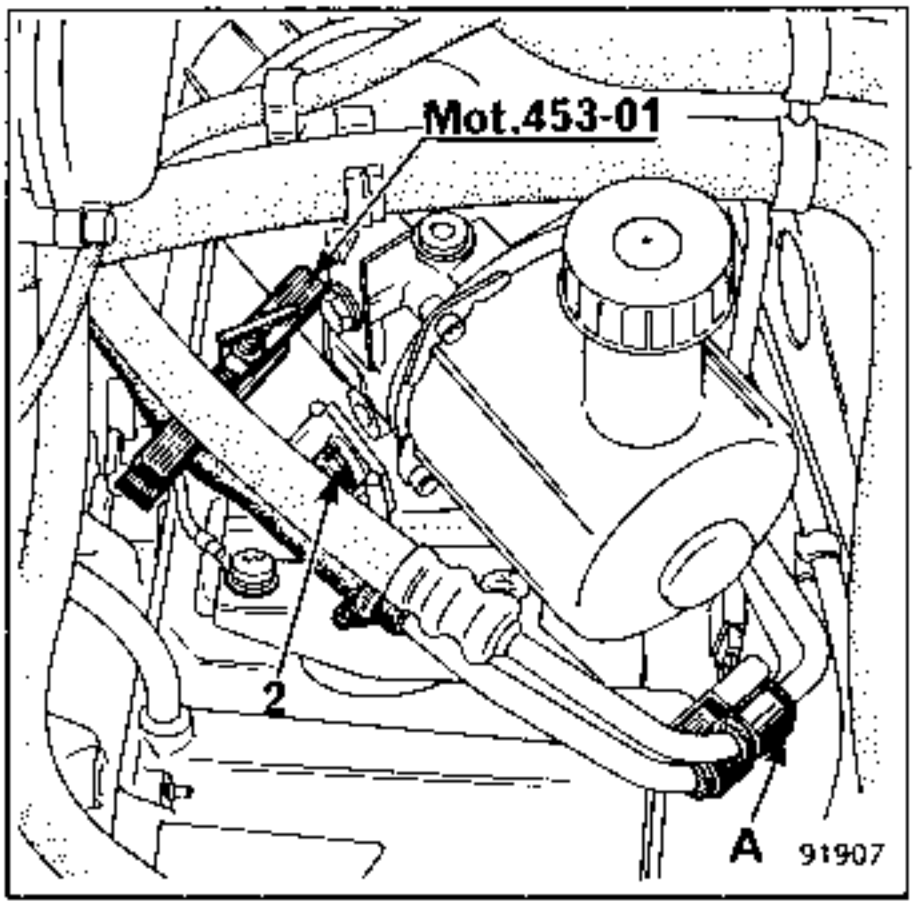
Remove :

- the front left hand wheel,
- bolts (3) and (4) that secure the lower part of the pump to its support,



- the bolt (2) that secures the upper part of the pump,
- the pipe retaining clip (A).

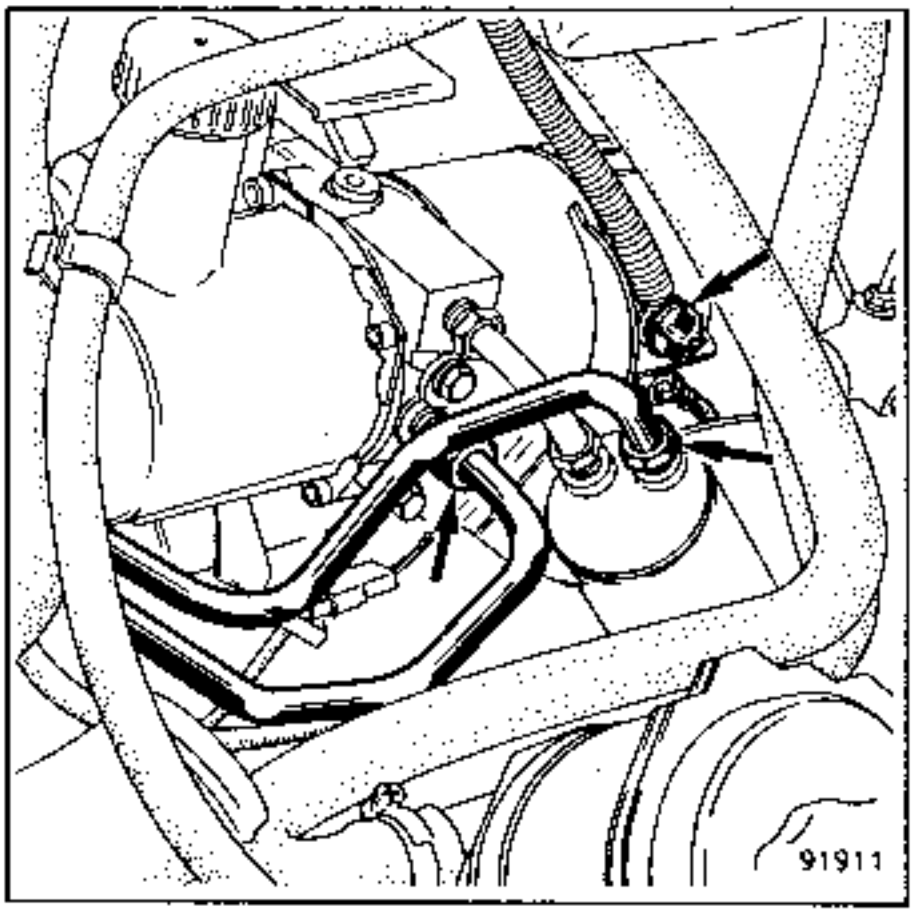
Place a clamp Mot.453-01 on the rotary valve supply hose.



Pull out the pump and lay it on one side.

Remove :

- the low pressure connection from the pump,



REMOVING (continued) REFITTING

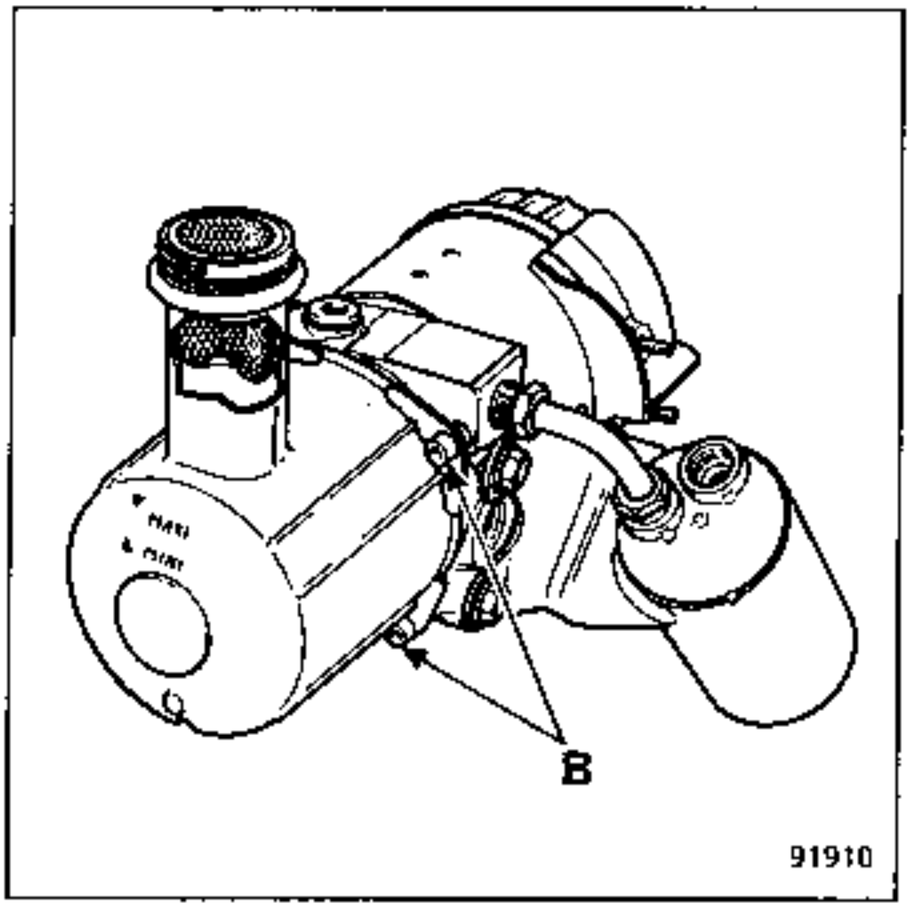
- the high pressure connection on the accumulator,
- the electric motor positive and negative terminals.

Take out the pump-reservoir unit.

NOTE : the reservoir part of this unit can be replaced.

To do this, remove :

- the four screws (B),
- the reservoir together with its O ring.

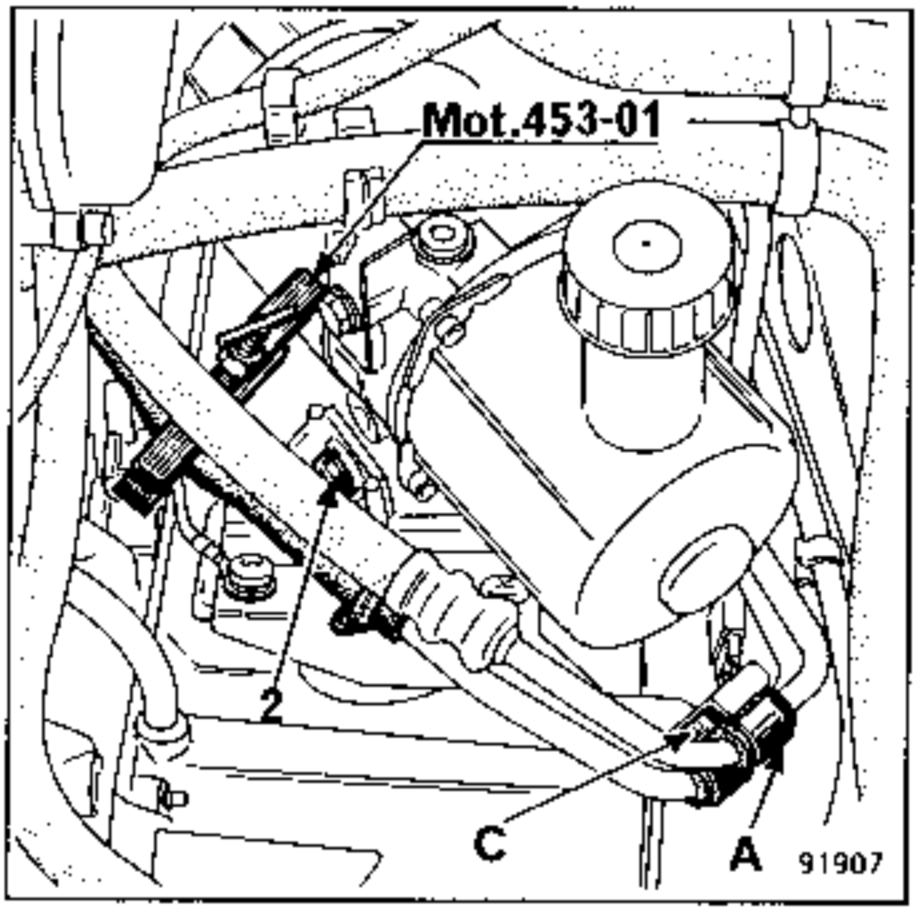


Carry out these operations in reverse to refit the reservoir, using a new O ring.

REFITTING

Fit :

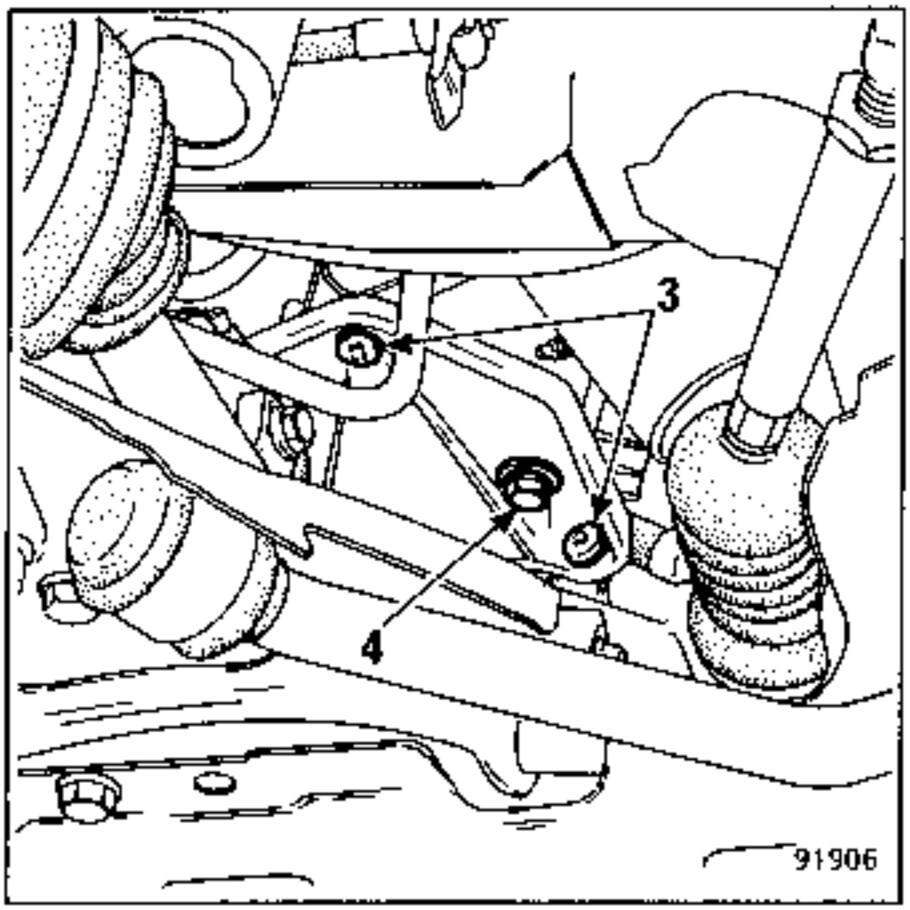
- the pump, reconnecting the electric motor terminals,
- the high and low pressure connections, without tightening them. Correctly position the pump on its support and resecure it, without tightening the fastenings,
- screw (2) and clip (A).



NOTE : ensure that the plastic pad (C) is in position.

- the pump lower securing screws (3) and (4).

NOTE : screws (30 and (4) are of different lengths. It is essential to place the short screw (4), with the socket head, in the position shown in this illustration, to avoid locking the pump motor.



Tighten the high and low pressure connections.

Tighten the pump securing screw and clip (A).

Remove clamp Mot.453-01.

Fill and bleed the system (see the corresponding section).

METHOD OF ADJUSTING THE IDLING SPEED

This method can be used on all these vehicles unless otherwise stated :

- see the special procedure for B/C 40K models.

This adjustment must be carried out accurately to obtain a CO percentage that remains stable between two adjustments and we should like to remind you that the adjustment must be carried out under the following precise conditions :

1) The vehicle must be fully run-in : at least 1000 km (600 miles) (any adjustment on a vehicle which is not run-in can change very quickly).
2) The choke must not be operating (check this).
3) The engine must be at its normal operating temperature. To obtain this run the engine at approximately 2000 rpm until the thermostat opens. Do not allow it to warm up at idling speed as when at engine has run for a few minutes at idling speed, the CO percentage reading is no longer valid.
4) The idling speed must be that specified by the manufacturer (see chart).
5) The air filter must be in position and have a clean cartridge.
6) The ignition system must be in good condition and correctly adjusted.
7) There must be no additional air leakage into the system (vacuum pipes, emission control system, oil vapour re-intake, anti-evaporation, exhaust gas recirculation systems etc.).
8) There must be no leaks on the exhaust system. It must be fully sealed.
9) No large electrical current consumer must be running (blower fan, headlights, heated rear screen etc.).
10) Check that the exhaust gas recirculation system is not operating, at idling speed.
11) Before adjusting the idling speed, cut out the exhaust pulsair system by pinching flat the pipe or pipes connecting the pulsair to the air filter or by blocking the pulsairs.
12) On vehicles equipped with a catalyser, ensure that the catalyser is not operating.

Adjusting using an exhaust gas analyser.

In those markets concerned, remove the tamperproofing cap from the mixture screw (B).

Turn screw (A) to obtain the average idling speed stated on the chart for the vehicle concerned.

Turn screw (B) to obtain the CO percentage stated on the chart.

Turn screw (A) to obtain the correct idling speed.

Repeat these two operations until both the CO percentage and the idling speed are correct.

In those countries where the regulations require it, fit a tamperproofing cap to screw (B) after the adjustment.

Tamperproofing caps

CARBURETTOR	Tamperproofing cap Part no.
ZENITH 32 IF 2	77 01 200 835
SOLEX 32 DIS	77 01 200 831
SOLEX 28 x 34 Z 10	77 01 200 831
WEBER 32 DRT	77 01 200 833

ENGINES F2N G 742

ADJUSTING THE IDLING SPEED

IMPORTANT :

It is essential when adjusting or checking the mixture at idling speed to :

- cut out the exhaust pulsair system by pinching flat the pipe connecting the air filter to the pulsair with clamp Mot.453-01,
- commence the adjustment procedure on the vehicle when the engine is cold.

Adjustment procedure :

- With the engine cold, the exhaust pulsair system cut-out and the analyser connected up.
- Start the engine on full choke, push it into 900 rpm for approximately 1 minute then fully push in the choke.
- Wait until the engine cooling fan cuts in for the first time before adjusting the idling speed.

IMPORTANT :

- It is essential to follow this adjustment procedure and, above all, not to accelerate the engine so that there is no risk of bringing the catalyser into operation.
- If, during the analysis, the CO percentage tends towards 0 and the CO_2 percentage becomes higher than 14%, the catalyser is operating :
  . recommence the adjustment procedure when the engine is cold.

Adjustment figures :

Vehicle	Speed (rpm)	Mixture (% CO)	Conditions
B 40 K C 40 K	850 ± 50	1,25 ± 0,5	Follow the above described procedure without the exhaust pulsair system operating.

Type C1E-752 engines, Switzerland-Sweden :

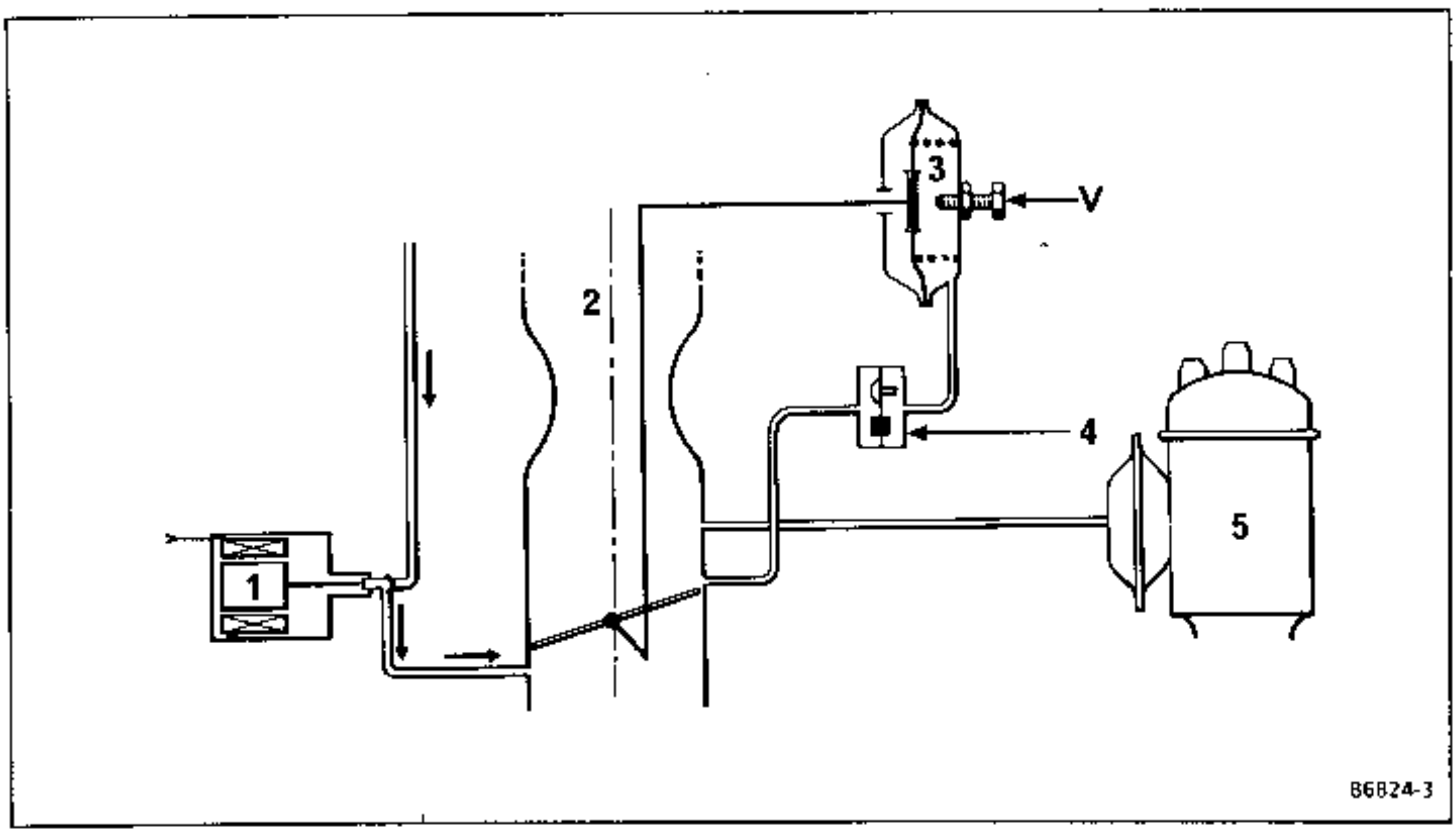
The ZENITH V 10513 carburettor is equipped :

- with an idling speed cut-out (1),
- with a throttle actuator (3) to reduce hydrocarbon emission during overrun, which is operated by a delay valve (4) the function of which is to maintain the effect of the manifold vacuum, on the throttle actuator (3) for a few seconds (ensure that the delay valve is fitted the correct way round with its white face towards the connection point on the carburettor).

ADJUSTING THE FAST IDLING

With the engine warm, after first adjusting the normal idling speed, directly connect the throttle actuator (3) to a vacuum pump and apply a vacuum of 700 mbars to it. Then adjust it by means of screw (V).

If no vacuum pump is available, directly connect the actuator to the inlet manifold, accelerate the engine and release the accelerator and adjust the fast idling speed by turning screw (V).



1. Idling speed cut-out (fed from output side of ignition switch).
2. ZENITH 32 IF2 V 10514 carburettor
3. Throttle actuator
4. Delay valve with its white face towards the carburettor
5. Distributor R 335 C 34 timing : + 6° flywheel

V: Fast idling speed adjusting screw : 1700 ± 100 rpm.

Engines C1E-B-756

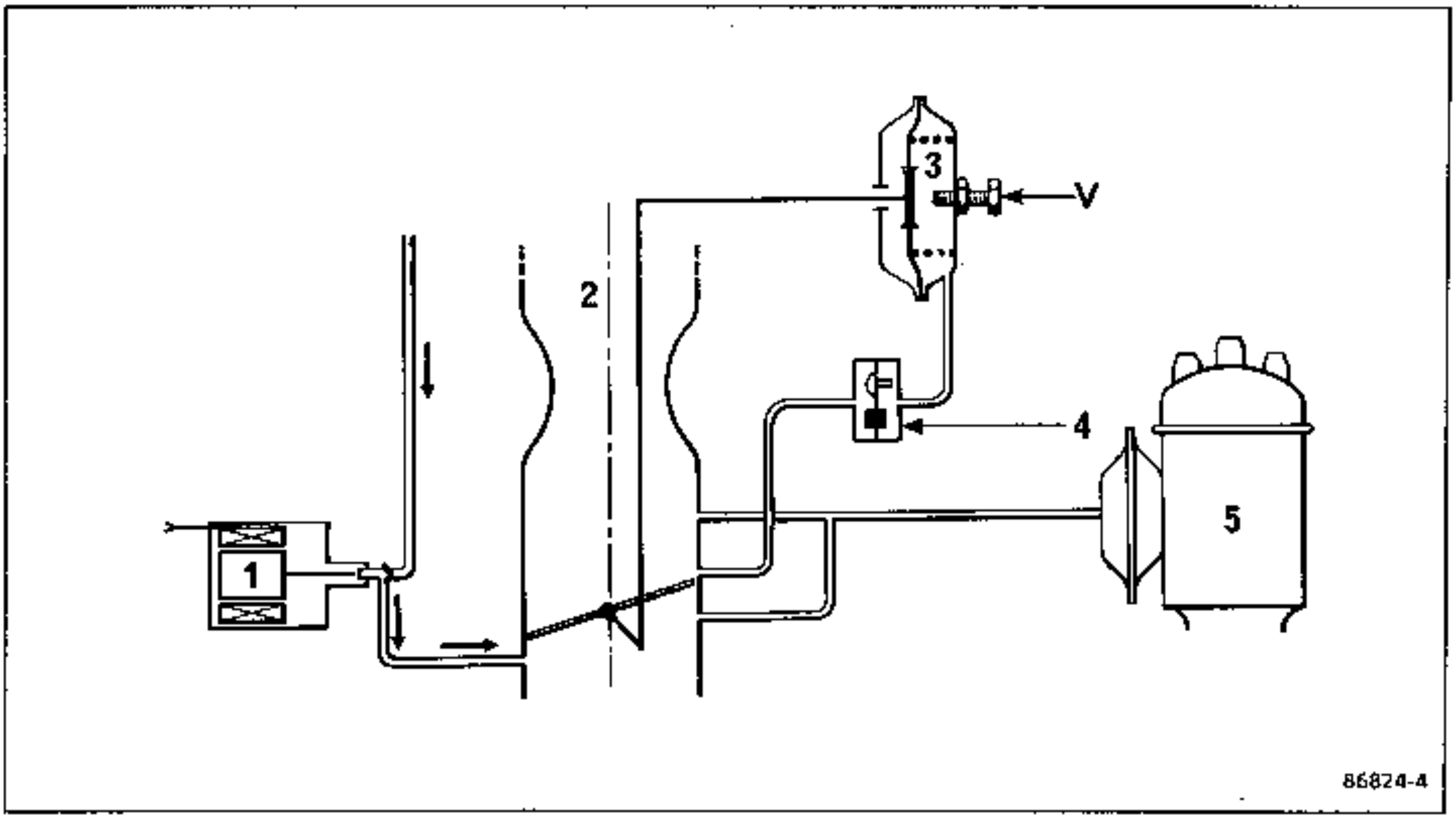
The ZENITH 321F2 V 10521 carburettor is equipped :

- with an idling speed cut-out (1),
- with a throttle actuator (3) to reduce hydrocarbon emission during overrun, which is operated by a delay valve (4) the function of which is to maintain the effect of the manifold vacuum, on the throttle actuator (3) for a few seconds (ensure that the delay valve is fitted the correct way round with its white face towards the connection point on the carburettor).

ADJUSTING THE FAST IDLING

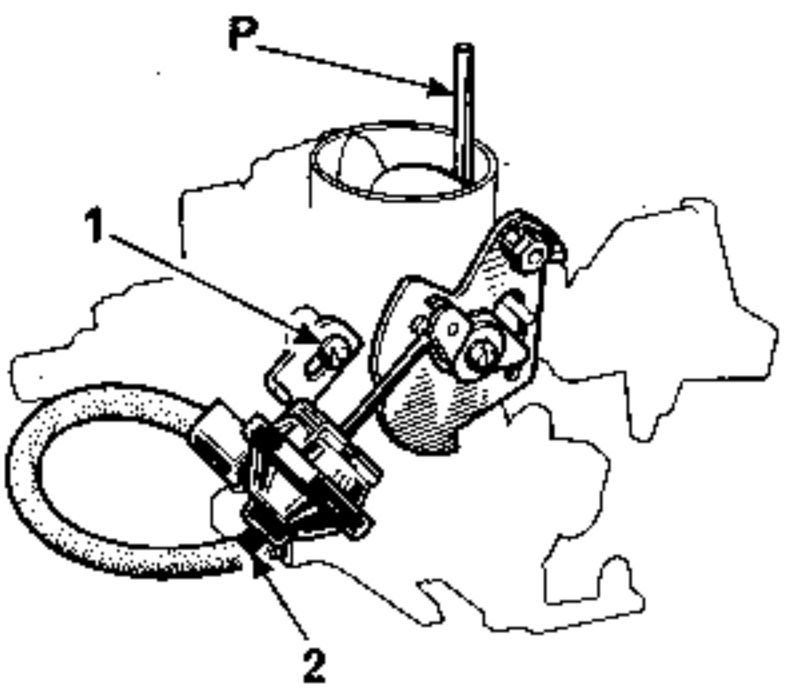
With the engine warm, after first adjusting the normal idling speed, directly connect the throttle actuator (3) to a vacuum pump and apply a vacuum of 700 mbars to it. Then adjust it by means of screw (V).

If no vacuum pump is available, directly connect the actuator to the inlet manifold, accelerate the engine and release the accelerator and adjust the fast idling speed by turning screw (V).



1. Idling speed cut-out (fed from output side of ignition switch).
2. ZENITH 321F2 V 10521
3. Throttle actuator
   V : fast idling speed adjusting screw : 1700 ± 100 rpm.
4. Delay valve with its white face towards the carburettor
5. Distributor R341C33
   Timing : + 2° flywheel. Capsule C33 must be disconnected.

The SOLEX 32 DIS 860 carburettor has, in addition to the throttle actuator, pneumatic choke assistance.



88682

Pre-adjustment :

Tighten screw (1) in its slot at the point where the choke flap just starts to lift away from its closed position.

Pneumatic initial opening.

Adjustment :

Push the rod in the direction shown by the arrow.

Turn screw (2) until rod (P) can be inserted.

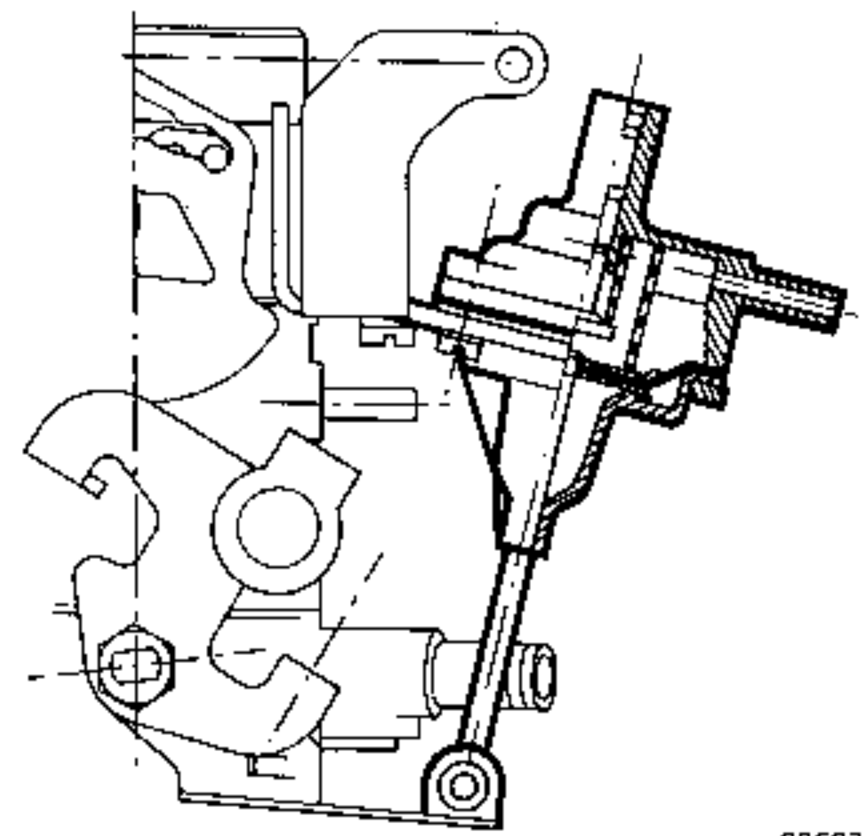
DECELERATION SYSTEM

Principle of operation :

The carburettor is equipped with a throttle actuator to reduce hydrocarbon emission duting overrun.

It opens in two stages.

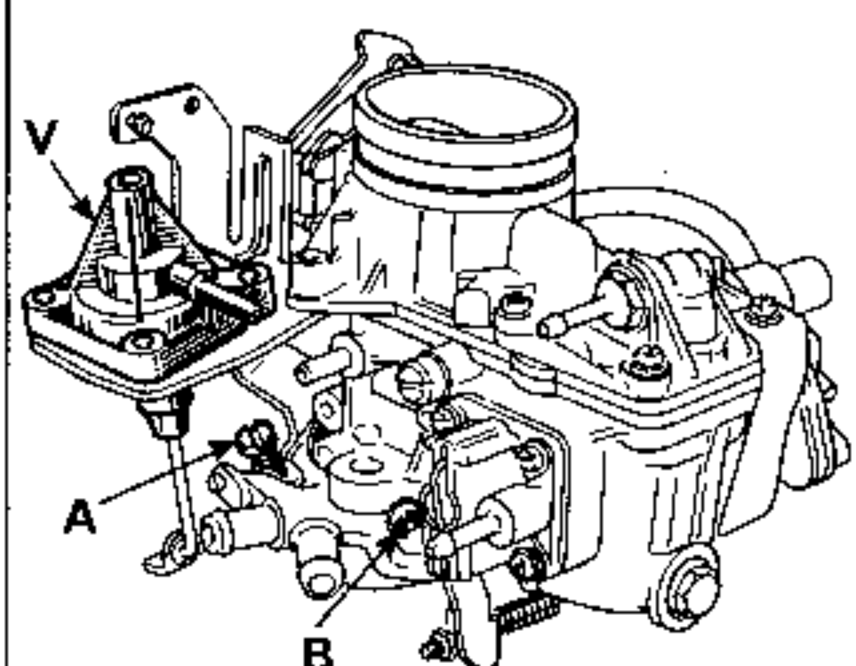
A delay valve mounted between the carburettor and the throttle actuator maintains, for a period, the vacuum on the diaphragm, (Brown part of the valve towards carburettor connection).



88693

ADJUSTING THE FAST IDLING

Turn screw (V), whilst applying a vacuum of 800 mbars, with a vacuum pump, to the throttle actuator to obtain a fast idling speed of : 1800 $\pm$ 100 rpm.



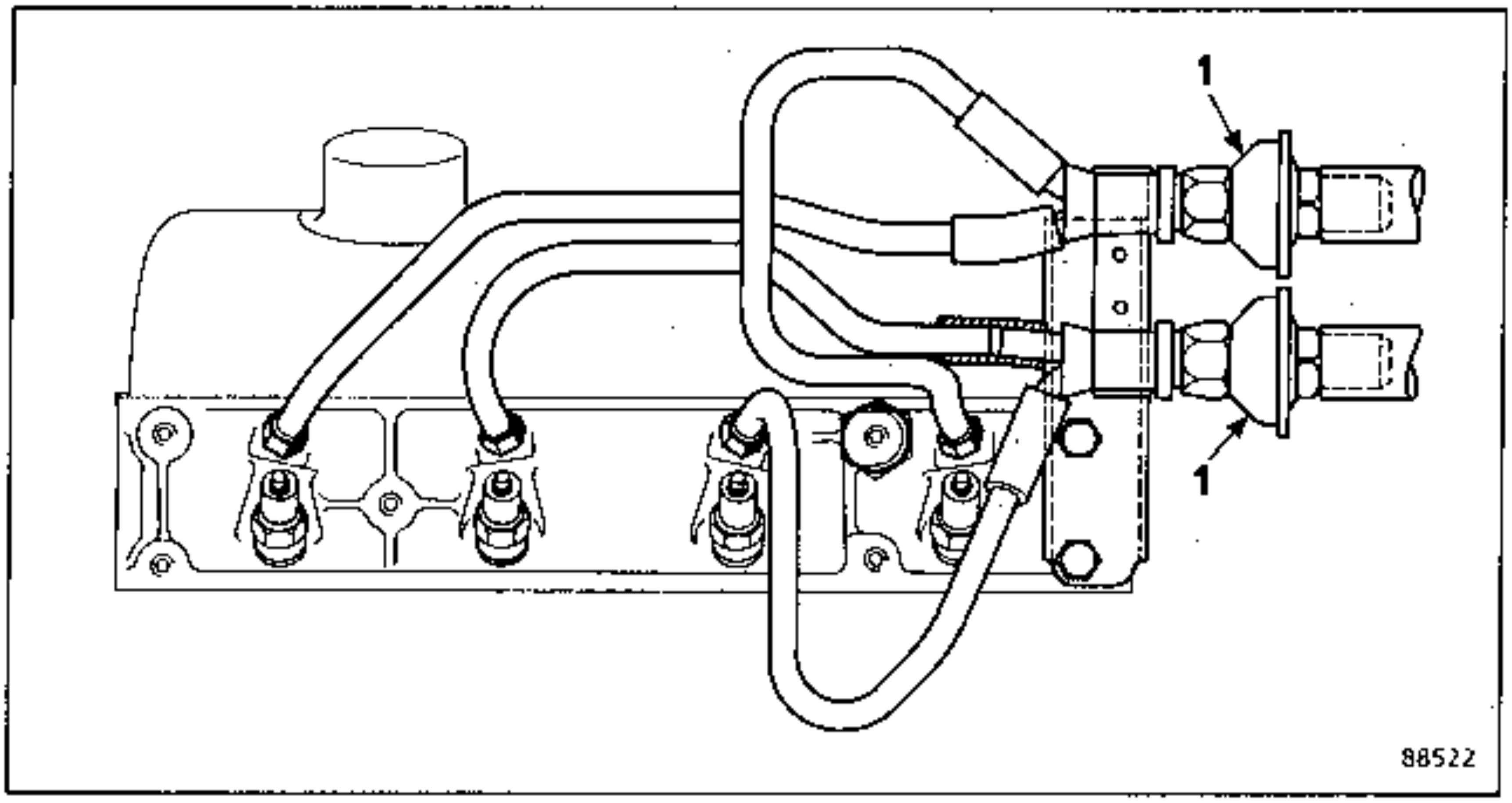
88680

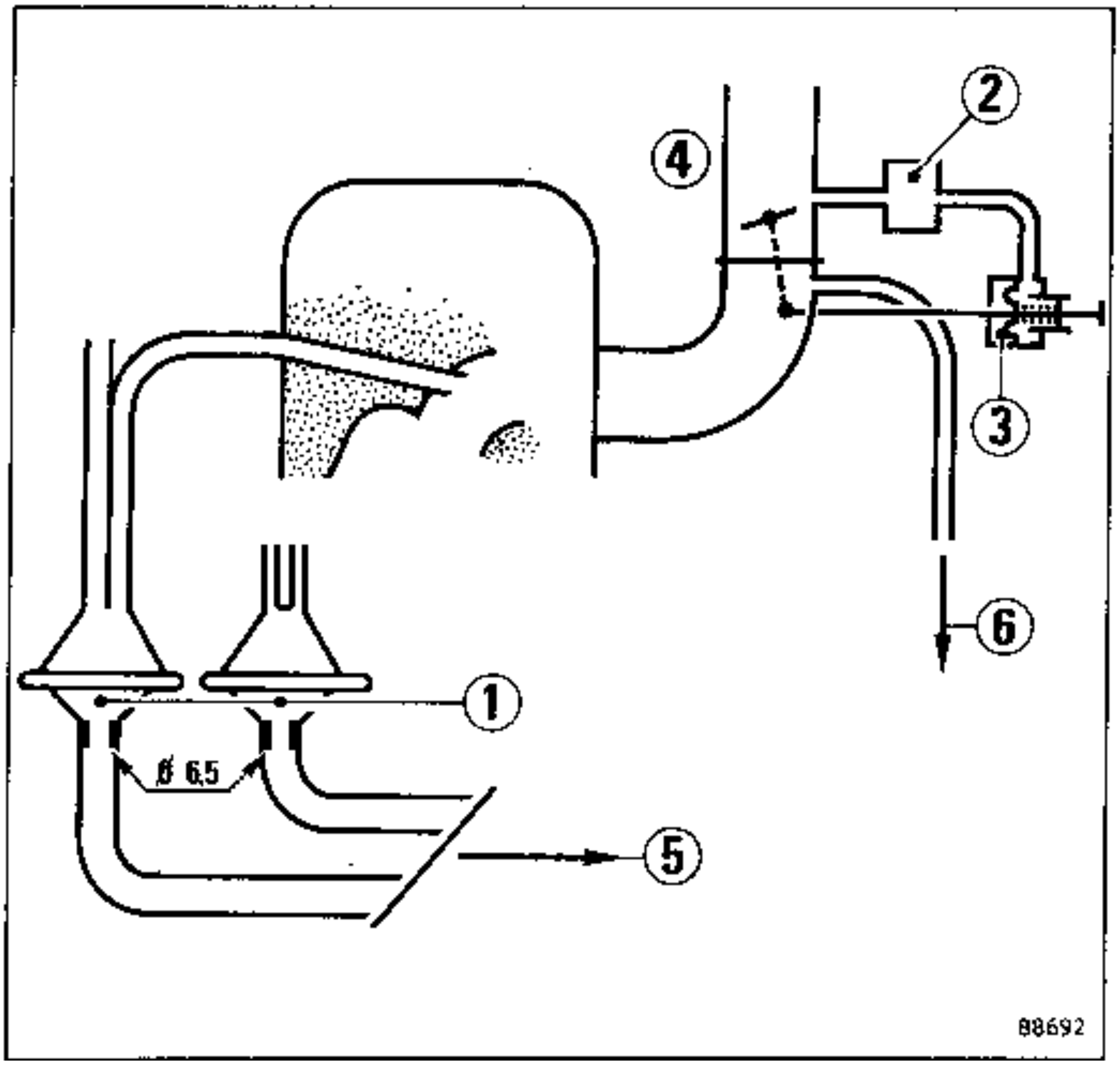
ADJUSTING THE IDLING SPEED

Do not forget to cut out the exhaust extractor system before adjusting the idling speed.

SYSTEM FOR BLOWING AIR INTO THE EXHAUST

Layout diagram





1. Air inlet valves (pulsairs)

2. Delay valve (brown side towards carburettor)

3. Throttle actuator

4. Carburettor

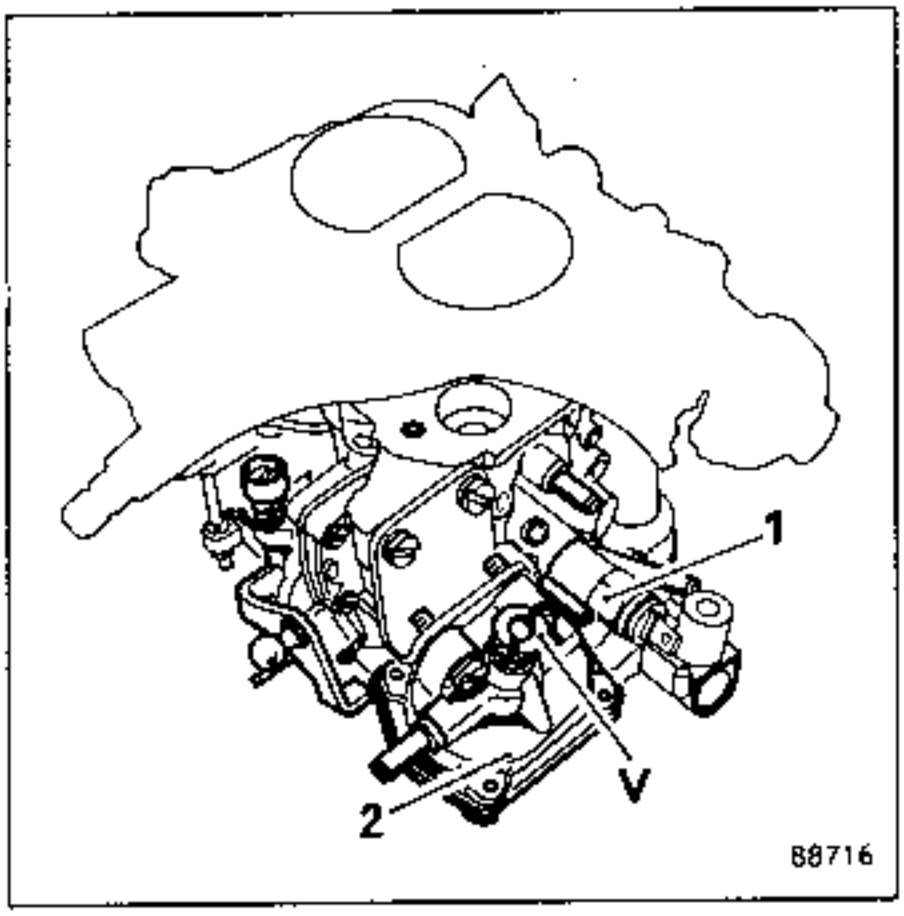
5. To air filter

6. To A.E.I. electronic ignition capsule

Special features of carburettors WEBER 32 DRT 5 and 6 :

WEBER 32 DRT 5 and 6 carburettors are equipped :

- with an idling speed cut-out (1),
- with a throttle actuator (2) only on vehicles with manual gearboxes (32 DRT 5).



Adjusting the fast idling :

After first adjusting the normal idling speed when the engine is warm, disconnect the actuator and apply a vacuum of 700 mbars, with a manual vacuum pump, to obtain an engine speed of 1800 ± 100 rpm, which is adjusted by means of screw (V). A white delay valve maintains the vacuum on the throttle actuator and delays the return to normal idling speed during deceleration (for 5 to 15 seconds).

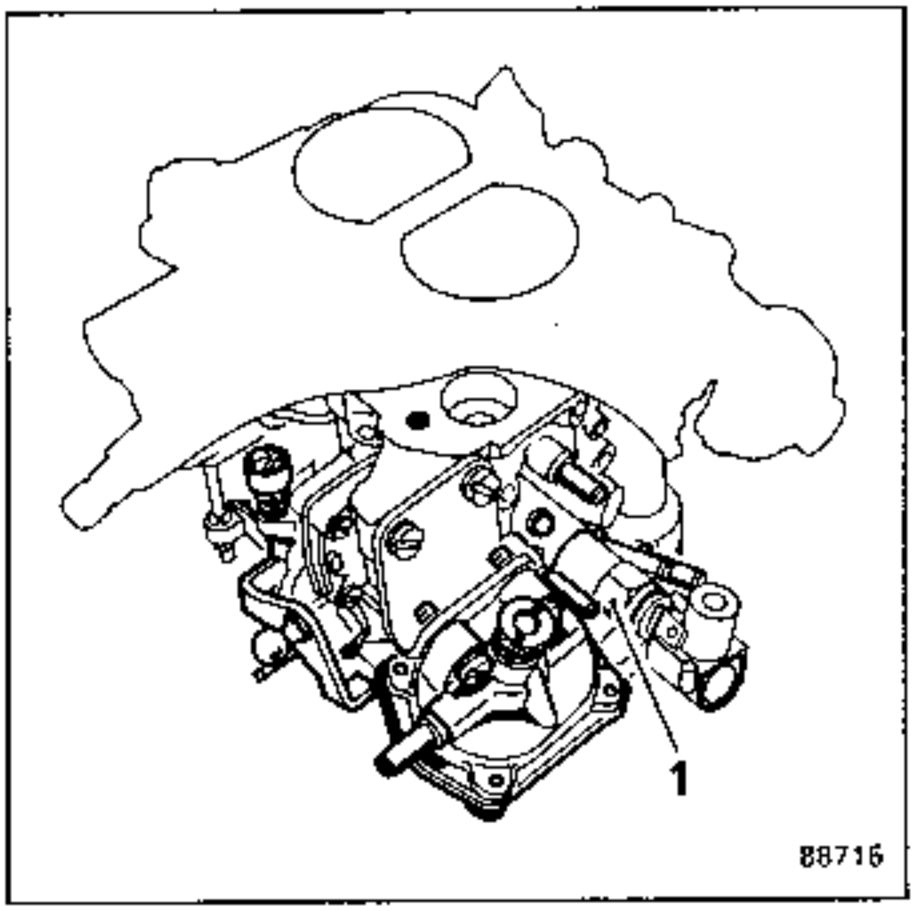
ANTI-REIGNITION SYSTEM

Idling speed cut-out (1).

This is a solenoid valve which shuts off the idling speed circuit, when its current supply is broken, that is to say when the ignition is switched off.

Testing

With the engine running at idling speed, disconnect the supply wire to the valve. The engine should stop.



Special features of WEBER 32 DRT 18 and 20 carburettors :

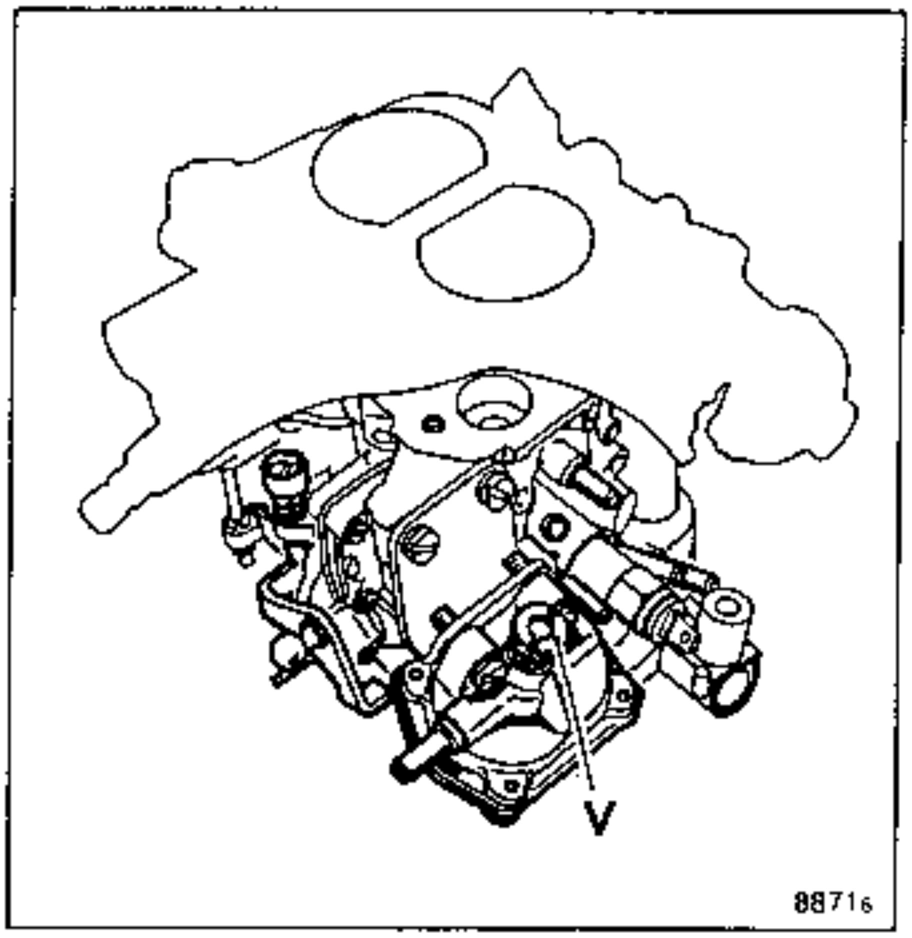
WEBER 32 DRT 18 and 20 carburettors are equipped :

- with an idling speed cut-out,
- with a throttle actuator to reduce hydro carbon emission during overrun,
- with a limited opening 2nd barrel throttle on the type 32 DRT 20.

ADJUSTING THE FAST IDLING SPEED

Conditions :

(The engine must be warm, the normal idling speed must be correctly adjusted and one of the solenoid valve terminals is to be disconnected if the oil temperature is higher than 70°C).



Disconnect the throttle actuator and apply a vacuum of 700 mbars, with a manual vacuum pump then obtain a speed of 1700 ± 100 rpm by turning screw (V). A white delay valve maintains the vacuum on the throttle actuator and slows up its normal return when the engine is decelerating (for 5 to 15 seconds).

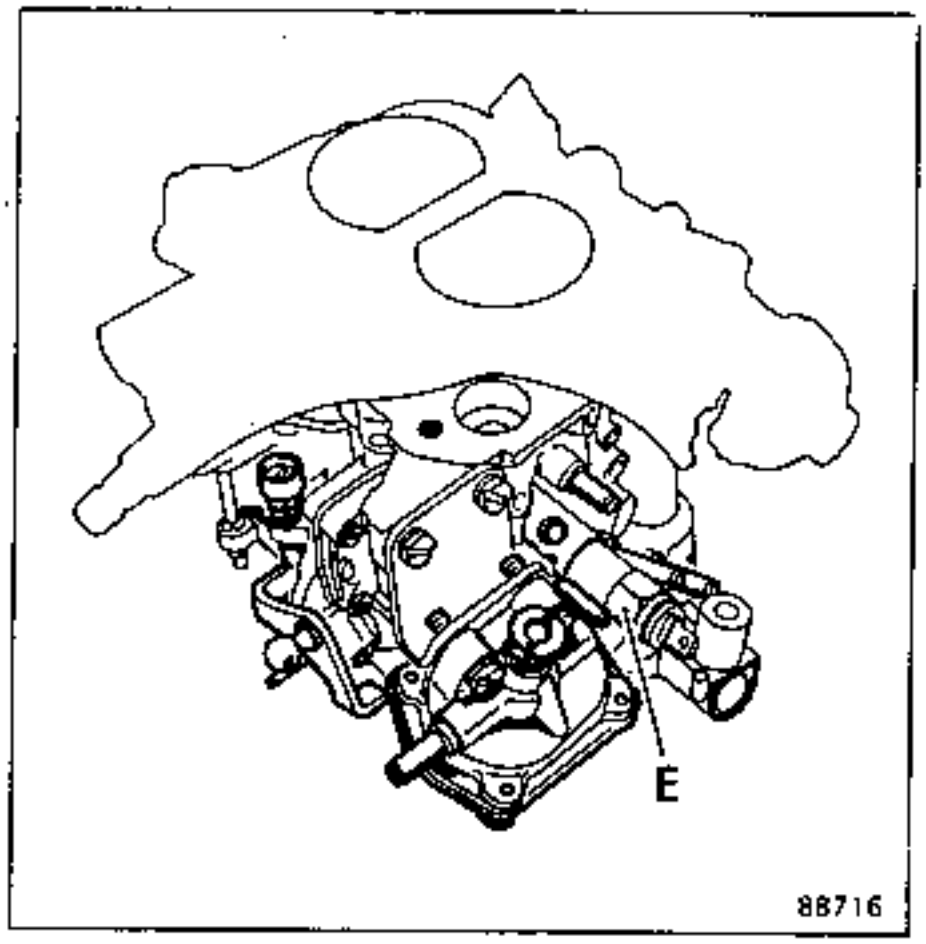
ANTI-REIGNITION SYSTEM

Idling speed cut-out (E)

This is a solenoid valve which closes off the idling circuit when no longer fed with current, that is to say when the ignition is switched off.

Checking

With the engine running at idling speed, disconnect the supply wire. The engine should stop.

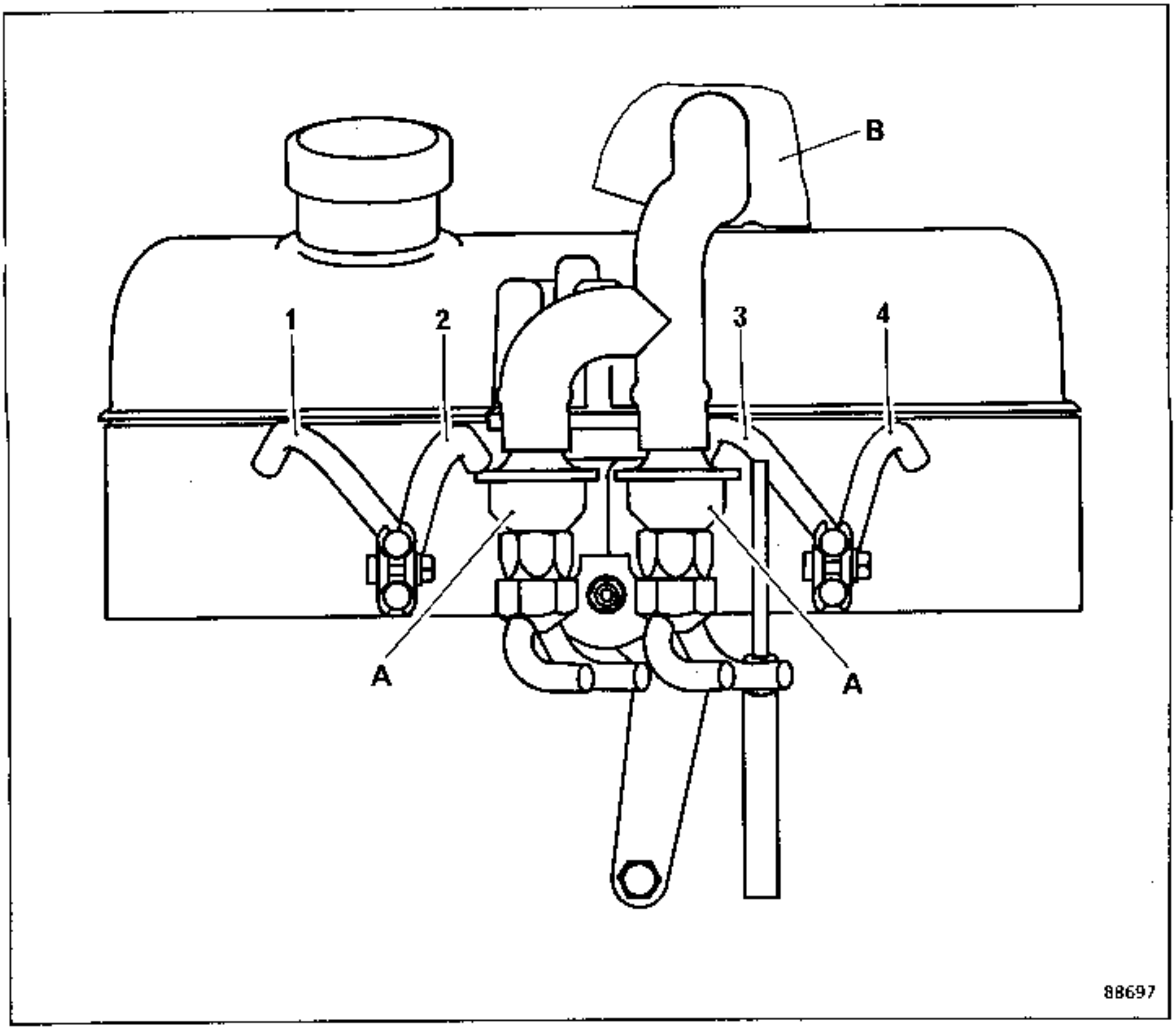


EMISSION CONTROL SYSTEM PRINCIPLE OF OPERATION :

Engines C2J-788 and 789 :

Layout of system for drawing air into the exhaust :

Item nos. 1 to 4 show the correct positions for fitting the hoses.



A. Pulsairs, that is to say air intake valves

B. Air filter

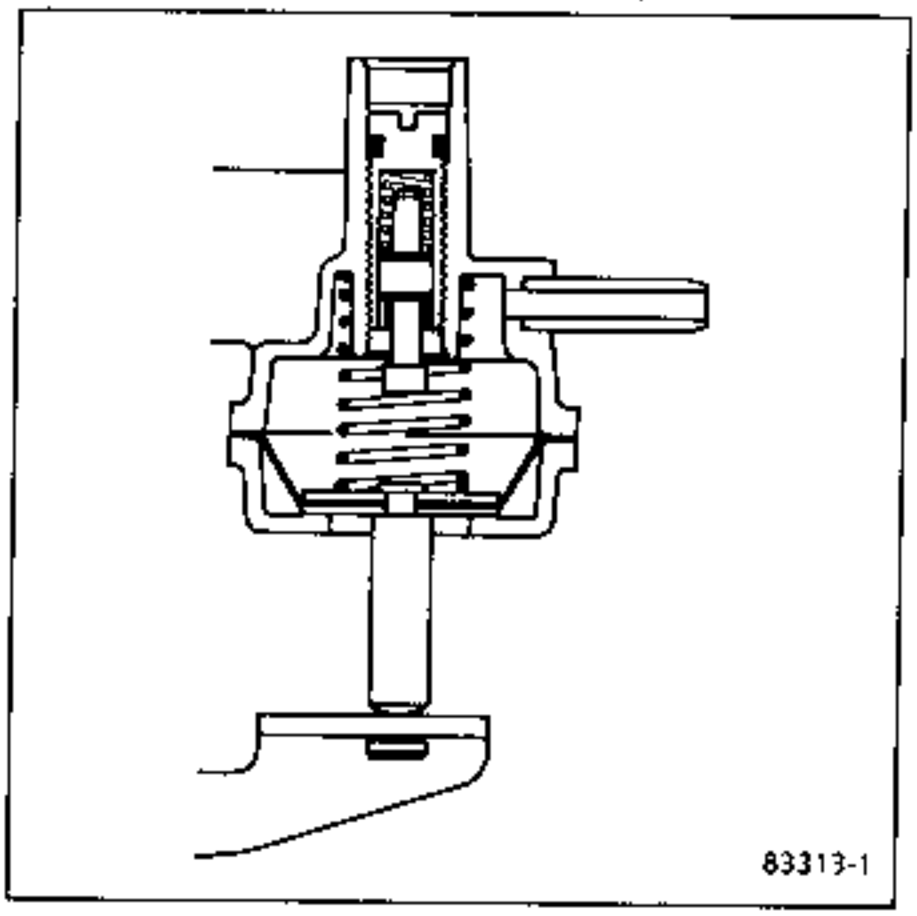
Engines C2J-788 and 789 :

OVERRUN SYSTEM

Principle of operation

On vehicles equipped with a manual gearbox the carburettor has a throttle actuator to reduce hydrocarbon emission when the engine is decelerating.

The actuator is of the single stage type.



A delay valve mounted between the carburettor and the throttle actuator maintains the vacuum on the diaphragm for a long period.

EXHAUST AIR INJECTION SYSTEM

This consists of :

- 1 air filter
- 2 pulsairs or air intake valves
- pipes that carry the air to the exhaust valve.

Principle of operation

After the exhaust valve has closed, the inertia of the gases sets up a vacuum behind the valve.

The air inlet valves open to allow air to flow from the filter to the exhaust valve and thus oxydise any unburnt gases.

When there is no longer a vacuum behind the valve, that is to say the pressure rises higher than atmospheric pressure, the air intake valves close and prevent any exhaust gas reverse flow.

Engines C2J-788 and 789

Principle of operation of the exhaust gas recirculation (E.G.R.) system :

The recirculation valve opens under the influence of the vacuum taken from the carburettor.

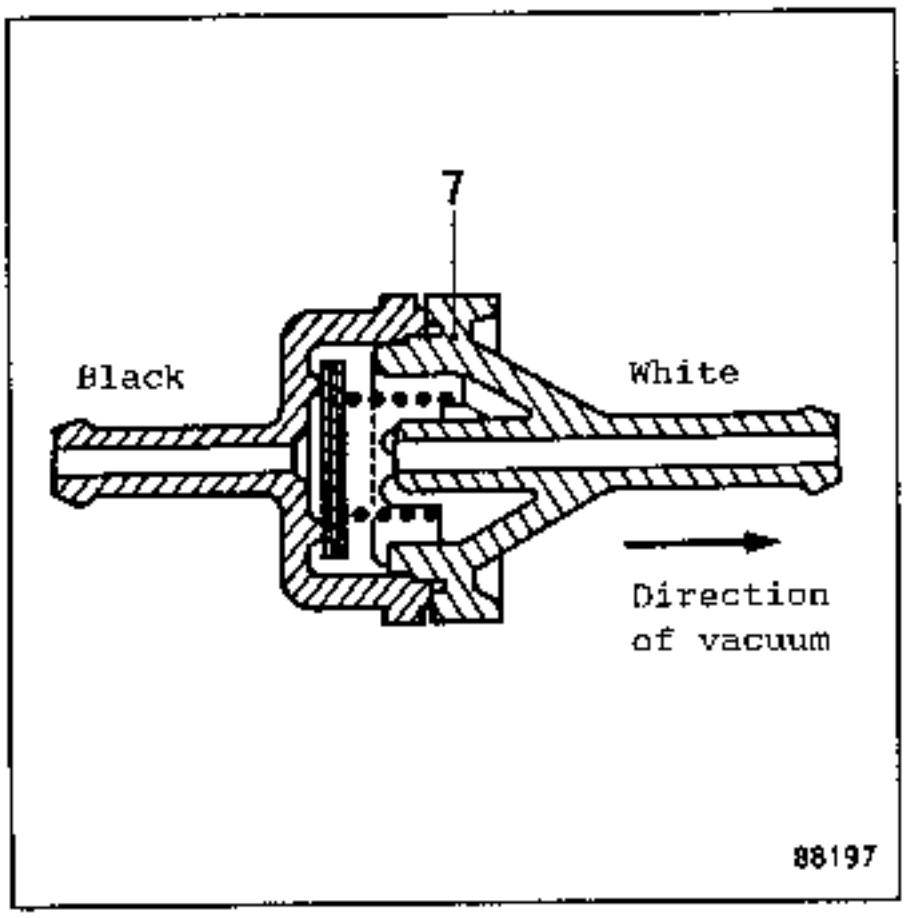
Up to a coolant temperature of 45°C, a temperature valve closes the circuit leading to the recirculation valve.

The recirculation valve is controlled by a pneumatic control unit.

The system generates a control signal that opens the recirculation valve by amplifying the differential pressure or vacuum signal from the venturi (E2) and the vacuum signal (E1) from the engine air intake by-pass circuit.

The function of the auxiliary valve (VD2) is to move the regulated point when the throughput to the engine passes a given threshold.

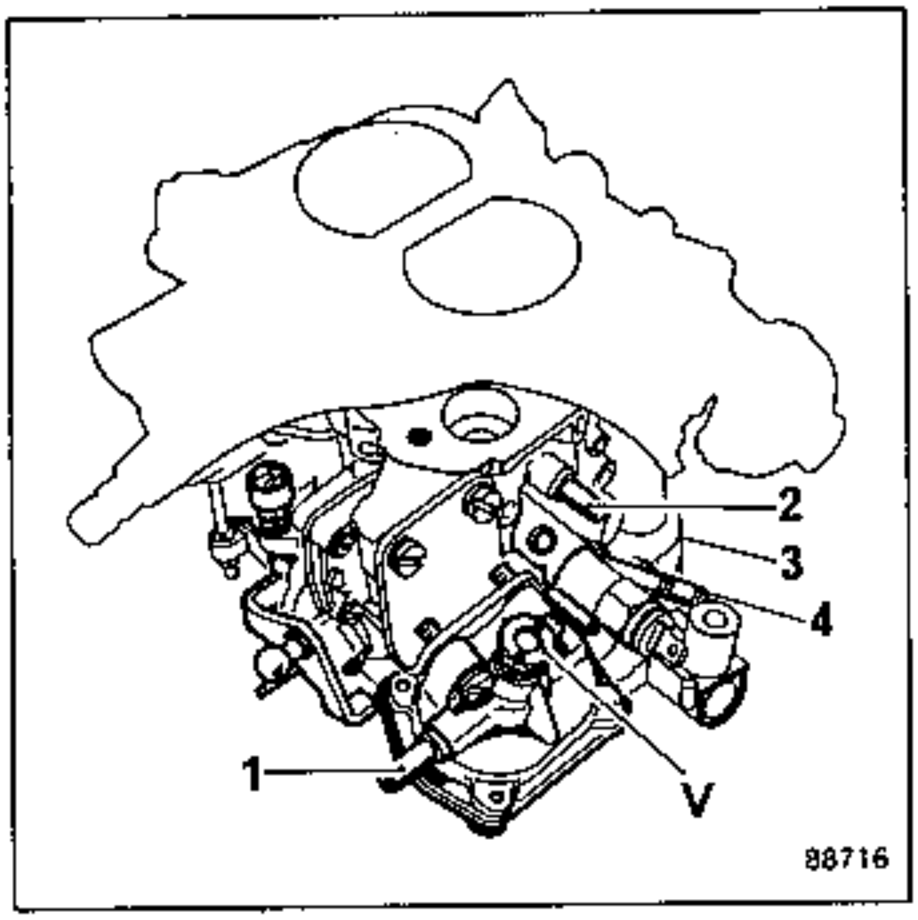
- Setting (VD1) = 40 mbars
- Setting (VD2) = 105 mbars
- Non-return valve : correct way of fitting



The by-pass system that includes non-return valve (7) causes the E.G.R. valve (8) to close more quickly during overrun.

Identifying the functions of the exhaust gas recirculation system :

The exhaust gas recirculation system vacuum connections on the carburettor, are identified by rings of different colours.



1 - Throttle actuator (C2J-788 only, or manual gearbox). Ring colour : blue.

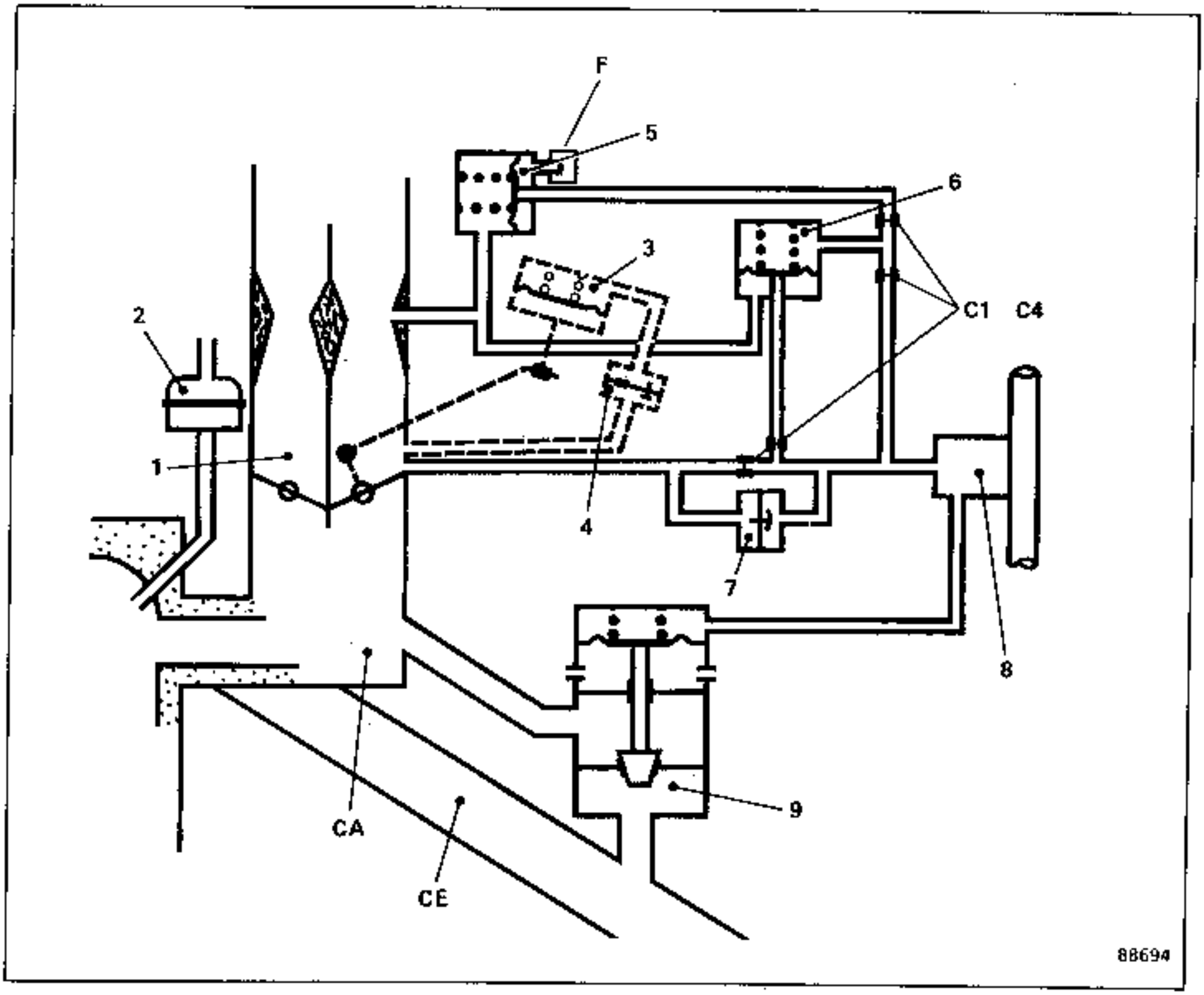
2 - E.G.R. venturi vacuum connection. Ring colour : green.

3 - E.G.R. throttle edge signal and throttle actuator reset connection (C2J-788). Ring colour : brown.

4 - A.E.I. electronic ignition unit advance connection. Ring colour : black.

Engines C2J-788 and 789

Emission control system circuit diagram :



1. Carburettor
2. Pulsairs or air intake valves
3. Throttle actuator*
4. Delay valve*
5. Auxiliary valve
6. Regulator valve
7. Non-return valve

*

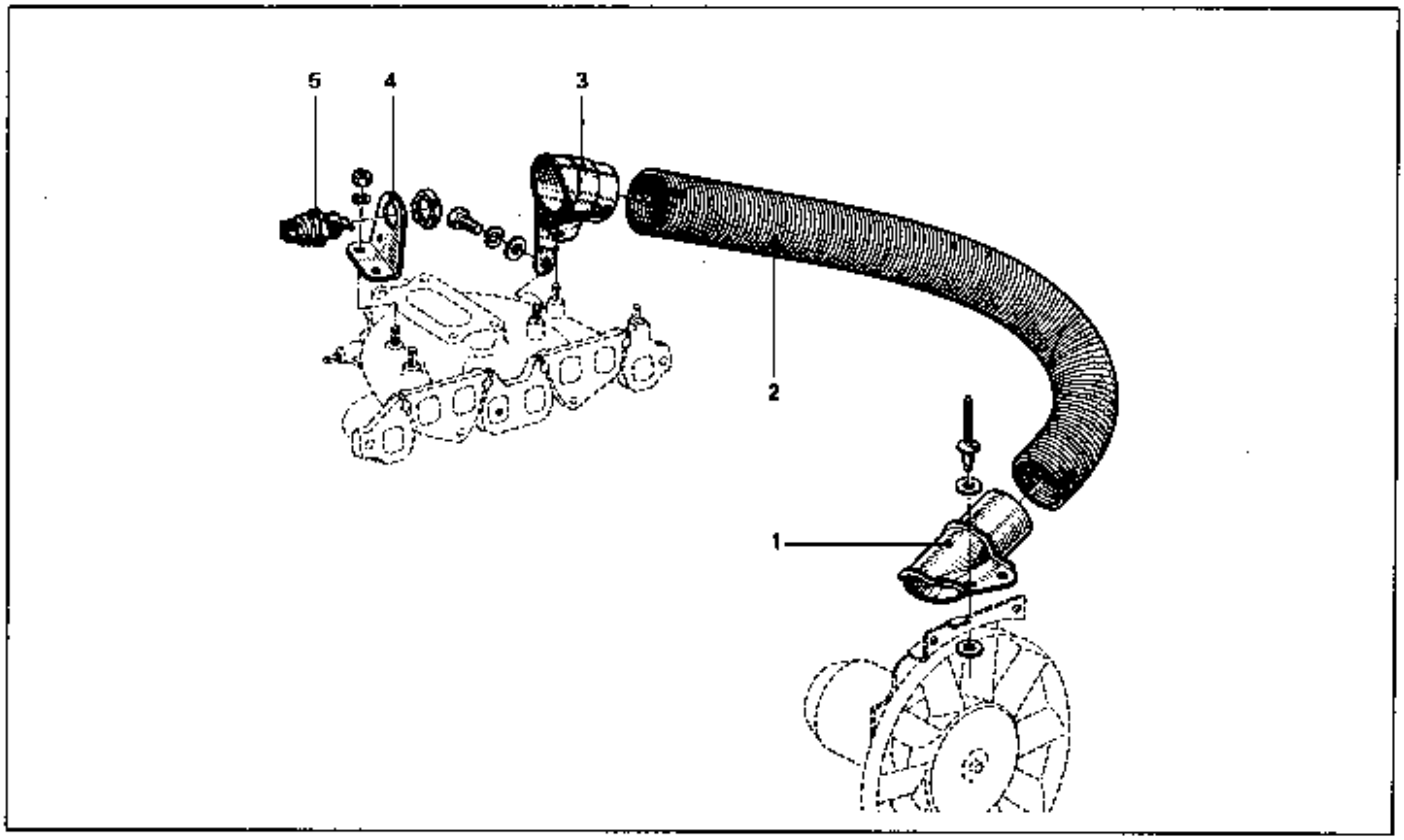
On engines C2J-788 only (manual gearbox).

8. Temperature valve
9. E.G.R. valve
CA. Inlet manifold
CE. Exhaust manifold
F. Filter
G. To air filter

C1 to C4 : Calibrated orifices
- C1 : 60
- C3 : 30
- C2 : 80
- C4 : 30

Engines C2J-788 and 789

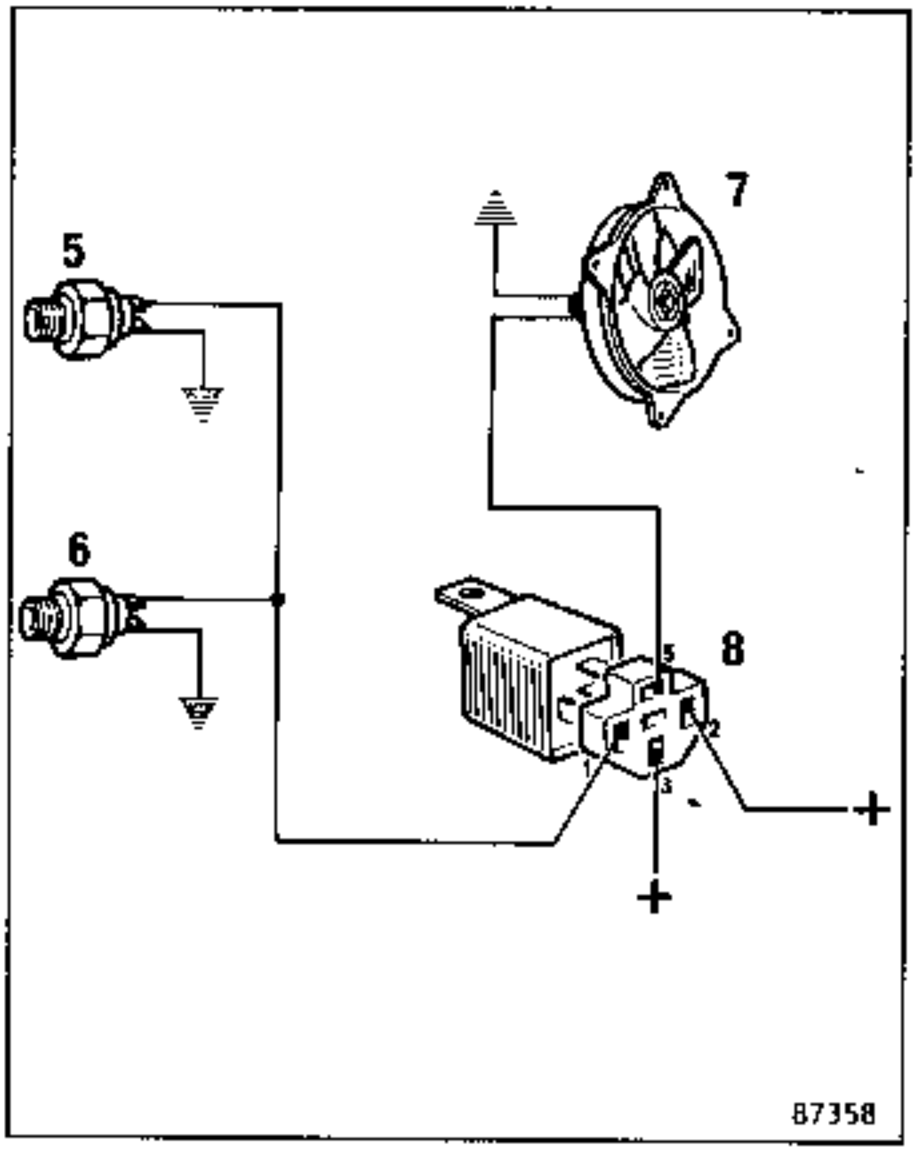
Anti-percolation system :



To improve driving comfort, air from a fan unit is blown over the carburettor.

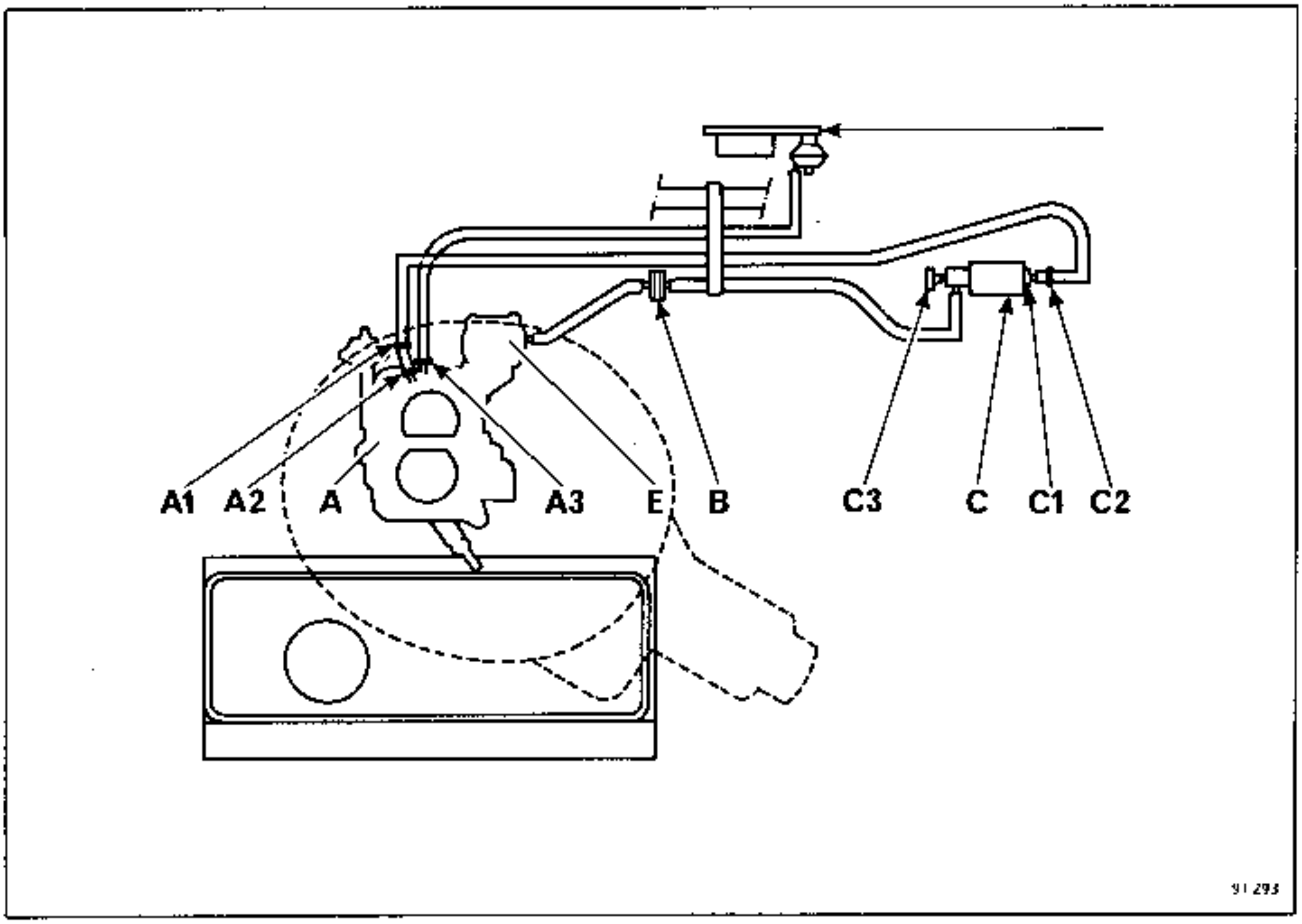
The fan switches on as soon as the ambient temperature near the carburettor reaches 97°C. It is controlled by a 97/80°C temperature sensor which is secured to the inlet manifold and connected, in parallel, with the fan electrical circuit.

1. Intake casing
2. Ducting
3. End fitting
4. Securing bracket
5. 97/80°C temperature sensor
6. Fan unit sensor
7. Fan unit
8. Relay



Engines C2J-788 and 789

POSITIONS OF PIPES THAT FORM THE EMISSION CONTROL CIRCUIT



A WEBER 32 DRT carburettor

A1 Red ring
A2 Red positioning ring
A3 Black positioning ring

B Delay valve
White face towards solenoid valve

C Solenoid valve

C1 Red ring
C2 Red positioning ring
C3 Solenoid valve filter

D Ignition module (capsule)

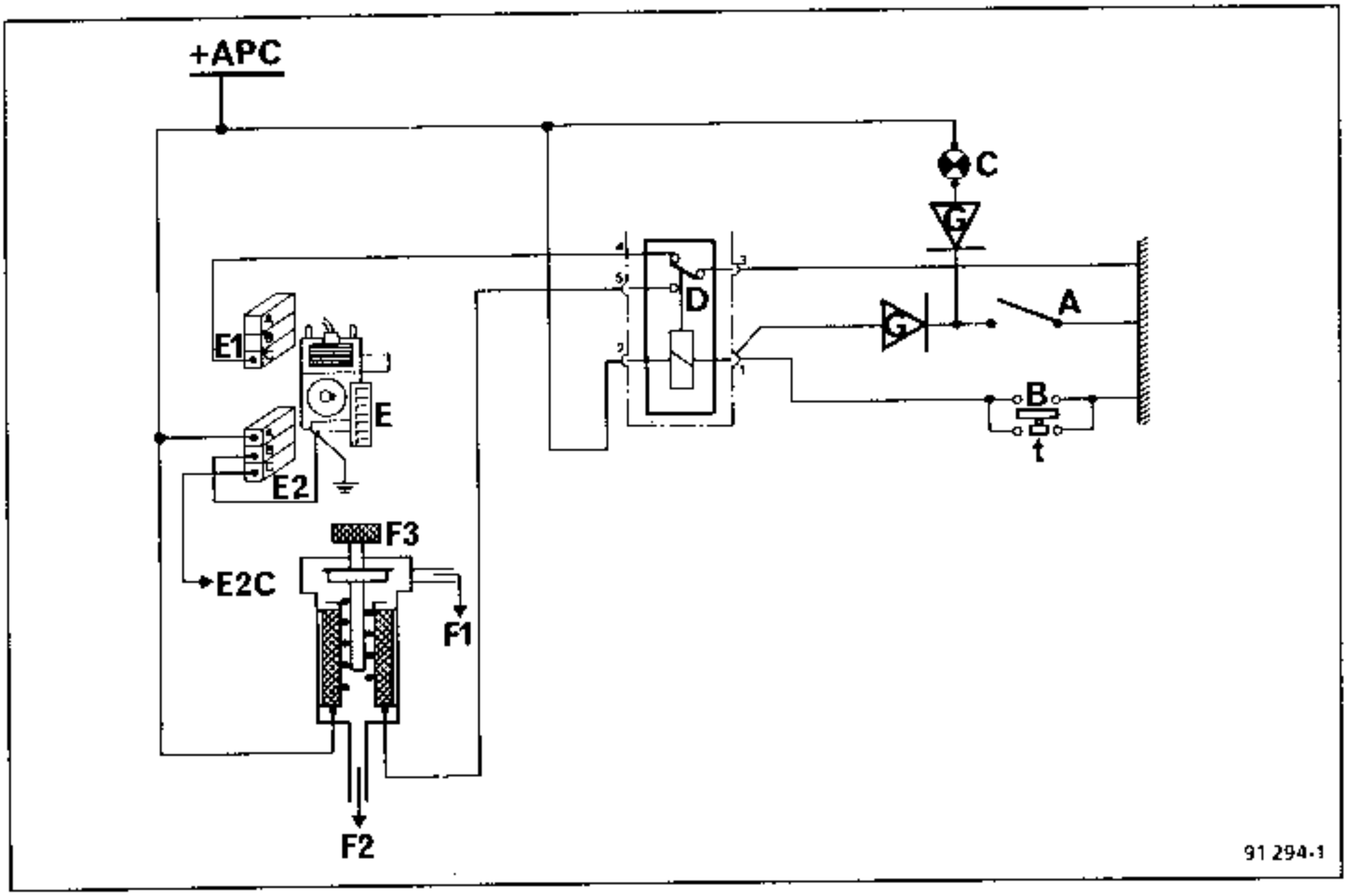
E Throttle actuator

The throttle actuator (E) is controlled, under certain conditions, on overrun, by solenoid valve (C). These conditions are :

- when the engine oil temperature is between 15 and 70°C,
- between 15 and 70°C, the throttle actuator will not operate when the choke is pulled out.

Engines C2J G 782 and C2J T 784

ELECTRICAL CIRCUIT DIAGRAM



A Choke control

B 15/70°C oil temperature switch. Open at temperatures between 15 and 70°C.

C Choke warning light

D Relay

E Ignition unit

E1 Black connector
Channel C : correction of advance of - 5° at flywheel

E2 White connector
Channel A : plus after ignition switch
Channel B : earth
Channel C : tachometer signal

F Solenoid valve

F1 To throttle actuator via the white delay valve

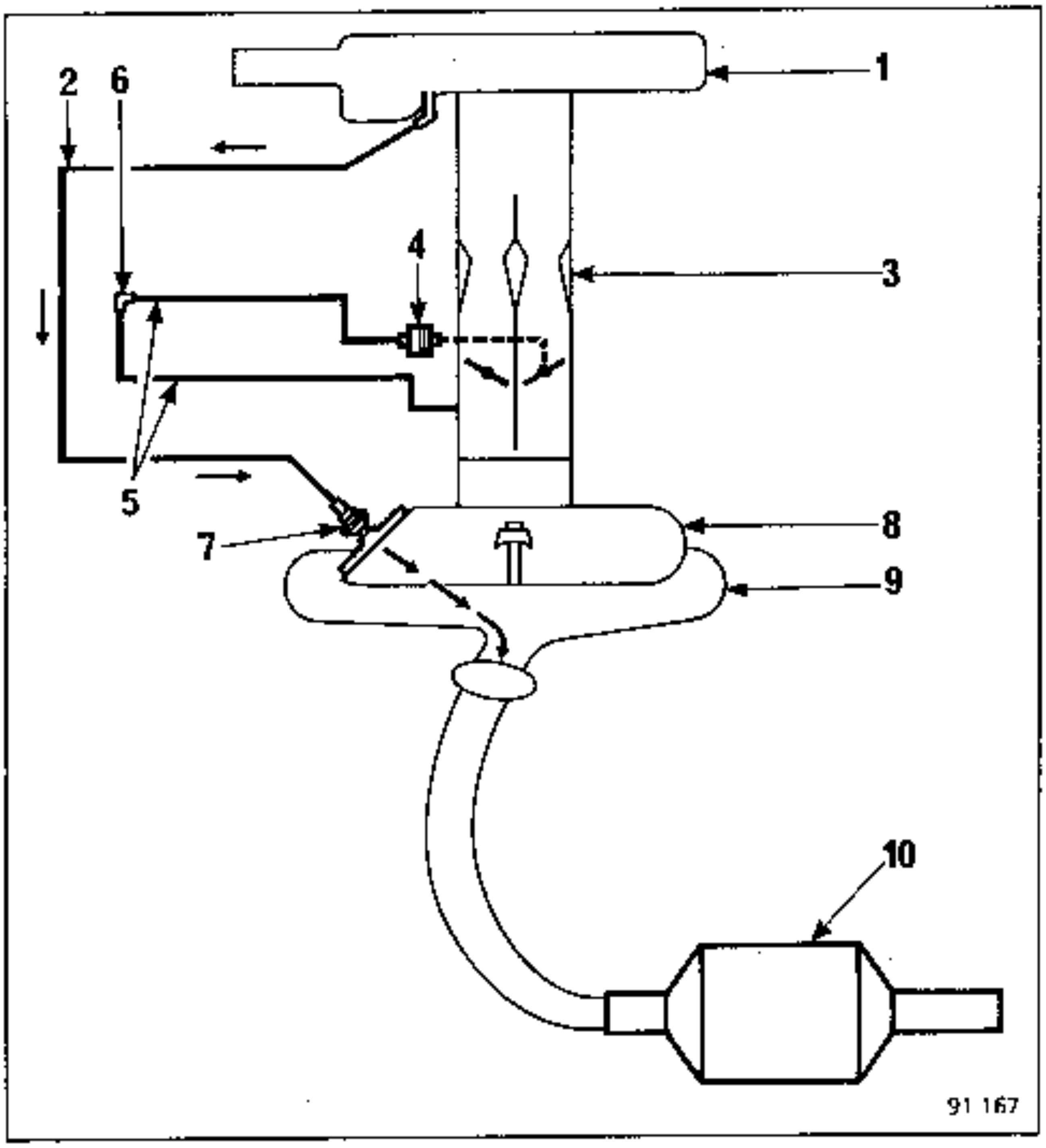
F2 To carburettor
Connection on input side of throttle

F3 Solenoid valve filter

G Diodes

+ APC = + after ignition switch

Engines F2N G 742



1. Air filter
2. Pipe conencting the air filter (1) to Pulsair air intake valve (7)
3. Carburettor
4. Delay valve
5. Pipe connecting vacuum take-off point to actuator
6. 2 way connector
7. Pulsair
8. Inlet manifold
9. Exhaust manifold
10. Catalyser

The emission control system consists of a pulsair (7) mounted on the inlet manifold (8) and connected to the air filter (1) on one hand and to the exhaust manifold (9) on the other hand.

The pulsations in the exhaust manifold (9) set up a vacuum behind the pulsair (7) and this opens an air circuit between the air filter (1) and the exhaust (9) via the catalyser (10).

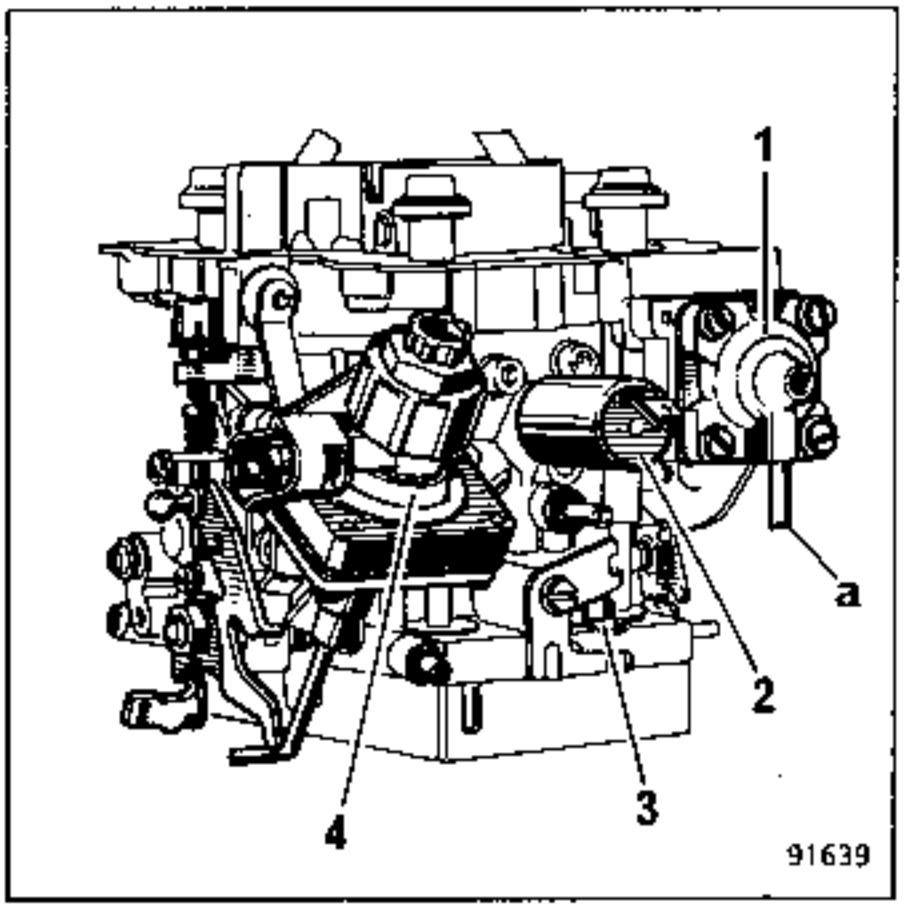
By passing fuel-free air (oxygen) into the exhaust system before the catalyser one raises the temperature of the products of combustion and permits a catalytic reaction to take place in the catalyser : this causes an oxydisation of the exhaust gases to take place to reduce the hydrocarbon (HC) and carbon monoxide (CO) content.

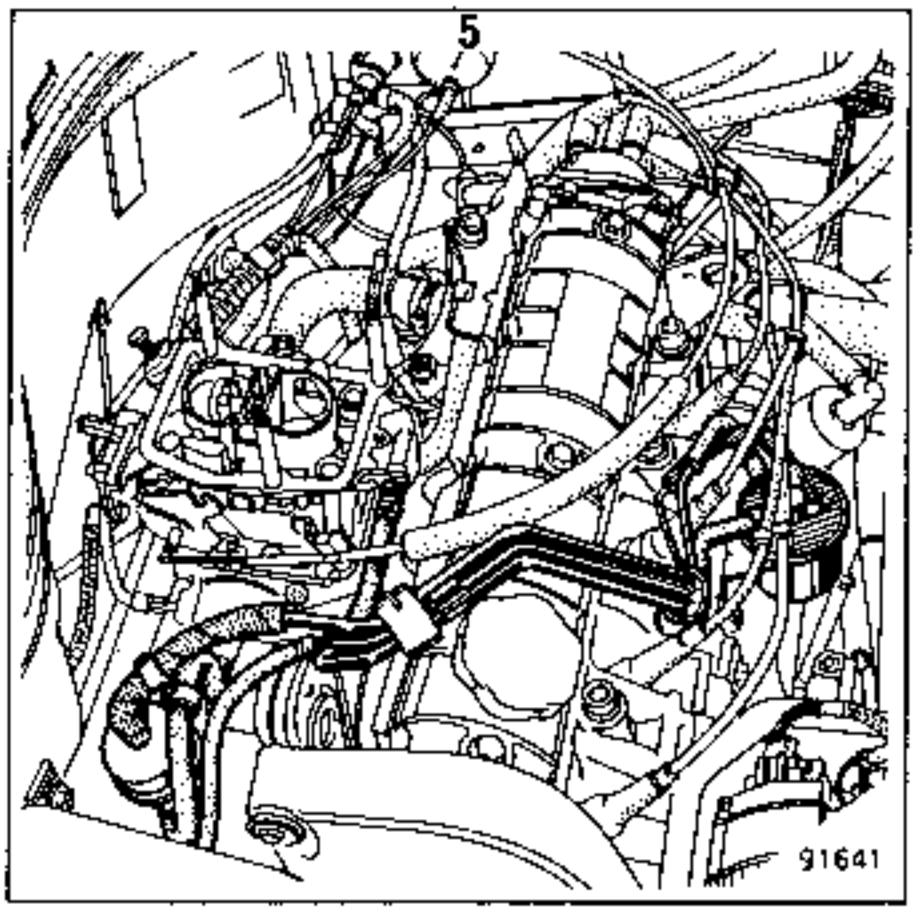
The reduction of the level of hydrocarbon emission during overrun results from the fitting of a throttle actuator and a delay valve (4) that is white or yellow in colour (the coloured side is to be towards the carburettor connection).

Engines F2N G 742

On all versions, the SOLEX 28 x 34 Z 10 carbruettor is equipped :

- with an idling speed cut-out on the idling speed circuit of the first barrel,
- with an electrical resistance on the idling circuit of the first barrel in place of the hot water heating system,
- with an accumulator, that is to say an additional volume on the choke servo diaphragm to eliminate stalling after starting,
- with a single or two stage throttle actuator depending on the version. The first stage is the emission control stage (to reduce hydrocarbon output during overrun) and for the air conditioning. The second stage is for the power steering system. The control systems for the different functions are therefore separate.

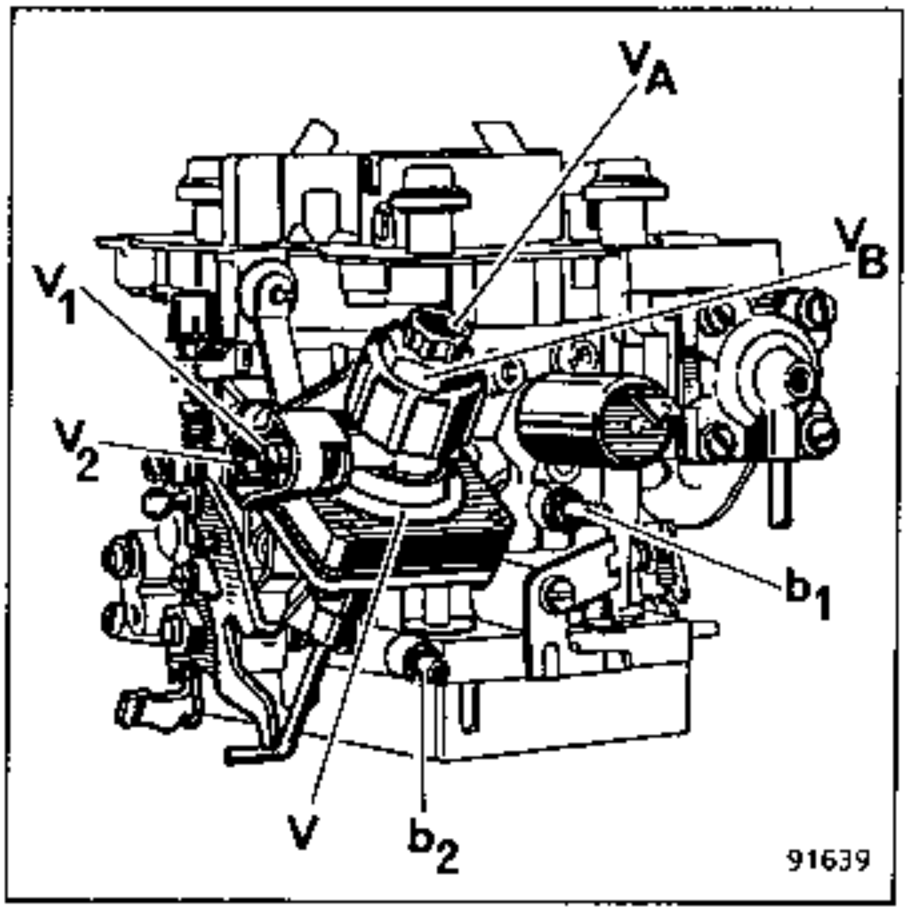




1. Choke servo diaphragm
   a - Connection between servo diaphragm and accumulator
2. Cut-out on first barrel idling circuit
3. First barrel idling circuit heating resistance
4. Two stage throttle actuator (on certain versions)
5. Accumulator on choke servo diaphragm

ENGINES F2N G 742 WITH POWER STEERING, AIR CONDITIONING AND EMISSION CONTROL

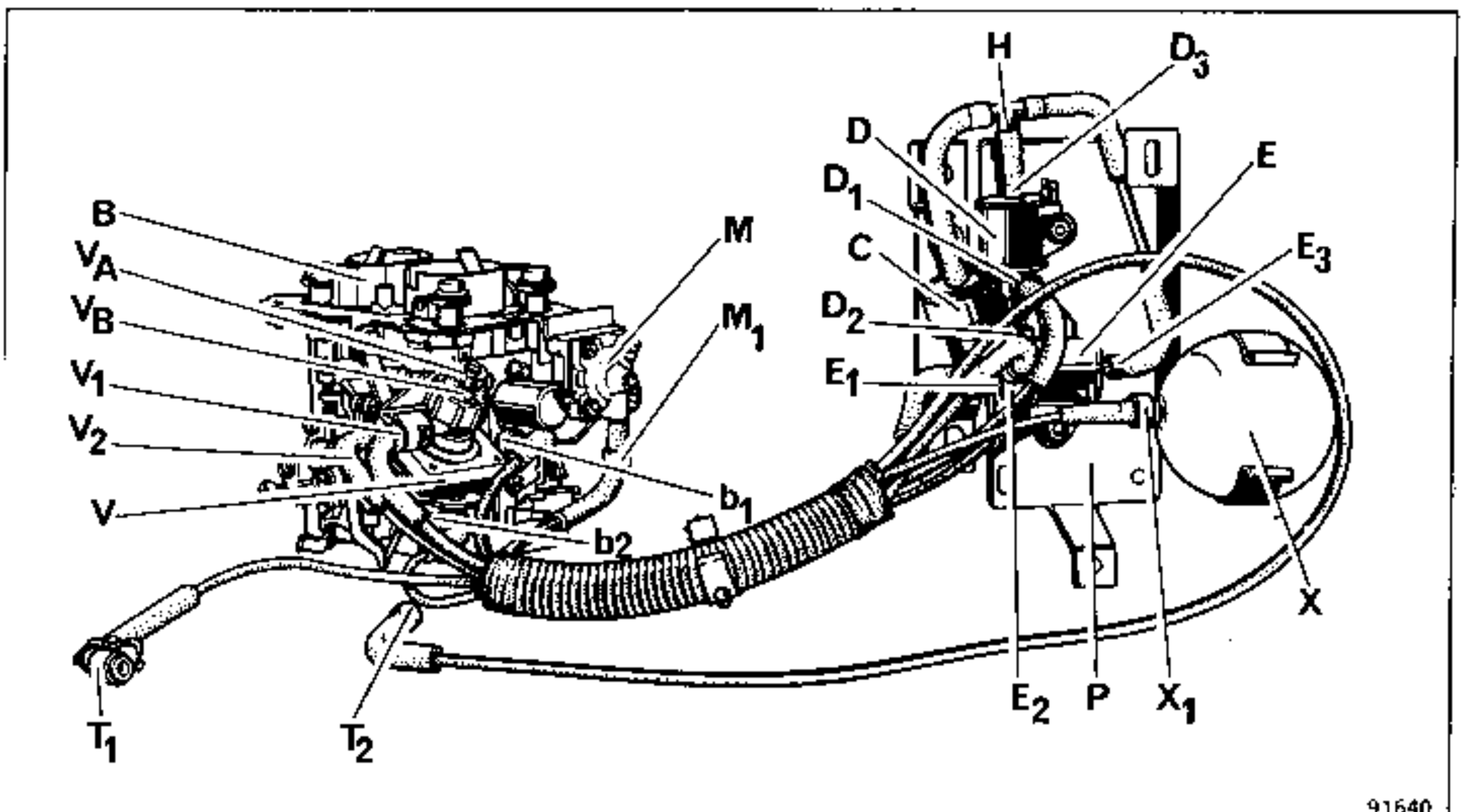
These vehicles are equipped with a two stage throttle actuator. Each stage is controlled separately by its own solenoid valve.



V. - Two stage throttle actuator
- V_A-Air conditioning and emission control adjusting screw
- V_B-Power steering adjusting screw
- V_1-Air conditioning connector on actuator
- V_2-Power steering connector on actuator
- b_1-Emission control connection
- b_2-Power steering and air conditioning connection

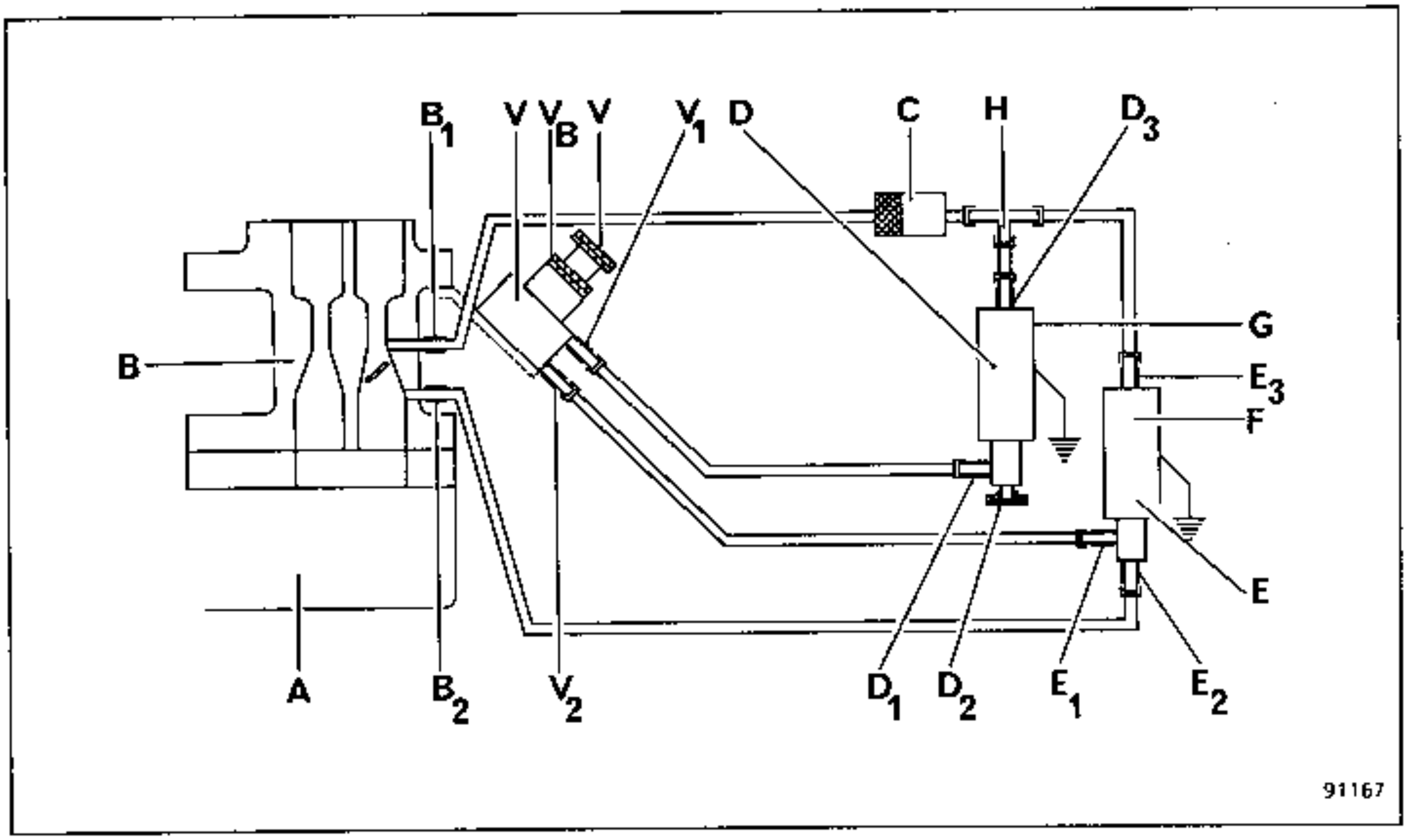
Adjustments on vehicles with air conditioning and power steering :

- Fast idling on vehicles with power steering (screw (V_B) : 1050 $\pm$ 50 rpm.
- Fast idling on vehicles with air conditioning and emission control (screw (V_A) : 1500 $\pm$ 100 rpm.



ENGINES F2N G 742 WITH POWER STEERING, AIR CONDITIONING AND EMISSION CONTROL

Pneumatic circuit diagram :



A - Inlet manifold

B - Carburettor
B1-White identification ring
B2-Red identification ring

C - Delay valve (coloured face towards carburettor)

D - Solenoid valve controlling stage V1 on throttle actuator V
D1-Grey identification ring
D2-Filter
D3-White identification ring

E - Solenoid valve controlling stage V2 on throttle actuator V
E1-Light blue identification ring
E2-Red identification ring
E3-White identification ring

F - Power steering signal

G - Air conditioning signal

H - T union

V - Throttle actuator (on carburettor)
V1-Grey identification ring
V2-Light blue identification ring
VA-Adjusting screw for air conditioning and emission control
VB-Adjusting screw for power steering

M - Choke servo diaphragm
M1-Green identification ring

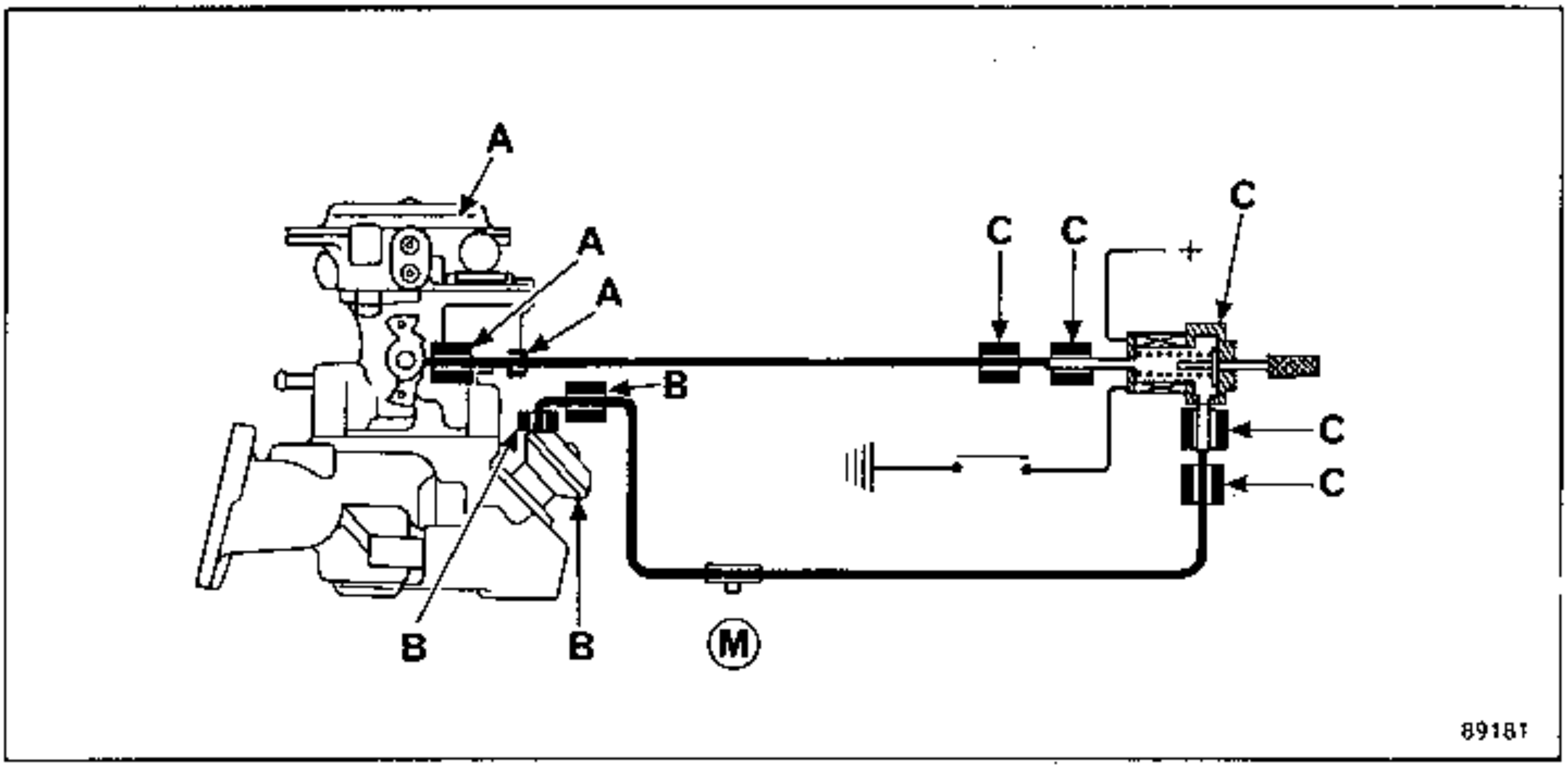
X - Choke accumulator
X1-Green identification ring

P - Support plate

T_1 - A.E.I. connection on manifold yellow identification ring

T_2 - Connection on A.E.I., yellow identification ring

Exhaust gas recirculation system circuit diagram (E.G.R.)



A = Throttle unit
B = E.G.R. valve
C = Solenoid valve

(M) Vacuum gauge
0 - 1000 mbar

A1 : Brown identification ring on throttle unit

A2 : Brown identification ring on pipe

B1 : Mauve identification ring on E.G.R. valve

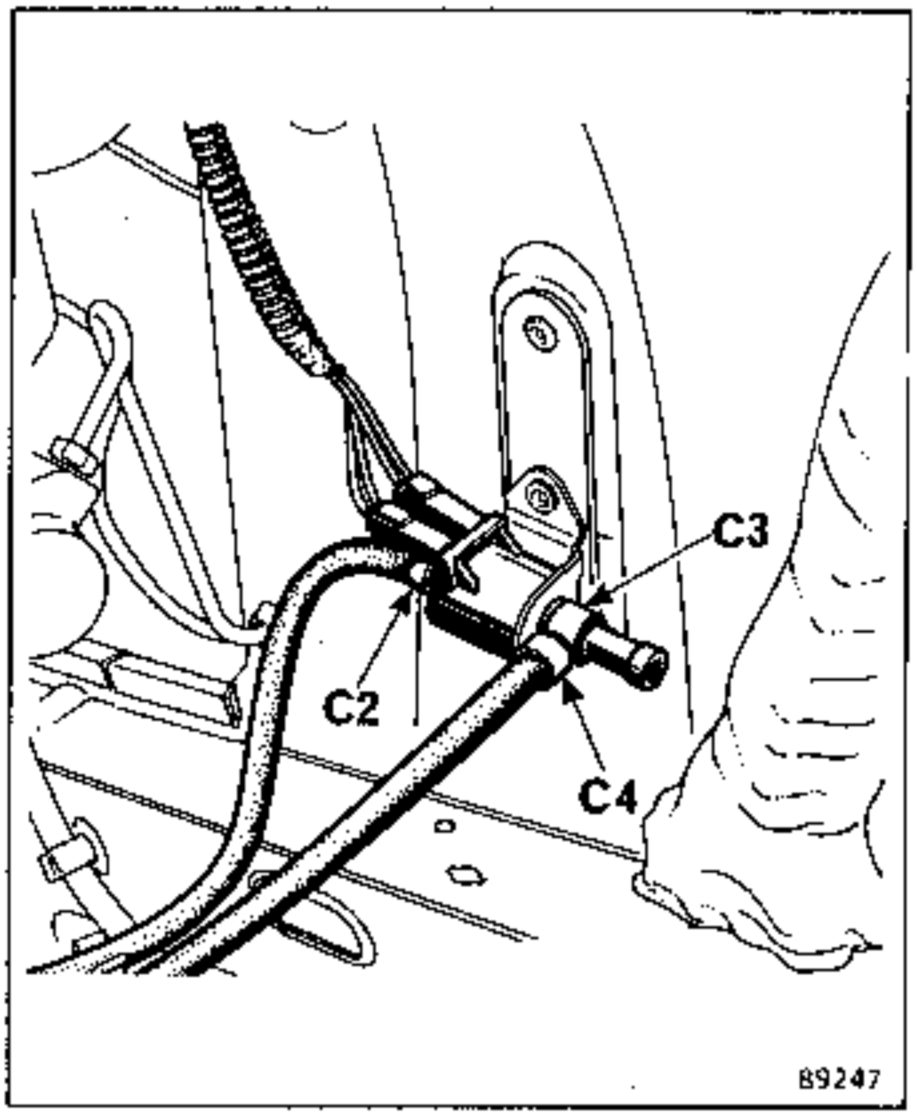
B2 : Mauve identification ring on pipe

C1 : Brown identification ring on solenoid valve

C2 : Brown identification ring on pipe

C3 : Mauve identification ring on solenoid valve

C4 : Mauve identification ring on pipe



CHECKING - ADJUSTING THE SYSTEM

ENGINES C1E-752

FUNCTION TESTED :

TEST EQUIPMENT	CONDITIONS	FINDINGS	REMARKS
IGNITION ADVANCE			
Tachometer Strobe light	Warm engine (after fan has cut in twice), speed less than 800 rpm. Advance capsule discon.	Distributor adjustment R335 at + 6° flywheel ± 2°	After adjusting advance curve R335, reconnect capsule C34 : Timing should remain + 6° ± 2° flywheel
NORMAL IDLING			
Tachometer CO tester	Warm engine (after fan has cut in twice)	Readings : - speed : **650 ± 25 rpm** - mixture : **1,0 ± 0,5 % CO** from 87 model year : - speed : **700 ± 50 rpm** - mixture : **1,5 ± 0,5 % CO**	Adjust if outside tolerances
HYDROCARBON EMISSION (C6H14)			
Tachometer CO tester	Warm engine (after fan has cut in twice) At normal idling speed	1. HC less than 770 ppm 2. HC more than 770 ppm	No action Check : - Spark plug gaps - Oil vapour reintake system - For air leaks
FAST IDLING			
Tachometer Manual vacuum pump Time change from fast idling to normal idling	After adjusting normal idling : accelerate the engine, off load, to 3000 rpm, then release the throttle control	1. The engine speed should fall gradually to normal idling in between 5 to 15 seconds. 2. If the engine speed drops immediately	The throttle actuator is opening correctly Check : - the direction in which the delay valve is fitted, white side towards carburettor, - the solenoid valve pneumatic connection - the electrical circuit.

CHECKING - ADJUSTING THE SYSTEM

ENGINES C1E-752 (continued)

FAST IDLING (CONTINUED)			
		3. If the engine takes more than 20 seconds or less than 8 seconds to return to idling speed	Check that the following are correct : - the delay valve, - the carburettor, - the throttle control.
	Warm engine : using a manual vacuum pump, apply a vacuum of 700 mbars to the actuator	Fast idling : Speed : **1700 ± 100 rpm**	Adjust if outside tolerances
IDLING SPEED CUT-OUT			
	With the engine running at idling speed, disconnect idling speed cut-out	If the engine stalls	The system is operating correctly

CHECKING - ADJUSTING THE SYSTEM

ENGINES C1E B 765

FUNCTION TESTED :

TEST EQUIPMENT	CONDITIONS	FINDINGS	REMARKS
IGNITION ADVANCE			
Tachometer Storbe light	Warm engine (after fan has cut in twice), speed less than 800 rpm. Advance capsule disconnected	Distributor adjustment R335 at + 2° flywheel ± 2°	After adjusting advance curve R341, reconnect capsule C33 : Timing should then be + 10° flywheel ± 2°
NORMAL IDLING			
Tachometer CO tester	Warm engine (after fan has cut in twice)	Readings : - speed : **700 ± 50 rpm** - mixture : **1,5 ± 0,5 % CO**	Adjust if outside tolerances
FAST IDLING			
Tachometer Manual vacuum pump Time to change from fast idling to normal idling	After adjusting normal idling : accelerate the engine, off load, to 3000 rpm, then release the throttle control	1. The engine speed should fall gradually to normal idling in between 5 to 15 seconds	The throttle actuator is opening correctly
		2. If the engine speed drops immediately.	Check : - the direction in which the delay valve is fitted, white side towards carburettor, - the solenoid valve pneumatic connection - the electrical circuit.
		3. If the engine takes more than 20 seconds or less than 8 seconds to return to idling speed	Check that the following are correct : - the delay valve, - the carburettor, - the throttle control
	Warm engine : using a manual vacuum pump, apply a vacuum of 700 mbars to the actuator	Fast idling : Speed : 1700 ± 100 rpm.	Adjust if outside tolerances
IDLING SPEED CUT-OUT			
	Disconnect cut-out at idling.	If the engine stalls	The system is operating correctly

CHECKING - ADJUSTING THE SYSTEM

ENGINES C1J TURBO

Items to be adjusted

CONDITIONS	NOMINAL READING AND TOLERANCE	REMARKS
	Normal Idling	
- Warm engine - Pulsair system not operating (air pipes pinched flat)	- Speed : 650 ± 50 rpm - mixture : $1,5\ ^{+0,5}_{-0}$ % CO	After adjustment, remove clamps from air pipes
	Fast Idling	
- Warm engine - Apply a vacuum of 800 mbars, with a vacuum pump, to the throttle actuator - Accelerate the engine, off load, to 3000 rpm and allow the throttle to return normally	- Speed : 1800 ± 100 rpm.	After adjusting the normal idling speed

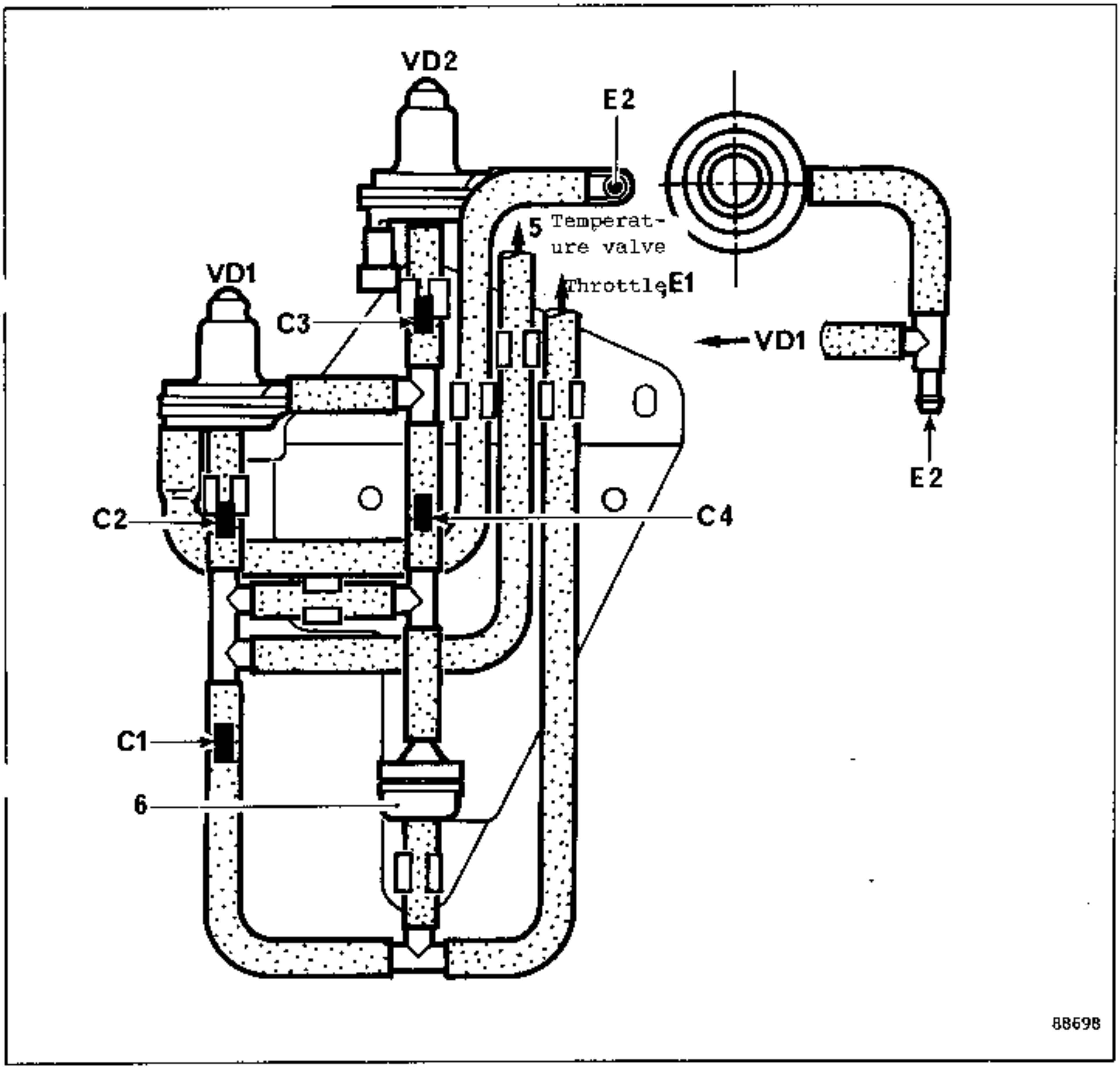
Functions tested :

CONDITIONS	FINDINGS	REMARKS
	Overrun system throttle actuator - Delay valve	
- Warm engine - Accelerate to 3000 rpm then allow the throttle control to return normally	The engine speed should fall, gradually, with a pause at 2 points : 1800 ± 100 rpm and 1300 ± 100 rpm, within a period of 3.5 to 6.5 seconds. Defects : - Immediate return to idling - Taking too long to return to idling	The throttle actuator is opening correctly - Check the direction in which the delay valve is fitted and the strength of the throttle return system. - Check that the delay valve is correct (brown in colour) and strength of throttle return system.

CHECKING - ADJUSTING THE SYSTEM

ENGINES C2J-788 and 789

Central pneumatic control unit :

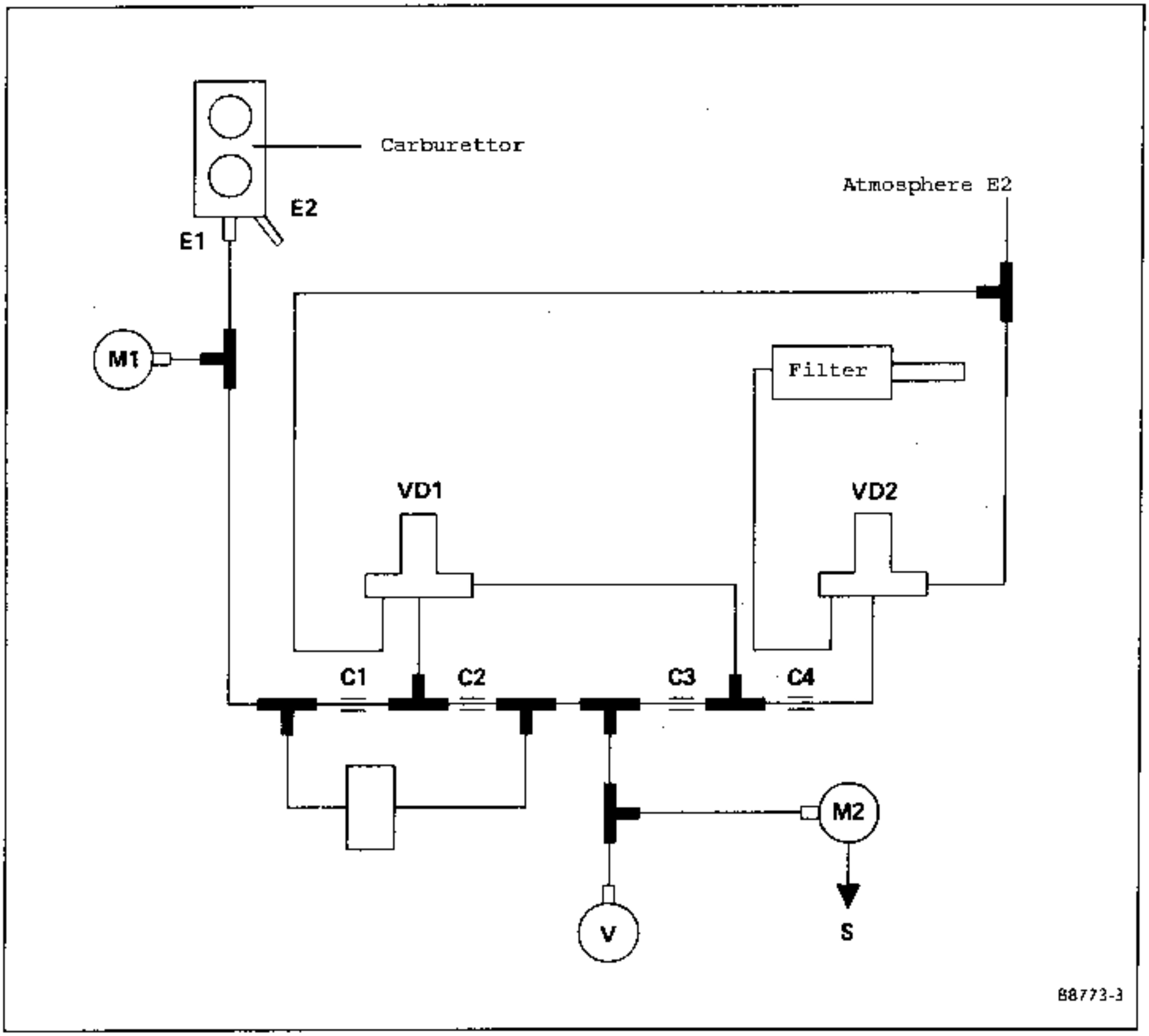


VD1. Regulator valve colour : Gold
VD2. Auxiliary valve colour : Green
C1 - C4 : Calibrated orifices
C1 : 60
C2 : 80
C3 : 30
C4 : 30

5. To temperature valve
6. Non-return valve

CHECKING - ADJUSTING THE SYSTEM

ENGINES C2J-788 and 789



- C1 to C4 : Calibrated orifices :
- M1)
- M2) Vacuum gauges
- V : E.G.R. valve

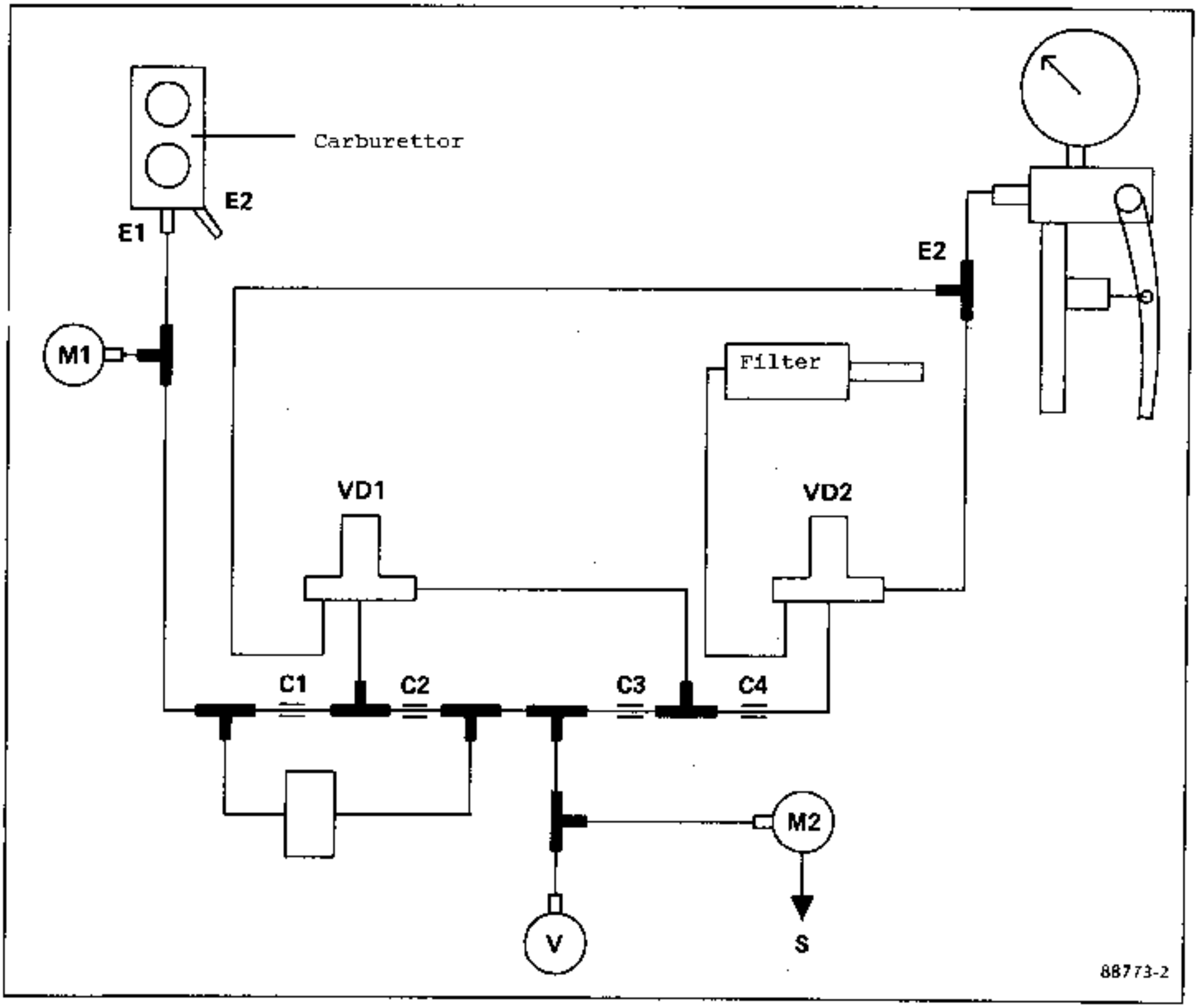
Adjusting VD1

Disconnect E2 and leave it vented to atmosphere.

Open the throttle to obtain a vacuum of 200 mbars at M1. Vacuum S at M2 should then be at least 85 mbars.

CHECKING - ADJUSTING THE SYSTEM

ENGINES C2J-788 and 789



- CI to C4 : Calibrated orifices :
- M1)
- M2) Vacuum gauges
- V : E.G.R. valve

Adjusting VD2

- Disconnect E2 and leave it vented to atmosphere.
- Open the throttle to obtain a vacuum of 200 mbars at M1. The vacuum at M2 should then be between 80 mbars and 110 mbars.
- Connect a manual vacuum pump at E2 and apply a vacuum of 60 mbars.
- The vacuum S at M2 should then be more 150 mbars.

CHECKING - ADJUSTING THE SYSTEM

ENGINES C2J-788 and 789

FUNCTIONS TESTED

CONDITIONS	NOMINAL READINGS AND TOLERANCES	REMARKS
	Normal Idling	
- Warm engine. - Exhaust pulsair system not operating (air pipes pinched flat).	- Speed : Manual gearbox : 700 ± 25 rpm. Automatic transmission : 600 ± 25 rpm.* - Mixture : Manual gearbox : 1.5 ± 0.5% CO Automatic transmission : 1.0 ± 0.5% CO*	- After adjustment, remove the clamps from the air pipes *Note : with selector lever in "D"
	Fast Idling (C2J-788)	
- Warm engine. - Apply a vacuum of 700 mbars, with a vacuum pump, to the throttle actuator.	- Speed : 1800 ± 100 rpm	- After adjusting the normal idling speed
	Hydrocarbon content (C_6H_{14})	
- Warm engine. - Exhaust pulsair system not operating. - Engine at idling speed.	1 - HC less than 450 PPM* 2 - HC more than 450 PPM* * (C_6H_{14})	No action - Check the spark plug gaps the reintake system and the exhaust gas recirculating valve for leaks.
	Operation of exhaust air intake system (Pulsair)	
- Warm engine. - Engine at idling speed.	1 - HC and CO (with exhaust pulsair system) = HC and CO (without pulsair system operating). 2 - HC and CO (with exhaust pulsair system) less than HC and CO (wihtout pulsair system operating).	- Pulsair system defective: Check system and its air circuits for leaks. - Pulsair system operating correctly.

CHECKING - ADJUSTING THE SYSTEM

ENGINES C2J 782 and C2J 784

FUNCTIONS TESTED :

TEST EQUIPMENT	CONDITIONS	FINDINGS	REMARKS
		NORMAL IDLING	
Tachometer CO tester	Warm engine (after fan has cut in twice). Engine oil temperature higher than 70°C	Readings : - speed : 700 ± 50 rpm - mixture : 1,5 ± 0,5 % CO	Adjust if outside tolerances
		FAST IDLING	
Tachometer Manual vacuum pump Time to change from fast idling to normal idling	Engine oil temperature between 15 and 70°C or one of solenoid valve terminals disconnected if engine oil temperature higher than 70°C Accelerate the engine, off load, to 3000 rpm, then release the throttle control	1. The engine speed should fall gradually to normal idling in between 5 to 15 seconds	The throttle actuator is opening correctly
		2. If the engine speed drops immediately	Check : - the direction in which the delay valve is fitted, white side towards solenoid valve, - the solenoid valve pneumatic connection - the electrical circuit
		3. If the engine takes more than 15 seconds or less than 5 seconds to return to idling speed	Check that the following are correct : - the delay valve, - the carburettor, - the throttle control
	Using a manual vacuum pump, apply a vacuum of 700 mbars to the actuator.	Fast idling : Speed : 1700 ± 100 rpm.	Adjust if outside tolerances.

CHECKING - ADJUSTING THE SYSTEM

ENGINES C2J G 782 and C2J T 784

FUNCTIONS TESTED :

TEST EQUIPMENT	CONDITIONS	FINDINGS	REMARKS
		FAST IDLING (continued)	
Tachometer Time taken to change from fast idling to normal idling	Warm engine (after fan has cut in twice) and engine oil temperature higher than 70°C.	If the engine returns to idling immediately (actuator not operating) after off load acceleration, If operation of actuator in question.	Operation correct Check : - the pneumatic and electrical circuit connections (see diagrams concerned) - oil temperature switch (at temperatures of less than 15°C or above 70°C, the switch should be earthed).
		IGNITION ADVANCE	
Tachometer Ohmmeter Strobe lamp	Eliminate the advance by earthing terminal C on the A.E.I. Engine at idling speed : 1-Choke operating (no matter what the oil temperature and choke light on).	The input wire to the AEI unit is not earthed.	If not, check electrical connections
	2-Choke pushed in, light off, oil temperature between 15 and 70°C.	The AEI unit input wire should be earthed.	If not, check : - the electrical connections, - the 15/70°C oil temperature switch.
	3-Oil temperature higher than 70°C.	The AEI unit input wire should no longer be earthed.	If it is, check : - the electrical connections, - the 15/70°C temperature switch.
		IDLING CUT-OUT	
	Disconnect cut-out at idling.	Engine stalls.	Operation correct.

CHECKING - ADJUSTING THE SYSTEM

ENGINES F2N G 742

Vehicles without power steering :

ITEMS TO BE ADJUSTED	CONDITIONS	READINGS	REMARKS
Normal idling	- warm engine after warm-up procedure and fan cutting in - Pipe between puls-air and air filter pinched flat.	**850 ± 50** rpm. CO : **1,25 ± 0,5 %**	Adjust after the fan has switched off. Engine warm, running at idling and pipe between pulsair and air filter pinched flat. The catalyser will vent itself.
Fast idling	- engine warm (after adjusting normal idling). - Apply a vacuum of 800 mbars to throttle actuator.	**1500 ± 100** rpm.	After adjusting normal idling, with fan stopped.

Vehicles with power steering :

ITEMS TO BE ADJUSTED	CONDITIONS	READINGS	REMARKS
Normal idling	Same as vehicle without power steering.	See above paragraph.	Same as vehicle without power steering.
Fast idling on power steering versions (screw V_B)	- Warm engine (after adjustment of normal idling). - Disconnect pipe from 2nd stage of actuator to solenoid valve D (grey ring). - Disconnect pipe with light blue ring from 1st stage of throttle actuator. - Apply vacuum of 800 mbars to 1st stage of actuator (V_2 on diagram).	**1050 ± 50** rpm.	- After adjustment of normal idling. - Fan stopped. - Wheels straight ahead.

CHECKING - ADJUSTING THE SYSTEM

ENGINES F2N G 742

FUNCTIONS TESTED :

TEST EQUIPMENT	CONDITIONS	FINDINGS	REMARKS
FAST IDLING (continued)			
Tachometer CO tester	- Warm engine after warm-up procedure and fan cutting in - Pipe between puls-air and filter pinched flat.	Readings : - speed : **850 ± 50** rpm or - mixture : CO : **1,5 ± 0,5 %**	- Adhere to engine warm up procedure. - Adjust if outside tolerance and fan switched off.
FAST IDLING - POWER STEERING (FIRST STAGE) (screw marked VB on diagram)			
- Tachometer	- Warm engine.	- the engine should maintain it normal idling speed of 850 ± 50 rpm despite turning the steering. DEFECTS : Drop in speed or too high a speed.	- Adjust if necessary. - Check the electrical connections on the pressure switch and solenoid valves. - Check pneumatic connections on oslenoid valves.
FAST IDLING ON EMISSION CONTROL VERSIONS (SECOND STAGE PLUS DELAY VALVE) (screw marked VA on diagram)			
- Tachometer - Stopwatch. - Time to fall from fast idling to normal idling.	- Warm engine. - Accelerate engine to 3000 rpm then release throttle control.	- the engine speed should gradually drop after a pause at 1500 ± 100 rpm in a period of 3 to 7 seconds. DEFECTS : -Immediate return to idling: -Sluggish return to idling speed	- Correct operation of throttle actuator (second stage). - Check the direction in which the delay valve is fitted (coloured face towards carburettor) and the strength of the throttle control return. - Check : - Pneumatic connections on the 2 sol. valves. - That delay valve is correct. - The throttle control.

CHECKING - ADJUSTING THE SYSTEM

ENGINES F2N G 742

Vehicles with power assisted steering :

ITEMS TO BE ADJUSTED	CONDITIONS	READINGS	REMARKS
Fast idling on emm-ission control vers-ions (screw V_A).	- Disconnect the pipe from the 1st stage of the act-uator to solenoid valve E (light blue ring). - Disconnect the pipe with the grey ring from the 2nd stage of the throttle actuator. - Apply a vacuum of 800 mbars to the 2nd stage of the actuator (V_1 on the diagram).	1500 ± 100 rpm.	- After adjusting normal idling speed. - Fan switched off. - Power steering stage of actuator previously adjusted.

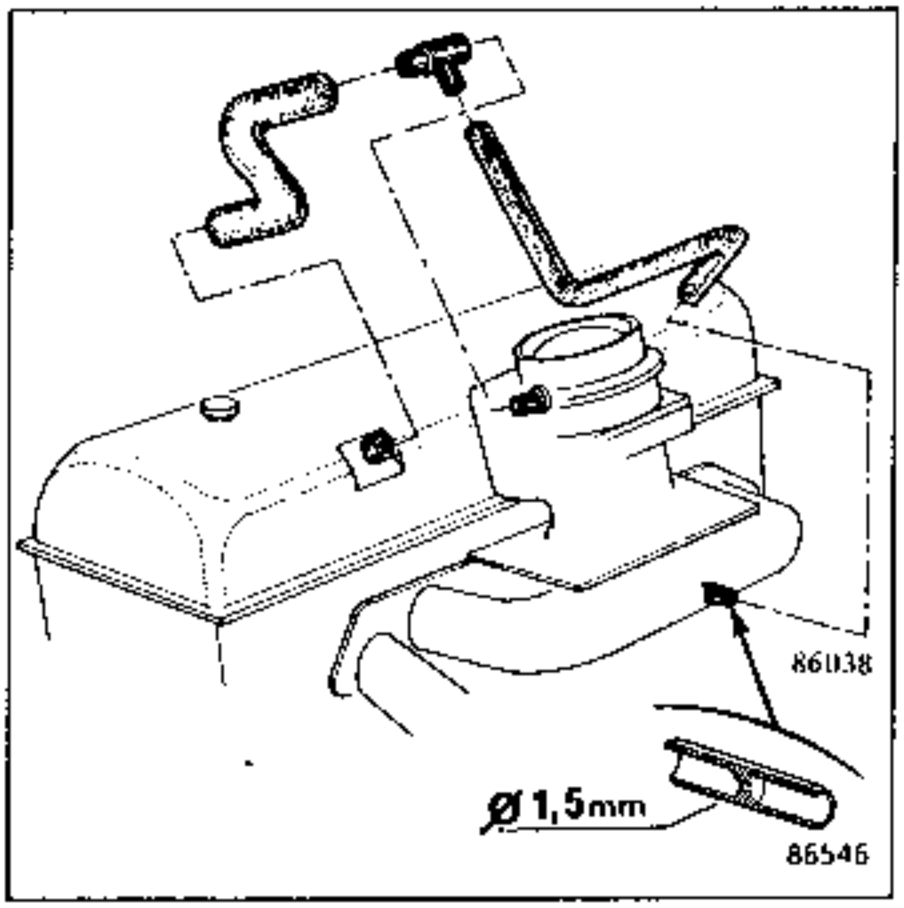
The gases from the engine crank case are recirculated. They are taken from the rocker arm cover and passed into the inlet manifold through a dual circuit (input and output) for burning in the combustion chambers.

CHECKING

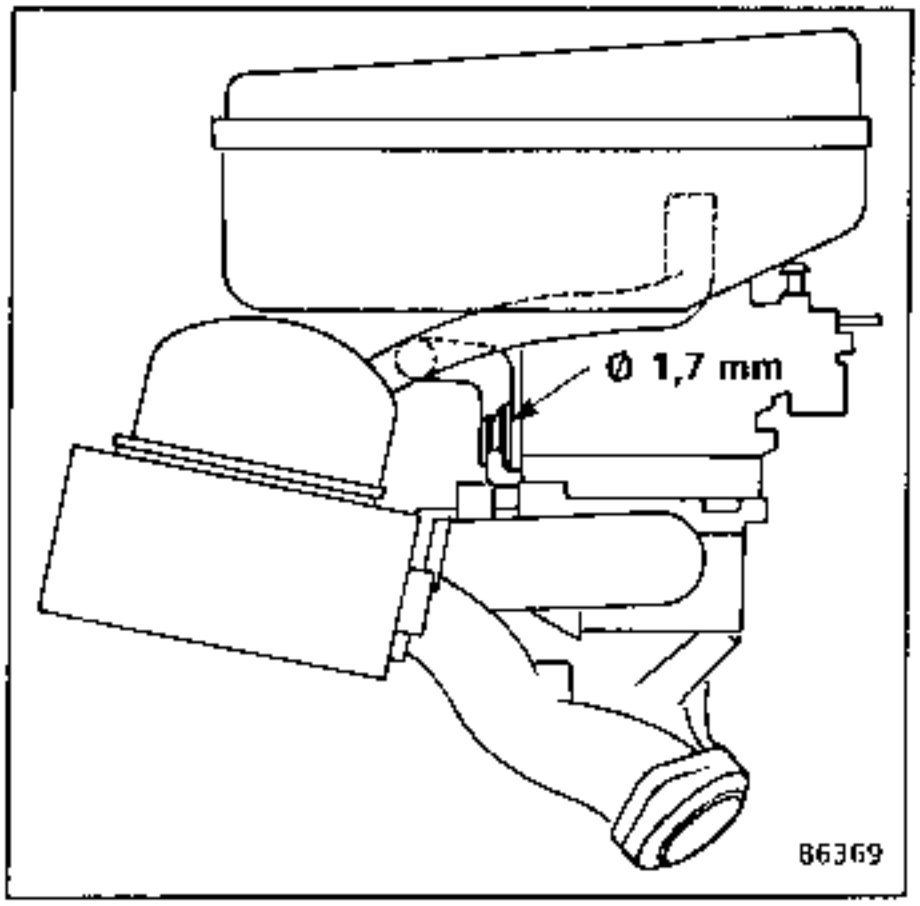
For the emission control system to operate correctly, the oil vapour reintake system must be kept clean and in good condition.

Check that the various calibrated orifices are in place and of the correct sizes.

ENGINES C1C,C1E,C1G,C1J

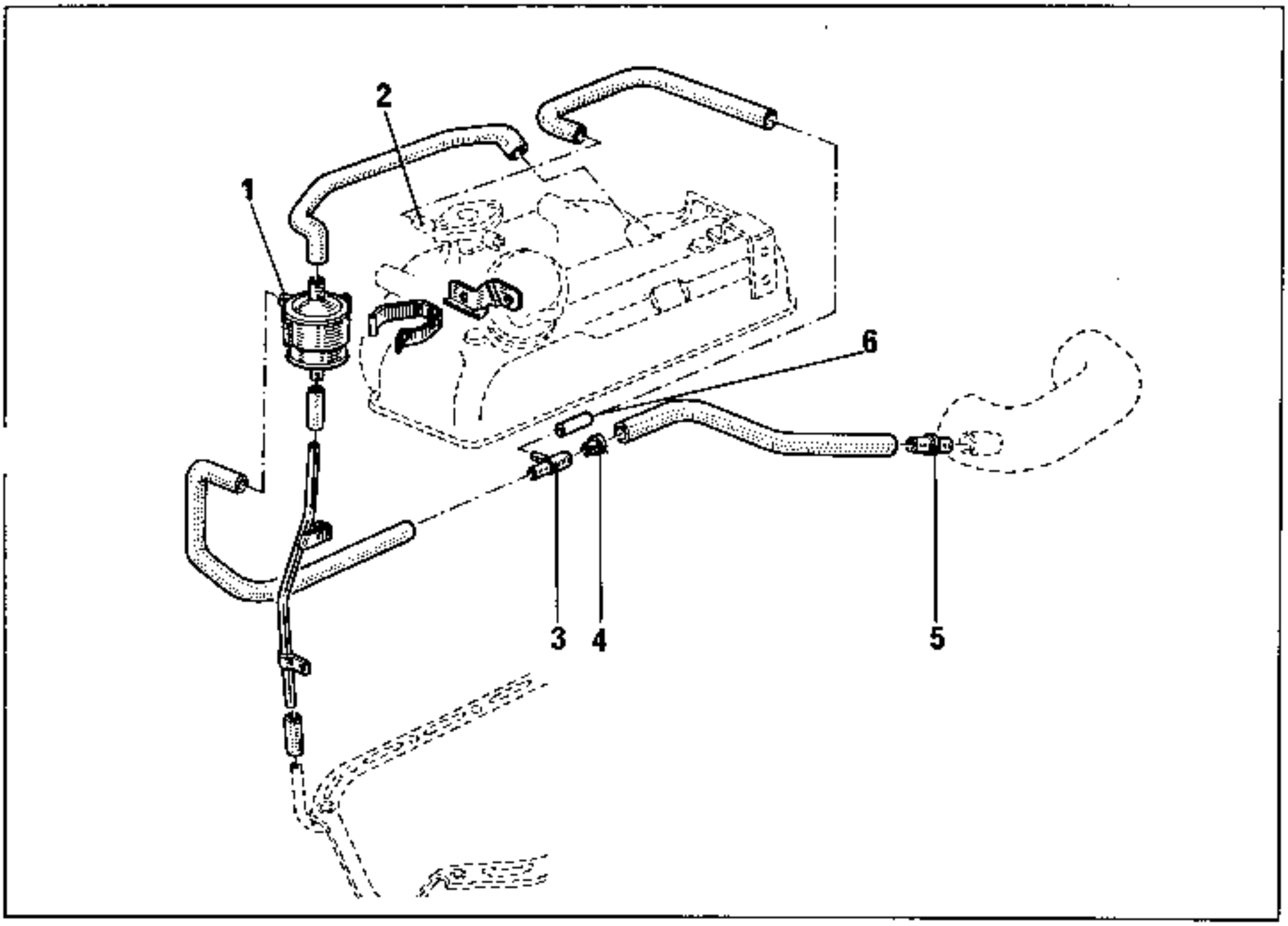


ENGINES C2J

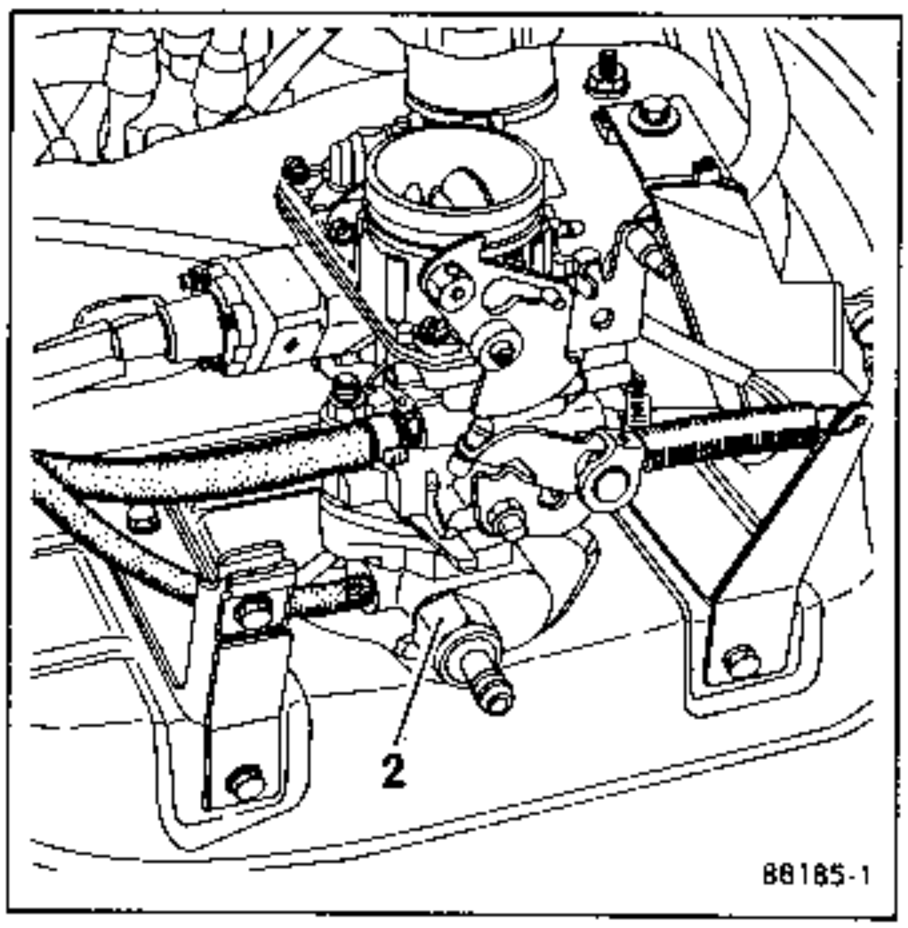


ENGINES C1C

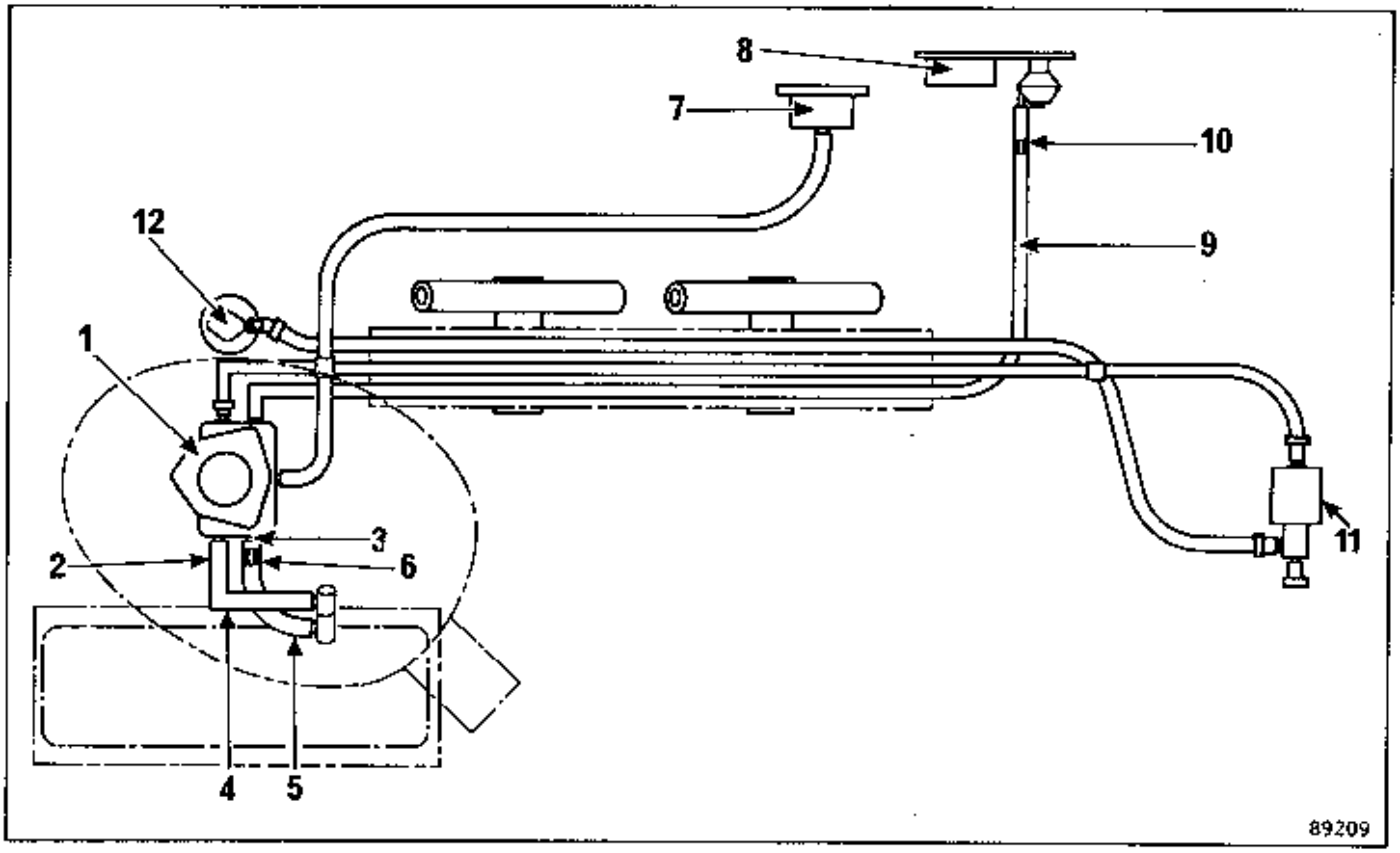
ENGINES C1J with turbocharger



1. Collector
2. Valve (closed when inlet manifold under pressure)
3. T union
4. 7 mm Ø calibrated orifice
5. Union
6. 1.7 mm Ø calibrated orifice

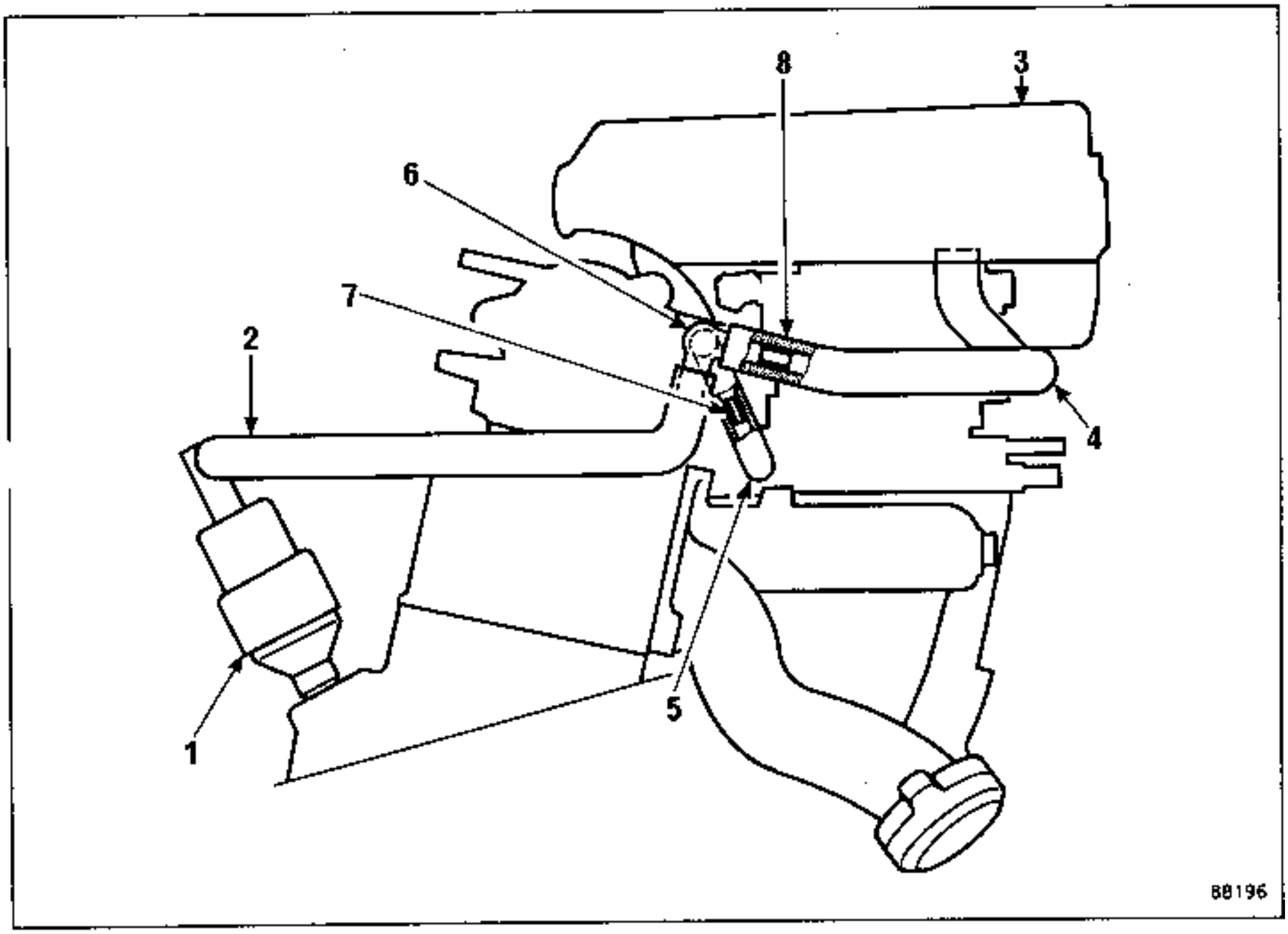


ENGINES C3J



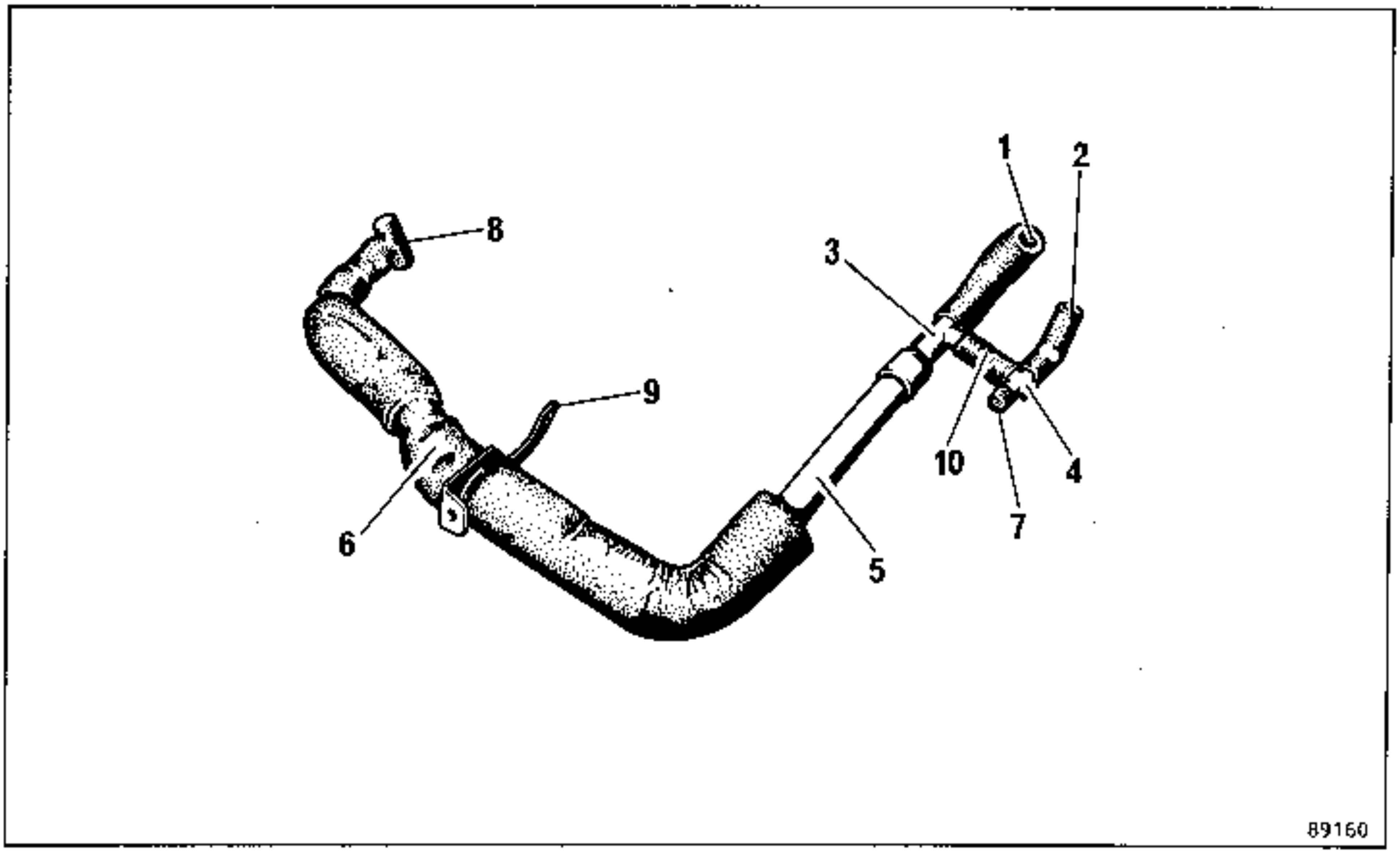
1. Throttle unit
2. Connector on input side of throttle unit
3. Connector on output side of throttle unit
4. Input side pipe
5. Output side pipe
6. 1.5 mm Ø calibrated orifice
7. Absolute pressure sensor
8. A.E.I. electronic ignition unit
9. Pipe connecting throttle unit to A.E.I. (only on the B,C,F 407, Bendix injection)
10. 1.2 mm Ø calibrated orifice (only or the B,C,F 407, Bendix injection)
11. E.G.R. control solenoid valve
12. E.G.R. valve

ENGINES F2N



1. Collector
2. Pipe (collector to 3 way union)
3. Air filter
4. Pipe (filter to 3 way union)
5. Pipe (3 way union to carburettor base)
6. 3 way union
7. 1.7 mm Ø calibrated orifice
8. 7 mm Ø calibrated orifice

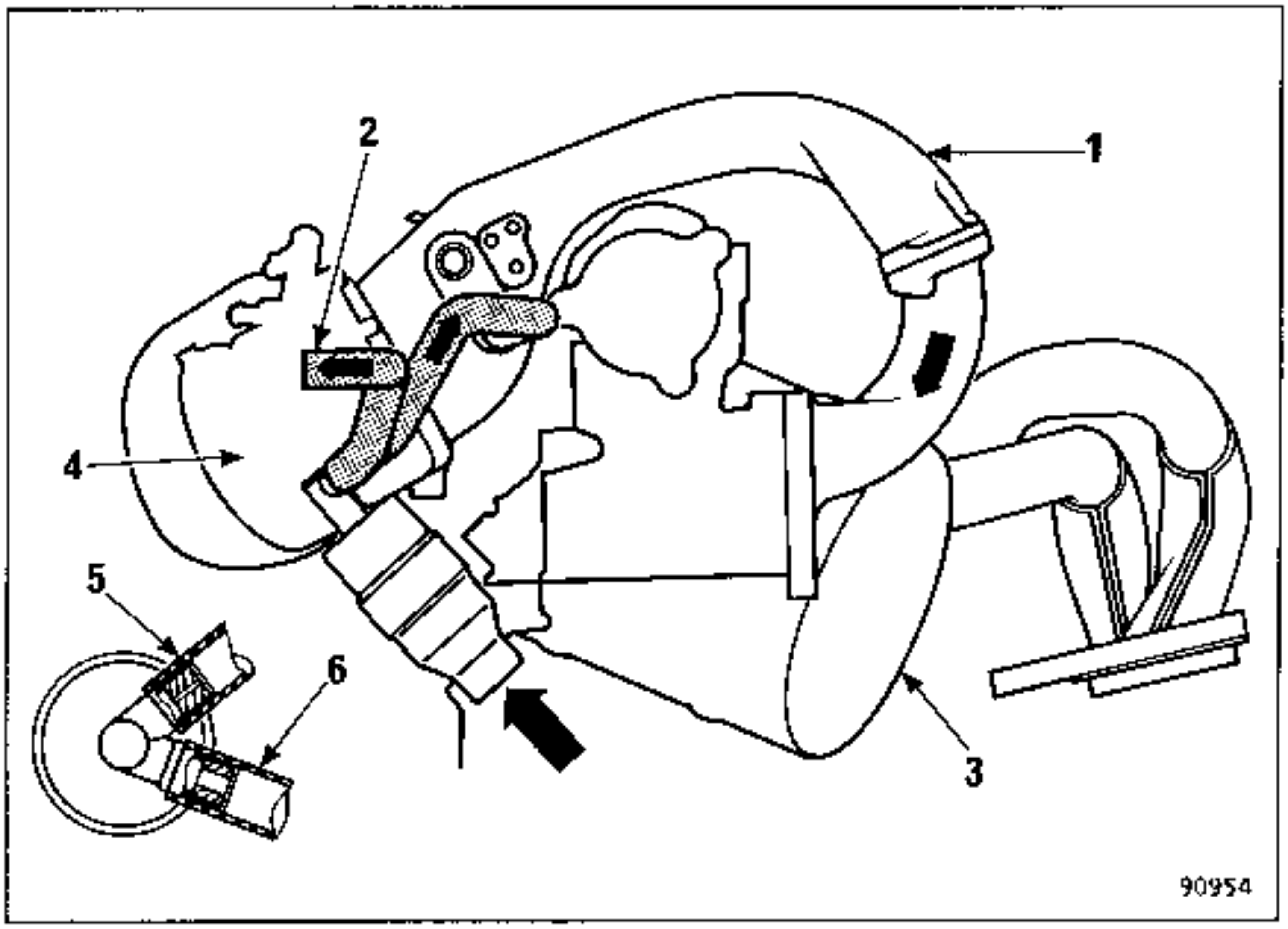
ENGINES F3N WITH SINGLE POINT INJECTION



1. Throttle unit upper connector (input side circuit)
2. Throttle unit lower connector (output side circuit)
3. T union
4. T union
5. Air duct
6. Air duct (isolated)
7. Plug
8. Collector
9. Securing lug
*10. Connecting pipe

*NOTE : on B, C 408 vehicles, 1987 model year, pipes (2) and (10), the T union (4), and plug (7) are replaced by a pre-formed elbow pipe connected to the lower connector on the throttle unit (output side circuit).

ENGINES F3N WITH MULTIPOINT INJECTION



1. Distributor unit
2. Connecting pipe
3. Air filter
4. Throttle unit
5. 1.5 mm Ø calibrated orifice (to distributor unit)
6. 6.5 mm Ø calibrated orifice (to connecting pipe)

CRANK CASE GAS/OIL VAPOUR REINTAKE SYSTEM

This system for recirculating the crank case gases is of the "closed vent" type with circuits, one on the input side and the other on the output side of the throttle unit.

The INPUT side circuit :

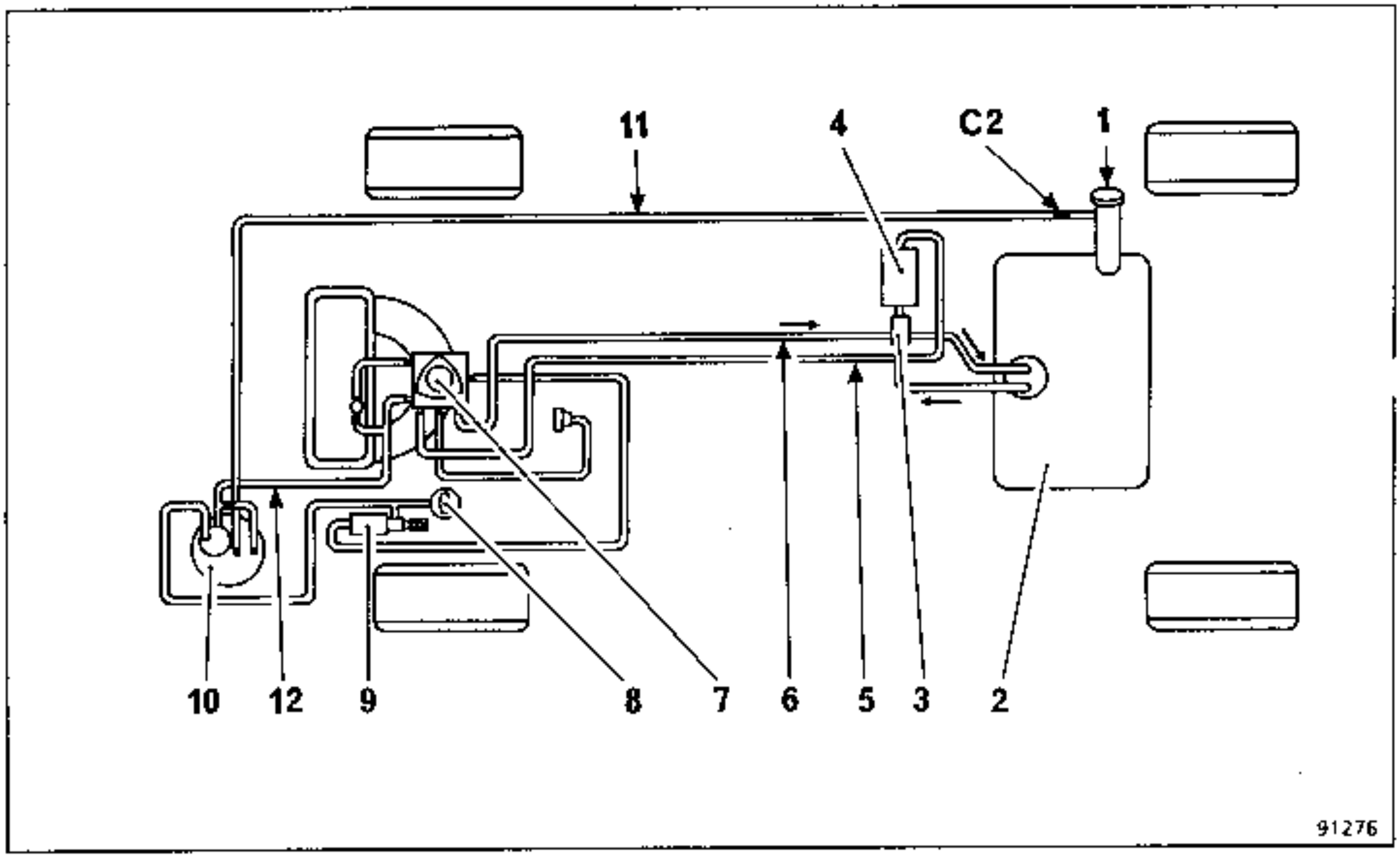
This passes from the collector, through a 6.5 mm Ø calibrated orifice, to the connecting pipe (between the air filter and the throttle unit).

The OUTPUT circuit :

This passes from the collector through a 1.5 mm Ø calibrated orifice to the inlet manifold.

CIRCUIT DIAGRAM

ENGINES C3J E 760



1. Sealed cap
2. Fuel tank
3. Electric fuel pump
4. Fuel filter
5. Fuel supply line
6. Fuel return line
7. Throttle unit
8. E.G.R. valve
9. Solenoid valve for controlling the E.G.R. and bleeding the canister
10. Fuel vapour absorption canister
11. Canister connecting pipe
12. Bleed pipe

Calibrated orifices :

C1 ø 0,90 mm
C2 ø 1,25 mm
C3 ø 1,50 mm

B/C/F 407 vehicles marketed in certain countries, during certain model years, are equipped with a fuel vapour absorption system.

The system consists of a fuel vapour absorption canister (10) connected to the fuel tank (2) by a pipe (11).

The canister contains active carbon and has a valve (A) which is connected to the inlet manifold through a solenoid valve (9) that bleeds the canister. The solenoid valve is controlled by the computer.

ENGINES C3J E 760

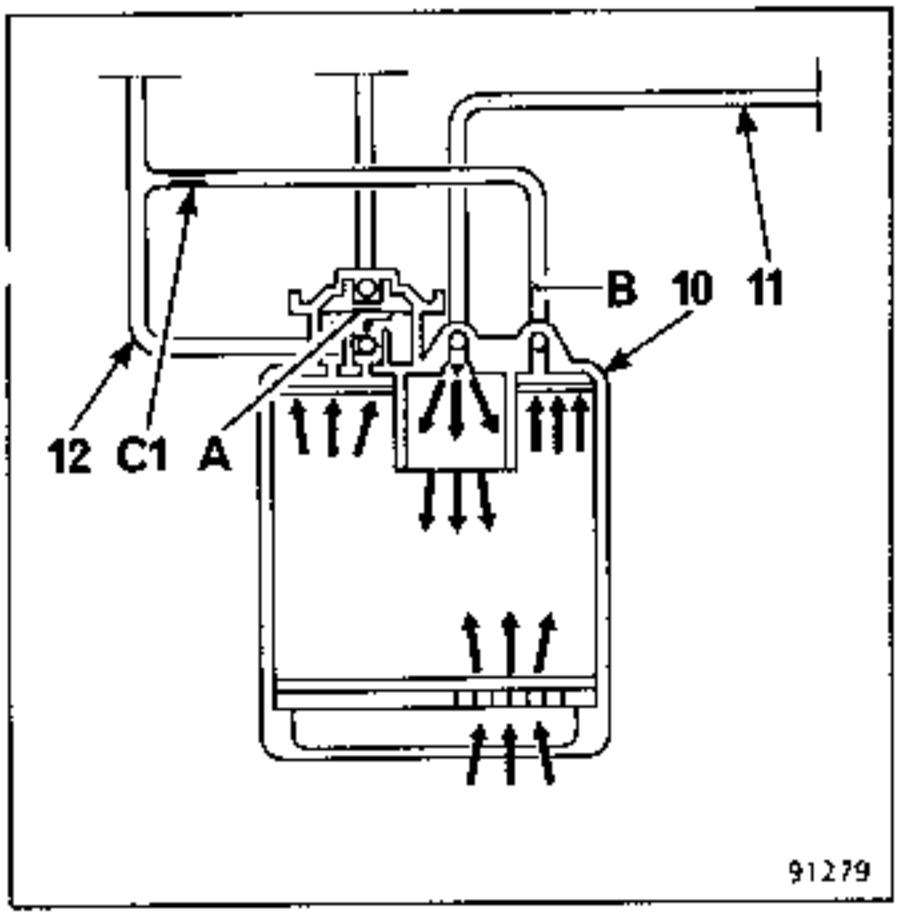
PRINCIPLE OF OPERATION

When the engine is not running :
The fuel vapour is collected by the canister (10).

This vapour comes from the fuel tank (2) through a calibrated orifice (C2) Ø 1.25 mm.

When the engine is running at idling speed:
The canister is bled through a circuit (B) in which there is a calibrated orifice (C1) 0.90 mm Ø.

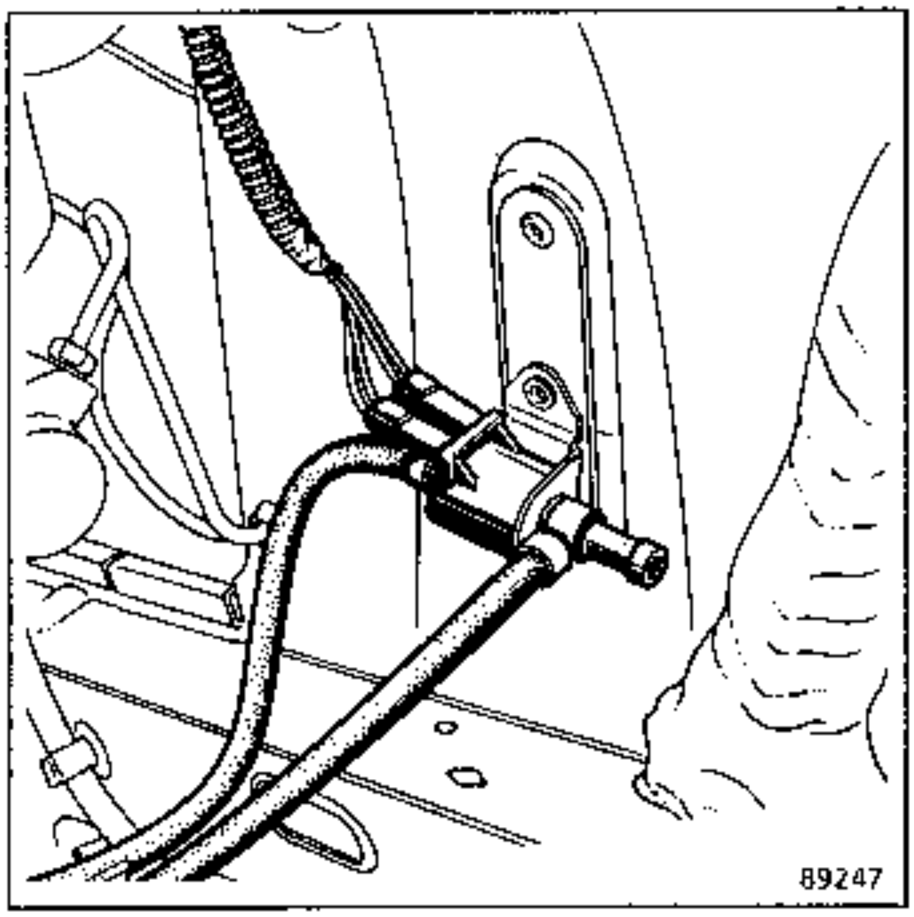
'hen the engine is running at speeds other than idling speed :
Under certain conditions, when the engine is hot, the injection computer operates the solenoid valve (9) to open the pneumatic circuit to valve (A) on the canister. The valve opens the bleed circuit between the inlet manifold and the canister along pipe (12).



POSITIONS OF THE ANTI-EVAPORATION SYSTEM COMPONENTS

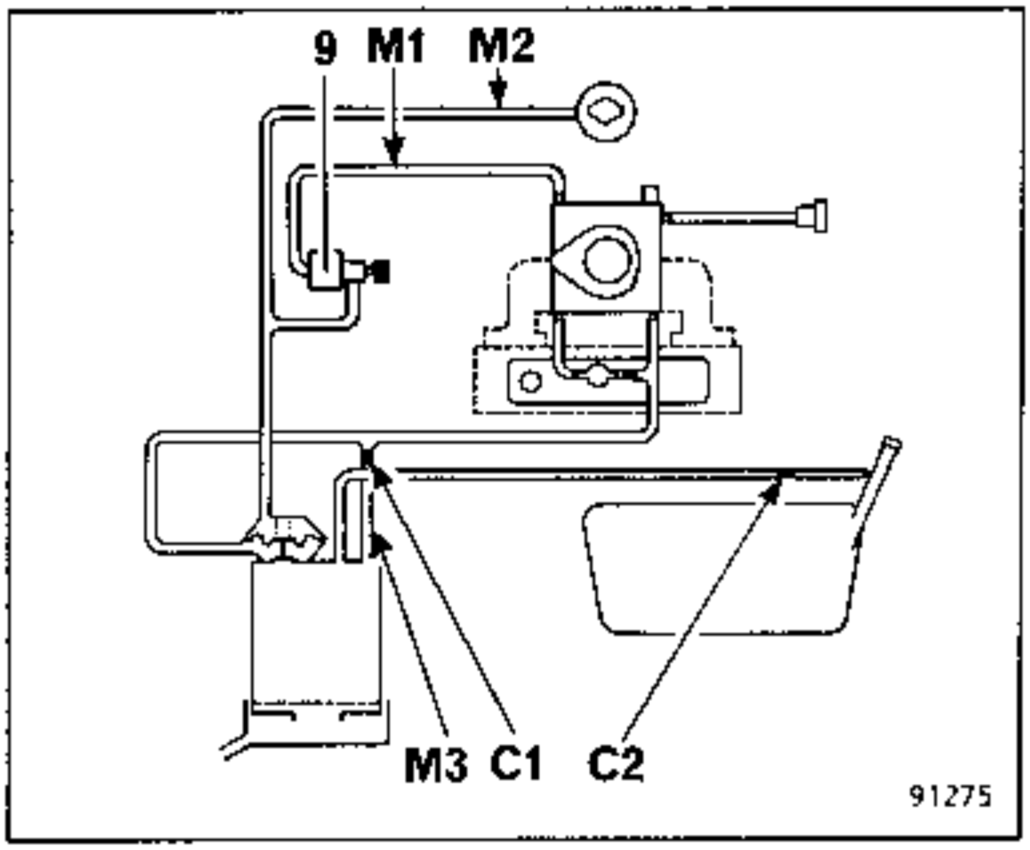
The canister :
The fuel vapour absorption canister is secured, by a strap, to a support near the brake master cylinder.

The E.G.R. control and canister bleed solenoid valve is mounted on the left hand shock absorber turret near the brake master cylinder.



CHECKING THE ANTI-EVAPORATION SYSTEM

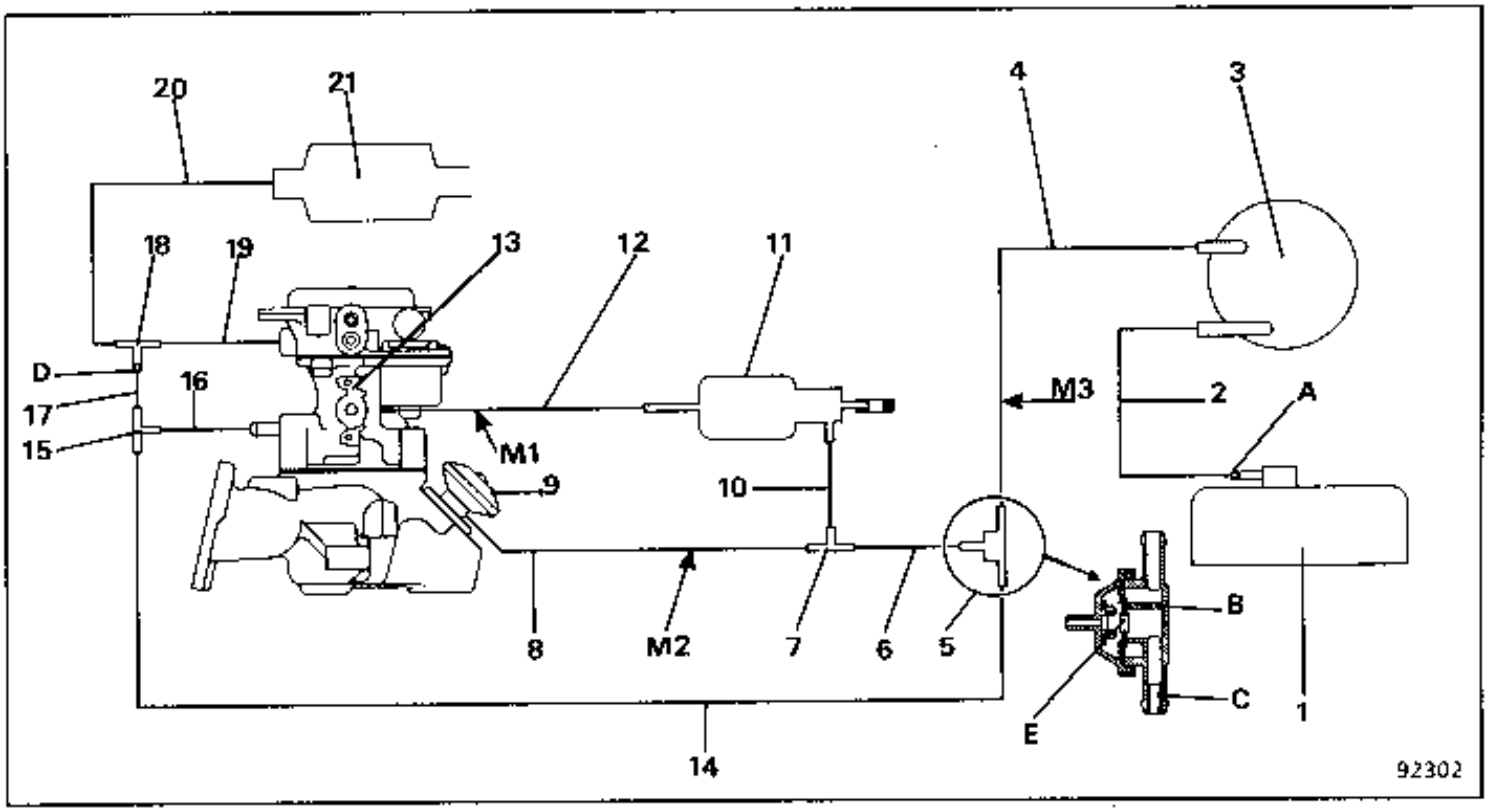
ENGINES C3J E 760



FUNCTION UNDER TEST	TEST EQUIPMENT	CONDITIONS	FINDINGS	REMARKS
Anti-evaporation circuit bleed	Vacuum gauges (0,1000 mbar) connected in parallel to : - M1 - M2 - M3 Voltmeter connected across the 2 terminals on the solenoid valve (9)	Engine warm after fan has cut in twice Running at idling speed	- No vacuum at M2 - Vacuum at M3 - Voltage = 12 volts across terminals on solenoid valve (9)	If there is a vacuum at M2, check that the solenoid valve is correctly connected and check the computer and electrical wiring. If the vacuum at M3 = the vacuum at M1, check size of calibrated orifice C1
		When accelerator is depressed	- Vacuum at M2 = vacuum at M1 - Vacuum at M3 tending towards vacuum at M1 (without becoming the same). - Voltage falls towards 0 when accelerator depressed.	If vacuum at M2 is not the same as vacuum at M1, check the solenoid valve, that the computer is correct and that the pneumatic circuits are correct.

CIRCUIT DIAGRAM

ENGINES F3N SINGLE POINT INJECTION



1. Fuel tank
2. Pipe between tank and canister
3. Fuel vapour absorption canister
4. Pipe between canister and bleed
5. valve
6. Bleed valve
7. Pipe between bleed valve and T union
8. T union
   Pipe between T union and recirculation valve
9. Exhaust gas recirculation valve (E.G.R.)
10. Pipe between T union and solenoid valve
11. Solenoid valve controlling the exhaust gas recirculation valve and the canister bleed
12. Pipe between solenoid valve and throttle unit
13. Throttle unit
14. Pipe between valve and T union
15. T union
16. Pipe between T union and throttle unit
17. Pipe between T unions
18. Calibrated T union
19. Pipe between calibrated T union and throttle unit
20. Pipe between calibrated T union and collector
21. Collector

Calibrated orifices :

A ø 1,4 mm
B ø 0,80 mm
C ø 2 mm
D ø 1,5 mm

E diaphragm in valve (5)

ENGINES F3N SINGLE POINT INJECTION

PRINCIPLE OF OPERATION

B/C 408 vehicles marketed in certain countries and of certain model years are equipped with a system for absorbing the fuel tank vapour.

The principle of operation is identical to the system fitted to B/C and F 407s.

The bleed system is different in that the canister bleed valve is not an integral part of the canister.

PRINCIPLE OF OPERATION

When the engine is stopped :

The fuel vapour is collected in the canister (3). It comes from the fuel tank (1) through a calibrated orifice (A) 1.4 mm Ø.

When the engine is running at idling speed :

The canister is bled through the calibrated orifice B, 0.80 mm Ø and pipes (4), (14) and (16).

When the engine is running at speeds other than idling speed :

Under certain conditions, when the engine is warm, the injection computer operates the solenoid valve (11) to open the pneumatic circuit at the bleed valve (5). The diaphragm (E) on the valve is lifted to permit the canister to be fully bled through the circuit parallel with the calibrated orifice (B), as shown by the arrows, through the calibrated orifice (B) which is 2 mm Ø.

POSITIONS OF THE ANTI-EVAPORATION SYSTEM COMPONENTS

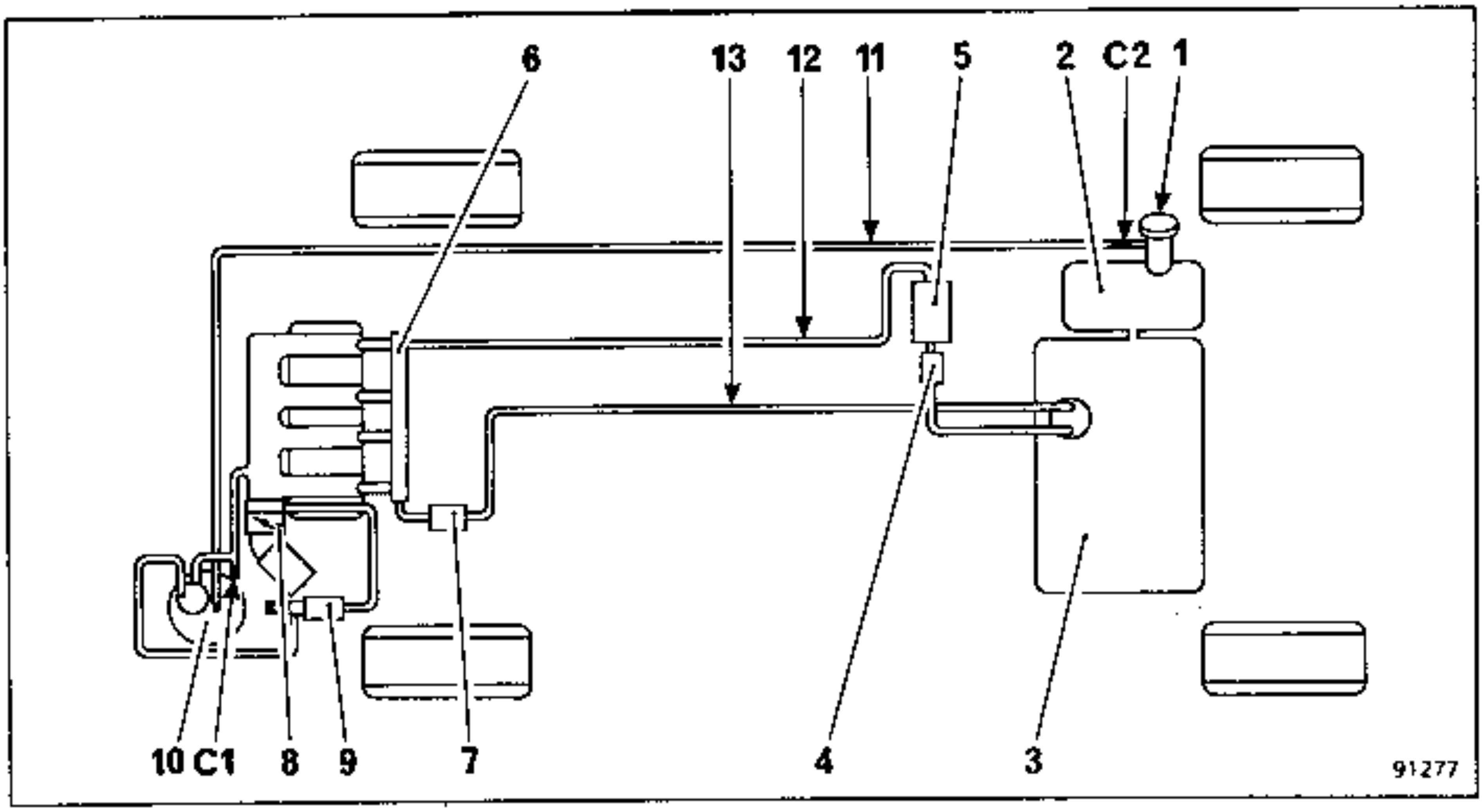
The positions of the various anti-evaporation system components are identical to those on B, C and F 407 vehicles.

Checking the anti-evaporation system :

The system is checked in exactly the same way as B,C,F 407 vehicles (see system bleeds on page 14-42).

CIRCUIT DIAGRAM

ENGINES F3N J 702



1. Sealed filler cap
2. Auxiliary tank
3. Main tank
4. Electric fuel pump
5. Fuel filter
6. Fuel gallery
7. Pressure regulator
8. Throttle unit
9. Canister bleed control solenoid valve
10. Fuel vapour absorption canister
11. Pipe connecting filler pipe to canister
12. Fuel line
13. Return line

Calibrated orifices :

C1 ø 0.65 mm
C2 ø 1.25 mm

C409 vehicles marketed in certain countries (in particular SWEDEN) are equipped with a circuit to absorb vapour from the fuel tank.

The circuit consists of a fuel vapour absorption canister (10) connected to the fuel tank (2) by a pipe (11).

The canister contains active carbon. It is equipped with a valve (A) connecting it to the inlet manifold through a solenoid valve (9) which controls the canister bleed. The solenoid valve is operated by the computer.

ENGINES F/N J 702

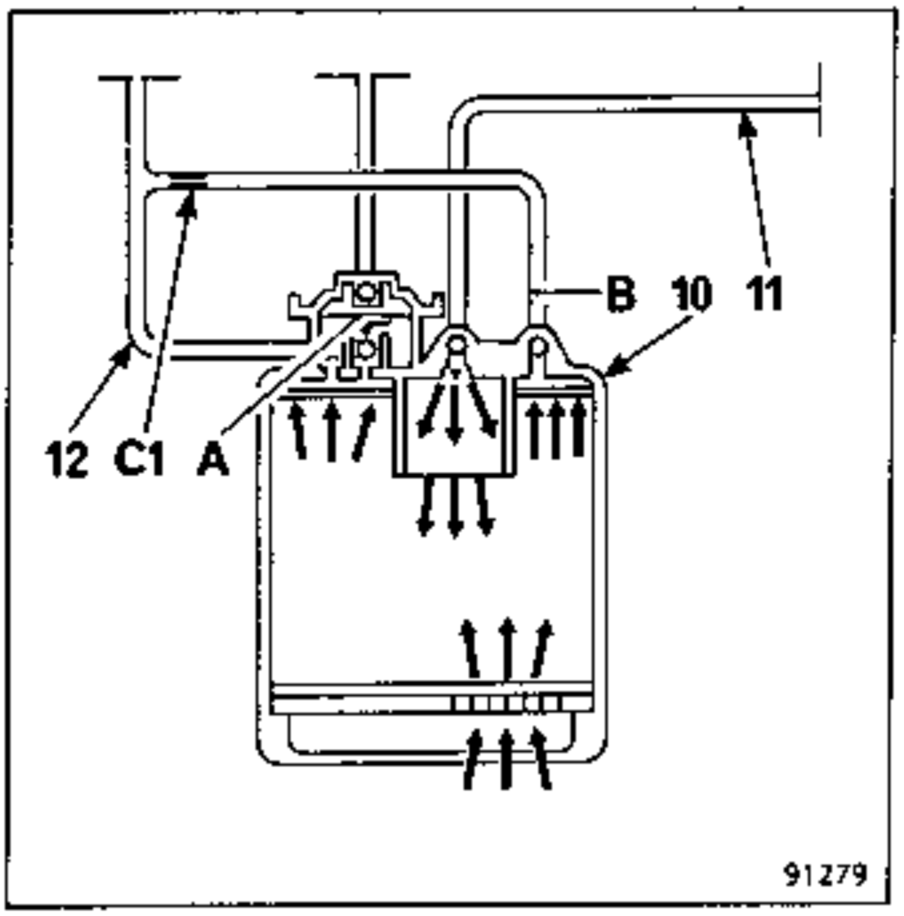
PRINCIPLE OF OPERATION

When the engine is stopped :
The fuel vapour is collected in the canister (10).

It comes from the fuel tank (2) through a calibrated orifice (C2) 1.25 mm Ø.

When the engine is running at idling speed :
The canister is bled through a circuit (B) with a calibrated orifice (C1) 0.65 mm Ø in it.

When the engine is running at other than idling speed :
Under certain conditions, when the engine is warm, the injection computer operates the solenoid valve (9) to open the pneumatic circuit acting on the canister valve (A). The valve opens the bleed circuit between the inlet manifold and the canister through pipe (12).



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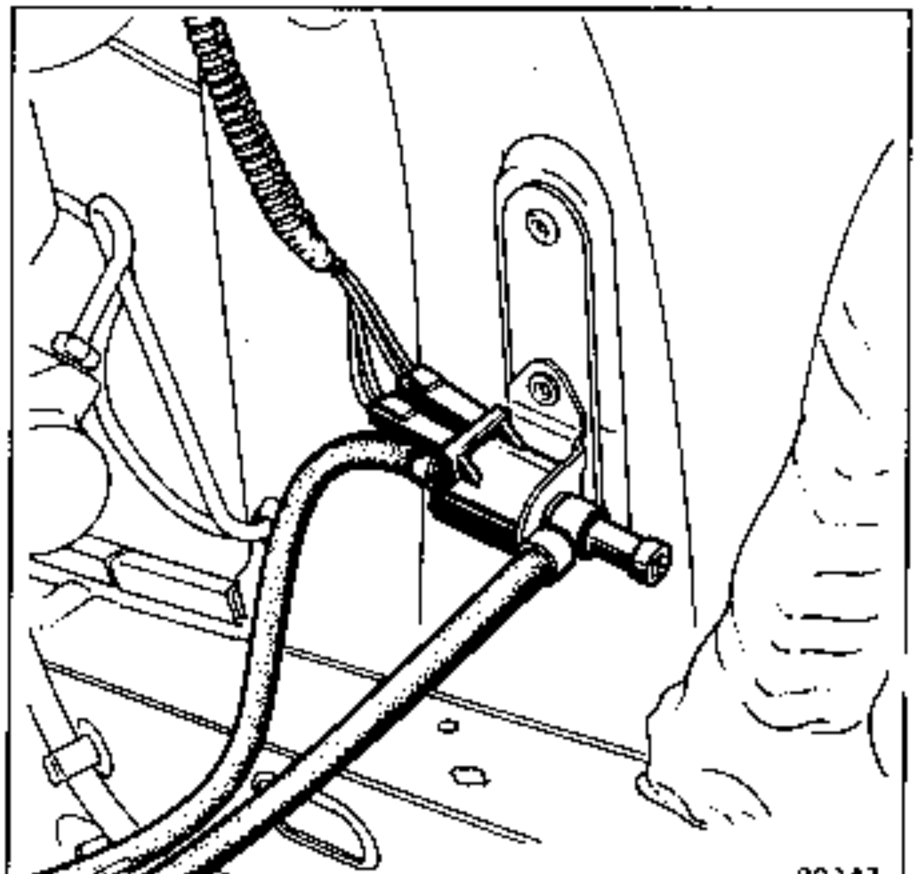
ANTI-EVAPORATION CIRCUIT COMPONENT LAYOUT

Canister :
The fuel vapour absorption canister is secured to a support by a strap, near the brake master cylinder.

The E.G.R. and canister bleed solenoid valve :
Is mounted on the left hand shock absorber turret near the brake master cylinder.



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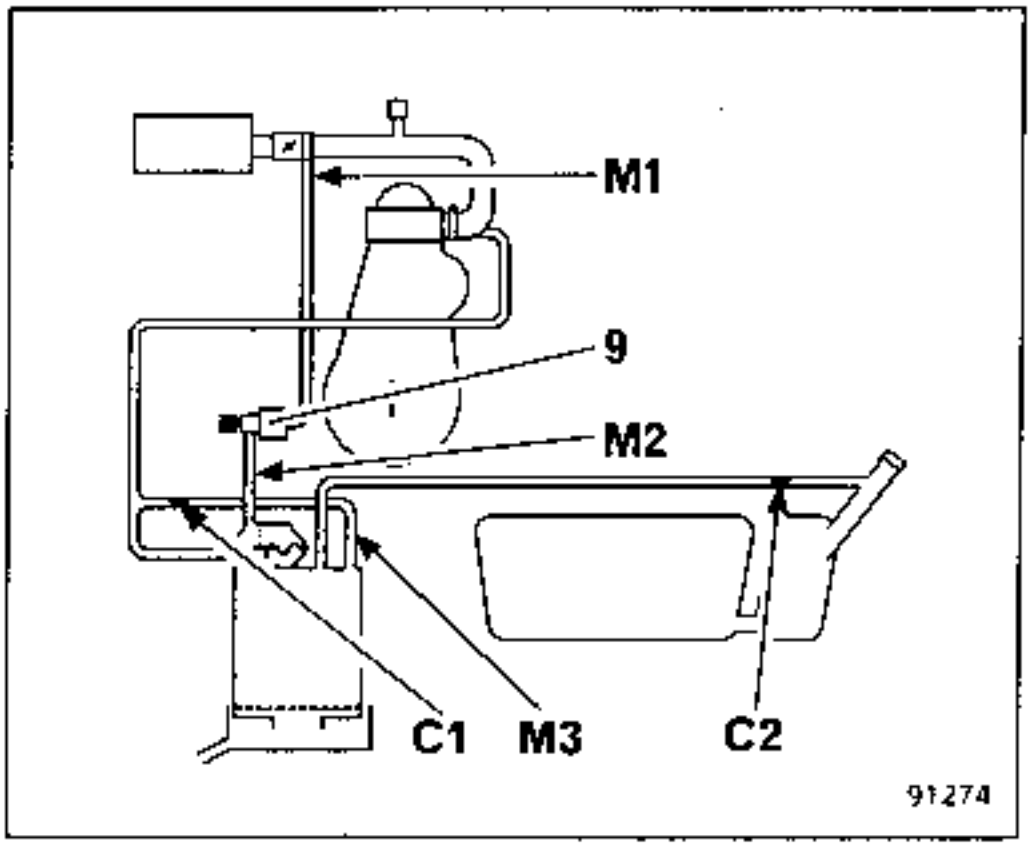
CHECKING THE ANTI-EVAPORATION CIRCUIT

ENGINES F3N J 702



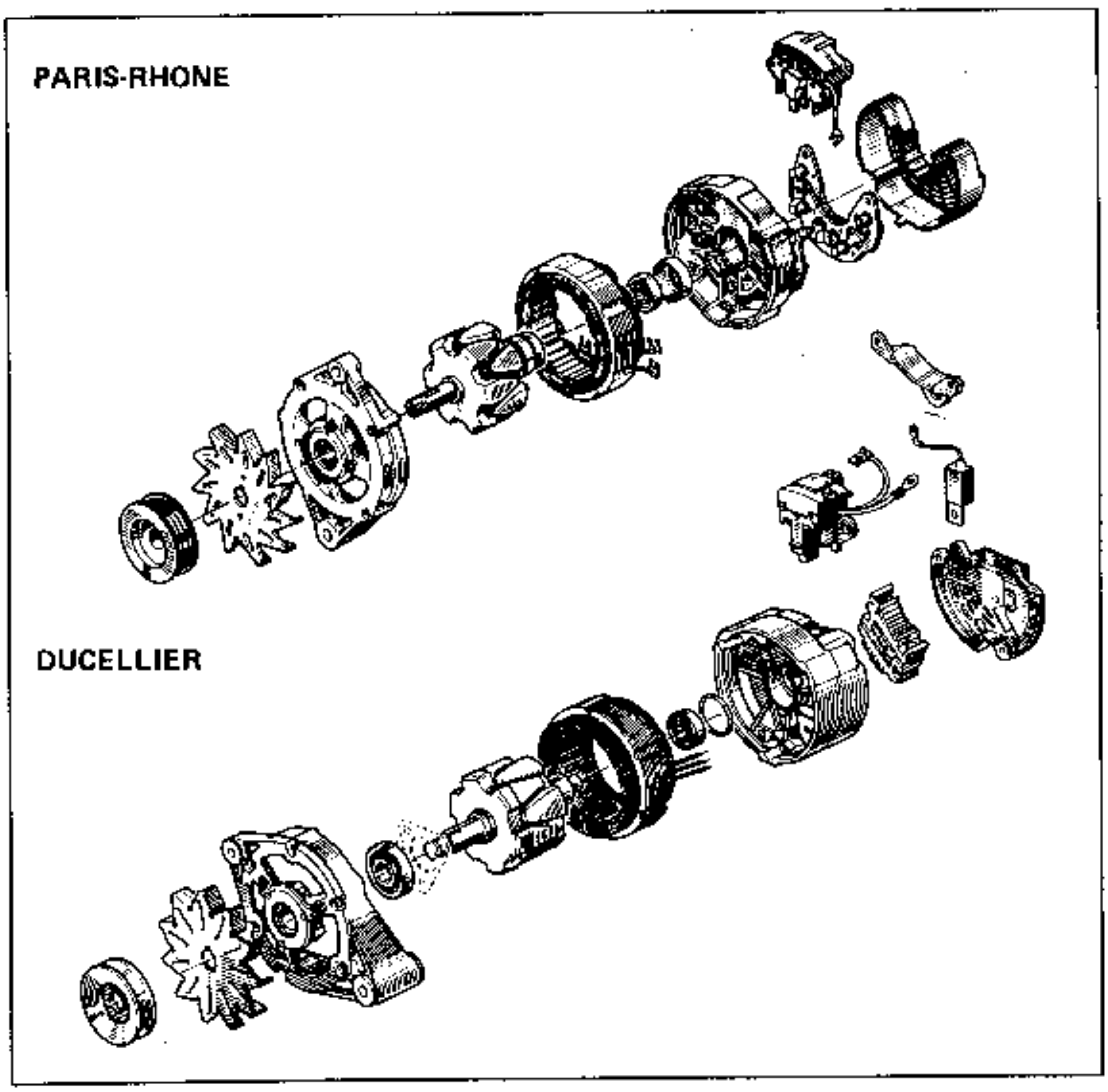
FUNCTION TESTED	TEST EQUIPMENT	CONDITIONS	FINDINGS	REMARKS
Anti-evaporation circuit bleed	Vacuum gauges (0.1000 mbar) connected in parallel with the circuits at : - M1 - M2 - M3 Voltmeter connected across the 2 terminals of solenoid valve (9)	Engine warm after electric fan has cut in twice Running at idling speed	- Zero vacuum at M2 - Vacuum at M3 - Voltage = 12 volts across the terminals of solenoid valve (9)	If there is a vacuum at M2, check the solenoid valve connections, the computer and the electrical wiring. If the vacuum at M3 = the vacuum at M1, check that calib. orif. C1 is correct
		When accelerator is depressed	- Vacuum at M2 = vacuum at M3 - Vacuum at M3 tends towards the vacuum reading at M1 (without becoming identical). - Voltage drops towards 0 volts when accelerator depressed.	If vacuum at M2 is not equal to vac- at M1, check solenoid valve, that the computer is correct and check pneumatic circuits.

CHECKING :

After allowing the alternator to warm up for 15 minutes at 13.5 volts.

rpm	PARIS-RHONE A 14 N 87 75 amp	PARIS-RHONE A 13 N 104 50 amp	DUCELLIER 516 058 50 amp
1 250	12 A	10 A	10 A
3 000	61 A	43 A	43 A
6 000	70 A	48 A	48 A

Exploded view



OPERATION-FAULT FINDING

These vehicles are equipped with alternators that have integral voltage regulators and a warning light on the instrument panel that operates as follows :

- When the ignition is switched on, the light switches on,
- when the engine starts, the light switches off,
- if the light switches on again whilst the engine is running, there is "charging" defect.

FAULT FINDING

If the warning light does not switch on when the ignition is switched on.

Check that the regulator connector is connected.

Check whether the bulb is burnt out (to do this earth the 6.3 mm pin on the connector. The light should switch on).

If the warning light switches on whilst the engine is running :

It is an indication of a charging defect the origin of which can be :

- broken alternator drive belt. Broken charging cable,
- damage inside the alternator (rotor, stator, diodes or brushes),
- voltage regulator defect.

If the customer complains of a charging defect despite the fact that the warning light is operating correctly.

If the regulated voltage is less than 13.5 V, check the alternator. The defect may be caused by :

- a burnt out diode,
- one of the phases broken,
- carbon deposits on the slip ring tracks.

Checking the voltage

Connect a voltmeter across the battery terminals and read the battery voltage.

Start the engine and increase the speed until the voltmeter pointer stabilises at the regulated voltage.

This voltage should be between 13.5 V and 14.8 V.

Switch on as many current consuming accessories as possible. The regulated voltage should remain between 13.5 V and 14.8 V.

WARNING : It is essential to disconnect the battery and the voltage regulator before carrying out arc welding work on the vehicle.

REMOVING-REFITTING

Do not remove a drive belt by forcing it off with a screwdriver. It is made of synthetic threads and could be damaged.

Disconnect :

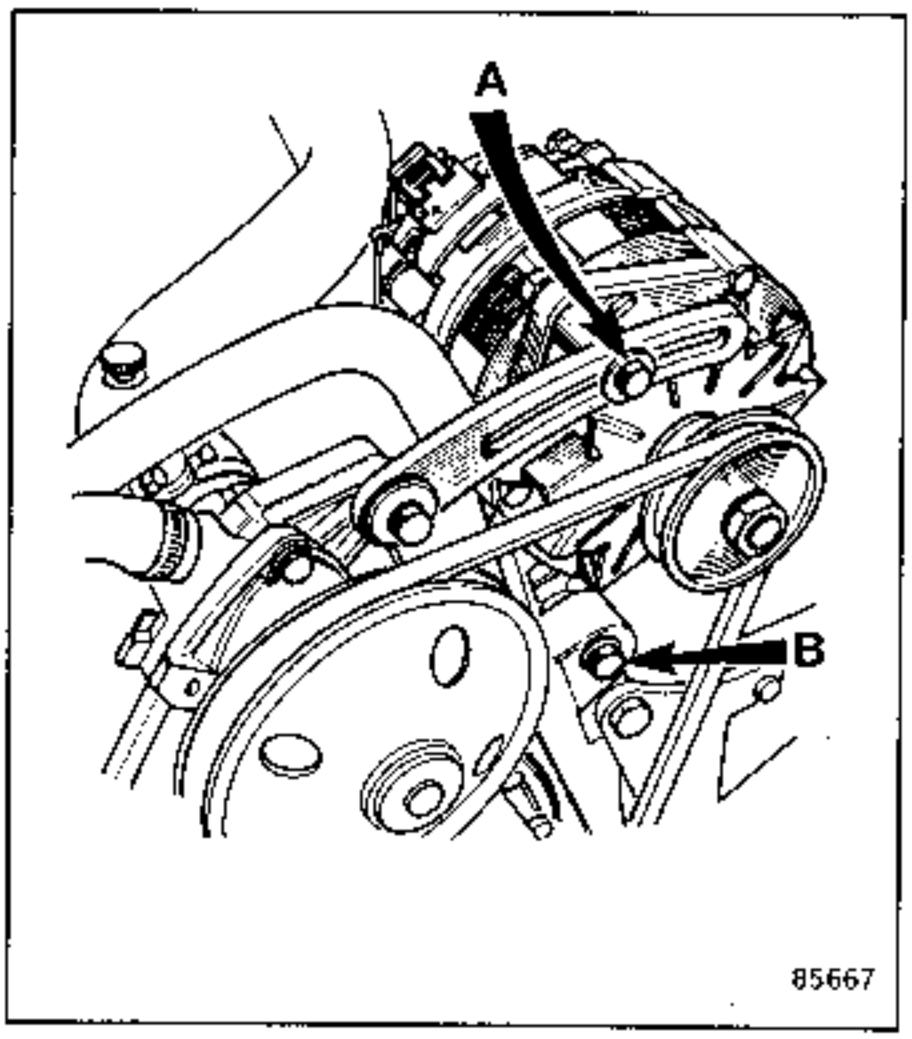
- the battery,
- the electrical wires.

Remove :

- the bolt (A) from the tensioner,
- the securing bolt (B) and take off the alternator.

Requirement after refitting

After refitting the alternator, re-tension the belt.



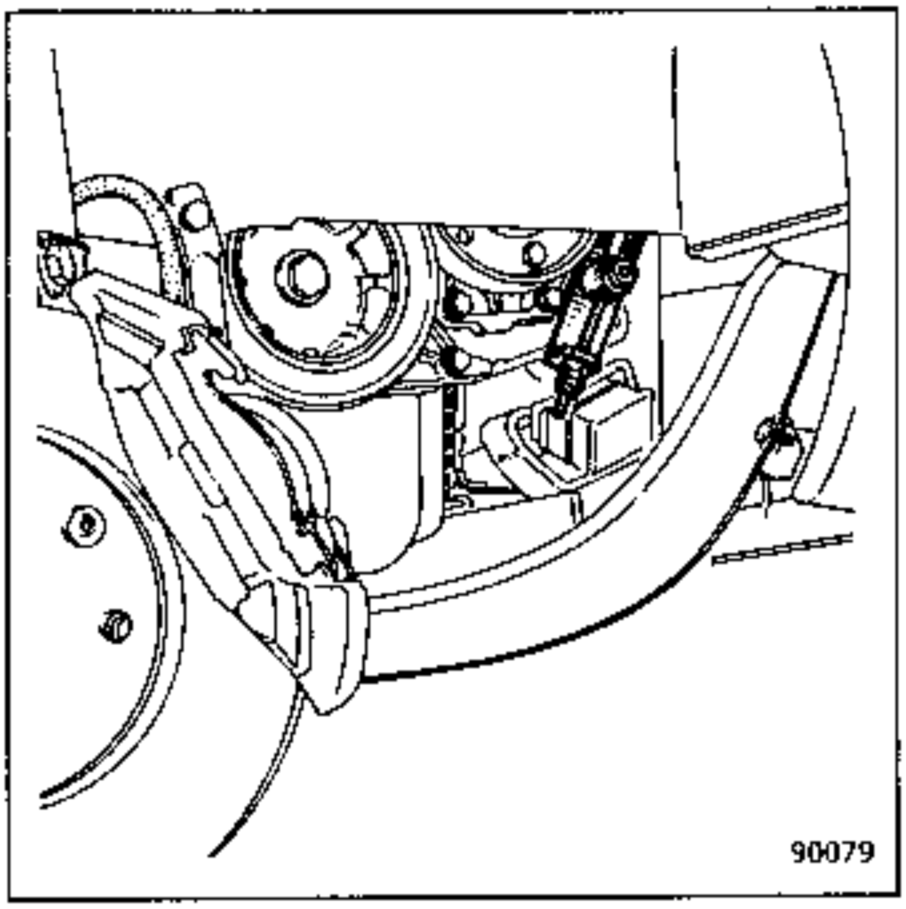
REMOVING-REFITTING

Disconnect the battery

Remove :

- The radiator grille,
- The radiator baffle on the right hand side,
- The cover from the right hand wheel arch.

Slacken the belt and remove it.



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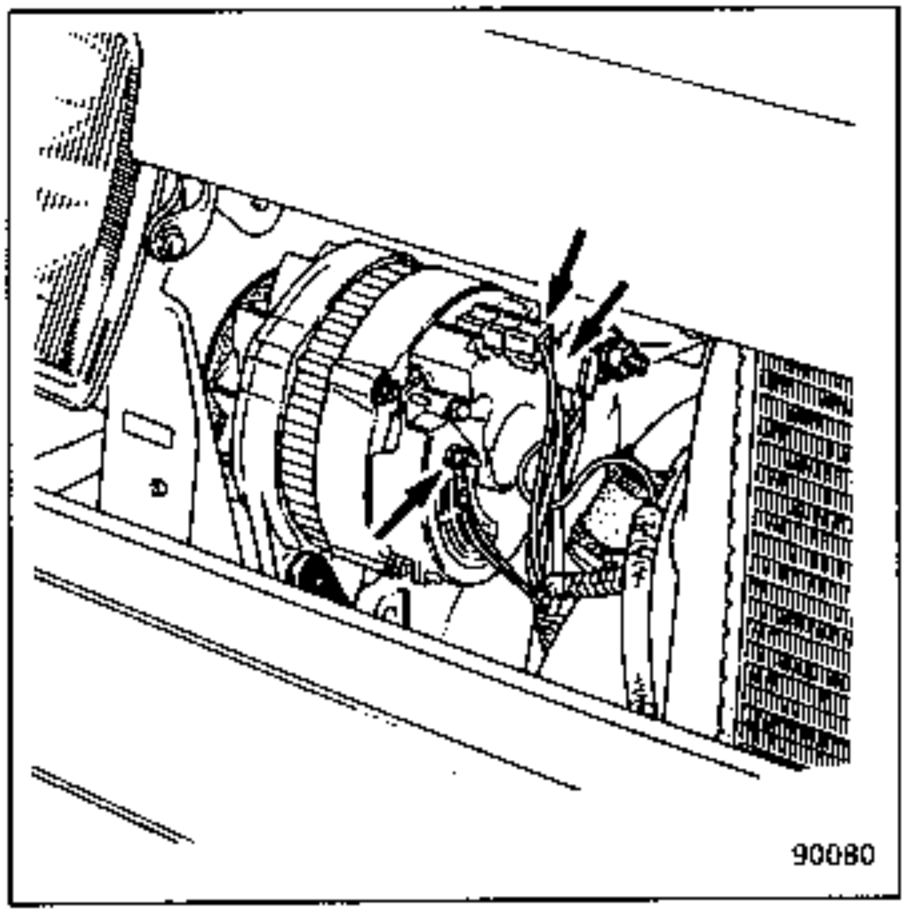

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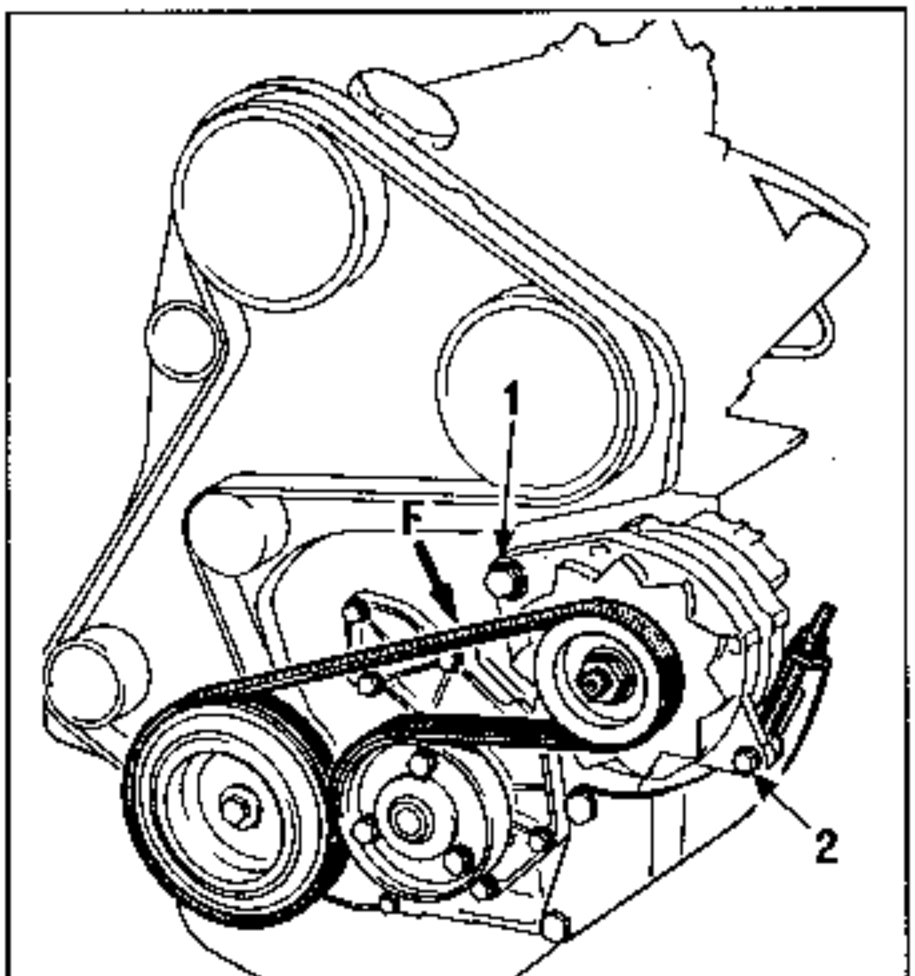
Disconnect the connectors from the alternator.

Remove alternator securing bolts (1) and (2) and take out the alternator through the radiator grille aperture.

Requirement after refitting

After refitting the alternator, re-tension the belt.



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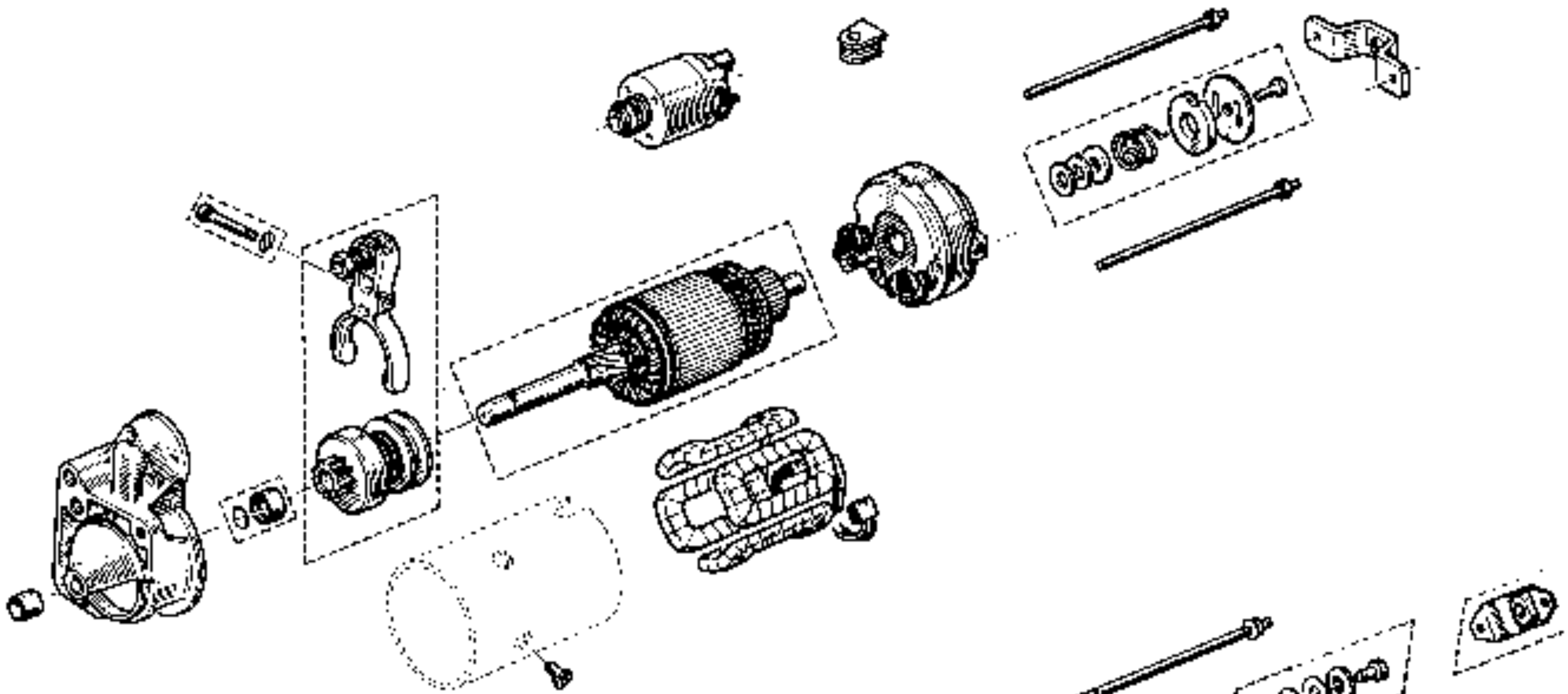
Using tool Ele.346-04, check the belt tension the deflection F should be 3.5 mm

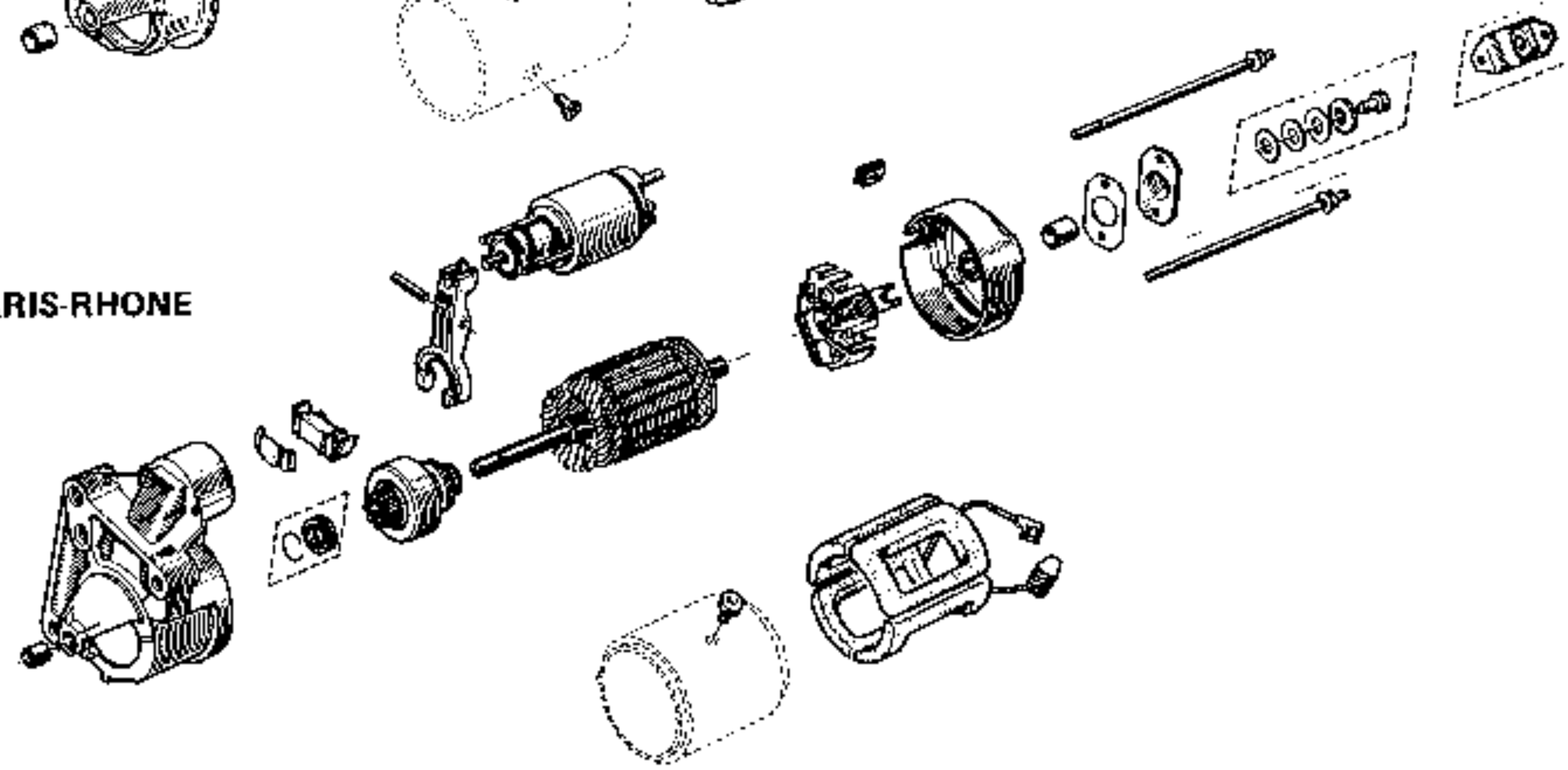
CHECKING

Make	Type	Torque (locked pinion)	Current flow (locked pinion)
DUCELLIER	534 042	1 daN.m	350 A
DUCELLIER	534 043	1,1 daN.m	340 A
PARIS-RHONE	D9 E 771	0,8 daN.m	460 A
PARIS-RHONE	D9 E 76	1,3 daN.m	420 A
BOS CH	A001208323F	3,4 daN.m	1 000 A

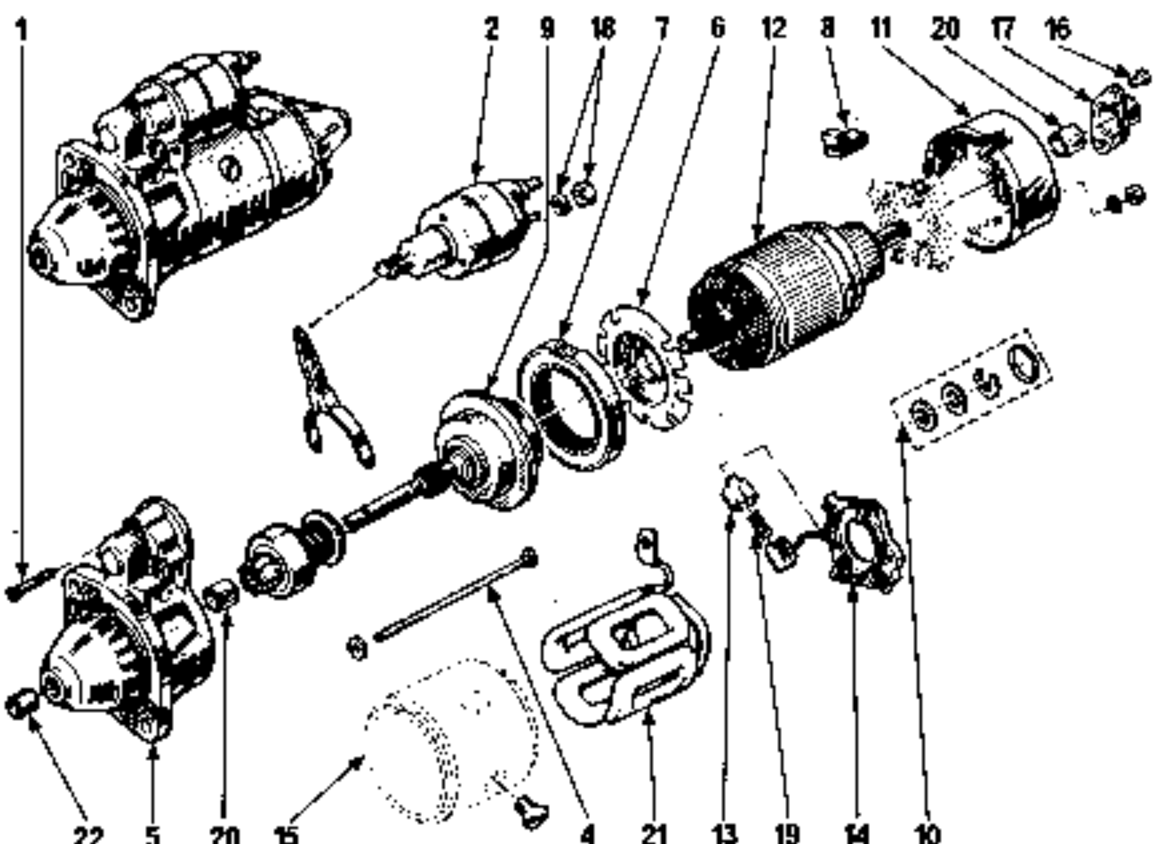
DUCELLIER



PARIS-RHONE



BOSCH



REMOVING

Disconnect the battery.

Remove the heat shield.

Disconnect the cables.

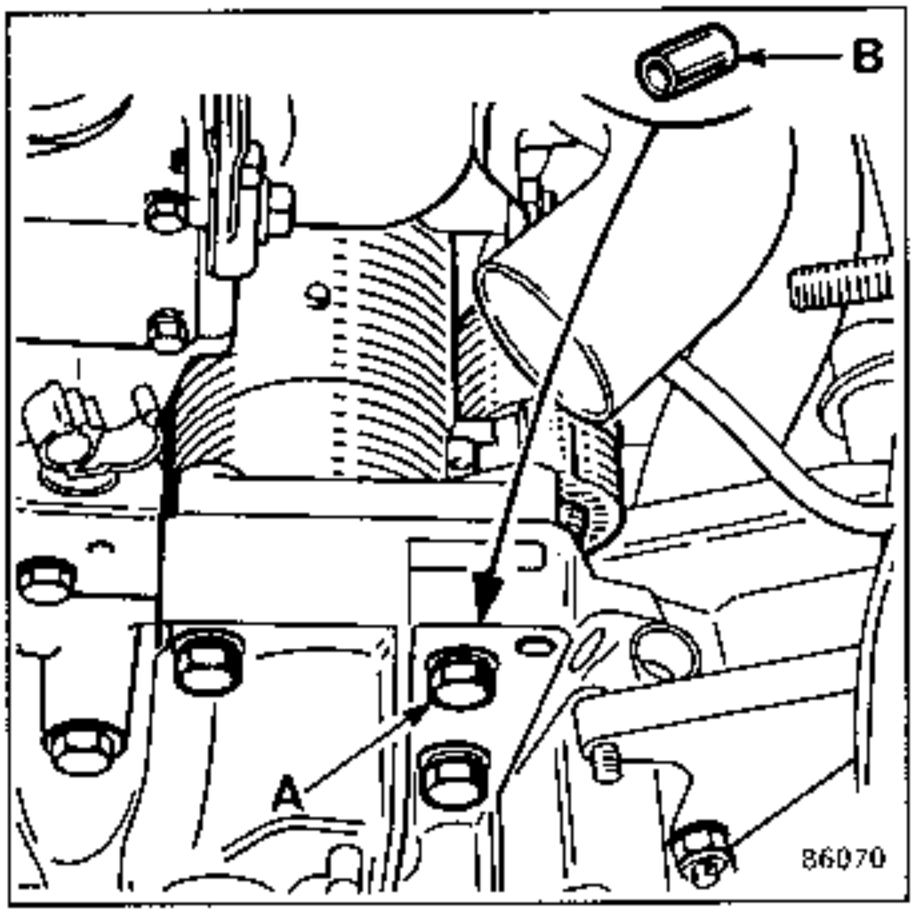
Remove :

- The rear securing lug,
- the three starter securing bolts.

SPECIAL REQURIEMENTS DURING REFITTING

Tighten the three starter securing bolts before tightening its rear fastening lug.

WARNING : Ensure that bolt (A) is in the correct position. When refitting the starter, it is ESSENTIAL to ensure that the locating dowel (B) is in the hole through which passes bolt (A).

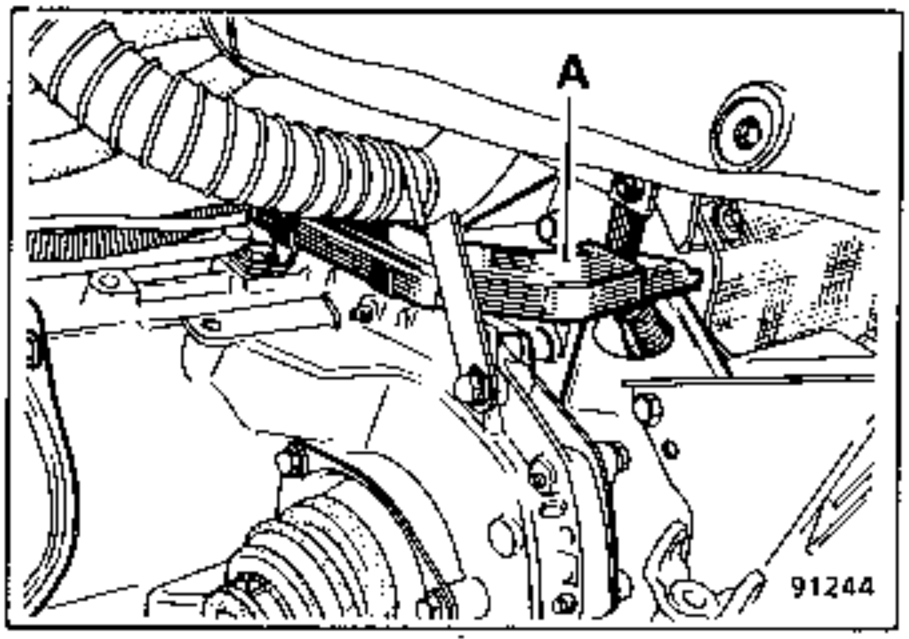


REMOVING

Disconnect the battery.

Remove :

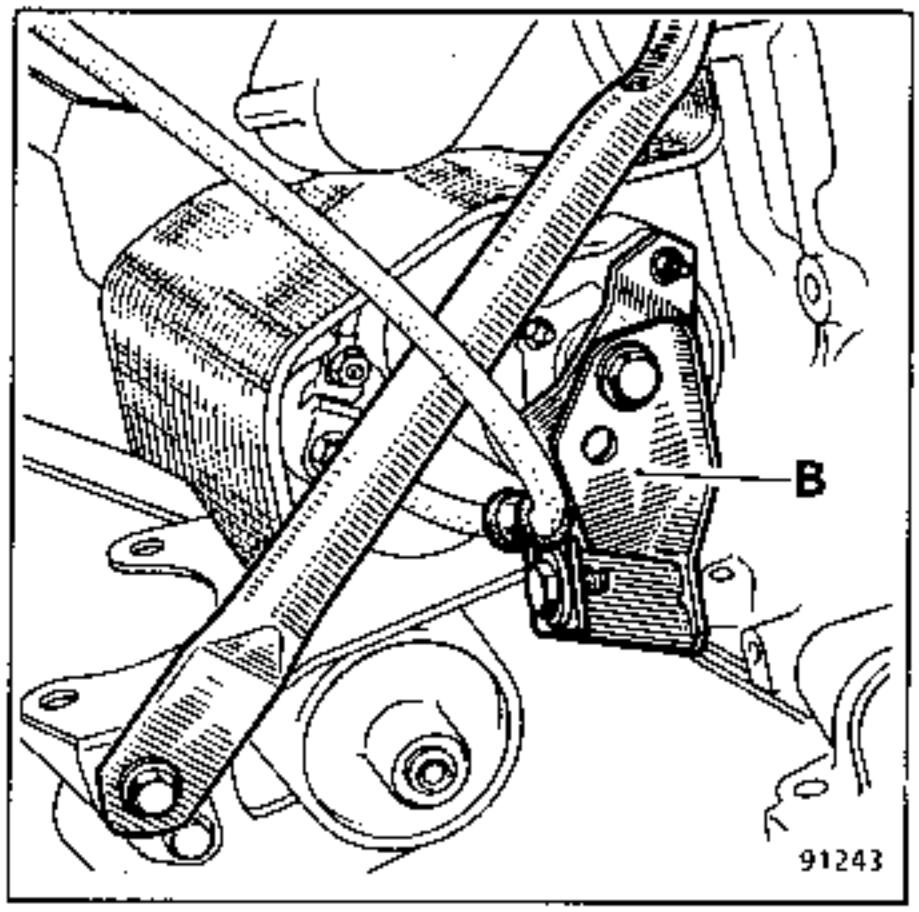
- the air ducts between the intake nozzle and the air filter,
- the air filter,
- the turbocharger heat shield,
- the engine wiring shield (A).



- the three securing bolts from the starter,
- the starter rear support (B),
- the exhaust down pipe support bar (C).

Disconnect the wires.

Remove the starter from behind the front right hand wheel.

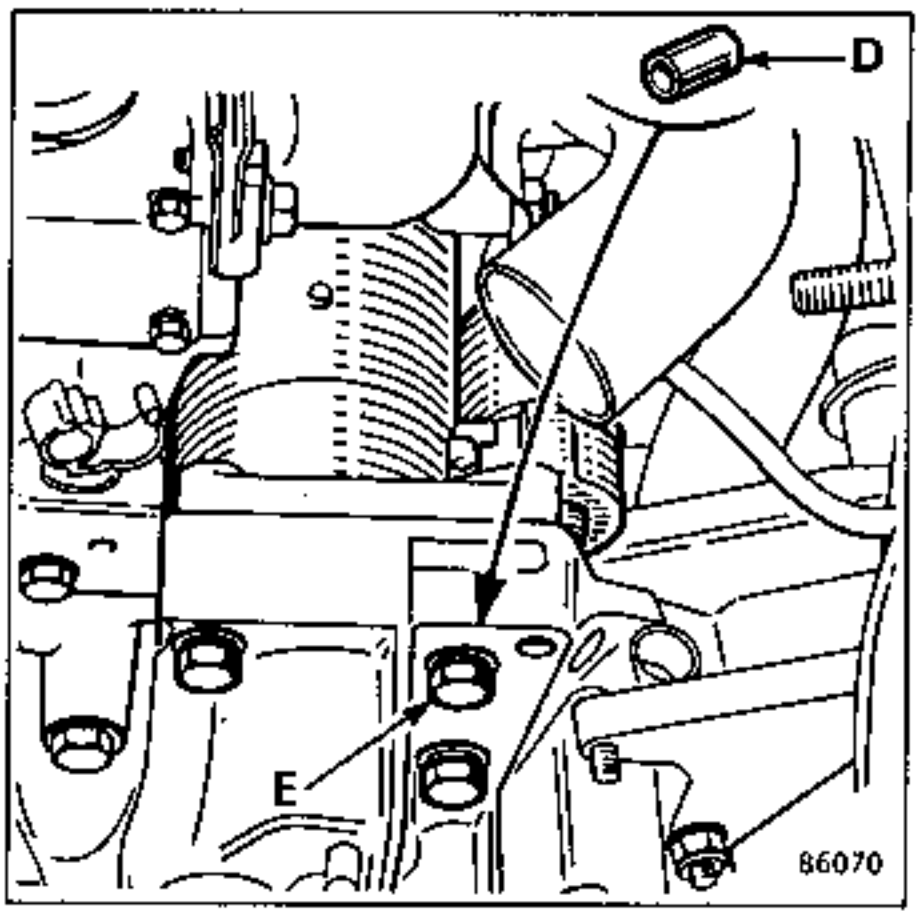


REFITTING

It is essential to ensure that the turbocharger heat shield is refitted.

Check that the locating dowel (D) is in position at point (E).

Reconnect the battery and test the starter.



REMOVING

Disconnect the battery.

Remove :

- the air ducts from the air intake nozzle and the air filter,
- the air filter,
- the heat shield,
- the three starter securing bolts,
- the starter rear support lug.

Disconnect the wires.

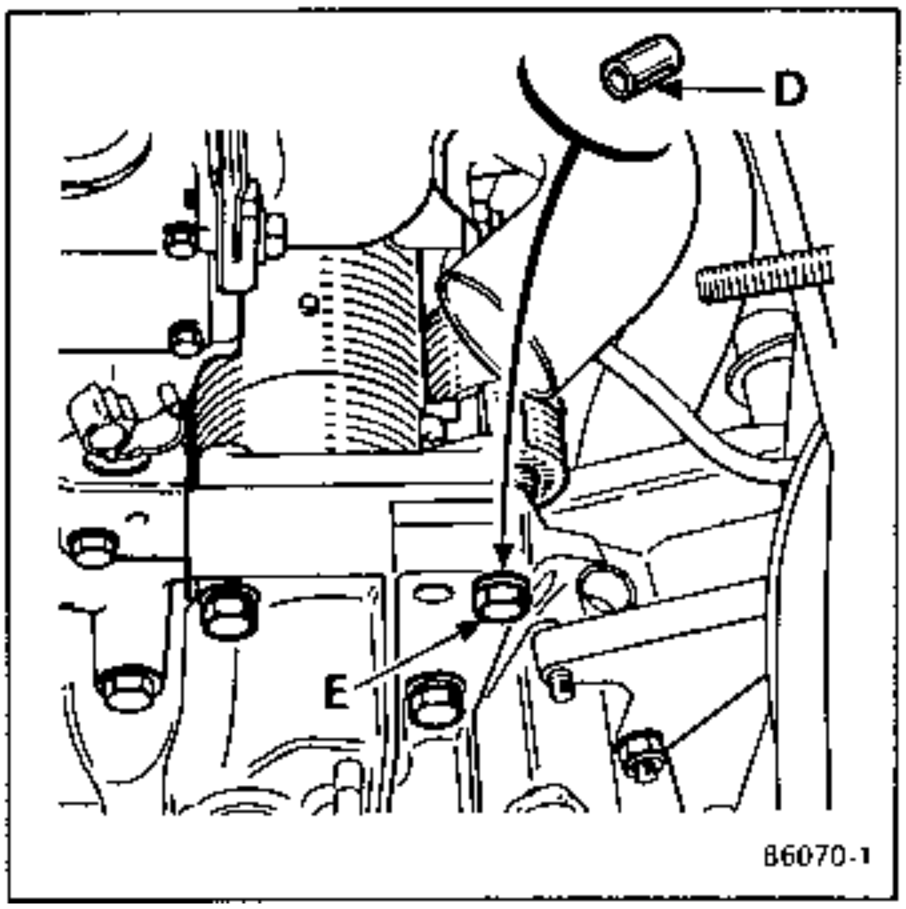
Remove the starter from behind the front right hand wheel.

REFITTING

It is essential to ensure that the heat shield is refitted.

Check that the locating dowel (D) is in position at (E).

Reconnect the battery and test the starter.



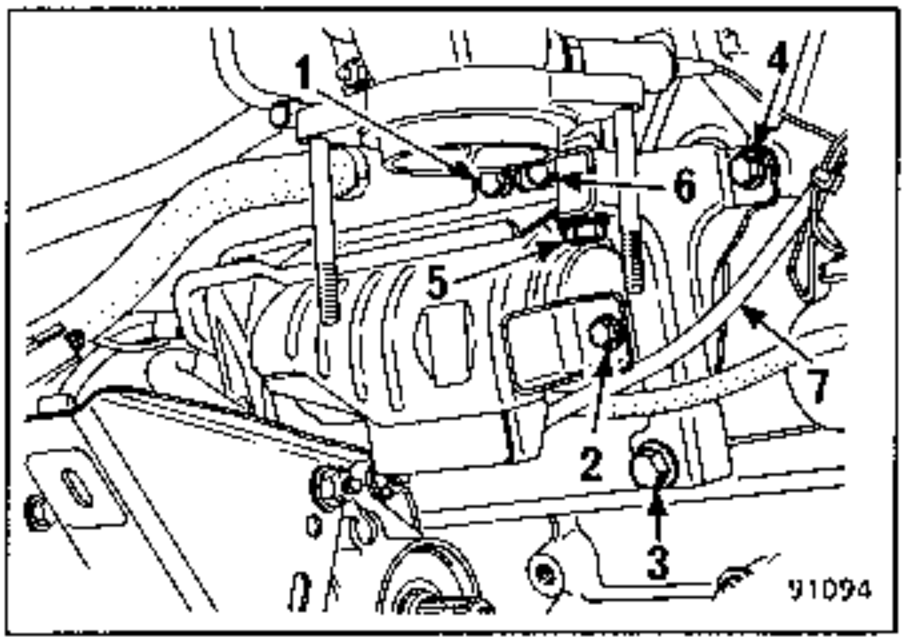
REMOVING

Disconnect the battery.

Release the air filter.

Remove :

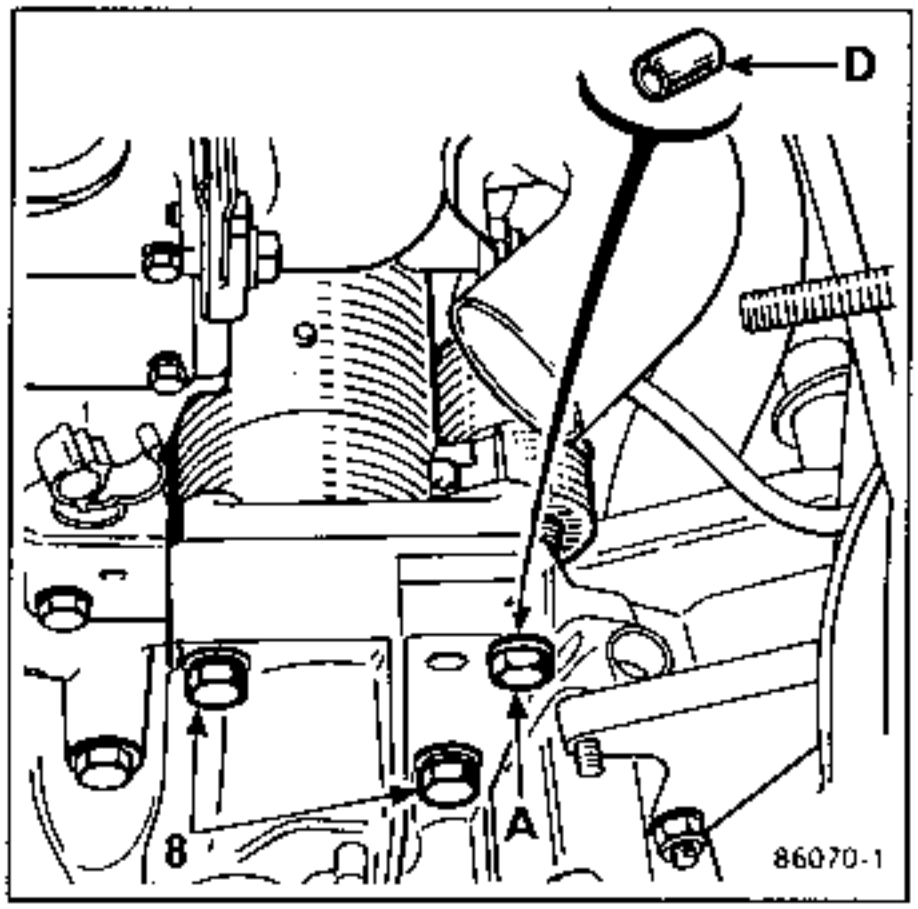
- The starter securing bolt and securing nut and remove the starter from the gearbox.
- The exhaust down pipe (between the catalyser and the exhaust manifold).
- The starter heat shield (bolts 1 and 2).



- The support lug mounting (bolts 3, 4 and 5).
- The starter rear support lug (bolts 6 and 7).
- Disconnect the starter cables and remove the starter (2 bolts on the gearbox). Take out the starter from behind the front right hand wheel.

REFITTING

Ensure that the locating dowel D is in position at A.



Refit :

- The starter (only the 2 bolts 8) and reconnect it.
- The starter rear support (Do not tighten the bolts).
- The rear support mounting and tighten all the bolts.
- The starter heat shield (1 bolt at A and bolts 1 and 1).
- The exhaust down pipe (It is essential to fit new seals).
- The air filter.
- Reconnect the battery and test the starter.

Special operations involved in removing starters with reduction gears

For the item references see page 6.

STARTER SOLENOID

Remove :

- the electrical connections (18),
- the three securing bolts (1),
- the starter solenoid (2) with its core and return spring.

FLANGE AT DRIVE END

Remove :

- the two connecting bolts (4),
- the flange (5) fitted with the drive shaft, the free wheel and the reduction gear.

WARNING : The cover plate (6) and the hollow wheel (7) may fall out.

FREE WHEEL AND PLANET TYPE REDUCING GEAR

Remove :

- the rubber seal (8),
- the cover plate (6),
- the hollow wheel (7),
- the starter pinion assembly (9) (reduction gear, free wheel and fork lever).

THE YOKE (15)

Remove :

- the two screws (16) from the cover,
- the cover (17),
- the armature shaft retaining and compensator washers (10),
- the flange at the commutator end (11).

ARMATURE

Take out the armature (12) whilst retaining the end of the commutator with a tube of the same diameter (outside diameter 28 mm).

Eg. : A 22 mm box spanner, to prevent the brushes being ejected.

REPLACING THE BRUSHES

Unhook the brush holders (13) from the ring (14).

Extract the carbon brushes and the compression springs (19).

Do not disconnect the field windings (21) from the brush carrier ring.

Remove the worn brushes with pliers and file down the pieces of braid still remaining on the brush carrier ring.

Check the correct way round for fitting the brushes.

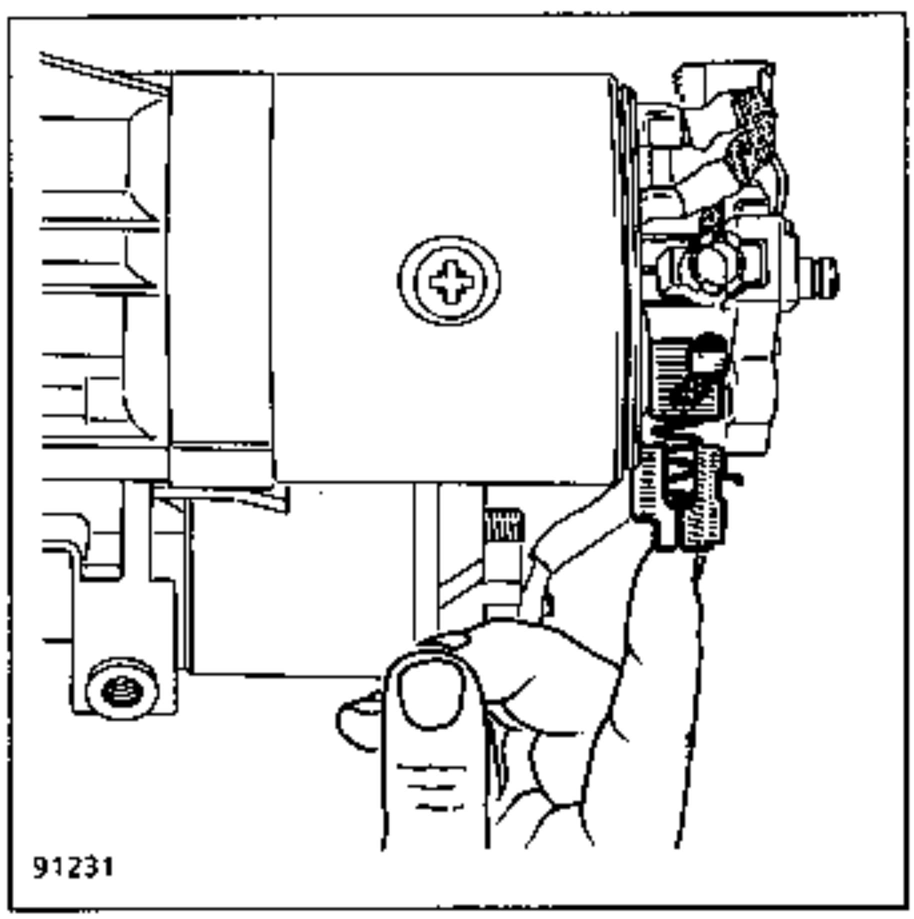
Place the new brushes on the ring and tighten the clips to the securing lugs with pliers and soft solder them in place.

REFITTING THE BRUSHES

Place the compression springs and the brushes in the brush holders.

Use the same tube as was used for removing to hook the brush holders on to the ring.

The brush holders can be replaced directly on the commutator.



REASSEMBLY

Reassemble the starter by carrying out the removing operations in reverse after first inspecting all the parts.

Each time the starter is repaired, replace the sintered metal bushes (20) in the flanges.

Check the needle race (2).

Commutator Ø :	NEW	30	mm
	MIN	28.9	mm

Minimum length of brushes 7 mm.

Armature end float 0.05 to 0.3 mm.

CLEANING-LUBRICATION

Never use liquid cleaners. Blow out the unit with compressed air (max. pressure 4 bars).

Grease the bearing and reduction gear and oil the bearings (with silicone based oil).

SETTINGS

Vehicle	Engine	Ignition	Timing (degrees) capsule disconnected	Idling (rpm) ± 25	Dwell (%)	Cam angle (degrees)
F400	C1C	R342 - D83	+ 5 ± 1	700	63 ± 3	57 ± 3
B.C.S.400	C1C	R339 - D83	+ 10 ± 1	700	63 ± 3	57 ± 3
B.C.F.S.400	C1E	R335 - D83	+ 8 ± 1	625	63 ± 3	57 ± 3
B401 DAI F401 DAI	C1E 754	R341 - D80	+ 4 ± 1	625	63 ± 3	57 ± 3
	C1E 754	R341 - C33	+ 2 ± 1	650	63 ± 3	57 ± 3
B.C.F.401 Emiss. cont.	C1E	R335 - C34	+ 6 ± 1	625	63 ± 3	57 ± 3
B.C.F.402	C1J	RE204	+ 10 ± 1	625		
B.C.F.402 Emiss. cont	C1J	RE211	+ 10 ± 1	700		
B.C.403	C2J	RE025	+ 8 ± 1	700		
B.C.403	C2J	RE226	+ 6 ± 1	600 EN D		
B.C.403	C2J	RE254	-	700		
B.C.403 Spain	C2J	RE450	+ 6 ± 1	700		
B.C.403 Emiss. cont.	C2J	RE217	+ 1 ± 1	700 (without pulsair)		
C405	C1J	RE208/RE209	+ 8 ± 1	650		
C405 Switzerland	C1J	RE229	-	650		
B.C.S.40F	C1G	RE450	+ 6 ± 1	650		
B.C.40G	F2N	RE232	-	800		
B.C.F.40H	C1E	R341 - C33	+ 2° ± 2	700	63 ± 3	57 ± 3
B.C.40J	C2J	RE257 BM RE026 TA	-	700 600 en D		
B.C.40K	F2N	RE259	-	850 (without pulsair)		
B.C.F.40M	C2J	RE257	-	700		
B.C.F.407	C3J	RE028	-	700		

BM: Manual gearbox.
TA: Automatic transmission.
DAI: Directorate of international affairs.

SPECIAL FEATURES OF ELECTRONIC UNITS

The integral electronic ignition unit (RE.257) has an additional plug that operates an advance correction system under certain conditions :

- through a dual threshold oil temperature switch : oil temperatures between 15 and 70°C.
- the advance correction is cut out if the choke is operating,
- the advance correction applies to a speed range between 1200 and 2900 rpm and at a manifold vacuum between 350 and 850 mbars. It deducts 5° of advance, as measured at the flywheel, in the zones in which it is operating.

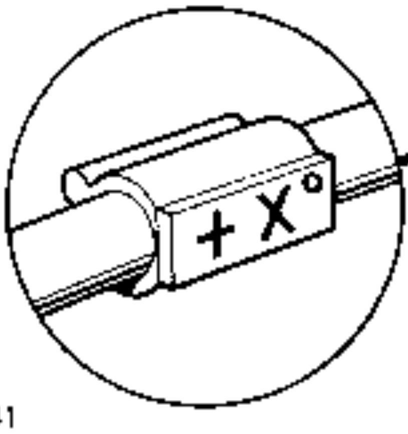
Vehicle	Engine type	Advance curve	OIL TEMPERATURE (°C)			
			less than 15°C	from 15 to 70°C	Above 70°C	
B40M C40M F40M	C2J T 784	RE. 257	0° flywheel	- 5 ± 2° flywheel	0° flywheel	Advance correction between 1200 and 2900 rpm at vacuum of 350 to 850 mbar (no correction on choke).
B40J C40J	C2J G 782	RE. 257	0° flywheel	- 5 ± 2° flywheel	0° flywheel	

NOTE : the vacuum capsule of AEI (electronic ignition unit) RE.257 is connected to the carburettor through a connection identified by a black ring.

ENGINES C1C-C1E

Identification of initial timing

The ignition initial timing is indicated on a clip secured to the secondary supply cable.



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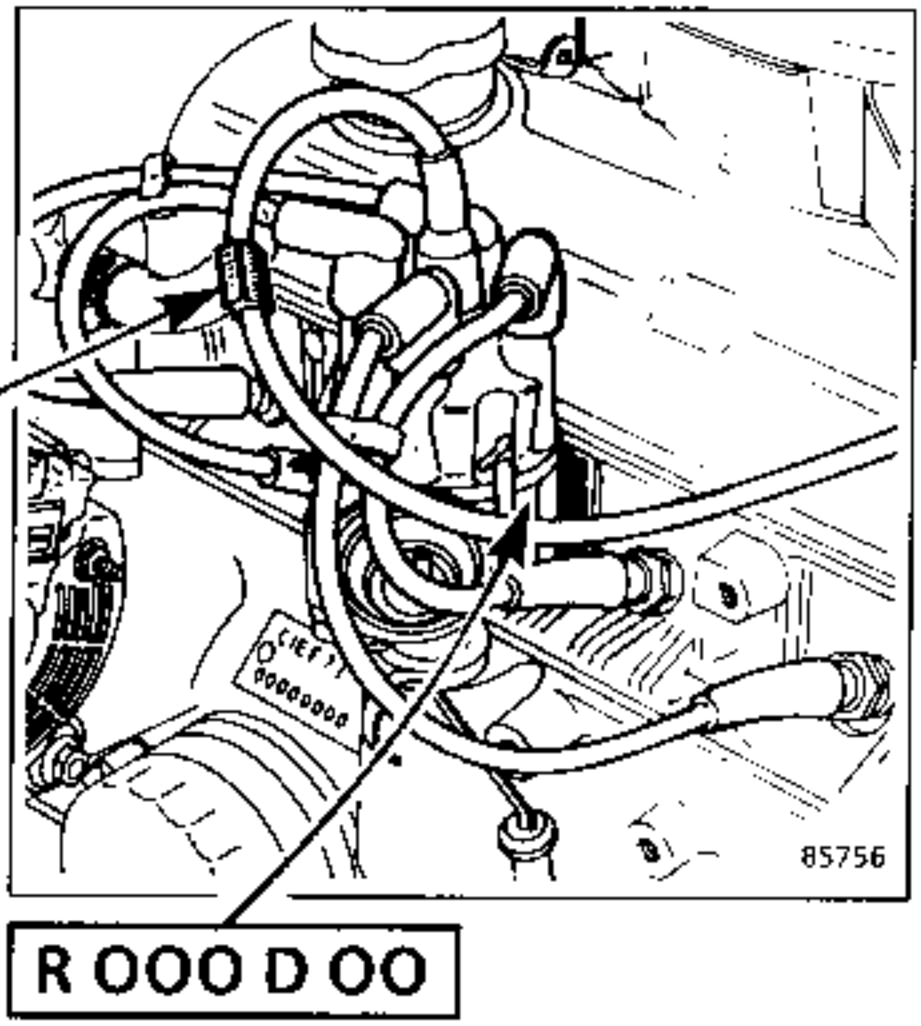
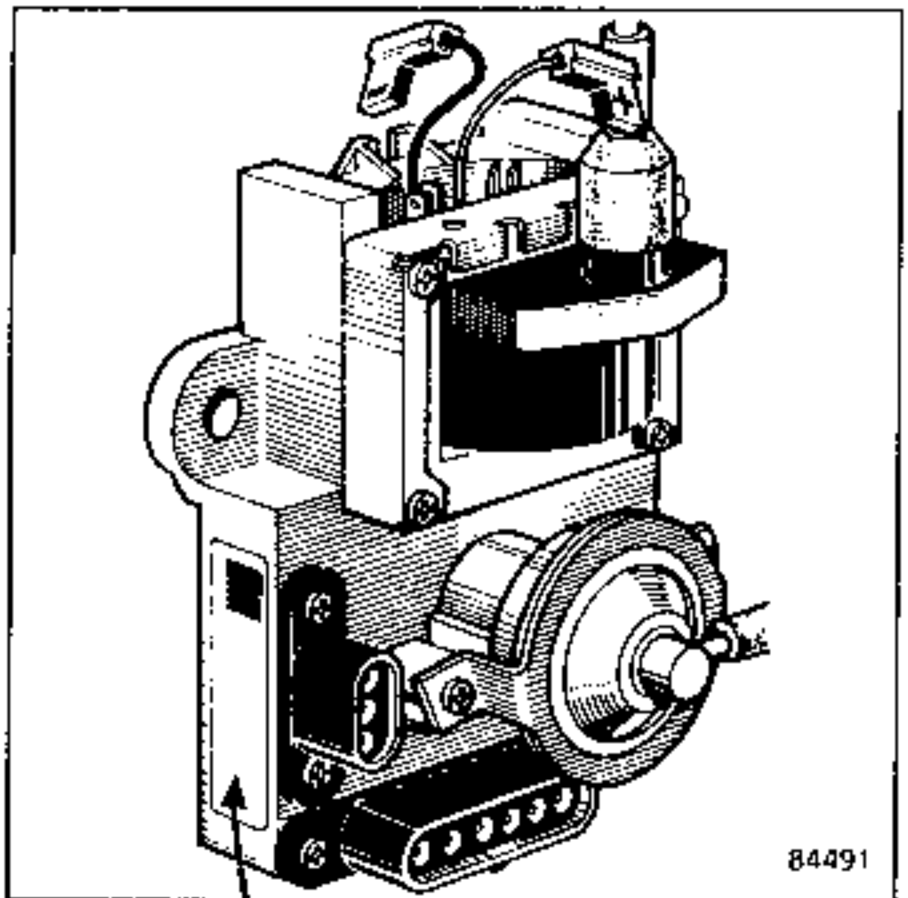


Identification of the centrifugal and vacuum advance curves.

These are identified by a number engraved on the distributor body.

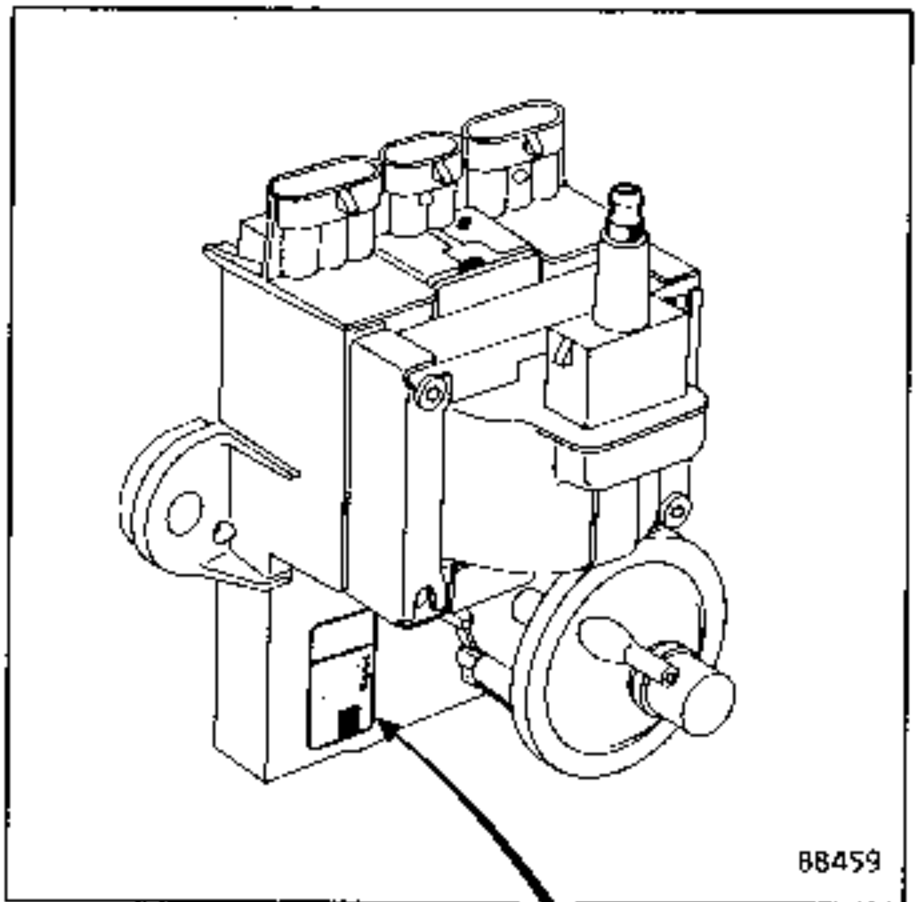
Unit and curve identification

UNIT TYPE D or E



84491

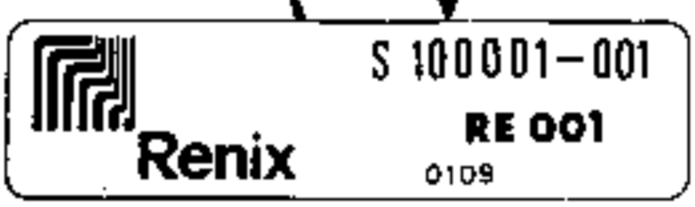
UNIT TYPE F



88459

CURVE IDENTIFICATION

The curves are identified by a label stuck to the body of the electronic computer.



Example : curves RE.001

Example : curves RE.025

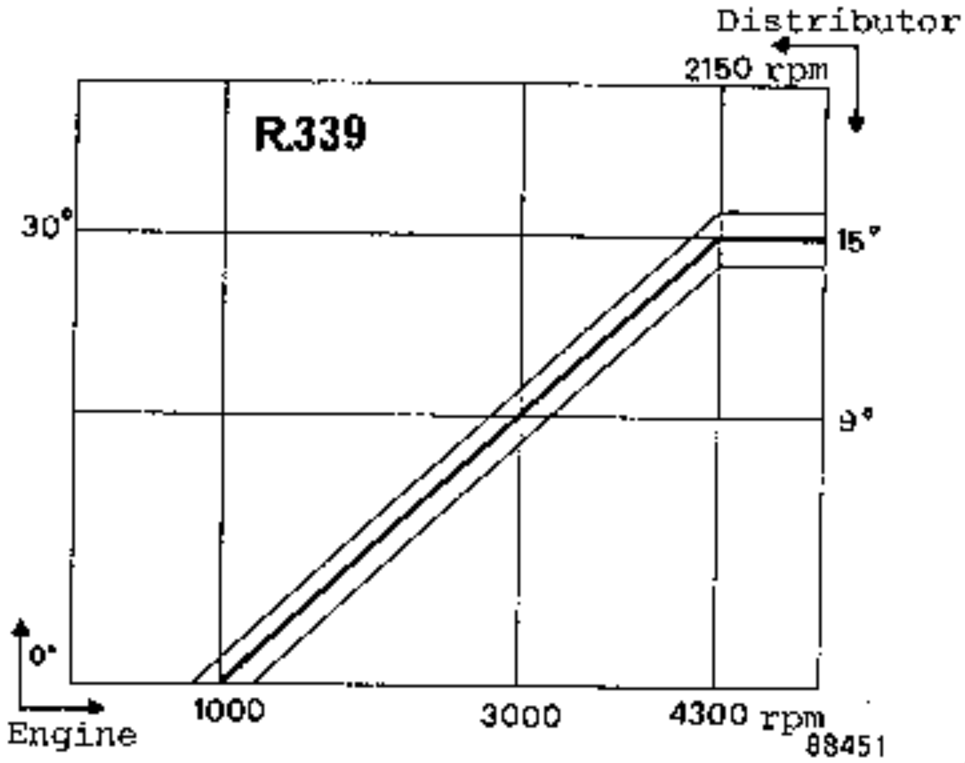
CURVE CHARACTERISTICS

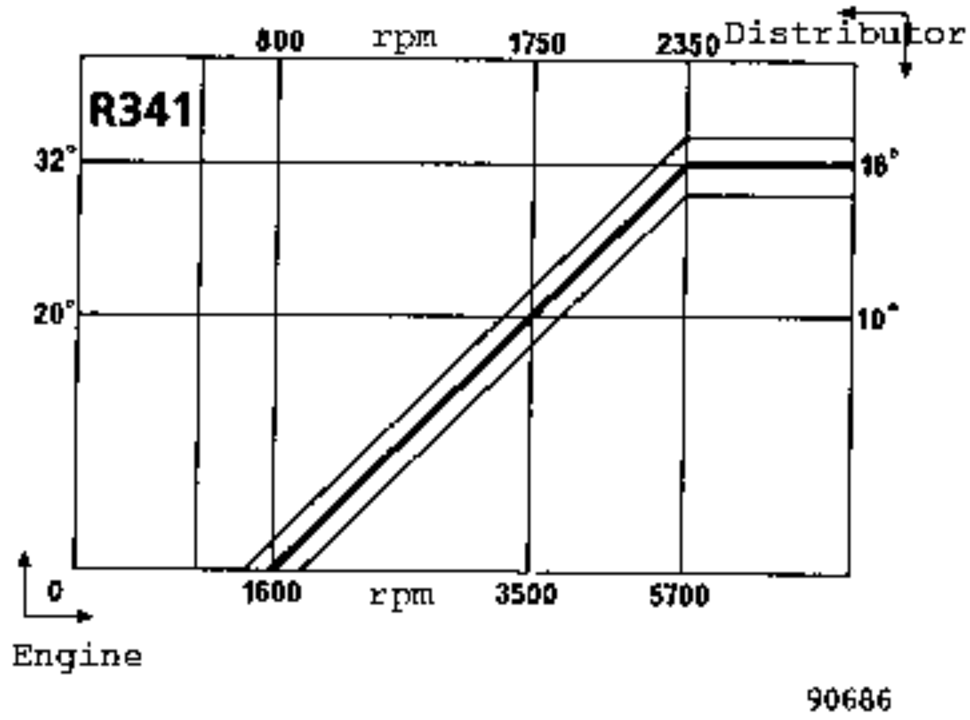
Centrifugal curves

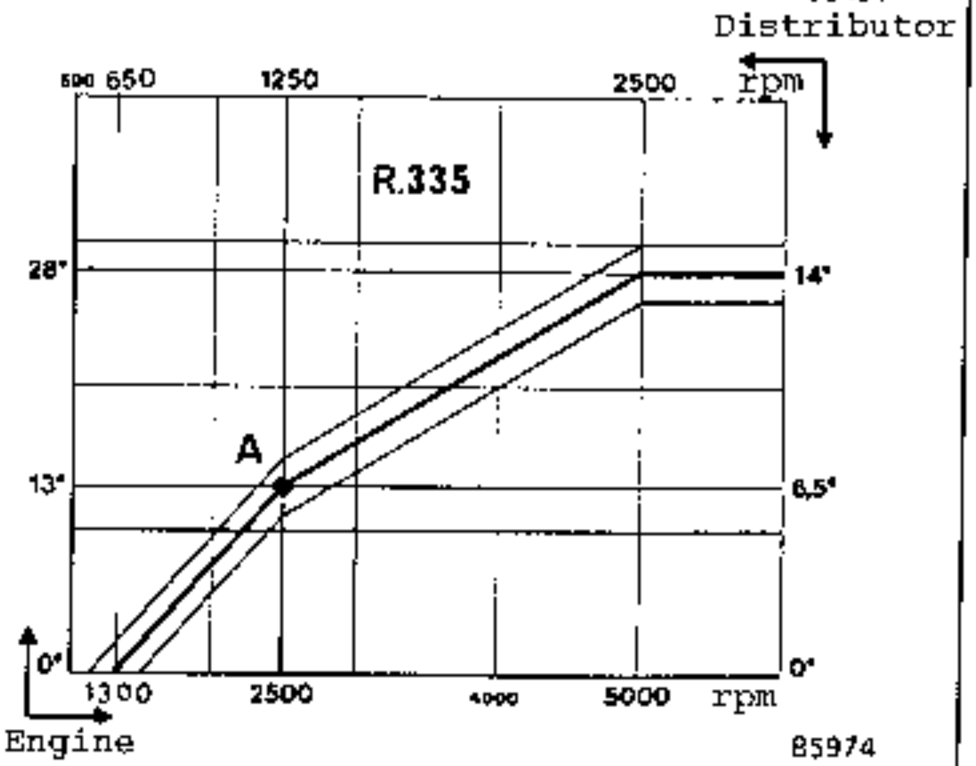
These curves are plotted in engine degrees and engine rpm (for direct readings when the engine is running) and in degrees distributor and distributor rpm (for testing the distributor on the test bench).

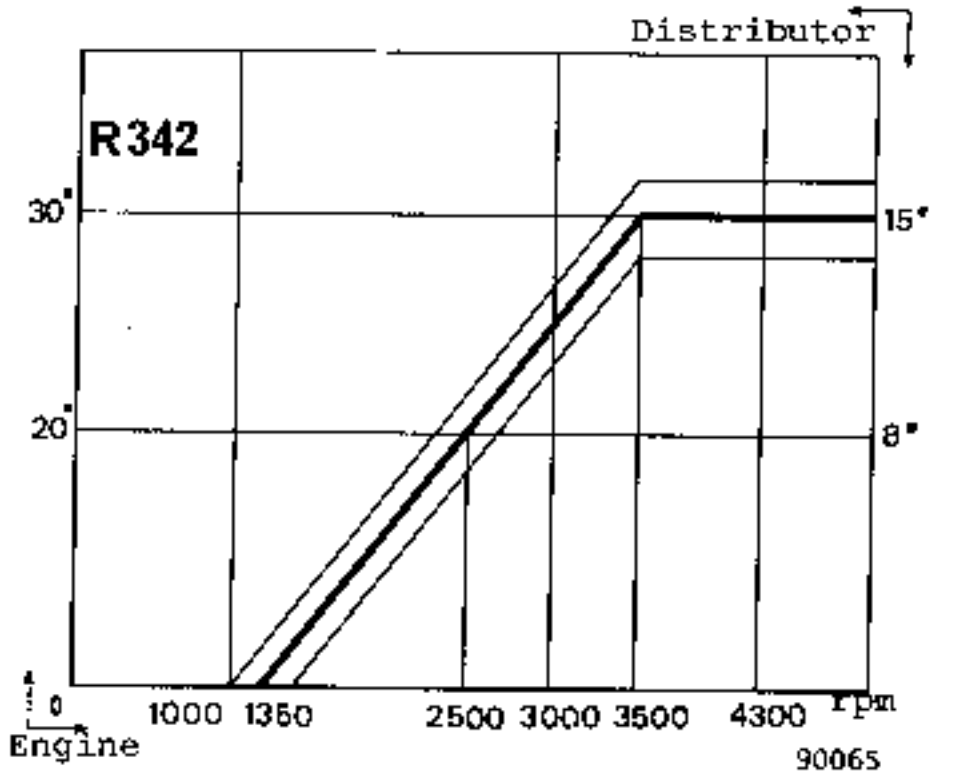
We should like to remind you that :

- 1 distributor rpm = two engine rpm,
- 1 distributor degree = two engine degrees.









Example :

Curve R 335 and initial timing of 8°.

At point A on the curve, at a flywheel speed of 2500 rpm, read 13° plus the initial advance that is to say 13° + 8° = 21°.

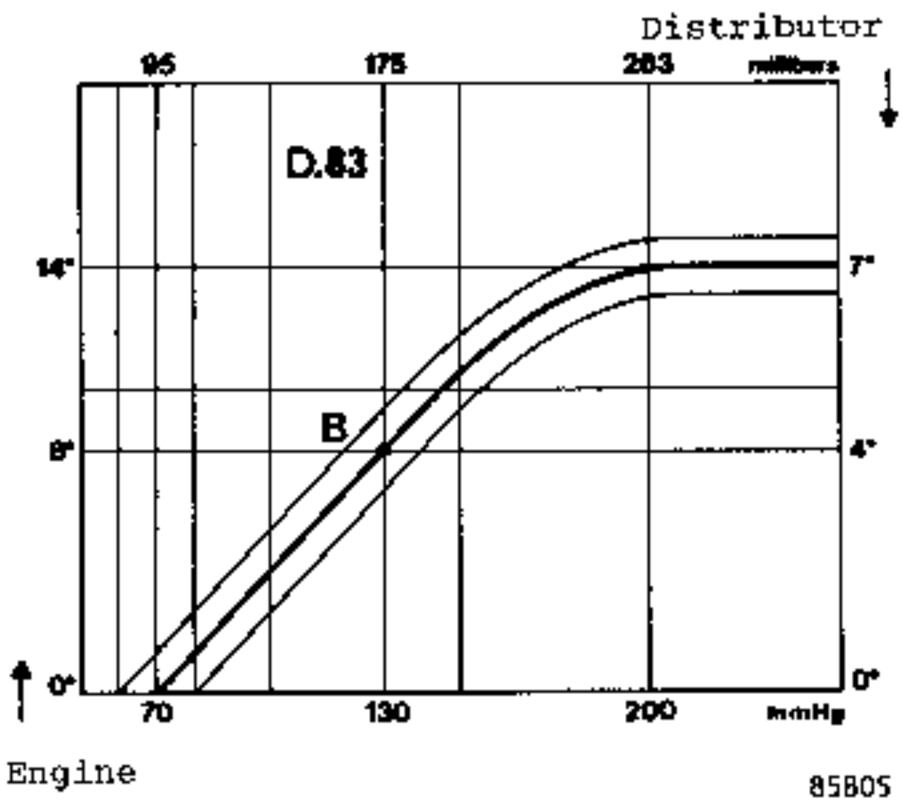
On the distributor test bench read 6.5° at 1250 rpm.

CURVE CHARACTERISTICS

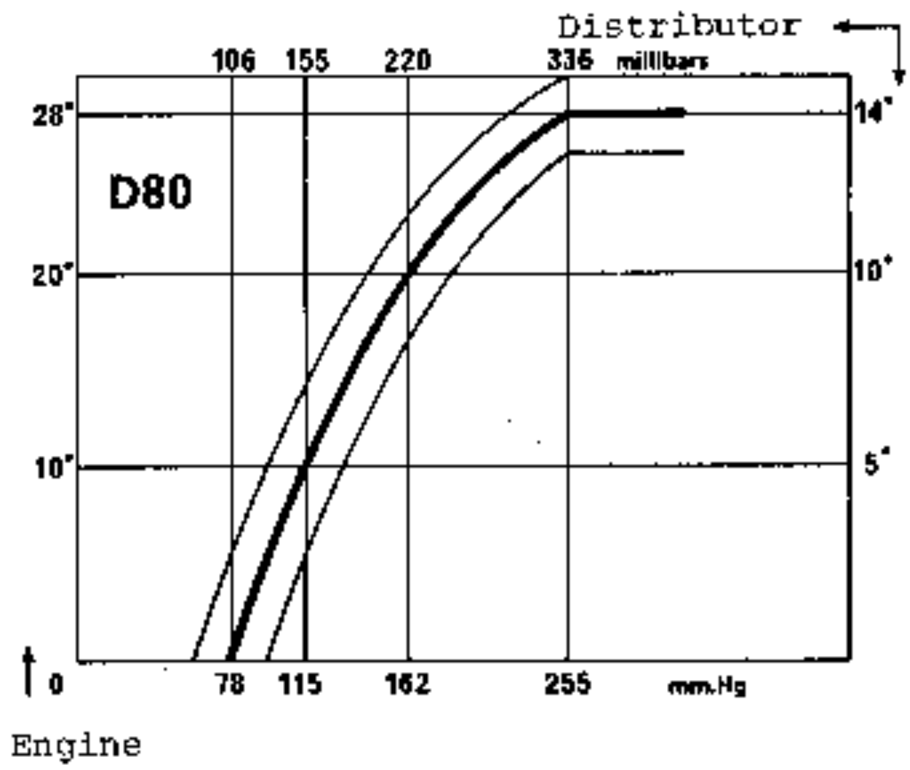
Vacuum curves

These curves are plotted in millibars or millimetres of mercury and in engine degrees (for checking the timing with the engine running) and in millibars or millimetres of mercury and distributor degrees (for checking the distributor on the test bench).

We should like to remind you that one distributor degree = two engine degrees but that the vacuum reading remains the same.



85805



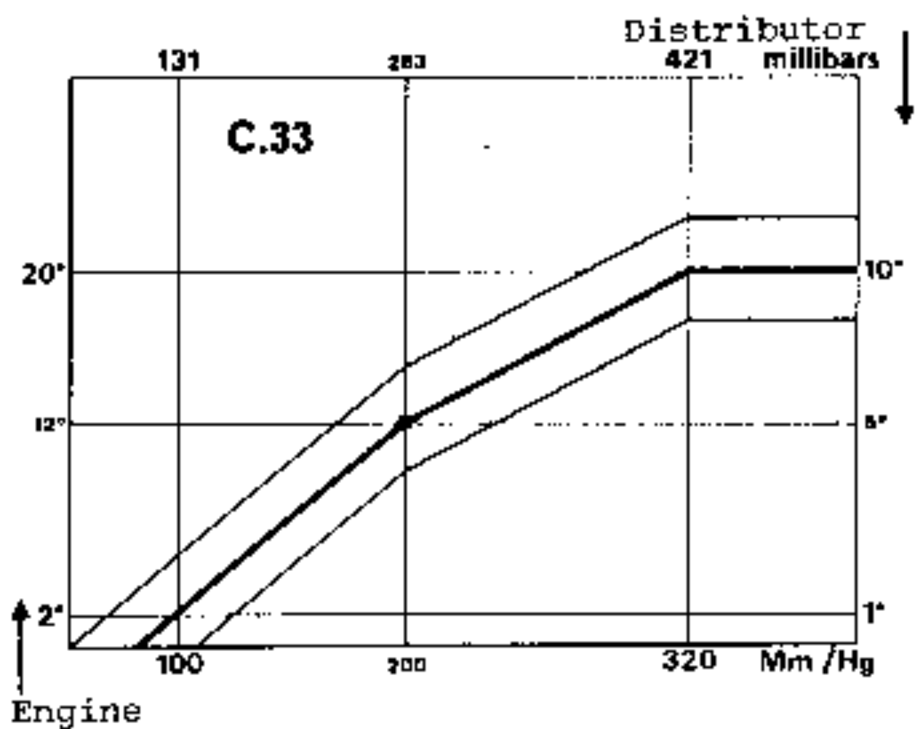
90687

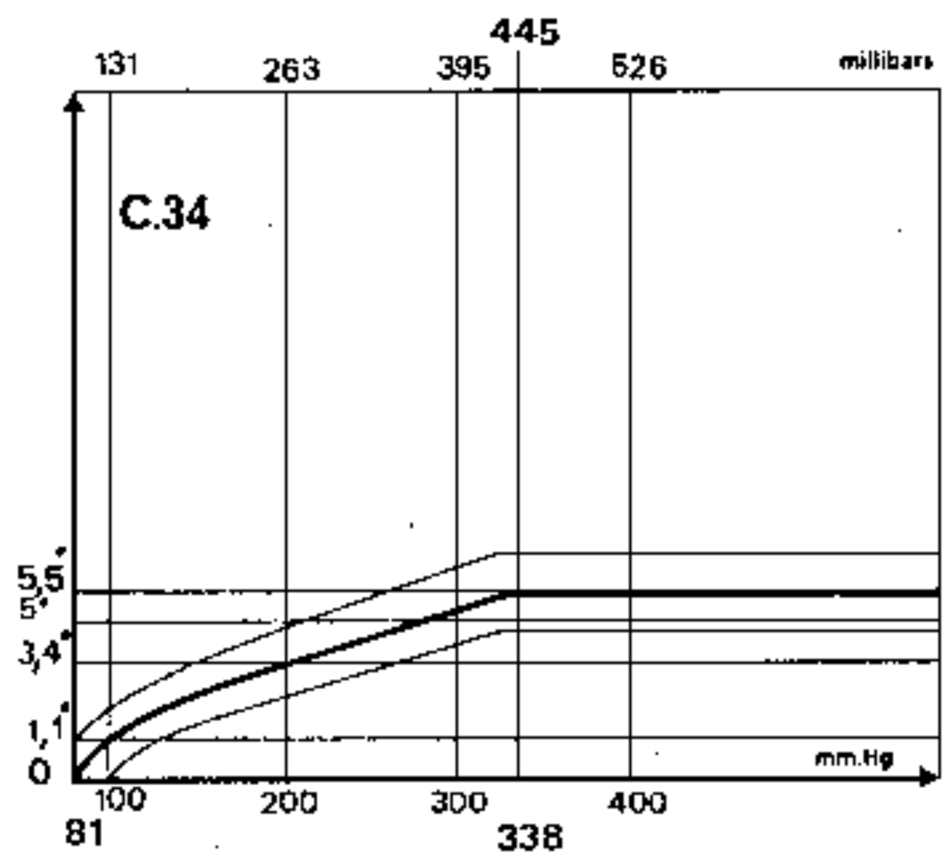
Example :

Curve D83 and initial timing of 8°.

At point B on the curve, at 175 mbar (130 mm/hg), the reading at the flywheel is 8° plus the initial timing that is to say 8° + 8° = 16°.

On the distributor test bench at 175 mbars (130 mm/hg) the reading is 4°.



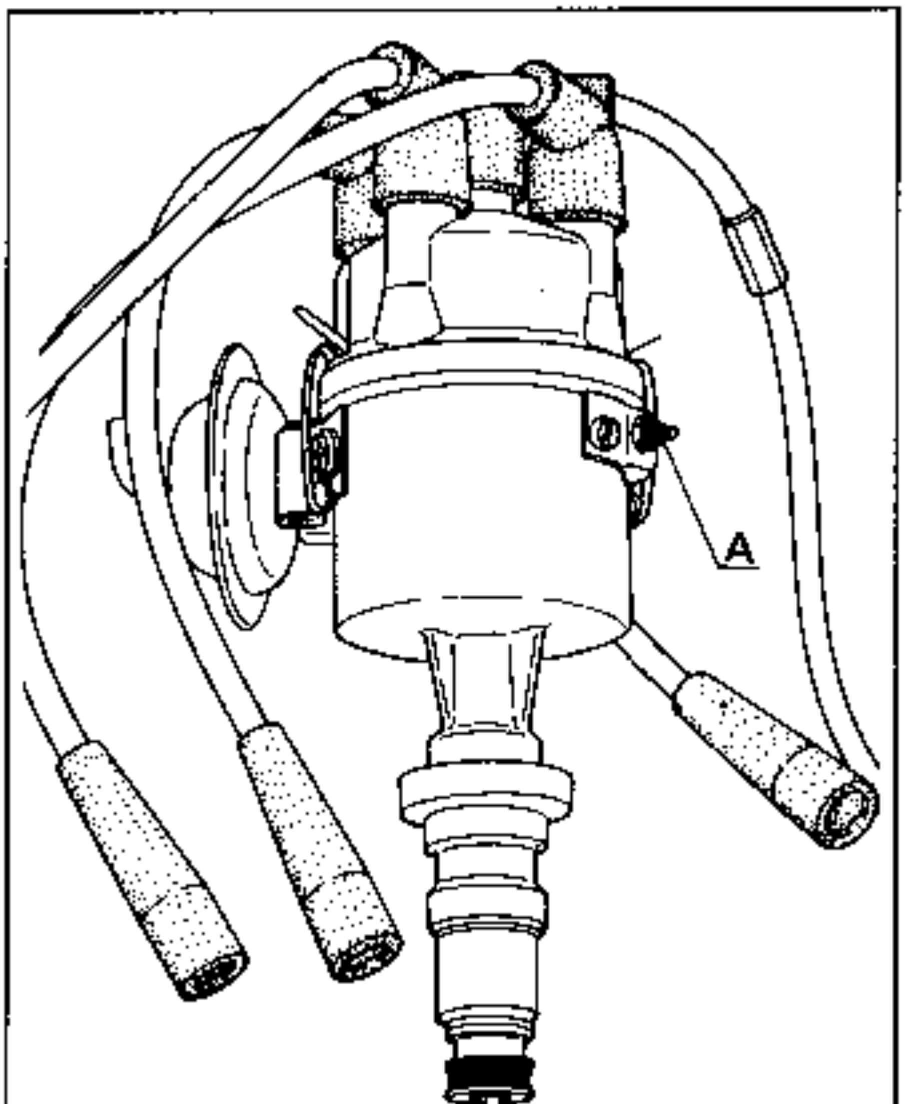


92426

1 - SPECIFICATIONS

External points adjustment.

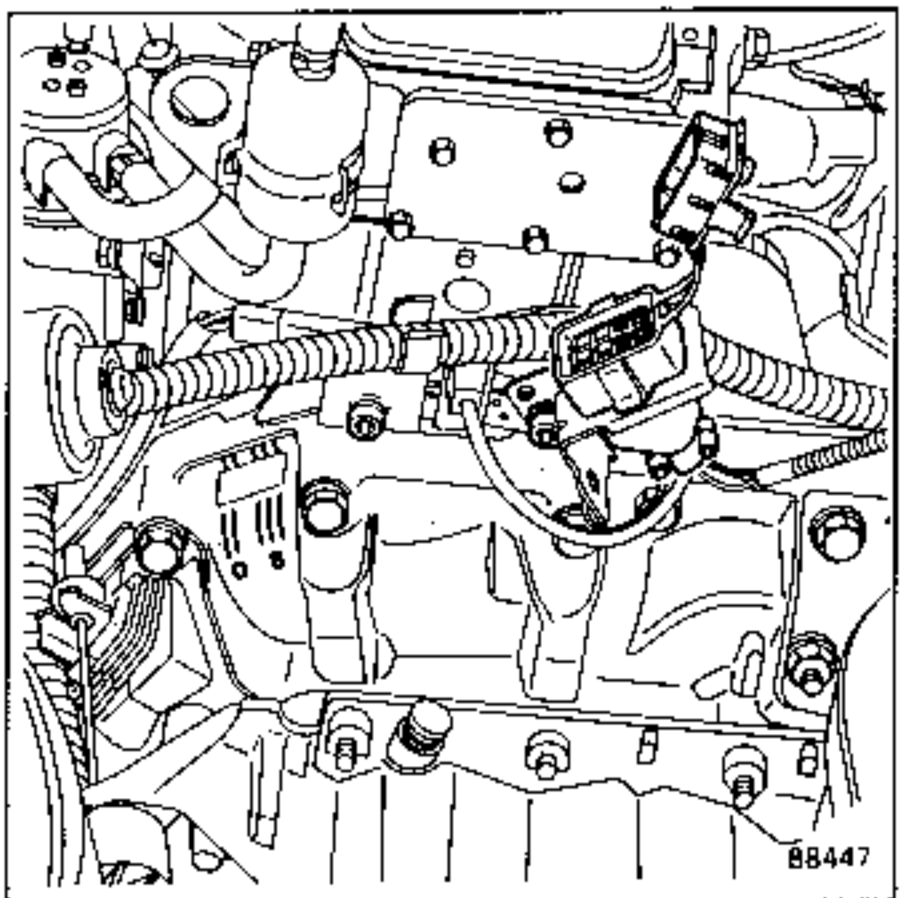
These vehicles are equipped with distributors the points of which can be adjusted from outside (A).



81297

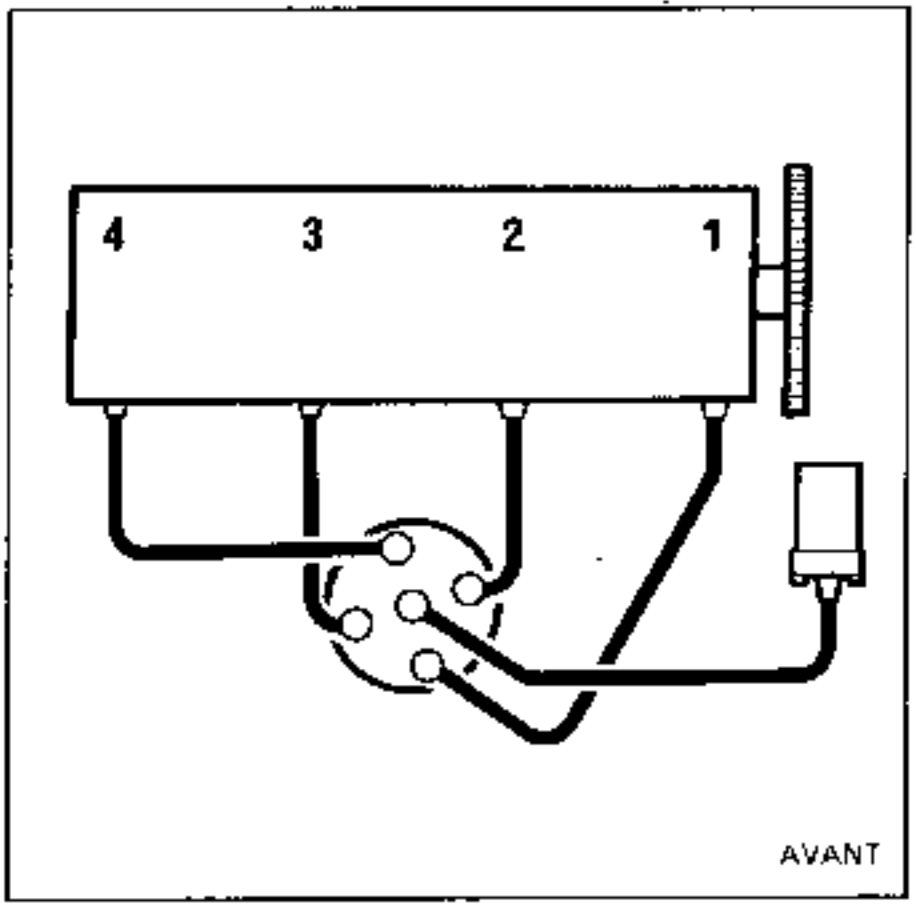
Initial timing marks.

The 0 reference is top dead centre on nos. 1 or 4 cylinders.



88447

2 - IGNITION LEAD CONNECTION ORDER



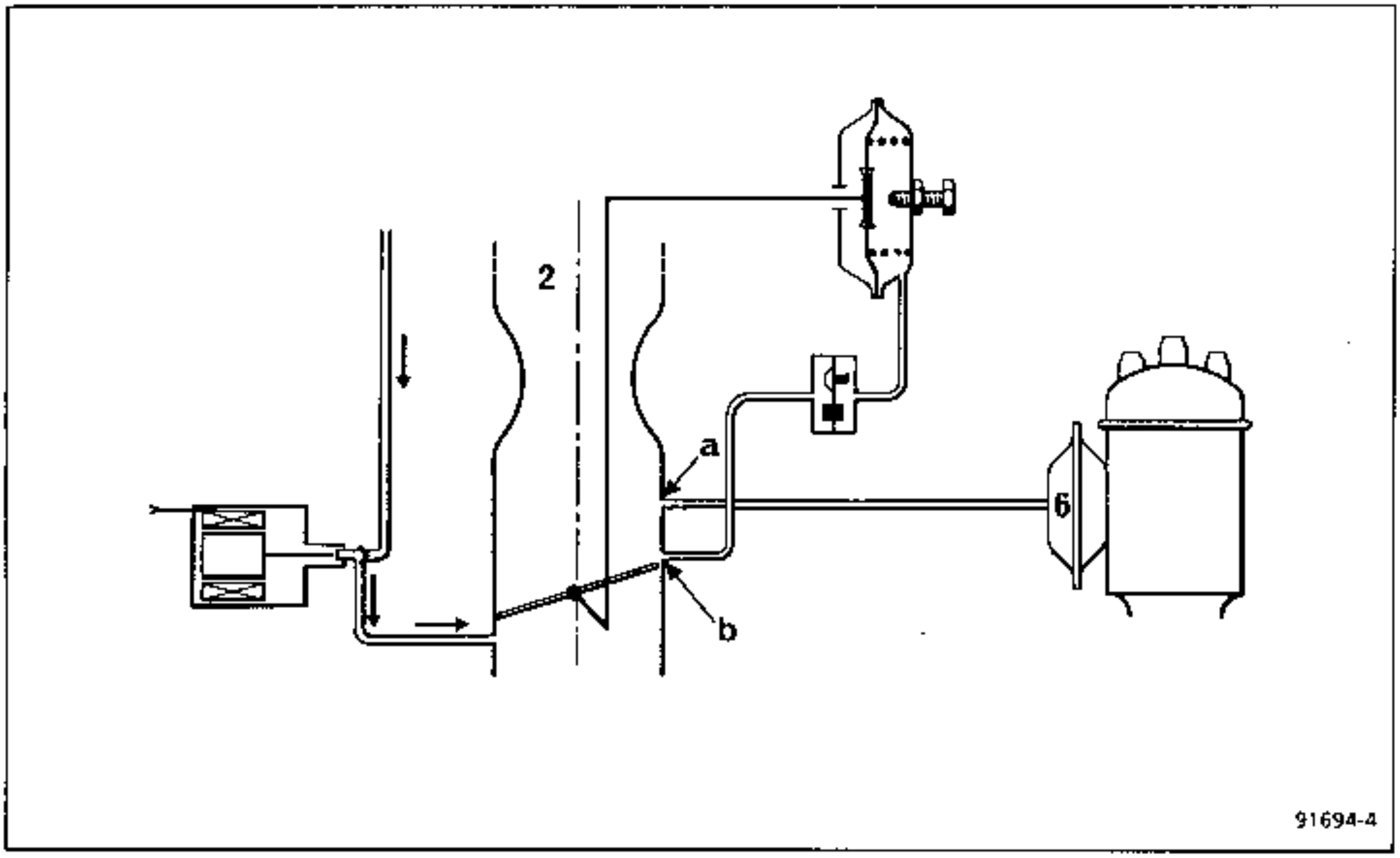
Firing order :

(1-3-4-2).

- it is essential to connect the leads as shown in the above diagram.

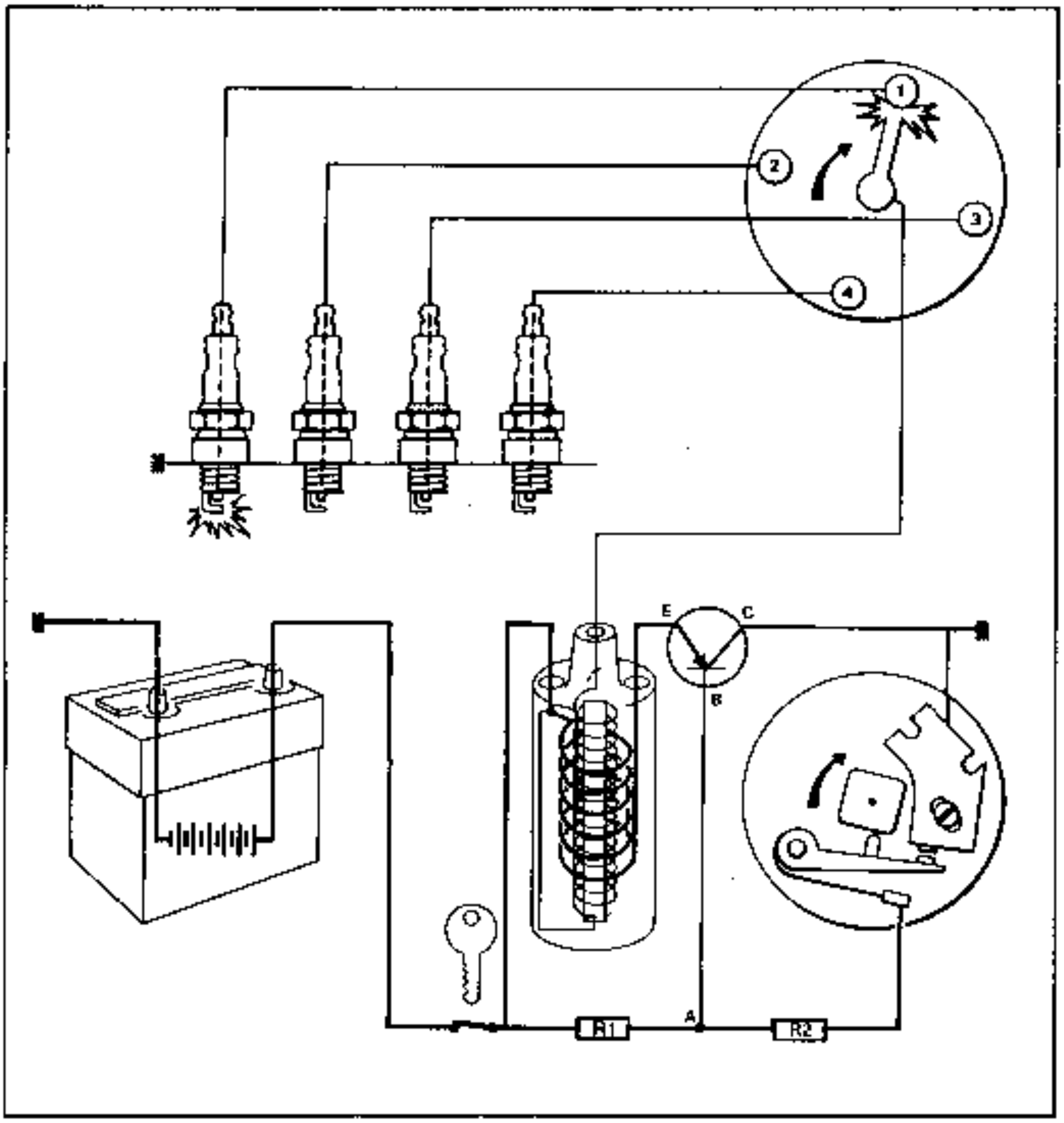
ENGINES C1E B 756

SPECIAL FEATURES



The distributor capsule (6) C33 receives two signals one from the input side and the other from the output side of the throttle through two jets (a) and (b) which are in the carburettor throttle casing (2). It is therefore essential, when setting the distributor timing, TO DISCONNECT CAPSULE C33 (6).

SIMPLIFIED CIRCUIT DIAGRAM OF A TRANSISTORISED IGNITION SYSTEM WITH A CIRCUIT BREAKER



Principle of operation :

- When the points are open : the base (B) and the emitter (E) of the transistor are at the same potential.
- When the points are closed : the base (B) of the transistor becomes negative because the voltage has dropped at point A because of the presence of the two resistances R1 and R2 : the transistor conducts current.
- As soon as the points open, the voltage rises at point A and the transistor ceases to conduct current.

The advantages of this system :

- The transistor improves the break in the primary current.
- The strength of the current passing through the points is very low and this gives them a longer operating life.

CONNECTIONS

A : On the diagnostic bay

1) Connect C to the cylinder block.
2) Connect (B) to the two ring terminals on the coil (if necessary disconnect the interference suppression condenser).
3) Connect (A) to the diagnostic plug on the bay.

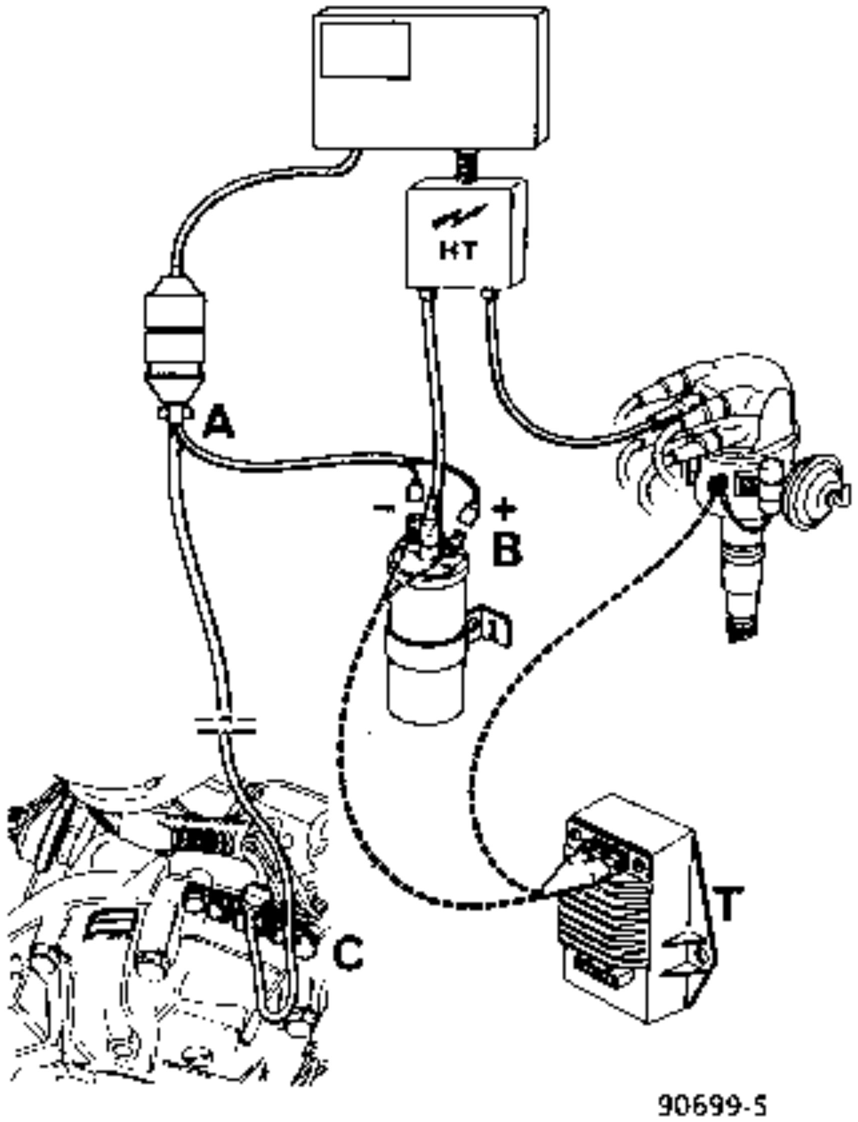
Select conventional ignition at the diagnostic bay.

IMPORTANT : the diagnostic bay engine earth is provided by sensor (C). Do not forget to secure this sensor in place.

Connect :

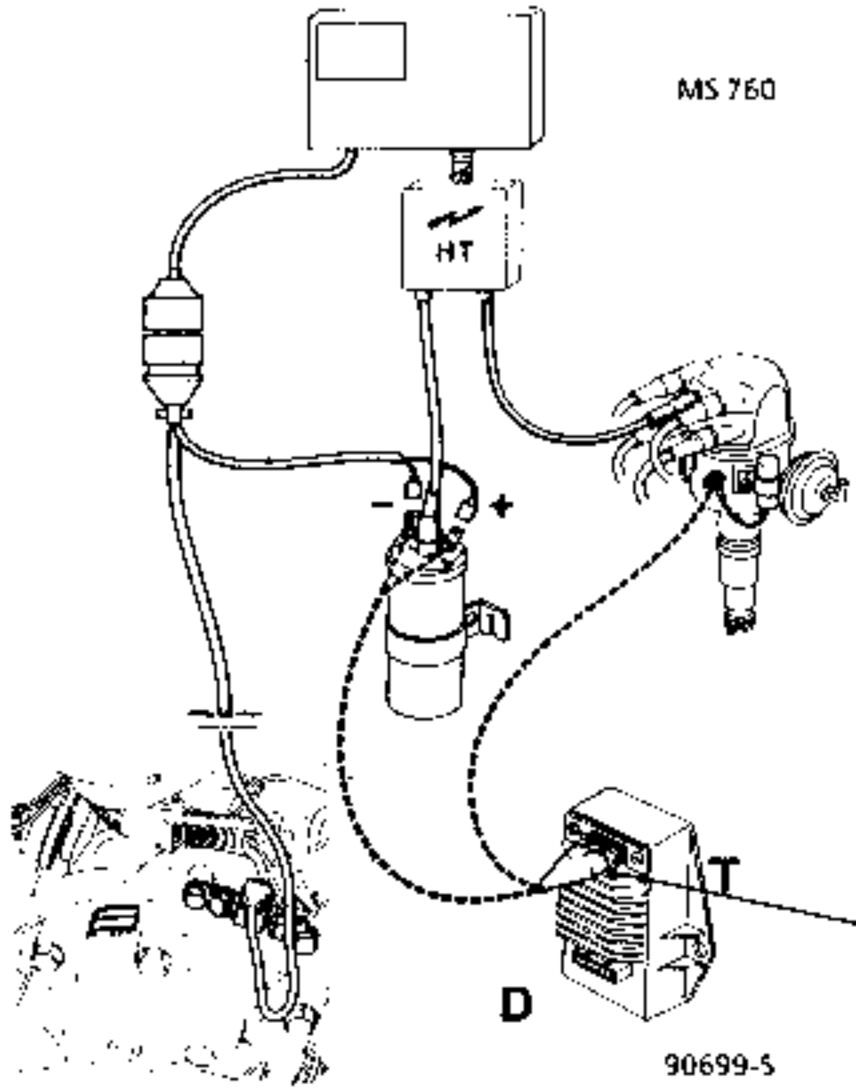
- the high tension sensor,
- the no. 1 cylinder magnetic clip,
- the connection to the + side of the battery.

DIAGNOSTIC BAY



85671-1 T (Transistorised module)

B : Using MS 760



85671-1

With the same connections as above

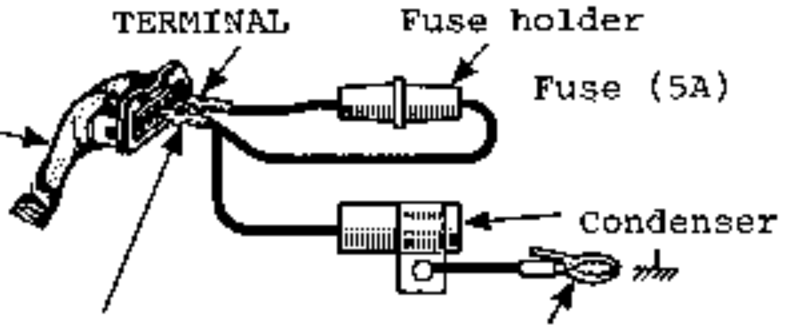
Tests carried out (with plug (D) connected):

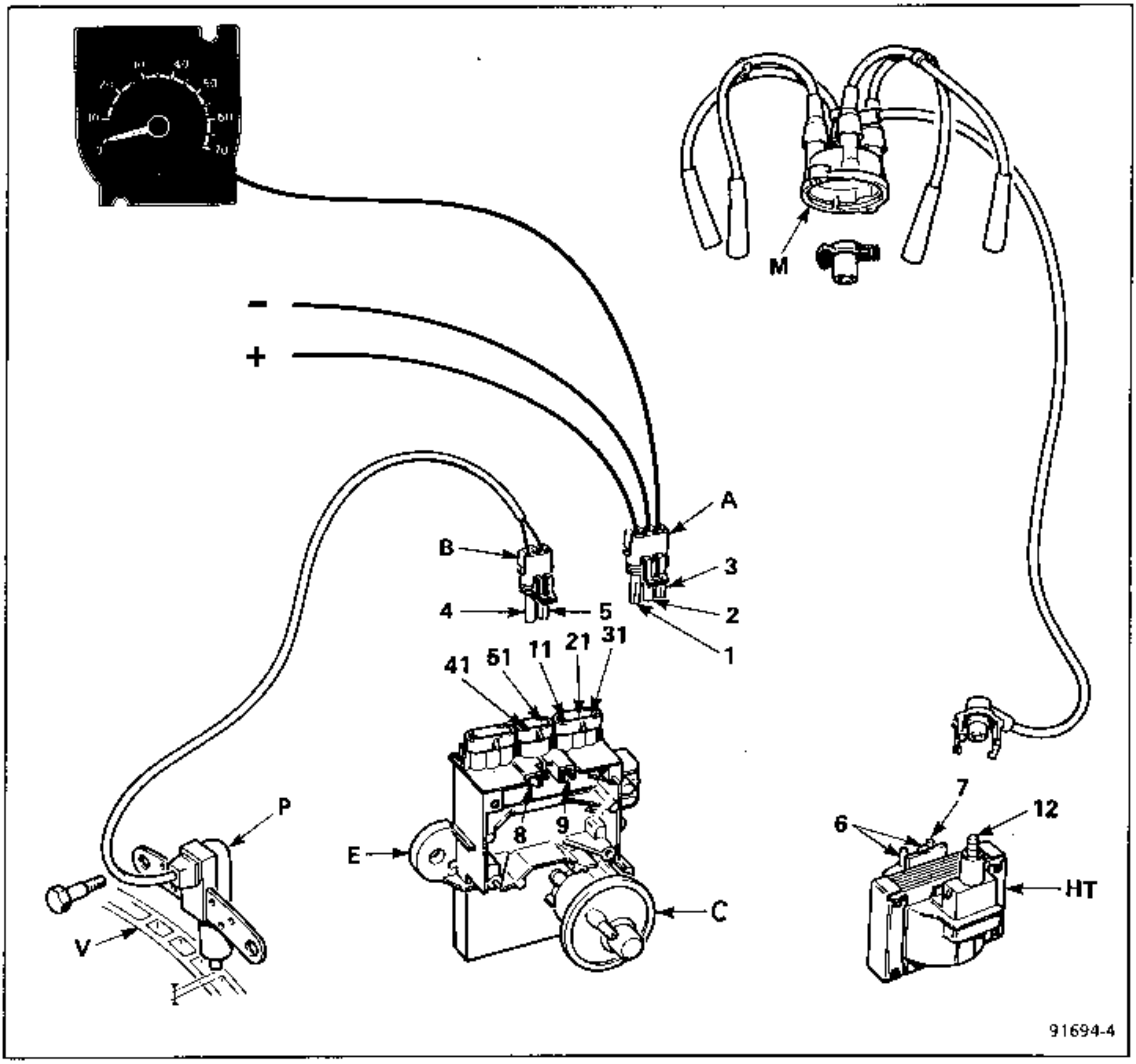
- engine speed,
- initial timing,
- advance curves.

Connections necessary to carry out the following tests :

- dwell %,
- condition of points.

Disconnect (D) and interconnect terminals 1 and 3.





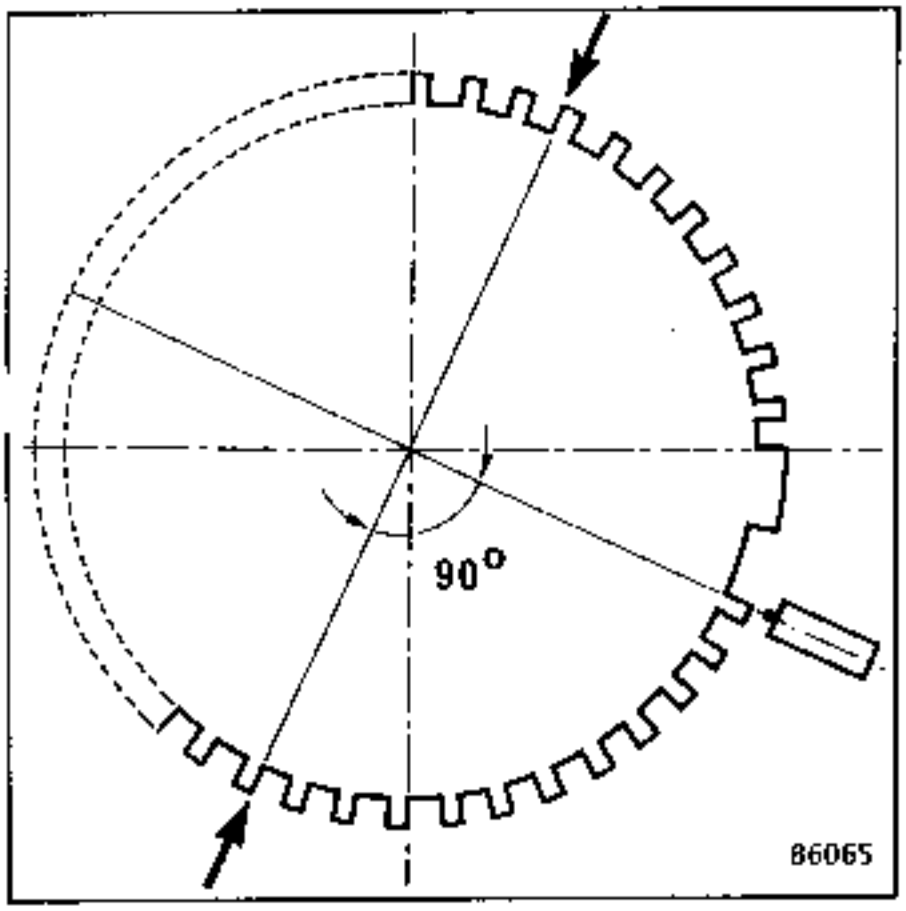
Item	Description
1.	+ supply
2.	Earth
3.	Tachometer
4.	Sensor winding
5.	Sensor winding
6.	Coil + terminal and interference suppression condenser terminal
7.	Coil - terminal
8.	Coil + contact
9.	Coil - contact
11.	Module + "input"
12.	Secondary stud

Item	Description
21.	Module earth
31.	Tachometer "output"
41.	Sensor signal
51.	Sensor signal
M.	Distributor cap
HT.	High tension coil
C.	Vacuum capsule
E.	Electronic computer module
P.	Magnetic position sensor
V.	Flywheel

NOTE : terminals 8 and 11 are directly interconnected inside the unit.

1 - Flywheel

The flywheel has 44 evenly spaced teeth of which two have been eliminated at each half turn, to create an absolute position mark at 90° before top and bottom dead centre. In reality therefore, there are only 40 teeth.



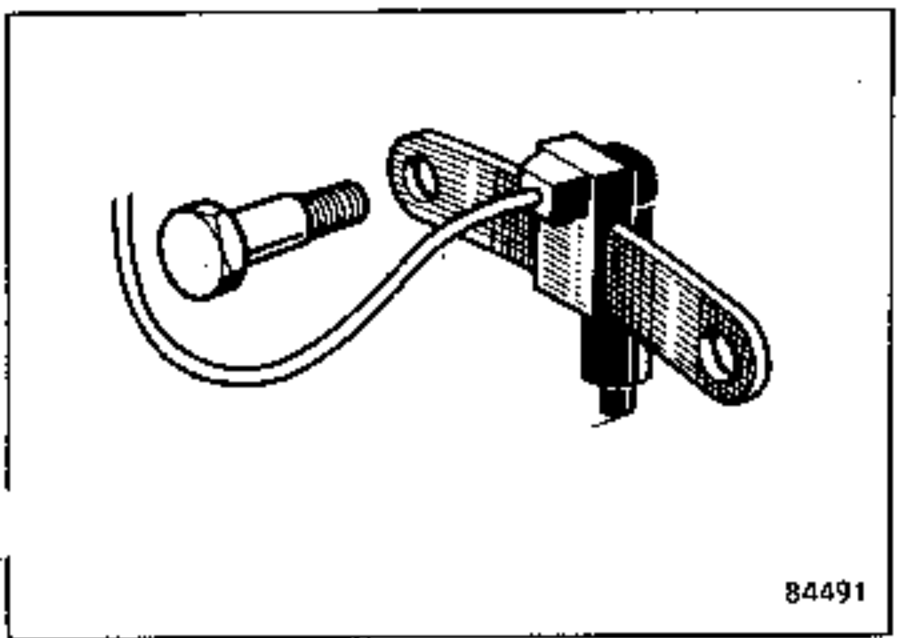
2 - Position sensor (P)

This determines :

- the position of top dead centre and bottom dead centre,
- the engine speed.

It cannot be adjusted (it is pre-adjusted on its mounting bar).

It must be secured to the clutch housing with shouldered bolts.

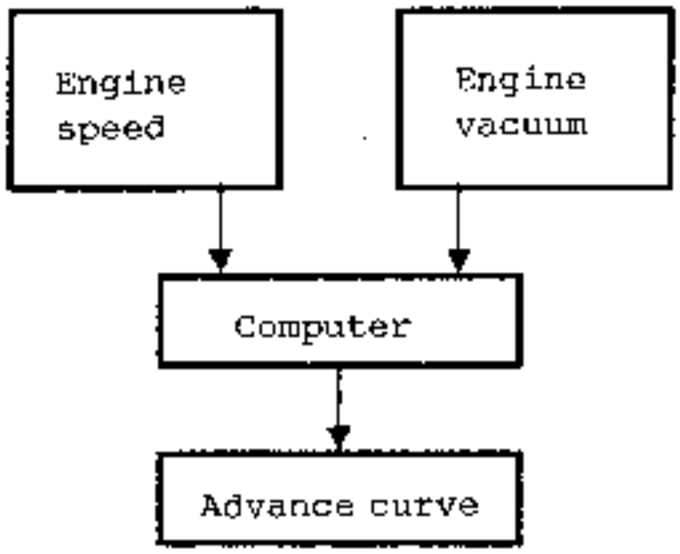


3 - The vacuum sensor

The external appearance of this sensor is identical to that of the vacuum capsule of a conventional ignition system but its internal workings are different.

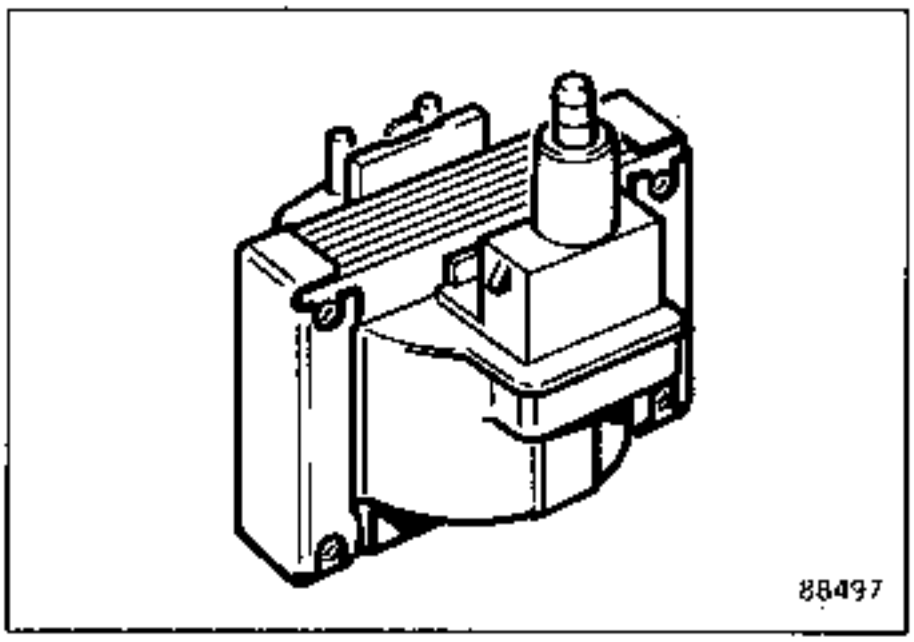
4 - The computer

This is an electronic system that determines the advance curve as a function of the engine speed and the engine vacuum.



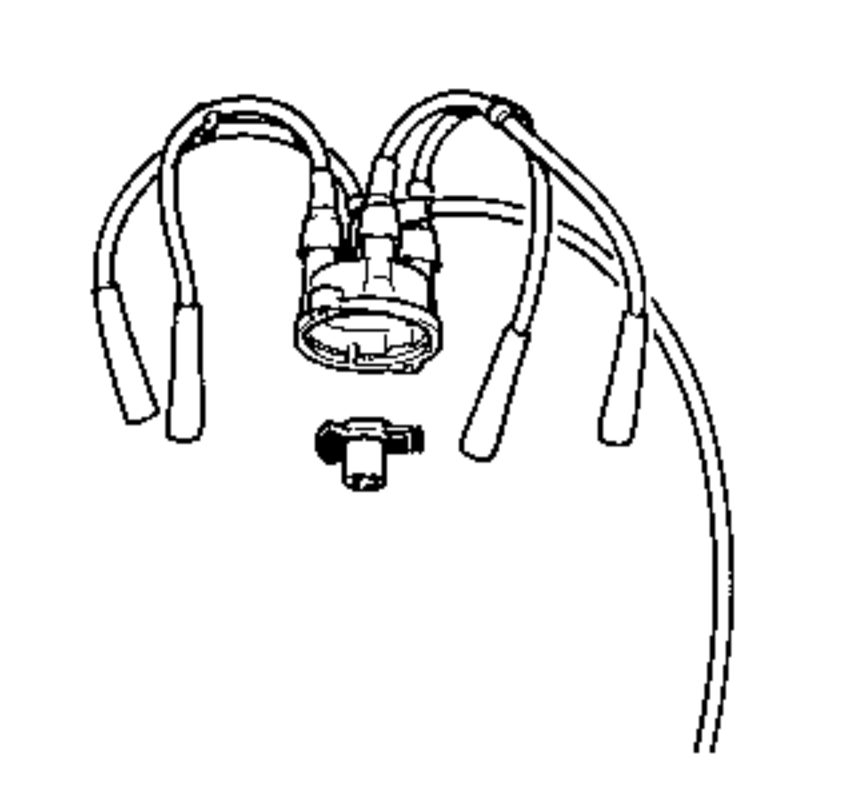
5 - The coil

This is independent from the computer and therefore can be replaced separately.



6 - The distributor cap

The only function of this component is to distribute the high tension current to the spark plugs in the correct firing order. It cannot be adjusted.

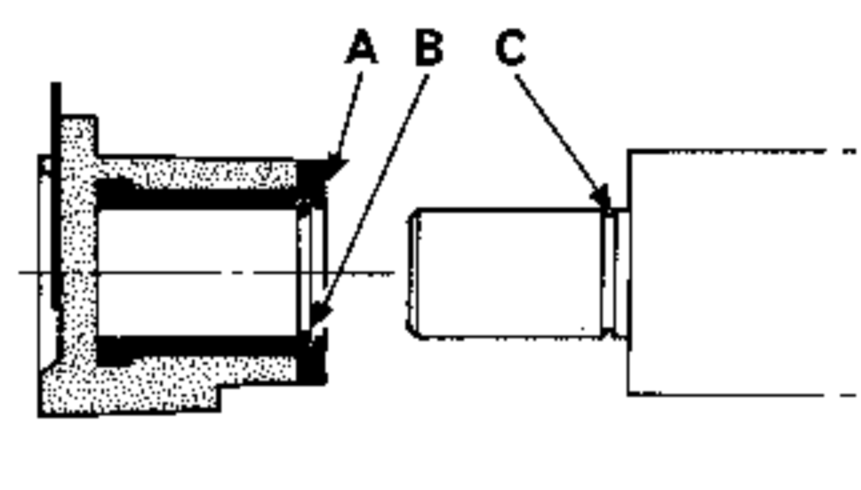


88497

The rotor arm arrangement

This rotor arm has an insert (A) and a snap ring (B).

There is a groove (C) on the camshaft.



88175-1

REMOVING (special operations)

Remove the disc (on certain models it has a slot on it to assist in its extraction).

If the rotor arm is difficult to remove, free it by gripping it and turning it with a pair of combination pliers, then break the plastic coating to make it possible to extract the rotor arm.

Under no circumstances should you strike the end of the camshaft.

REFITTING

WARNING : NEVER BOND A ROTOR ARM WITH THE SNAP RING B IN IT TO A CAMSHAFT WHICH COMPRISES A GROOVE C.

CHECKING

The centrifugal and vacuum advance curves can be checked but not adjusted (the check can remove any doubt as to whether the electronic computer is operating correctly or not).

TEST EQUIPMENT

This is identical to that used on our vehicle ranges :

- voltmeter) Of the recommended type
- ohmmeter)
- test light
- strobe light
- diagnostic bay (the connections being identical to those on vehicles not equipped with a diagnostic plug and with the "electronic" key pushed in).

IMPORTANT

Precautions to be taken :

- Never strike a high tension spark on the electronic computer.
- Never earth the coil primary or secondary circuits.

NO IGNITION

Inspect :

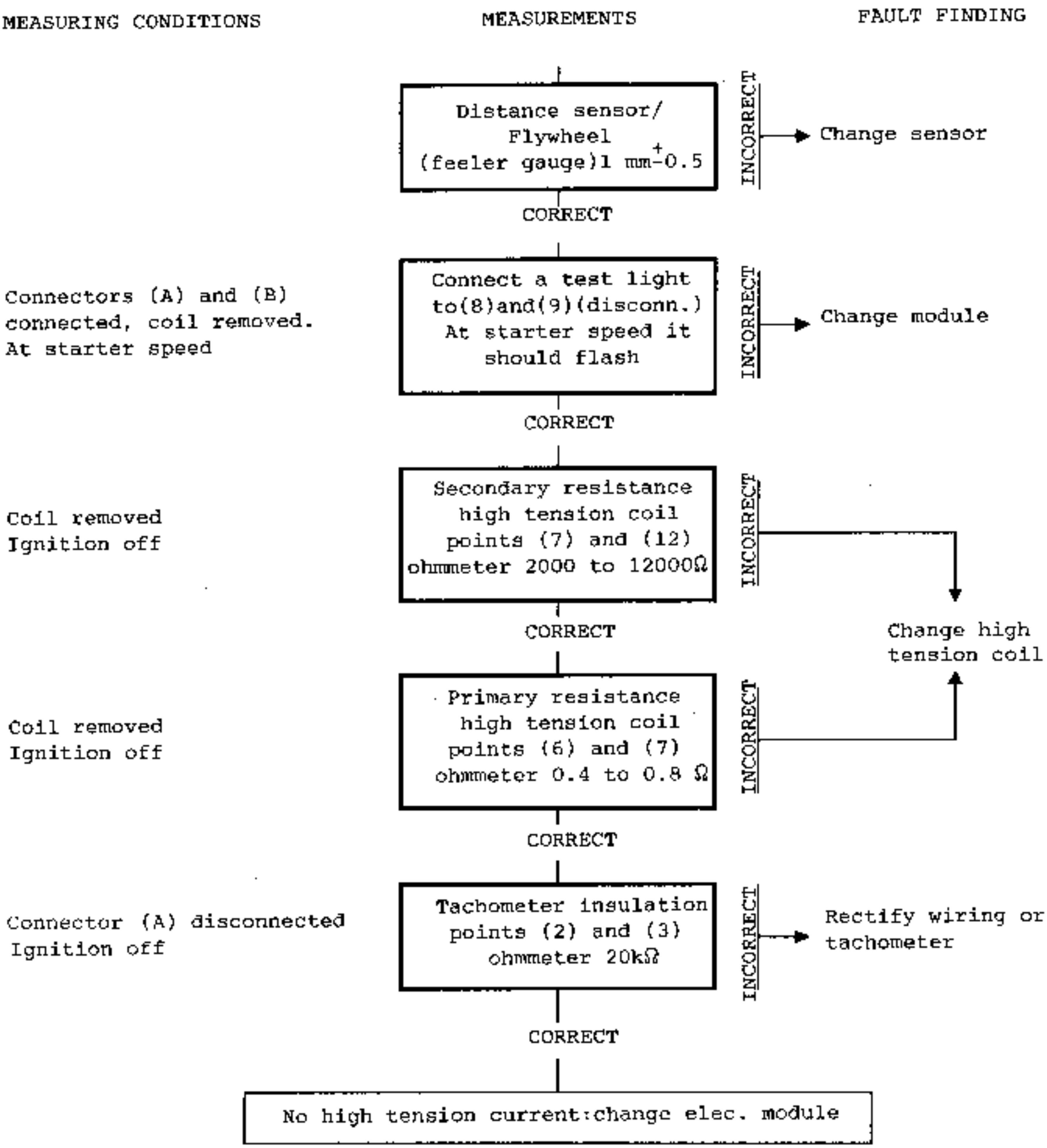
- the spark plugs,
- the plug leads,
- the distributor cap,
- the coil high tension lead.

> Check on the condition of the pins in connectors (A) and (B) : Disconnect and reconnect the connectors several times.
> Clean the terminal ends if necessary before changing any component parts.

PRIOR CHECK

Check between point 6 (coil supply + at the interference suppression condenser outlet) and earth (with the ignition on) that the voltage is higher than 9.5 volts.

MEASURING CONDITIONS	MEASUREMENTS		FAULT FINDING
Connector (A) disconnected Ignition on Starter turning	module supply + point (1) and veh. earth (voltmeter) > 9,5 volts	INCORRECT →	- Check battery voltage - Charge battery - Check module supply wiring
	CORRECT ↓		
Connector (A) disconnected Ignition off	Connector earth point (2) and veh. earth ohmmeter 0 Ω	INCORRECT →	Check module earth wiring
	CORRECT ↓		
Connector (A) disconnected Ignition off	Coil supply point (6) and (11) ohmmeter 0 Ω	INCORRECT →	Change electronic module
	CORRECT ↓		
Connector (A) connected Ignition on	Connector (A) point (6) and veh. earth (voltmeter) > 9,5 volts	INCORRECT →	Shake connector (A). If still incorrect, check connections between coil terminals and contacts. If still incorrect, change connector (A).
	CORRECT ↓		
Connector (B) disconnected Ignition off	Sensor resistance points (4) and (5) ohmmeter 200 Ω ± 50 Ω	INCORRECT →	Change the magnetic sensor
	CORRECT ↓		


MEASURING CONDITIONS
MEASUREMENTS
FAULT FINDING
Distance sensor/ Flywheel (feeler gauge)1 mm±0.5
INCORRECT
Change sensor
CORRECT
Connectors (A) and (B) connected, coil removed. At starter speed
Connect a test light to(8)and(9)(disconn.) At starter speed it should flash
INCORRECT
Change module
CORRECT
Coil removed Ignition off
Secondary resistance high tension coil points (7) and (12) ohmmeter 2000 to 12000Ω
INCORRECT
CORRECT
Change high tension coil
Coil removed Ignition off
Primary resistance high tension coil points (6) and (7) ohmmeter 0.4 to 0.8 Ω
INCORRECT
CORRECT
Connector (A) disconnected Ignition off
Tachometer insulation points (2) and (3) ohmmeter 20kΩ
INCORRECT
Rectify wiring or tachometer
CORRECT
No high tension current:change elec. module

STARTING DIFFICULT BUT NO PROBLEMS WHEN ENGINE IS RUNNING

Inspect or check with test equipment the :

- spark plugs,
- plug leads,
- distributor cap,
- coil high tension lead.

Check the high tension at starter speed :

- disconnect the high tension lead at the distributor cap end,
- place the lead 2 cm from the cylinder block.

NOTE : DO NOT TOUCH THE ELECTRONIC MODULE WITH THE HIGH TENSION LEAD

Operate the starter

High tension spark even

- CORRECT → Check : carburation, mechanical condition of engine, initial timing
- INCORRECT → Check module supply : >9.5 volts. Check battery charge. Charge battery
  - CORRECT → Measure sensor resist. at points (4) and (5) ohmmeter : 200Ω ± 50Ω. If incorrect, replace
  - CORRECT → Check distance sensor/flywheel (feeler gauge) 1 mm ± 0.5. If incorrect, replace
  - CORRECT → Clean sensitive face of sensor
  - CORRECT → Replace sensor

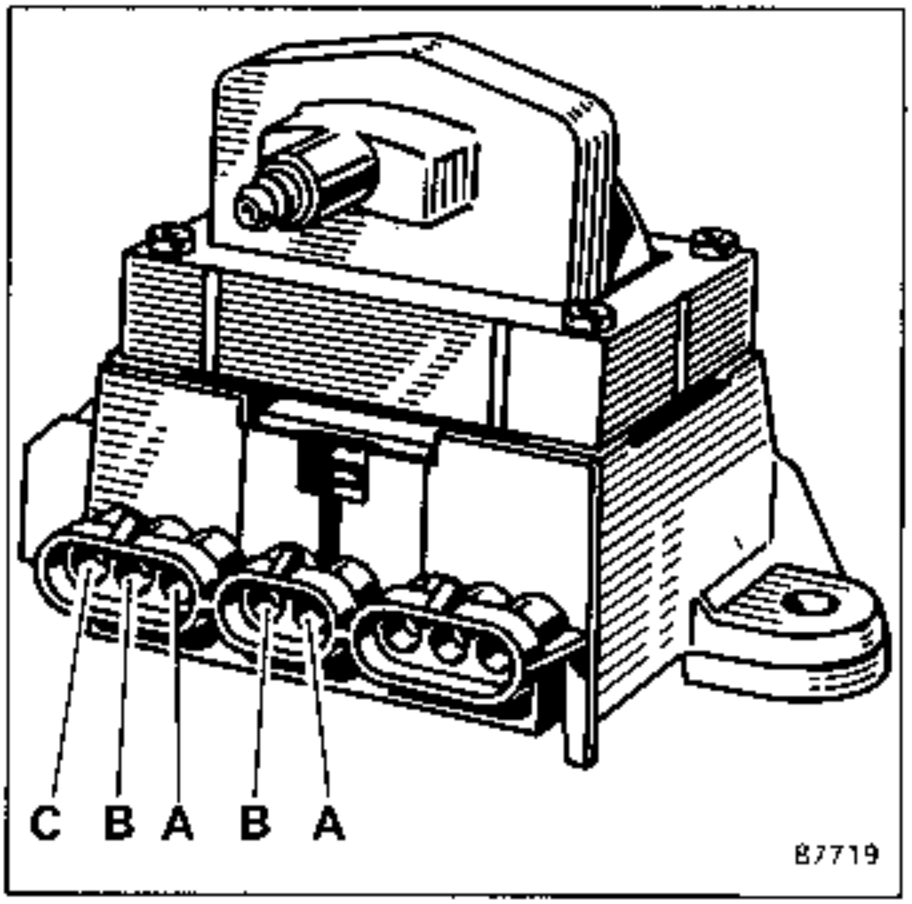
CHECK THE MECHANICAL CONDITION OF THE VACUUM CAPSULE

- stabilise engine speed at 3000 rpm.
- disconnect vacuum pipe from capsule.

Does the engine speed fall?

- YES → Capsule correct
- NO → Check condition of vacuum pipe
  - CORRECT → Change electronic module

The injection unit is programmed with the ignition advance curves and sends a control signal (5 volts) to the ignition power module.



3 way connector

A Battery +
B Earth
C Tachometer

2 way connectors

A Control earth
B Control signal

Vehicle	Engine	AC	CHAMPION	EYQUEM	Electrode gap (mm)
BCSF 400	C1C	C42 CXLS	N281 YC	C52 LS	0,75 – 0,85
BCSF 401	C1E	C42 CXLS	N281 YC	C52 LS	0,75 – 0,85
BCF 402	C1J	-	N281 YC	C52 LS	0,75 – 0,85
BC 403	C2J	C42 CXLS	N281 YC	C52 LS	0,75 – 0,85
C 405	C1J	-	N3G	805 LP	0,6 – 0,7
BCF 407	C3J	-	RN12 YC	-	0,75 – 0,85
BC 408	F3N	-	RN9 YC	-	0,75 – 0,85
C 409	F3N	C41 CXLS	N6 YC	C82 LS	0,75 – 0,85
BCS 40F	C1G	C42 CXLS	N281 YC	C52 LS	0,75 – 0,85
BC 40G	F2N	C41 CXLS	N279 YC	C82 LS	0,75 – 0,85
BCF 40H	C1E	C42 CXLS	N281 YC	C52 LS	0,75 – 0,85
BCF 40M	C2J	C42 CXLS	N281 YC	C52 LS	0,75 – 0,85
BC 40J	C2J	C42 CXLS	N281 YC	C52 LS	0,75 – 0,85
BCFS 401(S)	C1E	C42 CXLS	N281 YC	C52 LS	0,75 – 0,85
BC 40K	F2N	C41 CXLS	N279 YC	C82 LS	0,75 – 0,85

(S) = Switzerland

PINKING DETECTOR

Principle of operation

When the computer receives a signal from the pinking detector it alters the ignition advance.

Checking

With the engine running at idling speed, connect an advance tester to the system.

Tap lightly (in a series of taps) on the cylinder head, near the sensor, with a bronze drift.

The advance reading should fall.

WARNING : Do not tap the sensor itself.

CHECKING THE SAFETY PRESSURE SWITCH ON C405 VEHICLES

Remove the component.

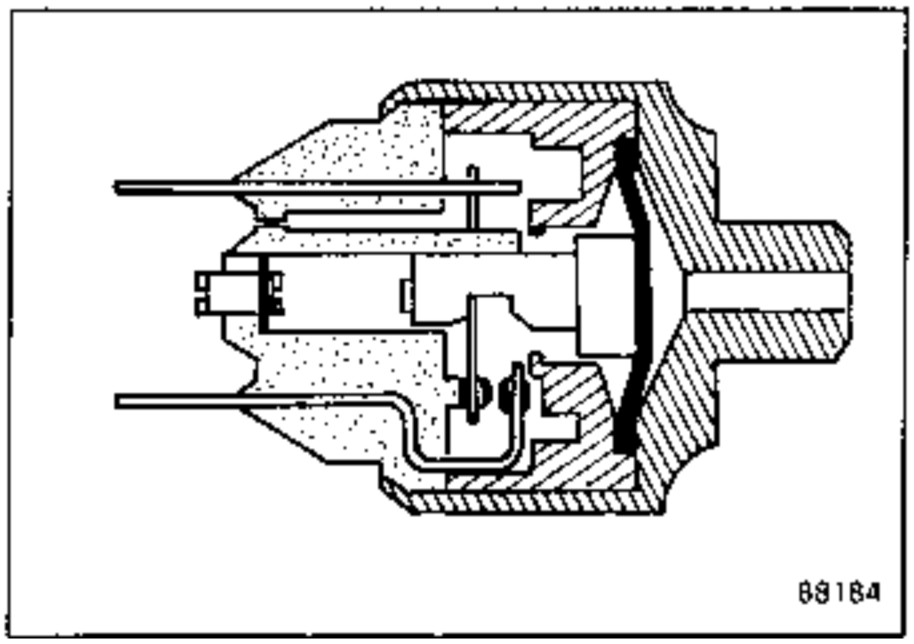
Connect it to tool Mot. 1014.

Connect it to an ohmmeter.

Apply a gradually increasing pressure.

P = Less than 1000 mbar
R = ∞
P = Greater than 1100 to 1200 mbar
R = 0 Ω

When the pressure is falling (approximate indication).
P = 900 mbar
R = ∞



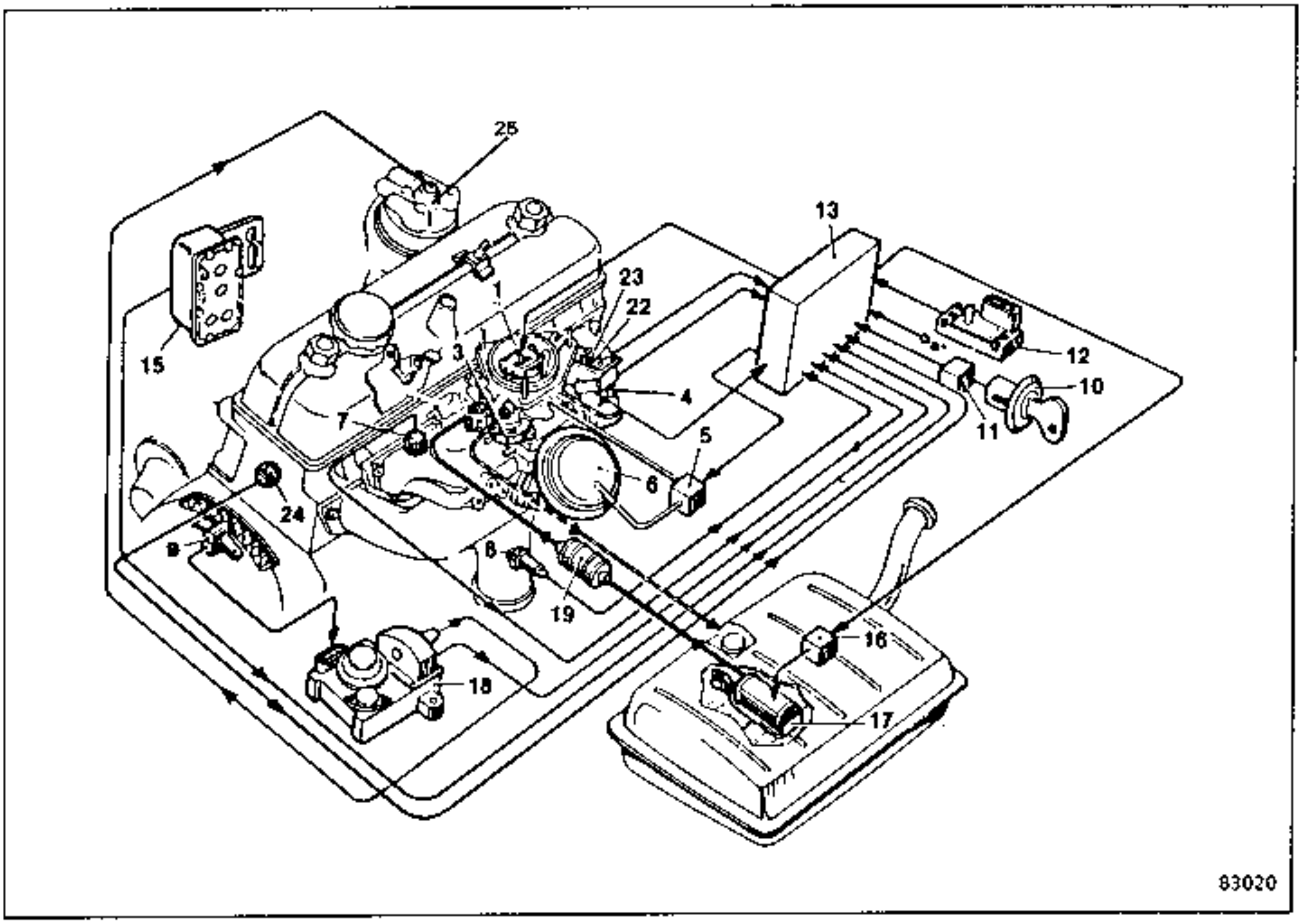
The Bendix or Renix single point injection systems fitted to B,C,F 407 and B,C 408 vehicles comprise :

- a computer which, in the case of the Renix injection system, controls both injection and ignition. The ignition timing is regulated by a pinking detector mounted on the cylinder head between nos. 2 and 3 cylinders, on the ignition harness side. In the case of the Bendix injection system, the computer does not control the ignition and is not assisted by a pinking detector,
- the computer is in the passenger compartment under the glove box,
- the injection relays are also in the passenger compartment under the glove box alongside the accessory connection plate,
- the sensor detecting the air temperature or the mixture temperature is mounted on the inlet manifold,
- the coolant temperature sensor is mounted on the rear face of the cylinder head (Engine 3J A 700) or on the inlet manifold (Engine F3N),
- the inlet manifold temperature sensor is mounted on the outside of the inlet manifold (Engine C3J B 702),
- the absolute pressure sensor and diagnostic plug are on the scuttle (C3J B 702 and F3N),
- the diagnostic plugs (Engine C3J A 700) are under the ignition module on the scuttle,
- the idling speed is controlled by an electric motor on the throttle unit,
- the Bendix single point injection system (C3J A 700) is checked with a multimeter at plugs D1 and D2,
- the Renix injection system is checked with tester XR 25 fitted with the latest edition of the cassette, the fault finding signal output is constant and transitory defects are not placed on memory,
- the injection warning light on the instrument panel does not operate with this type of injection system.

Sensor type	Engine	Specifications of various sensors :				
Coolant temperature	C3J A 700	Temperature °C	0°	25°	80°	100°
		Resistance kΩ	31 35	9,70 10,3	1,16 1,35	0,63 0,74
Coolant temperature	F3N	Temperature °C	4°	20°	70°	100°
		Resistance Ω	7500	3400	450	185
Air or mixture temperature	C3J F3N	Temperature °C	4°	20°	70°	100°
		Resistance Ω	7500	3400	450	185
Inlet manifold temperature (external)	C3J B 702	Temperature °C	4°	20°	70°	100°
		Resistance Ω	7500	3400	450	185

- the oxygen sensor is mounted on the exhaust manifold on the input side of the exhaust pipe securing flange.

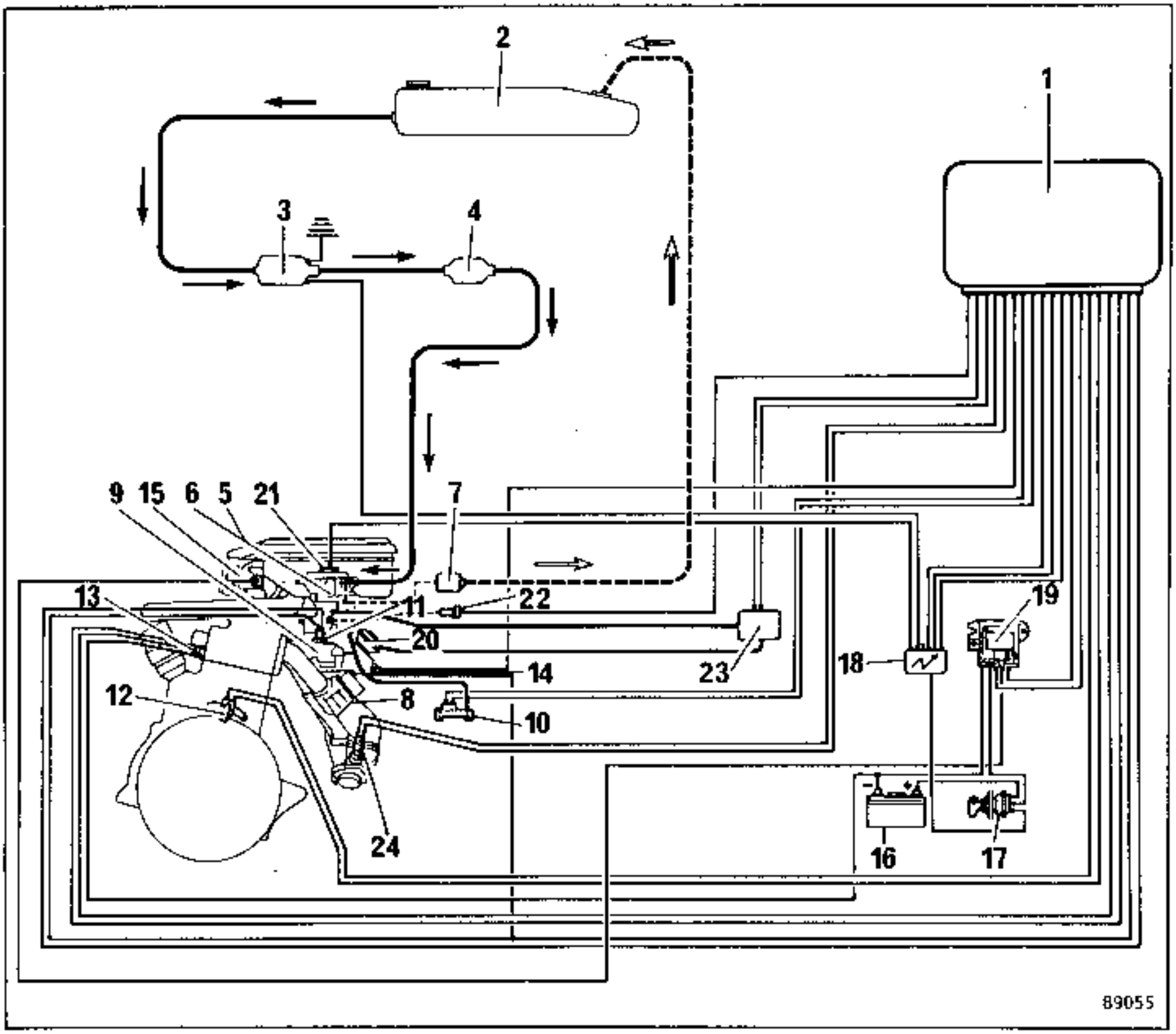
Layout diagram of Bendix single point injection system components.



1. Injector
3. Pressure regulator
4. Idling speed control motor
5. Exhaust gas recirculation solenoid valve
6. Exhaust gas recirculation valve
7. Sensor showing temperature of mixture in inlet manifold
8. Oxygen sensor
9. Speed sensor
10. Ignition/starting switch
11. Supply relay
12. Manifold absolute pressure sensor
13. Electronic computer
15. Starter relay
16. Fuel pump relay
17. Fuel pump (under tank on diagram)
18. Electronic ignition module
19. Line mounted fuel filter
22. Throttle switch (idling)
23. Throttle switch (full load)
24. Sensor (coolant)
25. Distributor cap

Layout diagram of Renix single point injection system components.

B.C.F.407, B.C.408

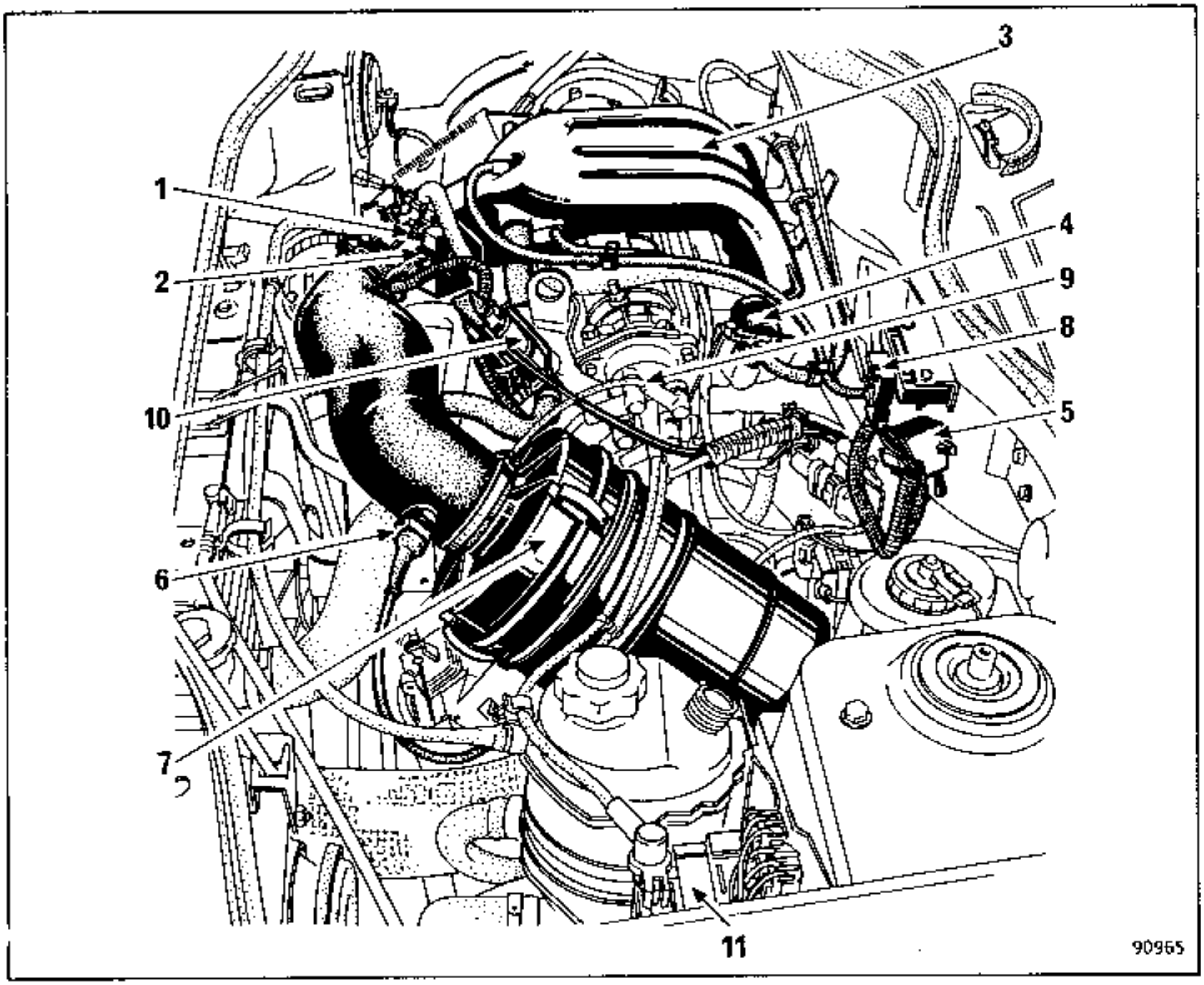


1. Computer
2. Fuel tank
3. Electric fuel pump
4. Fuel filter
5. Air filter
6. Throttle unit
7. Pressure regulator
8. Exhaust manifold
9. Inlet manifold
10. Absolute pressure sensor
11. Mixture temperature sensor
12. Speed sensor
13. Pinking detector (B,C 408)
14. Coolant temperature sensor (B,C 408) or inlet manifold temperature sensor (B,C,F 407)
15. Distributor cap
16. Battery
17. Ignition-starting switch
18. Relay unit
19. Ignition power module
20. E.G.R. valve
21. Injector
22. Switch (Full load - No load)
23. Exhaust gas recirculation and anti-evaporation system bleed control solenoid valve
24. Oxygen sensor

- the computer controls the injection and ignition. The ignition timing is adjusted by means of a pinking detector mounted on the cylinder head between cylinders 2 and 3, under the air distributor on the same side as the ignition harness,
- the computer itself is in the passenger compartment, under the glove box,
- the injection relays are also in the passenger compartment under the glove box alongside the accessory connection plate,
- the coolant temperature sensor is mounted on the cylinder head near the oil vapour collector and the idling speed control valve,
- the air temperature sensor is mounted on the air intake nozzle,
- the absolute pressure sensor and diagnostic plug are on the scuttle,
- the idling speed control valve is mounted on the cylinder head,
- the oxygen sensor is screwed into the exhaust manifold on the input side of the down pipe securing flange,
- the air and coolant temperature sensor specifications are identical,
- the Renix multipoint injection system is tested in exactly the same way as the Renix single point injection system. The diagnostic signal output is constant and transitory defects are not recorded on memory,
- the injection warning light on the instrument panel does not operate with this type of injection system.

Coolant temperature sensor	Temperature °C	20°	80°	90°
	Resistance Ω	283 - 297	383 - 397	403 - 417
Air temperature sensor	Temperature °C	0°	20°	40°
	Resistance Ω	254 - 266	283 - 297	315 - 329

ENGINES F3N 702



1. Throttle unit
2. Full load-no load switch
3. Inlet distributor
4. Fuel pressure regulator
5. Diagnostic plug
6. Air temperature sensor
7. Air filter
8. Absolute pressure sensor
9. Ignition distributor
10. Idling speed control valve
11. Ignition power module

Symptoms

1. Engine will not start or starts badly
2. Engine starts then stops
3. Uneven idling
4. Poor acceleration
5. Engine misfiring at all speeds
6. High fuel consumption
7. Engine lacks power
8. CO percentage too high at idling (>0.5%)
9. CO percentage too low at idling
10. Engine pinks
11. Idling speed too high
12. Idling speed too low, engine stalls

Remarks :
For this check list to be valid, the engine must be in good condition and the electrical equipment checked and, if necessary, rectified.

1	2	3	4	5	6	7	8	9	10	11	12	Cause	Remedy - Check
●	●											1 sec. timing relay defective	Check current supply.
●												Electric fuel pump not running	Check fuel pressure. Is current arriving at relay and fuel pump? If yes, replace fuel pump.
		●	●			●				●		Idling switch incorrectly adjusted or defective	Check switch setting or replace if defective.
●		●	●							●		Air intake system leaking	Check inlet manifold and units mounted on it plus all ducting for leaks.
●		●			●	●						Injector defective	Check current supply to injector by disconnecting it. The engine should stall.
●		●				●			●			Fuel pressure too low or non-existent. Mixture sensor defective	Check pressure, filter, fuel lines and pressure regulator. Check sensor and replace if necessary.
					●							Fuel pressure too high	Fuel return line blocked or kinked. Pressure regulator defective.
●										●	●	Idling speed regulator motor not operating	Check operation of motor. If defective, replace.
●										●	●	Poor current supply to idling speed regulator motor	Check electrical circuit and computer. If defective or of incorrect type, replace.
		●									●	Exhaust gas recirculating valve (E.G.R.)	Check E.G.R. valve, solenoid valve and pneumatic circuits for leaks.
						●			●			Defective ignition Engine temperature too high Incorrect mixture : wrong type of fuel	Check cooling, ignition and fuel systems plus full load switch and mixture regulation.
		●		●								Sensor target on flywheel defective	Check that slots or apertures on flywheel are even and correctly spaced.

Symptoms

1. Engine will not start or starts badly
2. Engine starts then stops
3. Uneven idling
4. Poor acceleration
5. Engine misfiring at all speeds
6. High fuel consumption
7. Engine lacks power
8. Engine speed too high at idling (>0.5%)
9. CO percentage too low at idling
10. Engine pinks
11. Idling speed too high
12. Idling speed too low, engine stalls

Remarks :
For this check list to be valid, the engine must be in good condition and the electrical equipment checked and, if necessary, rectified.

1	2	3	4	5	6	7	8	9	10	11	12	Cause	Remedy - Check
					●		●					Coolant or inlet temperature sensor defective	Check and replace if necessary.
			●			●						Full load switch	Replace if necessary
		●					●					Idling switch defective Oxygen sensor defective Fuel pressure too low	Check adjustment, replace if necessary Replace if necessary Check fuel system
●	●											Pressure sensor defective	Check pipe leading to inlet manifold. Check current supply to sensor (+ 5 volts).
●												Speed sensor defective	Check resistance and gap.
●												Ignition power module defective	Check that module supply and coil resistance are correct.
	●					●						Mixture temperature sensor defective	Check resistance.
●					●							Intake manifold temperature sensor defective	Measure resistance.
		●										Throttle not closing	Free the throttle, adjust throttle linkage and adjust throttle plate.
						●						Throttle not fully opening	Adjust throttle control.
				●								Poor central earth. Connector pins defective	Check connections.
●	●	●	●	●	●	●				●	●	Wiring harness or connections broken	Rectify connections.
●	●	●	●	●	●	●				●	●	Defective electronic computer.	Carry out complete check of system before replacing electronic computer.

Symptoms

1. Engine will not start or starts badly
2. Engine starts then stops
3. Uneven idling
4. Poor acceleration
5. Engine misfiring at all speeds
6. High fuel consumption
7. Engine lacks power
8. Engine speed too high at idling (>0.5%)
9. Engine pinks
10. Idling speed too high
11. Idling speed too low, engine stalls

Remarks :
For this check list to be valid, the engine must be in good condition and the electrical equipment checked and, if necessary, rectified.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	Cause	Remedy - Check
●	●										3 s. timing relay defective	Check current supply.
●											Electric fuel pump not running	Check fuel pressure. Is current arriving at relay and fuel pump? If yes, replace fuel pump.
		●	●			●			●		Idling switch incorrectly adjusted or defective	Check switch setting or replace if defective.
●		●	●						●		Air leaking into intake system	Check inlet manifold, units mounted on it and all ducting for leaks.
●		●			●	●					Injectors defective	Check the pulses to the injectors by trial and error, disconnecting the electrical supply (speed drops).
●	●					●					Fule pressure too low or non-existent Air temperature sensor defective	Check pressure, filter, fuel lines, pressure regulator and pump. Check sensor and replace if necessary.
					●						Fuel pressure too high	Is the pipe connecting the pressure regulator to the inlet manifold connected? Fuel return line blocked or kinked. Pressure regulator defective.
●									●	●	Idling speed control valve Coolant temperature sensor Idling switch defective	Check that valve is operating correctly. If defective, replace. Check sensor and replace if necessary. Adjust or replace switch.
●									●	●	Defective ignition Engine temperature too high Incorrect mixture : wrong type of fuel	Check cooling and fuel systems plus full load switch and mixture regulator.
						●		●			Current supply to idling regulator valve defective	Check electrical circuit and computer. If defective or of incorrect type replace.
						●		●			Air temperature sensor defective	Check sensor and replace if necessary
		●		●							Target on flywheel defective	Check that slots or apertures on flywheel are even and correctly spaced.

Remarks :
For this check list to be valid, the engine must be in good condition and the electrical equipment checked and, if necessary, rectified.

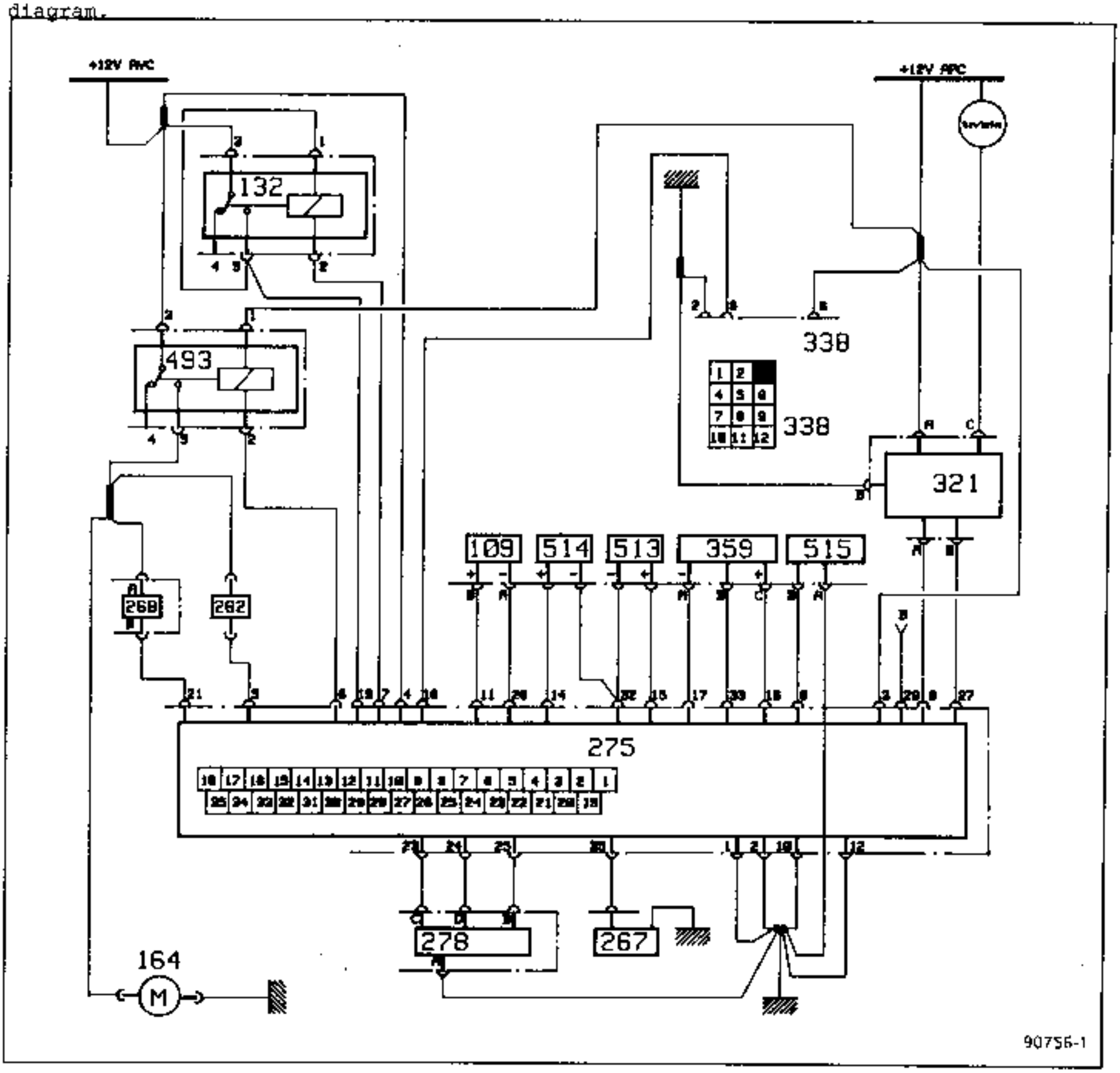
Symptoms

1. Engine will not start or starts badly
2. Engine starts then stops
3. Uneven idling
4. Poor acceleration
5. Engine misfiring at all speeds
6. High fuel consumption
7. Engine lacks power
8. Engine speed too high at idling (>0.5%)
9. Engine pinks
10. Idling speed too high
11. Idling speed too low, engine stalls

1	2	3	4	5	6	7	8	9	10	11	Cause	Remedy - Check
		●	●			●	●				Full load switch defective Idling switch defective Oxygen sensor defective Fuel pressure	Check and if necessary replace. Check and if necessary replace. If necessary replace. Check pressure and system if necessary.
●	●										Pressure sensor defective	Check pipe connecting to inlet manifold. Check sensor current supply (+ 5 volts).
●											Speed sensor defective	Check resistance and gap.
●											Ignition power module defective	Check module supply and coil resistance.
	●					●					Air temperature sensor defective	Check resistance and circuit.
●					●						Coolant temperature sensor on engine defective	Measure resistance and check circuit
		●									Throttle not closing	Free throttle, adjust throttle linkage then adjust throttle plate.
						●					Throttle not fully opening	Adjust throttle control.
				●							Poor central earth, connector pins defective	Check connections.
●	●	●	●	●	●	●			●	●	Wiring harness or connections broken	Rectify defective connections.
●	●	●	●	●	●	●			●	●	Electronic computer defective	Fully check the injection system electrical circuits before replacing electronic computer.

CIRCUIT DIAGRAM
ENGINES C3J B 702

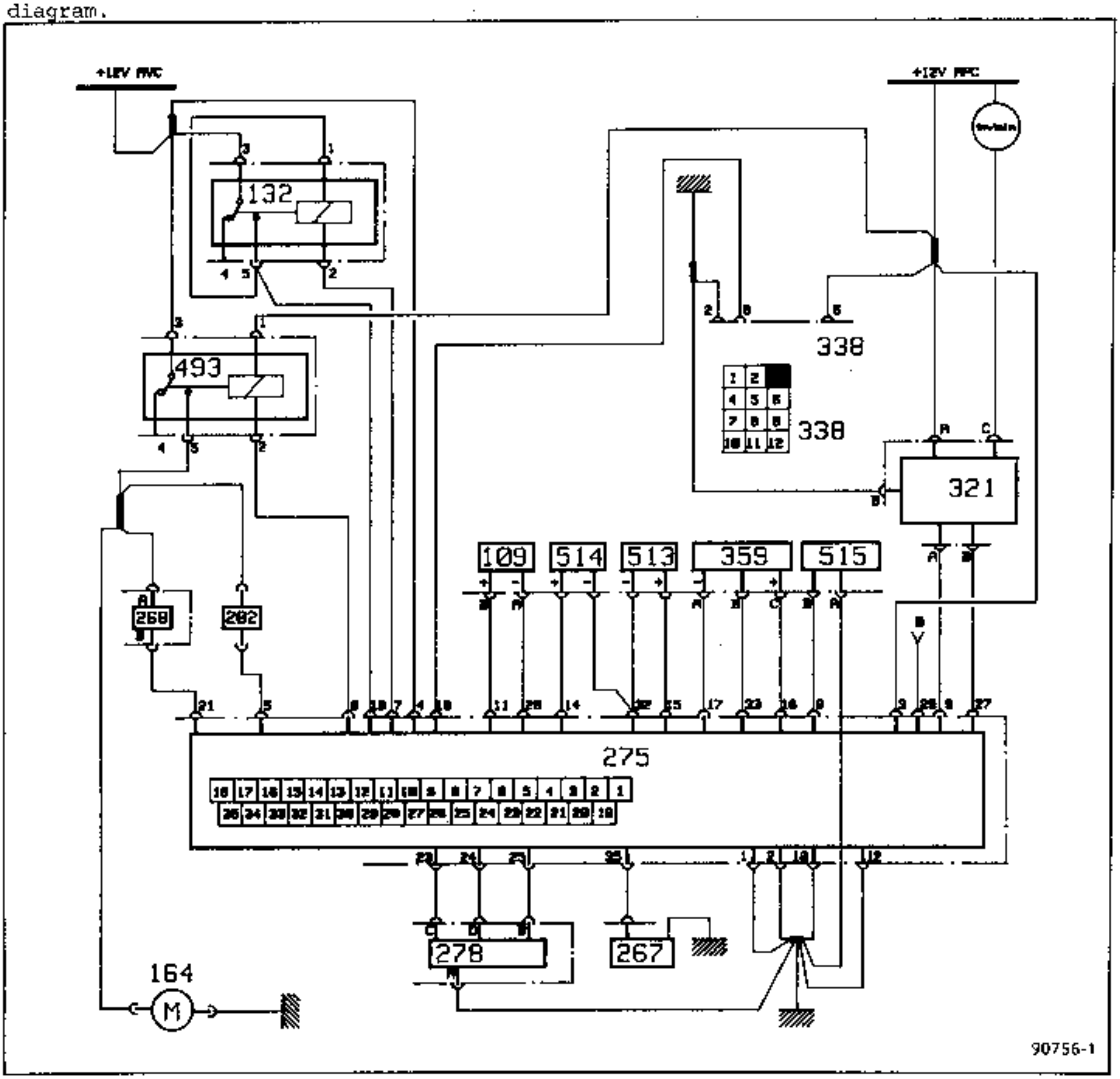
The references are the same as those on the general list of electrical components. Each electrical component has its own reference which is used to identify it on the diagram.



LIST OF ELECTRICAL COMPONENTS

109. Flywheel sensor
132. Injection relay
164. Fuel pump
267. Oxygen sensor
268. Injector
275. Computer
278. Idling speed control motor
282. Exhaust gas recycling and canister bleed control solenoid valve
321. Ignition coil
338. Diagnostic plug
359. Absolute pressure sensor
493. Fuel pump relay
513. Coolant or inlet manifold temperature sensor
514. Air or mixture temperature sensor
515. Full load switch
Connectors
tr/min. - rpm
+APC. + after ignition switch
+AVC. + before ignition switch
B. Starter signal
NOTA: 2 wires connected to pin No.5 on relay 132

CIRCUIT DIAGRAM
ENGINES C3J E 760
The references are the same as those on the general list of electrical components. Each electrical component has its own reference which is used to identify it on the diagram.



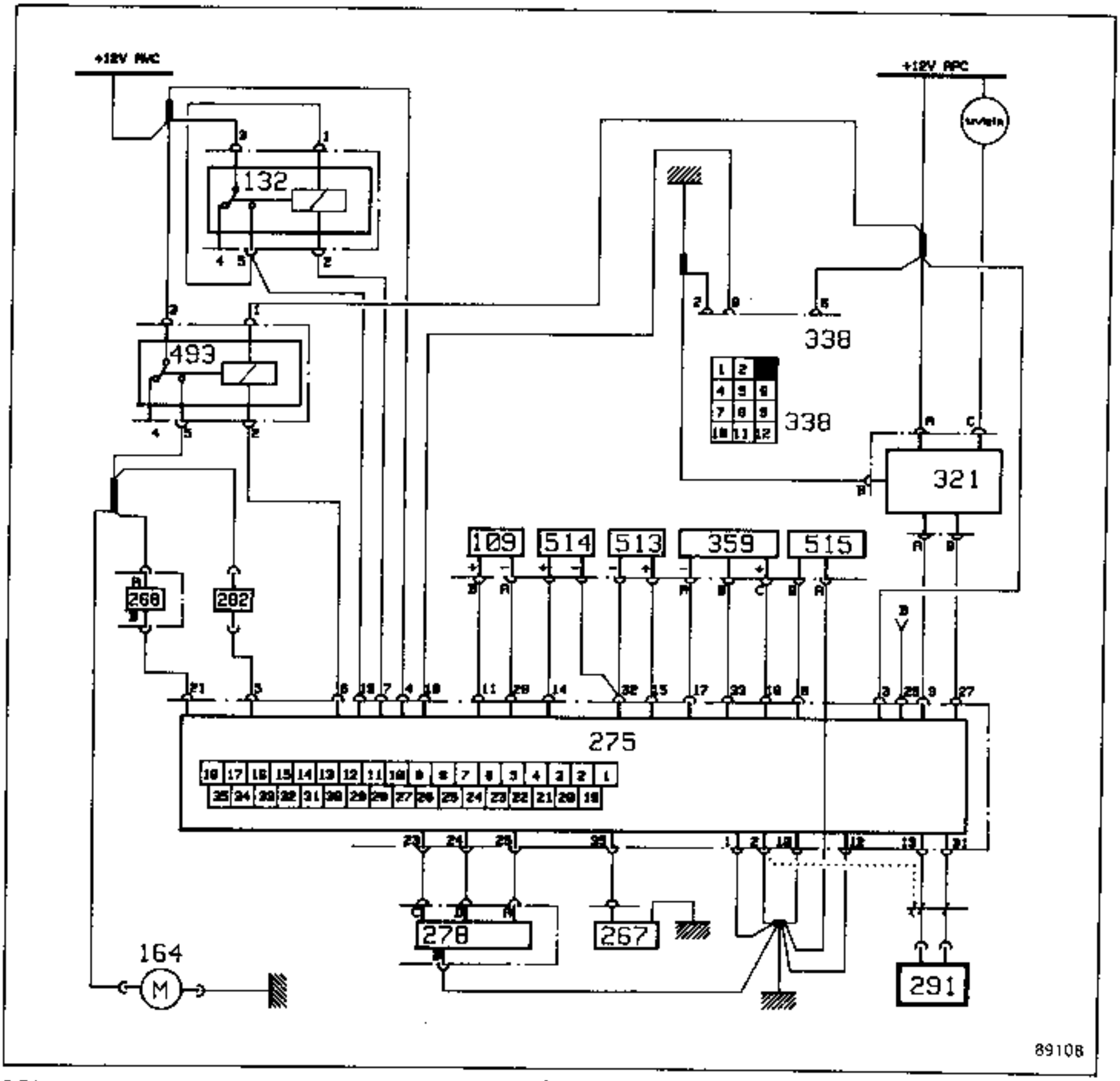
LIST OF ELECTRICAL COMPONENTS

109. Flywheel sensor
132. Injection relay
164. Fuel pump
267. Oxygen sensor
268. Injector
275. Computer
278. Idling speed control motor
282. Exhaust gas recycling and canister bleed control solenoid valve
321. Ignition coil
338. Diagnostic plug
359. Absolute pressure sensor
493. Fuel pump relay
513. Inlet manifold temperature sensor
514. Air or mixture temperature sensor
515. Full load switch
⅄ Connectors
tr/min. - rpm
+ APC. + after ignition switch
+ AVC. + before ignition switch
B. Starter signal
NOTA : 2 wires connected to pin No. 5 on relay 132

CIRCUIT DIAGRAM

ENGINES F3N G 716 and F3N H 717

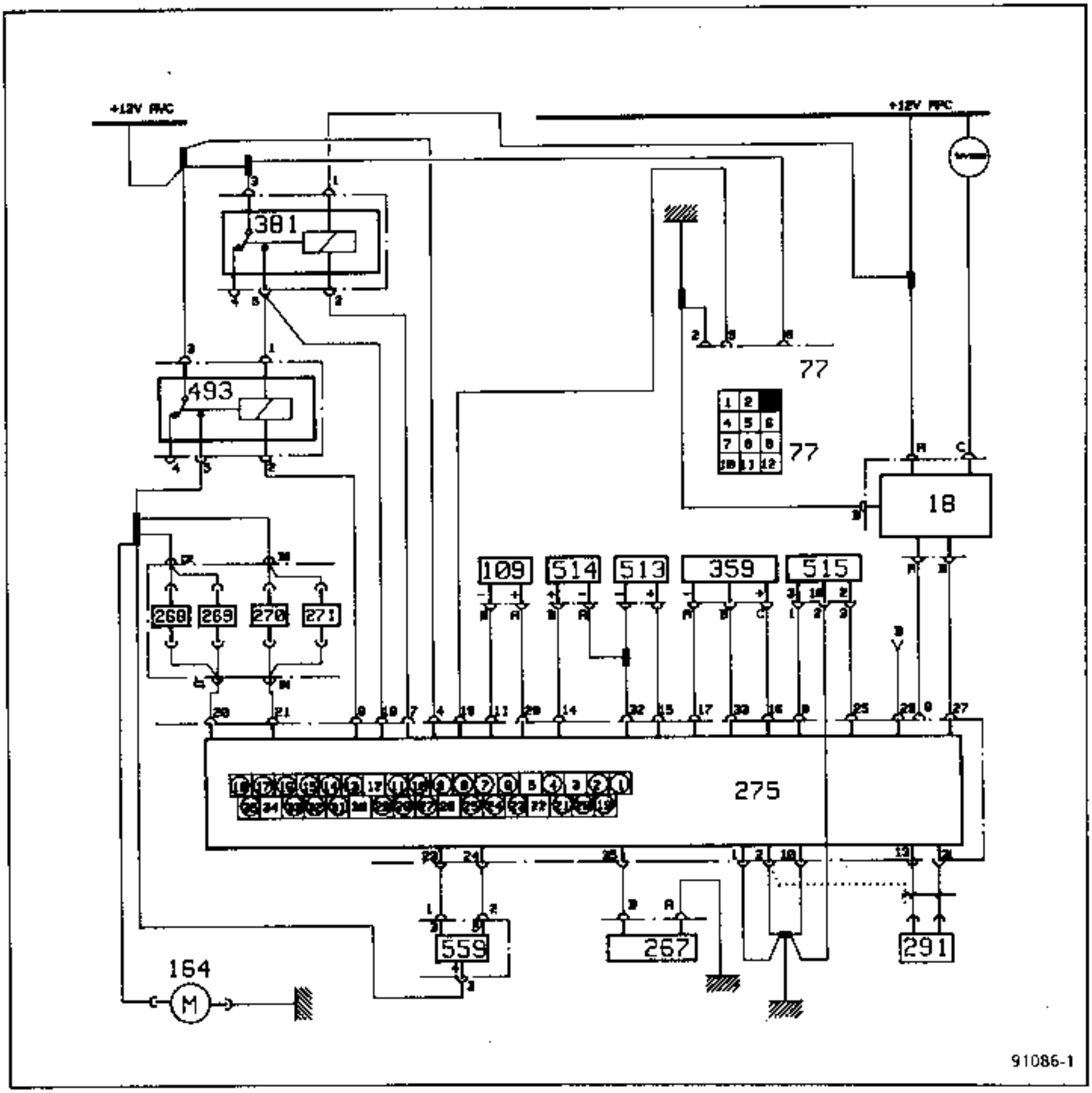
The references are the same as those on the general list of electrical components. Each electrical component has its own reference which is used to identify it on the diagram.



LIST OF ELECTRICAL COMPONENTS

109. Flywheel sensor
132. Injection relay
164. Fuel pump
267. Oxygen sensor
268. Injector
275. Computer
278. Idling speed control motor
282. Exhaust gas recycling control solenoid valve
291. Pinking detector
321. Ignition coil
338. Diagnostic plug
359. Absolute pressure sensor
493. Fuel pump relay
513. Coolant temperature sensor
514. Air temperature sensor
515. Full load switch
tr/min. - rpm
+APC. + after ignition switch
+AVC. + before ignition switch
B. Starter signal
C. Neutral point switch (Engine F3N H 717)

CIRCUIT DIAGRAM
ENGINES F3N J 702



18. Ignition power module (M.P.A.)
77. Diagnostic socket (seen from above)
109. Flywheel sensor
164. Fuel pump (engine)
267. Oxygen sensor
268 - 271. Injectors
275. Injection and ignition computer
291. Pinking sensor
359. Pressure sensor
381. Supply relay
493. Fuel pump relay

513. Coolant temperature sensor
514. Air temperature sensor
515. Full load/no load switch sensor
559. Idling speed control valve
⅄ Connectors
A. Anti-evaporation canister bleed solenoid valve
B. Starter signal
tr/min. - rpm

NOTE : 2 wires are connected to pins No. 1 and 5 on relay 381.

SPECIAL TOOLS

A test unit has been developed for microprocessor systems. It is known as the XR 25 and connects into the diagnostic plug to permit a rapid test to determine the condition of the computer and most of its peripherals. See the latest edition of M.R.INJ. R (E) for the Renix multipoint injection system and M.R.INJ.MON for the Renix single point injection system.

Tester XR 25

PRECAUTIONS :

The computer must be disconnected before the test and no test can be carried out on the computer itself.

When carrying out electrical tests with voltmeters/ohmmeters or interconnections between electrical terminals, take care to identify, correctly, the wires as stated on the electrical wiring diagrams.

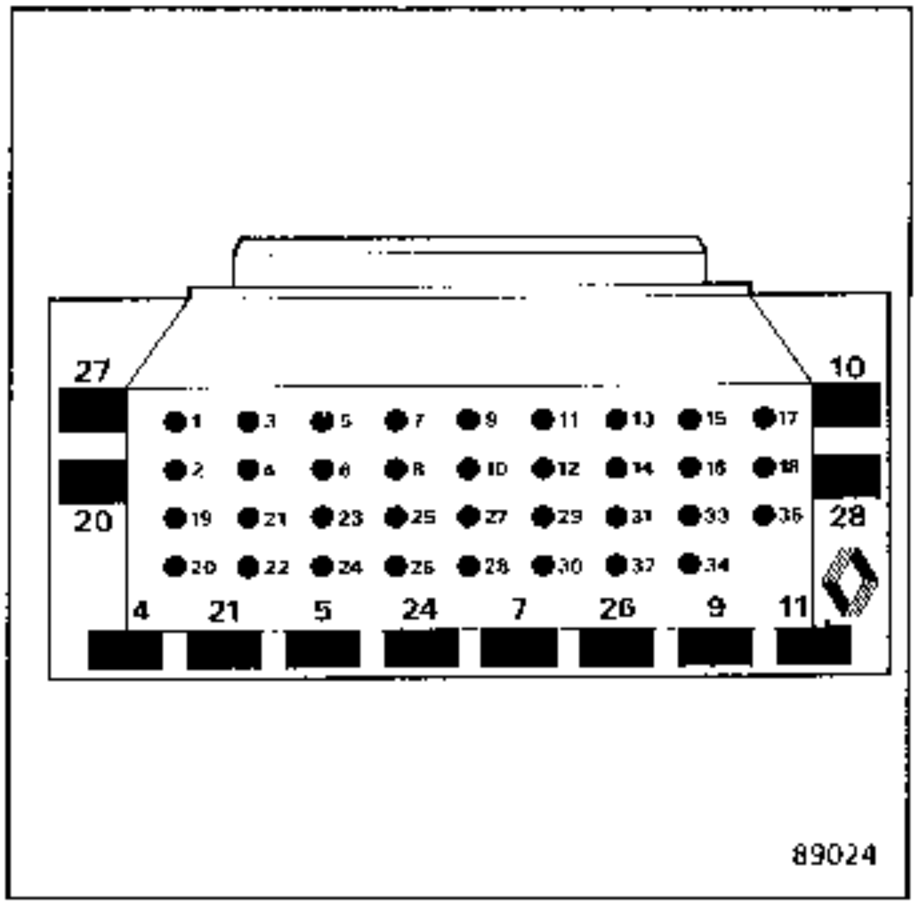
An incorrect connection could damage the injection system components.

Checking the intake system for leaks

If the idling speed is uneven (hunting) check the condition of the intake system ducts and connections.

Check, furthermore, that the throttle on load - off load switch is operating correctly as it can cause similar defects.

Junction block M.S.1048



NOTE : if the information produced by the XR 25 gives rise to a test on the electrical continuity of electrical circuits connected to the main injection system connector, plugging the connector into this junction block makes it easier to gain access to the various contacts with the tester probes.

(M.S. 1048 consists of a 35 channel block secured to a printed circuit on which there are 35 copper plated surfaces numbered 1 to 35).

USING THE XR 25

If necessary consult the wiring diagram in the Workshop Manual covering the type of injection system to be tested. If one or more lines light up on the XR 25 bar graph, consult the corresponding numbers on the fault finding chart (lines 1, 7 and 8 can only light up on the right hand side of the bar graph).

Fault finding information	1	On when engine stopped : Correct. If off : check diagnostic plug wiring/computer supply/earth/defective computer.
Air temperature sensor	4	If 4 (LH and RH) switch on : wiring or sensor short or broken circuit.
Coolant temperature sensor	5	Test conditions : 1) engine cold : warm it up 2) engine warm : before testing switch ignition off then switch it back on again. If 5 □□ O.K. 5 ■■ incorrect Check wiring/coolant temperature sensor REMARK : If the engine is cold (20°) 5 may be switched on. Do not assume, from this, that the wiring or coolant temperature sensor is defective. Repeat the test at a temperature above 20°.
Pressure sensor	7	Check : connector/wiring/pressure sensor. On central display : pressure reading = barometric reading with engine stopped (# 01)
Flywheel sensor circuit	8	If on or flashing when engine is running : check flywheel sensor/wiring/connector
Throttle switch (*)	10	Accelerator released : If off on the right (or on on the left), check harness or switch. Accelerator slightly depressed : 10 (LH and RH) should be off. If not, check wiring or throttle switch. Accelerator fully depressed (test) : 10 (LH) should switch on. If not : check wiring or throttle switch. (*) test with engine stopped or running
Oxygen sensor	13	Carry out test on warm engine. 3 cases possible : 1) If 13 is off : the engine is not warm enough. 2) If 13 LH is switched on : the oxygen sensor is correct. 3) If 13 (LH and RH) are switched on : there is a defect on the wiring/connector or oxygen sensor.

If the information obtained from the XR 25 involves checking electrical continuity from the injection system main connector, plugging the connector into junction block M.S.1048 will make it easier to gain access to the various contact points, with the probes

(M.S.1048 consists of a block, with 35 channels, secured to a printed circuit, on which there are 35 copper plated surfaces numbered 1 to 35).

USING THE XR 25

CHECKING THE IGNITION POWER MODULE (MPA)

This test is only to be carried out on a cold engine.

First method :

Connections :

- disconnect the 2 way connector from the power module and connect the terminal marked G, on the XR 25, to terminal B of the 2 way socket on the power module.

Check that a spark is struck between the high tension secondary lead and the cylinder block (holding the lead approximately 1 cm from the block).

- press key G on the XR 25 and on the keyboard (frequency generator), number 0.

Second method :

The test is carried out at starter speed using a kilo-voltmeter.

ASSOCIATED CHECKS

These checks are carried out if no defect is noted during tests 1 - 2 and 3 but the vehicle still suffers from operating defects.

With the Engine stopped or Engine running

D 03

01 Pressure in mb.
02 Coolant temperature : degrees.
03 Air temperature : degrees.
04 Battery voltage : volts.
06 Engine speed : rpm.
13 Pinking detector (except on types C3J engines).
14 Difference between the idling speed required by the computer and the actual engine idling speed. (Single point injection only).

Examples of readings provided when the following numbers are selected :

01 Ignition on, engine stopped. The pressure indication is atmospheric pressure.
02 Ignition on, engine stopped or running. The temperature reading should be near that of the coolant in the radiator.
03 Ignition on. The temperature reading should be that of the air entering the engine.
04 Computer supply voltage.
14 This reading is the difference between the idling speed required by the computer and the actual engine idling speed.
A difference of less than 100 rpm is more or less acceptable.
If the difference is greater than 100 rpm : check the setting of the motor that operates the throttle.

USING THE XR 25

DISPLAYS WHEN THERE ARE NO DEFECTS

Connect tester XR 25 to the vehicle diagnostic plug and isert the latest edition of the cassette. Switch on the ignition.

Enter, on
the keyboard : D 03

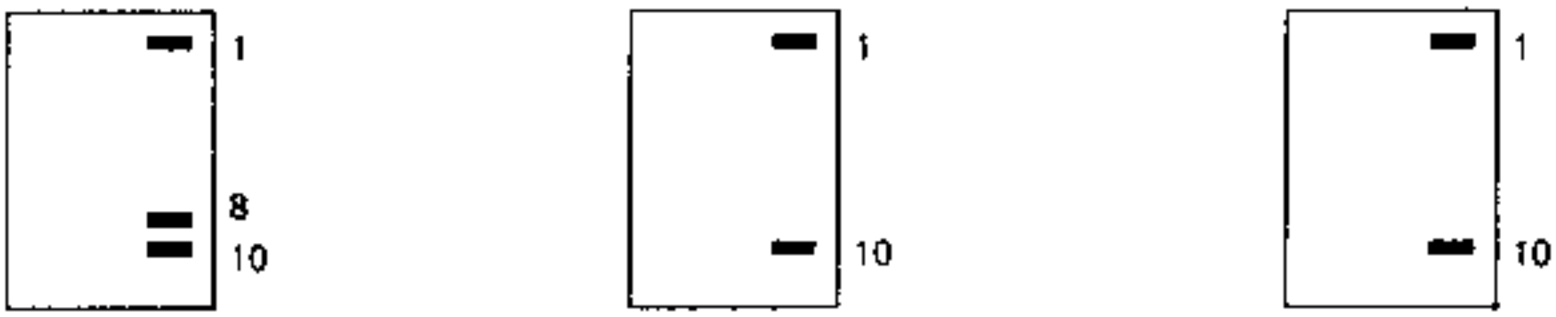
Computer identification number depending on the vehicle type

Injection code number

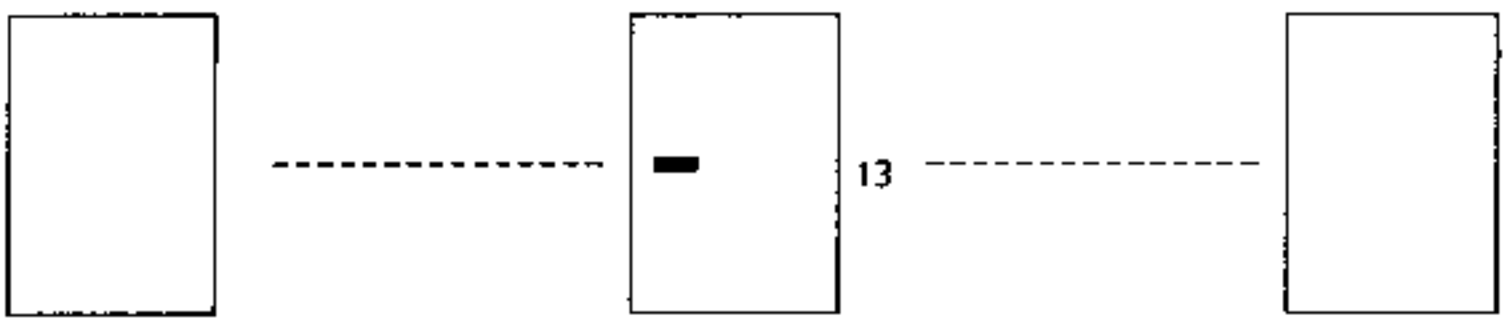
(Centre display on XR 25)

XXX : 150 B,C,F 407 Renix injection (C3J B 702 and C3J E 760)
XXX : 201 B,C 408 01 (F3N H 717)
XXX : 202 B,C 408 05 (F3N G 716)

TEST 1	TEST 2	TEST 3*
(Ignition on)	(Engine running)	(Engine turned by starter if it will not start)



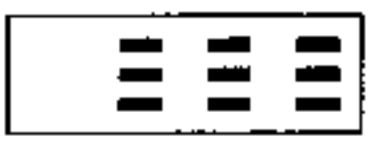
In all 3 tests : 13 should be off when the engine is cold
(13 should switch on after the engine has been running for approximately 3 minutes)



CORRECT CORRECT CORRECT

* Ignition on 1/8/10 are switched on. Line 8 switches off when starter is operated.

Possible readings on central display



1) Ignition on engine stopped.	1) Diagnostic code not displayed, check that the computer is the correct type for the vehicle.	1) Check that the computer is the correct type for the vehicle. Defect can still be interpreted by the XR 25.
2) Ignition on, engine running (no defect). No diagnostic code displayed.	2) See the chart of non-interpreted readings in the "associated test" section.	

USING THE XR 25

Special features of single point injection systems on type C3J and F3N engines :

The idling speed is controlled by a motor.
The mixture is controlled by an oxygen sensor.
There is a pinking detector (engines F3N).
The exhaust gas recirculation system and the anti-evaporation circuit are bled by a single solenoid valve.
The defects are not placed on memory.

If one or more lines of the bar graph on the XR 25 are switched on, consult the corresponding number on the fault finding chart.

	85.A				
●	1	CODE PRESENT	TEST 1 IGNITION ON (ENGINE STOPPED)	TEST 3 CHECK AT STARTER SPEED (IF VEHICLE DOES NOT START)	TEST 2 ENGINE RUNNING
	2	COMPUTER FAULT			
	3	5 VOLT SUPPLY			
●	4	*AIR SENSOR CIRCUIT			
●	5	COOLANT SENSOR CIRCUIT			
	6	CO POTENTIOMETER CIRCUIT			
●	7	PRESSURE SENSOR SIGNAL			
●	8	FLYWHEEL SENSOR CIRCUIT			
	9	INJECTOR SUPPLY			
●	10	*NL-FL SWITCHES			
		R INJECTION CHART CODE:D 03			
	11	FLYWHEEL SENSOR			
	12	*PINKING SENSOR			
●	13	*OXYGEN SENSOR			
●	14	AIR COND. SIGNAL			
		Engine stopped #01 Pressure in mb. #03 Air temp:deg. #02 Cool. temp:degrees #04 Bat.volt:volts			
		Engine running #06 Engine speed : rpm			
	20	MEMORY FUNCTION	CODE 00		

● Tests carried out

PINKING SENSOR*

With the Engine at idling speed, or a higher speed, enter # 13.
Take the reading from the central display :
The reading should vary with the engine speed. If it is always less than 5, check the wiring and the pinking sensor.

* Pinking sensor on the F3N engine.

TEST SEQUENCE
TEST 1

Ignition on engine stopped
Take readings 1 to 7
If 2 to 7 are off : no defect

TEST 2

Engine running
Take readings 1 to 14

ASSOCIATED TESTS
(ENGINE RUNNING)

- Throttle switches : No load/Full load.
- Pinking sensor.
- Oxygen sensor.

THROTTLE SWITCH

* With the engine running : press the accelerator whilst watching line 10

* This can be done with engine stopped

OXYGEN SENSOR
(WARM ENGINE)

Line 10 on the Lh side should not be switched on (do not carry out the test with the engine decelerating because 13 may switch off).

Possible cases :

13 Defect
13 Engine not warm enough
13 Oxygen sensor. Wait for 30 seconds

NOTE : if the sensor has been disconnecte before repeating the test, switch off the vehicle ignition.

. USING THE XR 25

Special features of single point injection systems on type F3N J 702 engines :

The idling is controlled by a Bosch valve.
The mixture is controlled by an oxygen sensor.
There is a pinking detector.

The anti-evaporation circuit is controlled (on certain versions).
The defects are not placed on memory.

If one or more lines of the bar graph on the XR 25 are switched on, consult the corresponding number on the fault finding chart.

TEST 1 IGNITION ON (ENGINE STOPPED)
TEST 3 CHECK AT STARTER SPEED (IF VEHICLE DOES NOT START)
TEST 2 ENGINE RUNNING

	85.A		
●	1 ▭	CODE PRESENT	
	2 ▭	COMPUTER FAULT	
	3 ▭	5 VOLT SUPPLY	
●	4 ▭	*AIR SENSOR CIRCUIT	
●	5 ▭	COOLANT SENSOR CIRCUIT	
	6 ▭	CO POTENTIOMETER CIRCUIT	
●	7 ▭	PRESSURE SENSOR SIGNAL	
●	8 ▭	FLYWHEEL SENSOR CIRCUIT	
	9 ▭	INJECTOR SUPPLY	
●	10 ▭	*NL-FL SWITCHES	
		R INJECTION CHART CODE:D 03	
	11 ▭	FLYWHEEL SENSOR	
	12 ▭	*PINKING SENSOR	
●	13 ▭	*OXYGEN SENSOR	
●	14 ▭	AIR COND. SIGNAL	
		Engine stopped #01 Pressure in mb. #03 Air temp:deg. #02 Cool. temp:degrees #04 Bat.volt:volts	
		Engine running #06 Engine speed : rpm	
	20 ▭	MEMORY FUNCTION	CODE 00

● Tests carried out

PINKING SENSOR*
With the Engine at idling speed, or a higher speed, enter #13.
Take the reading from the central display :
The reading should vary with the engine speed. If it is always less than 5, check the wiring and the pinking sensor.

* Pinking sensor on the F3N engine.

TEST SEQUENCE
TEST 1

Ignition on engine stopped
Take readings 1 to 7
If 2 to 7 are off : no defect

TEST 2

Engine running
Take readings 1 to 14

ASSOCIATED TESTS
(ENGINE RUNNING)

- Throttle switches : No load/Full load.
- Pinking sensor.
- Oxygen sensor.

THROTTLE SWITCH

* With the engine running : press the accelerator whilst watching line 10

* This can be done with engine stopped

SENSOR 02
(WARM ENGINE)

Line 10 on any bar graph should not be switched on (do not carry out the test with the engine decelerating because 13 may switch off).

Possible cases :
13 ■ ■ Defect
13 □ □ Engine not warm enough
13 ■ □ Oxygen sensor. Wait for 30 seconds

NOTE : if the sensor has been disconnected before repeating the test, switch off the vehicle ignition.

USING THE XR 25

DISPLAYS WHEN THERE ARE NO DEFECTS

Connect tester XR 25 to the vehicle diagnostic plug and insert the latest edition of the cassette. Switch on the ignition.
Enter, on the keyboard : D 03

Computer identification number depending on the vehicle type (see Manual for vehicle concerned and its technical notes)

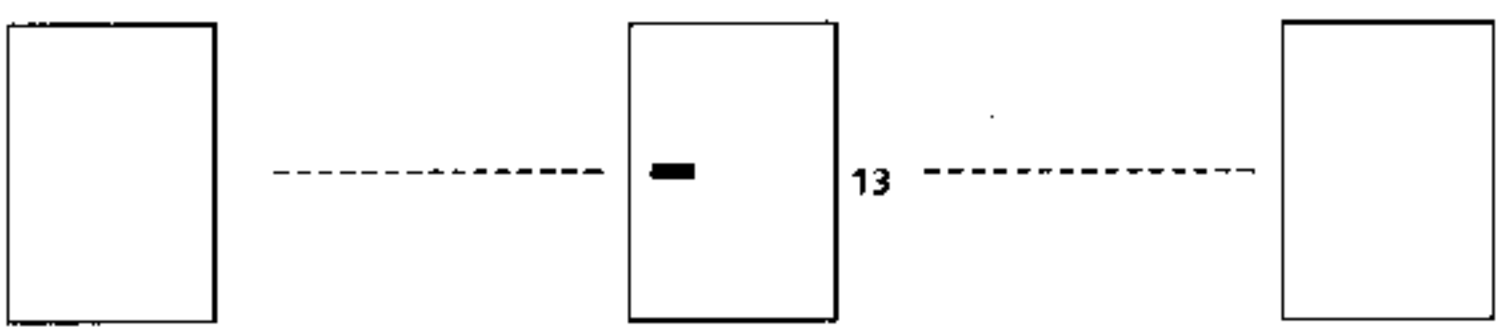
Eg: **XXX.3** (Centre display on XR 25)

Injection code number

XXX : 210 F3N J 702 without anti-evaporation system
XXX : 211 F3N J 702 with anti-evaporation system

TEST 1 (Ignition on)	TEST 2 (Engine running)	TEST 3* (Engine turned by starter if it will not start)

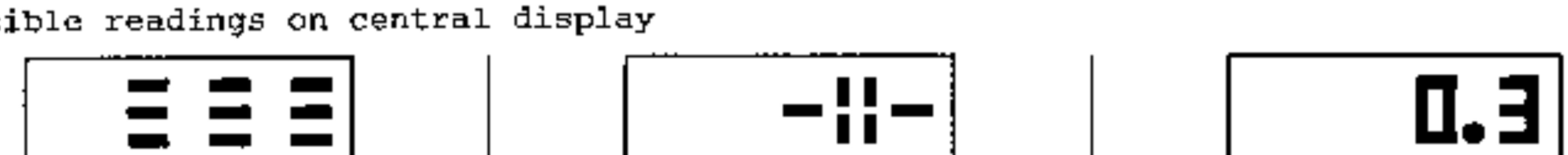
In all 3 tests : 13 should be off when the engine is cold.
(13 should switch on after the engine has been running for approximately 3 minutes).



CORRECT	CORRECT	CORRECT

*Ignition on 1/8/10 are switched on. Line 8 switches off when the starter is operated.

Possible readings on central display



1) Ignition on engine stopped. 2) Ignition on, engine runn- (no defect). No diagnostic code displayed.	1) Diagnostic code not displayed, check that the computer is the correct type for the vehicle. 2) See the chart of non-interpreted readings in the "associated test" section.	1) Check that the computer is the correct type for the vehicle. Defect can still be interpreted by the XR 25.

CHECKING THAT THE SYSTEM SPECIFICATIONS ARE CORRECT

ENGINES C3J B 702

Using tester XR 25 and cassette No. 4 or above

Function to be tested	Conditions	Selection on tester	Bar graph line no.	Bar graph display	Digital display Remarks
Injection diagnostic position	Engine stopped Ignition on Coolant temperature higher than 80°C	D03	L1 L8 L10	L1 presence code L8 TDC code L10 no load switch	xxx3 xxx = 150 3 = injection diagnosis
Check no load/ full load switch	Engine stopped: Ignition on - no load - pedal slightly depressed - pedal ful.dep		L10 L10 L10		
Test on absolute pressure sensor	Engine stopped Ignition on	# 01			xxxx local barometric pressure
Coolant temperature sensor test	Engine running at idling after fan has cut in once. If tester has returned to 0	# 02 D 03 # 02			xxx 80°C - 110°C
Air temperature sensor test	Engine cold - stopped - ignition on	# 03			xxx Ambient temperature ± 2°C
If air and coolant temperature are the same	Engine stopped Ignition on		L5		
Idling speed test	Engine running at idling, after a few seconds *If tester returns to 0	# 06 D 03 # 06	L10		Note speed xxx 800 - 900 rpm

CHECKING THAT THE SYSTEM SPECIFICATIONS ARE CORRECT

ENGINES C3J B 702

Function to be tested	Conditions	Selection on tester	Bar graph line no	Bar graph display	Digital display Remarks
Oxygen sensor test	Engine at idling		L13	Possible test  Must be switched off on RH side	
Coolant temperature test if same as mixture temperature after engine started	Stop engine leave for a few seconds and re-start		L5		

E.G.R. system test	Conditions	Equipment	REMARKS	
	Engine warm, hand brake on, engage clutch in 1st and accelerate slightly	0-1000 mbar vacuum gauge connected to solenoid valve outlet	At idling →	No vacuum
			On load →	Vacuum equal to manifold vacuum

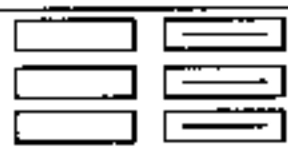
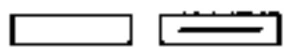
The check to ensure that the system specifications are correct is carried out with tester XR 25 equipped with cassette no. 4 or above, with the corresponding magnetic card placed in front of the bar graph.

Connect the tester to the vehicle diagnostic plug with the engine switched off.

CHECKING THAT THE SYSTEM SPECIFICATIONS ARE CORRECT

ENGINES C3J E 760

Using tester XR 25 and cassette No. 6 or above

Function to be tested	Conditions	Selection on tester	Bar graph line no	Bar graph display	Digital display Remarks
Injection diagnostic position	Engine stopped Ignition on Intake sensor temperature higher than 60°C	D03	L1 L8 L10	 L1 :presence code L8 :TDC code L10 :no load switch	xxx3 xxx = 150 3 = injection diagnosis
No load/full load switch test	Engine stopped Ignition on : - no load - pedal slightly depressed - pedal ful.dep		L10 L10 L10		
Absolute pressure sensor test	Engine stopped Ignition on	# 01			xxxx local barometric pressure
Inlet manifold sensor test	Engine at idling after fan has cut in once If tester has returned to 0	# 02 D 03 # 02			xxx 60°C – 110°C
Air temperature sensor test	Engine cold - stopped - ignition on	# 03			xxx Ambient temperature ± 2°C
If air and inlet manifold temperatures are the same	Engine stopped Ignition on		L5		
Idling speed test	Engine running at idling, after a few seconds *If tester has returned to 0	# 06 D 03 # 06	L10		Check speed xxx 800 – 900 tr/min.

CHECKING THAT THE SYSTEM SPECIFICATIONS ARE CORRECT

ENGINES C3J E 760

Function to be tested	Conditions	Selection on tester	Bar graph line no	Bar graph display	Digital display Remarks
Testing the oxygen sensor	Engine idling		13	Test possible Must be switched off on the RH side	
Test on inlet manifold temperature sensor if it is the same as the mixture temperature before the engine has started	Stop the engine after a few seconds and restart		5		

Function to be tested	Conditions	Equipment	REMARKS
Test on E.G.R. and canister bleed systems (in certain markets)	Engine warm, hand brake applied, engage clutch in 1st, accelerating slightly	0-1000 mbar vacuum gauge connected to solenoid valve outlet	At idling → No vacuum On load → Vacuum same as manifold vacuum

The check to ensure that the system's specifications are correct is carried out with tester XR 25 equipped with cassette No. 6 or above, with the corresponding magnetic card in front of the bar graph.

Connect the tester to the vehicle diagnostic plug with the engine switched off.

CHECKING THAT THE SYSTEM SPECIFICATIONS ARE CORRECT

ENGINES F3N G 716 and F3N H 717

Using tester XR 25 equipped with cassette No. 5 or above.

Function to be tested	Conditions	Selection on tester	Bar graph line no	Bar graph display	Digital display Remarks
Injection diagnostic position	Engine stopped Ignition on Coolant temperature higher than 80°C	D03	L1 L8 L10	L1 :presence code L8 :TDC code L10:no load switch	xxx3 **F3N G 716** xxx = 202 **F3N H 717** xxx = 201 3 : injection diagnosis
Check on no load/ full load switch	Engine stopped Ignition on : - no load - pedal slightly depressed - pedal ful.dep		L10 L10 L10		
Test on absolute pressure sensor	Engine stopped Ignition on	# 01			xxxx local barometric pressure
Coolant temperature sensor test	Engine running at idling after fan has cut in once. If tester has returned to 0	# 02 D03 # 02			xxx 80°C - 110°C
Air temperature sensor test	Engine cold - stopped, - ignition on	# 03			xxx Ambient temperature ± 2°C
If air and coolant temperature are the same	Engine stopped Ignition on		L5		
Idling speed test	Engine running at idling, after a few seconds *Tester has returned to 0	# 06 D03 # 06	L10		Note speed xxx **F3N G 716** xxx = 700 - 800 **F3N H 717** xxx = 650 - 750

CHECKING THAT THE SYSTEM SPECIFICATIONS ARE CORRECT

ENGINES F3N G 716 and F3N H 717

Function to be tested	Conditions	Selection on tester	Bar graph line no	Bar graph display	Digital display Remarks
Test on pinking sensor Noise measurement	Engine warm and running at idling speed	# 13	L 12		Note reading x x should be higher than 3
Test on pinking sensor Noise measurement	Engine warm and running off load : 3000 rpm	# 13	L 12		Note the min and max readings over approx 10 seconds xx xx should be more than 10
Oxygen sensor test	Engine warm and running at idling speed		L 13	Must be switched off on RH side	Sensor primed
Test on coolant temperature if it is the same as the air temperature before the engine is started	Stop the engine for a few seconds and restart		L 5		
Check on E.G.R. system	Conditions	Equipment		REMARKS	
	Warm engine, hand brake applied, engage clutch in 1st while accelerating slightly	0-1000 mbar vacuum gauge connected to solenoid valve outlet		At idling → No vacuum On load → Vacuum the same as the manifold vacuum	

The check to ensure that the system specifications are correct is carried out with tester XR 25 equipped with cassette No. 5 or above, with the corresponding magnetic card place in front of the bar graph.

Connect the tester to the vehicle diagnostic plug with the engine switched off.

CHECKING THAT THE SYSTEM SPECIFICATIONS ARE CORRECT

Using tester XR 25 and cassette No. 5 or above (F3N J 702 without anti-evaporation system).

Using XR 25 and cassette No. 6 or above (F3N J 702 with anti-evaporation system).

Function to be tested	Conditions	Selection on tester	Bar graph line no	Bar graph display	Digital display Remarks
Injection diagnostic position	Engine stopped Ignition on	D03	L1 L8 L10	L1 :presence code L8 :TDC code L10:no load switch	xxx3 Engine F3N J 702 without anti-evaporation system : xxx = 210 Engine F3N J 702 with anti-evaporation system : xxx = 211 3 = injection diagnosis
Check on no load /full load switch	Engine stopped Ignition on : - no load - pedal slightly depressed - pedal ful.dep		L10 L10 L10		
Test on absolute pressure sensor	Engine stopped Ignition on	# 01			xxxx local barometric pressure
Coolant temperature sensor test	Engine running at idling speed after fan has cut in once. If tester has returned to 0	# 02 D03 # 02			xxx 80°C - 110°C
Air temperature sensor test	Engine cold - stopped - ignition on	# 03			xxx Ambient temperature $\pm$ 2°C
Idling speed and idling regulation test	Engine warm, running at idling. No current consumers operating : (fan, headlights, wheels at full lock).	# 06 # 12			Note the speed xxx 750 to 850 rpm Note the RCO xxx 2,3 - 3,1

CHECKING THAT THE SYSTEM SPECIFICATIONS ARE CORRECT

ENGINE F3N J 702 both with and without anti-evaporation system

Function to be tested	Conditions	Selection on tester	Bar graph line no.	Bar graph display	Digital display Remarks
Test on no load switch, engine running	Engine stopped: - no load - accelerator slightly depressed - gently return to no load position		L10 L10 L10		
Test on pinking sensor Noise measurement	Engine warm running at 3000 rpm*, off load	# 13	L12		Note the min. and max readings over approx 10 seconds x x x The reading should not be 0 and should be var.
Oxygen sensor test	Engine warm and running at idling speed		L13	Must be switched off on the RH side	Sensor primed

The check to ensure that the system specifications are correct is carried out with tester XR 25 equipped with cassette No. 5 or above and with the corresponding magnetic card placed in front of the bar graph.

Connect the tester to the vehicle diagnostic plug with the engine switched off.

(*) : it is possible for a sensor defect to be detected when the engine is accelerated, off load. Take no notice of this.

CHECKING AND ADJUSTING THE NO LOAD-FULL LOAD SWITCH

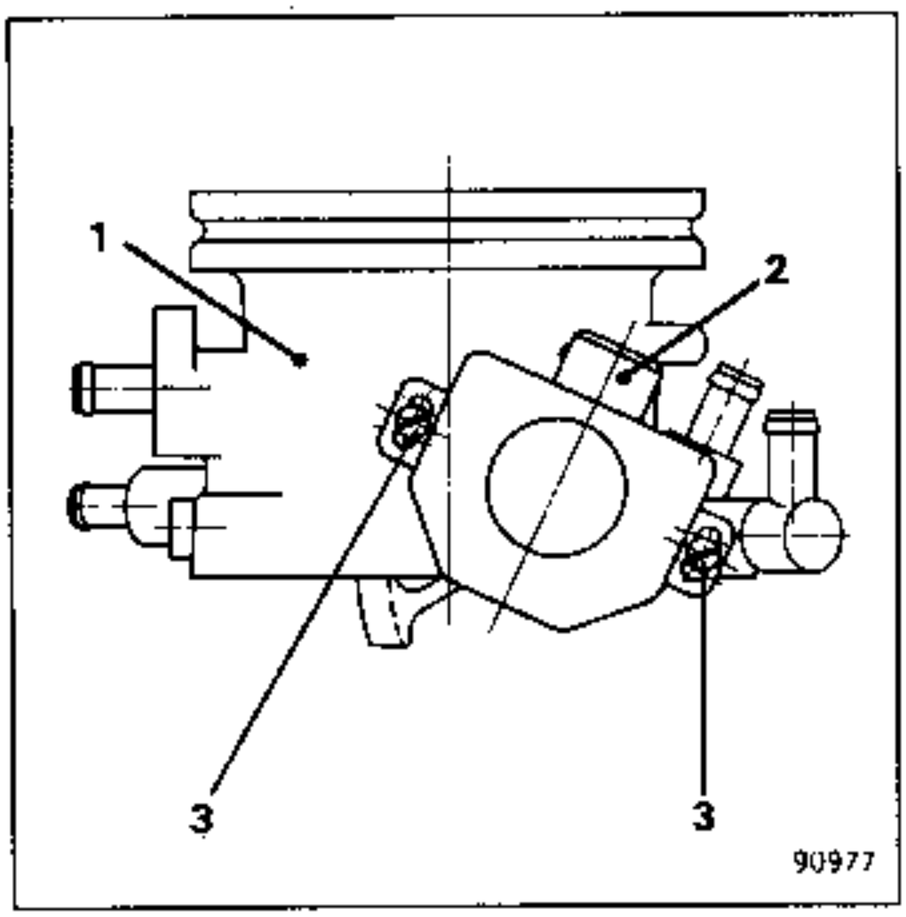
Using an ohmmeter and a set of feeler gauges or a throttle angle measuring tool (if the unit is removed) check that the switch is correctly positioned and operating correctly :

A Idling : no load (throttle open by less than 1°).

B Partial load : throttle open by more than 1° (0.25 mm feeler gauge on the throttle stop).

C Full load (throttle open by more than 70°).

Throttle open	Resistance across terminals in ohms (Ω)	
	2 & 18	18 & 3
A	0	Infinite
B	Infinite	Infinite
C	Infinite	0



1. Throttle unit.
2. Terminals of no load - full load switch.
3. Adjusting screw.

ADJUSTING THE AIR FLOW

Connect tester XR 25, fitted with the latest edition of the cassette (engine at idling speed : coolant temperature higher than 80°C).

Enter D03 then # 12 on the tester and note the reading on the central display.

Check the idling speed by entering #06 : 750 to 850 rpm.

Remove the tamperproofing cap.

Find the minimum reading by unscrewing screw (B) until the idling speed starts to increase.

Then screw in screw (B) until this figure increases by 0.2 to 0.3 ms.

Example : minimum figure :2.3 ms,
adjust to 2.55 ± 0.05 ms.

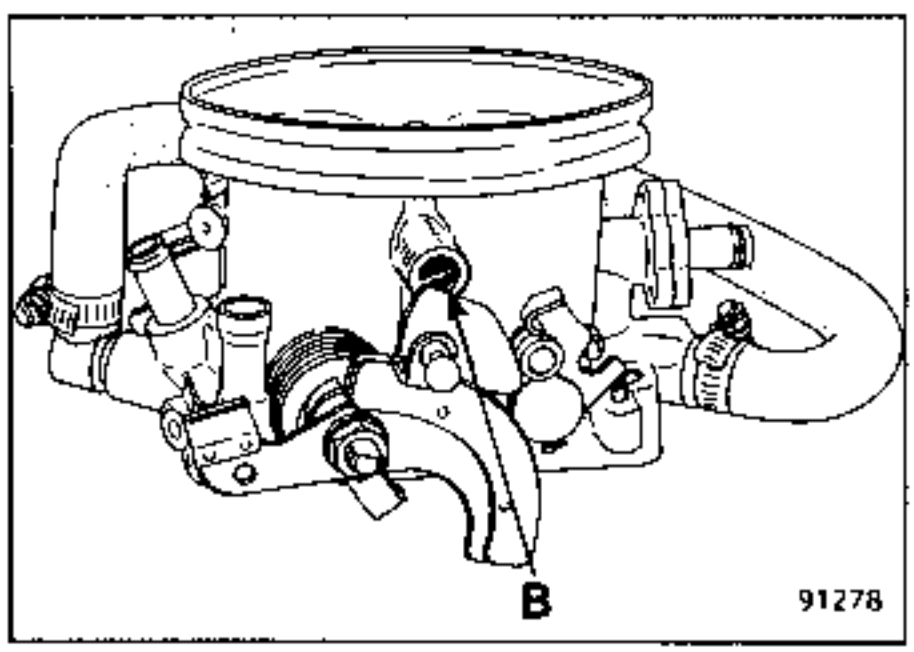
NOTE : on a new vehicle, screw (B) is screwed fully in.

After adjustment, plug the access to screw (B) by fitting a tamperproofing cap part no. 77 01 200 832.

CHECKING THE AIR FLOW

Pinch flat the air pipe that supplies the idling speed regulator valve between the filtered air ducting and the throttle unit on one hand and the regulator valve on the other hand, using tool Mot.453-01.

Check the idling speed when the regulating system is not operating and adjust it, at screw (B) so as to bring it to between 550 and 600 rpm.



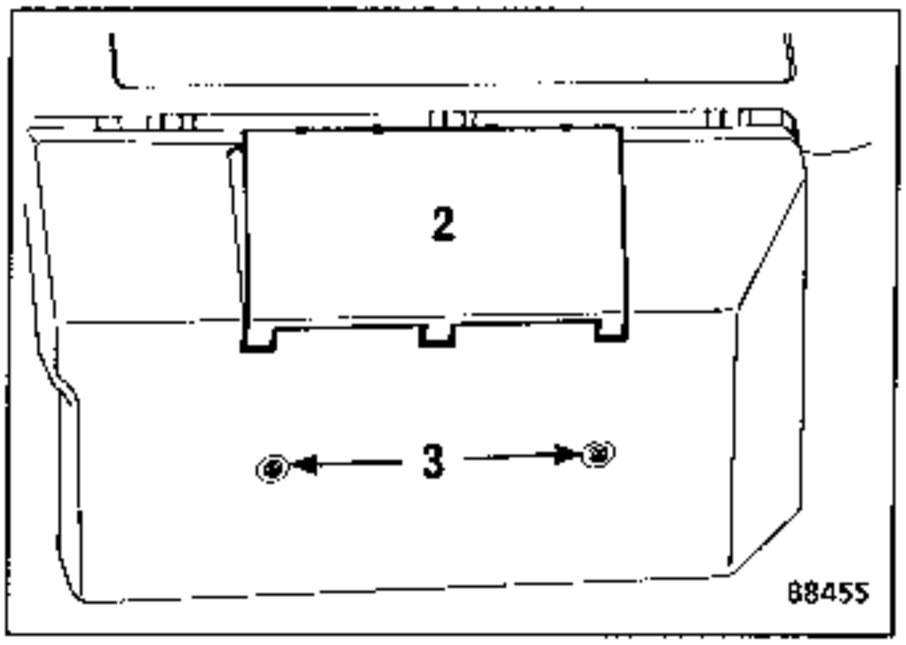
REMOVING THE COMPUTER

The computer is in the passenger compartment, on the right hand side of the vehicle, under the glove box.

Disconnect the battery.

Remove :

- the fuse box (2), (2 torx screws (3)).



Pull back the trim.

Release the strap that secures the computer and remove it from its mounting plate.

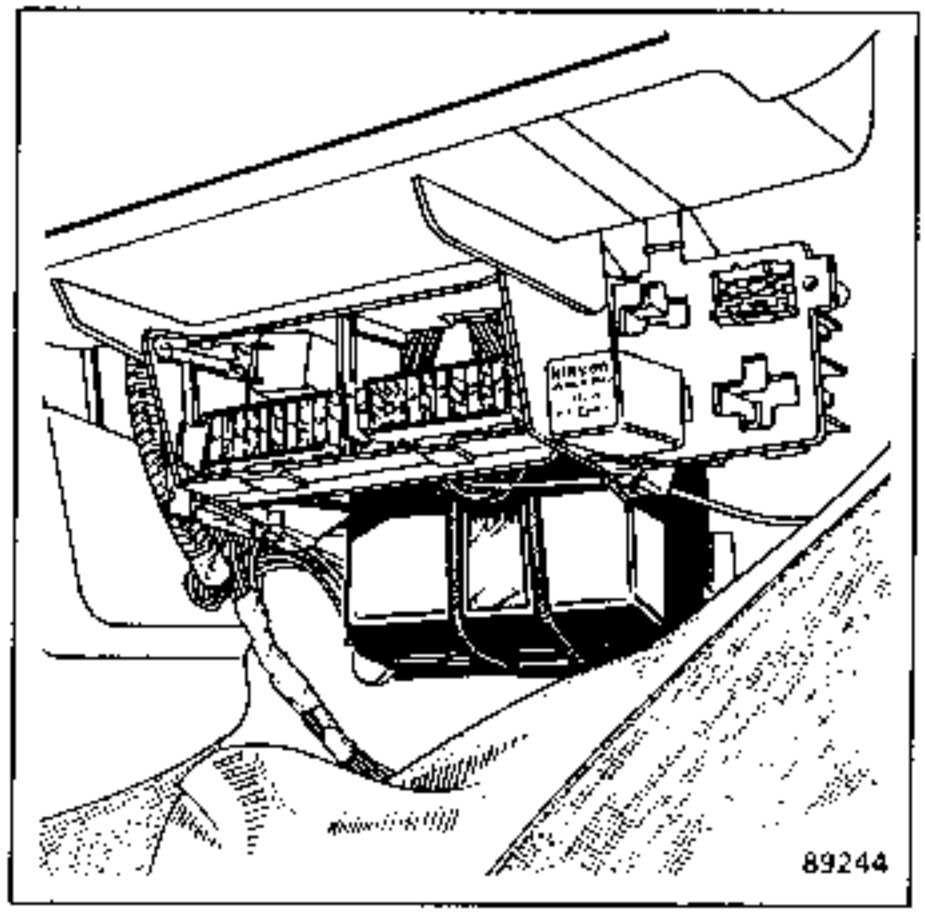
Unclip the 2 connectors that connect the computer to the vehicle wiring.

REFITTING

Carry out the removing operations in reverse.

Ensure that the computer is correctly positioned on its securing plate.

Ensure that the connection between the computer and the 2 connectors leading to the vehicle wiring is absolutely perfect.



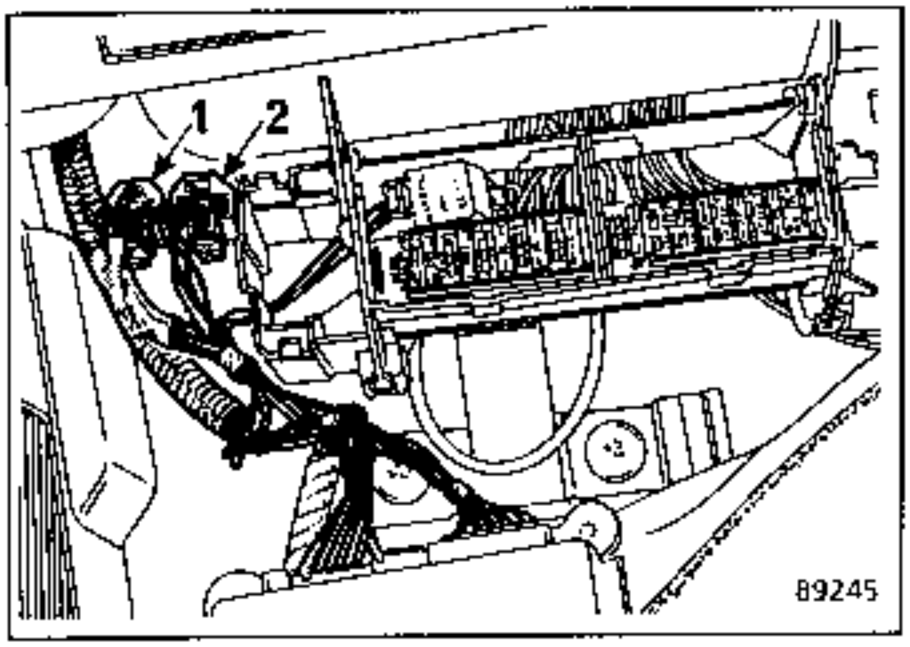
REMOVING THE RELAYS

These relays are in the passenger compartment under the glove box on the computer securing plate.

Disconnect the battery.

(See removing the computer).

Unscrew the screw that secures each relay to the plate.



1. Supply or locking relay
2. Fuel pump relay

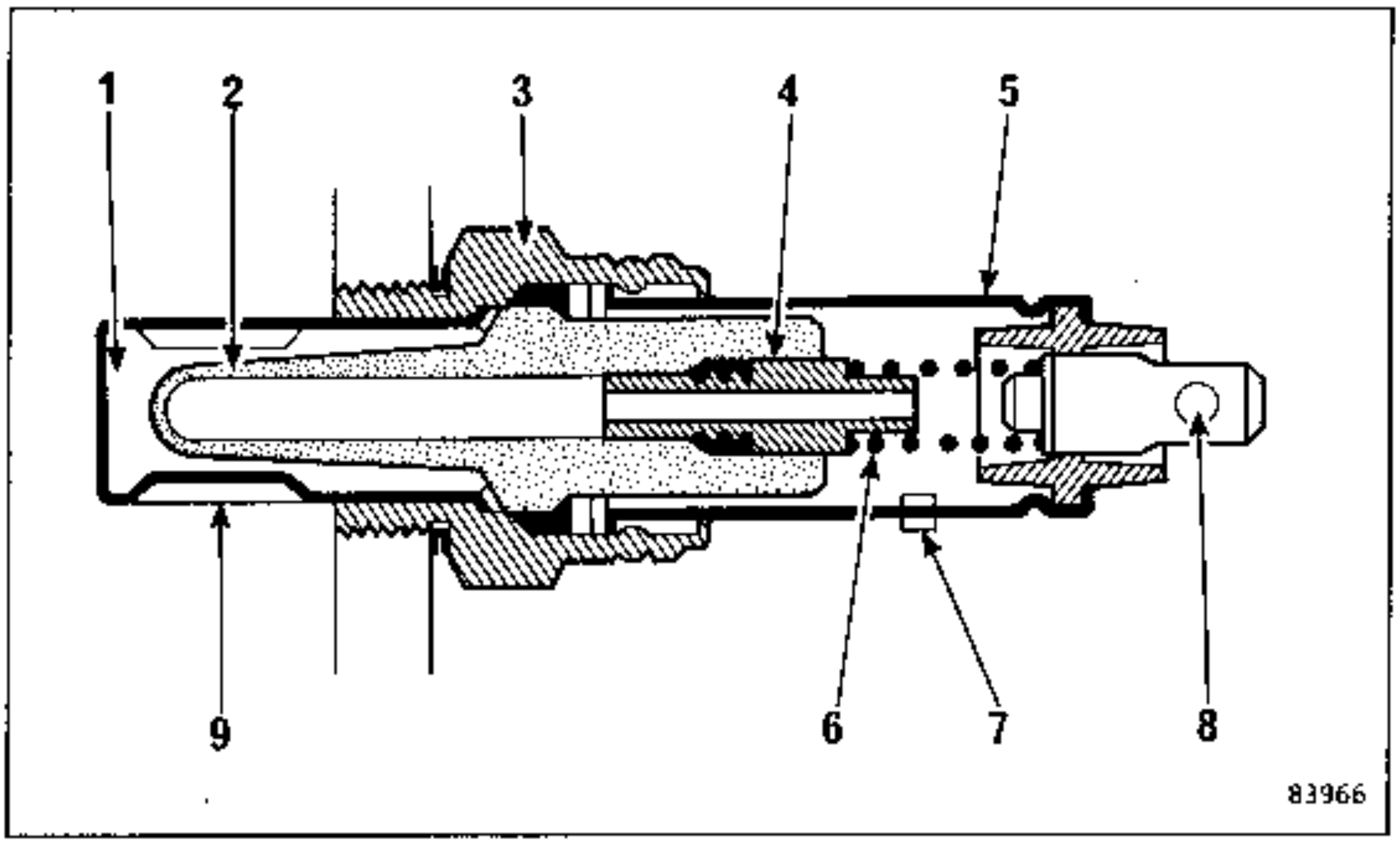
MIXTURE REGULATION

OXYGEN SENSOR OPERATING PRINCIPLE

The oxygen sensor determines the amount of oxygen in the exhaust gases. This reading varies according to the strength of the mixture. The sensor operates as follows. A variation in the composition of the air/fuel mixture, when compared with the stoechiometric ratio (Lambda = 1) results, automatically, in a variation of the output voltage.

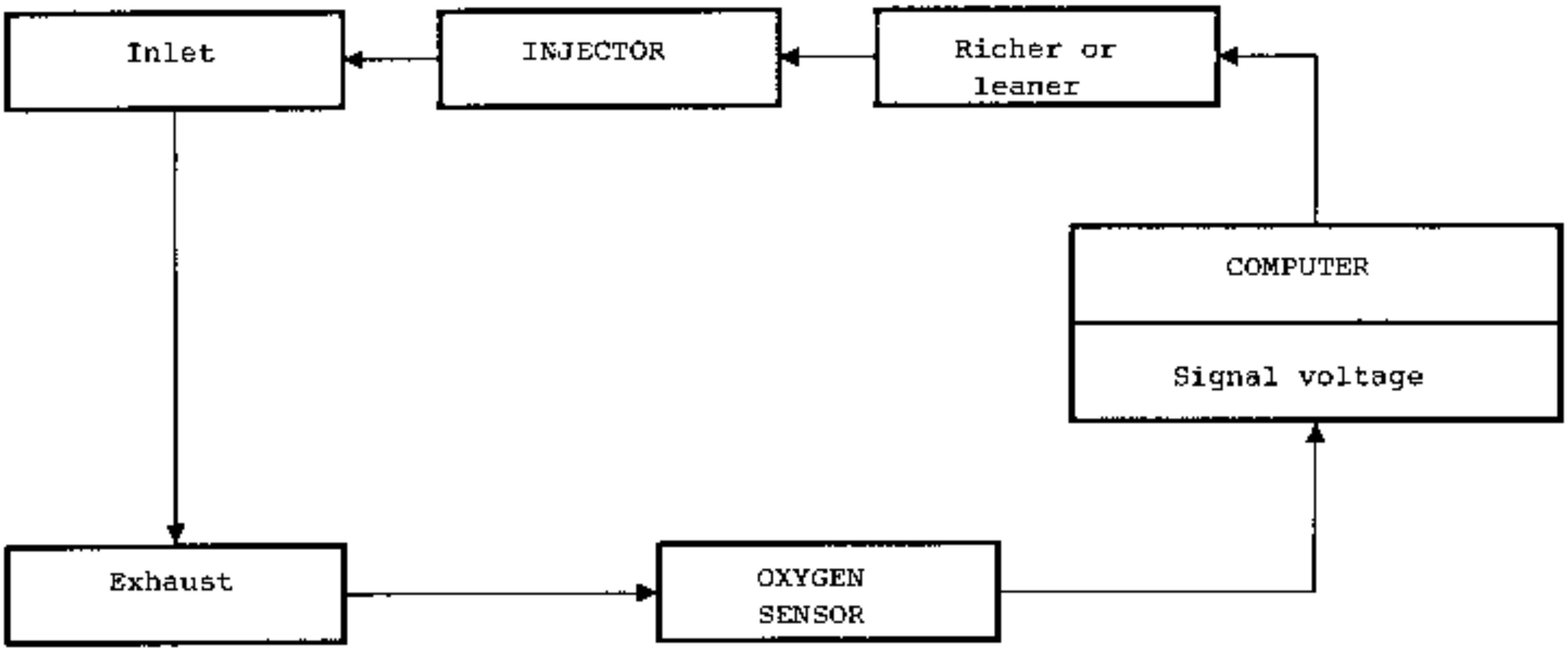
The computer corrects the air/fuel mixture to maintain its proportions as near as possible to the stoechiometric ratio (Lmbda = 1) and this permits, when used in conjunction with catalysers, a very close control to be maintained on the exhaust gas emission.

The operating principle of the sensor is based on the property of the type of ceramic used to carry oxygen ions at temperatures above approximately 250°C. If the oxygen content is not the same on either side of the sensor an electrical voltage is set up across the two end surfaces because of the special properties of the material used. This voltage makes it possible to measure the oxygen content of the gases on either side of the sensor.



1. Protective cover
2. Ceramic sensor
3. Ferrule
4. Contact plug
5. Protective cover
6. Contact spring
7. Vent orifice
8. Electrical connection
9. Exhaust gases

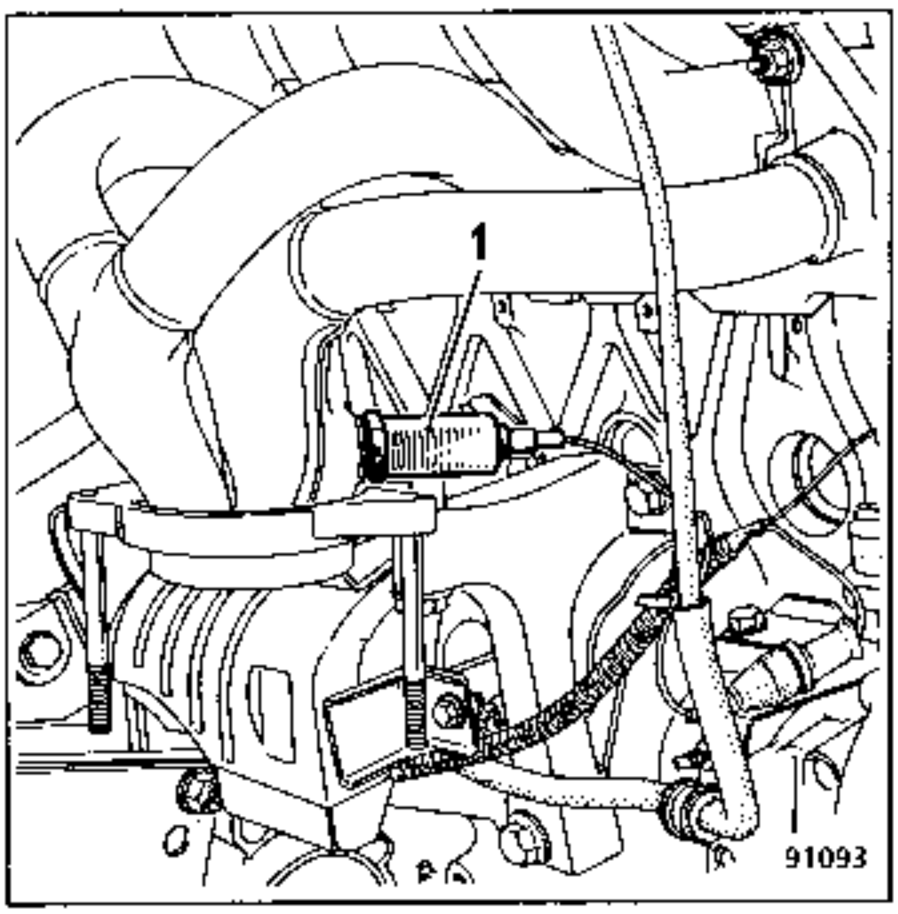
MIXTURE REGULATION



Principle of regulation by means of an oxygen sensor .

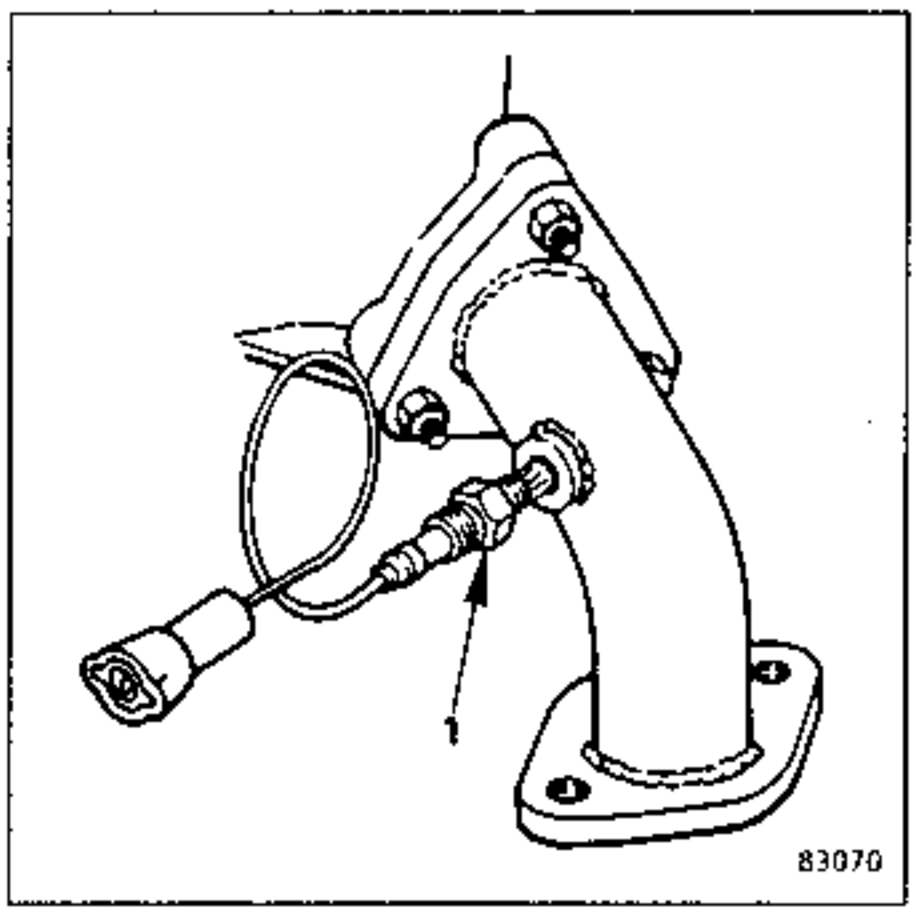
THE POSITION OF THE OXYGEN SENSOR

On the F3N engine, the oxygen sensor is mounted on the exhaust manifold on the input side of the down pipe flange.



1. Oxygen sensor

On the C3J engine, the oxygen sensor is mounted on the exhaust pipe connector between the manifold and the down pipe.



I. Oxygen sensor

Replacing the oxygen sensor :

REMOVING

Disconnect the electrical connector.
Unscrew the oxygen sensor from the down pipe assembly.
Clean the thread in the down pipe assembly.

REFITTING

Warning :

Apply anti-seizing grease only to the thread on the sensor, not to any other of the parts.

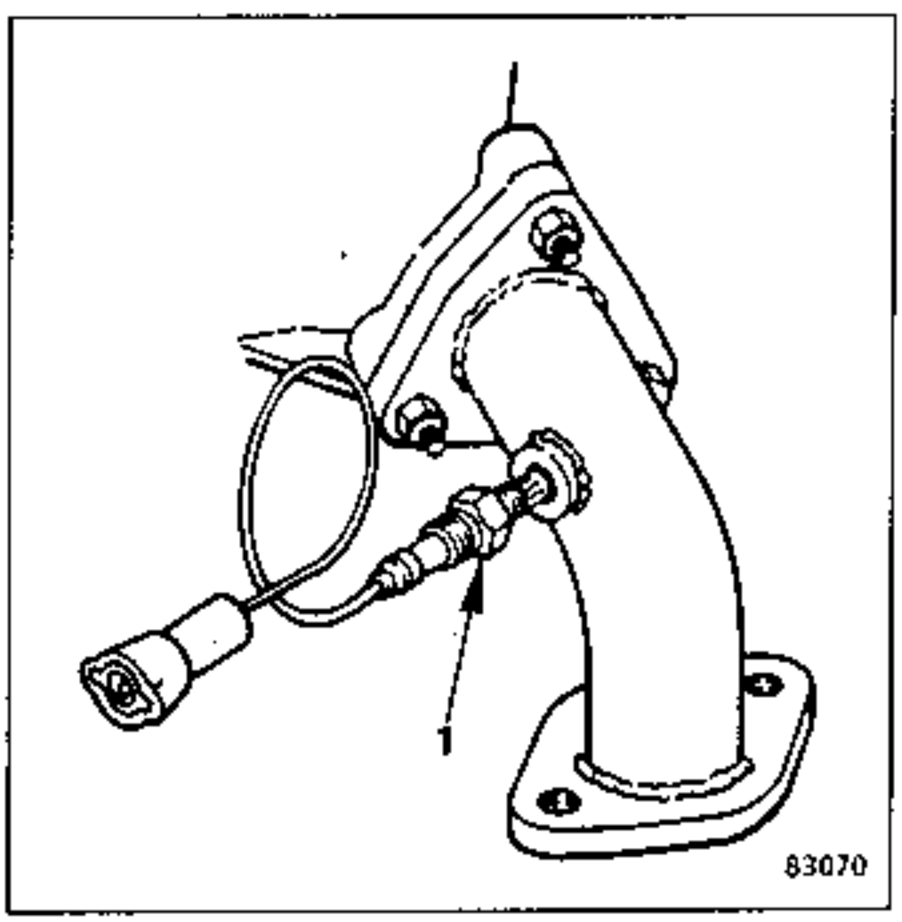
Screw the oxygen sensor, by hand, into the down pipe assembly.
Tighten it to a torque of 2.7 to 3.4 daN.m.

Ensure that the terminal ends of the wires are pushed fully into the connector.

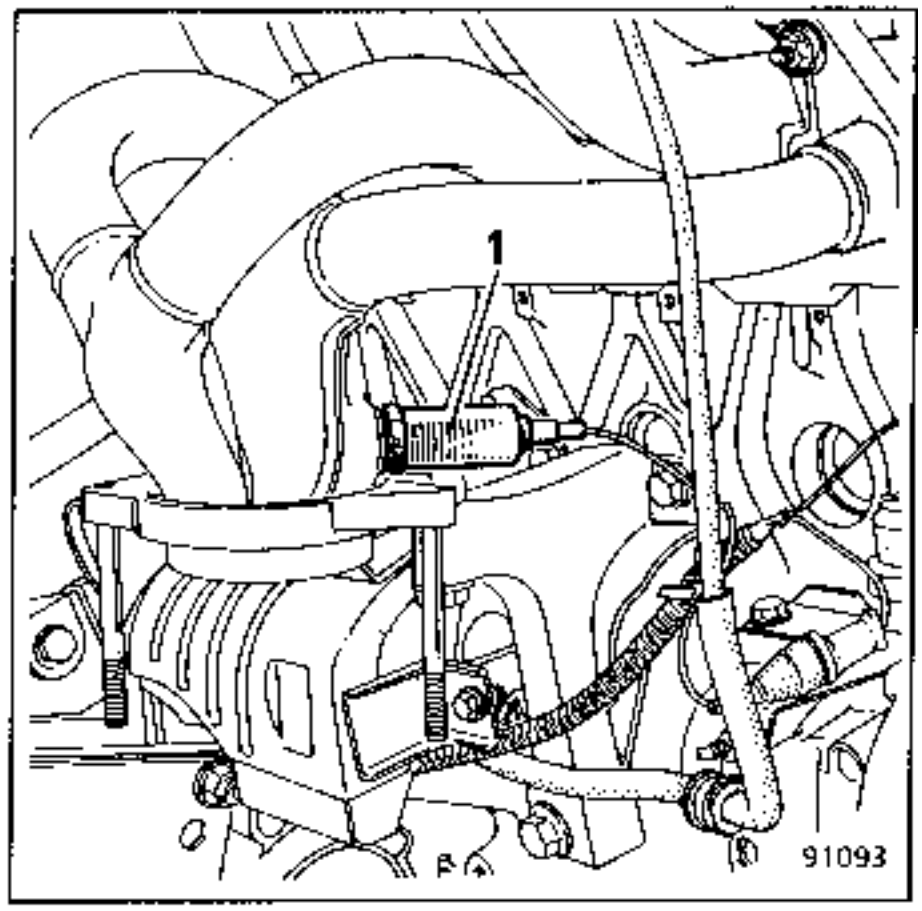
Reconnect the electrical connector.

REMARK : push the rubber protector on to the sensor body only until it is 13 mm from the base.
The spiral wires on the oxygen sensor cannot be joined or soldered. If these wires are broken, the sensor must be replaced.

C3J ENGINES



1. Oxygen sensor

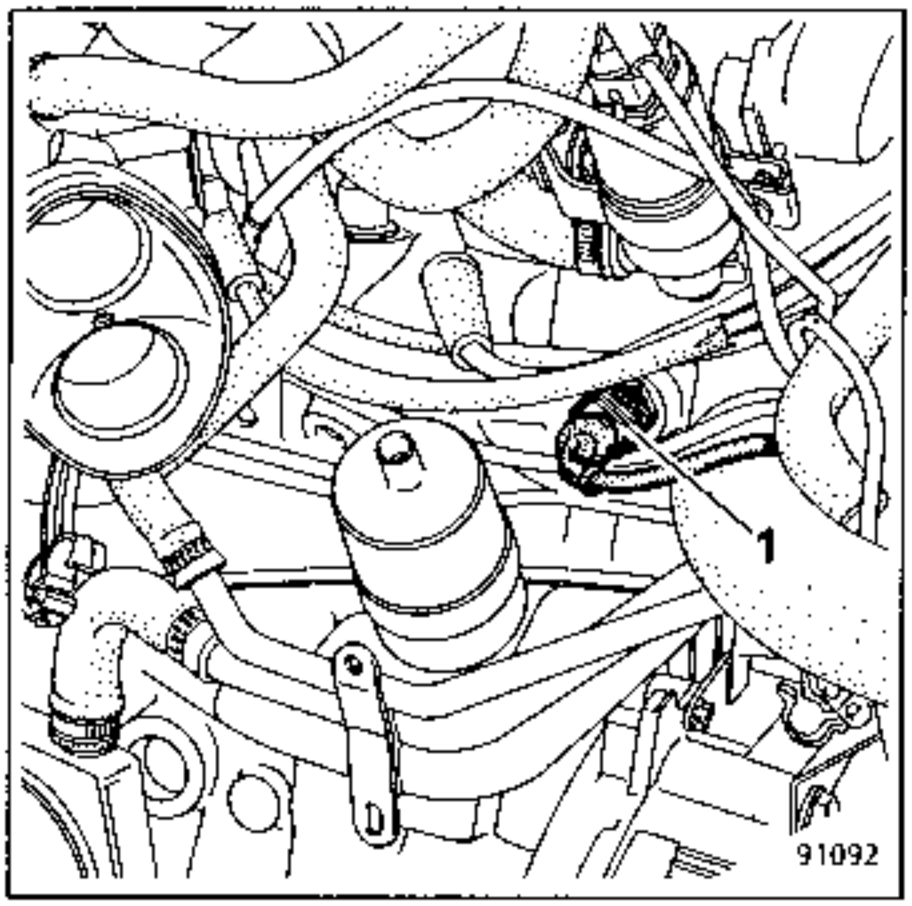


1. Oxygen sensor

REMOVING THE COOLANT TEMPERATURE SENSOR

Disconnect the electrical connector.

Remove the sensor, when the engine is cold, by unscrewing it and quickly plugging the hole in the cylinder head to avoid excessive coolant loss.



1. Coolant temperature sensor

There is no control valve on the heater. The coolant flow through the heater matrix is continuous and contributes to engine cooling.

DO NOT BLOCK THE PIPES

ANTI-FREEZE QUANTITIES AND GRADES

Vehicle type	Engine	Quantity in litres	Grade	Special features
B400-C400-S400 - F400	C1C	5,5	GLACEOL AL anti-freeze (type C)	Protection down to -23°C for hot, temperate and cold climates. Protection down to -40°C for very cold climates.
B401-C401-S401 - F401	C1E			
B402-C402 - F402	C1J			
B403-C403	C2J			
B404-C404-S404 - F404	F8M	6,5		
C405	C1J	5,5		
B407-C407 - F407	C3J			
B408-C408	F3N	6,5		
C409				
B40F-C40F-S40F	C1G	5,5		
B40G-B40K-C40G-C40K	F2N			
B40H-C40H - F40H	C1E			
B40M-C40M - F40M	C2J			
B40J-C40J				

It is forbidden to pour ordinary tap water into the cooling system to top up the level. Use only demineralised water.

ESSENTIAL SPECIAL TOOLS	
M.S. 583	Hose clips Refractometer Supplier : **Contact your local After-Sales Head Office.**

ANTI-FREEZE DENSITY

Place clamps M.S.583 on the radiator hoses to avoid draining the cooling system.

Remove the radiator filler cap and draw out coolant.

Measure the degree of anti-freeze protection using the refractometer.

Hot and temperate climates :

- protection -23°C (35% anti-freeze solution),

- protection -40°C (50% anti-freeze solution).

The front protection is less effective when the anti-freeze concentration exceeds 60%.

The protection figures shown in the charts are those for coolant at a temperature of 40°C when the measurements are taken.

Using the chart

On vehicles with a coolant capacity of 5.5 litres, if the protection provided is shown as -15°C :

- to take the protection down to -23°C one must take 0.7 litres of the existing solution out of the circuit and replace it by 0.7 litres of pure anti-freeze.

- to take the protection down to -40°C, one must remove 1.9 litres of the existing mixture from the system and replace it by 1.9 litres of pure anti-freeze.

PURE ANTI-FREEZE TO BE ADDED

-23° C
Warm and temperate climates

Protection measured at 40°C (coolant temperature)	System capacity (litres) 5.5 — Quantity of coolant to be replaced by Glaceol AL anti-freeze to obtain protection down to -23°C
-5° C	1,6
-10° C	1,1
-15° C	0,7
-20° C	0,2

-40° C
Very cold climates

Protection measured at 40°C (coolant temperature)	System capacity (litres) 5.5 — Quantity of coolant to be replaced by Glaceol AL anti-freeze to obtain protection down to -40°C
-5° C	2,6
-10° C	2,3
-15° C	1,9
-20° C	1,6
-25° C	1,2
-30° C	1
-35° C	0,5

ALUMINIUM MATRIX RADIATORS

Certain vehicles are equipped with cooling radiators that have aluminium matrixes.

1. Flushing out

Do not flush out these radiators or their cooling systems with caustic soda or any alkaline product (as this could cause corrosion of light alloy components and the risk of leakage).

2. Storage

If a radiator removed from a vehicle is to be stored for less than 48 hours no particular precautions need to be taken.

Above this period, however, particles of brazing flux used during the manufacture of the radiator and the dichlorate ingredients of the coolant that the radiator previously contained can, when they make contact with the air, cause oxydisation of the aluminium parts of the radiator and subsequent leakage.

If a radiator, after removal, is to be left for more than 48 hours one must :

- either FLUSH IT OUT THOROUGHLY with water, BLOW IT THROUGH with compressed air and PLUG all its apertures,
- or keep it filled with coolant, if possible.

3. Anti-freeze and coolant

These aluminium radiators require an appropriate anti-freeze or coolant.

AL type C coolant or GLACEOL AL type C concentrated anti-freeze, as marketed through the RENAULT network, fulfils the specification requirements laid down by our Design Office especially as regards :

- the fact that it does not attack aluminium and cast iron components,
- its alkaline content is specially designed for the special requirements of light alloy systems,
- it contains special additives that guarantee effective protection against the acidic products of combustion both in high speed Diesel and Petrol engines,
- its concentration provides both protection and efficient operation at all temperatures.

Prepared type C anti-freeze

- 2 litre can 7701 405 402,
- 10 litre can 7701 405 403,
- 215 litre drum 7701 417 021.

Prepared type C Export anti-freeze

- 1 litre can 7701 406 211.

ESSENTIAL SPECIAL TOOLS	
M.S. 554-03	Kit for testing cooling systems for leaks
M.S. 554-01	Adaptor for M.S. 554-03
M.S. 554-04	Adaptor for M.S. 554-03

1) Checking the system for leaks

Replace the valve on the expansion bottle by adaptor M.S.554-01.

Connect tool M.S.554-03 to it.

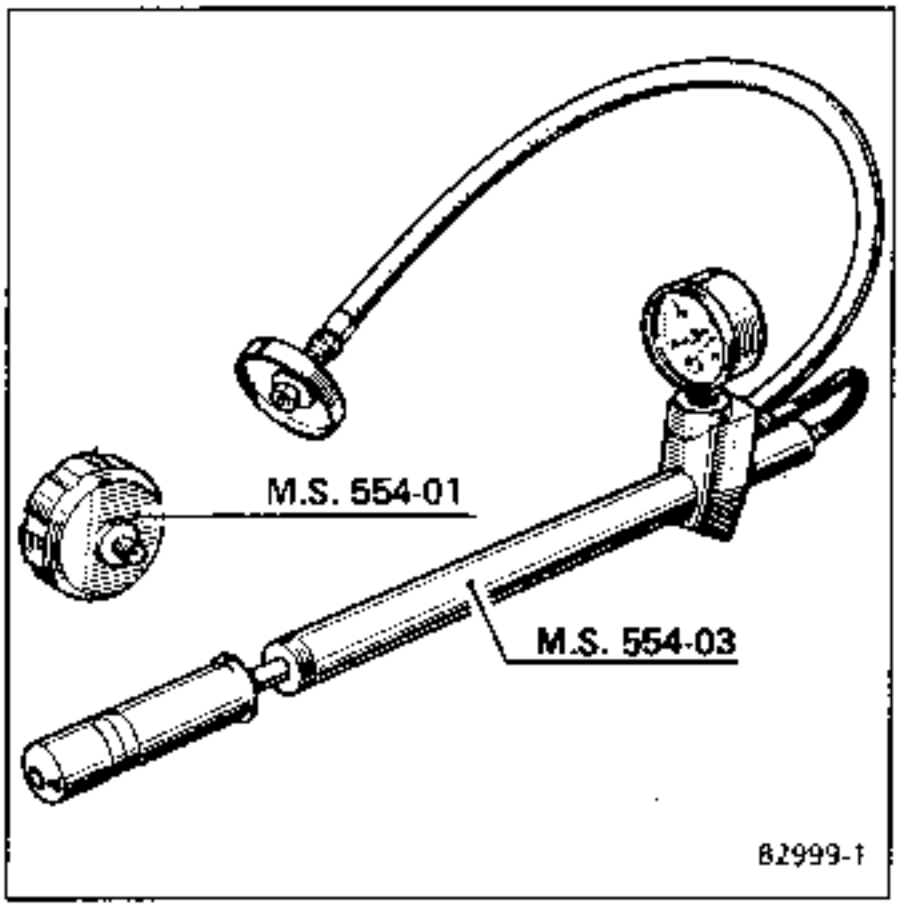
Warm up the engine then stop it.

Pump the equipment to place the system under pressure.

Stop pumping at 0.1 bars above the valve pressure setting.

The pressure should not fall. If it does, look for the leak.

Slowly unscrew the union on the tool M.S. 554-03 to release the pressure in the cooling system then remove tool M.S.554-01 and refit the expansion bottle valve, using a new seal.



2) Checking the valve pressure setting

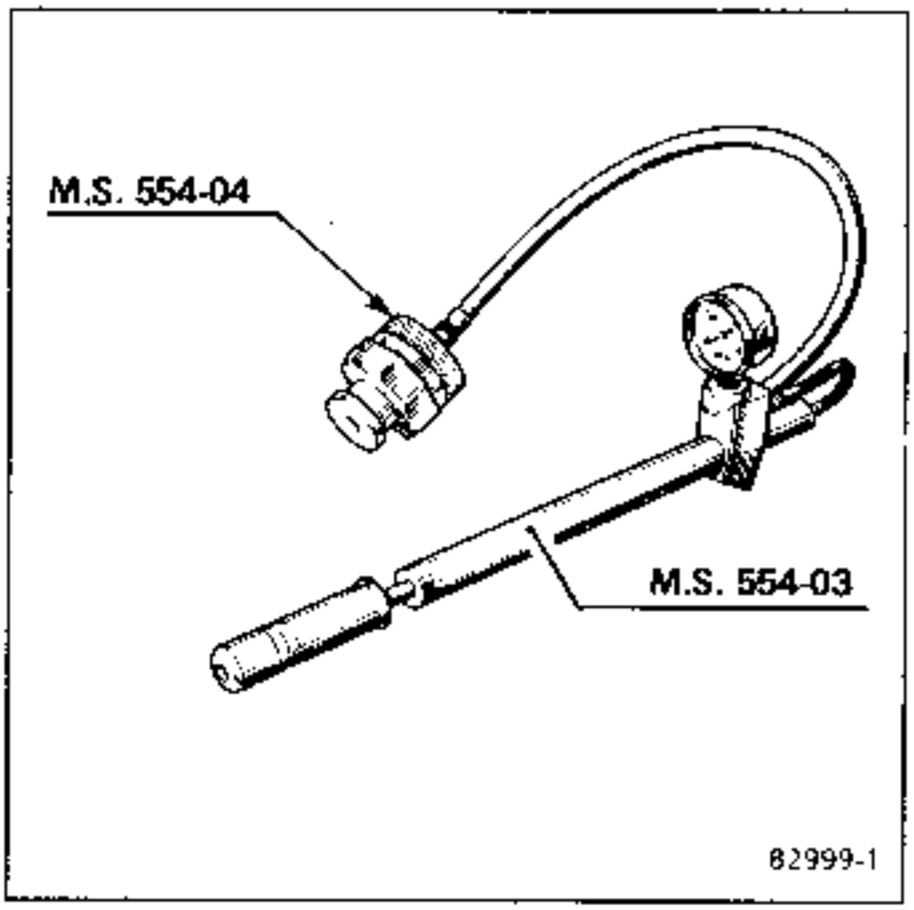
If coolant has passed through the expansion chamber valve, it must be replaced by a new one.

Fit tool M.S.554-04 to pump M.S.554-03 and fit it to the valve to be tested.

Raise the pressure. It should stabilise at the valve pressure setting. The test tolerance is ± 0.1 bar.

Valve pressure setting

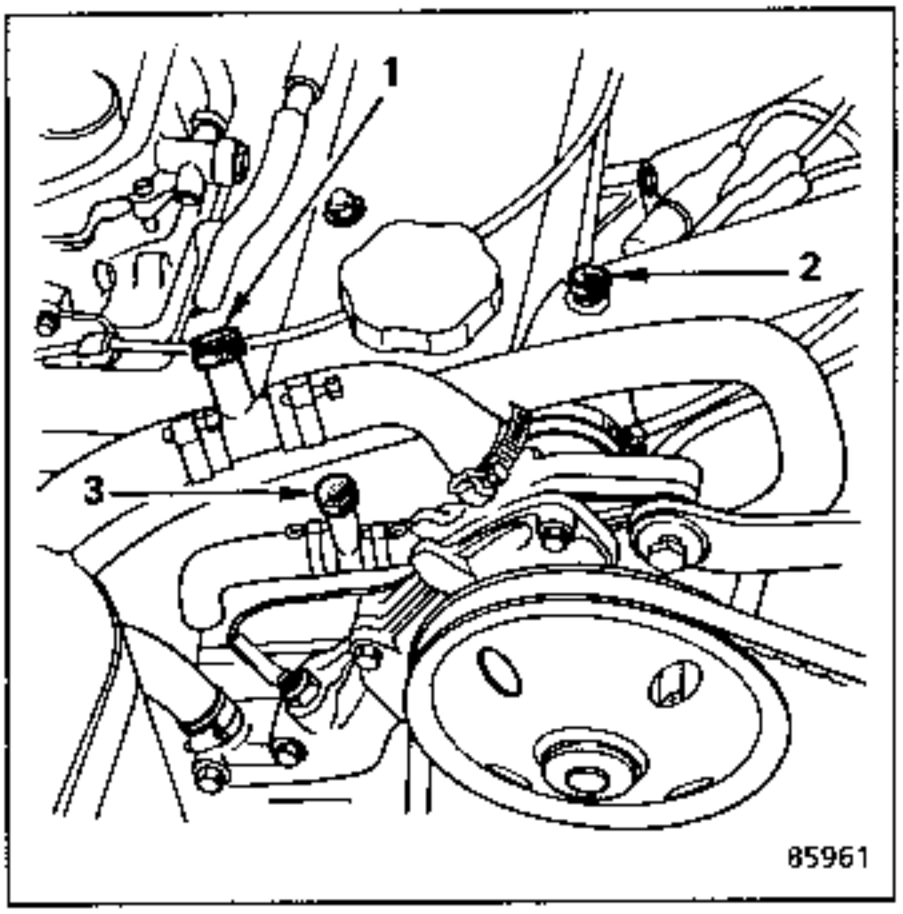
Brown plastic valve 1.2 bars.



FILLING

Check that the drain plug on the cylinder block is tight.

Open bleed screws 1 - 2 and 3.



There is no control valve on the heater. Flow through the heater matrix is continuous.

Release the expansion bottle and secure it as high up as possible on the vehicle bonnet.

Fully fill the radiator and refit its cap.

Finish filling the cooling system through the hole in the expansion bottle.

Close the bleed screws as soon as coolant runs from them.

Fill the expansion bottle to the MAX mark.

CLOSE THE EXPANSION BOTTLE.

BLEEDING ON ALL VEHICLES EXCEPT THE C 405

Run the engine at at least 1500 rpm for approximately 15 minutes.

Leave the engine to cool, completely and check and, if necessary, top up the level of the coolant in the expansion bottle to the MAX mark.

WARNING : If the system is not properly bled, hot spots may form in the cooling system.

NOTE : do not open the bleed screw or screws with the engine running.

BLEEDING THE C 405

With the engine stopped

Fill the system through the degassing bottle whilst lifting it slightly.

Screw the cooling system test pump (M.S. 554-03 + M.S.554-01) on to the bottle.

Place a clamp (Mot.453-01) on the hose at the input to the bottle.

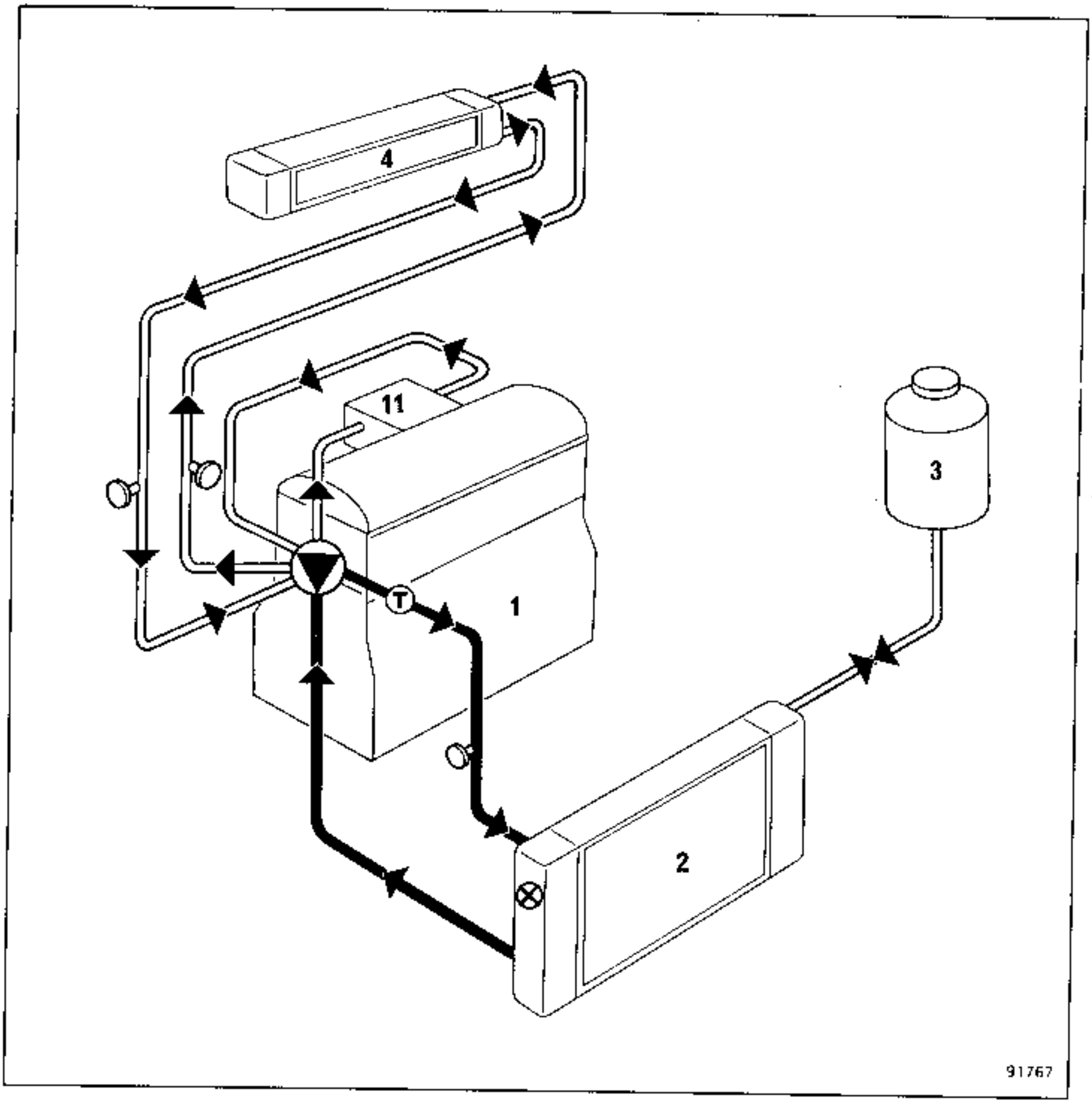
Pump the equipment to obtain a pressure of 500 gr.

Open the bleed screws and wait until the coolant flows from them in a continuous stream.

Close the bleed screws, top up the level in the bottle, remove the clamp and screw on the valve.

Start the engine and wait until the cooling fan has cut in a number of times.

ENGINES "C" - All types except C 405 vehicles



1. Engine
2. Radiator
3. Cold bottle
4. Heater

Thermostat

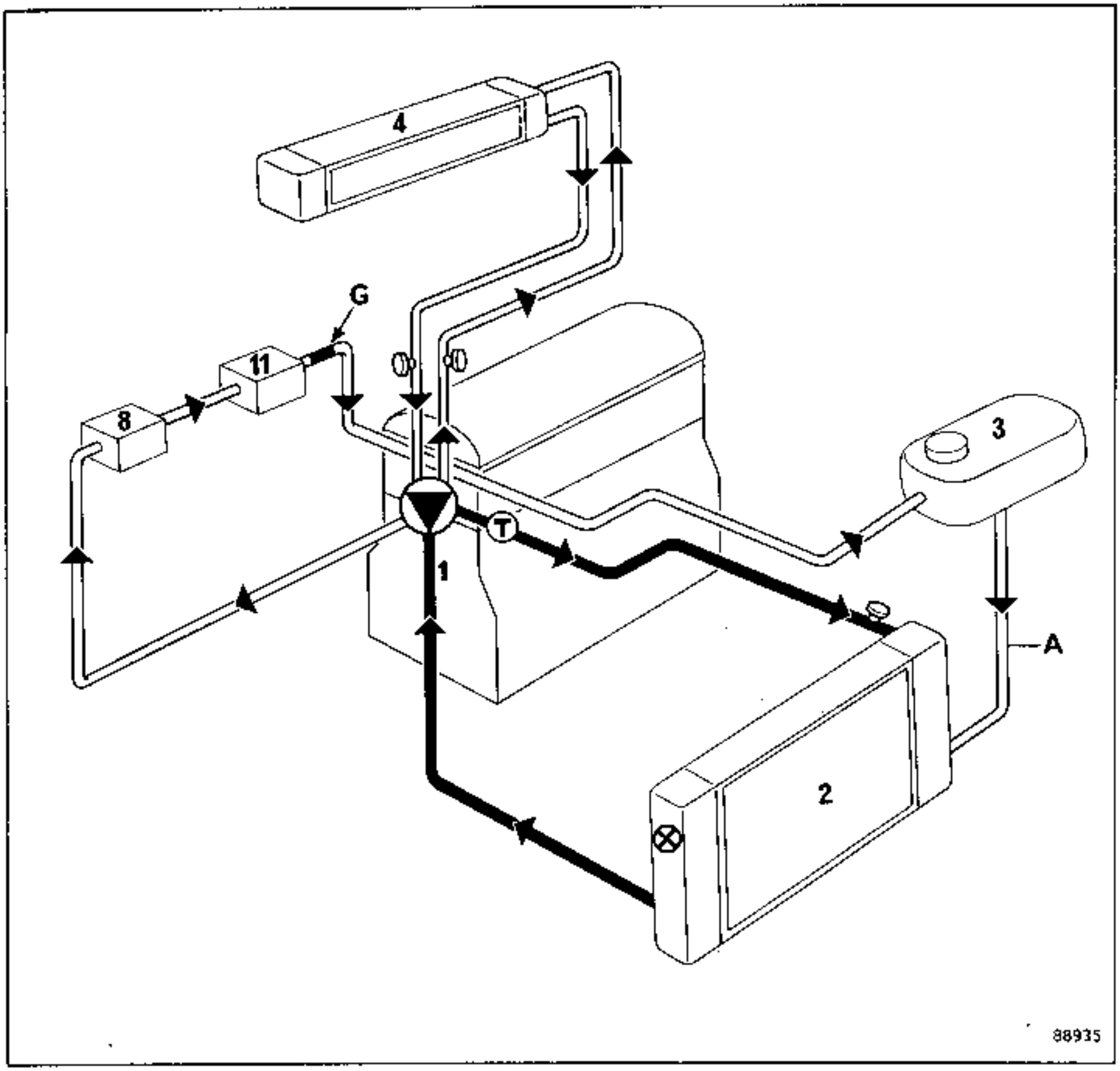
Temperature switch

Coolant pump

Bleed screws

MODIFICATIONS TO THE COOLING SYSTEM SINCE ITS INTRODUCTION, ON THE C 405 VEHICLE

1st ARRANGEMENT



NOTE : Coolant pipe A is no longer supplied by the Parts Department and therefore when carrying out any work on a vehicle with this early type system one must fit pipe B (see 2nd arrangement) and plug the take-off point on the radiator.

1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
8. Manifold
11. Carburettor base heating
G. 3 mm jet

Thermostat

Temperature switch

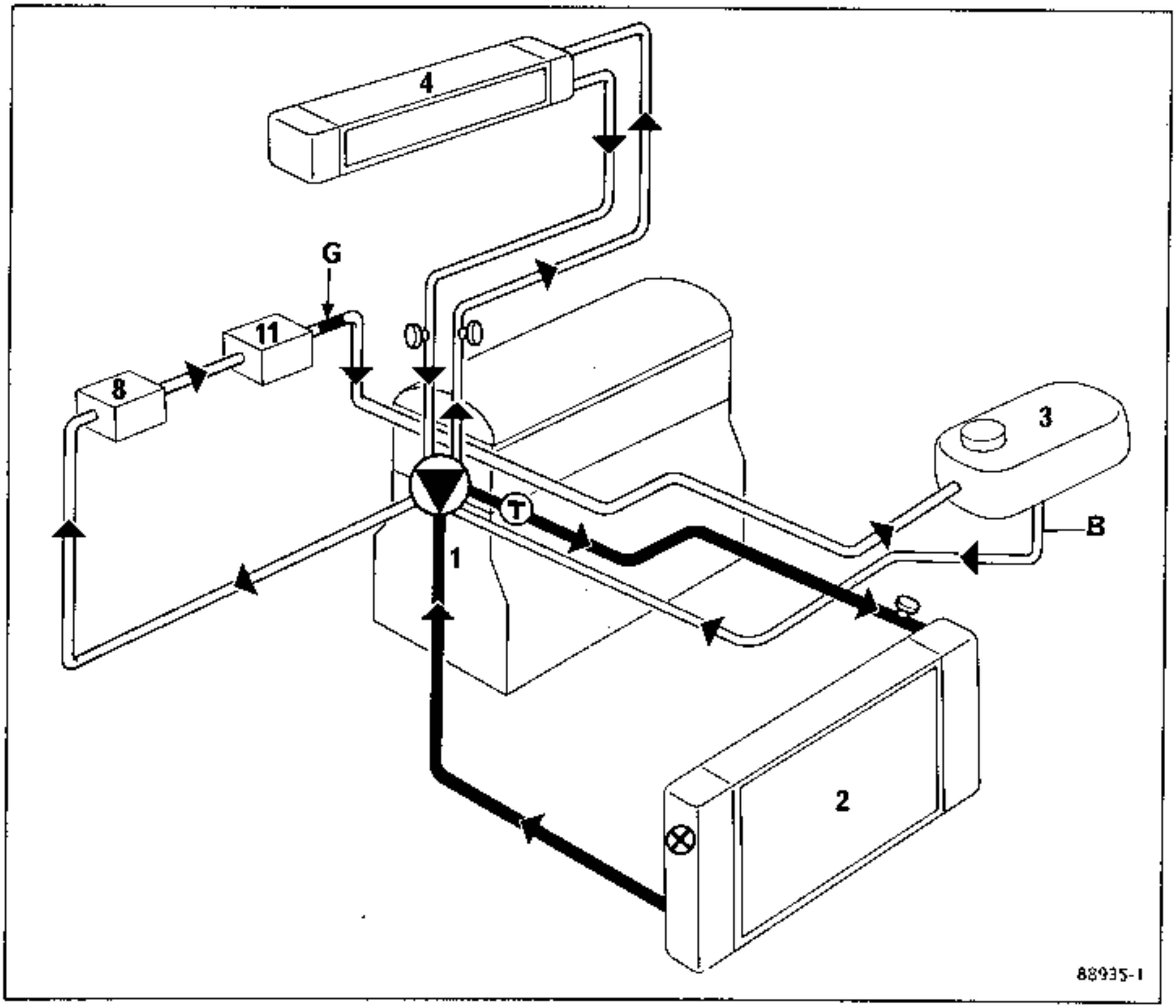
Coolant pump

Bleed screws

The reason for introducing this second type arrangement was to improve the degassing of the radiator and the heater performance. At the same time it also contributes to reducing noise.

2nd ARRANGEMENT

From the following serial numbers : Flins : F 5666 or Dieppe : K 6559



1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
8. Manifold
11. Carburettor base heating
G. 3 mm jet

Thermostat

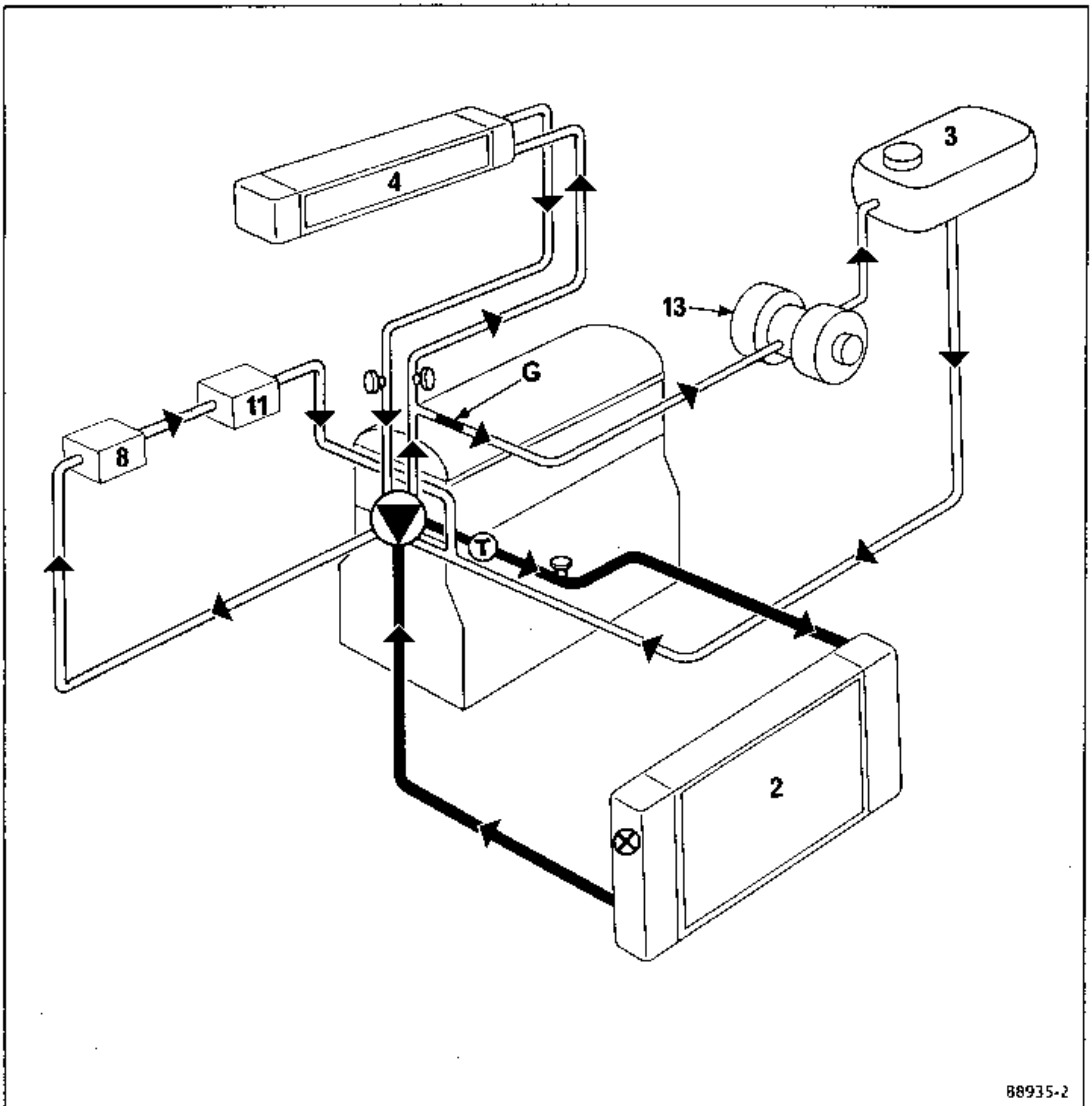
Temperature switch

Coolant pump

Bleed screws

Water cooled turbocharger

3rd ARRANGEMENT



1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
8. Manifold
11. Carburettor base heating
13. Turbocharger

G 3 mm jet

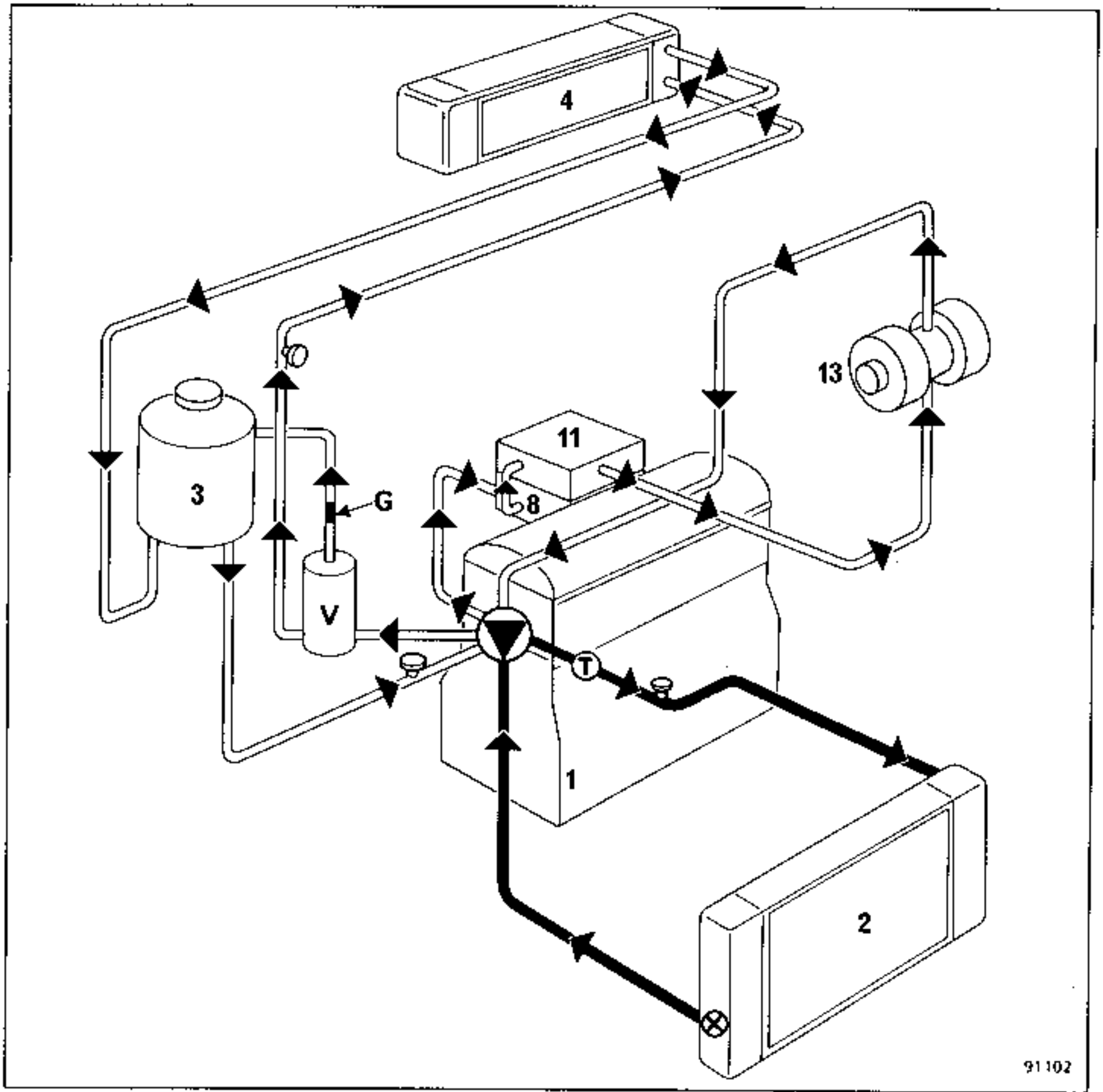
T Thermostat

Temperature switch

Coolant pump

Bleed screws

4th ARRANGEMENT



1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
8. Manifold
11. Carburettor base heating
13. Turbocharger
G. 3 mm jet

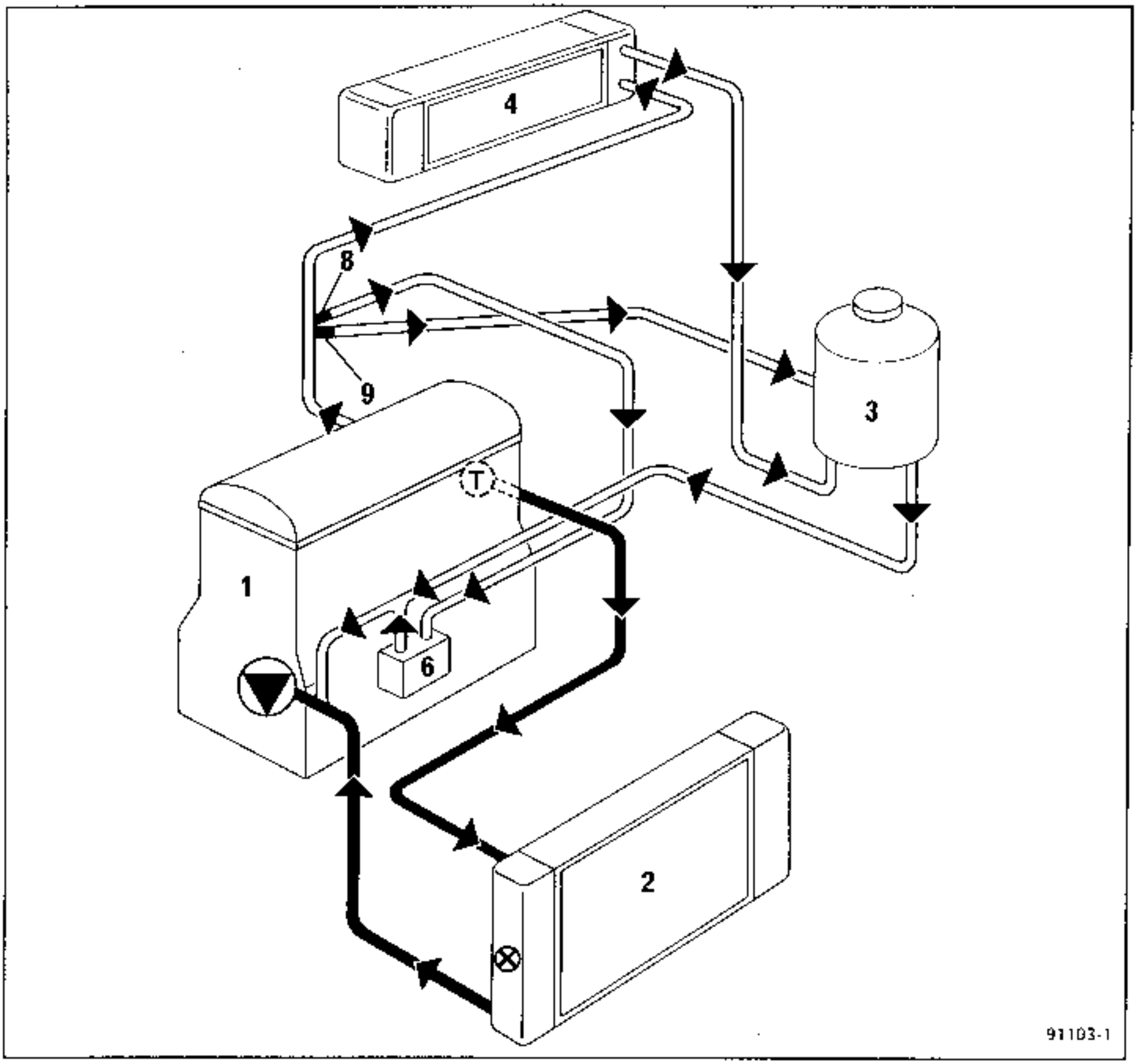
Thermostat

Bleed screws

Temperature switch

Coolant pump

VORTEX unit (degassing unit)

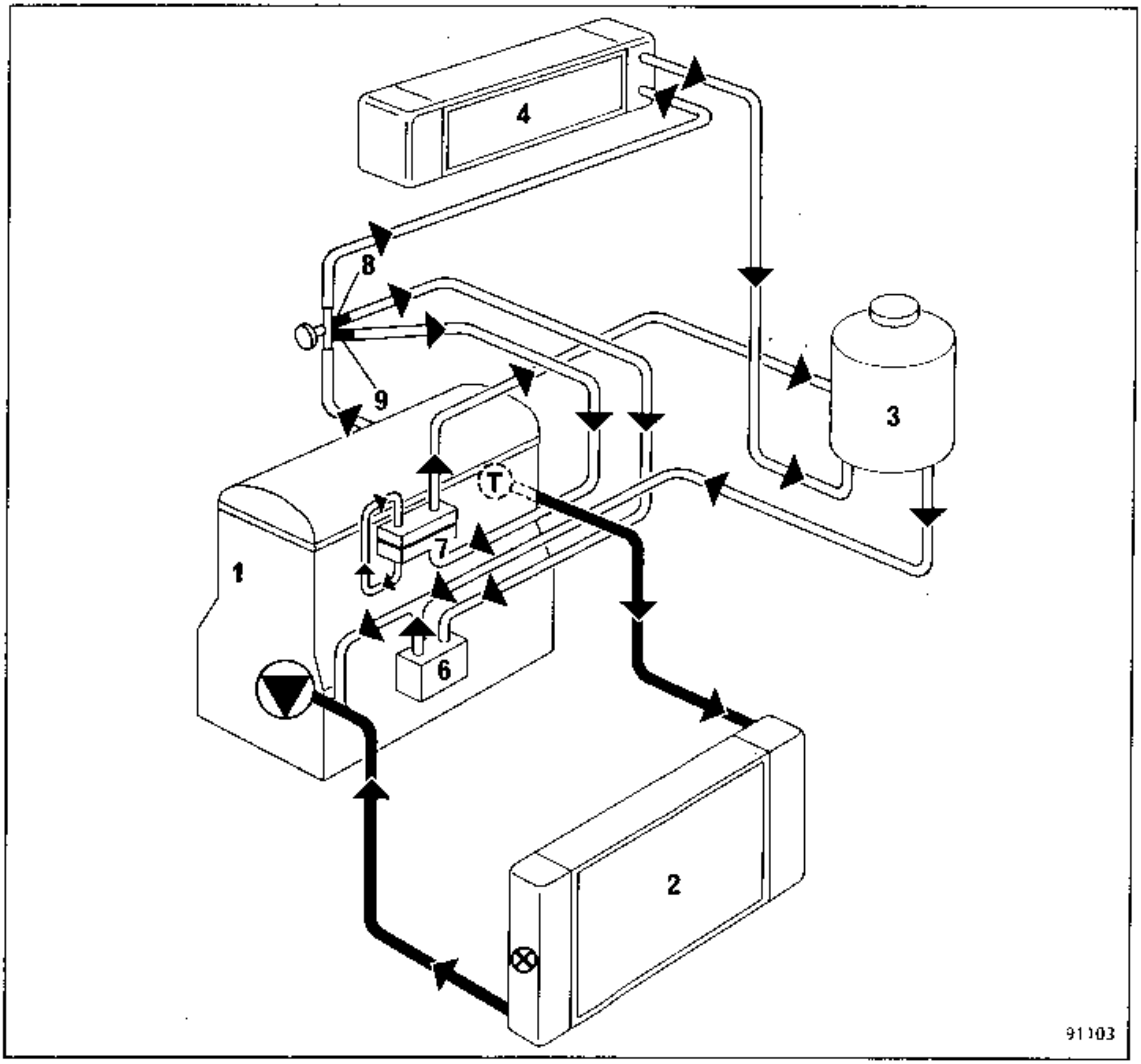


1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
6. Modine unit
8. 8 mm jet
9. 3 mm jet

(T) Thermostat

(⊗) Temperature switch

(▼) Coolant pump



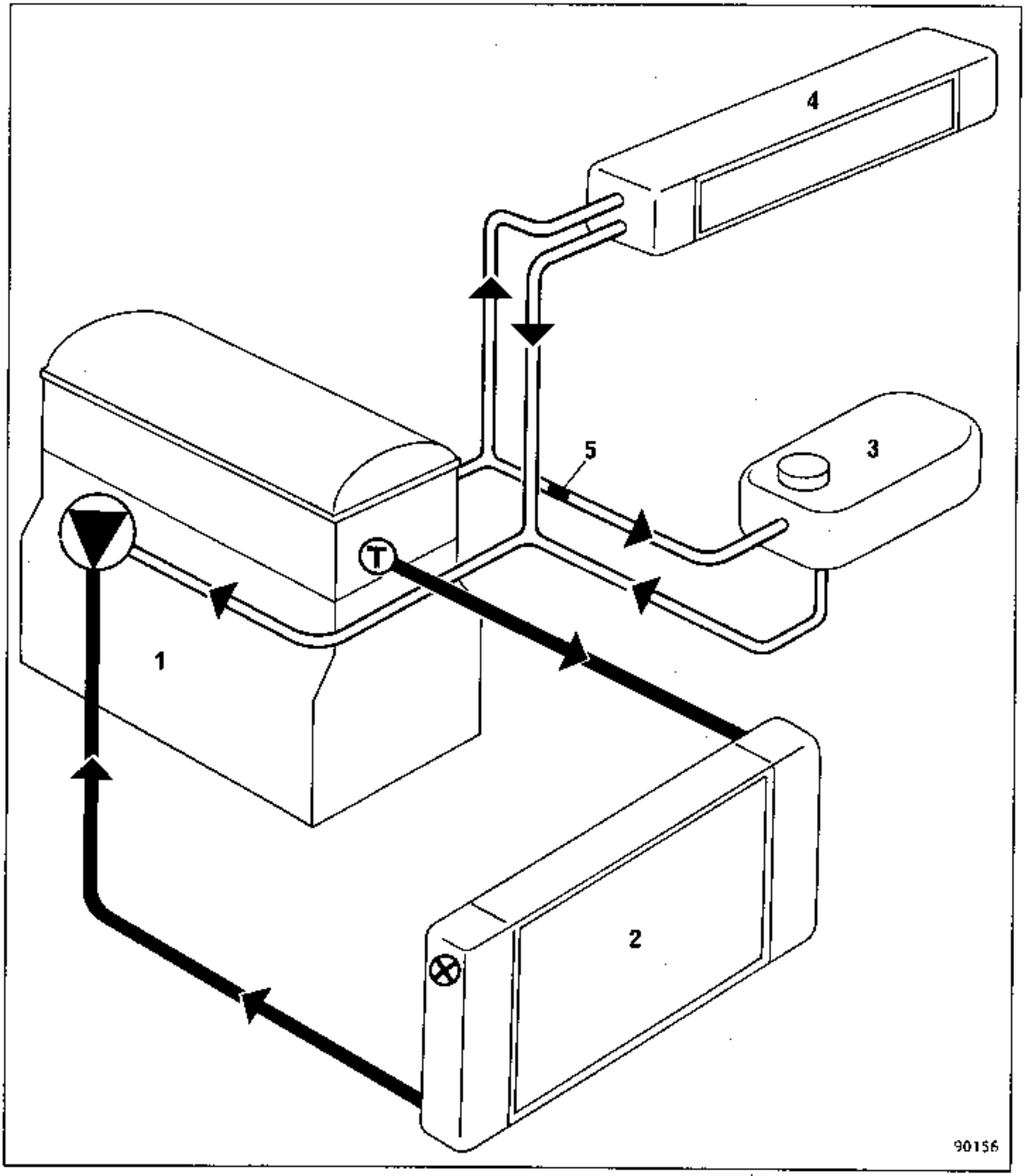
1. Motor
2. Radiator
3. "Hot" bottle
4. Heater
6. Modine unit
7. Throttle unit
8. 8 mm jet
9. 3 mm jet

T Thermostat

Temperature switch

Coolant pump

Bleed screw



1. Engine
2. Radiator
3. "Hot" bottle
4. Heater
5. 3 mm jet

Coolant pump

Thermostat

Temperature switch

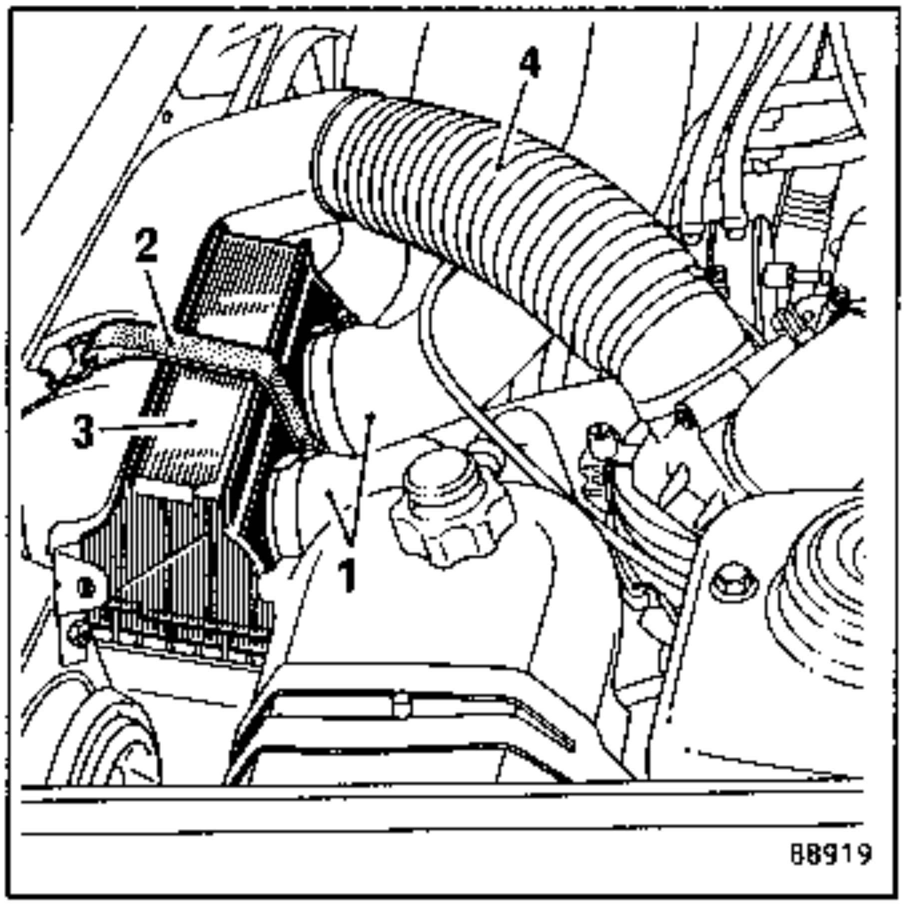
REMOVING

Disconnect the pipes from the intercooler.

Release the strap and the cold air intake and take out the intercooler by freeing it from its positioning holes.

REFITTING

Carry out the removing operations in reverse.



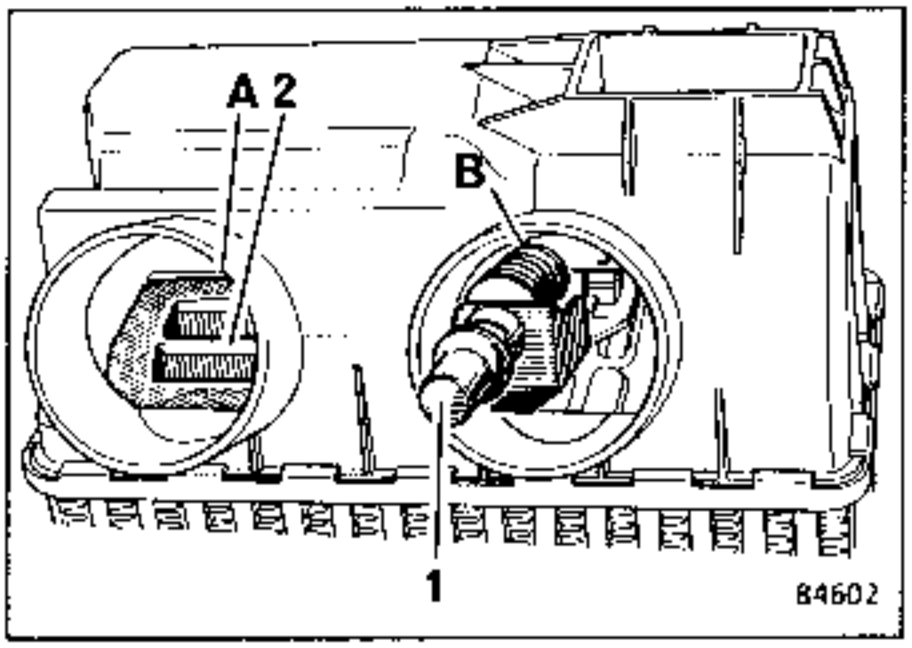
1. Air pipes
2. Strap
3. Intercooler
4. Cold air intake

Checking the intercooler thermostatic capsule.

Immerse the thermostatic capsule (1) in water.

After 5 minutes immersion :

- when the water is at 43 $\pm$ 2°C the flap (2) should close off the flow of air to the cooler,
- with the water at 47 $\pm$ 2°C the flap (2) should close off the direct flow between the input (A) and the output (B), all the air should flow through the intercooler.



These repair methods are described by means of diagrams that show, immediately, the points at which the various operations are to be carried out.

To avoid making them too complex, symbols have been used to show details of the operation required :

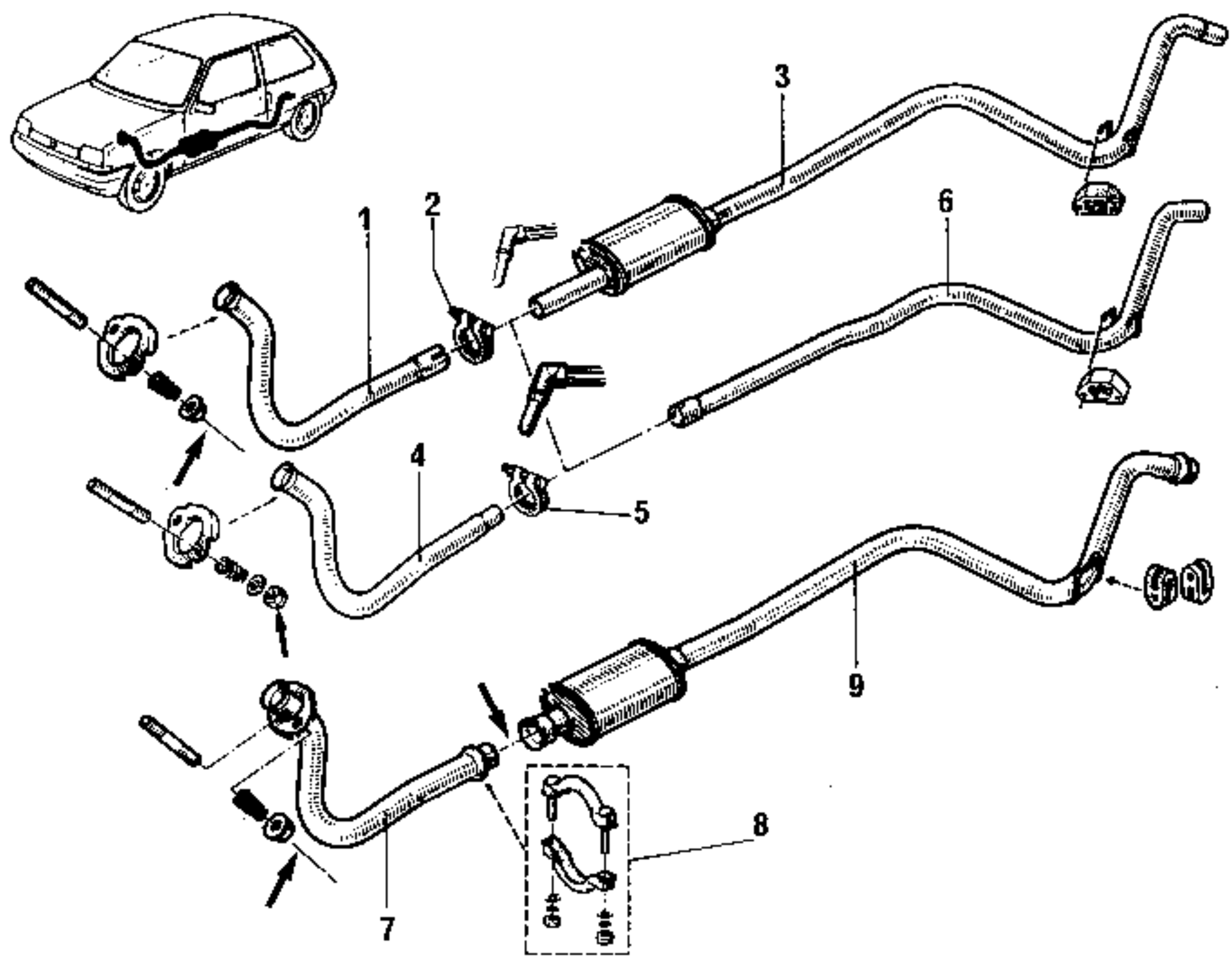
 Fully unscrew to remove

Cut :

- either with a flame torch,
- or with a tube cutter.

 Cut only with a flame torch :

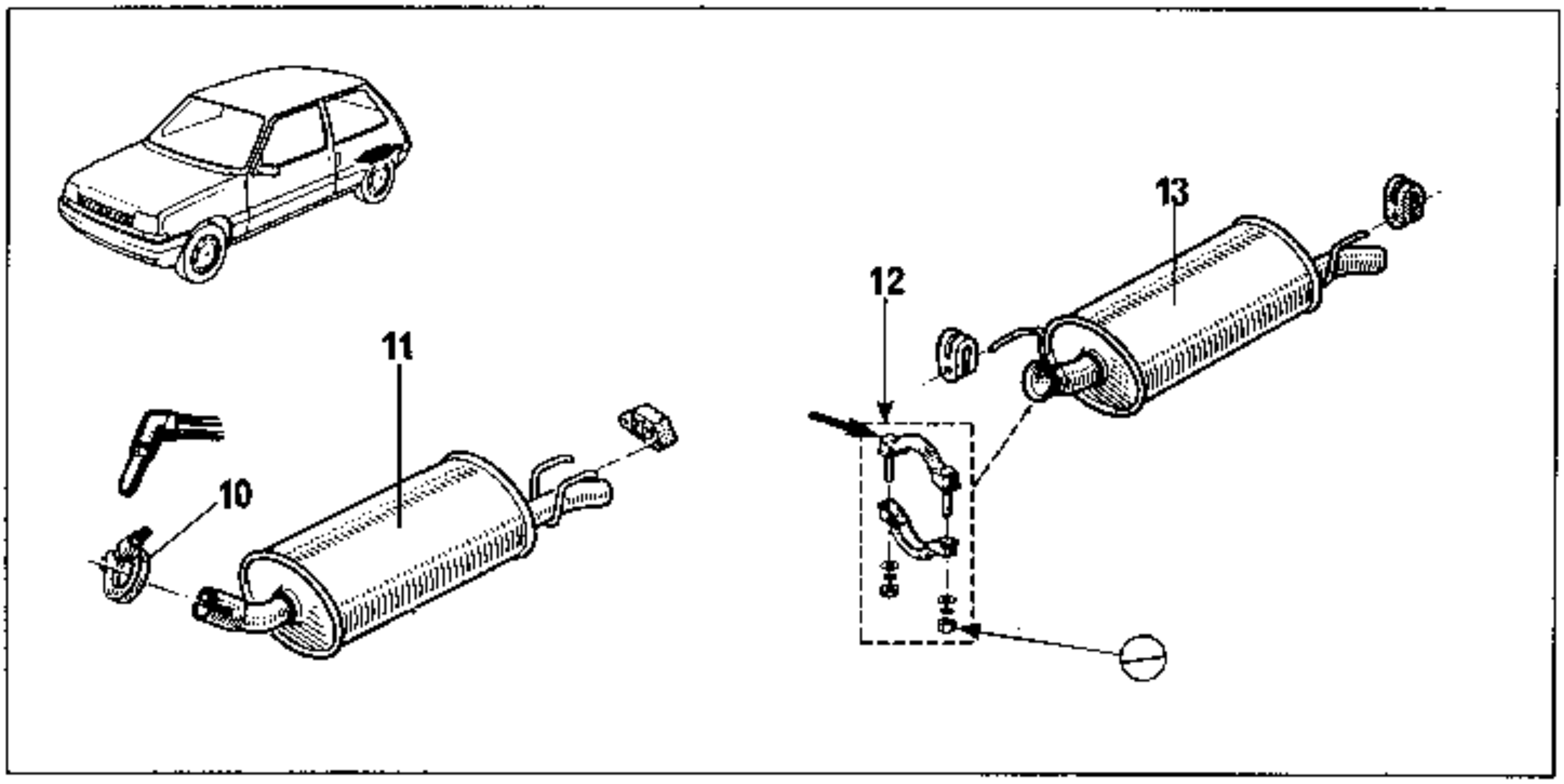
- a clamp,
- the external tube of a sleeved section.



As a safety measure, keep a CO2 fire extinguisher near to the area where the work is to be carried out.

1. Down pipe (on all models except the C 405, 1987 model year)
2. Securing clamp
3. Intermediate pipe + expansion chamber (same note as no. 1)
4. Down pipe (1st arrangement except the C 405 1987 model year)
5. Securing clamp
6. Intermediate pipe (same note as no. 4)
7. Down pipe
8. Securing clamps
9. Intermediate pipe + expansion chamber

7.–9.: All models except the C 405, 1987 model year



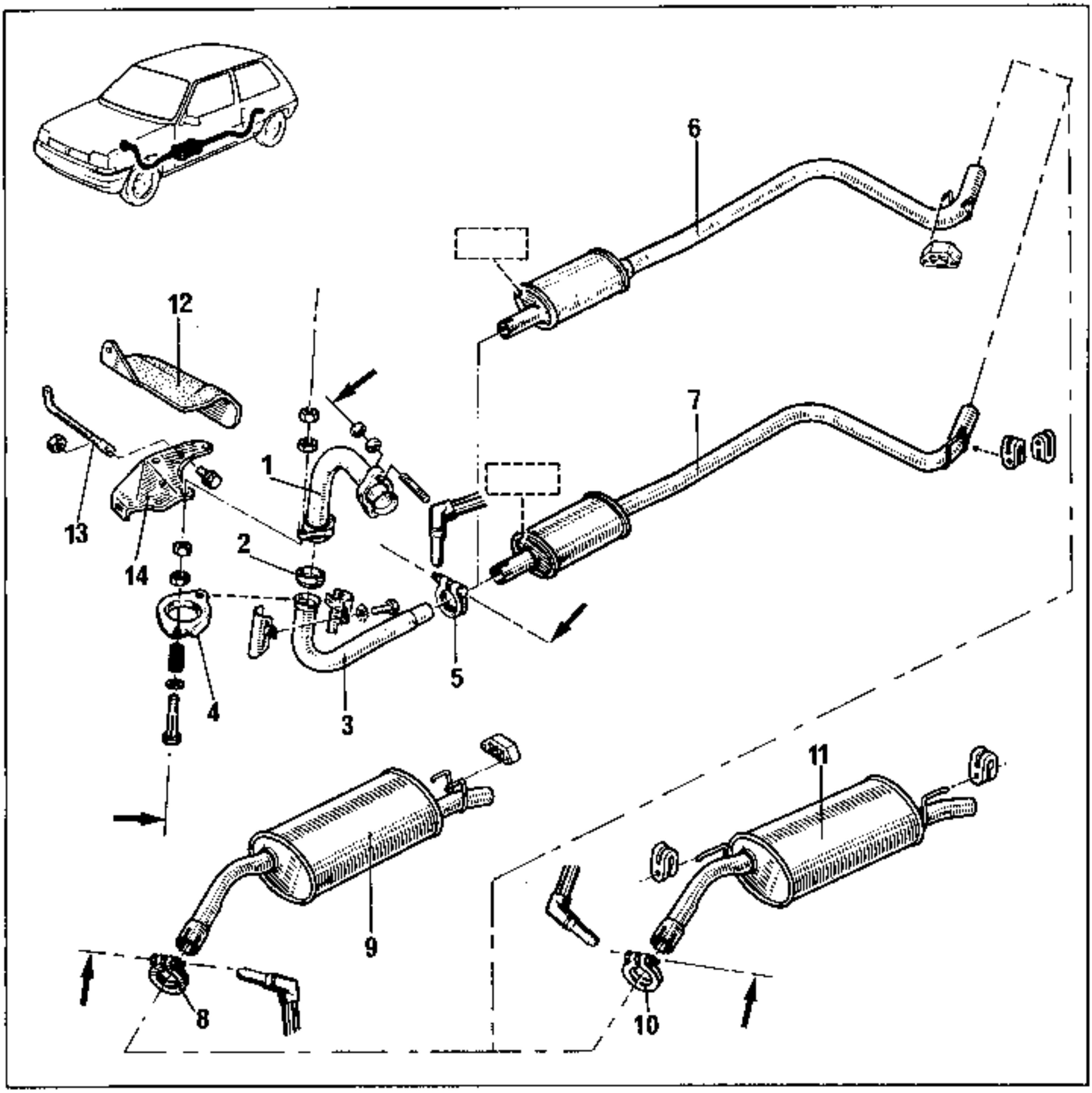
10. Securing clamp
11. Silencer

10.–11.: All models to 1987 model year

12. Securing clamp
13. Silencer

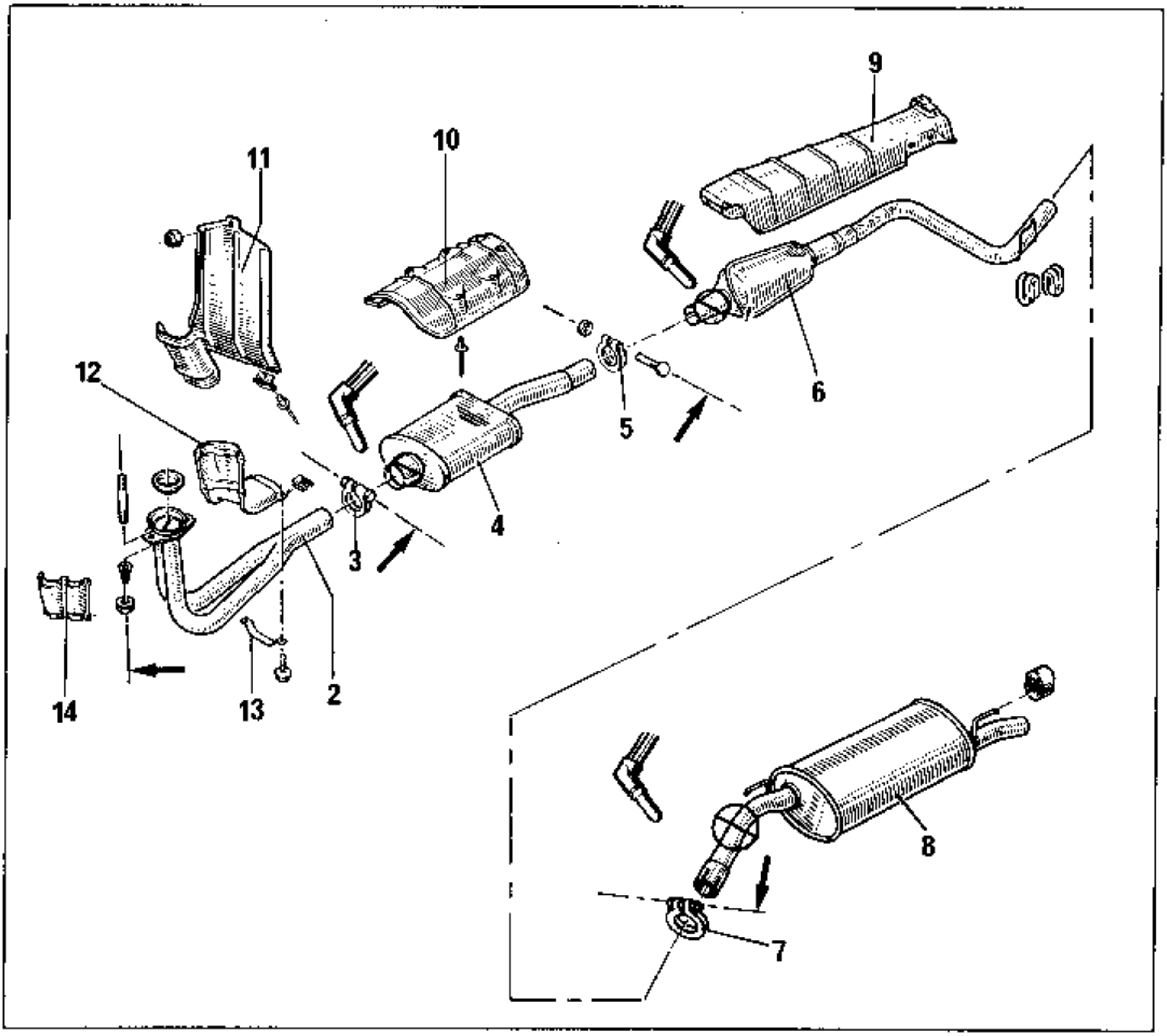
12.–13.: All models from 1987 model year

C 405



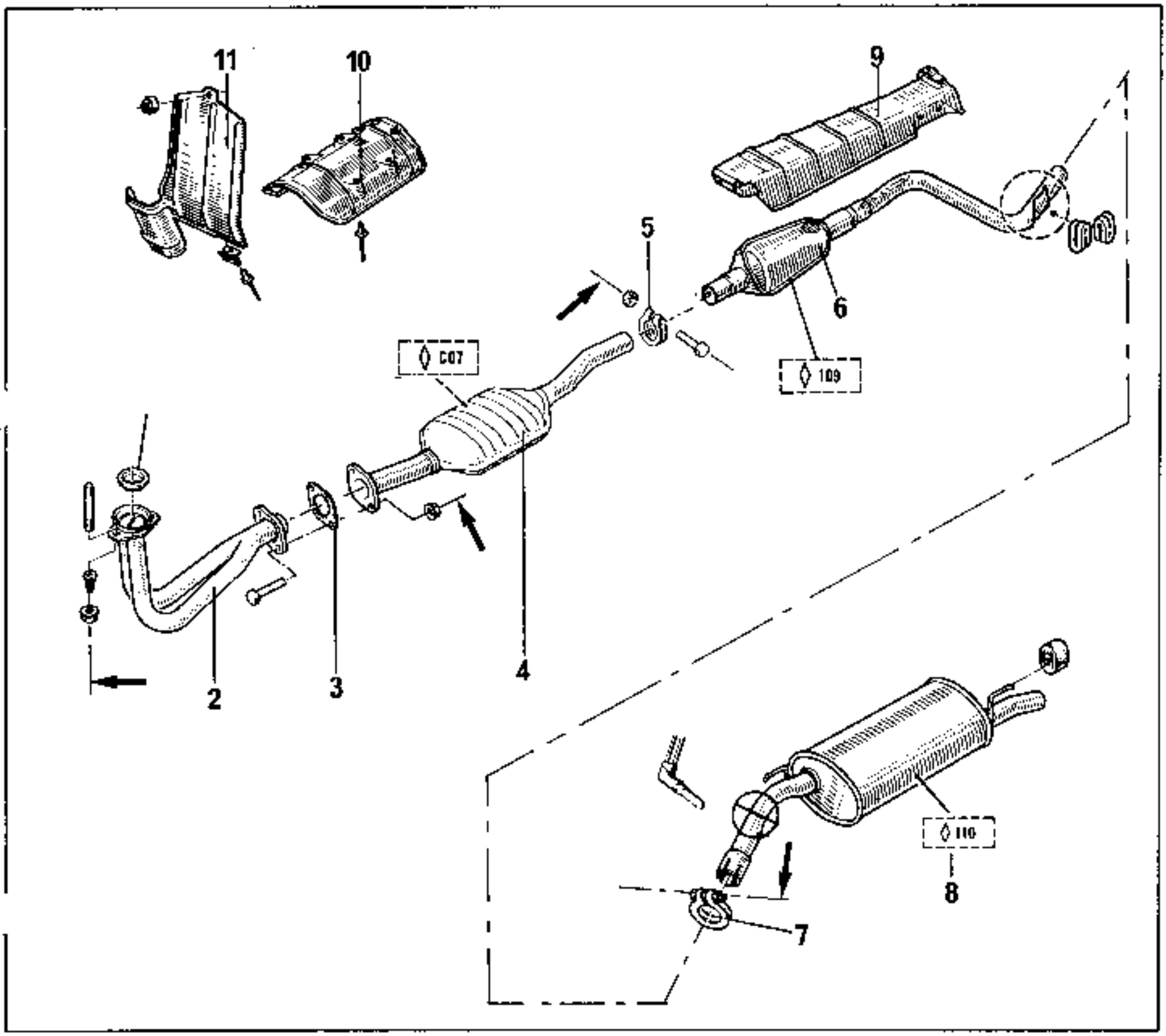
1. Down pipe upper section + securing clamp
2. Joint between down pipe upper and lower sections
3. Down pipe lower section
4. Down pipe securing clamp
5. Securing clamp
6. Expansion chamber + intermediate pipe (up to 1987 model year)
7. Expansion chamber + intermediate pipe (from 1987 model year)
8. Securing clamp
9. Silencer (up to 1987 model year)
10. Securing clamp
11. Silencer (from 1987 model year)
12. Heat shield
13. Strut
14. Spacer

B, C 40 G



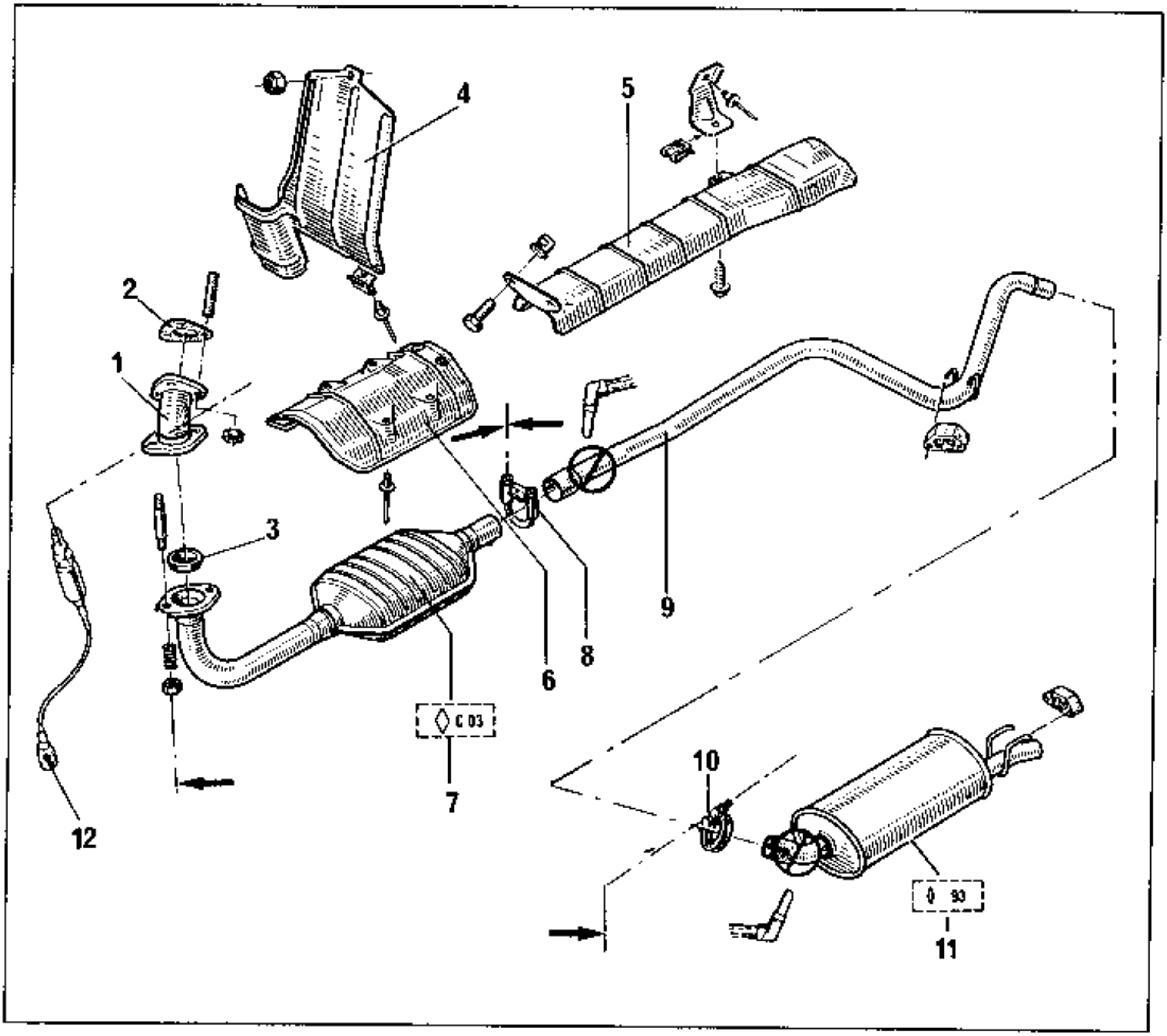
1. Manifold - down pipe gasket
2. Down pipe
3. Securing clamp
4. Expansion chamber
5. Securing clamp
6. Chamber + intermediate pipe
7. Securing clamp
8. Silencer
9. Intermediate chamber shield
10. Expansion chamber shield
11. Scuttle shield
12. Down pipe shield
13. Securing clamp
14. Down pipe shield

B/C 40 K



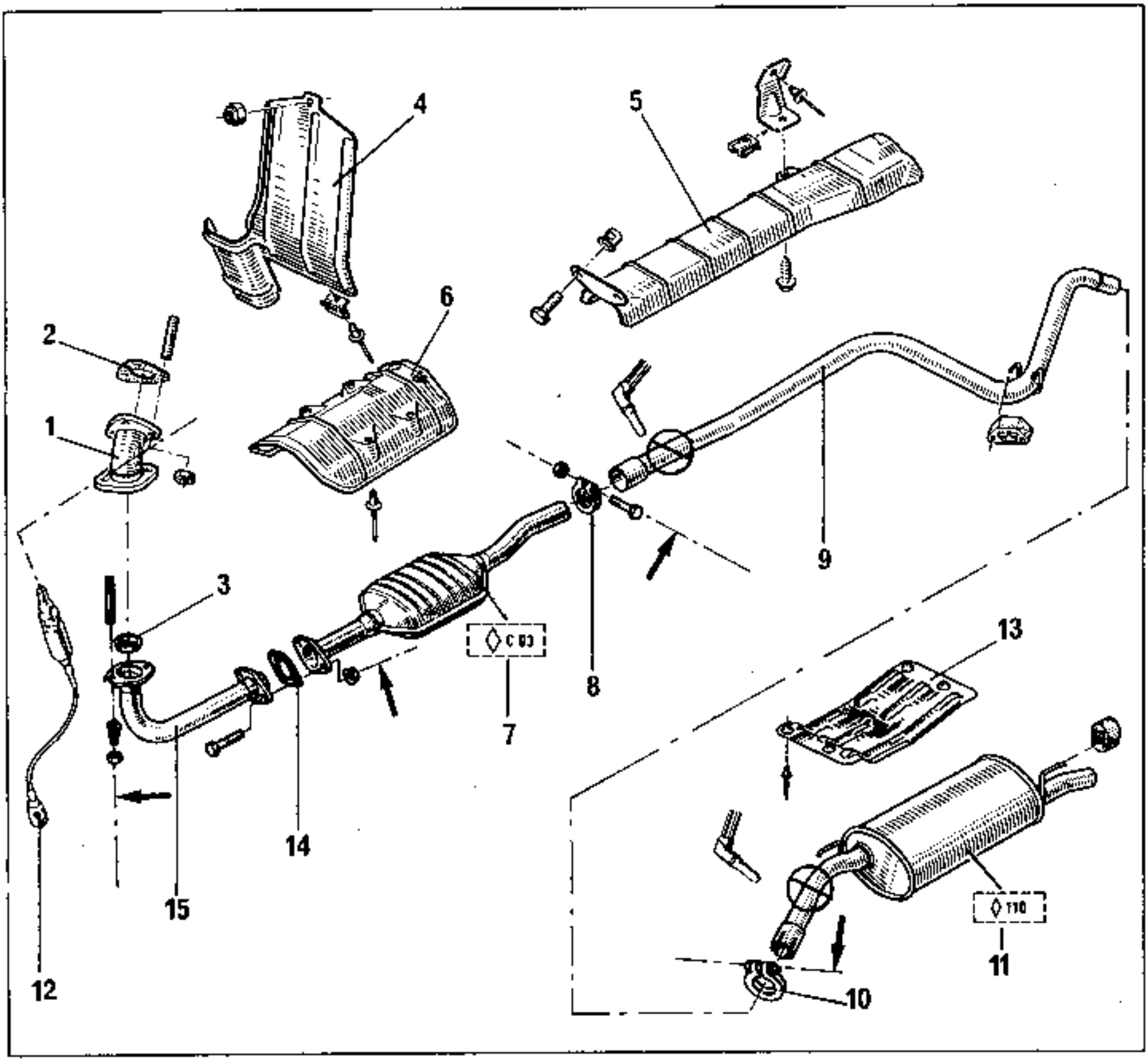
1. Manifold - down pipe gasket
2. Down pipe
3. Down pipe - catalyser seal
4. Catalyser or catalytic converter
5. Securing clamp
6. Expansion chamber + intermediate pipe
7. Securing clamp
8. Silencer
9. Expansion chamber shield
10. Catalyser shield
11. Scuttle and down pipe shield

B, C, F 407 :



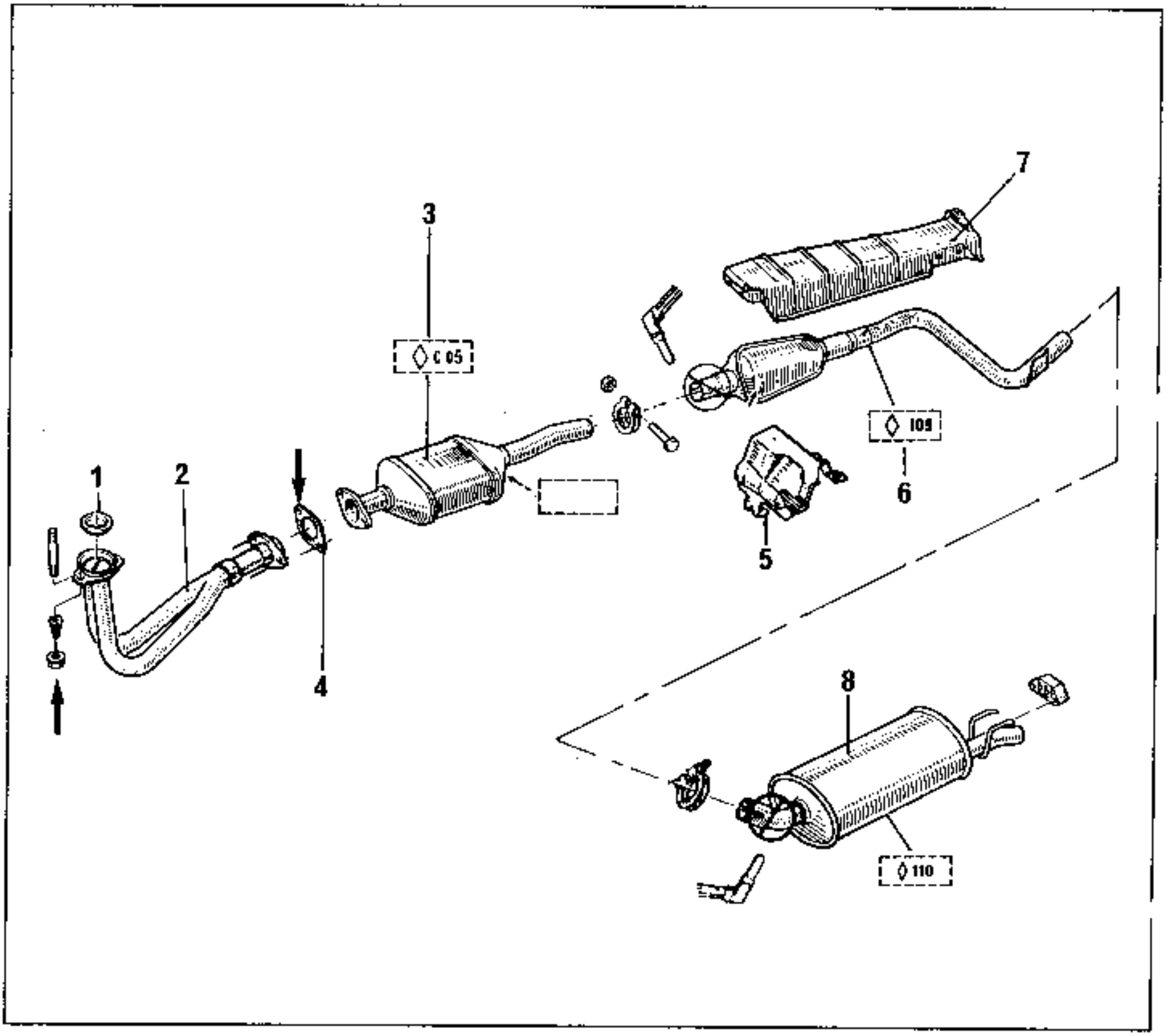
1. Connector between manifold and down pipe
2. Manifold - connector gasket
3. Connector - down pipe gasket
4. Scuttle shield
5. Intermediate pipe shield
6. Catalyser shield
7. Catalyser or catalytic pot
8. Securing clamp
9. Intermediate pipe
10. Securing clamp
11. Silencer
12. Oxygen sensor

B, C, F 407 1987 model year
B, C 408



1. Connector between manifold and down pipe
2. Manifold - connector gasket
3. Connector - down pipe gasket
4. Scuttle shield
5. Intermediate pipe shield
6. Catalyser shield
7. Catalyser or catalytic converter
8. Securing clamp
9. Intermediate pipe
10. Securing clamp
11. Silencer
12. Oxygen sensor
13. Silencer shield
14. Down pipe - catalyser gasket
15. Down pipe

C 409

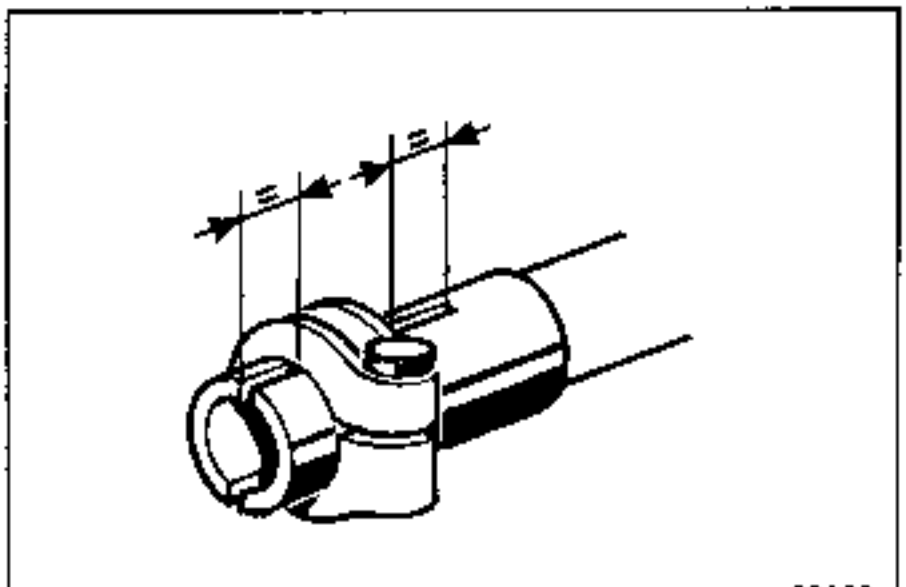


1. Gasket
2. Down pipe
3. Catalyser
4. Gasket

5. Shield
6. Intermediate pipe + expansion chamber
7. Shield
8. Silencer

To align the exhaust system correctly and tighten the clamps properly :

- tighten the various connections starting at the exhaust manifold and finish at the silencer,
- place the clamps so that their clamping areas pull down on to the split ends of the pipes and their gaps are between two of the slits in the pipe,

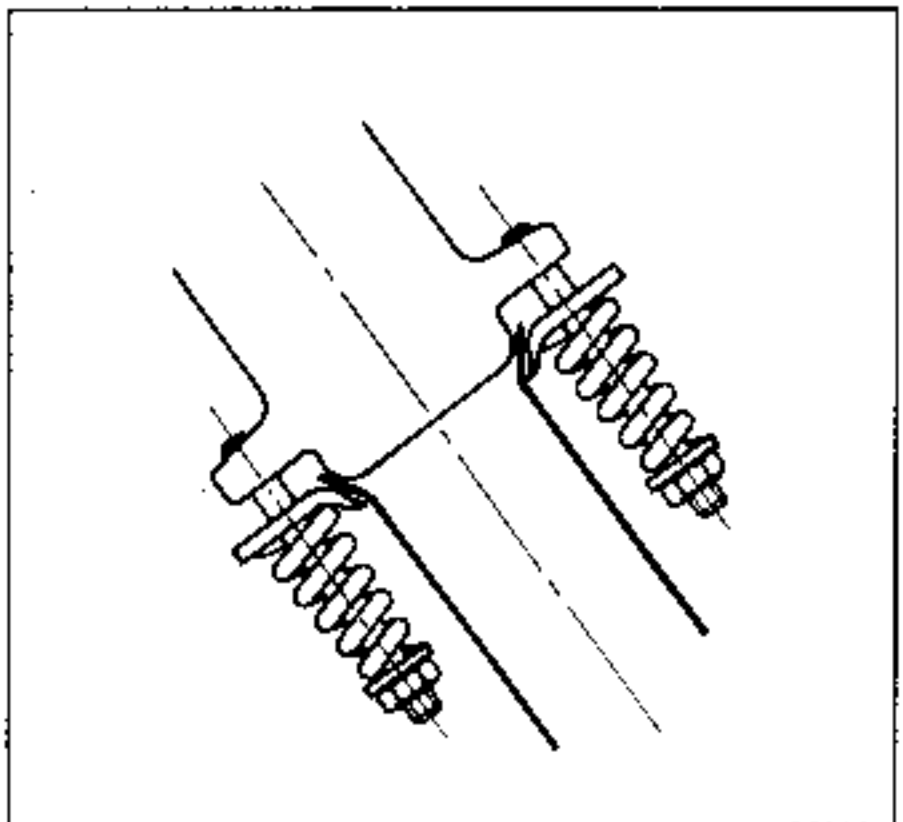


88123

- tighten the bolts on the clamps to the specified torque : 8 mm diameter bolts: 2 daN.m, to avoid distorting the pipe and the clamp as this can cause leakage.

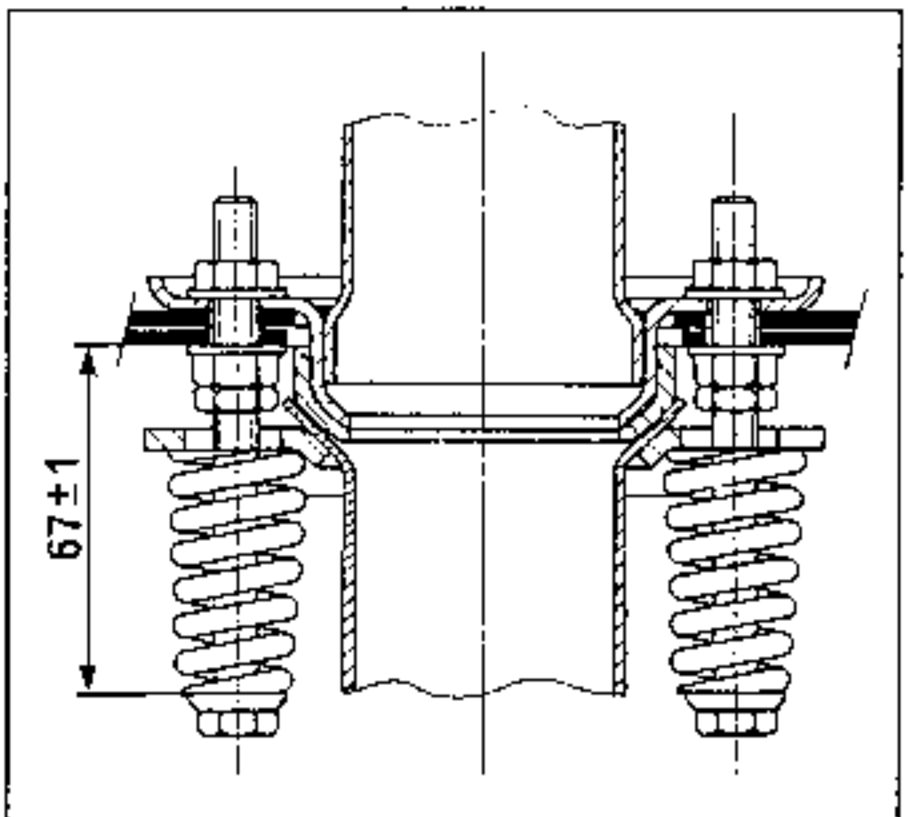
IMPORTANT : Any seal or gasket removed must be REPLACED by a new one.

Tightening the clamps :
All models except the C405


86013

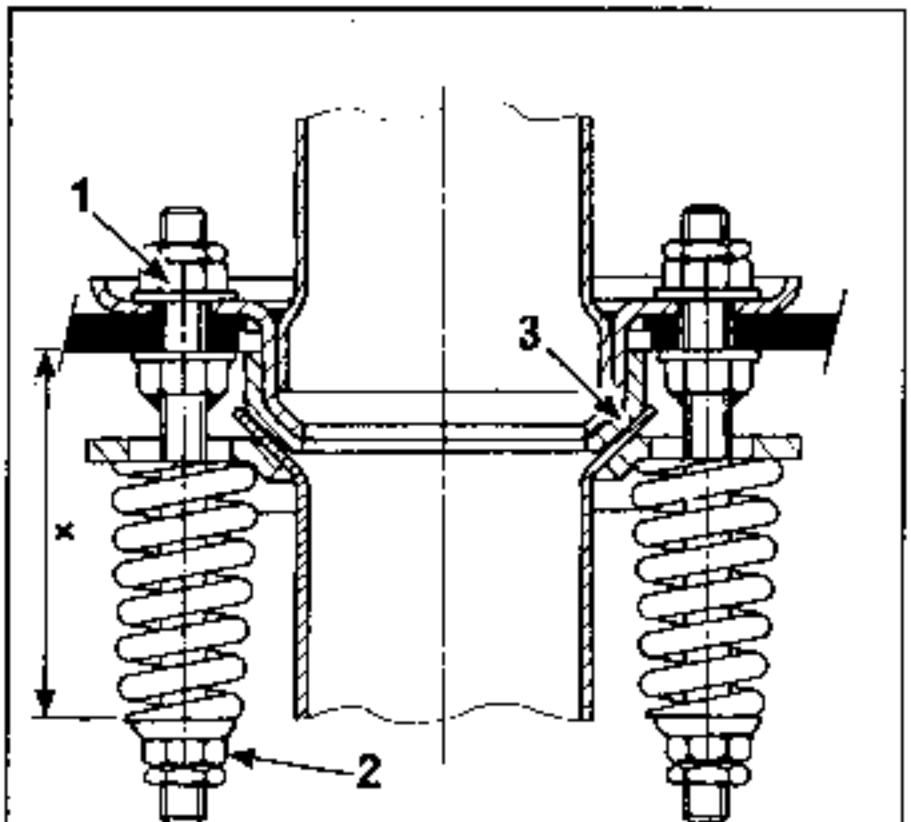
Tighten the springs until they are coil-bound, then loosen them by one and a half turns.
WARNING : Never leave the springs coil-bound, that is to say with their coils in contact with one another.
Removing on the C 405
The exhaust pipe is to be disconnected at the ball joint. Hold nut 1 and loosen 2.
Refitting :
Do not forget to fit the anti-grating washer 3. Pull up the springs, on the vehicle to the required pre-load. The pre-load should be $X = 67 \pm 1$mm.

1st arrangement :



88171

2nd arrangement :



88171-1

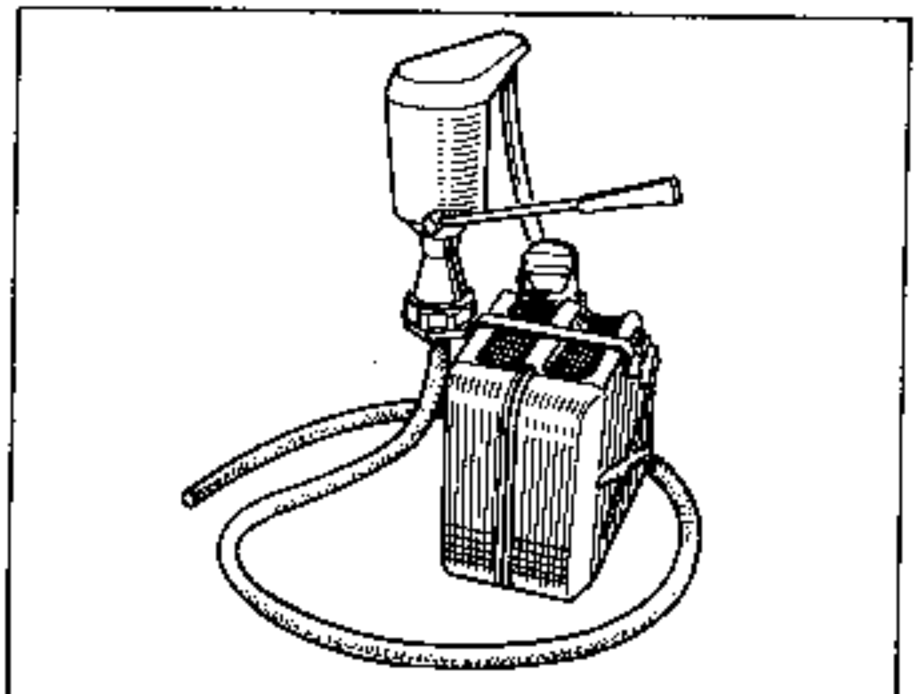
REMOVING :

Place the vehicle on a lift.

Before raising the vehicle :

- Disconnect the battery.
- Drain all the fuel from the tank using, for example, the "3000 piston pump".

To obtain this pump, contact your **local After-Sales Head Office.**

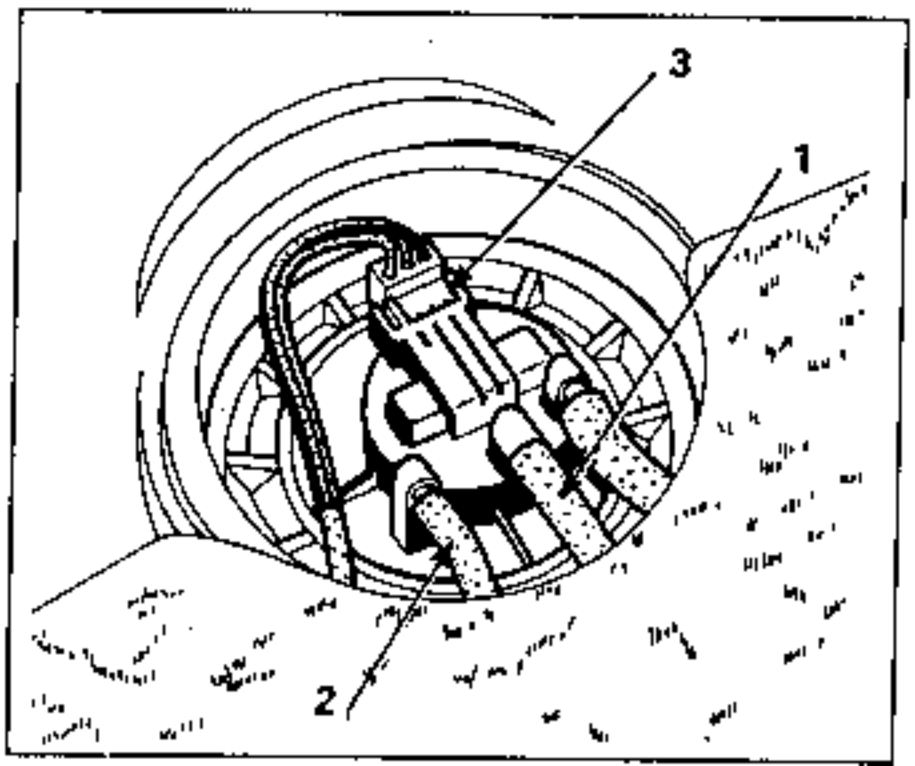


76003

Note : To fully empty the tank it may be necessary to pass the pump in through the fuel gauge tank unit aperture.

Tilt forward the rear seat, remove the cover and disconnect :

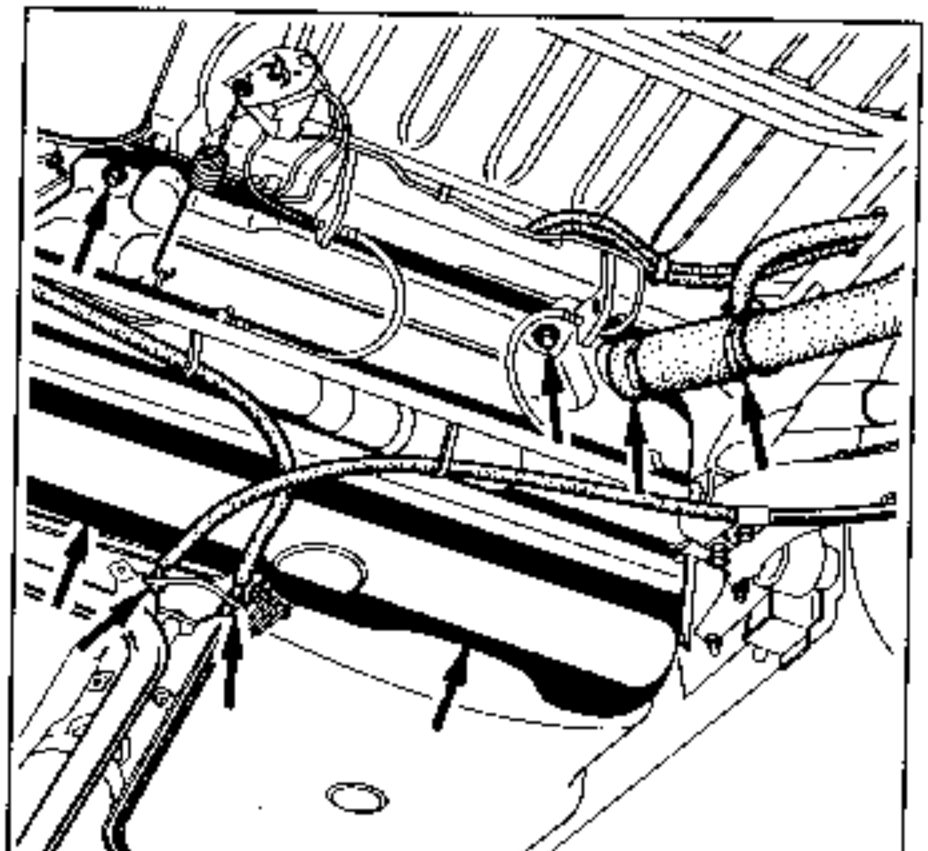
- the fuel output pipe (1),
- the fuel return pipe (2),
- the electrical connector (3).



Raise the vehicle and disconnect :

- the hand brake cables at the lever end,
- the exhaust system at the down pipe from the engine and move it as far forward as it will go on its suspension,
- the tank filler pipe and vent pipe.

Remove the 5 securing bolts and take out the tank.



88436

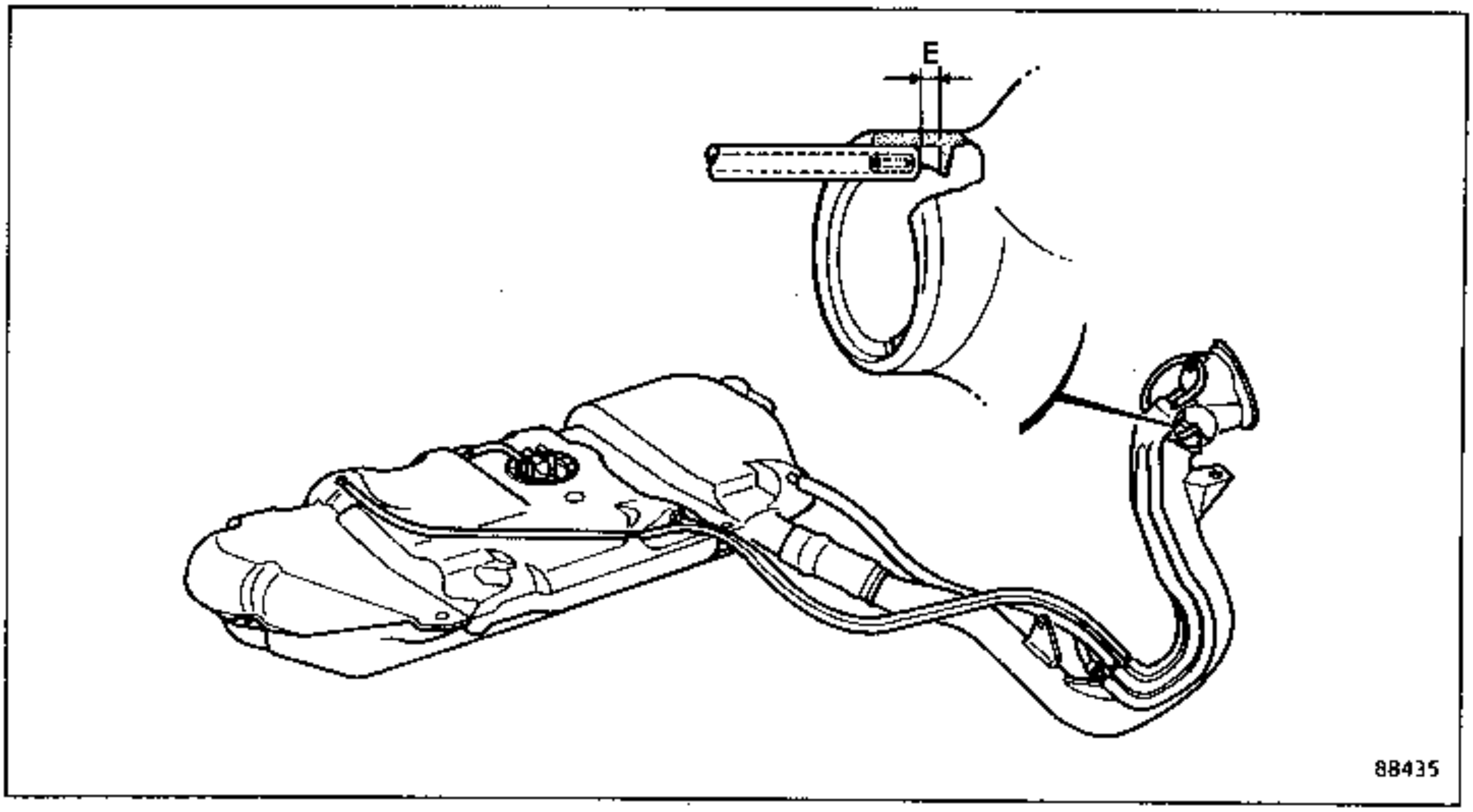
When refitting :

Ensure that the pipes are in the correct positions and correctly connected.

Resecure the filler pipe with new hose clips.

The fuel tank filler cap is of the "NON-VENTED" type. The tank is vented through pipe (5) which has a jet in it and which is located in the filler pipe funnel base.

WARNING : When pipe (5) is in place, a space (E) of approximately 5 mm must be left if the tank is to be correctly vented.

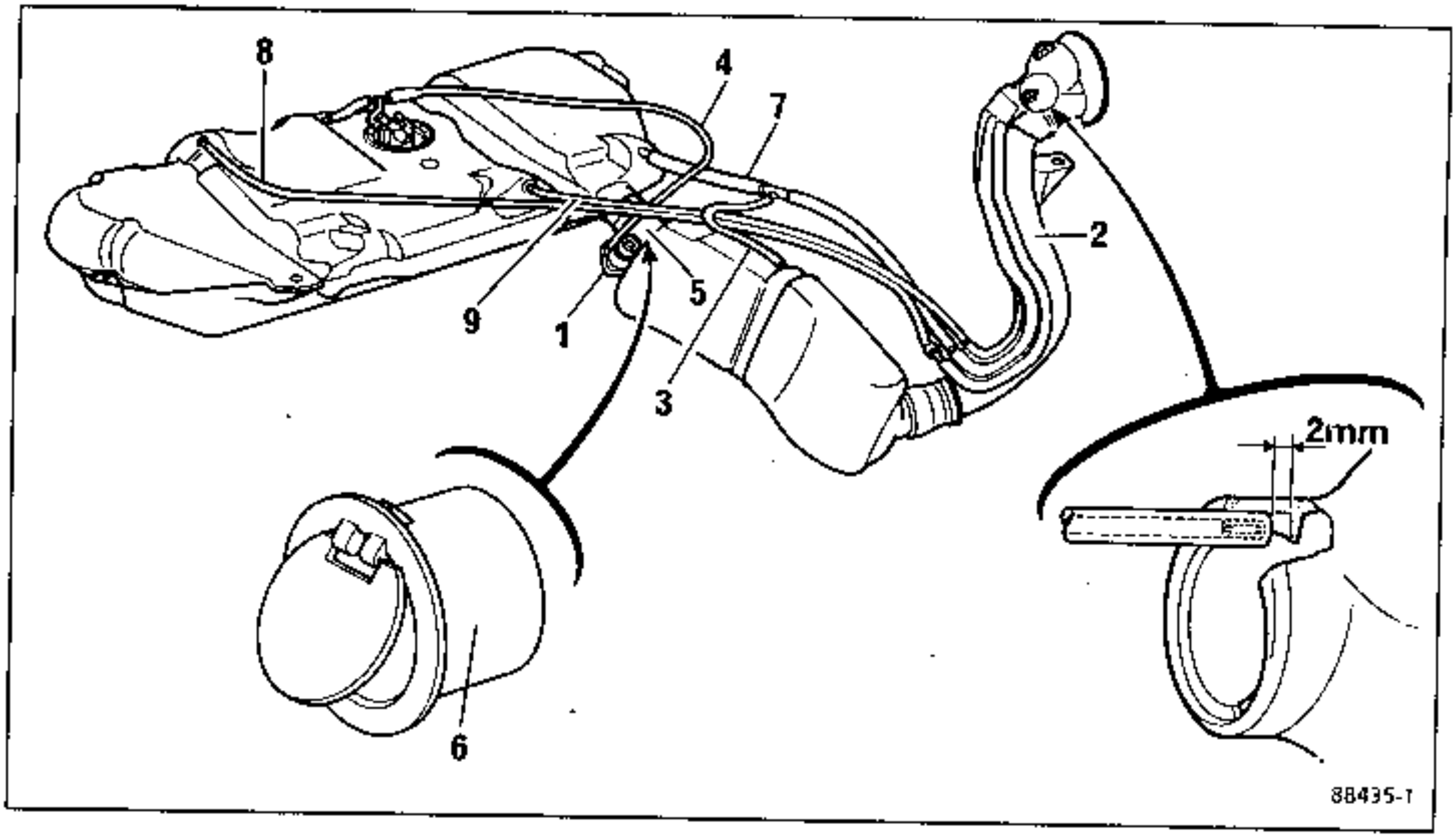


REMOVING THE MAIN TANK ONLY (special operations)

Drain the tank through the fuel gauge tank unit aperture.

Removing the main tank involves removing :

- The electric fuel pump together with its support and the fuel filter.
- Disconnecting the main fuel pipe (5).
- Disconnecting the vent pipes Nos. (7), (8) and (9) and the transfer pipe (4).



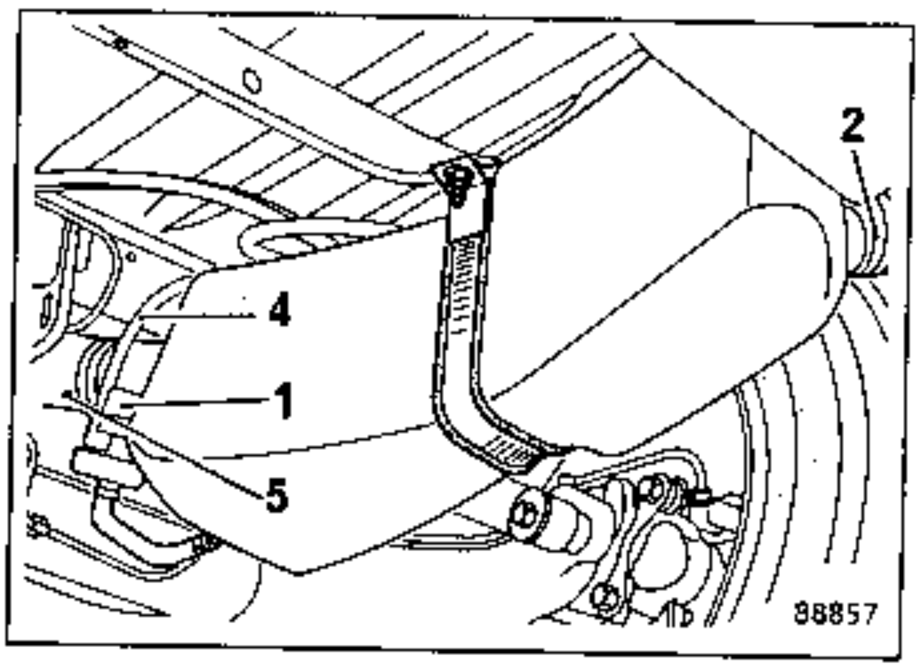
REMOVING THE AUXILIARY TANK :

Remove the spare wheel and its cradle.

Disconnect :

- The auxiliary pump connector (1)
- The filler pipe (2)
- The vent pipe (3)
- The transfer pipe to the main tank (4)
- The filler pipe (5).

On refitting, ensure that the non-return valve (6) is refitted with its slot upwards.



This vehicle is equipped with a 7 litre auxiliary tank that increases the total capacity to 50 litres.

FILLING :

When the tanks are filled with fuel, it flows :

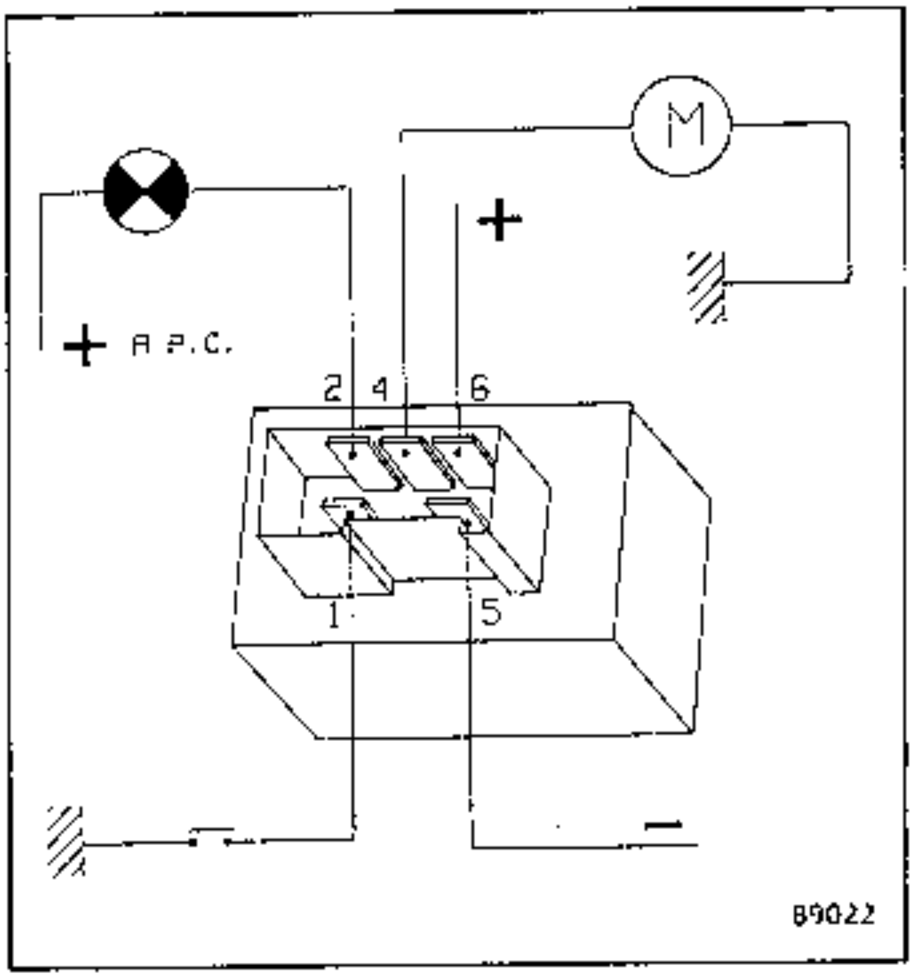
- down the filler pipe
- into the auxiliary tank
- through the connecting pipe between the 2 tanks in which there is an anti-transfer non-return valve (the function of which is to prevent fuel being transferred from the main tank to the auxiliary tank with changes in the vehicle attitude).
- and fills the main tank from which it feeds the engine.

NORMAL OPERATION :

The fuel is taken directly from the main tank by the main fuel pump.

FUEL TRANSFER FROM THE AUXILIARY TANK INTO THE MAIN TANK :

When the fuel level reaches a pre-determined threshold in the main tank, for 5 seconds, the minimum fuel level warning light on the instrument panel will switch on and the auxiliary tank pump will run for 40 seconds (to transfer fuel from the auxiliary tank into the main tank).



1. Fuel gauge
2. Minimum fuel warning light after ignition switch
4. M : auxiliary fuel pump
5. Earth
6. Main fuel pump signal (tachometer relay)

+ APC : + after ignition switch.

WARNING : If the vehicle runs out of fuel or the main tank runs dry, to facilitate starting and to reduce the length of time during which the starter will be running, we recommend :

- either pouring more than 10 litres of fuel into the tank through the filler pipe (after running out of fuel),
- or pouring a few litres into the tank through the fuel gauge tank unit aperture (after draining).

If this action is not taken, the starter will have to rotate, continuously, for more than 1 minute, to fill the systems before the engine will start.

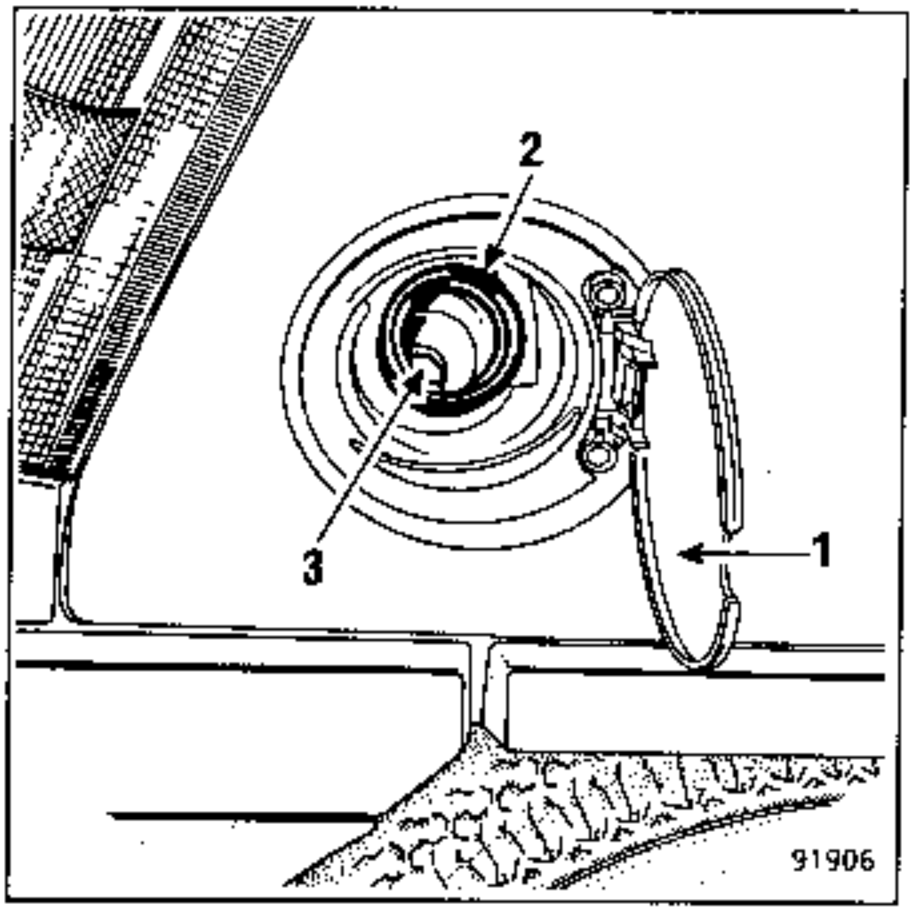
Filling the fuel tank of vehicles adapted to run on unleaded petrol.

This type of vehicle is only to be filled with unleaded petrol and the filler pipe is therefore equipped :

- with a smaller aperture that is too small for a leaded petrol type filler nozzle.

- a valve closing off the filler pipe.

The filler pipe flap has, on its inside, a label stating, in three languages (English, French and German) that the vehicle is designed for unleaded petrol.



1. Flap
2. Filler pipe
3. Valve

The fuel supply system on C 405 and C 409 vehicles is identical.

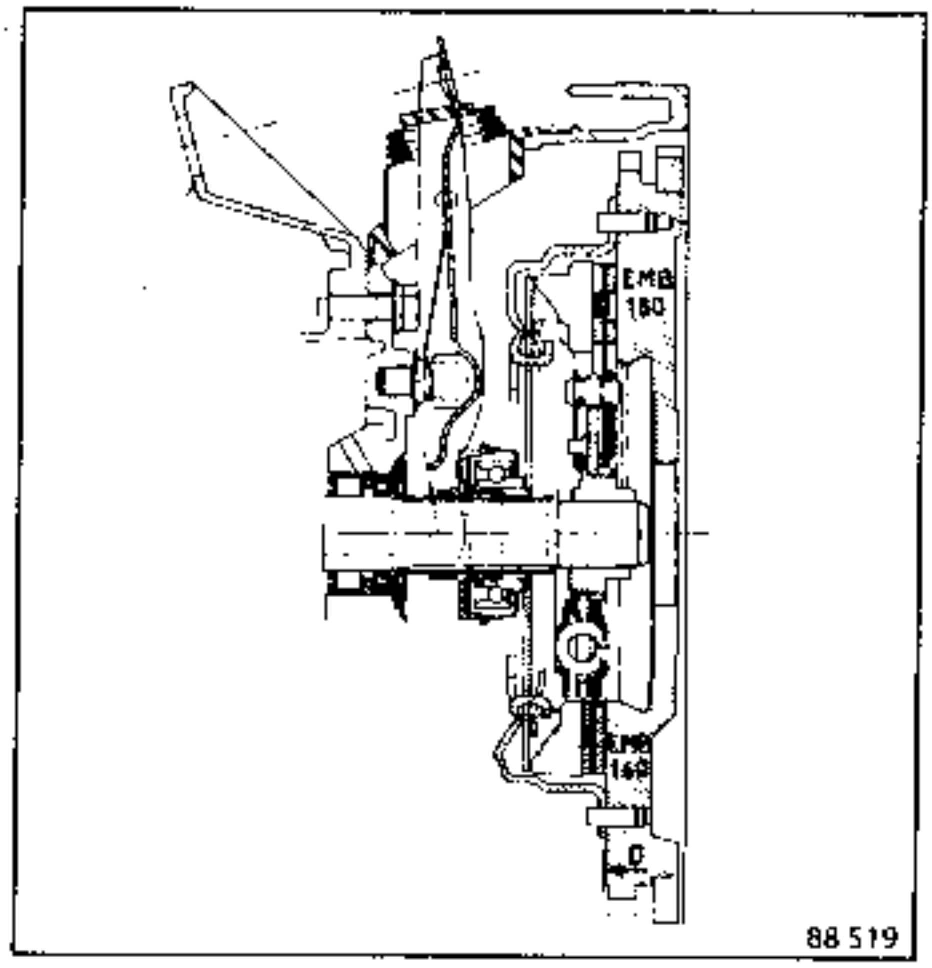
Single disc, cable controlled clutch, operating dry.

Diaphragm spring type clutch plate.

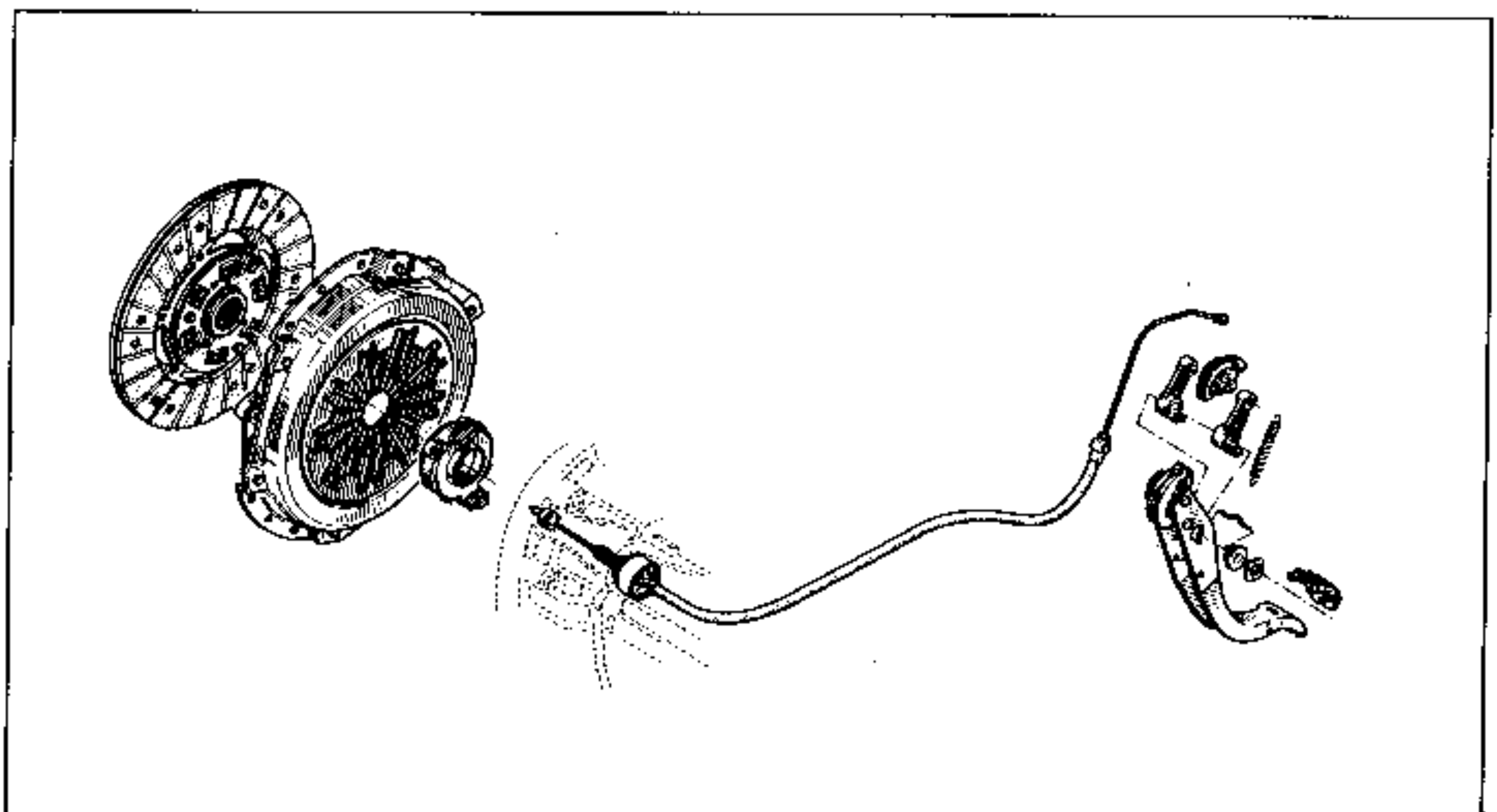
Elastic hub type clutch disc.

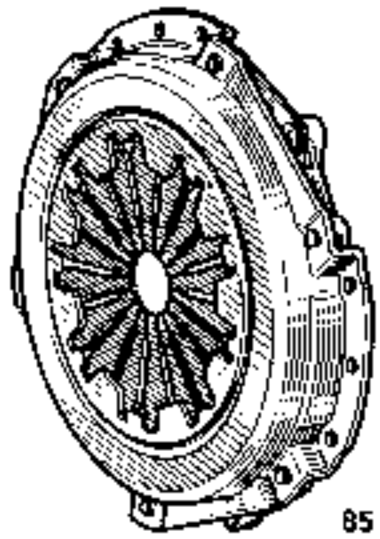
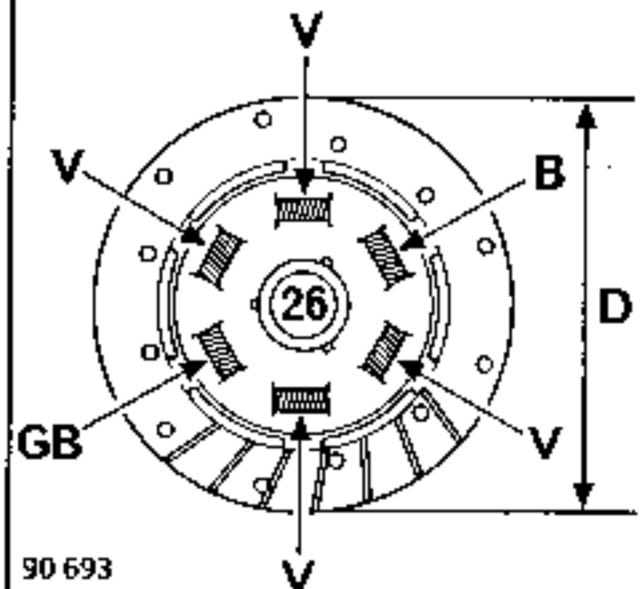
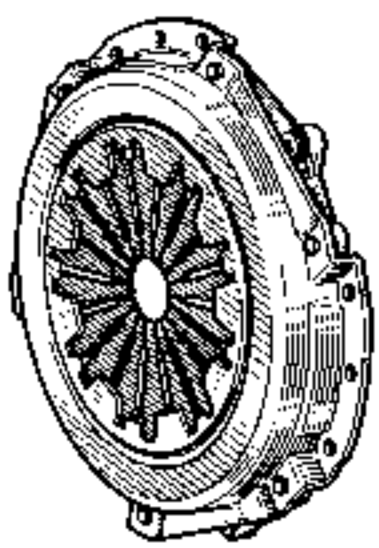
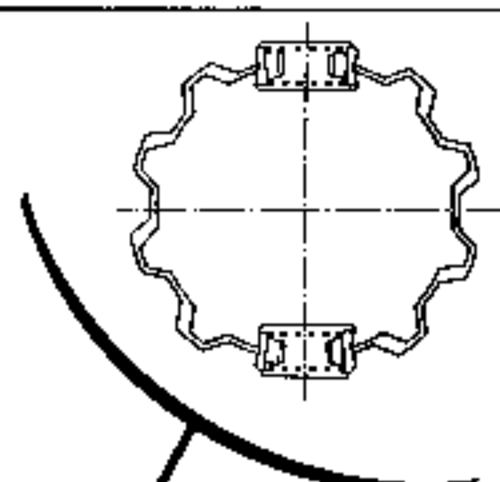
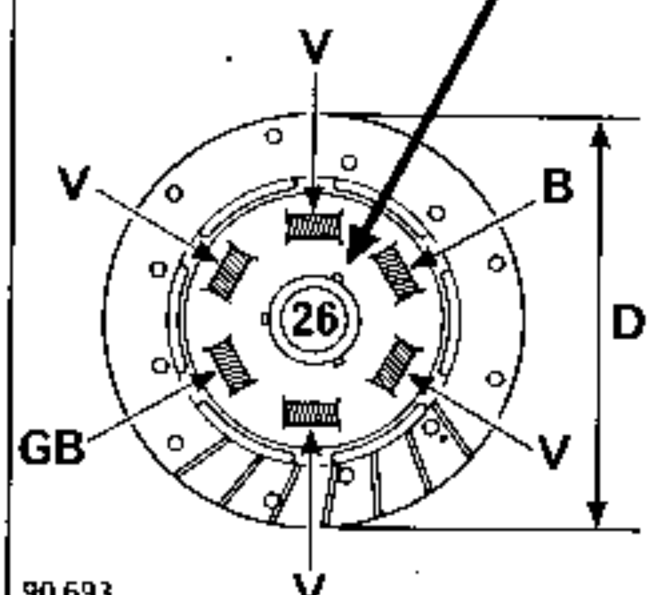
Self-centering guided ball type release bearing, in permanent contact.

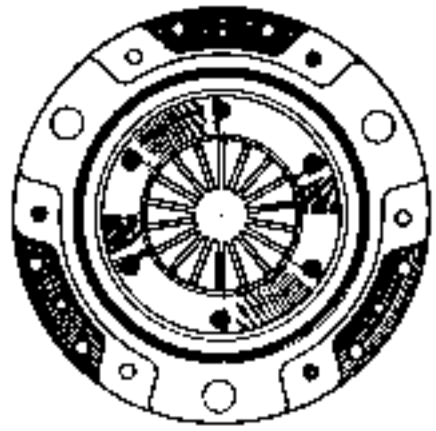
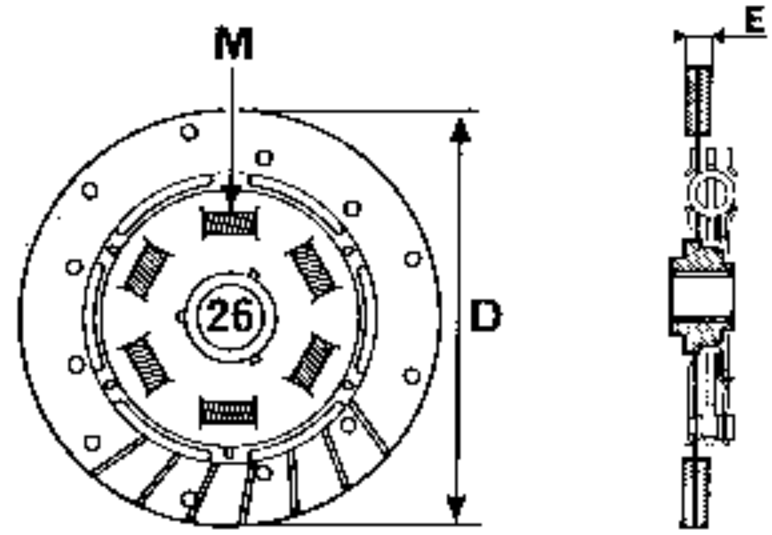
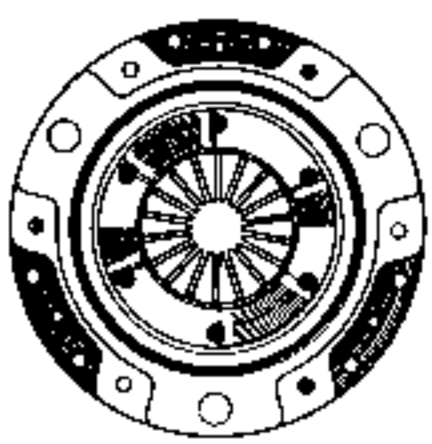
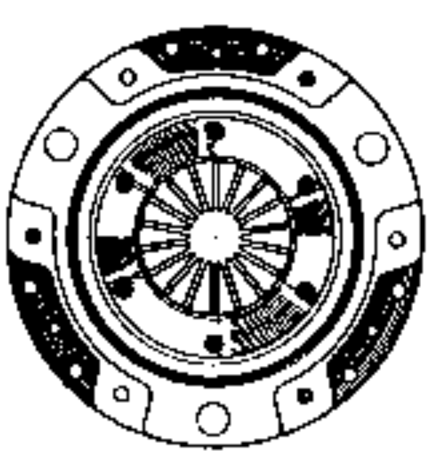
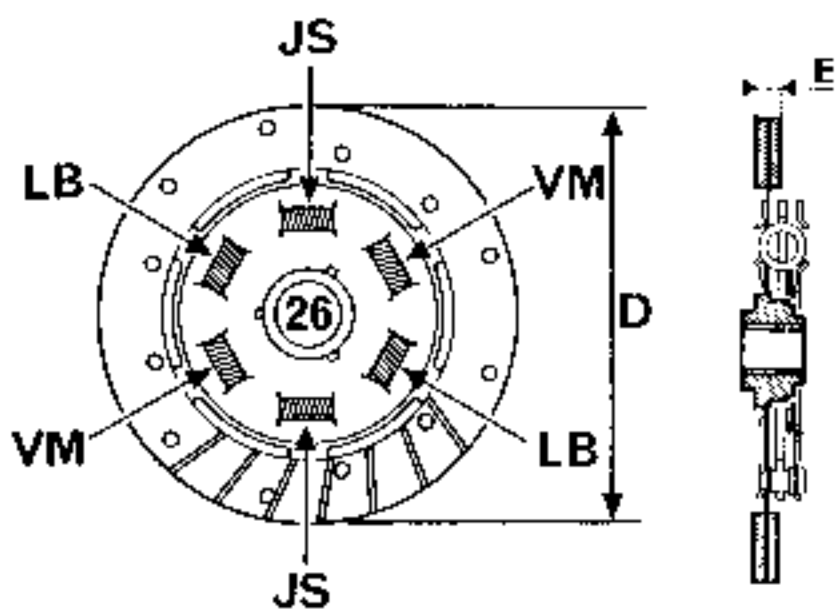
Automatic wear take-up system.



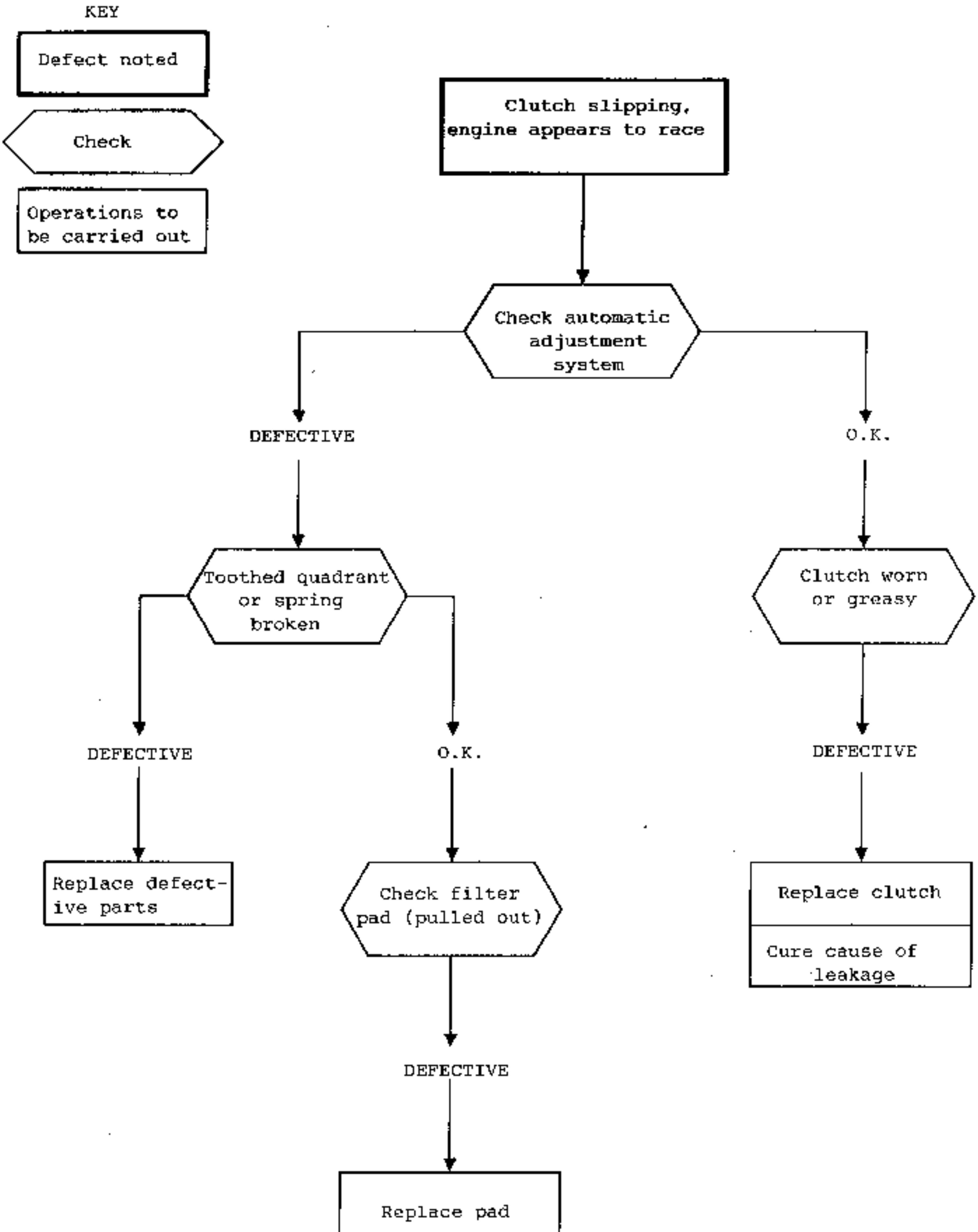
Exploded view

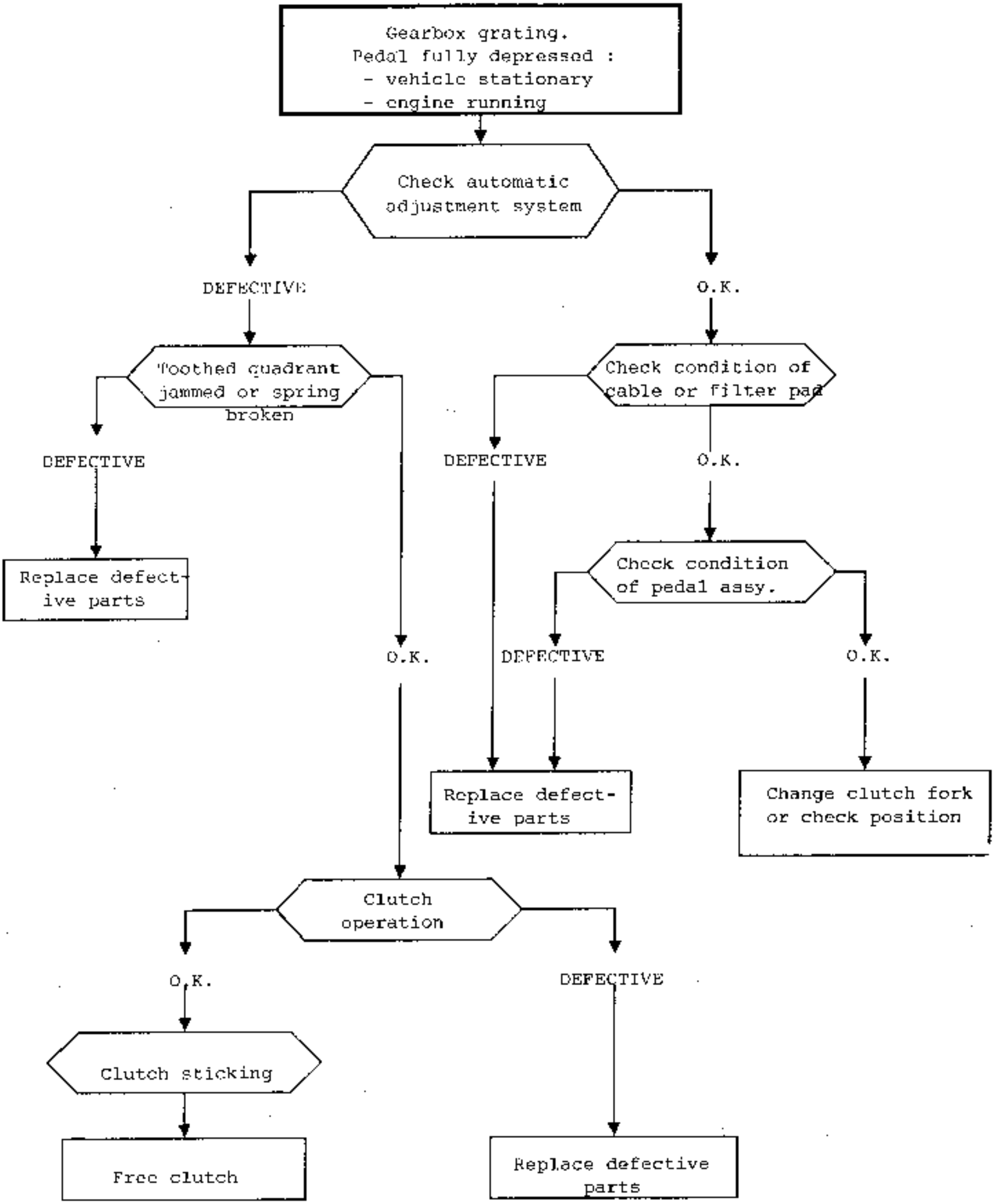


VEHICLE TYPE	ENGINE TYPE	CLUTCH UNIT	DISC
B/C/F400 B/C/S/F401 B/C/F402 B/C403 B/C/F407 B/C/F/S40F B/C/F40H B/C40J B/C/F40M	C1C C1E C1J C2J C3J C1G C1E C2J C2J	 85 873 **180 CP 335**	 90 693  76 906 **26** splines B = White E = 7,7 mm GB = Blue grey D = 181,5 mm V = Green
B/C404 S404 F404	F8M	 85 873 **180 CP 335**	 90 748  90 693  76 906 Special features : 2 additional springs on the hub. **26** splines B = White E = 7,7 mm GB = Blue grey D = 181,5 mm V = Green

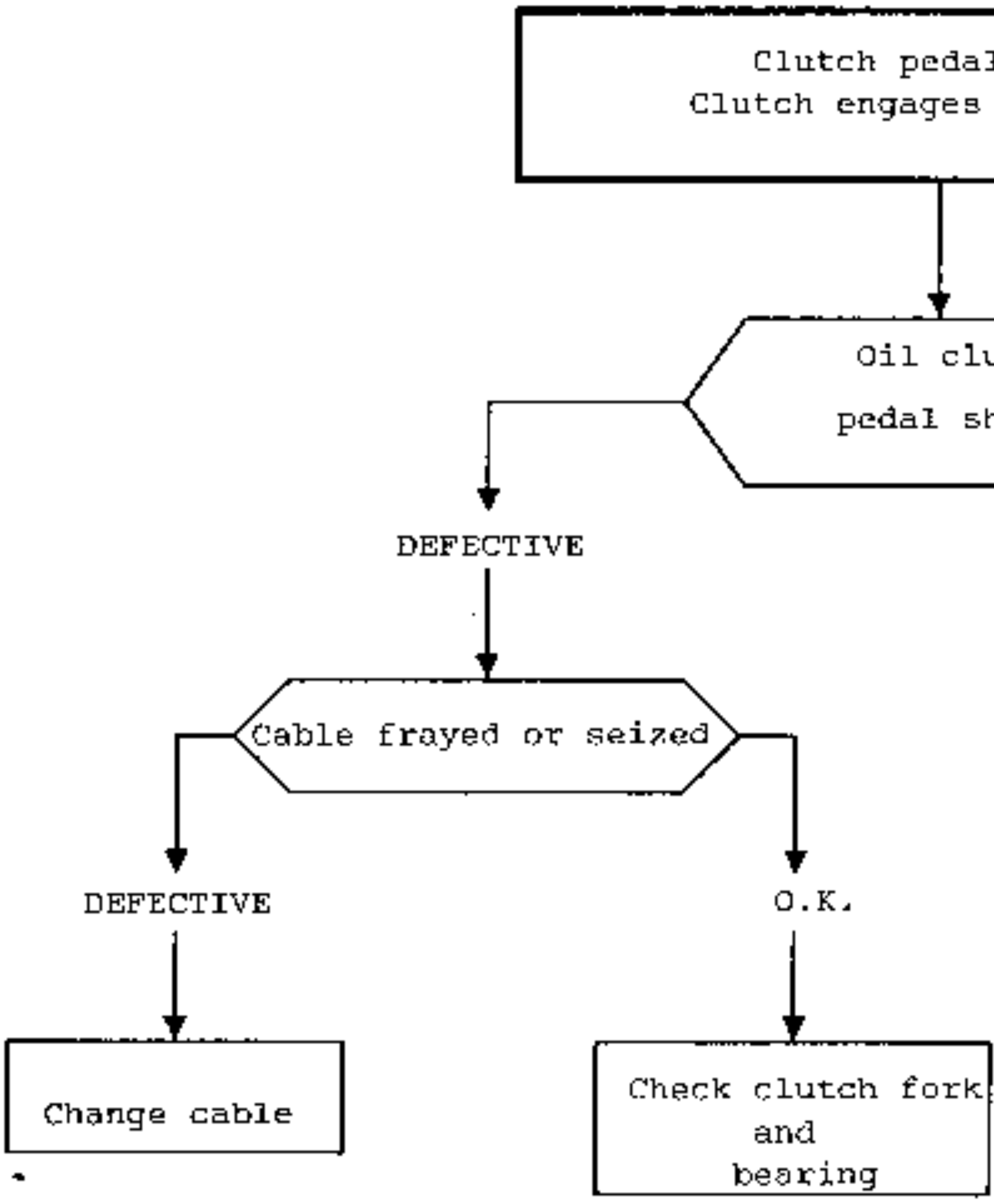
VEHICLE TYPE	ENGINE TYPE	CLUTCH UNIT	DISC
B/C408 C409 B/C40G B/C40K	F3N F3N F2N F2N	 76 907 **200 CP 425**	90 693  76 906 **26** splines M = 6 light pink springs E = 7,7 mm D = 200 mm
C405	C1J	1er TYPE  76 907 **200 CP 410** 2ème TYPE  76 907 **200 CP 425**	 90 693 76 906 **26** splines E = 7,7 mm D = 200 mm VM = Moss green JS = Sand yellow LB = Light mauve

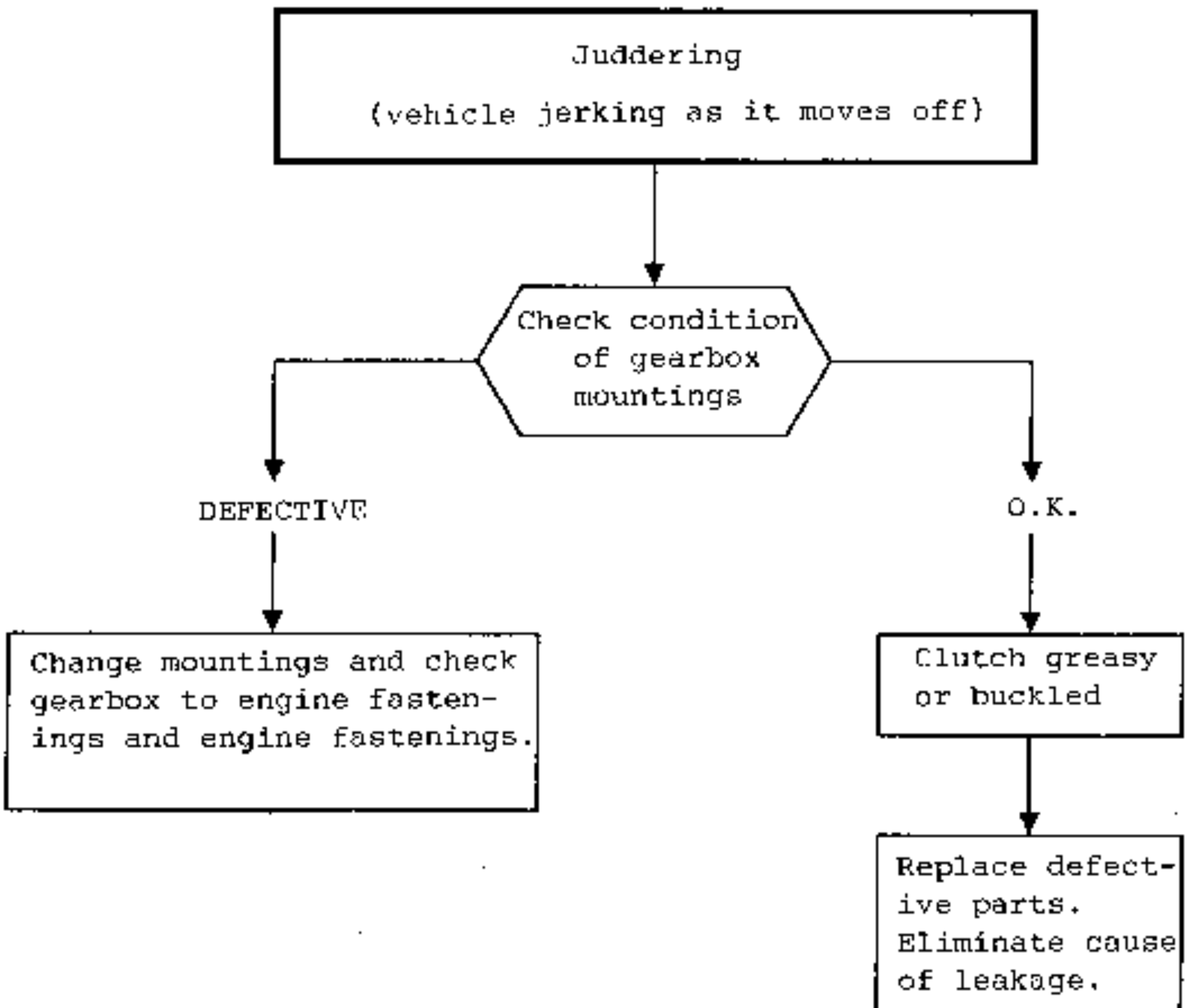
Type	Pack size	Part no.	Unit
Grease No. 20	1 gr sachet	77 01 032 832	RH planet wheel splines (Shaft splines Clutch (Fork pivot (Release bearing guide (Fork pads
CAF 4/60 THIXO	100 gr tube	77 01 404 452	Ends of drive shaft spring pins
LOCTITE 518	24 ml syringe	77 01 421 162	Housing assembly faces

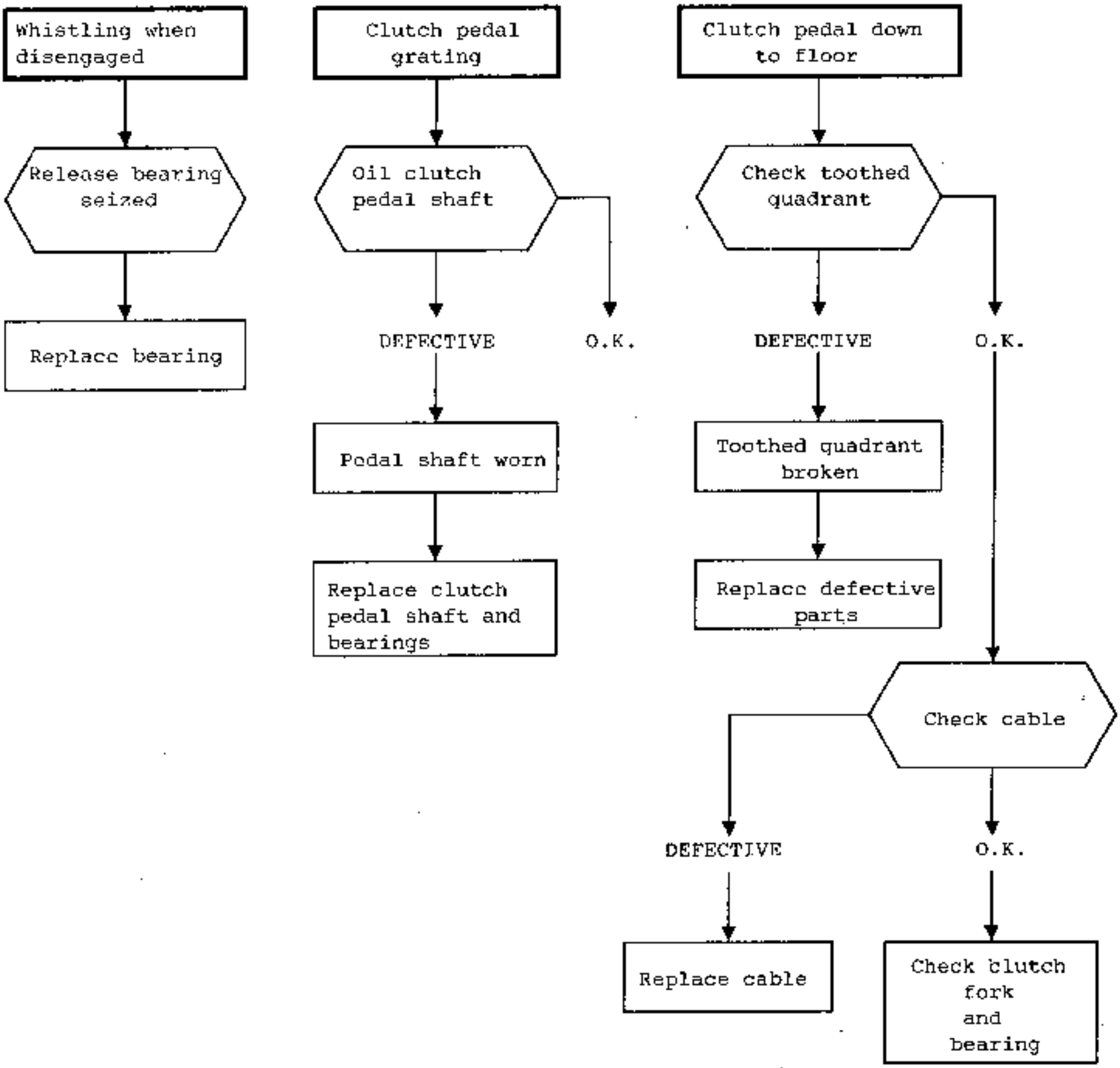

KEY
Defect noted
Check
Operations to be carried out
Clutch slipping, engine appears to race
Check automatic adjustment system
DEFECTIVE
O.K.
Toothed quadrant or spring broken
Clutch worn or greasy
DEFECTIVE
O.K.
DEFECTIVE
Replace defective parts
Check filter pad (pulled out)
Replace clutch
Cure cause of leakage
DEFECTIVE
Replace pad



Rare. Occurs after vehicle not used for some time (several days)


Clutch pedal grating.
Clutch engages violently.
Oil clutch pedal shaft
DEFECTIVE
O.K.
Cable frayed or seized
DEFECTIVE
O.K.
Change cable
Check clutch fork and bearing


Juddering
(vehicle jerking as it moves off)
Check condition of gearbox mountings
DEFECTIVE
O.K.
Change mountings and check gearbox to engine fastenings and engine fastenings.
Clutch greasy or buckled
Replace defective parts. Eliminate cause of leakage.


Whistling when disengaged
Release bearing seized
Replace bearing
Clutch pedal grating
Oil clutch pedal shaft
DEFECTIVE
O.K.
Pedal shaft worn
Replace clutch pedal shaft and bearings
Clutch pedal down to floor
Check toothed quadrant
DEFECTIVE
O.K.
Toothed quadrant broken
Replace defective parts
Check cable
DEFECTIVE
O.K.
Replace cable
Check clutch fork and bearing

This operation is carried out after first removing the gearbox.

ESSENTIAL SPECIAL TOOLS	
Mot. 582	Retainer
Plus tooling required to remove gearbox	

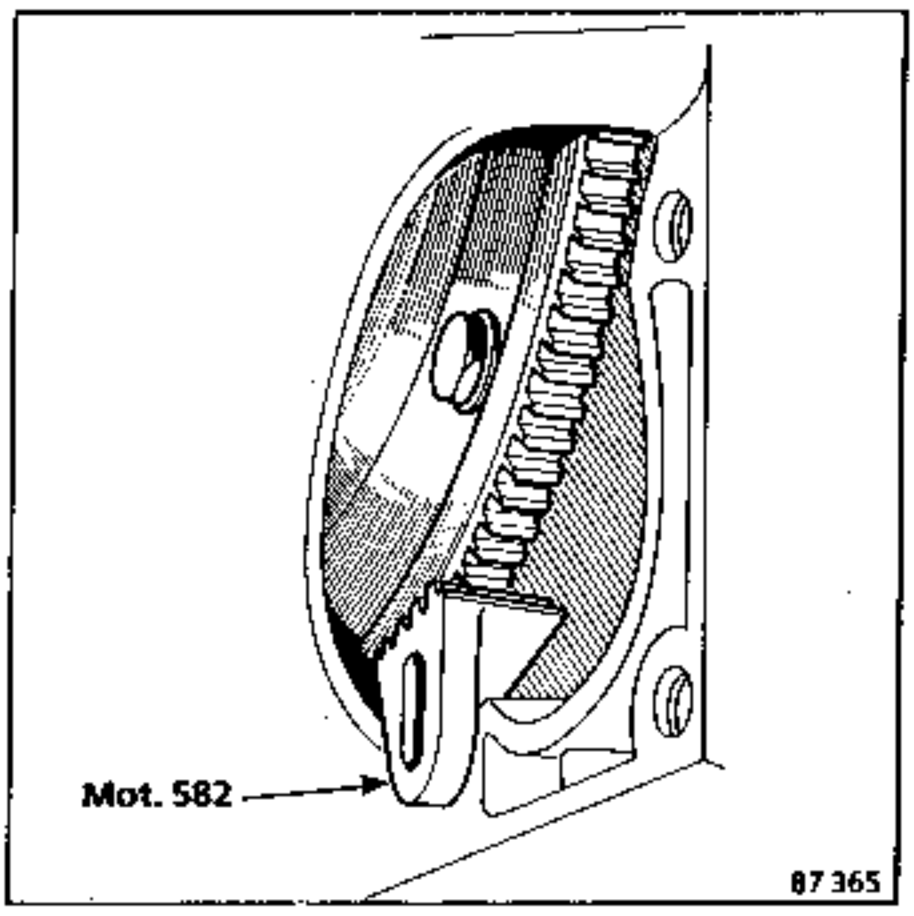
TIGHTENING TORQUES (in daN.m)	
Unit securing bolts	**2,5**

REMOVING

Fit retainer Mot.582.

Remove the clutch unit securing bolts and take out the clutch unit and disc.

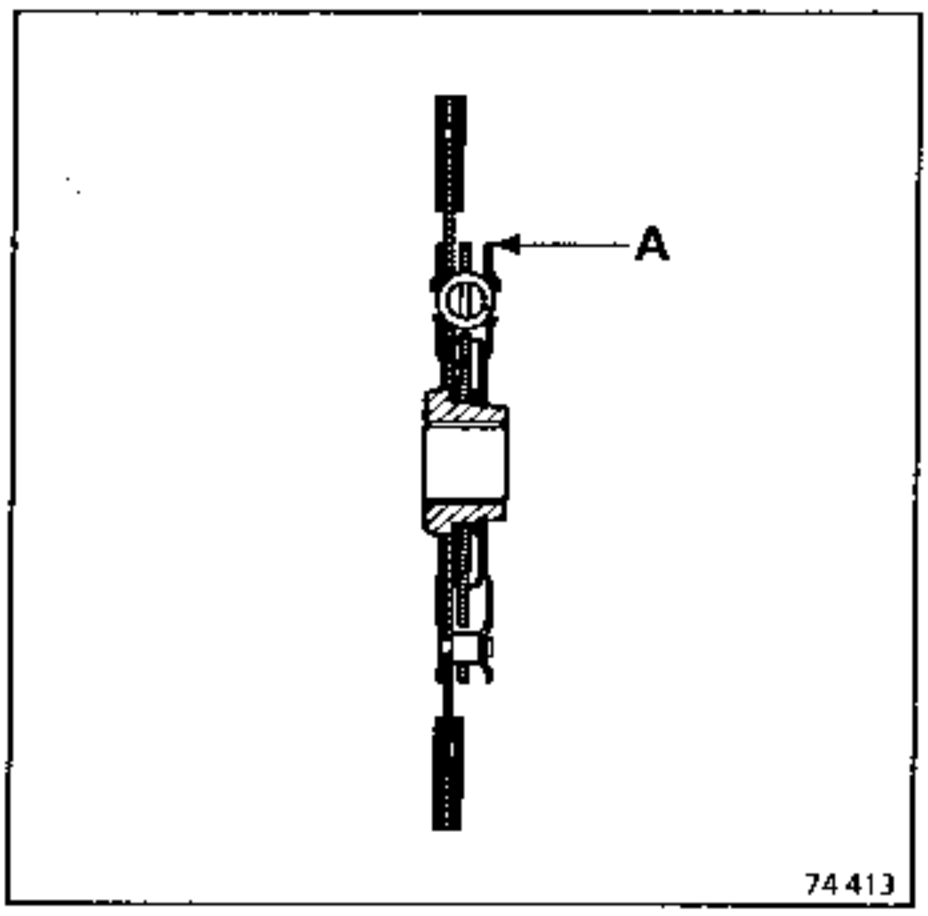
Check and replace any defective parts.



REFITTING

Degrease the mounting face on the flywheel.

Place the disc in position (with offset (A) on the hub towards the gearbox) : centralise it, visually, without using a tool.



Screw up the unit securing bolts, evenly, then tighten them to torque.

Remove the retainer Mot.582.

Coat the bore in the release bearing, the guide tube and the splines on the clutch shaft with grease No. 20 (MOBIL X 57030).

After refitting the gearbox, reset the toothed quadrant and check that the play take-up system operates correctly.

This operation is carried out after first removing the gearbox.

REMOVING

Remove the release bearing by tilting the fork.

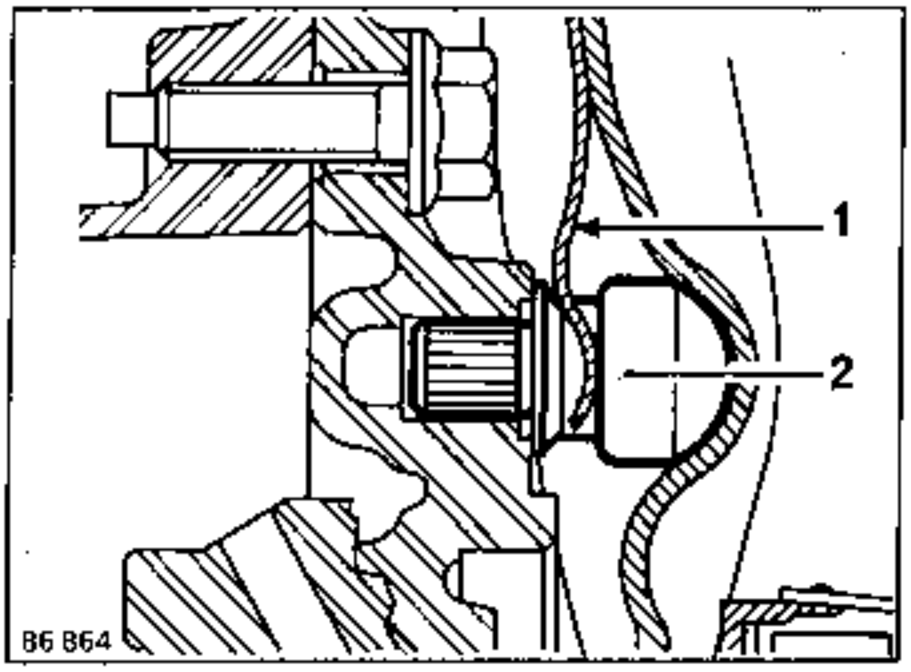
Remove the rubber protector and pull the fork towards the inside of the clutch housing.

REFITTING

Coat the walls of the guide tube and the pads on the fork with grease No. 20 (77 01 032 832).

Early type

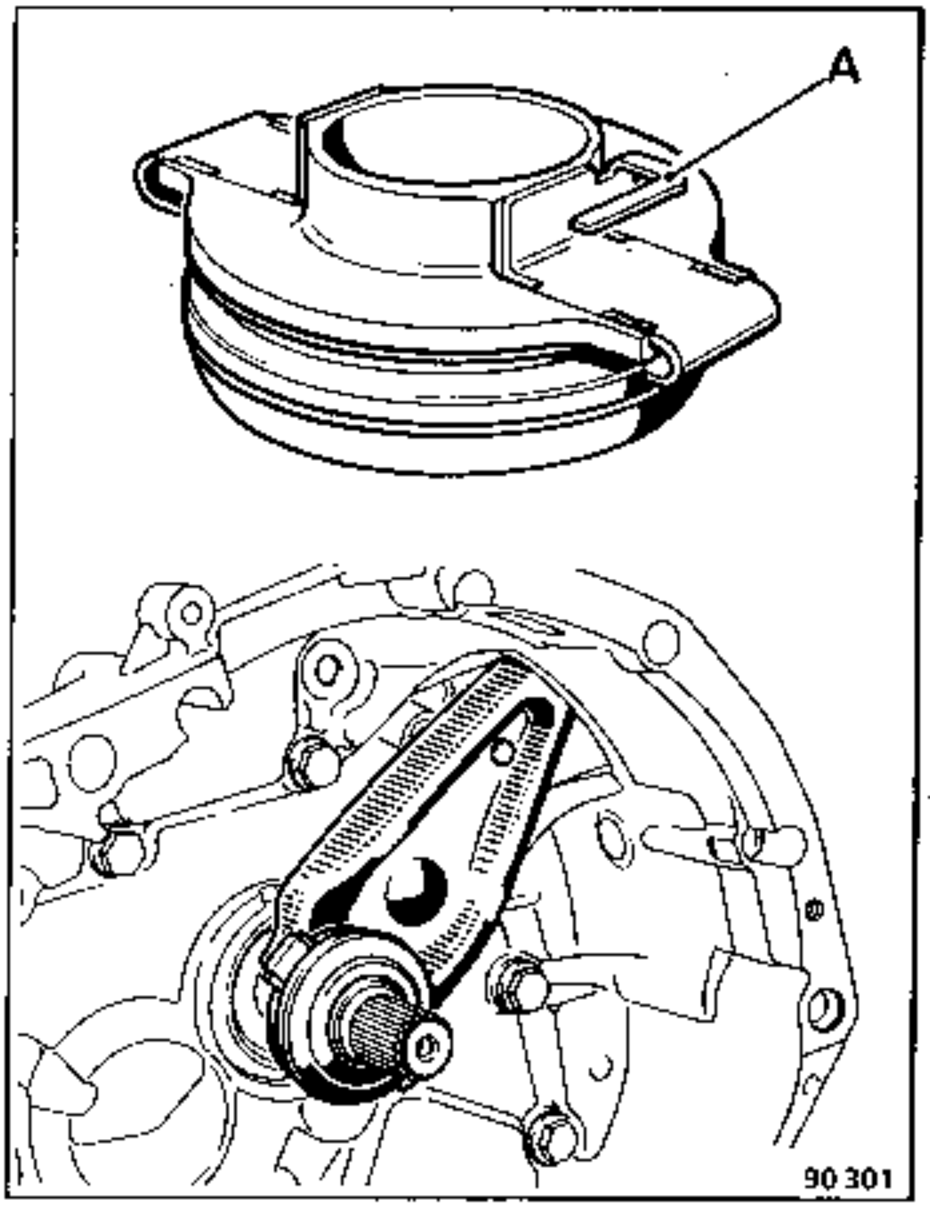
Fit the fork, placing the spring (1) behind the cup (2) on the pivot.



Later type

The spring (1) locating the clutch fork on the pivot has been discontinued.

Place the release bearing on the guide tube, inserting the lug (A) into the fork.



Refit the rubber protector.

Ensure that the mechanism operates correctly.

NOTE : when carrying out work that does not involve removing the gearbox, or after refitting the gearbox, DO NOT lift the fork as the lug (A) could slip out of the release bearing.

This operation is carried out after removing the gearbox and taking off the clutch housing.

See Workshop Manual "B.V. JB", section entitled "Separating the Housings".

TIGHTENING TORQUES (in daN.m)	
Housing bolts	2,5

REMOVING

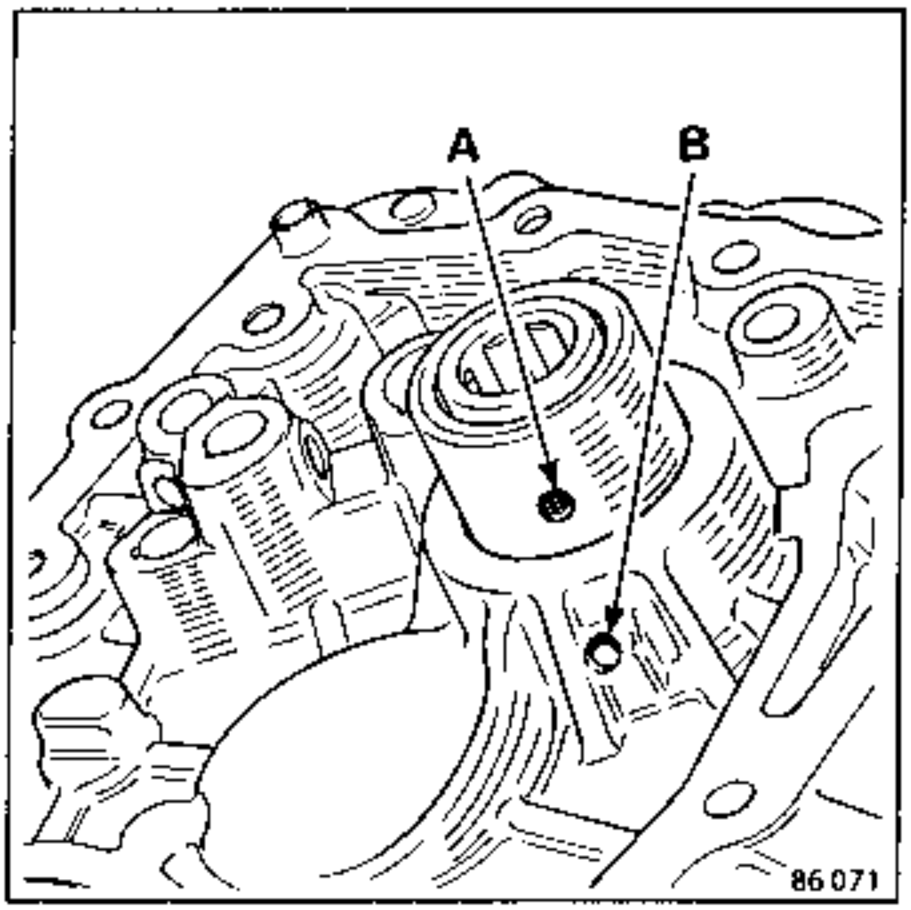
Extract the guide tube on the press.

After the guide tube has been removed, it cannot be re-used.

REFITTING

Apply a film of grease No. 20 (MOBIL X 57030) to the walls of the bore.

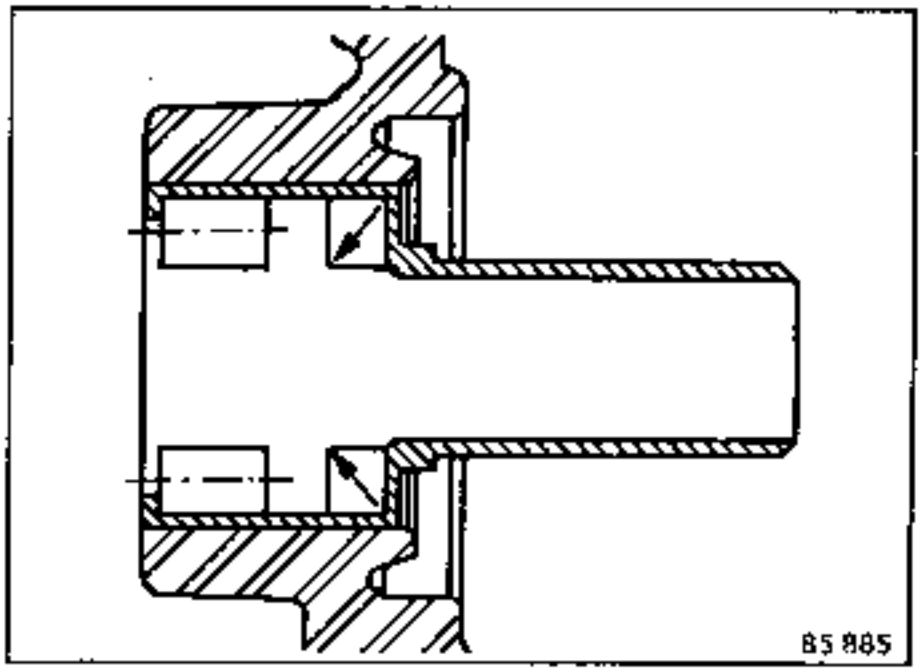
Align the bearing lubrication hole (A) in the guide tube with the hole in the clutch housing (B).



Insert the guide tube, on the press, until it is fully against the internal face on the housing.

Oil the seal before fitting the shaft.

Wrap masking tape round the splines on the clutch shaft.

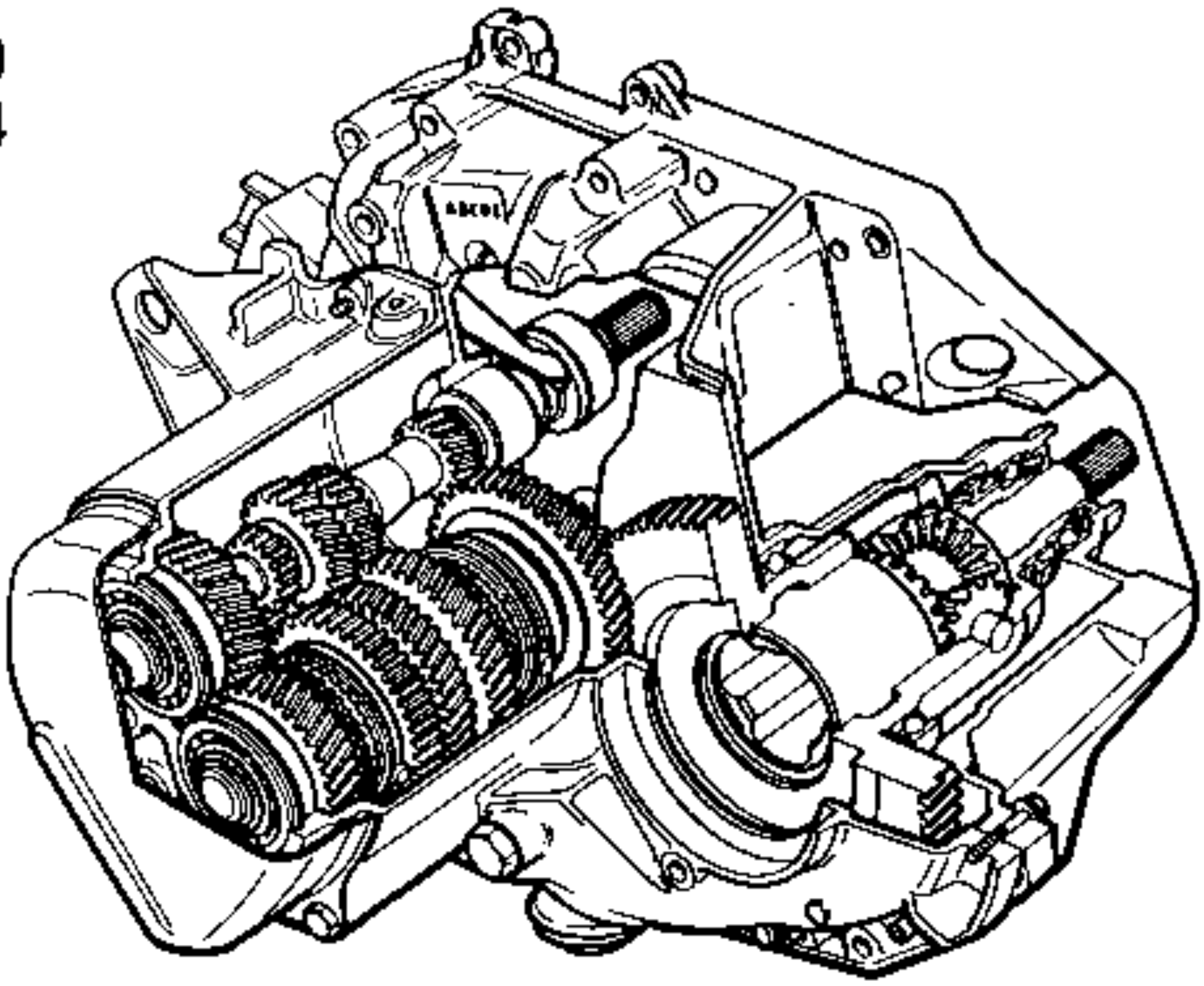


Coat the face of the housing with Loctite 518.

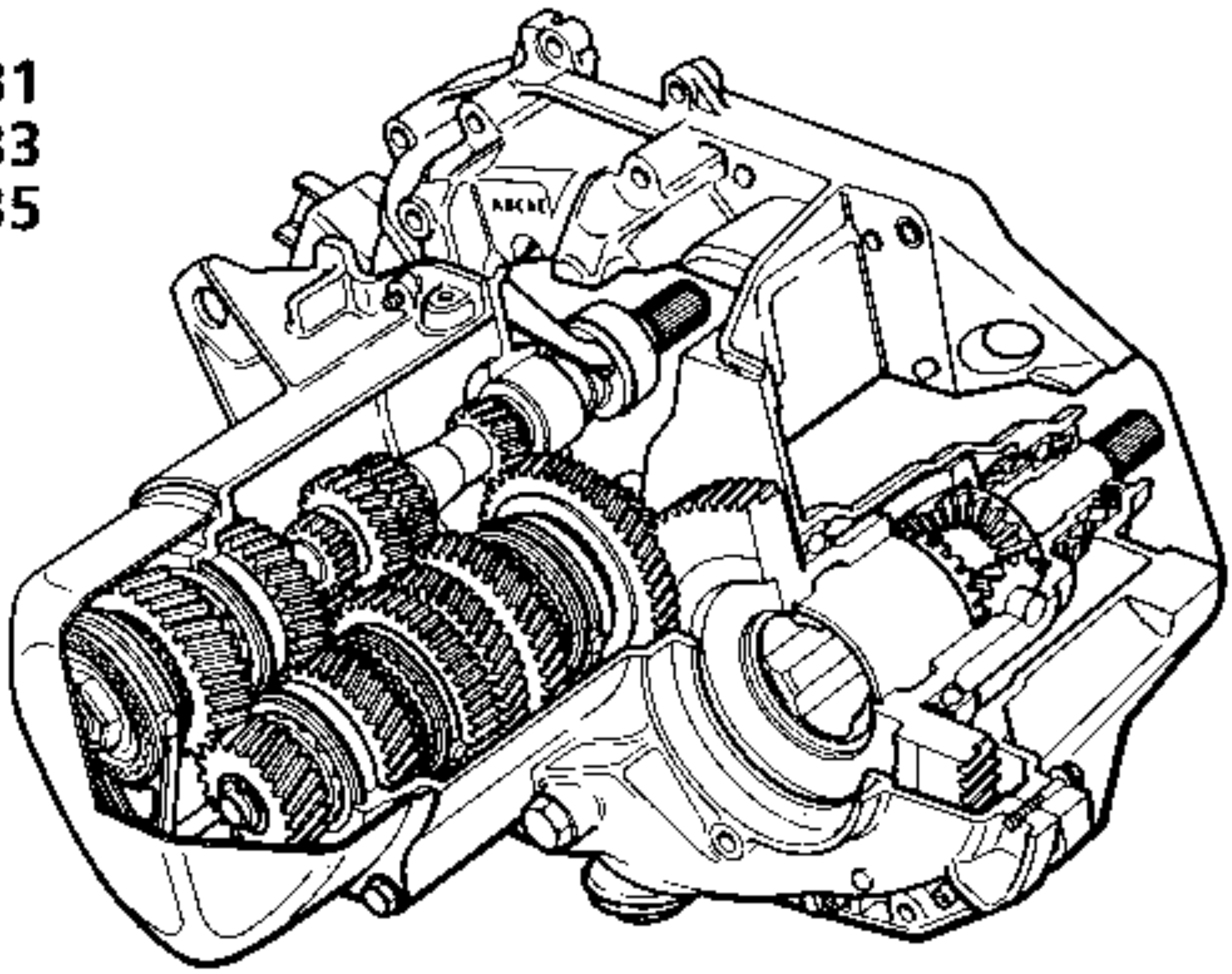
Refit the housing and secure it in place by tightening its bolts to a torque of 2.5 daN.m.

Coat the release bearing guide tube with grease No. 20 (MOBIL X 57030).

JB0
JB4



JB1
JB3
JB5

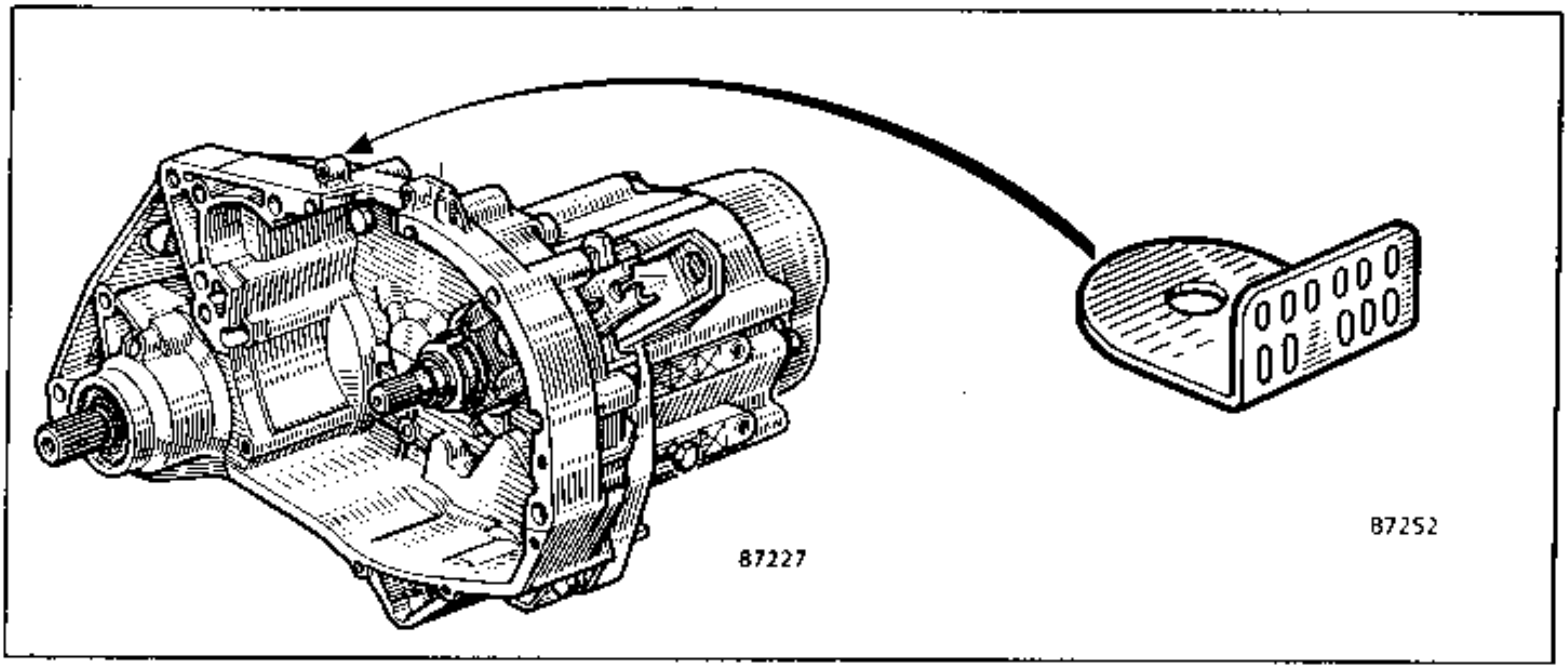


These vehicles are equipped with type JB gearboxes.

The operations involved in overhauling these gearboxes are covered by Workshop Manual "B.V. JB".

In this section, therefore, we shall only describe the following operations :

- Removing - Refitting the gearbox.
- Removing - Refitting the 5th speed gears on the vehicle.
- Removing - Refitting the external gear shift control.
- Replacing the differential outlet seal.



An identfiication plate secured to the clutch housing shows :

At **A** : the gearbox type
At **B** : the gearbox index number
At **C** : the serial number
At **D** : the factory at which it was produced
At **E** : the engine type with which the gearbox is used

COLOUR CODING

2/3 of the surface is painted with a colour that identifies the gearbox type to ensure that it is fitted with the correct drive shafts.

The remaining 1/3 of the surface is painted with a code colour that identifies the gearbox index number.

Gearbox type	COLOUR CODING	
	Entire surface	2/3 of surface
	Early type	New type
JB0	Red	Orange
JB1	Red	Red
JB2	Black	Aluminium
JB3	Black	Black

For all type JB4 and JB5 gearboxes, the colour coding consists of two colours (green and pink) in bands of equal width.

The following gearboxes :

JB0) 4 forward speeds
JB4) 1 reverse

JB1) 5 forward speeds
JB3)
JB5) 1 reverse

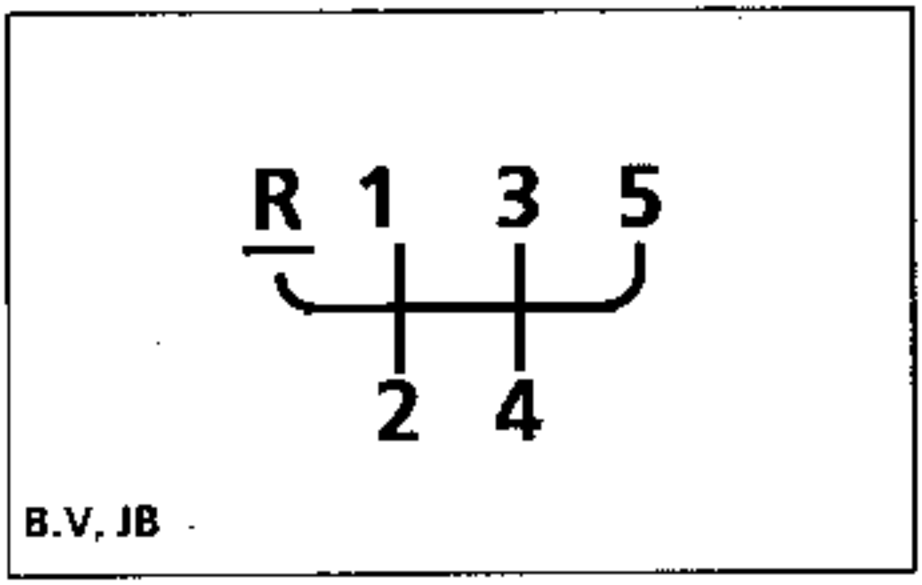
are equipped with BORG-WARNER synchronisers.

Type JB4 and JB5 gearboxes differ from JB0 - JB1 and JB3 gearboxes mainly at the following points :

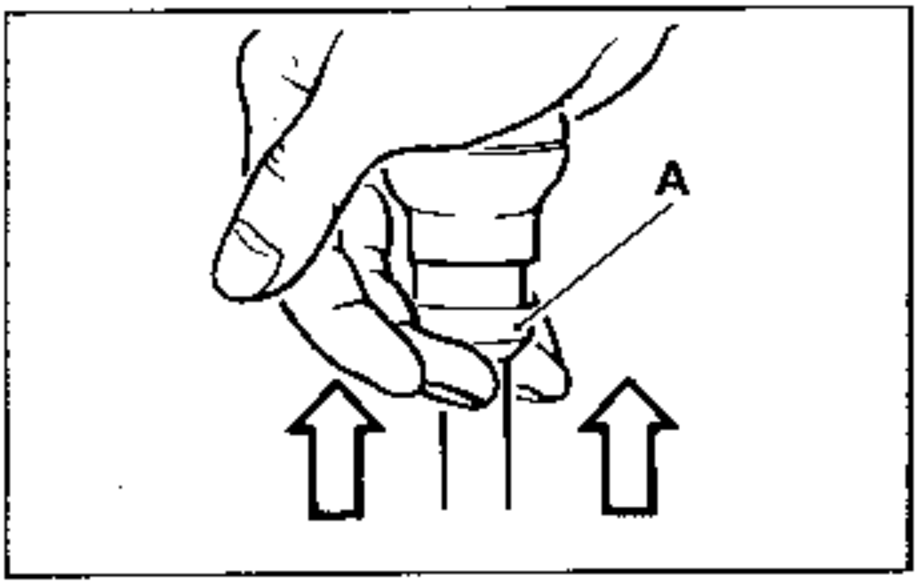
- the dimensions of the clutch housing, gearbox housing and gear trains,
- the differential housing which is light weight cast iron and the crown wheel which is narrower,
- the sun wheels which have lightened tail shafts and lobes,
- the guide tube arrangement.

The component parts of these units are not interchangeable.

GEAR SHIFT GATE



To select reverse, lift the lock release ring (A) and move the lever.



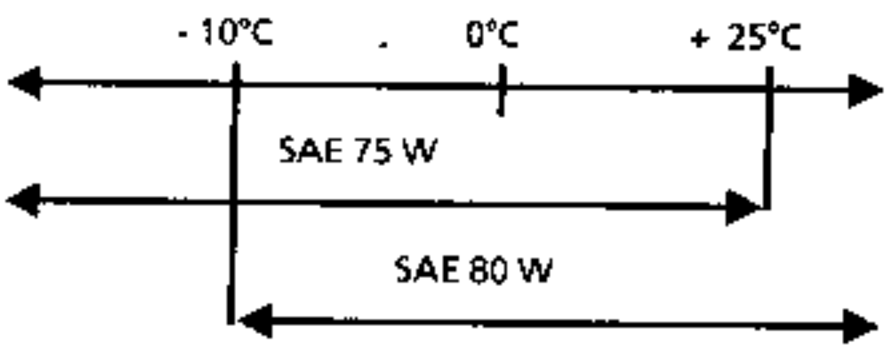
Index	Vehicle	Final drive set	Speedo. drive set	1st	2nd	3rd	4th	Reverse
JB0								
009	B/C/S404	19/59	21/20	11/41	19/39	25/33	31/28	11/39 26
010	F404	16/57	21/19					
011	F40H F401	15/58						
014	F400	14/63						
016	B/C401	14/59						
JB4								
000	F40F Spain	15/58	21/19	11/41	19/39	25/33	31/28	11/39 26
001	B/C401 B/C/S400 B/C40F		21/20					
002	B/C/S401 B/C40H	17/56						
003	B/C40F	16/57						
004	B/C/S40F Spain	16/55						

Index	Vehicle	Final drive set	Speedo. drive set	1st	2nd	3rd	4th	5th	Reverse
JB1									
011	F40H.F40M F401.F402.F407	15/58	21/19						
013	B/C/S404	17/56	21/20						
019	F404.B/C/S404	15/58	21/19	11/41	19/39	25/33	30/29	34/27	11/39 26
020	B/C404	16/57	21/20						
021	F404 SPAIN	15/61	21/19						
022	B402	15/61	21/19						
JB3									
009 014	C405	15/56	ELECT. SPEEDO.	11/34	19/35			33/25	
019	C409	15/58	21/20			25/33	30/29		11/39 26
023	B/C408	16/57	21/20	11/41	19/39			34/27	
024	B/C40G B/C40K	16/57	21/20	11/34	19/35			33/25	
JB5									
001	B/C40M B/C403 B/C40J B/C/S40H B/C/S401 B/C/S/407	16/55		11/41	19/39			34/27	
002	B403.C403	15/61		11/34	19/35			33/25	
003	B402.C402 B407.C407 B/C/S40F	17/56	21/20			25/33	30/29		11/39 26
004	B400.C400	15/61		11/41	19/39			34/27	
005	B/C/S40F	16/57							
008	B/C40F Spain	15/58							

CAPACITY (in litres)

Plug without dipstick. Normal level	Plug with dipstick Low level
4 speed	
3,25	2,75
5 speed	
3,40	2,90

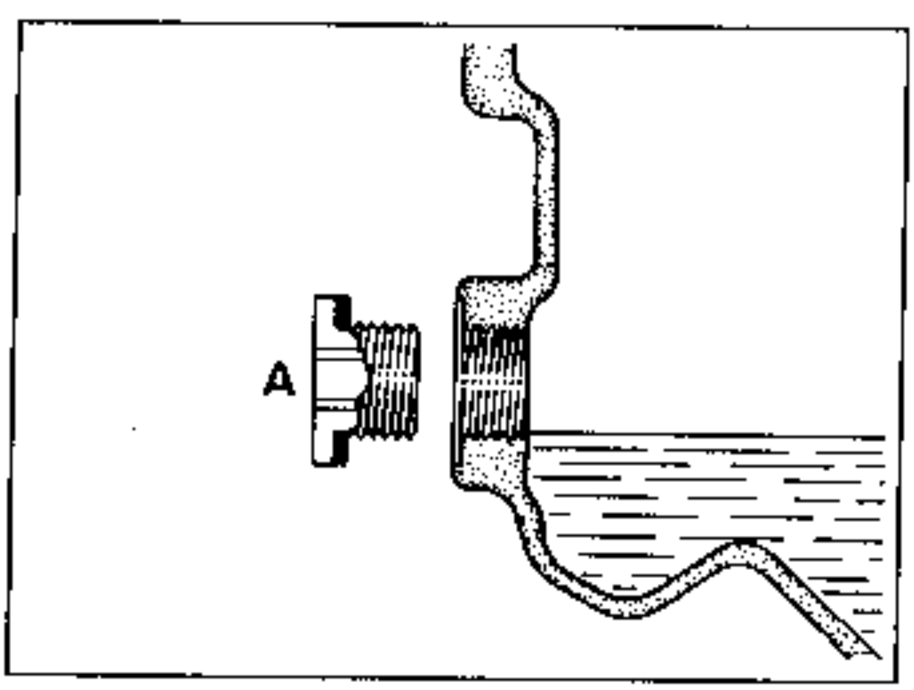
VISCOSITY



CHECKING THE LEVEL

Plug (A) without dipstick

Fill up to the edge of the plug hole.

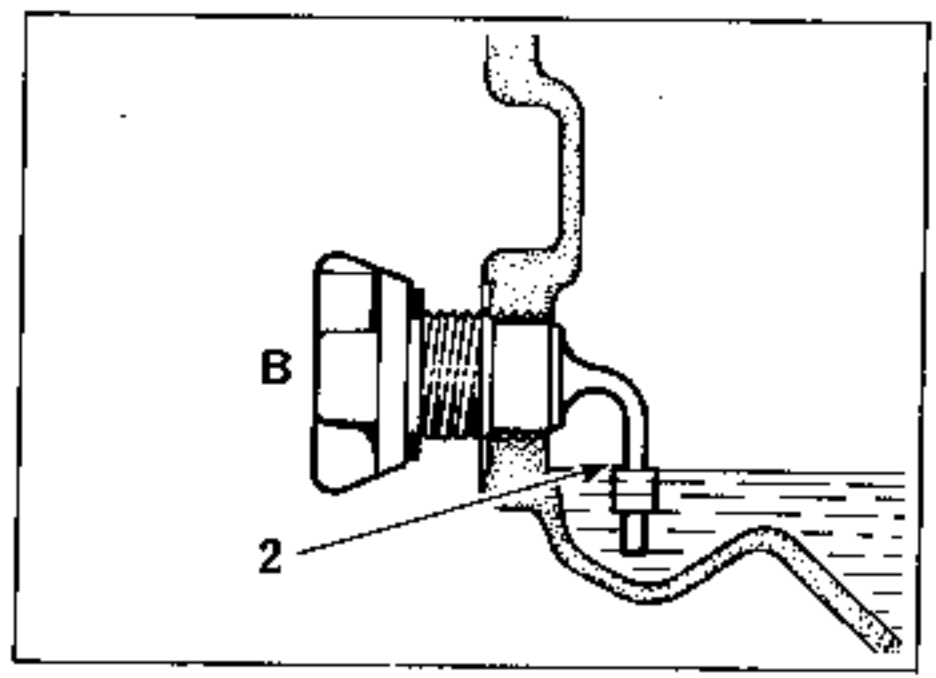


Plug (B) with dipstick

Wipe the dipstick section.

Refit the plug without screwing it in and with the dipstick downwards.

Take out the plug. The level should be on the boss (2).



GRADES

In order to stand the thermal stresses to which they are subjected in "Petrol engined turbo" vehicles, the gearboxes of these vehicles must only be lubricated with the new "High Temperature" oil approved by RENAULT : TRANSELF TRX 80 W.

Consequently, two differing grades of oil are recommended.

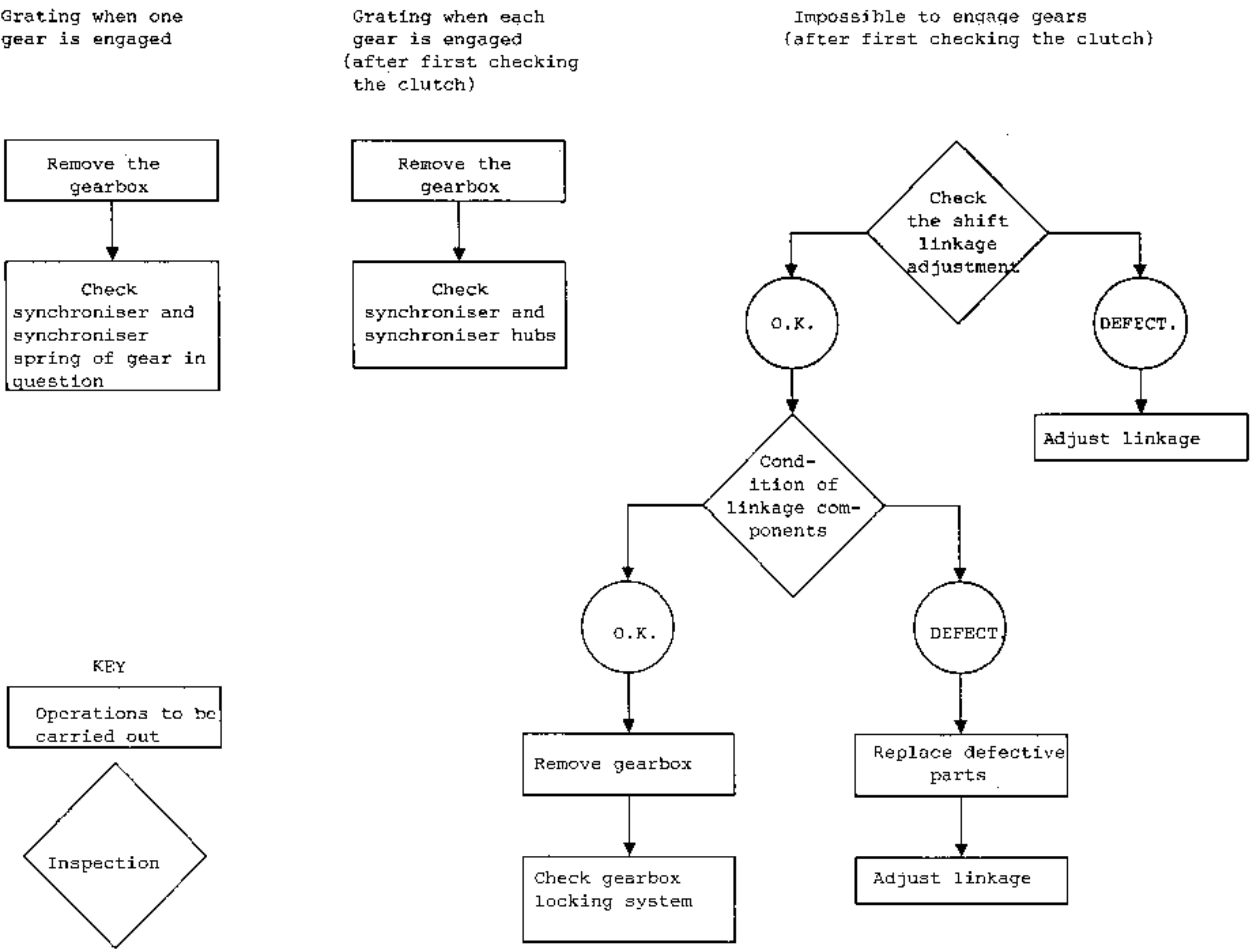
VEHICLE	GRADE
NATURALLY ASPIRATED	API GL5 - MIL L 2105 B or C
PETROL ENGINED TURBO	TRANSELF TRX 80 W*

(*) In case of difficulty in obtaining local supplies of this oil it can be ordered from the Parts Department under the part no. 77 01 417 403 (in 28 litre cans only).

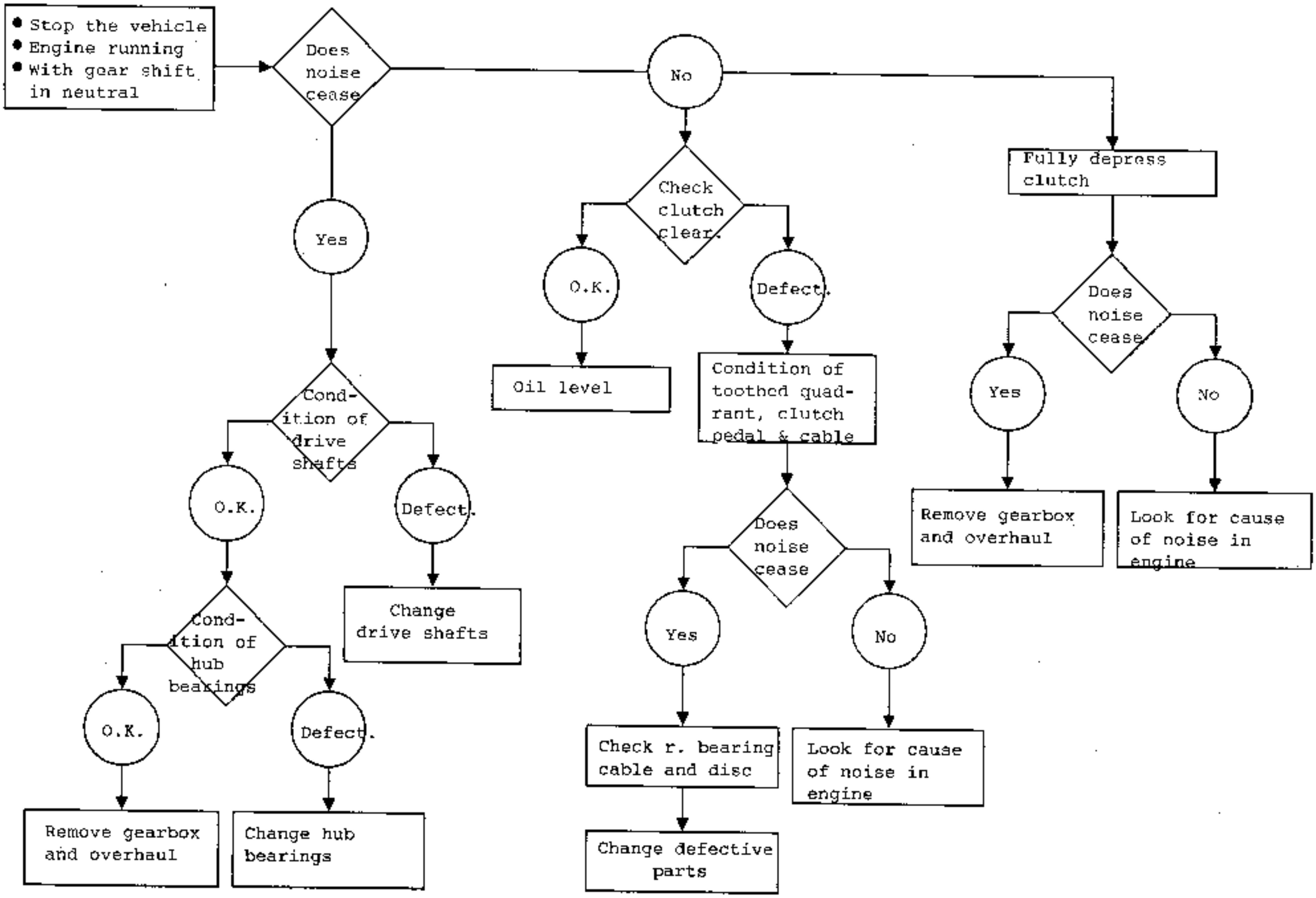
Type	Pack size	Part no.	Unit
Grease No. 20 **MOBIL X57 030**	1 gr sachet	**77 01 032 832**	Clutch fork pivot Release bearing guide tube bore Clutch shaft splines RH sun wheel splines
Loctite 518	24 ml syringe	**77 01 421 162**	Housing joint faces
Loctite FRENBLOC	24 cc bottle	**77 01 394 071**	5th speed fixed gear 5th speed synchroniser hub Primary shaft nut Secondary shaft bolt
CAF 4/60 THIXO	100 gr tube	**77 01 404 452**	Ends of spring pins on drive shafts Taper drain and filler plugs Screw threads on switches
MOLYKOTE grease **33 MEDIUM**	100 gr tube	**77 01 028 179**	Shift mechanism pivot points

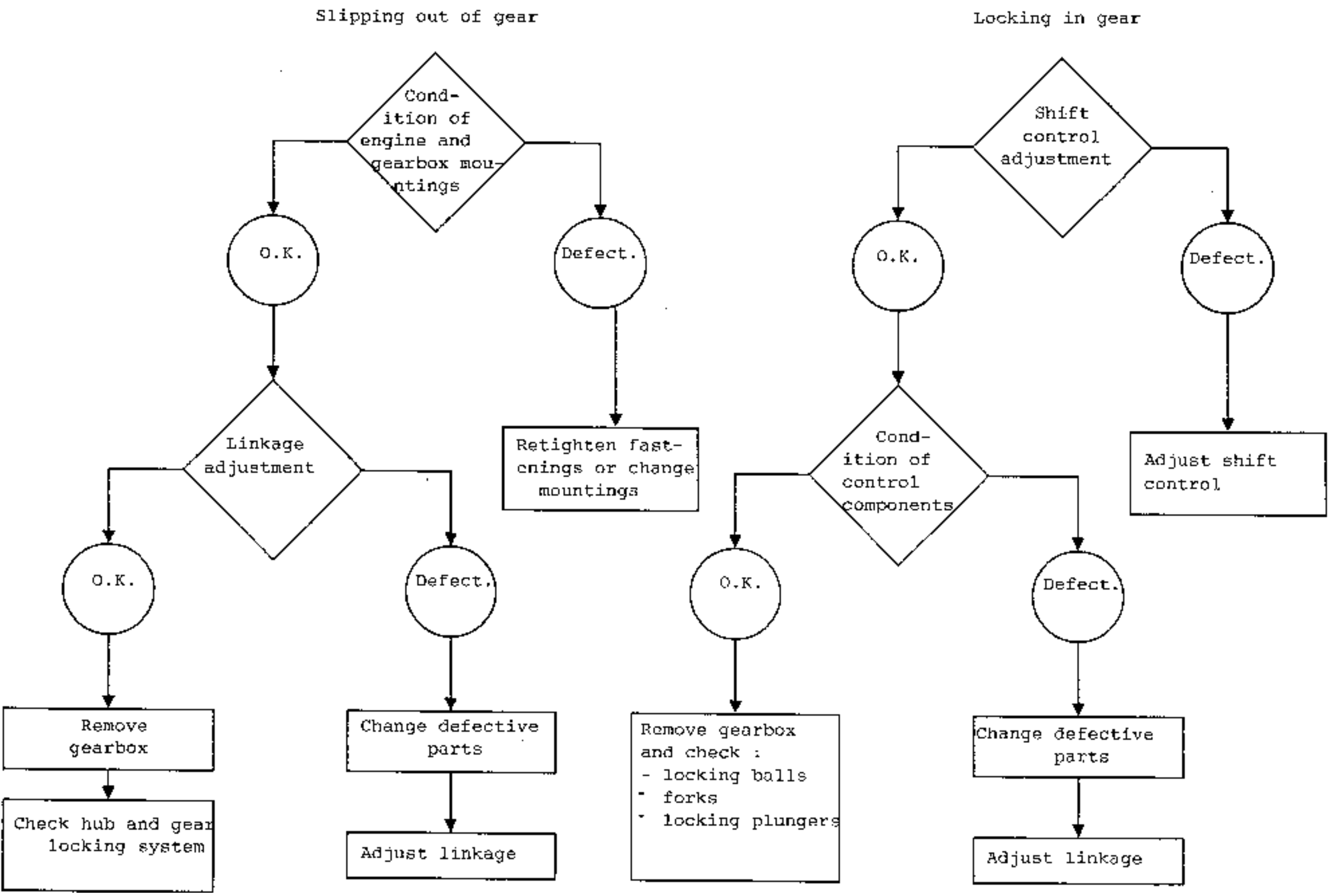
Parts that must automatically be replaced

Whenever they are removed :
- the spring pins,
- the primary and secondary shaft nuts and bolt


Grating when one gear is engaged
Remove the gearbox
Check synchroniser and synchroniser spring of gear in question
Grating when each gear is engaged (after first checking the clutch)
Remove the gearbox
Check synchroniser and synchroniser hubs
Impossible to engage gears (after first checking the clutch)
Check the shift linkage adjustment
O.K.
DEFECT.
Adjust linkage
Condition of linkage components
O.K.
DEFECT
Remove gearbox
Check gearbox locking system
Replace defective parts
Adjust linkage
KEY
Operations to be carried out
Inspection

Abnormal noises while vehicle is being driven




Slipping out of gear
Condition of engine and gearbox mountings
O.K.
Defect.
Linkage adjustment
Retighten fastenings or change mountings
O.K.
Defect.
Remove gearbox
Check hub and gear locking system
Change defective parts
Adjust linkage
Locking in gear
Shift control adjustment
O.K.
Defect.
Condition of control components
Adjust shift control
O.K.
Defect.
Remove gearbox and check :
- locking balls
- forks
- locking plungers
Change defective parts
Adjust linkage

On versions equipped with the type "F" (Petrol and Diesel) engines and the Super 5 GT Turbo (C405) the gearbox cannot be removed alone. The power unit assembly must therefore be removed (see "Engine" section).

ESSENTIAL SPECIAL TOOLS	
B.Vi. 31-01	Set of pin punches
T.Av. 476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)	
Brake caliper securing bolts	10
Shock absorber lower sec. bolts	8
Steering ball joints	4
Mounting securing bolts	4 - 5
Wheel bolts	8
Drive shaft bellows securing screws	2,5
Bolts round gearbox periphery	4 - 5

CONSUMABLES
Loctite FRENBLOC : Brake caliper securing bolts CAF 4/60 THIXO : Ends of pins on RH drive shaft Grease No. 20 (MOBIL X57 030) : Clutch shaft and RH sun wheel splines

REMOVING

Place the vehicle on a lift or on axle stands.

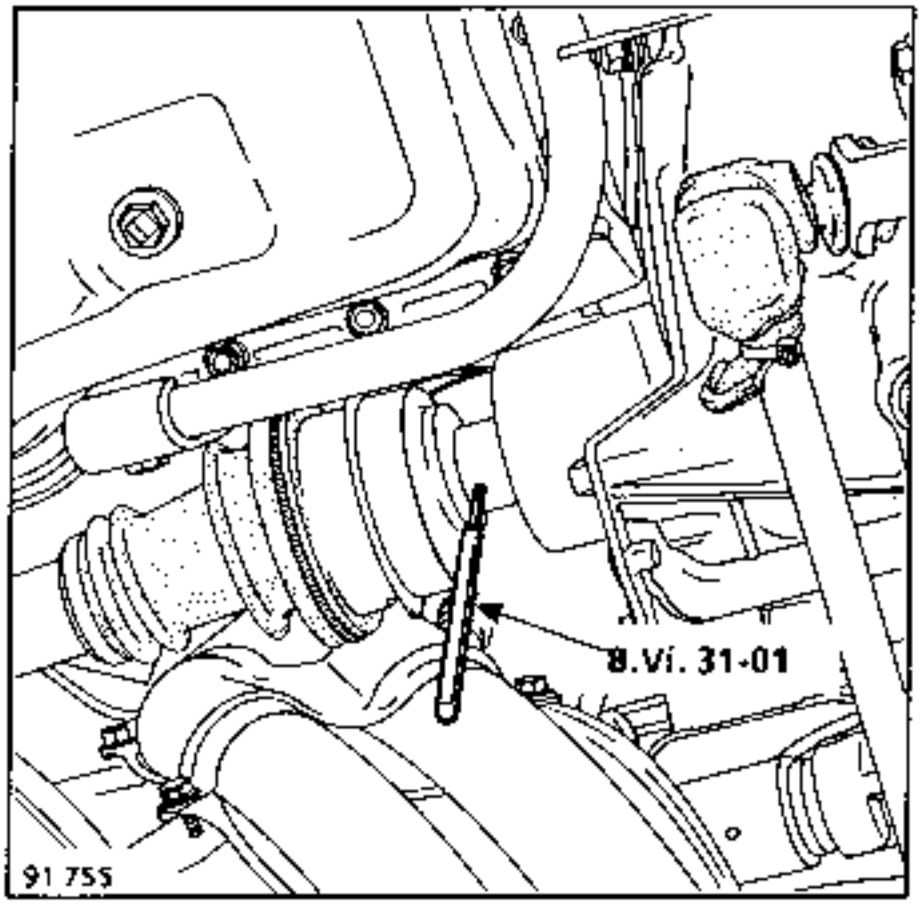
Disconnect the battery.

Remove :
- the front wheels,
- protective casing under the engine.

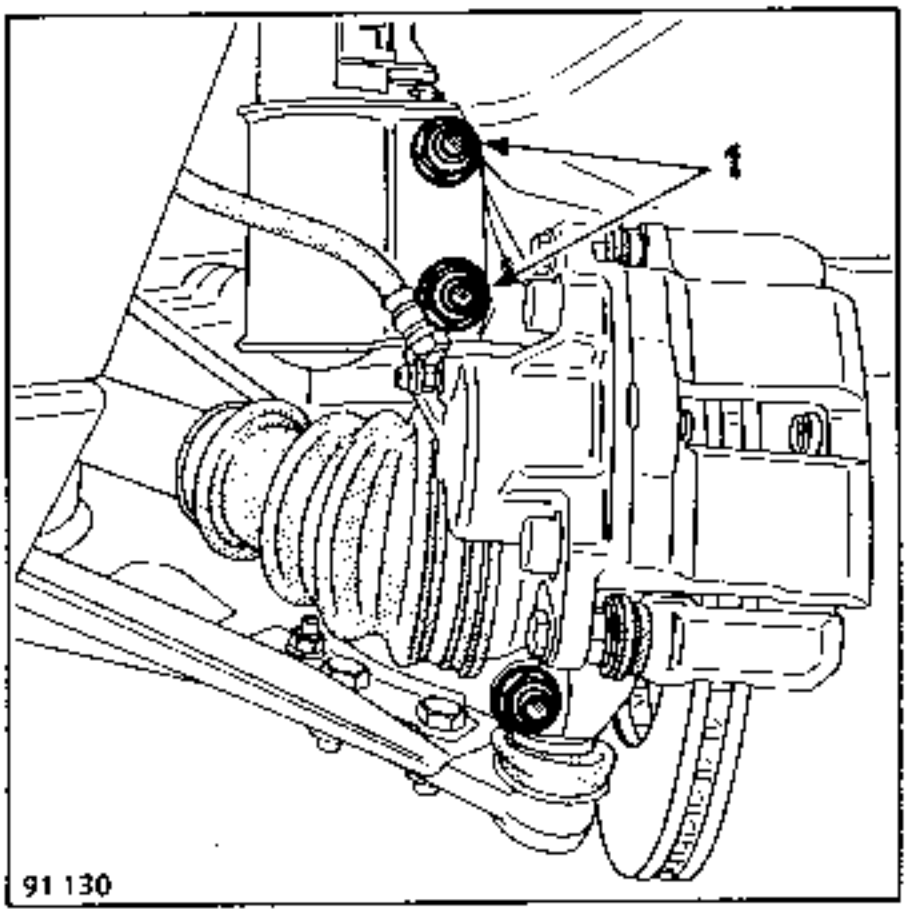
Drain the gearbox.

On the right hand side of the vehicle :

Remove :
- the pin from the drive shaft using pin punches B.Vi.31-01.



- the two bolts (1) that secure the lower end of the shock absorber.



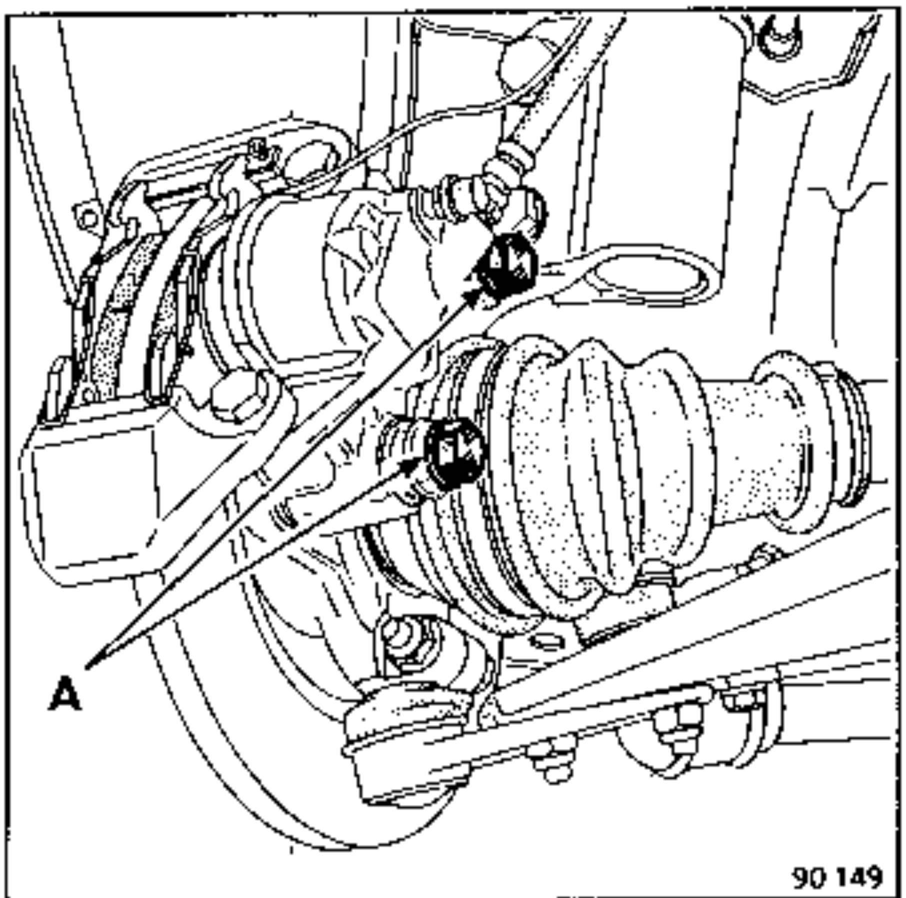
91 130

Free the drive shaft taking care not to catch the bellows, at the wheel end, by protecting it and securing the stub axle carrier to avoid subjecting the brake hose to tension.

On the left hand side of the vehicle

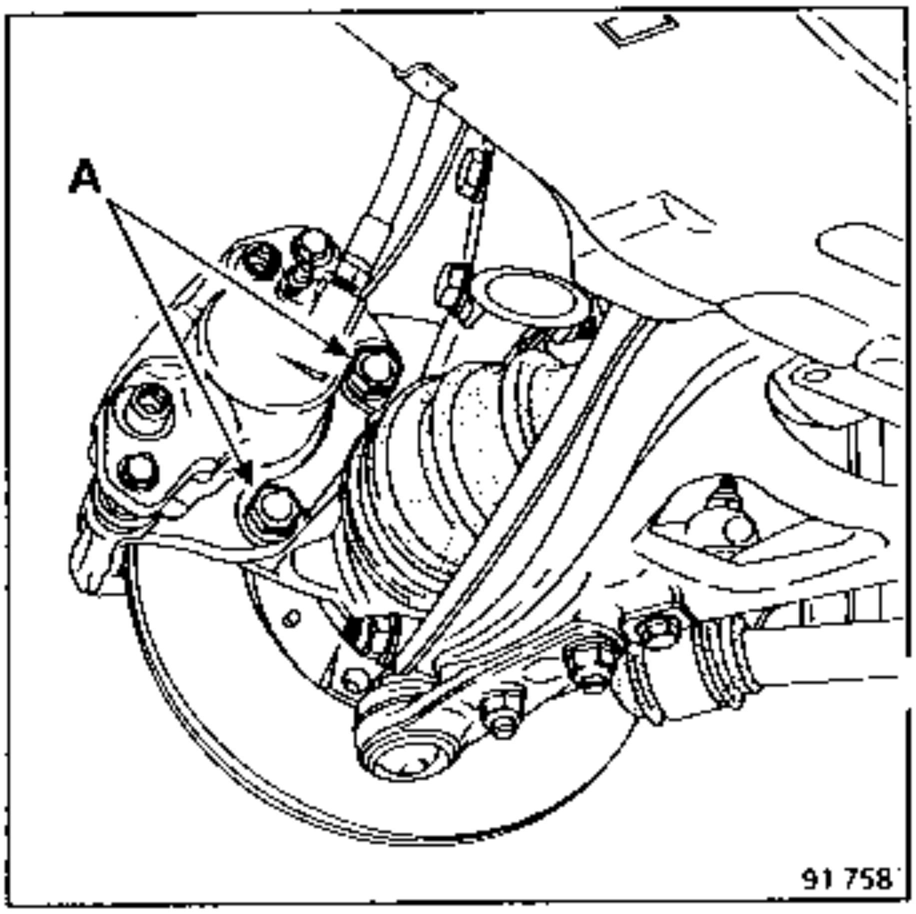
Remove :
- the two caliper securing bolts (A). Secure the caliper to the suspension spring to avoid subjecting the hose to tension.

BENDIX



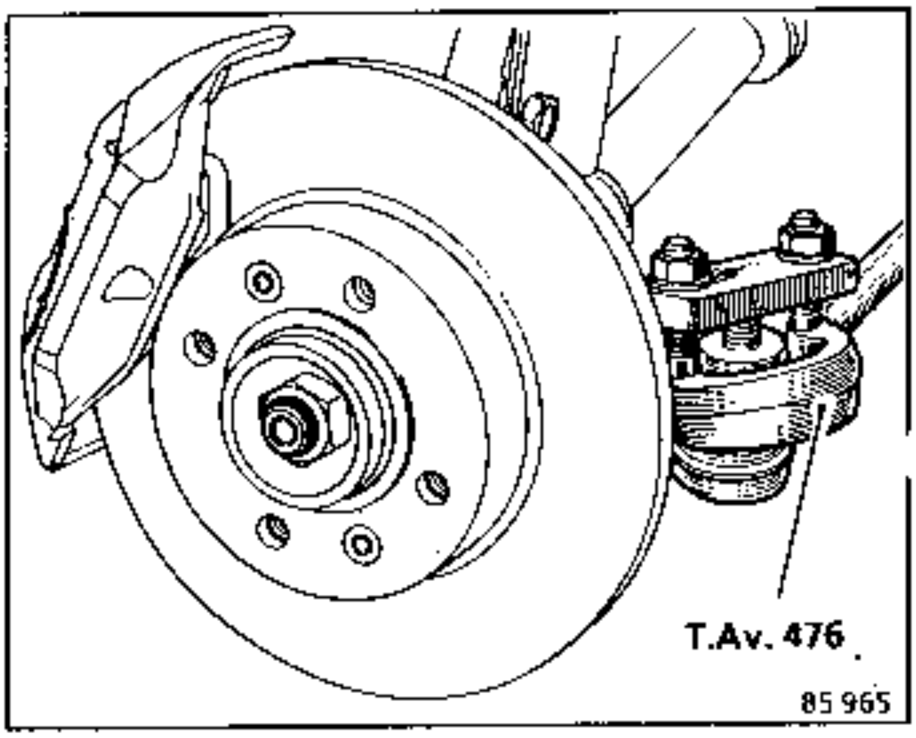
90 149

GIRLING



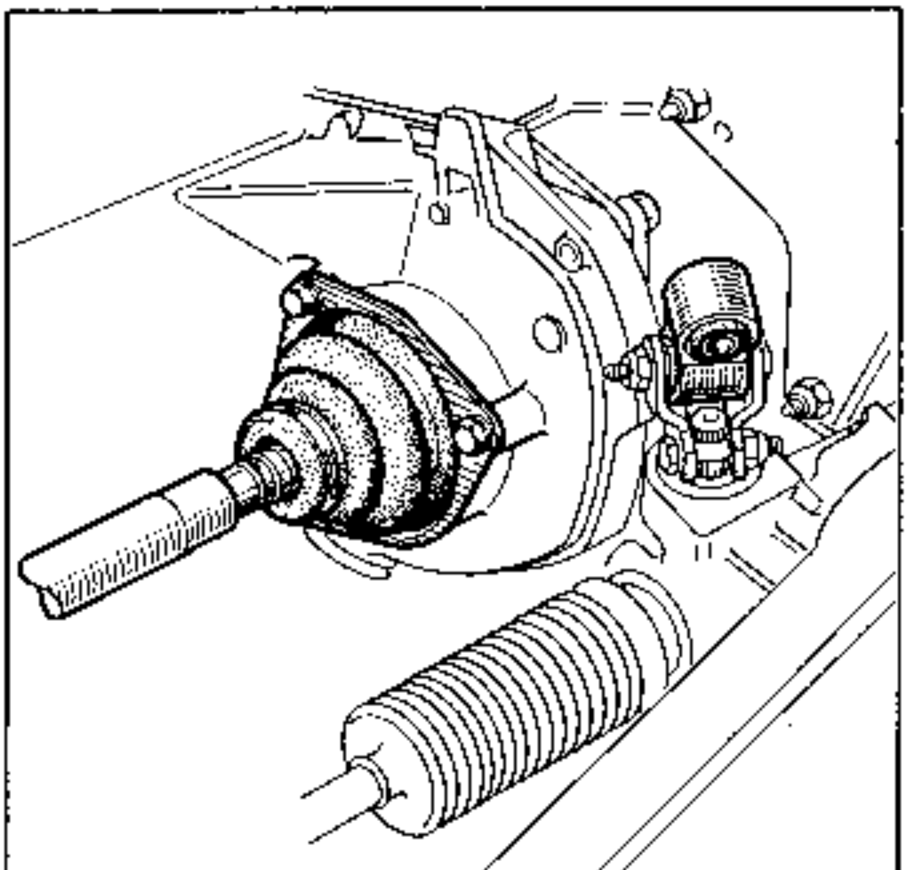
91 758

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



85 965

- the three screws that secure the drive shaft bellows in place,

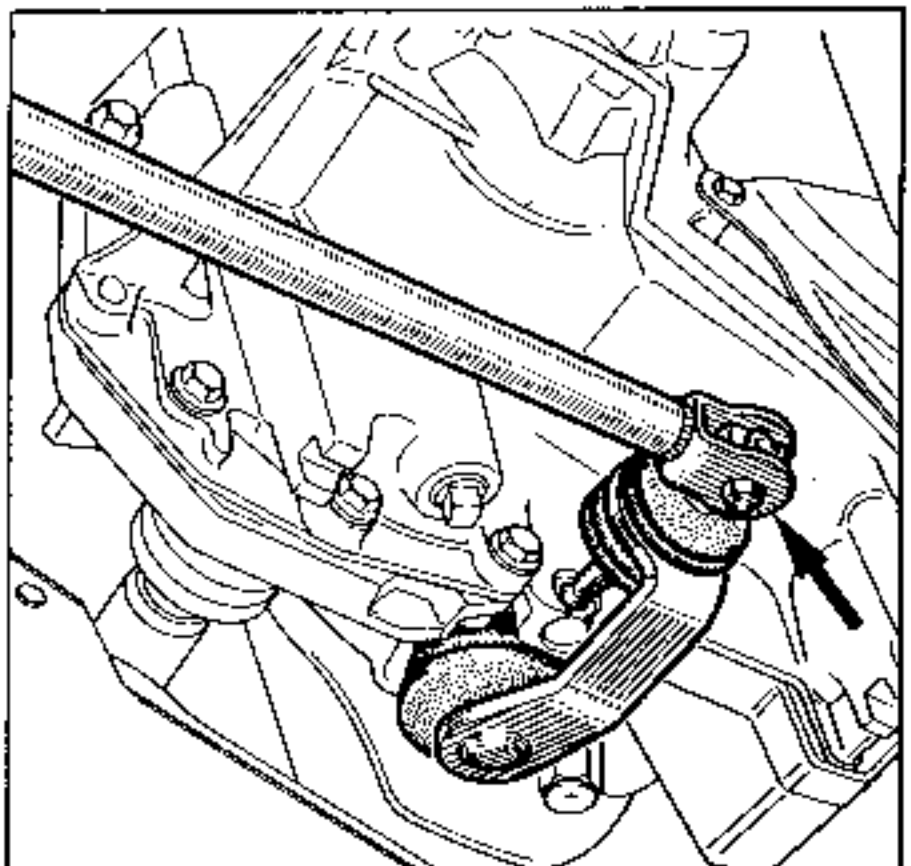


85 678

- the two bolts on the lower end of the shock absorber and free the drive shaft.

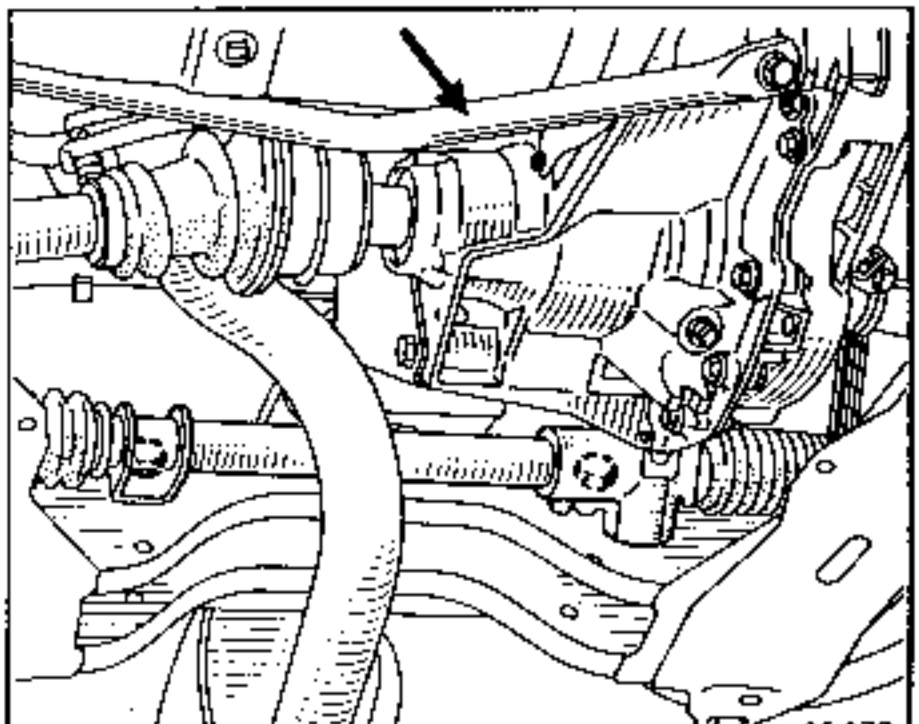
Check that the drive shaft rollers cannot be taken out by hand. If they can, check, on reassembly, that the bearing needles have not fallen into the gearbox.

From under the vehicle, remove :
- the shift control,



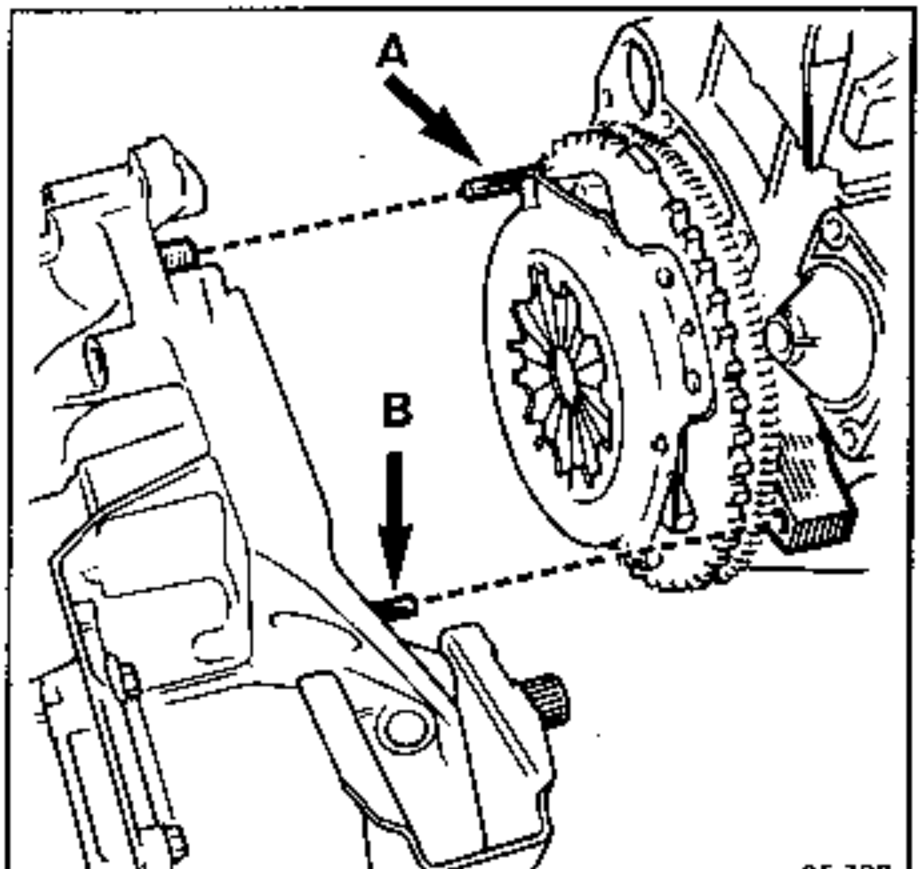
85 966

- the engine to gearbox tie rod.



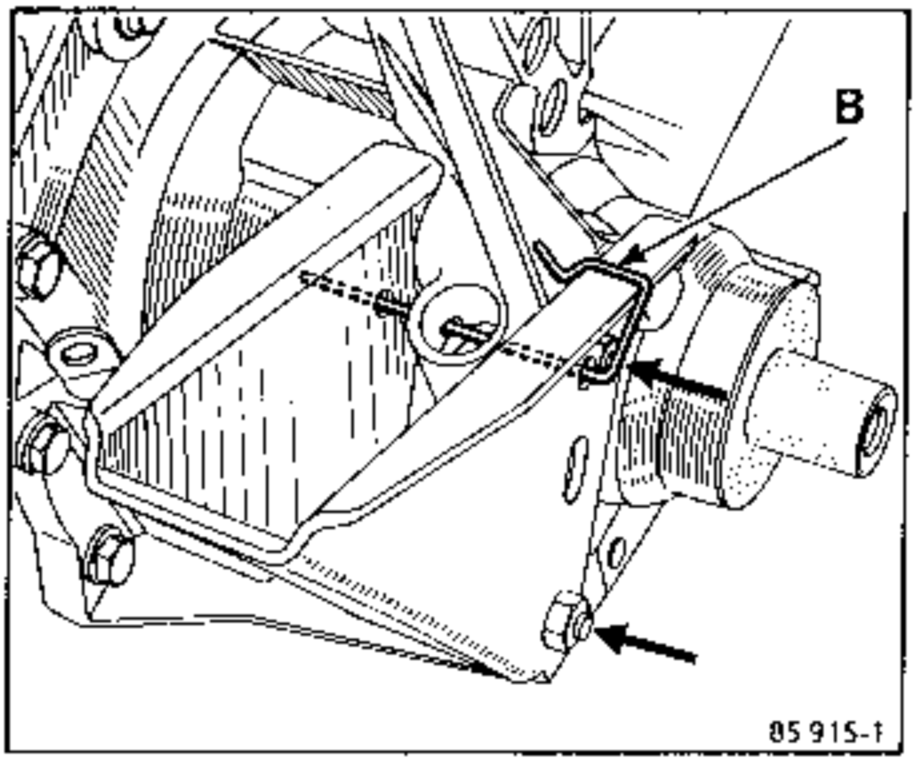
85 879

- the clutch protection plate,
- the wires from the switches,
- the starter protection plate,
- the two studs (A) and (B),



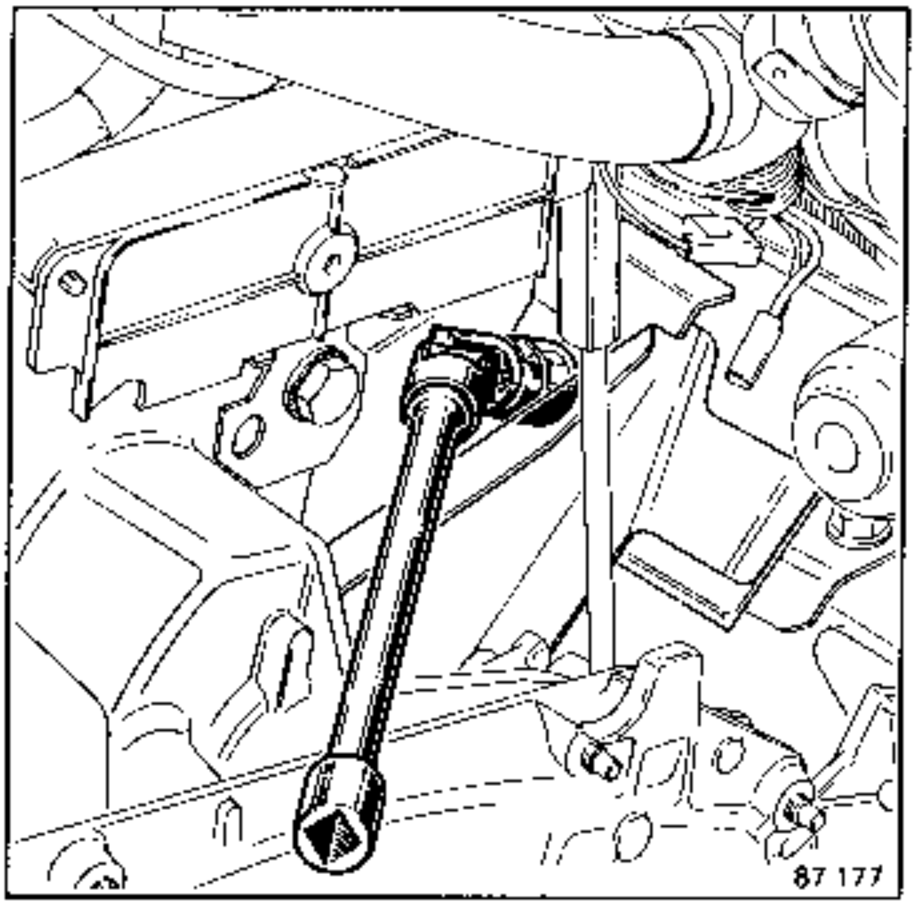
86 308

- the clip (B) from the speedometer drive cable,
- the nuts from the gearbox front and rear flexible mounting bolts, loosening the nut on the engine flexible mounting,



85 915-1

- the earthing braid,
- the air filter, plugging the entrances to the carburettor so that no foreign bodies can fall into them,
- the nut from the rear flexible mounting, using an extension and a ball jointed spanner.



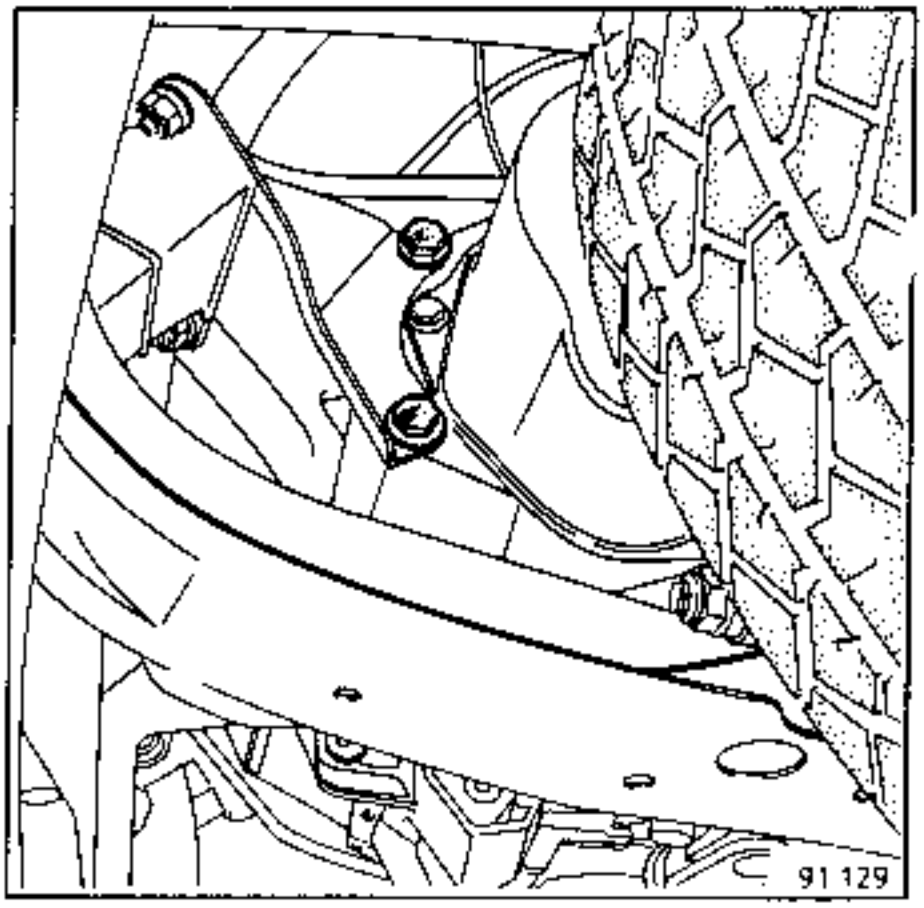
87 177

Disconnect :
- the choke cable from the carburettor,
- the speedometer drive cable,
- the clutch cable,
- the wires from the fan and the coolant temperature gauge.

Unclip :
- the coolant bottle, placing it on the engine,
- the radiator, placing it on the engine (without disconnecting the pipes) after having protected the fins with cardboard.

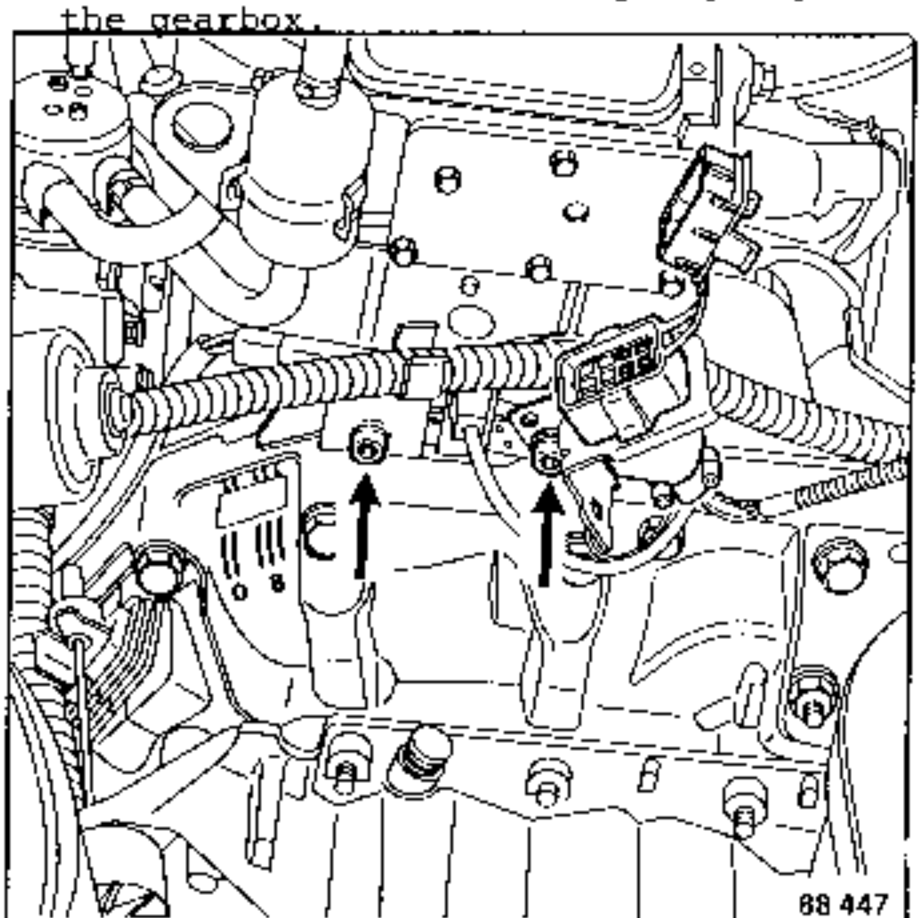
Take the weight of the engine to release the rear flexible mounting.

Remove :
- the front mounting,



91 129

- the T.D.C. sensor and the A.E.I. unit,
- the starter securing bolts,
- the bolts from round the periphery of the gearbox.



88 447

Hook the gearbox on to the workshop crane securing it at the clutch cable support lug and one of the gearbox securing bolts fitted in place of the stud (B).

Free the engine from the gearbox by sliding the 5th speed housing between the vehicle side members and the engine sub-frame.

Lift the engine.

Swing the gearbox slightly to the left to clear the final drive section then take out the gearbox from the vehicle.

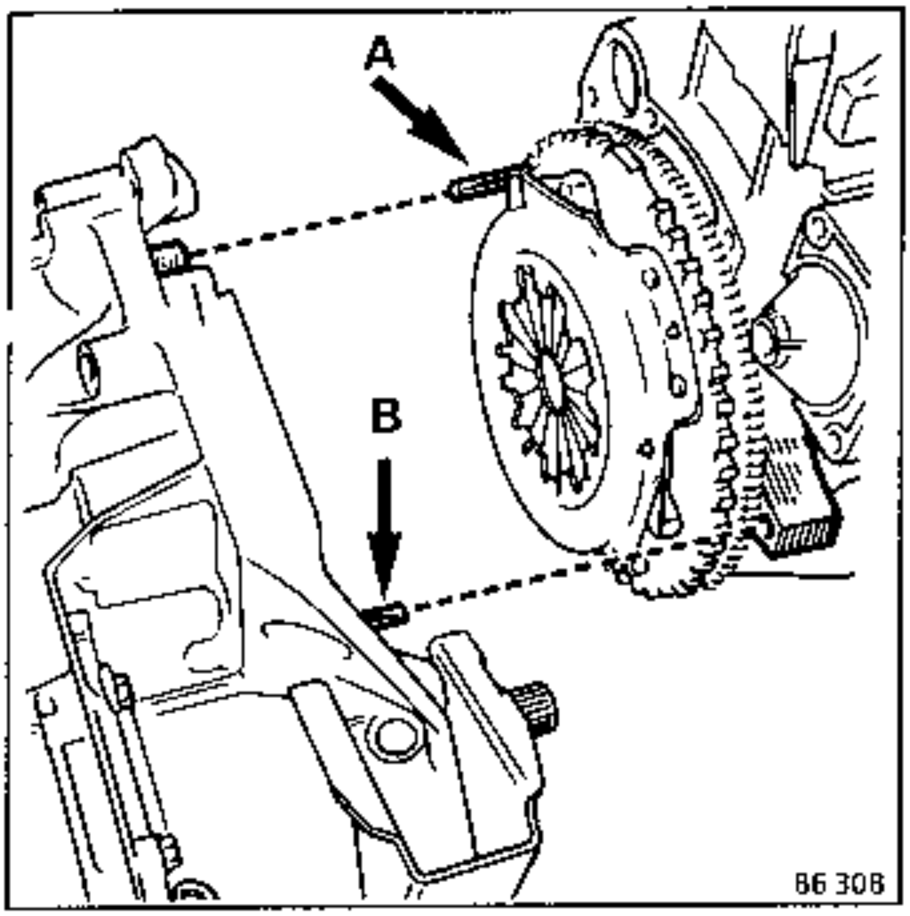
REFITTING (Special features)

Coat the splines on the clutch shaft and on the RH planet wheel with grease No. 20 (MOBIL X57 030).

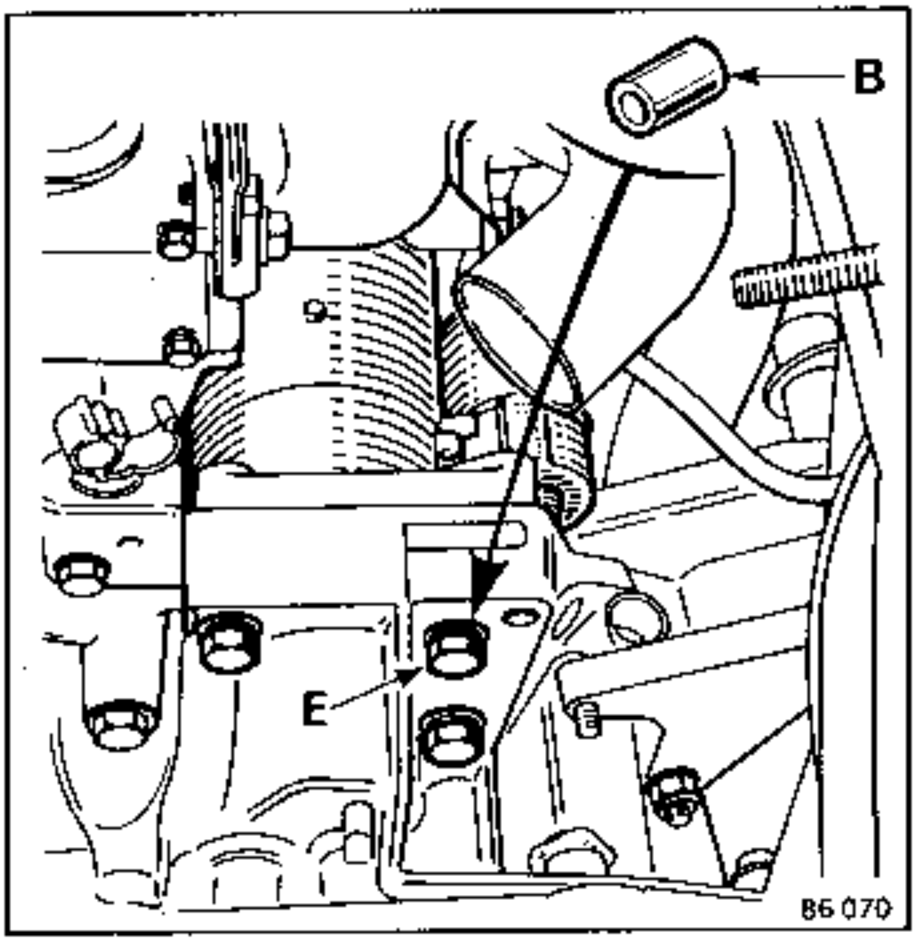
Place the gearbox in position.

Check that the locating dowels are correctly fitted into their holes.

Refit the studs (A) and (B) in the same positions as they were before removal, they, together with the bolts round the gearbox align and locate the assemblies.

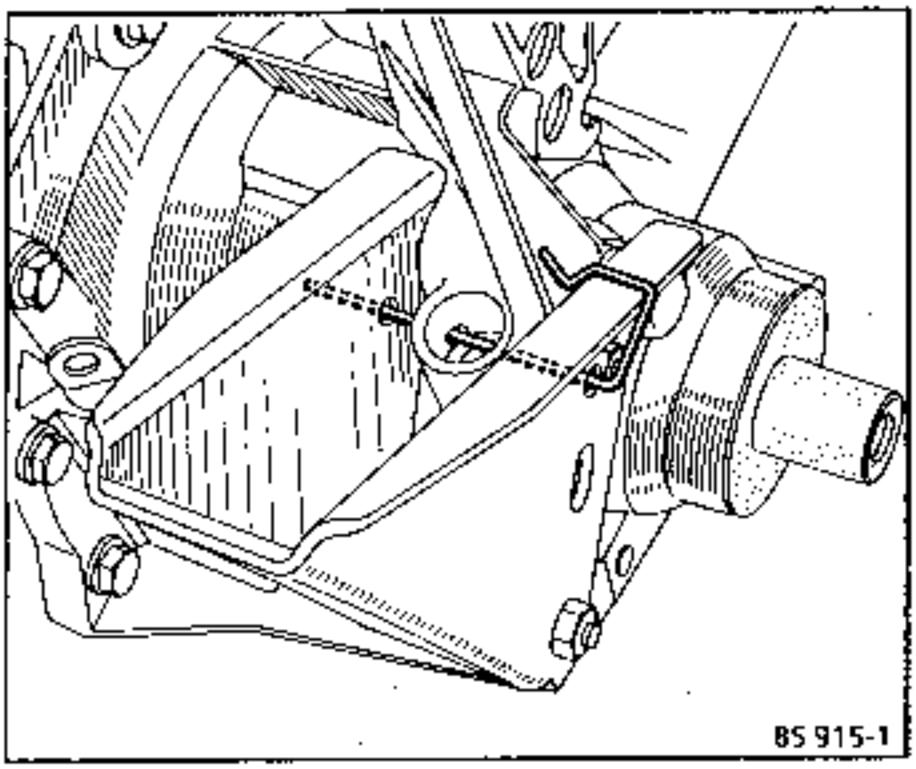


WARNING : ensure that the starter bolt (C) is refitted in the correct position.



Check that the locating dowel (D) is in position. IT MUST be placed in bolt hole (E) (Type C engine).

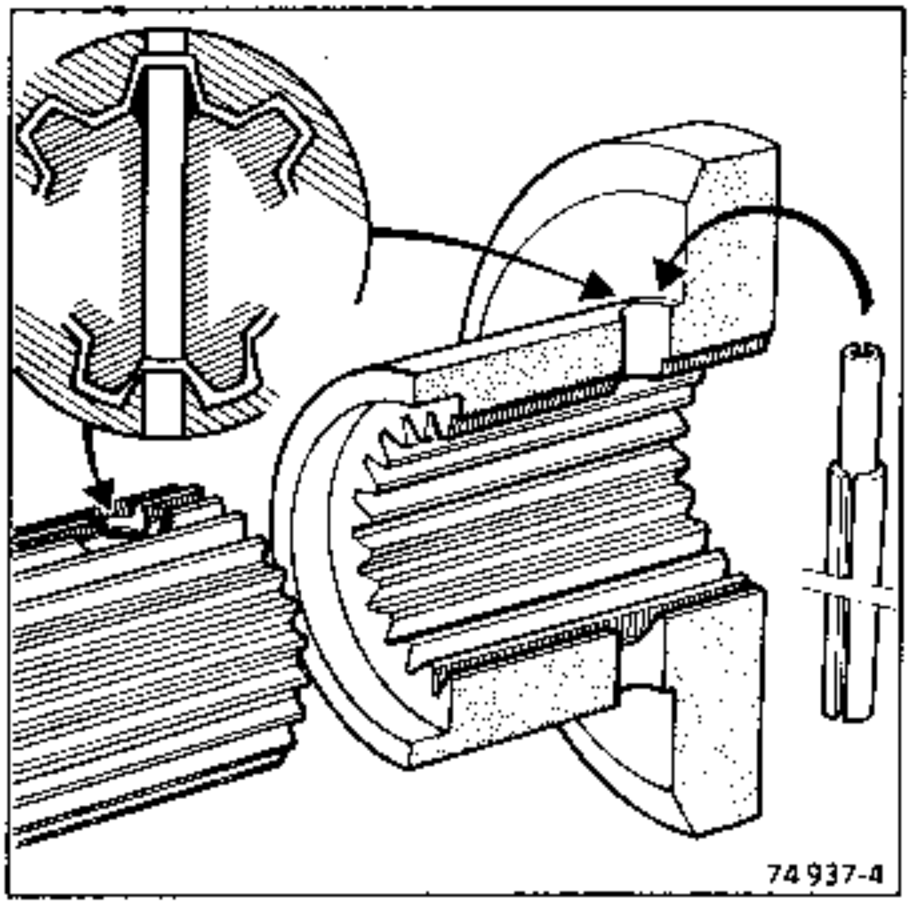
Reconnect the speedometer drive cable, ensuring that the clip is correctly refitted.



Correctly position the right hand drive shaft with reference to the sun wheel.

Swing the stub axle carrier into position whilst engaging the drive shaft in the sun wheel.

Use the cranked pin punch B.Vi.31-01 to align the holes.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Lead chamfers on the sun wheels facilitate fitting the new spring pins.

Seal the pin holes (with CAF 4/60 THIXO).

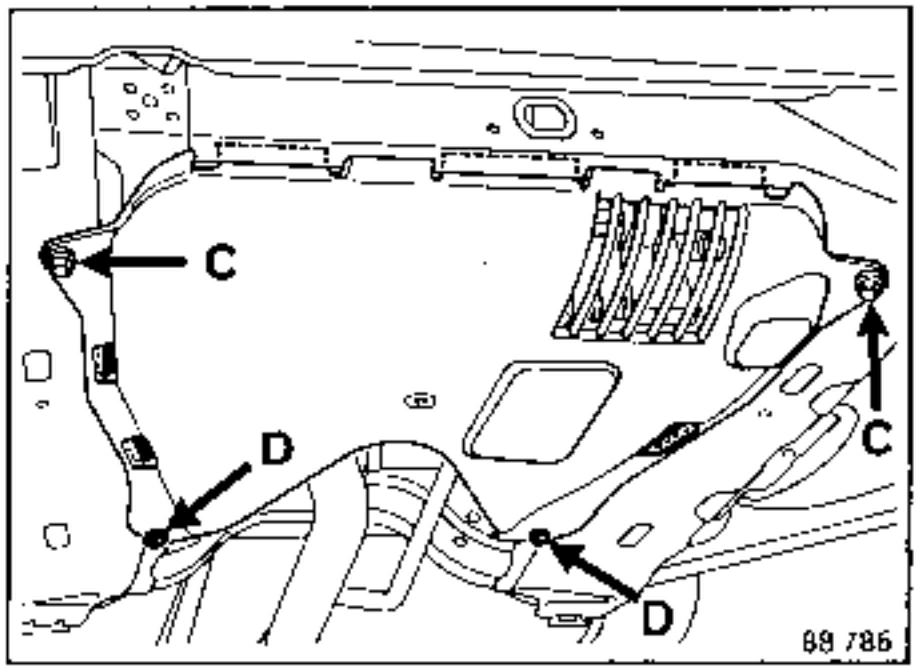
Fit the caliper securing bolts after applying Loctite FRENBLOC to them and tighten the bolts to torque.

Depress the brake pedal a number of times to bring the pistons into contact with the brake pads.

Tighten the following to torque :
- the nuts securing the lower end of the shock absorber,
- the steering ball joint nut,
- the nuts on the flexible mountings,
- the screws securing the left hand drive shaft bellows.

Fill the gearbox with oil.

Place the protective casing under the engine.



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2 bolts (C)
2 "quarter turn" retaining clips (D)

Tighten the wheel bolts to the specified torque.

ESSENTIAL SPECIAL TOOLS	
B.Vi. 28-01	Extractor body
B.Vi. 31-01	Set of pin punches for removing and inserting 5 mm ø spring pins
B.Vi. 1003	5th speed hub extractor
B.Vi. 1007	Claws for B.Vi.28-01

TIGHTENING TORQUES (in daN.m)	
Primary shaft nut	**13.5**
Secondary shaft bolt	**8**
Nuts on mounting pads	**4**

CONSUMABLES

Loctite FRENBLOC :

Nut on primary shaft
Bolt on secondary shaft
5th speed fixed gear
5th speed hub

SPECIAL FEATURES

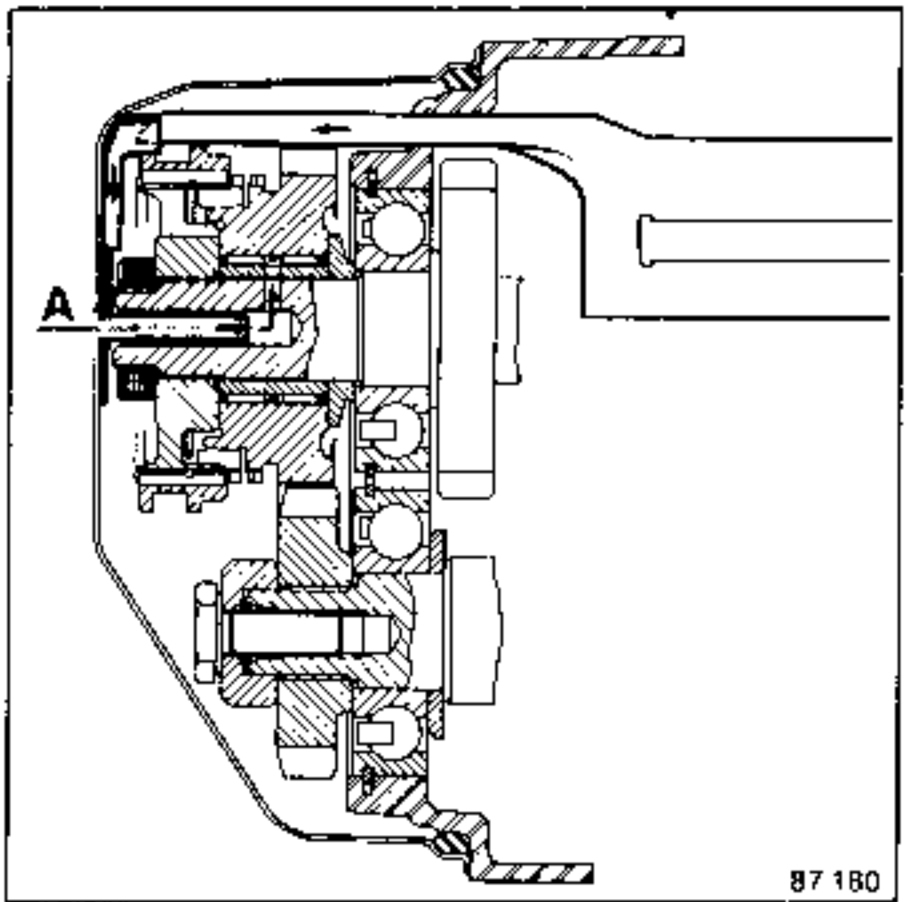
Do not pull the 5th speed shift fork shaft outwards as this will allow the gear locking assembly to fall into the gearbox. To avoid all possibility, engage a gear (3rd or 4th).

REMOVING

Remove the gearbox front flexible mounting to lower the box.

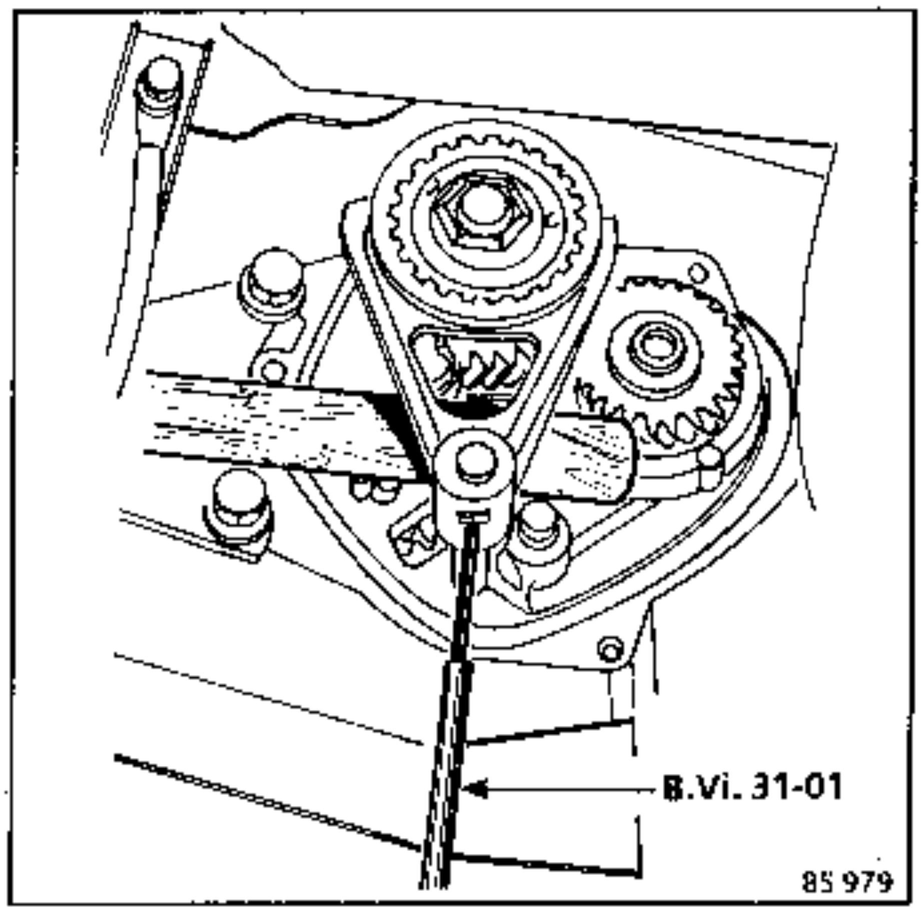
Drain the gearbox.

The housing must be removed in line with the gearbox horizontal axis because it carries an oil pipe (A) that penetrates the primary shaft.



Place :
- a drip tray under the rear housing and remove it,
- a wooden chock between the 5th speed shift fork and the drive gear to act as a support and then remove the pin from the fork using punch B.Vi.31.01.

Removing the pin can be made easier by slightly bending the end of punch B.Vi. 31.01 so that it is not necessary to lift the gearbox.



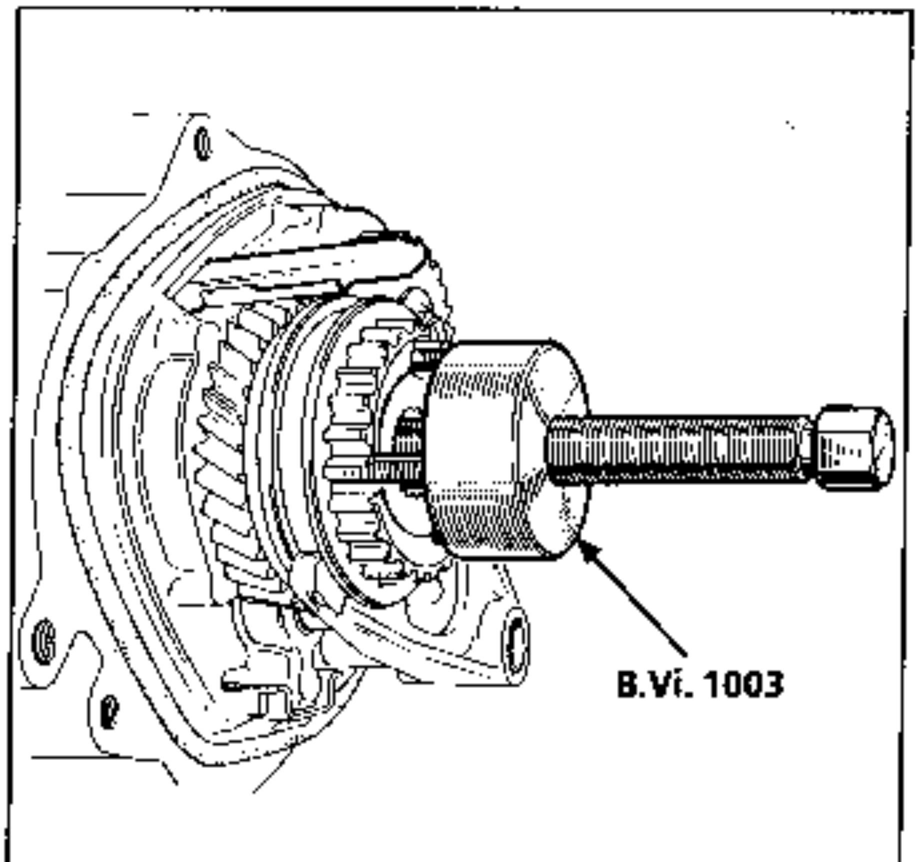
On the primary shaft :

Select 1st speed at the shift lever and 5th speed at the box, by sliding the 5th shift fork along its shaft.

Loosen and remove the nut from the primary shaft and the bolt from the secondary shaft (65).

Return the gearbox to neutral.

Place tool B.Vi.1003 in the slots on the 5th speed hub and remove the hub-sliding gear and fork assembly.



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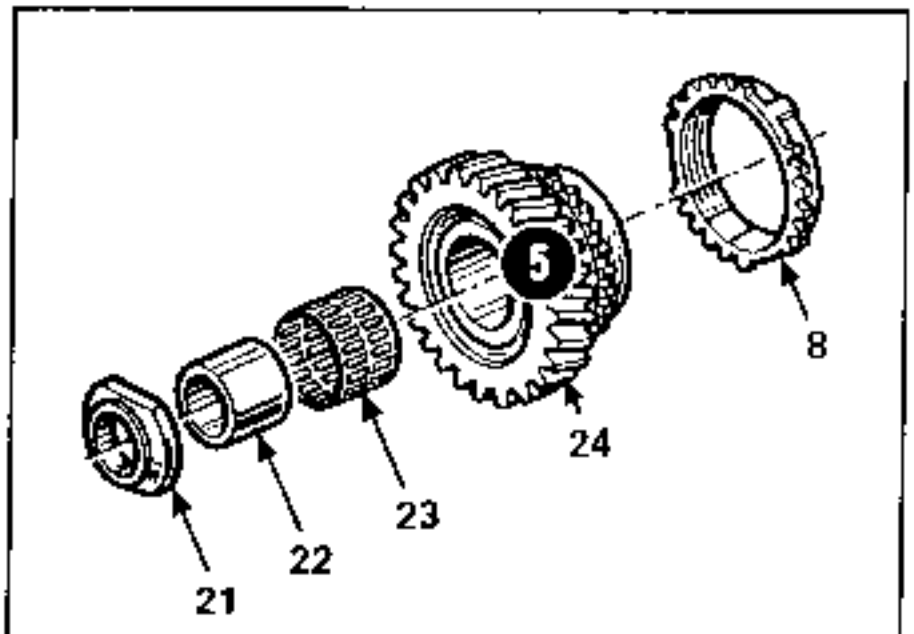
Remove components (8) and (24) to (21) in that order.



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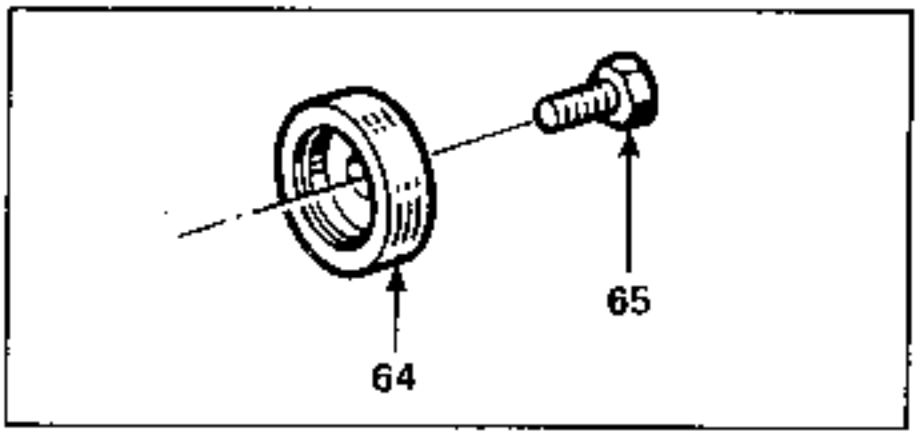
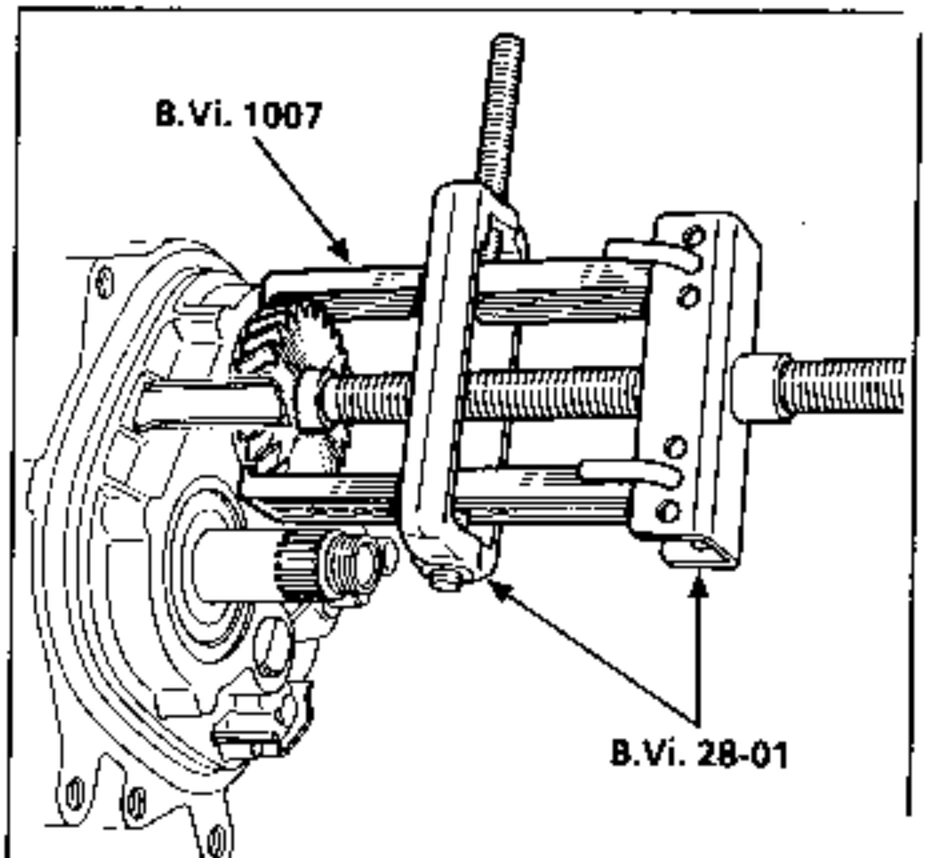
On the secondary shaft :

Remove the shouldered washer (64).



Remove the fixed gear using B.Vi.28-01 fitted with jaws B.Vi.1007.



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REFITTING

On the secondary shaft :

Apply 3 drops of Loctite FRENBLOC to the fixed gear splines.

Fit the shouldered washer (64).

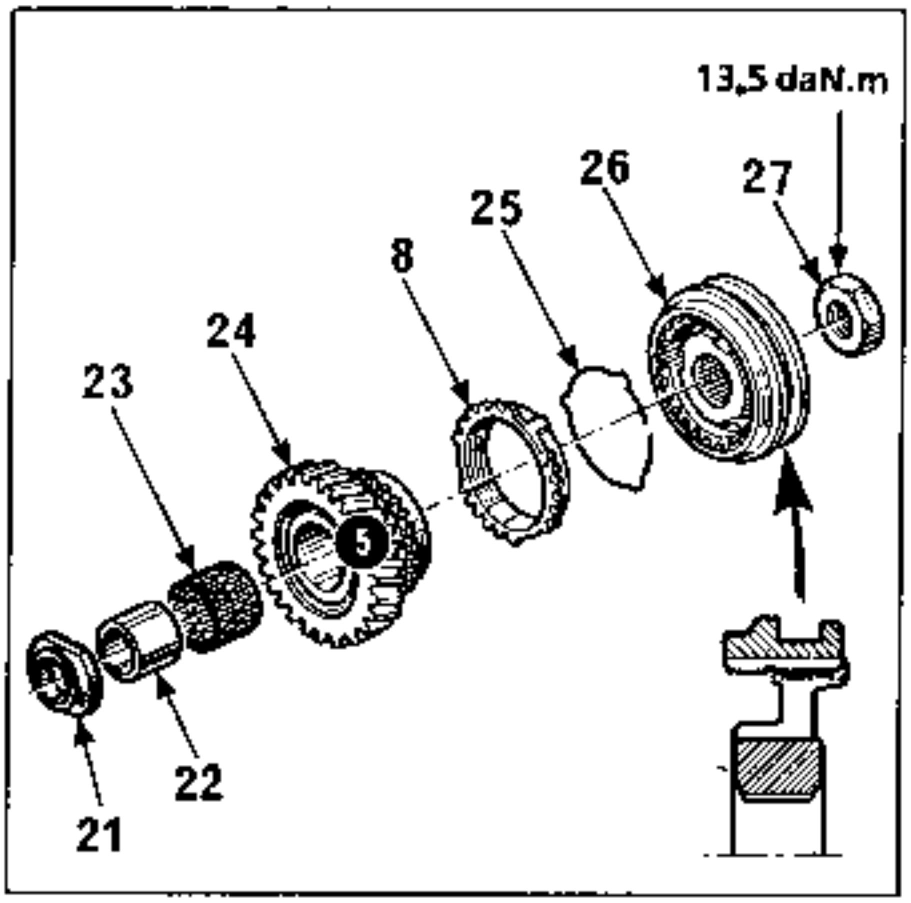
On the primary shaft :

Refit, in this order (21) (shoulder on the bearing side) (22), (23), (24) and (8).

Place the fork on the sliding gear (26), together with (25).

Apply 3 drops of Loctite FRENBLOC to the hub and refit the hub-sliding gear and fork assembly.

Place the bosses on the synchroniser ring in the slots in the hub.

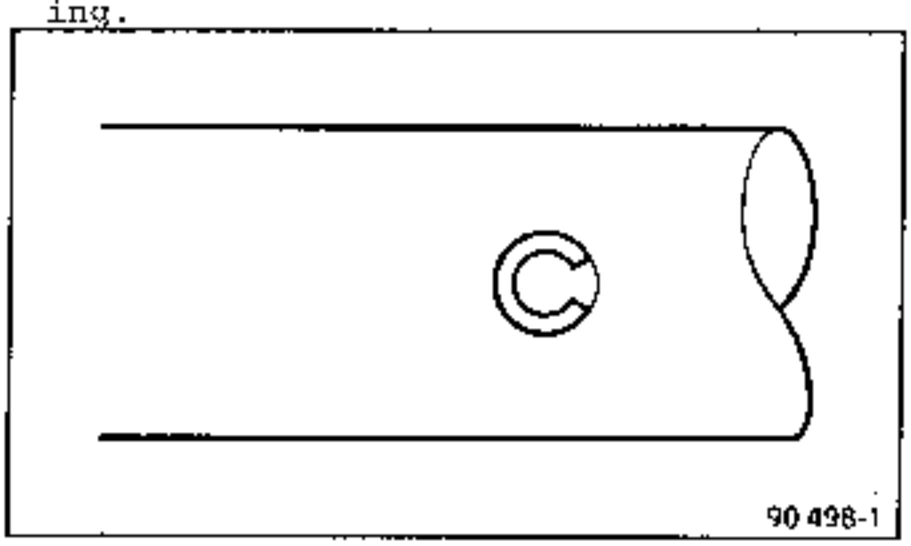


Select 1st at the shift lever and 5th at the gearbox by sliding the 5th speed fork along its shaft.

Apply 3 drops of Loctite FRENBLOC :

- to the nut (27) on the primary shaft, tightening it to a torque of 13.5 daN.m
- on the bolt (65) and tightening it to a torque of 8 daN.m to force fit the fixed gear.

Place a wooden chock between the 5th speed fork and the driving gear to support it and fit a new pin to the 5th speed fork using punch B.Vi.31-01 and fitting it the correct way round. The slit is to point towards the rear housing.



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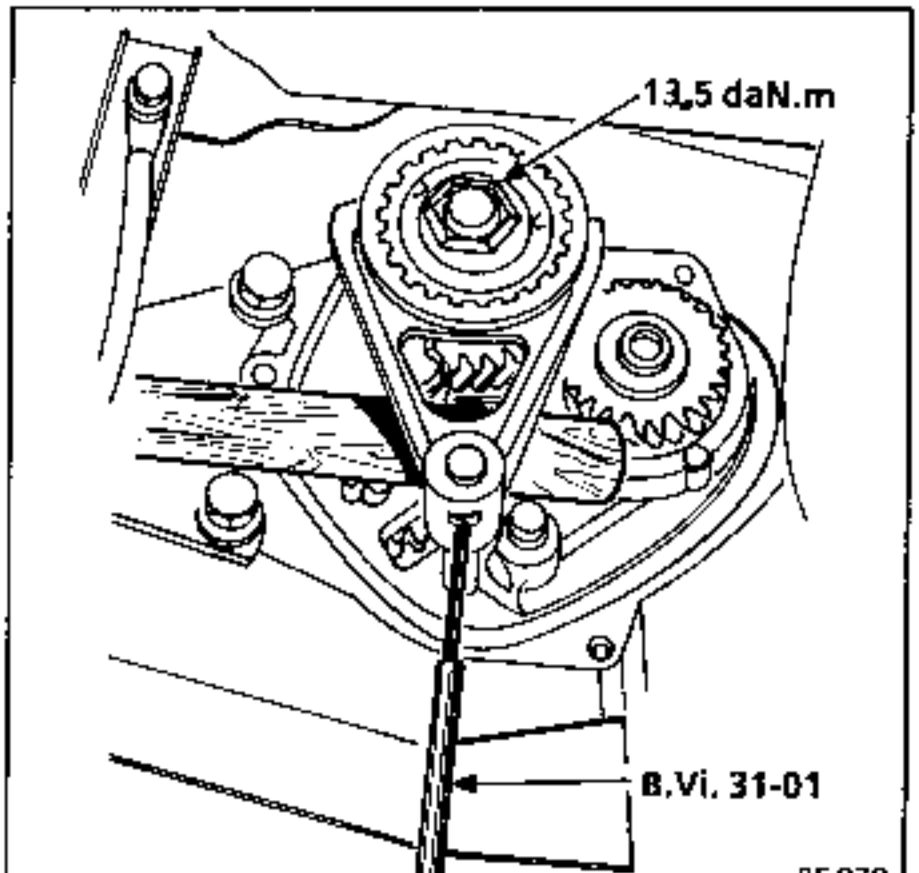

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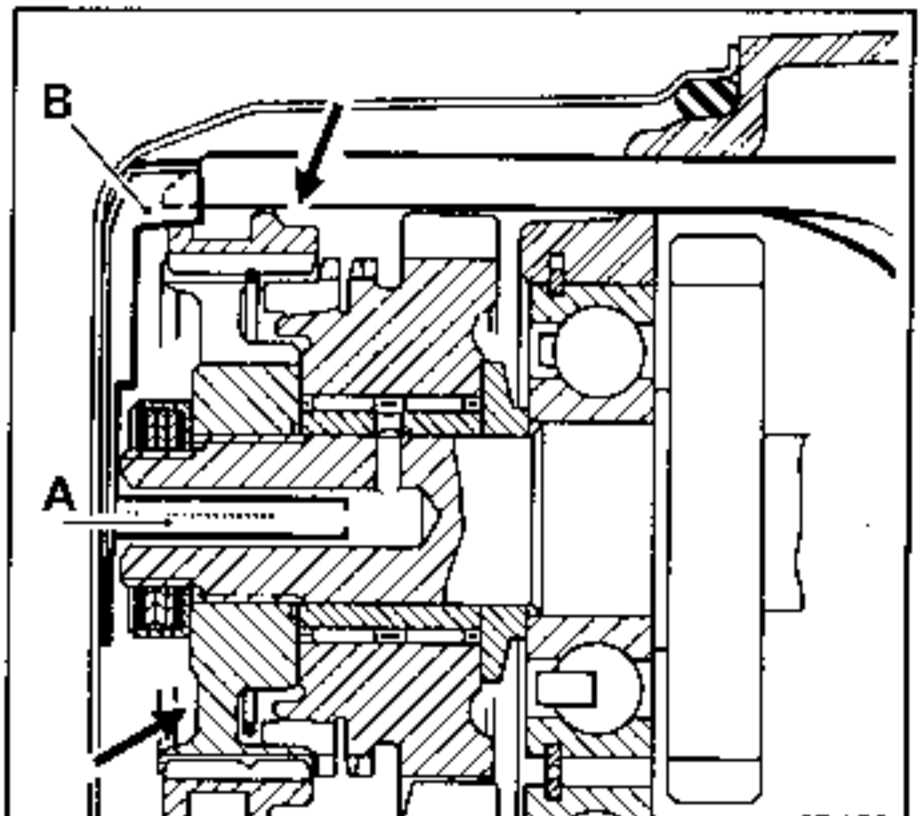
Fit a new O ring to seal the rear housing.

Return the gearbox to neutral then fit the rear housing, engaging the oil pipe (A) into the primary shaft and the lubrication gulley into the oil collector rail (B). Tighten the bolts to a torque of 2.5 daN.m.



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Check that all the gears select correctly.

If difficulties are encountered, check that neither reverse nor 5th speed are engaged.

Fill type JB1 and JB3 gearboxes with : 3.40 litres or JB5 gearboxes : 2.90 litres of oil.

Check the rear housing for leaks with the engine running.

ESSENTIAL SPECIAL TOOLS		
B.Vi.	31-01	Set of pin punches
T.Av.	476	Ball joint extractor
B.Vi.	945	Plug for fitting the differential seal
B.Vi.	1058	Plug for fitting the differential seal (JB3 with taper roller bearings)

TIGHTENING TORQUES (in daN.m)	
Brake caliper securing bolts	10
Shock absorber lower securing bolts	8
Steering ball joints	4
Wheel bolts	8

REMOVING

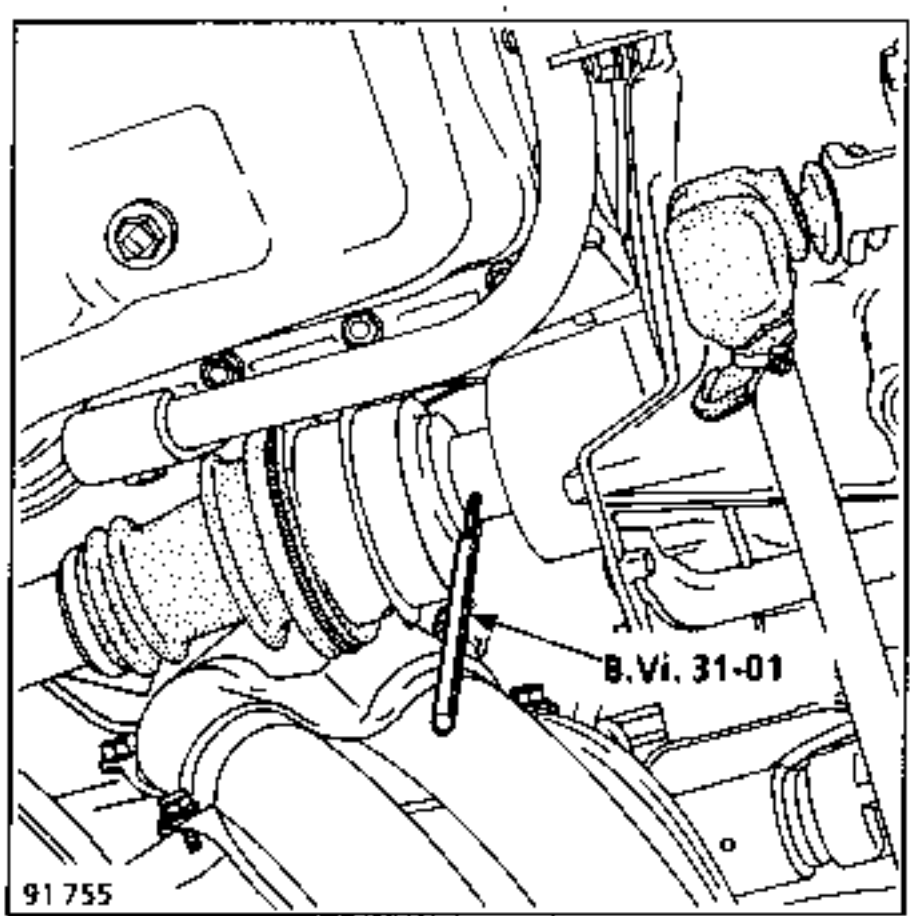
Remove the protective casing from under the engine.

Drain the gearbox.

Support the front of the vehicle, on the side concerned, with axle stands.

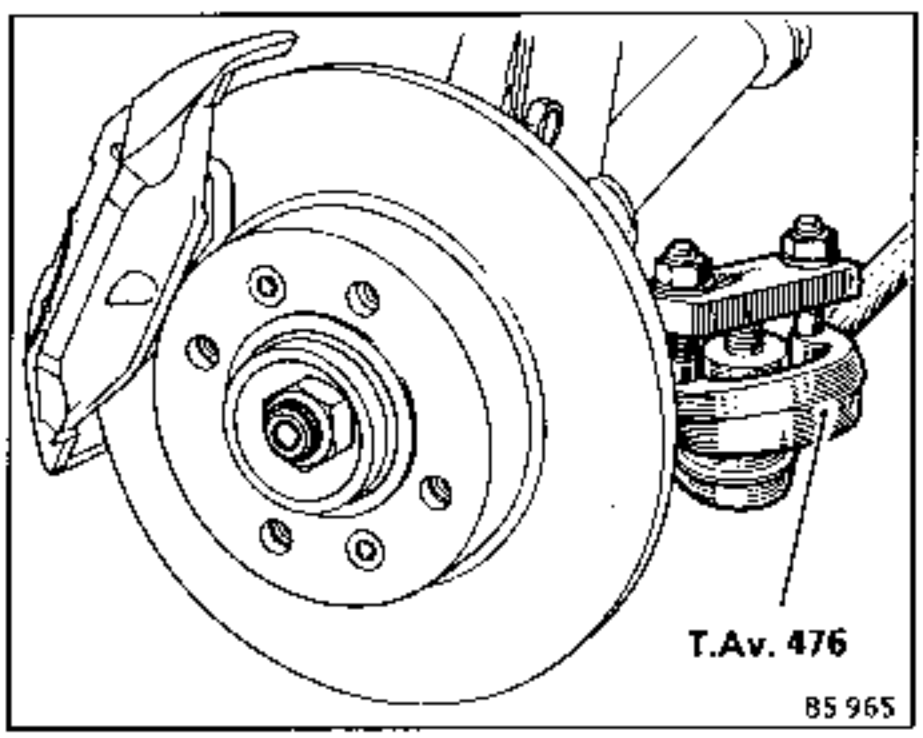
Remove the wheel.

Knock out the pin from the drive shaft (punch B.Vi.31-01).



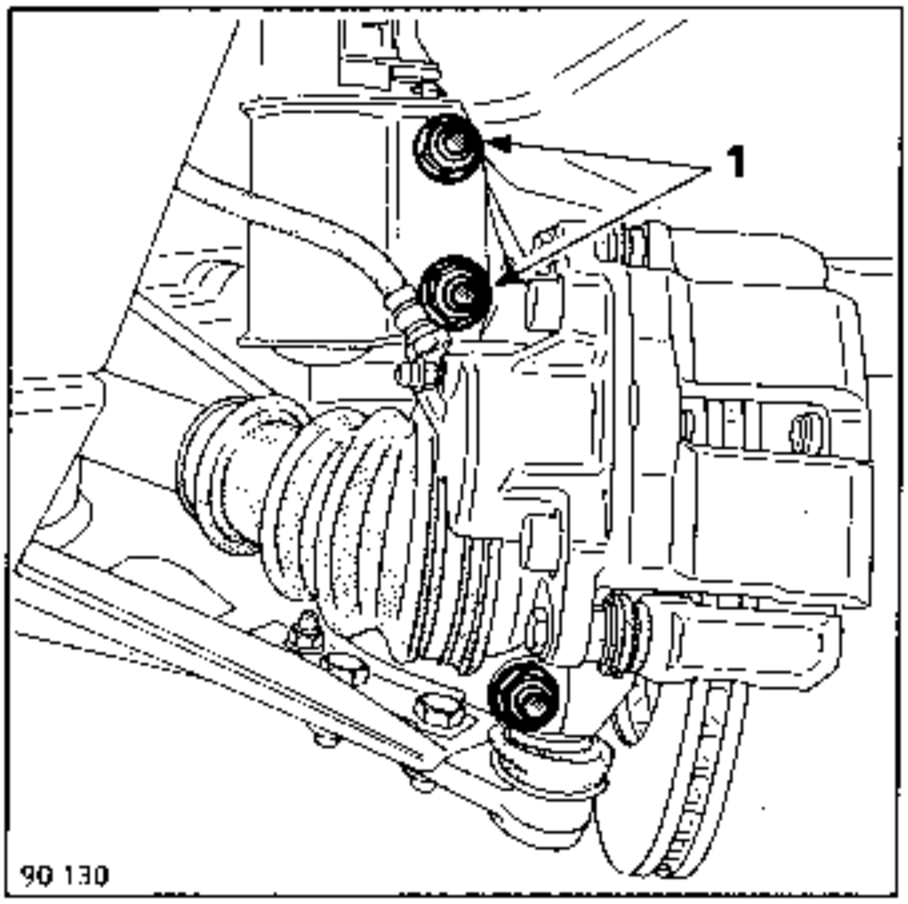
CONSUMABLES
Loctite FRENBLOC : Brake caliper securing bolts
CAF 4/60 THIXO : Ends of pin holes in drive shaft
Grease No. 20 : Splines on RH sun wheel

Remove :
- the steering ball joint (tool T.Av.476)



- the two brake assembly securing bolts, fastening the caliper to the suspension spring to avoid applying tension to the hose.

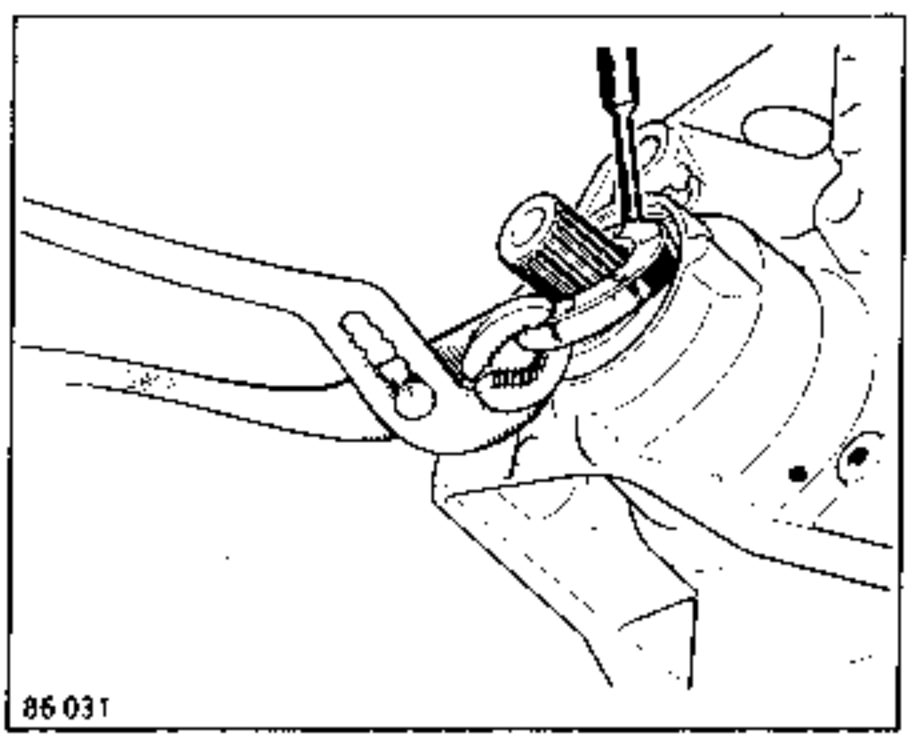
- the bolts (1) that secure the lower end of the shock absorber.



Tilt the stub axle carrier and disconnect the drive shaft from its sun wheel, taking care not to catch the bellows at the wheel end, by protecting it.

Using a pin punch and a small hammer, tilt the seal in its location.

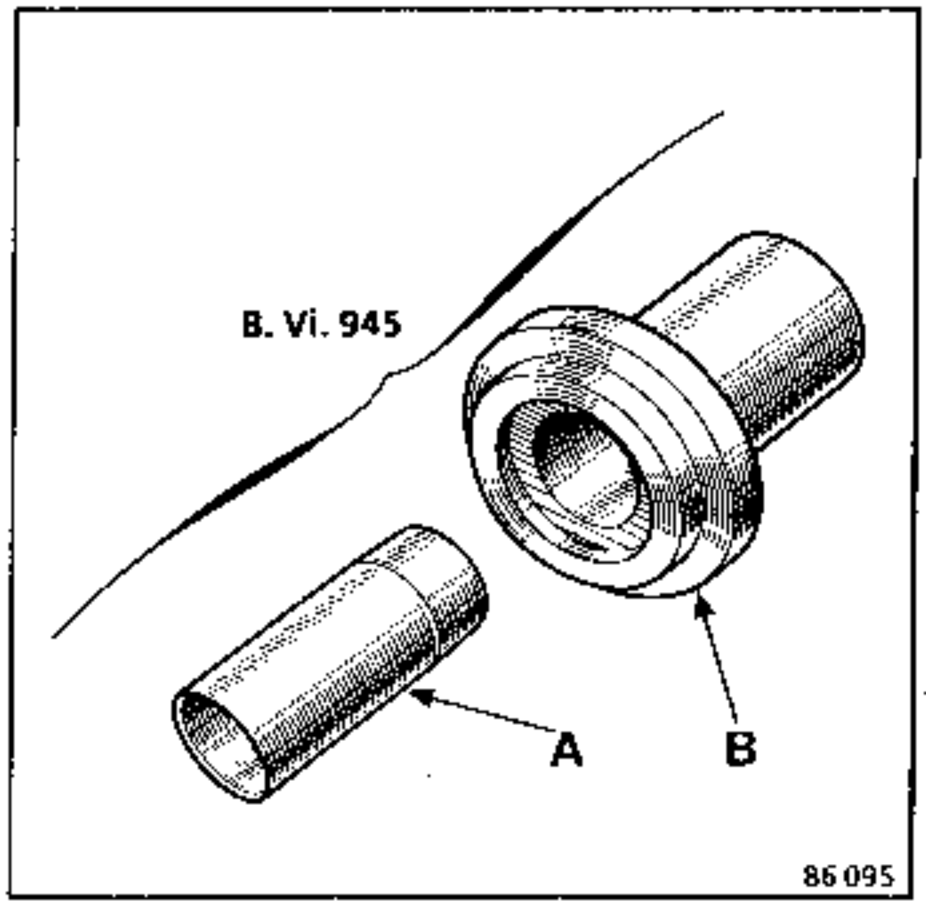
After tilting the seal, pull it out with pliers, taking care not to damage the splines on the sun wheel.



REFITTING

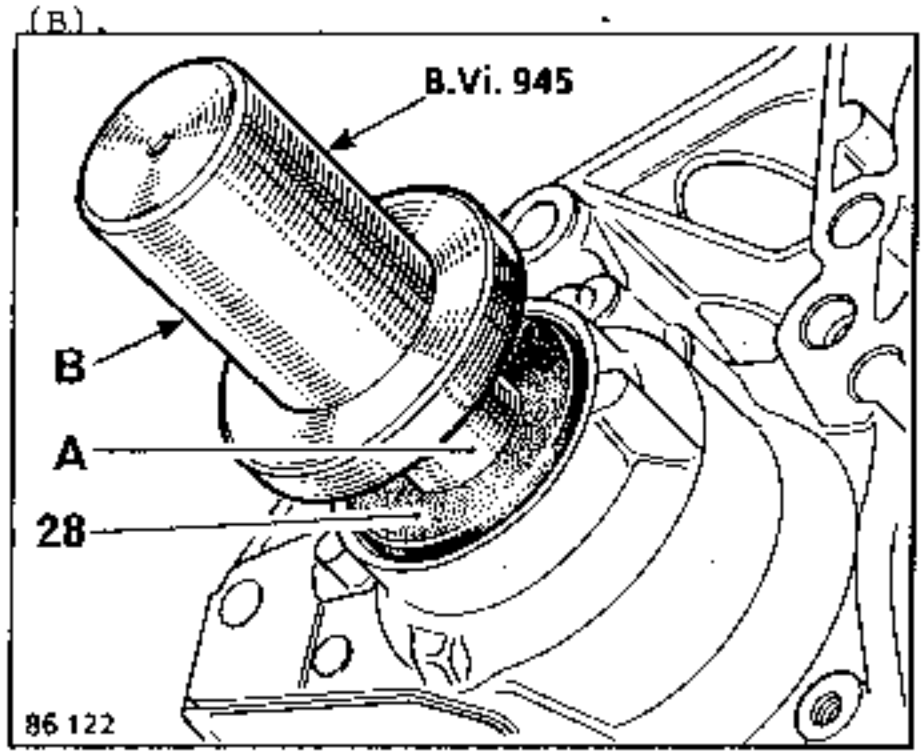
1. Vehicles equipped with type JB0, JB1, JB4, JB5 All Models and JB3-09 gearboxes.

The seal (28) is refitted using tool B.Vi.945 which consists of :
- a tapered seal protector (A),
- a plug for inserting the seal (B).



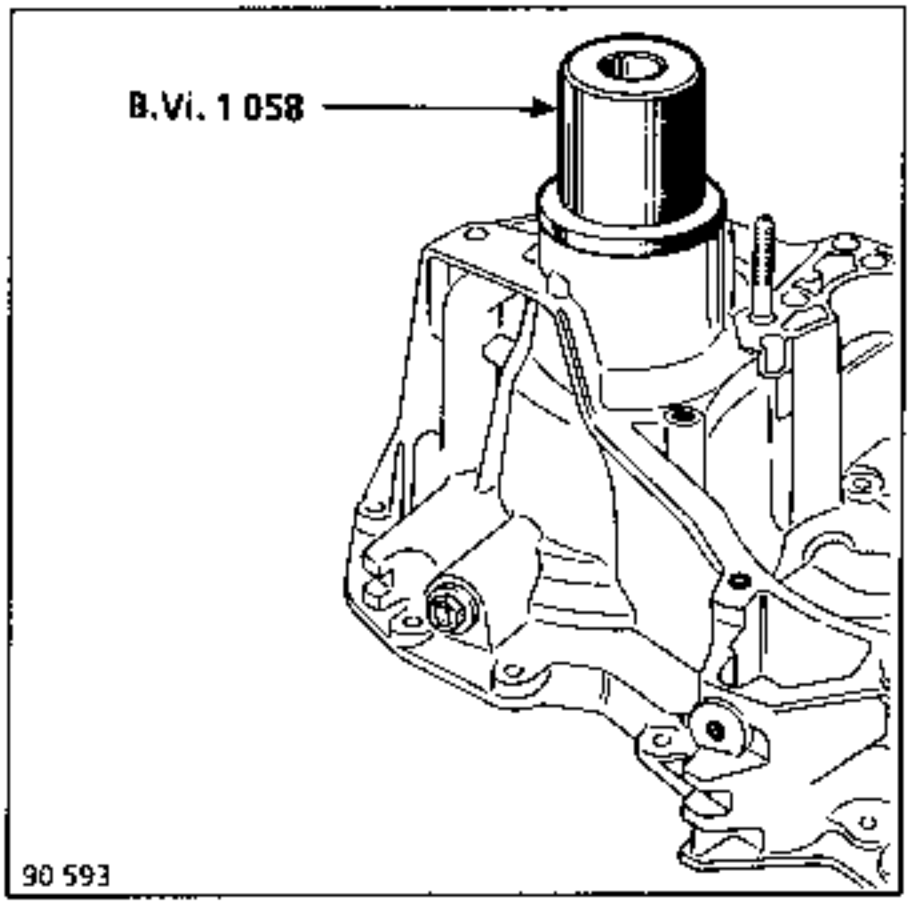
METHOD

Oil the protector (A) and place it on the sun wheel. Fit the oiled seal using plug (B).



2. Vehicles equipped with type JB3-014,019, 023 and 024 gearboxes (with the differential running on taper roller bearings).

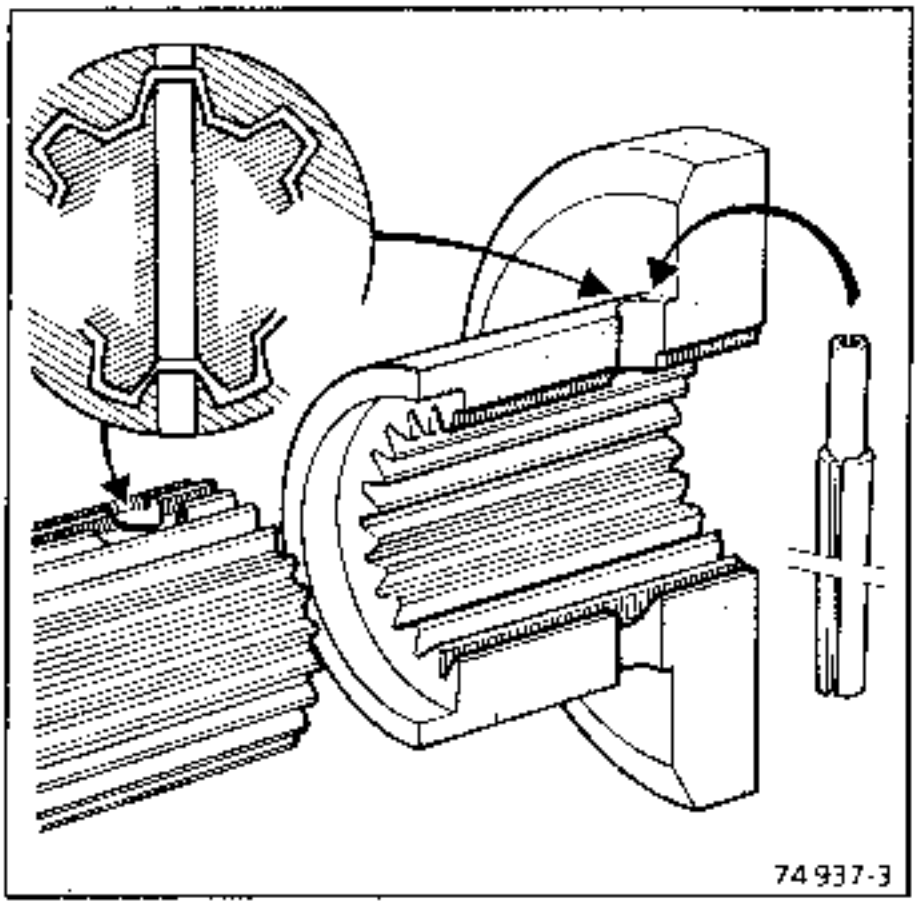
Proceed in the same way using tool B.Vi. 1058 and the protector (A) from B.Vi.945.



Coat the splines on the sun wheel with grease No. 20.

Correctly position the drive shaft with reference to the sun wheel.

Swing up the stub axle carrier, engaging the drive shaft in the sun wheel, using punch B.Vi.1031 to align the holes.



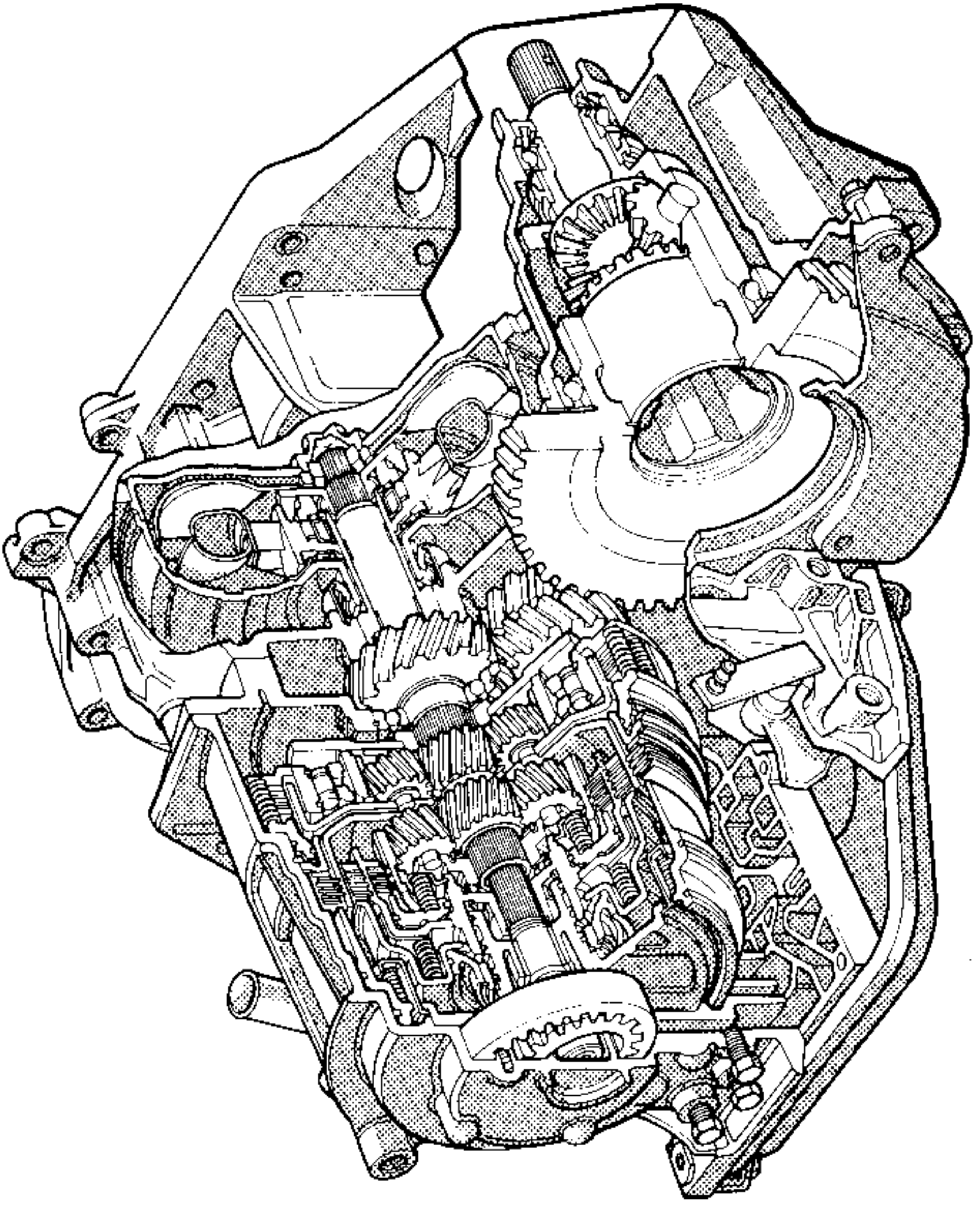
Fit new spring pins and seal the ends with CAF 4/60 THIXO.

Tighten the bolts and nuts to the specified torques.

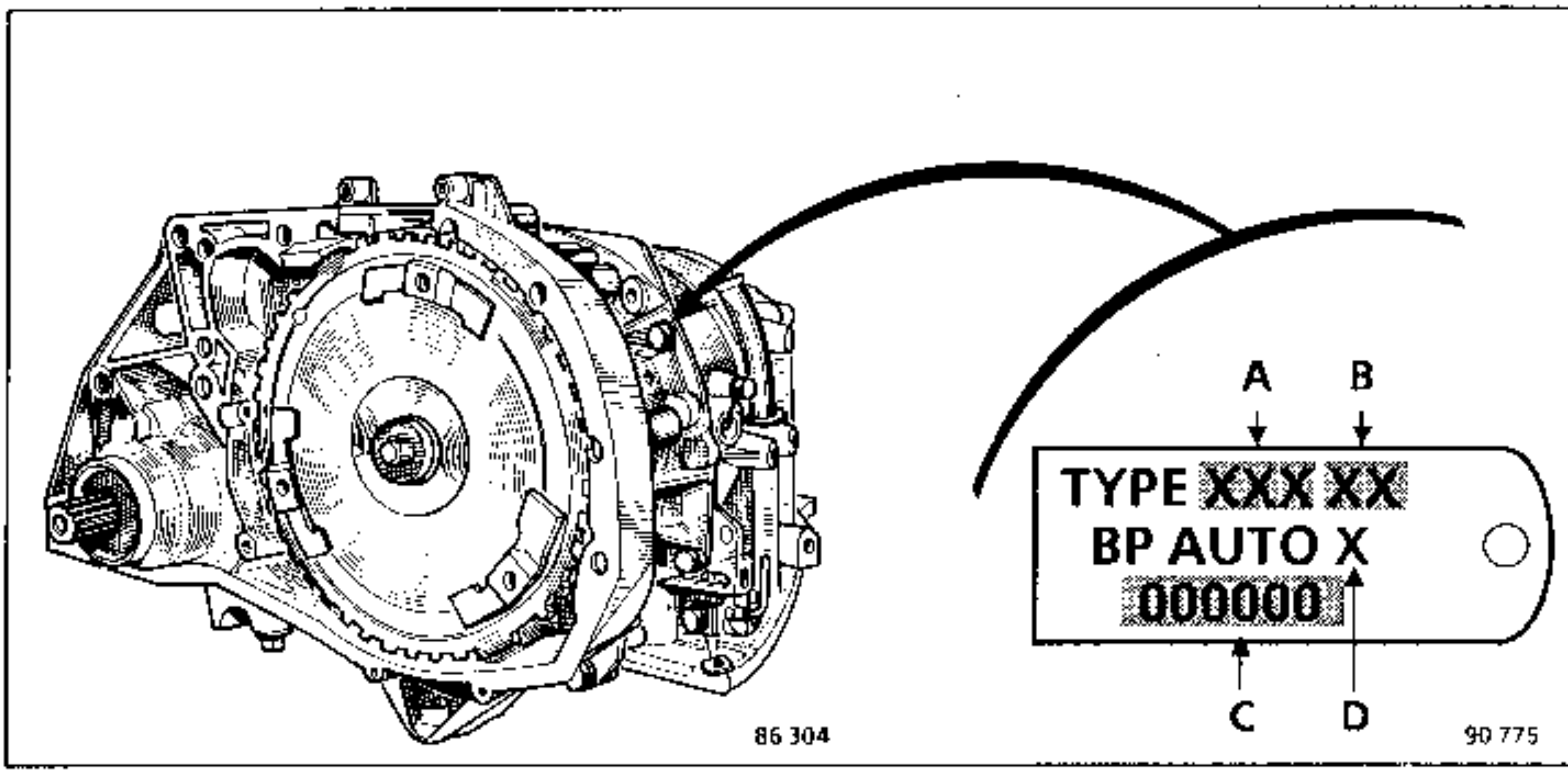
Fit the brake caliper, coating its bolts with Loctite FRENBLOC.

Fill the gearbox with oil.

The automatic transmission is of the MB type



The identification plate shows :
- at **A** : the automatic transmission type,
- at **B** : the type index,
- at **C** : the serial number,
- at **D** : the factory at which it was made.



Vehicle	A.T. type	Index	Final drive gears	Step-down gears	Speedo. drive gears	Oil pressure $\pm$0.1 bars	No. of planet wheels	No. of electronic unit
B403 C403	MB1	600 601 602	17/56	29/24	21/20	4,4	2	021 221 135
B408 C408	MB3	001	16/57	29/24	21/19	4,4	2	134 230
B40J C40J	MB1	602	17/56	29/24	21/20	4,4	2	135

B/C403 - B/C40J

Accel. position	1 ↔ 2		2 ↔ 3	
	↗	↘	↗	↘
FL	25	16	42	29
FD	75	59	119	108

B/C408

Accel. position	1 ↔ 2		2 ↔ 3	
	↗	↘	↗	↘
FL	23	15	38	27
FD	69	54	110	100

The kick-down system is integral with the electronic unit.

The special feature of index 2 electronic units (example 221-230) is that they prevent speed selection from 2nd to 3rd when the driver quickly lifts his foot from the accelerator depressed position to the "foot lifted" position.

2nd will select into 3rd, in the usual way, when the driver re-accelerates.

If the speed sensor is defective, the A.T. will be locked in 3rd under all conditions (if the defect has occurred whilst the vehicle is being driven or after starting).

The nature of the fault is found using B.Vi. 958 or tester XR25.

Special features

FAULT FINDING

Unit	Potentiometer		Starter test B.Vi.958 light 6	If the speed sensor is defective the transmission is locked in :
	Diagnosis	Reference		
021	no	(1)	yes	1st
134	no	(1)	yes	3rd
135	yes	1/2 load	yes	3rd
221	no	(1)	yes	3rd
230	no	(1)	yes	3rd

(1) If there is no potentiometer diagnosis, the fact that this is incorrectly adjusted causes all the shift speeds to be incorrect.

If the potentiometer circuit is broken, there is only one shift speed :

Pedal depressed (PD) if :
connectors 10 and 11 are disconnected
or the + 5 volt supply is broken
or if the cursor is not moving

Foot lifted (FL) if :
the earth is broken

ADJUSTING THE VALVE CLEARANCES ON VEHICLES EQUIPPED WITH AUTOMATIC TRANSMISSIONS

When using tool M.S.511-01, connected to the starter, to turn the engine over, under no circumstances is it to be connected to anything other than the starter solenoid.

If it is connected at any other point there is a risk that the A.T. electronic control unit will be irreparably damaged.

TOWING THE VEHICLE

The front of the car should be lifted. However, if this is impossible, the vehicle can be towed, with its front wheels on the ground, under exceptional circumstances as follows :
- pour an additional 2 litres of fluid into the transmission (ELF RENAULTMATIC D2 or MOBIL ATF 220).
- tow the vehicle at less than 30 km/h (20 mph) and, even then, for no more than a maximum of 50 km (30 miles) (with the lever in "N").

Do not forget to drain off the excess oil after this operation.

BALANCING THE WHEELS

The dynamic balancing of the drive wheels, with the wheels still on the vehicle, is forbidden.

DRIVING THE VEHICLE

The transmission is only lubricated when the engine is running. It is therefore forbidden :
- to coast with the ignition switched off (down a hill for example)
- to have the vehicle pushed (see section entitled "Towing the vehicle").

It is impossible to start the engine by pushing the vehicle.

No special equipment is required to tow a caravan with this vehicle.

The "Automatic Transmission" (T.A.M.) manual covers the complete overhaul of the automatic transmissions fitted to the various versions of this vehicle.

We shall therefore only describe, in this chapter :
- the operations of Removing and Refitting the automatic transmission.
- Removing - Refitting - Adjusting the shift controls.

Although they can be carried out with the automatic transmission still in the vehicle, operations such as "Replacing the hydraulic control valve" - "Replacing a differential seal" are not described in the vehicle repair manual because they are no different from the methods described in the "T.A.M." manual.

Consumables

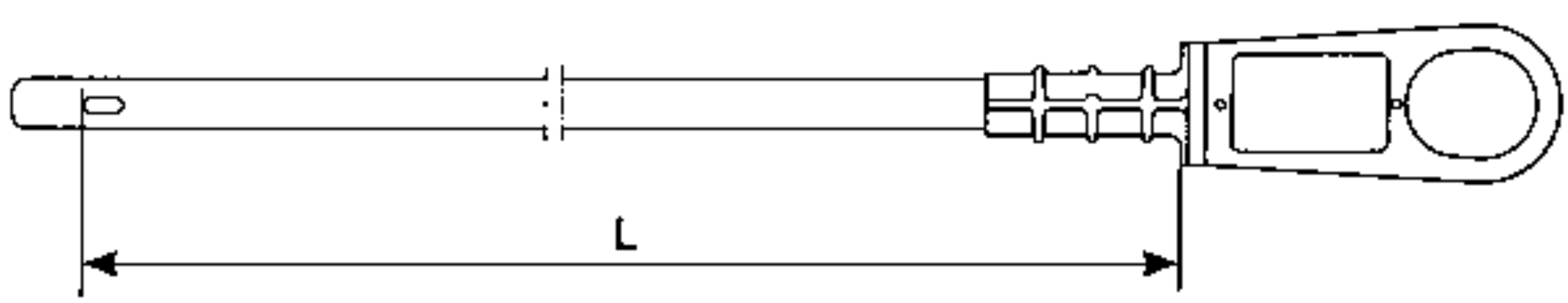
Type	Quantity	Unit concerned
CAF 4/60 THIXO	Coating	Sealing the pins in the drive shafts
Grease MOLYKOTE BR2	Coating	RH sun wheel splines

Whenever they are removed :
- the spring pins,
- the self-locking nuts.

Draining - Refilling

CORRECT TYPE OF DIPSTICK

VEHICLE TYPE	COLOUR OF HANDLE, LENGTH	DIPSTICK PART NO.	A.T. TYPE
B/C403 - B/C408 - B/C40J	(2) GREEN or	77 00 716 561	MB3 { 600 601 602
	(1) L = 243 mm	77 00 739 735	MB3 001



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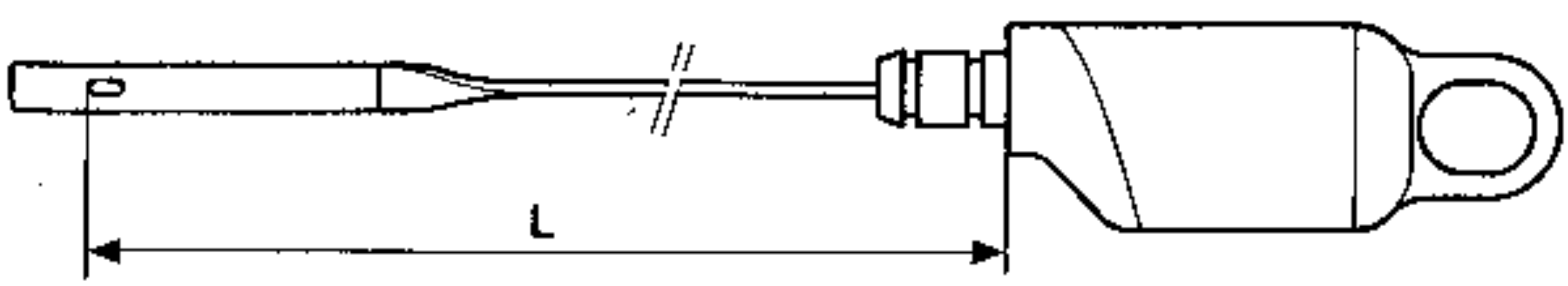

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FLUID TYPE

The MB automatic transmission only has one fluid level and one fluid grade (for convertor, final drive and mechanism).

OIL GRADE

ELF RENAULTMATIC D2

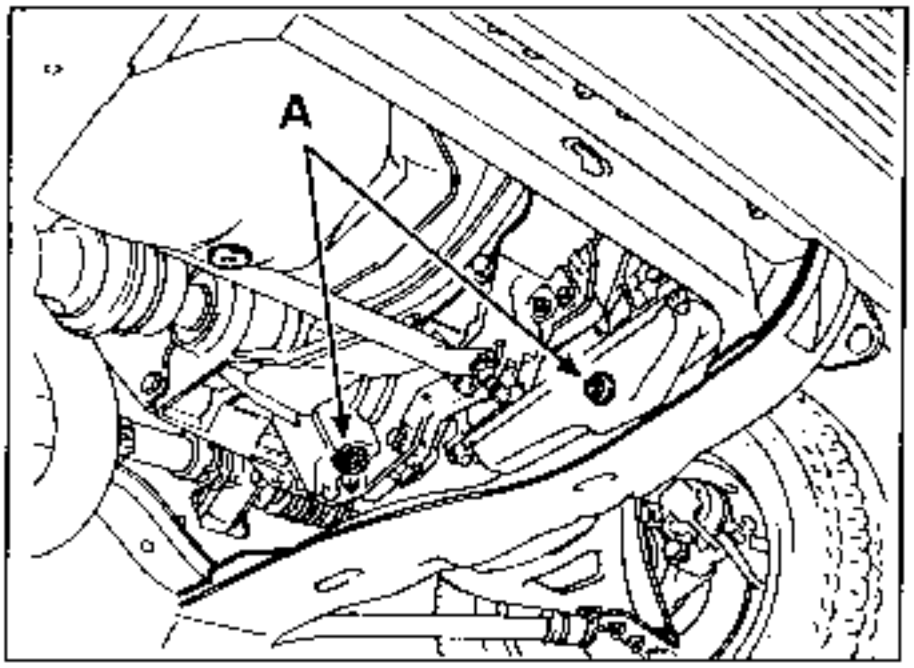
If this is not available, use :
MOBIL ATF 220 (which are intermixable)
or TOTAL DEXRON

CAPACITY IN LITRES (approximate)

Total nominal	:	4.5 l
After draining	:	2 l

FLUID CHANGE PERIODS

The transmission is not drained during the warranty inspection between 1 000 and 3 000 km (600 and 1 800 miles). Checking the level is all that is necessary.
The fluid is changed every 50 000 km (30 000 miles) and the gauze filter is also changed.
The unit is to be changed when cold with the dipstick and plugs (A) removed.



Use new seals when refitting the plugs.

The unit is filled through the dipstick tube.

Use a funnel fitted with a 15/100 filter to avoid dirt entering the unit.

Use the recommended fluid.

Start the engine, run it at idling speed, check the level and top-up if necessary.

CHECKING THE FLUID LEVEL WHEN COLD

The vehicle is to be unladen and parked on a flat horizontal surface.

Place the selector lever in "PARK" (P).

Start the engine and wait for 1 to 2 minutes for the convertor and the cooler to fill.

The oil will be at ambient temperature (20°C).

Take out the dipstick with the engine running.

The level is not to be lower than the MIN COLD level (1) (there is a risk of damage) or above the MAX COLD level (2) (there is a similar risk of damage).

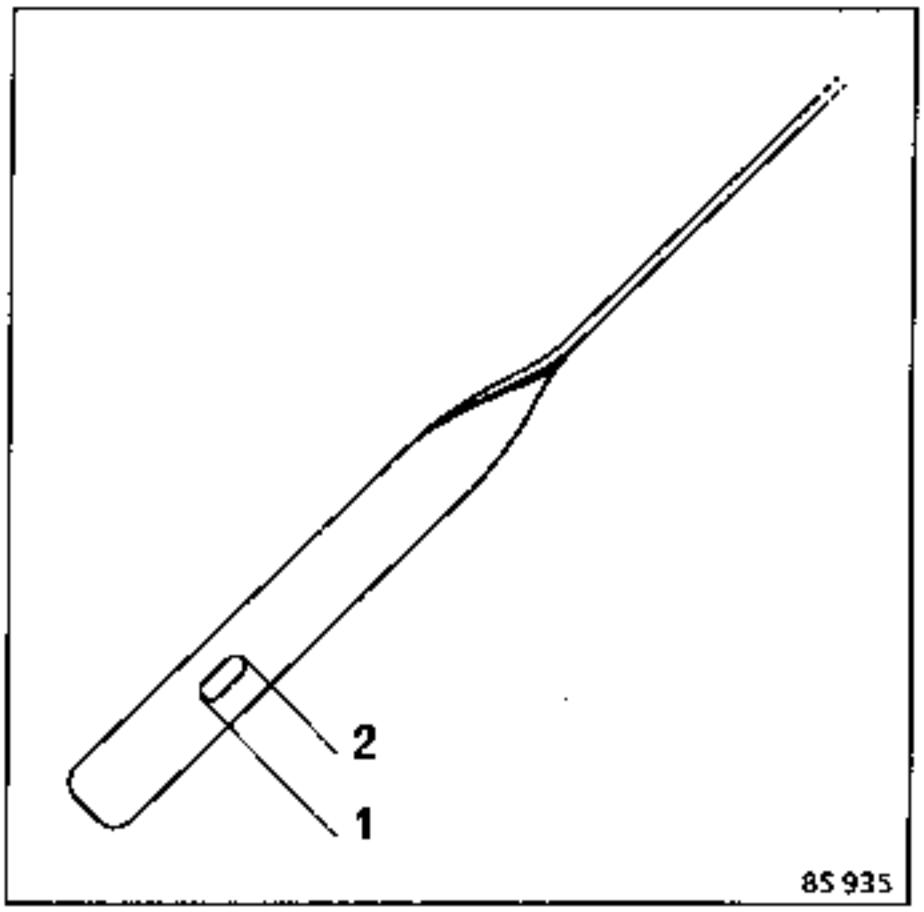
Never fill the unit over the MAX COLD level.

WARNING

Too much fluid in the unit causes :
- overheating of the fluid,
- leakage.

Too little fluid results in damage to the mechanism.

TOP-UP THE FLUID LEVEL WHEN THE UNIT IS COLD.

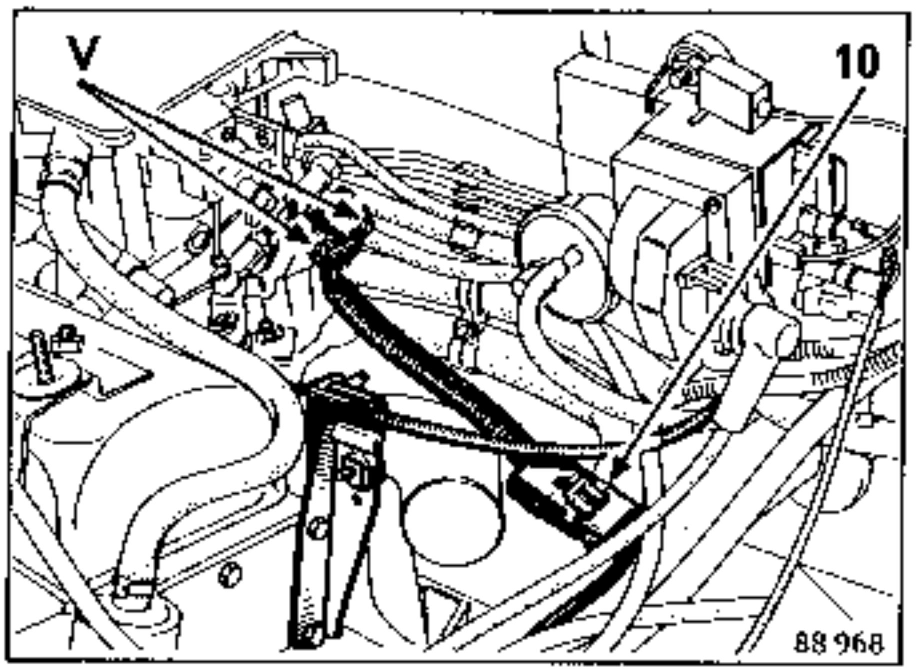


ESSENTIAL SPECIAL TOOLS	
B.Vi.958	Tester

PREPARATION

With the vehicle stationary, and the ignition switched off, check that the accelerator cable is correctly adjusted.

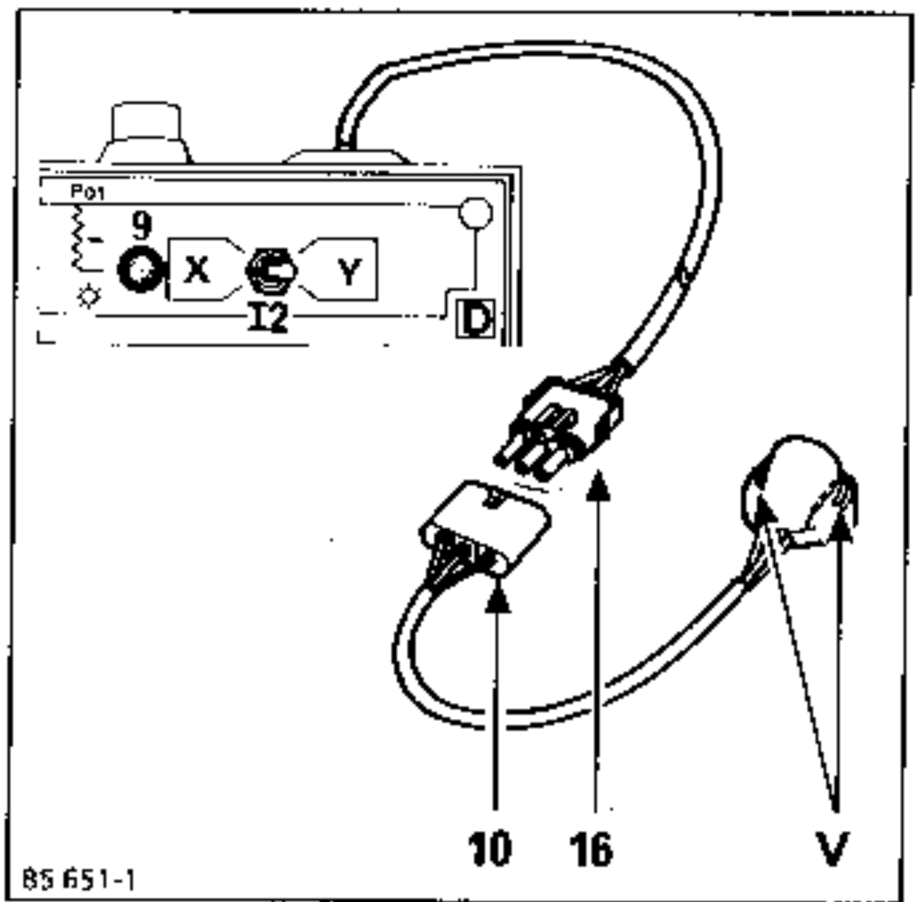
Disconnect the three way connector (10) on the wiring connecting the electronic unit to the potentiometer.



Connect the potentiometer connector (10) to the connector on B.Vi.958 (16).

Provide a supply to B.Vi.958 from the battery.

The switch "I2" should be in position "Y".



TESTING

Fully depress the accelerator	LIGHT 9
O.K.	★
DEFECTIVE or incorrectly adjusted	○

ADJUSTING

Slightly unscrew the two screws (V) that secure the potentiometer in place.

Hold the throttle fully open by depressing the accelerator pedal and slowly turn the potentiometer until the indicator light (9) switches on. Then retighten the two screws (V).

If the indicator light (9) cannot be switched on by means of this adjustment, check the wiring and, if the potentiometer is defective, replace it.

Whenever the potentiometer has been replaced or refitted, it is to be re-adjusted.

NOTE : whenever cleaning the carburettor, remove the load potentiometer or protect it so that it cannot get splashed by the cleaning solvent.

ESSENTIAL SPECIAL TOOLS	
B.Vi. 466-06	Cylindrical end fitting
B.Vi. 466-07	Oil pressure gauge

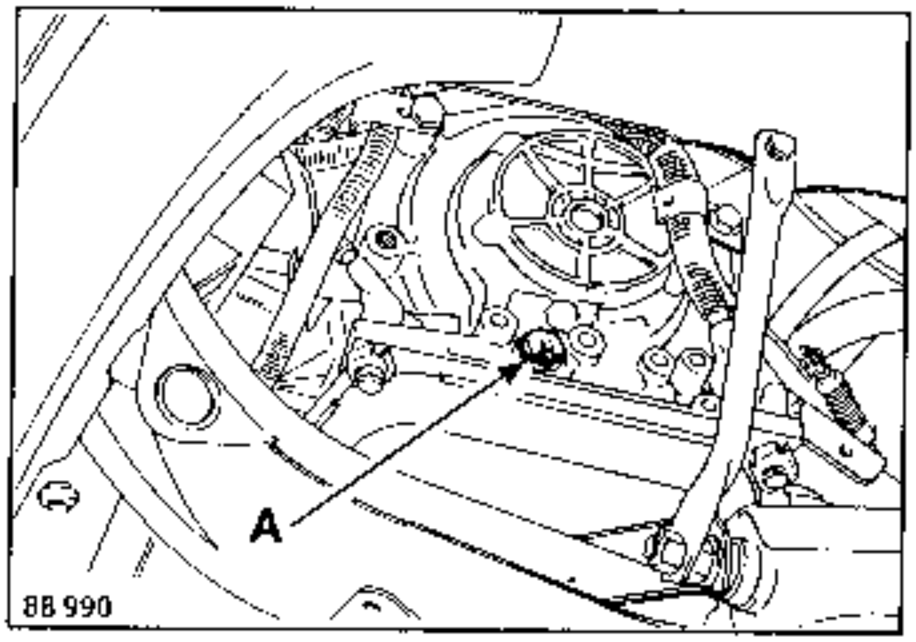
CHECKING

Prior requirements for measuring :

The normal operating temperature is 80°C.

Ensure that the accelerator cable is correctly adjusted.

Connect the oil pressure gauge B.Vi. 466-07 to end fitting B.Vi.466-06, at (A).



Measuring :

Place the selector lever in 2nd speed hold.

Fully depress the accelerator whilst depressing the brake, at the same time, to stabilise the speed at 80 km/h (50 mph)

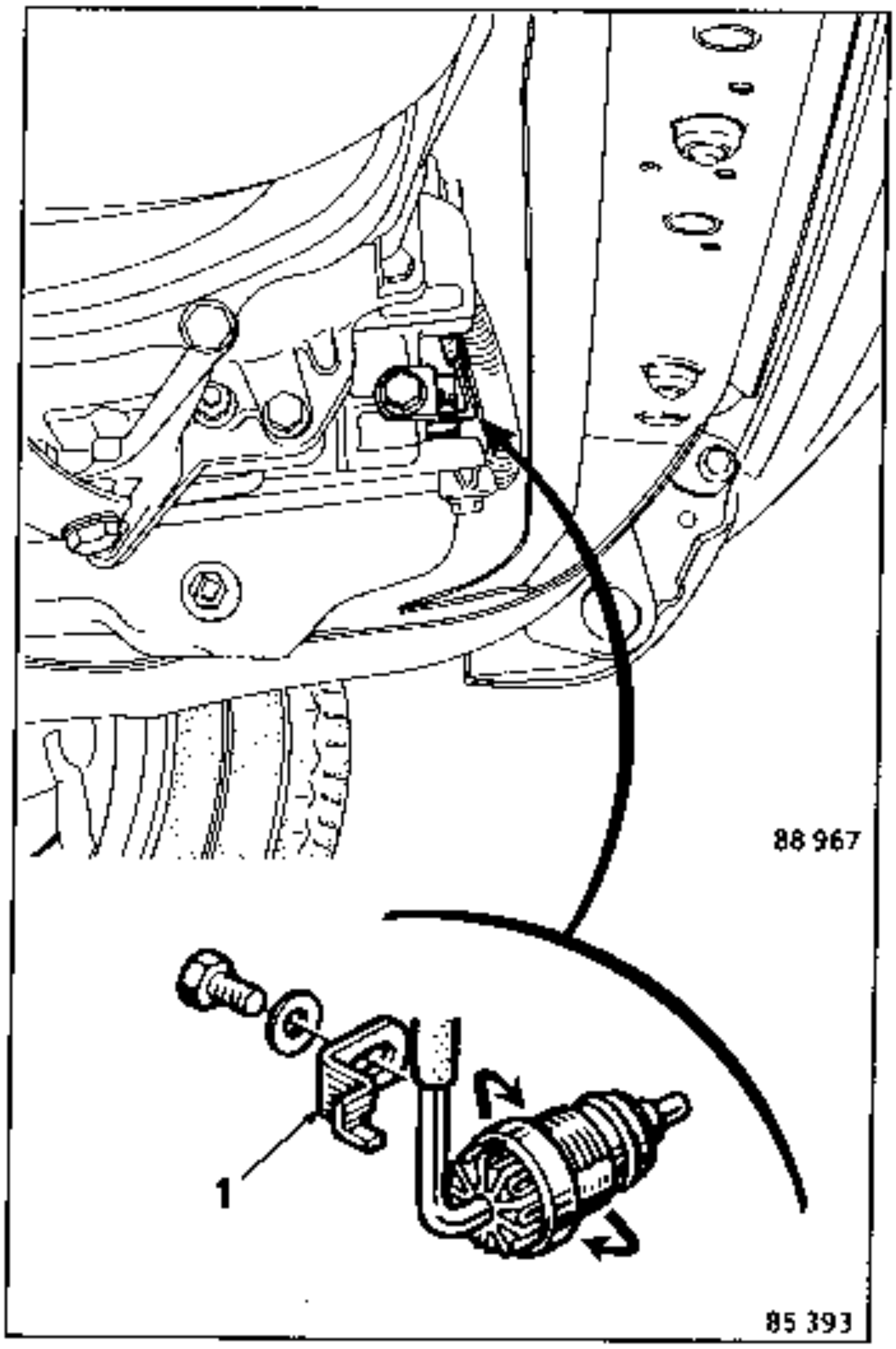
The pressure should be :

B/C403)
B/C40J) MBJ = 4.4 $\pm$ 0.1 bars

B/C408 MB3 = 4.4 $\pm$ 0.1 bars

ADJUSTING :

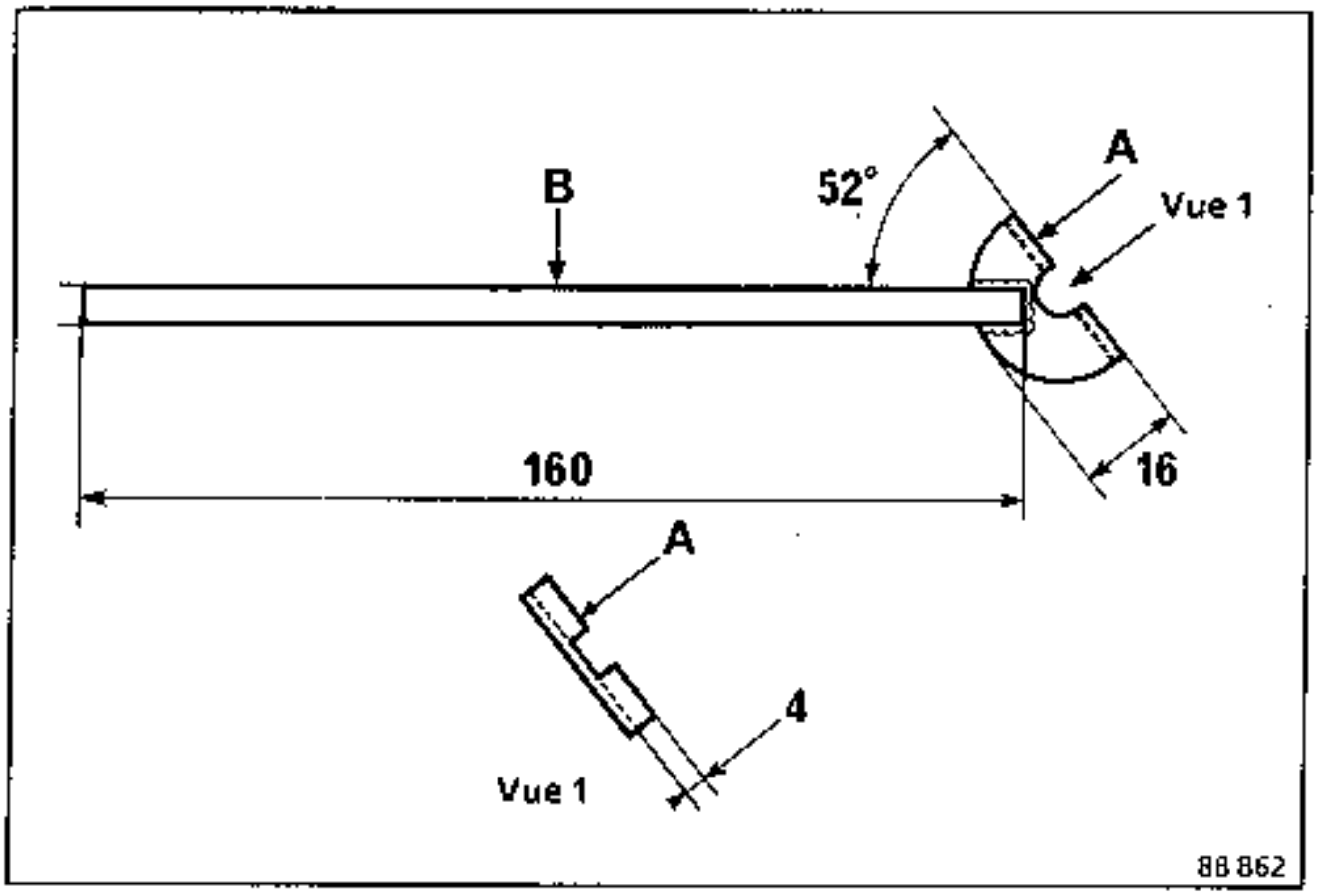
Remove the stop (1) and turn the capsule. By screwing the capsule in, one increases the pressure and vice versa.



NOTE : 2 notches = approximately 0.08 bars.

A tool can be made up locally to facilitate this operation.
(Its dimensions are expressed in mm).

A = washer Ø 8/30 mm, thickness 1.5 mm
B = rod Ø 6 mm



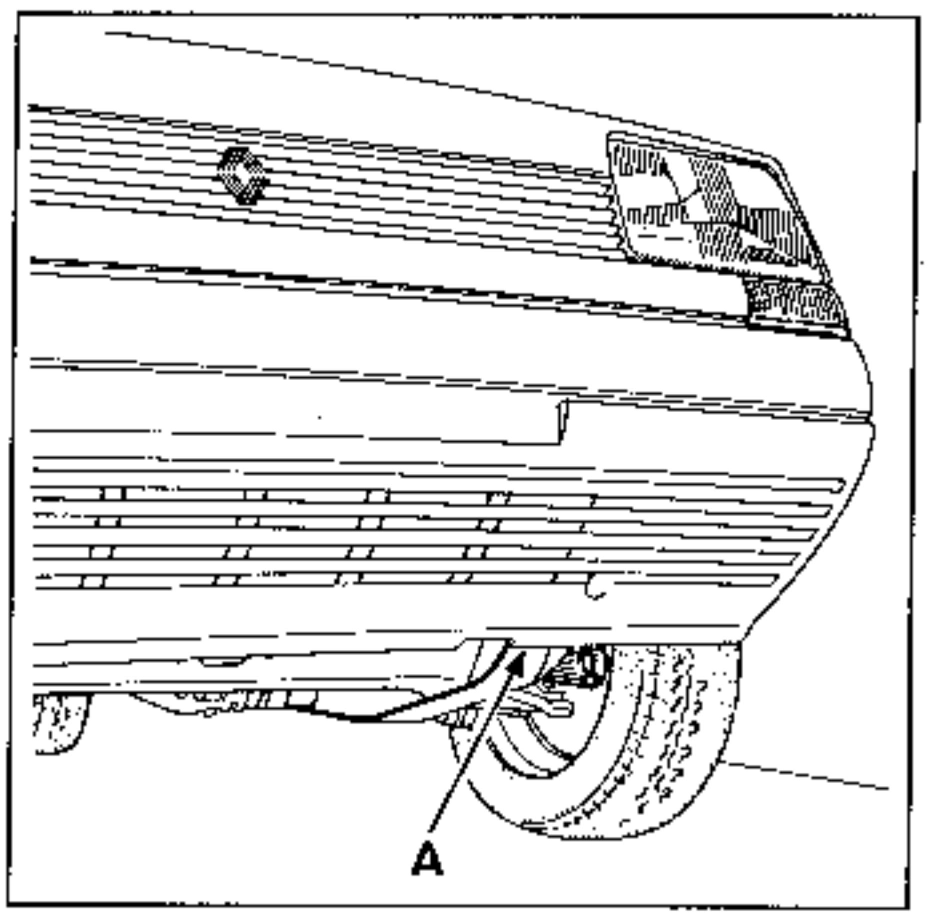
Gauze filter

This is to be replaced every 50 000 km (30 000 miles) or whenever any extensive work is carried out on the transmission mechanism.

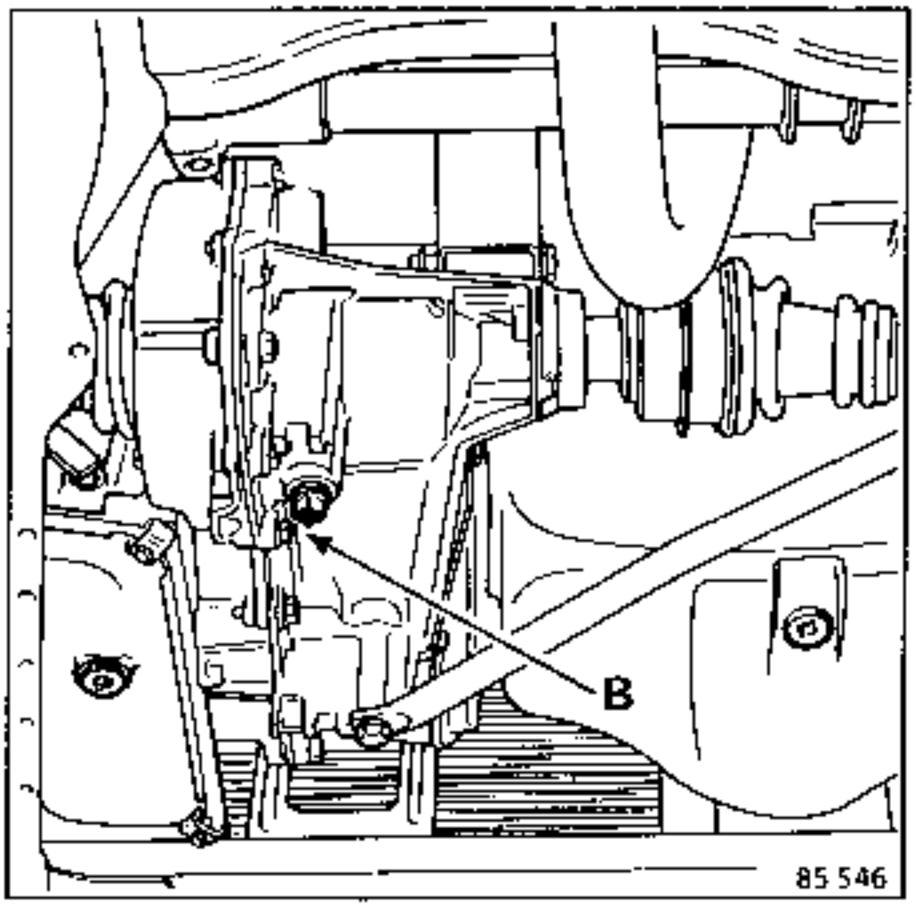
REPLACING

Drain the automatic transmission.

Remove the nut from the transmission flexible mounting at (A).

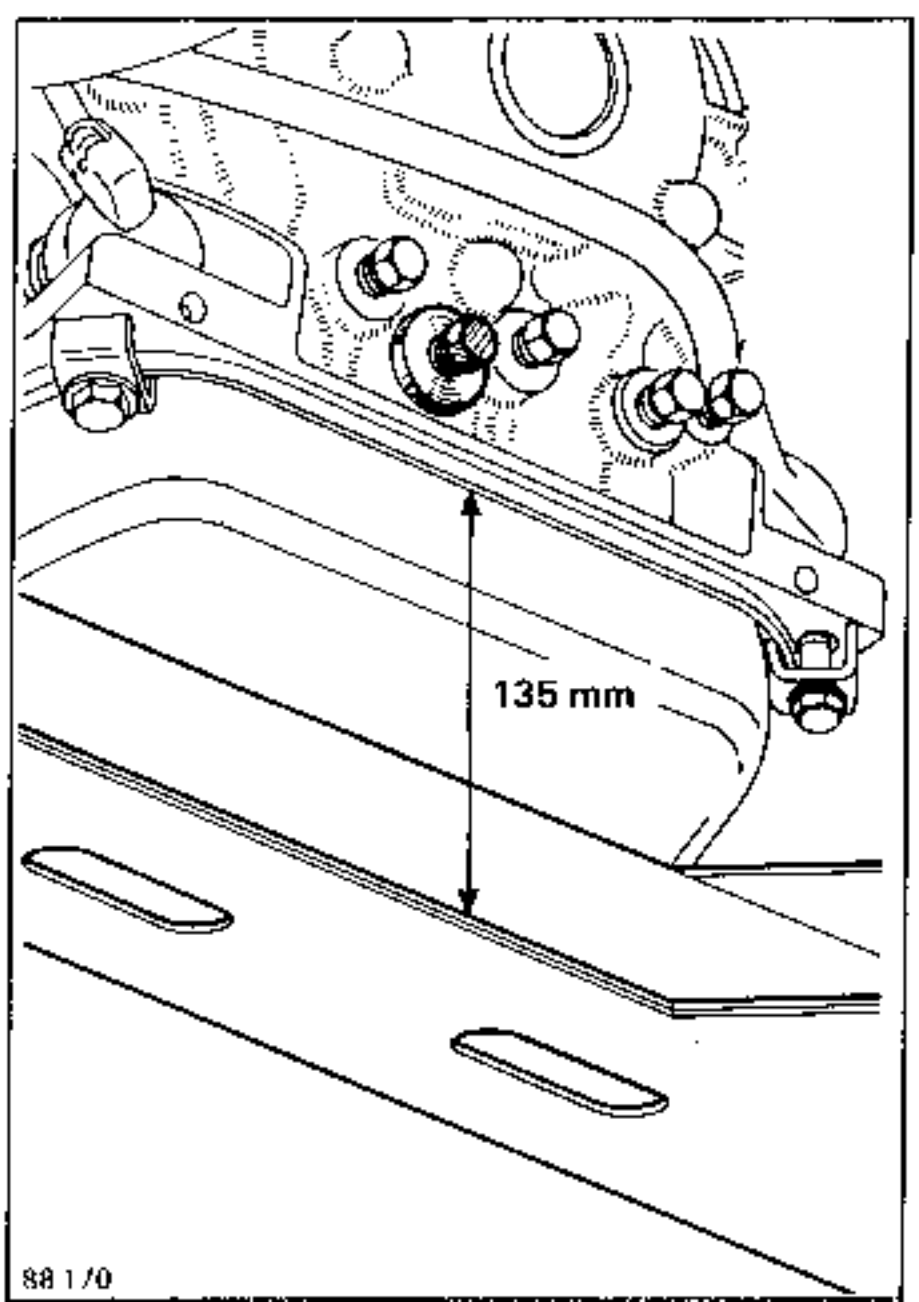


Place a jack under the transmission at (B).



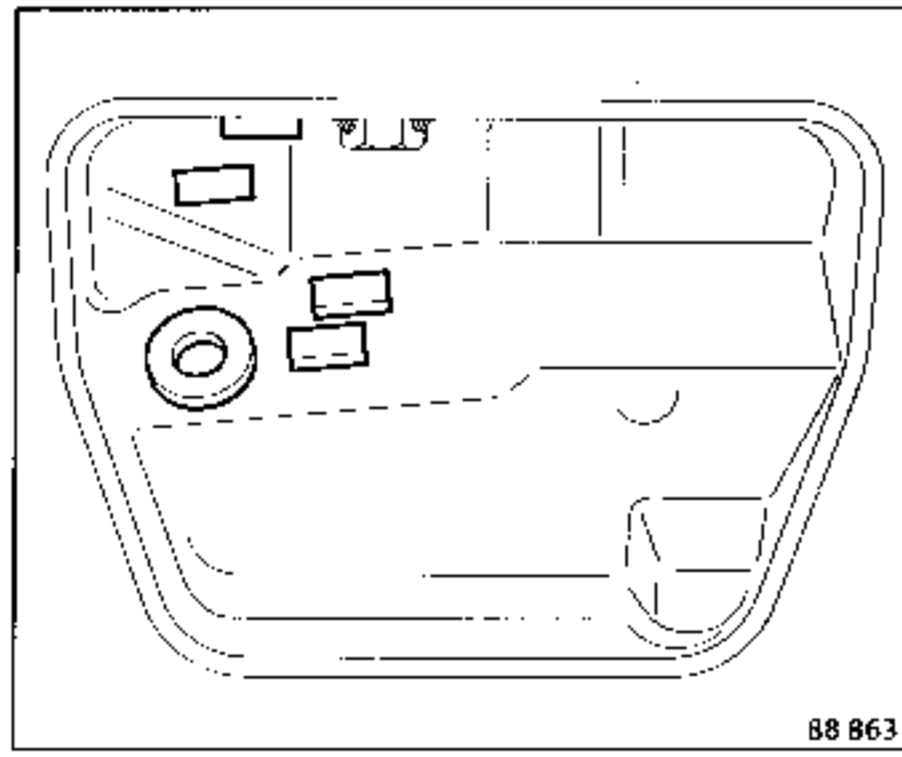
85 546

Lift the engine - transmission assembly to obtain a dimension of approx. 135 mm.



88 170

Remove the transmission pan plate and the gauze filter together with its gasket.
Clean the pan plate and its magnets and refit them (with the ridged face against the plate).



88 863

Fit the new filter together with its gasket and tighten it to a torque of 0.9 daN.m.

Refit the pan plate and fill the transmission with fluid.

REMOVING - REFITTING

To remove the automatic transmission, one must take out the entire engine - transmission assembly.

ESSENTIAL SPECIAL TOOLS	
B.Vi. 31-01	Pin punches for spring pins
Mot. 878	Lifting chain and rings
T.Av. 476	Ball joint extractor
Mot. 582	Torque convertor locking quadrant
B.Vi. 465	Torque convertor retaining lug

TIGHTENING TORQUES (in daN.m)	
Brake caliper securing bolts	**10**
Shock absorber securing bolts	**8**
Steering ball joints	**4**
Wheel bolts	**8**
Drive shaft bellows securing screws	**2,5**
Cooler securing bolts	**4**
Bolts on convertor drive plate : Verto	**3**
Renault ø 227	**1,9 - 2,5**
Bolts round transmission periphery	**4**

CONSUMABLES
Loctite FRENBLOC : Caliper securing bolts
CAF 4/60 THIXO : Drive shaft pins
MOLYKOTE BR2 : Drive shaft splines and torque convertor locator

REMOVING

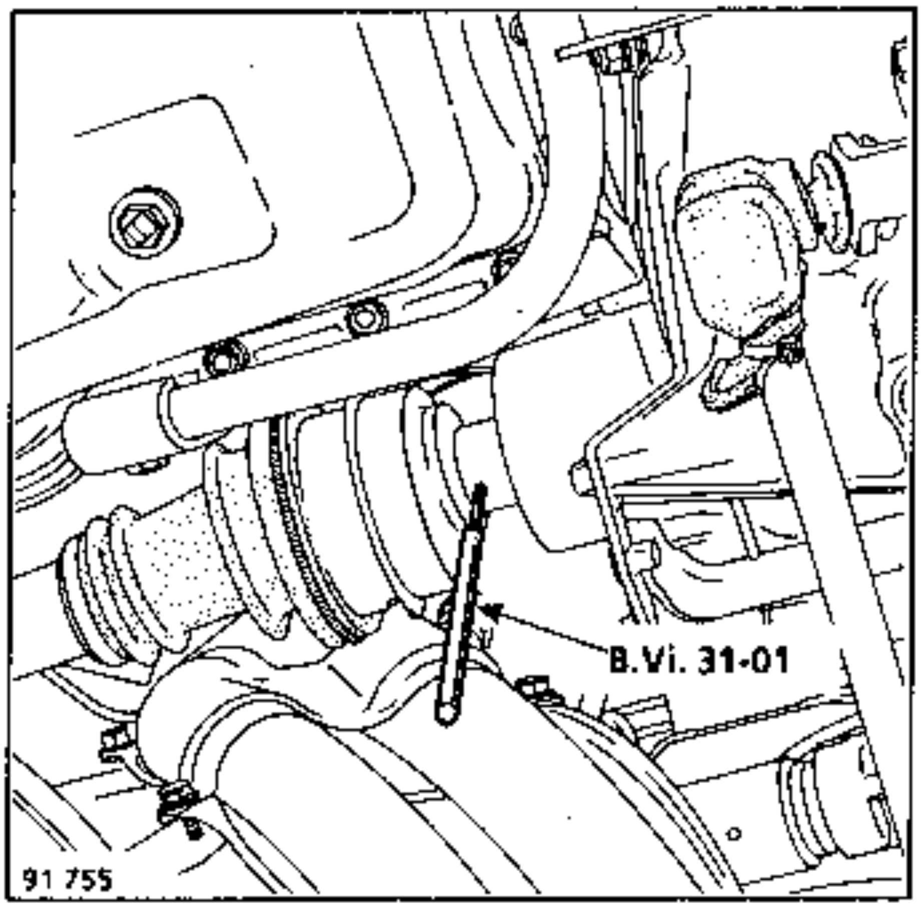
Disconnect the battery.

Drain :
- the cooling system (lower radiator hose),
- the automatic transmission fluid.

Remove :
- the bonnet,
- the engine cooling radiator and expansion bottle,
- the A.E.I. ignition unit,
- the air filter,
- the wheels.

On the right hand side of the vehicle :

- the pin from the drive shaft using punches B.Vi.31-01.

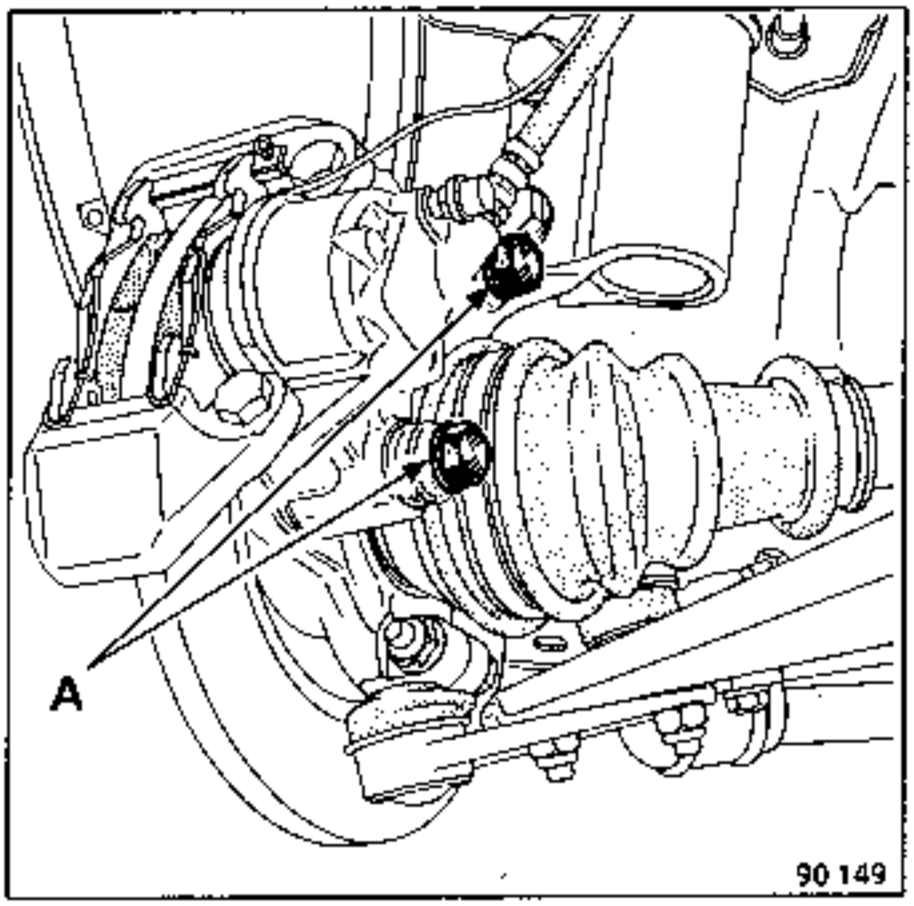


On the left hand side of the vehicle :

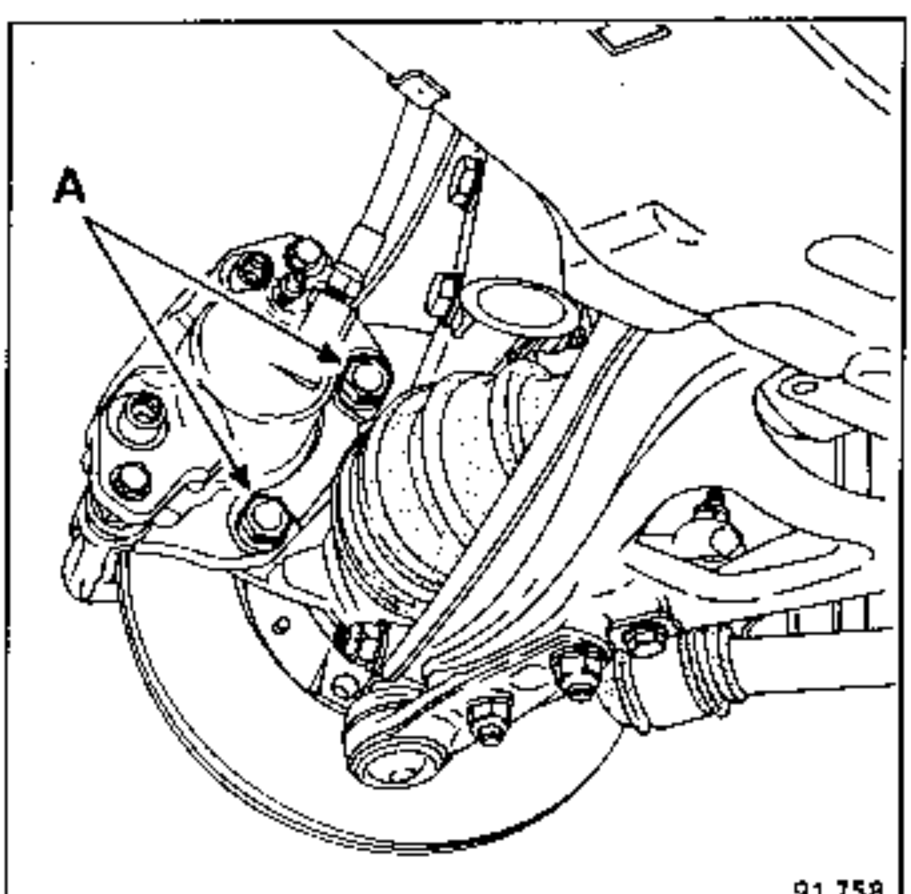
- the two bolts that secure the lower end of the shock absorber. Free the drive shaft, taking care not to damage the bellows. Secure the stub axle carrier to avoid applying tension to the brake hose.

- the two caliper securing bolts (A). Secure the caliper to the suspension spring to avoid applying tension to the hose.

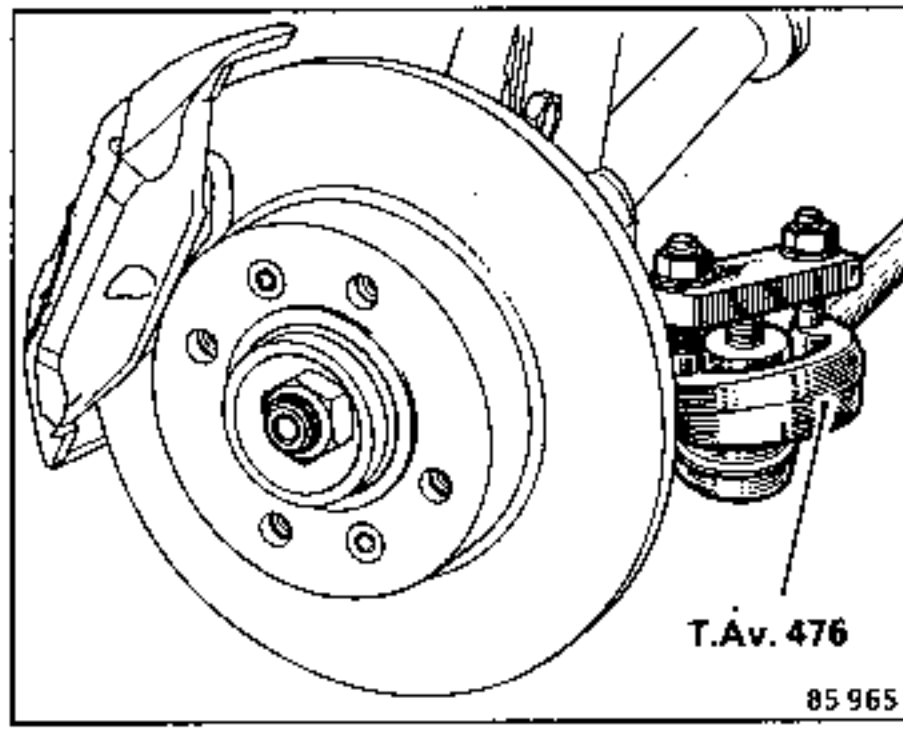
BENDIX



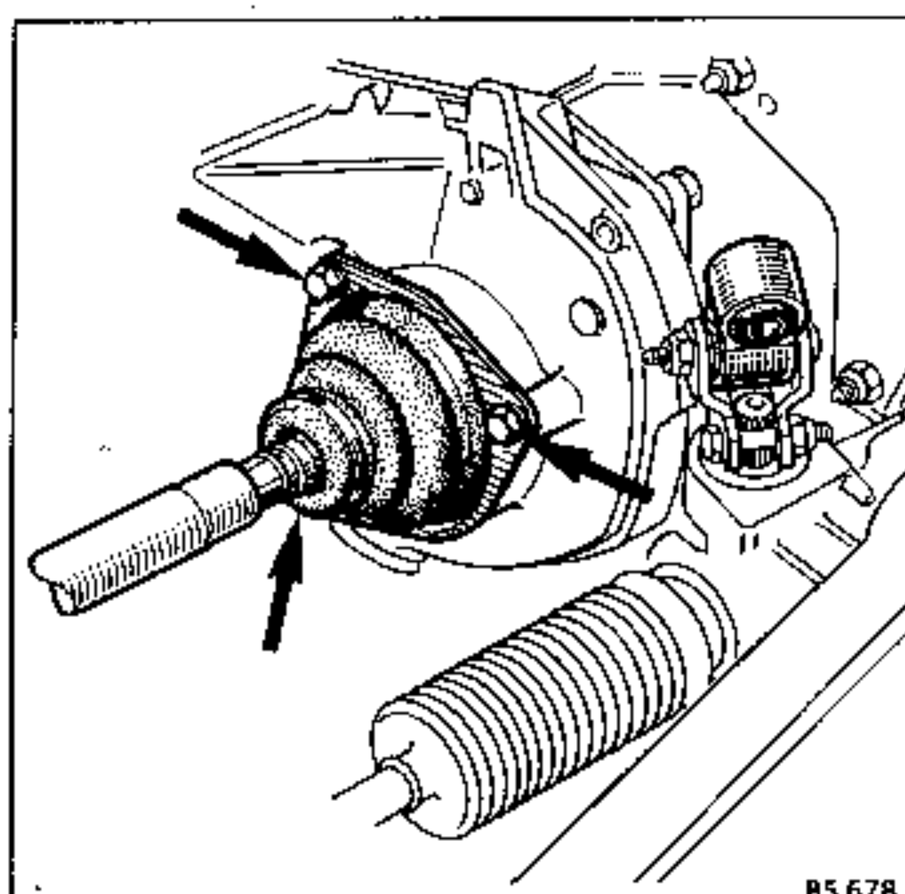
GIRLING



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

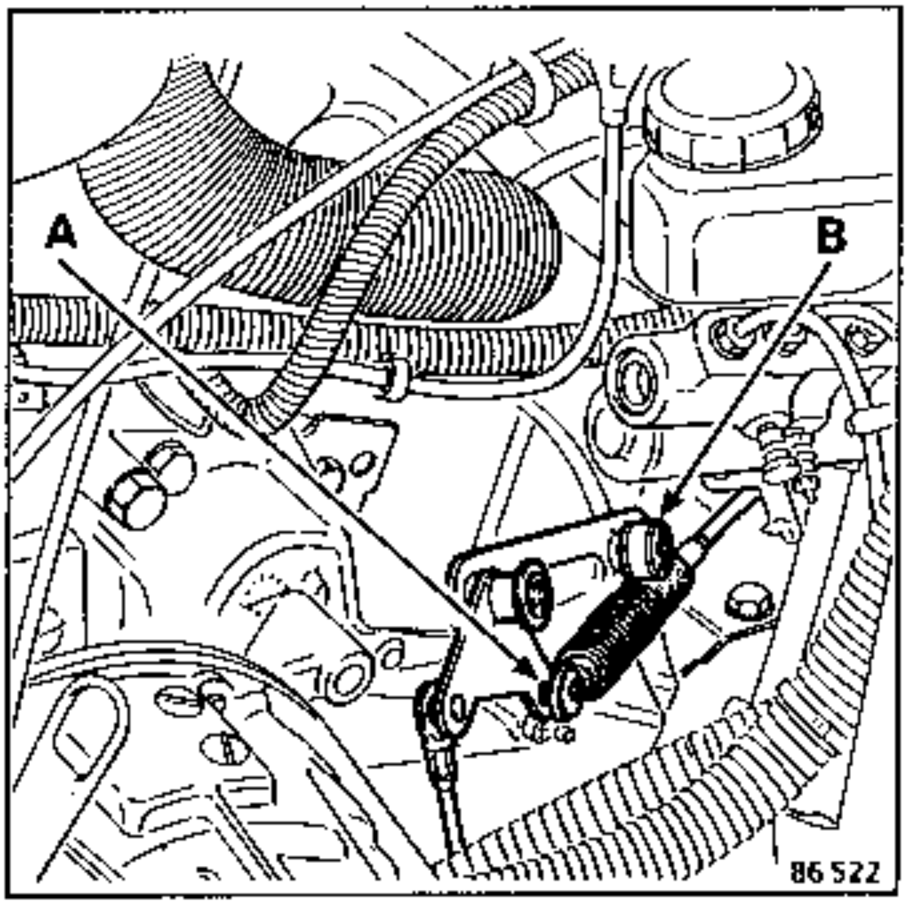


- the three screws that secure the drive shaft bellows,



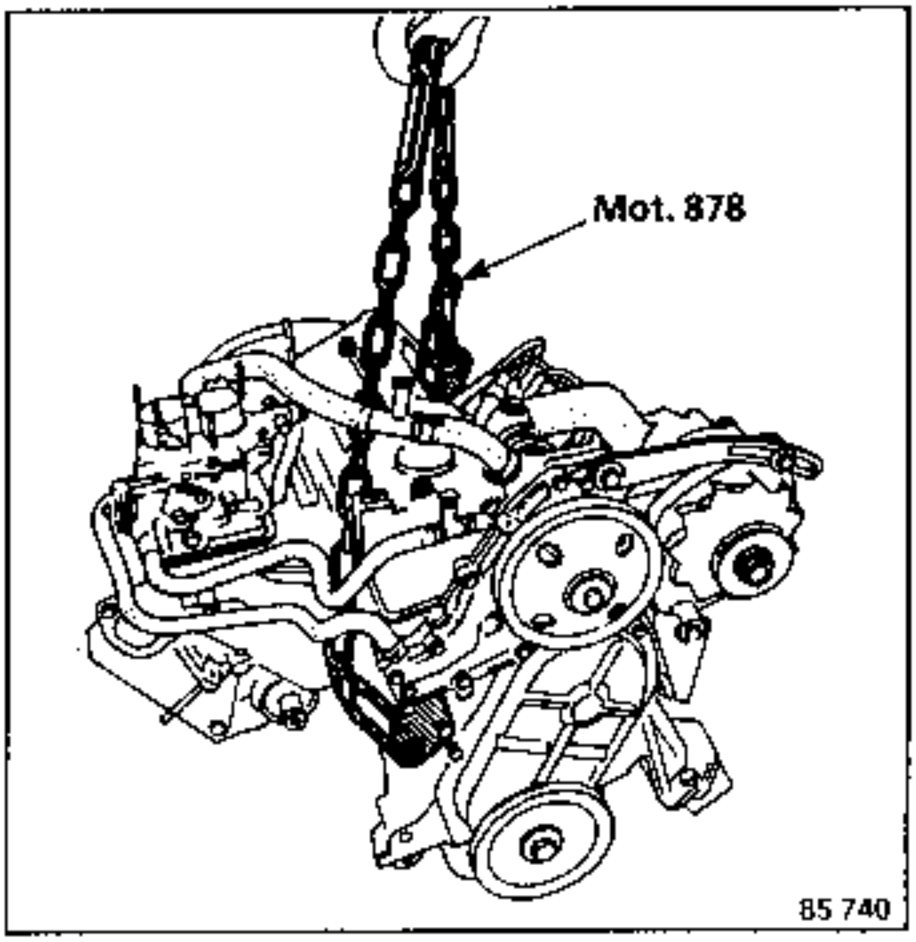
- the two bolts that secure the lower end of the shock absorber and free the drive shaft.

Disconnect :
- the heater hose at the coolant pump, the transmission cooler hose, the fuel system hose, the brake servo vacuum hose, the capsule hose,
- the starter cables, freeing them from the automatic transmission,
- the electronic unit electrical junction block,
- the earthing braids,
- the accelerator, the choke and speedometer cables,
- the shift cable from its securing points at (A) and (B).



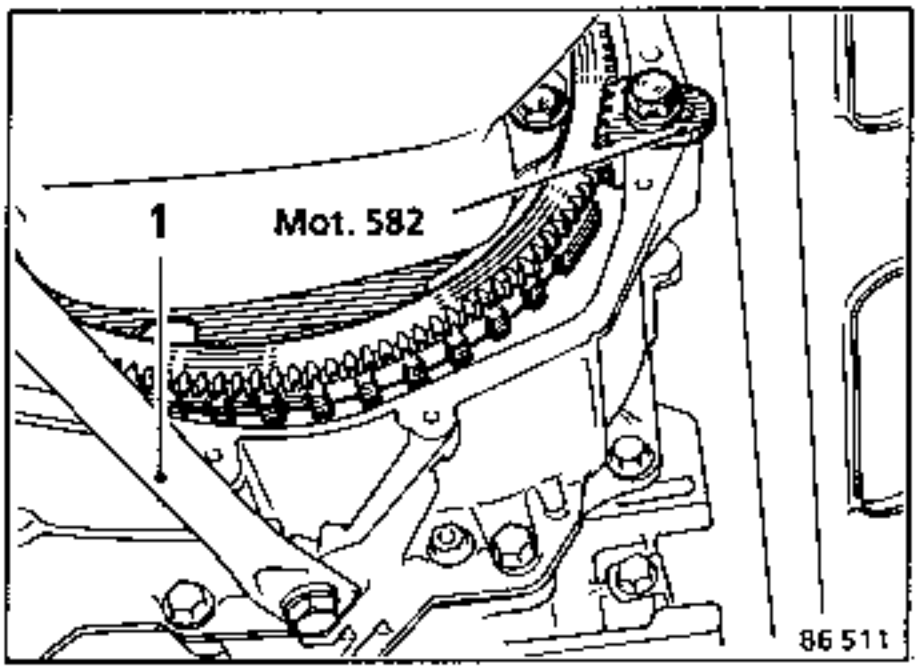
Remove :
- the A.T. speed sensor, freeing the cable covers from the A.T.,
- the exhaust clamp,
- the flexible mounting nuts and bolts.

Using a lifting hook and tool Mot.878, lift the engine - transmission assembly out of the engine compartment.

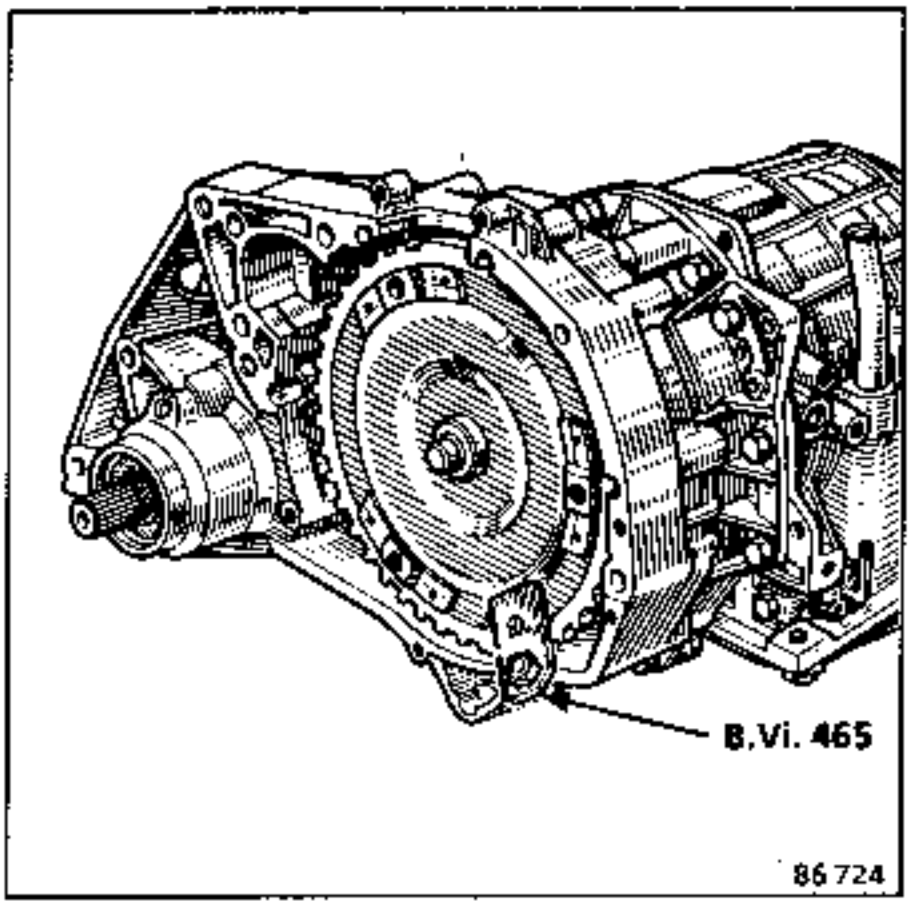


Remove :
- the starter,
- the engine strut (1),
- the protective panel.

Fit the locking quadrant Mot.582 and remove the bolts from the convertor drive plate.



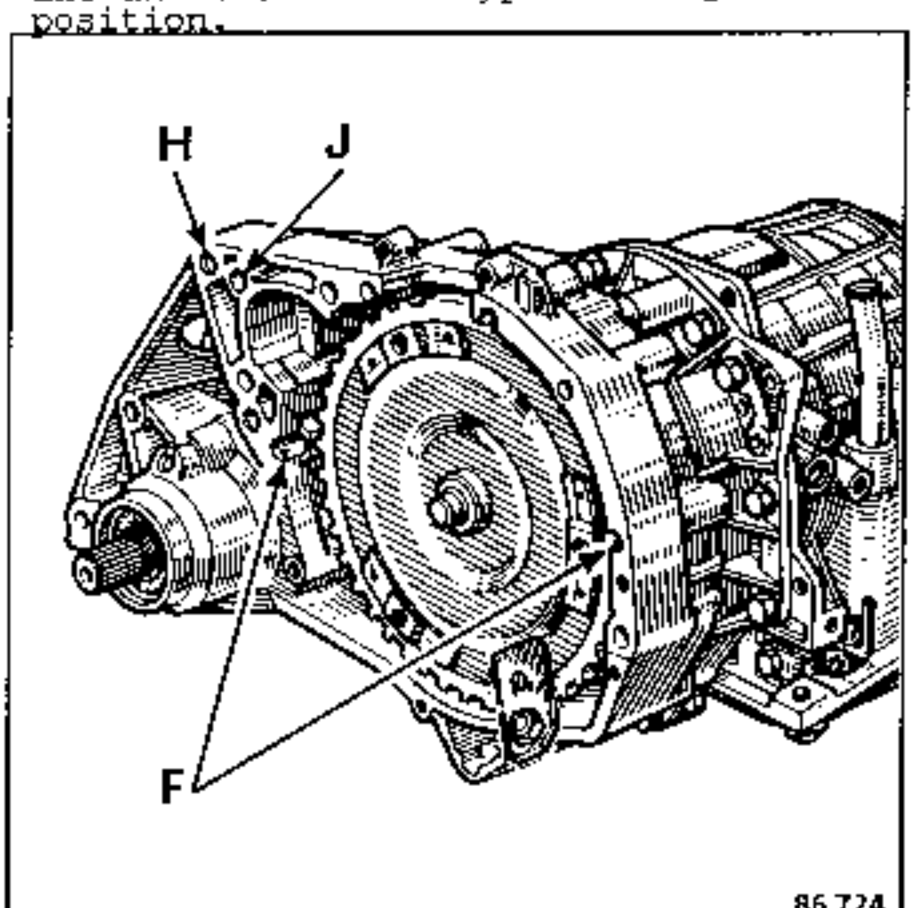
Fit the convertor retaining lug B.Vi.465 and disconnect the automatic transmission from the engine.



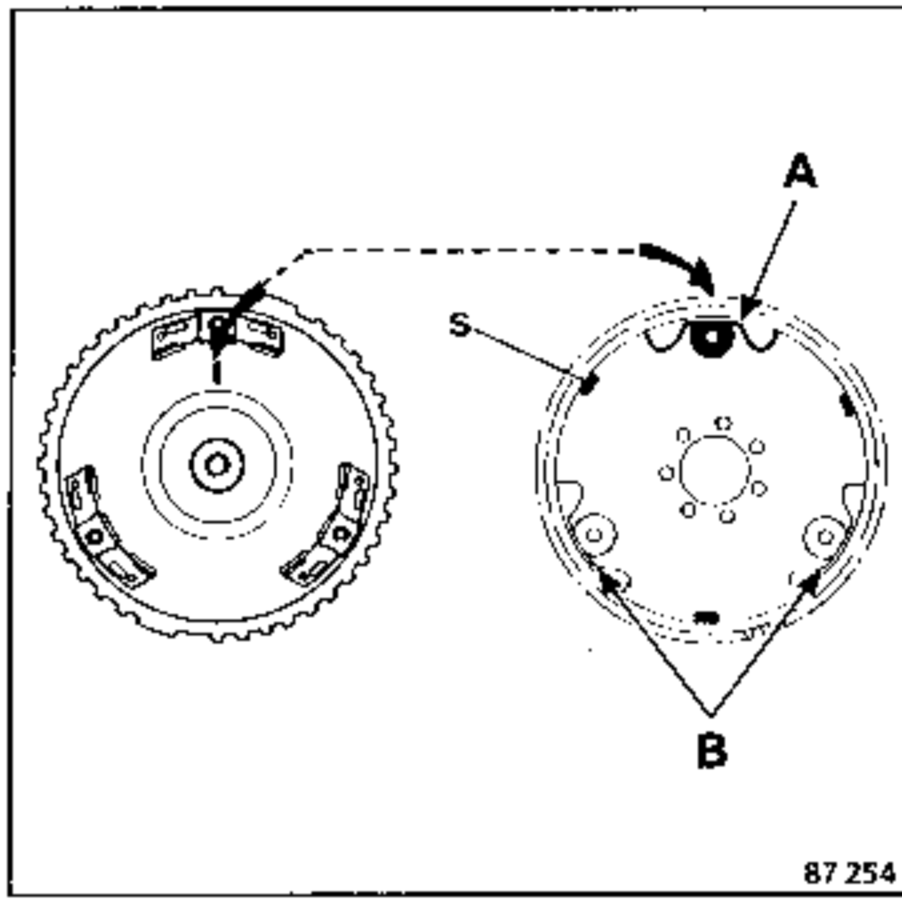
REFITTING

Lubricate the torque convertor, location, in the crankshaft, with MOLYKOTE BR2.

Ensure, and this is essential, that the two dowels (F) that locate the transmission on the engine and dowel (J) that locates the starter on the type "C" engine and (H) on the type "F" engine are in position.



Correctly position the drive plate with reference to the torque convertor (Verto convertor).
As the plate on the convertor is flat, fit it to the engine with the welds (S) towards the convertor and correctly align the position marks (dab of paint on sharp



corner).
A Sharp corner
B Rounded corners

If the transmission is fitted with a Renault convertor Ø 227 mm, there are no position marks for the position of the convertor on the drive plate. The ignition sensor target is an integral part of the drive plate.

On refitting, one merely has to align, correctly, the studs on the torque convertor with the holes in the plate.

Tighten the nuts :

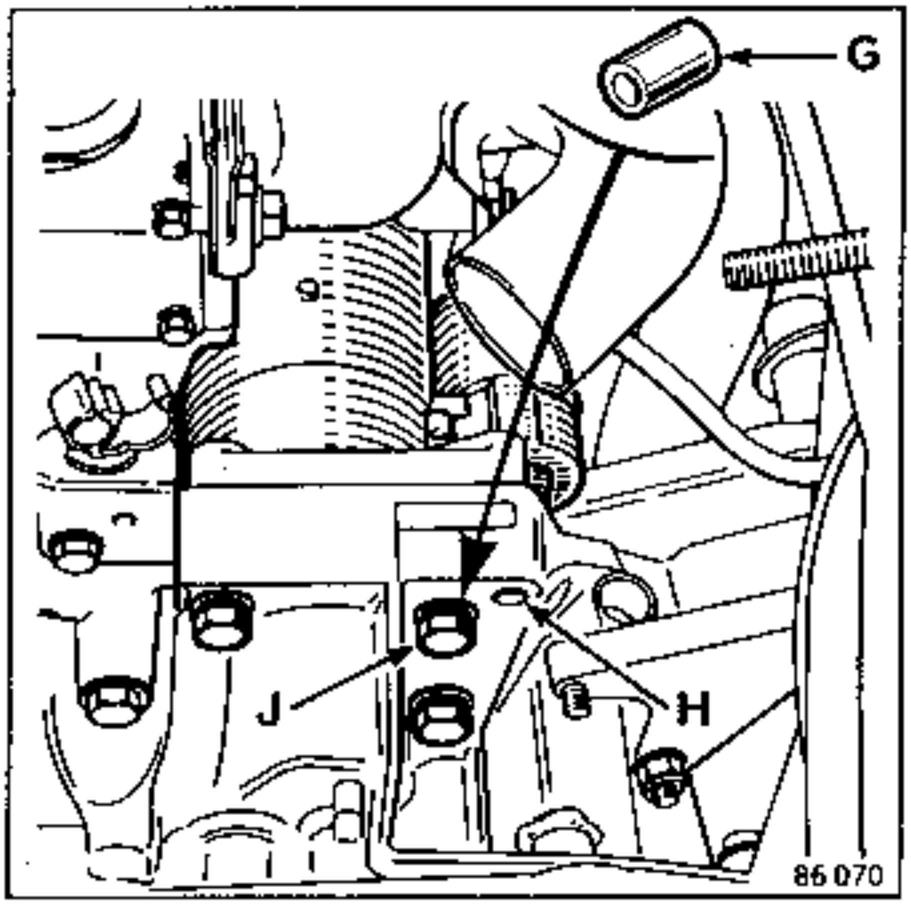
- $1.9\,^{0}_{-0.5}$ m.daN, if stud Ø is 8 mm

or - $2.5\,^{+0.5}_{0}$ m daN if stud Ø is 9 mm

Connect the automatic transmission to the engine.

Remove B.Vi.465 and refit the bolts that secure the drive plate and the protective plate.

When refitting the starter, ensure that the locating dowel (G) is in place. It MUST be placed in the bolt hole (J) in the case of type "C" engines and (H) in the case of type "F" engines.

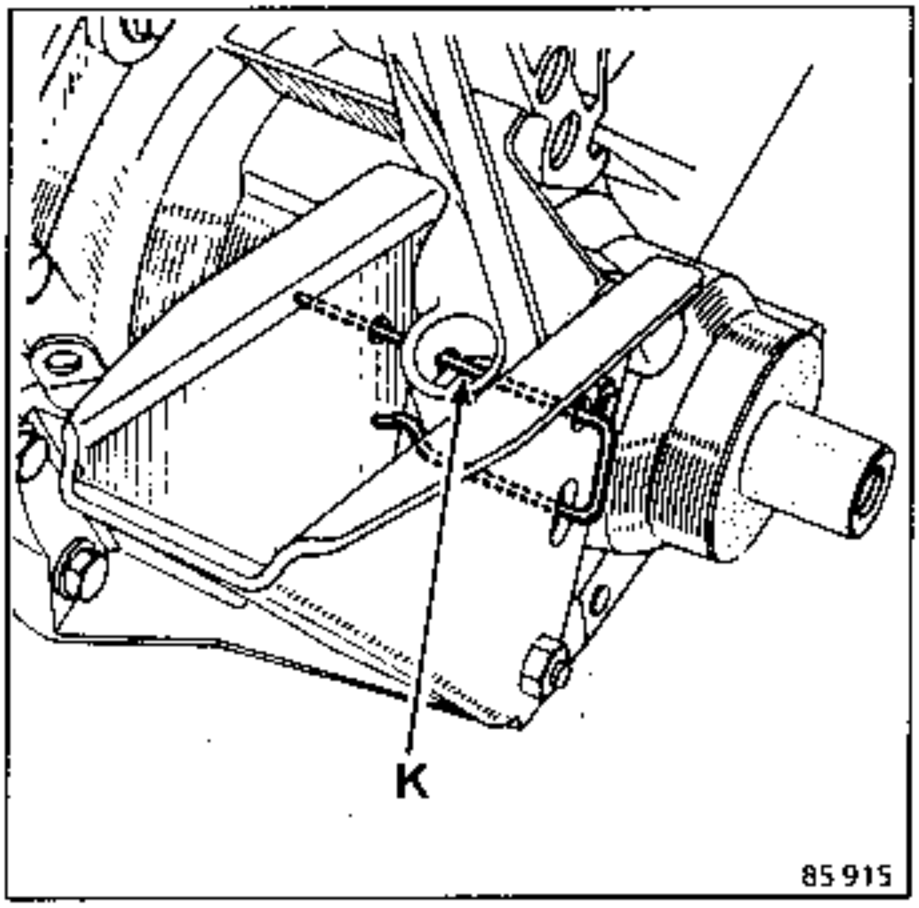


Refit the complete flexible mountings and the engine strut.

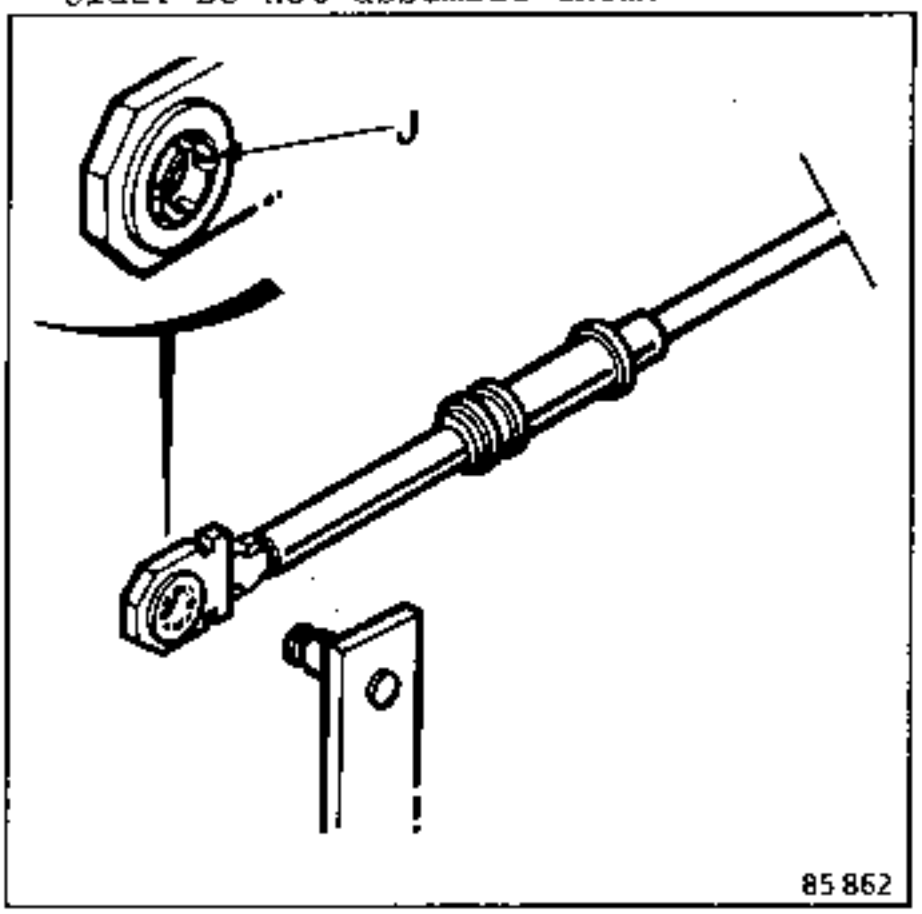
Lower the engine - automatic transmission assembly into the compartment.

Refit :
- the radiator and its two wires,
- the heater hoses to the coolant pump, and the heater wire,
- the transmission cooler hoses,
- the A.E.I. ignition unit,
- the expansion bottle.

Reconnect :
- the A.T. earthing braid,
- the engine earthing wire on the scuttle,
- the starter cables (pass them through the eye on the transmission),
- the 6 way connector on the electronic unit,
- the brake servo and capsule hoses,
- the fuel hoses,
- the accelerator, choke and speedometer cables (retain the speedometer cable with its clip (K),

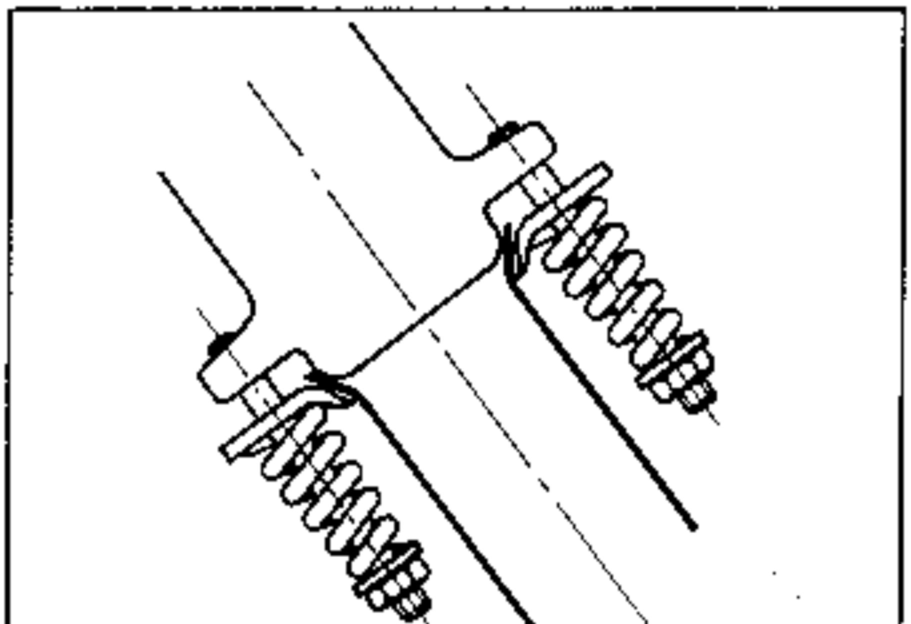


- the shift cable positioning the locating projections (J) on the ball joint side. Do not assemble them.



Place the cables in the cable covers.

Refit :
- the air filter,
- the exhaust securing flange. Tighten the springs until they are coil bound, then loosen them by one and a half turns. Never leave the springs coil bound.


86013

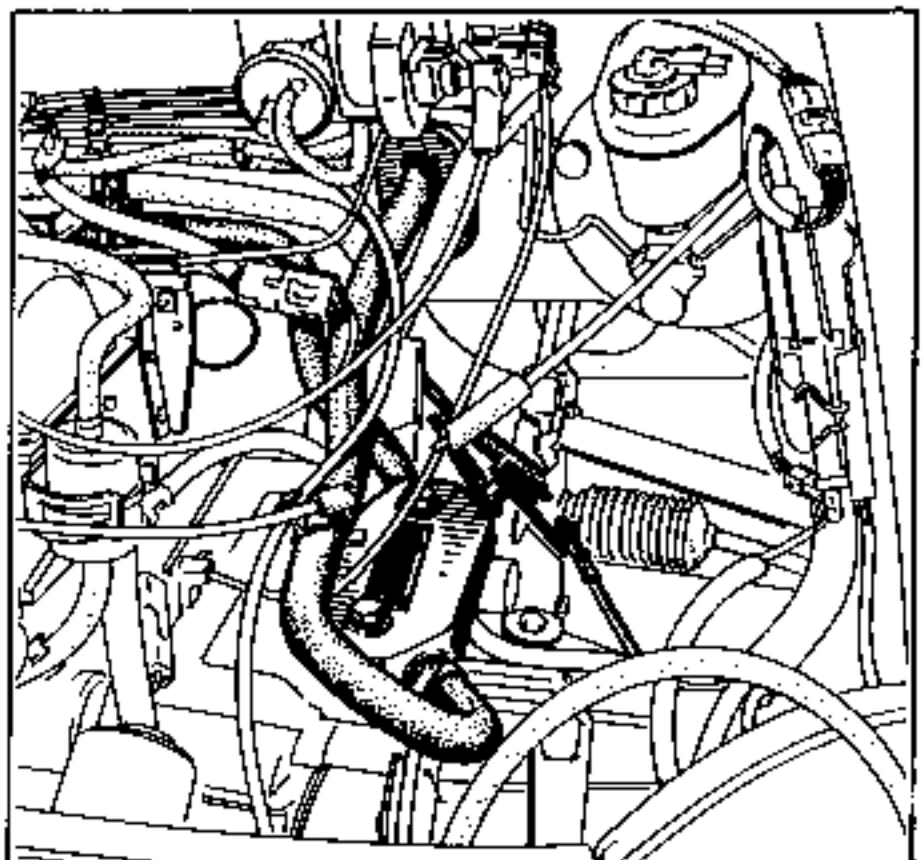
- the drive shafts : apply MOLYKOTE BR2 grease to the right hand sun wheel splines and CAF 4/60 THIXO to the pin holes in the drive shafts.
- the caliper securing bolts, applying Loctite FRENBLOC to the bolts before tightening them to torque.

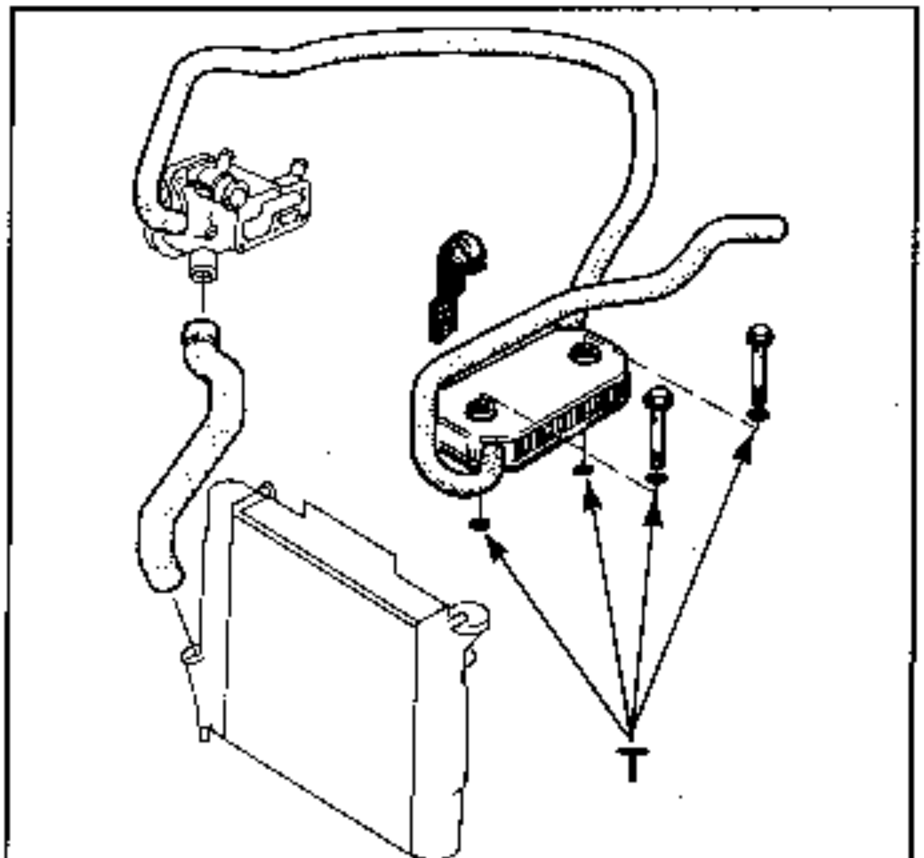
Press down the brake pedal a few times to bring the pistons against the brake pads and reconnect the battery.

Fill the transmission and the cooling system.

Bleed the cooling system.

SPECIAL OPERATIONS INVOLVED WITH RE-FITTING THE TRANSMISSION COOLER


88969



89010

To ensure that the assembly is correctly sealed, do not forget to fit the O rings (T) to either side of the cooler. Screw up the bolts evenly then tighten them to a torque of 4 daN.m.

Start the engine and check that the entire unit is free from leaks.

Type	Quantity	Unit concerned
Loctite SCELBLOC	Coating	Stub axle splines
CAF 4/60 THIXO	Coating	Pins in drive shafts at gearbox
MOLYKOTE BR2	Coating	Splines on joint at gearbox end
FRENBLOC	Coating	Brake caliper bolts
MOBIL CVJ 825 Black Stor MOBIL EXF 57C	295 g 180 g 130 g 160 g	Joint GE 86 Joint GE 76 Joint GI 62 Joint RC 490

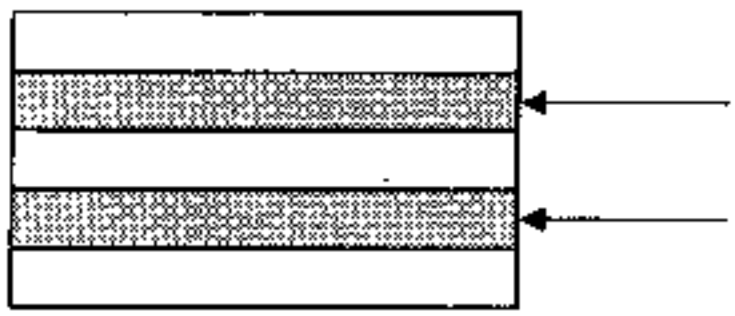
As the drive shafts are of different lengths and specifications, depending on the gearbox with which they are used, it is essential to ensure that the correct type is fitted (see the Parts Catalogue for the vehicle concerned).

The gearbox identification plates and drive shafts have colour codes on them to identify them. These codes are shown in the charts below.

The drive shaft identification consists of an adhesive label applied near the bellows at the wheel end.

Early type

Adhesive label with two bands of colour.



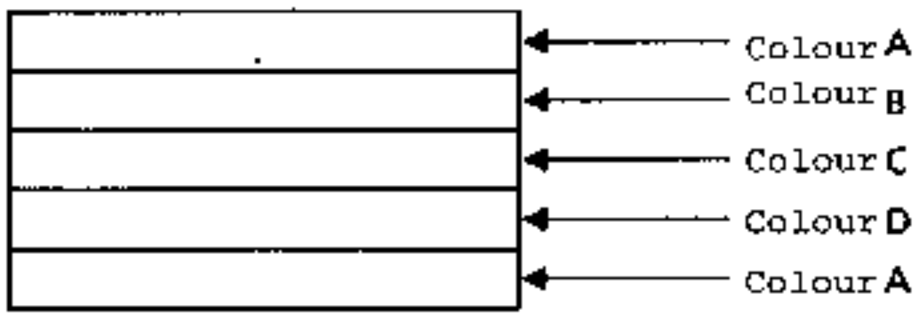
Colour A

Colour B

G.B. or A.T.	Joint at wheel end	Colour code on gearbox identification plate	DRIVE SHAFT COLOUR CODES			
			LH SIDE		RH SIDE	
			A	B	A	B
JB 0/1 MB 1	GE 86	Red	Sky blue	Red	Sky blue	Red
JB 0/1	GE 76 engine F8M		Sky blue	Brown	Sky blue	Brown
JB 3	GE 86 engine F2N	Black	Sky blue	Red	Sky blue	Red
	exc. GE 86 engine F2N				Sky blue	Sky blue
JB 4/5	GE 86	Green/Pink	Sky blue	Pink	Sky blue	Pink
	GE 76	Green/Pink	Sky blue	Green	Sky blue	Green

Later type

Adhesive label with five bands of colour.



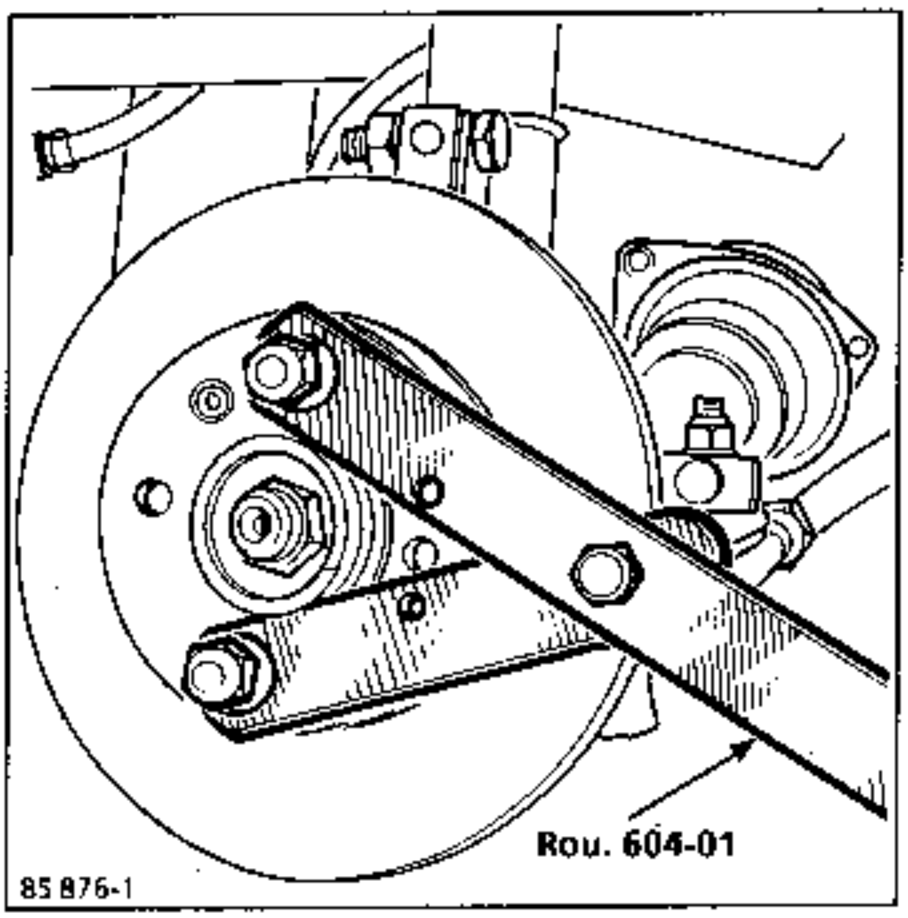
G.B. or A.T.	Joint at wheel end	Colour code on gearbox identfiica-tion plate	DRIVE SHAFT COLOUR CODES							
			LH SIDE				RH SIDE			
			A	B	C	D	A	B	C	D
JB 0/1	GE 76	Orange/Red	Sky blue	Orange	Sky blue	Brown	Sky blue	Orange	Sky blue	Brown
	GE 86		Sky blue		Red	Sky blue	Sky blue		Red	Sky blue
	GE 86		Sky blue	Red	Black	Silver	Sky blue	Red	Black	Silver
JB 3	GE 86	Black	Sky blue	Red	Black	Silver	Sky blue	Red	Black	Silver
	GE 86		Sky blue	Black	Sky blue	Silver	Sky blue	Black	Sky blue	Silver
JB 4/5	GE 76	Green/Pink	Sky blue		Green	Sky blue	Sky blue		Green	Sky blue
	GE 86		Sky blue		Pink	Sky blue	Sky blue		Pink	Sky blue
MB 1	GE 76	Brown	Sky blue	Orange	Sky blue	Brown	Sky blue	Orange	Sky blue	Brown
MB 3	GE 86	Silver	Sky blue	Red	Black	Silver	Sky blue	Red	Black	Silver
	GE 86		Sky blue	Black	Sky blue	Silver	Sky blue	Black	Sky blue	Silver

ESSENTIAL SPECIAL TOOLS		
B.Vi.	31-01	Pin punches
Rou.	604-01	Hub lock
T.Av.	476	Ball joint extractor
T.Av.	1050	Drive shaft extractor

TIGHTENING TORQUES (in daN.m)	
Drive shaft nuts	25
Screws securing bellows to G.B.	2,5
Wheel bolts	8
Nuts at bottom of shock absorber	8
Brake caliper securing bolts	10
Steering ball joint nuts	4

REMOVING

Remove :
- the brake assembly (hang it from the chassis to avoid damaging the brake hose),
- the drive shaft nut : tool Rou.604-01.

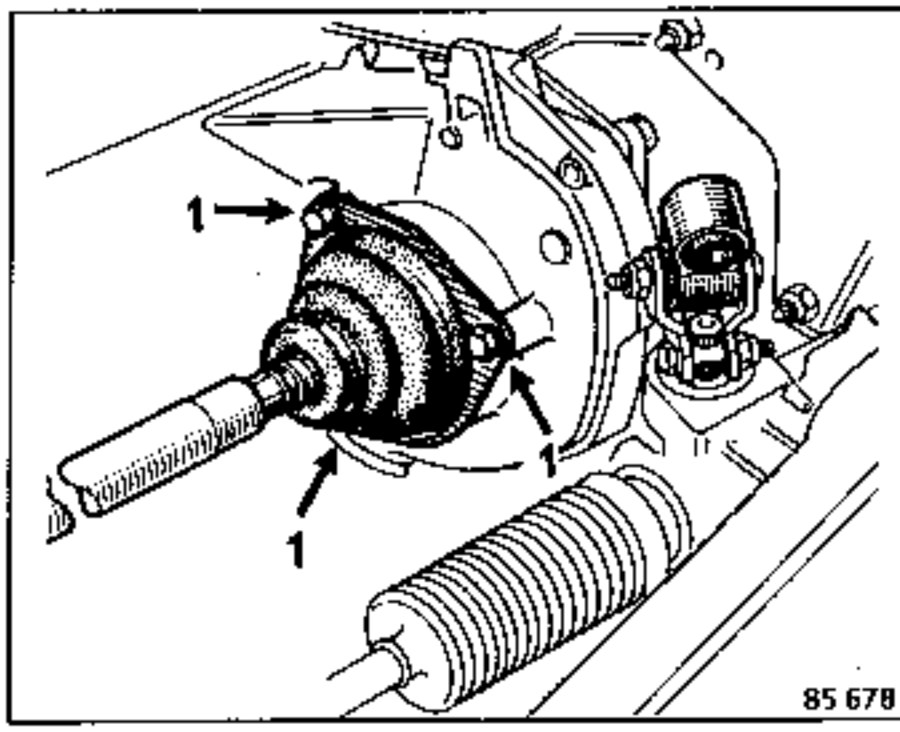


85 876-1

LH side :

Drain the gearbox.

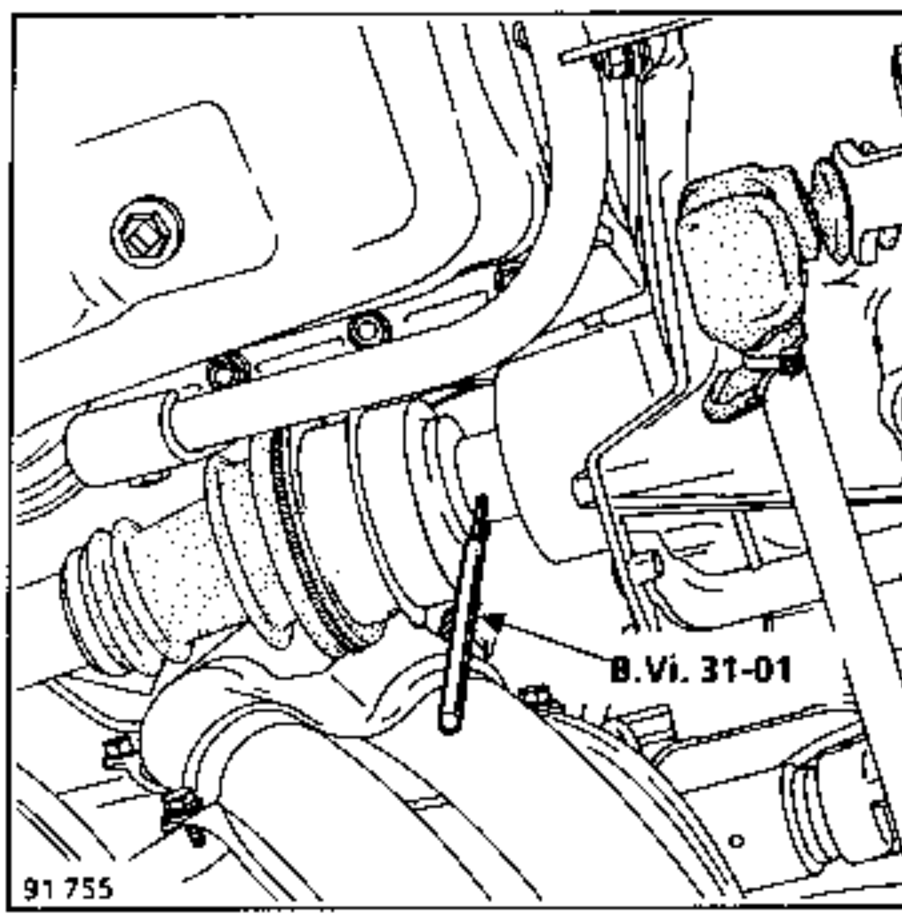
Remove the three screws (1).



85 678

RH side :

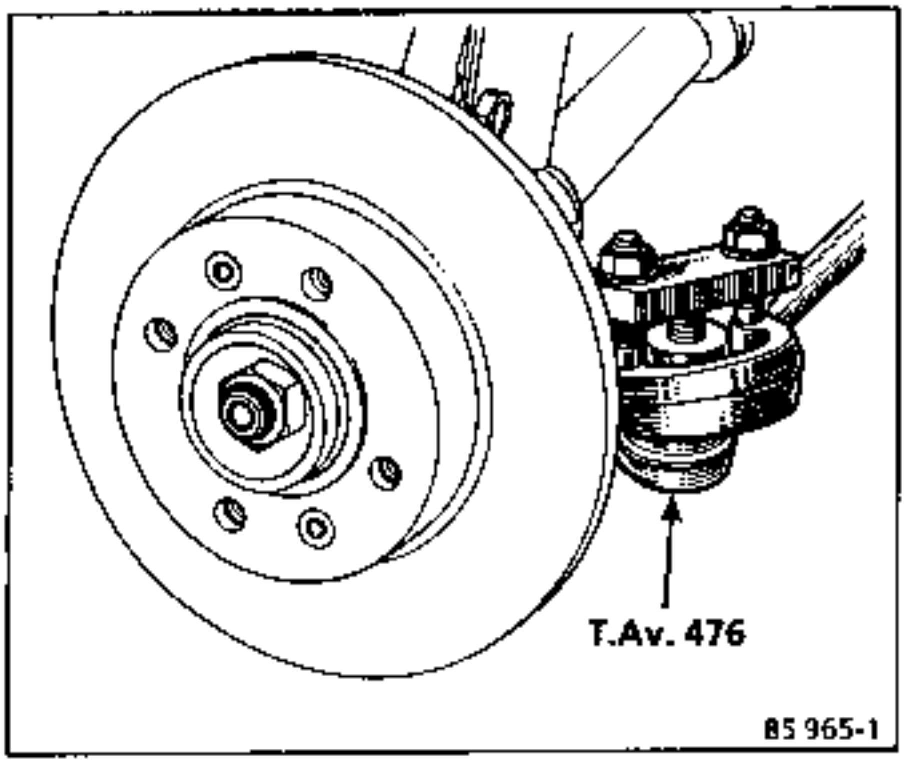
Remove the pin : punch B.Vi.31-01.



91 755

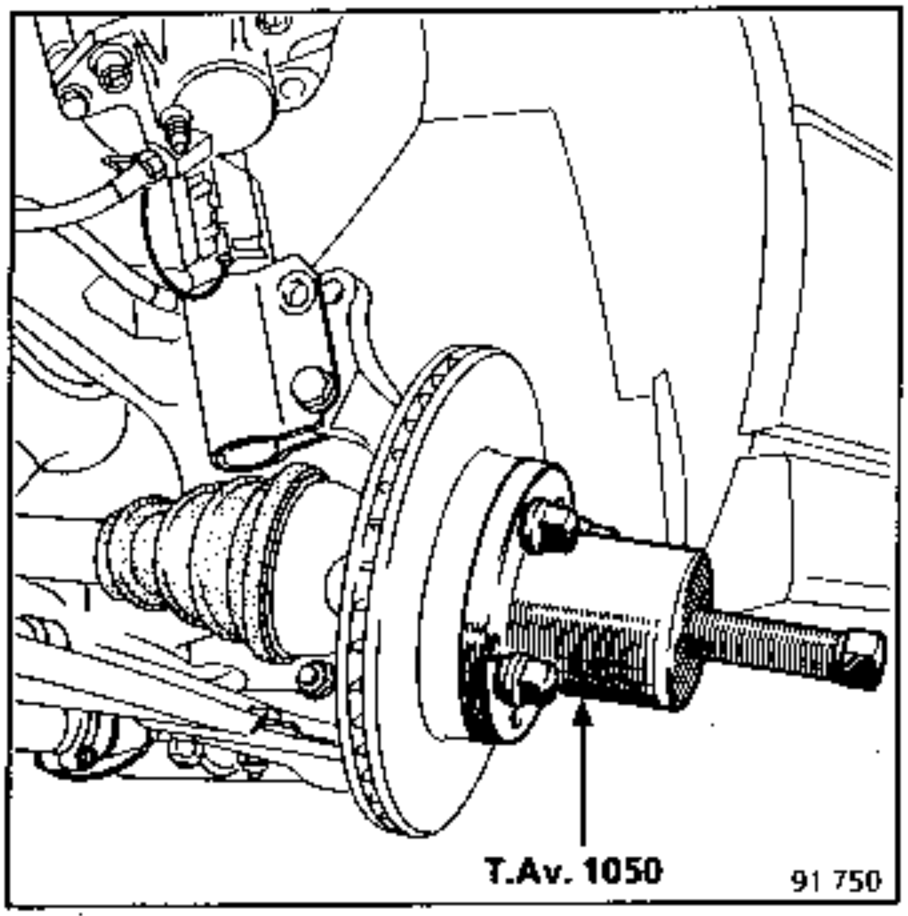
On both sides :

Remove :
- the steering ball joint nut : tool T.Av. 476.

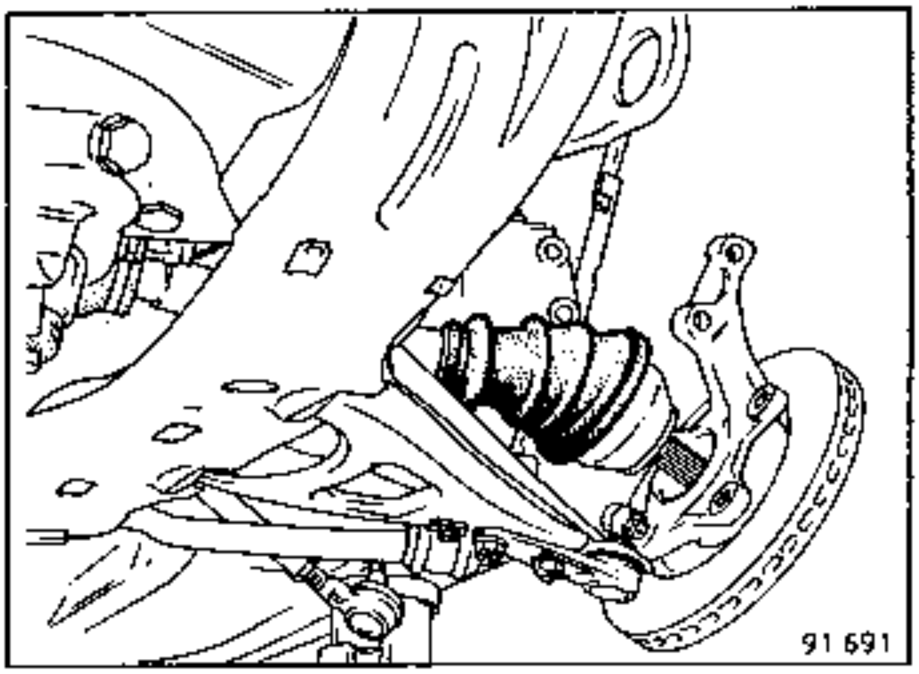


- the upper bolt securing the lower part of the shock absorber.

These vehicles are equipped with bonded drive shafts which therefore have to be pushed out with tool T.Av.1050.



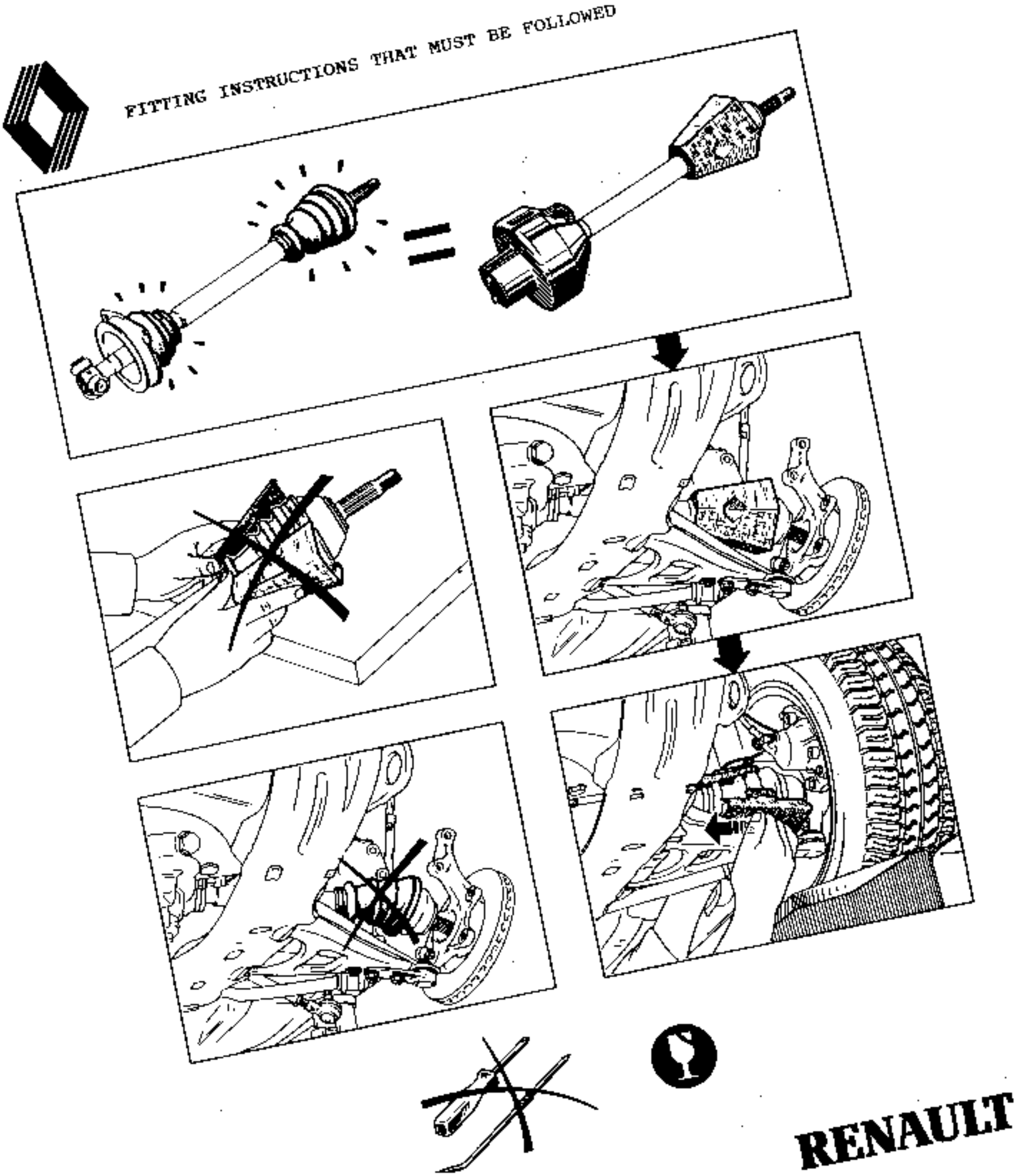
Remove the lower bolt securing the lower end of the shock absorber and extract the drive shaft.



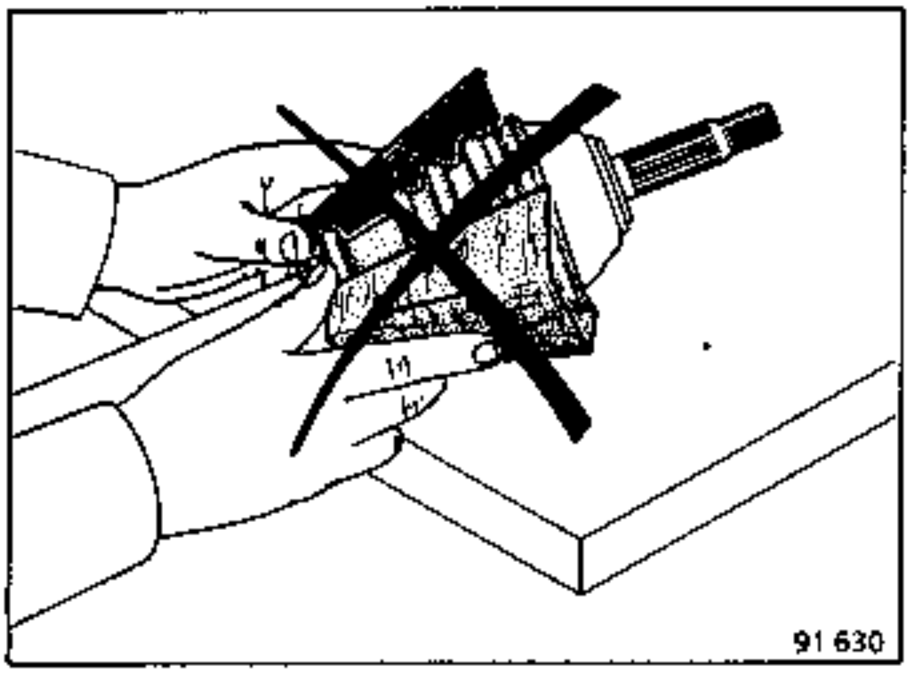
Take care not to damage the bellows during this operation.

REFITTING

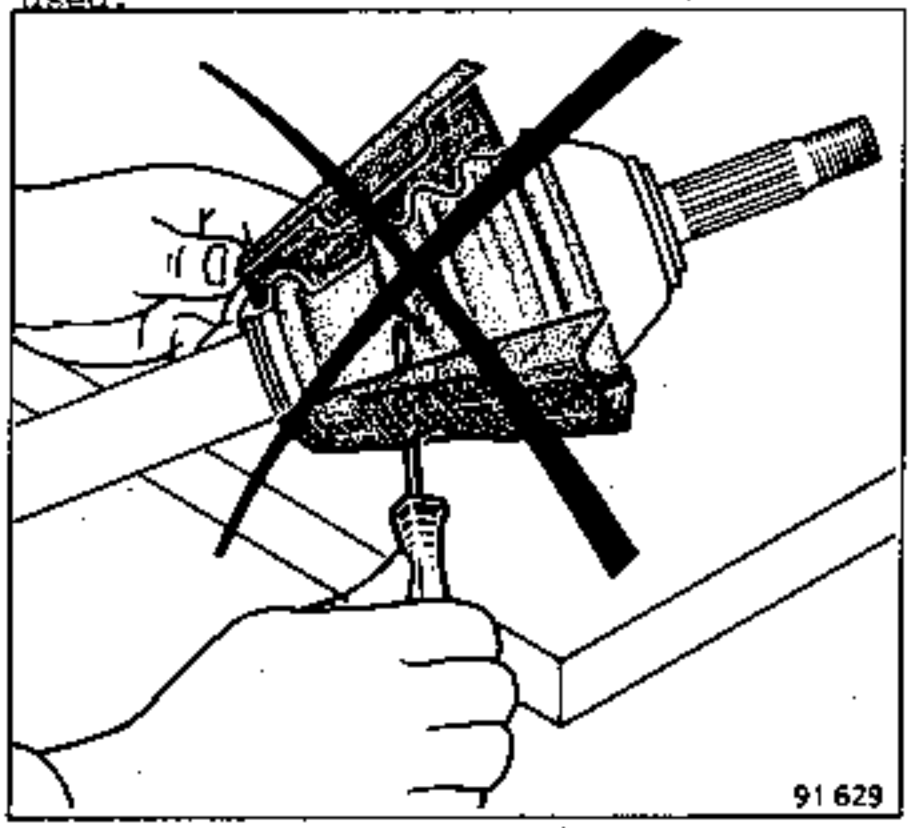
NOTE : from now on the Parts Department will supply drive shafts equipped with a protector aaccompanied by fitting instructions. It is essential to follow these instructions to ensure a high QUALITY repair in that the slightest impact to the bellows will cause the rubber to break, over a period of time, and irreparable damage to the drive shafts.


FITTING INSTRUCTIONS THAT MUST BE FOLLOWED
RENAULT

Never remove the cardboard protectors until the drive shaft is fully fitted to the vehicle.

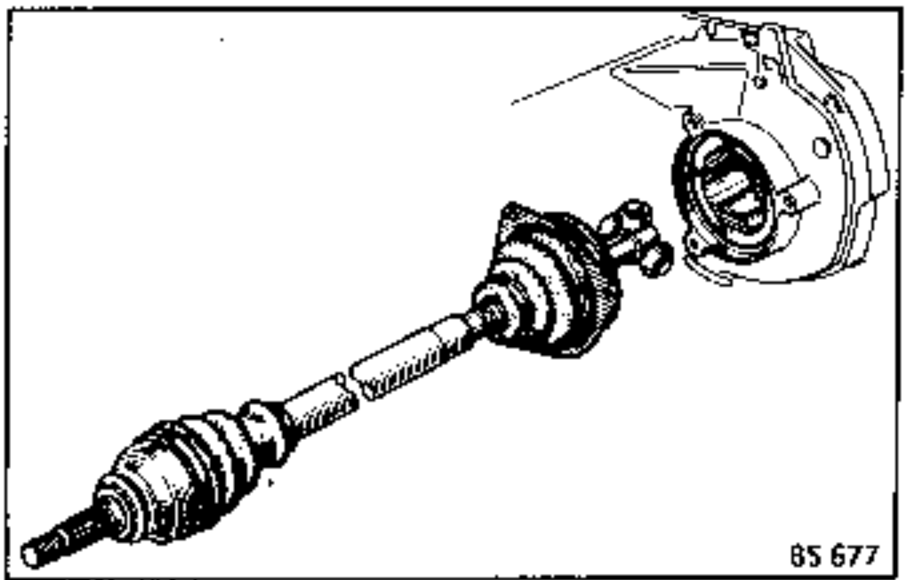

91 630

Under no circumstances is a sharp ended tool that could damage the bellows to be used.


91 629

LH side :

Remove the plastic protector from the bearing bellows and insert the drive shaft as near to horizontal as possible.


85 677

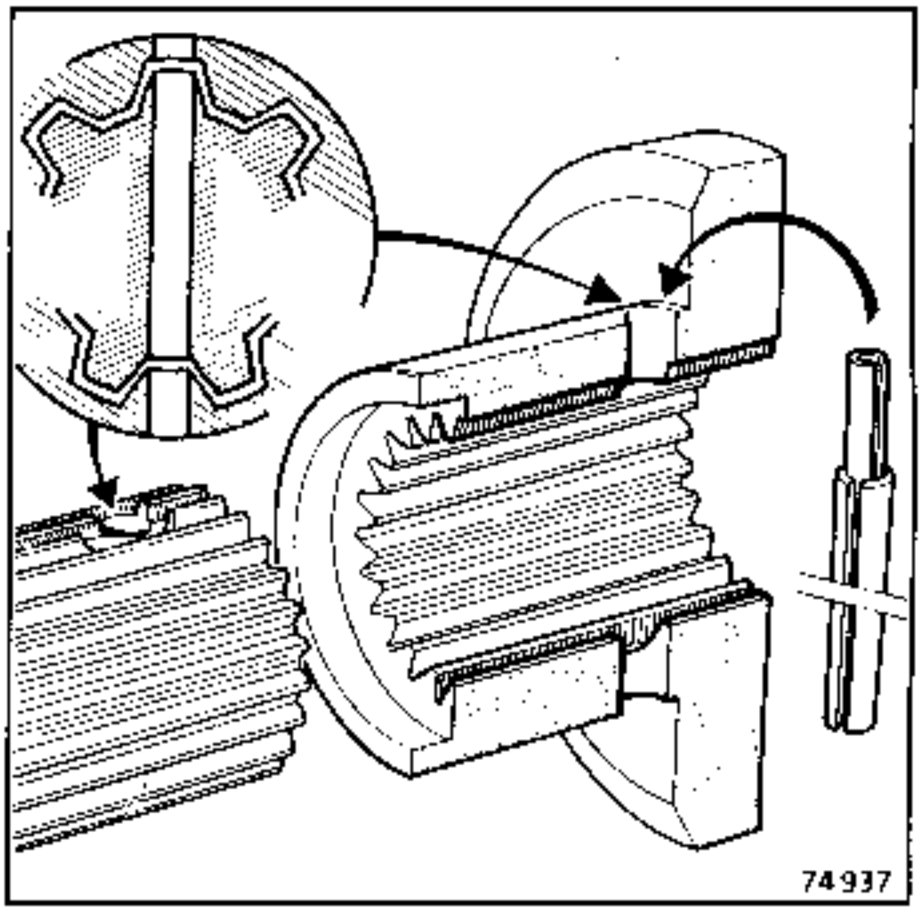
RH side :

With the protector in place, coat the splines on the joint at the gearbox or automatic transmission end with MOLYKOTE BR2 grease.

Correctly position the drive shaft with reference to the sun wheel and insert it.

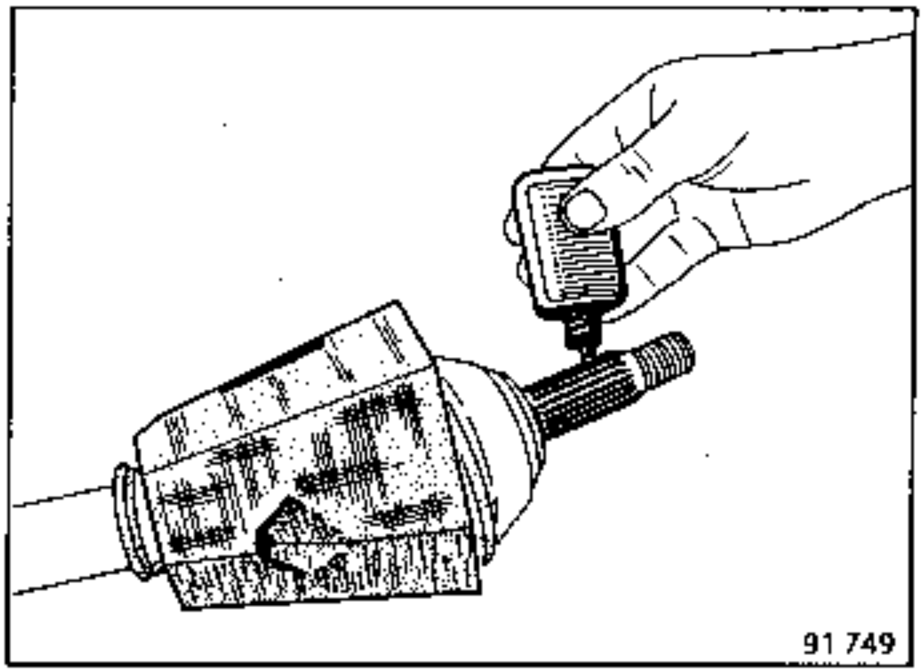
Check that it is correctly positioned by inserting the cranked end of pin punch B.Vi.31-01.

Fit two new spring pins using tool B.Vi. 31-01. Seal the ends of the pin holes with CAF 4/60 THIXO.

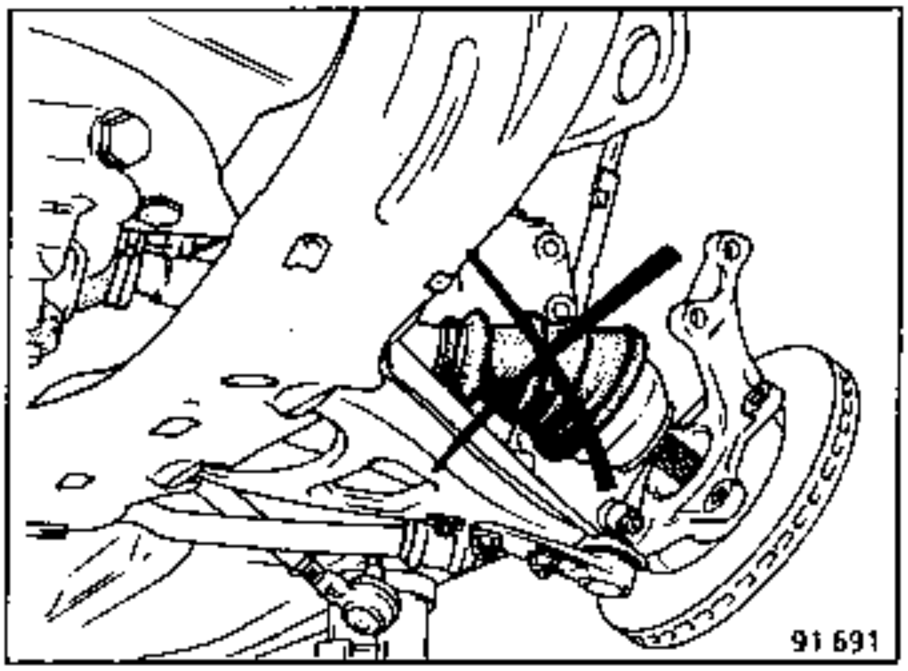

74 937

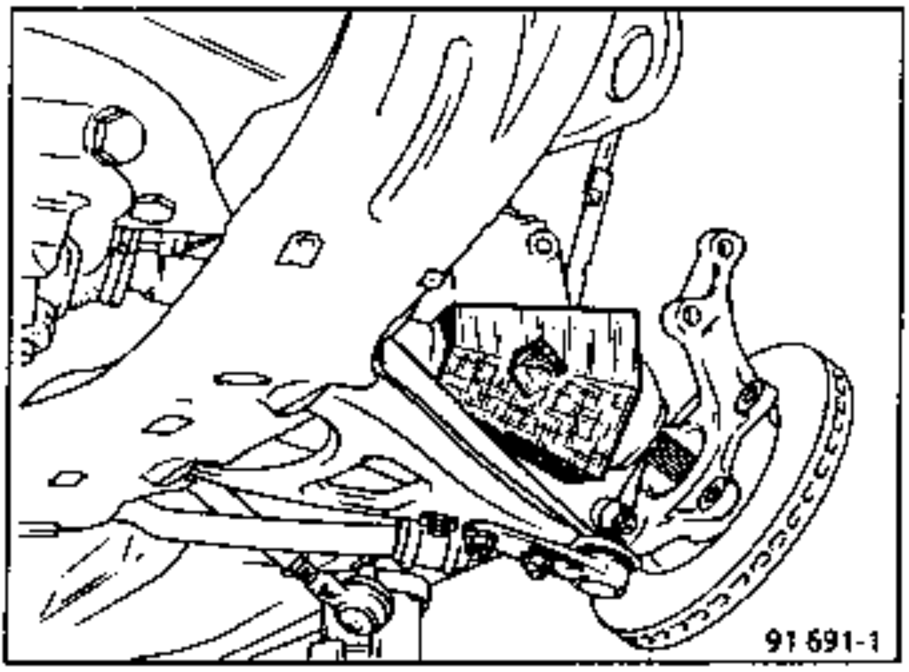
On both sides :

Coat the splines on the stub axle with Loctite SCELBLOC.


91 749

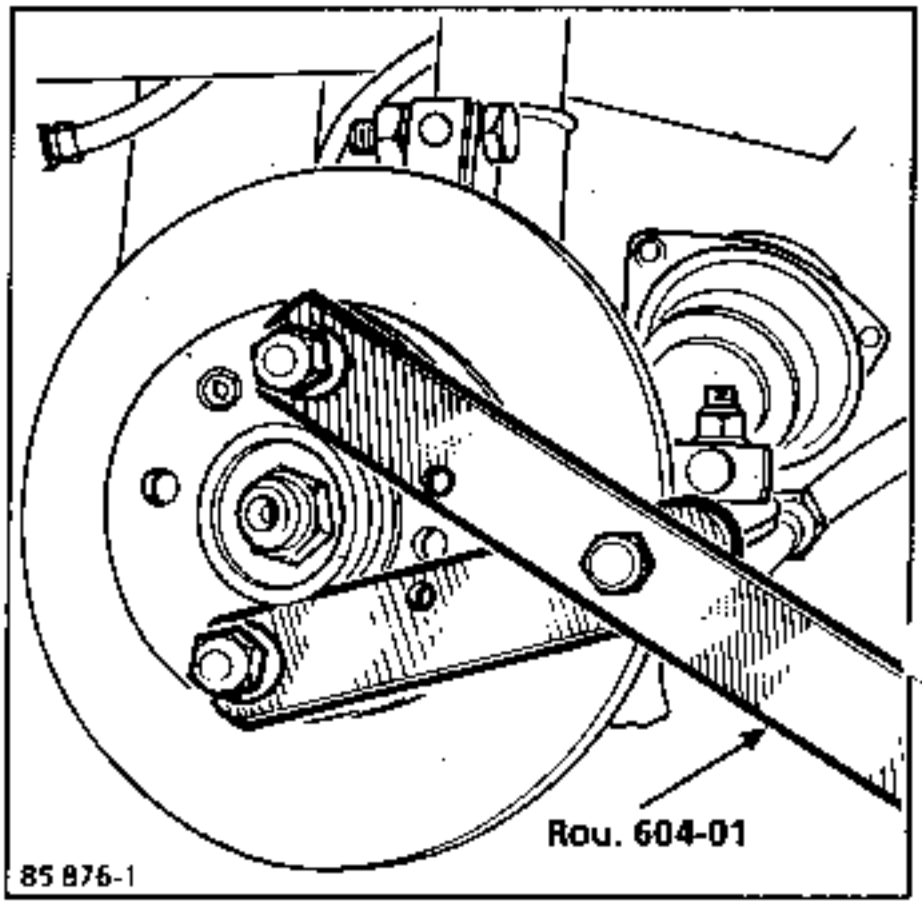
Insert the stub axle on the drive shaft into the hub.





Refit :
- the two bolts securing the bottom of the shock absorber to the stub axle carrier and tighten them to torque,
- the steering ball joint, tightening the nut to torque.

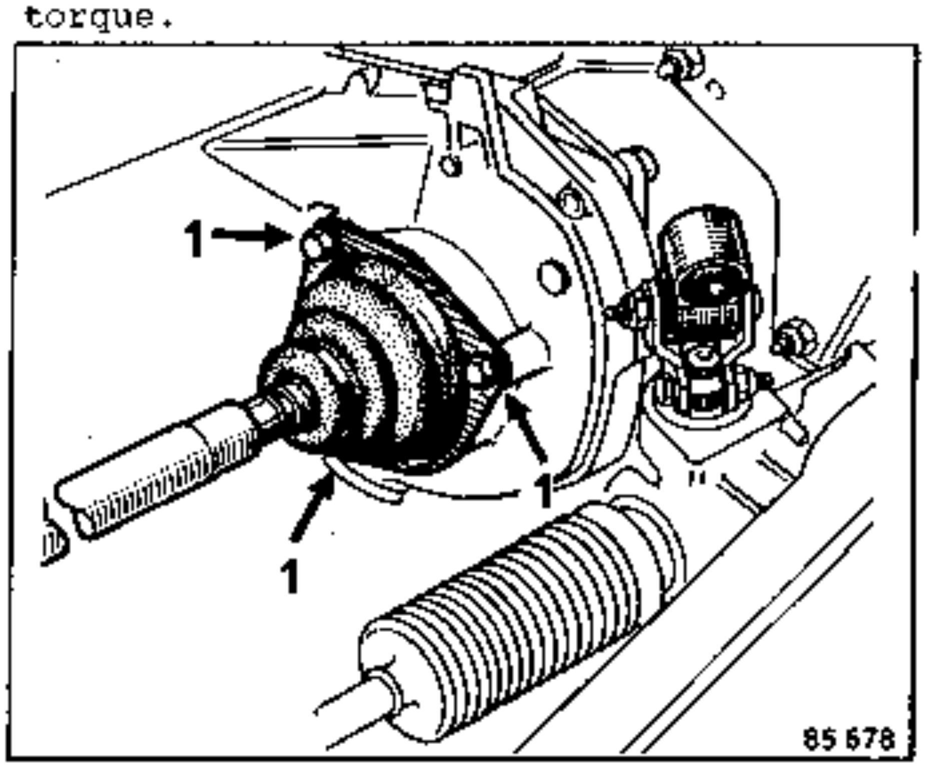
Tighten the nut on the drive shaft to torque using tool Rou.604-01.



On the left hand side :

Clean the bellows locating area on the gearbox and resecure the bellows and the plate.

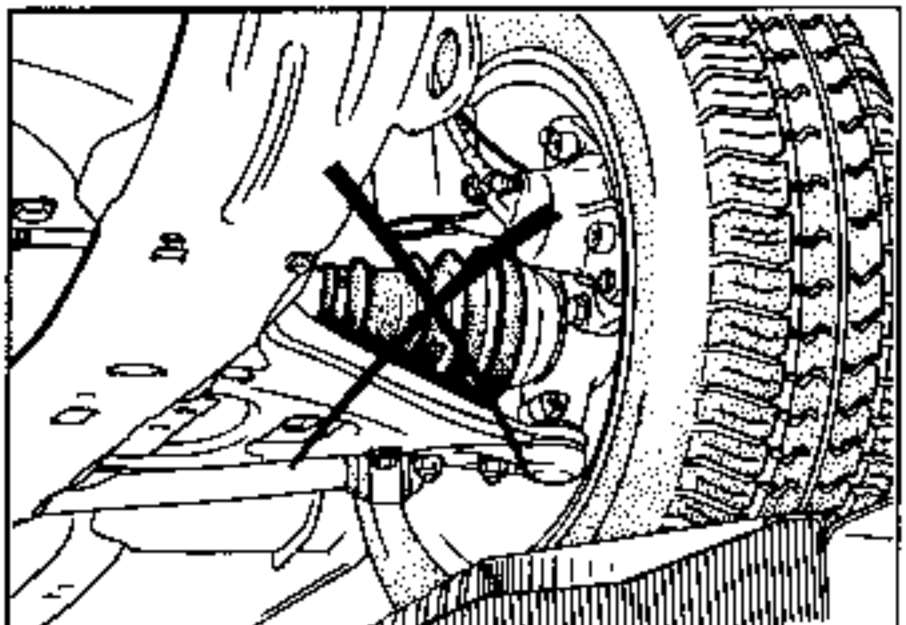
Place the bellows as horizontally as possible and tighten the three screws to torque.

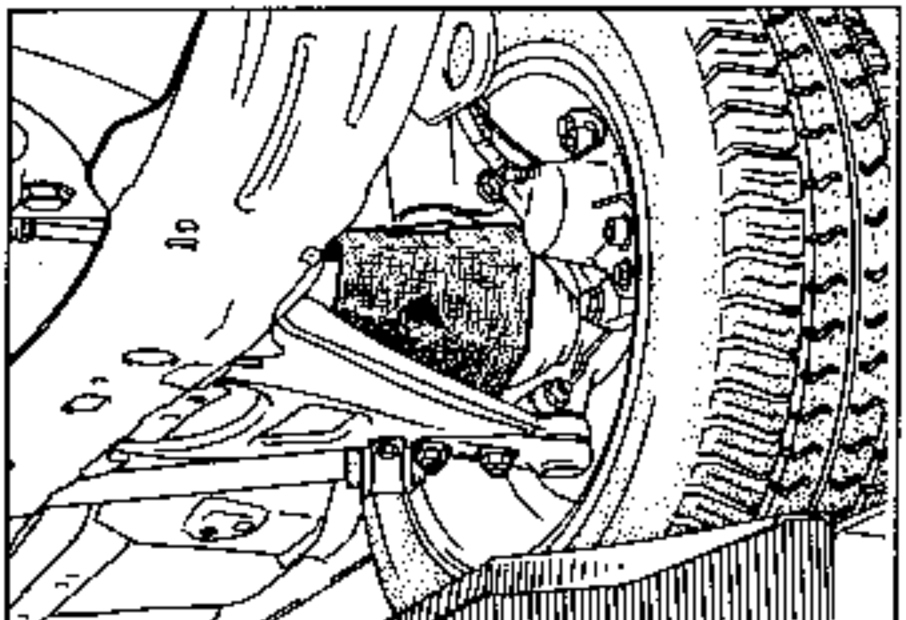


On both sides :

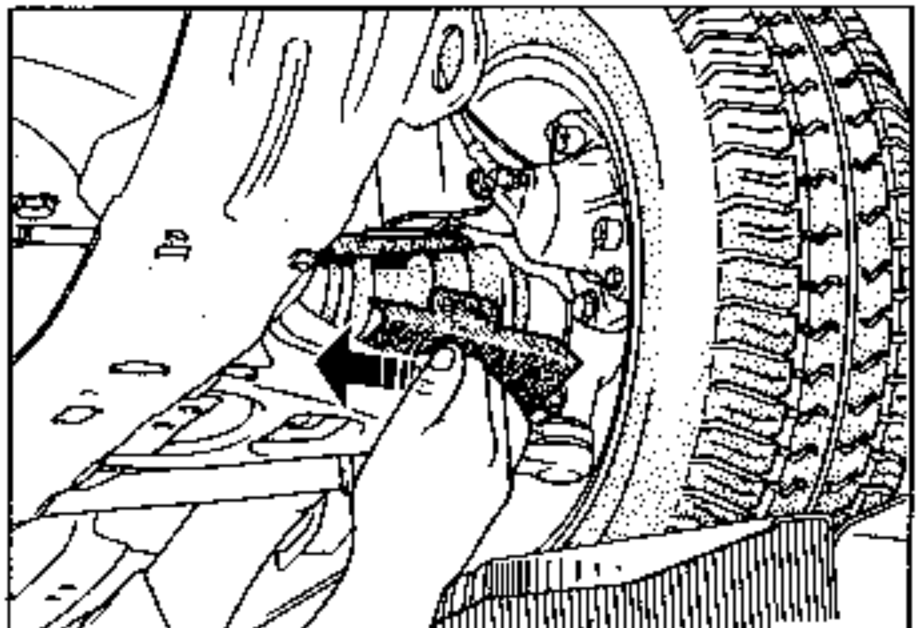
Fit the brake calipers, after coating their bolts with Loctite FRENBLOC, and tighten the bolts to torque.

Lower the vehicle on to its wheels.

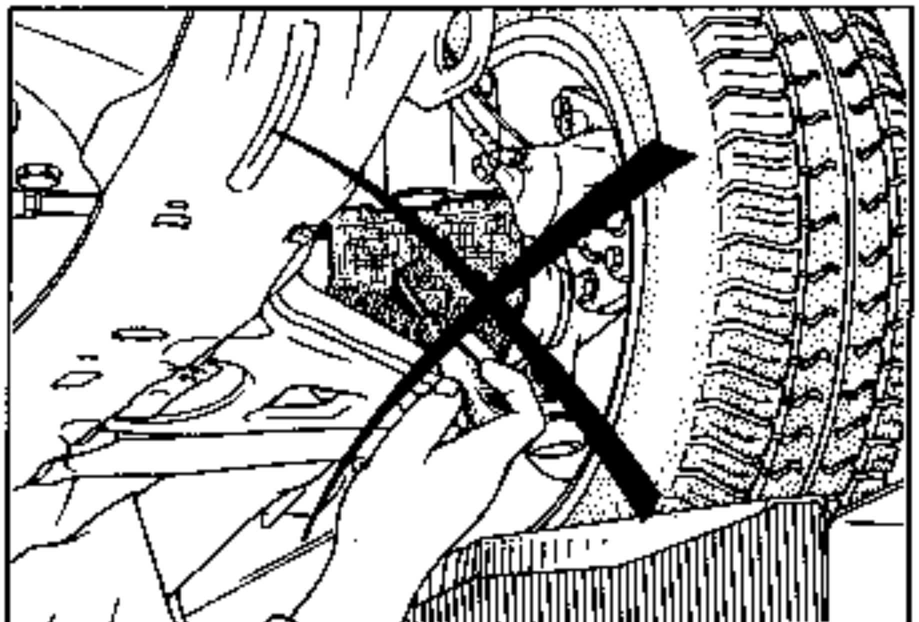

91 693


91 631

With the vehicle resting on its wheels, remove the cardboard protectors by tearing them off as shown in this illustration.


91 633

Under no circumstances use a sharp ended tool that could damage the bellows.


91 632

Depress the brake pedal a number of times to bring the pistons into contact with the pads.

If a left hand drive shaft has been replaced, refill the gearbox with oil or the automatic transmission with fluid.

Joint GE86
Joint GE76

ESSENTIAL SPECIAL TOOLS		
T.Av.	537-02	Expander for GE 86
T.Av.	586-01	Expander for GE 76
T.Av.	1034	Pliers for crimping the drive shaft clips

1 Cup yoke

2 Retaining star

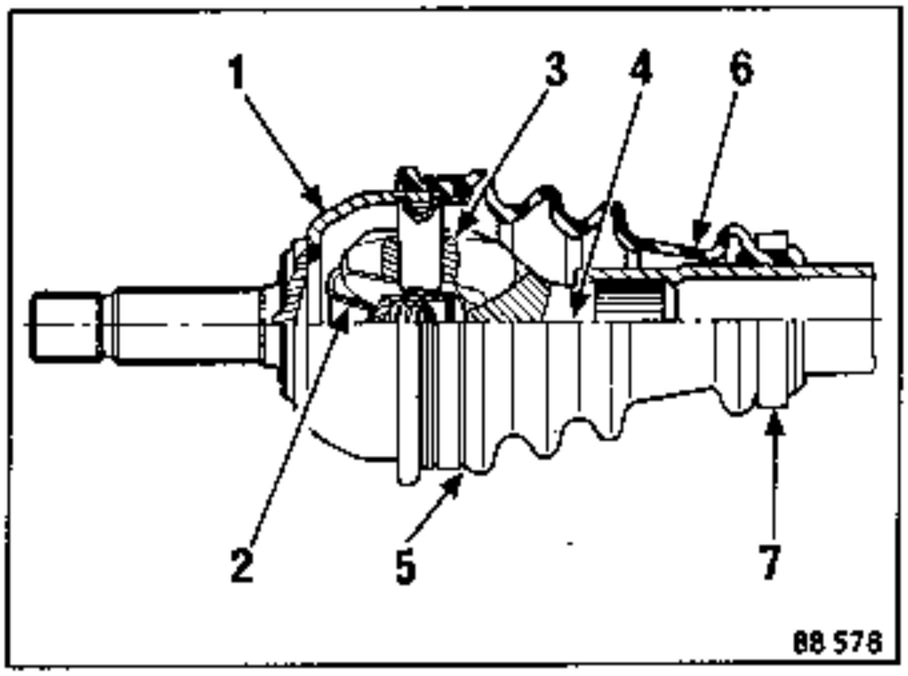
3 Spider

4 Shaft yoke

5 Retaining clip

6 Rubber bellows

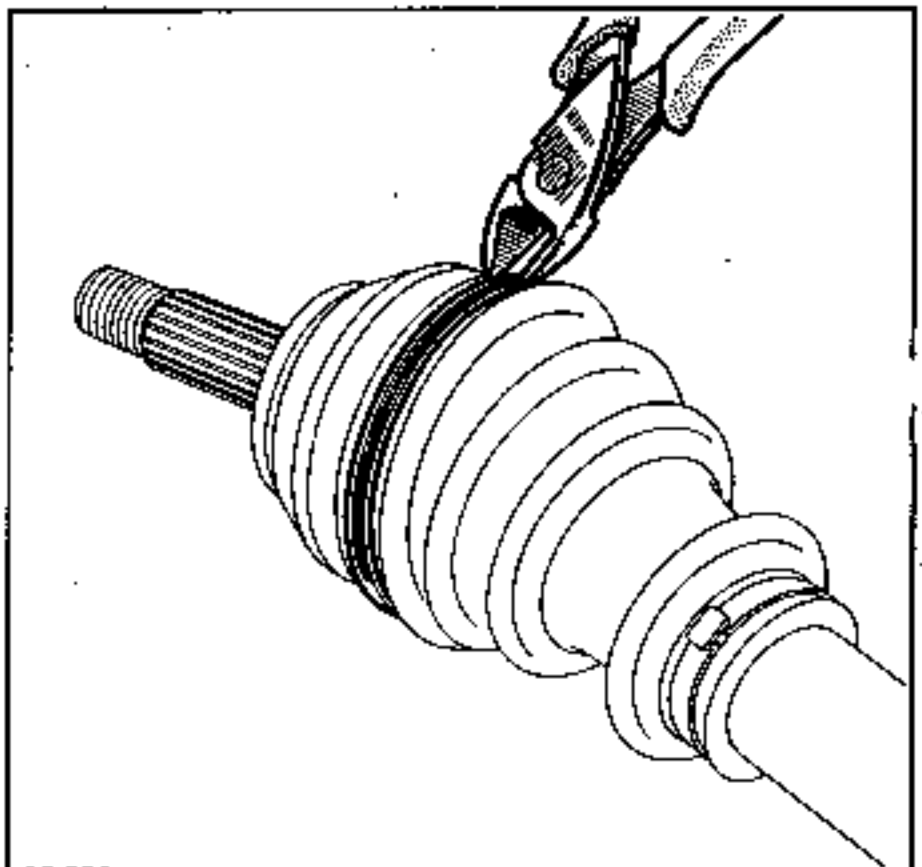
7 Retaining ring



88 578

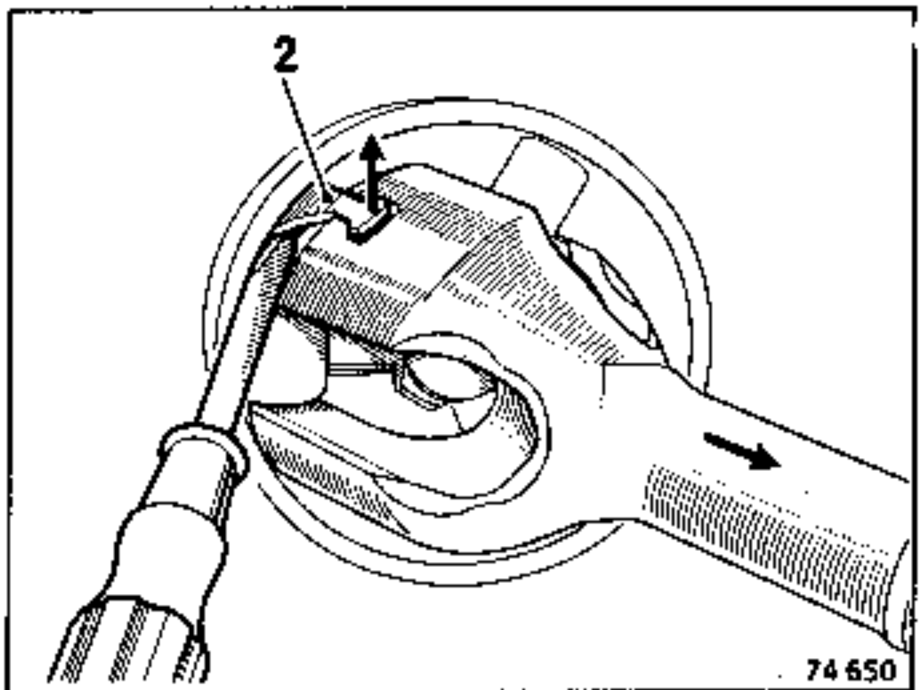
DISMANTLING

Cut the original clips, taking care not to damage the grooves in the cup yoke.


88 638

Remove as much grease as possible.

Free the cup yoke from the drive shaft by lifting one of the arms of the retaining star (2).



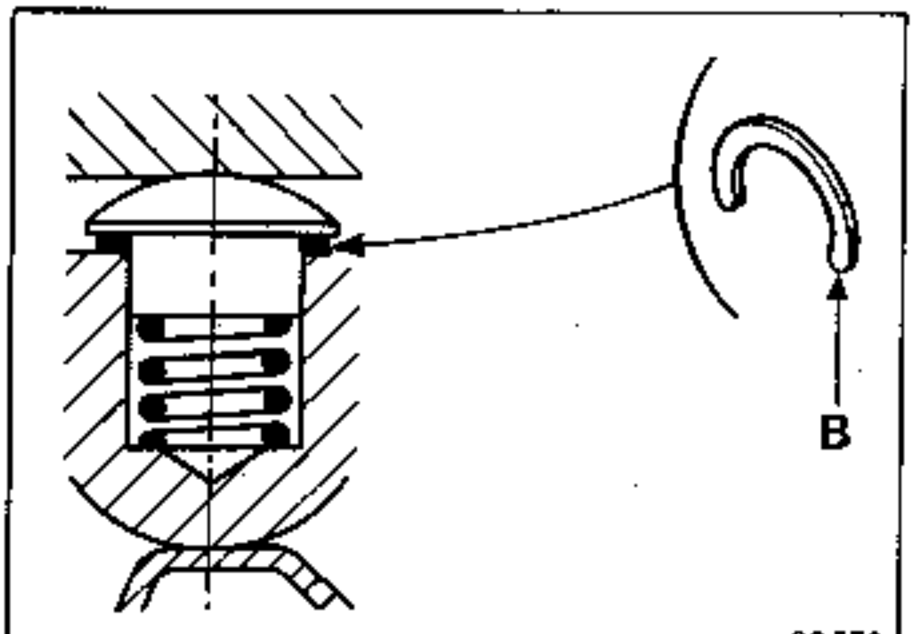
74 650

DO NOT TWIST THE ARMS ON THE RETAINING STAR.

Retrieve the thrust ball joint, the shim under the ball joint (B).

NOTE : the shim under the ball joint is of the correct thickness for the original axial play.

This shim is to be retained and refitted on reassembly.



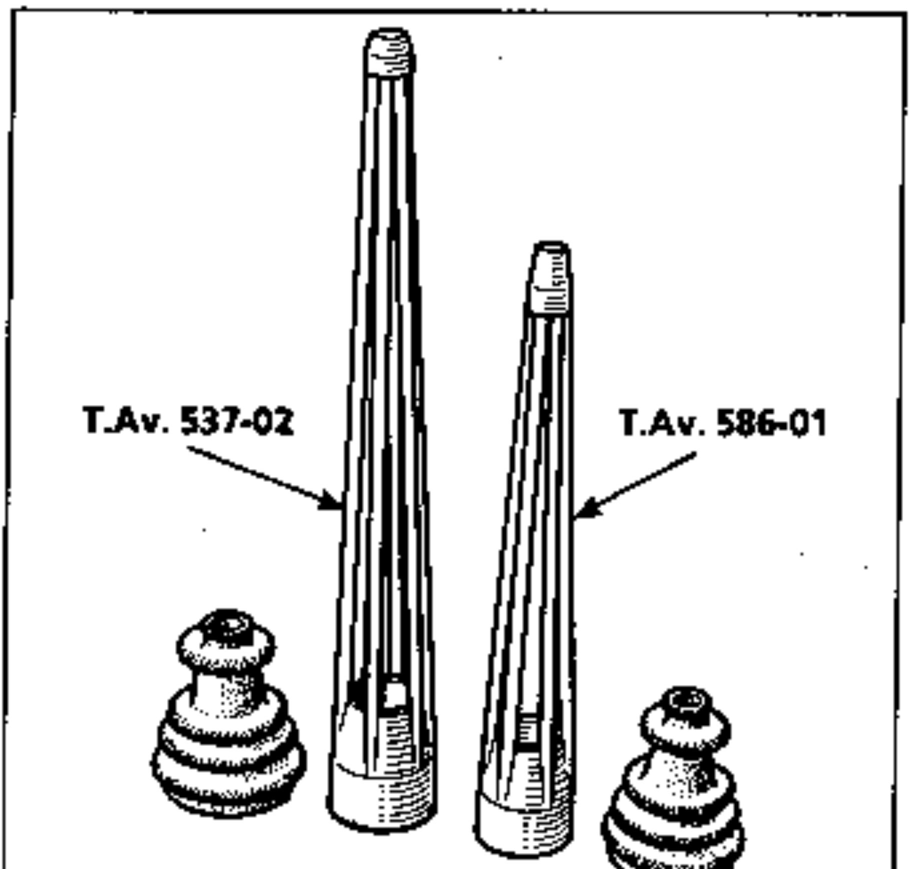
88 579

Degrease all the parts.

REASSEMBLY

An expander is essential for refitting the bellows :

T.Av.537-02 for the GE 86 joint
T.Av.586-01 for the GE 76 joint

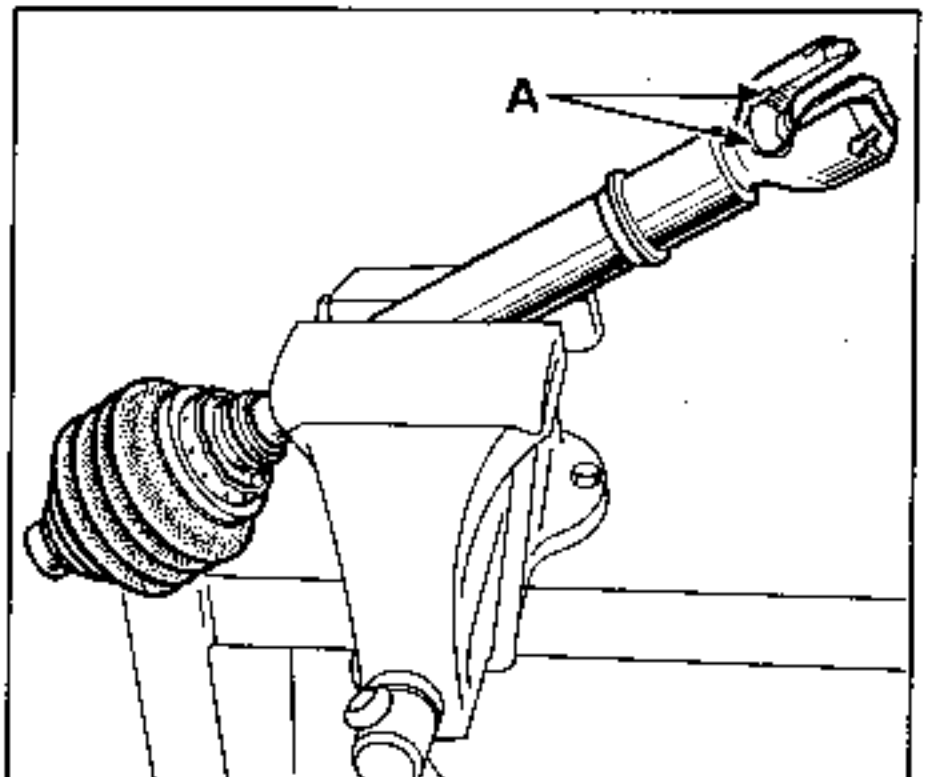


78 411

Joint GE86
Joint GE76

Grip the drive shaft, at an angle, in a vice fitted with soft jaws.

Engage the tool fully over the shaft yoke (if this is not possible, rub down the inside of the cylindrical part of the tool with emery cloth).

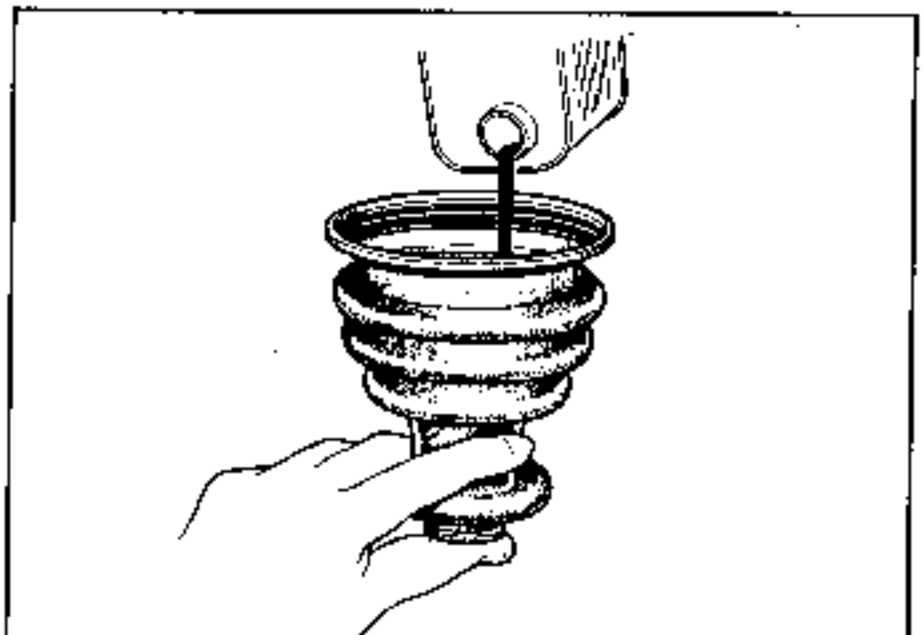


78 408-1

It is essential to ensure that there are no sharp edges on the shaft yoke (A) (lightly rub them down with emery cloth if necessary).

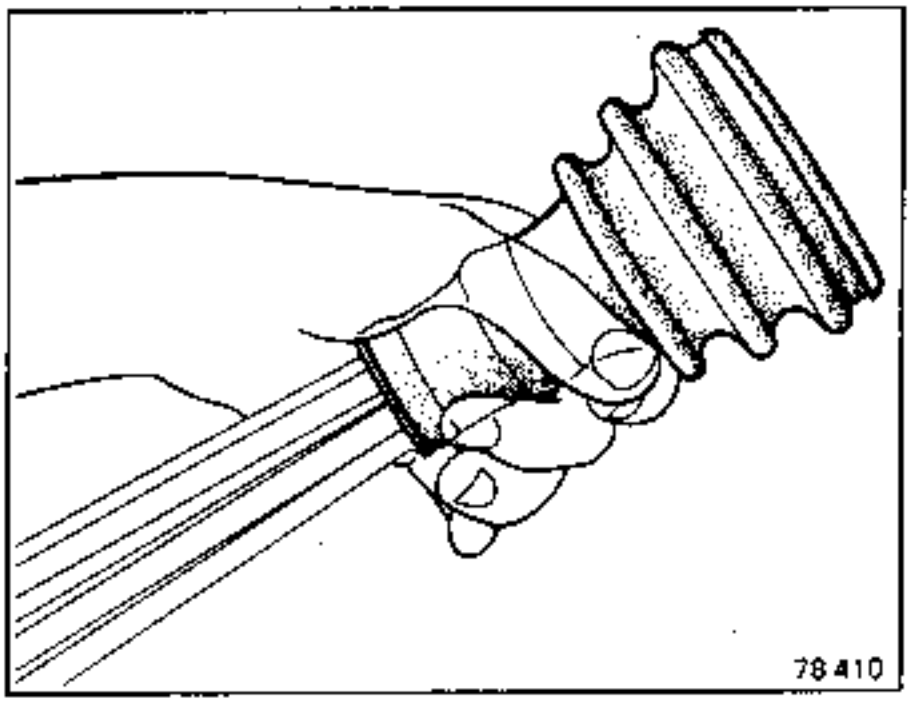
Thoroughly lubricate the following with large quantities of clean engine oil :
- the entire tool (arms and location),
- the inside of the bellows, especially round its collar.

To do this, plug the collar end, pour oil inside the bellows and swill it over the entire inside surface.

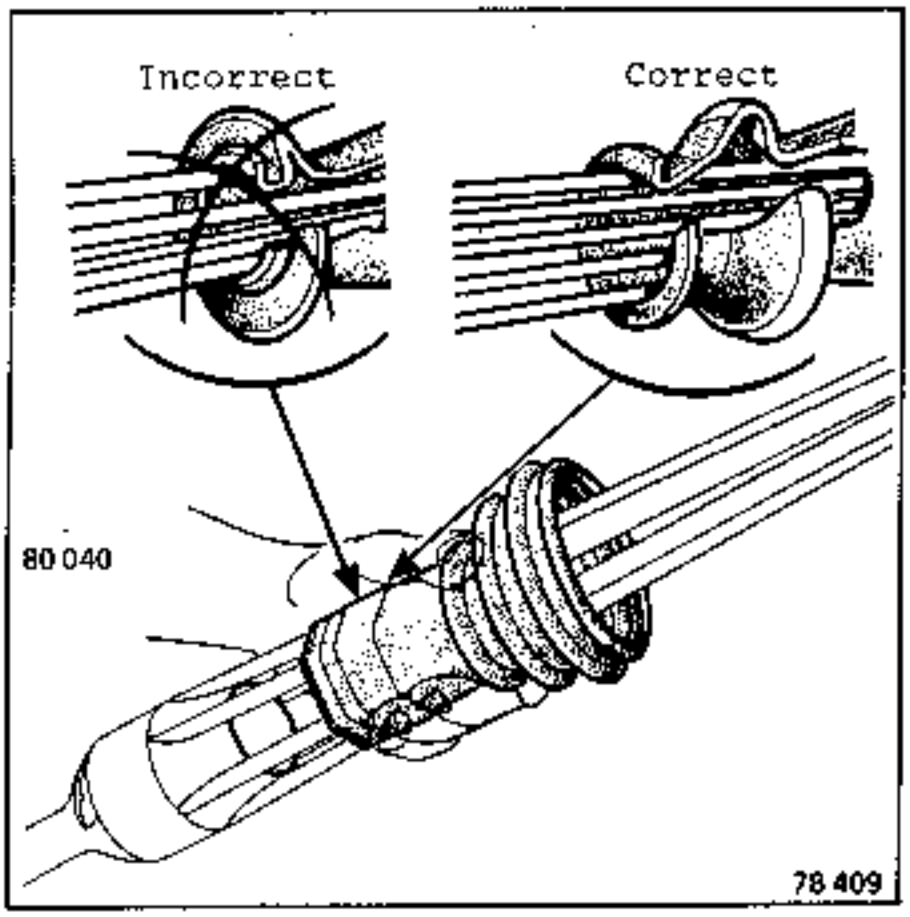


80 158

Place the bellows on the end of the tool.


78 410

Place a clean cloth round one hand and place this over the bellows to extend, fully, the first fold.



80 040

78 409

Press one hip against the side of the vice.

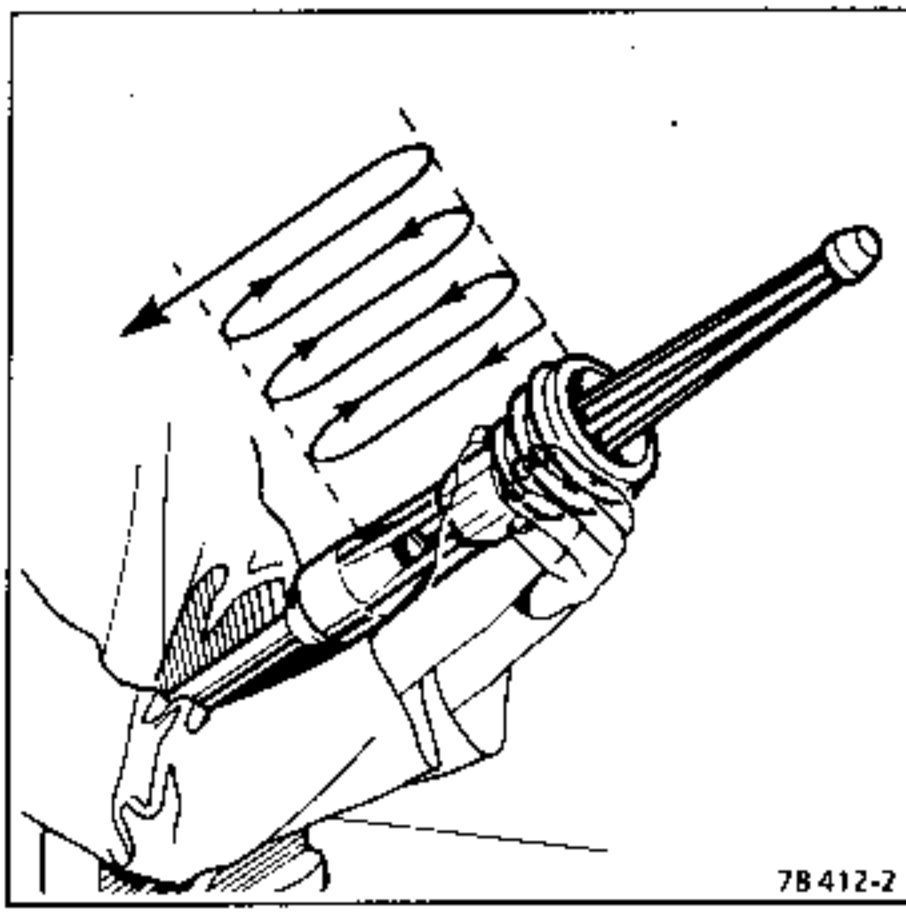
Place the other hand round the first and pull down the bellows taking care not to turn in its first fold.

Bring the bellows as near as possible to the cylindrical part of the tool and allow it to return to half way down.

Repeat this operation a number of times (a maximum of 5 times) to soften up the rubber of the bellows (do not hesitate to relubricate the arms of the tool during this operation).

Joint GE86
Joint GE76

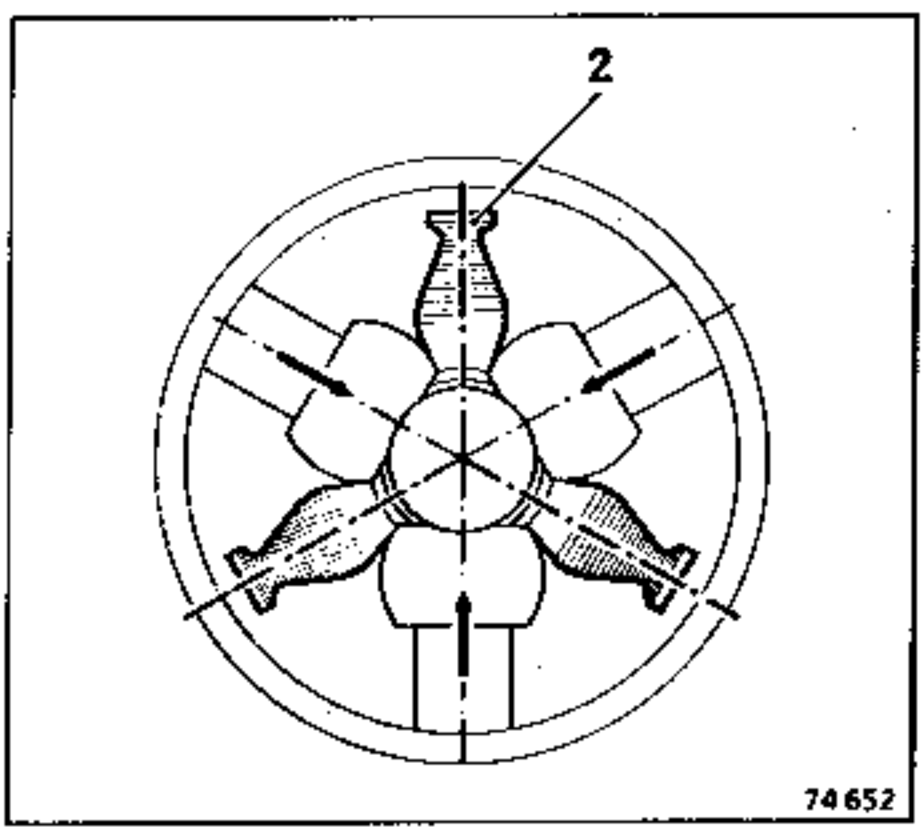
When the bellows can be felt to be sliding more easily, pass it over the cylindrical part of the tool in one movement.


78 412-2

Place the spring and thrust ball joint in the spider.

Pull the rollers in towards the centre.

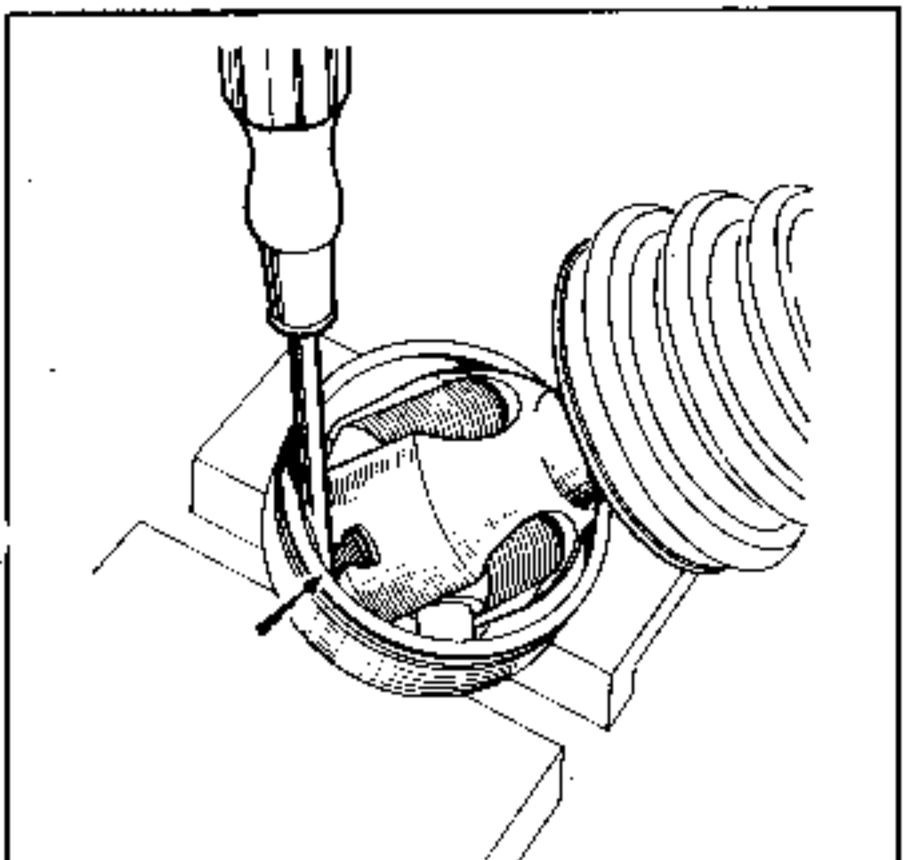
Place the retaining star (2) so that each of its arms falls exactly on the centre-lines between the shafts on the spider.



74 652

Engage the shaft yoke into the cup yoke.

Tilt the shaft to engage one arm of the retaining star into a slot in the shaft yoke and press down on it to locate it correctly.



74653

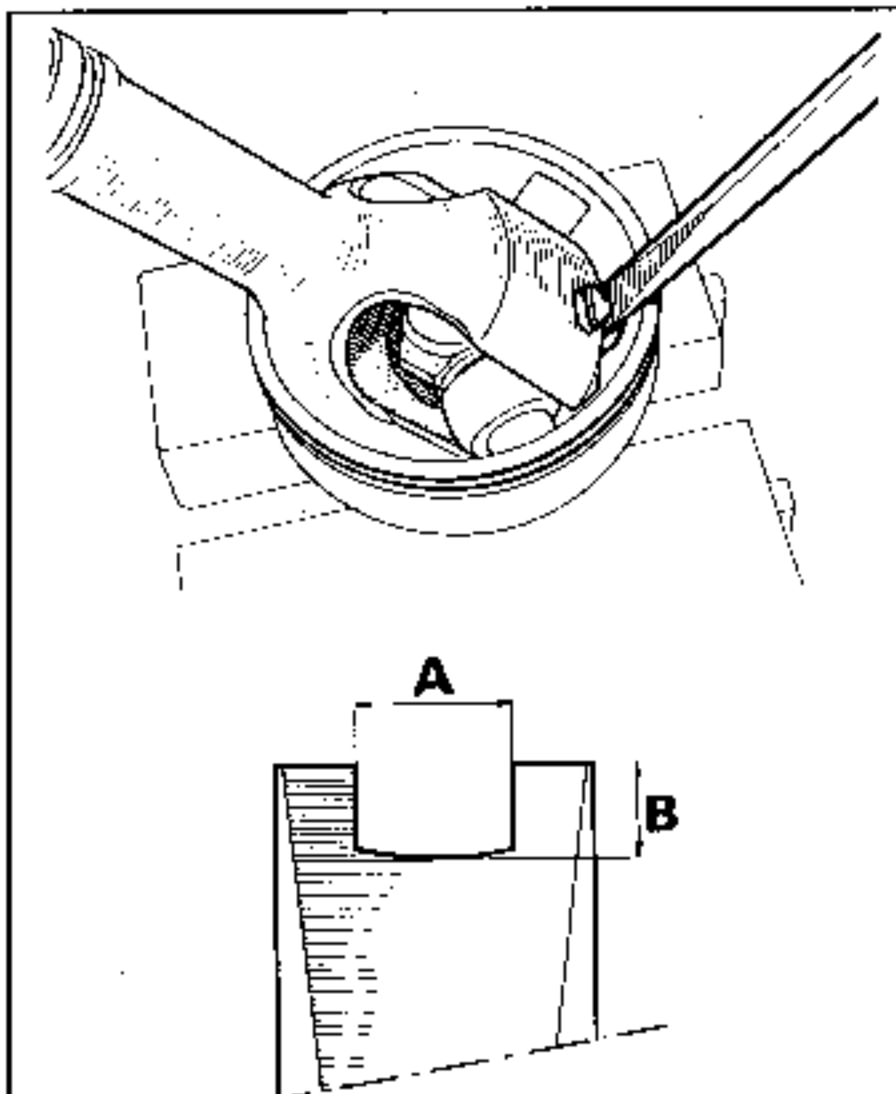
Fitting the other two arms of the retaining star will be made easier by using, for example, a screwdriver the end of which has been modified as shown in the illustration.

A = 5 mm   B = 3 mm

Ensure that the arms of the retaining star are correctly positioned in their locations.

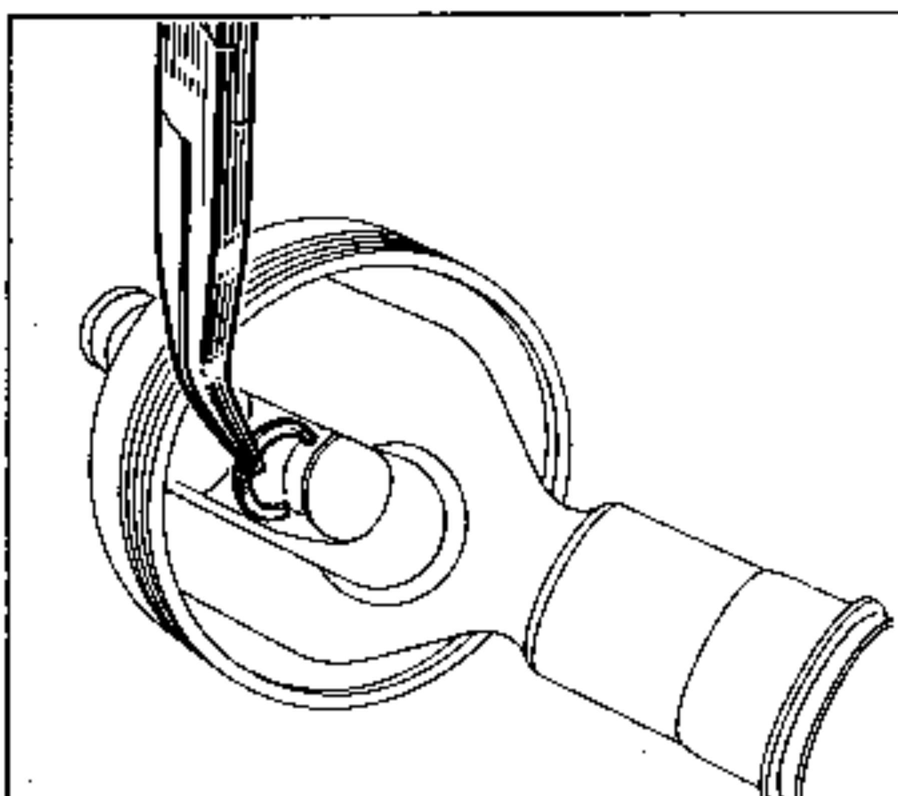
Tilt the shaft in the same plane as one of the arms of the retaining star, the ball joint will lift under the effect of the spring.

Joint GE86
Joint GE76



74697

Insert the shim under the head of the ball joint (it is not to project outside the head of the joint).



88668

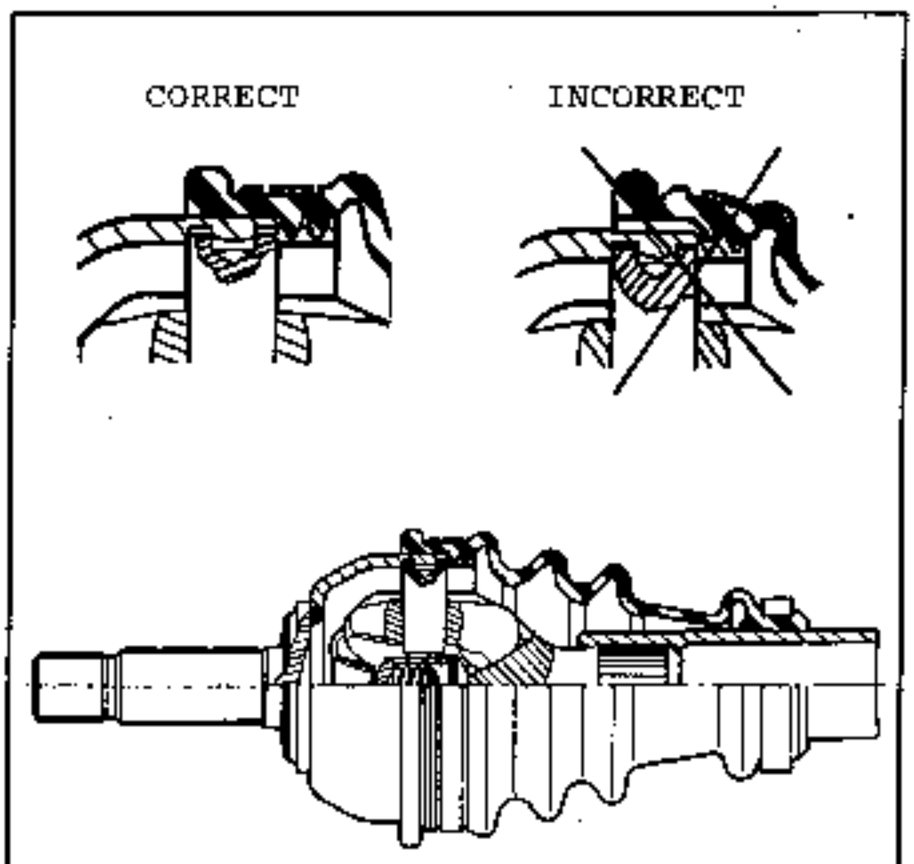
Check that the joint operates correctly, by moving it by hand.

There should be no stiff points.

Distribute the metered quantity of grease into the bellows and into the cup yoke.

NOTE : it is essential to use only the quantity of grease described in the consumables section.

Position the two beads on the bellows in the grooves in the cup yoke, with it fully pulled down on to the drive shaft tube.

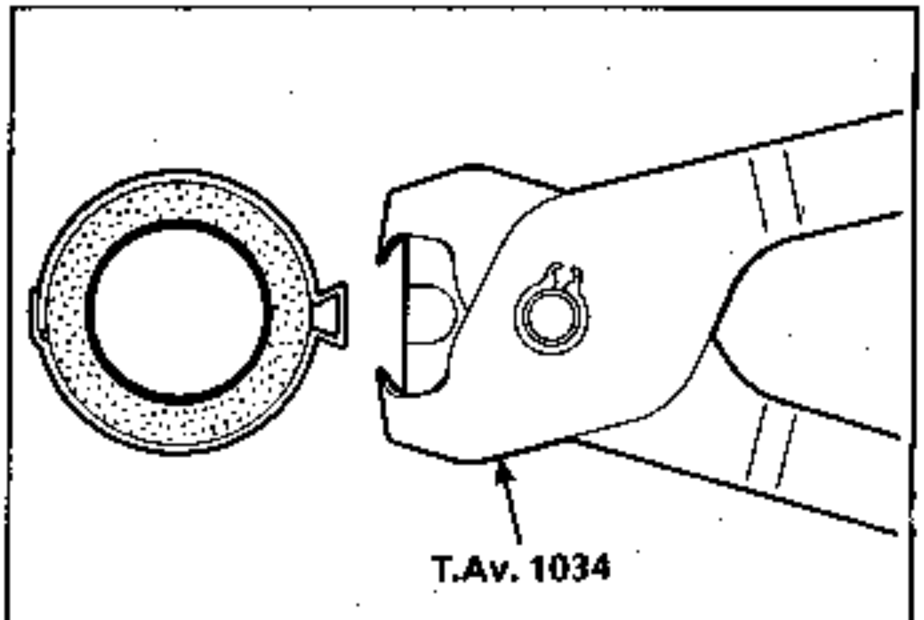


88 578

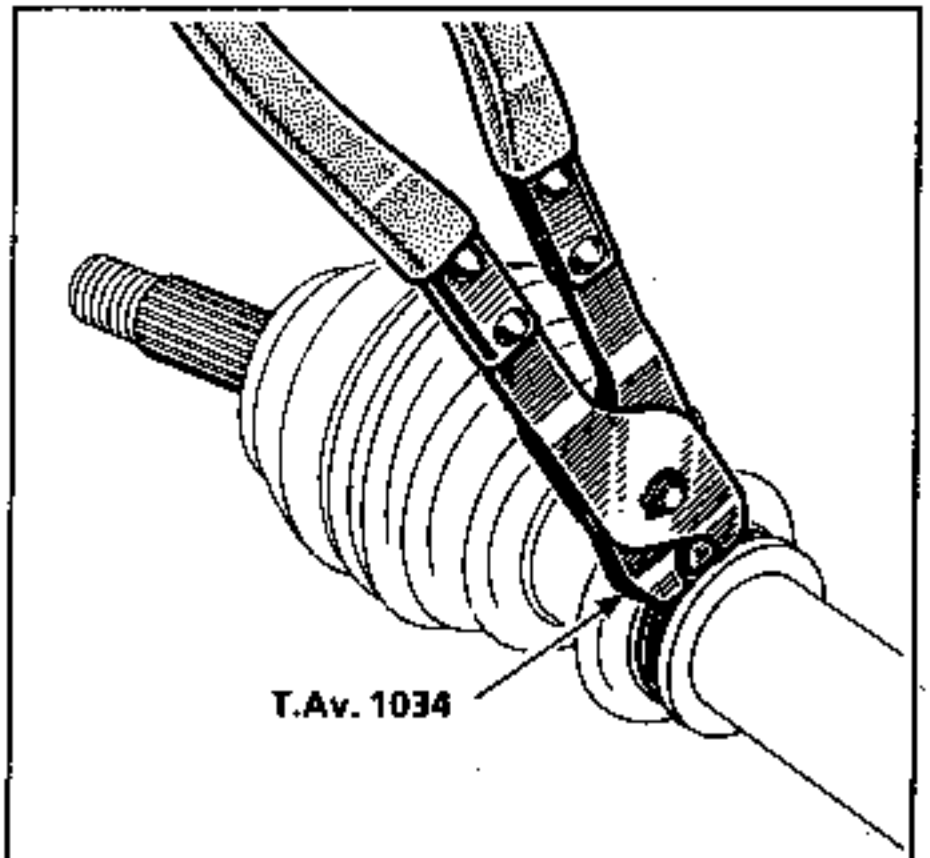
Insert a rod, with no sharp edges, and the end of which has been rounded between the bellows and the tube to ensure that the amount of air in the bellows is correct.

Joint GE86
Joint GE76

Fit the clips and tighten them with tool **T.Av. 1034**

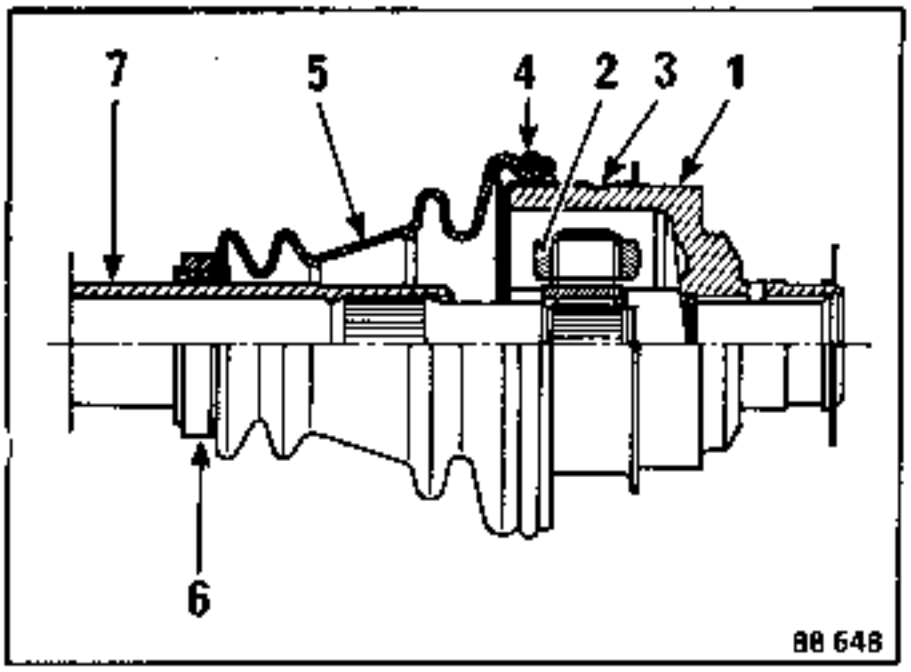


88 601



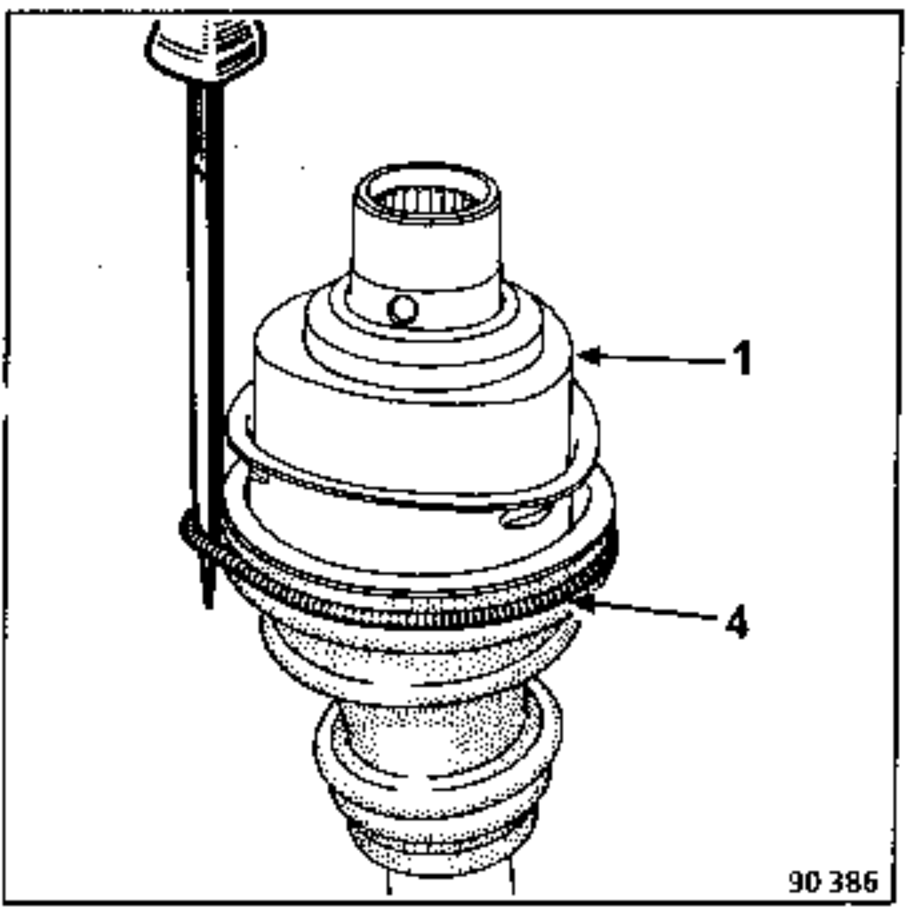
88 639

1 Yoke
2 Spider
3 Sheet metal cover
4 Retaining spring
5 Rubber bellows
6 Retaining ring
7 Drive shaft



DISMANTLING

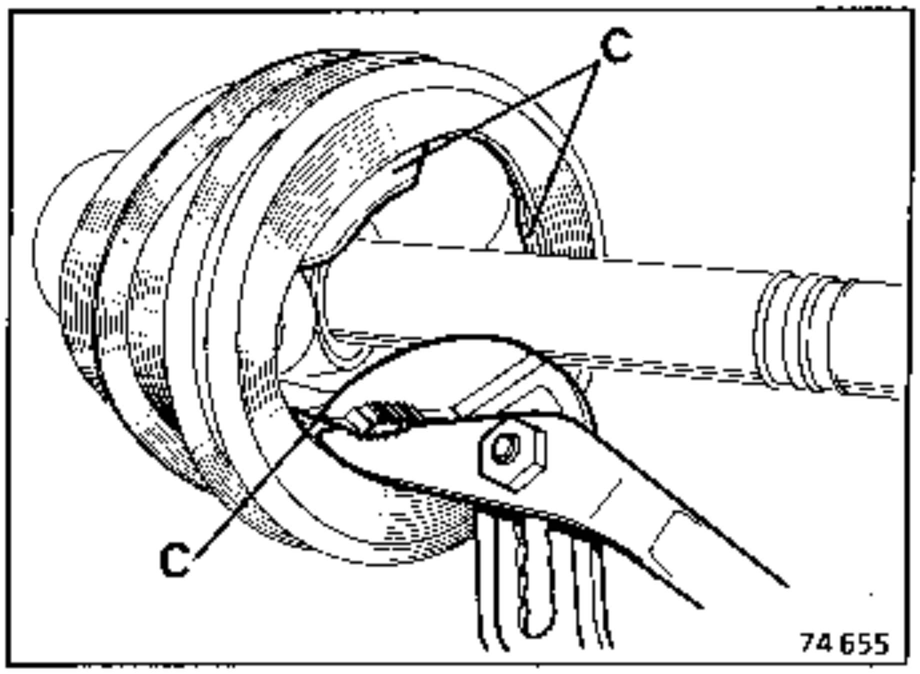
Free the spring (4) that secures the bellows to the yoke (1).



Cut the bellows over its entire length and remove as much grease as possible.

Lift each end of the locating plate (C) with a pair of pliers and remove the yoke.

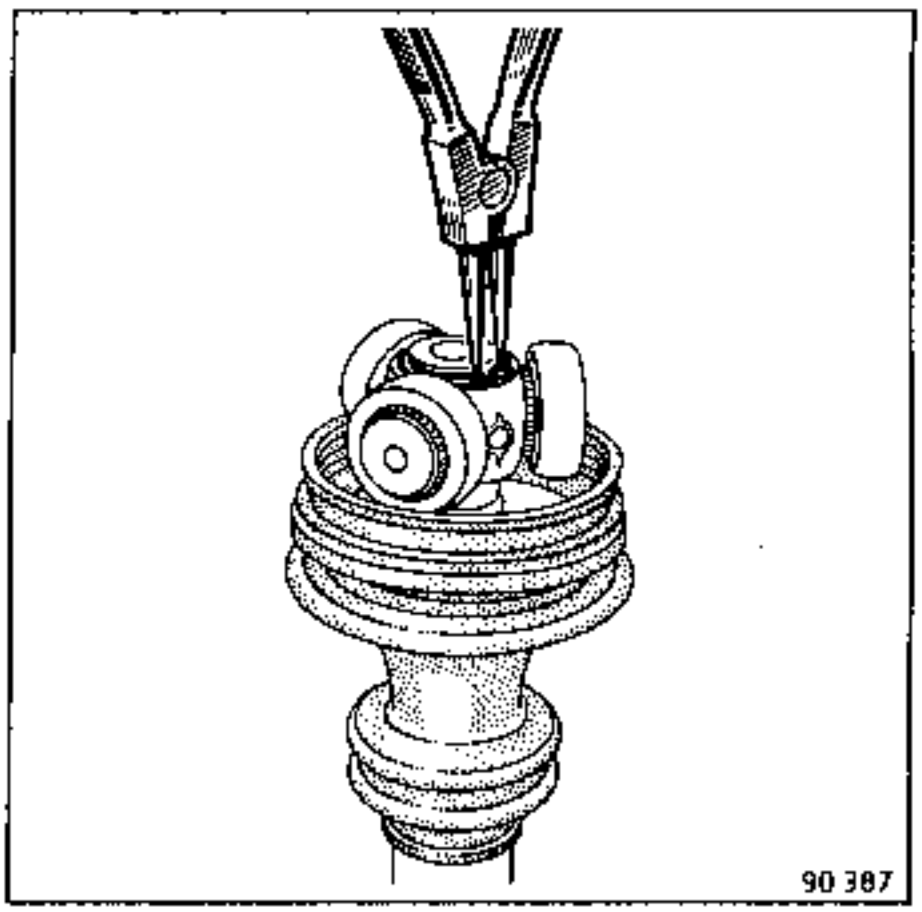
Joint GI62



Do not remove the rollers from their respective trunnions because these rollers and needle bearings are matched and should never be intermixed.

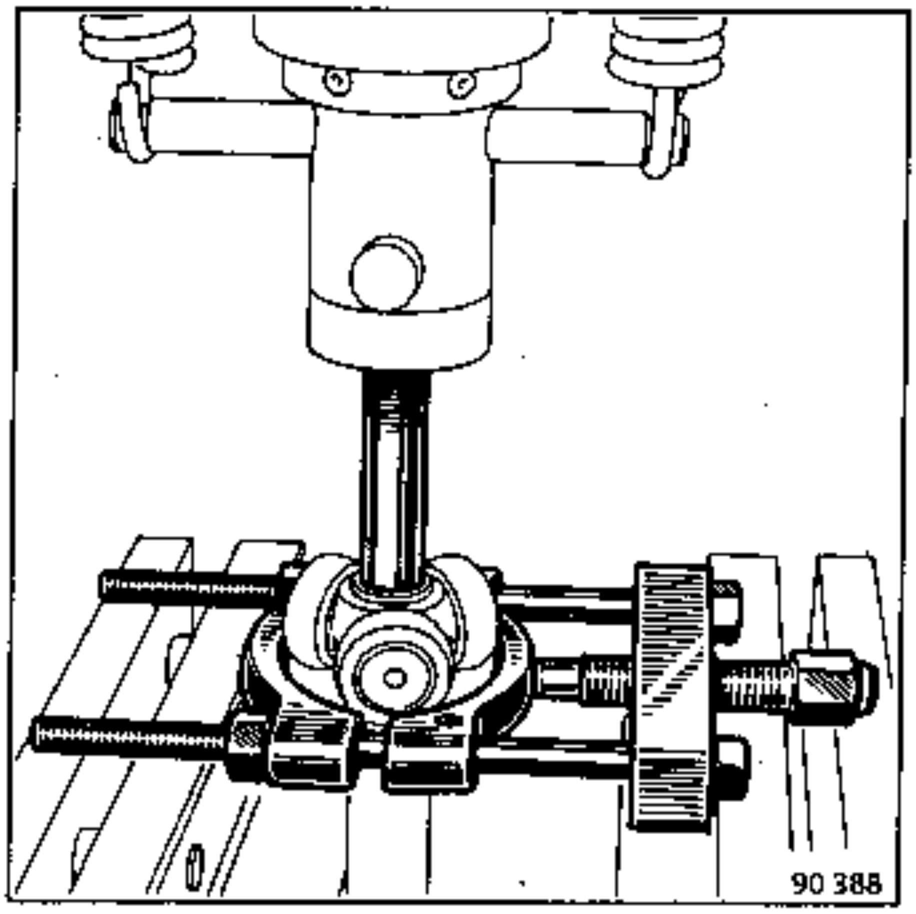
Never use thinners to clean the component parts.

When applicable, remove the circlip.



Joint GI62

Extract the spider from the shaft, taking the load on an extractor.

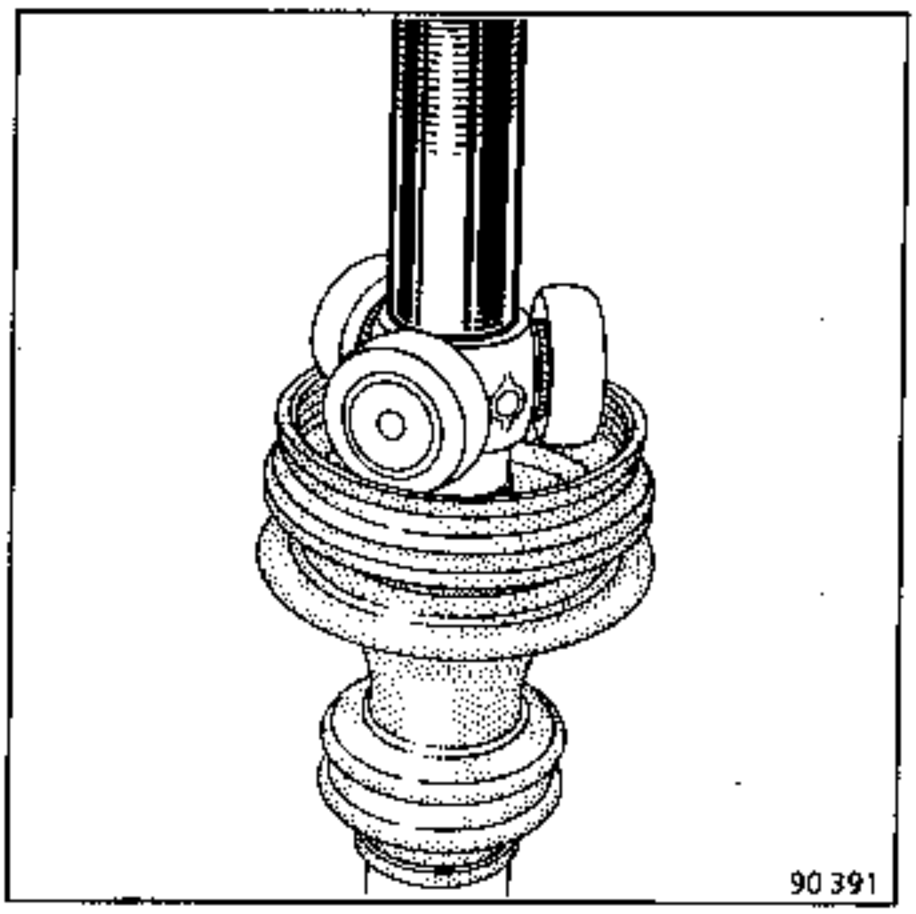


90 388

REASSEMBLING

Lubricate the drive shaft and slide on the new retaining ring and bellows.

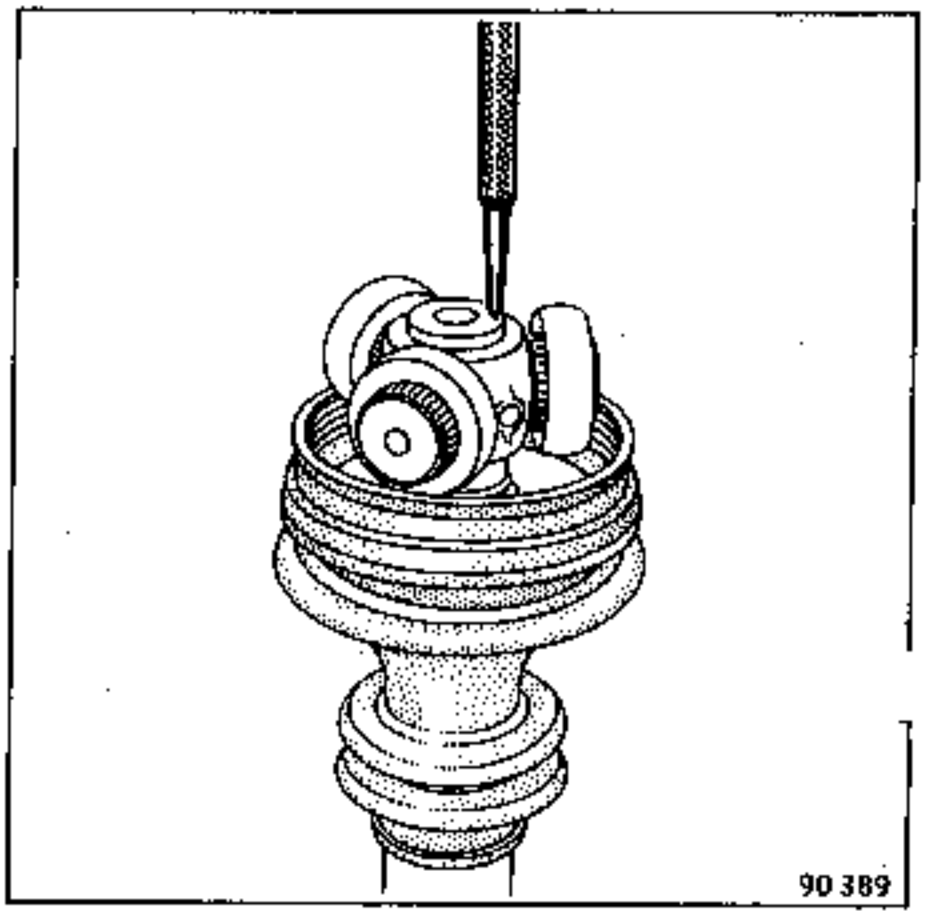
Fit the spider on to the splined shaft.



90 391

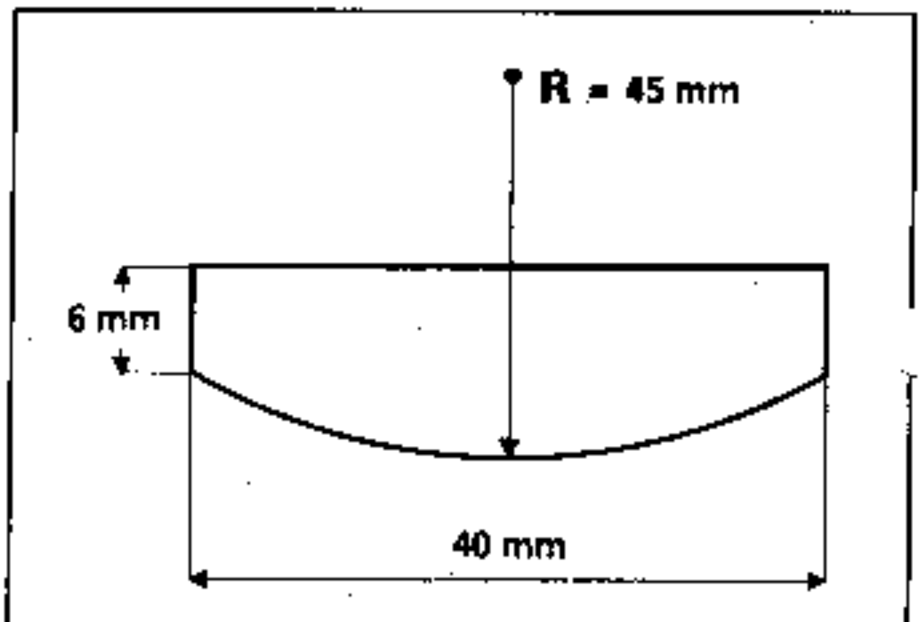
Refit the retaining circlip or secure the assembly by peaning the metal on to the drive shaft splines at three points 120° from one another.

NOTE : it is essential to use the correct quantity of grease as specified in the "Consumables" section.



90 389

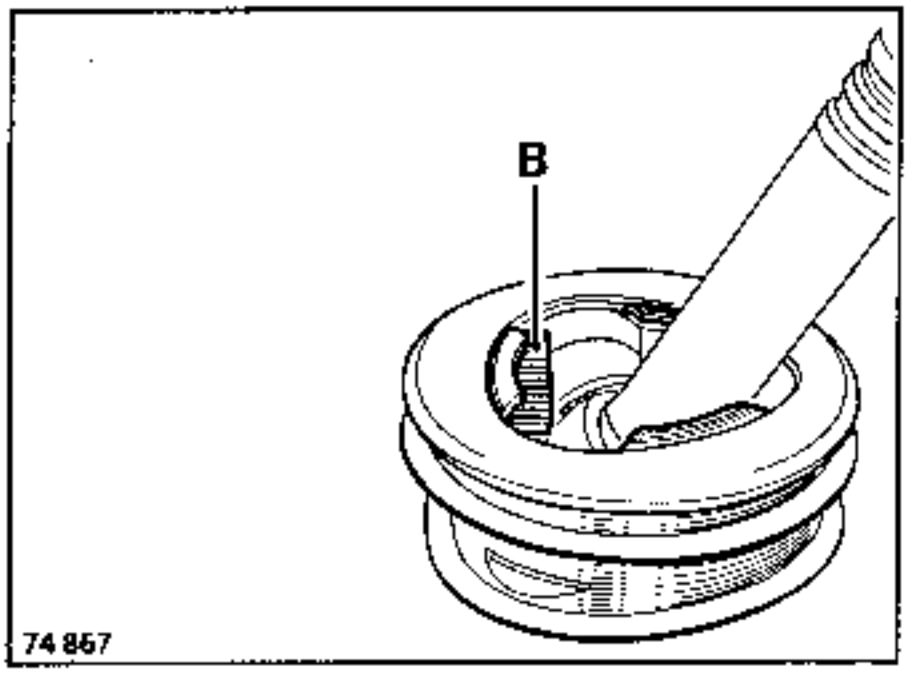
Place a shim (B) 2.5 mm thick, made to the dimensions shown in this drawing, between the locating plate and the yoke.



75 434-1

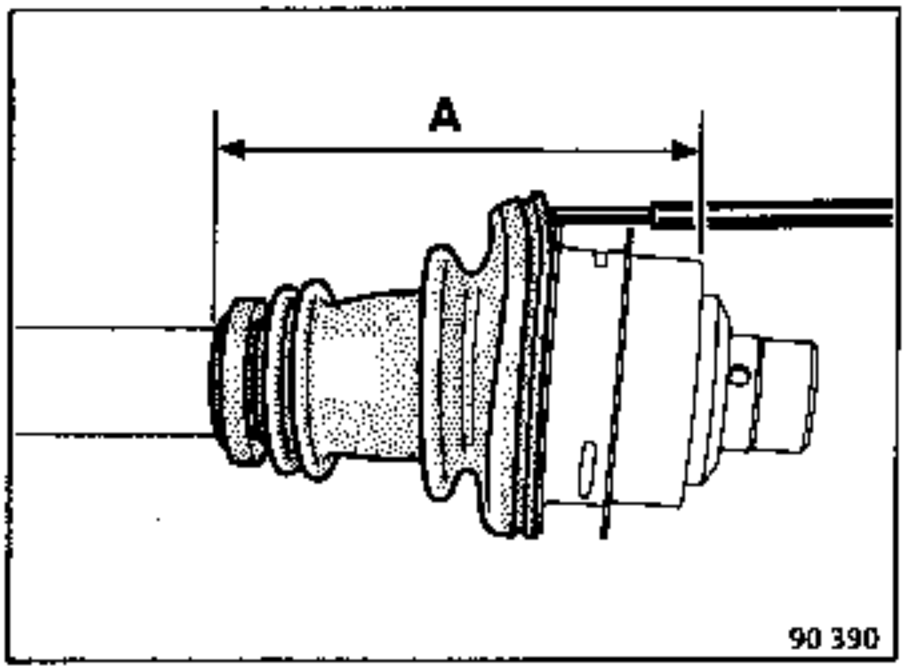
Joint GI62

Using a bronze drift, carefully return the retaining plate to its original position and take out the shim (B).



74 867

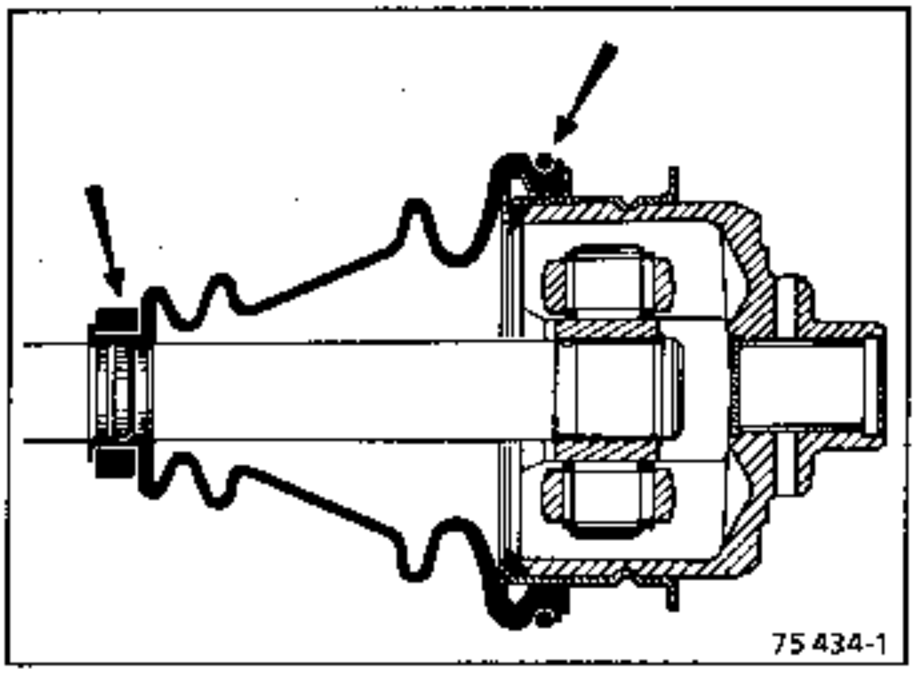
Place the lips of the bellows in the grooves on the drive shaft and on the sheet metal cover.



90 390

Insert a smooth rod the ends of which have been rounded off between the bellows and the yoke to ensure that the volume of air inside the joint is correct.

Extend or push in the joint to obtain dimension A = 153.5 $\pm$ 1 mm (the dimension is taken between the end of the bellows and the machined face on the largest diameter on the yoke).

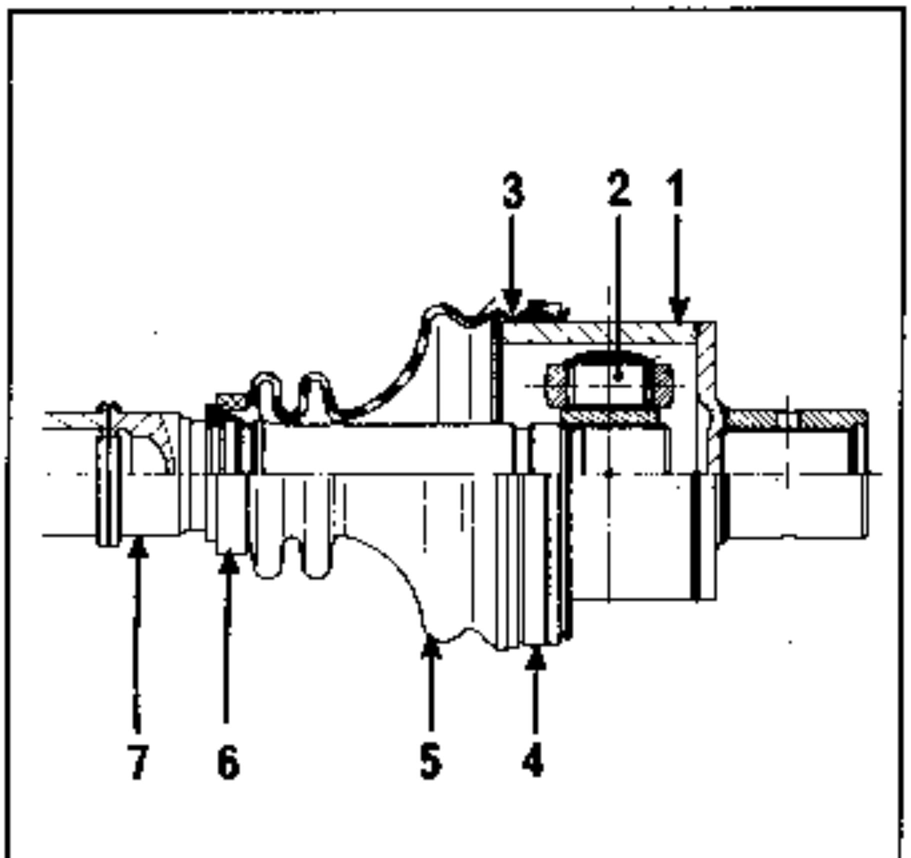

75 434-1

With the joint in this position, remove the rod.

Fit the bellows retaining spring and retaining ring :
- the spring is not to be stretched,
- its coils are to remain in contact with one another after fitting.

JointRC490

ESSENTIAL SPECIAL TOOLS	
T.Av. 1034	Pliers for crimping the drive shaft clips

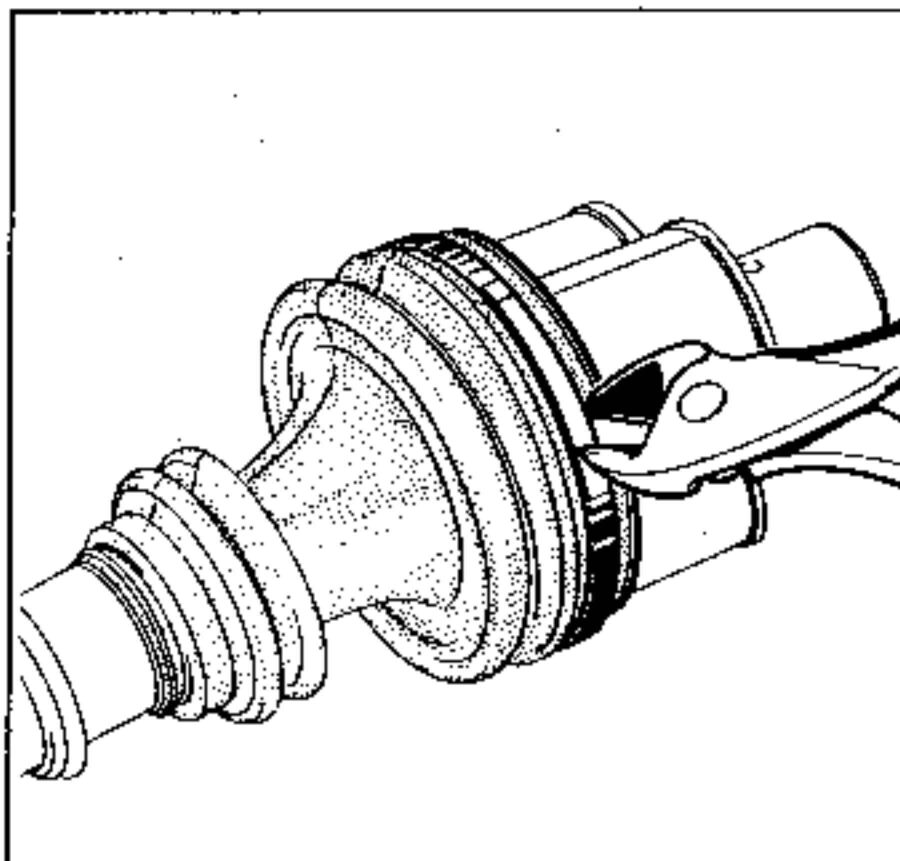


89 134

1 Yoke
2 Spider
3 Sheet metal cover
4 Retaining clip
5 Rubber bellows
6 Retaining ring
7 Drive shaft

DISMANTLING

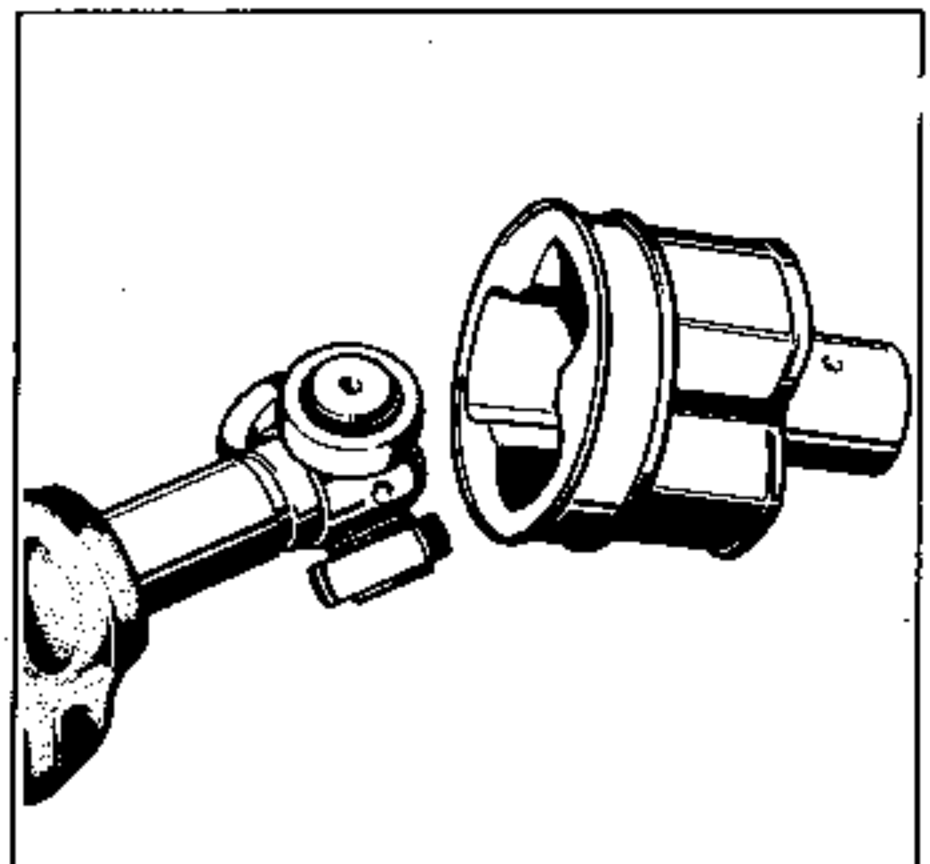
Cut :
- the existing retaining clip, taking care not to damage the sheet metal cover,


89 143

- the bellows over its entire length.

Remove as much grease as possible.

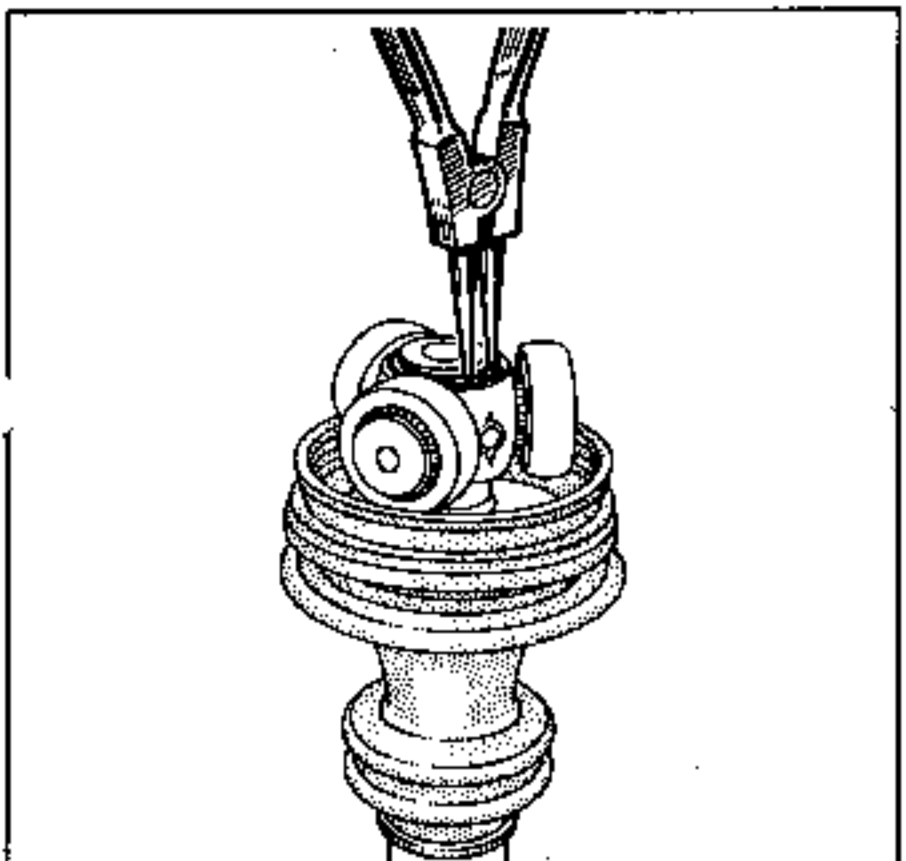
Remove the yoke.


89 145

NOTE : as the yoke has no locking tab, it can be removed without forcing it.

Do not remove the rollers from their respective trunnions because the rollers and needle bearings are matched and must never be intermixed.

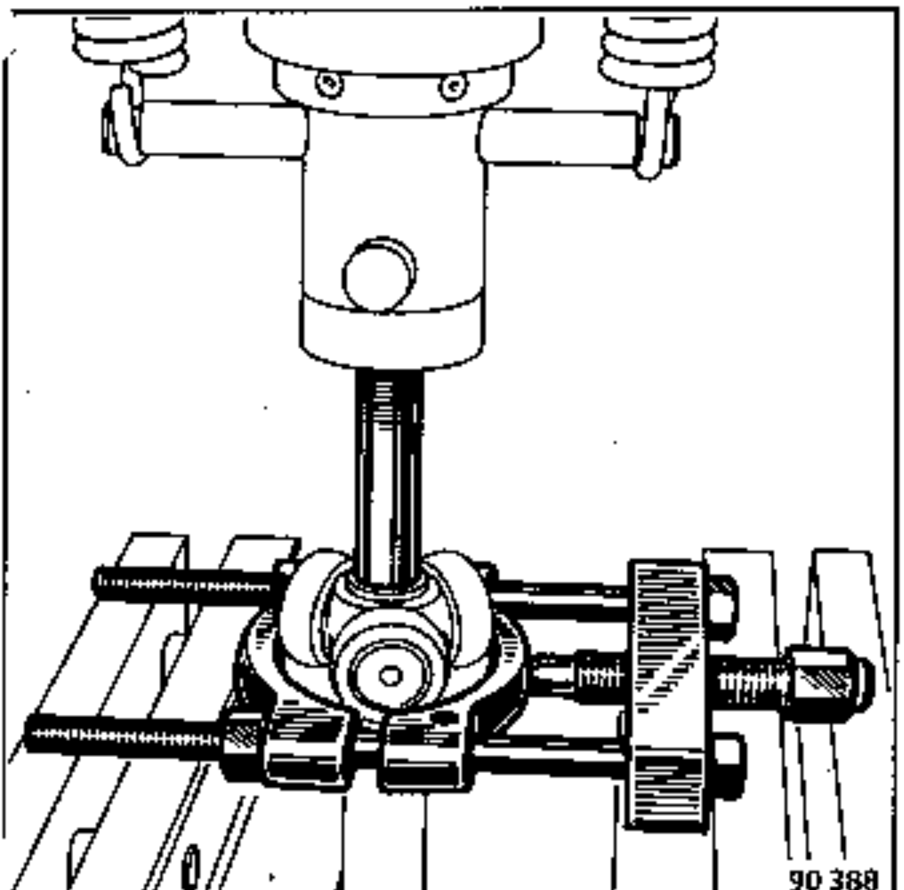
Remove the circlip (on certain models).



90 387

Never use thinners for cleaning the component parts.

Extract the spider, on the press, taking the load on an extractor of the FACOM U53G type.



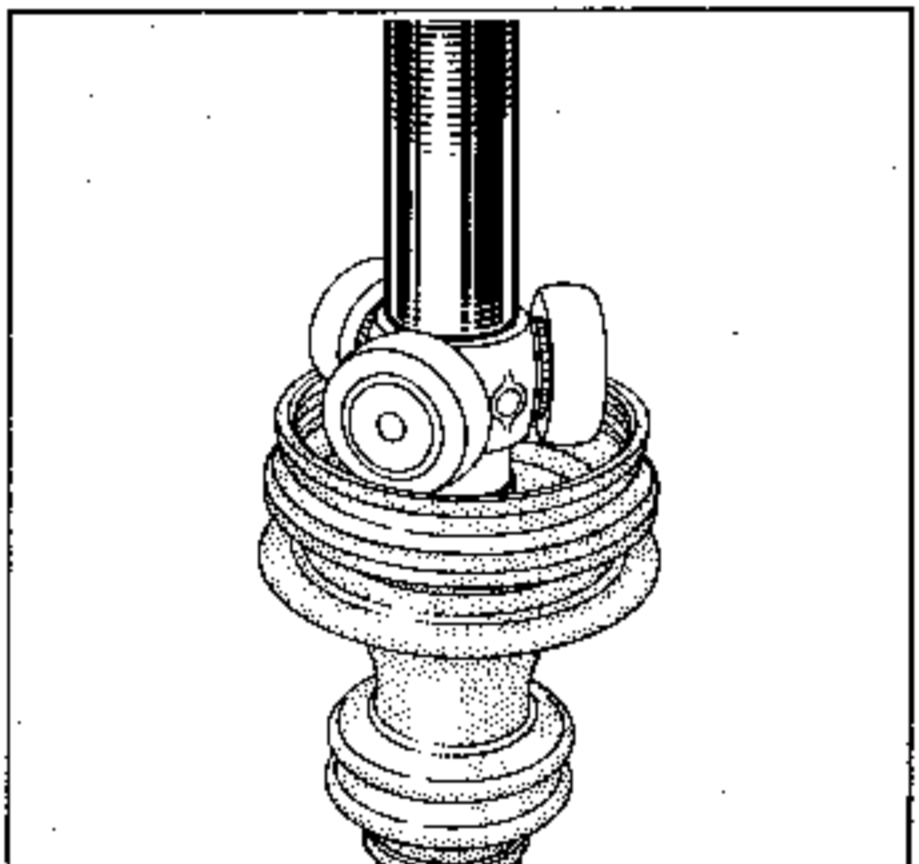
90 388

JointRC490

REASSEMBLY

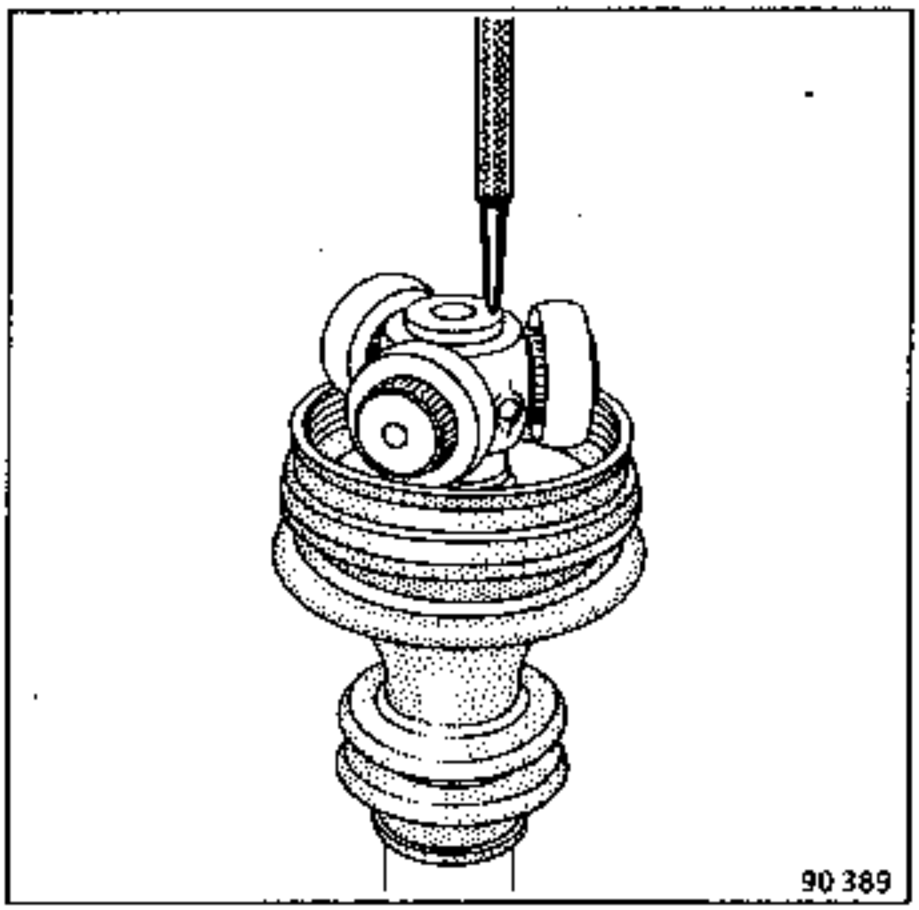
Lubricate the drive shaft and slide on the new retaining ring and bellows.

Fit the spider to the splined shaft.



90 391

Refit the retaining circlip or secure the spider by peaning its metal on to the splines of the drive shaft at three points 120° apart.



90 389

Slide on the yoke and engage it on the spider.

Spread the pre-measured quantity of grease inside the bellows and inside the yoke.

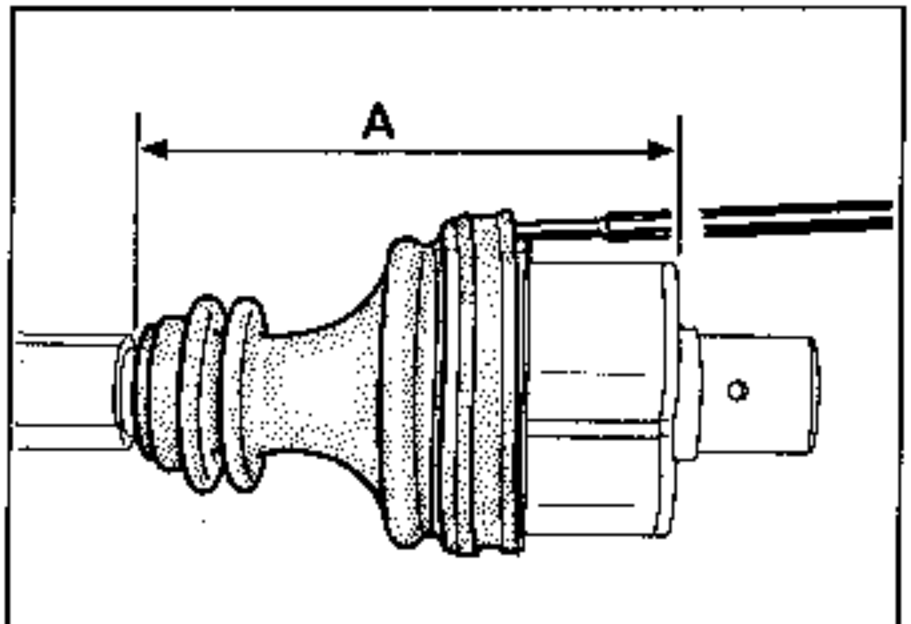
NOTE : it is essential to use only the quantity of grease specified in the consumables section.

Position the lips on the bellows in the grooves in the drive shaft and the cover.

Insert a smooth rod, the end of which has been rounded, between the bellows and the yoke to ensure that the joint contains the correct quantity of air.

Extend or bring together the joint to obtain a dimension A = 156 $\pm$ 1 mm (dimension taken from the end of the bellows to the machined face on the largest diameter of the yoke).

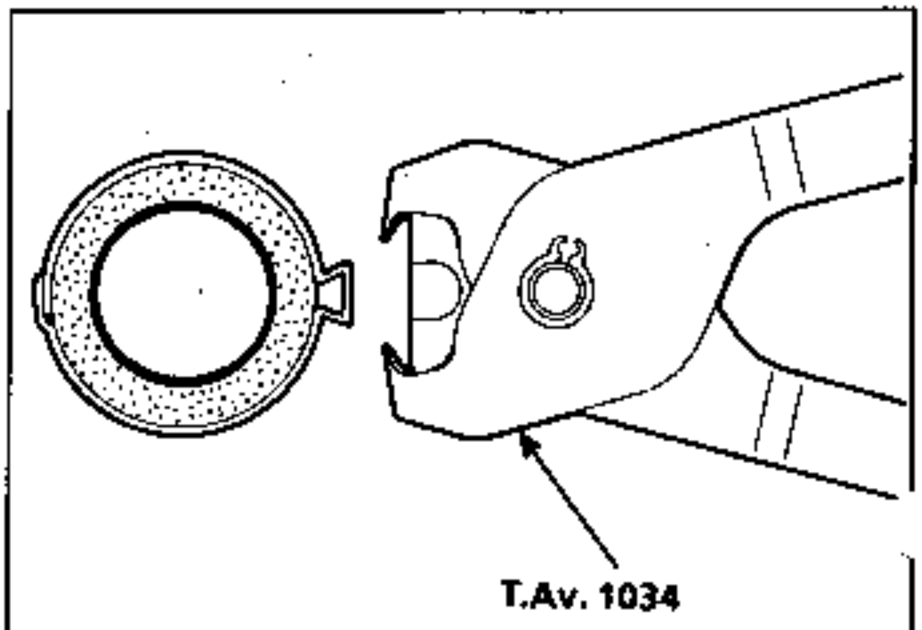
With the joint in this position, remove the rod.



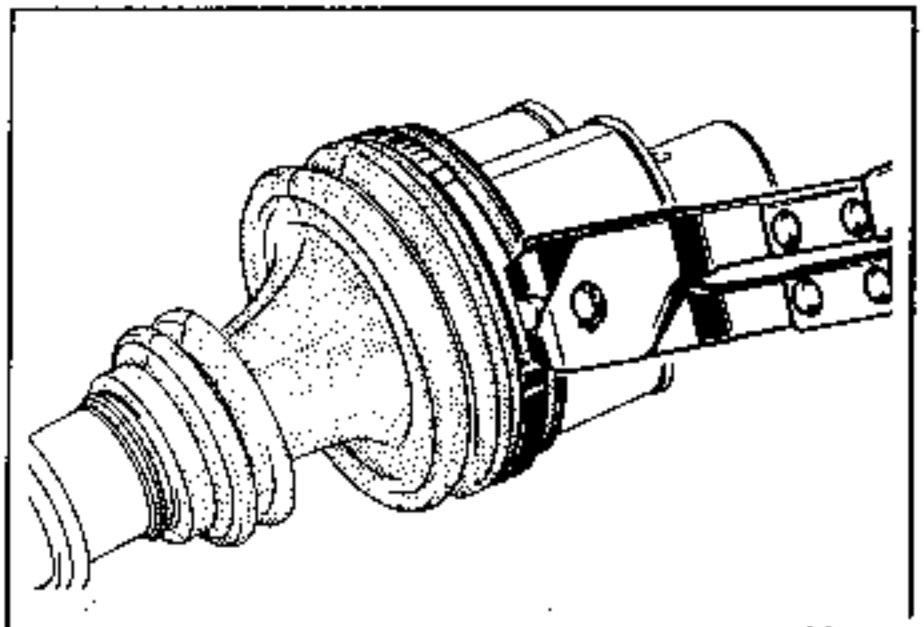
90 392

JointRC49C

Fit :
- the retaining ring to the bellows,
- the retaining clip, crimping it with tool T.Av.1034.



88 601



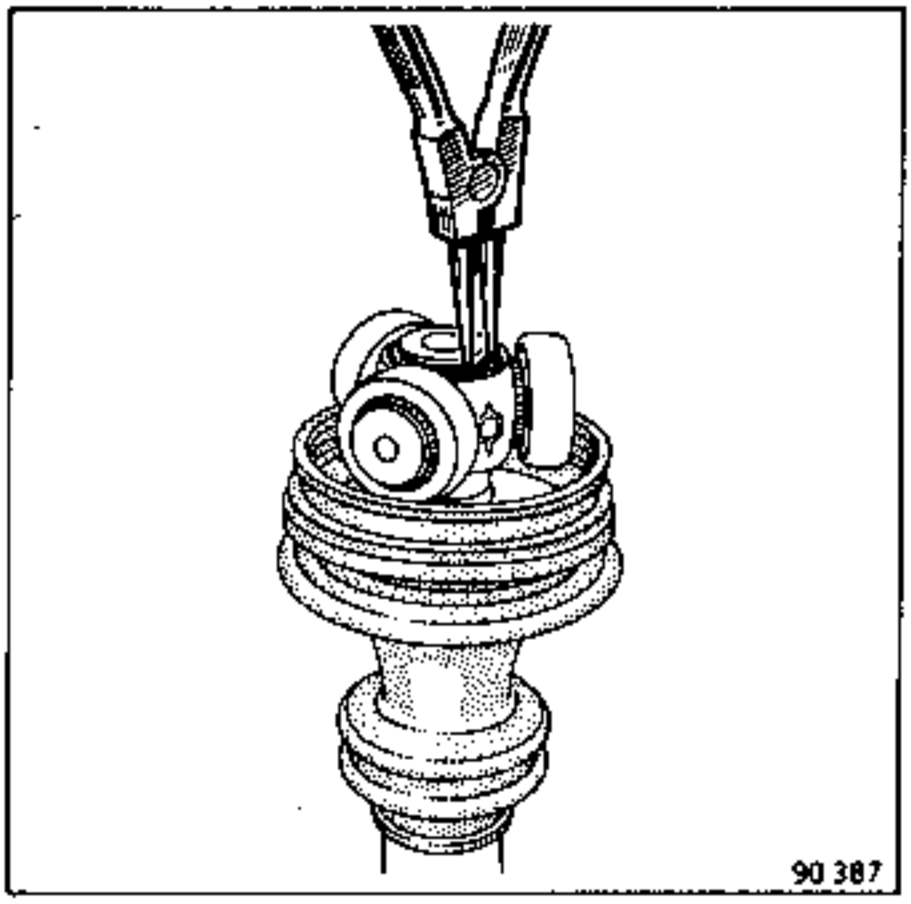
89 144

ESSENTIAL SPECIAL TOOLS	
T.Av.944	Plug for fitting the bearing to the shaft

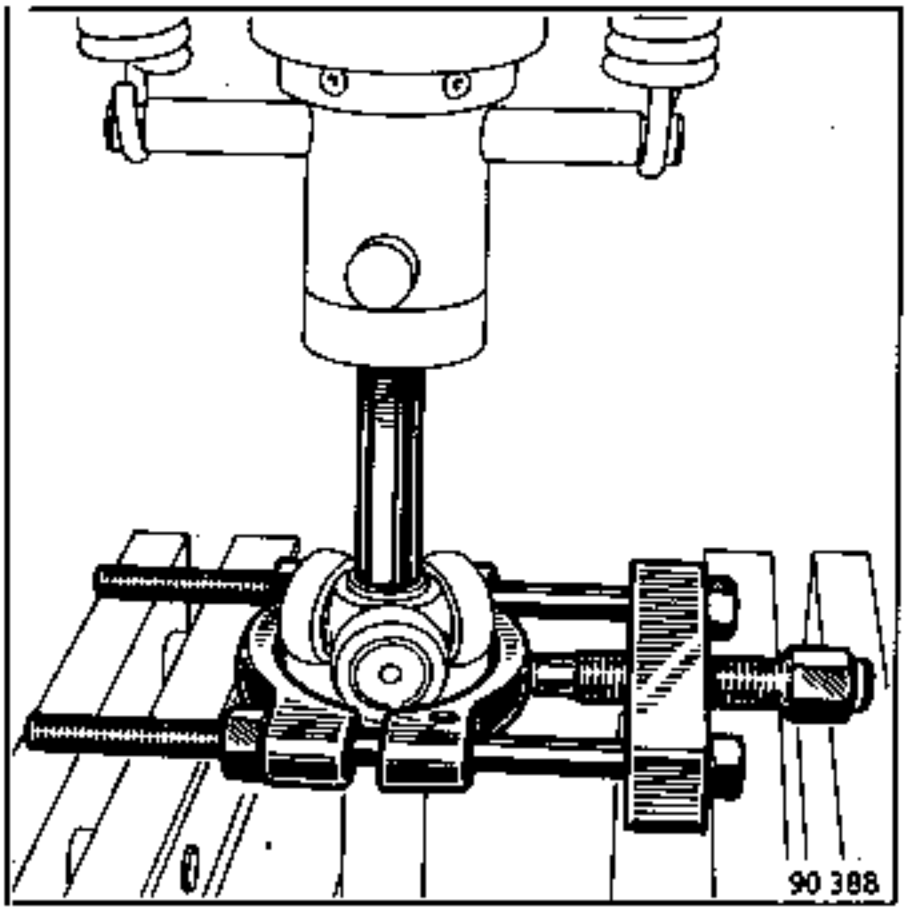
REMOVING

Never use thinners to clean the component parts.

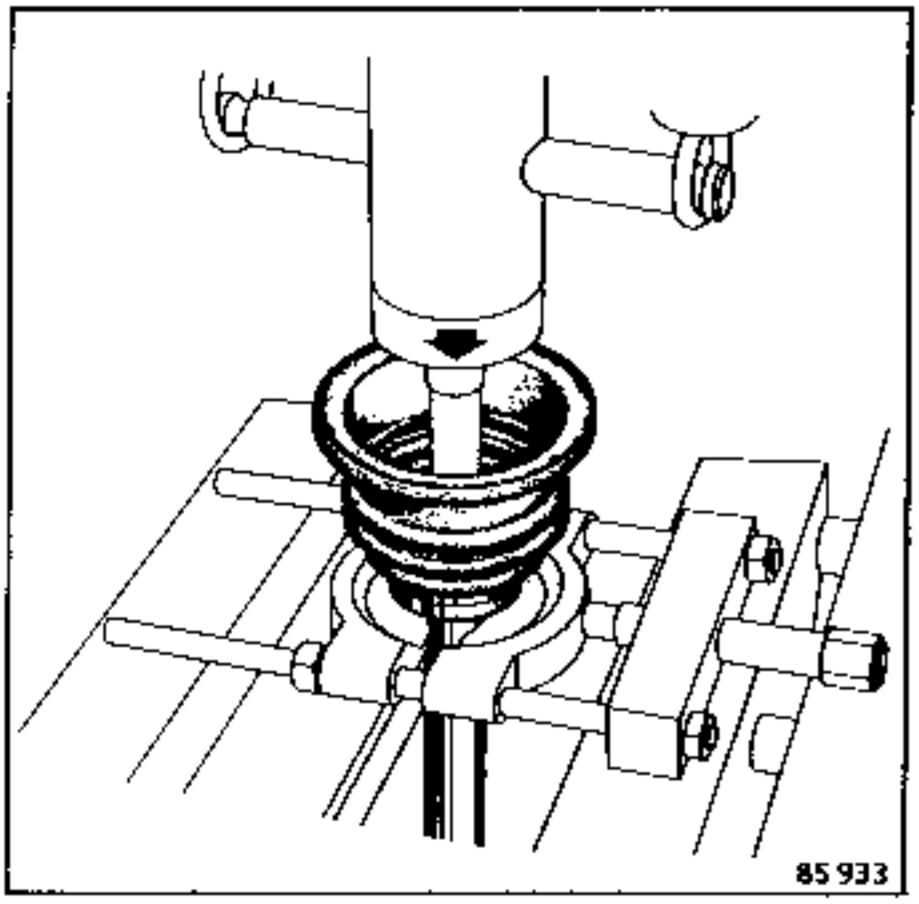
If there is one, remove the circlip.



Extract the spider, on the press, taking the load on an extractor type FACOM U53G.



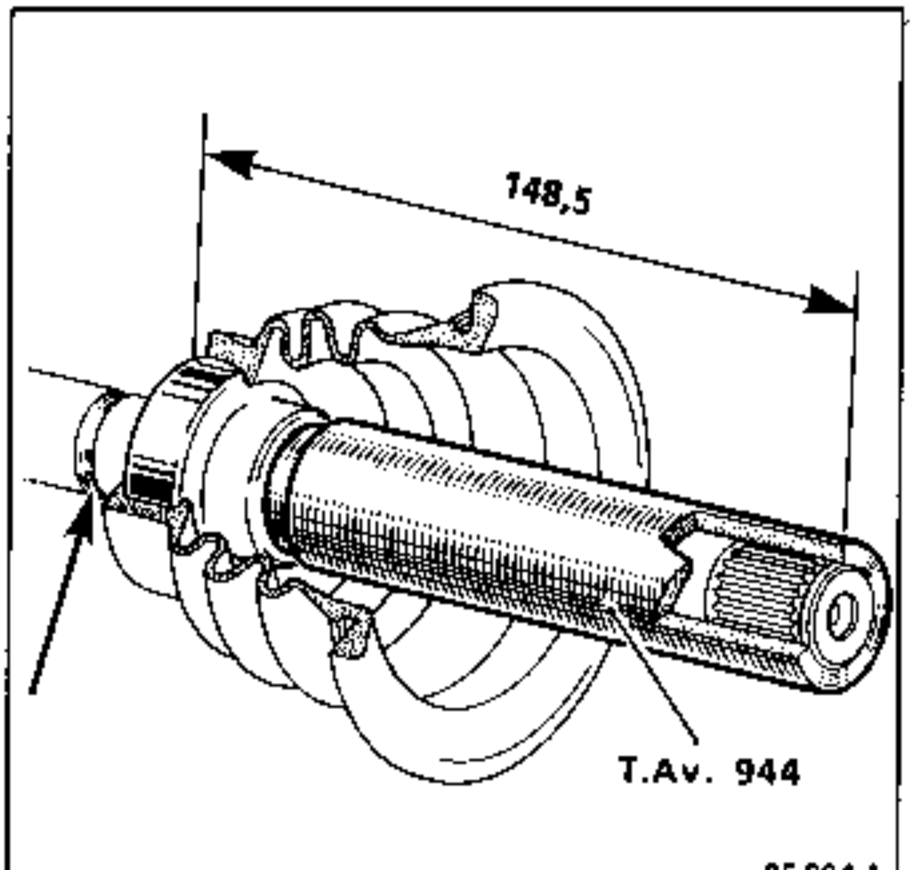
Remove the bellows and bearing assembly in the same way as the spider.



REFITTING

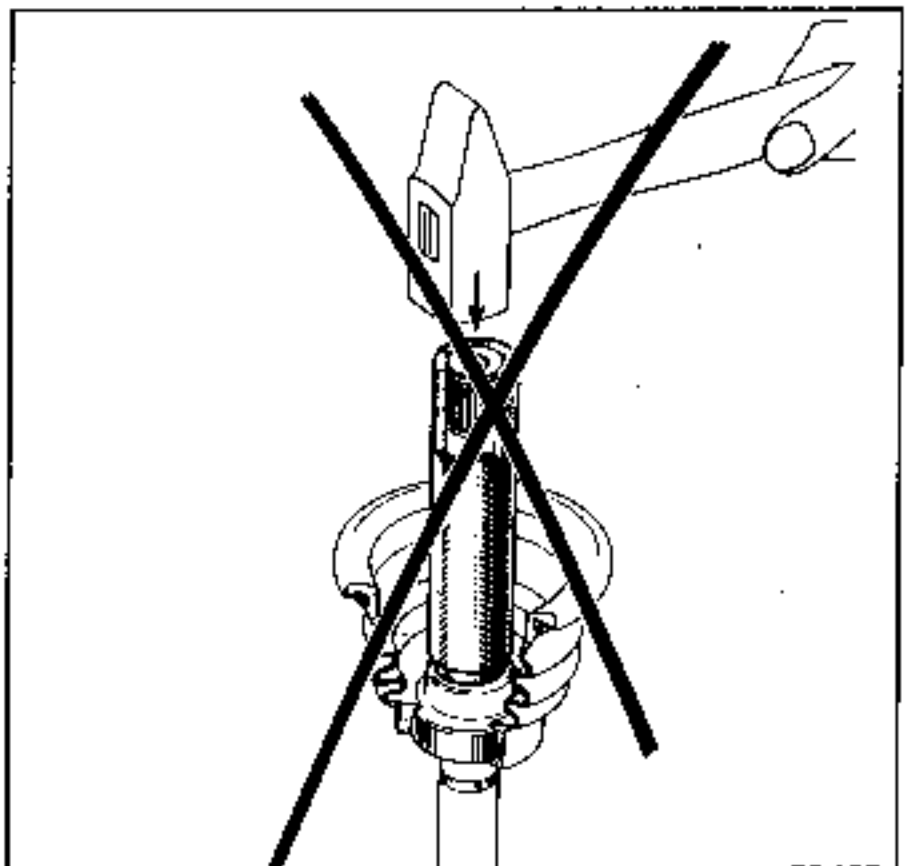
To be in the correct position on the shaft, the bearing must be pushed on until a dimension L = 148.5 is obtained between the rear face of the bearing and the end of the shaft.

This dimension is obtained by pushing the bearing on with tool T.Av.944 until the end of the tool is flush with the end of



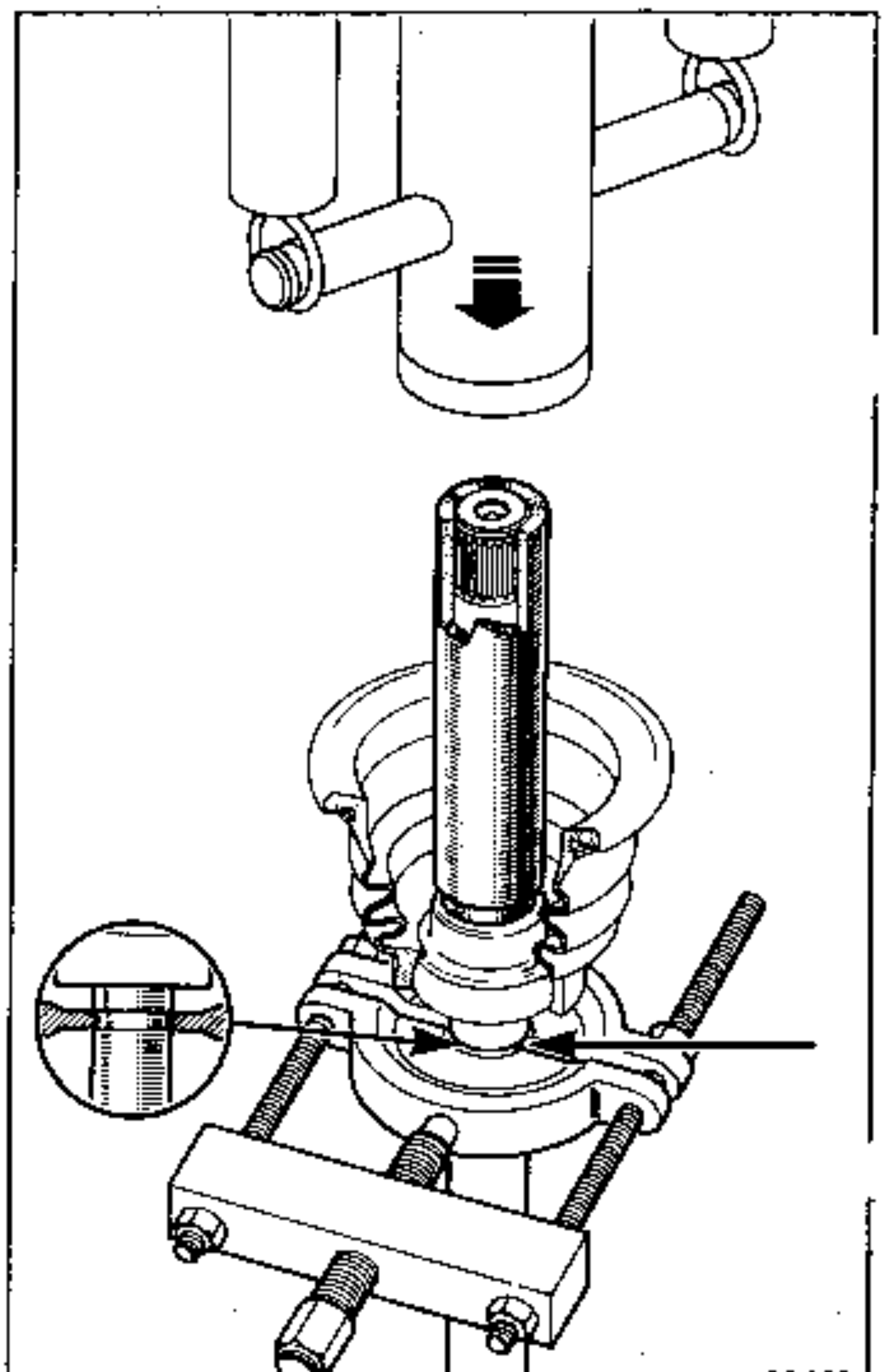
85 884-1

the shaft.
To avoid distorting the bearing, which carries a lip seal, distortion which could cause leakage, the bearing is never to be fitted with a hammer, but on the press, so that the pressure can be applied gradually



86 197

Furthermore, the drive shaft is to be mounted on the press, gripping it at groove (G) with a tool of the Facom U53G type to avoid damage to the joint at the wheel end.



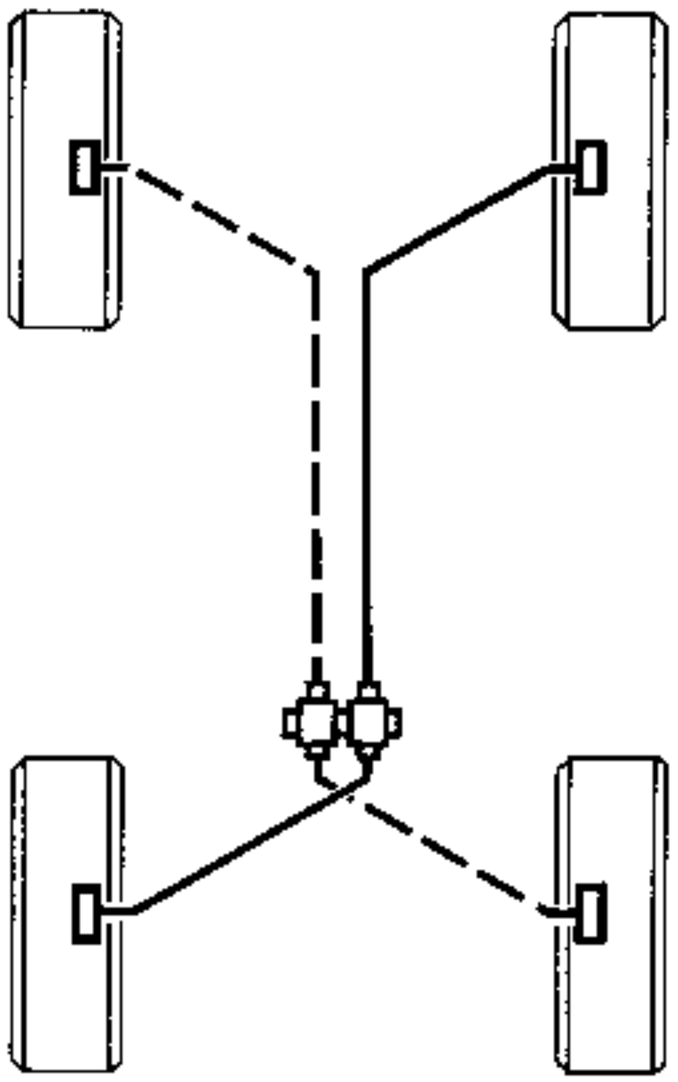
86 198

Fit the spider to the splined shaft and refit the retaining circlip (when applicable).

NOTE : these diagrams are general diagrams and under no circumstances are they to be used to determine take-off points and circuit applications. When replacing one of the component parts of a vehicle braking system, always mark the pipes before disconnecting them so that they can be reconnected in their original positions. ESSENTIAL.

"X" TYPE BRAKING SYSTEM

with fixed compensator

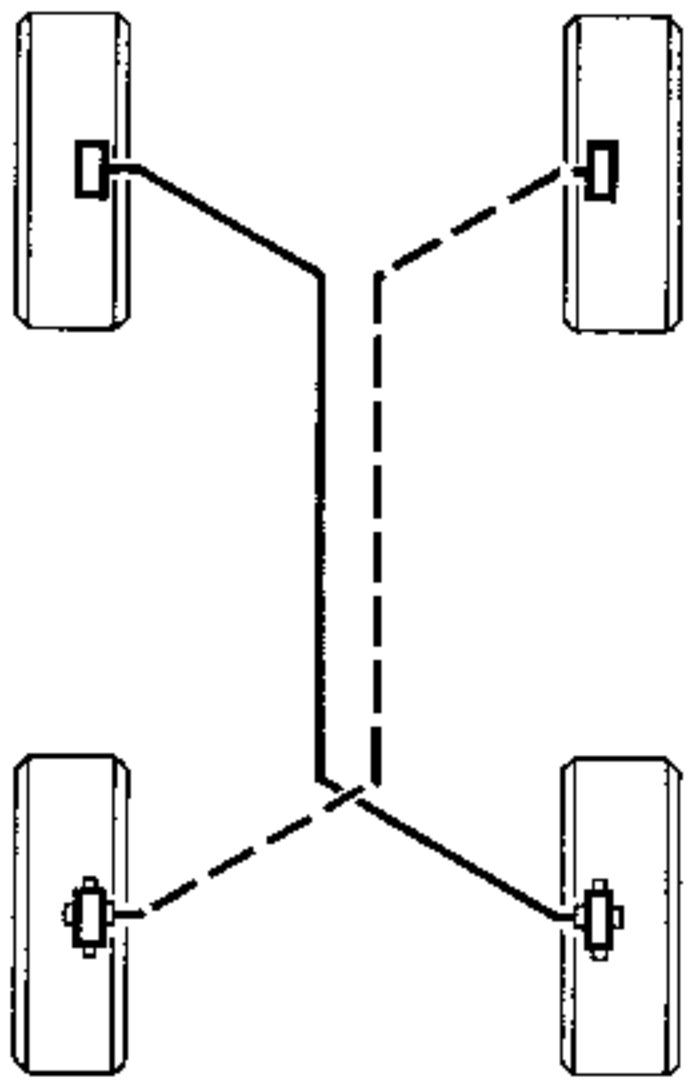


81 563-2

1st ARRANGEMENT

B400
C400
S400
B401
C401
S401
B402
C402
8407
C407

"X" TYPE BRAKING SYSTEM
with fixed compensators forming part of the wheel cylinders



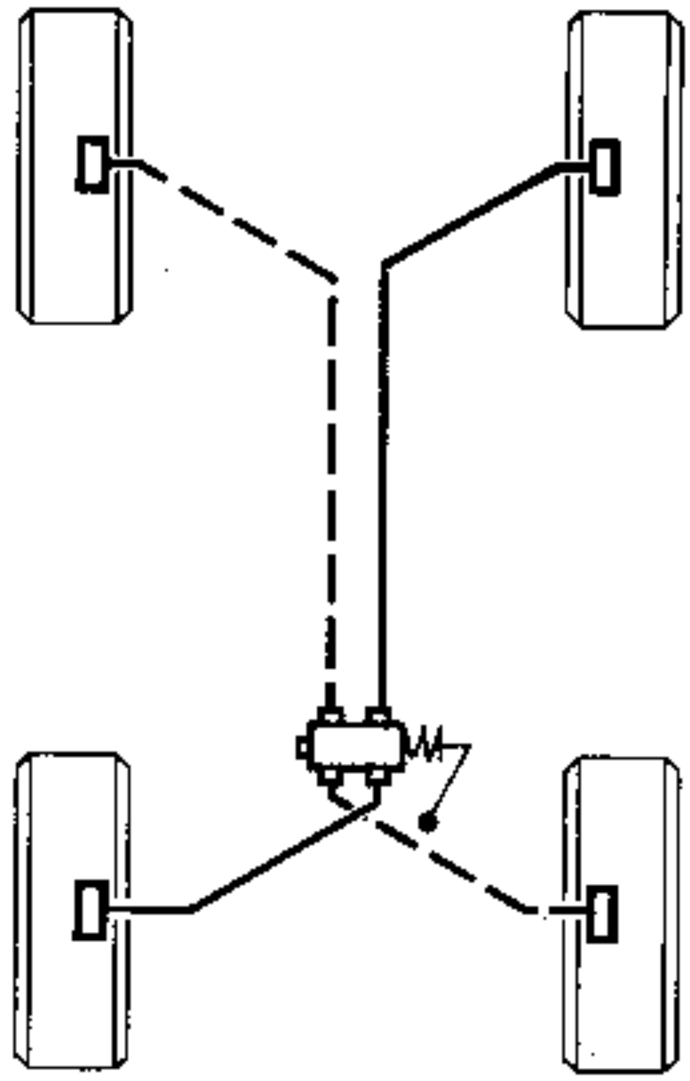
91 563-3

2nd ARRANGEMENT

B400	B404	B40G
C400	C404	C40G
S400	S404	B40H
B401	B407	C40H
C401	C407	B40J
S401	B408	C40J
B402	C408	B40K
C402	B40F	C40K
B403	C40F	B40M
C403	S40F	C40M

"X" TYPE BRAKING SYSTEM

with load controlled compensator



91 563

1st ARRANGEMENT

B403	C405	F400
C403	C409	F401
B404		F402
C404		F404
S404		F407
B408		F40F
C408		F40H
B40F		F40M
C40F		

	B400 C400 S400	B401 C401 S401	B40H C40H	B402 C402 B403 C403 B404 C404 S404 B407 C407 B408 C408 B40F C40F S40F	B40J C40J B40M C40M
FRONT BRAKES (dimensions in mm)					
Diameter of wheel cylinders	45	45	45	48	48
Diameter of discs	238	238	238	238	238
Thickness of discs	8	8	8	12	12
Minimum thickness of discs*	7	7	7	10.5	10.5
Thickness of pads (back plate included)	15	15	15	18	18
Minimum thickness of pads (back plate included)	6	6	6	6	6
Maximum disc run-out	0.07	0.07	0.07	0.07	0.07
REAR BRAKES (dimensions in mm)					
Diameter of wheel cylinders	22 or 20.6 (1)	22 or 20.6 (1)	20.6 (1)	22 or 20.6 (1)	20.6 (1)
Diameter of drums	180.25	180.25	180.25	180.25	180.25
Maximum diameter of drums after re-grinding	181.25	181.25	181.25	181.25	181.25
Diameter of discs	-	-	-	-	-
Thickness of discs	-	-	-	-	-
Minimum thickness of discs*	-	-	-	-	-
Width of linings	40	40	40	40	40
Thickness of linings (shoe included)	6.5	6.5	6.5	6.5	6.5
Minimum thickness of linings (shoe included)	2.5	2.5	2.5	2.5	2.5
MASTER CYLINDER (dimensions in mm)					
Diameter	17.5	19	19	19	19

* The brake discs cannot be re-ground. If they are heavily worn or scored they must be replaced by new ones.

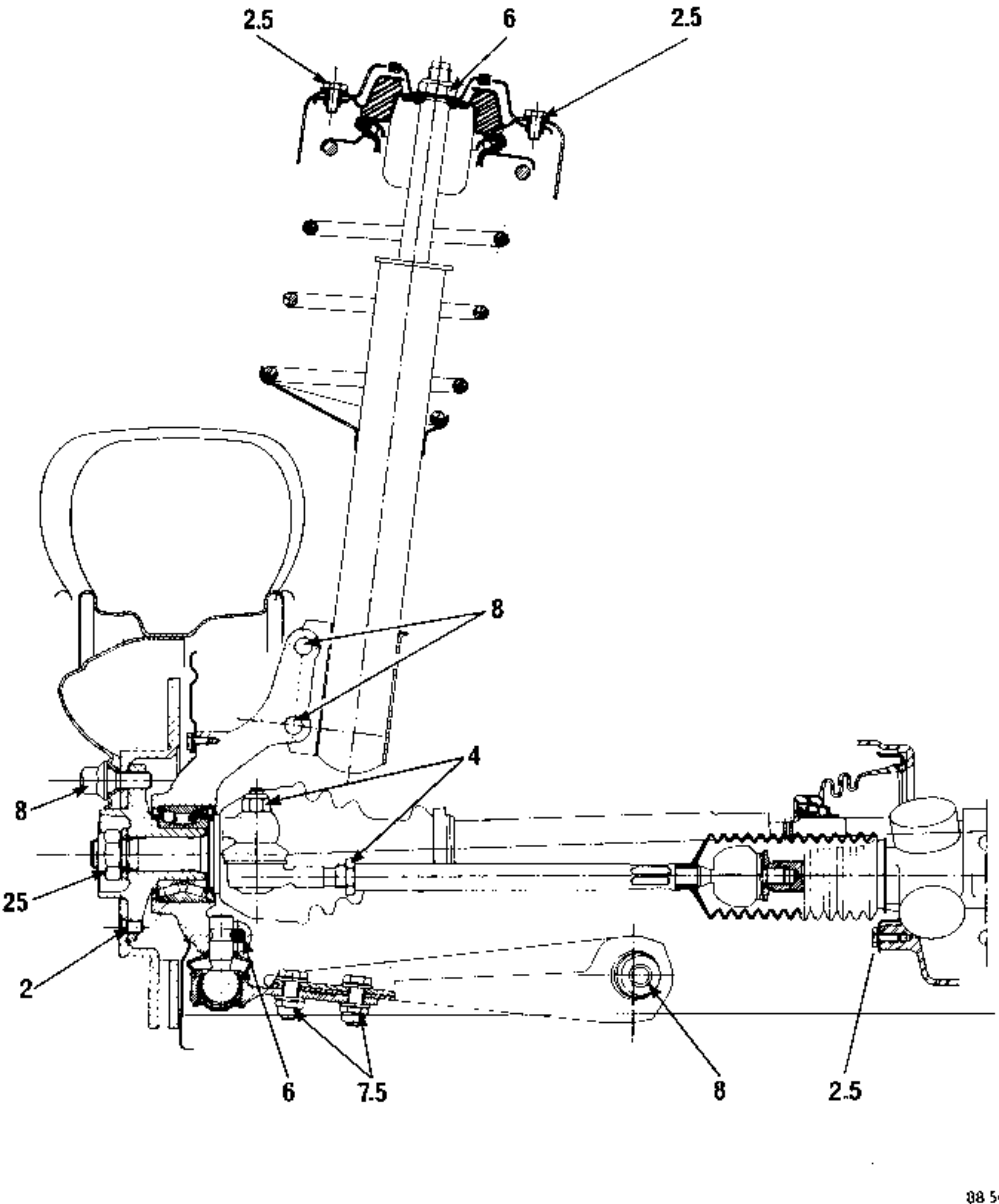
(1) Wheel cylinder with fixed integral compensator. If the wheel cylinder or compensator is defective, the entire unit must be replaced. Attempting to repair the unit is forbidden.

	B40G C40G B40K C40K	C405 C409	F401 => MOD 89 F404 => MOD 86 F40H => MOD 89 F400	F401 MOD 89 => F40H MOD 89 =>	F402 F404 MOD 86 => F407 F40F F40M F401 (DAI)
FRONT BRAKES (dimensions in mm)					
Diameter of wheel cylinders	48	48	45	45	48
Diameter of discs	238	238	238	238	238
Thickness of discs	20	20	8	12	12
Minimum thickness of discs*	18	18	7	10,5	10,5
Thickness of pads (back plate included)	18	18	15	18	18
Minimum thickness of pads (back plate included)	6	6	6	6	6
Maximum disc run-out	0.07	0.07	0.07	0 07	0.07
REAR BRAKES (dimensions in mm)					
Diameter of wheel cylinders	20.6 (1)	30	22	22	22
Diameter of drums	180,25	–	180.25	180.25	203.45
Maximum diameter of drums after re-grinding	181.25	–	181.25	181.25	204.45
Diameter of discs	–	238	–	–	–
Thickness of discs	–	8	–	–	–
Minimum thickness of discs*	–	7	–	–	–
Width of linings	40	–	40	40	38
Thickness of lining or pad (shoe or back plate included) — Trailing	6.5	–	6.5	6.5	5.5
(Disc)	–	11	–	–	–
Leading	6,5	–	6,5	6,5	7
Minimum thickness of lining or pad (shoe or back plate included) — Trailing	2.5	–	2.5	2.5	2.5
(Disc)	–	5	–	–	–
Leading	2.5	–	2.5	2.5	2.5
MASTER CYLINDER (dimensions in mm)					
Diameter	19	19	19 17.5 for F400	19	19

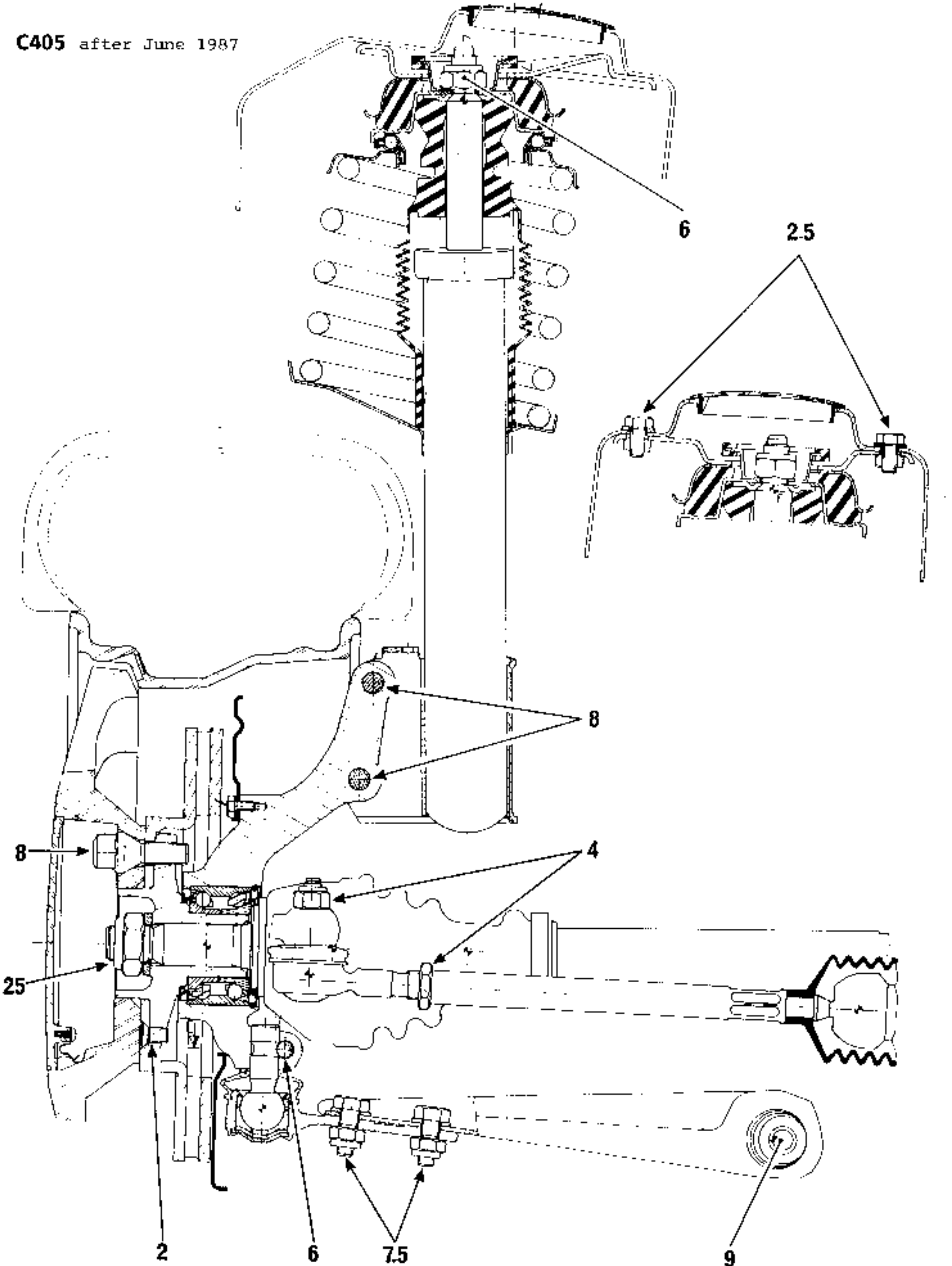
* The brake discs cannot be re-ground. If they are heavily worn or scored they must be replaced by new ones.

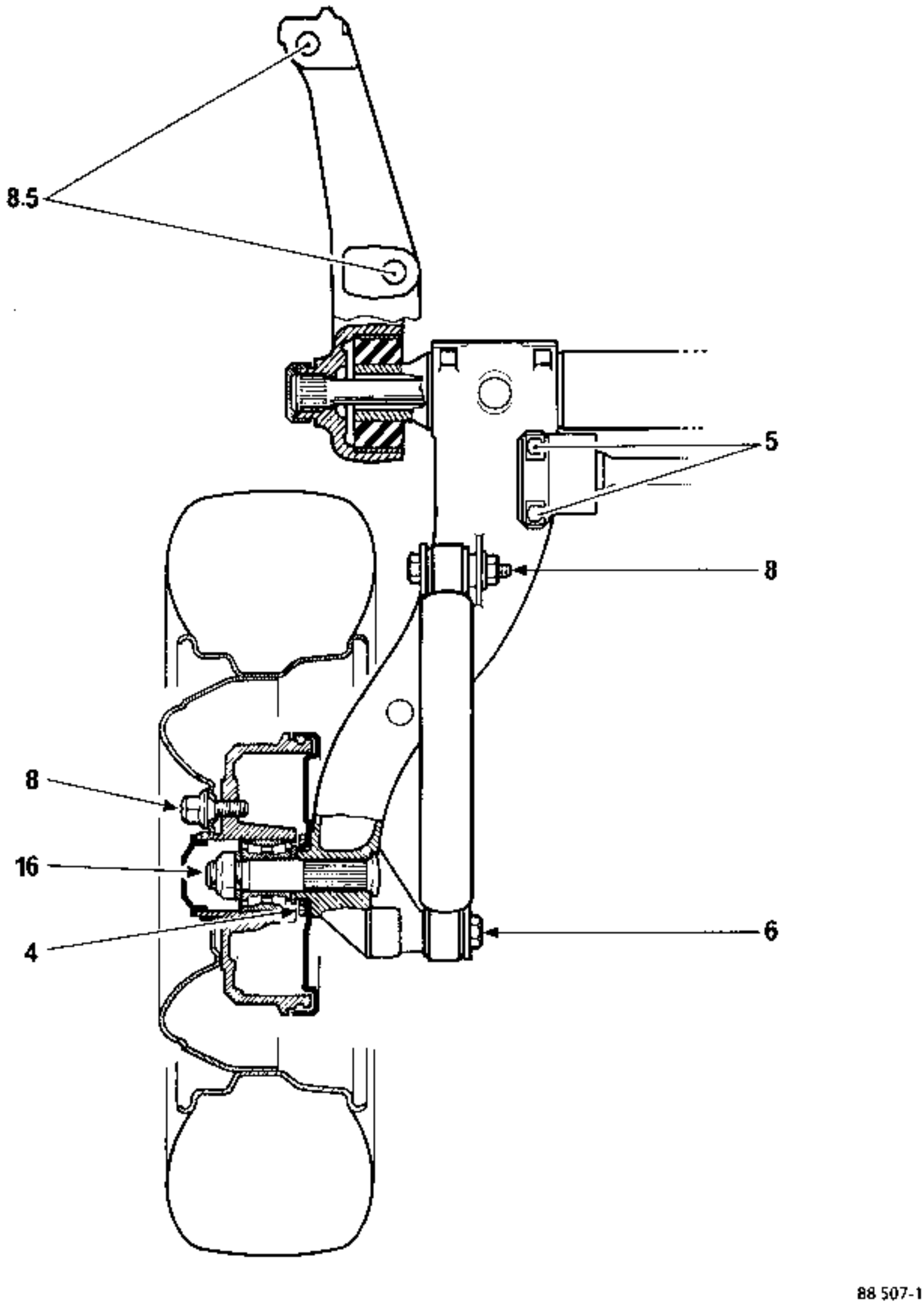
(1) Wheel cylinder with fixed integral compensator. If the wheel cylinder or compensator is defective, the entire unit must be replaced. Attempting to repair the unit is forbidden.

B40X - C40X - F40X - S40X All types
C405 before July 1987



C405 after June 1987




8.5
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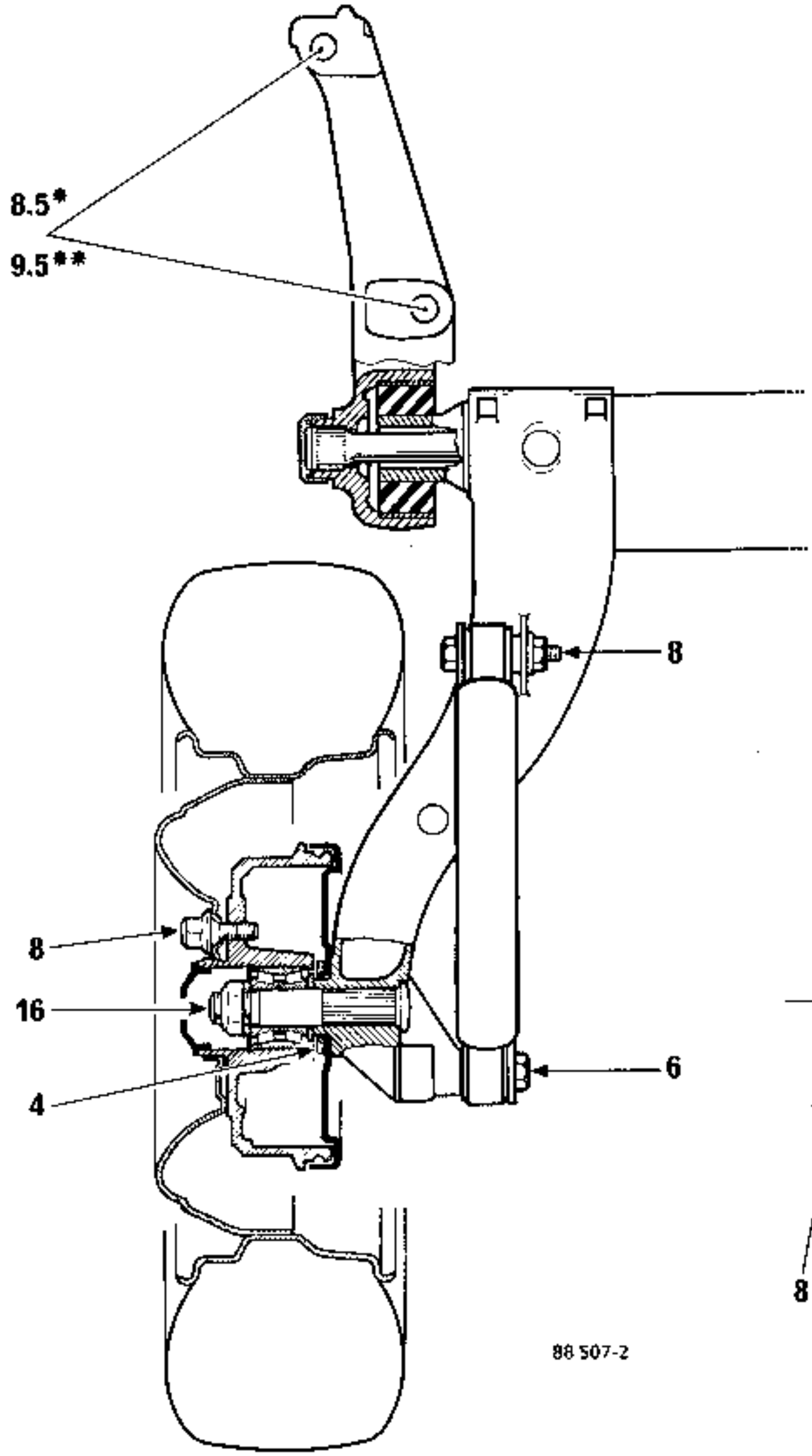
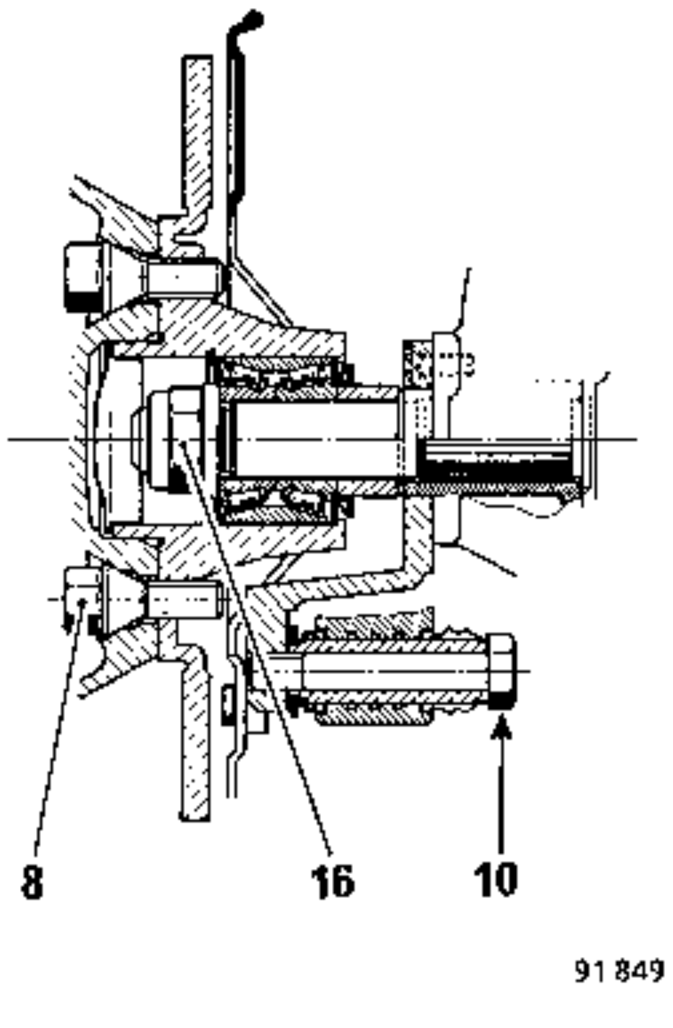
88 507-1



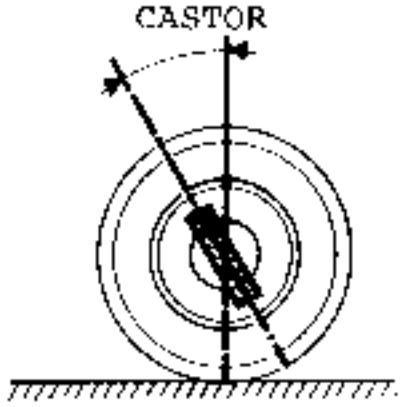
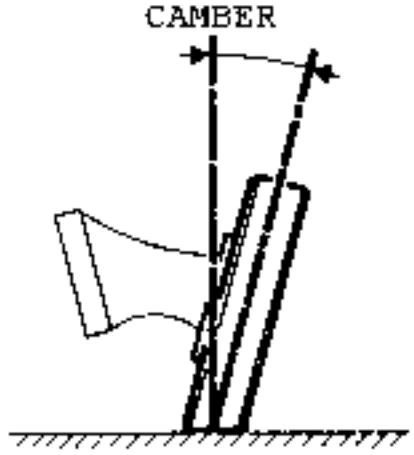
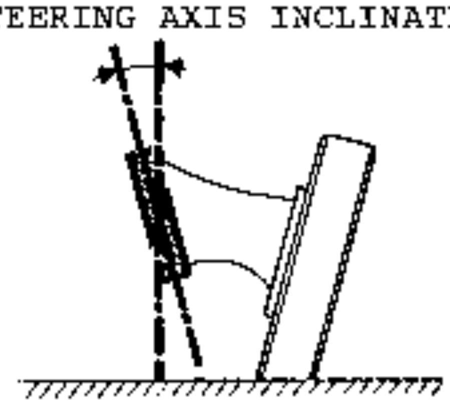
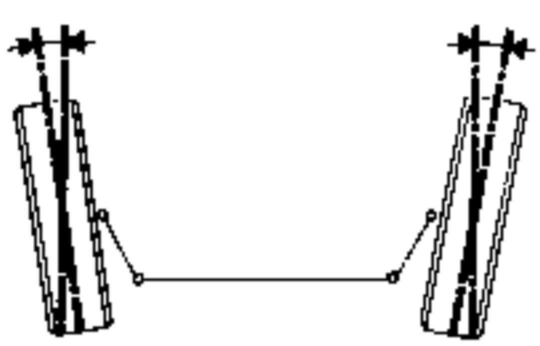
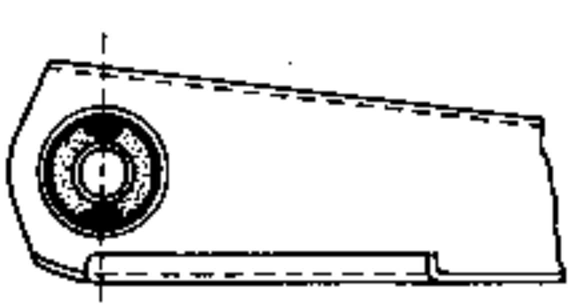


* B40X - C40X

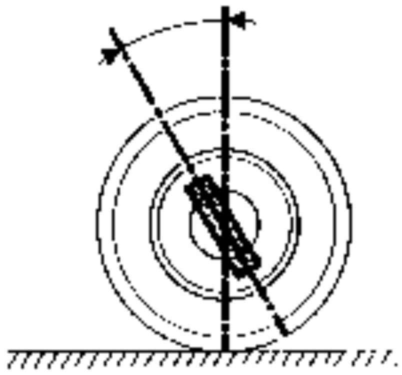
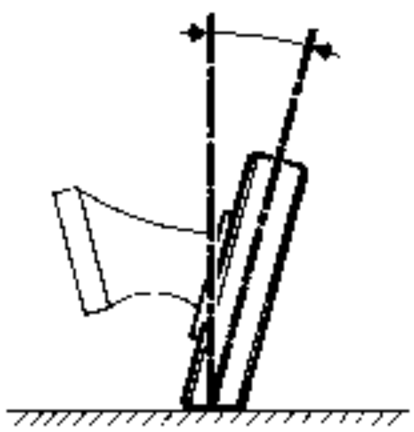
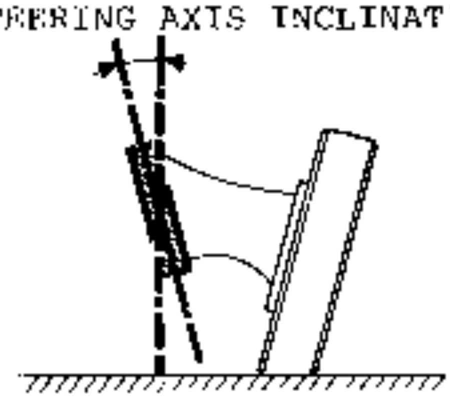
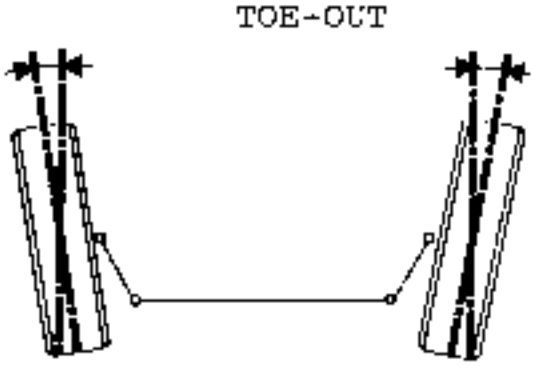
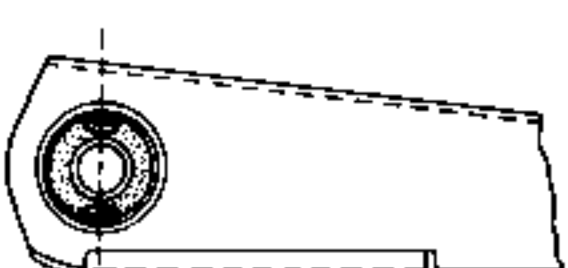
** F40X

	DIMENSIONS	TIGHTENING TORQUES
Bleed screws	–	0,6 – 0.8
Hoses on front wheel cylinders	M 10 x 100	1.3
Hoses on rear suspension arms	M 10 x 100	1.3
Supply to rear wheel cylinders	M 10 x 100 or M12 x 100	1.3
Master cylinder outlets	M 10 x 100 or M12 x 100	1.3
Compensator inlets	M 10 x 100 or M12 x 100	1.3
Compensator outlets	M 10 x 100 or M12 x 100	1.3

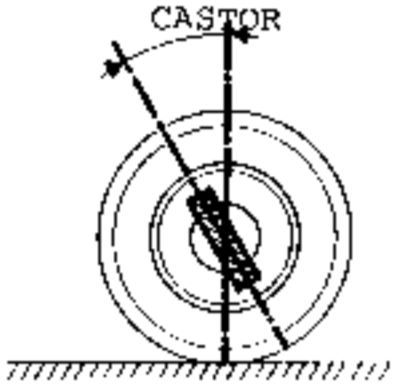
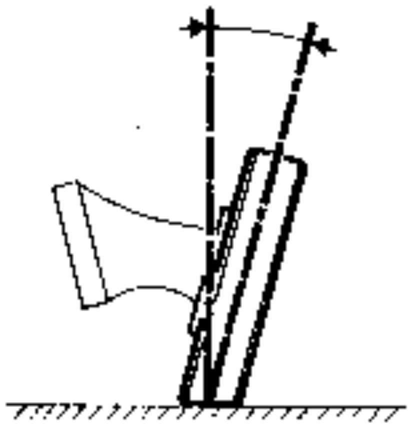
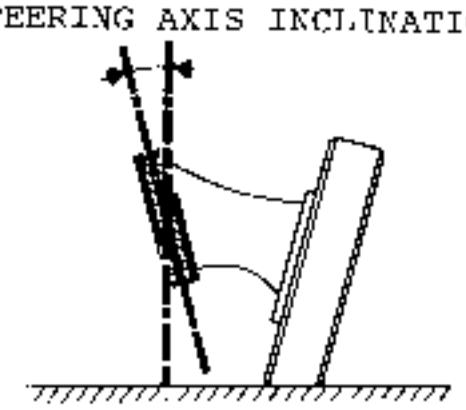
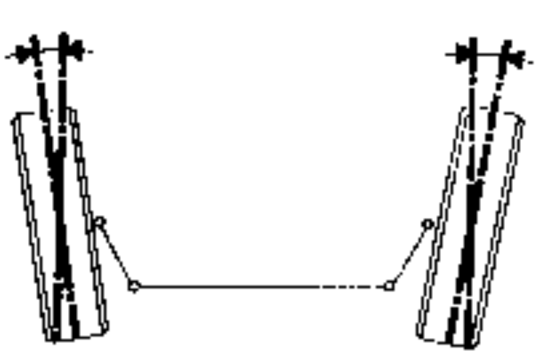
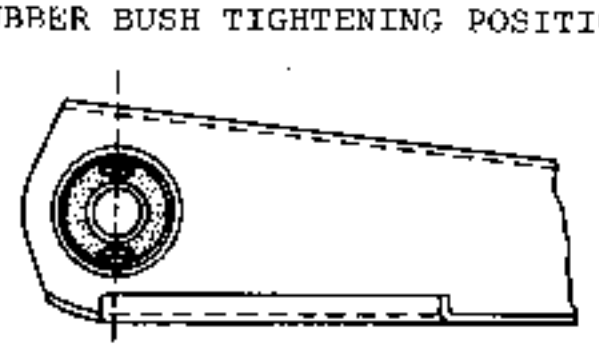
All types B40X - F40X - S40X - C40X except C405 - C409

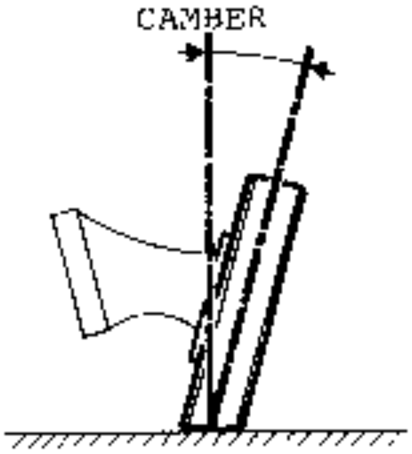
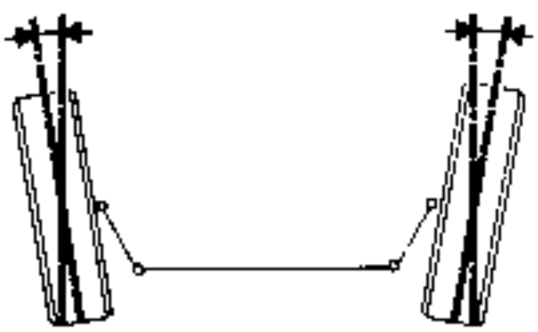
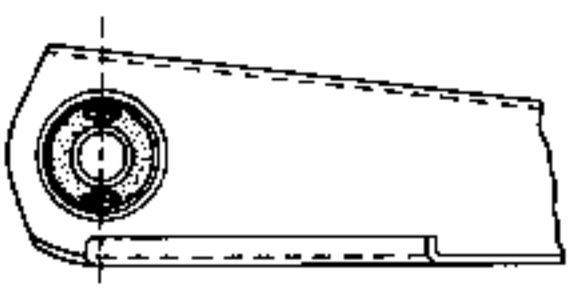
ANGLE	VALUE	POSITION OF FRONT AXLE	ADJUSTMENT
CASTOR 	2°30' 2° 1°30' 1° 0°30' Max. difference RH-LH sides = 1°	H5 - H2 = 40 mm H5 - H2 = 60 mm H5 - H2 = 80 mm H5 - H2 = 100 mm H5 - H2 = 110 mm	NON ADJUSTABLE
CAMBER 	0°50' 0°30' 0°15' } ± 30' 0° - 0°20' Max. difference RH-LH sides = 1°	H1 - H2 = 50 mm H1 - H2 = 60 mm H1 - H2 = 75 mm H1 - H2 = 90 mm H1 - H2 = 110 mm	NON ADJUSTABLE
STEERING AXIS INCLINATION 	11°50' 12°10' 12°40' } ± 30' 13°10' 13°40' Max. difference RH-LH sides = 1°	H1 - H2 = 50 mm H1 - H2 = 60 mm H1 - H2 = 75 mm H1 - H2 = 90 mm H1 - H2 = 110 mm	NON ADJUSTABLE
TOE-OUT  78423	Across both wheels 0°10' ± 10' (1 ± 1 mm)	UNLADEN	Adjustable by turning the steering link sleeves 1 turn = 30' (3 mm)
RUBBER BUSH TIGHTENING POSITION  81 603		UNLADEN	

C405 before July 1987 - C409

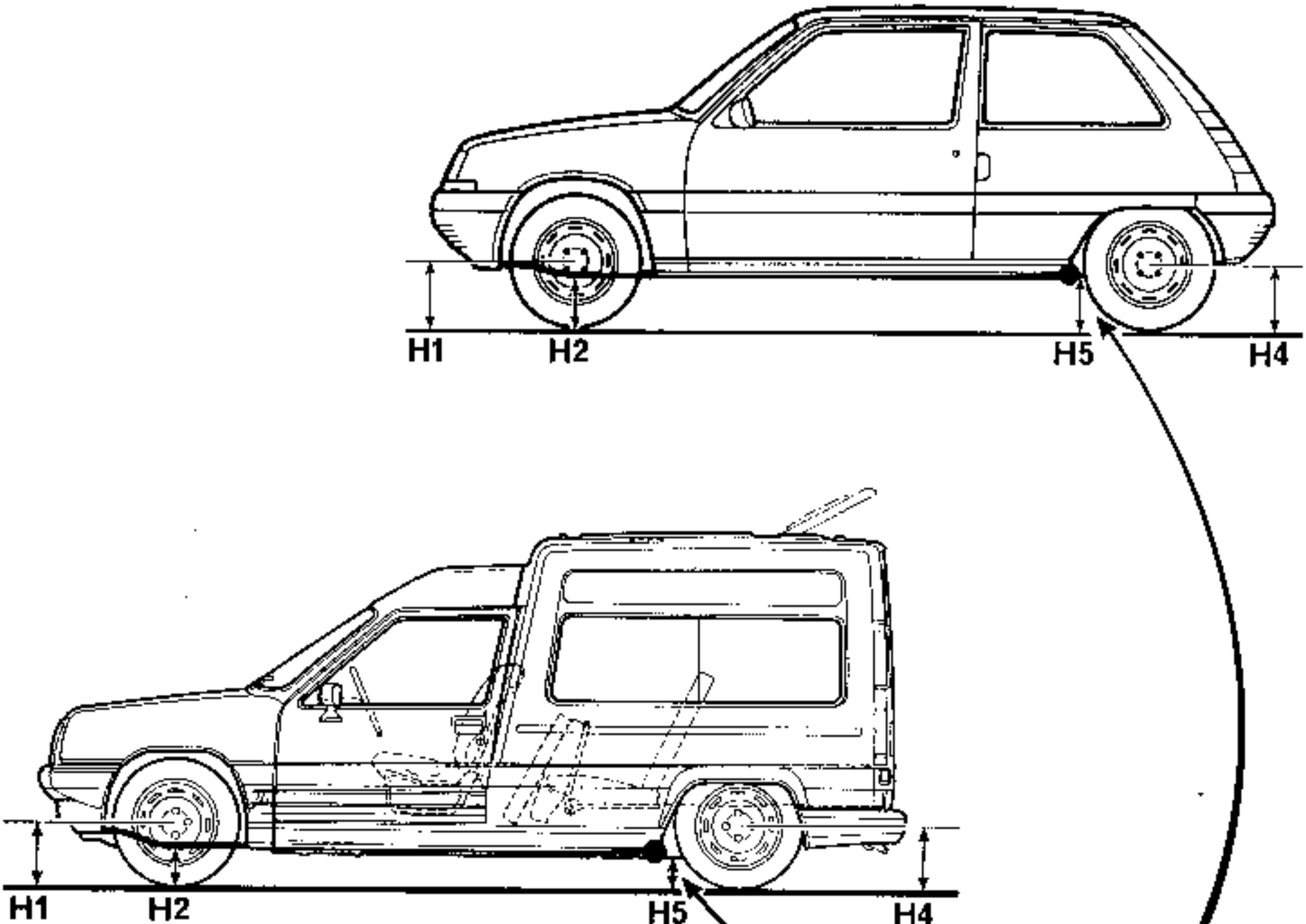
ANGLE	VALUE	POSITION OF FRONT AXLE	ADJUSTMENT
CASTOR 	2°10' 1°40' 1°10' 0°40' 0°10' Max. difference RH-LH sides = 1°	H5 - H2 = 43 mm H5 - H2 = 62 mm H5 - H2 = 81 mm H5 - H2 = 100 mm H5 - H2 = 119 mm	NON ADJUSTABLE
CAMBER 	- 1° ± 30' Max. difference RH-LH sides = 1°	UNLADEN	NON ADJUSTABLE
STEERING AXIS INCLINATION 	13°10' ± 30' Max. difference RH-LH sides = 1°	UNLADEN	NON ADJUSTABLE
TOE-OUT  78423	Across both wheels 0°10' ± 10' (1 ± 1 mm)	UNLADEN	Adjustable by turning the steering link sleeves 1 turn= 30' (3 mm)
RUBBER BUSH TIGHTENING POSITION  81603		UNLADEN	

C405 after June 1987

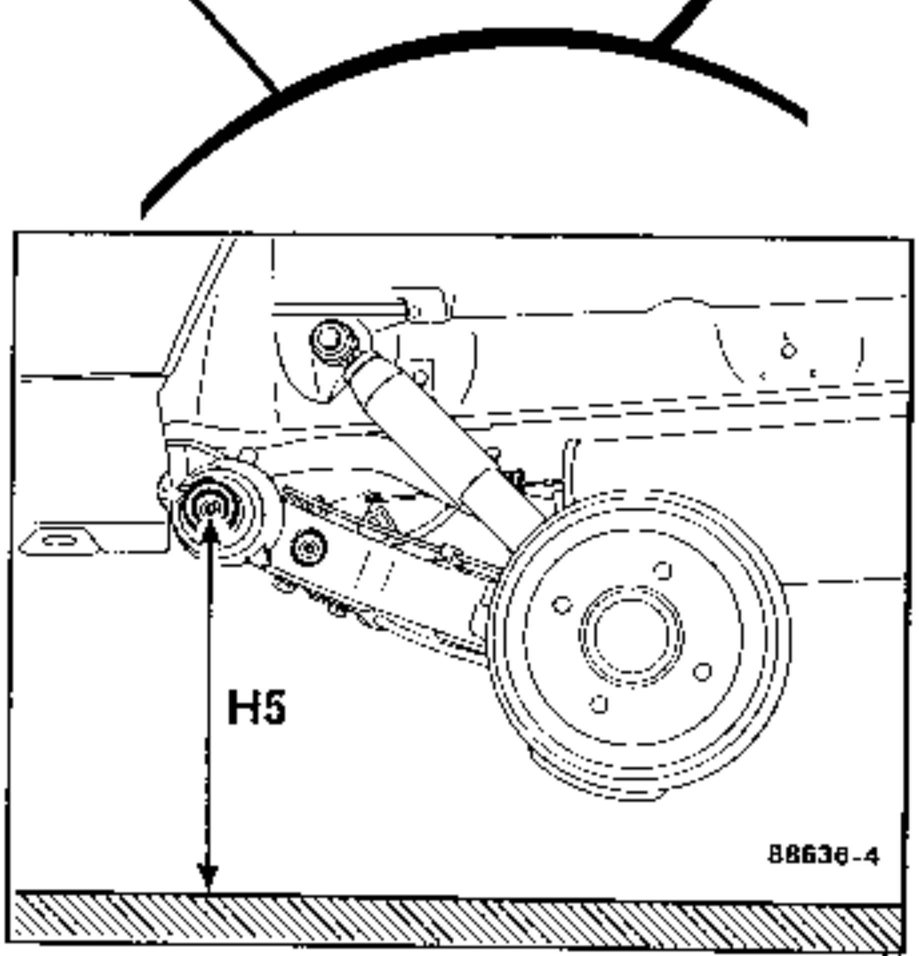
ANGLE	VALUE	POSITION OF FRONT AXLE	ADJUSTMENT
CASTOR 	3° 2°30' 2° 1°30' 1° Max. difference RH-LH sides = 1°	H5 – H2 = 41 mm H5 – H2 = 60 mm H5 – H2 = 79 mm H5 – H2 = 98 mm H5 – H2 = 117 mm	NON ADJUSTABLE
CAMBER 	– 1° ± 30' Max. difference RH-LH sides = 1°	UNLADEN	NON ADJUSTABLE
STEERING AXIS INCLINATION 	10°30' ± 30' Max. difference RH-LH sides = 1°	UNLADEN	NON ADJUSTABLE
TOE-OUT  78423	Across both wheels 0°10' ± 10' (1 ± 1 mm)	UNLADEN	NON ADJUSTABLE
RUBBER BUSH TIGHTENING POSITION  81 603		UNLADEN	

ANGLE	VALUE		POSITION OF REAR AXLE		ADJUSTMENT	
	Tubular rear axle	4 bar rear axle	Tubular r. axle	4 bar r. axle	Tubular r. axle	4 bar r. axle
CAMBER 	−0°50' ± 30' (negative)		UNLADEN		NON ADJUSTABLE	
TOE-IN  78 423	0° to −30' or 0 to −3 mm	−20' to −50' or −2 to −5 mm	UNLADEN		NON ADJUSTABLE	
RUBBER BUSH TIGHTENING POSITION  81 603	–		UNLADEN		–	

R. axle = Rear axle



Dimension H5 is measured to the centre of the suspension bar.

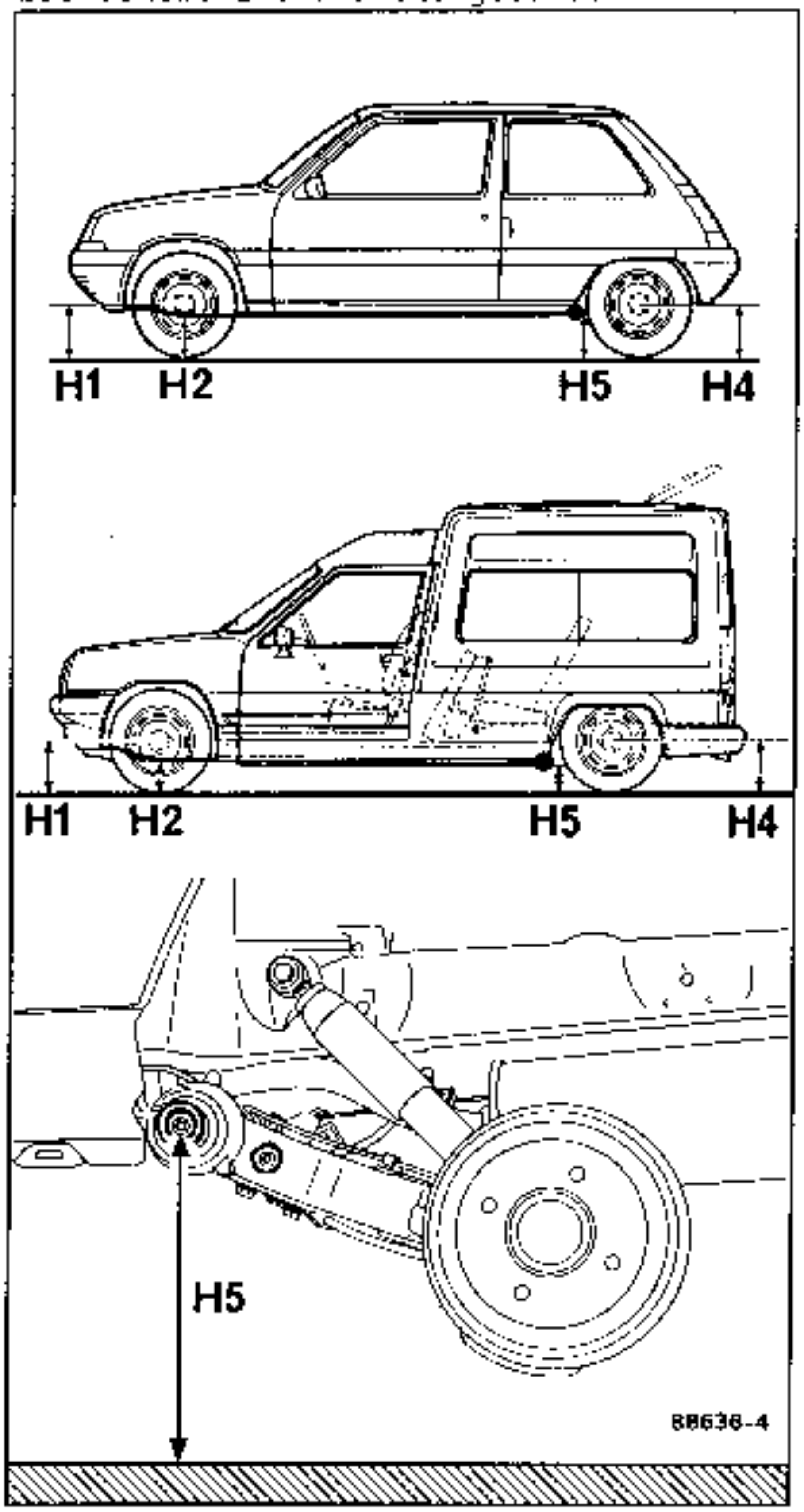


The underbody heights are measured with the vehicle unladen on a flat horizontal surface (preferably a lift) :
- with the fuel tank full,
- after checking the tyre pressures.

H1 and H4 is the dimension between the centres of the wheels and the ground.

H2 is the dimension from the front side member to the ground at the wheel centreline.

H5 is the dimension between the suspension bar centreline and the ground.



Measure dimensions :
H1 and H2 at the front,
H4 and H5 at the rear,
and determine the difference.

GOOD ROAD VERSIONS

B400 - C400 - S400

H1 - H2 = 79^{+10}_{-5} mm

H4 - H5 = -10^{-10}_{+5} mm

B401 - C401 - S401 - B40H - C40H

H1 - H2 = 66^{+10}_{-5} mm

H4 - H5 = -10^{-10}_{+5} mm

B402 - C402 - B403 - C403 - B404 - C404 - S404 - B407 - C407 - B40F - C40F - S40F - B40G - C40G - B40J - C40J - B40K - C40K - B40M - C40M

H1 - H2 = 72^{+10}_{-5} mm

H4 - H5 = -10^{-10}_{+5} mm

B408 - C408

H1 - H2 = 84^{+10}_{-5} mm

H4 - H5 = -10^{-10}_{+5} mm

C405 - C409 → MOD 88

H1 - H2 = 97^{+10}_{-5} mm

H4 - H5 = 20^{+10}_{-5} mm

C405 - C409 MOD 88 →

H1 - H2 = 101^{+10}_{-5} mm

H4 - H5 = 23^{+10}_{-5} mm

F400 - F401 - F402 - F404 - F407 - F40H - F40M

H1 - H2 = 61^{+10}_{-5} mm

H4 - H5 = -40^{-10}_{+5} mm

ROUGH ROAD VERSIONS

B401 - C401 - B402 - C402

H1 - H2 = 51^{+10}_{-5} mm

H4 - H5 = -27^{-10}_{+5} mm

Only the rear underbody height can be adjusted by turning the torsion bars.

After any modification to the underbody height adjust :
- the brake compensator (on certain versions),
- the headlight adjustment.

Consumables

TYPE	QUANTITY	UNIT
Elf-Multi	5 g Coating	Seal lips Threads on wheel bolts
Hatmo	Coating	Lower suspension arm bearings Steering column splines and bushes
Molykote BR2	24 cm^3 Coating	Steering box Drive shaft splines at gearbox end Torsion bar splines
MOBIL CVJ 825 Black Star or MOBIL EXF 57C	140 g 160 g 295 g 180 g	Drive shaft joint at GB end (GI 62) Drive shaft joint at GB end (RC 490) Drive shaft joint at wheel end (GE 68) Drive shaft joint at wheel end (GE 76)
CAF 4/60 THIXO	1 -2 drops	Pin holes in drive shafts
Molykote 33 Médium	Coating	Anti-roll bar bearings Plastic bushes on the early type rear suspension arms
Loctite FRENBLOC	1 -2 drops	Thread on axial ball joint
Loctite SCELBLOC	5 -6 drops	Drive shaft stub axle
Self-vulcanising plugs in kit combi A	77 01 417 243	The repair of tubeless tyres
Huile SAE W80	Coating	Rear wheel stub axle

- Axial ball joint locking plates.
- Wheel balancing weight retainers.
- Hub bearings.
- Drive shaft bellows - bearing.
- Girling brake caliper guide screws.
- Rear bearing clips.
- Stub axle locking nuts.

Brake fluid

BRAKE FLUID CHANGE PERIODS

Current brake fluids suffer from a slight deterioration during the first months of operation because of a slight water take-up. From then on, the water content stabilises.

As this slight deterioration occurs at the beginning of the operating life, braking systems are designed according to the characteristics of used brake fluid so that THE BRAKE FLUID NO LONGER REQUIRES TO BE SYSTEMATICALLY PERIODICALLY REPLACED.

Furthermore, the design technology used for our braking systems, in particular our disc braking systems (hollow pistons that transmit very little heat, very small quantity of fluid in the cylinder, sliding calipers that make it unnecessary to maintain a reserve of fluid in the least well cooled part of the wheel) has permitted us to reduce, to a minimum, risks of vapour lock, even when the brakes are being very intensively used (in mountainous areas).

Consequently, as the characteristics of brake fluids change very little after the first few months of operation, it is, as we have said, no longer necessary to systematically change the brake fluid. However, all the brake fluid must be changed each time any extensive work is carried out on the braking system such as replacing a caliper or a wheel cylinder and, obviously, any time the system is fully overhauled.

Topping-up the level :

Wear on the brake pads and linings causes a progressive fall in the level of the fluid in its reservoir. It is not necessary to top-up this fall in that the correct level will be re-established when the pads or linings are replaced. Obviously, however, the level must not be allowed to fall below the minimum mark.

Officially approved brake fluids :

Mixing, in the same braking system, two incompatible brake fluids, could cause a high risk of leakage as a result, mainly, of the deterioration of the cup washers. To avoid such risks, it is imperative to use only brake fluids that have been checked and officially approved by our laboratries & which are in line with the requirements of SAE Standard J 1703 and DOT 3 or DOT 4.

Front anti-roll bar specifications

VEHICLE TYPE	B400, C400, S400 (Equip. vers. 161) B401, C401, S401, B402, C402, B403, C403 B404, C404, S404, B407, C407, B408, C408, B40F, C40F, S40F B40H, C40H, B40J, C40J, B40M, C40M F400, F401, F402, F404, F407, F40H, F40M	B40G, C40G, B40K, C40K, C405, C409
DIAMETER	22	21

Rear anti-roll bar specifications

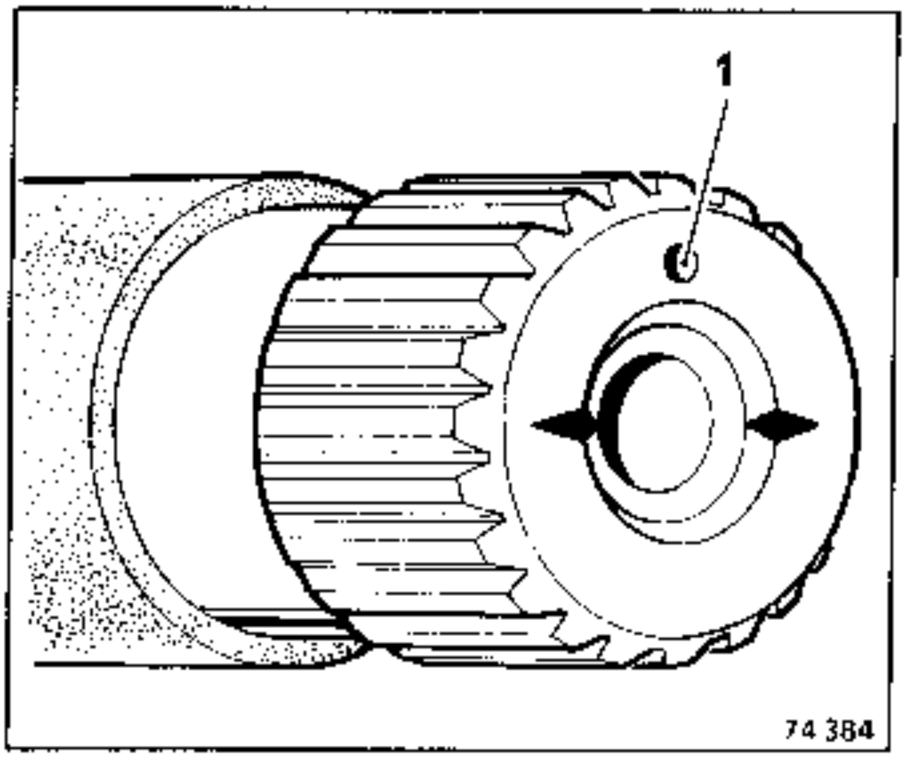
	TUBULAR TYPE REAR AXLE			4 BAR TYPE REAR AXLE
VEHICLE TYPE	B400, C400, S400 (Except equip. vers. 161)	B400, C400, S400 (Equip. vers. 161) B401, C401, B402, C402 (Except rough road vers.) S401, B403, C403, B404, C404, S404, B407, C407, B40F, C40F, S40F B40H, C40H, B40J, C40J, B40M, C40M	B408, C408, B40G, C40G, B40K, C40K	B401, C401, B402, C402 (rough road vers.) C405, C409 F400, F401, F402, F404, F407, F40H, F40M
DIAMETER	13.5 mm	15,5 mm	17 mm	23.4 mm
NUMBER OF SPLINES AT WHEEL ENDS	-	-	-	31
NUMBER OF SPLINES AT SHACKLE ENDS	-	-	-	30

	TUBULAR TYPE REAR AXLE		4 BAR TYPE REAR AXLE	
VEHICLE TYPE	B400 C400 S400 B401, C401, B402, C402 (except rough road vers.) S401 B403 C403 B404 C404 S404 B407 C407 B40F C40F S40F B40H C40H B40J C40J B40M C40M	B408 C408 B40G C40G B40K C40K	B401, C401, B402, C402 (rough road vers.) C405 C409	F400 F401 F402 F404 F407 F40H F40M
DIAMETER	18 mm	18.5 mm	20.8 mm	23.2 mm
NUMBER OF SPLINES AT BEARING ENDS	27	27	27	27
NUMBER OF SPLINES AT SHACKLE OR SUSPENSION ARM ENDS	26	26	26	26

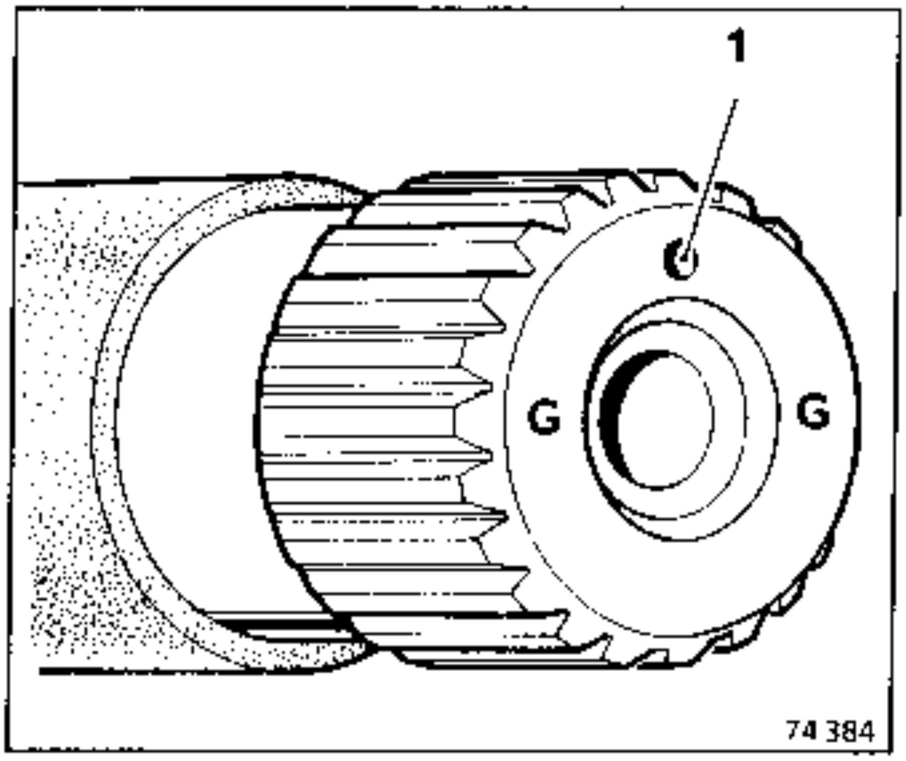
As the direction of the torsion in these bars is reversed, the right hand and left hand bars are identified by :

- imprints made in their ends
  or
- letters stamped on their ends

LEFT HAND BAR

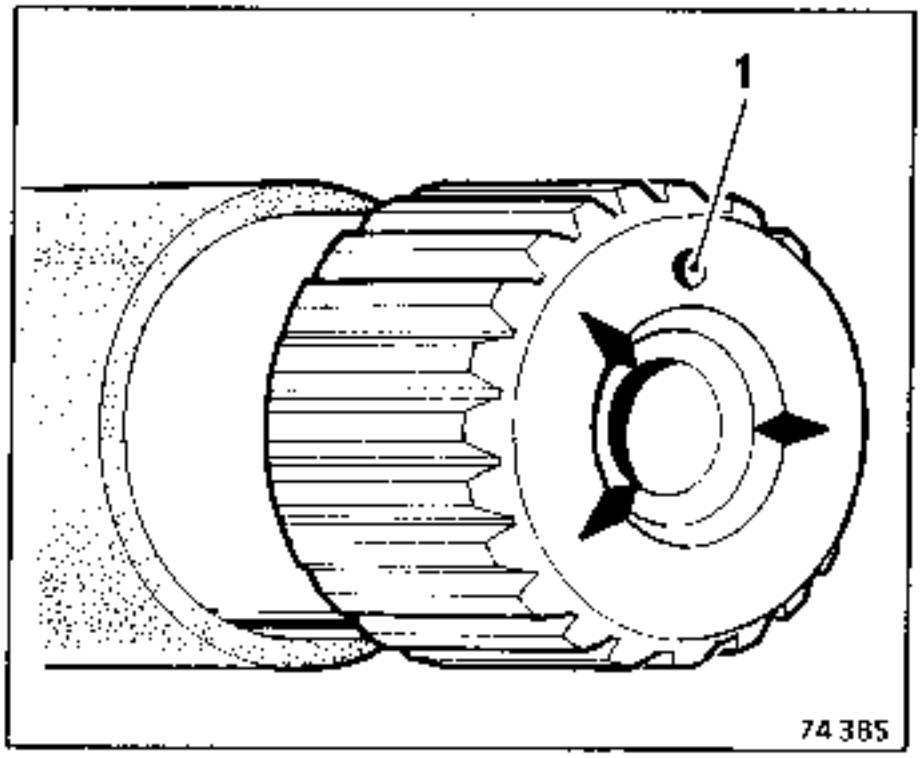


2 imprints

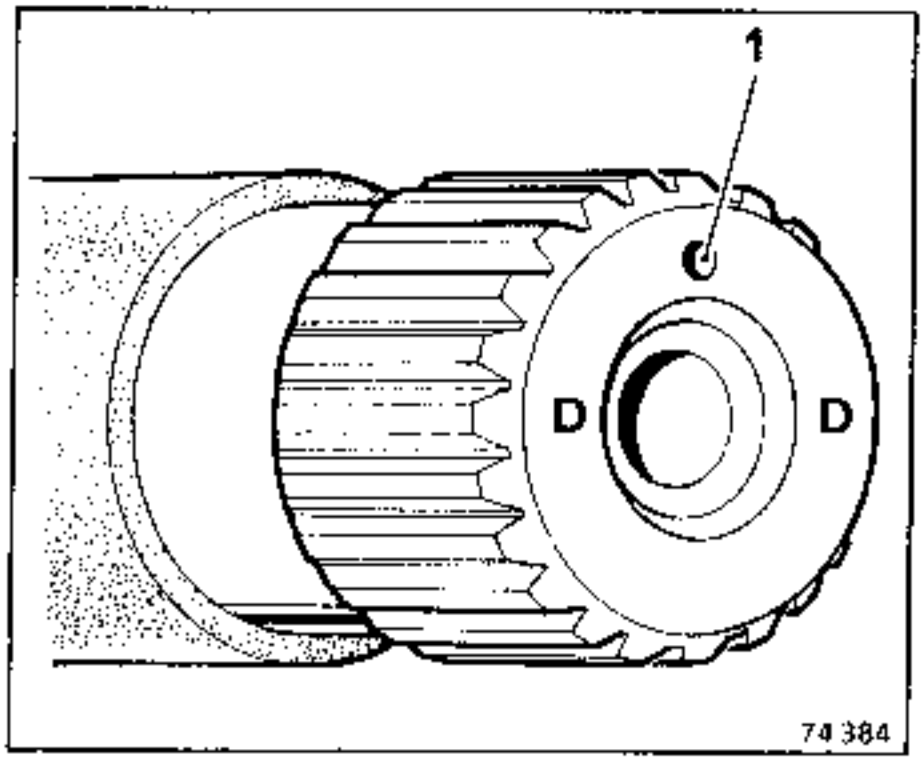


Letter G

RIGHT HAND BAR



3 imprints



Letter D

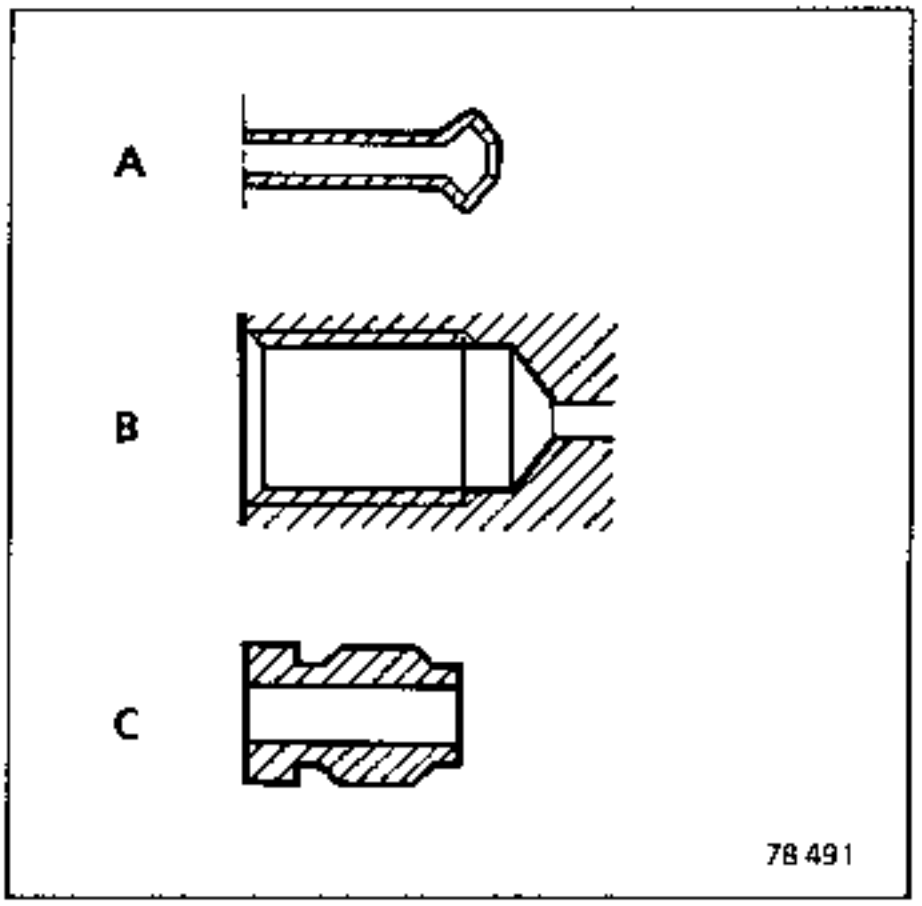
NOTE : certain bars carry a reference mark "1" (drill mark) that is used to position the bar in its bearings.

The unions on the pipes between the master cylinder, the front calipers, the pressure limiter and the rear wheel cylinders have METRIC THREADS.

Consequently, it is important only to use the Replacement Parts that appear in the Parts catalogue for this vehicle.

Parts identification :

- The SHAPE of the end of the PIPE whether steel or copper (A),
- The SHAPE of the TAPPING in the wheel cylinder (B),
- Pipe uNIONS coloured GREEN or BLACK : with external hexagons of 11 mm or 12 mm (C).



The effect of the angles

The effect of the various geometry angles on vehicle road holding and tyre wear.

CAMBER

It is the comparison between the left hand and right hand angles that is important. A difference of more than one degree between the two sides causes the vehicle to pull to one side and the necessary correction at the steering wheel causes abnormal tyre wear.

CASTOR

It is the comparison between the left hand and right hand angles that is important. A difference of more than one degree causes the vehicle ot pull to one side and correcting this pull, at the steering wheel, causes excessive tyre wear.

This defect is characterised by the vehicle pulling towards the side on which the angle is smallest, at constant speed.

STEERING BOX HEIGHT

This adjustment effects the variation in the toe-in or toe-out during movement of the suspension.

Variations in the toe-in/out that are different on the right and left hand sides cause (without any change in the position of the steering wheel) :
- pulling to one side during acceleration,
- pulling to the other side during overrun,
- changes in the steering position on bumpy roads.

TOE-IN/OUT

It essential for the steering to be centralised before this adjustment is carried out in order to avoid an influence on the vehicle road holding.

It is to be noted :
- that too much toe-out causes symmetrical wear on the inside edges of both tyres,
- that excessive toe-in causes symmetrical wear on the outside edges of both tyres.

PRELIMINARY CHECKS

Before checking the axle geometry one must check the following points and remedy any defects :

- That the tyres on any given axle are the same from the point of view of :
  . dimensions,
  . pressures,
  . states of wear.
- The hinge points :
  . the condition of the rubber bushes,
  . the play in the ball joints,
  . the play in the bearings.
- The wheel run-out : this is not to exceed 1.2 mm (it will be compensated for by the goemetry checking equipment).
- That the underbody heights are the same (condition of the suspension).

DETERMINING THE STEERING CENTRE POINT

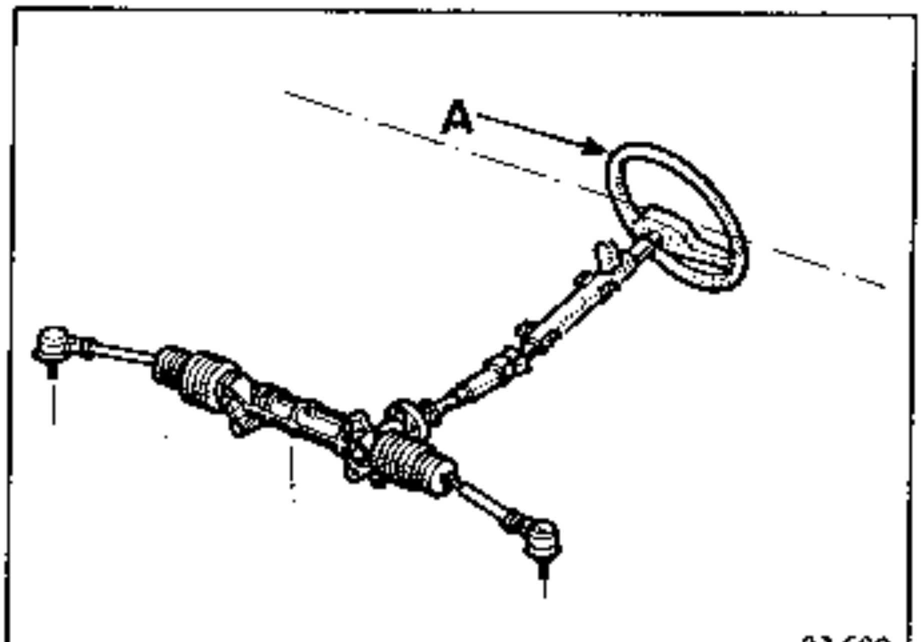
The steering must be centralised before checking and adjusting the front axle geometry to avoid the vehicle pulling to one side.

Turn the steering through full lock in one direction.

Make a mark (A) at the top of the steering wheel rim.

Turn the steering through full lock in the other direction whilst counting the number of turns and fractions of a turn.

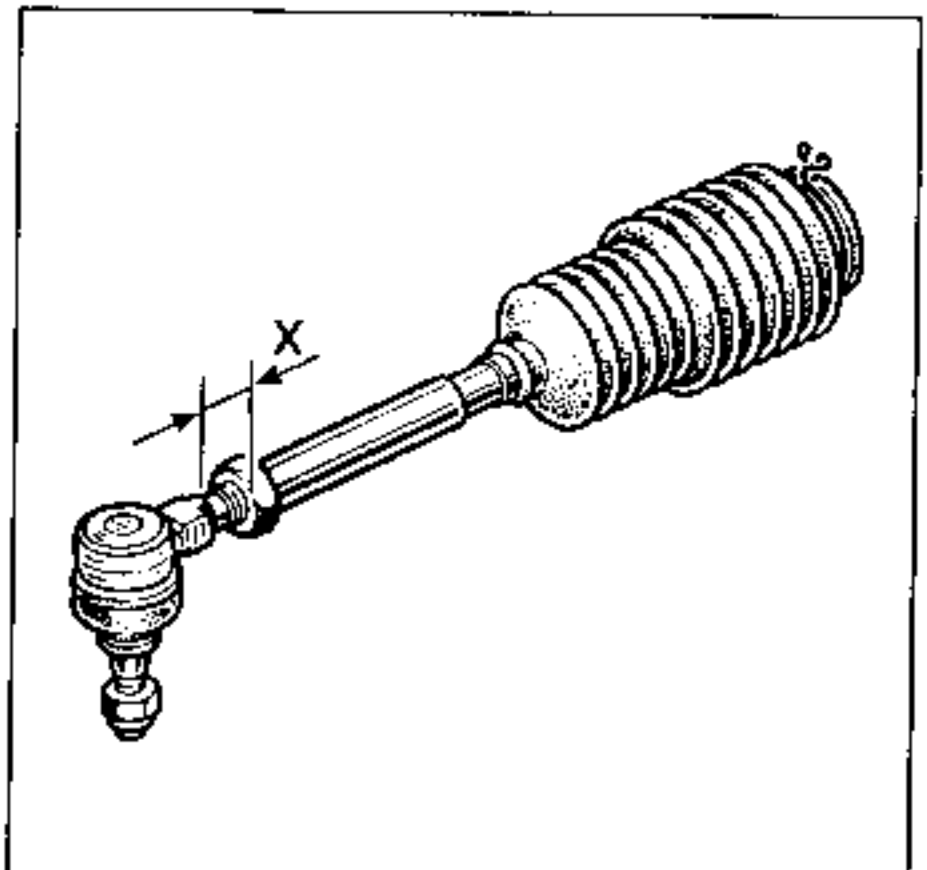
Return to half the number of turns and fractions of a turn noted. The steering will then be in the "centre point".



82 699

In this position, fit the geometry checking equipment and carry out the check.

When adjusting the toe-in/toe-out ensure that the lengths X on the steering link ball joint shanks are the same.



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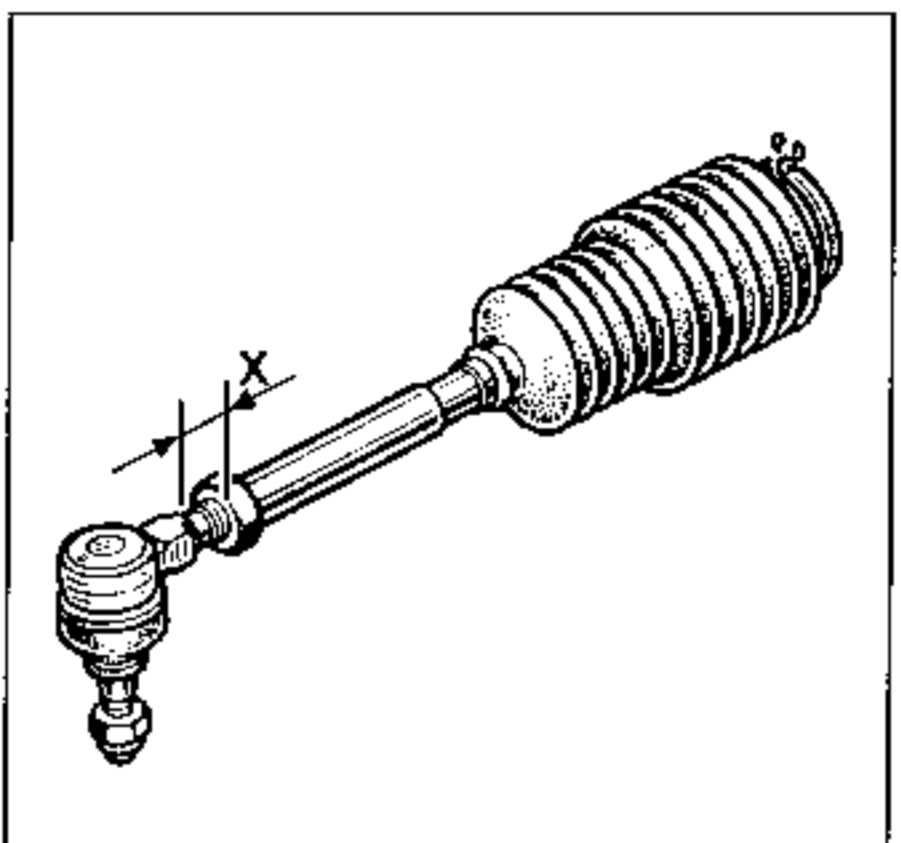
CHRONOLOGICAL ORDER IN WHICH THE OPERATIONS ARE TO BE CARRIED OUT

Because of the nature of the front axle geometry, altering one of the angles (castor, camber, king pin inclination, toe-in/out and variation) effects the other angles to a greater or lesser extent. (It is the castor angle that has most effect).

It is therefore essential to work in the following order :

- mount the equipment on the vehicle following the manufacturer's instructions,
- determine the steering centre point (see preceeding paragraph) and lock the steering wheel,
- lift the vehicle, taking the load under the body,
- eliminate the wheel run-out,
- lower the vehicle on to the swing plates,
- fit the brake pedal depresser,
- bounce the suspension to return the vehicle to the correct suspension height,
- check that the dimensions X on the steering ball joint shanks are the same,



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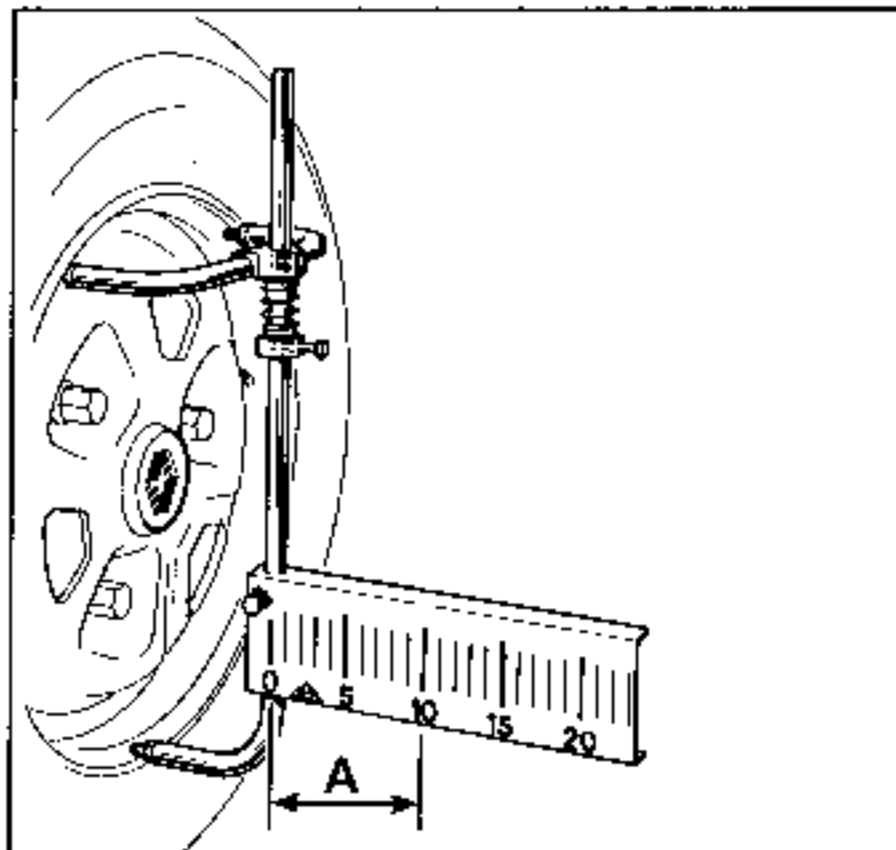
- take the readings A on the scales.



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(1) If dimensions X are the same :

- dimension A should be equally distributed.

(2) If dimensions X are not the same :

- note down dimensions A on the right hand and left hand sides, subtract them and distribute half the result on each side.

Example :
Reading on right hand side : 16
Reading on left hand side : 10
16 - 10 = 6
6 : 2 = 3

Adjust the steering links to even out the dimensions A on both sides :
A = 13

- in this position, zero the swing plates,
- check, in the following order :
  . the castor,
  . the steering axis inclination,
  . the camber,
  . the toe-in/out

ADJUSTING THE TOE-IN/OUT

One of several cases may arise :

	Toe-in/Toe-out	Distribution	Correction required
1	Correct	Incorrect	Turn the adjusting sleeves (or end fittings) by the same number of turns in opposite directions on the left and right hand sides to obtain the same dimension A on both sides.
2	Incorrect	Correct	Adjust the toe-in/out by the same amount on the right and left hand sides whilst ensuring that dimensions A remain exactly the same on both sides.
3	Incorrect	Incorrect	Carry out an initial evening-out of dimensions A on both sides then adjust the toe-in/out as described in case no. (2).

Front axle Fault Finding

DEFECT	POSSIBLE CAUSE
Incorrect castor	- Suspension arm bent - Side member bent
Camber + steering axis inclination correct but camber incorrect Steering axis inclination incorrect	- Suspension arm bent - Side member bent
Camber correct but Steering axis inclination incorrect	- Stub axle carrier bent
Steering axis inclination correct but Camber incorrect	- Stub axle carrier bent
Incorrect variation of toe-in/out	- See castor: Suspension arm bent Side member bent
Toe-in/out incorrect by more than 6 mm	- RH or LH stub axle carrier bent

This fault finding sequence covers all the types of circuit and braking system component used on our current range of vehicles.

Notice is only to be taken of the information relating to the system and components used on the vehicle dealt with in this Workshop Manual.

To facilitate finding the cause of the trouble, the fault finding sequence is broken down into two distinct sections.

I The effect felt at the pedal
II The effect on the vehicle behaviour

I THE EFFECT FELT AT THE PEDAL

DEFECT	POSSIBLE CAUSE
Stiff pedal : Excessive effort required to obtain a low rate of deceleration	- Defect in servo system - Pads or linings : - greasy, - glazed or of the incorrect type, - overheating caused by prolonged braking with the pedal constantly depressed (coming down inclines) or linings of the wrong type. - Piston seized, - Pipe kinked or flattened, - Pads or linings worn : friction lining almost worn away. Commencement of metal to metal contact (loud noise).
Spongy pedal Note : because the servo assistance on current vehicles is high, one often has the impression that the pedal is spongy. To determine whether the system is actually defective, two tests are to be carried out 1. With the vehicle moving Carry out a subjective test as to whether the deceleration is what would be expected for a given pedal travel. 2. Vehicle stationary with the engine stopped Carry out a further check on the pedal travel : depress the pedal 5 times to empty the brake servo before taking the results of the test as valid.	- Air in the braking system : poorly bled. - Internal leakage in the braking system. - Insufficient fluid in the reservoir (external leakage from the braking system).

Pedal travel excessive Test to be carried out with the vehicle stationary and the engine stopped. Note : the brake pedal must be depressed 5 times to empty the brake servo before the results of the test can be considered as valid.	- Brake shoes incorrectly adjusted - Drum brakes - Manual adjustment : the shoes are too far away from the drum. Disc and drum brakes - Automatic adjustment : too much tension in the hand brake cable. Note : the brake lining wear is automatically taken up when the pedal is depressed unless there is too much tension in the hand brake cable when the brake is released. - Excessive and non-symmetrical wear on the linings and pads (wedge shaped or hollow). - Excessive master cylinder clearance. - Fluid boiling or which has overheated.
Pedal right down to the floor Test to be carried out with the vehicle stationary and the engine stopped. Note : the brake pedal must be depressed 5 times to empty the brake servo before the results of the test can be considered as valid.	- Hydraulic leakage (check the system for leaks). - Defect in the cup that seals between the two master cylinder circuits. - Fluid boiling.

II EFFECT ON VEHICLE BEHAVIOUR

DEFECT	POSSIBLE CAUSE
Brakes "self-applying"	- No lead on brake linings - Linings slightly greasy - Springs require changing
Brake judder	- Drum oval - Too much run-out in the discs - Discs of uneven thickness - Abnormal deposits on the discs (corrosion between pad and disc).

Pulling to one side when brakes are applied (front)	- Check front suspension and steering. - Piston seized*. - Tyres (wear - inflation pressures). - Pipe kinked or crushed*. *WARNING : on vehicles with negative off-set on the front axle, pulling to one side is the result of a braking defect on the opposite side.
Vehicle pulling to one side on braking (rear)	- Brake compensator or pressure limiting valve defective (adjustment - operation). - Piston seized. - Shoes incorrectly adjusted. manual adjustment : shoes too far from drums. Automatic adjustment : hand brake cable too tight. NOTE : The wear is automatically taken up when the pedal is depressed unless there is too much tension in the hand brake cable when the brake is released. - Return springs.
Brakes overheating	- Insufficient master cylinder clearance preventing the master cylinder returning to the released position. - Piston seized or not returning correctly. - Pipe kinked or crushed. - Hand brake control seizing. - Hand brake control incorrectly adjusted.

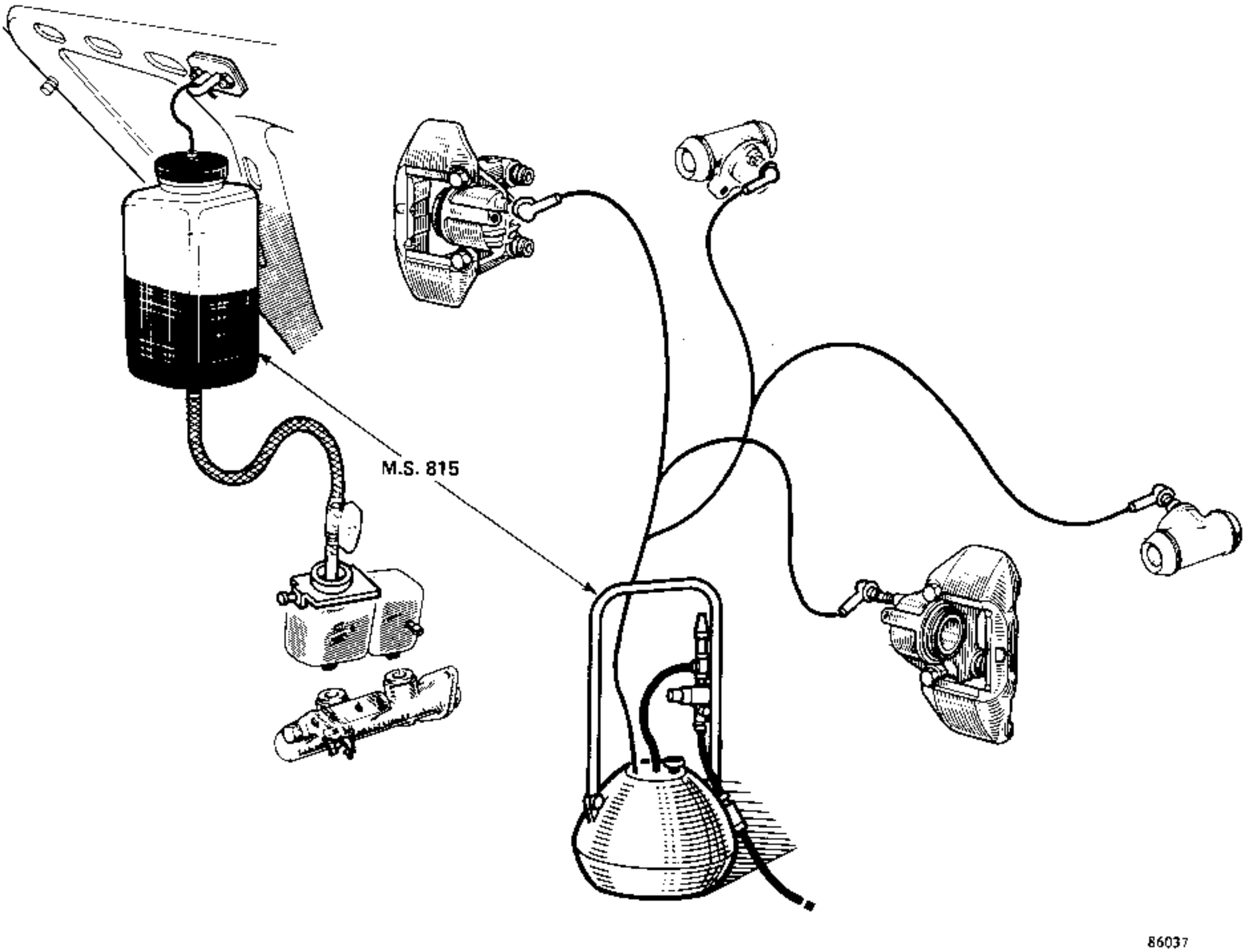
ESSENTIAL SPECIAL TOOLS	
M.S. 815	Brake bleeding equipment

When bleeding the systems of vehicles equipped with servo brakes, no matter what the method used, it is important for the brake servo to be out of action during the brake bleeding operation.

- The brakes are bled using equipment M.S. 815, on a four column lift with the vehicle resting on its wheels.
- Connect the pipes of the M.S. 815 equipment to the bleed screws on the :
  - master cylinder
  - wheel cylinder
  - compensator or pressure limiting valve.
- Connect the equipment to a compressed air source (min. pressure 5 bars).
- Connect the filling system to the brake fluid reservoir.
- Open the fluid supply and wait for the reservoir to fill (both sections).
- Open the compressed air valve.

For vehicles equipped with "X" (crossed) type braking systems, proceed as follows :

- Open :
  - the bleed screw on the rear right hand wheel and leave the fluid running for approximately 20 seconds,
  - the bleed screw on the front left hand wheel and leave the fluid running for approximately 20 seconds.
- Take no notice of any air bubbles in the pipes on the bleed equipment.
- Carry out the same operations on the rear left hand wheel and the front right hand wheel.
- Check that the brake pedal is firm, when pressed (press it several times).
- Re-bleed the system if necessary.
- Top-up the level in the brake fluid reservoir after disconnecting the bleed equipment.


M.S. 815
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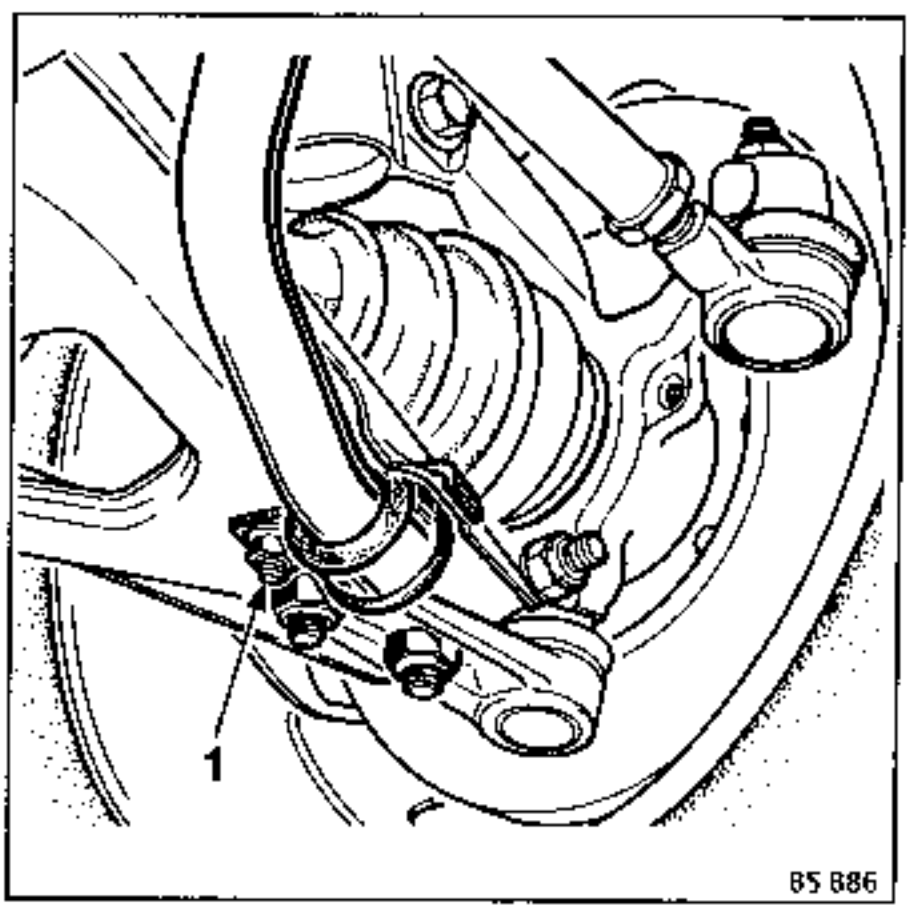
TIGHTENING TORQUES (in daN.m)	
Nuts securing lower arm to sub-frame	8
Key nuts on stub axle carrier	6
Anti-roll bar bearing nuts	2
Lower ball joint nuts	7.5
Wheel bolts	8

REMOVING

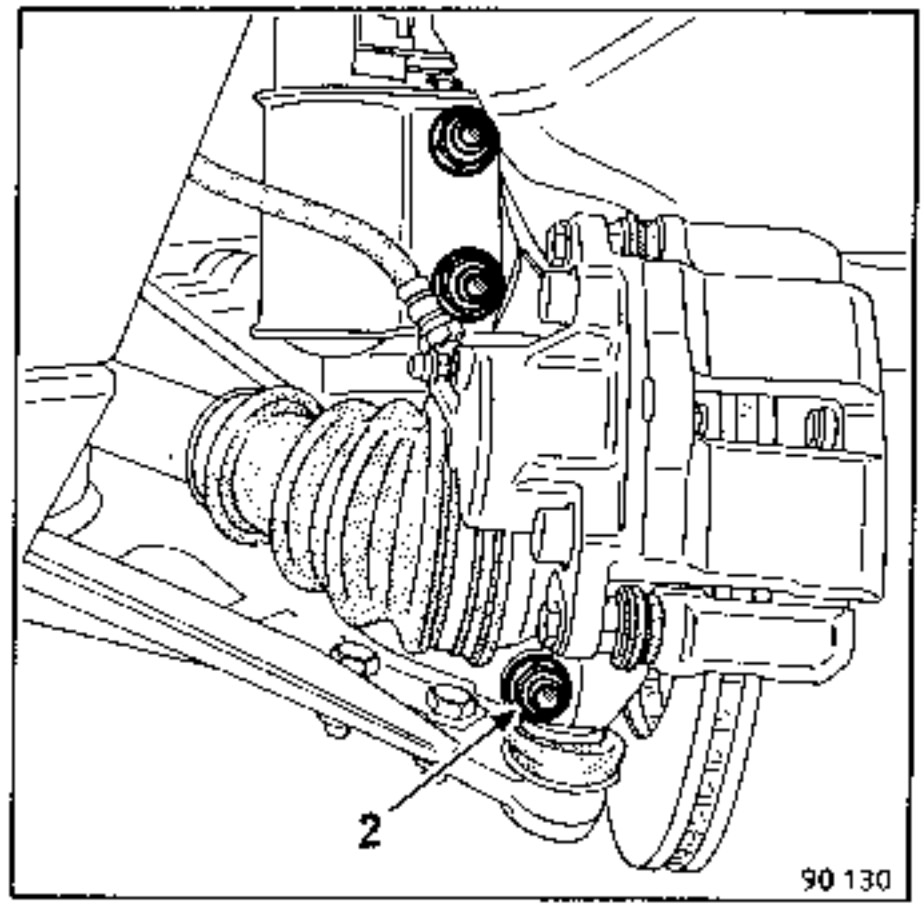
With the vehicle resting on its wheels, remove the anti-roll bar bearings (1) on the lower suspension arms.



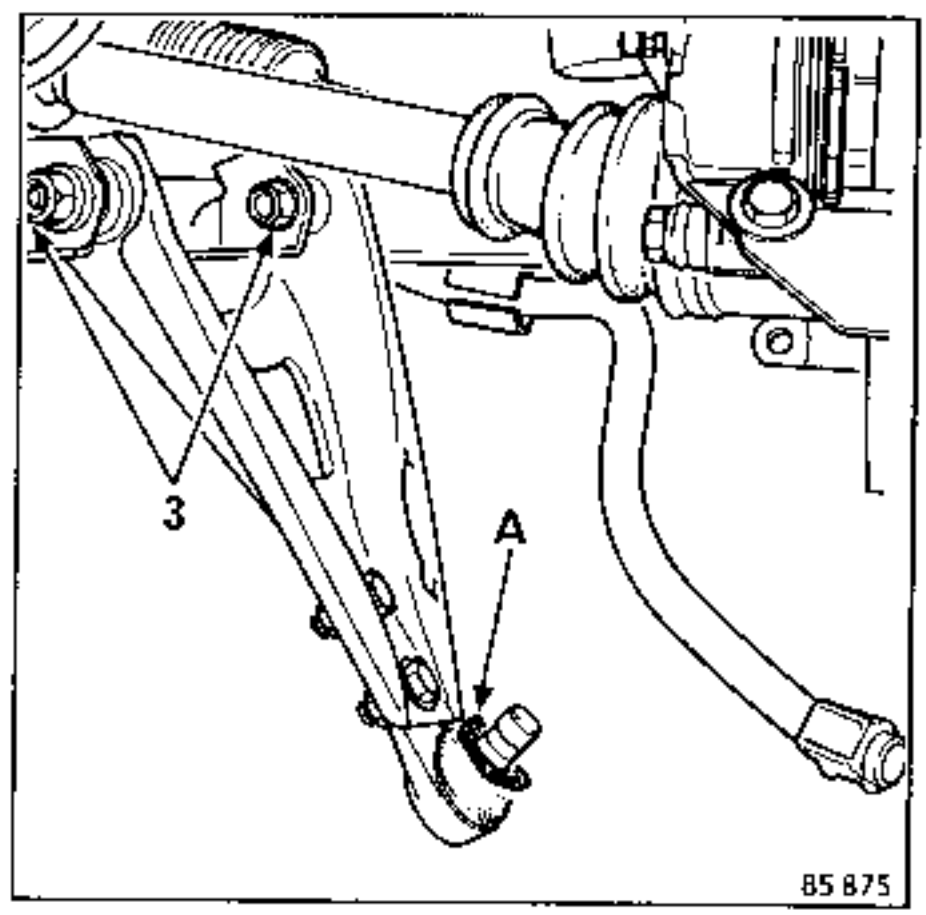
Remove the anti-roll bar downwards.

With the vehicle resting on stands, remove :

- the nut and the key (2),



- the two bolts (3) that secure the arm to the sub-frame,



- the arm.

REFITTING

Note : ensure that the plastic protective washer A is in position on the lower ball joint shank.

Fit :
- the suspension arm,
- the two bolts (3) without tightening them,
- the ball joint shank into the stub axle carrier and tighten the key nut (2) to torque.

With the vehicle resting on its wheels :

Refit the anti-roll bar without tightening its bearings.

Bounce the suspension and tighten the suspension arm and anti-roll bar bearing securing nuts to the specified torques (there is to be no load in the vehicle when the nuts are tightened).

Lower suspension arm rubber bushes

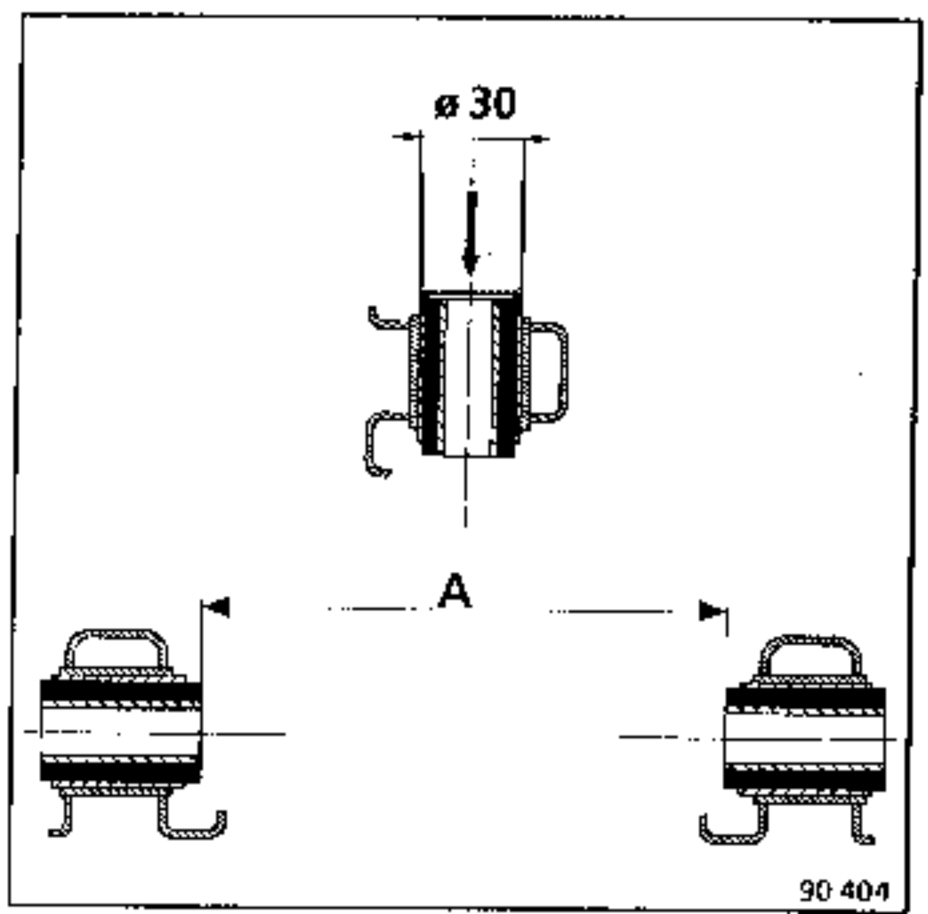
REPLACING

To maintain the correct relative positions of the bushes with reference to the suspension arm centreline, replace them one at a time.

Push out one of the worn bushes on the press using a tube with an outside diameter of 30 mm.

Fit the new bush to obtain :
dimension A = 147 ± 0.5 mm.

Push the second bush out, on the press and carry out the same operations as above to maintain :
dimension A at 147 ± 0.5 mm.

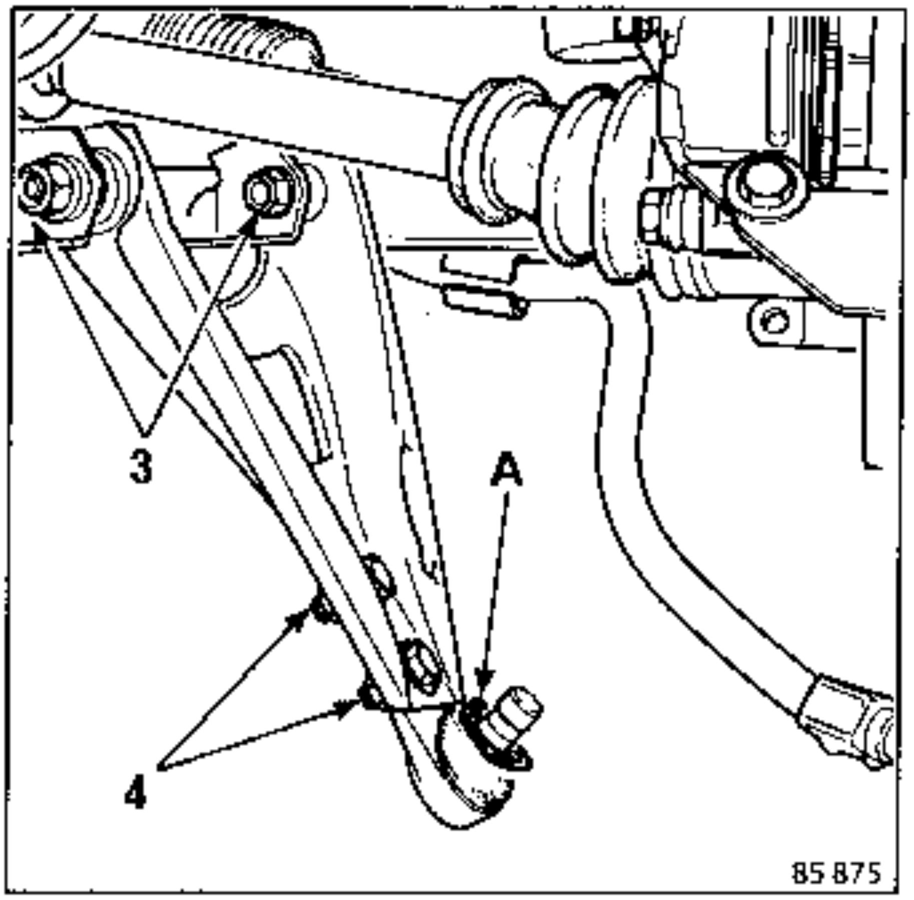


REMOVING

If its protective bellows is damaged, it is essential to replace the entire ball joint.

Carry out the same operations as for removing a lower suspension arm.

Loosen the two bolts (3) that secure the suspension arm to the sub-frame, without removing them.



Remove :

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

REFITTING

Note : ensure that the protective plastic washer A is in place on the lower ball joint shank.

Fit the ball joint and tighten its bolts to the specified torque.

Then continue with the same operations as for refitting the lower suspension arm.

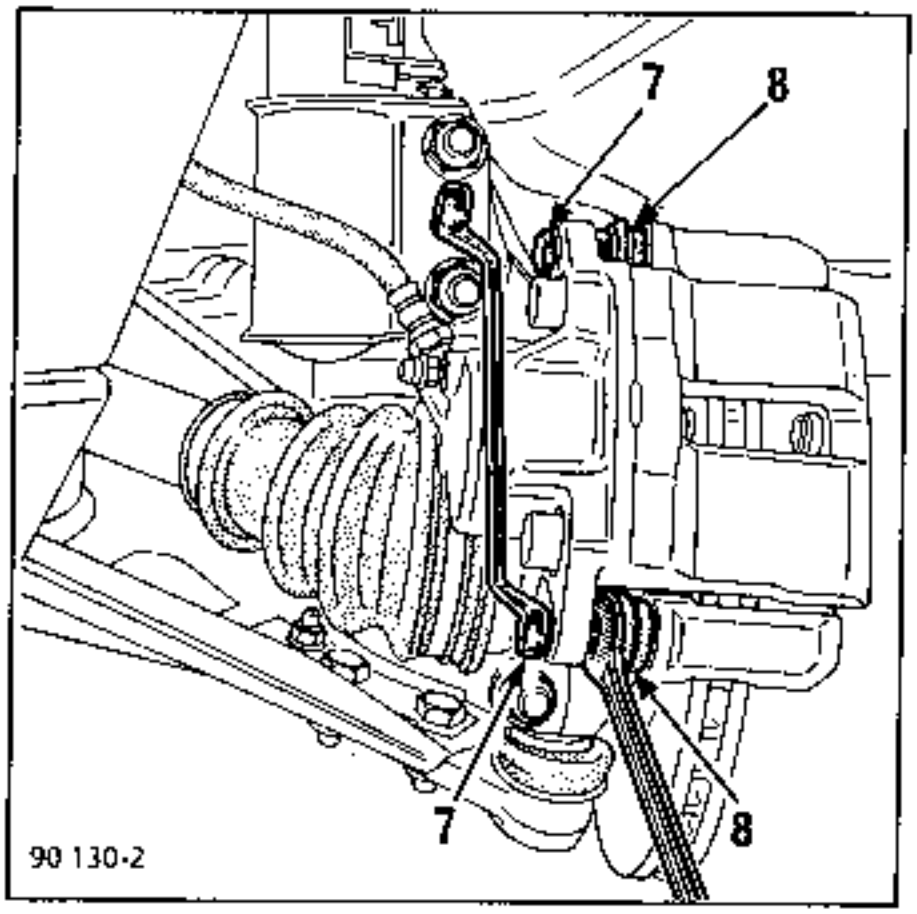
ESSENTIAL SPECIAL TOOLS	
Fre.823	Piston pusher

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Brake caliper guide bolts	3.5

REMOVING

Disconnect the wire from the pad warning sensor.

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



Remove the guide bolts (7) using two spanners.

Do not clean these bolts.

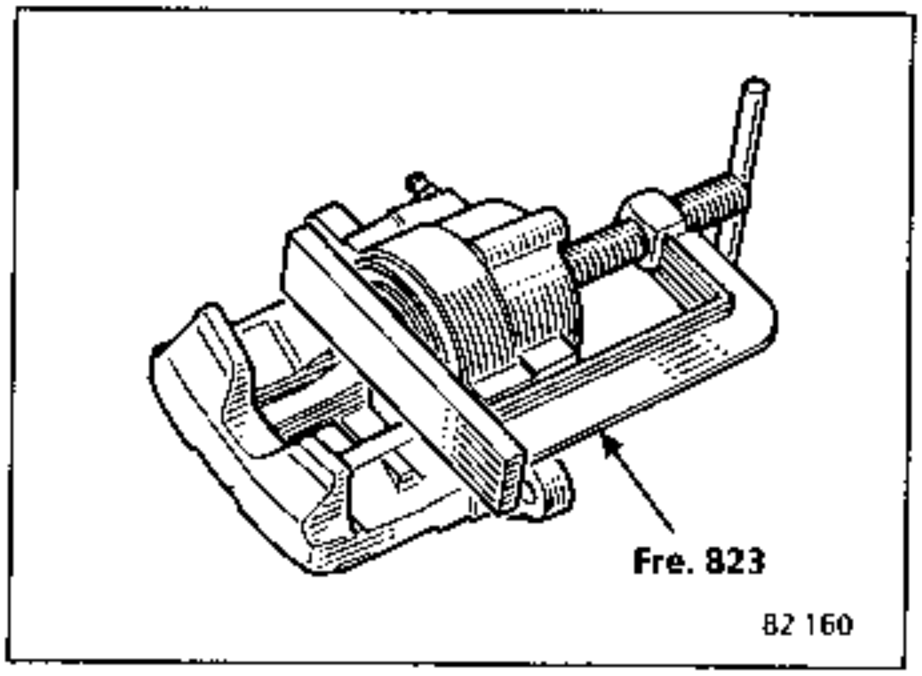
Take out :
- the sliding caliper
- the pads

Checking

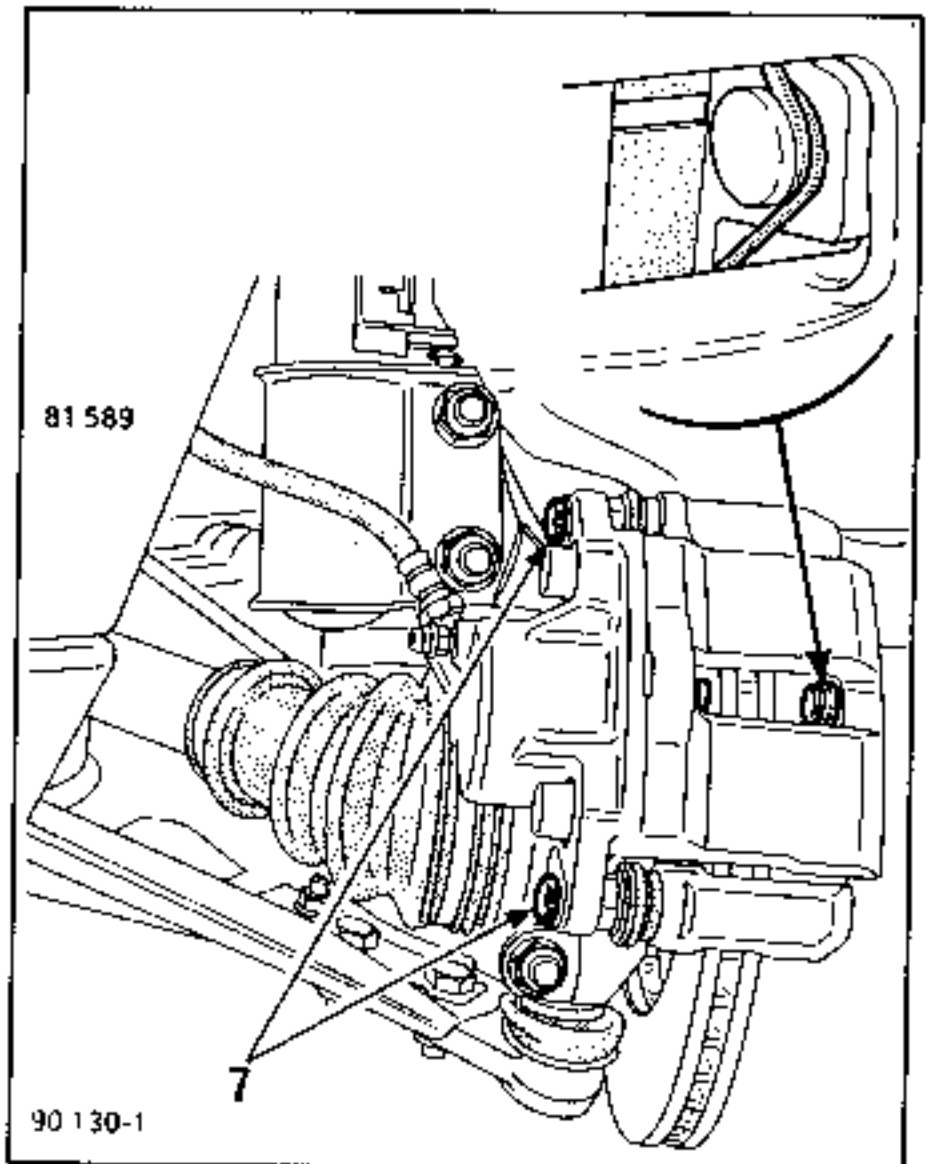
Check :
- that the piston dust cover and its retaining circlip are in good condition and correctly fitted,
- the condition of the dust cover (8) on the guides.

REFITTING

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



Fit the new pads and their springs ensuring that they are fitted the correct way round.



The pad with the wear warning sensor wire on it is fitted on the inside.

Fit the caliper followed by the lower guide bolt (7) after coating it with Loctite FRENBLOC.

Press down the caliper and fit the upper guide bolt also coated with Loctite FRENBLOC.

Tighten the guide bolts to the specified torque starting with the bottom one.

Reconnect the wear sensor wire.

Press down the brake pedal a number of times to bring the piston into contact with the pads.

ESSENTIAL SPECIAL TOOLS	
Fre. 823	Piston pusher

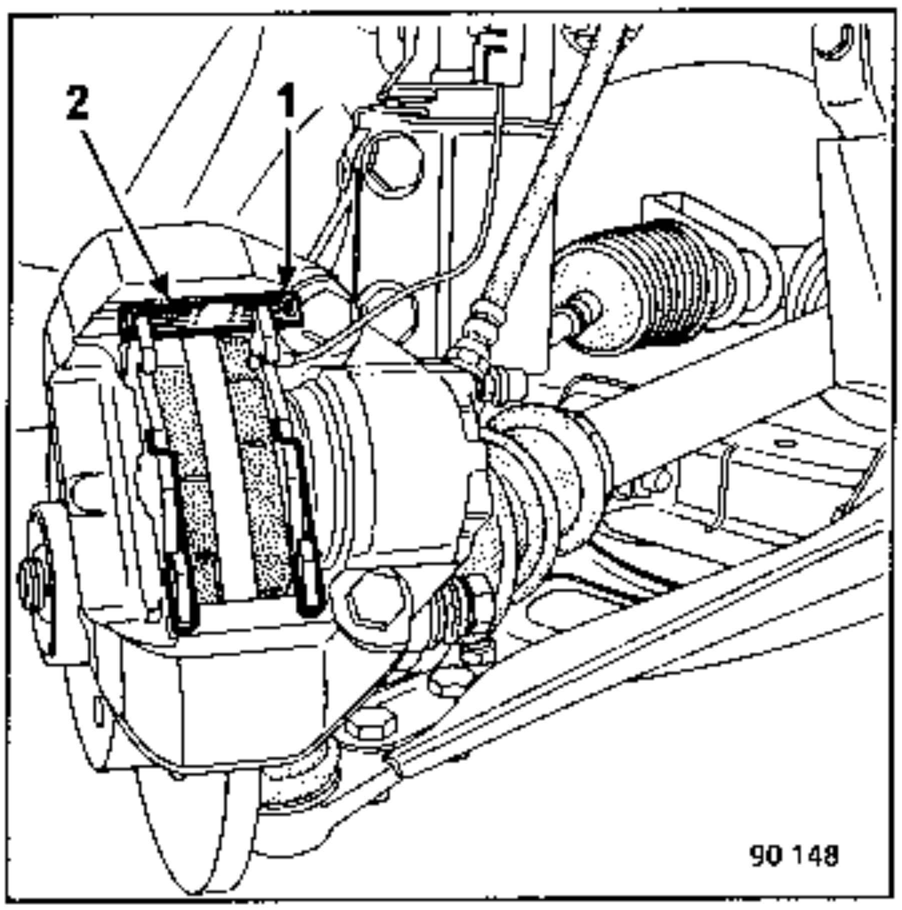
TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8

REMOVING

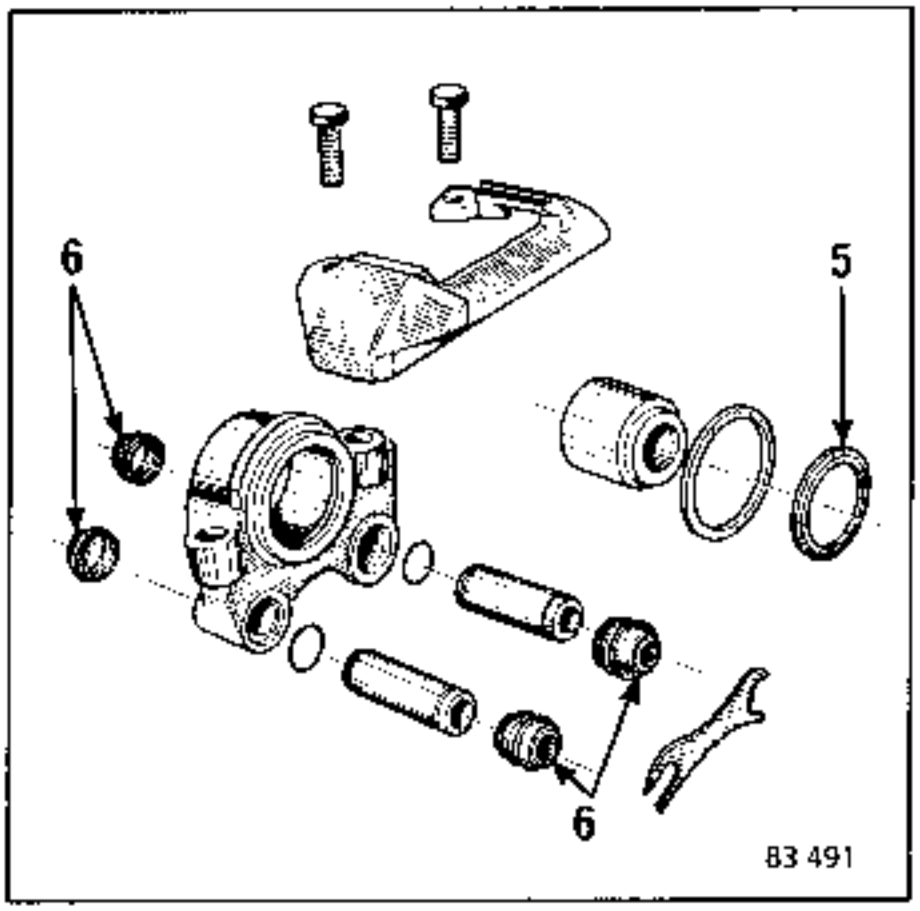
Disconnect the wear sensor wire.

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

Remove :
- the clip (1),
- the key (2),
- the pads.

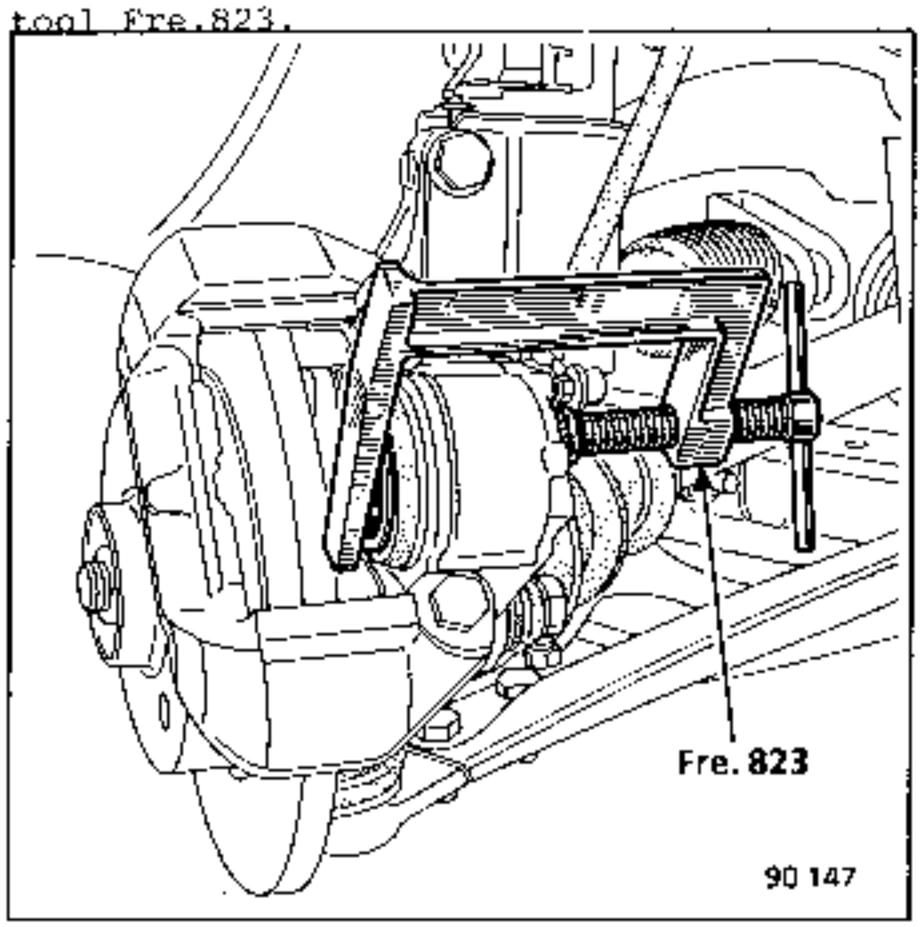


Check the condition of the dust cover (5) and the bellows (6) that protect the caliper slides and replace them if necessary. If they are replaced, grease the end of the piston and the two slides after first cleaning them with methylated spirits.

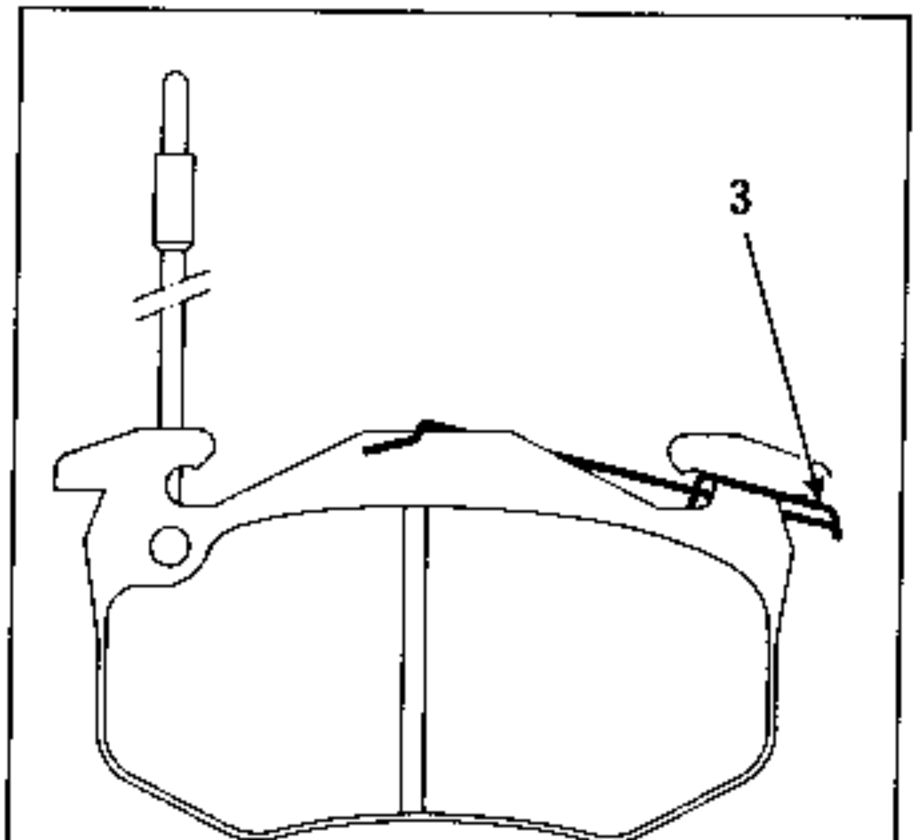


REFITTING

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



Fit the two anti-rattle clips (3) to the new pads.



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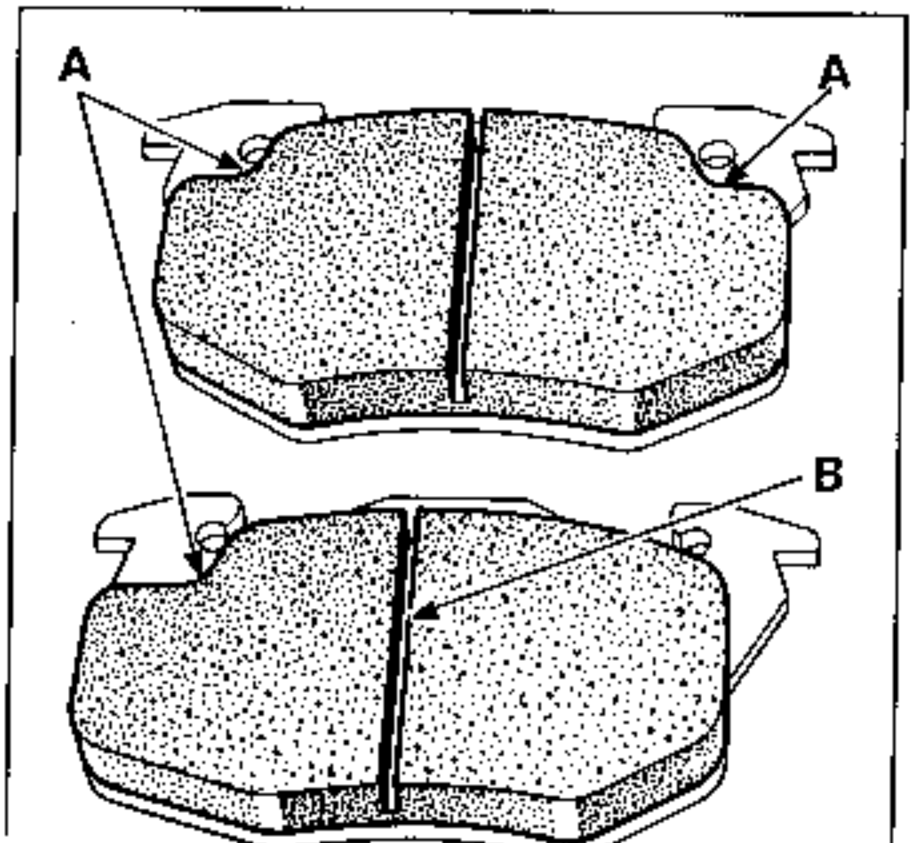
NOTE : these vehicles are either fitted with symmetrical pads or offset pads depending on the diameter of the caliper cylinder.

Ø 45 mm symmetrical pads
Ø 48 mm offset pads

Special feature of offset pads :



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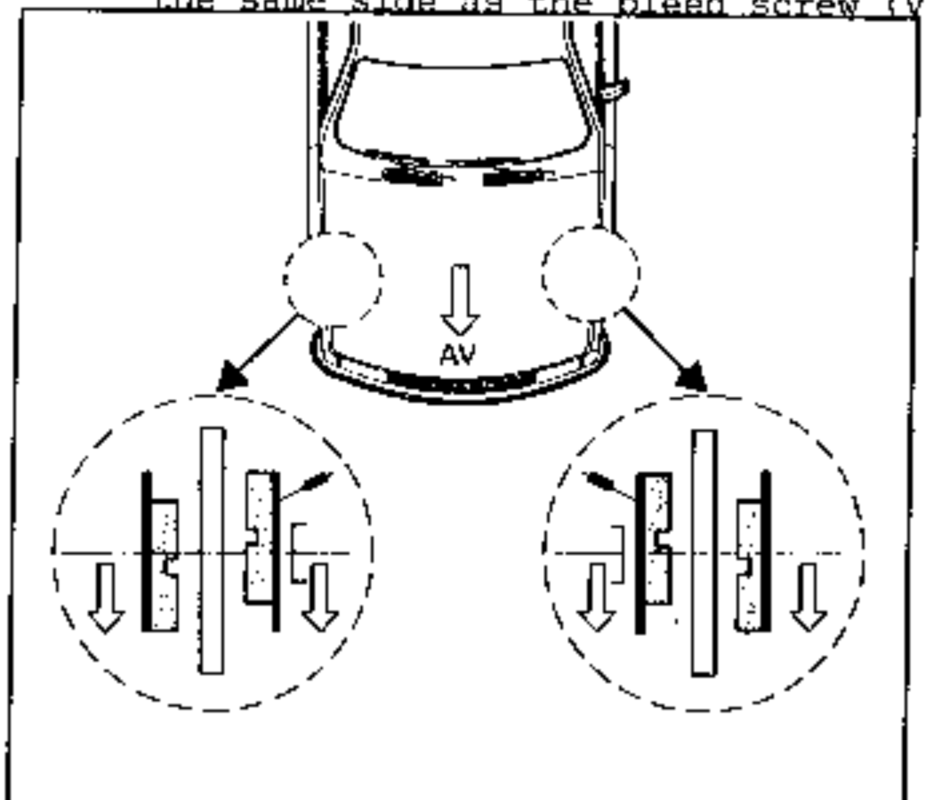
- the offset pad has only a single shoulder (A) on it instead of the two on the symmetrical pad.
- the groove (B) is offset when compared with that of the symmetrical pad.
- correct way round :
  - outer pad, both shoulders and groove (B) are offset towards the front of the vehicle,
  - inner pad, both shoulders and groove (B) are offset towards the rear of the vehicle,
  - the wear sensor wire is to be on the same side as the bleed screw (V).



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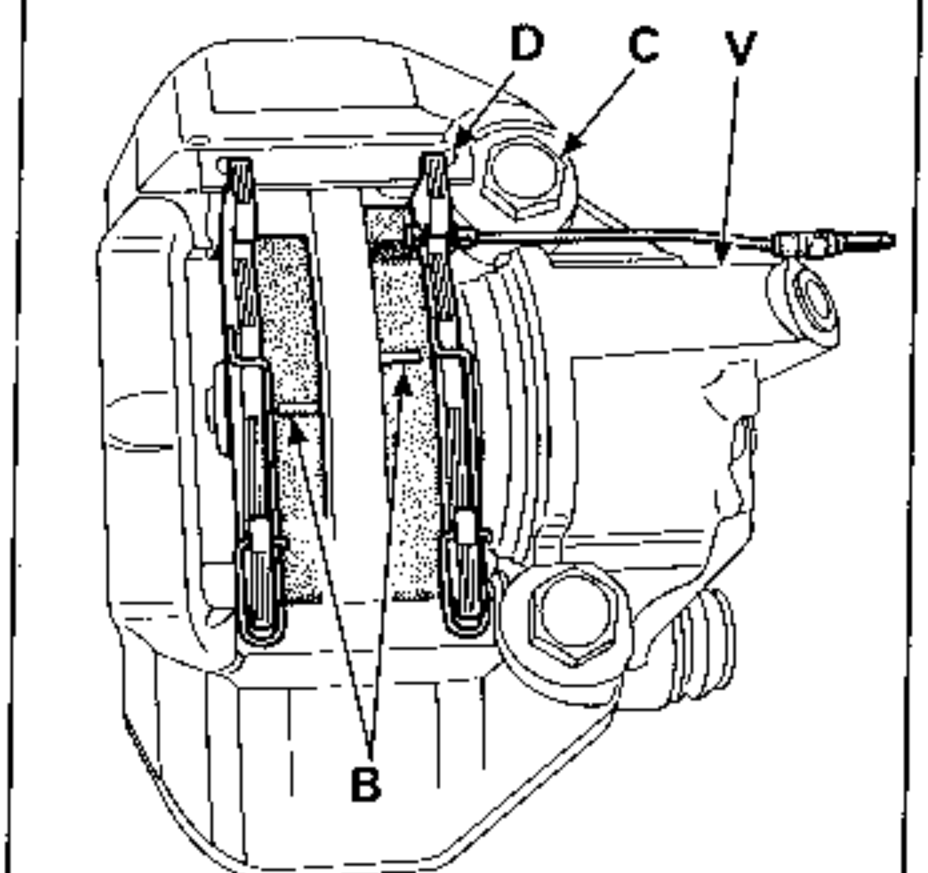

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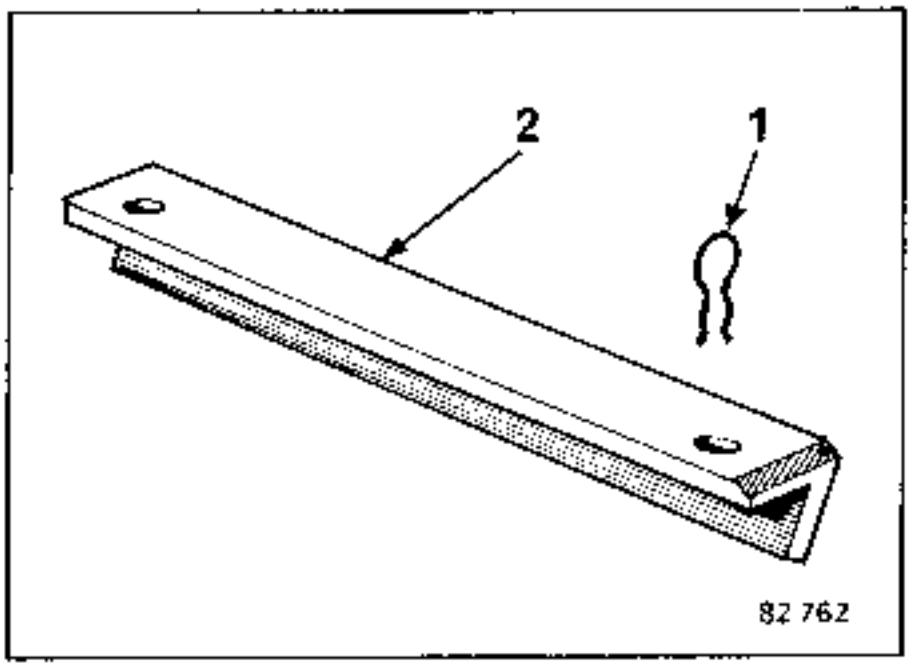
Place the pads in the caliper and insert the key (2).

Fit the clip (1) (there is only one clip per caliper).

NOTE : the clip is fitted at (D) on the inside of the caliper, near the caliper bracket securing bolt (C).



Reconnect the wear sensor wire.

Depress the pedal a few times to bring the piston into contact with the pads.

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Caliper securing bolts(BENDIX series IV)	10
Guide bolts (GIRLING)	3.5

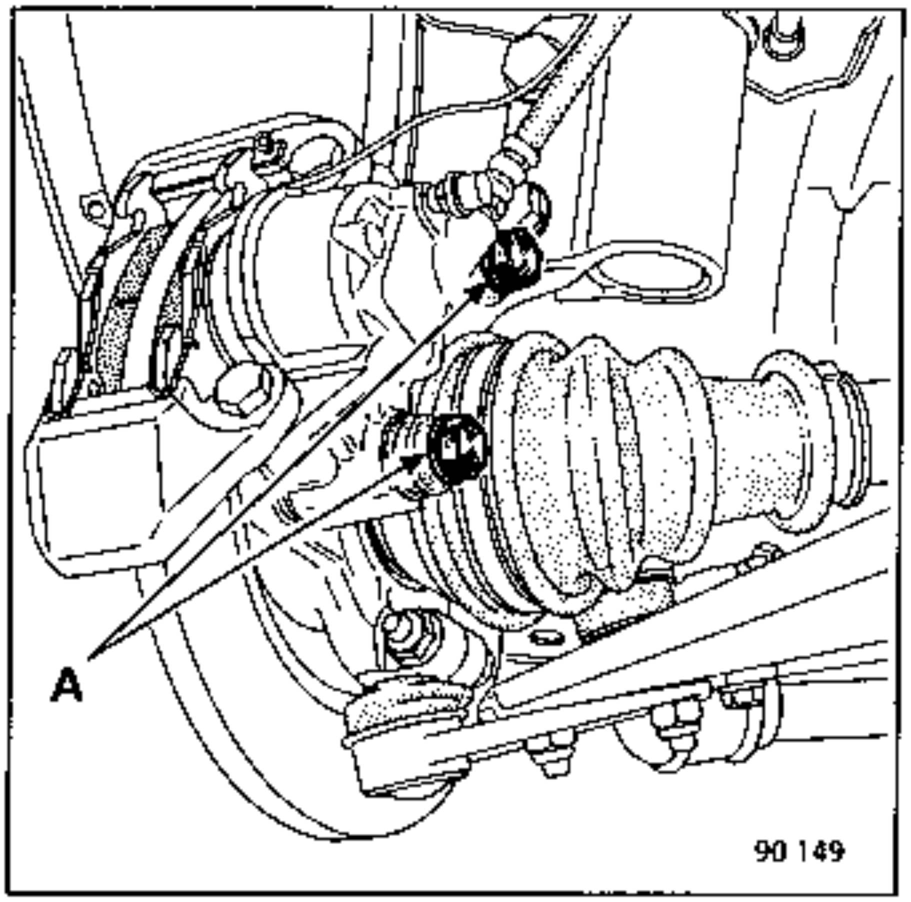
REMOVING

Loosen the hose at the wheel cylinder end.

Remove the brake pads (see corresponding section).

Special features of BENDIX Series IV

Remove the two bolts (A) that secure the unit to the stub axle carrier.



All types

Unscrew the wheel cylinder from the hose (catch the fluid in a container).

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

REFITTING

Screw the new wheel cylinder to the hose.

Loosen the caliper bleed screw and wait till fluid flows from it (ensure that there is enough fluid in the reservoir).

Retighten the bleed screw.

BENDIX Series IV

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

All types

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

The system will only require partial bleeding unless the brake fluid reservoir has emptied during the operation in which case a complete bleed will be necessary.

Press the brake pedal a number of times to bring the piston into contact with the pads.

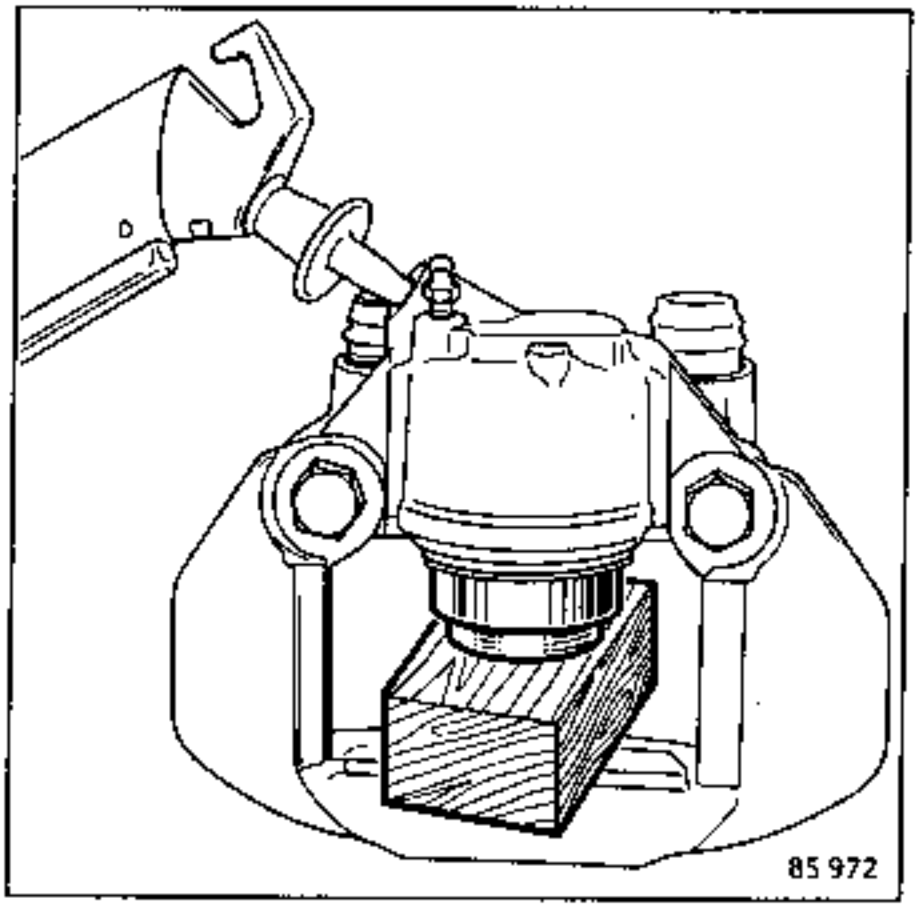
REPAIR

If the caliper bore is scored in any way the entire caliper must be replaced.

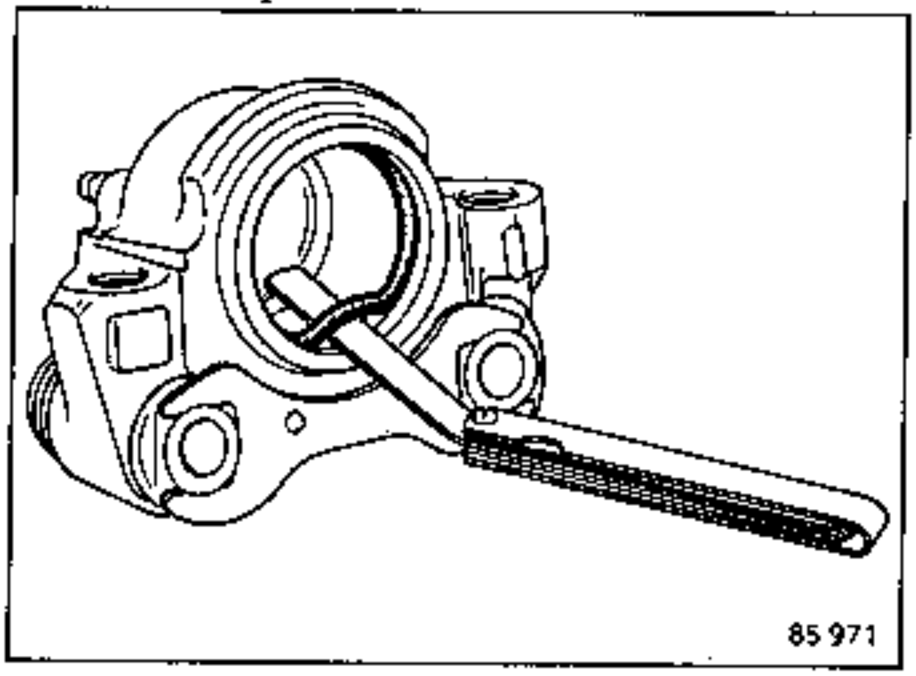
Remove the caliper.

Remove the dust cover (retaining snap ring on the GIRLING caliper).

Drive out the piston with compressed air after first placing a wooden chock between the caliper and the piston to avoid the piston being damaged. Any impact mark on the piston skirt would render it unusable.



Using a flexible strip with rounded edges (such as a feeler gauge) take out the rectangular section seal from the groove in the caliper.



Clean all the parts in methylated spirits.

Replace any defective parts by new genuine spares and refit the seal, the piston, the dust cover (and on the GIRLING the retaining snap ring).

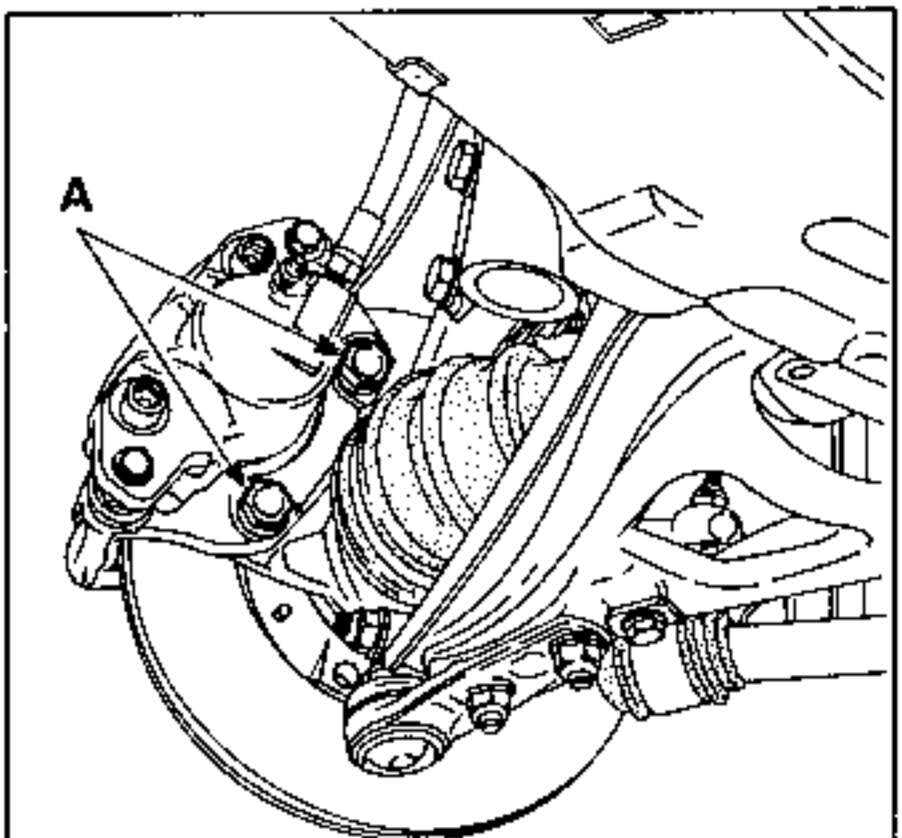
The brake discs cannot be reground. If a disc is heavily worn or scored it must be replaced by a new one.

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Caliper securing bolts	10
Caliper bracket securing bolts BENDIX Series IV	6.5

REMOVING

Remove :
- the two brake unit securing bolts (A).

GIRLING



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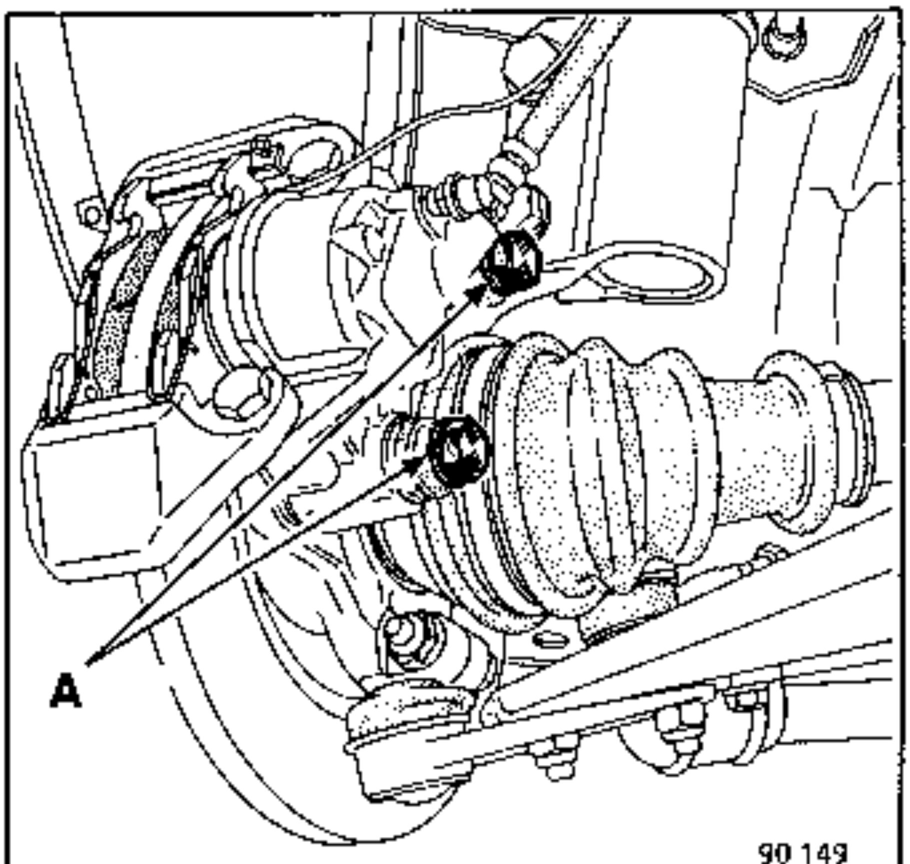
BENDIX Series IV



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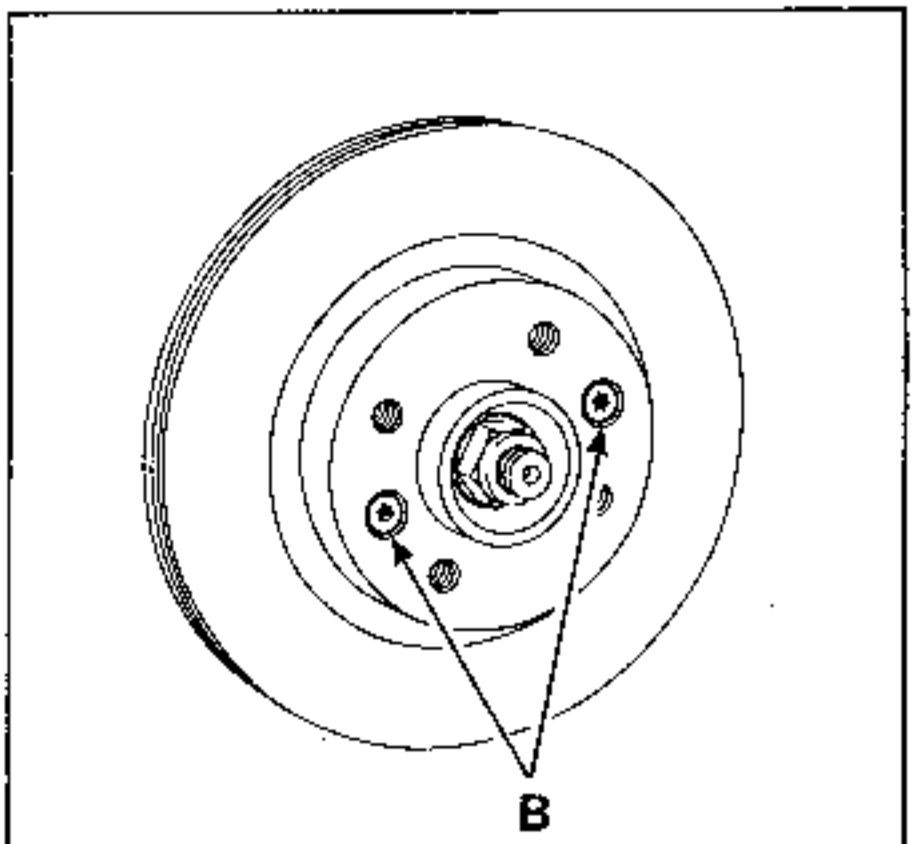
- the two disc retaining screws (B) using a key of the Torx T40 type (eg. Facom RX40 + adaptor or 89-40).
- the disc.



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REFITTING

Fit the disc to the hub and secure it with the two screws (B).

Refit the brake caliper, coat the bolts with Loctite FRENBLOC and tighten them to the specified torque.

Depress the brake pedal a number of times to bring the piston into contact with the pads.

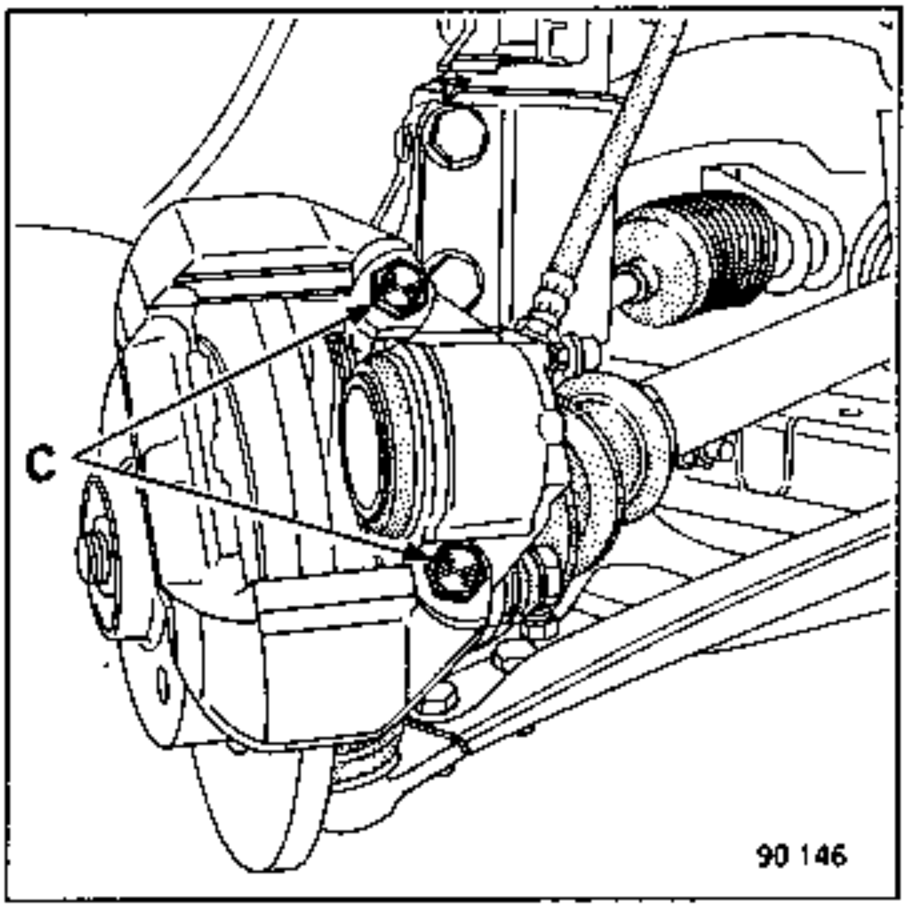
REPLACING

Whenever replacing a brake disc it is essential also to replace the pads.

As the first part of this operation, follow the method already described for replacing the pads and as the second part the method described for removing and refitting the calipers (see "Removing - Refitting" section).

Special features of the BENDIX Series IV

To replace the disc, remove :
- the pads,
- the two caliper bracket securing bolts (C).



ESSENTIAL SPECIAL TOOLS		
M.S.	**580**	Inertia weight
Rou.	**15-01**	Shaft end protector
Rou.	**604-01**	Hub retainer
T.Av.	**476**	Ball joint extractor
T.Av.	**1050**	Hub extractor

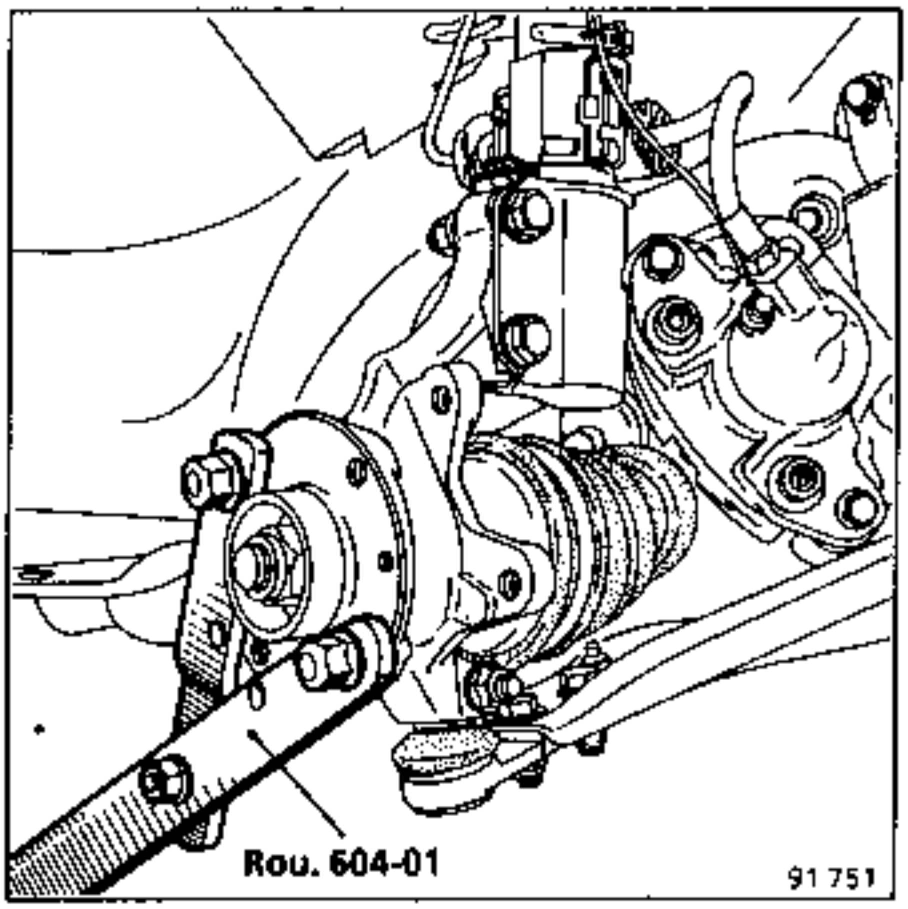
TIGHTENING TORQUES (in daN.m)	
Securing bolts at bottom of shock absorber	8
Nuts on lower ball joint keys	6
Steering ball joint nuts	4
Brake caliper securing bolts	10
Drive shaft nuts	25
Wheel bolts	8

Checking the play

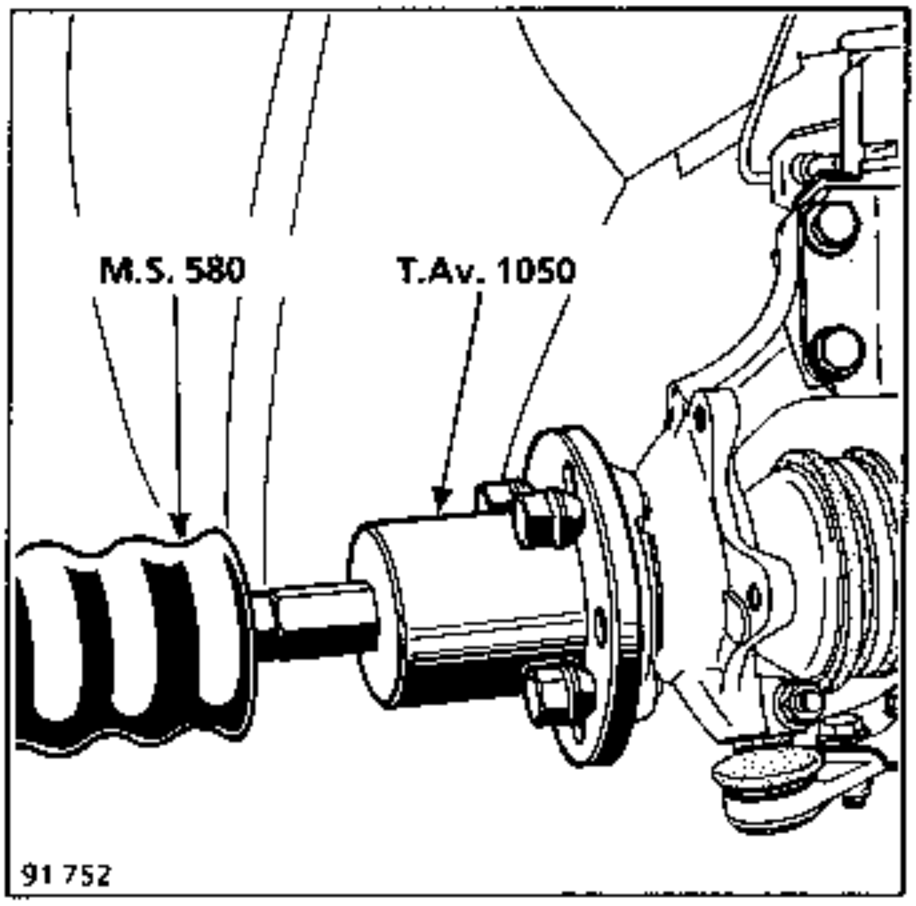
Check the end play in the hub with a dial indicator it should be : 0 to 0.05 mm.

REMOVING

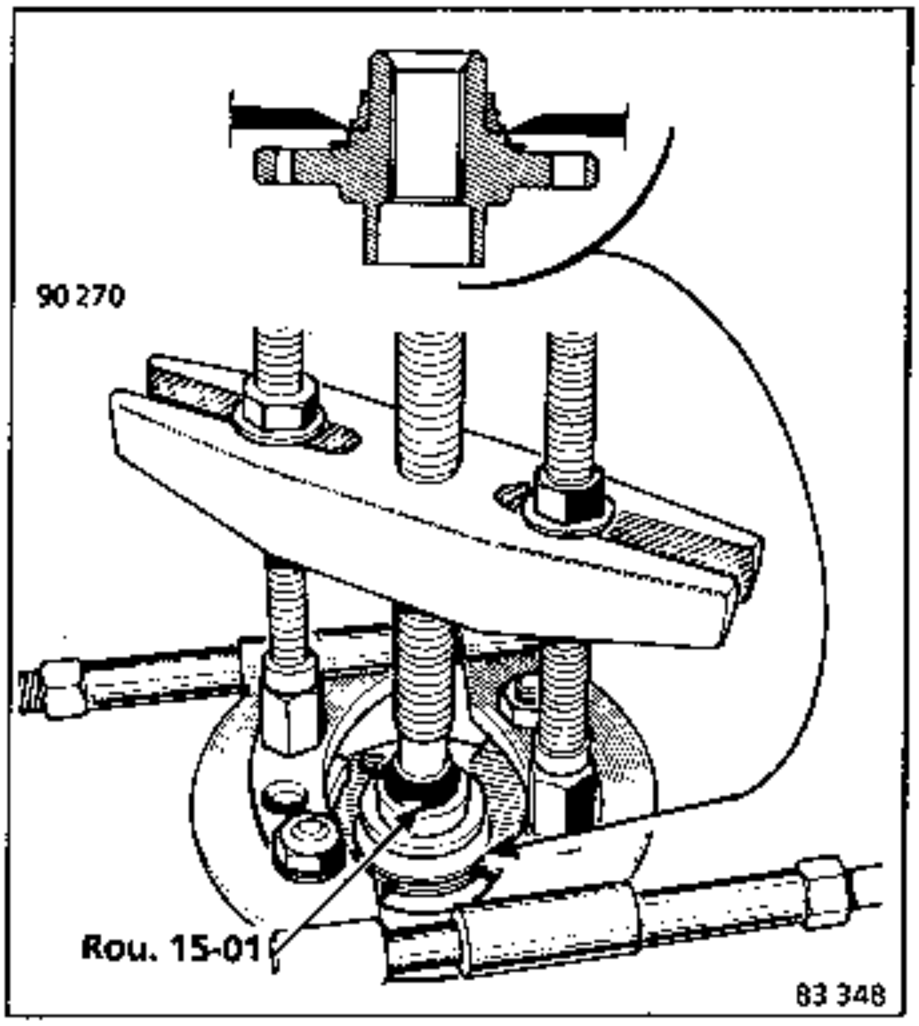
Remove :
- the brake disc (see the corresponding section),
- the drive shaft nut using tool Rou. 605-01.



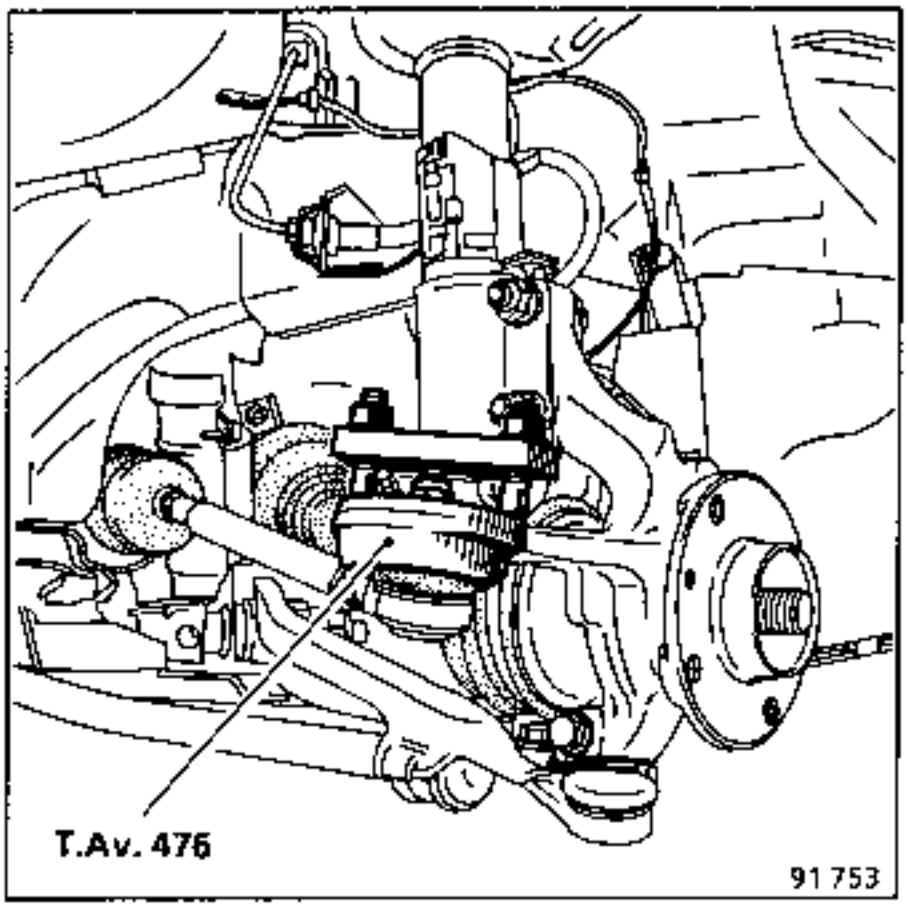
Extract the hub : tools T.Av.1050 + M.S.580.



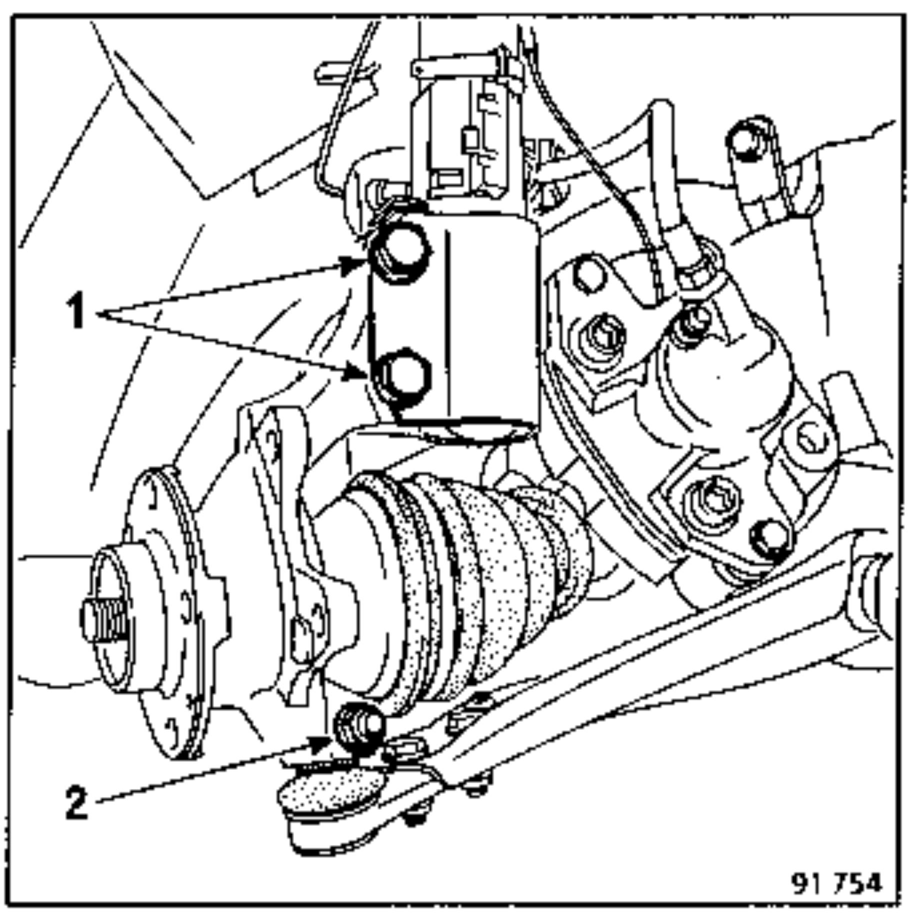
Remove the inner track ring from the hub using a jaw extractor type FACOM U53G + U53E and tool Rou.15-01.



Disconnect the steering link : tool **T.Av. 476**.

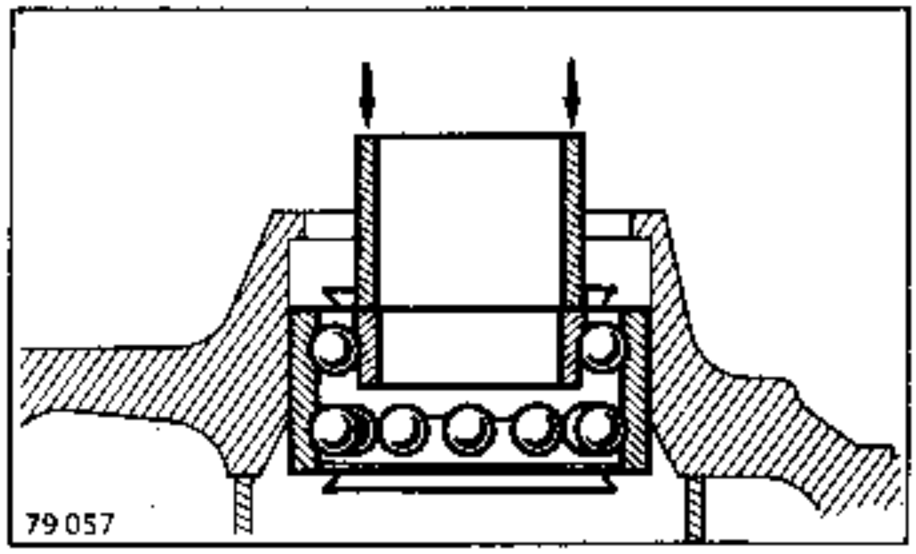


Remove :
- the securing bolts (1),
- the nut and the key (2),

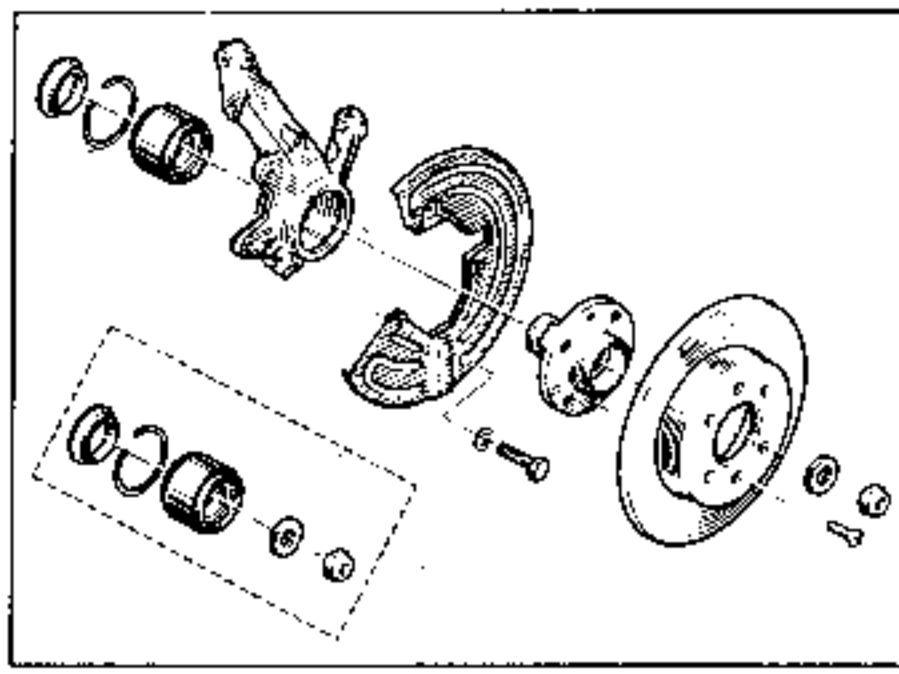


- the circlip.

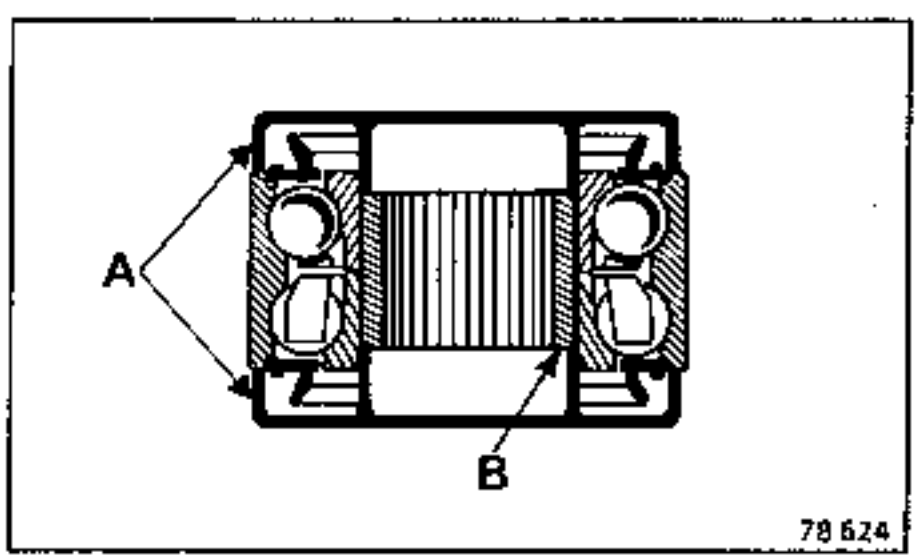
Extract the outer track ring, on the press, using one of the two inner track rings and leaving the ball cage and the seals in place.



REFITTING

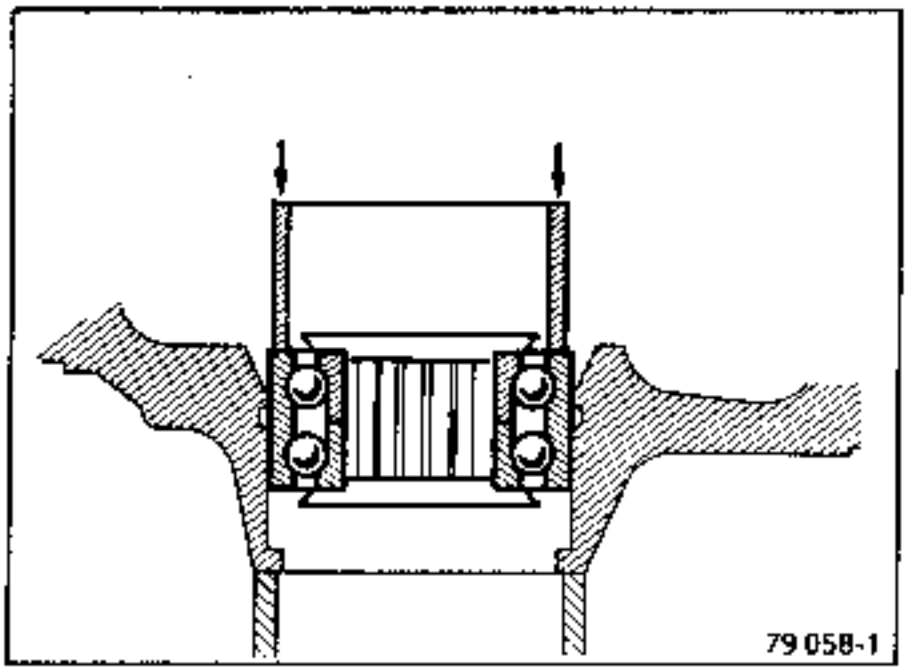


Remove the two plastic protectors (A) from the new bearing.



Fit the bearing into the stub axle carrier, on the press, together with its plastic bush (B) using a tube with an outside diameter of 63 mm and an inside diameter of 59 mm taking the load on the outer track ring.

Do not take the load on the inner track ring as this could damage the bearing, the insertion load being very high.

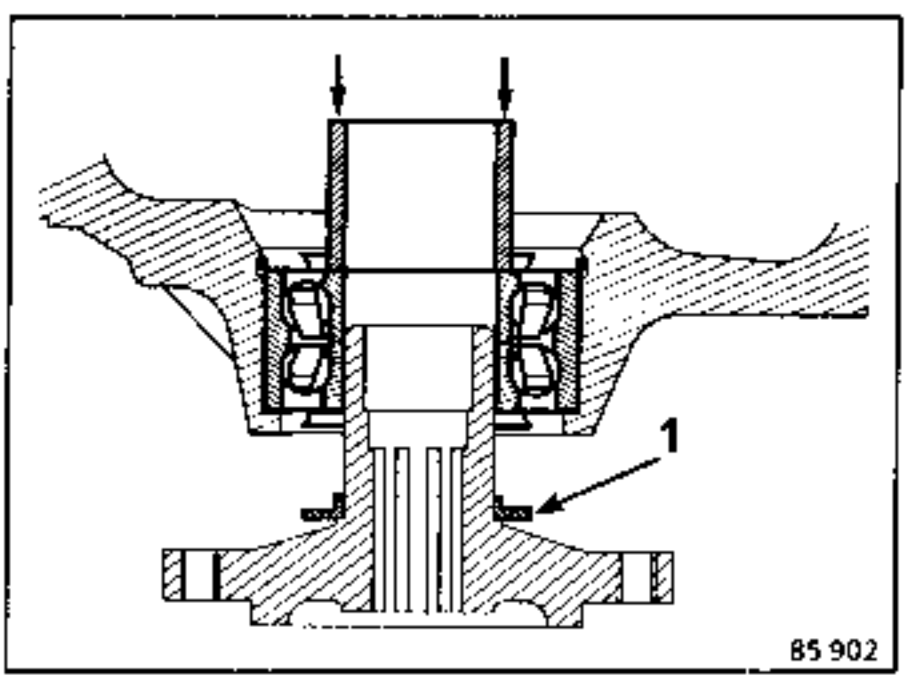

79 058-1

Remove the plastic bush (B).

Fit the new circlip.

Coat each of the seal lips with ELF Multi grease.

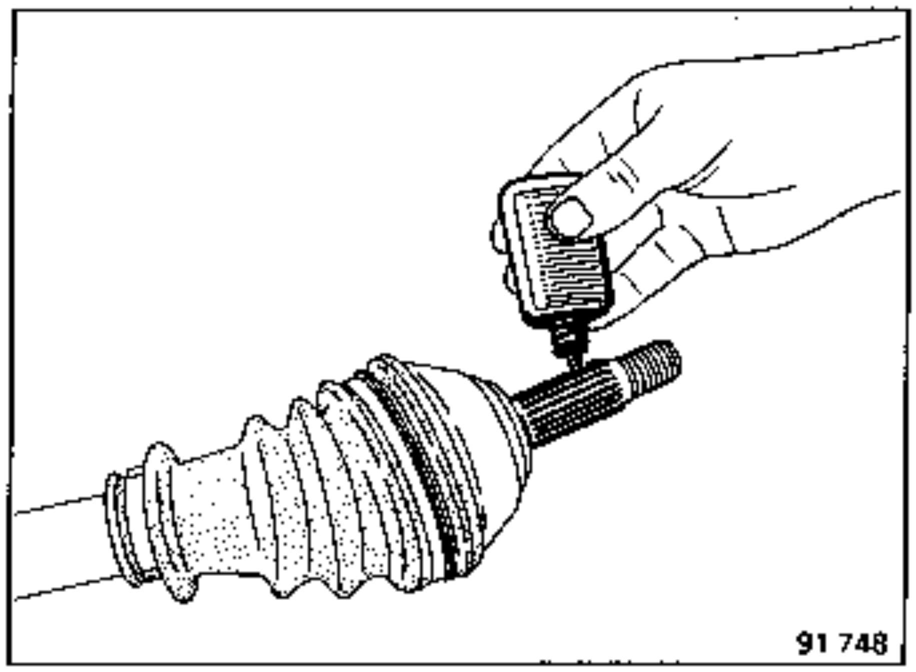
Place the thrust washer (1) on the hub and fit the hub, on the press, using a tube with an outside diameter of 45 mm and an inside diameter of 39 mm, taking the load on the bearing inner track ring.



85 902

Refit the stub axle carrier to the vehicle.

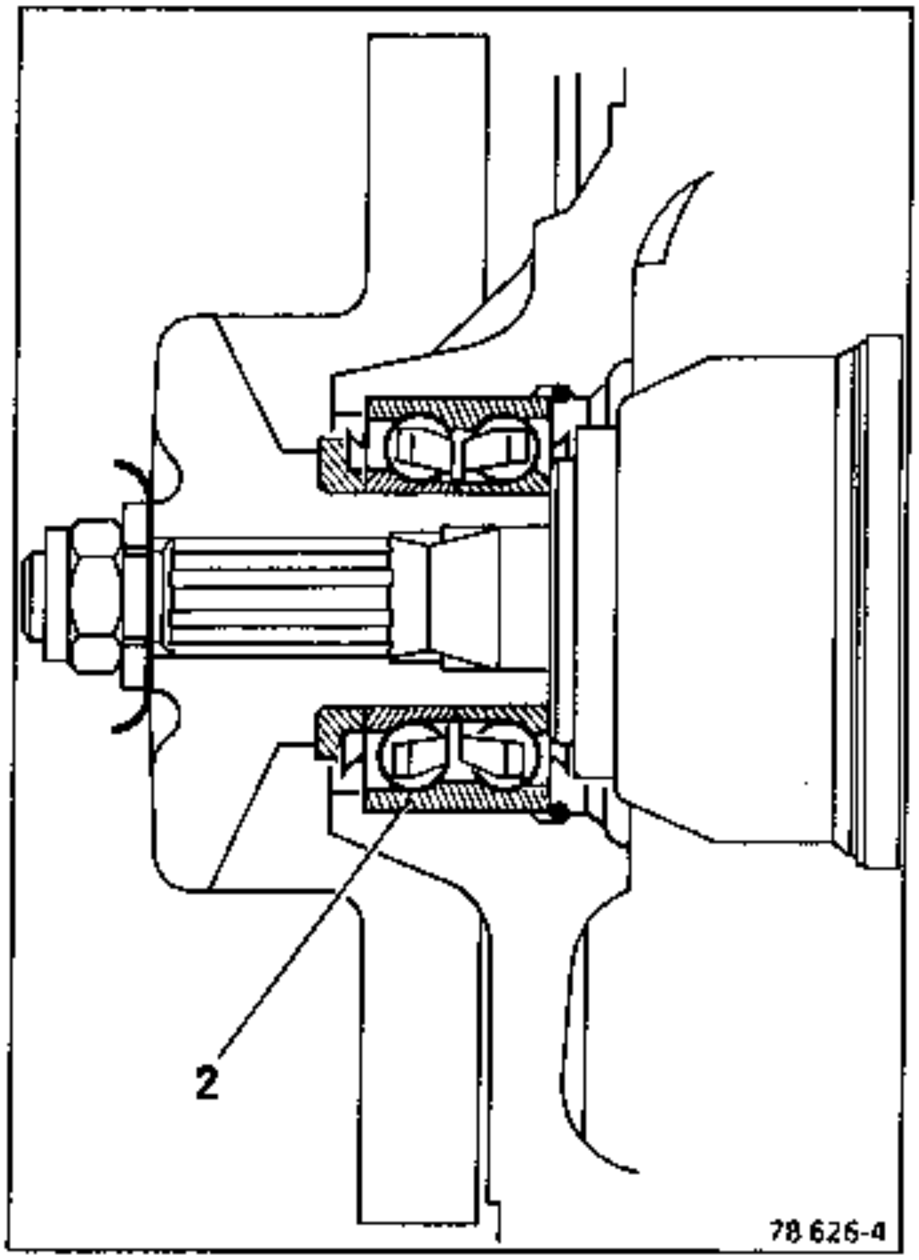
Coat the drive shaft stub axle with Loctite SCELBLOC.


91 748

Proceed from here by carrying out the removing operations in reverse.

The method of removing and refitting the component is identical to that for replacing a bearing.

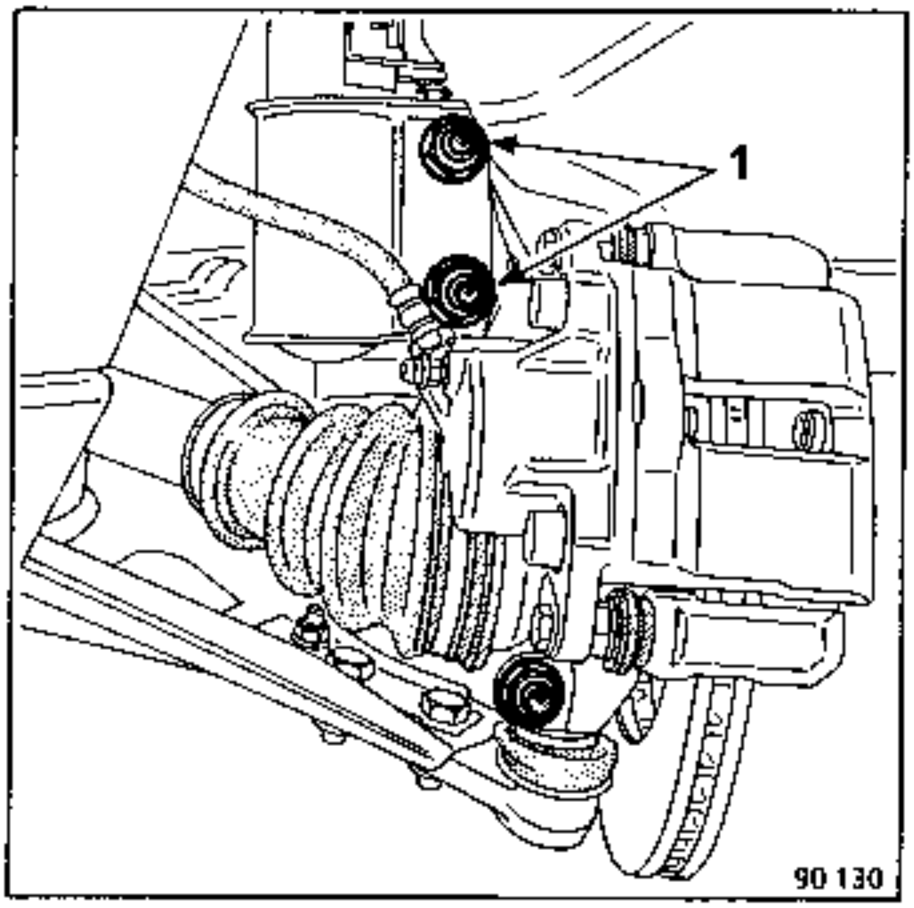
NOTE : as the load required to press the bearing outer track ring (2) into its bore is very high, one must, after removing this ring, replace the entire bearing because the bearing tracks are marked by the operation.



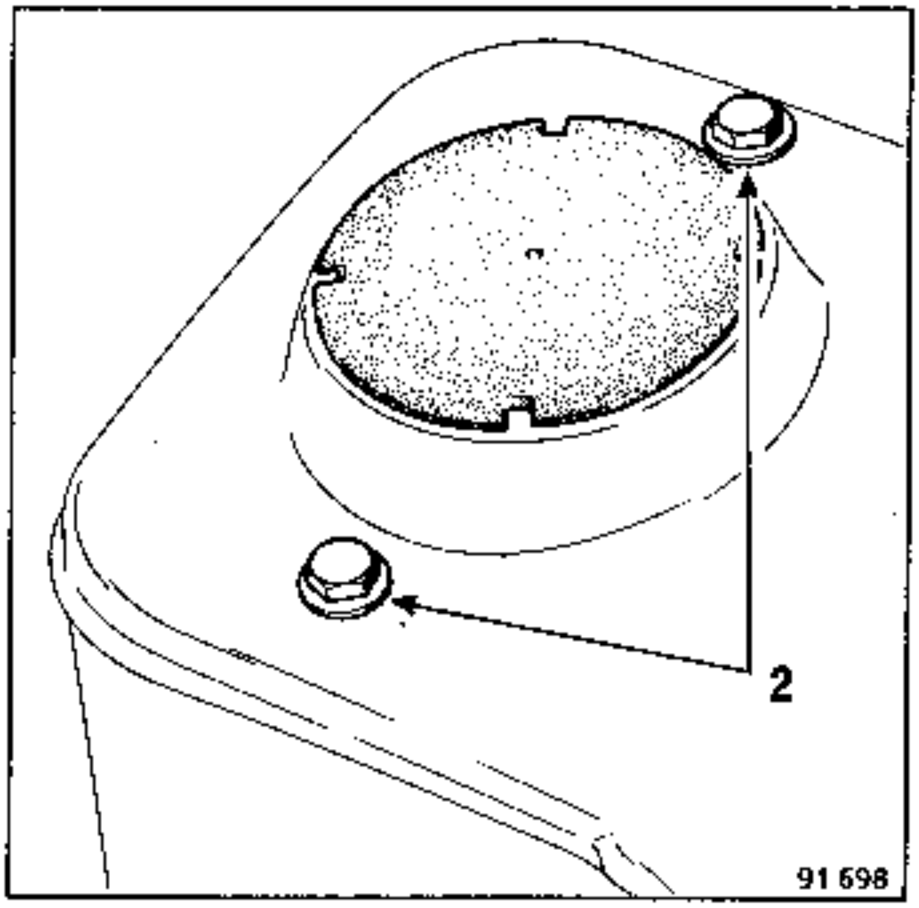
TIGHTENING TORQUES (in daN.m)	
Nuts on shock absorber rod	6
Shock absorber lower securing bolts	8
Shock absorber cup securing bolts	2.5
Wheel bolts	8

REMOVING

With the vehicle supported by stands on the side concerned, remove :
- the wheel,
- the two bolts from the lower end of the shock absorber (1),



- the two upper securing bolts (2),



- the shock absorber whilst pressing down the lower suspension arm to avoid contact between the shock absorber and the drive shaft bellows.

REFITTING

Carry out the removing operations in reverse, <u>taking care not to damage the drive shaft bellows</u>.

Tighten, to the specified torque :
- the shock absorber lower securing bolts (1),
- the upper securing bolts (2).

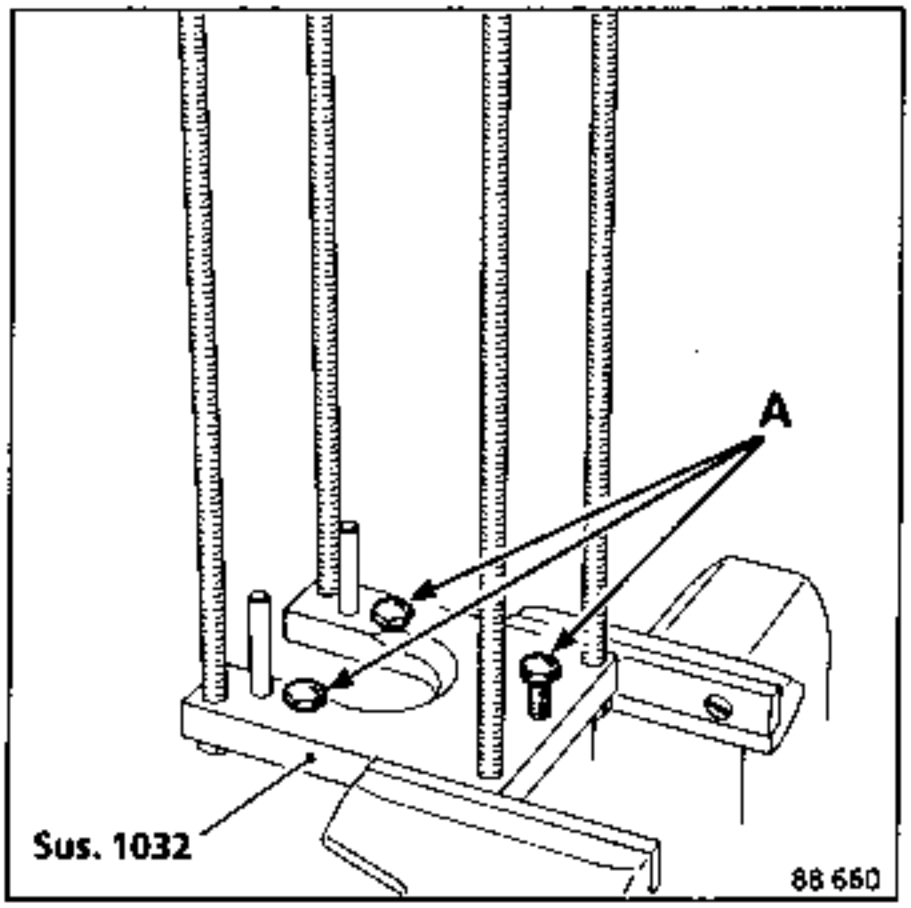
This tooling is not suitable for replacing the shock absorbers or the springs on type C405 vehicles made after June 1987. For these vehicles see the section entitled "Dismantling using tool Sus.1052".

Because of the high loads in the spring, it is essential to ensure that the tooling is in good condition.

ESSENTIAL SPECIAL TOOLS
Sus. 1032 Tooling for working on the front springs and shock absorbers

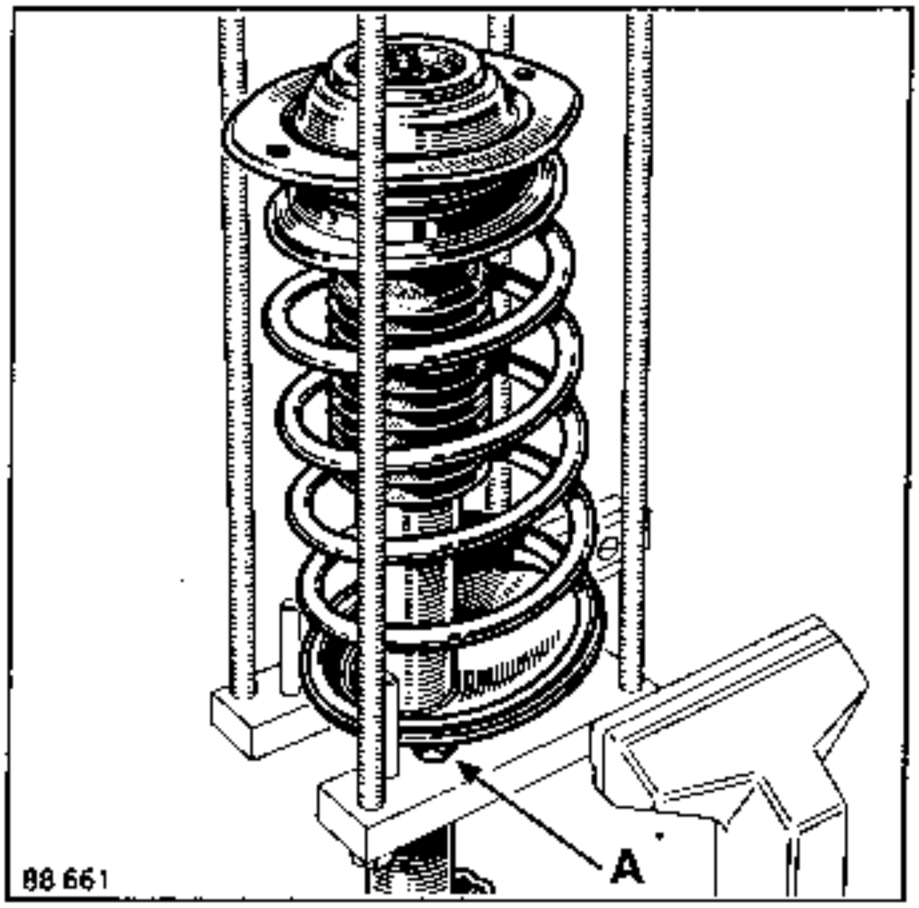
DISMANTLING THE SPRING - SHOCK ABSORBER

Grip the lower plate of tool Sus.1032 in a vice.



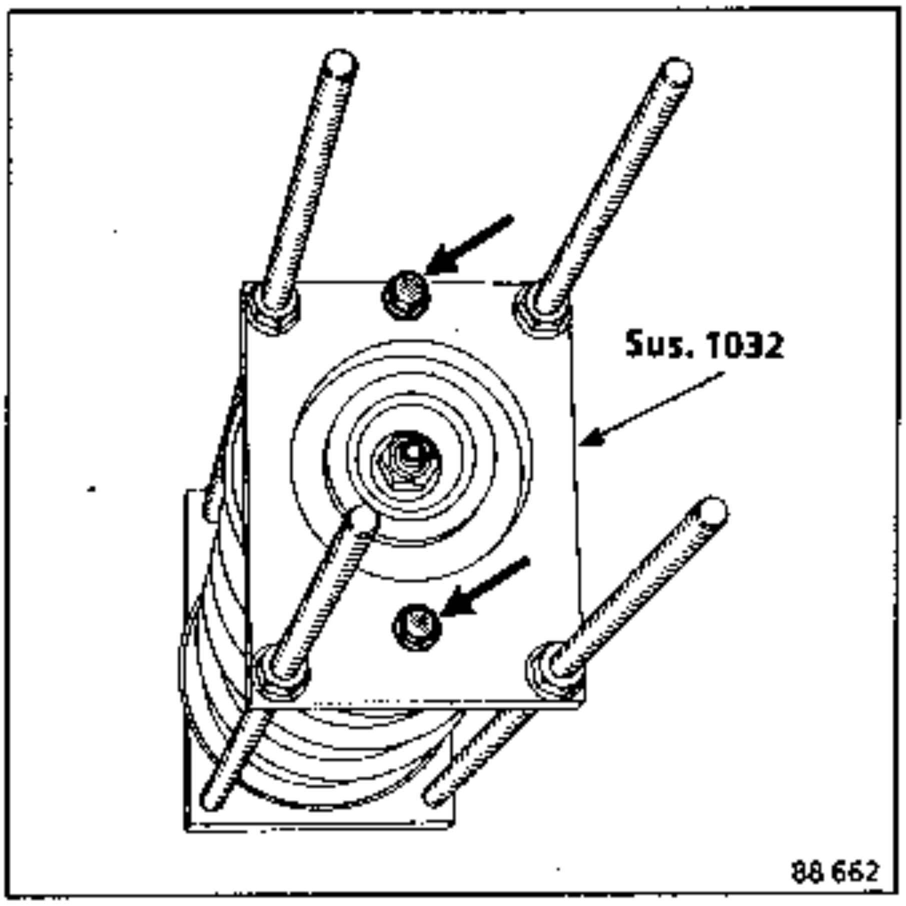
Fit :

- the spring - shock absorber assembly on the three locating bolts (A).



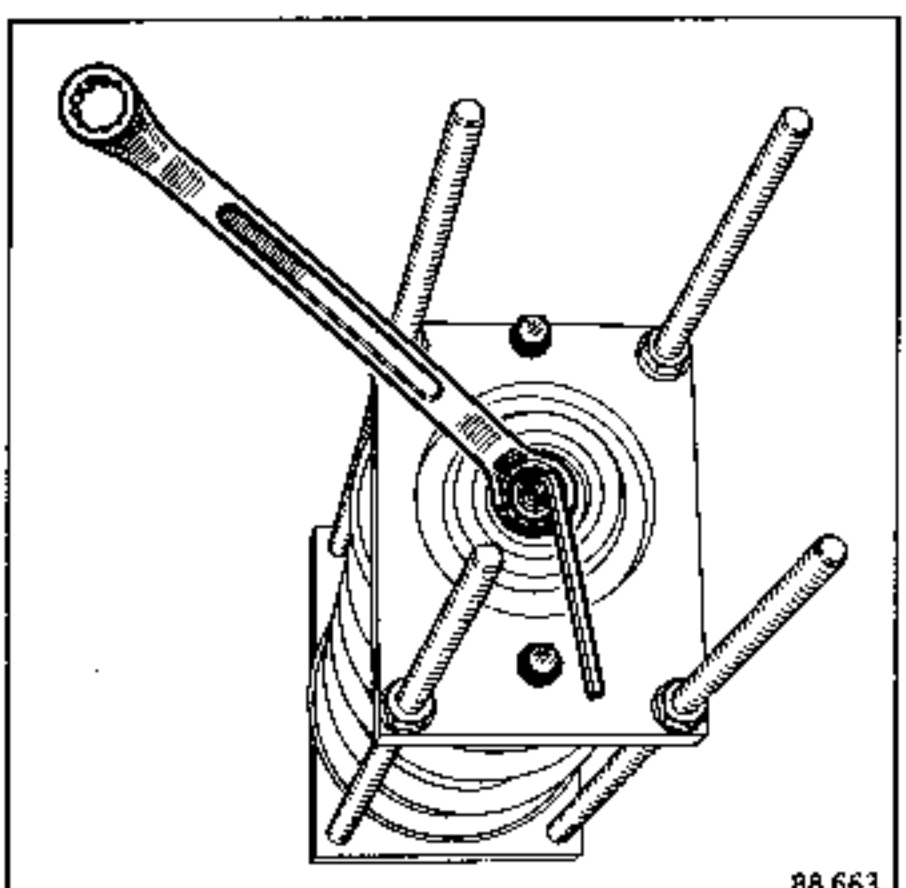
- the upper plate of tool Sus.1032.

Position the shock absorber by means of the three locating bolts (A) to be able to fit the two bolts that retain the upper cup.



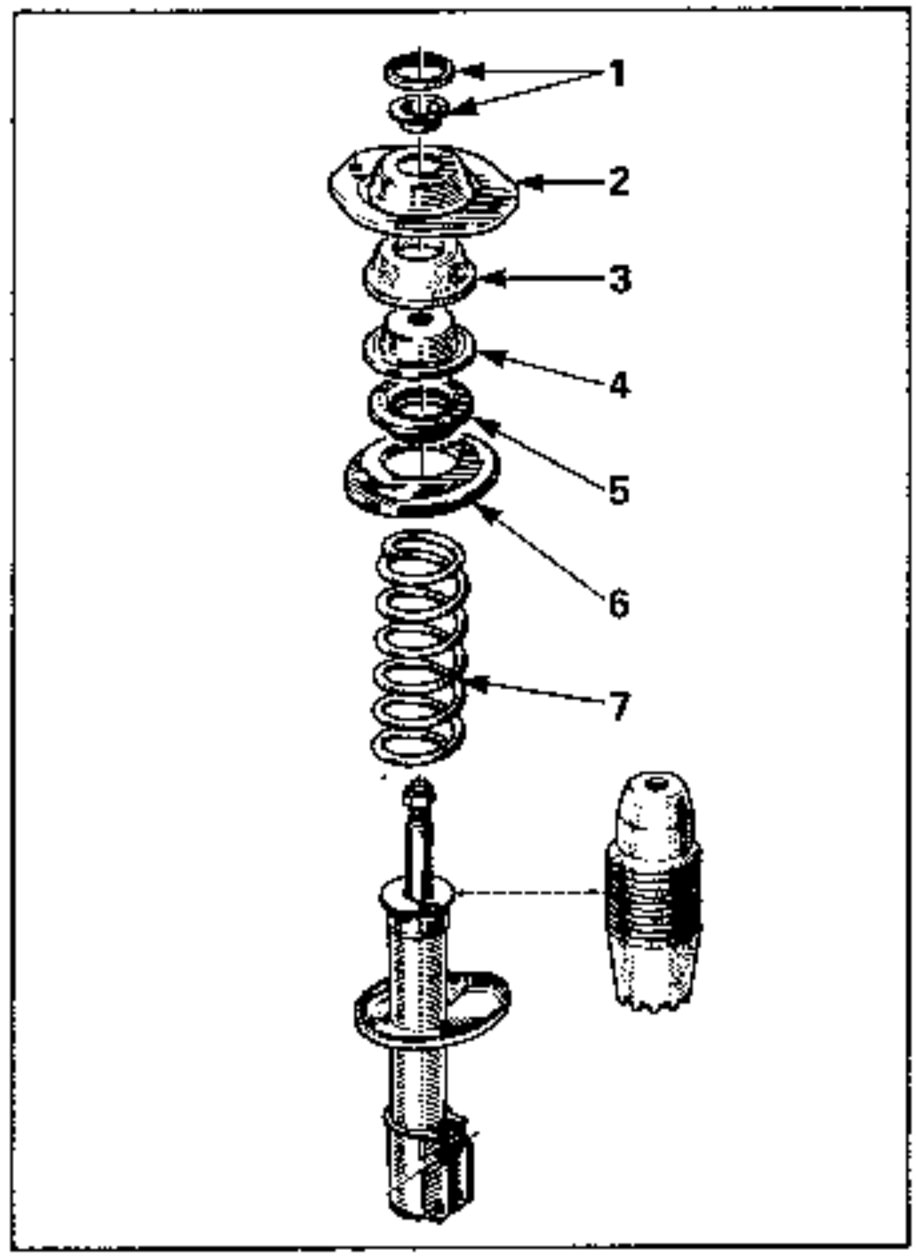
Compress the spring by approximately 10 mm.

Remove the nut from the shock absorber piston rod.



Gradually release the spring pressure.

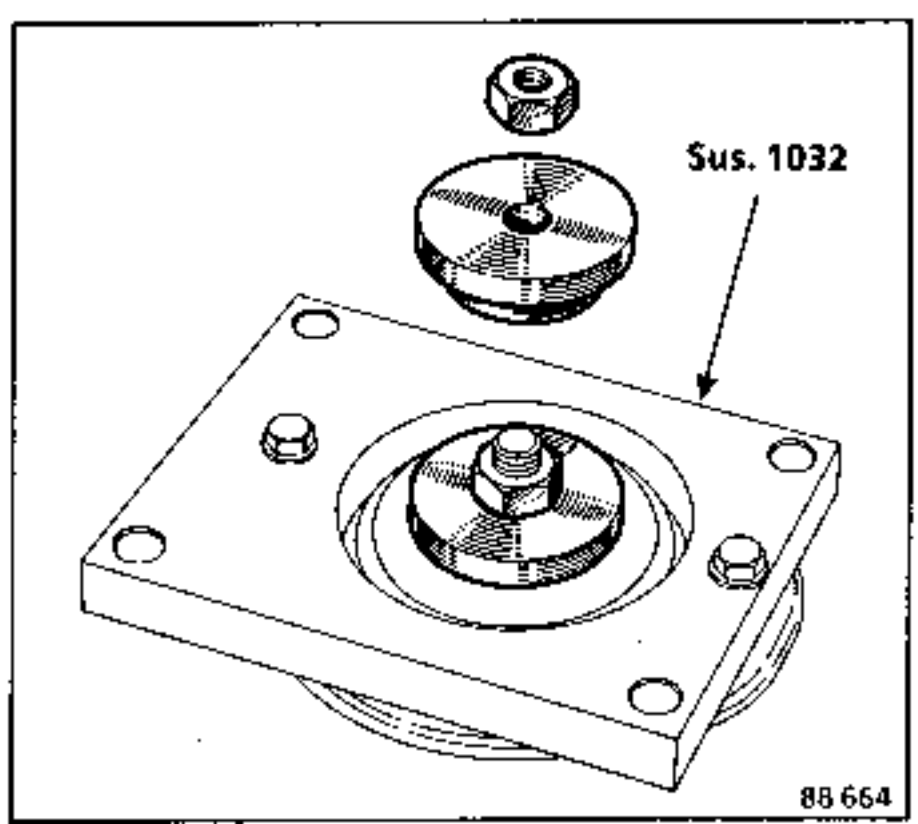
Dismantle parts (1) to (7) in that order.



Parts (4), (5) and (6) are the front axle pivot point.

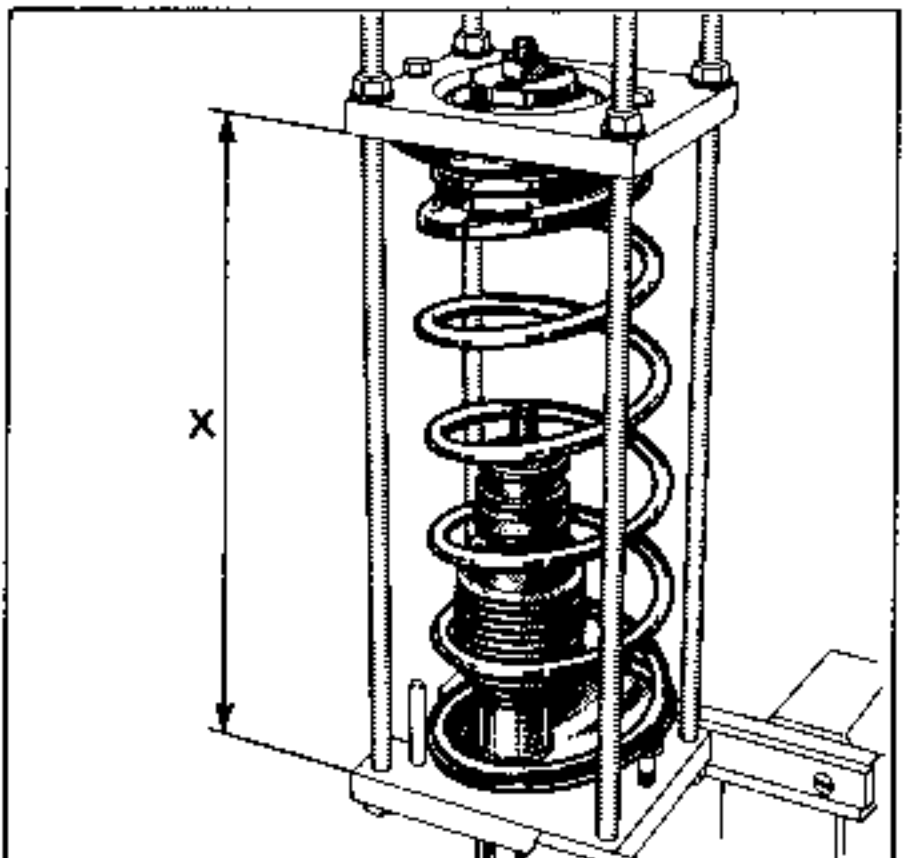
REASSEMBLING THE SPRING - SHOCK ABSORBER

Fit a plug to the upper plate of tool Sus.1032 to hold (2), (3) and (4) in place.



Position :
- the shock absorber on the three locating bolts (A),
- the spring on the lower shock absorber cup, ensuring that it is correctly positioned against the stop,
- the cup (6), the bearing (5) and the upper plate - plug assembly on the spring.

Compress the assembly to obtain a height X = 300 mm.

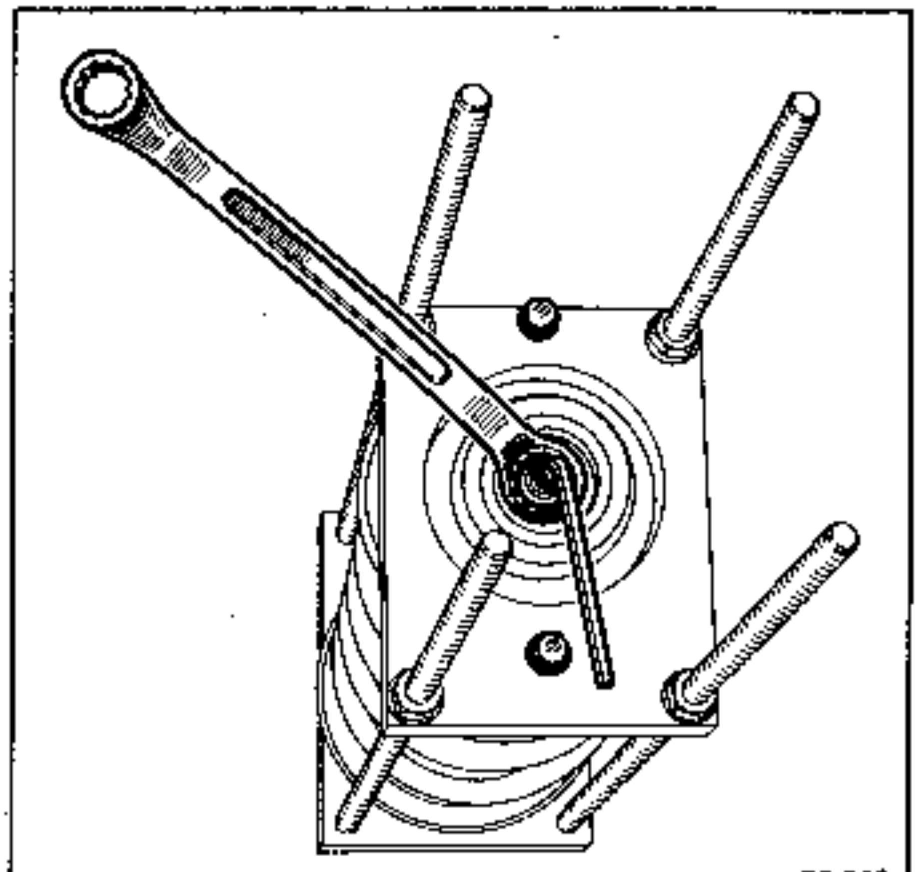


88 665

Remove the locating plug.

Pull on the shock absorber rod and, if necessary, turn the three locating bolts (A) to position the rod correctly in its location in the upper shock absorber cup.

Fit :
- the cup (1),
- the washer and nut.



88 663

Tighten the nut to the specified torque.

Gradually release the spring pressure.

Remove :
- the tool upper plate,
- the spring - shock absorber assembly from the compression tool.

REFITTING TO THE VEHICLE

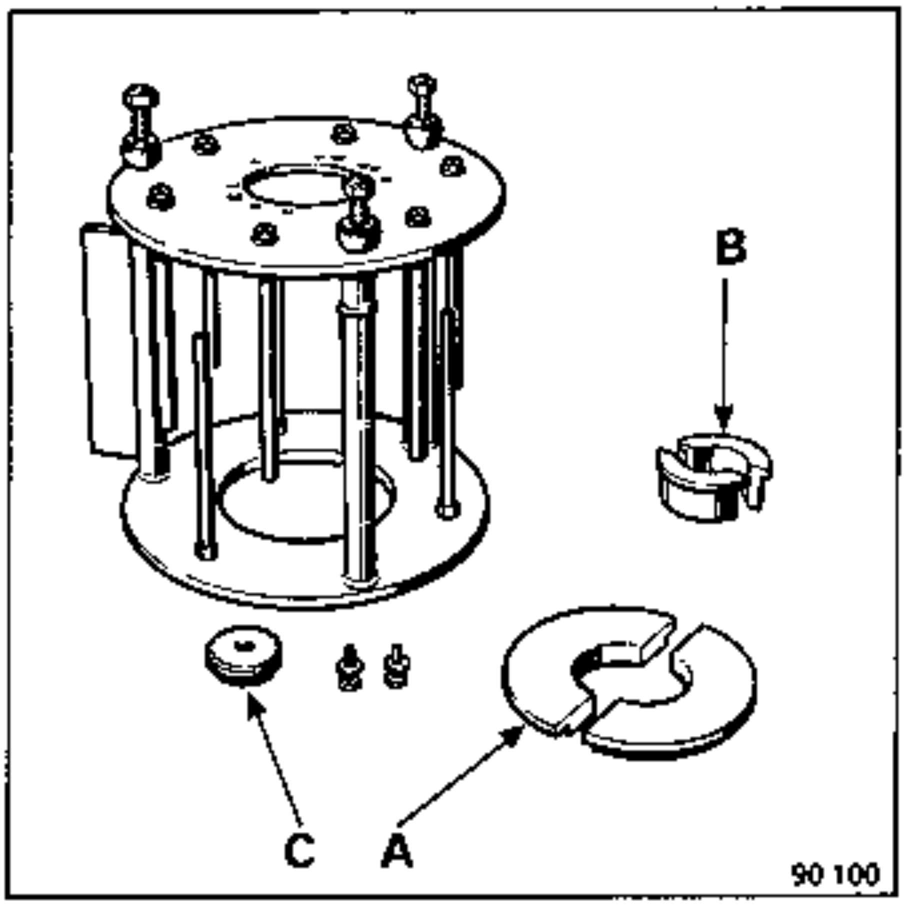
Refit the spring - shock absorber assembly to the vehicle whilst pressing down the lower suspension arm to avoid the shock absorber making contact with the drive shaft bellows.

Refit :
- the two shock absorber upper securing bolts and tighten them to torque,
- the shock absorber lower securing bolts and tighten them to torque.

Because of the heavy load in the spring, it is essential to ensure that the tooling is in perfect condition.

ESSENTIAL SPECIAL TOOLS
Sus.1052 Tooling for working on the front spring and shock absorber

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

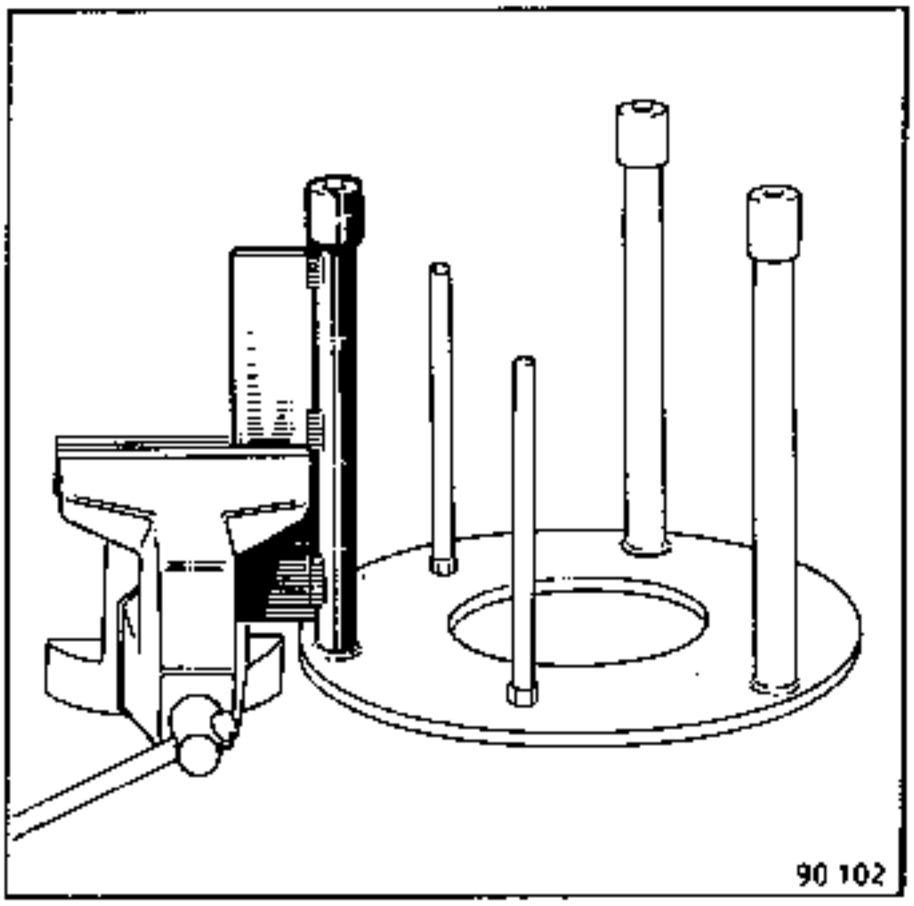


Upper and lower compression plate assembly assembly.

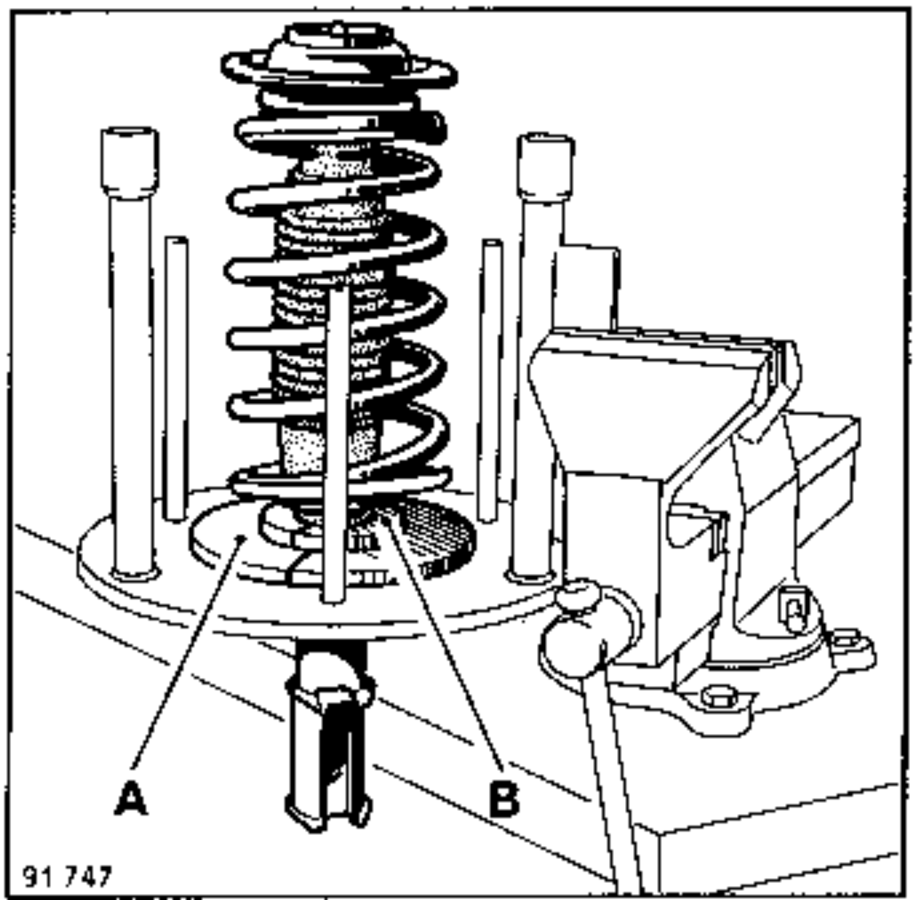
A Thrust cup
B Retaining shell marked R5
C Locating plug

DISMANTLING THE SPRING - SHOCK ABSORBER ASSEMBLY

Grip the lower plate of tool Sus.1052 in a vice.

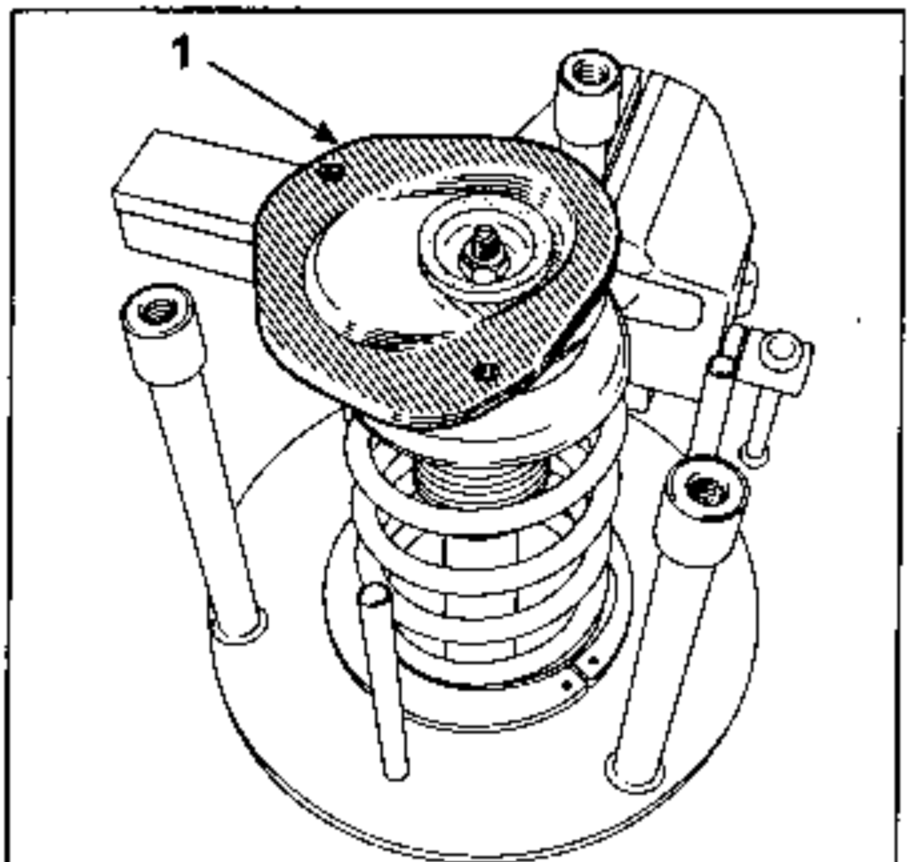


Place the spring - shock absorber assembly on the tool, positioning the two 1/2 cups (A) and the two 1/2 shells (B).



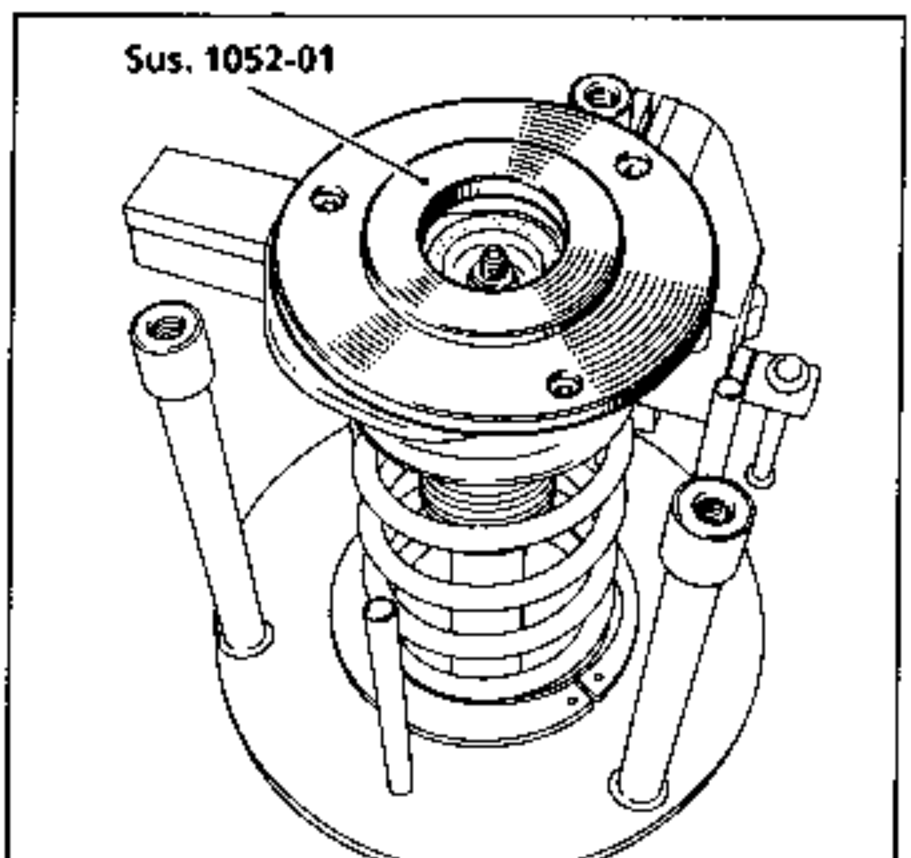
SPECIAL FEATURES OF TYPE C405 VEHICLES SINCE JUNE 1987

The upper pad (1) on these shock absorber assemblies is inclined.



91 699

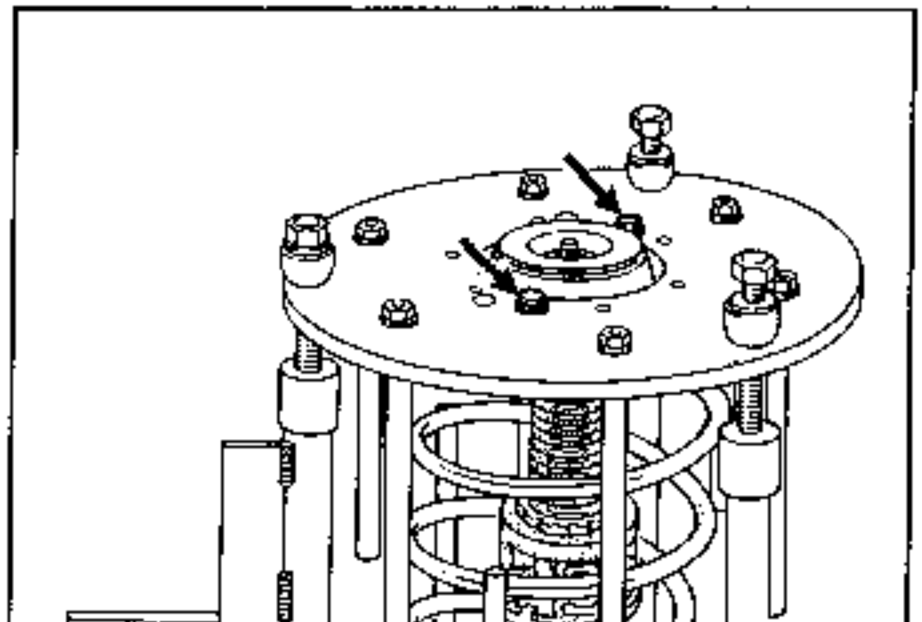
For this type of shock absorber one must use upper cup Sus.1052-01.



91 700

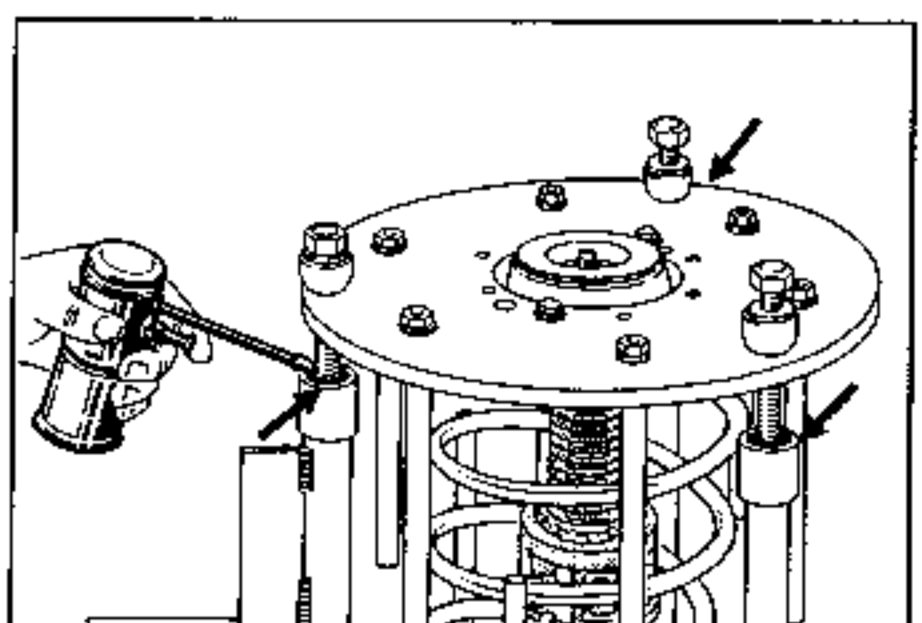
ALL TYPES

Fit :
- the upper plate,
- the two shock absorber upper cup retaining bolts in the marked holes (the vehicle references are engraved on the upper plate),

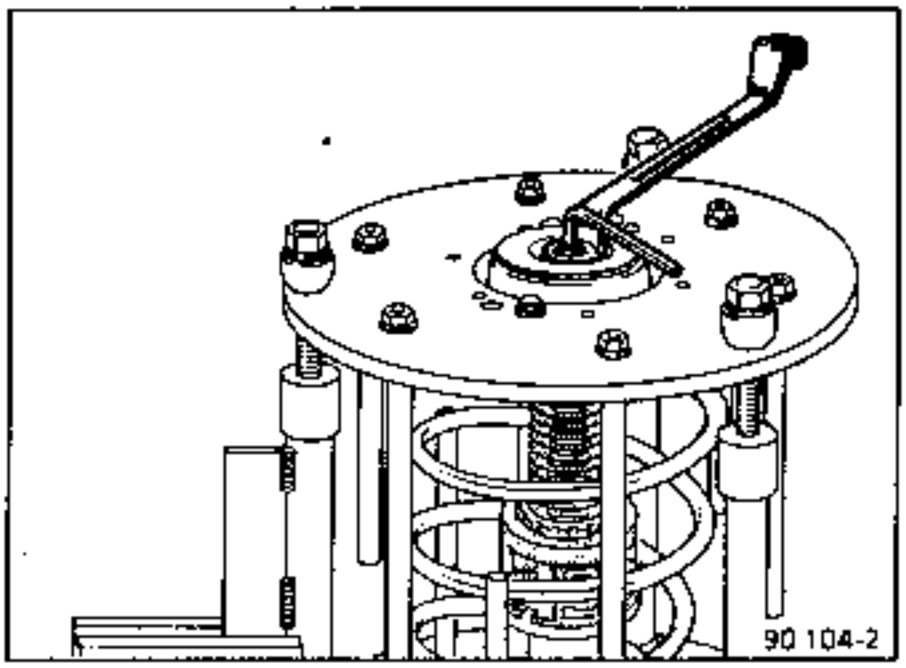

90 104

- the three compression bolts injecting copious quantities of oil into the oil reservoirs provided.

NOTE : as the screwed rods on the tool are subjected to very heavy loads, it is essential for them to be thoroughly oiled.

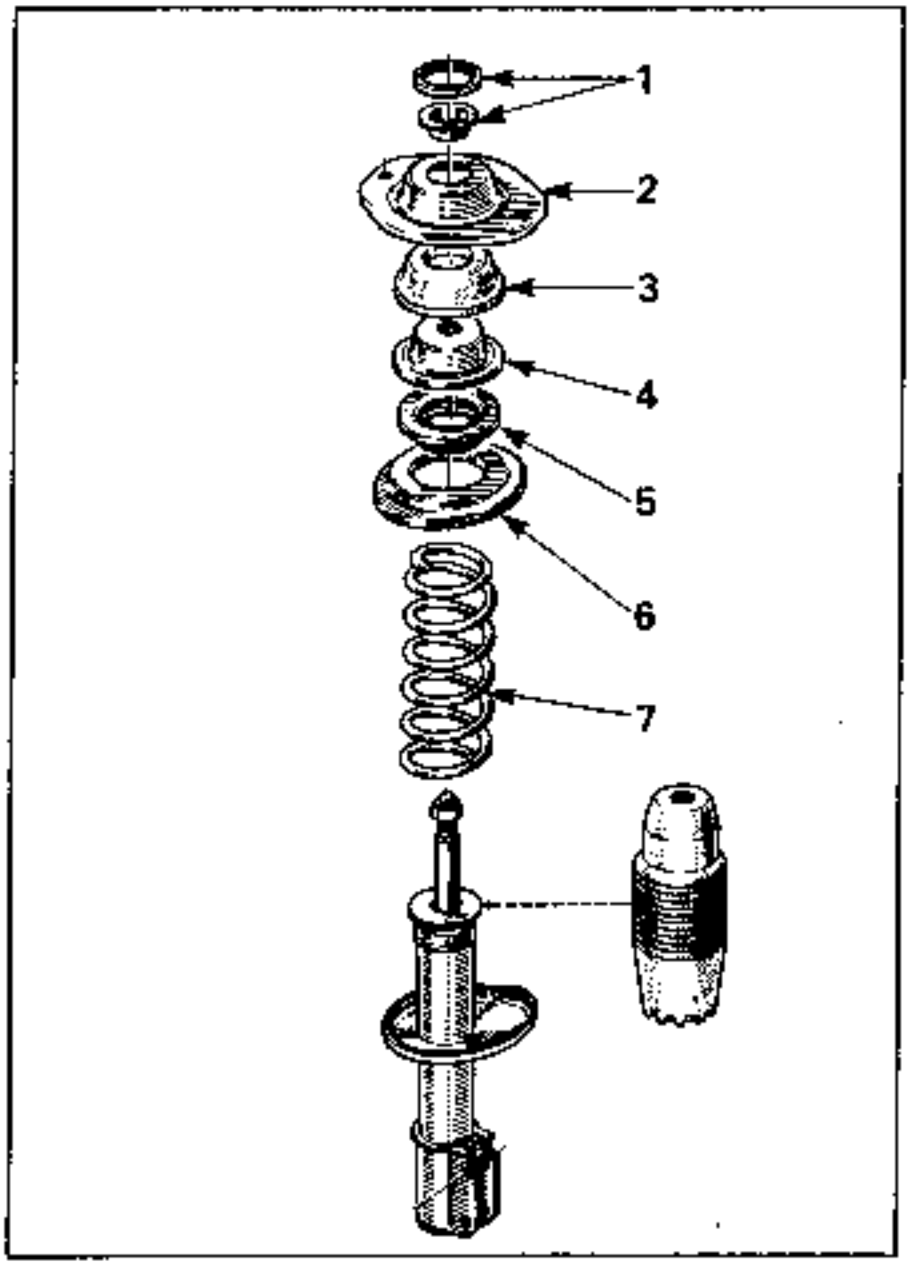

90 104-1

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



Gradually release the spring pressure.

Remove parts (1) to (7) in that order.

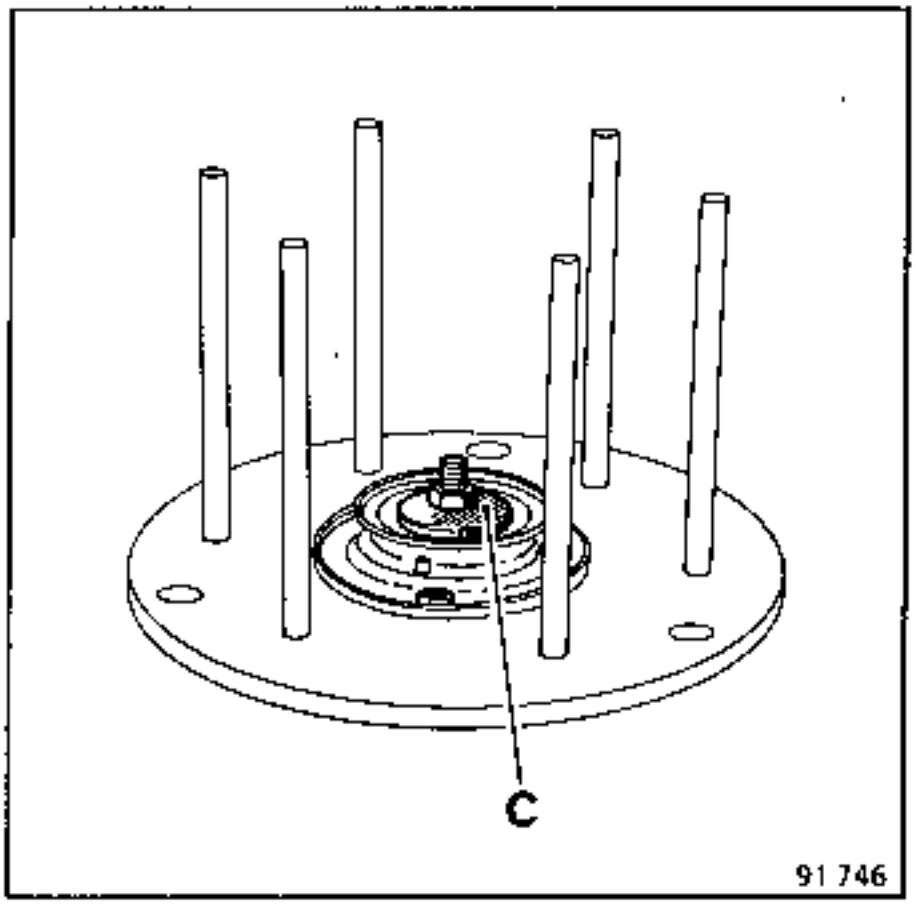


Parts (4), (5) and (6) form the front axle pivot point.

REASSEMBLING THE SPRING - SHOCK ABSORBER

Place a locating plug (C) on the upper plate of tool Sus.1052 to hold the assembly formed by (2), (3) and (4) in position.

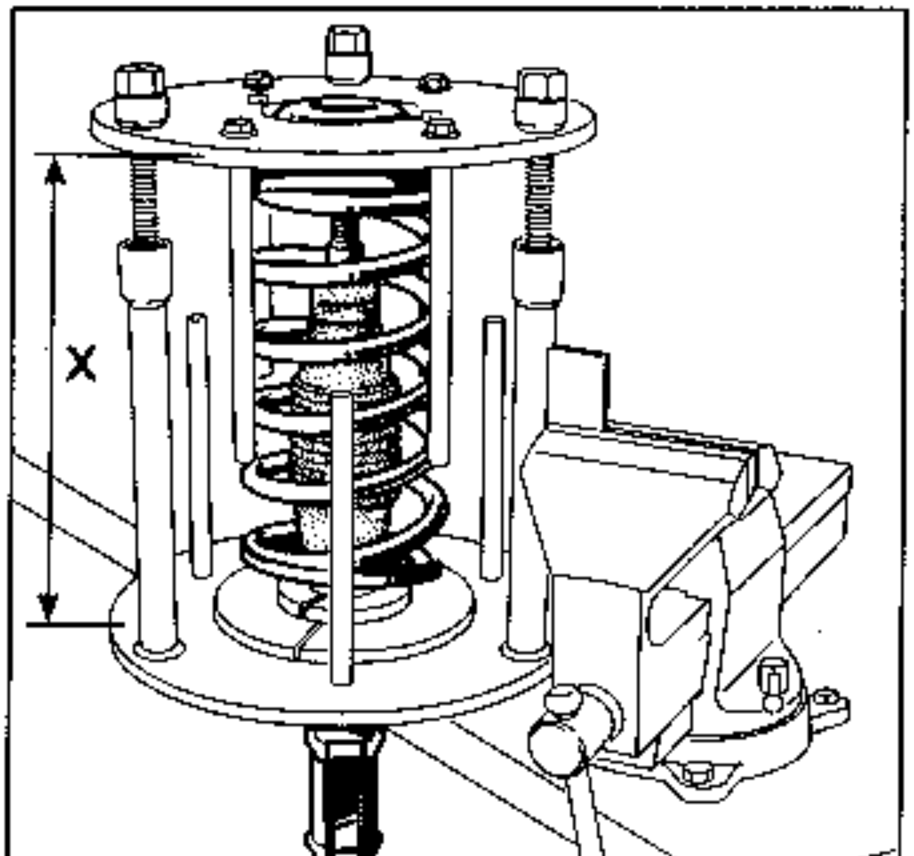
Fit plate Sus.1052-01 for type C405 vehicles produced after June 1987.



Position :
- the shock absorber,
- the spring on the shock absorber lower cup, ensuring that it is correctly positioned on the stop,
- the upper plate - plug assembly with the position marks in line.

Ensure that the spring is correctly positioned on the upper stop.

Compress the assembly to obtain a height
X = 400 mm

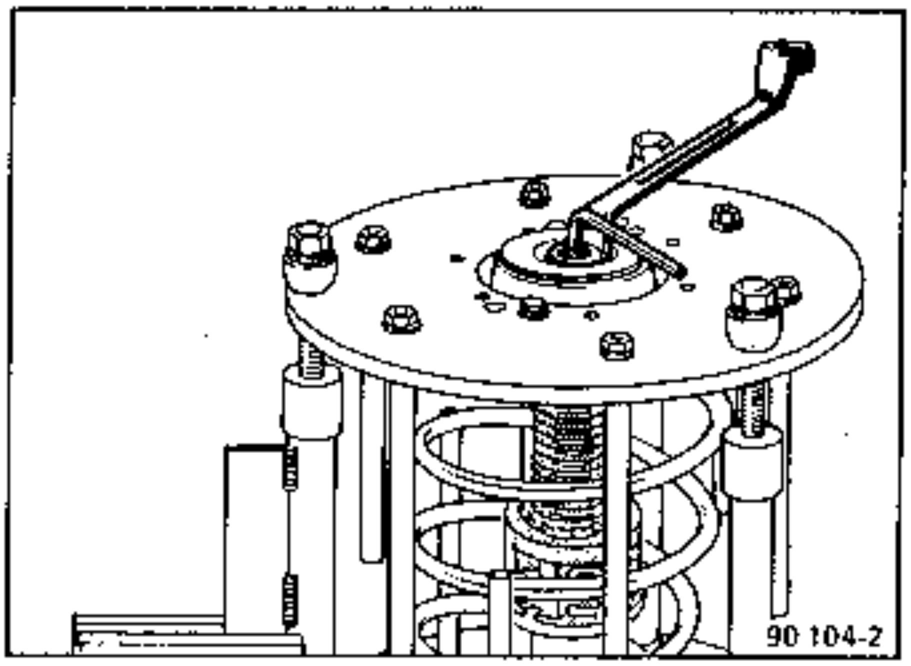


91 745

Remove the locating plug.

Compress the assembly and pass through the shock absorber piston rod.

Fit :
- the cup (1),
- the nut.



90 104-2

Tighten the nut to the specified torque.

Gradually release the spring pressure.

Remove :
- the upper plate from the tool,
- the spring - shock absorber assembly from the compression tool,
- plate Sus.1052-01 for the shock absorbers of C405 vehicles made since June 1987.

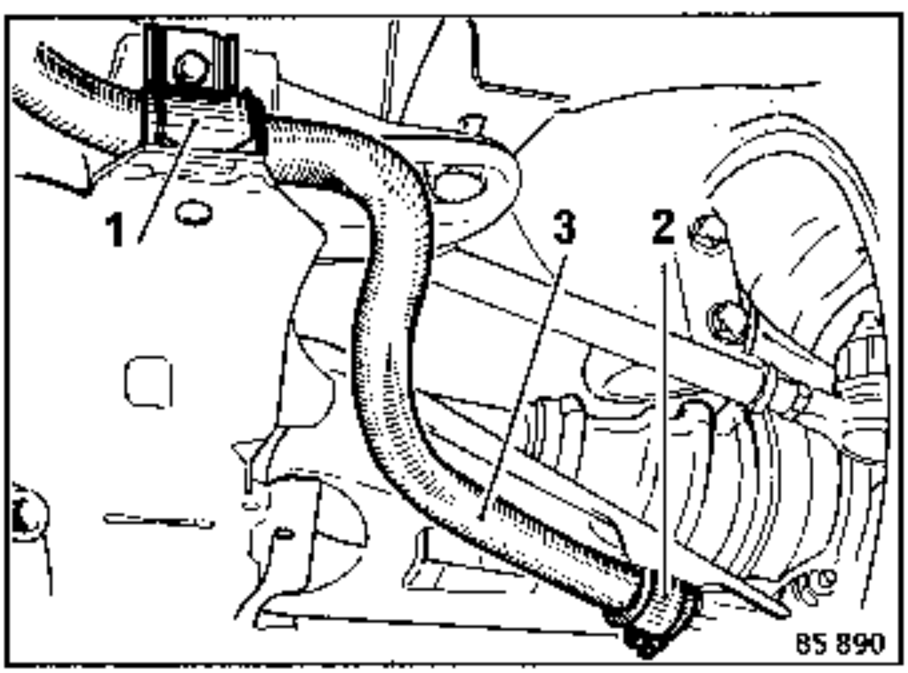
TIGHTENING TORQUES (in daN.m)	
Bearing retaining nuts	3

Before this operation can be carried out one must first remove :
- the exhaust down pipe,
- the gear shift control (manual gearboxes).

REMOVING

Remove from (1) to (3) on each side.

Check the condition of the anti-roll bar bearings and bushes and replace them if necessary.



1 Bearing on sub-frame
2 Bearing on suspension arm
3 Anti-roll bar

REFITTING

Coat the bearings with ELF MULTI MOS 2 grease.

Refit parts (3) to (1).

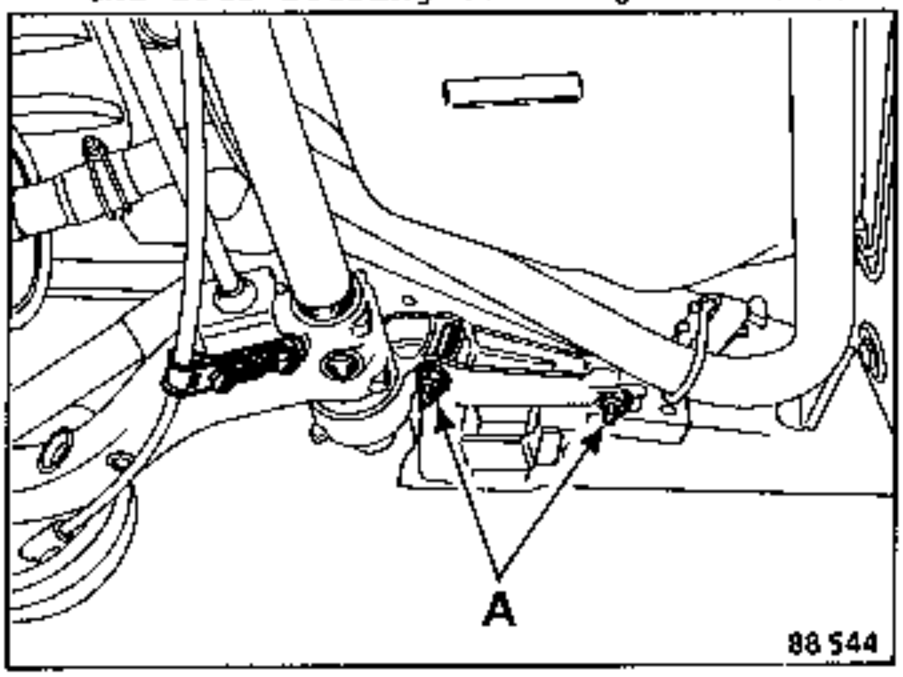
Position in which bearings are to be tightened : NO LOAD IN VEHICLE.

TIGHTENING TORQUES (in daN.m)	
Bearing securing nuts :	
B40X-C40X-S40X	8.5
F40X	9.5
Wheel bolts	8
Shock absorber lower securing bolts	6

REMOVING

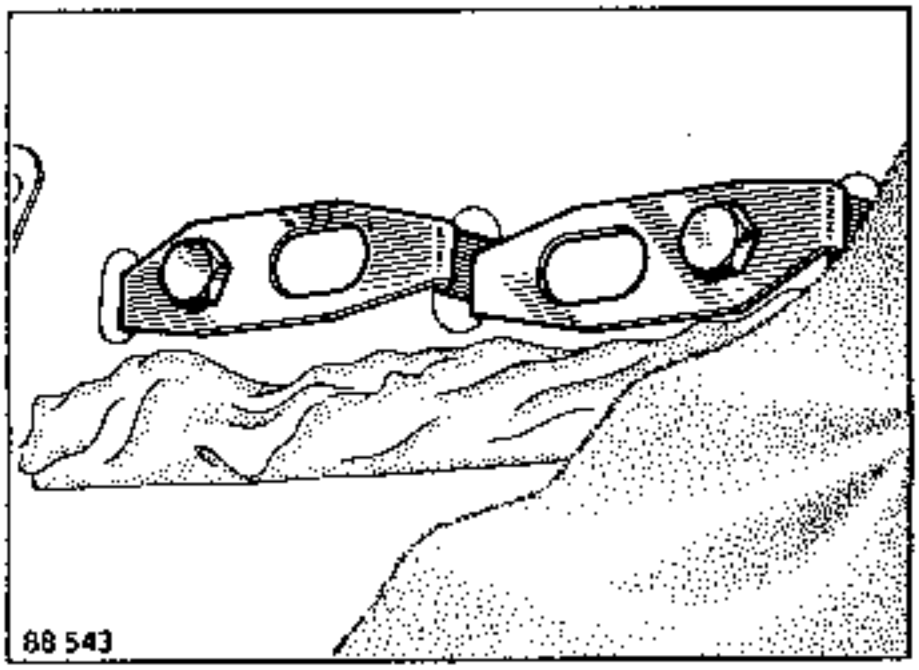
With the vehicle raised on a two column lift, remove :
- the two shock absorber lower securing bolts,
- the brake hoses,
- the brake compensator control (on certain versions),
- the hand brake secondary cables, disconnecting them at the central control point under the vehicle.

Support the rear axle and remove :
- the four bearing securing nuts (A),



- the rear axle assembly.

NOTE : damaged rear axle bearing securing bolts can be replaced by cutting the mastic under the rear seat to gain access to the bolt backing plates.



REFITTING

Carry out the removing operations in reverse.

Bleed the braking system.

Adjust the hand brake control.

Check, and if necessary adjust, the brake compensator (on certain versions).

(For these operations see section 37 "Controls").

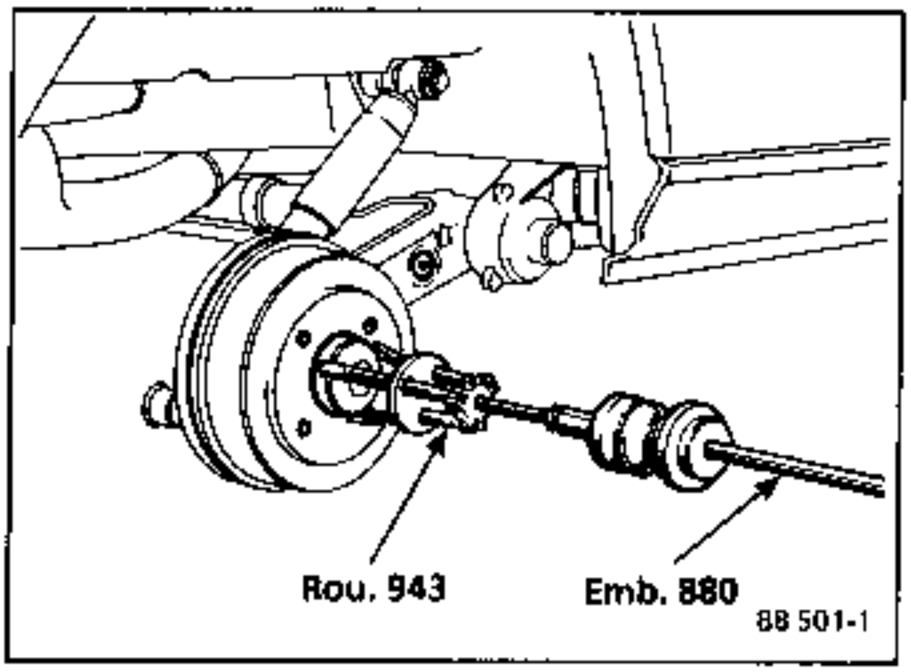
Both brake drums must be of the same diameter and therefore regrinding one drum automatically involves regrinding the other. A maximum of one mm of metal, on diameter, can be removed.

ESSENTIAL SPECIAL TOOLS		
Emb.	880	Inertia extractor
M.S.	821	Dust remover
Rou.	943	Hub plug extractor

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Brake anchor plate bolts	4.5
Hub nut	16

RMEOVING

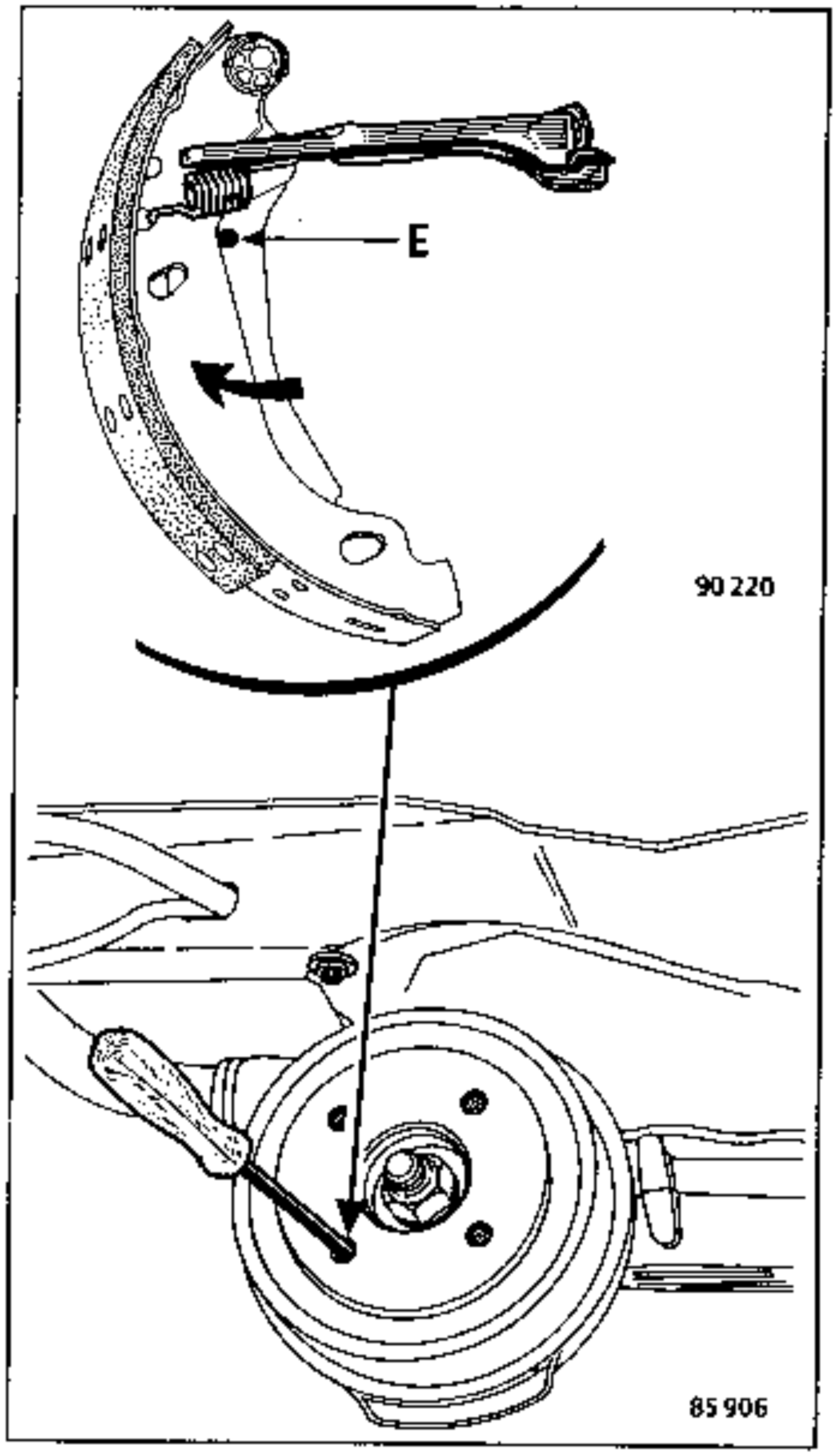
Remove :
- the hub plug using tools Rou.943 + Emb.880,



Release the hand brake and slacken off the hand brake secondary cables to permit the lever to move back.

Pass a screwdriver through the wheel securing hole in the drum and push the hand brake lever to release the brake shoe stud (E).

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

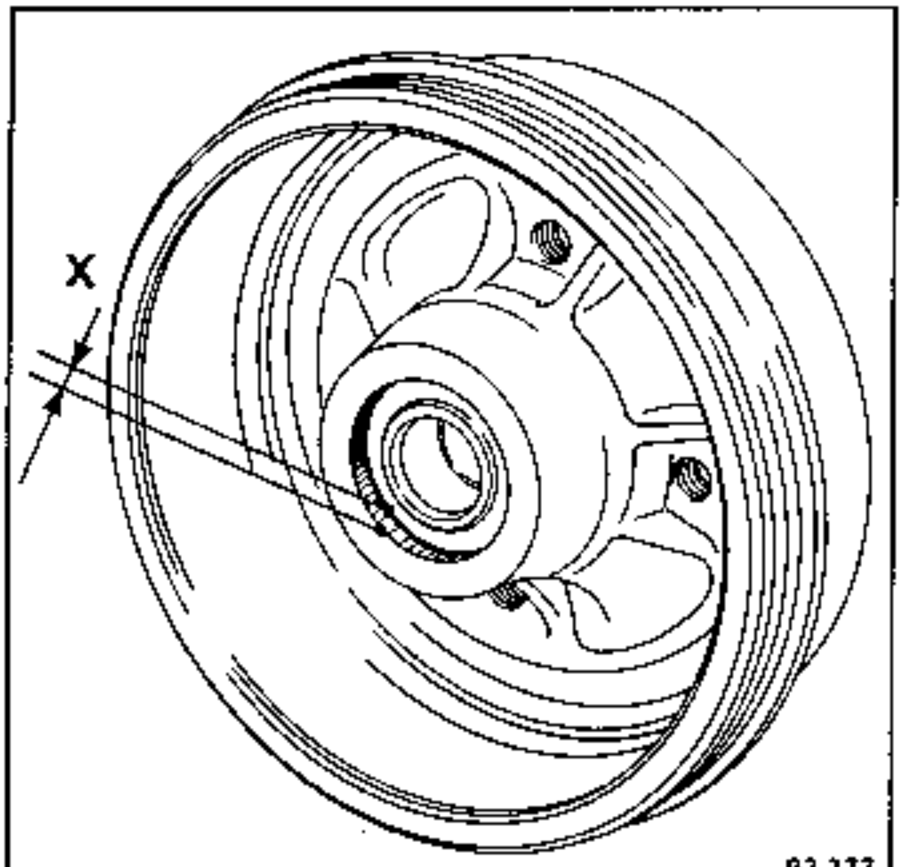


Remove :
- the stub axle nut and washer,
- the drum.

REFITTING

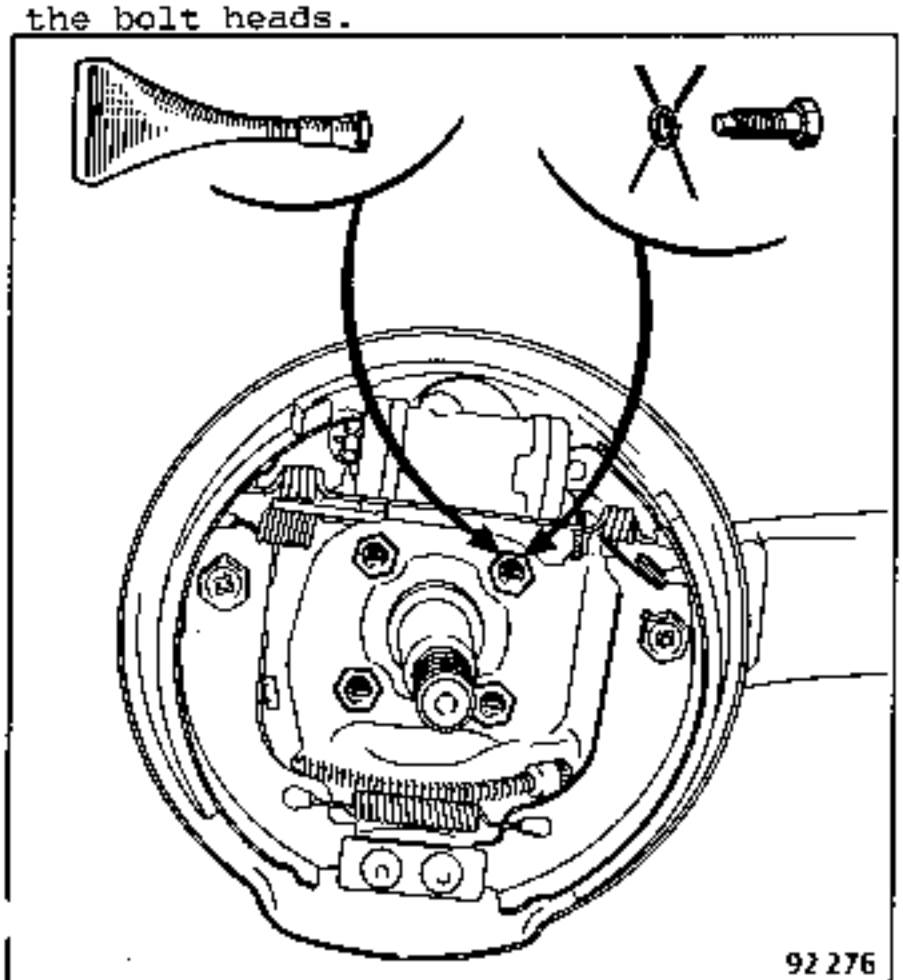
Special feature involved when replacing the drum.
The Parts Department is now supplying drums with a larger bearing locating area (dimension X) :

Early type : **X = 2.5 mm**
Later type : **X = 4.5 mm**

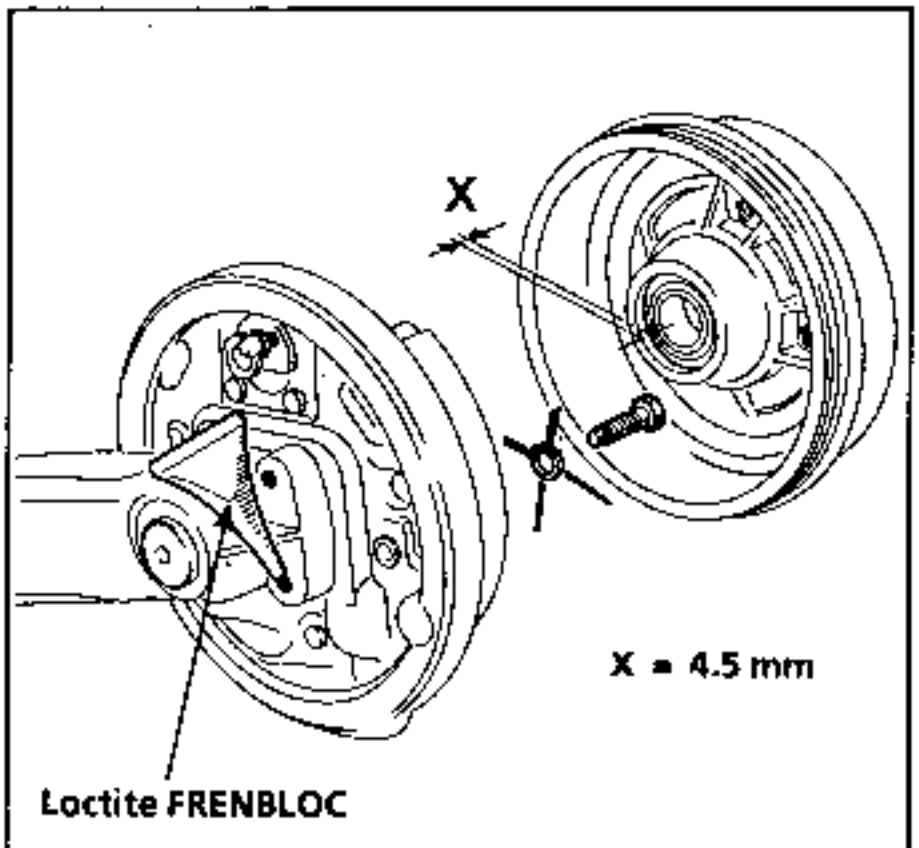


92 277

Carrying out this operation has involved eliminating the shakeproof washer and applying Loctite FRENBLOC to the brake anchor plate securing bolts to avoid any possible contact between the drum and the bolt heads.


92 276

IMPORTANT : when applying the adhesive, it is essential, if the anchor plate is to be tightened correctly, to apply the adhesive to the tapping in the suspension arm and not to the bolt. In fact, if the adhesive is applied to the bolts, when they are tightened the excess adhesive will prevent the flange making the effective contact with the suspension arm.



92 275

Consequently, you will find the instructions listed below on a label applied to the drums supplied by the Parts Department.

Dust out the drum and the linings with tool M.S.821.

Fit :
- the drum,
- the washer and the nut, tightening it to torque,
- the plug.

Adjust :
- the positions of the brake shoes by repeatedly pressing the brake pedal,
- the hand brake (see section 37 "Controls").

The following vehicles,

B400	B401	B402	B403	B404	B407	B408	B40F	B40G	B40H	B40J	B40K	B40M
C400	C401	C402	C403	C404	C407	C408	C40F	C40G	C40H	C40J	C40K	C40M
S400	S401			S404			S40F					

are now equipped with fixed brake compensators that are integral with the wheel cylinders. If either a wheel cylinder or compensator is found to be defective, change the entire unit. Any attempt at repairing these items is forbidden.

ESSENTIAL SPECIAL TOOLS	
M.S. 821	Brake dust remover

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Wheel nut	16
Bleed screws	0.8
Pipe union screw	1.3

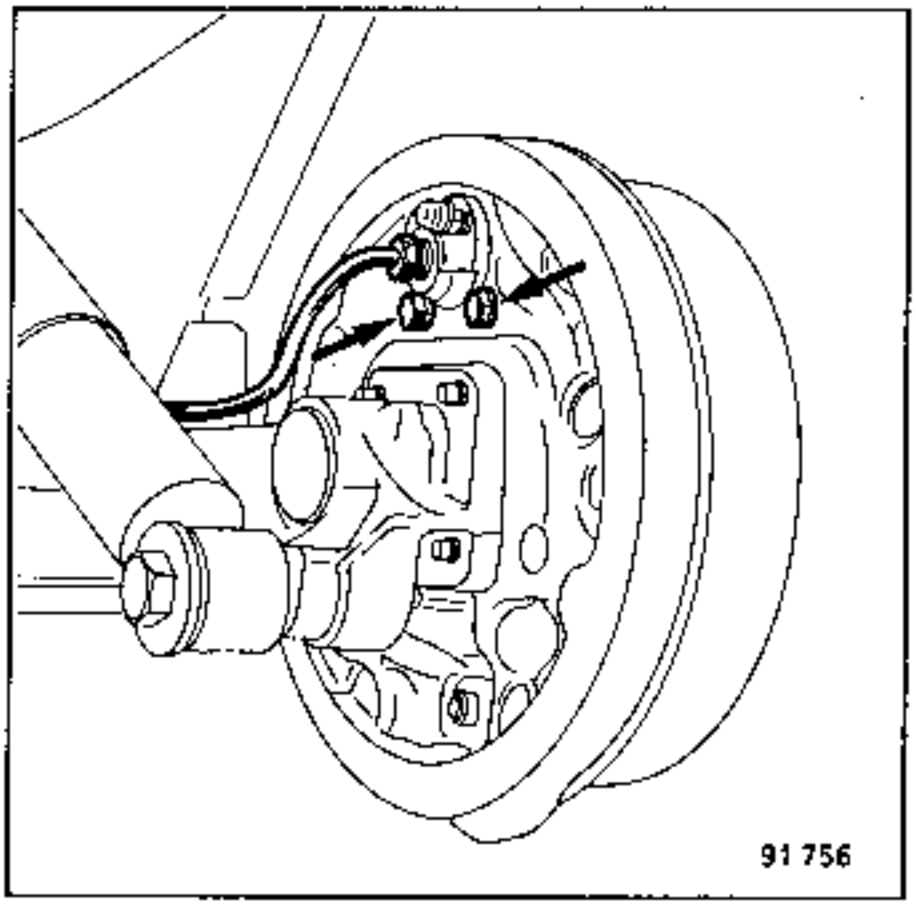
REMOVING

Remove :
- the drum (see corresponding section),
- the upper return spring (see section entitled "Brake shoes").

Pull apart the shoes.

Unscrew :
- the rigid brake pipe union on the wheel cylinder, using a pipe spanner,
- the two bolts that secure the cylinder to the anchor plate and remove the cylinder.

Check the condition of the brake shoes. If, in particular, they shows signs of contamination with oil, replace them by new ones.



REFITTING

Remove the dust from the drums and the shoes using tool M.S.821.

Carry out the removing operations in reverse.

Bleed the braking system.

Adjust the positions of the pads by repeatedly depressing the brake pedal.

Vehicles with integral brake compensators:

Check the shut-off pressure (see section 37 "Controls").

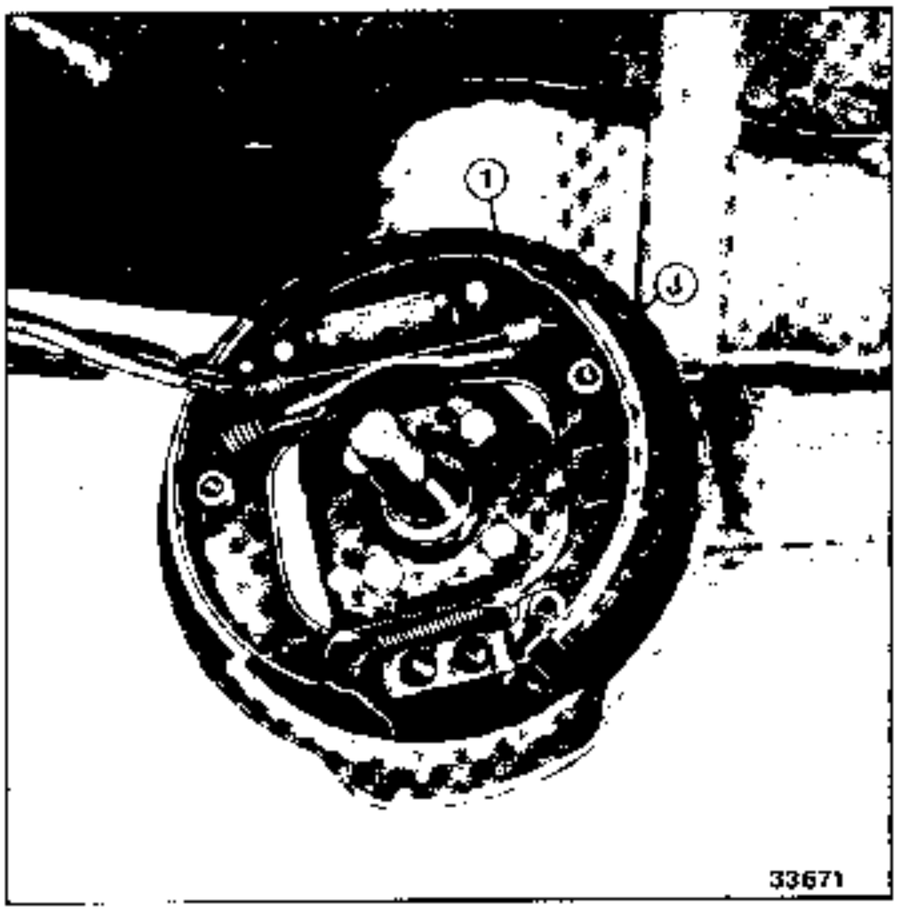
ESSENTIAL SPECIAL TOOLS		
Emb.	880	Inertia extractor
M.S.	821	Brake dust removal equip.
Rou.	943	Hub plug extractor

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Hub nuts	16

All the shoes or linings on any given axle are to be replaced. Never fit linings of different grades or make.

REMOVING

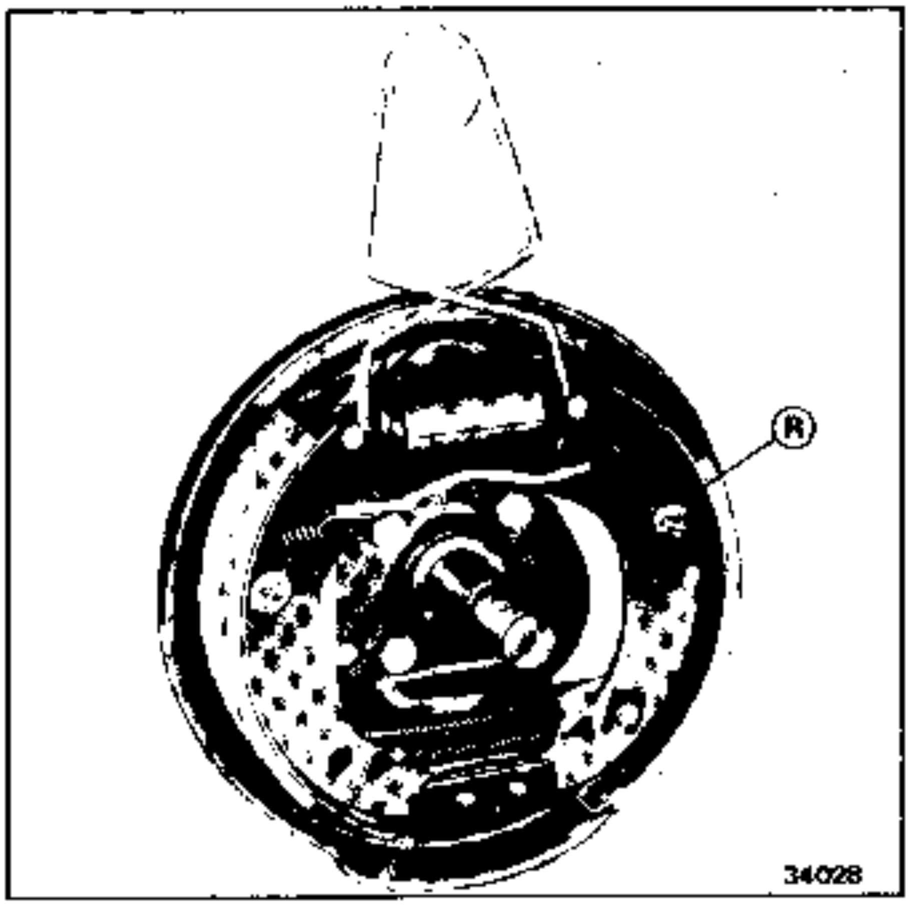
Remove :
- the brake drum (see corresponding section),



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

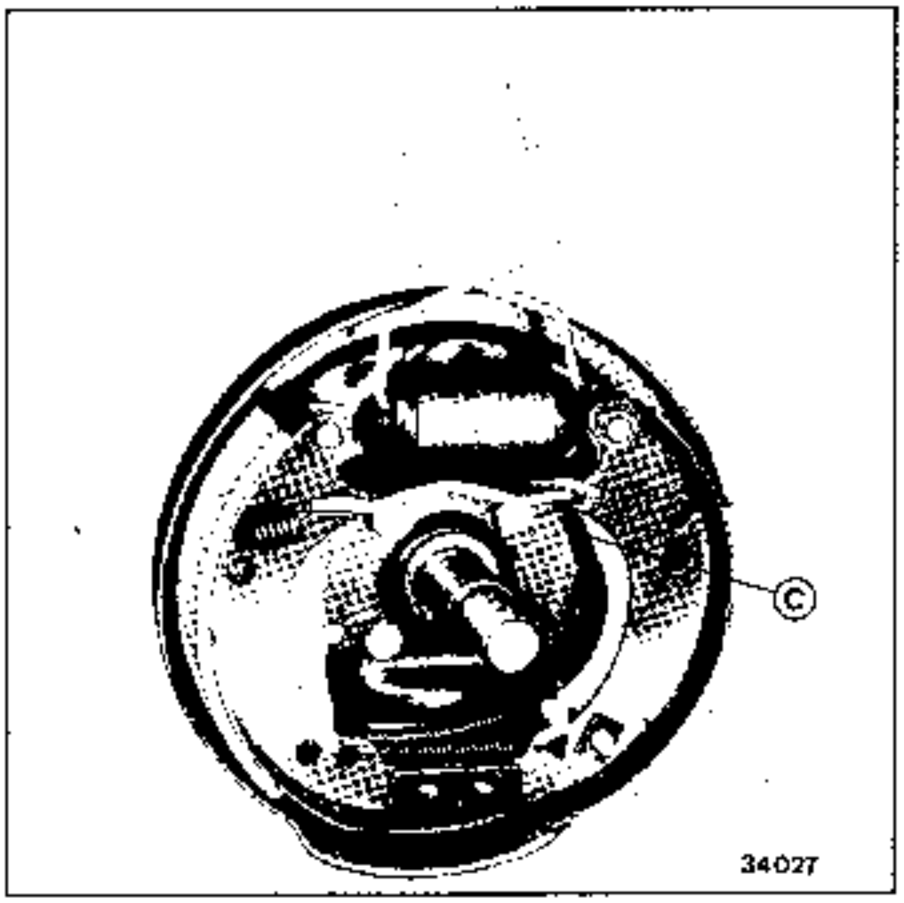
Fit a clip to the wheel cylinder pistons.

Using multi-purpose grips, remove the shoe retaining spring whilst keeping the connecting link (R) in contact with the brake anchor plate (J).

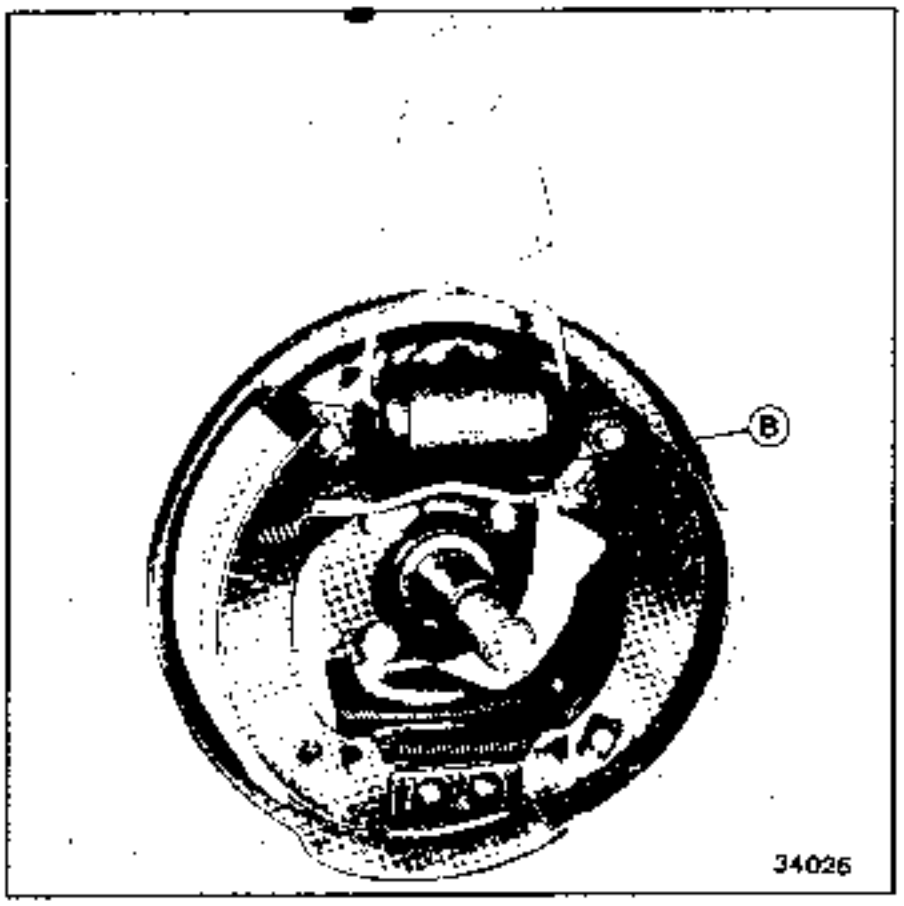


Move the toothed lever (C) as far as it will go towards the stub axle.

Pull the brake shoes away from the anchor plate.

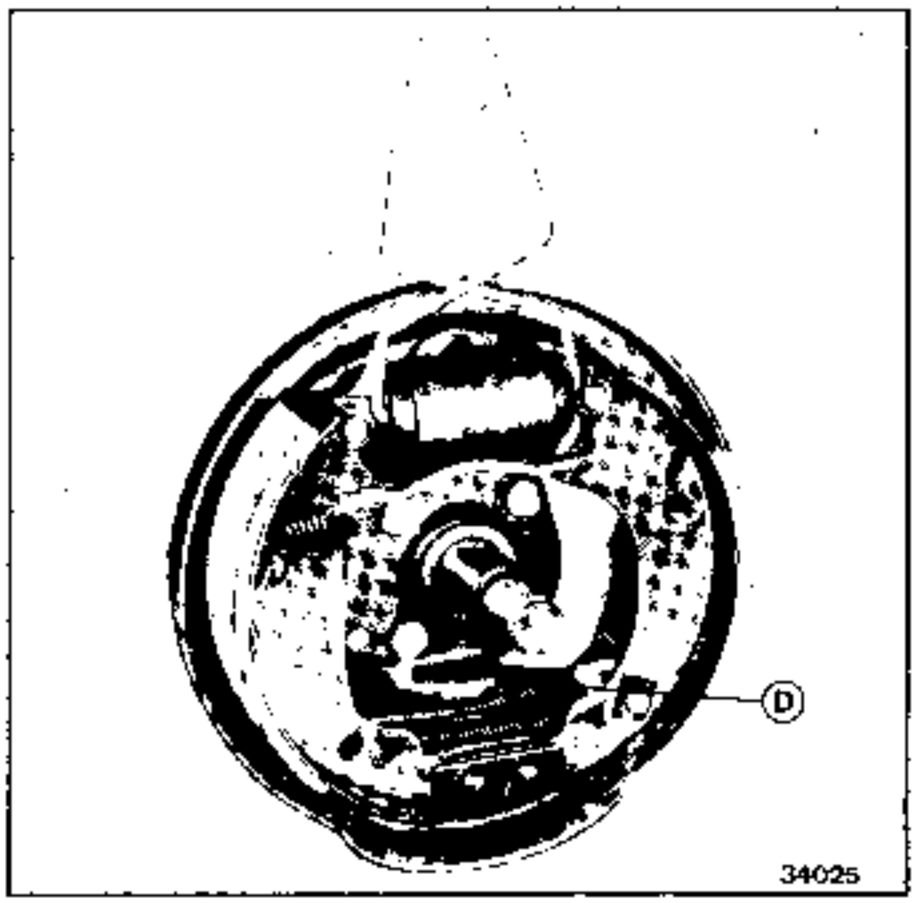


Pull link (B) outwards and remove it from the leading shoe.



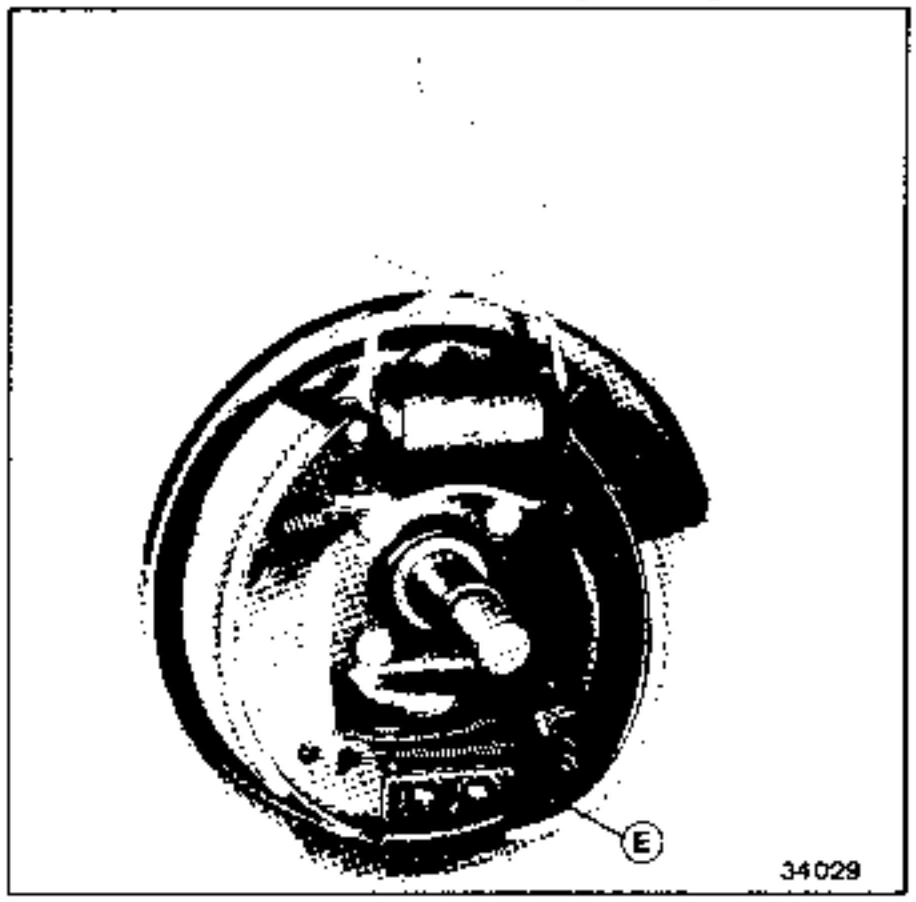
Unhook the hand brake cable.

Place the quadrant (D) in its initial position.



Swing the leading shoe through 90°.

Remove the shoes from the pivot points (E)



Dust out the drums and anchor plates using tool M.S.821.

Check the condition of the drums and hoses.

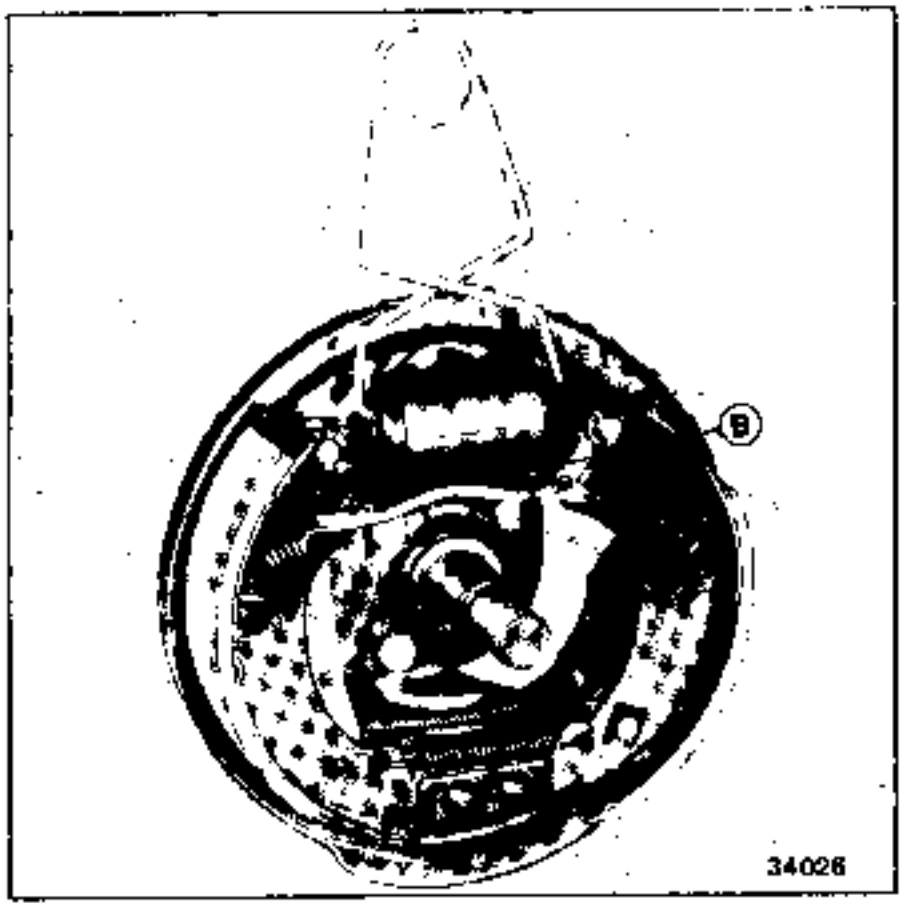
REFITTING

Hook :
- the hand brake cable in place,
- the lower spring into the shoes.

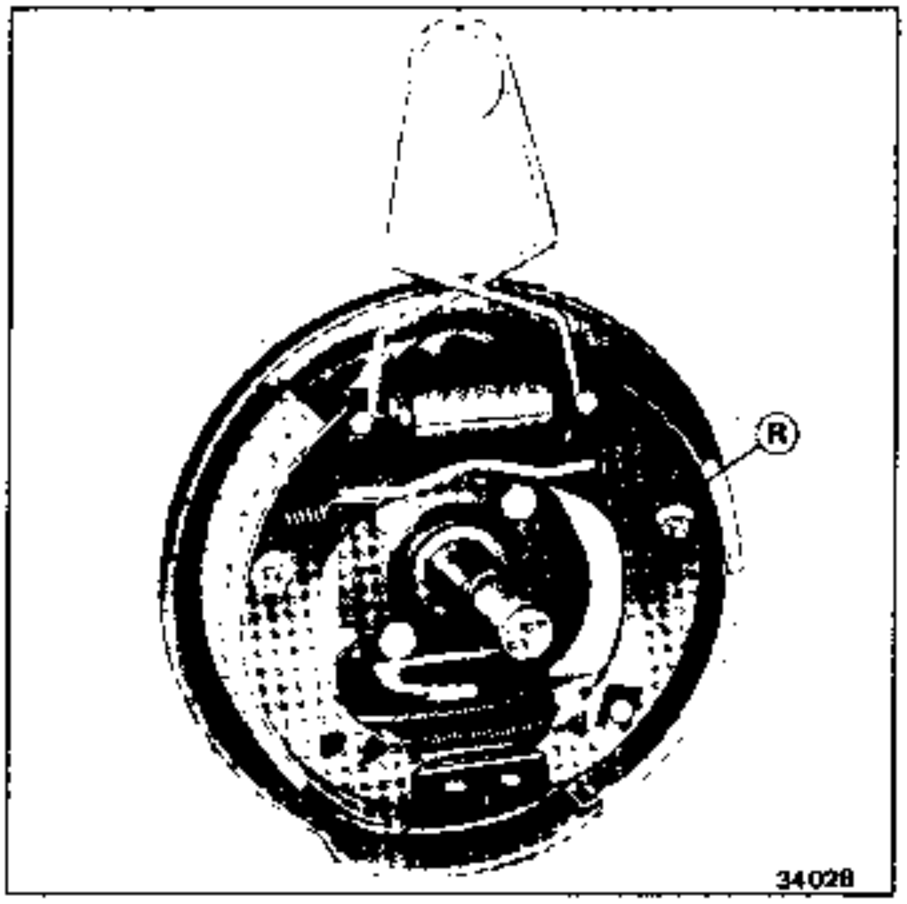
Place the shoes in position on the anchor plate, swinging the leading shoe through 90°.

Tilt the toothed lever as far as it will go towards the stub axle and then fit :

- the link (B),



- the two brake shoe retaining springs (R),

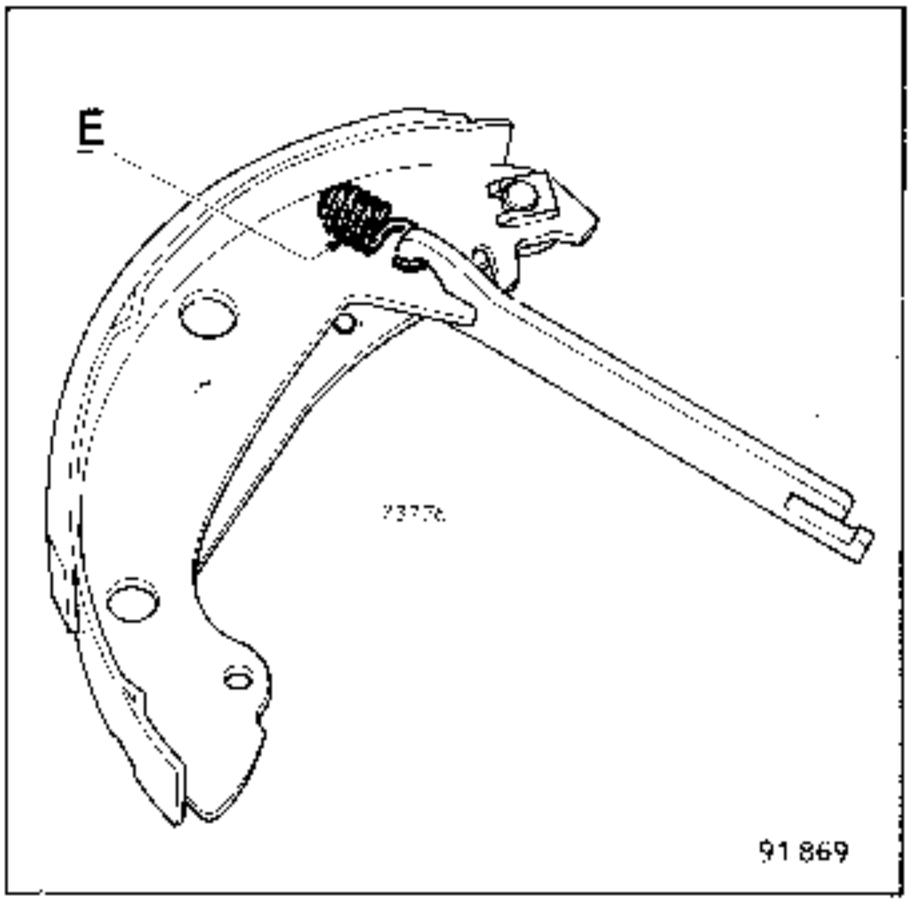


- the upper spring (1).

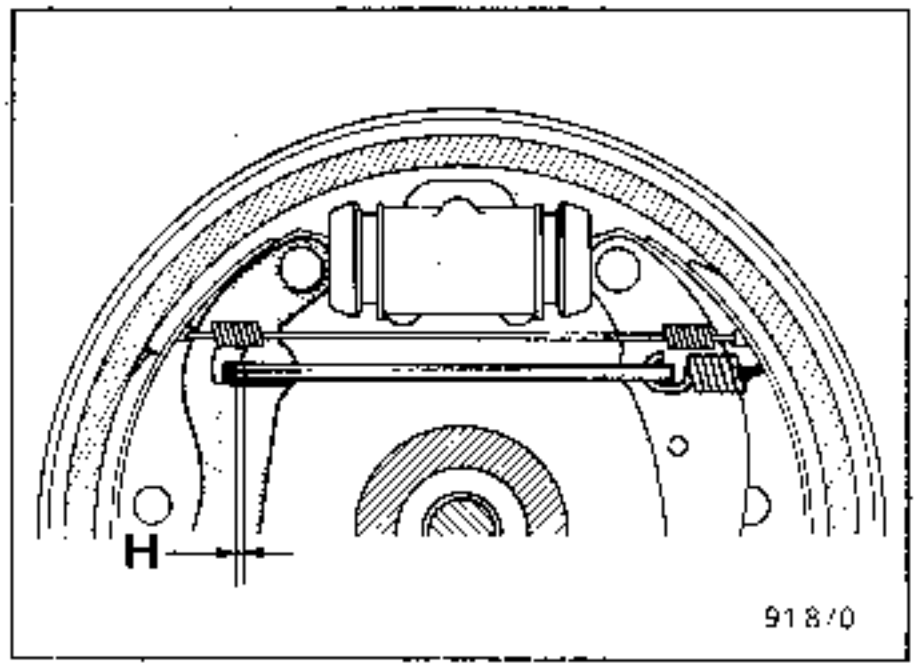
Remove the clips from the wheel cylinders.

ADJUSTING

The efficient operation of the automatic adjustment system depends on the tension in the spring (E) hooked between the link and the trailing shoe.



It is adjusted by measuring dimension H = approximately 1 mm, between the link and the leading shoe as shown above (with the hand brake lever in contact with the shoe).



If this dimension (H) is not correct, the link tension spring must be replaced as must the two shoe return springs.

Adjust :
- the positions of the shoes by repeatedly depressing the brake pedal.
- the hand brake (see section 37 "Controls").

ESSENTIAL SPECIAL TOOLS		
Emb.	**880**	Inertia extractor
M.S.	**821**	Brake dust remover
Rou.	**943**	Hub plug extractor

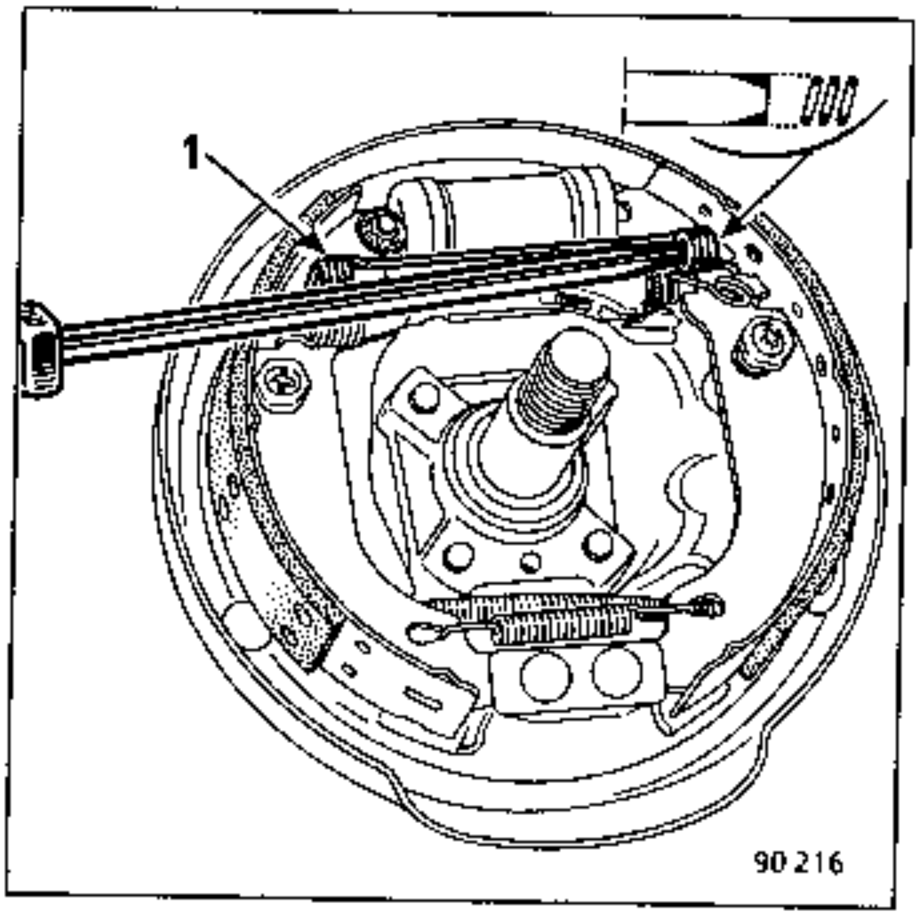
TIGHTENING TORQUES (in daN,m)	
Wheel bolts	**8**
Hub nuts	**16**

All the linings on any given axle must be replaced. Never fit linings of different makes or grades.

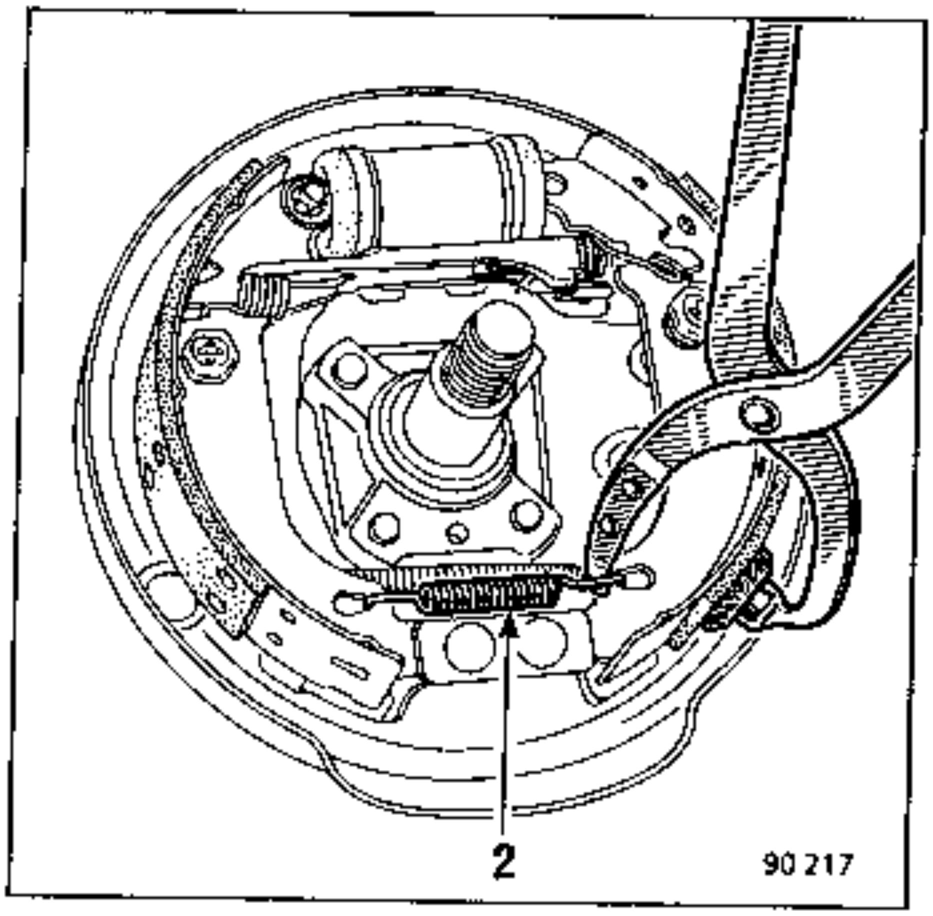
REMOVING

Remove :

- the brake drum (see corresponding section),
- the upper spring (1) using a screwdriver modified as shown in this drawing.

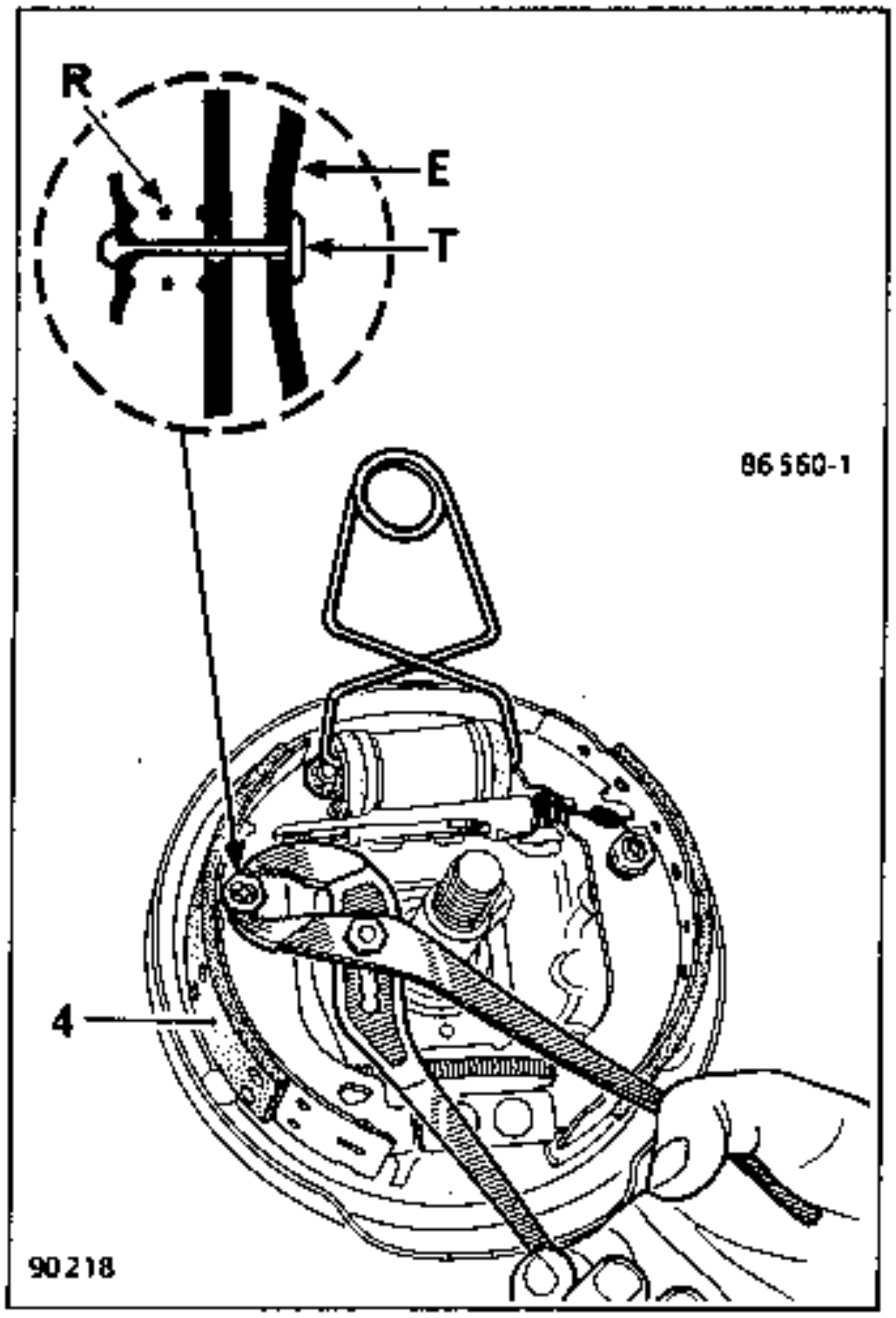


- the lower spring (2) using brake shoe grips.



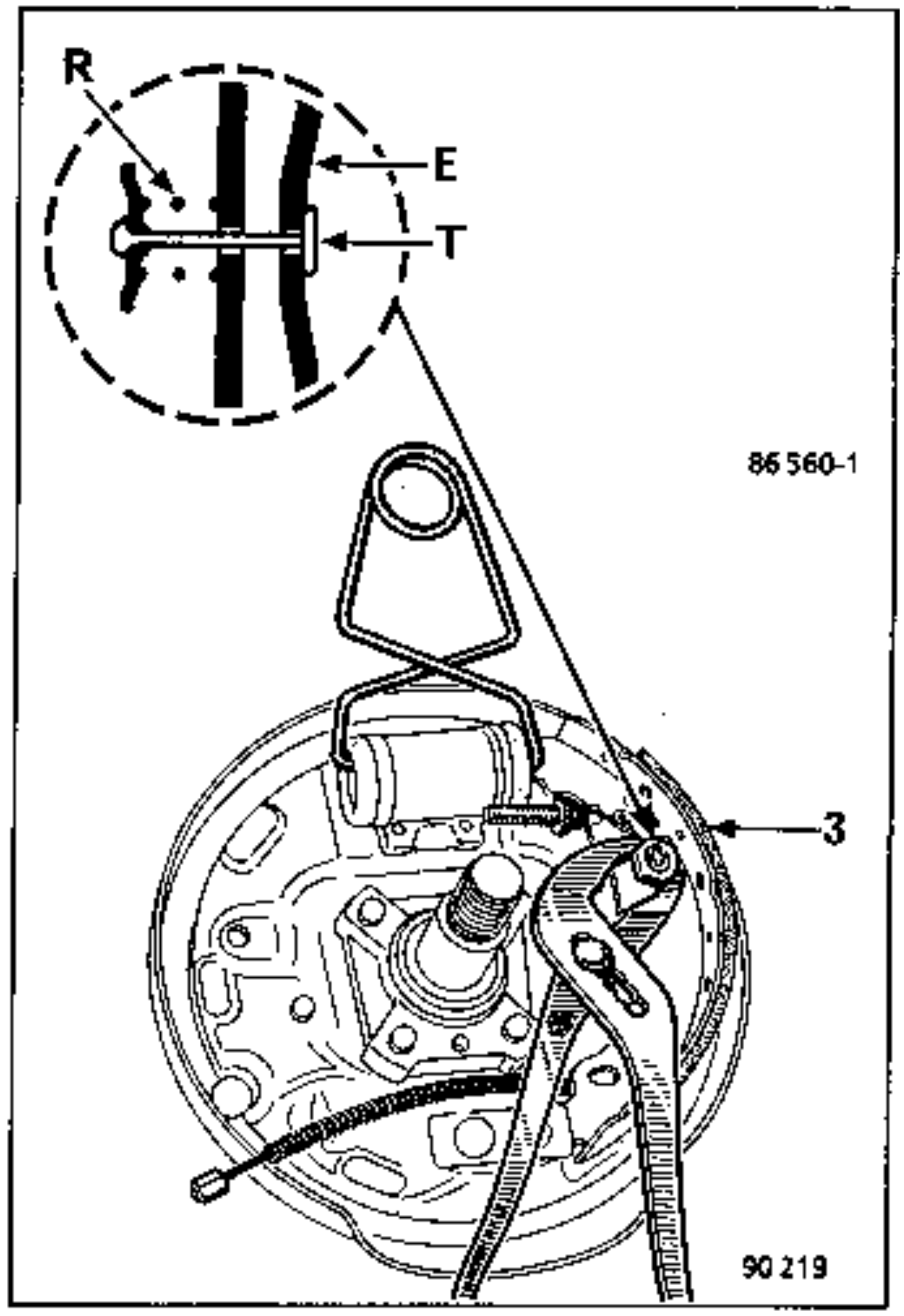
Fit a clip to the wheel cylinder pistons.

Using multi-purpose grips, remove the trailing shoe lateral retaining spring (R) whilst holding the connecting link (T) in contact with the brake anchor plate (E).



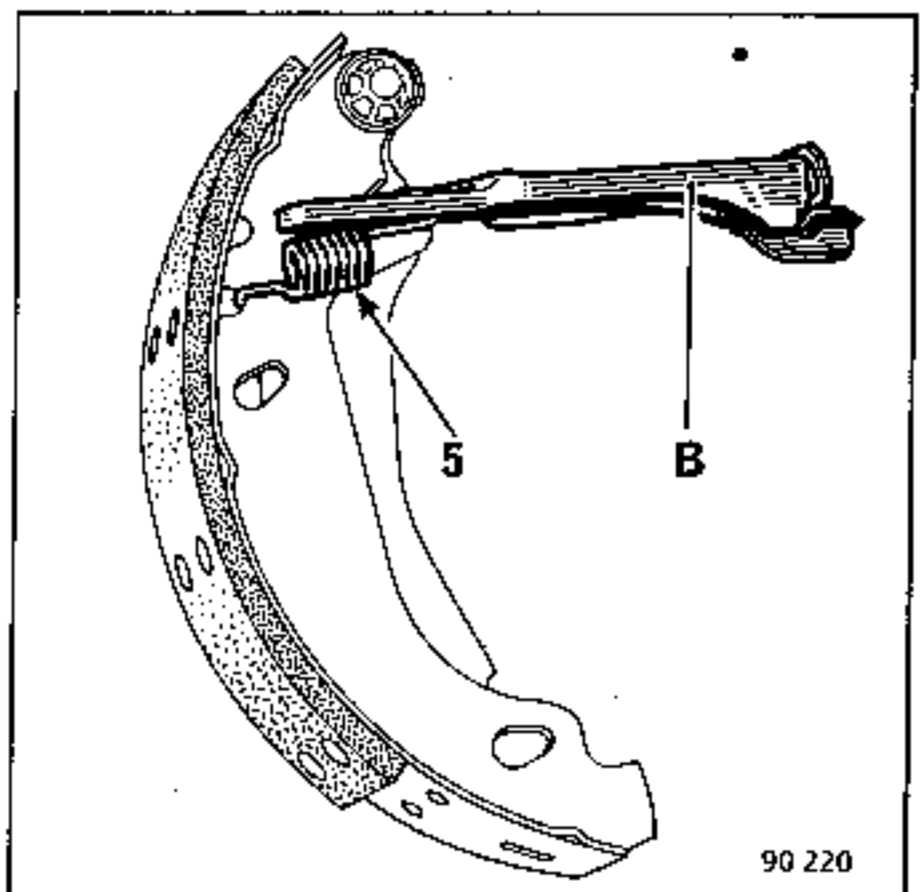
Slacken off, to their maximum extent, the hand brake cables and remove :

- the assembly formed by the trailing shoe (4) and the link, freeing the hand brake cable,
- the primary shoe lateral retaining spring (R),
- the primary shoe (3) and toothed quadrant assembly.

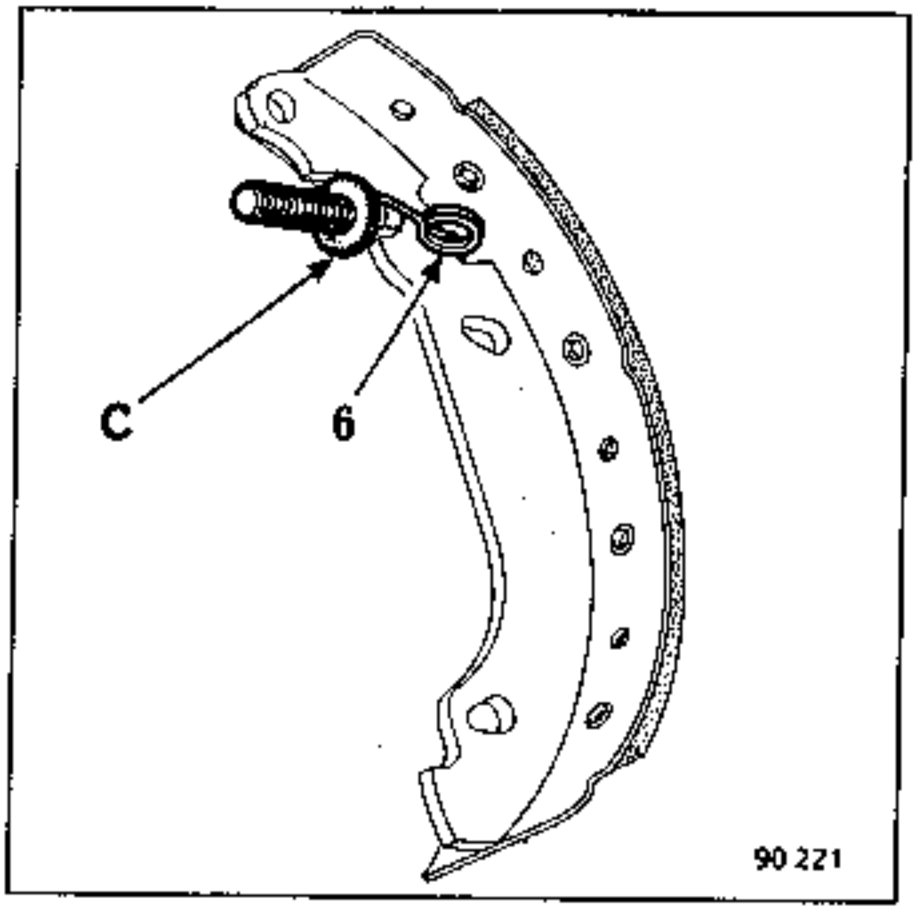


Remove, from the trailing shoe :

- the link (B) taking care not to damage the automatic wear take-up mechanism,
- the spring (5).



Remove the toothed quadrant (C) and the spring (6) from the leading shoe.

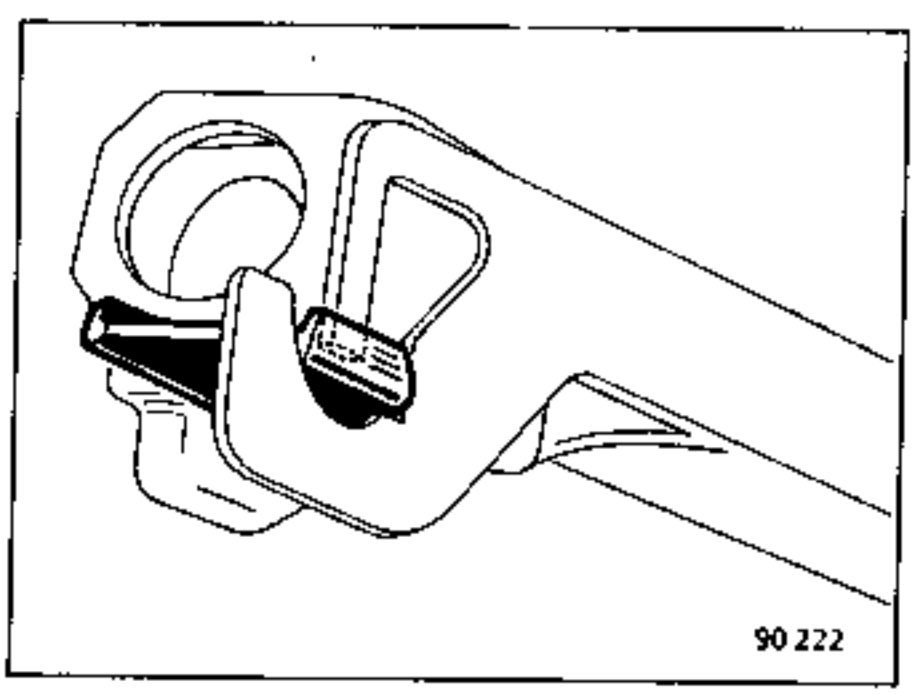


Dust out the drums and anchor plates using tool M.S.821.

REFITTING

NOTE : the component parts of the brake mechanisms are different on the right hand side and left hand side and it is essential not to intermix them.

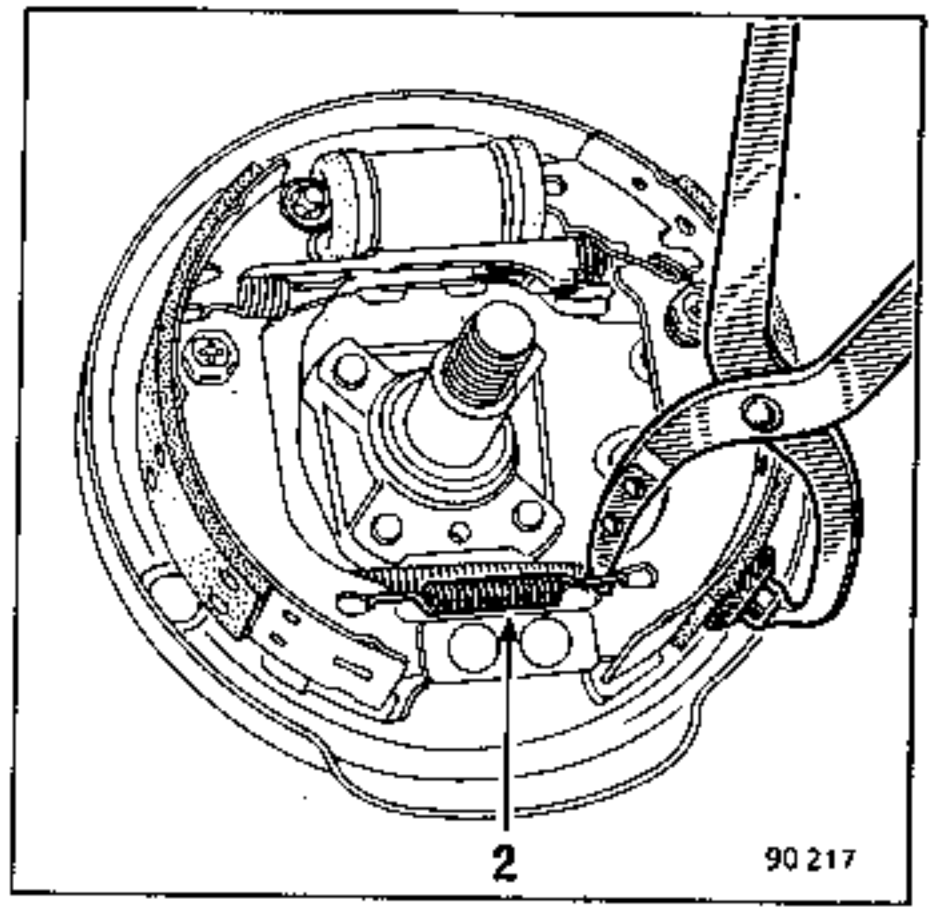
Refit, to the trailing shoe :
- the link (B) fitted with spring (5), ensuring that the automatic wear take-up mechanism is correctly positioned,
- the hand brake cable.



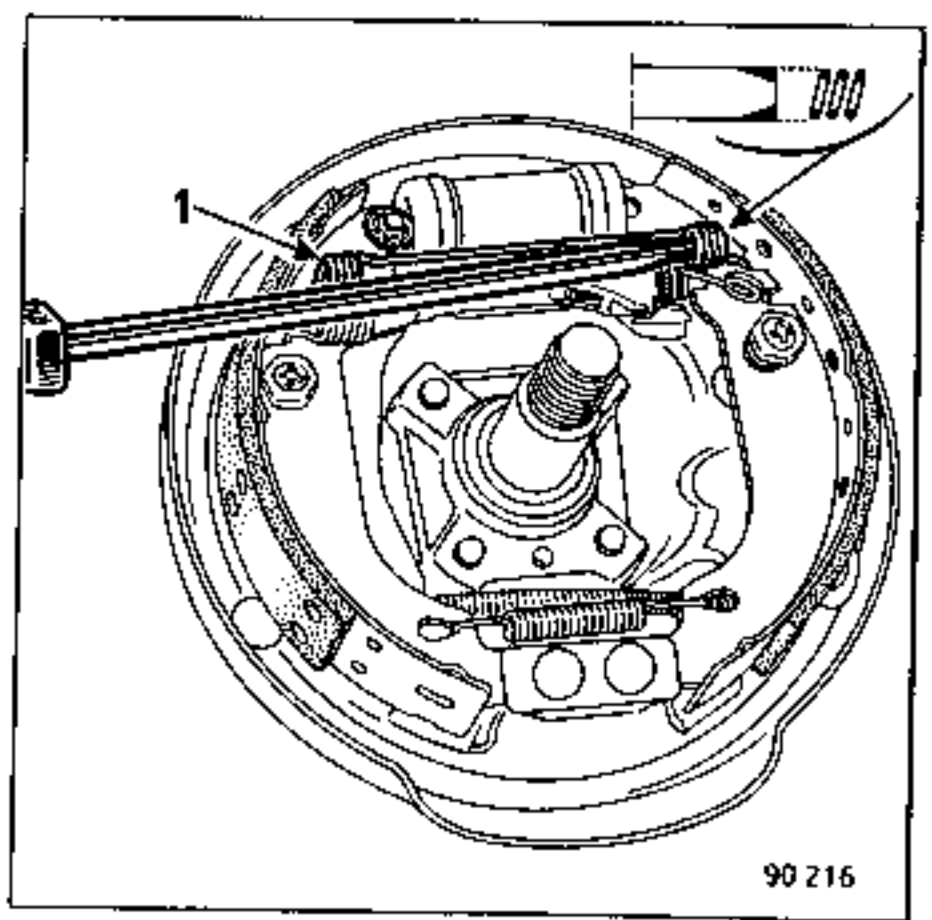
Re-secure the toothed quadrant (C) and spring (6) assembly, after returning them to zero.

Fit :
- the trailing shoe and secure it in place
- the leading shoe, ensuring that the toothed quadrant (C) fully enters the link (B) to secure it in place.

Remove the clips from the wheel cylinders then refit :
- the lower spring (2),

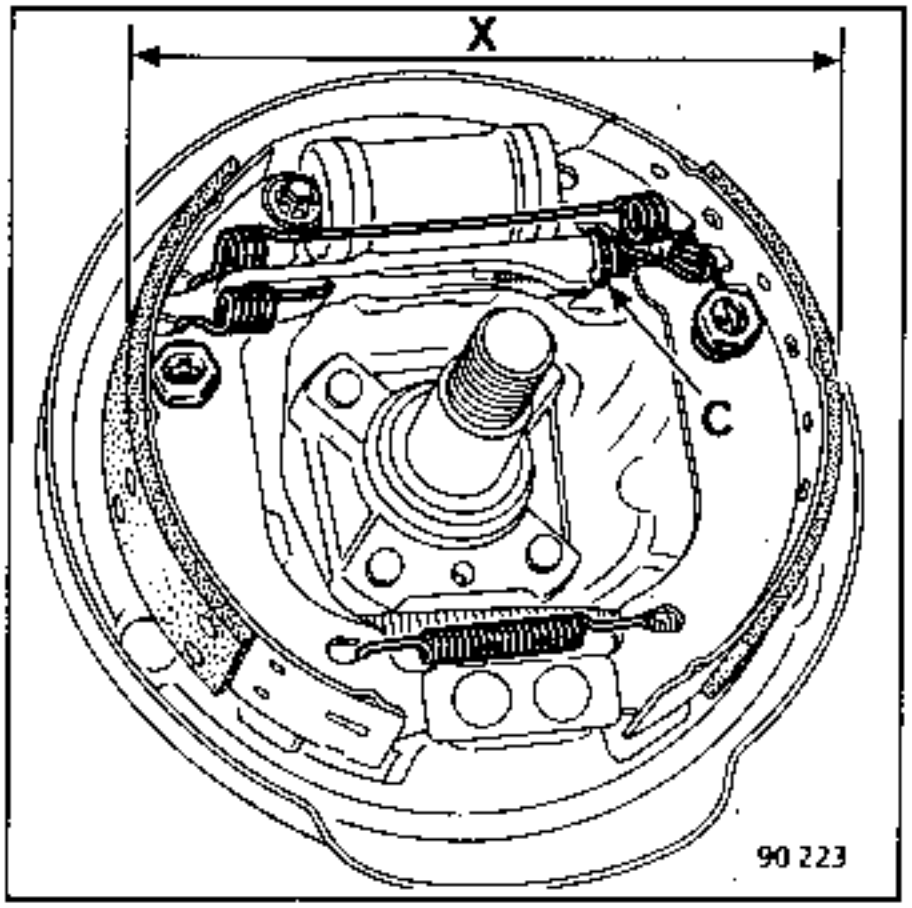


- the upper spring (1).



ADJUSTING

Adjust the shoe diameter adjustment, with a screwdriver, on the toothed quadrant (C) to obtain a diameter (X) between 178.7 mm and 179.2 mm.



Carry out the same adjustment on the other brake anchor plate.

Refit the drum.

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

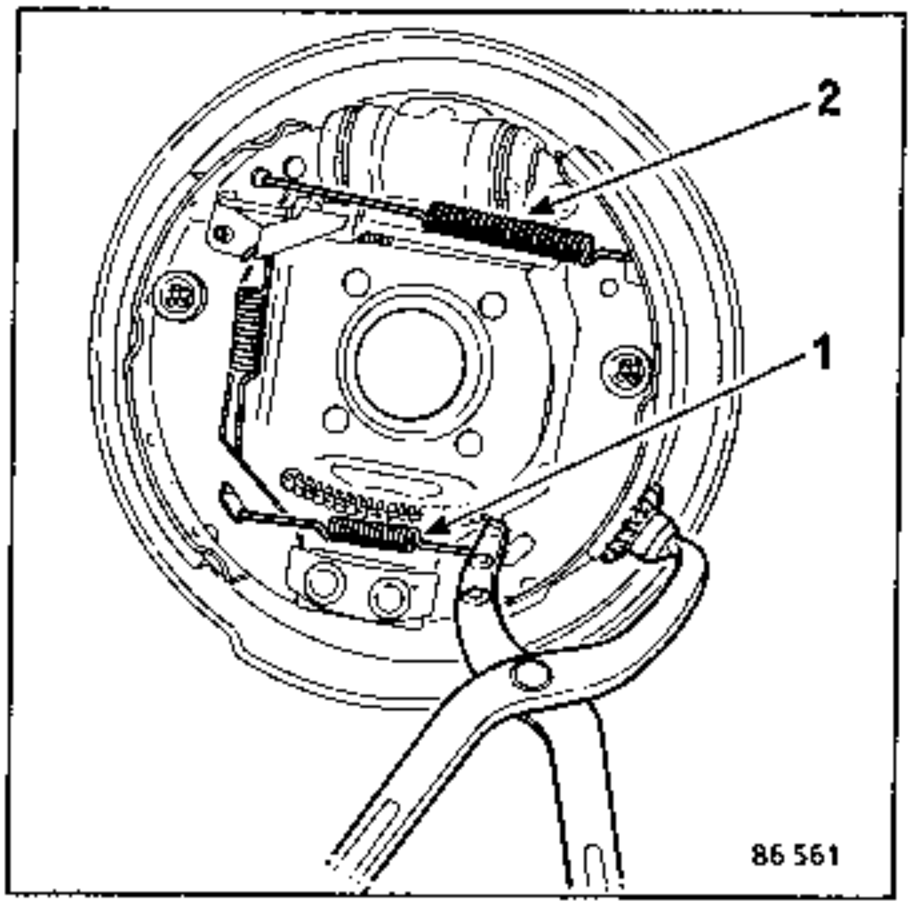
ESSENTIAL SPECIAL TOOLS	
Emb. 880	Inertia extractor
M.S. 821	Brake dust removal equip.
Rou. 943	Hub plug extractor

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Hub nuts	16

All the shoes or linings any any given axle are to be replaced. Never fit linings of different grades or make.

REMOVING

Remove
- the brake drum (see corresponding section),
- the lower spring (1), followed by the upper spring (2), using brake shoe grips.



86 561

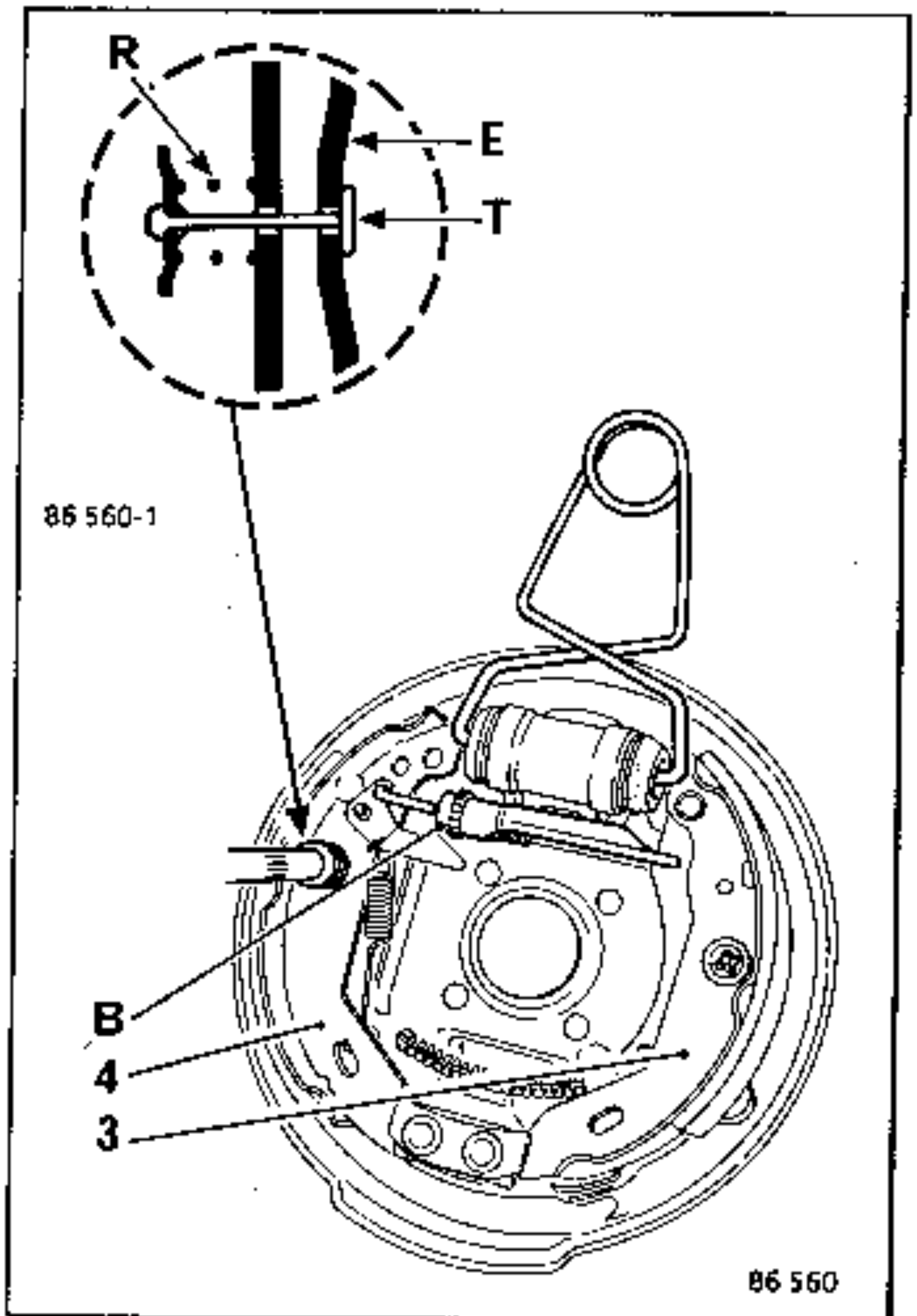
Fit a clip to the wheel cylinder pistons.

Using a socket of the valve clearance spanner type, remove the shoe lateral retaining springs (R), whilst keeping the connecting link (T) in contact with the brake anchor plate (E).

Fully slacken off the hand brake cables.

Remove :
- the leading shoe (4),
- the link (B),
- the trailing shoe (3).

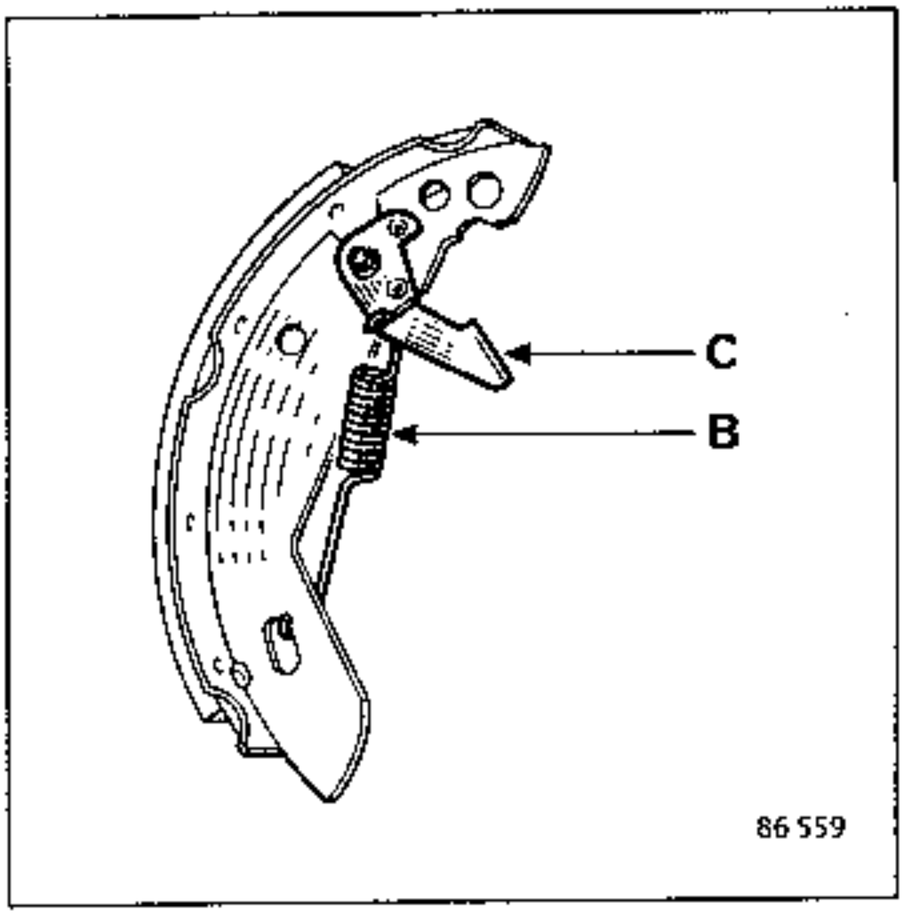
Disconnect the hand brake cable from the trailing shoe.



86 560-1

86 560

From the leading shoe, remove :
- the spring (5),
- the adjusting lever (C).



Dust out the drums and anchor plates using tool M.S.821.

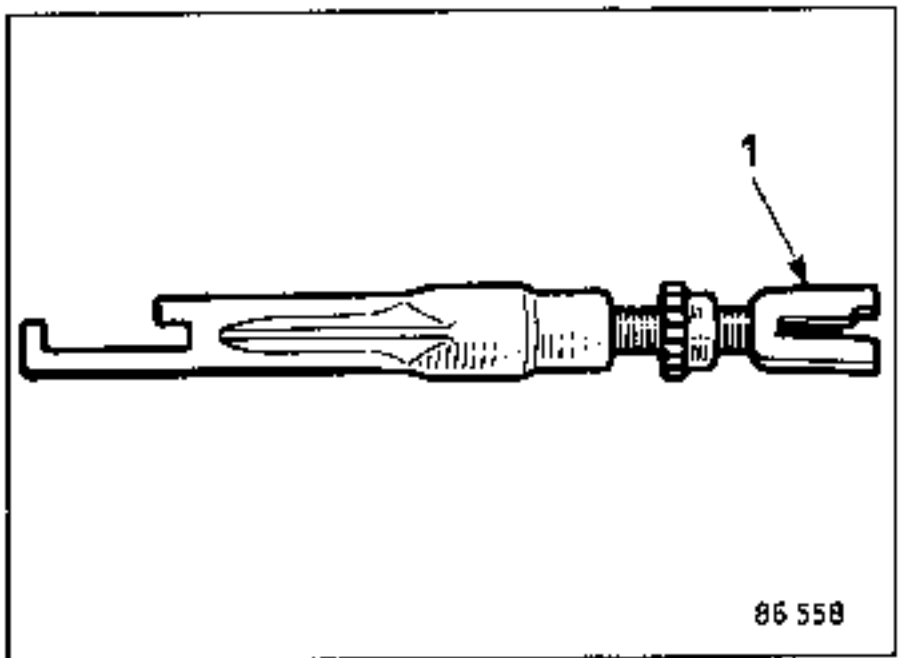
REFITTING

NOTE : the left hand brake mechanism and right hand brake mechanism component parts are different. It is essential not to intermix them.

Lightly grease the thread on the thrust link (B) and identify it.

The link for the left hand brake has a right hand thread.

The threaded plunger (1) is coloured SILVER.



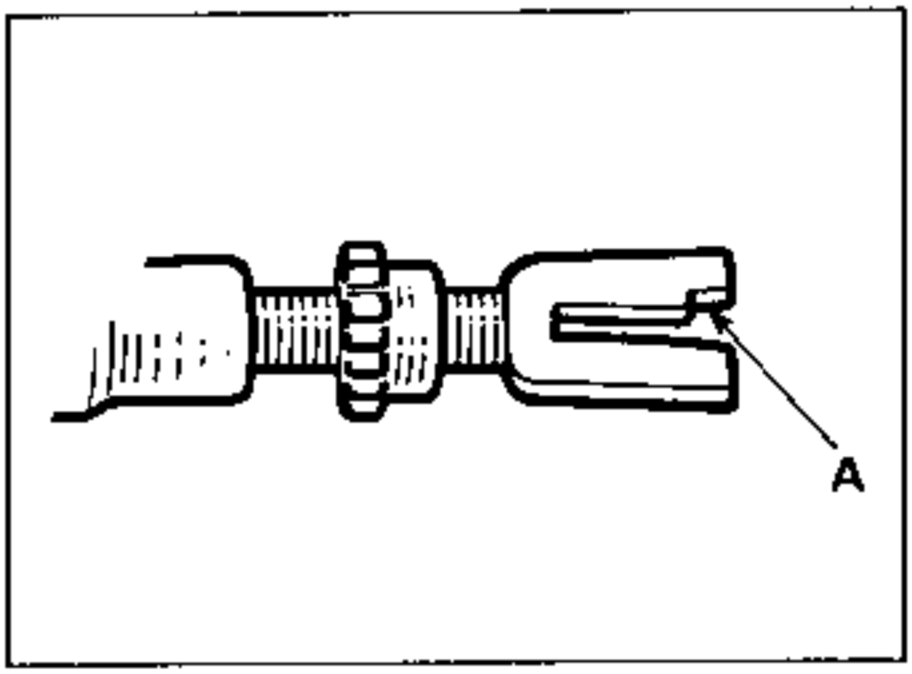
The link for the right hand brake has a left hand thread.

The threaded plunger (1) is coloured GOLD.

To the leading shoe, refit :
- the adjusting lever (C),
- the spring (5).

Re-secure the hand brake cable to the trailing shoe.

Fit :
- the trailing shoe and secure it in place,
- the thrust link, positioning the cut-out in the threaded plunger (A) on the same side as the adjusting lever.

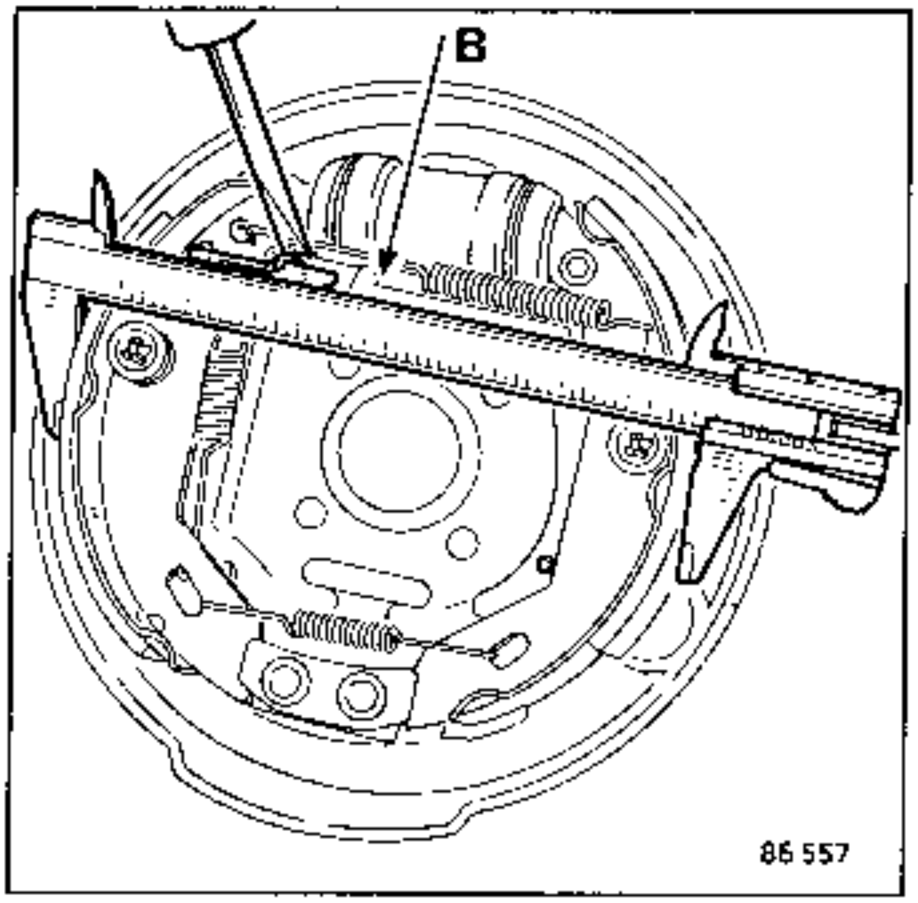


- the leading shoe and secure it in place.

Remove the clips from the wheel cylinder pistons then refit :
- the upper spring (2),
- the lower spring (1).

ADJUSTING

Adjust the diameter across the shoes with a screwdriver at link (B) to obtain a diameter of 178.7 mm to 197.2 mm.



Carry out the same adjustment on the other brake anchor plate assembly.

Refit the drum.

Adjust :
- the positions of the shoes by repeatedly pressing the brake pedal,
- the hand brake (see section 37 "Controls").

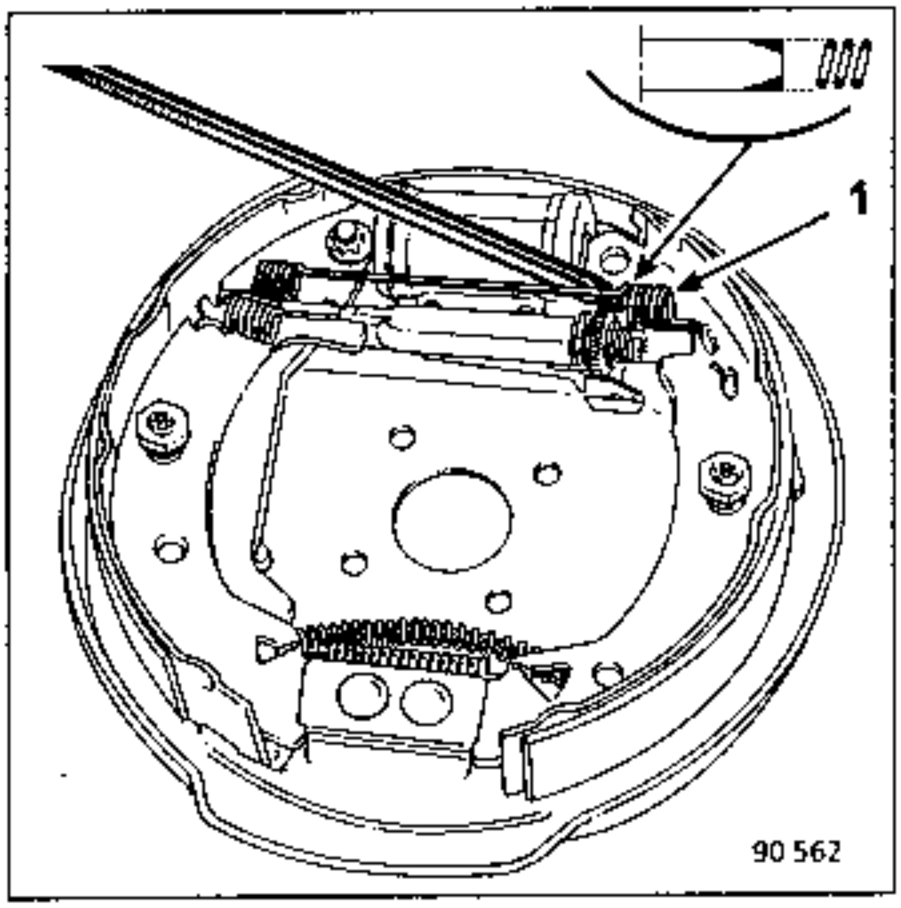
ESSENTIAL SPECIAL TOOLS		
Emb.	880	Inertia extractor
M.S.	821	Brake dust removal equip.
Rou.	943	Hub plug extractor

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Wheel nuts	16

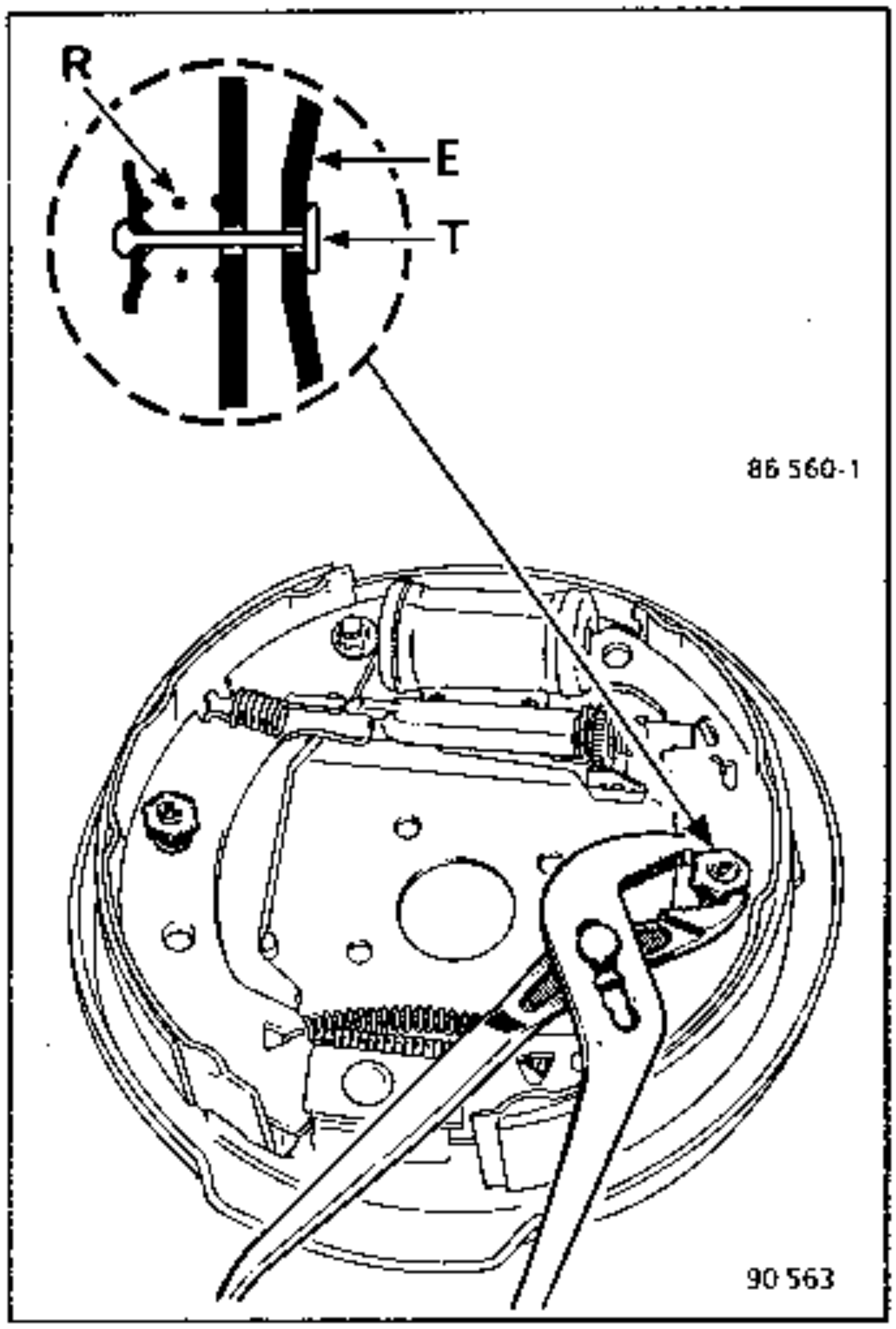
All the shoes or linings on any given axle are to be replaced. Never fit linings of different grades or make.

REMOVING

Remove :
- the brake drum (see corresponding section),
- the upper spring (1) using a screwdriver modified as shown in this drawing.



Using multi-purpose grips, remove the shoe retaining springs (R) whilst keeping the connecting link (T) in contact with the brake anchor plate (E).

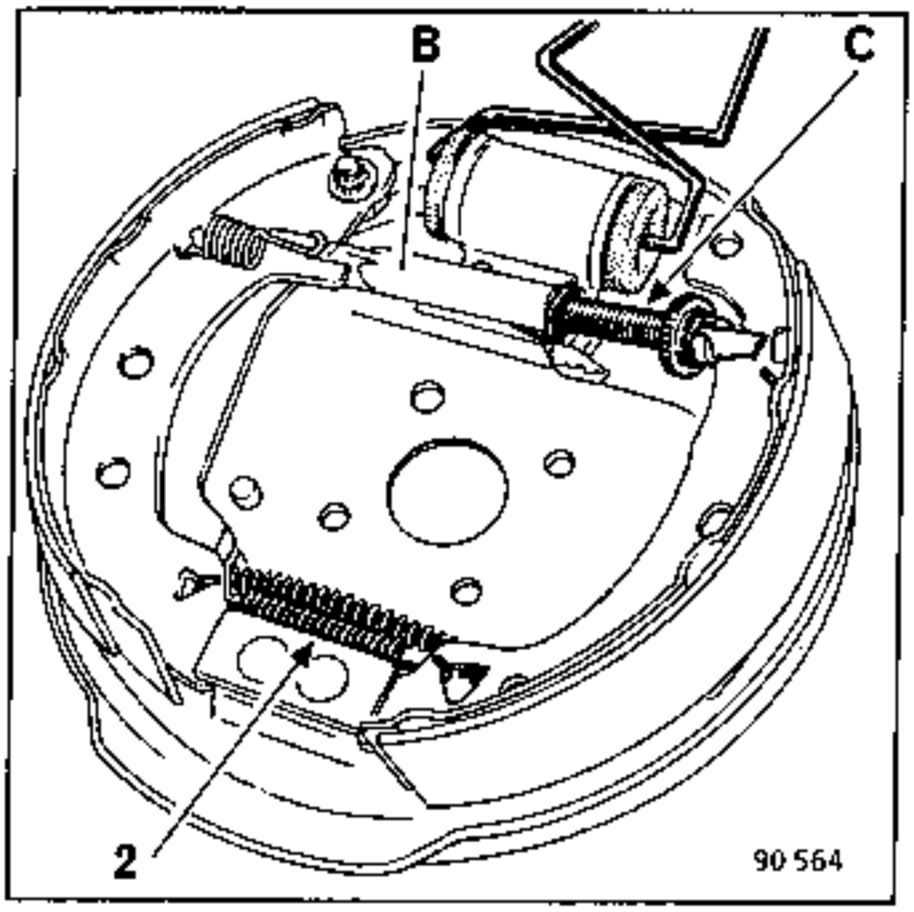


Fit a clip to the wheel cylinder pistons.

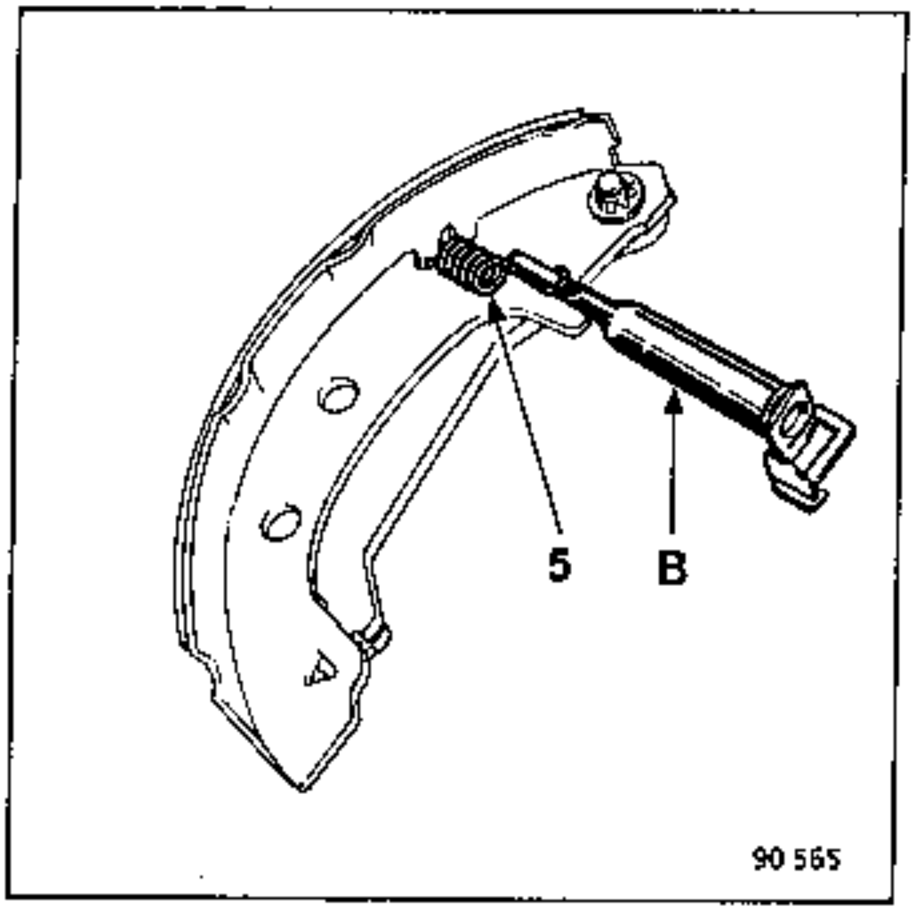
Fully slacken off the hand brake cables.

Pull the shoes apart to free the toothed quadrant (C) from the link (B).

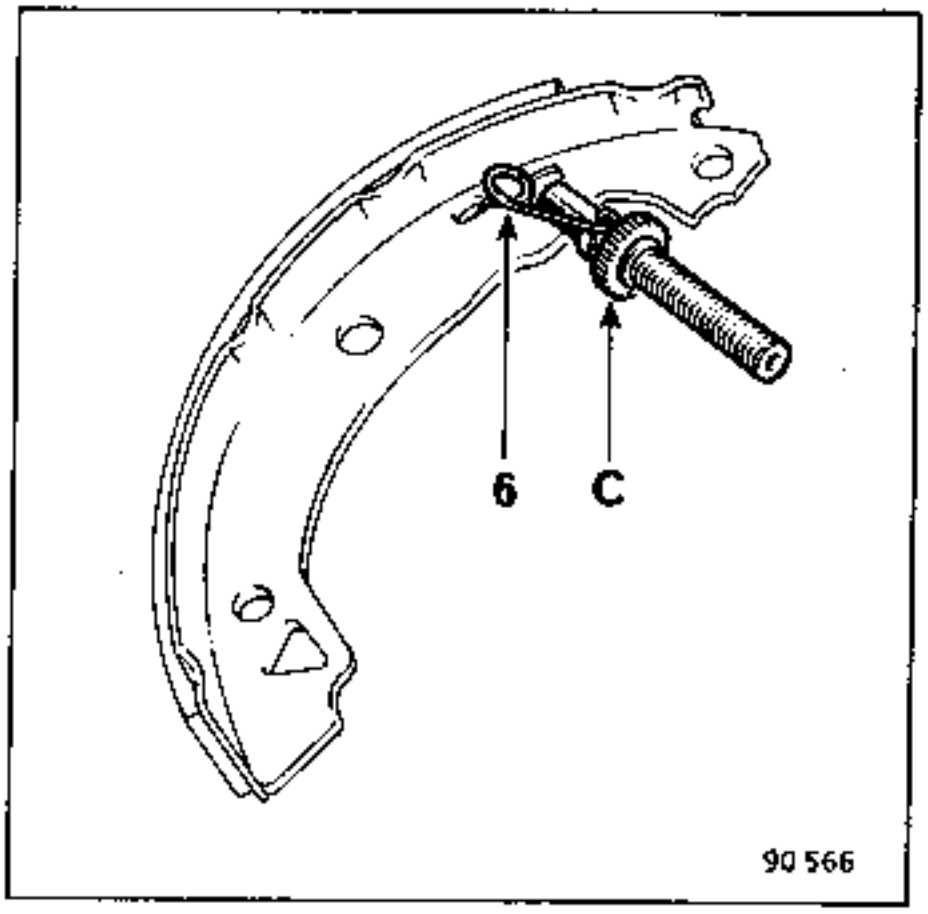
Remove the shoes by freeing the lower spring (2) and the hand brake cable.



From the trailing shoe, remove :
- the link (B) taking care not to damage the automatic wear take-up mechanism,
- the spring (5).



Remove the toothed quadrant (C) and the spring (6) from the leading shoe.

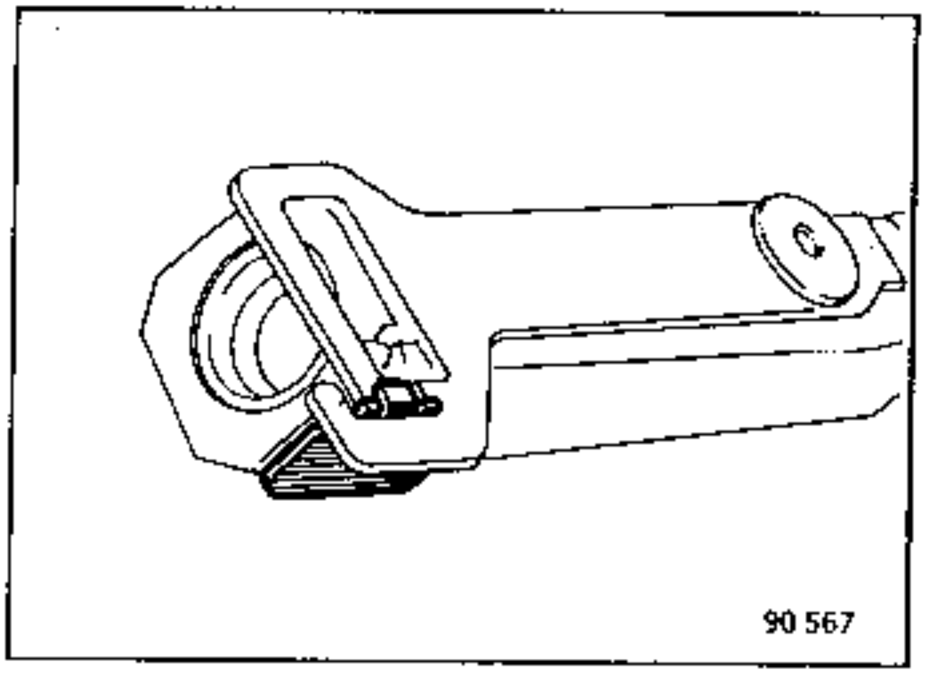


Dust out the drums and the anchor plates using tool M.S.821.

REFITTING

NOTE : the component parts of the left hand brake mechanism and right hand brake mechanism are different. It is essential not to intermix them.

Refit, to the trailing shoe :
- link (B) fitted with spring (5), ensuring that the automatic wear take-up mechanism is correctly positioned,



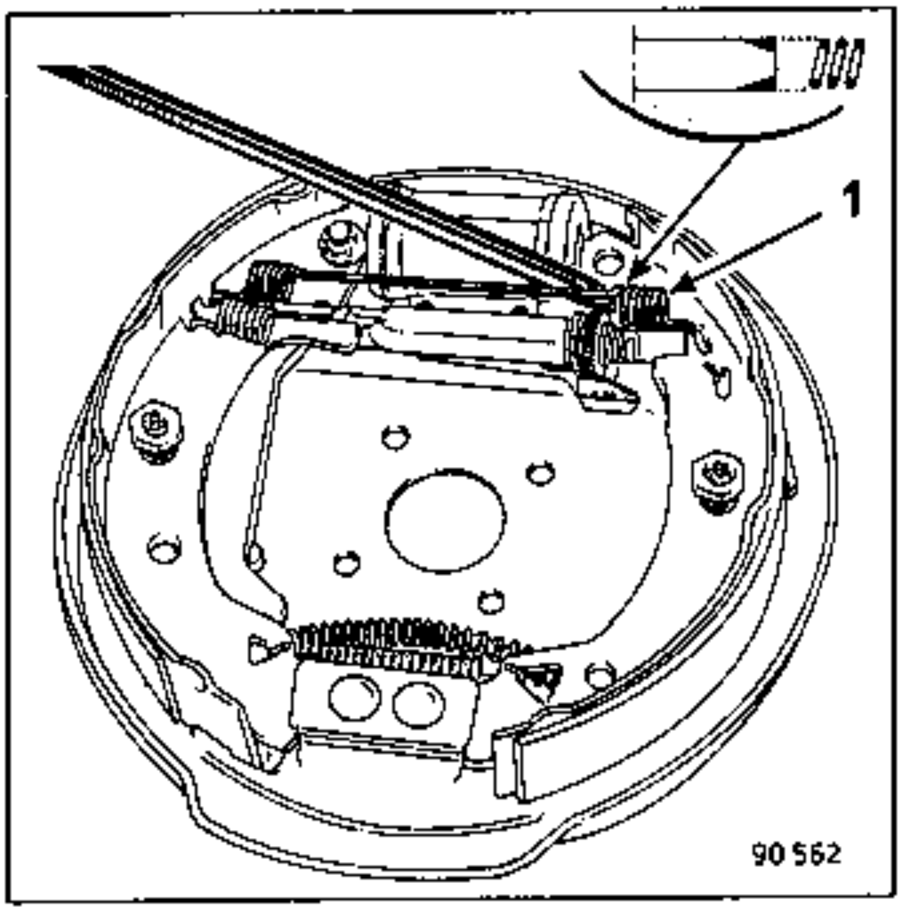
- the hand brake cable.

Re-secure the toothed quadrant (C) and spring (6) assembly to the leading shoe after zeroing them.

Fit both shoes equipped with spring (2) and the hand brake cable.

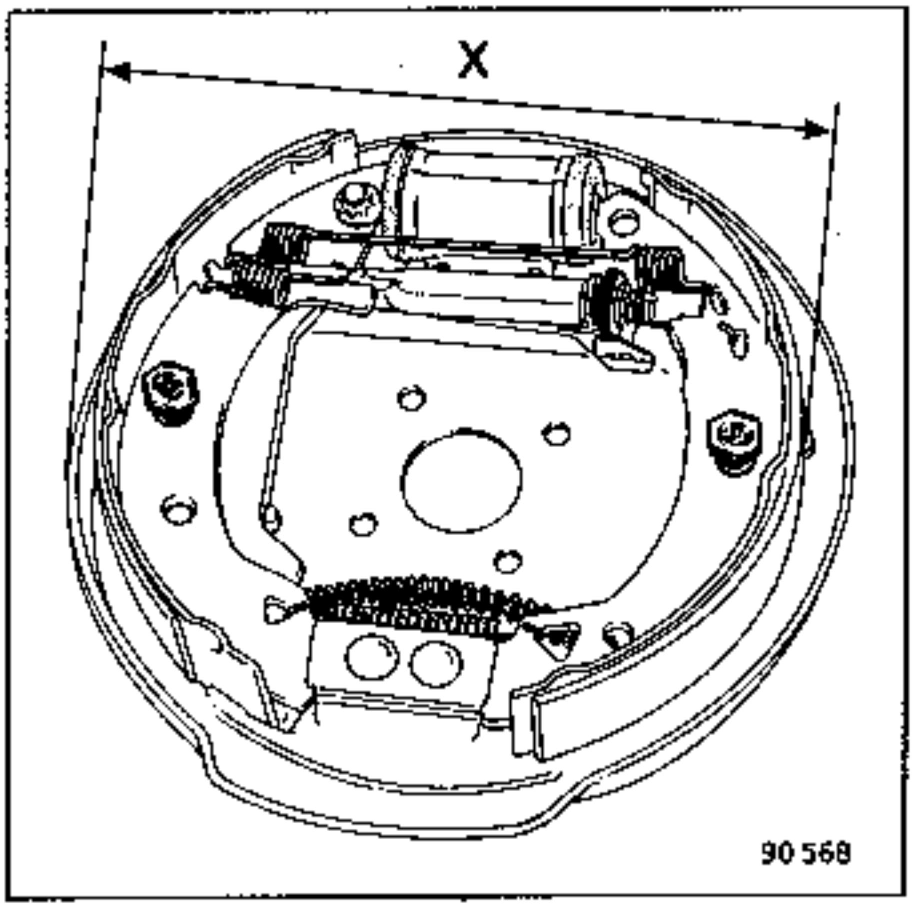
Pull the shoes apart to engage the toothed quadrant (C) into the link (B).

Secure the shoes to the anchor plates then refit the upper spring (1).



ADJUSTING

Using a screwdriver, adjust the diameter across the shoes at the toothed quadrant (C) to obtain a diameter X of between 202.5 mm and 202.7 mm.



Carry out the same adjustment on the other anchor plate assembly.

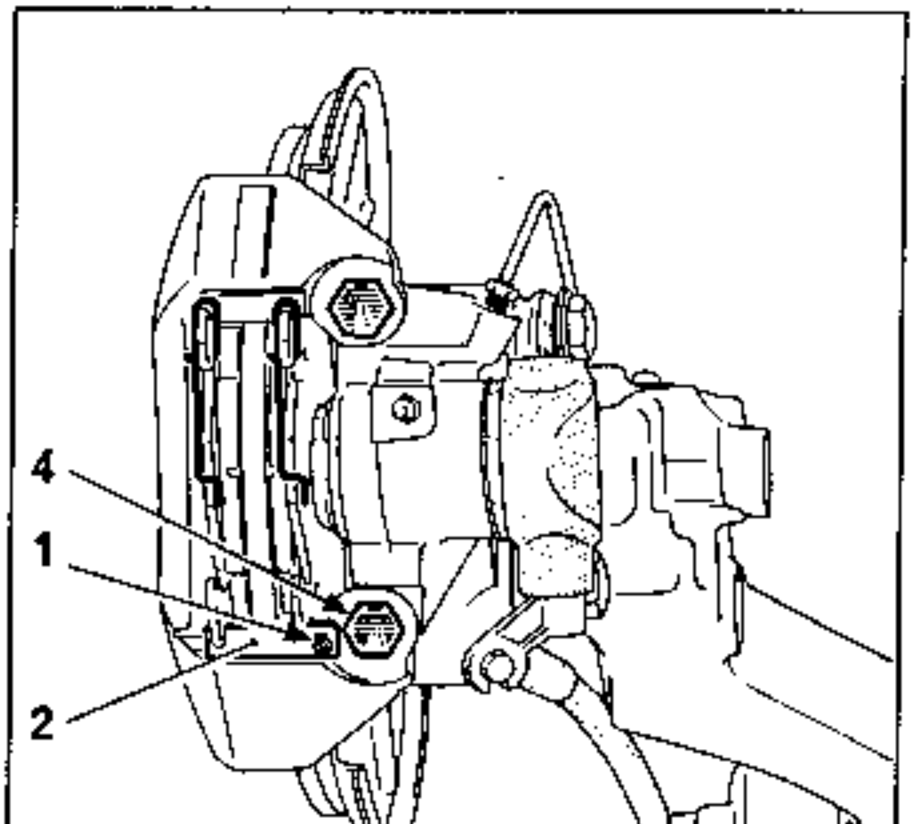
Refit the drum.

Adjust :
- the position of the shoes by repeatedly pressing the brake pedal,
- the hand brake (see section 37 "Controls").

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8

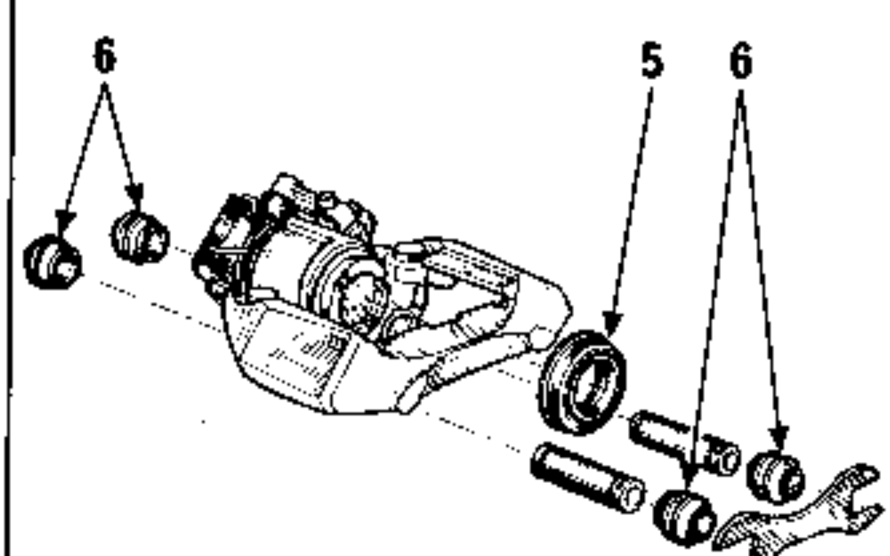
REMOVING

Remove :
- the clip (1),
- the key (2),
- the pads.



88 992

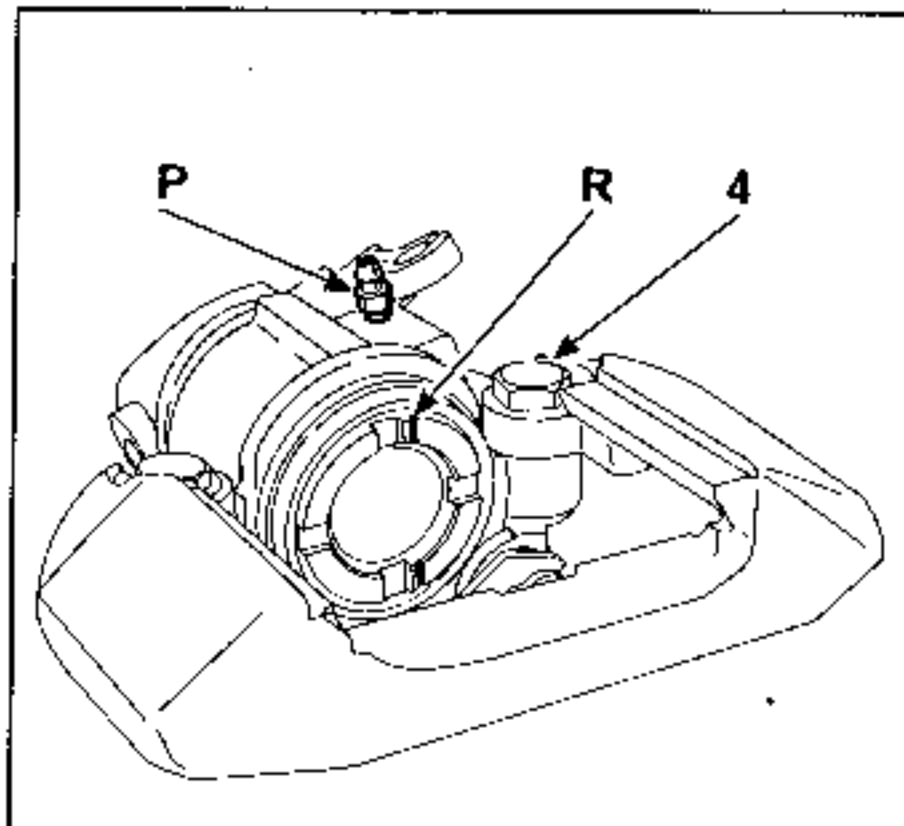
Check the condition of the dust cover (5) and the bellows (6) which protect the caliper slides and replace them if necessary. If they are replaced, grease the end of the piston and the two slides after first cleaning them with methylated spirits.



88 394

REFITTING

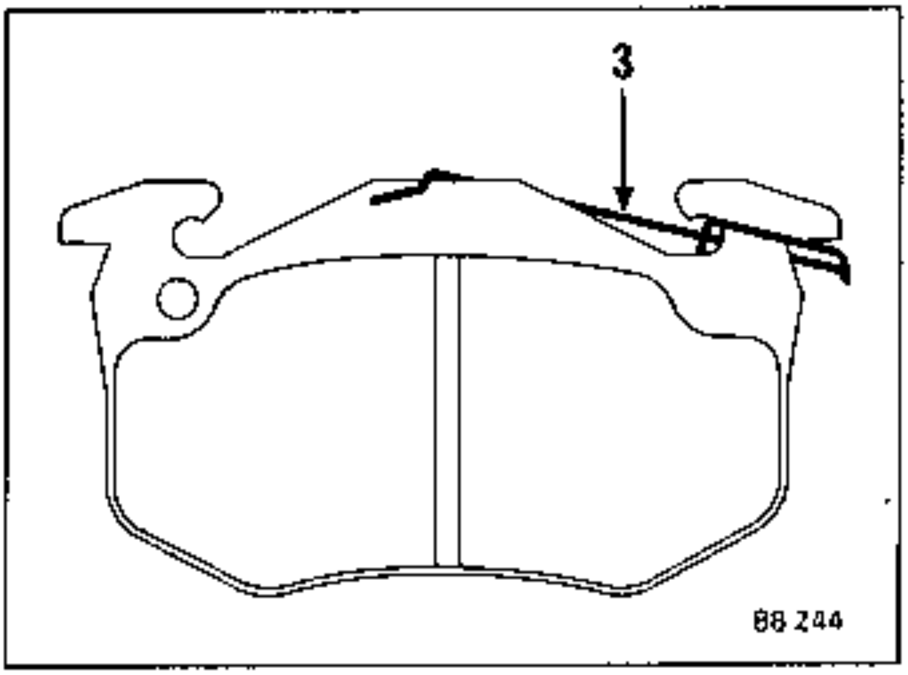
Push back the piston by screwing it in with a square section screwdriver until it turns but no longer moves inwards.



88 311

Position the piston so that the line (R) on its thrust face is on the same side as the bleed screw (P).

Fit the two anti-rattle clips (3) to the new pads.

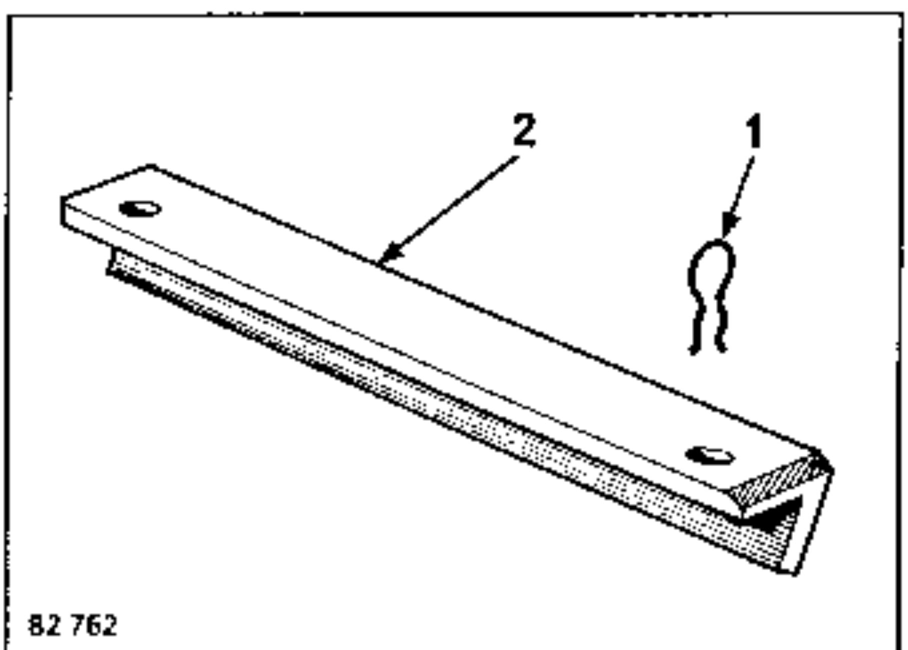


88 244

Place the pads in the caliper, ensuring that they are the correct way round.

Insert the key (2) and refit the clip (1) (there is only one of these clips per caliper).

NOTE : clip (1) fits to the inside of the caliper near the bolt (4).



82 762

Depress the brake pedal a number of times the bring the piston into contact with the pads.

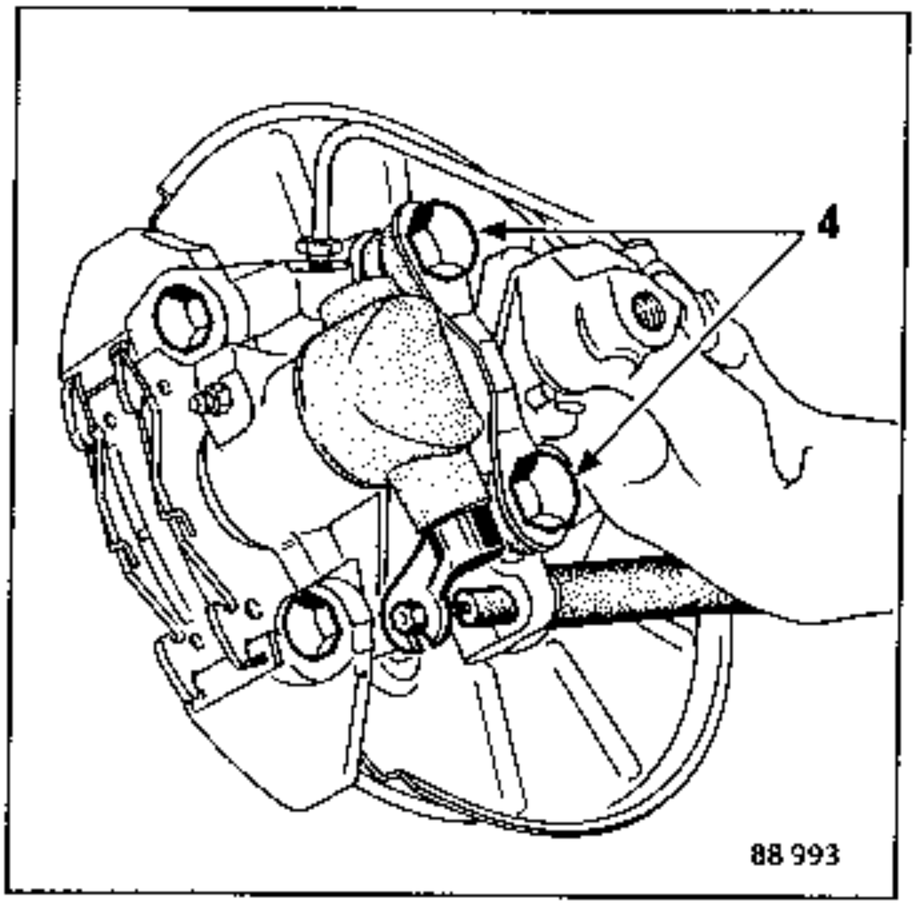
TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Brake caliper securing bolts	10

REMOVING

Remove the brake pads (see corresponding section).

Loosen the rigid brake pipe at the wheel cylinder end.

Disconnect the hand brake cable.



88 993

Remove the two bolts (A) that secure the caliper to the stub axle carrier.

Unscrew the pipe union (place a container to catch the brake fluid).

REFITTING

Screw in the union on the rigid pipe without tightening it.

Fit the caliper in place, coating the bolts with Loctite FRENBLOC and tightening them to torque.

Tighten the union on the rigid pipe.

Loosen the bleed screw on the wheel cylinder and wait until brake fluid runs from it (check that there is sufficient fluid in the brake fluid reservoir).

Re-tighten the bleed screw.

Check the condition of the pads and refit them.

If the brake fluid reservoir is not completely empty, the braking system will only require a partial bleed. If it is empty the complete system will have to be bled.

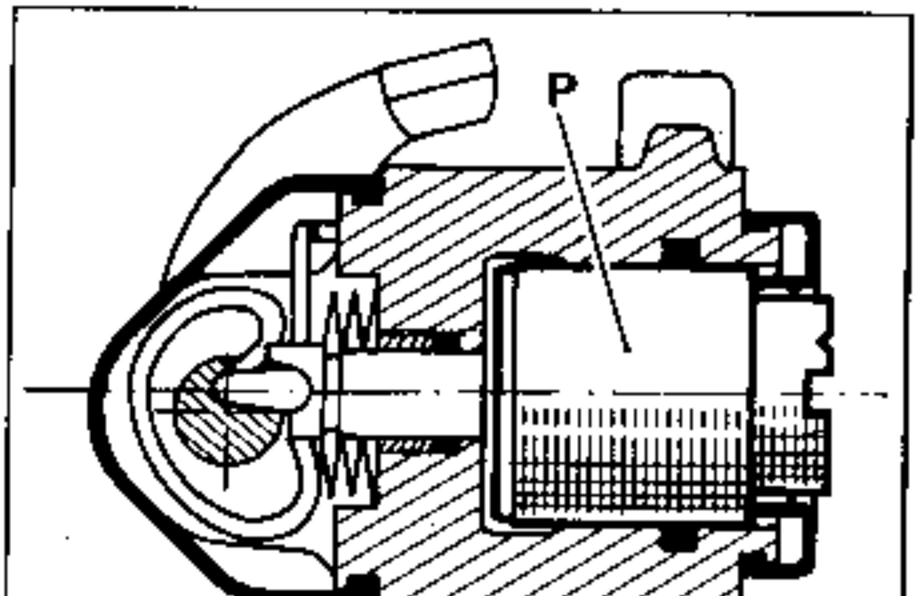
Press the brake pedal a few times to bring the piston into contact with the pads.

OVERHAULING

If there is any scoring in the caliper bore, the complete caliper will have to be replaced.

Remove the brake caliper.

It is forbidden to dismantle the mechanism inside the piston (P).

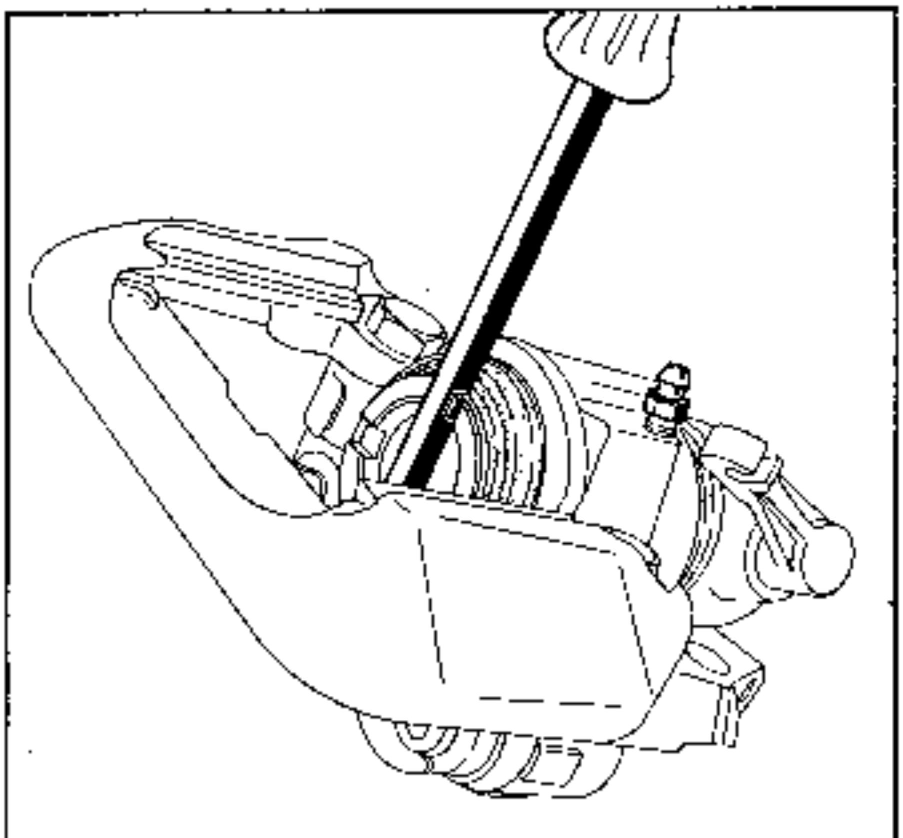


74 194-1

Grip the caliper in a vice fitted with soft jaws.

Remove the rubber dust cover.

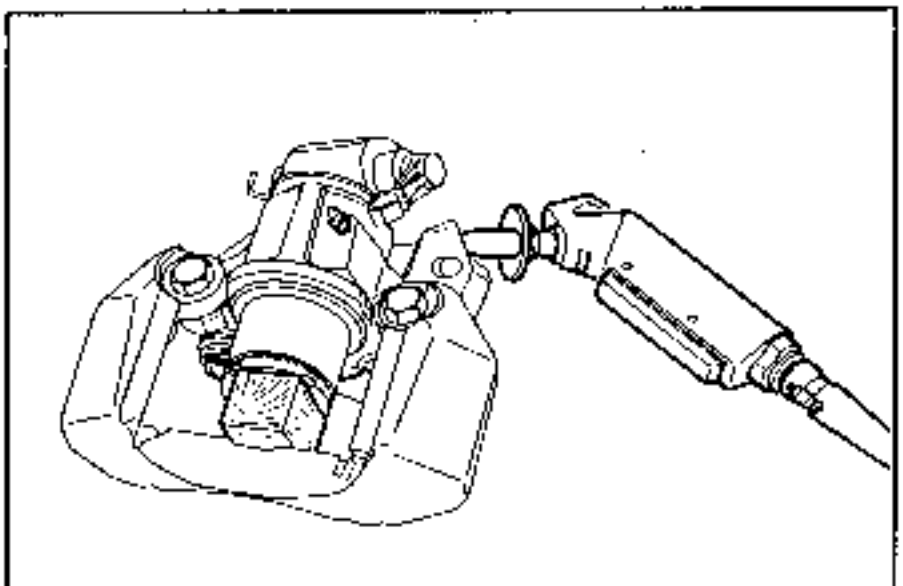
Remove the piston, by unscrewing it with a square section screwdriver.



88 306

When the piston turns freely, blow compressed air into the cylinder, applying the pressure gradually so as not to violently eject the piston. Place a wooden chock between the caliper and the piston to avoid any damage to the piston.

Any impact marks or scoring render the piston unusable.



88 398

Remove the seal from its groove using a steel strip with rounded edges.

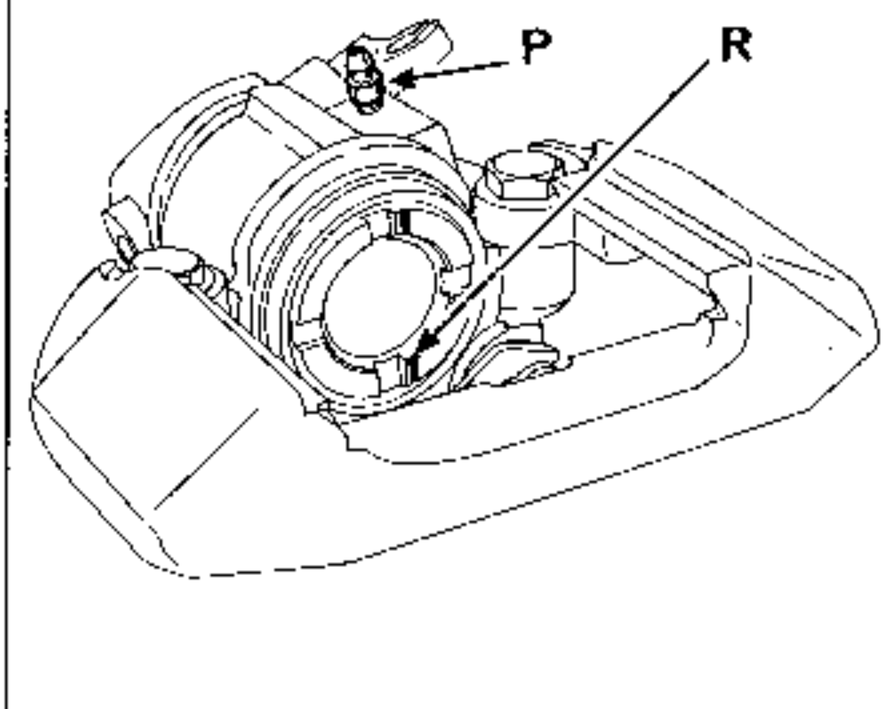
Carefully clean the parts in methylated spirits and reassemble them.

Lubricate the seal and the piston with brake fluid.

Gradually push in the piston, by hand, to avoid damaging its seal.

Complete the insertion of the piston by screwing it in with a screwdriver until the piston turns but no longer moves inwards.

Position the piston so that the line (R) on its thrust face is on the same side as the bleed screw (P), to ensure that the caliper can be fully bled and the pad can enter the central groove on the piston, correctly.



88 311

Coat the circumference of the piston with Spagraph grease.

Fit a new rubber dust cover.

ESSENTIAL SPECIAL TOOLS	
B. Vi. 28-01	Claw type extractor
Fre. 1047	Bridge piece for removing the hand brake control from the rear caliper

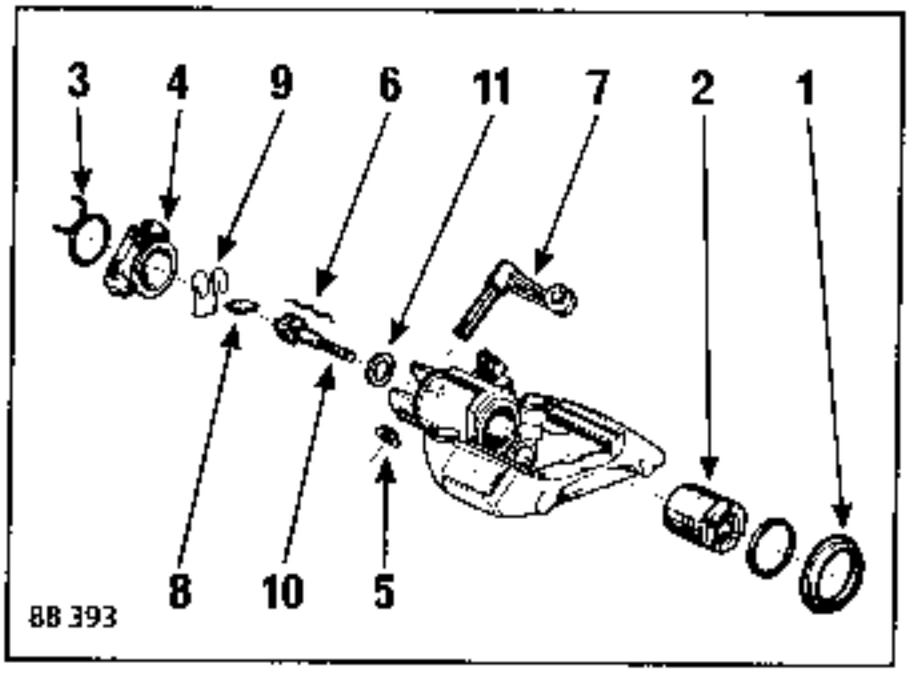
DISMANTLING

Grip the caliper and the caliper bracket in a vice fitted with soft jaws.

Remove :
- the sealing cap (1),
- the piston (2), by unscrewing it,
- the clip (3).

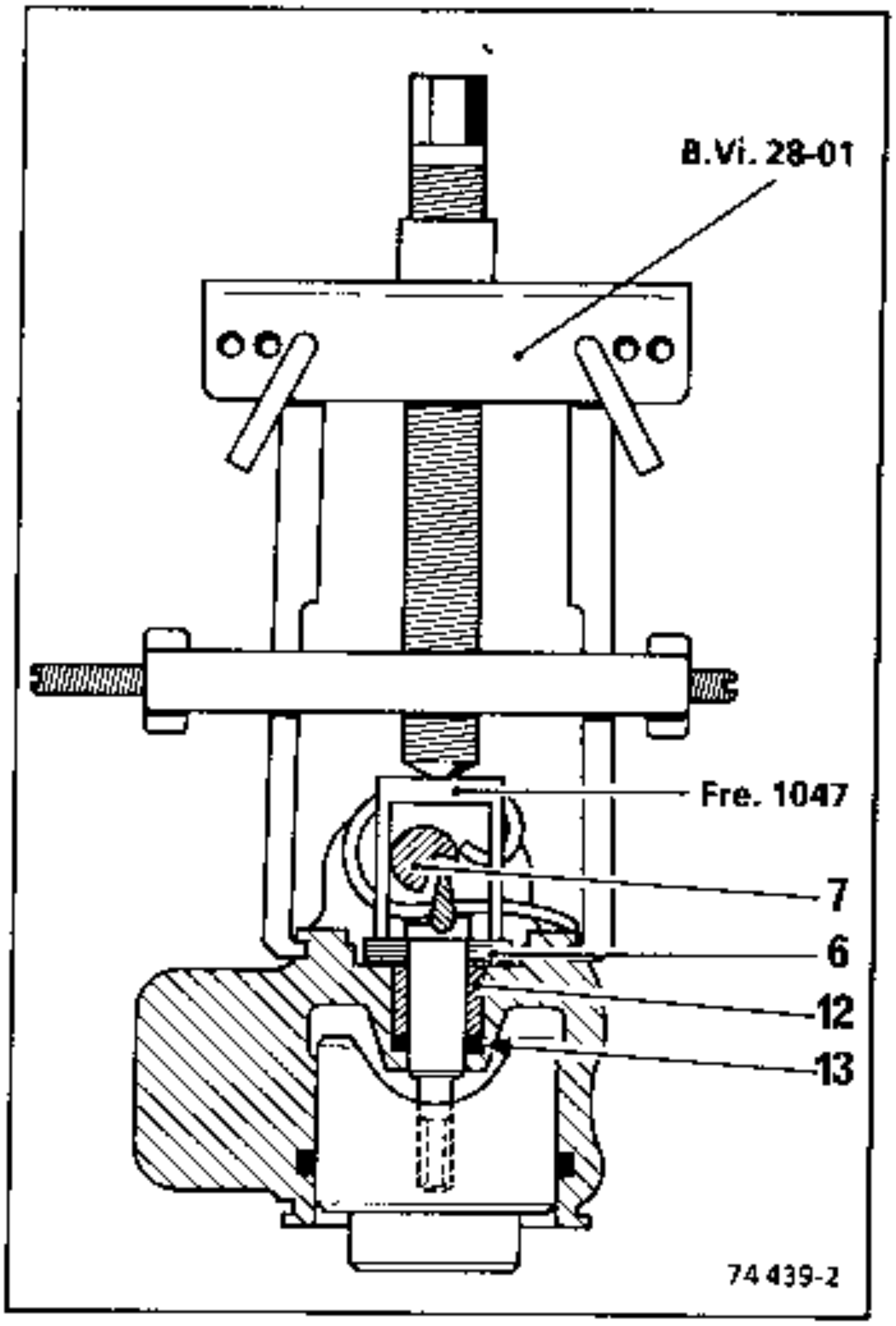
Turn the dust cover (4) over (it is fitted on to shaft (7)).

Remove the circlip (5).



Compress the spring washers (6) using tool Fre.1047 + B.Vi.28-01.

Remove :
- shaft (7) together with the dust cover (4) by pulling the lever,
- the plunger (8),
- the spring (9),

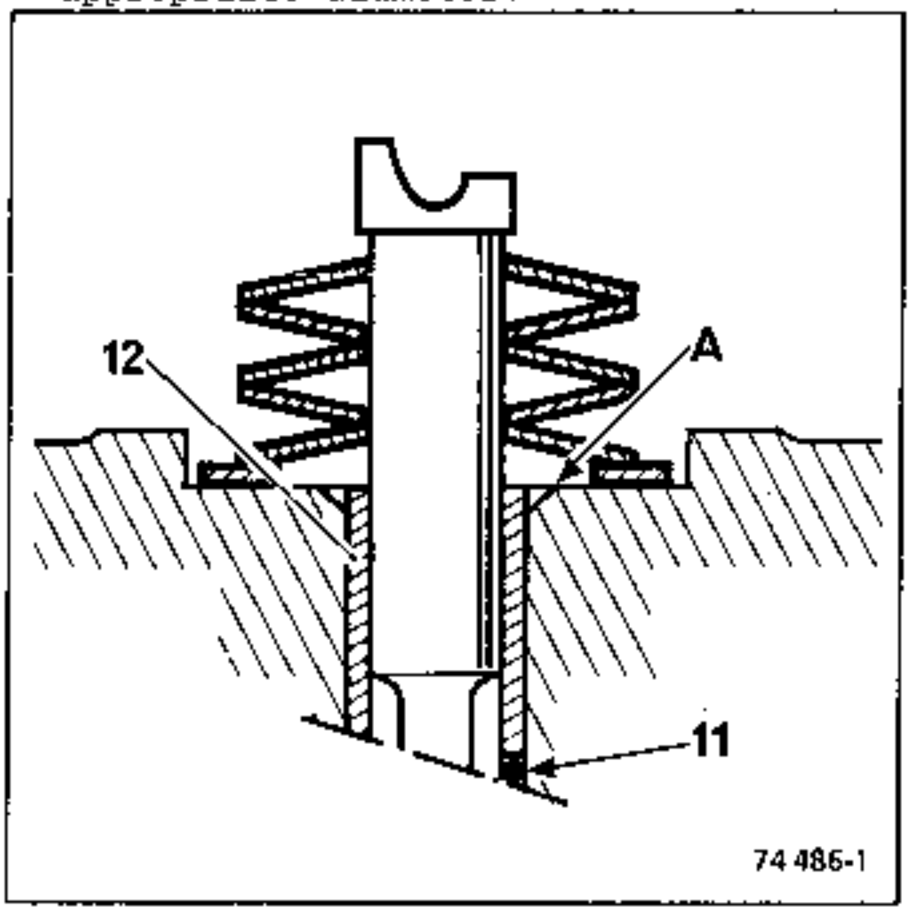


- the adjusting screw (10),
- the washer (11),
- the spring washers (6),
- the bush (12) using a pin punch,
- the O ring (13).

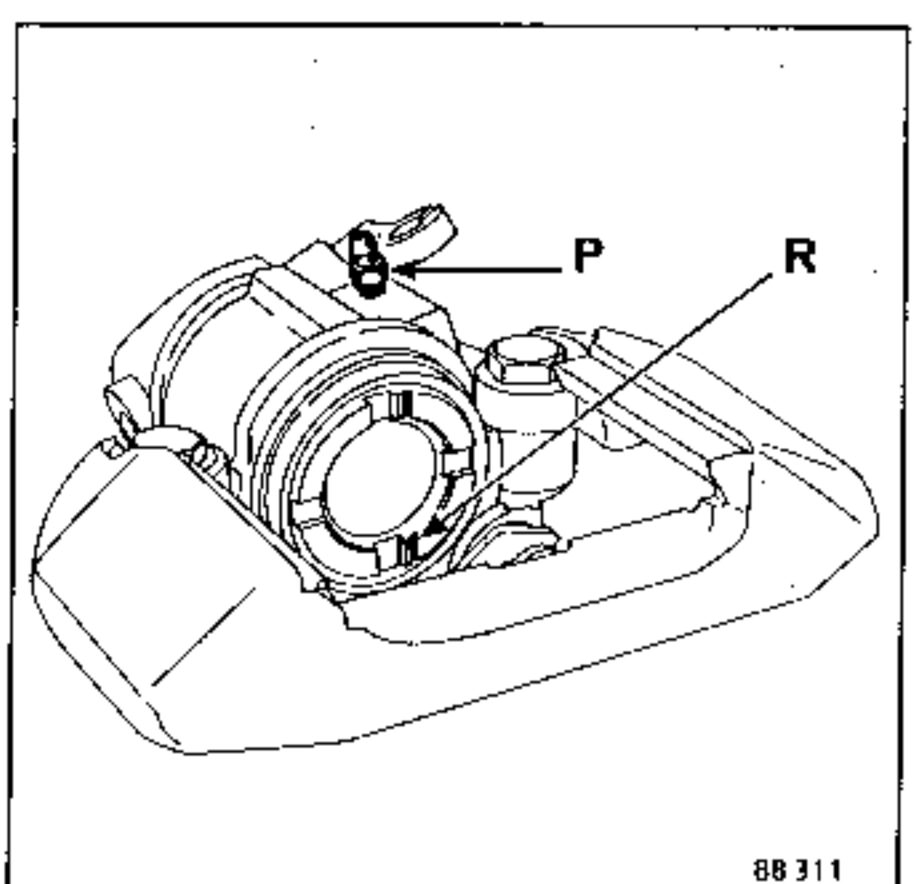
Clean all the parts in methylated spirits.

REASSEMBLY

Fit :
- the O ring (13),
- the bush (12) until it is flush with the face (A), using a tube of the appropriate diameter.



Check the position of the spring washers that must be fitted as shown in this illustration to permit the hand brake lever to return to the "released" position.
From then carry out the dismantling operations in reverse. Position the piston so that line (R) on its thrust face is on the same side as the bleed screw (P).



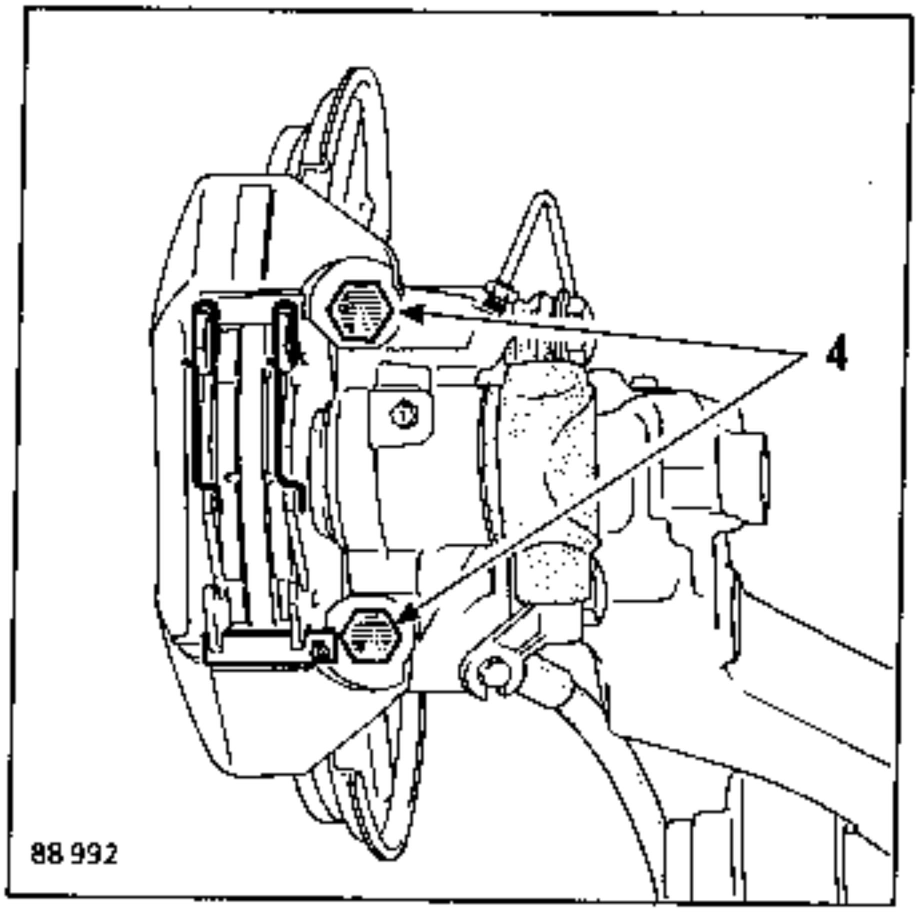
ESSENTIAL SPECIAL TOOLS		
Emb.	880	Inertia extractor
Rou.	943	Hub plug extractor

This vehicle is equipped with a hub-disc assembly that cannot be reground. If the disc is heavily worn or scored, the entire assembly must be replaced.

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Hub nuts	16
Caliper bracket securing bolts	10

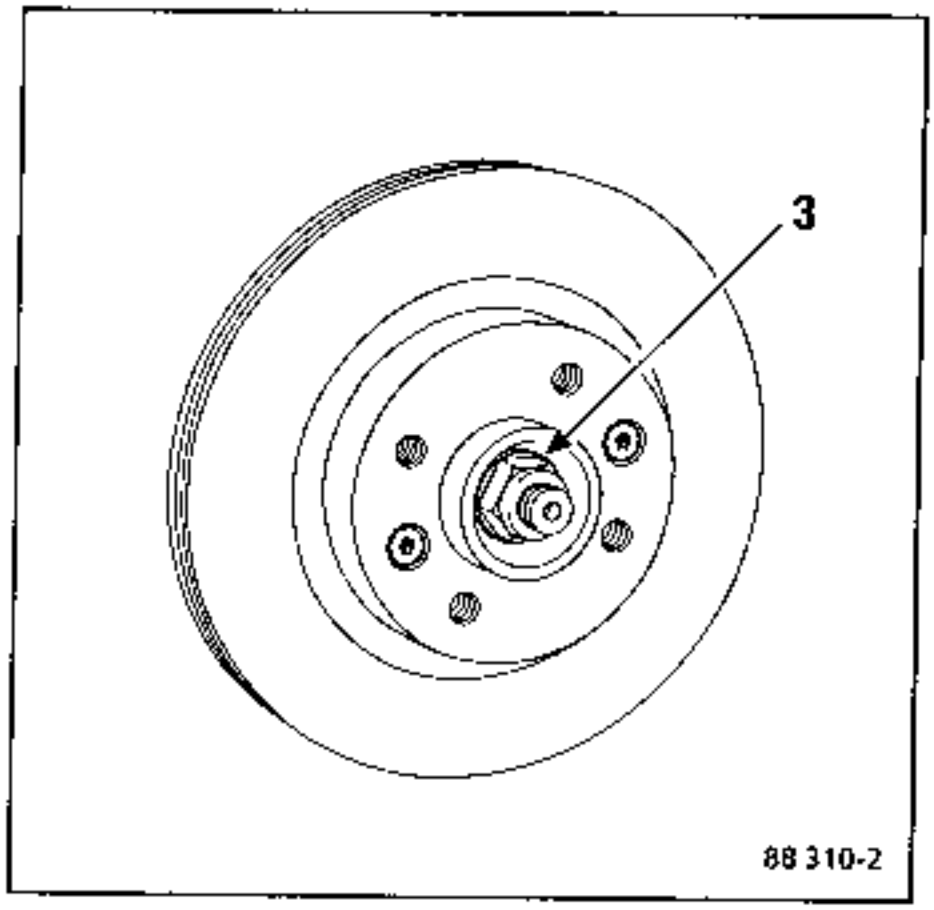
REMOVING

Remove :
- the brake pads (see corresponding section),
- the two caliper bracket securing bolts (A).



88 992

- the hub plug using tool Rou.943 + Emb.880,
- the hub nut (3),
- the hub-disc-bearing assembly.



88 310-2

NOTE : for the operations involved in replacing a hub-disc assembly, see the section entitled "Bearings".

REFITTING

Fit the hub-disc-bearing assembly on to the stub axle which has been previously coated with SAE W 80 oil.

Refit :
- the hub nut, tightening it to torque,
- the hub plug,
- the brake caliper bracket, coating its bolts with Loctite FRENBLOC and tightening them to torque,
- the brake pads (see the corresponding section).

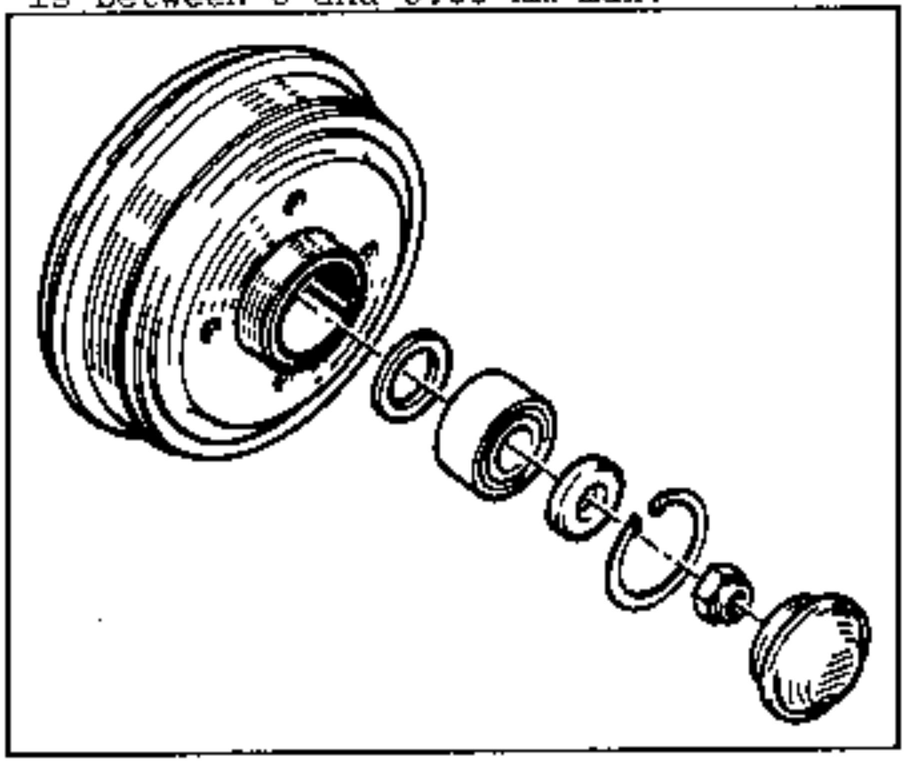
Press the brake pedal a number of times to bring the piston into contact with the pads.

ESSENTIAL SPECIAL TOOLS		
Emb.	880	Inertia extractor
Rou.	943	Hub plug extractor
T.Av.	1050	Hub extractor

TIGHTENING TORQUES (in daN.m)	
Hub nut	16
Wheel bolts	8

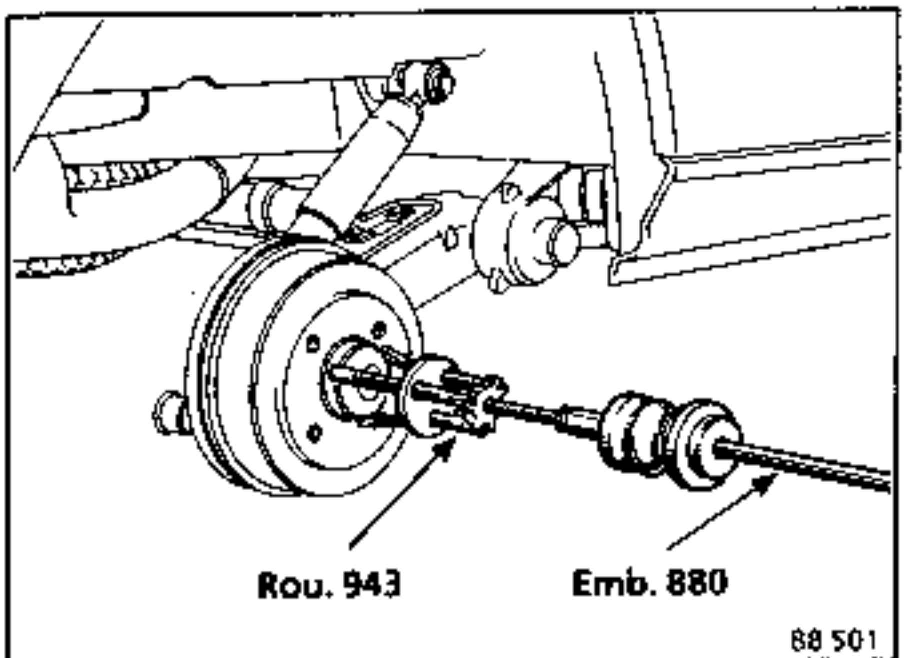
CHECKING

Check, by means of a dial indicator mounted on the hub, that the end play is between 0 and 0.03 mm max.



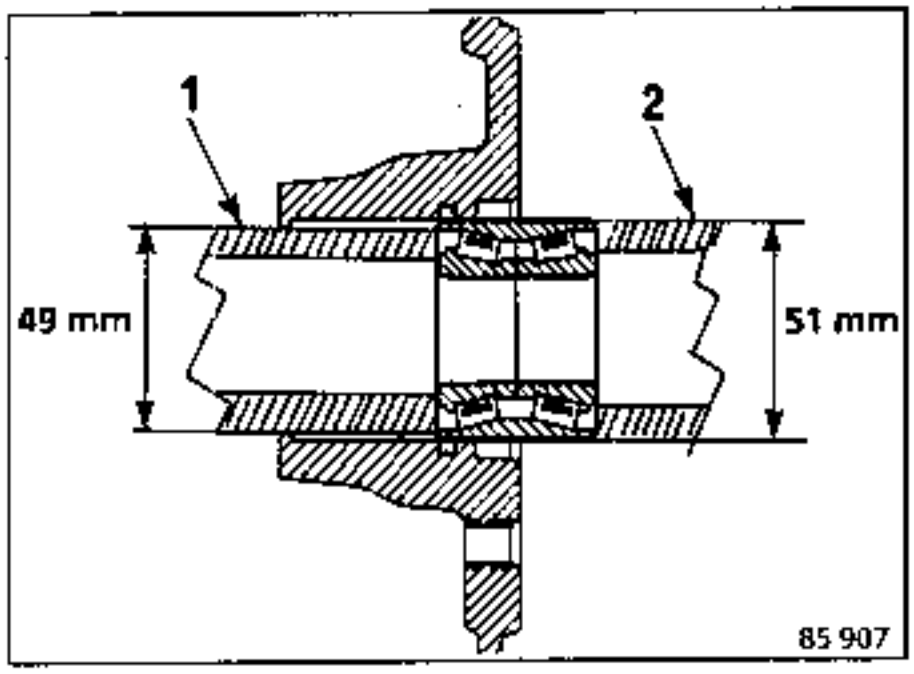
REMOVING

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



- the drum (see corresponding section).

Remove, from the drum :
- the bearing retaining clip,
- the bearing, using a tube (1).



REFITTING

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

Fit :
- a new clip,
- the drum, to the stub axle which has previously been oiled with SAE W 80 oil,
- a new self-locking nut, tightening it to torque,
- the hub plug.

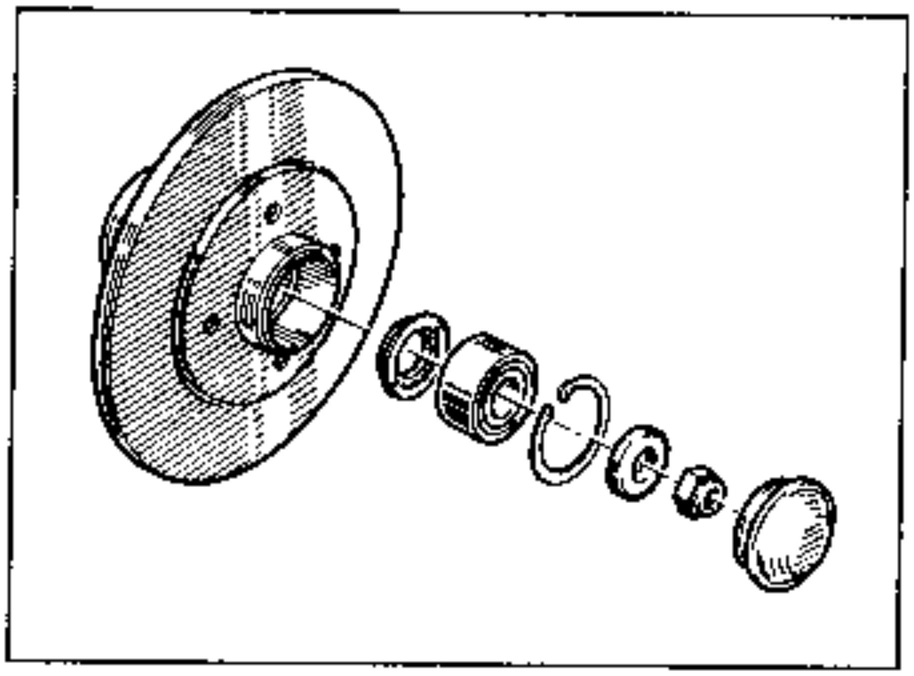
Adjust :
- the positions of the shoes by repeatedly depressing the brake pedal.
- the hand brake (see section 37 "Controls").

ESSENTIAL SPECIAL TOOLS		
Emb.	880	Inertia extractor
Rou.	943	Hub plug extractor
T.Av.	1050	Hub extractor

TIGHTENING TORQUES (in daN.m)	
Hub nuts	16
Brake caliper bracket bolts	10
Wheel bolts	8

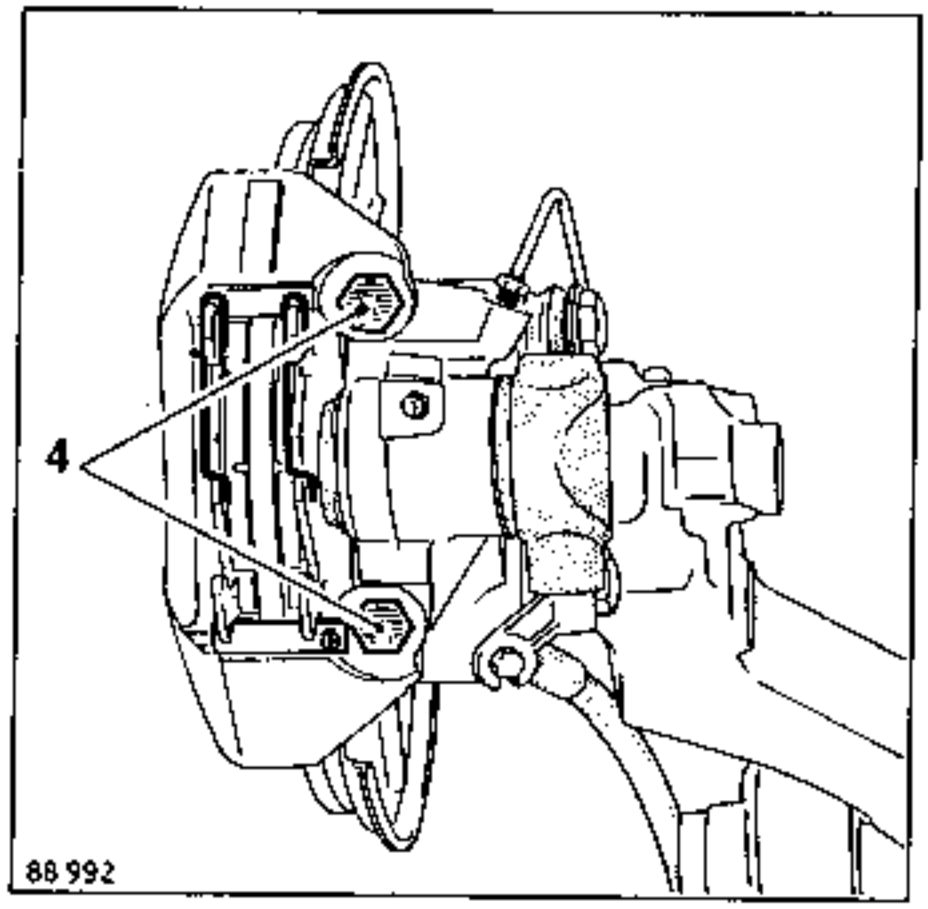
CHECKING

Check the axial play with a dial indicator mounted on the disc. It should be 0 to 0.03 mm max.



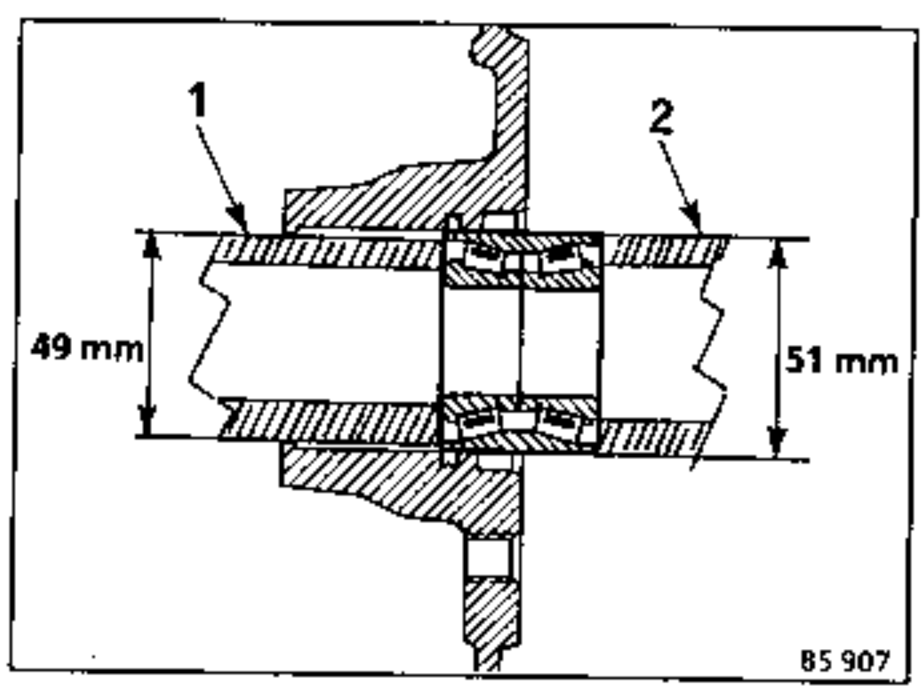
REMOVING

Remove :
- the brake pads (see corresponding section),
- the caliper bracket (two bolts (4)),



- the hub plug :
  tools Rou.943 + Emb.880,
- the stub axle nut and washer,
- the hub-disc-bearing assembly.

Remove, from the hub-disc :
- the bearing retaining clip,
- the bearing, using a tube (1).



REFITTING

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

Fit :
- a new clip,
- the disc, to the stub axle, which has previously been oiled with SAE W 80 oil,
- a new self-locking nut, tightening it to torque,
- the hub plug,
- the caliper bracket, coating the two securing bolts with Loctite FRENBLOC and tightening them to torque,
- the brake pads (see corresponding section).

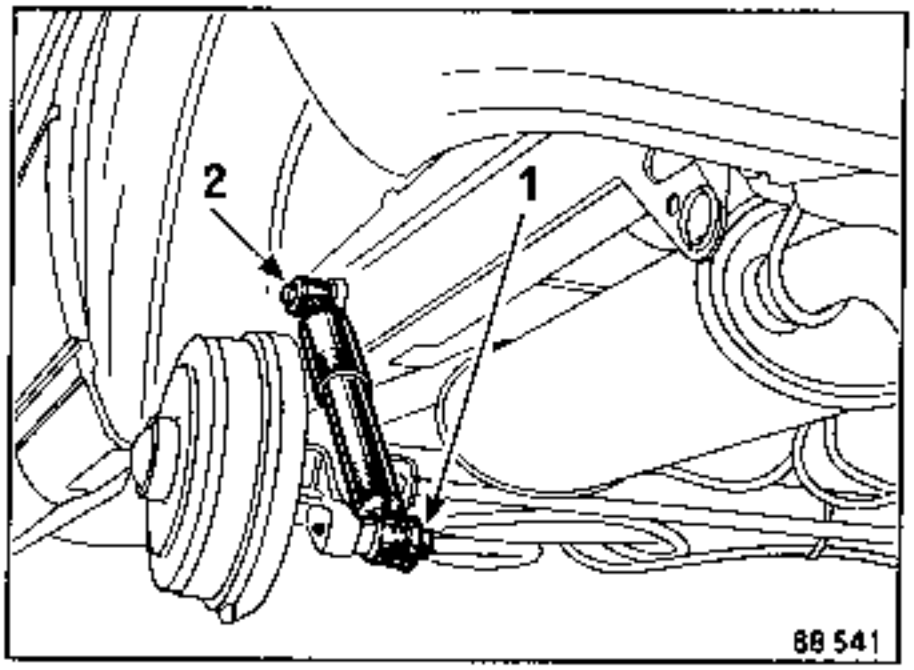
Press the brake pedal a number of times to bring the piston into contact with the pads.

TIGHTENING TORQUES (in daN.m)	
Upper securing bolt	**8**
Lower securing bolt	**6**

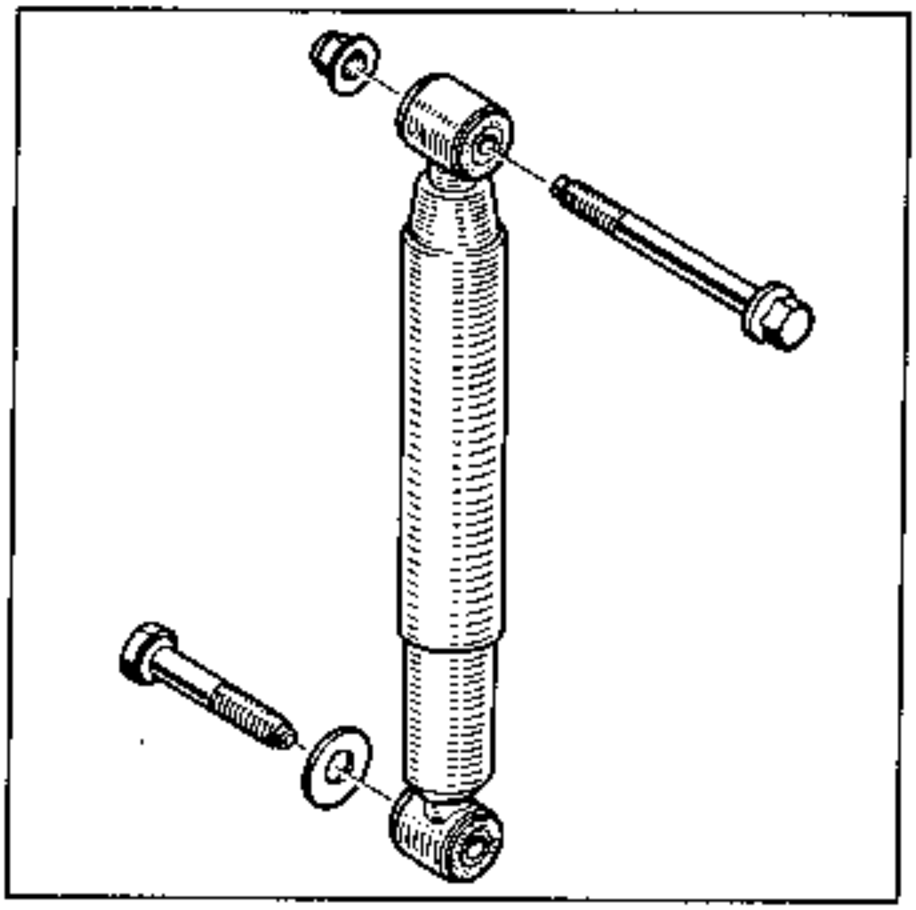
REMOVING

With the vehicle resting on its wheels, remove the lower securing bolt (1).

Lift the vehicle and remove :
- the wheel,
- the upper securing bolt (2),



- the shock absorber.



PRECAUTIONS TO BE TAKEN BEFORE FITTING A SHOCK ABSORBER

Shock absorbers are stored, in the spare parts stores, in a horizontal position.

Under these conditions, it is possible for the shock absorbers that are to operate vertically, to become unprimed.

Consequently, before fitting a shock absorber to the vehicle, pump it up and down, a number of times, in a vertical position.

REFITTING

Fit :
- the shock absorber,
- the upper securing bolt coated with MOLYKOTE BR2 grease, without tightening it,
- the wheel.

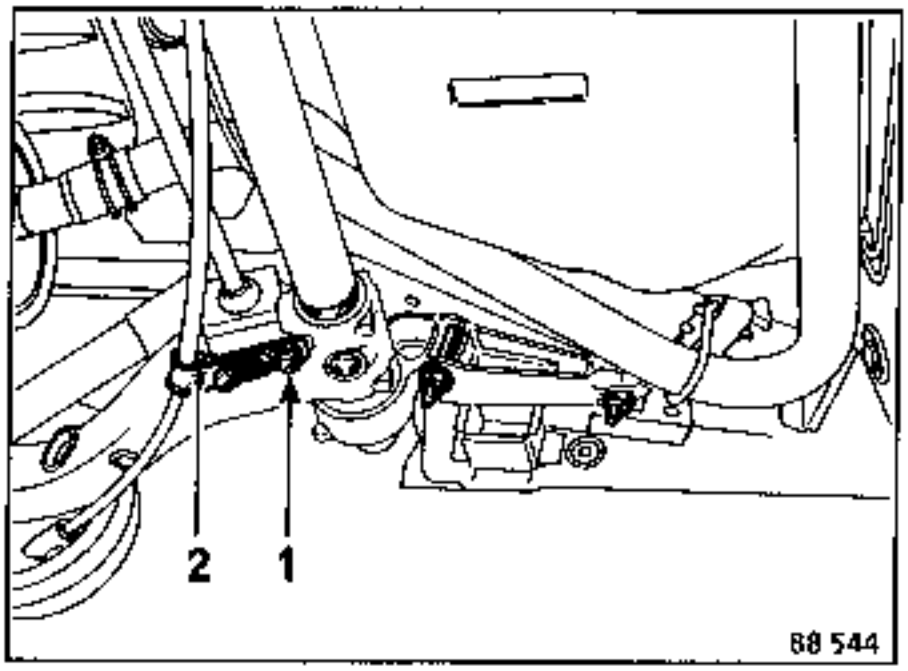
Lower the vehicle on to its wheels.

Fit the lower securing bolt after coating it with MOLYKOTE BR2 grease.

Tighten both bolts to the specified torque.

TIGHTENING TORQUES (in daN.m)	
Bar securing bolts	5

REMOVING



1 The securing bolts
2 The hand brake cable retaining clips.

Raise the vehicle on a lift with its wheels hanging free.

From either side, remove the bolts (1) and the nuts (2) and retrieve the trapped nuts.

Remove the bar.

REFITTING

Fit, on either side :
- the clips (2),
- the bolts (1) with their trapped nuts.

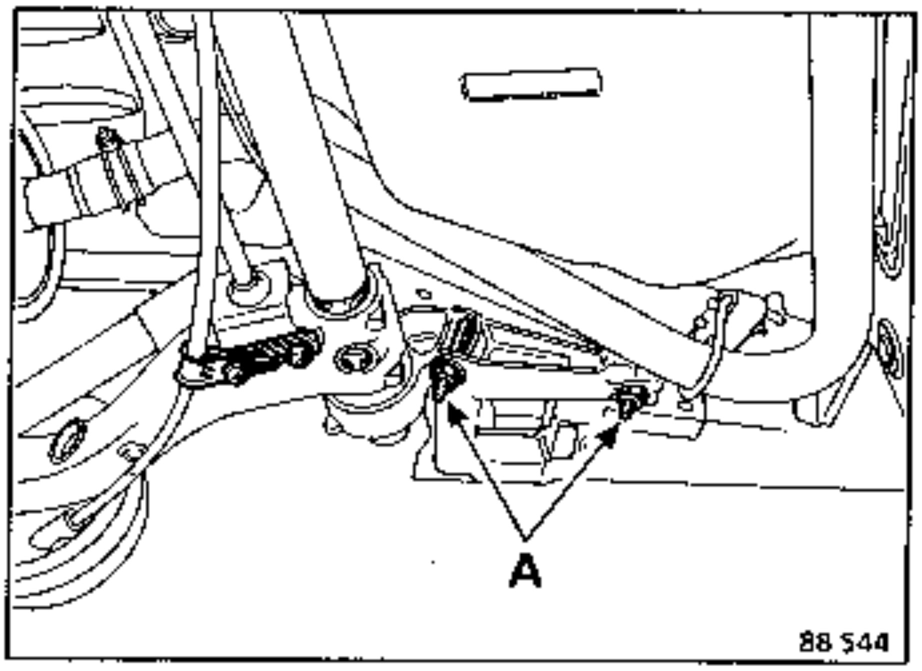
Tighten them to torque.

Half suspension arm assembly - tubular rear axle

TIGHTENING TORQUES (in daN.m)	
Bearing assembly securing nuts	
B40X-C40X-S40X	8.5
F40X	9.5
Anti-roll bar securing bolts	5
Wheel bolts	8
Shock absorber lower secur. bolt	6

REMOVING

With the vehicle on a two column lift, remove :
- the anti-roll bar,
- the shock absorber lower fastening,
- the hand brake secondary cable by disconnecting it from the central control under the vehicle,
- the brake hose,
- the compensator control on the right hand side (on certain versions),
- the two bearing assembly securing nuts (A).



Loosen the two nuts (A) on the other bearing assembly to be able to free the half suspension arm being removed from its locating points.

Remove the half suspension arm assembly by separating it from the other.

REFITTING

Three different cases may arise.

1. ARRANGEMENT WITH PLASTIC BUSHES

Check that the suspension arm shaft is suffering from no impact marks or excessive wear.

Lubricate the shafts and bushes with type 33 MEDIUM grease.

2. NEEDLE RACE TYPE ASSEMBLY

Check that the needle tracks and track rings are in good condition. If not replace them (see section "Axle bushes - tubular rear axle"). As the needle races are greased for life, it is not necessary to regrease them.

3. REPLACING A SUSPENSION ARM OF THE EARLY TYPE

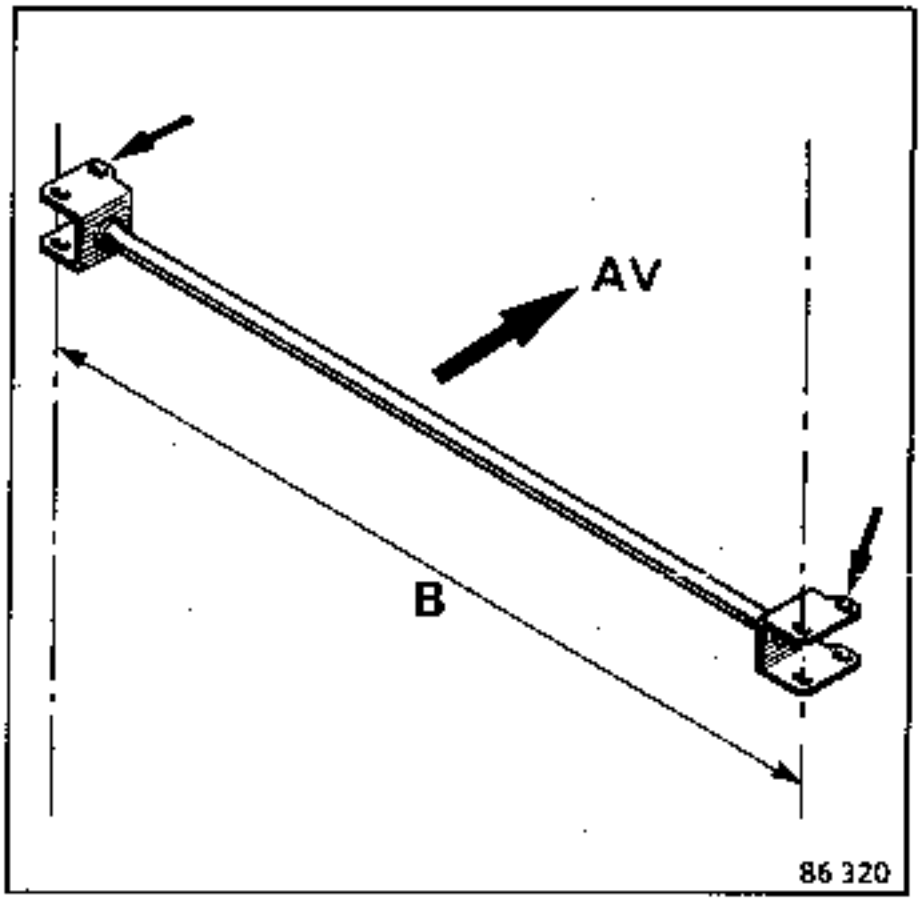
The fitting, in production, of needle race type bushes has involved a reduction in the Ø of the male tube (right hand) by 1 mm. The female tube (LH side) remains the same.

The Parts Department only supplies :

- male tubes (RH side) of the later type equipped with a needle track and a protector and this necessitates fitting a needle race into the female (left hand) suspension arm assembly (see "Axle bushes - tubular axle").
- female arms (LH side) fitted with needle race type bushes and a protector require the fitting of a bearing track (early or later type depending on the case) to the male arm (RH side) (see section entitled "Axle bushes - tubular rear axle").

Engage the two half assemblies, one into the other to obtain dimension (B).

NOTE : dimension (B) is the distance between the two same securing points for the anti-roll bar on the suspension arms. It is therefore possible to obtain this dimension by placing the anti-roll bar in its location and checking that its securing bolts enter correctly. Ensure that it is the correct way round.



From then on carry out the removing operations in reverse.

Bleed the braking system.

Adjust the hand brake control.

Check, and if necessary, adjust the brake compensator (on certain versions).

(For these operations, see section 37 "Controls").

This operation is carried out after removing the complete rear axle assembly and separating the two suspension arm sub-assemblies.

ESSENTIAL SPECIAL TOOLS	
T.Ar. 960	Bush extractor
T.Ar. 960-01	Additional spacer and end fitting
T.Ar. 960-02	Bush + spacer extractor assembly
T.Ar. 960-03	Tool for fitting standard type needle races
T.Ar. 960-04	Tool for fitting the special replacement needle races

The early type axles were fitted with plastic bushes. To eliminate the risk of noise, these vehicles are now fitted with needle races. These later type axles differ from the early type by a reduction in the ø of the male tube (RH side) of 1 mm. The female tube (LH side) remains the same.

The Parts Department supplies two sets of needle races, as replacement parts, to cover both arrangements :

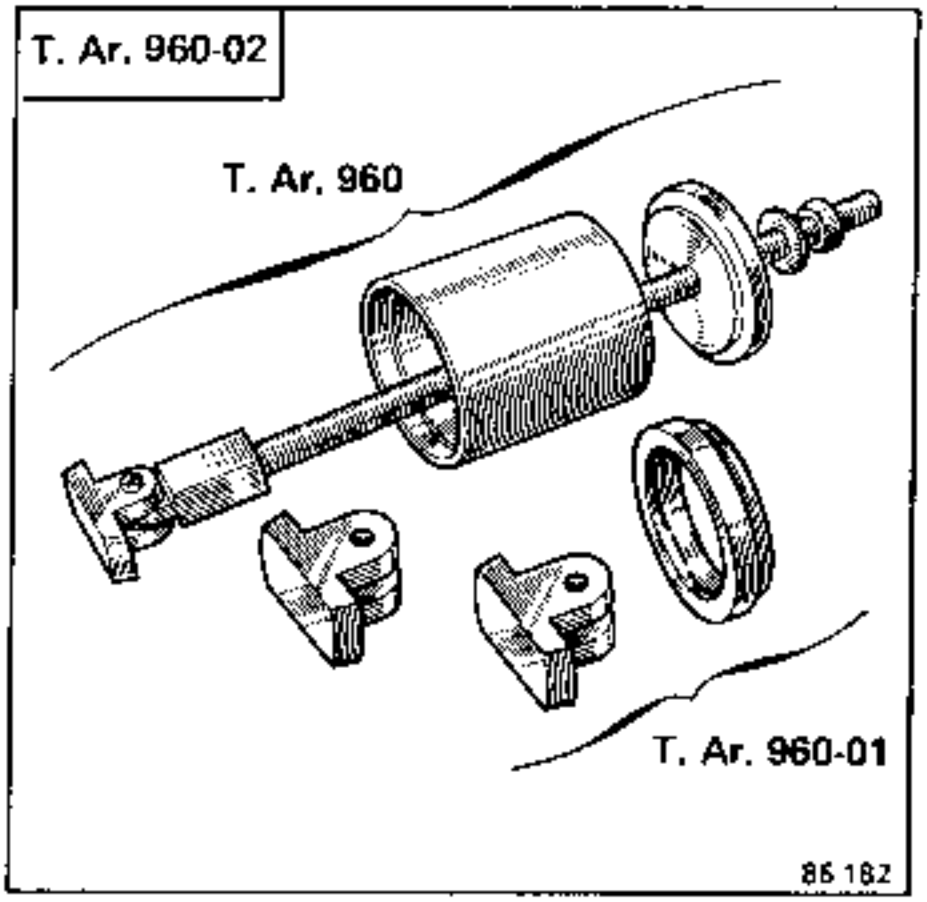
- The 1st set (special replacement) consists of :
  - two bearing tracks 1 mm thick for early type axles,
  - two needle races (common to both arrangements),
  - one seal (common to both arrangements).
- The 2nd set (standard production type) consists of :
  - two bearing tracks 1.5 mm thick for later type axles,
  - two needle races (common to both arrangements),
  - one seal (common to both arrangements).

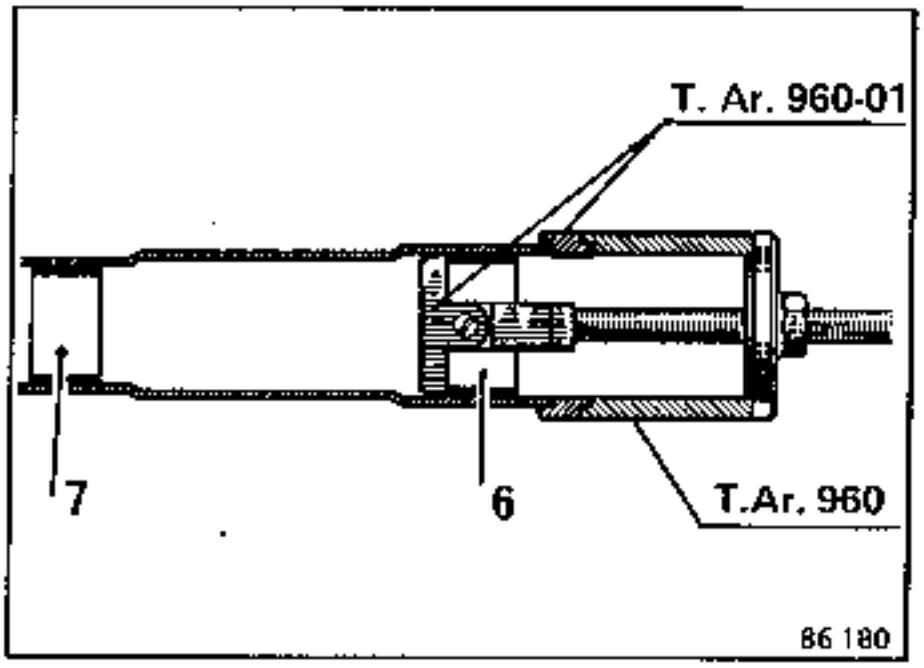
DISMANTLING

Both early and later type axles

Remove, from the female arm (LH side) :

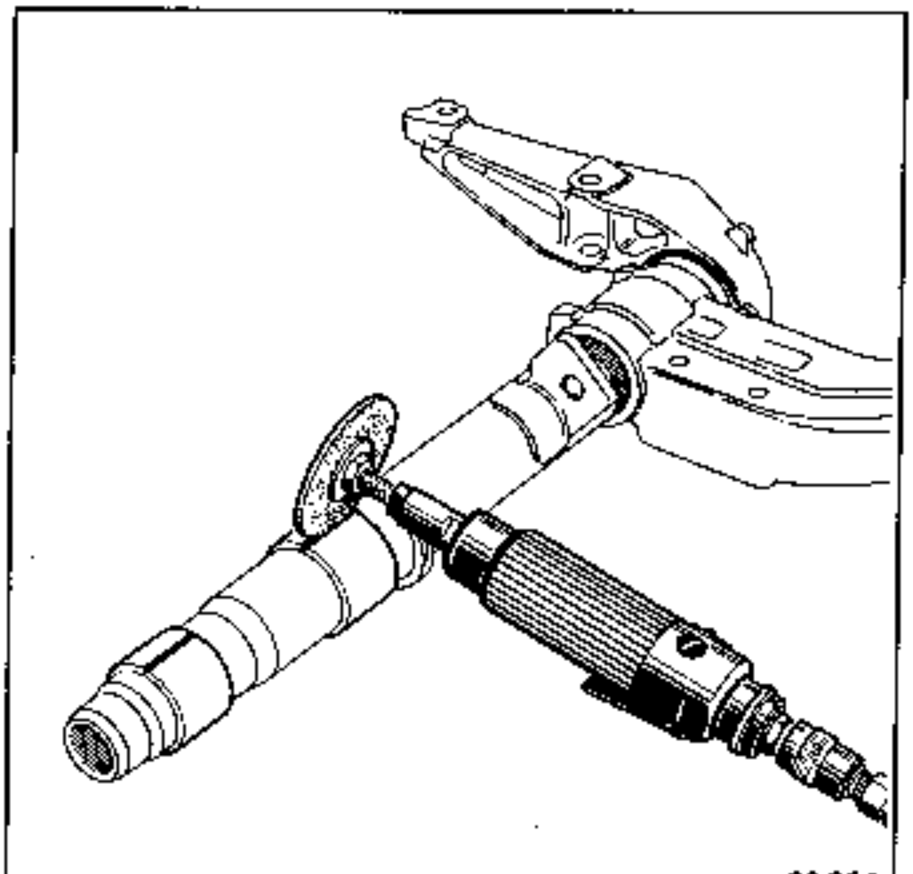
- the outer bush (6) tool T.Ar.960-02 or T.Ar.960 + T.Ar.960-01,
- the inner ring (7) using the small end fitting from tool T.Ar.960.





Later type axle

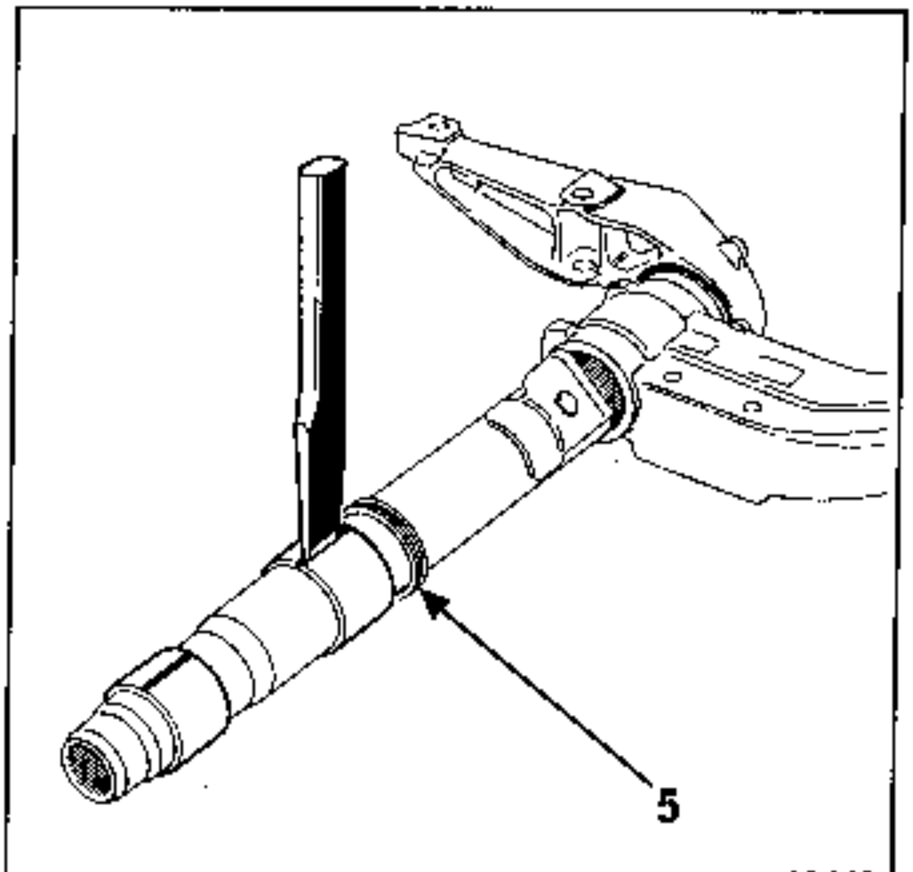
Grind grooves in the bearing tracks on the male arm (right hand) with a straight grinder, taking care not to mark the tube.



90 864

Split the bearing tracks with a cold chisel and remove them.

Cut and remove the seal (5).



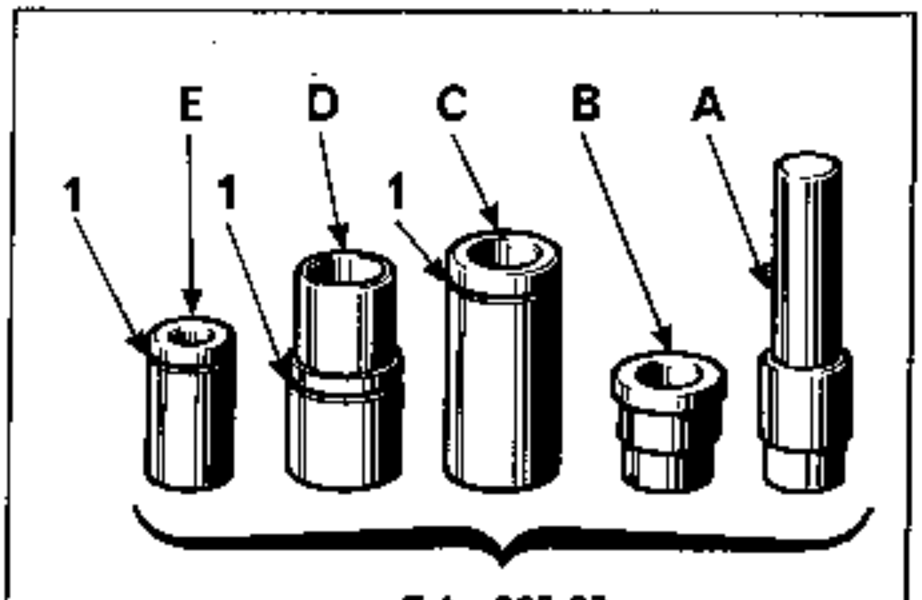
90 863

REASSEMBLY

Fitting the needle races and their tracks involves using special tools :

- tool T.Ar.960-03 for the later type (standard type),
- tool T.Ar.960-04 + components (A) and (B) from tool T.Ar.960-03 for the early type (special replacement).

NOTE : Items (C), (D) and (E) of tool T.Ar. 960-03 are identified by one groove (1) whereas tools T.Ar.960-04 have two grooves.

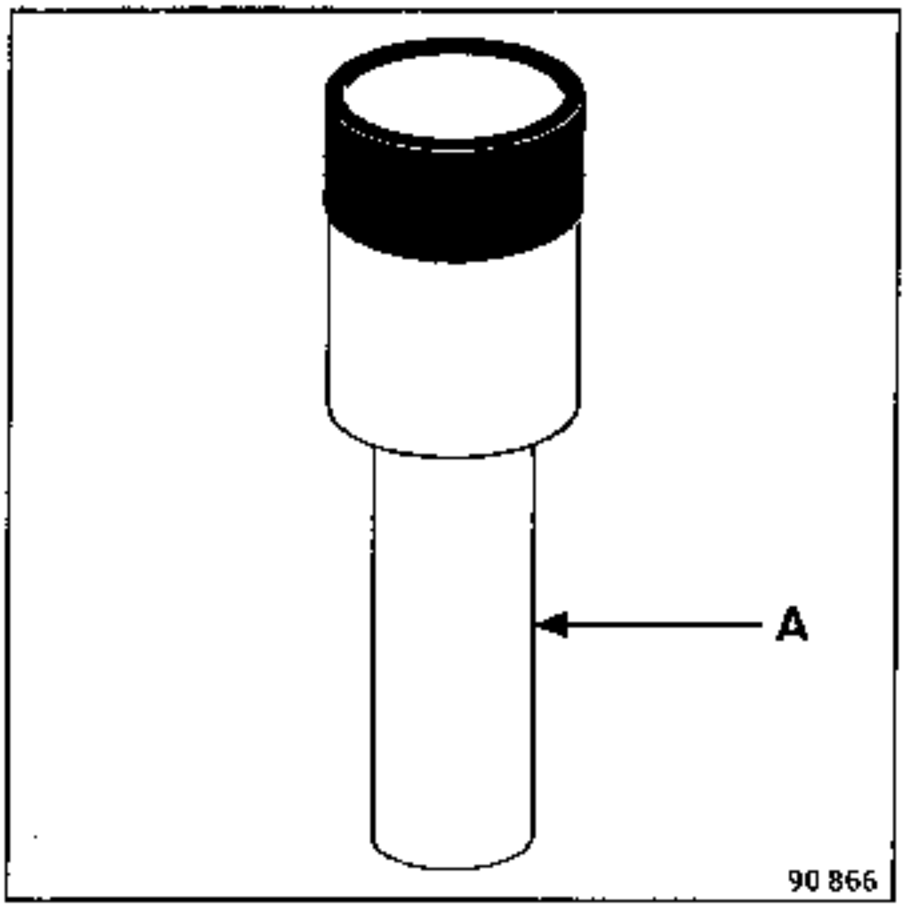


90 874

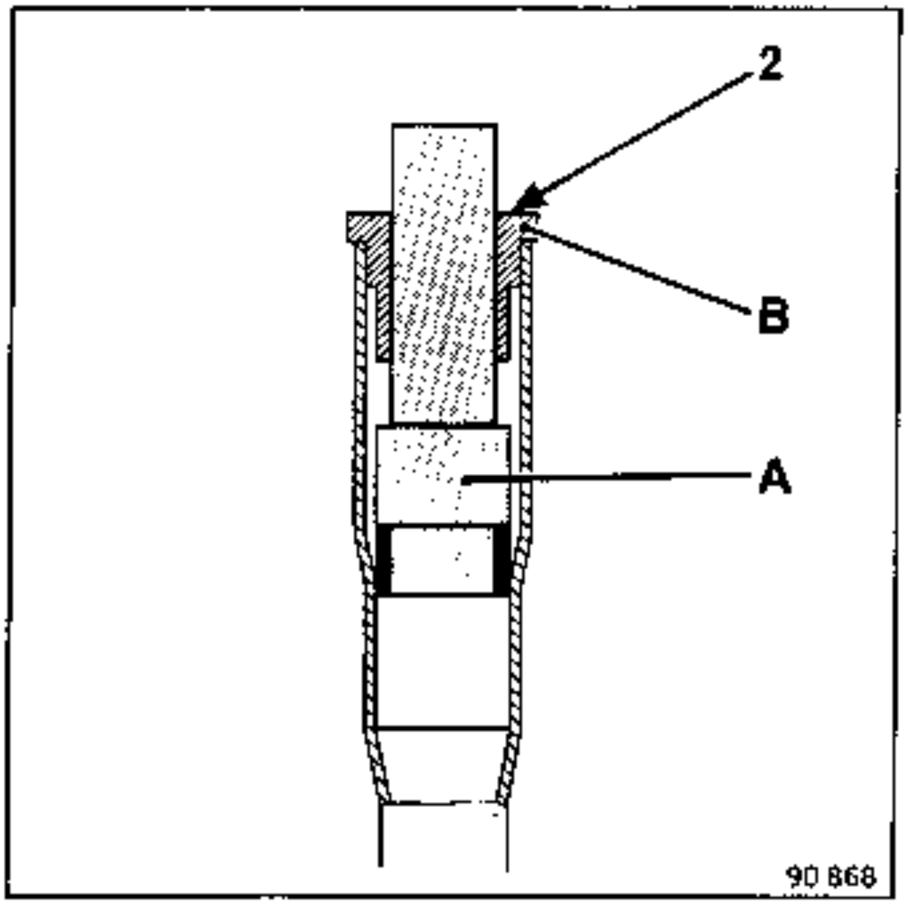
Fit :

- the small needle race to the mandrel (A),
- the mandrel (A) inot the tube using mandrel (B) as a guide.

Push them in on the press until the mandrel (A) is flush with face (2) of mandrel (B).

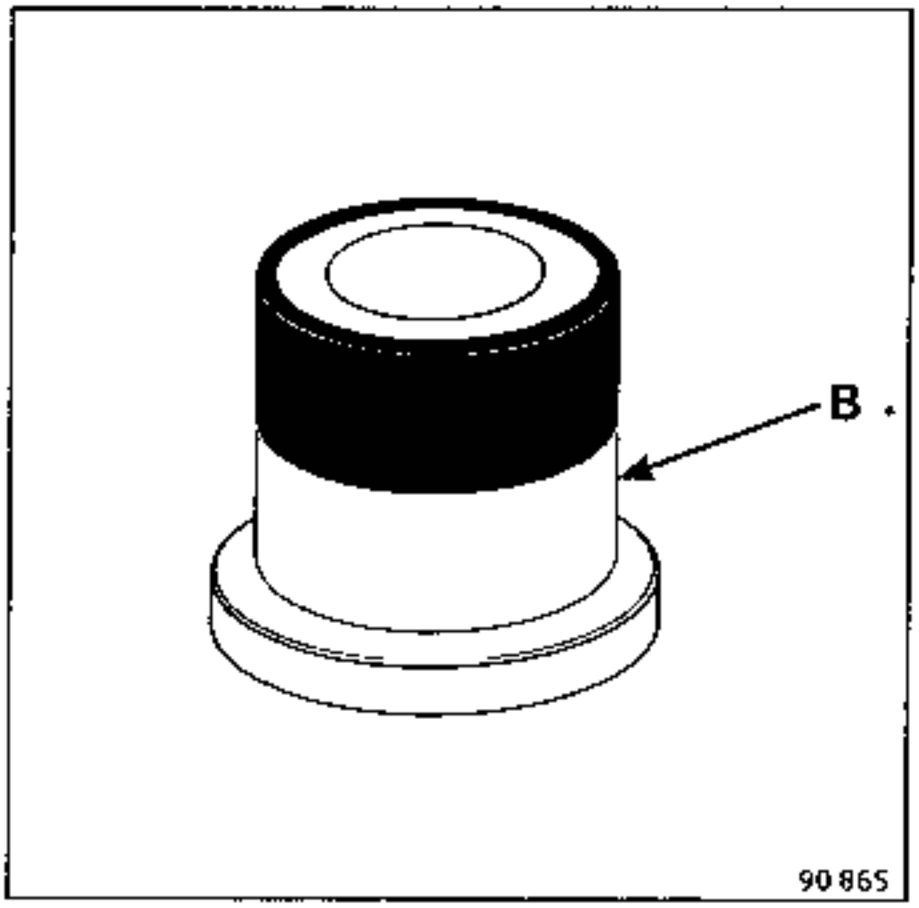


90 866



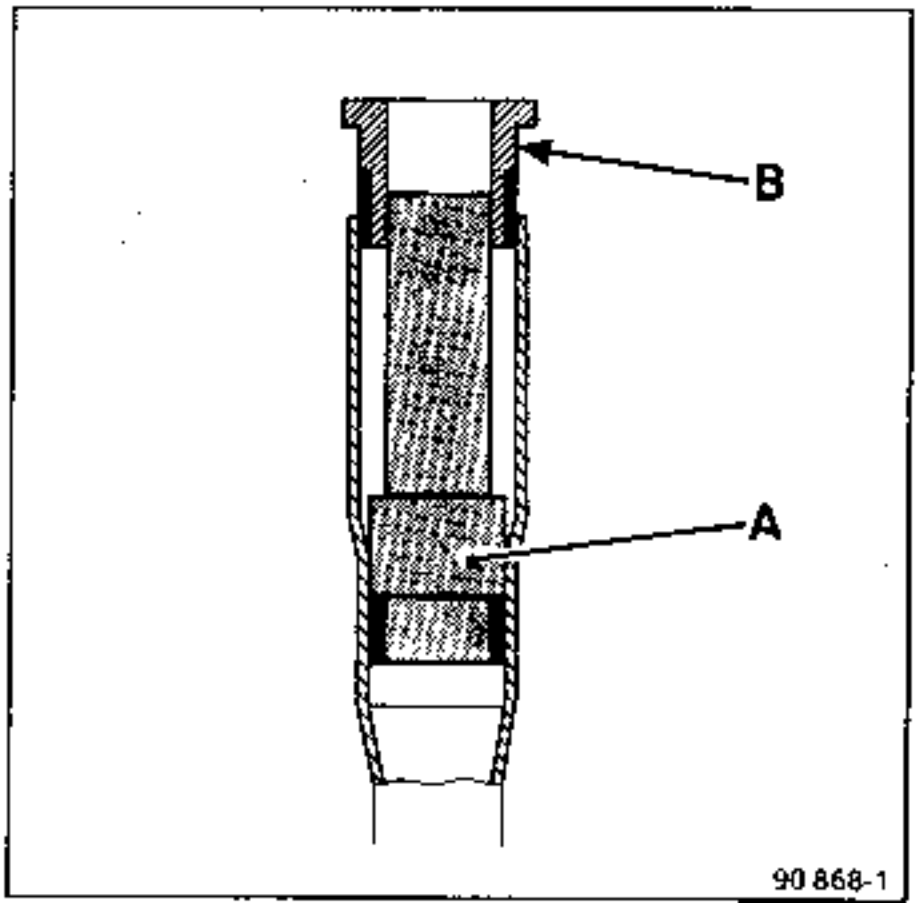
90 868

Position :
- the large needle race on mandrel (B),



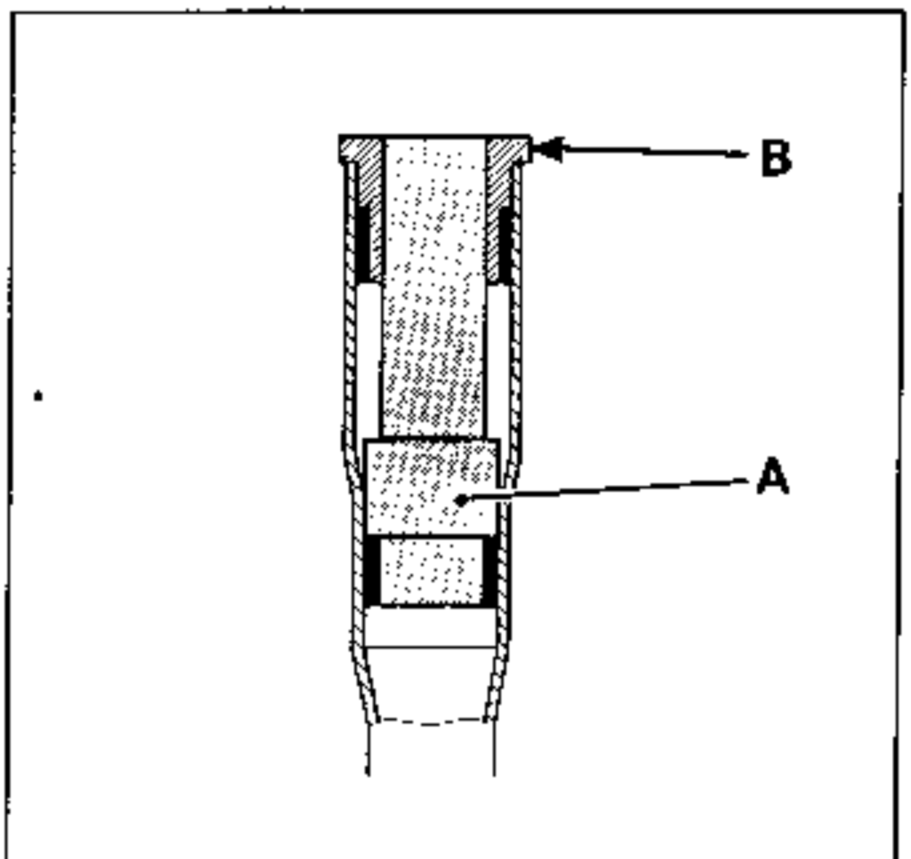
90 865

- mandrel (B) in the tube, using mandrel (A) as a guide.



90 868-1

Push them in on the press until mandrel (B) makes contact with the tube.

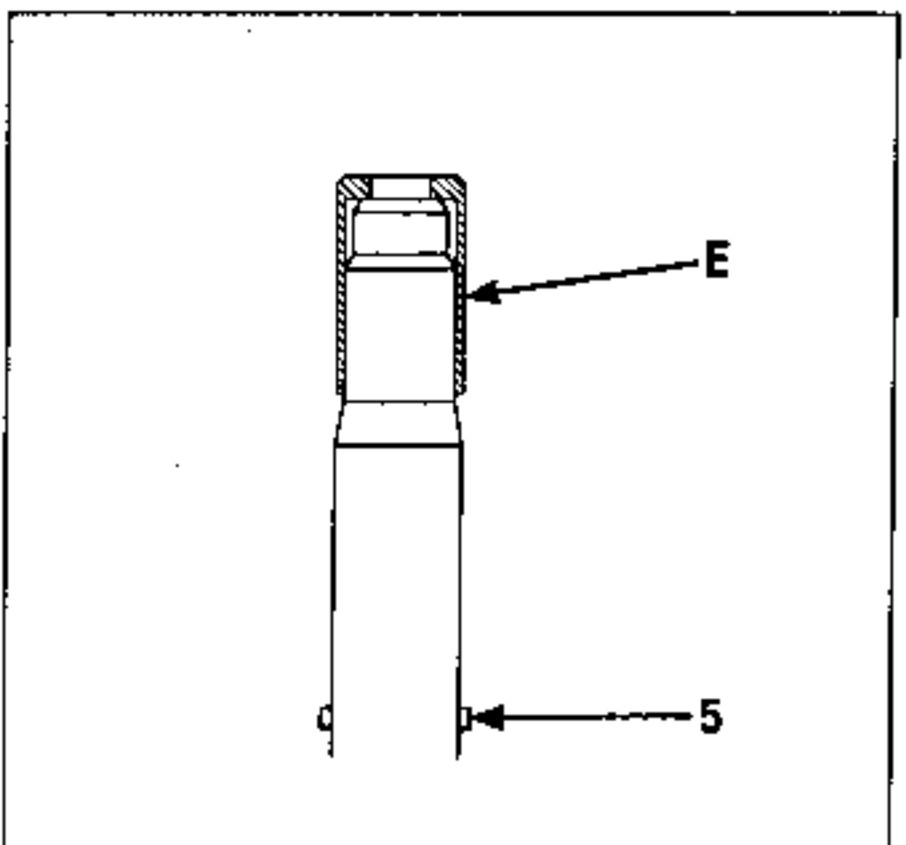


90 868-2

Remove mandrels (B) and (A).

Fit to the male tube :
- a new seal (5),
- the guide bush (E).

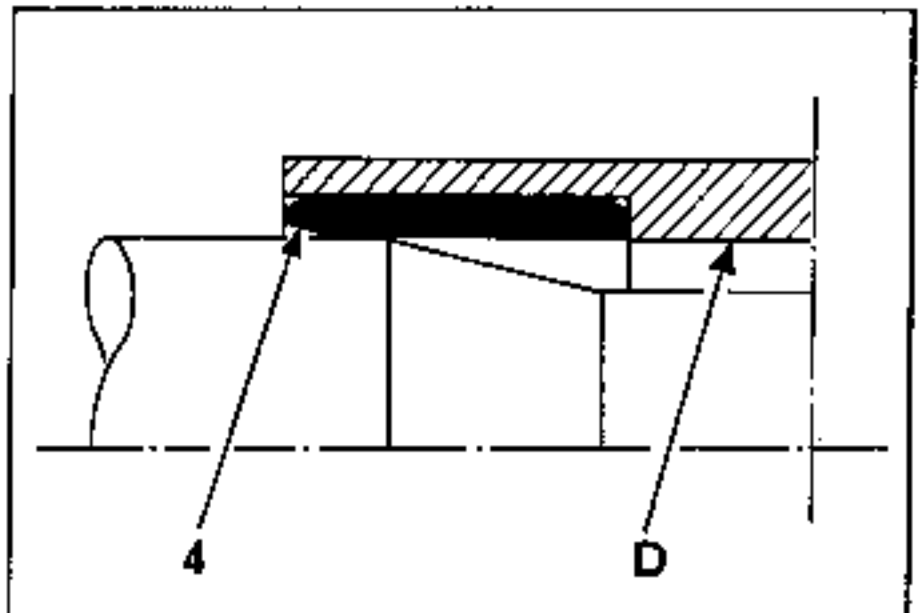
NOTE : The "standard production type" arrangement is assembled by using tool T.Ar,960-03 which is identified by one groove whereas the "special replacement arrangement" requires the use of tool T.Ar.960-04 which is identified by 2 grooves.



90 867

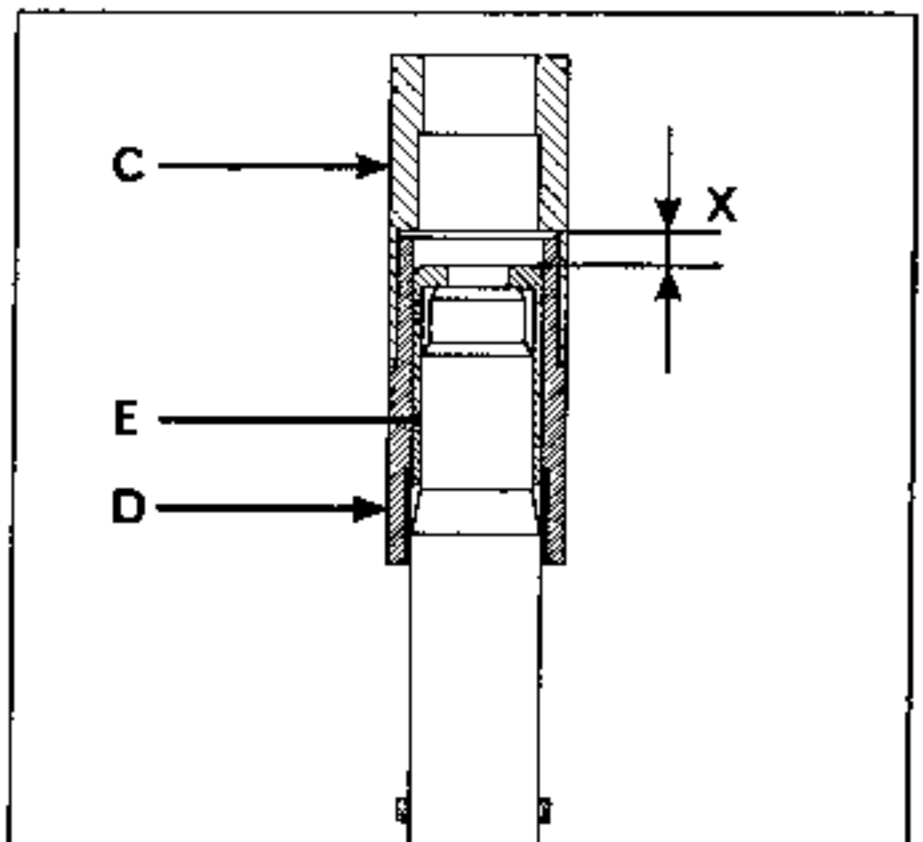
The bearing tracks have a lead chamfer at one end.

It is essential to fit these tracks the correct way round with chamfer (4) positioned as shown in this drawing so that there is enough bearing area left to support the insertion loads.



90 941

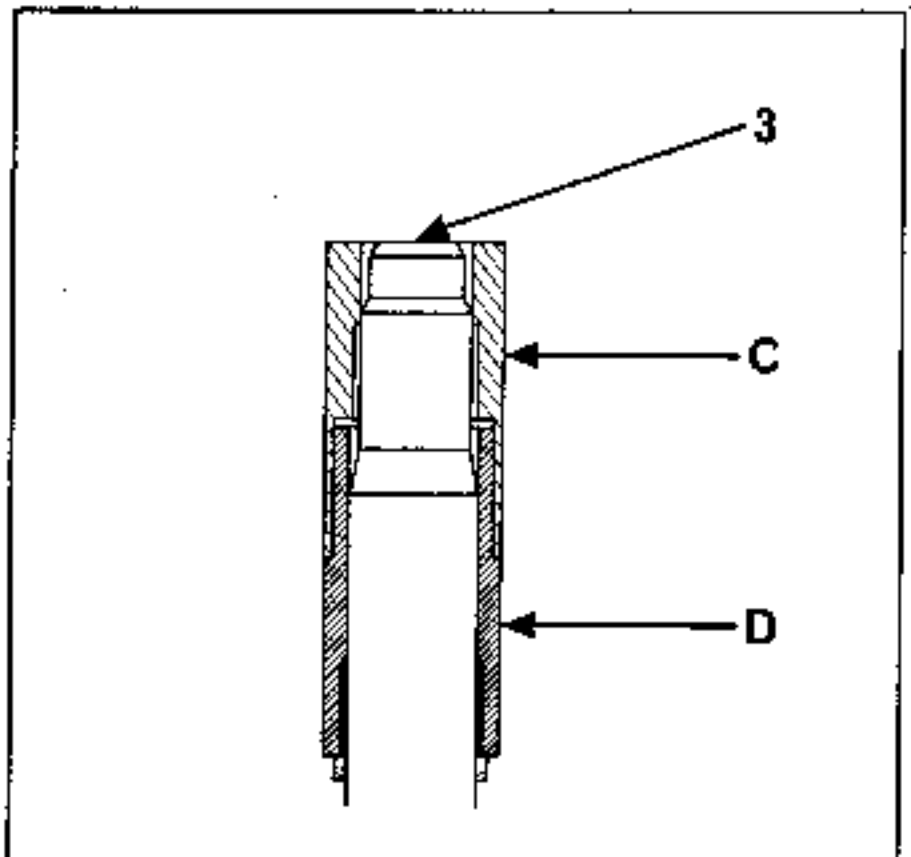
Fit :
- the large bearing track into the sleeve (D),
- the assembly formed by sleeve (D) and (C) on to the tube.



90 867-1

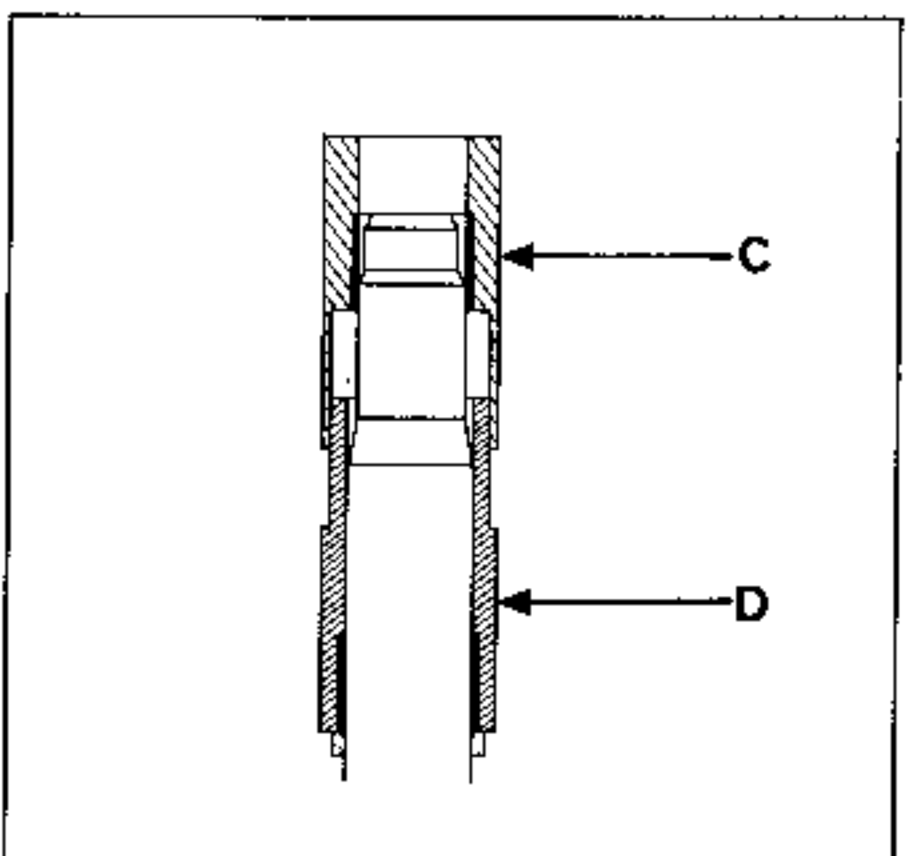
Push in the assembly by 10 mm (dimension X) (on the press).

Remove the guide tube (E) and push in assembly (D) and (C) until sleeve (C) is flush with the edge (3) of the tube.



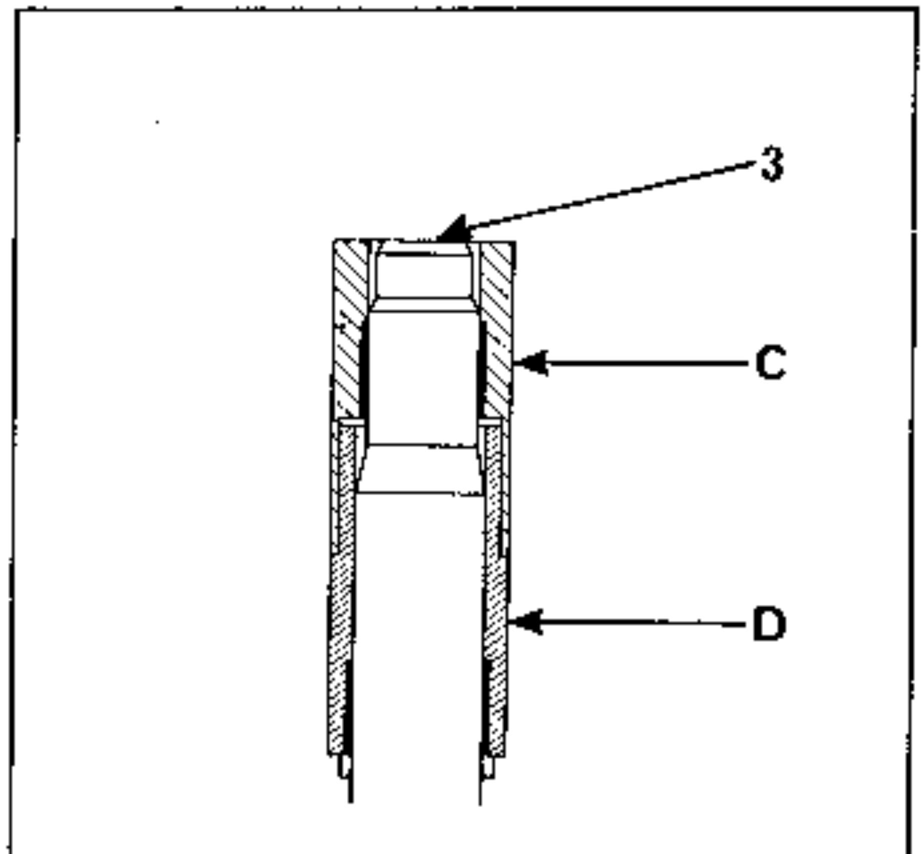
90 867-2

Position :
- the small bearing track ring in sleeve (C),
- sleeve (C) on the tube with sleeve (D) acting as a guide.



90 867-3

Push them on the press until the sleeve (C) is flush with the edge (3) of the tube.



90 867-4

Remove sleeves (C) and (D).

IMPORTANT

When fitting, if the load is taken on the axle bearings, it is essential to ensure that the suspension arms are correctly positioned in their anchor points (there is a risk of them coming out).

Re-locate them if necessary.

Assemble the two half axles.

NOTE : It is not necessary to grease the needle races. They are supplied greased for life.

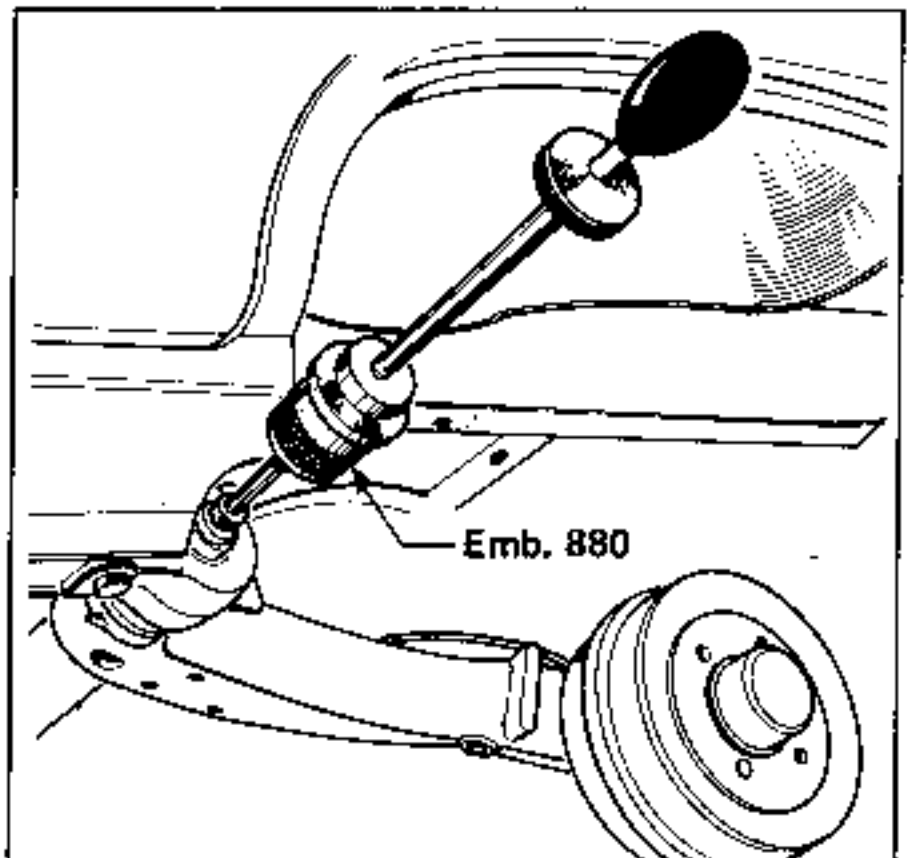
Then reconnect the rear axle assembles and refit them to the vehicle (see corresponding section).

ESSENTIAL SPECIAL TOOLS	
Emb. 880	Inertia extractor

TIGHTENING TORQUES (in daN.m)	
Shock absorber upper securing bolt	8
Shock absorber lower securing bolt	6

REMOVING

With the vehicle's wheels hanging free, remove the shock absorber on the side concerned.
Extract the bar, from one side, using tool Emb.880.

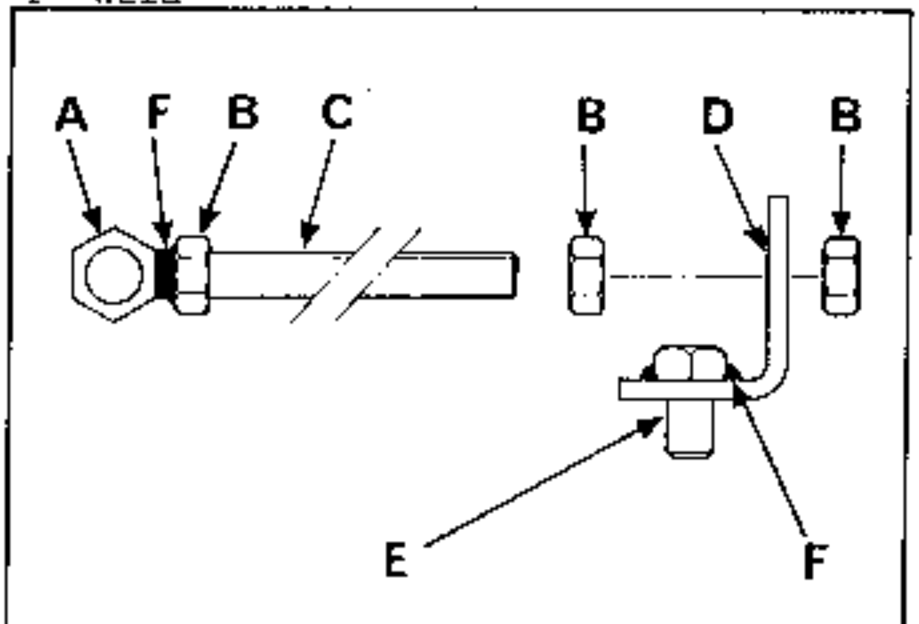


85 893

REFITTING

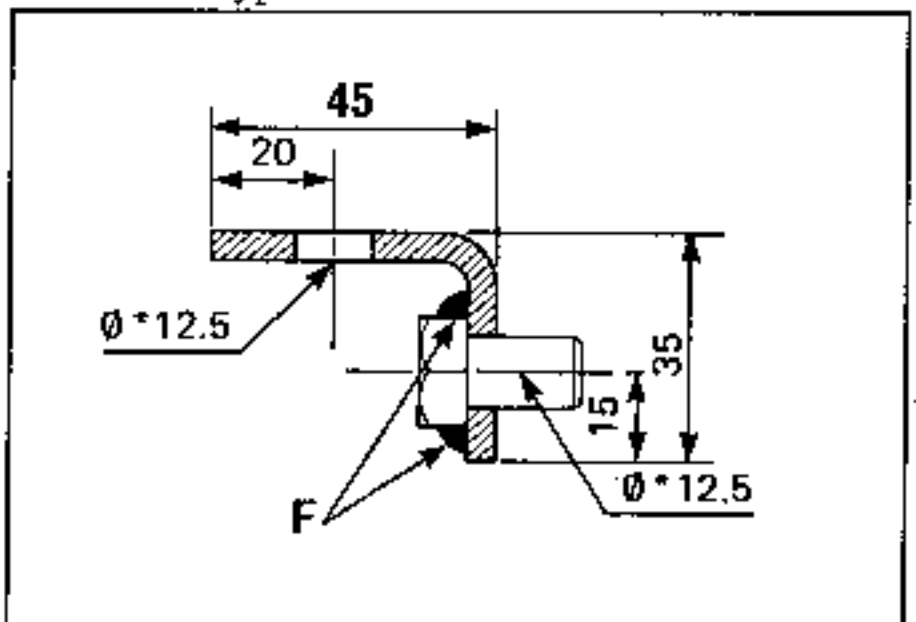
A tool will have to be made up locally to correctly position the bar when refitting.

A Nut 14 mm Ø
B Nut 12 mm Ø
C Screwed rod 12 mm Ø - length 660 mm
D Bracket made from flat section steel 30 x 5 mm
E 12 x 60 mm bolt cut off to a length of 20 mm
F Weld



75 505

The bracket (D) is specific to this vehicle type.



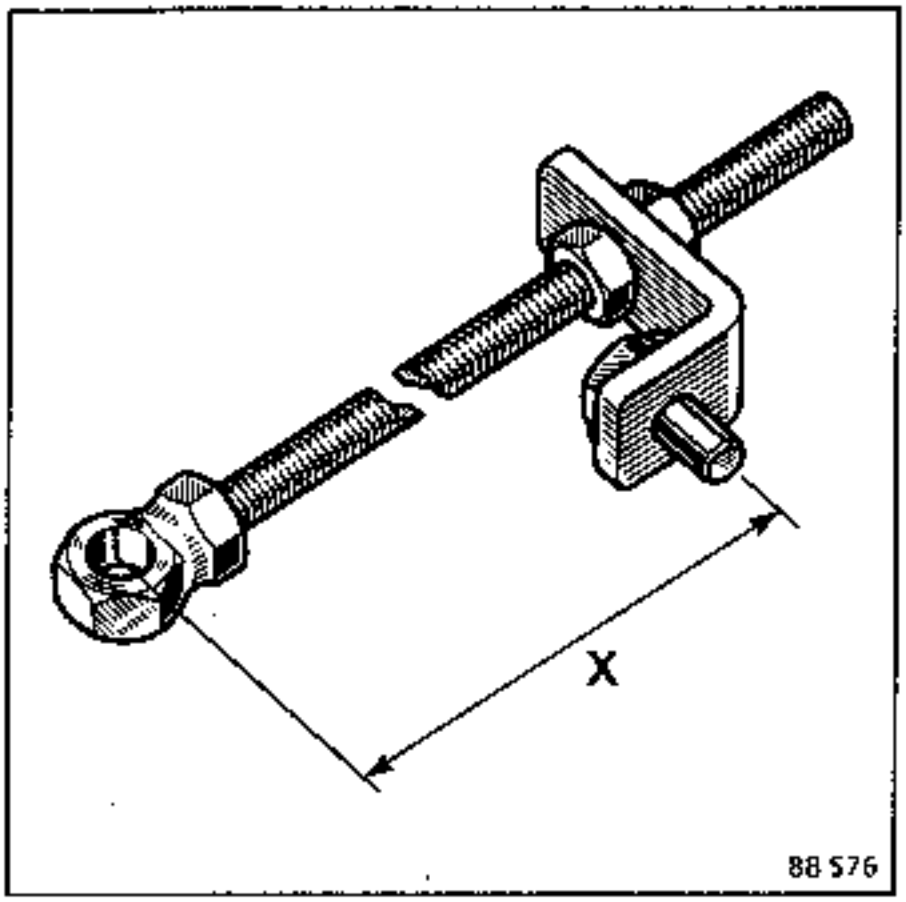
88 576-1

(*) hole diameter

Pre-adjust the tool to obtain dimension "X".

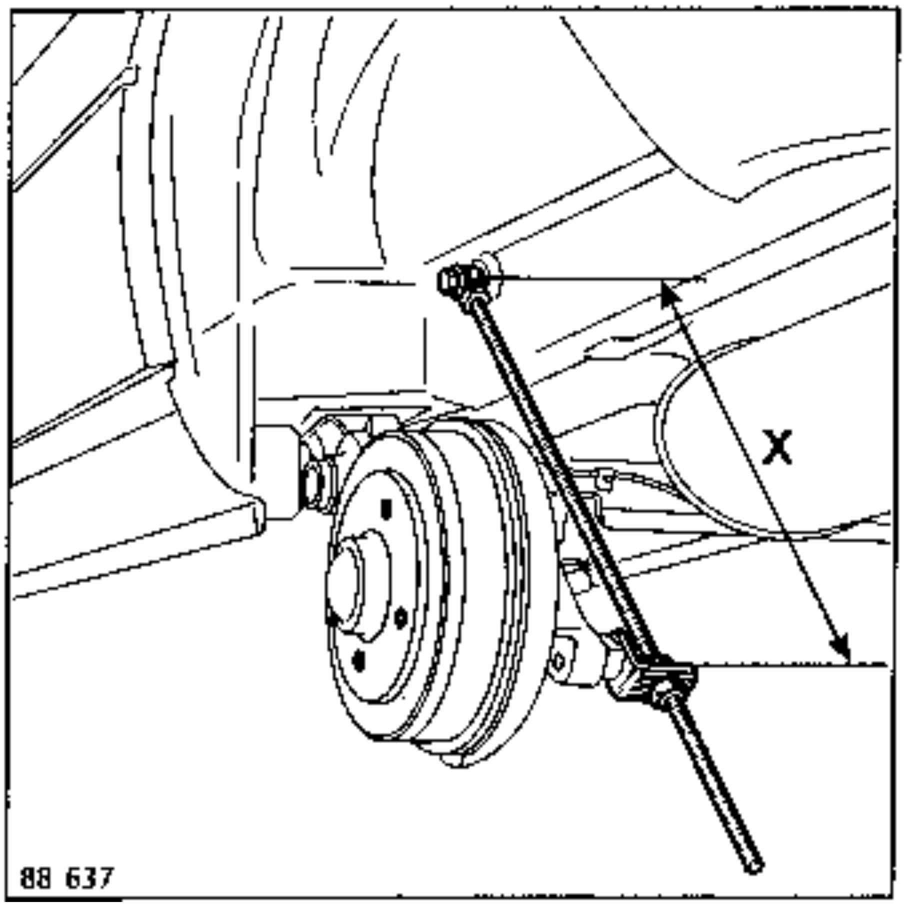
All types :

X = 405 mm



88 576

Fit the tool in place of the shock absorber.



88 637

Coat the spines on the bar with MOLYKOTE BR2 grease, insert it into the bearing and into the suspension arm. Turning it to find the position where it will enter freely the splines in both the suspension arm and the bearing.

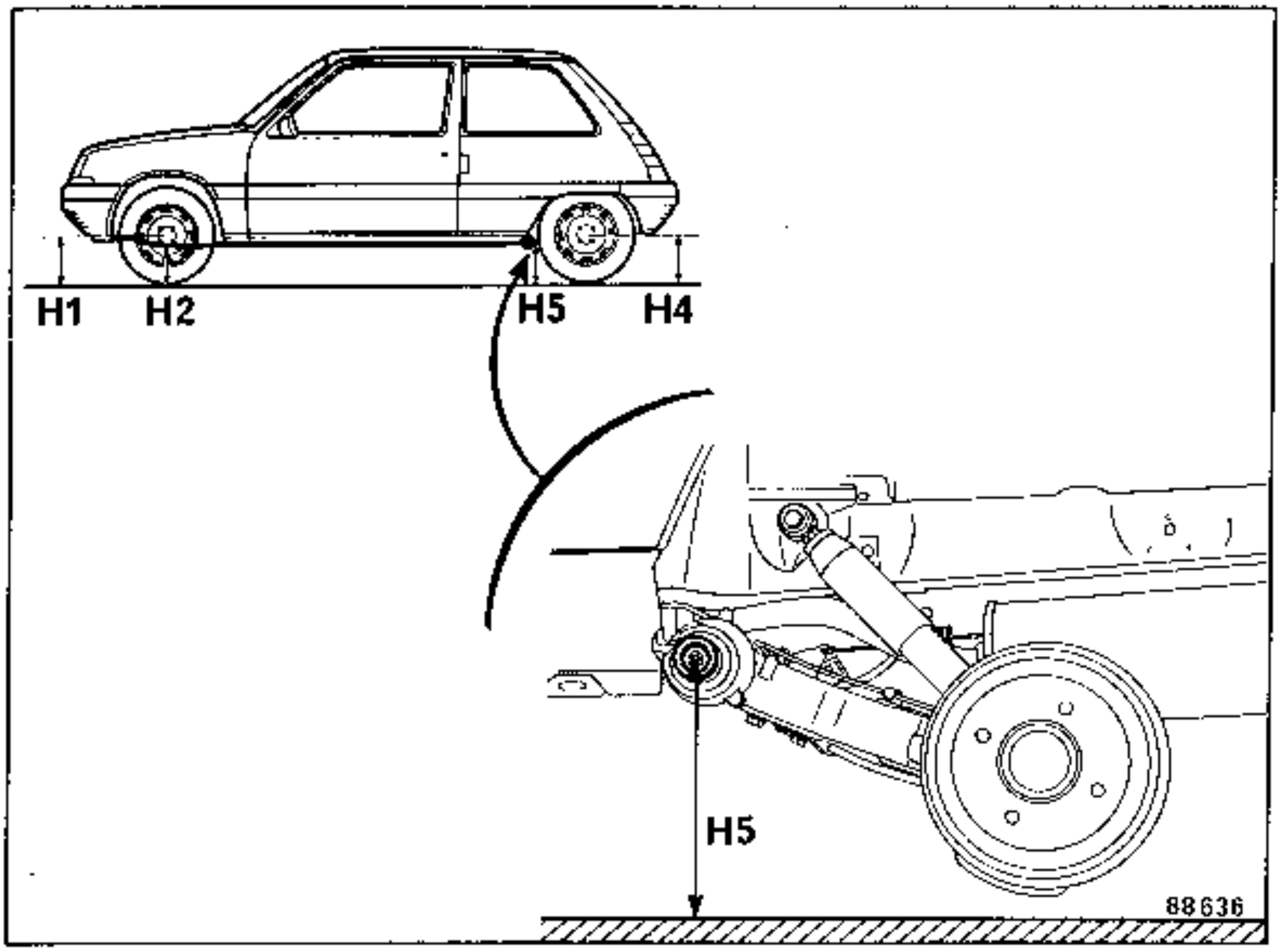
Remove the tool and refit the shock absorber.

Lower the vehicle on to its wheels and measure the underbody heights (see section "Underbody height - Tubular rear axle").

Check, and if necessary adjust :
- the brake compensator (on certain versions).
- the headlights.

CHECKING

Park the vehicle, unladen, with its fuel tank full, on a flat horizontal surface.



B400 - C400 - S400

H1 - H2 = $79 ^{+10}_{-5}$ mm

H4 - H5 = $-10 ^{-10}_{+5}$ mm

B401 - C401 - S401 - B40H - C40H

H1 - H2 = $66 ^{+10}_{-5}$ mm

H4 - H5 = $-10 ^{-10}_{+5}$ mm

B402 - C402 - B403 - C403 - B404 - C404 - S404 - B407 - C407 - B40F - C40F - S40F - B40G - C40G - B40J - C40J - B40K - C40K - B40M - C40M

H1 - H2 = $72 ^{+10}_{-5}$ mm

H4 - H5 = $-10 ^{-10}_{+5}$ mm

B408 - C408

H1 - H2 = $84 ^{+10}_{-5}$ mm

H4 - H5 = $-10 ^{-10}_{+5}$ mm

ADJUSTING

Only the rear underbody height can be adjusted by turning the torsion bars.

Determine the existing dimension "X" by adjusting the bracket (D) on the locally manufactured tool until the bar can be slid by hand into its location.

Remove the bar.

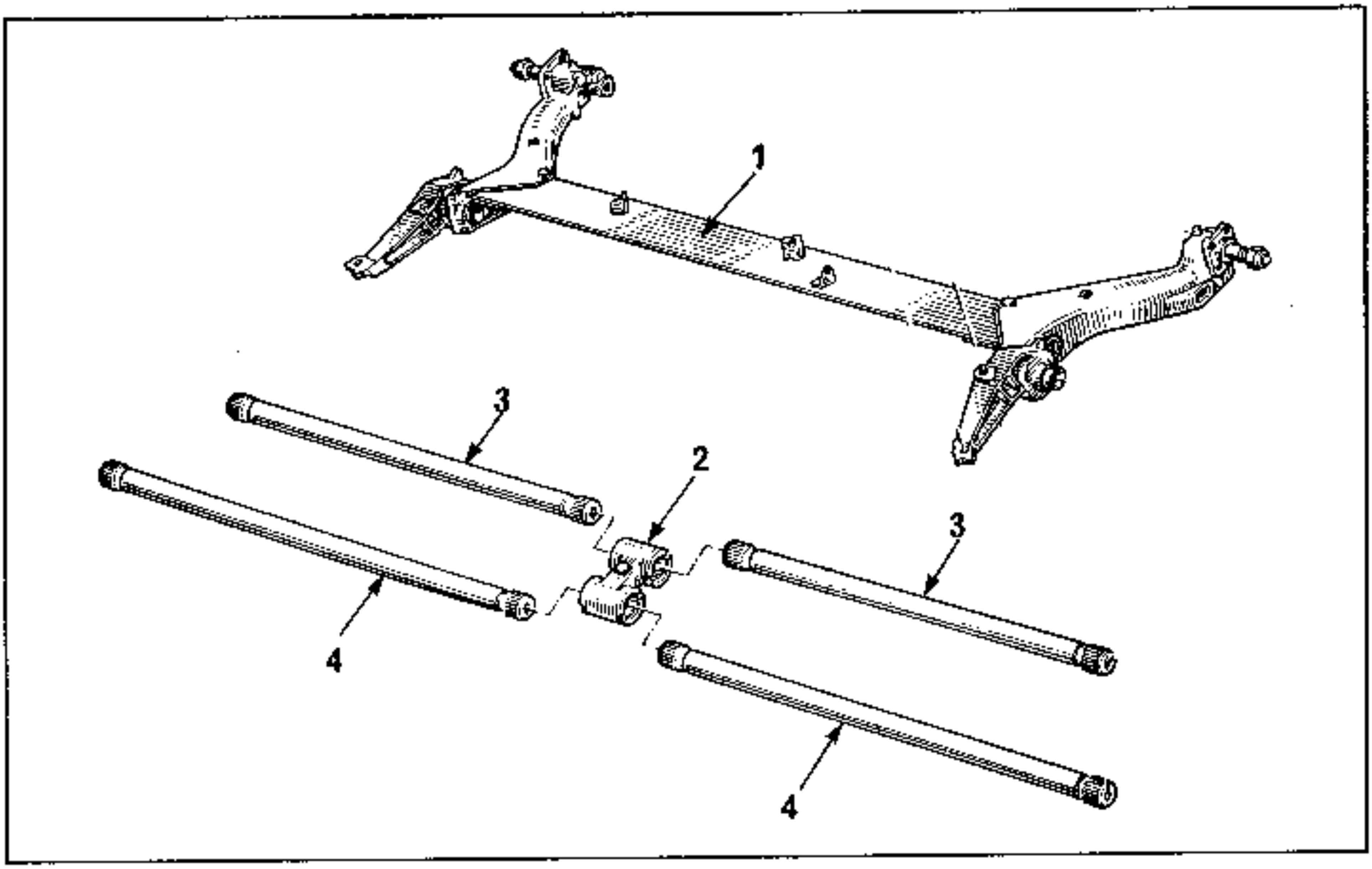
As 3 mm is the minimum possible value for an offset spline arrangement, the height of the vehicle can only be adjusted in multiples of 3 mm.

Lower the arm to offset the bar by the number of splines that will adjust the height by the amount required :

Example : 10 mm = 3 splines

Refit the bar so that it engages freely in the splines in both the suspension arm and its bearing.

Check, and if necessary adjust :
- the brake compensator (on certain versions),
- the headlights.



This rear axle assembly consists of :

- two arms interconnected by an angle section. This assembly (1) cannot be dismantled. If it is distorted, the entire assembly must be replaced.
- two bars known as anti-roll bars (3).
- two suspension bars (4).
- a double shackle (2) that interconnects the bars.

The assembly is secured to the body by two bearings on rubber bushes.

NOTE : it is forbidden to jack up the vehicle under the angle section (1).

The Parts Department supplies stripped down rear axle assemblies as replacements. The bars and the double shackle must therefore be removed from the original rear axle to make up the assembly.

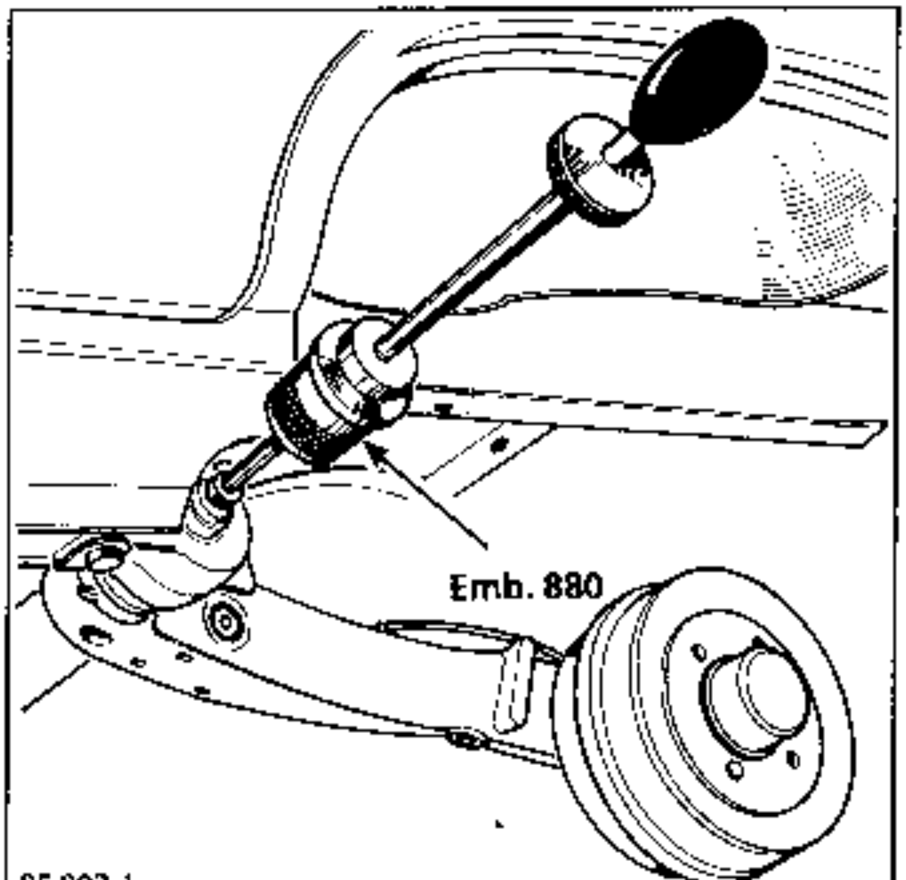
ESSENTIAL SPECIAL TOOLS	
Emb. 880	Inertia extractor

TIGHTENING TORQUES (in daN.m)	
Shock absorber upper securing bolt	**8**
Shock absorber lower securing bolt	**6**

REMOVING

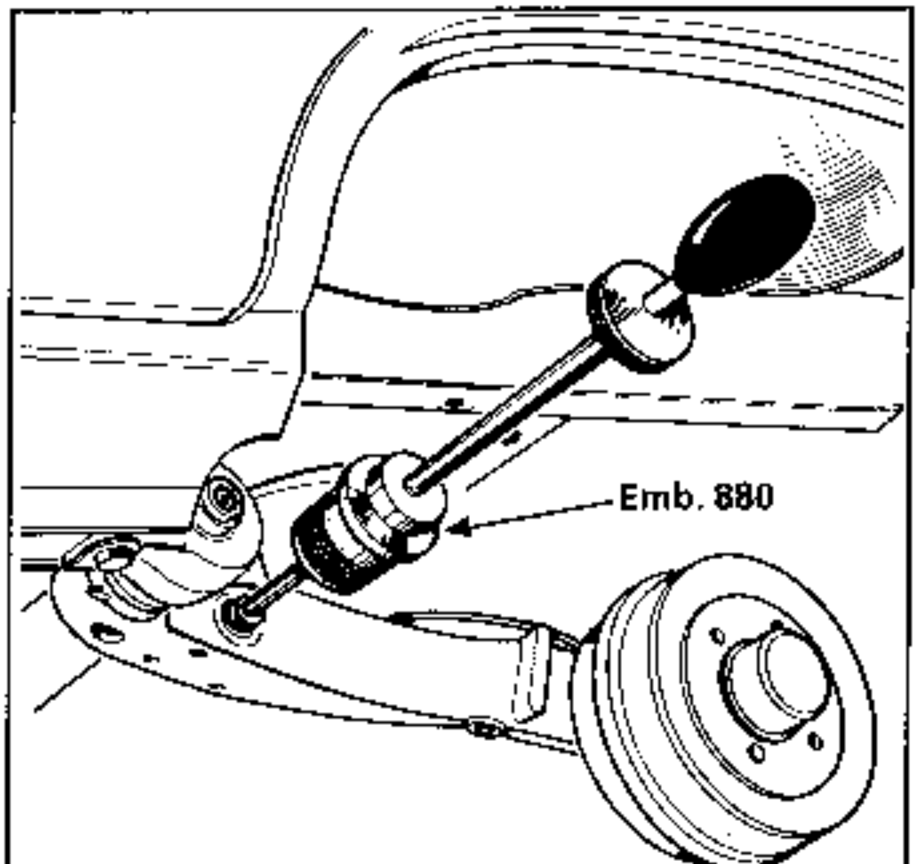
With the vehicle wheels hanging free, remove the two shock absorbers.

Using tool Emb.880 :
- extract the two suspension bars,



85 893-1

- extract the anti-roll bars and retrieve the double shackle from the centre.



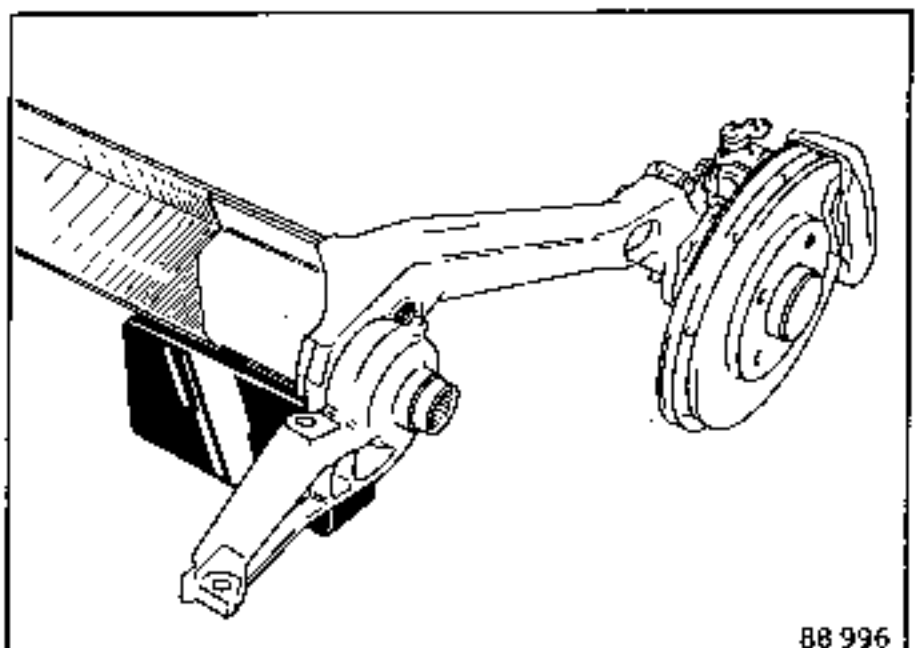
85 893-2

Clean and thoroughly grease the bar anchor points.

Then remove the rest of the rear axle assembly (see corresponding section).

REFITTING

Place the rear axle, upside down, on a fla surface and support it so that its bearing are free to move.

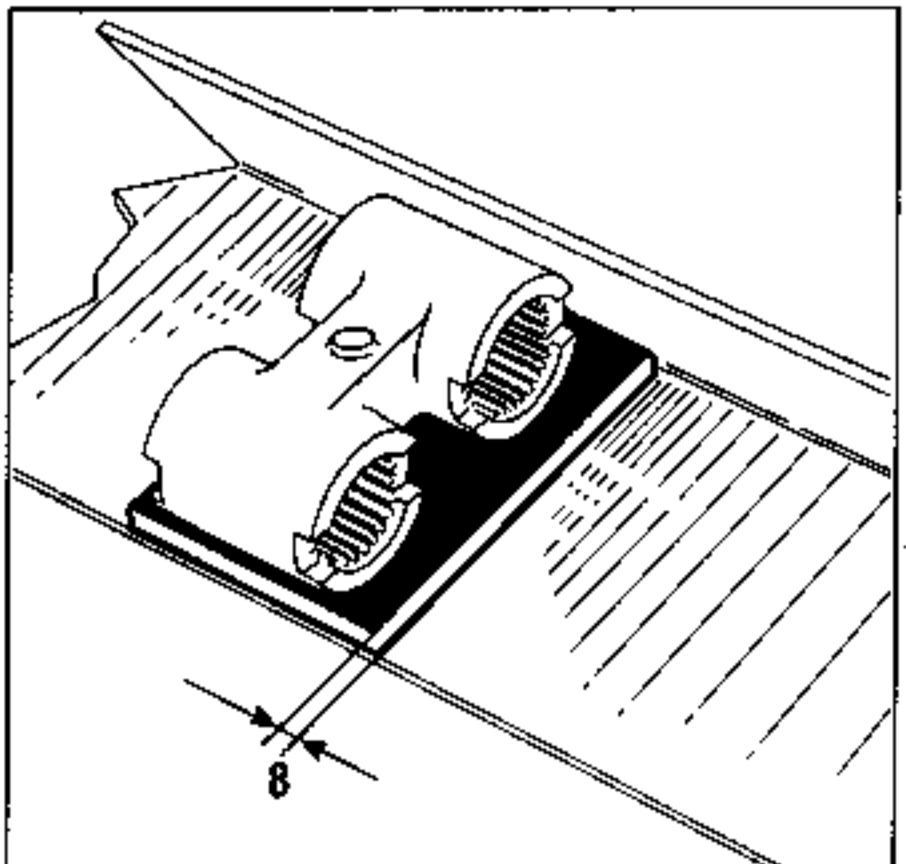

88 996

Special feature of early type C405 vehicles

NOTE : these vehicles have no position marks on the bars.

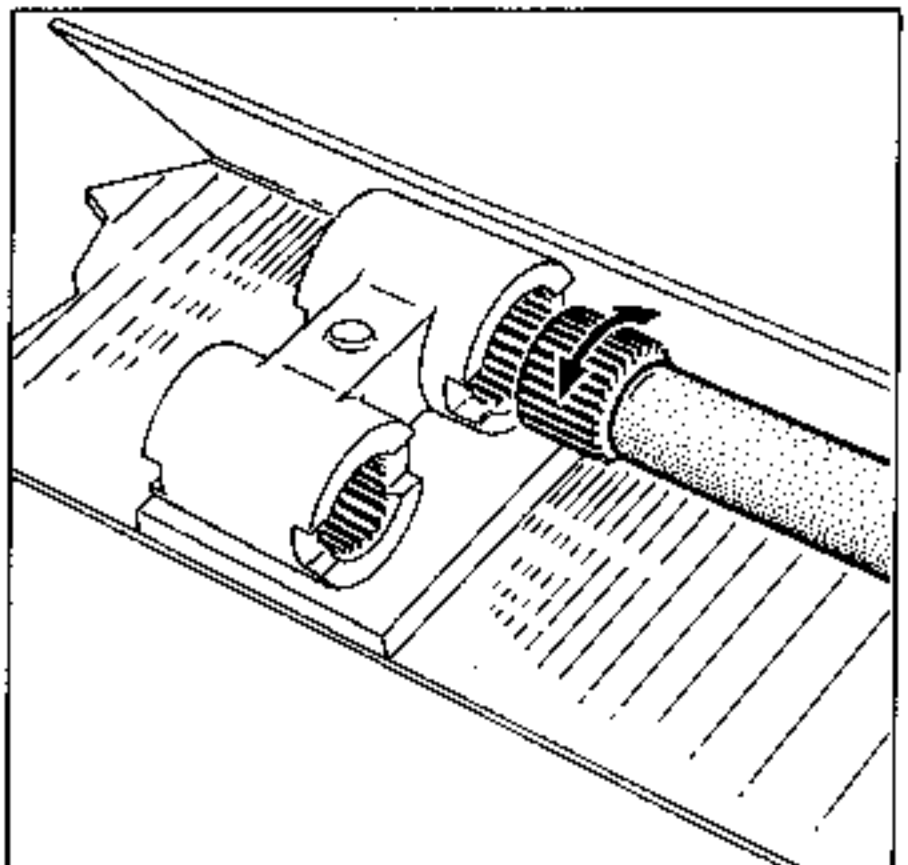
Fit :

- the double shackle in the centre of the axle resting on a pad 8 mm thick, parallel with the longest part of the angle section,



88 997

- one anti-roll bar, turning it to find the point where it enters freely.



88 995

NOTE : it is essential that the splines should be clean and thoroughly greased if this point where the bar enters freely is to be found.

- the 2nd anti-roll bar also finding the point where it enters freely.

Mark the positions of the bars in the anchor points on the suspension arms.

Remove the 8 mm pad.

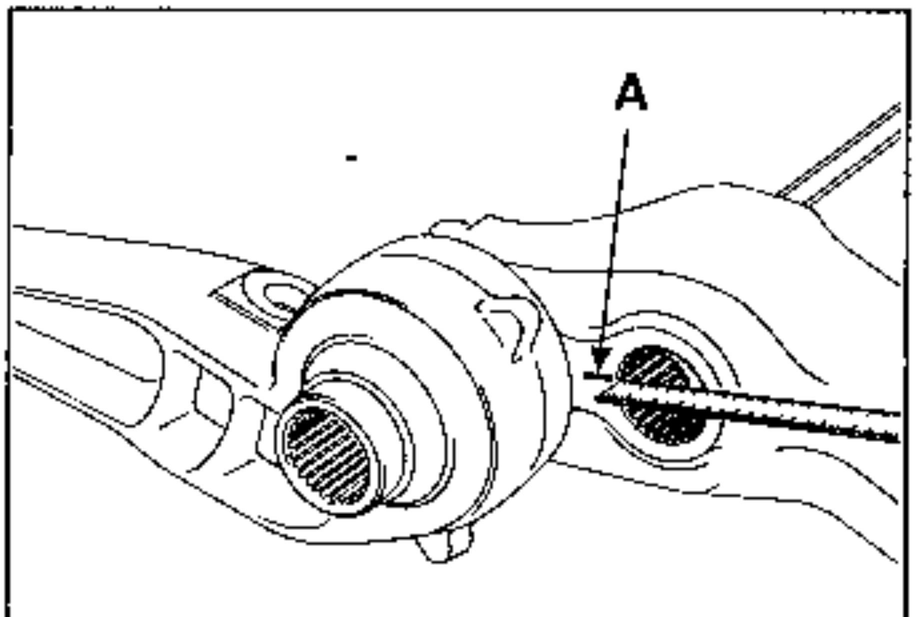
C405 later type
C409-C40X/B40X poor road version
F40X

NOTE : these vehicles do have position marks on the bars.

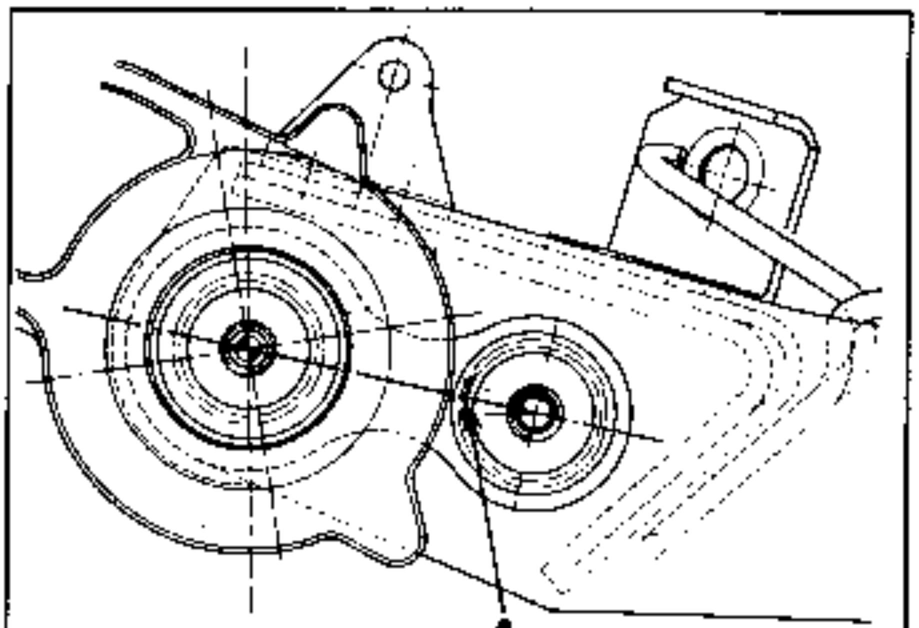
The marks are only on the bars and therefore corresponding marks must be made on the suspension arm outer anchor points.

To do this :

- lay a rule across the centres of the two anchor points and make a mark (A) (at the bottom of a spline),

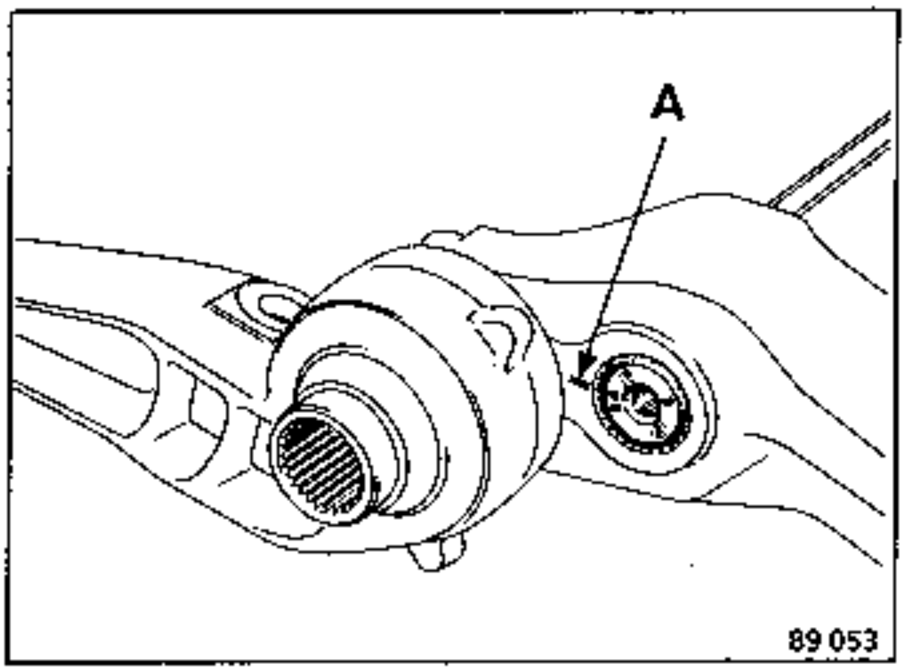


89 052



89 041

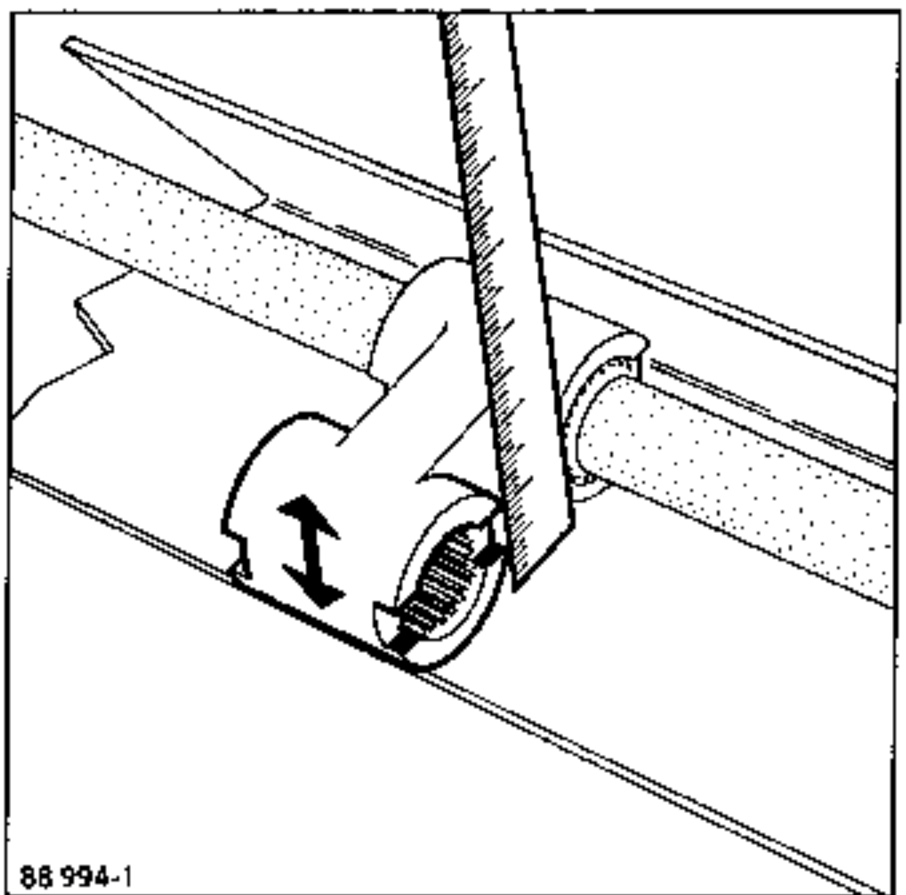
- fit (after greasing the anchor point) :
  . one anti-roll bar, with the crest of its marked spline in line with the mark on the arm,



  . the double shackle parallel with the longest length of the angle section,
  . the 2nd anti-roll bar with the marked spline (1) in line with the mark on the arm.

All types - compensating for the play in the double shackle.
The movements of the vehicle suspension are accompanied by relative movements of the double shackle and the angle section. To avoid these two components striking one another as they move, it is essential to carry out the following operations to position, correctly, the shackle.

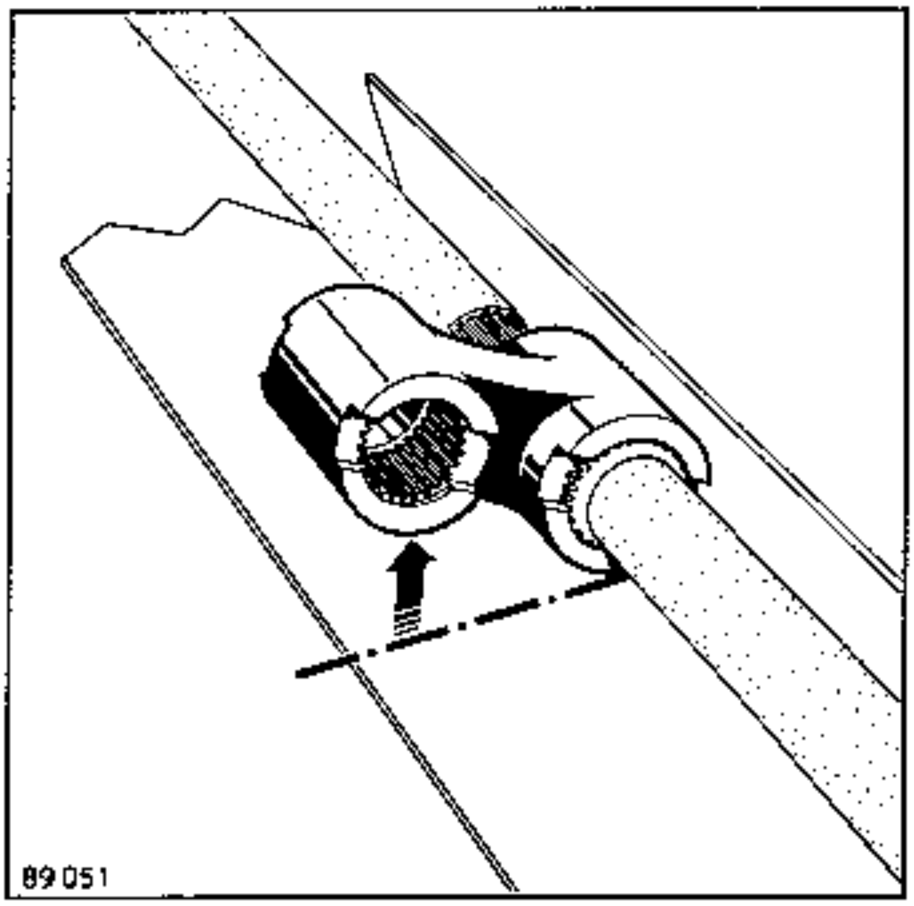
Measure the clearance caused by the play in the shackle.



Find, on chart I (page 33-44) the correction to be applied in number of splines.

Remove one of the bars.

Move out the shackle and turn it by the number of splines obtained from the chart to move it away from the longest arm of the angle section.

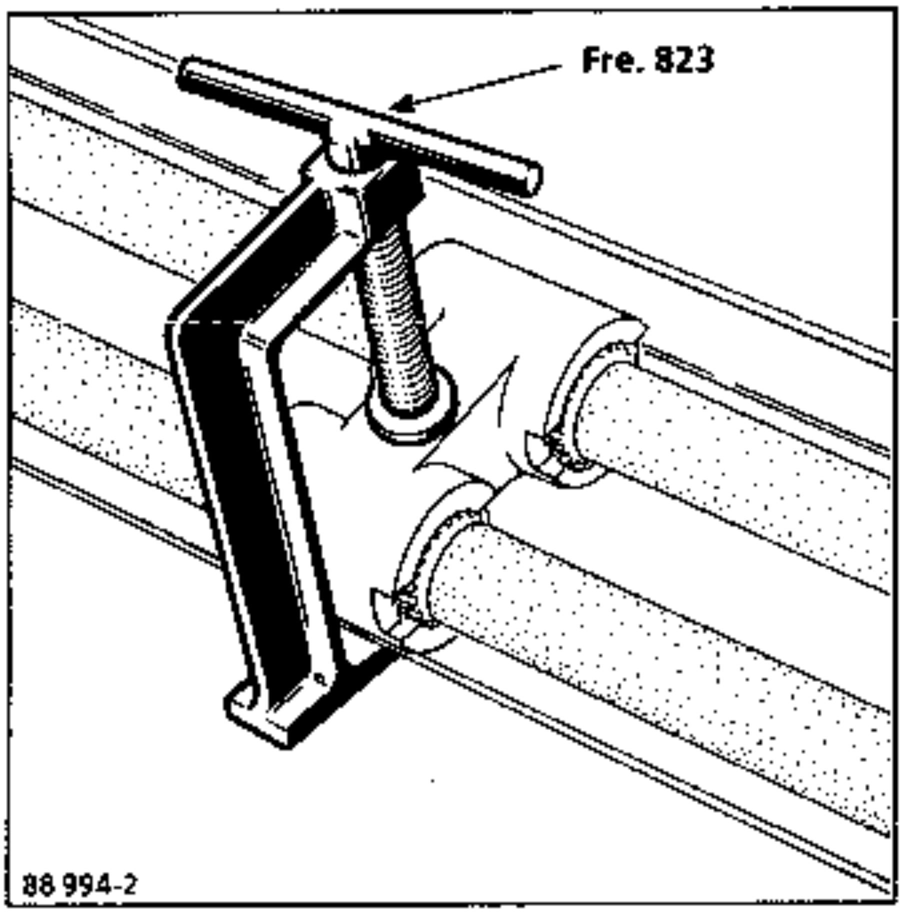


Refit the double shackle, in its new position, on the bar remaining in place.

Release the bar-shackle assembly and move them towards the "L" section by the same number of splines.

Refit the 2nd bar, offset by the same number of splines (in the opposite direction to the 1st as seen from the outer anchor point end).

Fit the two suspension bars, in the position where they will enter freely and clamp the double shackle with a tool of the Fre.823 type.



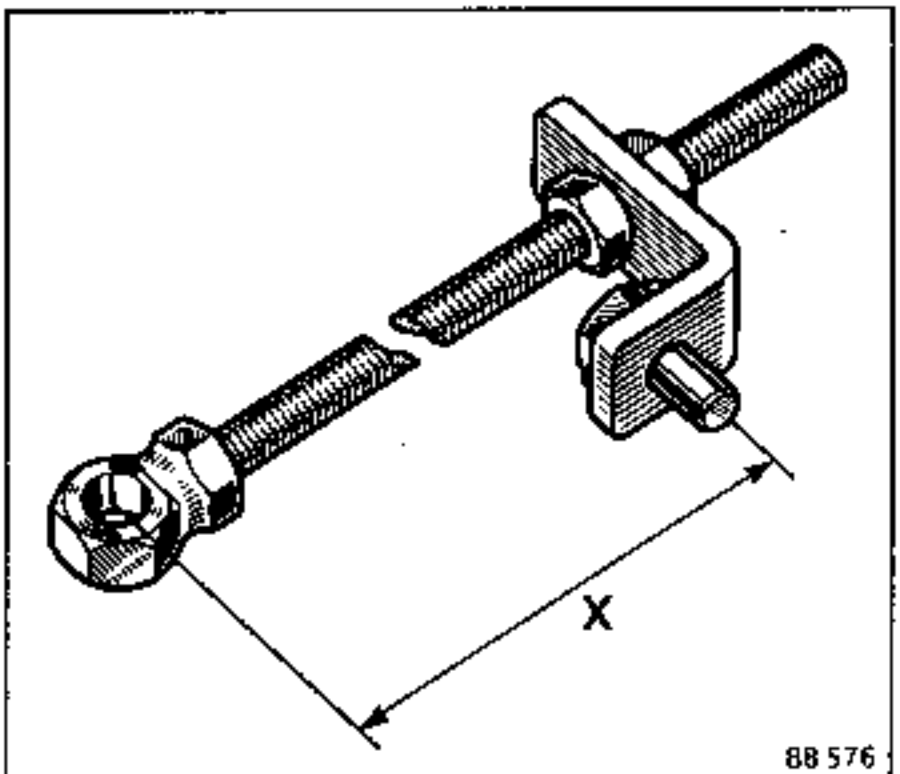
88 994-2

Fit the rear axle assembly to the vehicle.

To place the suspension arms in a position that permits the suspension arms to be fitted correctly, two tools will have to be made locally as shown by the drawing on page 33-36.

Pre-adjust the two tools to obtain a dimension "X" of :

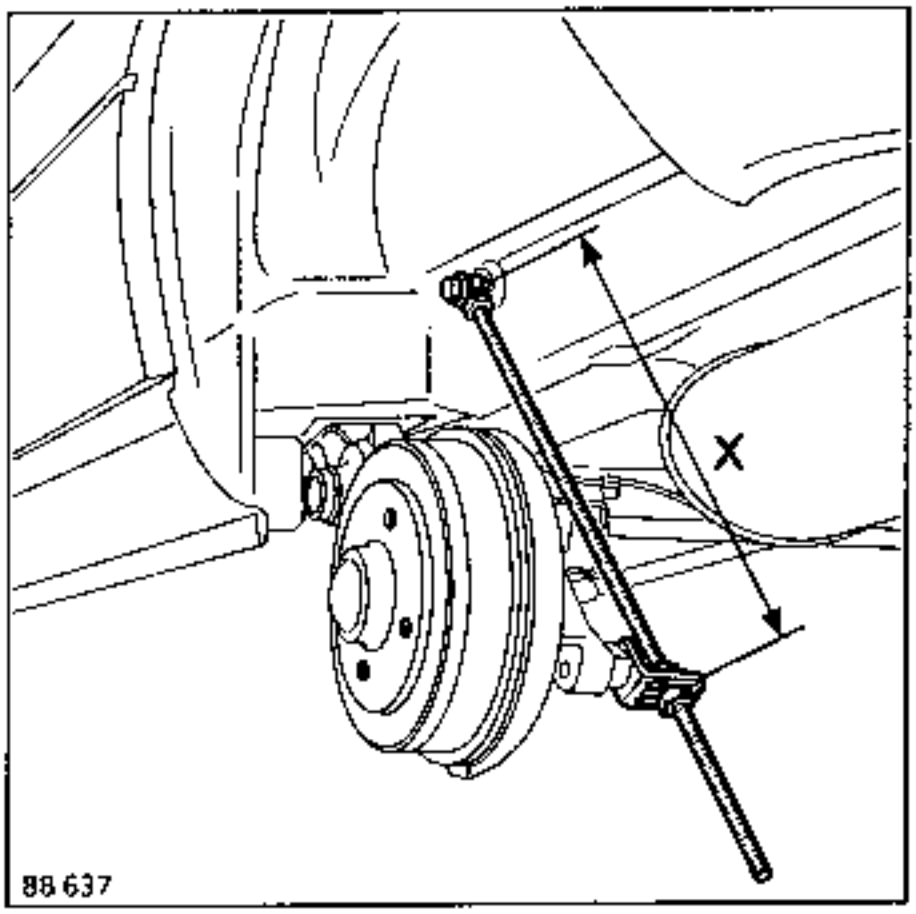
C405 - C409		**X = 385 mm**
B40X/C40X	(poor	**X = 425 mm**
F40X	road)	**X = 415 mm**



88 576

Remove the clamp Fre.823 and free the suspension bars from their anchor points in the double shackle and the bearings.

Fit the two tools in place of the shock absorbers.



88 637

Coat the splines with grease MOLYKOTE BR2 and engage one of the suspension arms, turning it to find the point where it will enter freely.

NOTE : it is essential for the splines to be absolutely clean and thoroughly greased to determine the point at which the bars will enter freely.

Insert the other bar in the same way.

Ensure that the position marks (1) on the suspension arms are in the same positions on either side. A difference of 2 splines is acceptable. If the difference is too great, it will have to be corrected by adjusting the positions at which the bars will enter freely.

Lower the vehicle on to its wheels and measure the underbody heights (see section "Underbody height - Four bar rear axle").

Check and, if necessary, adjust :
- the brake compensator,
- the headlights.

CHART I

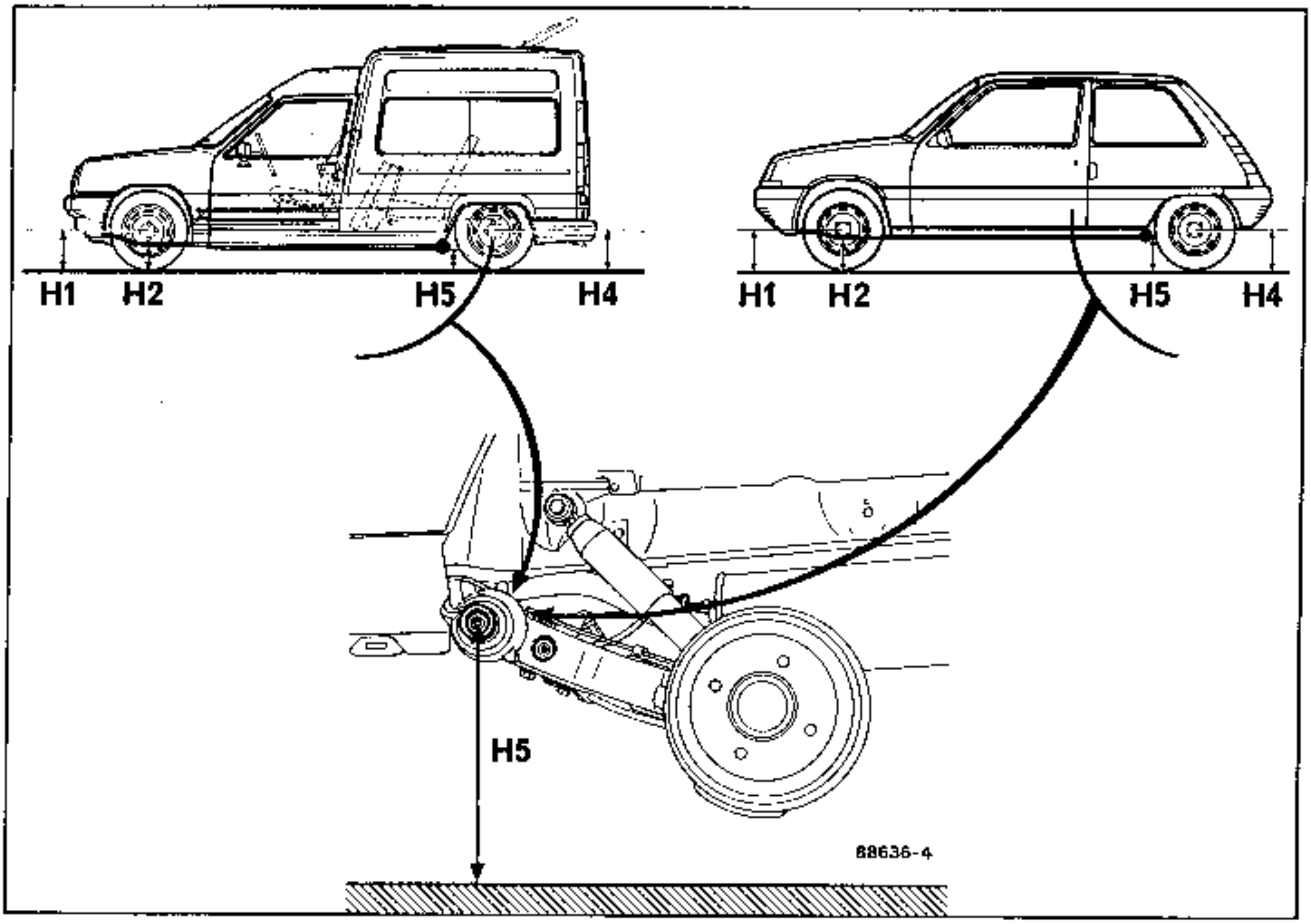
Play measured (mm)	Number of splines to compensate
2 to 4	1
5 to 6	2
7 to 8	3
9to10	4
11to12	5
13to14	6
15to16	7
17to18	8
19to20	9

CHART II

Height adjustment required (mm)	Number of splines to compensate
5	2
10	4
15	6
20	8
25	10
30	12
35	14
40	16
45	18
50	20

CHECKING

Park the vehicle, unladen, with its fuel tank full, on a flat horizontal surface.



GOOD ROAD VERSIONS

C405 - C409 → MOD 88

H1 - H2 = 97^{+10}_{-5} mm

H4 - H5 = 20^{+10}_{-5} mm

C405 - C409 MOD 88 →

H1 - H2 = 101^{+10}_{-5} mm

H4 - H5 = 23^{+10}_{-5} mm

F400 - F401 - F402 - F404 - F407 - F40H - F40M

H1 - H2 = 61^{+10}_{-5} mm

H4 - H5 = -40^{-10}_{+5} mm

POOR ROAD VERSIONS

B401 - C401 - B402 - C402

H1 - H2 = 51^{+10}_{-5} mm

H4 - H5 = -27^{-10}_{+5} mm

Three cases may occur where adjustment is required :

1. the height is correct on one side but the difference between right and left is too great.
2. the heights are incorrect and the RH/LH difference is too great.
3. the heights are incorrect but the RH/LH difference is within limits.

ADJUSTING

1. CASES WHERE A REAR AXLE ASSEMBLY HAS BEEN REPLACED

A The underbody height is correct on one side but the difference between the RH and LH sides is too great

A difference between the RH and LH sides is still taken up by adjusting the anti-roll bar on the lowest side.

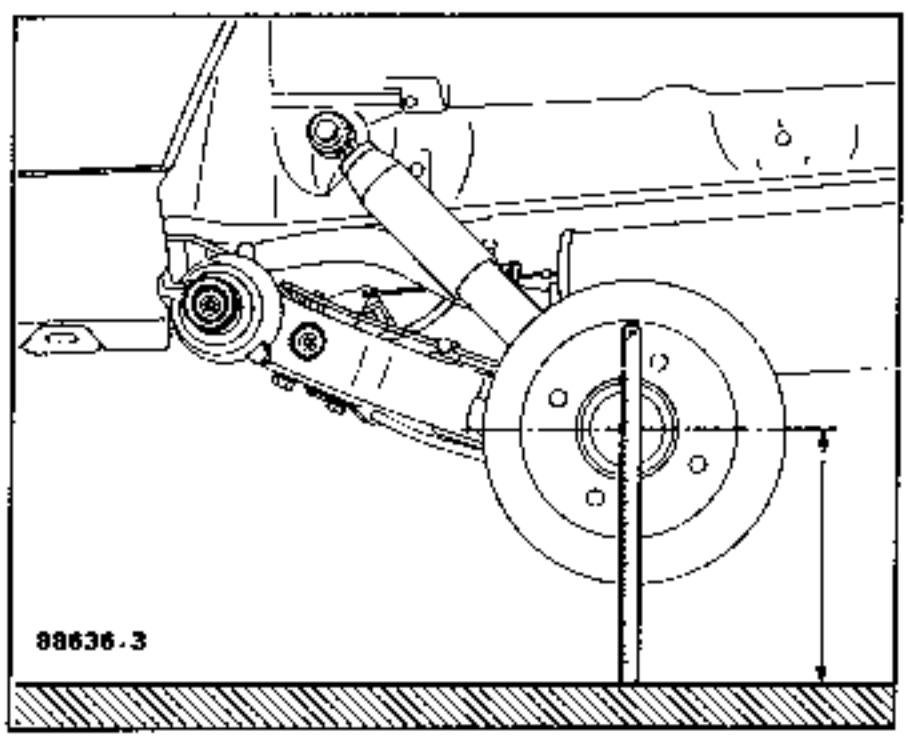
NOTE : It is essential to adjust from the lowest side in order to bring it up towards the highest side.

Mark the positions in the bearings and the double shackle of :
- the two suspension bars,
- the anti-roll bar on the lowest side.

Fit the special tools in place set to the dimension "X" that corresponds to the vehicle type.

Remove :
- the suspension bars,
- the anti-roll bar which has been marked.

Measure the dimension from the centre of the wheel to the ground (on the side which has no anti-roll bar).



Reduce this dimension by the difference between the right and left hand sides already measured by increasing dimension "X" on the tool.

NOTE : do not change the setting of the tool on the other side.

In this new position, refit :
- the anti-roll bar, at the point where it enters freely, and check the offset of the splines in the suspension arm and in the double shackle (see chart II on page 33-44),
- the two suspension bars wihtout any off-set of the position marks.

Fit :
- the shock absorbers,
- the wheel.

Lower the vehicle on to its wheels and check, and adjust, if necessary :
- the brake compensators,
- the headlights.

B If the heights are incorrect and the difference between the RH and LH sides is too great.

The difference between the RH and LH sides is still adjusted at the anti-roll bar on the lowest side.

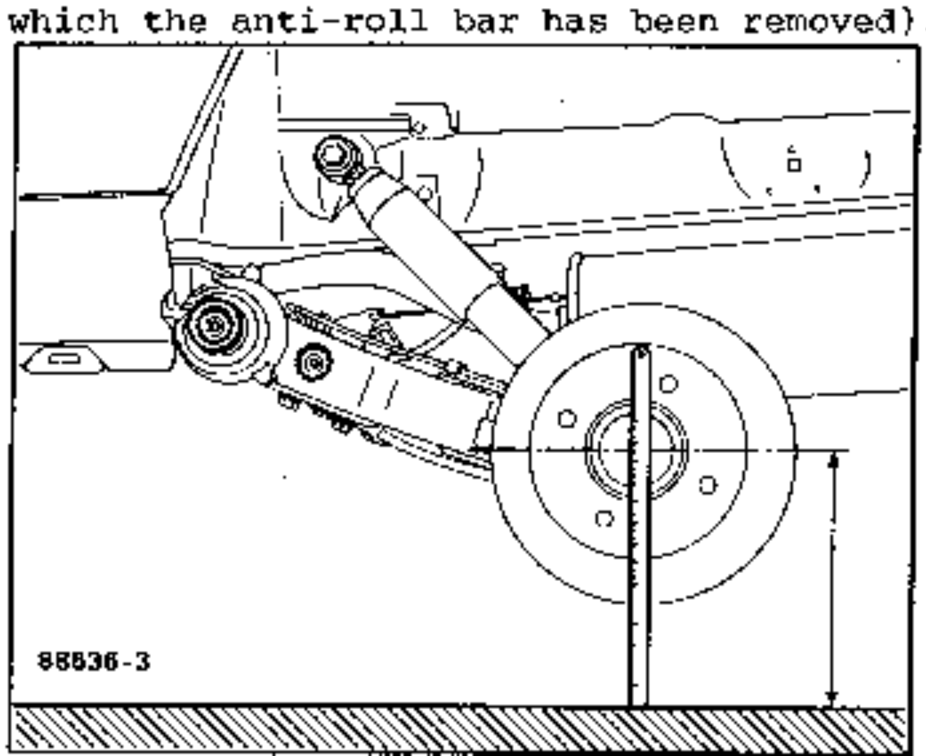
NOTE : it is essential to adjust on the lowest side to bring it back up towards the highest side.

Mark the positions in the bearings and double shackle of :
- the two suspension bars,
- the anti-roll bar on the lowest side.

Set the tools to the dimension "X" that corresponds to the vehicle type.

Remove :
- the suspension bars,
- the anti-roll bar which has been marked.

Measure the dimension from the centre of the wheel to the ground (on the side from which the anti-roll bar has been removed).



Reduce this dimension by the difference between the right and left hand sides already measured by increasing dimension "X" on the tool.

NOTE : do not alter the adjustment of the tool on the other side.

In this new position, refit the anti-roll bar at the point where it enters freely and check the offset on the splines in the suspension arm and the double shackle (see chart II on page 33-44).

Then, by adjusting both tools, increase or reduce the distance between the centres of the wheels and the ground, simulataneously on both sides, by the difference between the correct height and that measured on the highest side when the vehicle was initially checked.

In this position, refit the suspension bars at the point where they enter freely and check the amount by which the splines are offset (see chart II on page 33-44).

Refit :
- the shock absorbers,
- the wheels.

With the vehicle resting on its wheels, check, and if necessary adjust :
- the brake compensator,
- the headlights.

C If the heights are incorrect but the difference ebtween the RH and LH sides is within the tolerances

The underbody height is adjusted at the suspension bars.

Mark the positions of the two suspension bars in their bearings and in the double shackle.

Fit the special tools set at the dimension "X" for the vehicle in question.

Remove the suspension bars.

Measure the distance between the centres of the wheels and the ground (on both sides).

By adjusting both tools, reduce or increase this dimension, simultaneously, on both sides by the difference between the correct height and that measured when the vehicle was initially checked.

Refit the suspension bars at the points where they slide in freely and check the amount by which the splines are offset (see chart II on page 33-44).

Fit :
- the shock absorbers,
- the wheels.

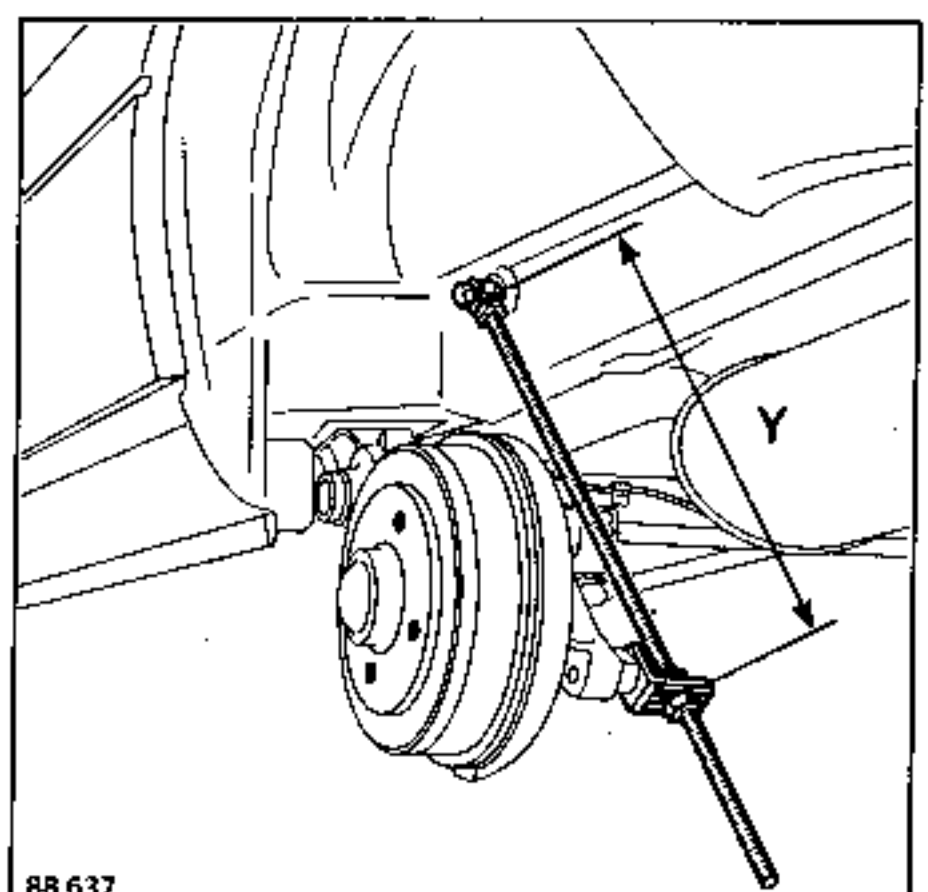
Lower the vehicle on to its wheels, check and if necessary, adjust :
- the brake compensator,
- the headlights.

2. READJUSTING THE SUSPENSION ON A VEHICLE

When readjusting the suspension of a vehicle that has already covered a certain mileage, it is important to determine the position at which the bars enter freely.

Remove the wheels and the shock absorbers.

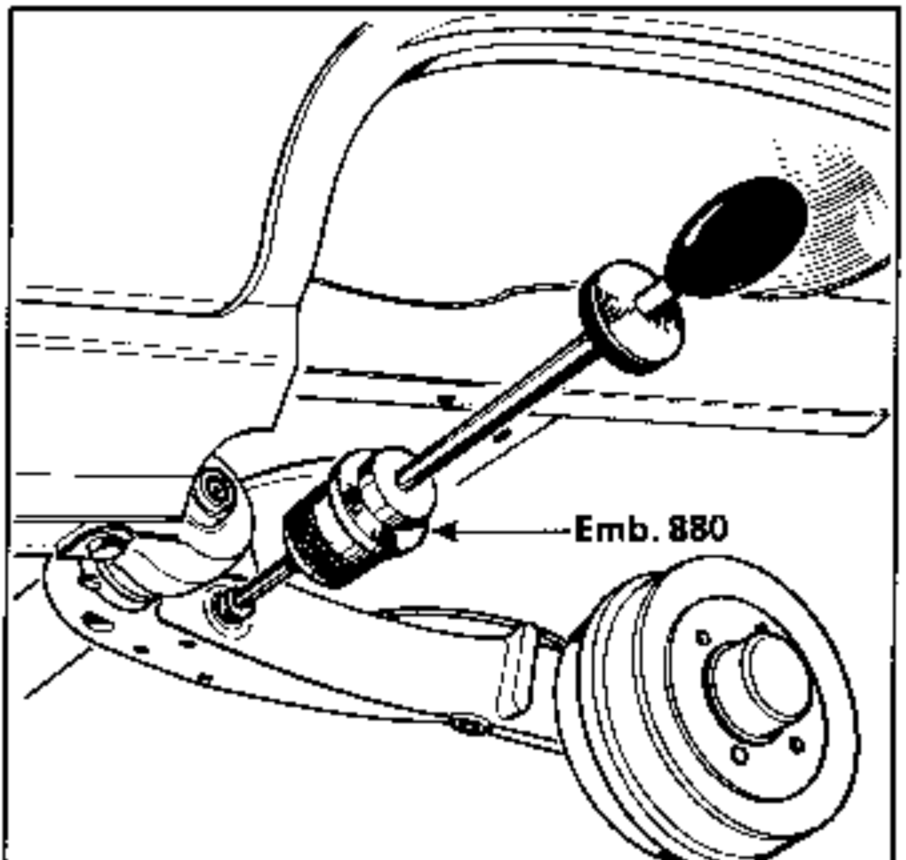
Fit the special tools in place of the shock absorbers setting them at the dimension "Y" that corresponds to the positions of the suspension arms when they are hanging free.



A If the difference between the RH and LH sides is too great

Mark the positions in their bearings and in the double shackle of :
- both suspension bars,
- the anti-roll bar on the lowest side.

Remove the three bars using tool Emb.880.



85 893-2

Thoroughly clean and grease the anchor points and the bars.

Find, by altering dimension "Y" on the side on which the anti-roll bar has been removed, the position at which the bar enters freely that corresponds to the position marks. From this position, adjust both tools simultaneously to determine the position at which the suspension arms enter freely in line with the position marks.

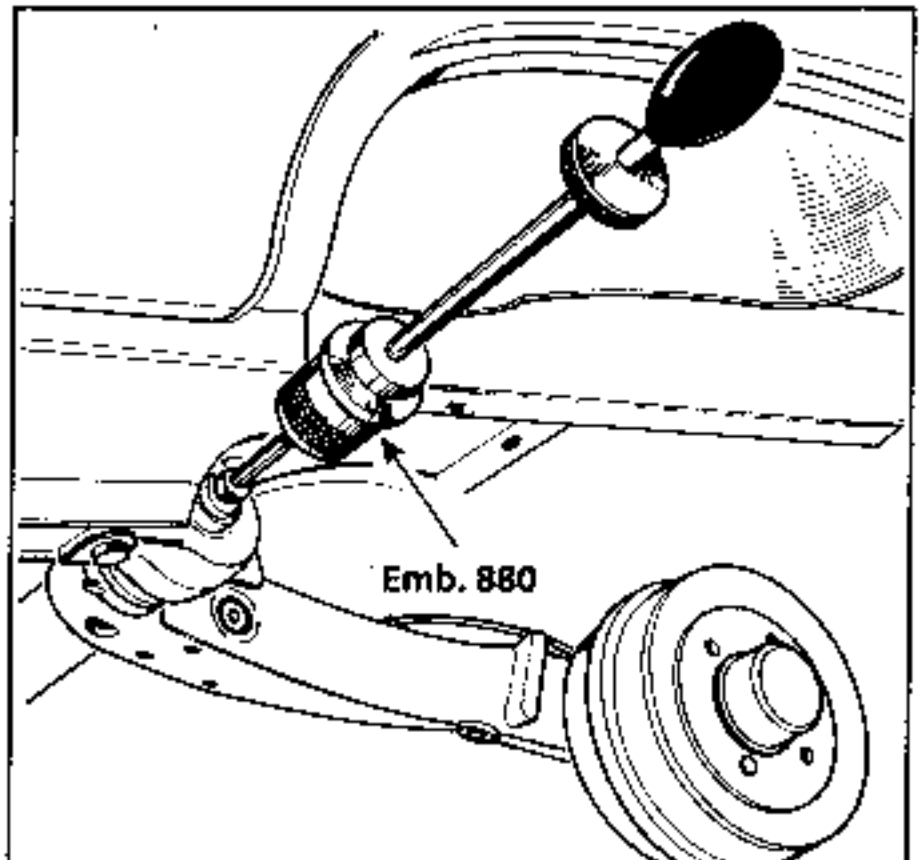
Lock the tools at the dimensions "Y" thus obtained.

Carry out the adjustment in this new position (see the section on "Adjusting the axle after a rear axle assembly has been replaced").

B Underbody heights that are incorrect but are the same on the RH and LH sides

Mark the positions of the two suspension bars in their bearings and in the double shackle.

Remove the two bars using tool Emb.880.



85 893-1

Thoroughly clean and grease the anchor points and the bars.

Adjust both tools simultaneously to determine the point at which the bars enter freely in line with the position marks.

Lock the tools at the dimension "Y" thus obtained.

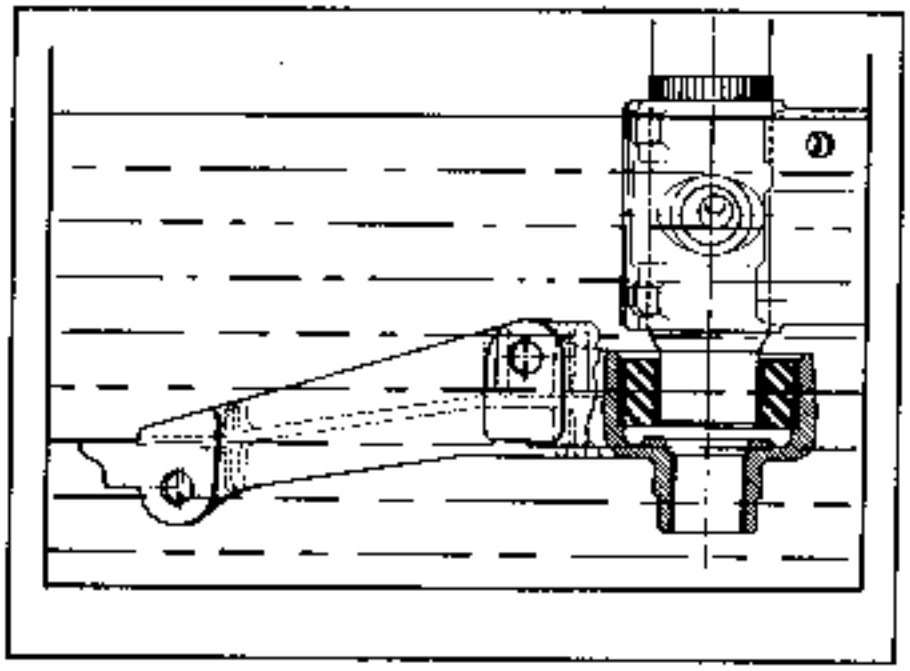
Carry out the adjustment in this new position (see the section on "Adjusting after the rear axle has been replaced"*).

(*) WARNING : when readjusting the suspension, it is dimension "Y" which is used as the starting point for the adjustment and not the dimension "X" stated in this manual.

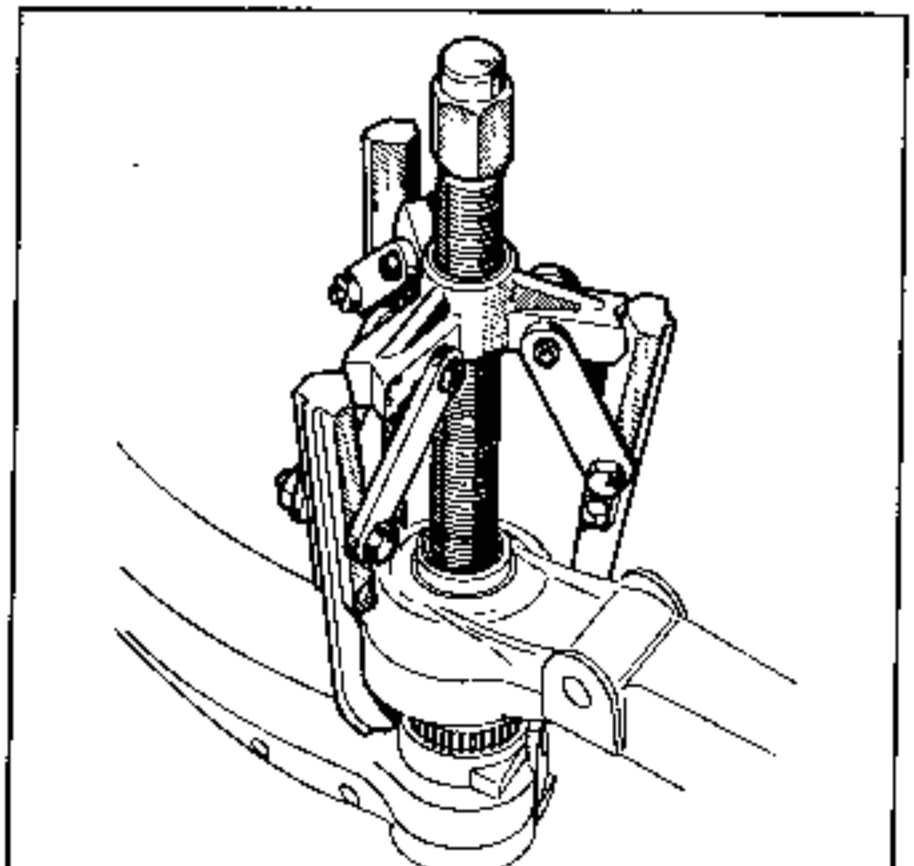
This operation is carried out after removing the rear suspension arms from the vehicle.

DISMANTLING

Fully immerse the bearing in brake fluid to soften the rubber bush.

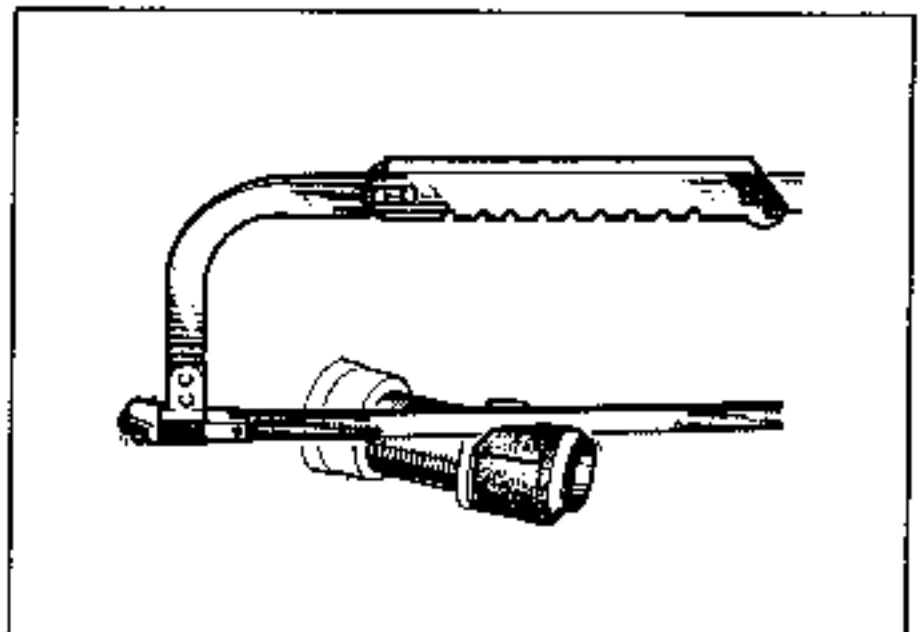


Using a two or three arm extractor, remove the outer part of the bearing by tearing away the rubber.



85 909

Saw off the inner bush taking care not to score the tube or the suspension arm.



75 362

REFITTING

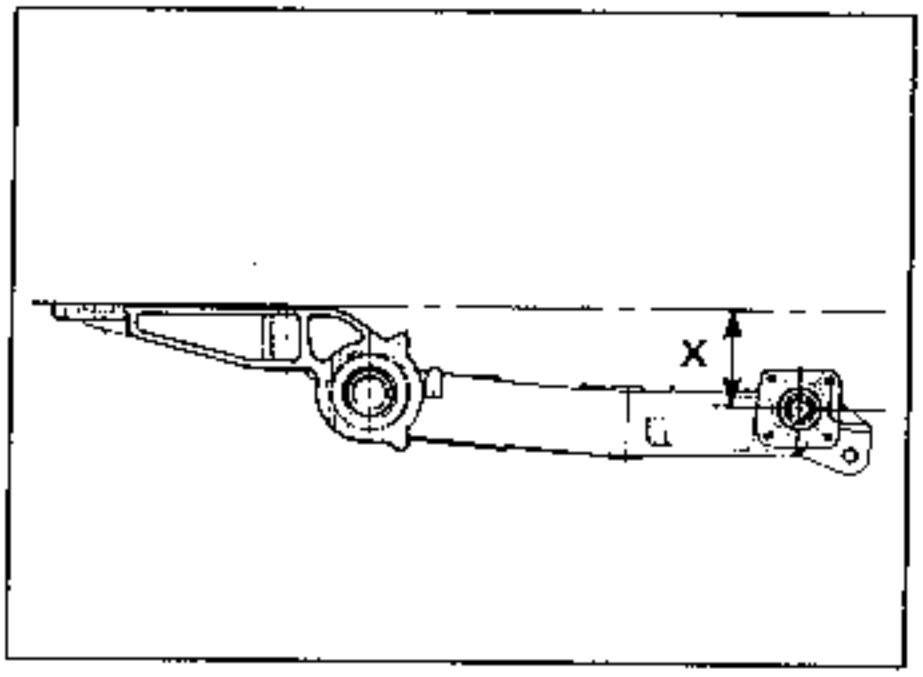
The new bearing is fitted to the suspension arm, on the press ensuring that its position and spacing, with reference to the arm, are correct.

Position

Ensure that dimension "X" between the locating face of the bearing and the stub axle centreline is correct.

B40X - C40X - S40X

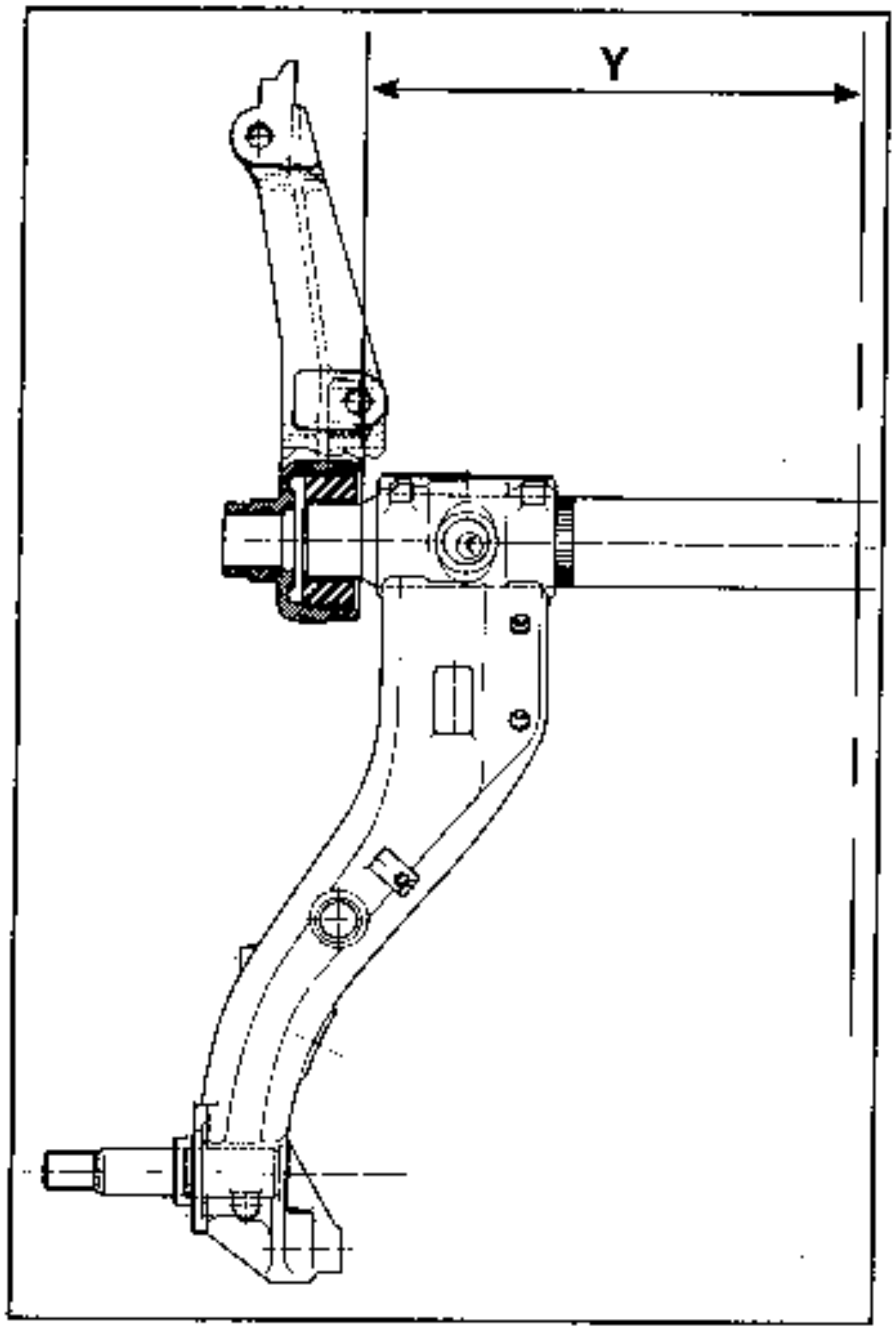
X = 83 mm



Spacing

With it in this position, push in the bearing until the bearing between centres dimension :

Y = 1054 ± 1 mm

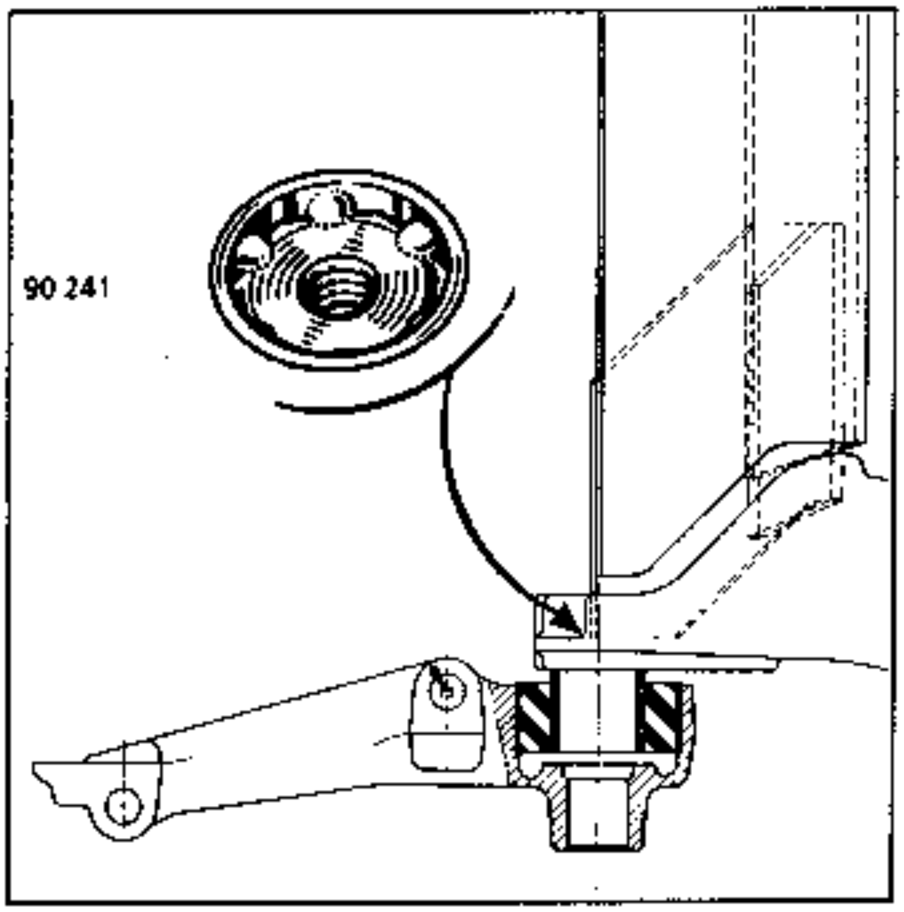


Refit the suspension arm to the vehicle.

This operation is carried out after the rear axle and the suspension arms have been removed from the vehicle.

DISMANTLING

Weld a spacer (for example a nut) into the bore of the bearing inner bush.



Push out the bush-bearing assembly on the press.

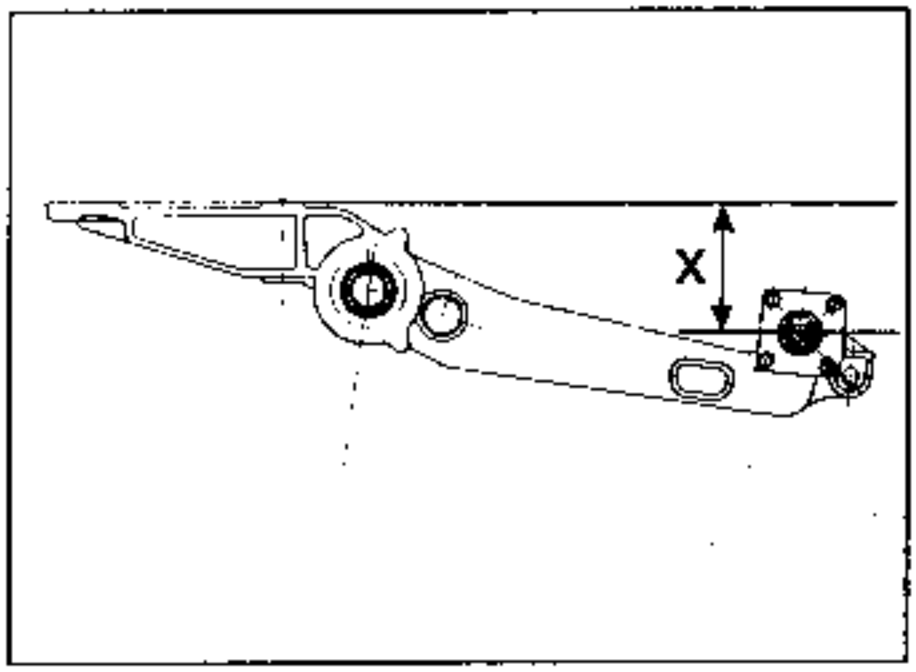
REFITTING

The bearing is fitted to the suspension arm on the press, ensuring that its position and spacing with reference to the suspension arm are correct.

Position

Ensure that dimension "X" between the locating face of the bearing and the stub axle centreline is correct.

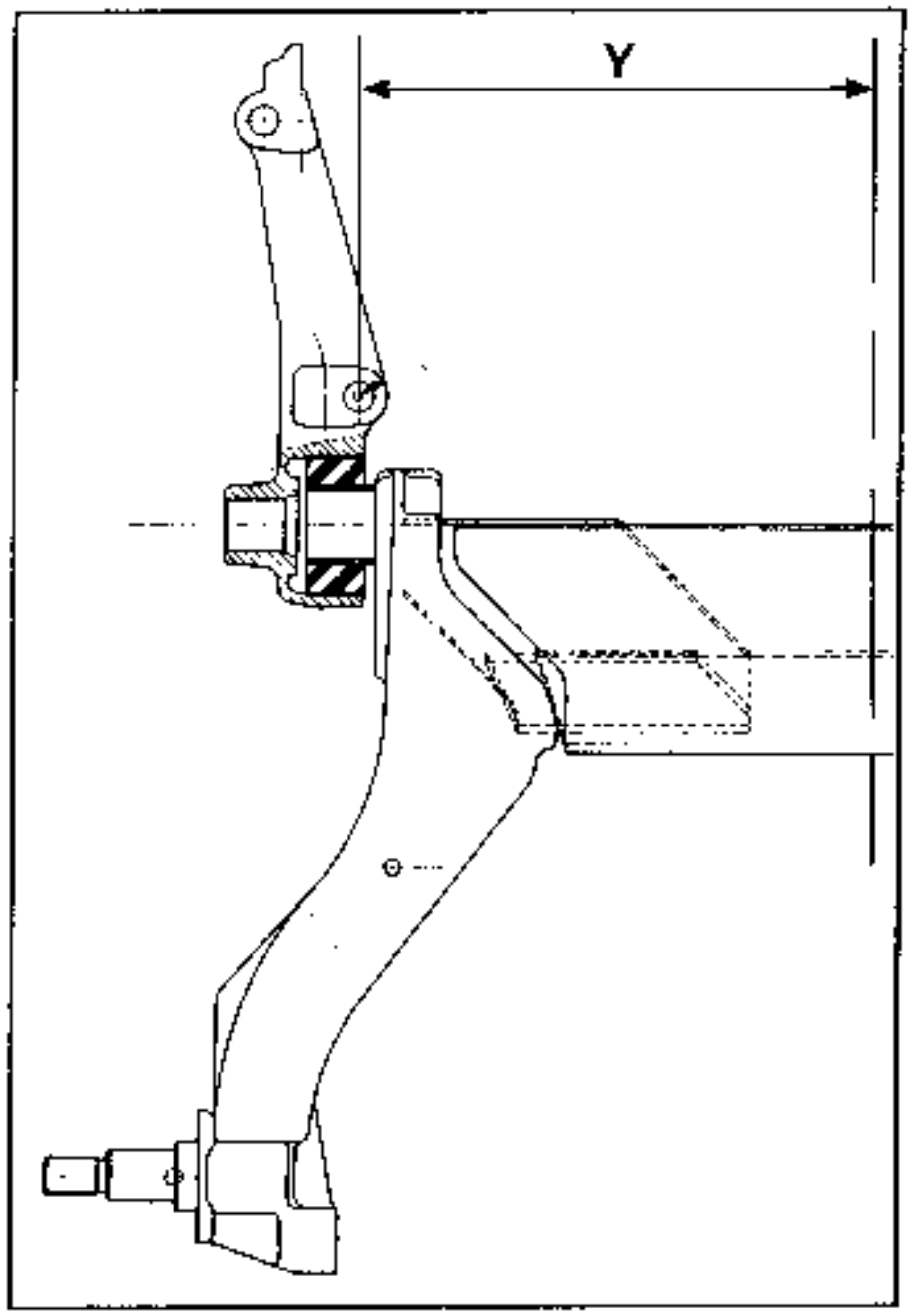
C405-C409	X = 74 mm
F40X	X = 123 mm
B40X/C40X (poor road)	X = 100 mm



Spacing

With the bearing in this position, push it in until the bearing between centres dimension :

$Y = 1054 \pm 1$ mm



Fit the rear axle assembly to the vehicle and refit the suspension bars (see corresponding section).

WHEELS

The wheel identification mark can take one of two forms :
- engraved marking in the case of pressed steel wheels,
- cast-in marks in the case of light alloy wheels.

The identification mark shows the main dimensional specifications of the wheel.

It may be stated in full :

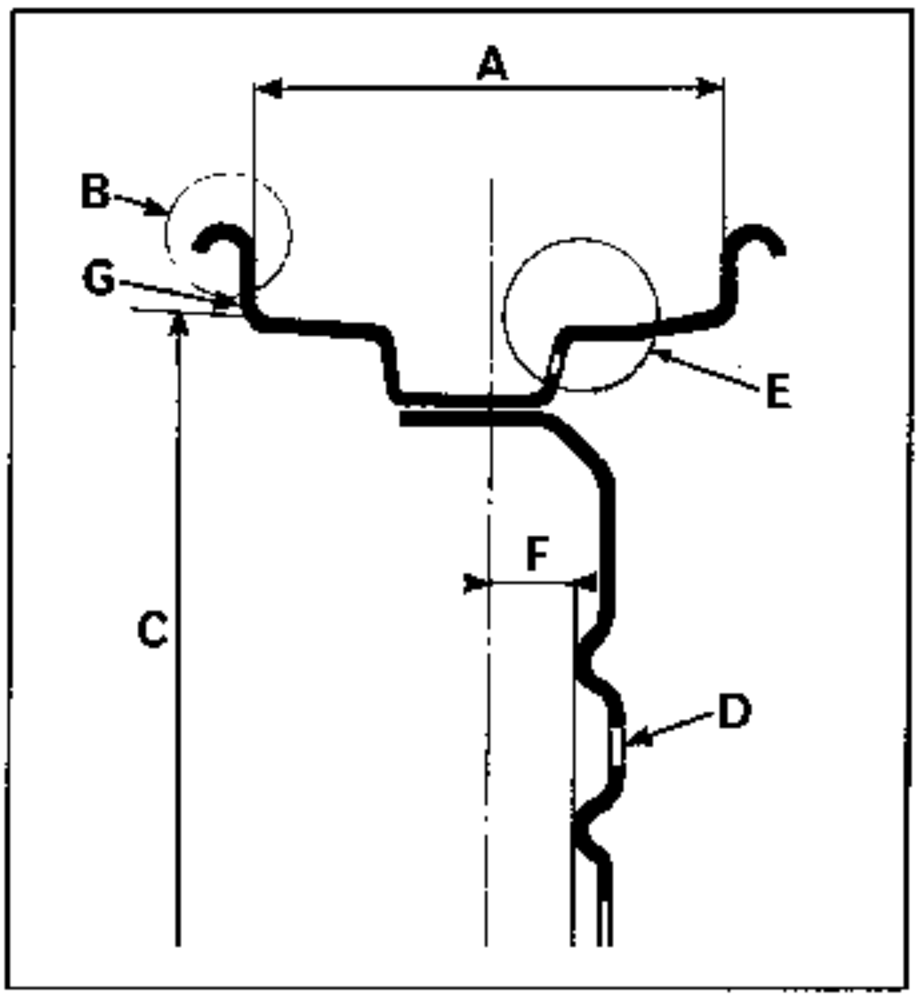
Example : 5 1/2 J 14 4 CH 36
or simplified
Example : 5 1/2 J 14

	A	B	C	D	E	F
WHEEL TYPE	WIDTH (in inches)	RIM EDGE PROFILE	NOMINAL Ø (in inches) At the tyre bead	NUMBER OF HOLES	Tyre locating profile	Offset in mm
5 1/2 J 14 4 CH 36	5 1/2	J	14	4	CH	36

The wheel bolts are on a pitch circle diameter of 100 mm.

Maximum run-out : 1.2 mm measured at the wheel rim (point G).

Maximum eccentricity: 0.8 mm measured on the tyre bead locating surface.

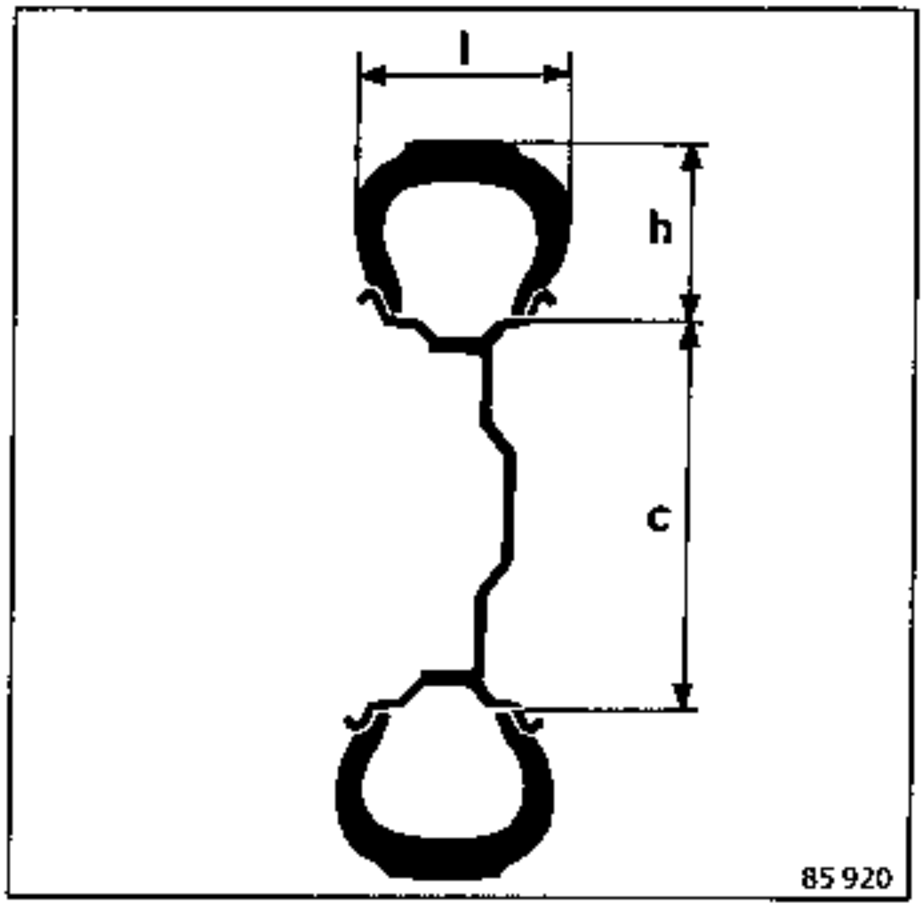


TYRES

The identification marking for any given tyre type can take two forms.

Example : 175/70 S R 13
or 175/70 R 13 80 S

175	/	70	S	R	13	
1		2	3	4	5	
175	/	70	R	13	80	S
1		2	4	5	6	3



1	175	Tyre width :	Expressed in millimetres (or in inches) and measured at the widest part of the tyre l = 175 mm	
2	70	Series or h/w ratio	h/w = 0.8 (normal) h/w = 0.7 (low profile) h/w = 0.6 (extra " ")	no inscription 70 60
3	S	Maximum speeds :	up to 180 km/h up to 190 km/h up to 200 km/h up to 210 km/h up to 230 km/h More than 230 km/h	S T U H V Z
4	R	Type of body :	Cross ply Radial Bias belted	no inscription R B
5	13	Diameter of wheel	Expressed in inches and in millimetres. c = 13 inches	
6	80	Index showing the load capacity of each tyre.		

VEHICLE TYPES	WHEELS	TYRES
B400 C400 S400	4 1/2 X 13	145/70 R 13 S
B401 C401 S401 B402 C402 B403 C403 B404 C404 S404 B407 C407 B40F C40F S40F B40H C40H B40J C40J B40M C40M	4 1/2 X 13	145/70 R 13 S 155/70 R 13 S
B403 C403 B404 C404 B408 C408 B40G C40G B40J C40J B40K C40K	5 X 13	165/65 R 13 T
C405 C409	5 1/2 X 13	175/60 R 13 H 195/55 R 13 H
F400 F401 F40H	5 X 13	145 R 13 S
F401 F402 F404 F407 F40F F40M	5 X 13	155 R 13 S

The tyres used are of the Tubeless type.

The inflation pressures must be checked when the tyres are cold. The temperature rise whilst the vehicle is being driven causes a pressure increase of 0.2 to 0.3 bars.

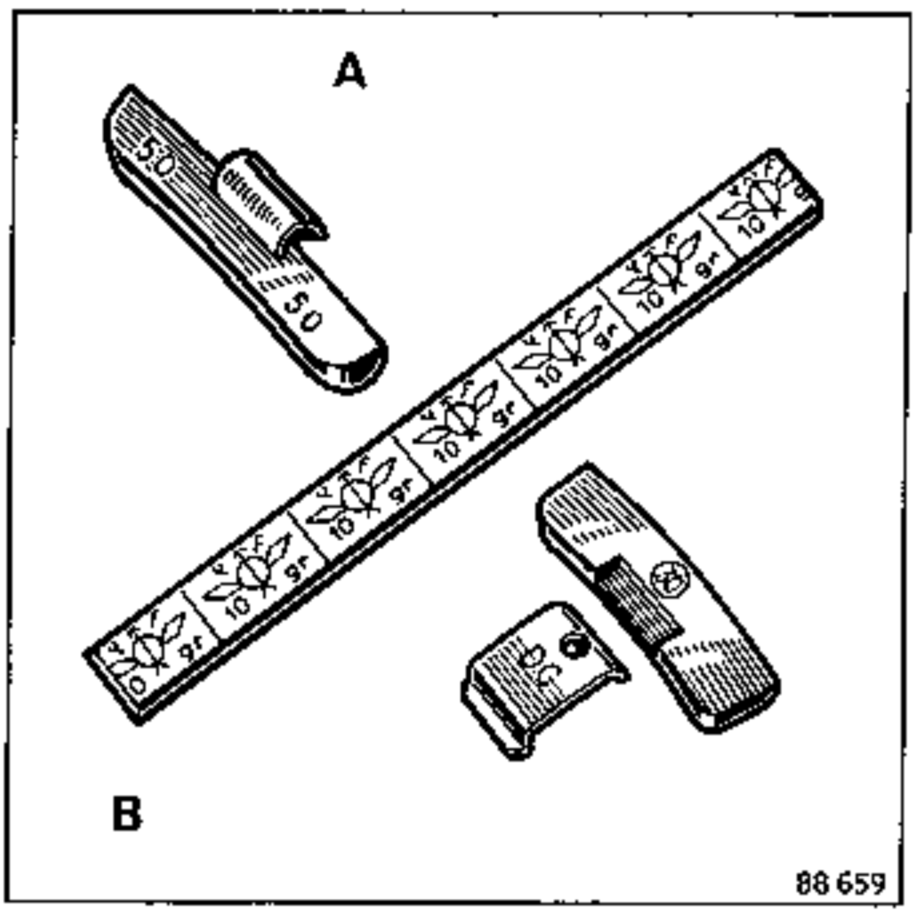
If the tyre pressures are ever checked when the tyres are warm, allow for this pressure increase and never deflate the tyres.

BALANCING WEIGHTS

Use only those balance weights supplied by the Parts Department :

- they are secured by hooks to pressed steel wheels (hooks that form part of the weight),
- they are secured by hooks (flat hooks) or are self-adhesive for light alloy wheels.

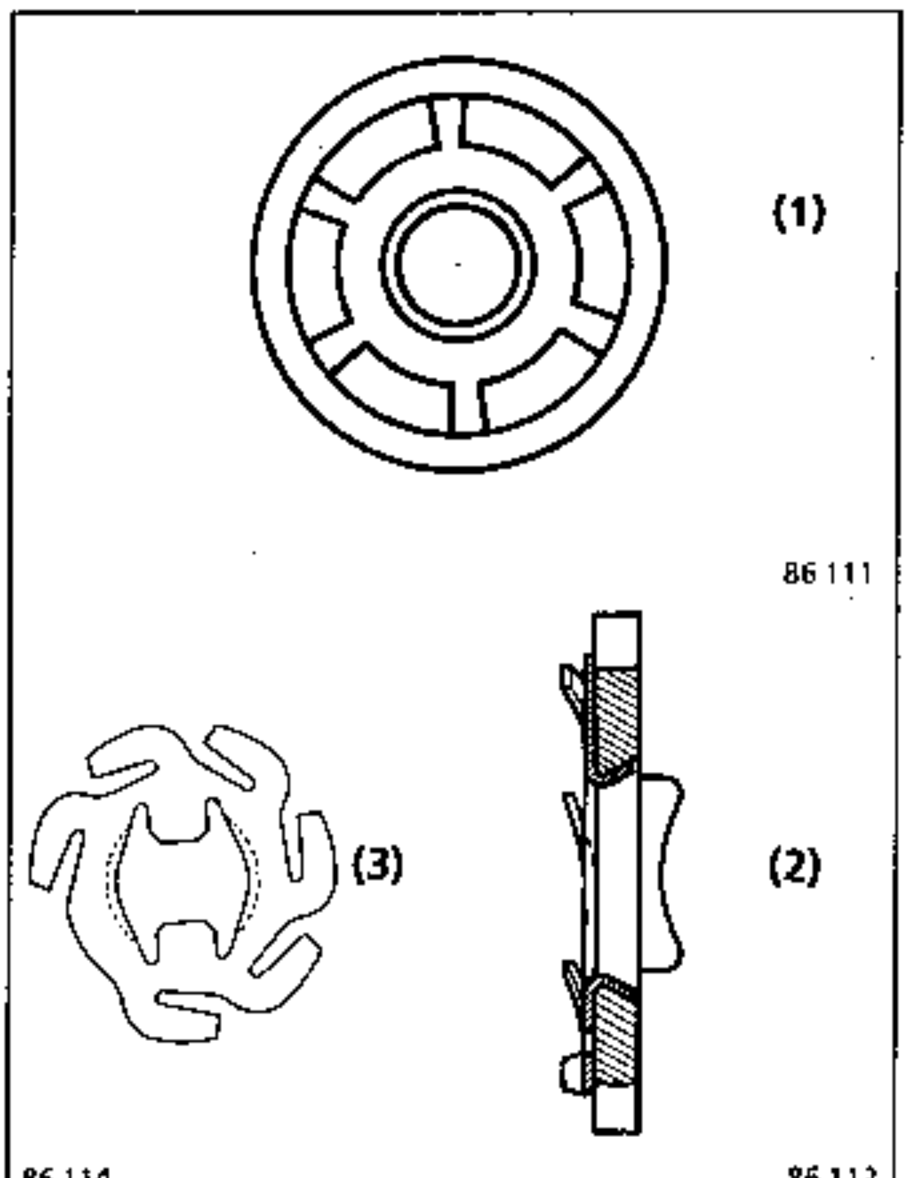
A Pressed steel wheels
B Light alloy wheels



ESSENTIAL SPECIAL TOOLS		
Dir.	812-01 or	Spanners for tightening the axial ball joints
Dir.	832-01	
T.Av.	476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)	
Ball joint nuts	4
Axial ball joint	5

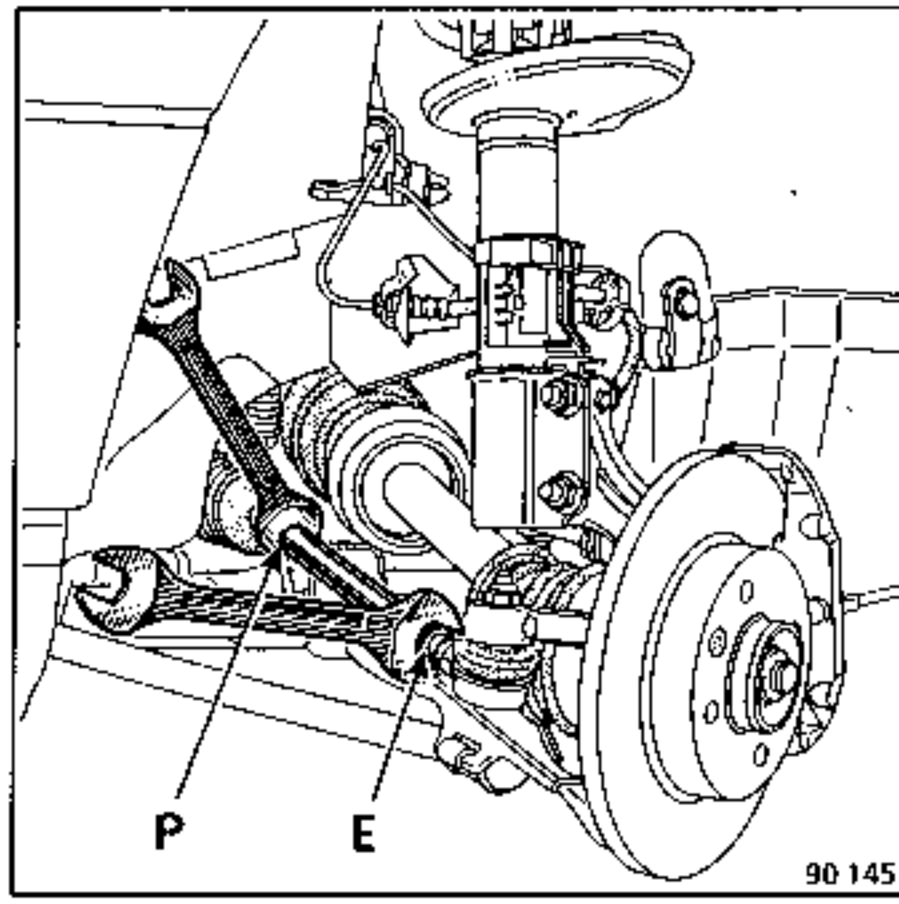
Axial ball joint with flat locking washer



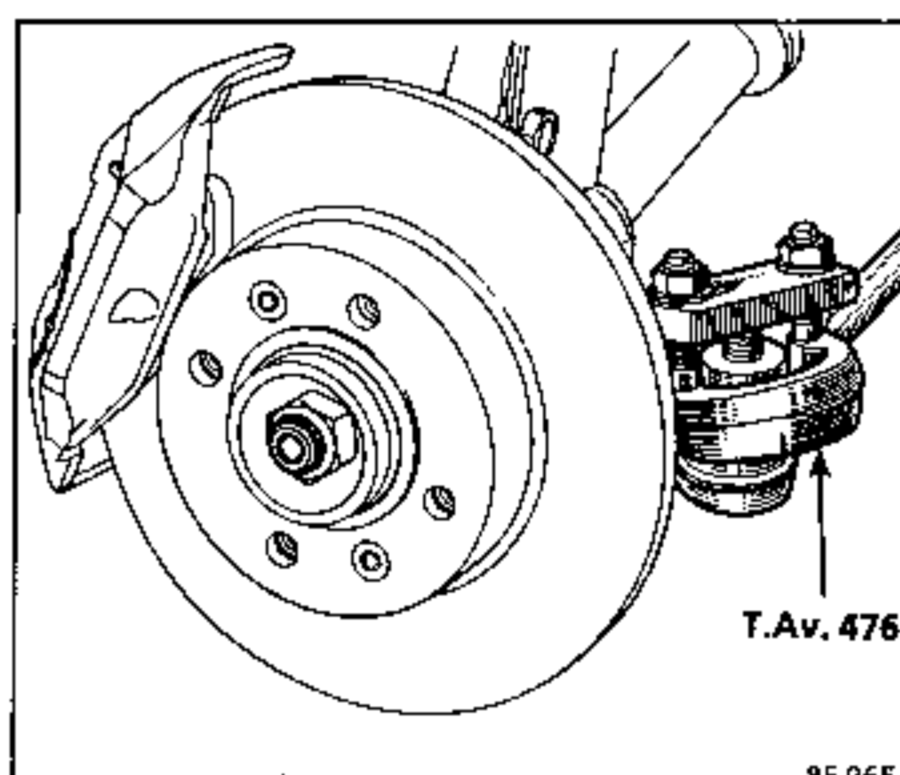
REMOVING THE BALL JOINT : assembly (2) must be replaced by a new one whenever removed. If the slots on the ball joint are not damaged, this can be refitted.

REMOVING

Loosen the lock nut (E) whilst holding the axial ball joint in an open ended spanner at (P).

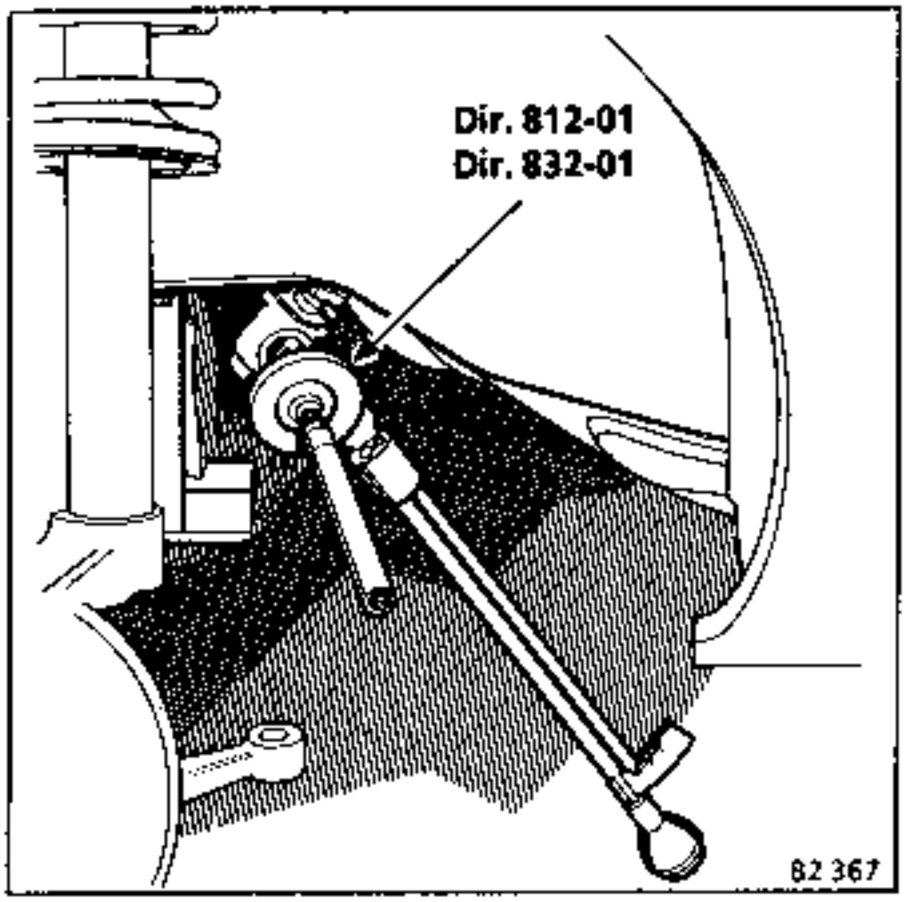


Disconnect the steering ball joint using T.Av.476.



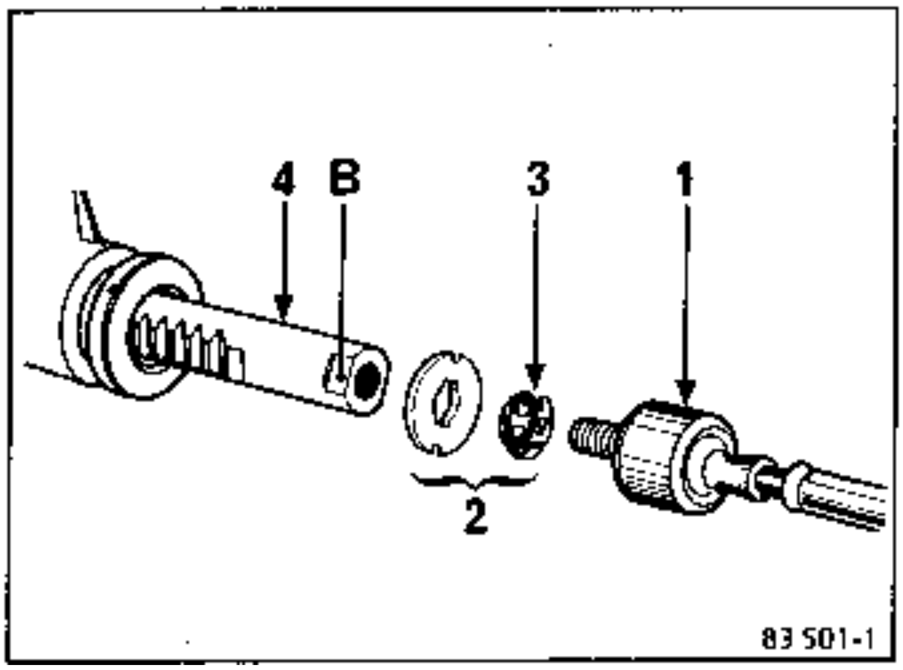
Remove :
- the ball joint casing, counting the number of threads engaged to facilitate adjusting the toe-out on refitting.
- the rack bellows.

Loosen the axial ball joint using spanner Dir.812-01 or Dir.832-01 whilst holding the stop washer (2) with a claw spanner to prevent the rack turning.



REFITTING

Fit the following to the rack (4) :
- the stop-locking washer assembly (2),
- the axial ball joint (1) after first coating its threads with LOCTITE "FRENBLOC".



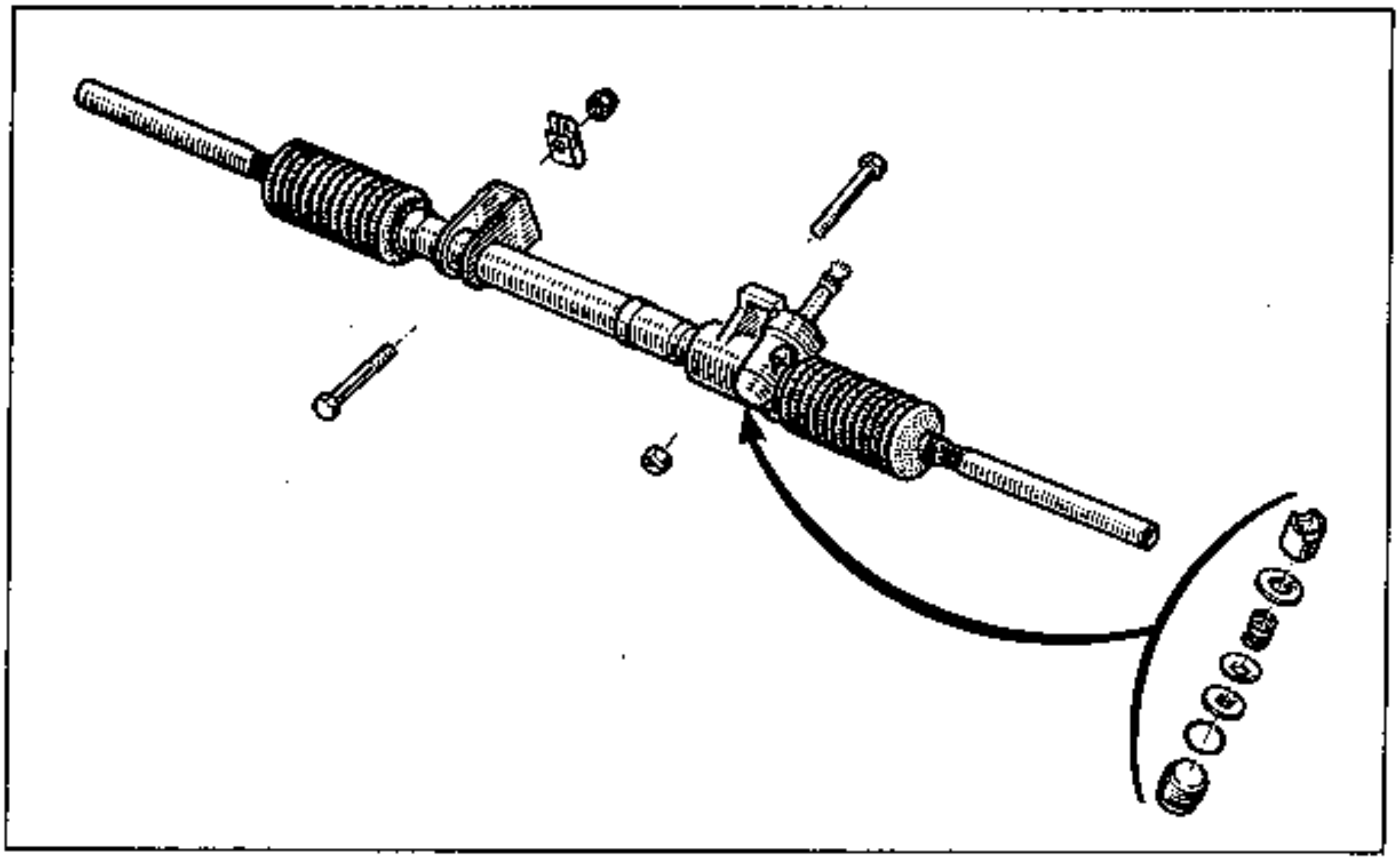
NOTE : before tightening the ball joint with spanner Dir.812-01 or Dir.832-01, check that the tabs on the locking washer (2) are in line with the flats (B) on the rack.

Refit the bellows and the clip.

Screw the ball joint into the sleeve by the number of turns noted during dismantling.

Reconnect the steering link to the stub axle carrier.

Check and, if necessary, adjust the toe-out then tighten the lock nut on the sleeve.

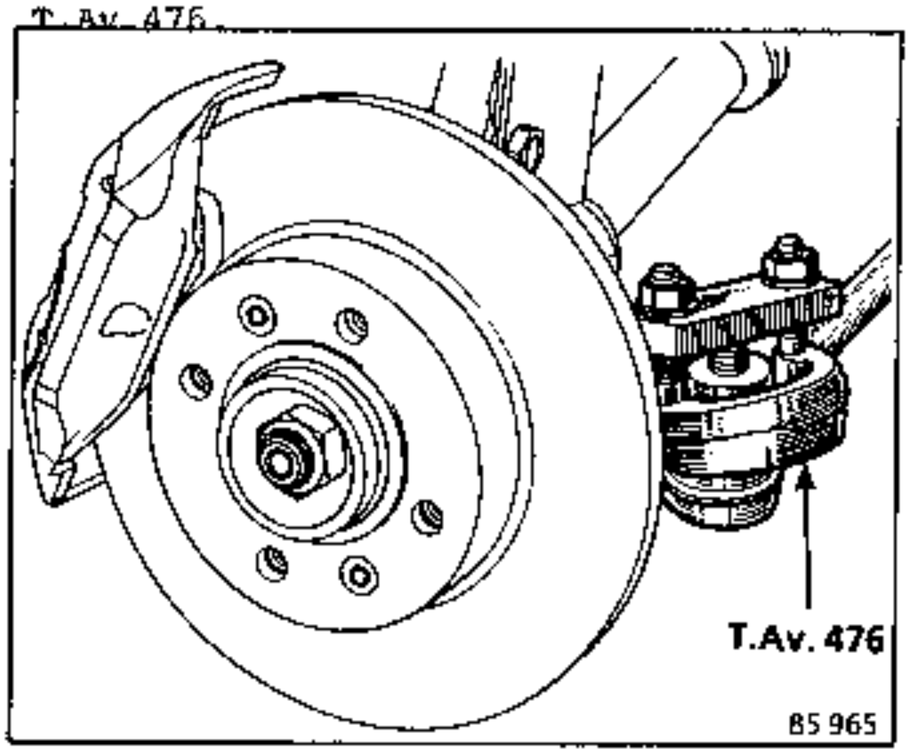


ESSENTIAL SPECIAL TOOLS	
T.Av. 476	Ball joint extractor

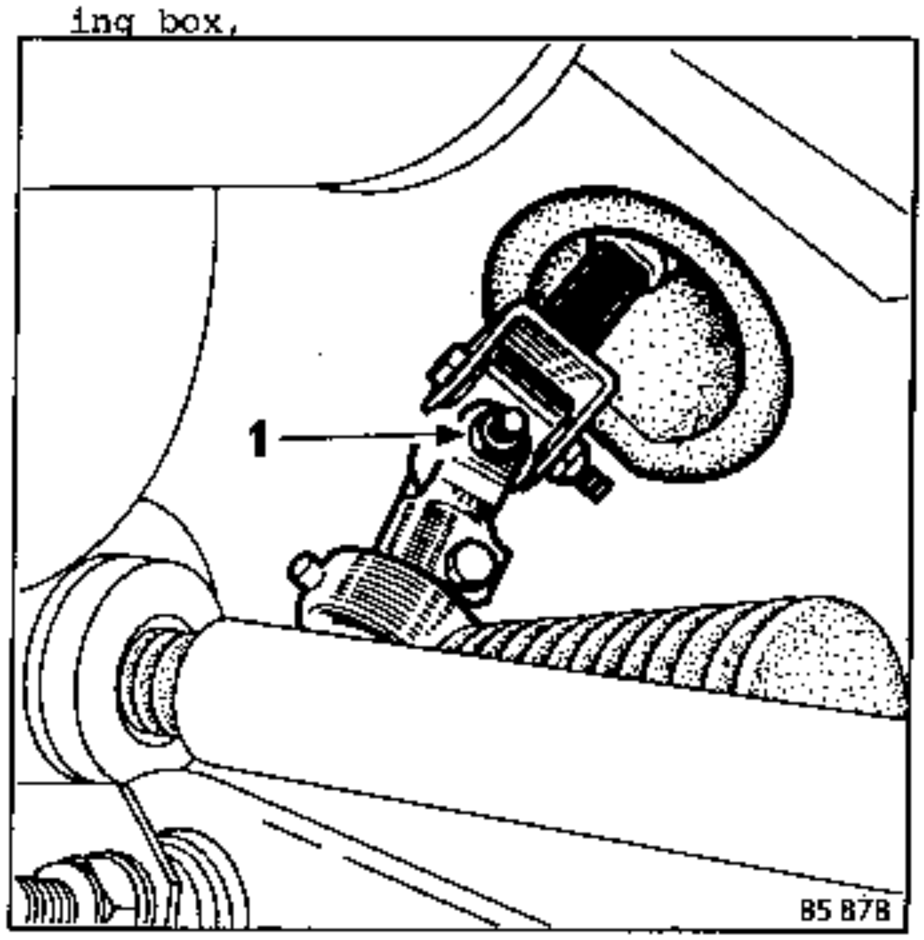
TIGHTENING TORQUES (in daN.m)	
Steering ball joint nuts	4
Axial ball joints	5
Steering box securing bolts	5

REMOVING

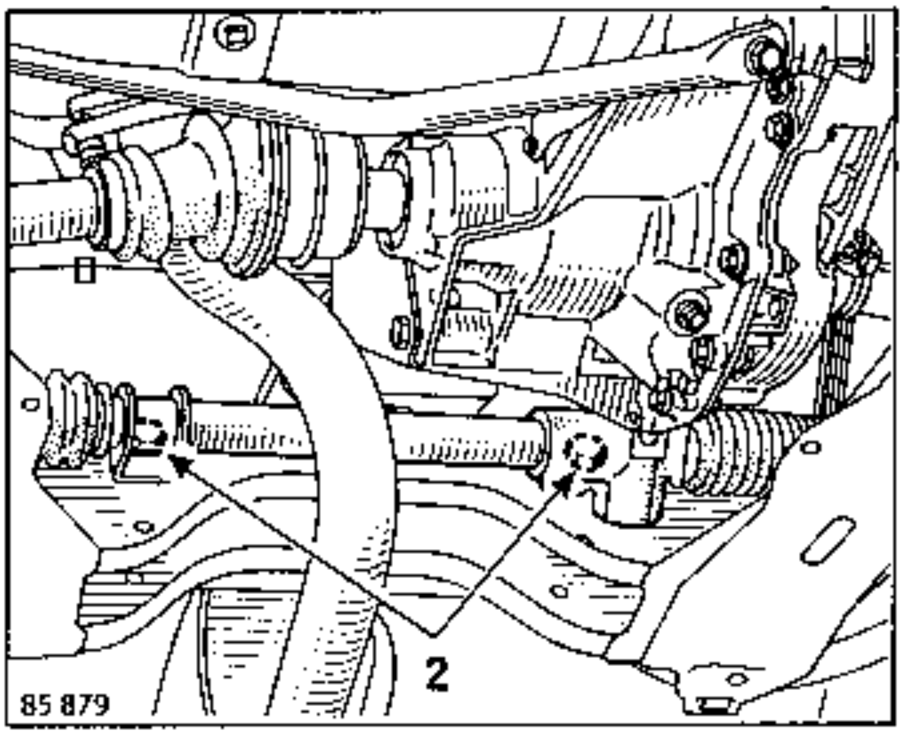
Disconnect the ball joints using tool T.Av.476.



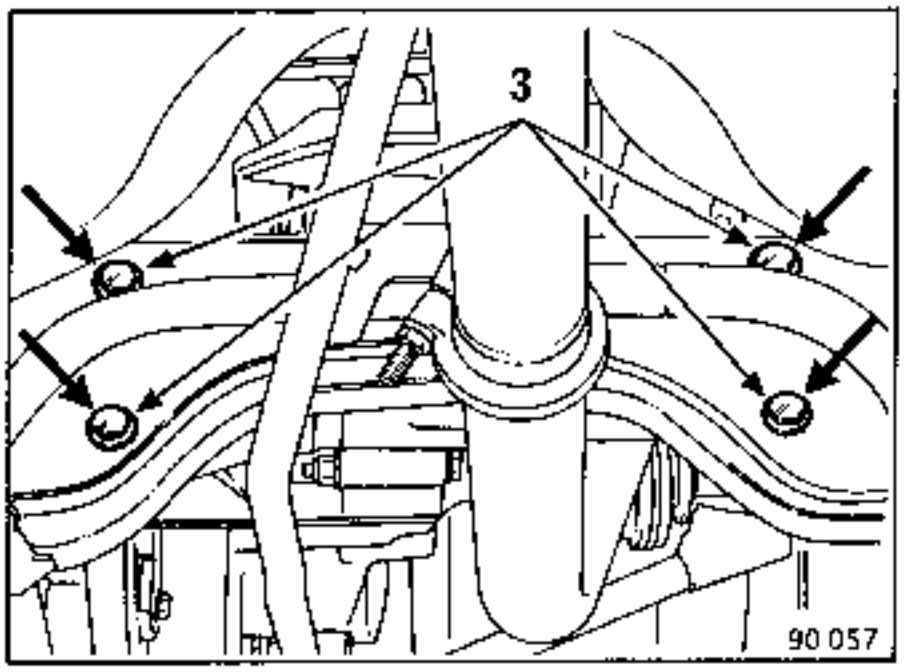
Remove :
- the plastic protector,
- the bolt that secures the universal joint (1), marking its position with reference to the steering box,



- the two bolts (2).



Special features of early type C405-C409 vehicles : the four bolts (3).



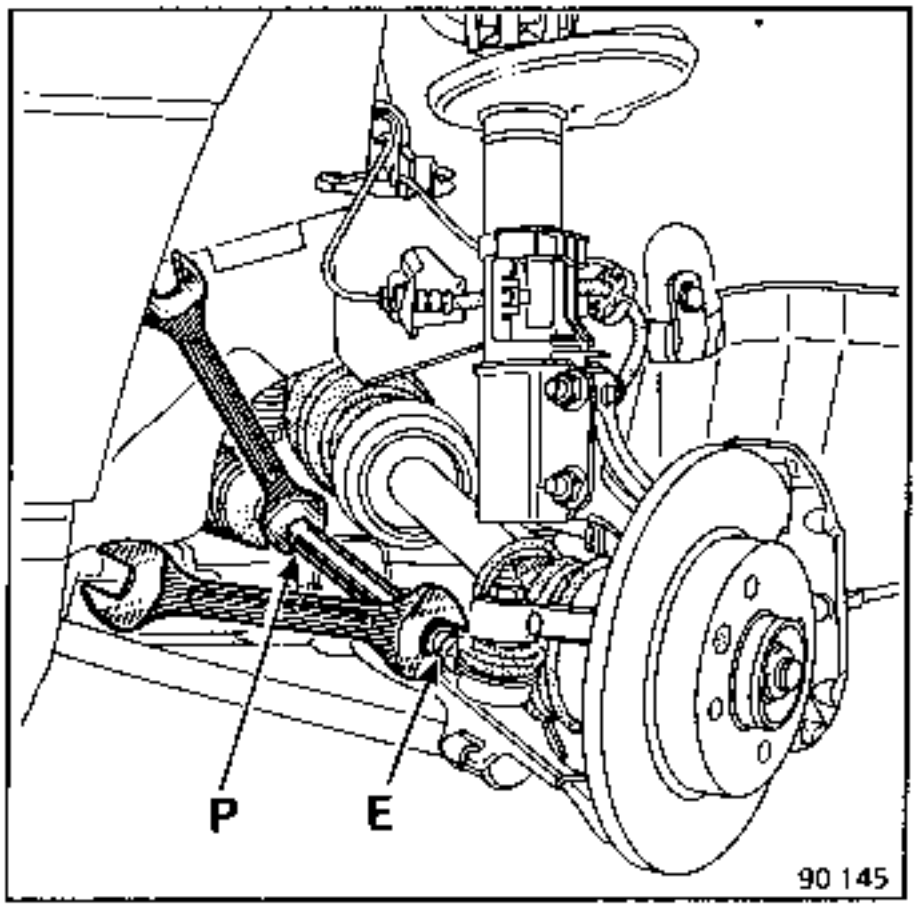
ALL TYPES :
the steering box.

Never unscrew the axial ball joints from the steering box unless they are to be replaced.

If the steering box is to be replaced, the ball joint casings at the stub axle end are to be removed.

To do this :

- loosen the lock nut (E) whilst holding the axial ball joint with an open ended spanner at (P),
- unscrew the ball joint casing, noting the number of threads engaged.



REFITTING

Carry out the removing operations in reverse.

If a new steering box is to be fitted, place the ball joint casings in the positions noted on dismantling.

Refit the steering box assembly and then the steering links to the vehicle with the universal joint in the position noted on dismantling. If not, re-centralise the steering wheel.

Fit the plastic protector.

NOTE : if it is impossible to fit the steering column universal joint, disconnect the retractable steering column shaft.

Check the front wheel toe-out.

ESSENTIAL SPECIAL TOOLS		
Dir.	812-01	Spanners for tightening the axial ball joints
Dir.	832-01	
T.Av.	476	Ball joint extractor

TIGHTENING TORQUES (in daN.m)	
Wheel bolts	8
Steering ball joint nuts	4
Axial ball joints	5

REMOVING

Support the front end of the vehicle on stands and remove the wheel on the opposite side to the steering column.

Remove :
- the rack bellows,
- the axial ball joint (see the corresponding section).

Move the steering through full lock so the rack is no longer projecting from the steering box and is away from the anti-rattle bearing.

34 035

With a flat screwdriver, the sharp end of which has been rounded off, remove the anti-rattle bearing.

34 032

REFITTING

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

Refit the anti-rattle bearing in the same way as it was removed, taking care to ensure that its three studs enter the slots (A).

34 035

Move the rack back into the bearing.
Refit, to the rack :
- the stop washer with a new locking washer,
- the axial ball joint,
- the ball joint casing at the stub axial carrier end.

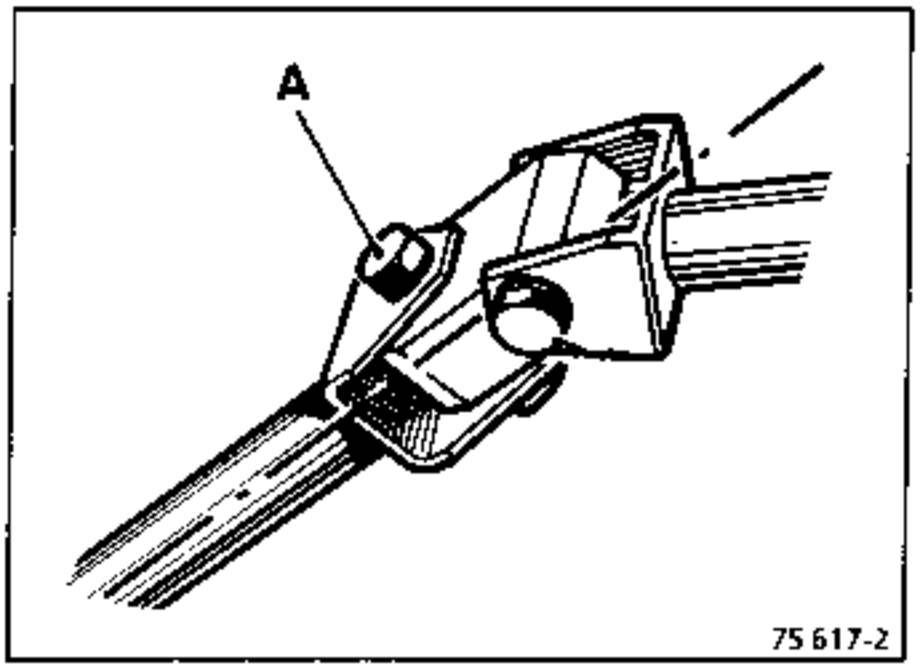
Check and, if necessary adjust, the toe-out.

TIGHTENING

Each of the bolts (A) and (B) is to be tightened when the centreline of its clevice is in line with the centreline of the block.

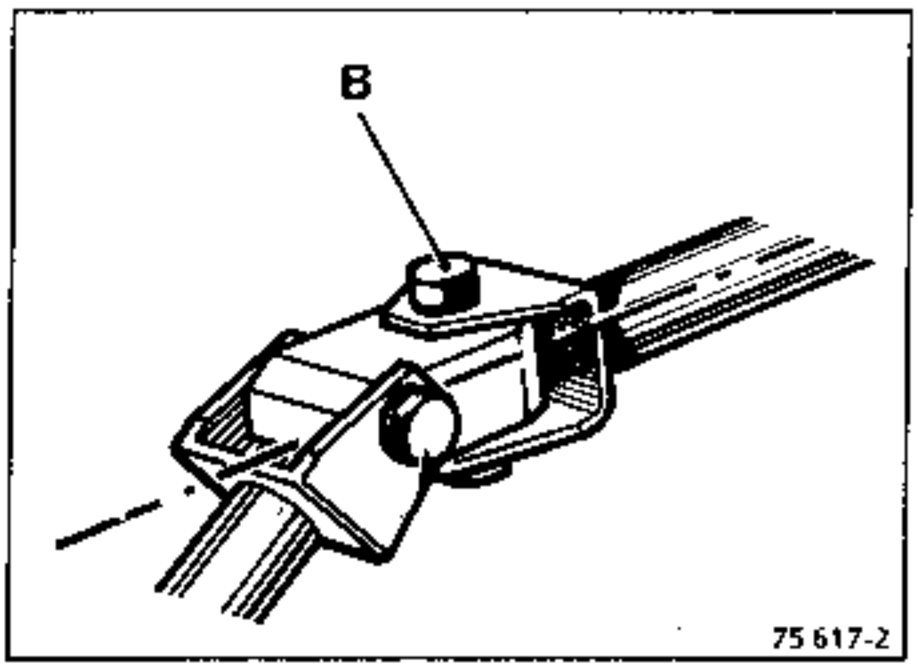
Place the block in position 1 and tighten bolt (A).

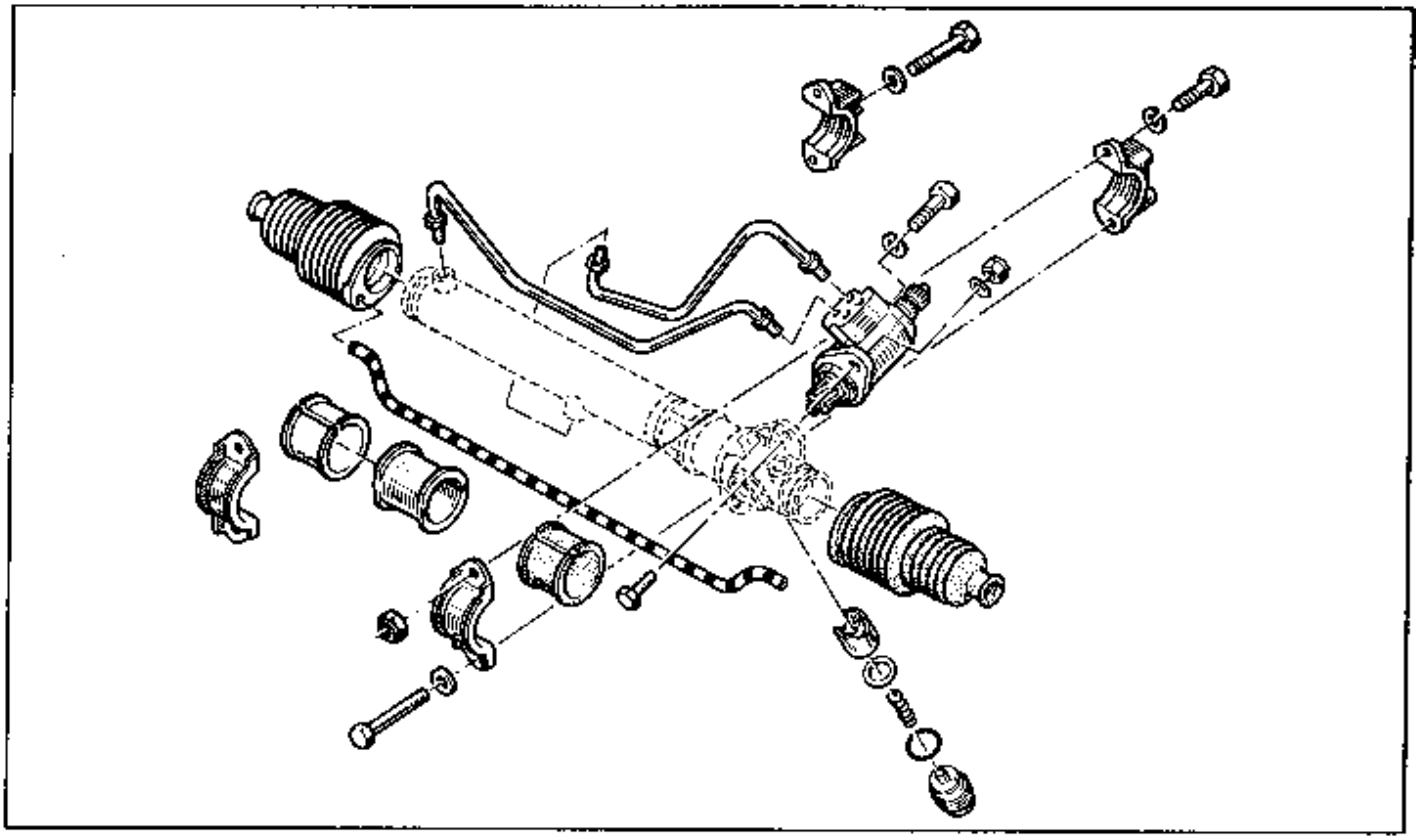
POSITION 1



Turn the steering wheel through a quarter of a turn to the right or to the left to obtain position 2 and tighten bolt (B).

POSITION 2



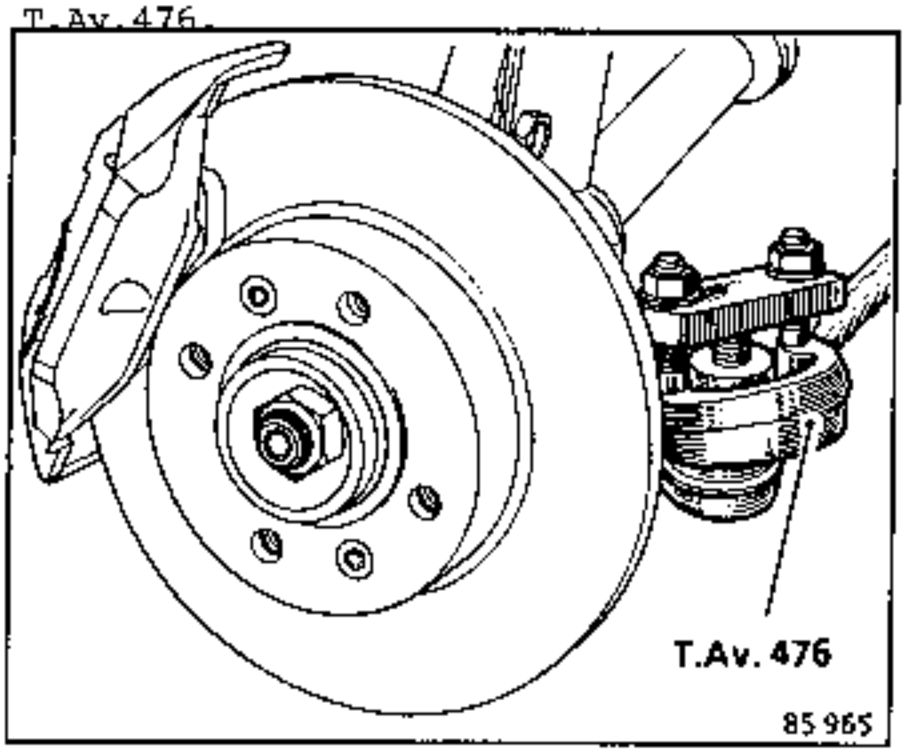


ESSENTIAL SPECIAL TOOLS		
Mot.	**453-01**	Hose clamps
T.Av.	**476**	Ball joint extractor

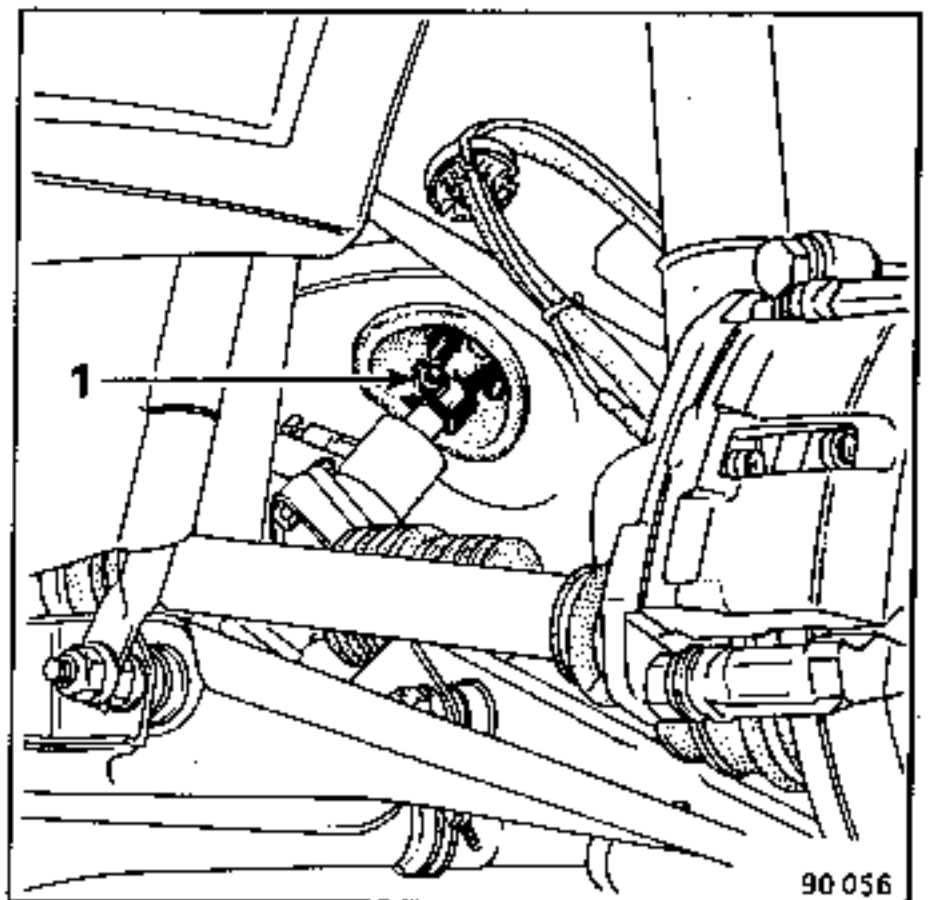
TIGHTENING TORQUES (in daN.m)	
Steering ball joint nuts	4
Axial ball joints	5
Steering box securing bolts	5

REMOVING

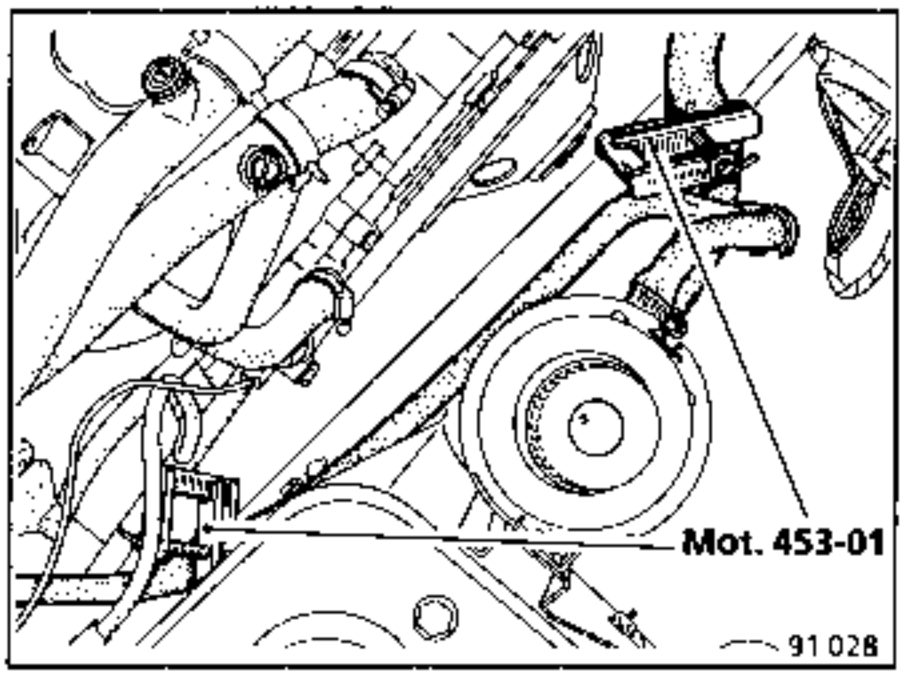
Disconnect the ball joints using tool T.Av.476.



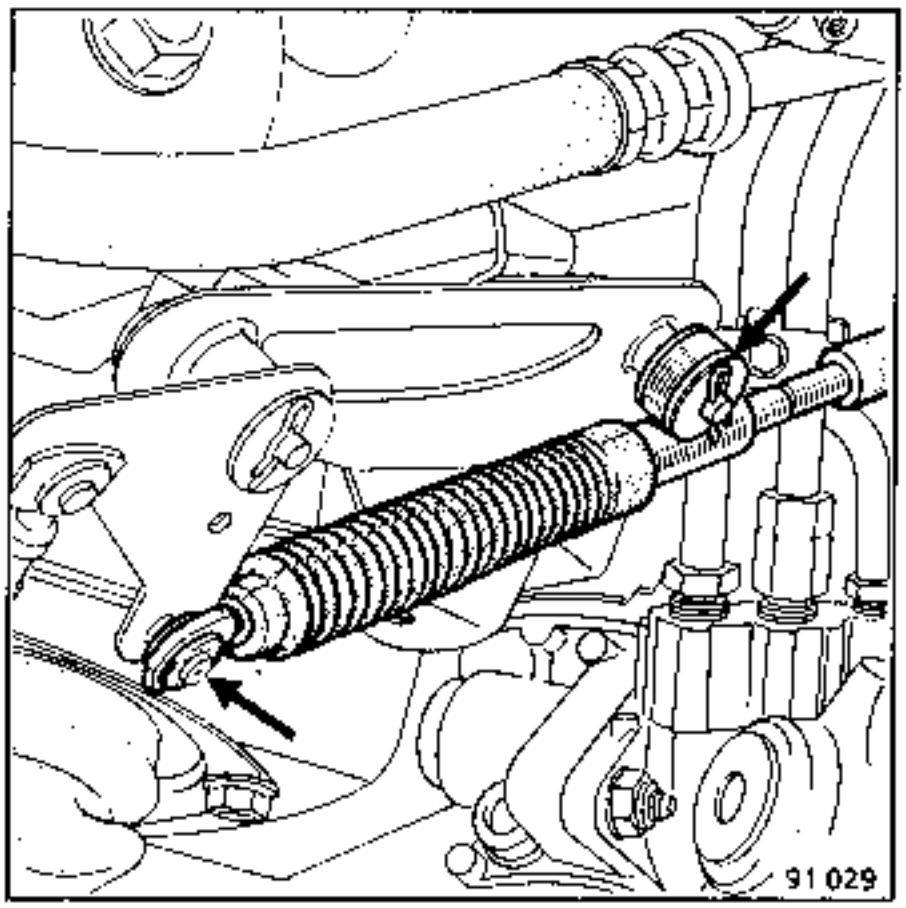
Remove the universal joint securing bolt (1) noting its position with reference to the steering box.



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



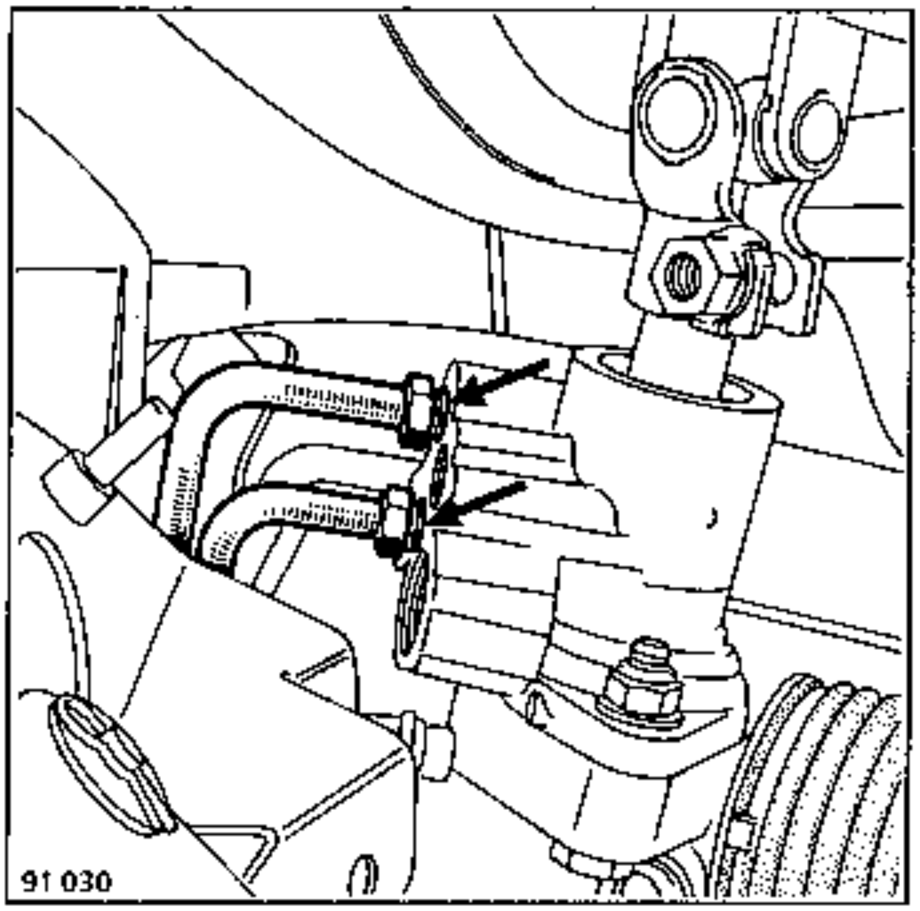
Remove :
- the gear shift control, leaving it to hang under the vehicle,



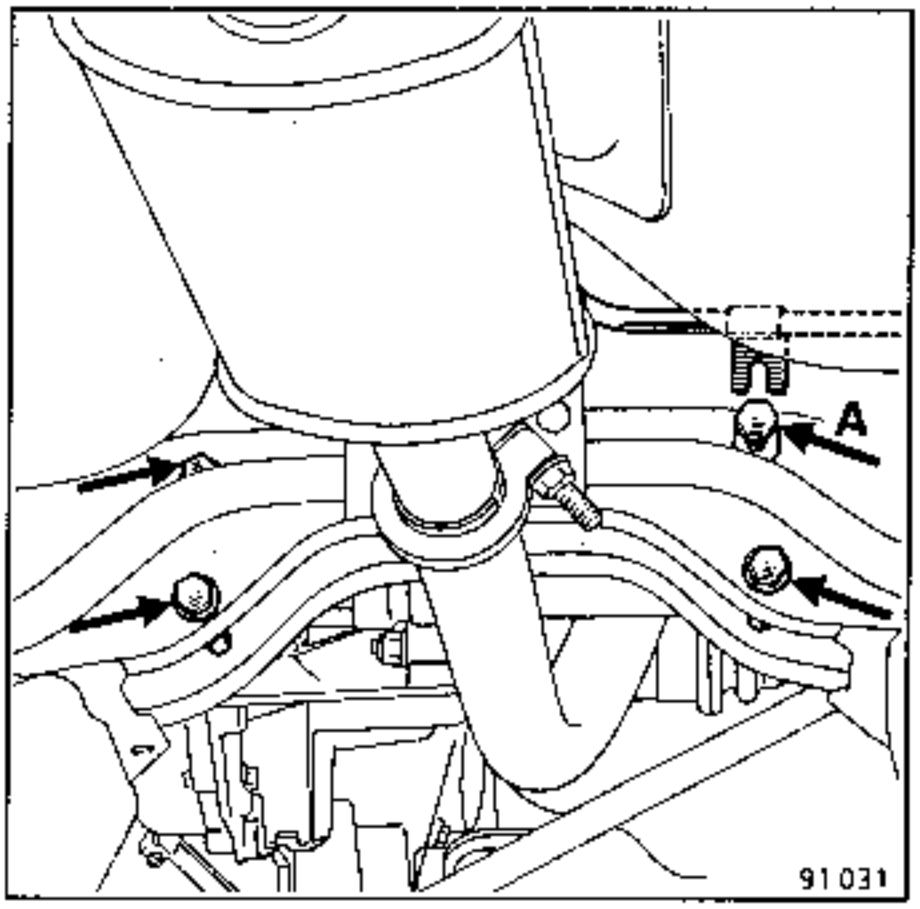
- the pipe clip,
- the oil pipe leaving the reservoir and the high pressure pipe between the pump and the rotary valve.

Loosen the steering box securing bolt (A) and free the low pressure pipe.

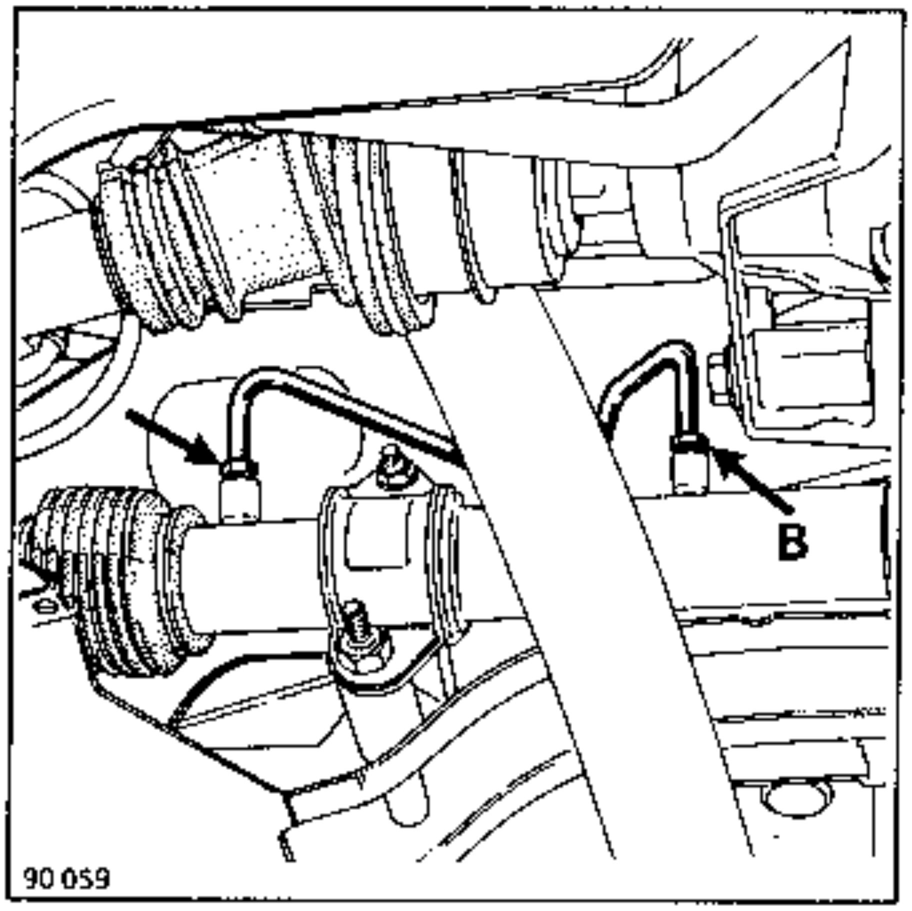
Fully unscrew the pipe leading to the ram (place a container to catch the oil).



From under the vehicle, remove :
- the protective casing under the engine,
- the four bolts that secure the steering box to the sub-frame.



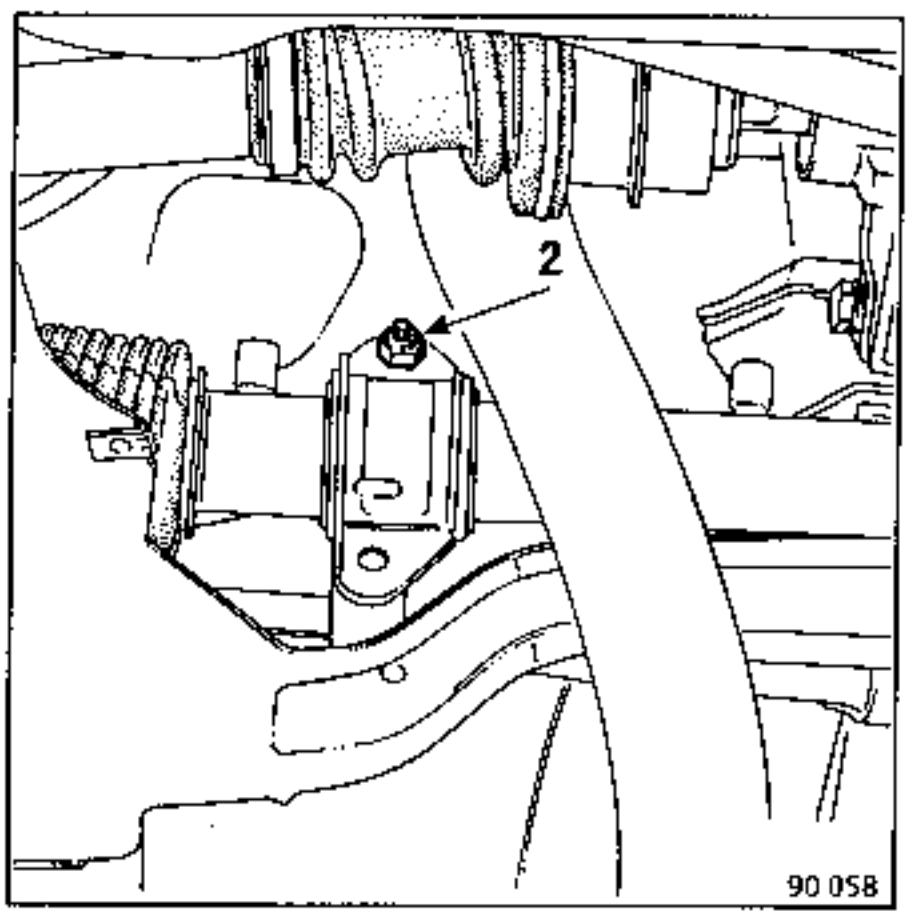
Lower the box. Unscrew and remove the pipes leading to the ram (place a container to catch the oil).



90 059

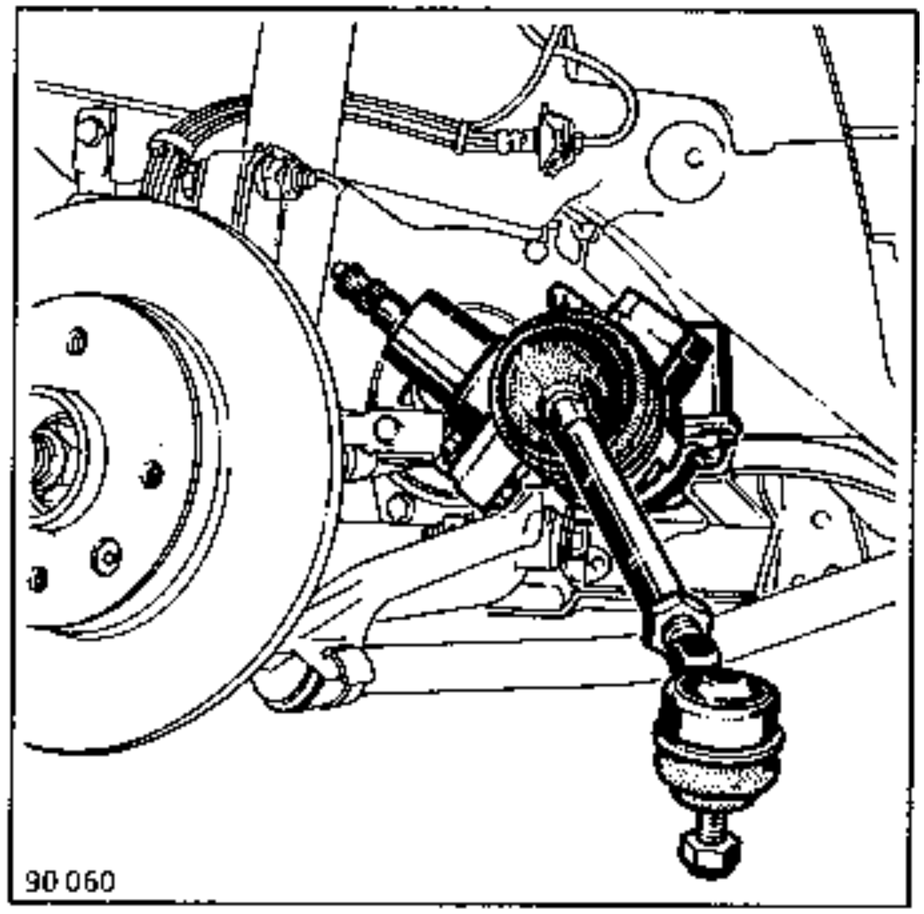
NOTE : fit plugs to the steering box tappings to prevent dirt entering.

Unscrew bolt (2) on the right hand steering box support so that it turns freely.



90 058

Remove the steering box through the left hand inner wing panel whilst positioning its right hand support so that it remains parallel with the sub-frame cross member.

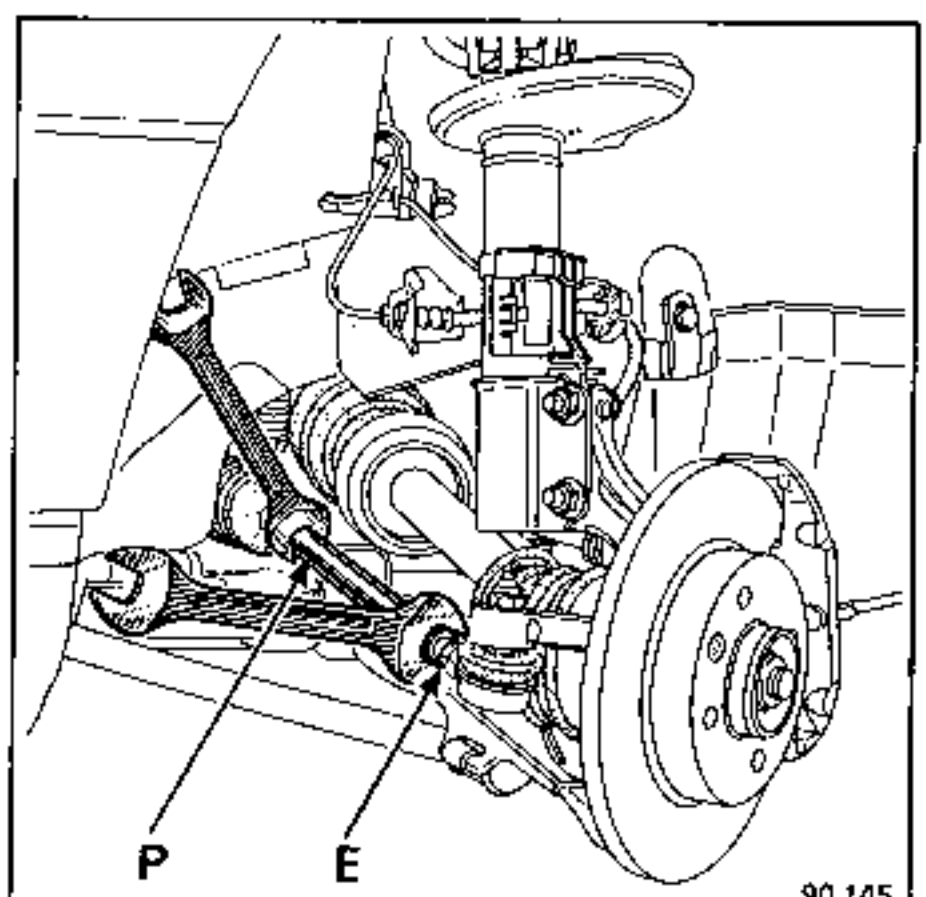

90 060

Never unscrew the axial ball joints from the rack unless they are to be replaced.

If the steering box is to be replaced by a new one, the ball joint casings at the stub axle carrier end will have to be removed for fitting to the new unit.

To do this :

- loosen the lock nut (E) whilst holding the axial ball joint with an open ended spanner at (P),
- unscrew the ball joint casings whilst counting the number of threads engaged.



90 145

REFITTING

If a new steering box is being fitted :

- place the ball joint casings in the positions noted during dismantling,
- loosen the right hand support on the steering box so that it can turn freely,
- remove the pipes from the ram and plug their tappings to prevent any dirt entering.

Place the steering box in position, without securing it and fit pipe (B).

Screw the ram supply pipe into the valve and the ram body without tightening it.

Position the steering column ball joint by following the marks made during dismantling and reconnect it.

Secure the steering box except at point (A).

Tighten the ram pipes and the bolt on the right hand mounting.

Tighten the steering column universal joint.

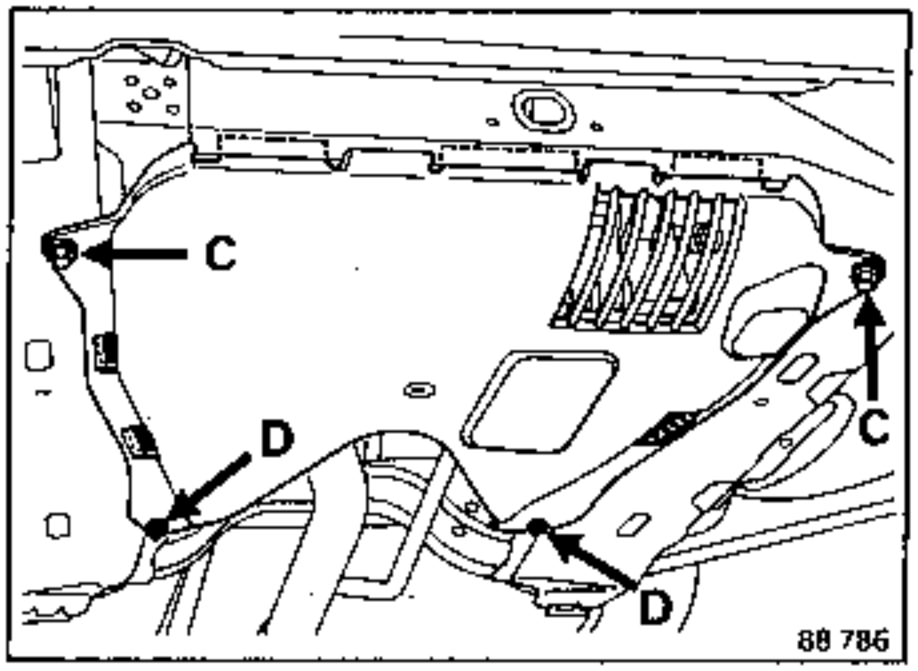
Reconnect the pipes to the rotary valve, repositioning the low pressure pipe.

Tighten point (A) on the steering box.

Fit the pipe retaining clip and remove clamps Mot.453-01.

Reconnect :
- the gear shift control,
- the ball joints to the stub axle carrier,

Fit the protective casing under the engine.



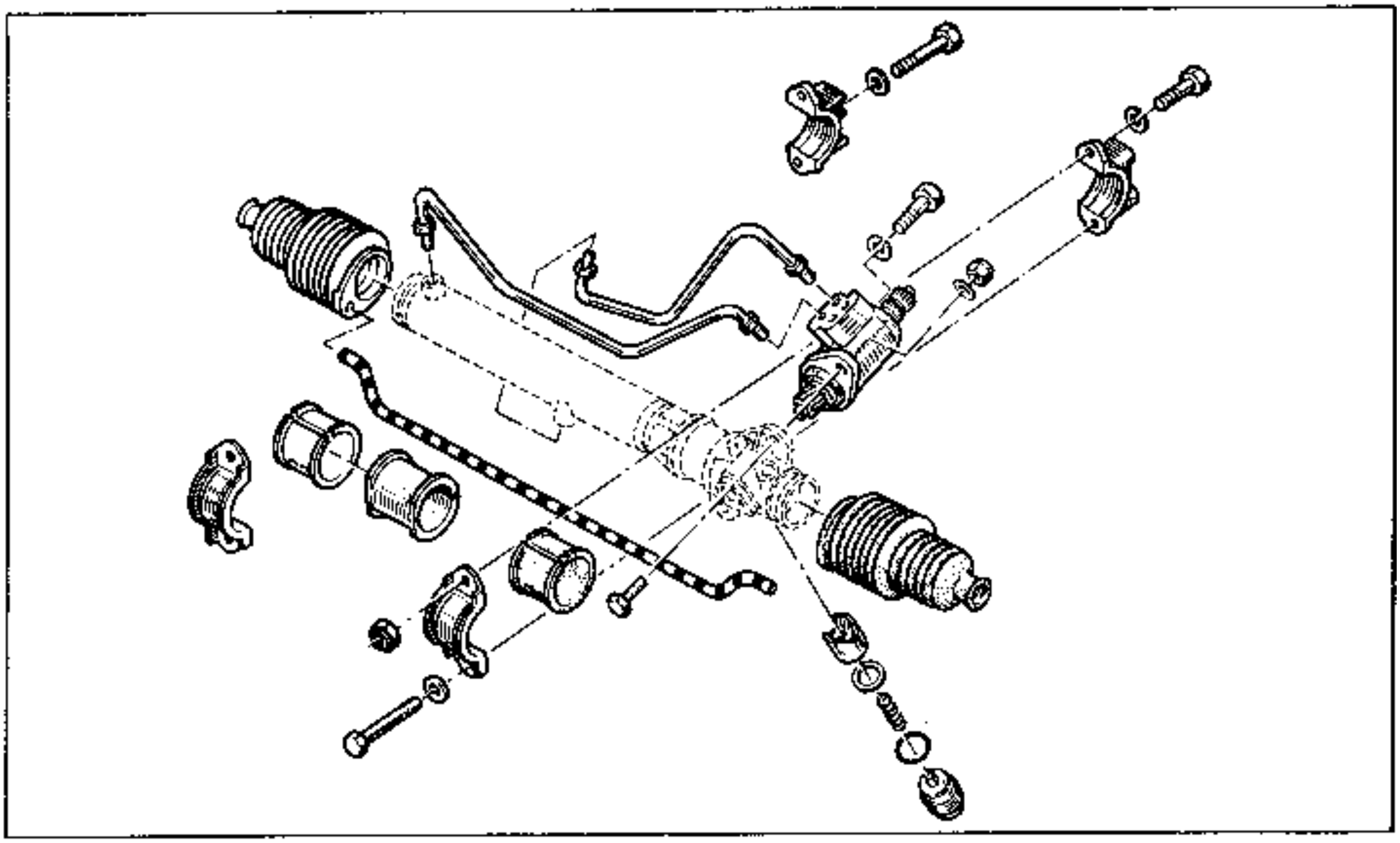
The 2 bolts C
The 2 "1/4 turn" clips D

Fill the oil reservoir level with the grille.

Turn the steering from left to right (with the engine stopped) to distribute the oil throughout the system.

Repeat this operation with the engine running then top-up the level (see section 13 "Filling the system").

Check and, if necessary, adjust the toe-out.

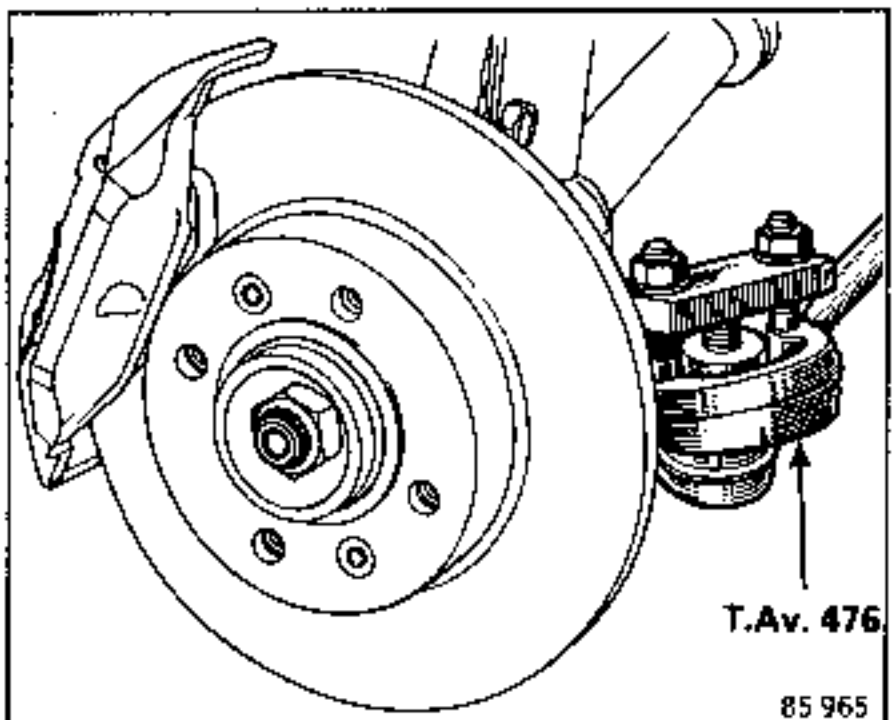


ESSENTIAL SPECIAL TOOLS		
Mot.	**453-01**	Hose clamps
T.Av.	**476**	Ball joint extractor

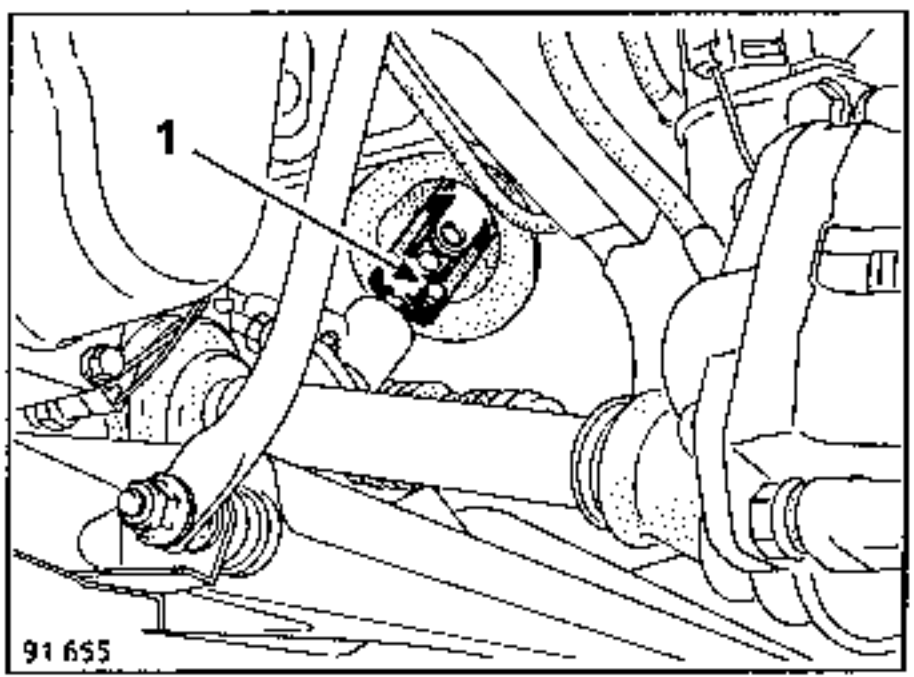
TIGHTENING TORQUES (in daN.m)	
Steering ball joint nuts	**4**
Axial ball joints	**5**
Steering box securing bolts	**5**

REMOVING

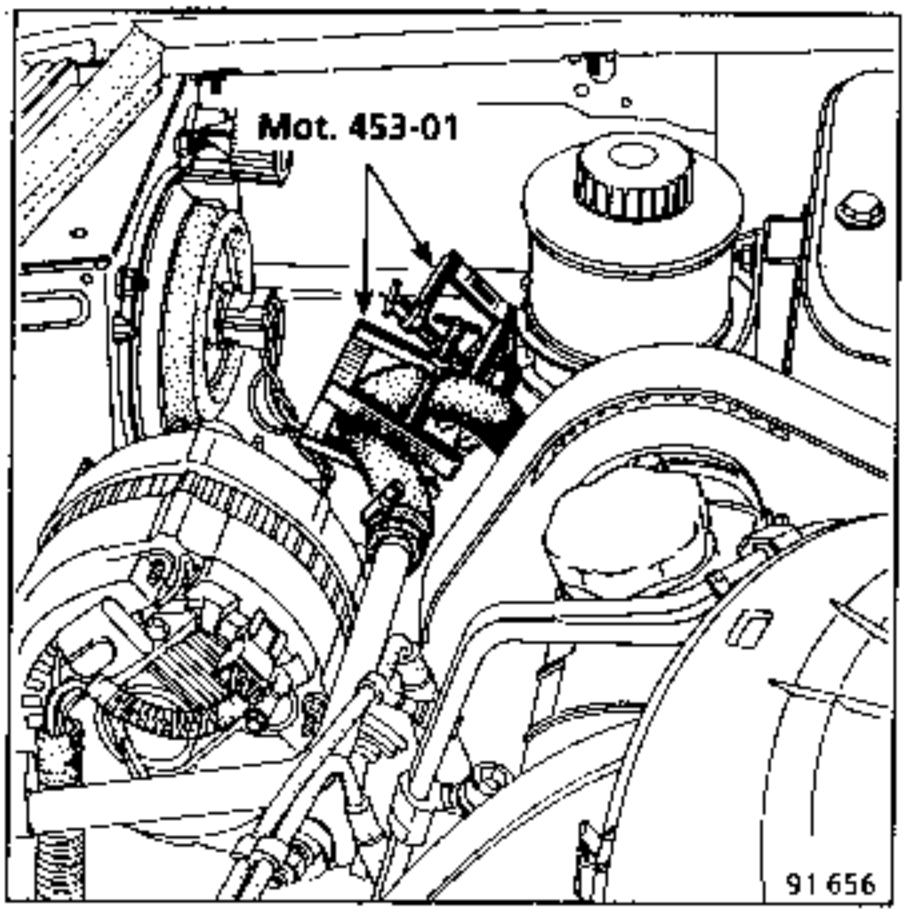
Disconnect the ball joints using tool T.Av.476.



Remove the ball joint securing bolt (1) noting its position with reference to the steering box.



Place a clamp Mot.453-01 on each of the pipes leading from the oil reservoir.

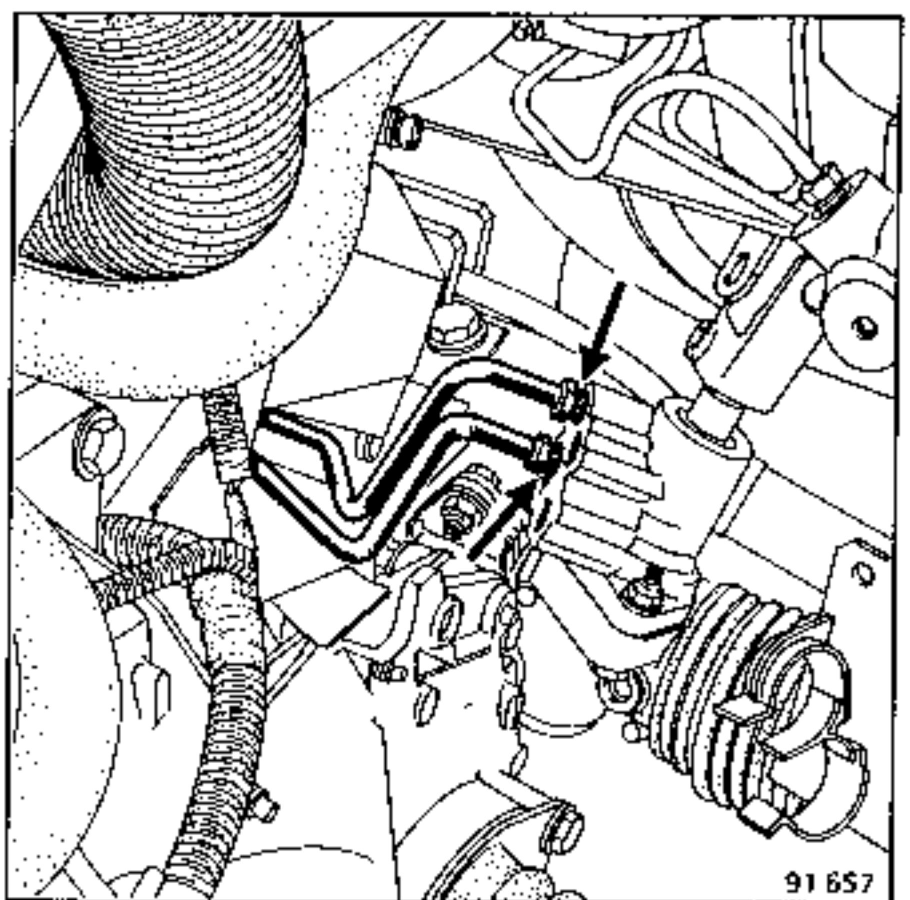


91 656

Remove :
- the pipe retaining clip,
- the pipes from the oil reservoir and the high pressure pipe from the pump to the rotary valve.

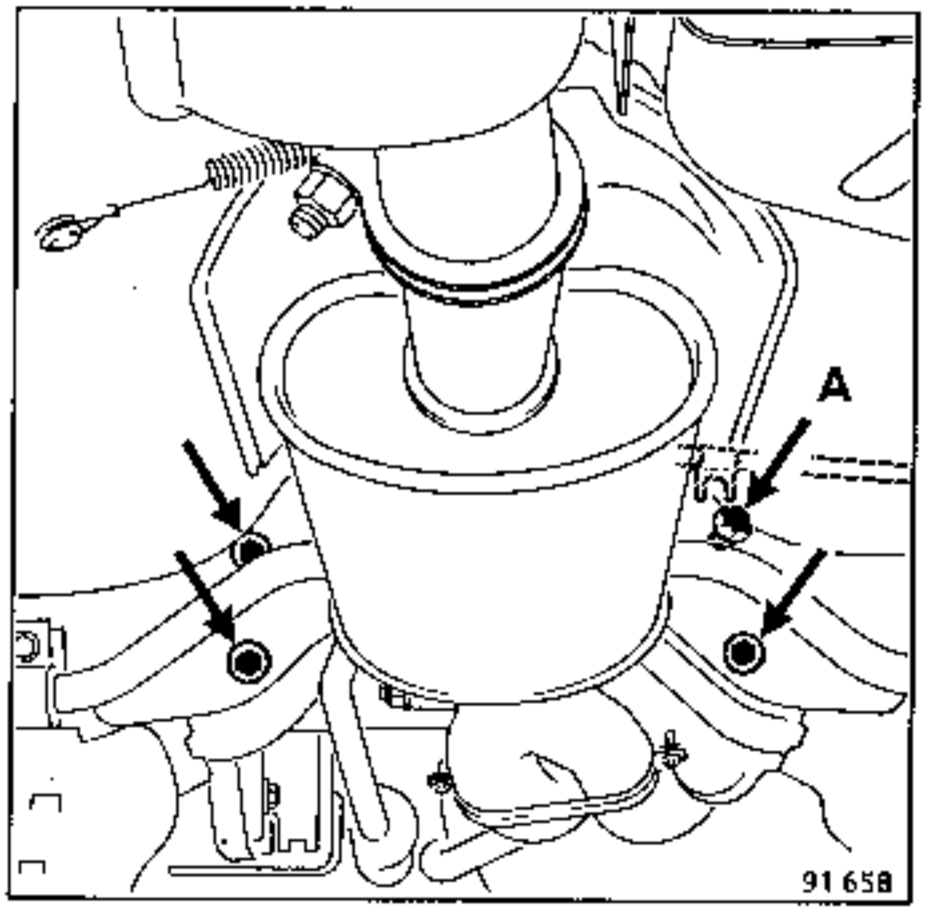
Loosen the steering box securing bolt (A) and remove the low pressure pipe.

Fully unscrew the pipes leading to the ram (provide a container to catch the oil).



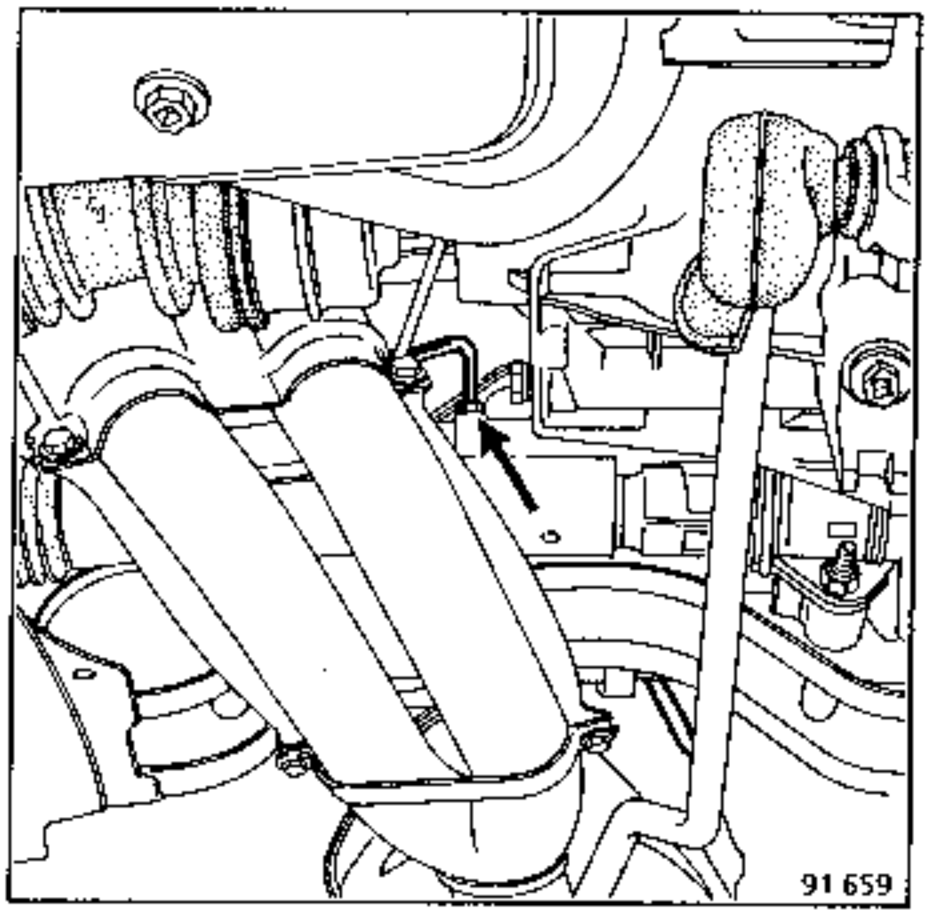
91 657

From under the vehicle, remove the four bolts that secure the steering box to the sub-frame.



91 658

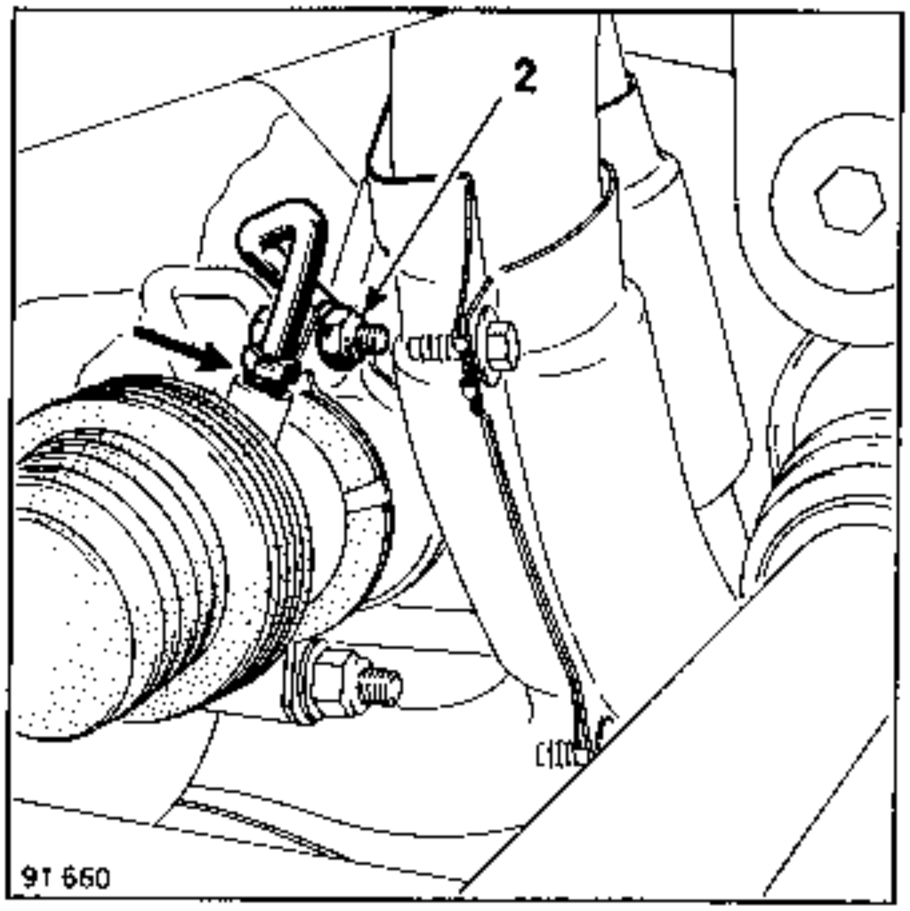
Lower the box and unscrew and remove the pipes leading to the ram (provide a container to catch the oil).



91 659

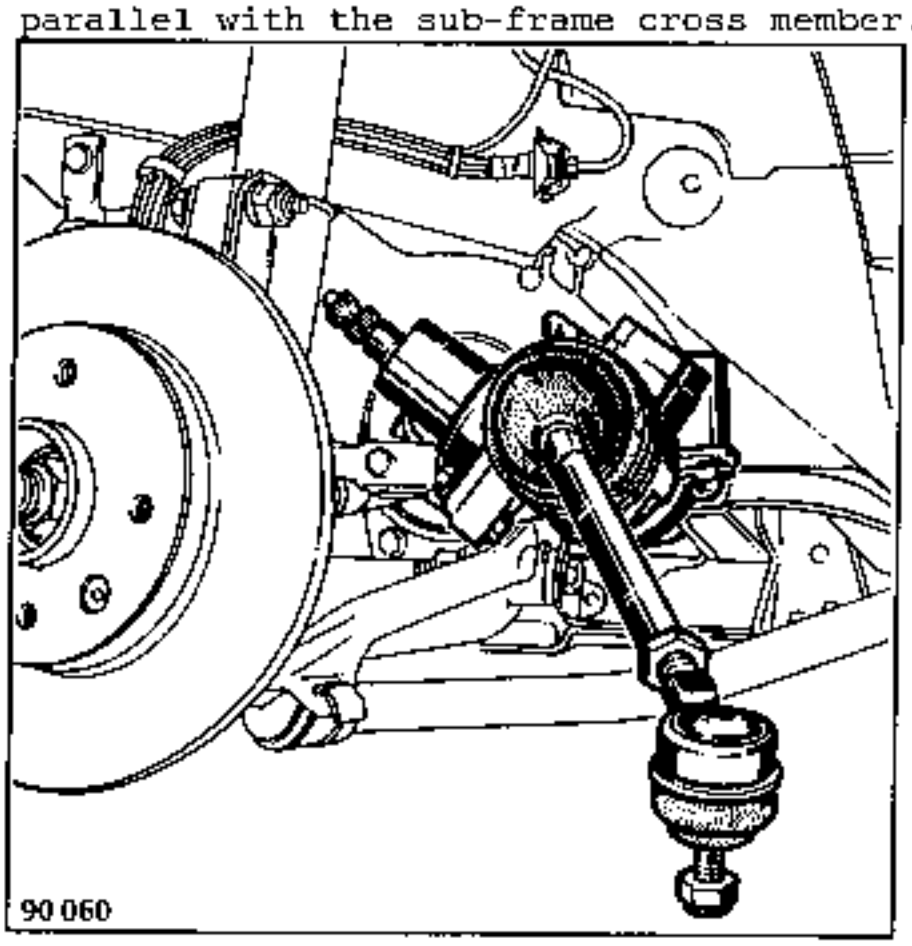
NOTE : fit plugs into the steering box tappings to prevent dirt entering.

Loosen the bolt (2) on the right hand steering box support so that it can turn freely.



91 660

Remove the steering box through the left hand inner wing panel, positioning the right hand support so that it remains parallel with the sub-frame cross member.



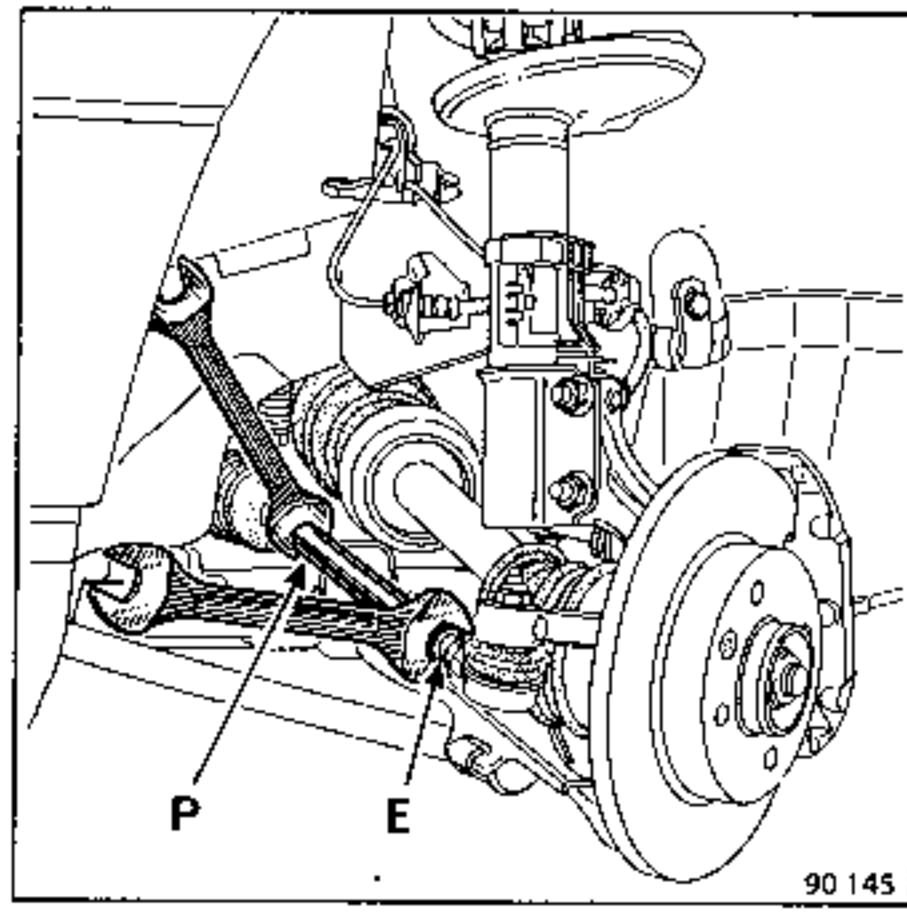
90 060

Never unscrew the axial ball joints from the steering rack unless they are to be replaced.

If the steering box is to be replaced, the ball joint casings at the stub axle carrier end will have to be removed.

To do this :

- loosen the lock nut (E) whilst holding the axle ball joint with an open ended spanner at (P),
- unscrew the ball joint casing whilst noting the number of threads engaged.



90 145

REFITTING

When fitting a new steering box :

- fit the ball joint casings in the positions noted during dismantling,
- loosen the right hand support on the steering box so that it can turn freely,
- remove the pipes from the ram, plugging their tappings to prevent any dirt entering.

Place the steering box in position without securing it.

Position and screw in the pipes leading to the ram on the valve and the steering box body without tightening them.

Position the steering column universal joint by following the marks made during removal and reconnect it.

Secure the steering box except at point (A).

Tighten the pipes leading to the ram and the bolt on the right hand support.

Tighten the steering column universal joint.

Reconnect the pipes leading to the rotary valve whilst correctly positioning the low pressure pipe.

Tighten the steering box securing bolt (A).

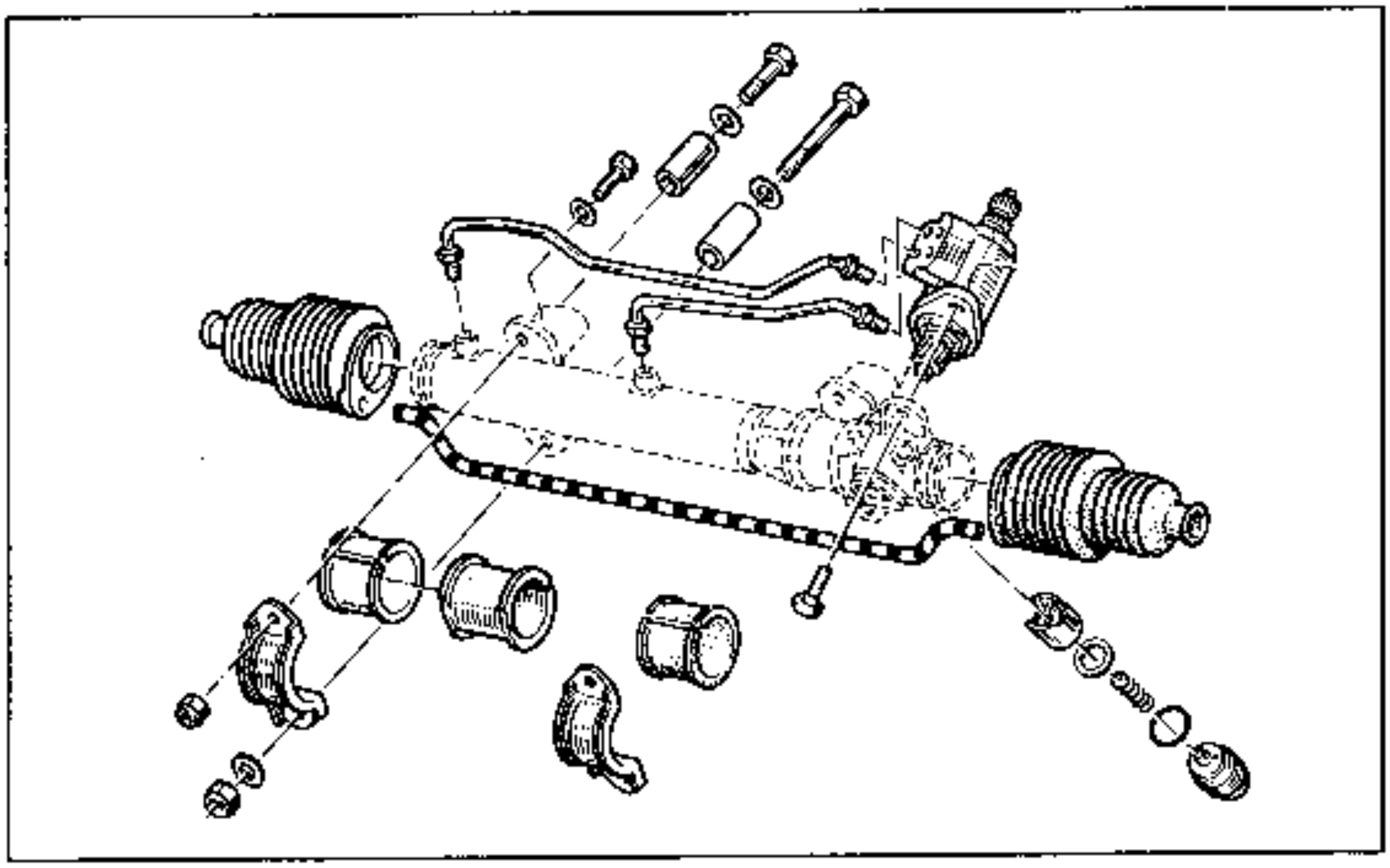
Fit the pipe retaining clip and remove clamps Mot.453-01.

Fill the system with oil up to the indicator pad on the reservoir filter.

Turn the steering to left and to right (with the engine stopped) to distribute the oil through the circuit.

Repeat this operation with the engine running then top-up the level (see section 13 "Filling the circuit").

Check and, if necessary, adjust the toe-out.

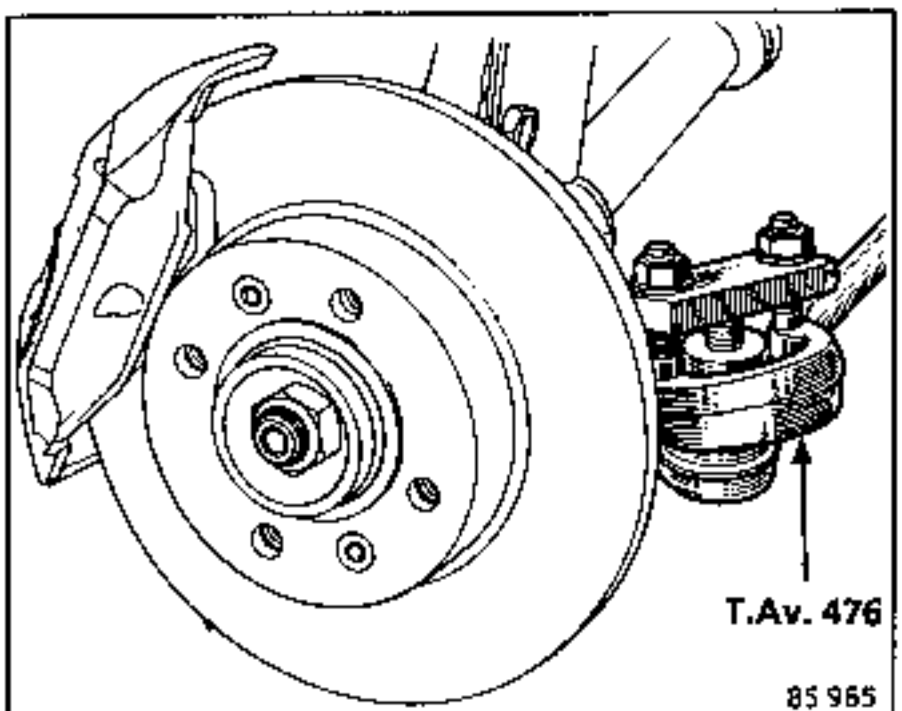


ESSENTIAL SPECIAL TOOLS	
Mot. 453-01	Hose clamps
T.Av. 476	Ball joint extractor

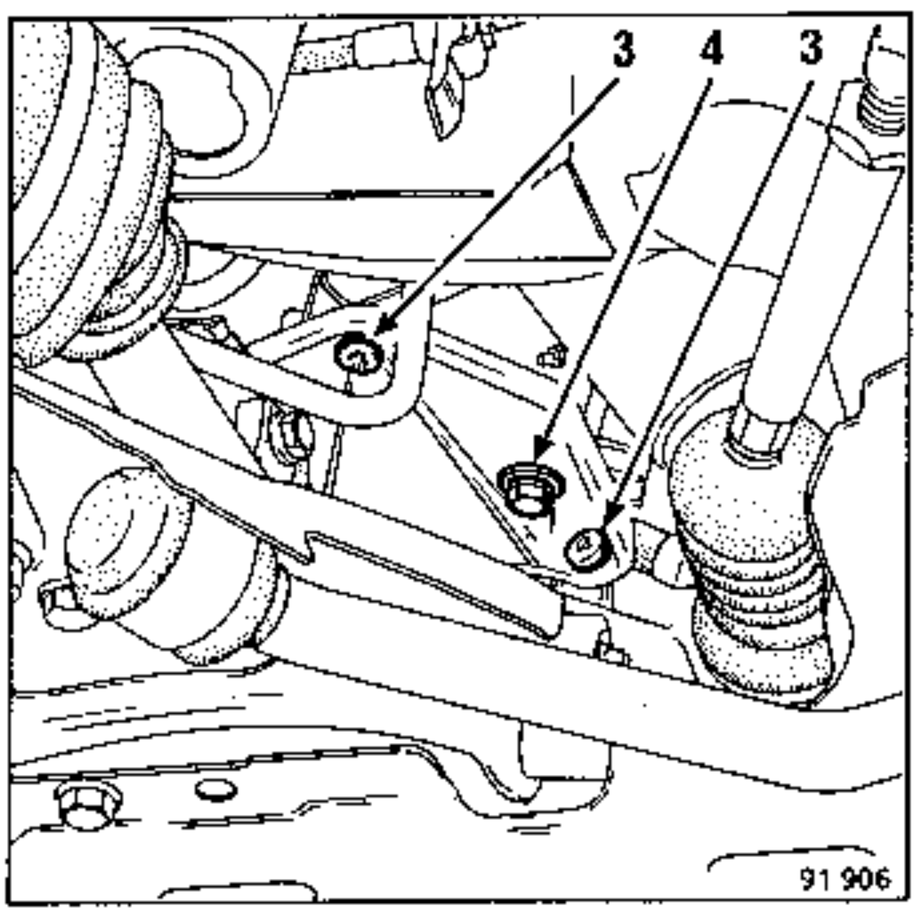
TIGHTENING TORQUES (in daN.m)	
Steering ball joint nut	4
Axial ball joint	5

REMOVING

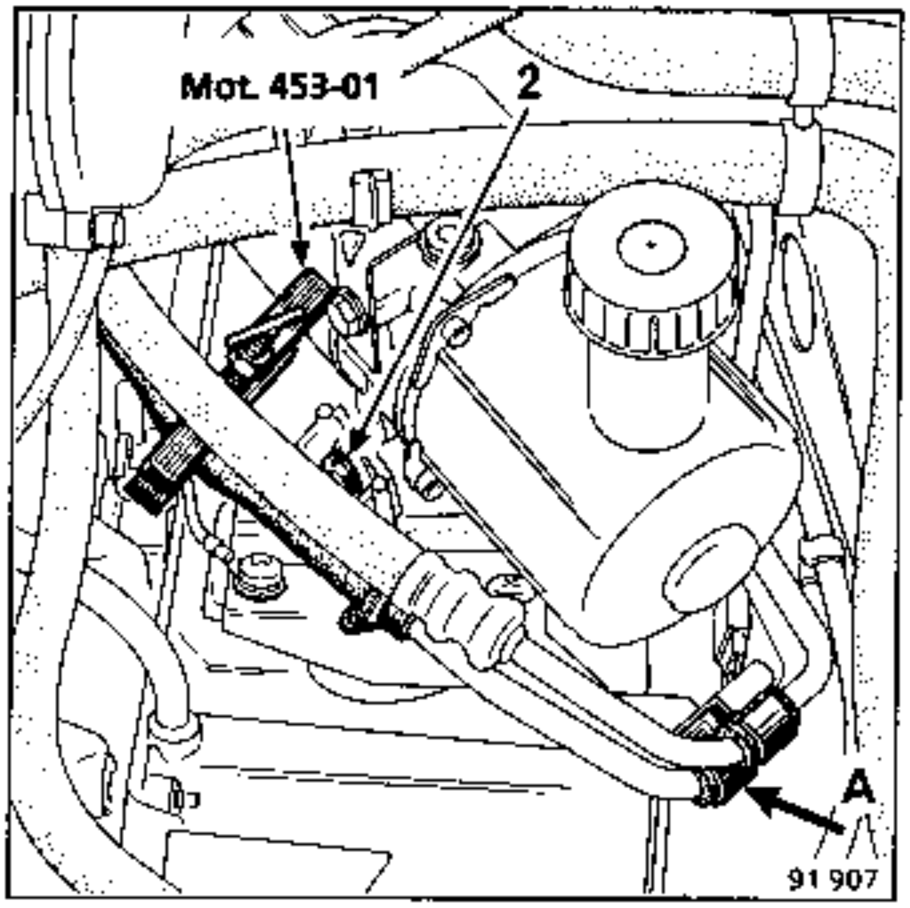
Disconnect :
- the battery,
- the steering ball joints : tool T.Av. 476.



Remove :
- the lower bolts (3) and (4) that secure the pump to its support.



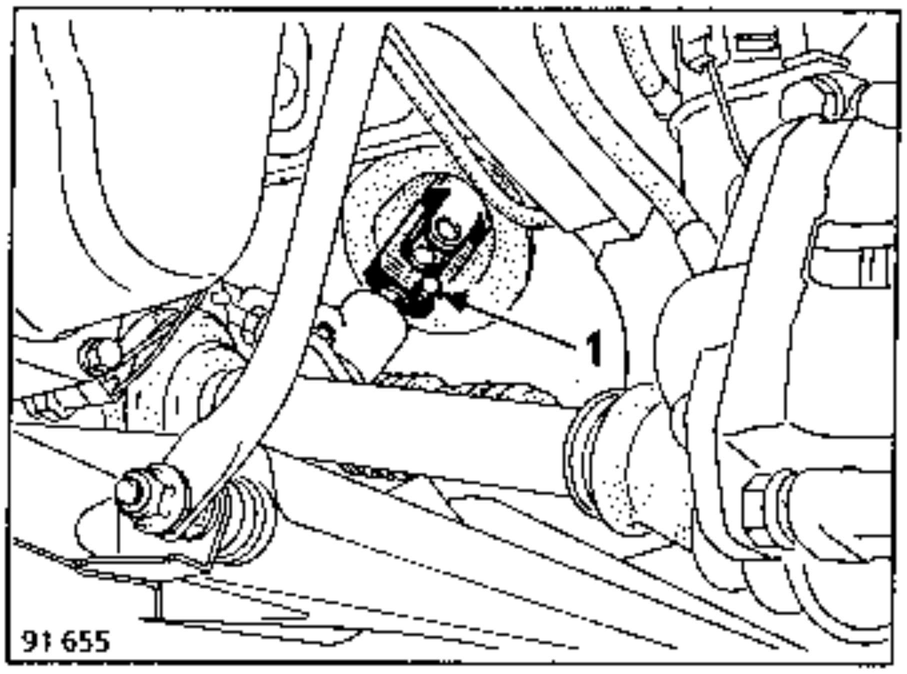
- the pump upper securing bolt (2),
- the hose retaining clip (A).



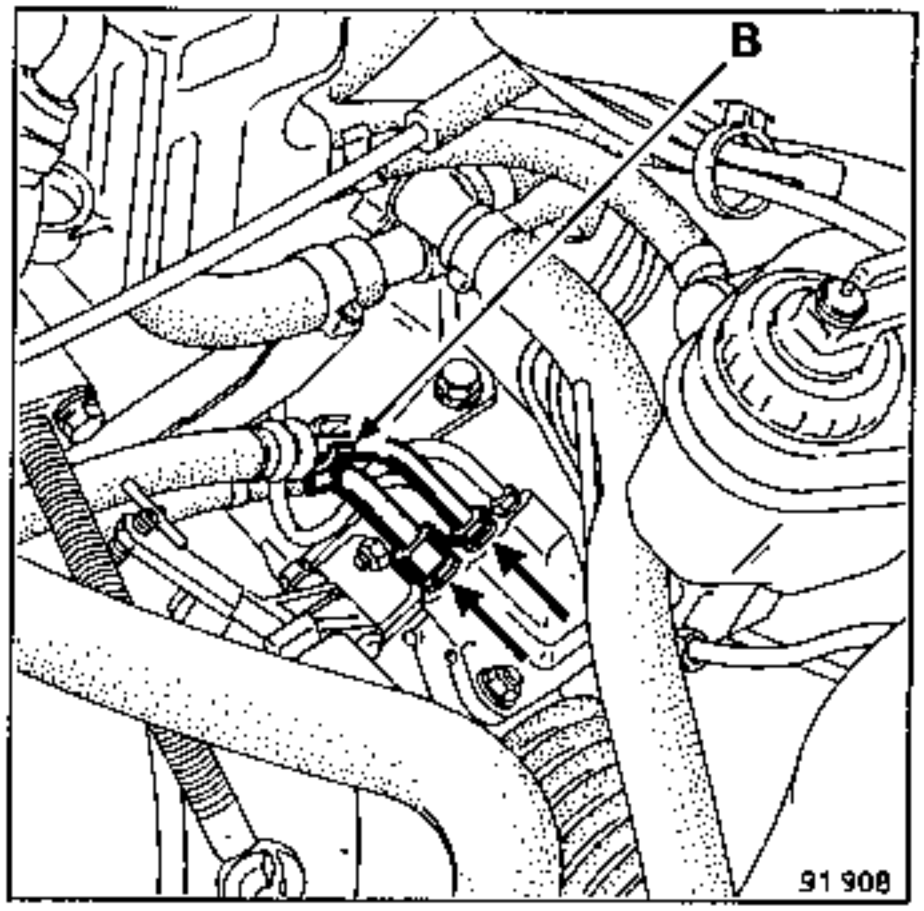
Place one clamp Mot.453-01 on the hose that supplies the rotary valve.

Push the electric pump towards the front of the vehicle.

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

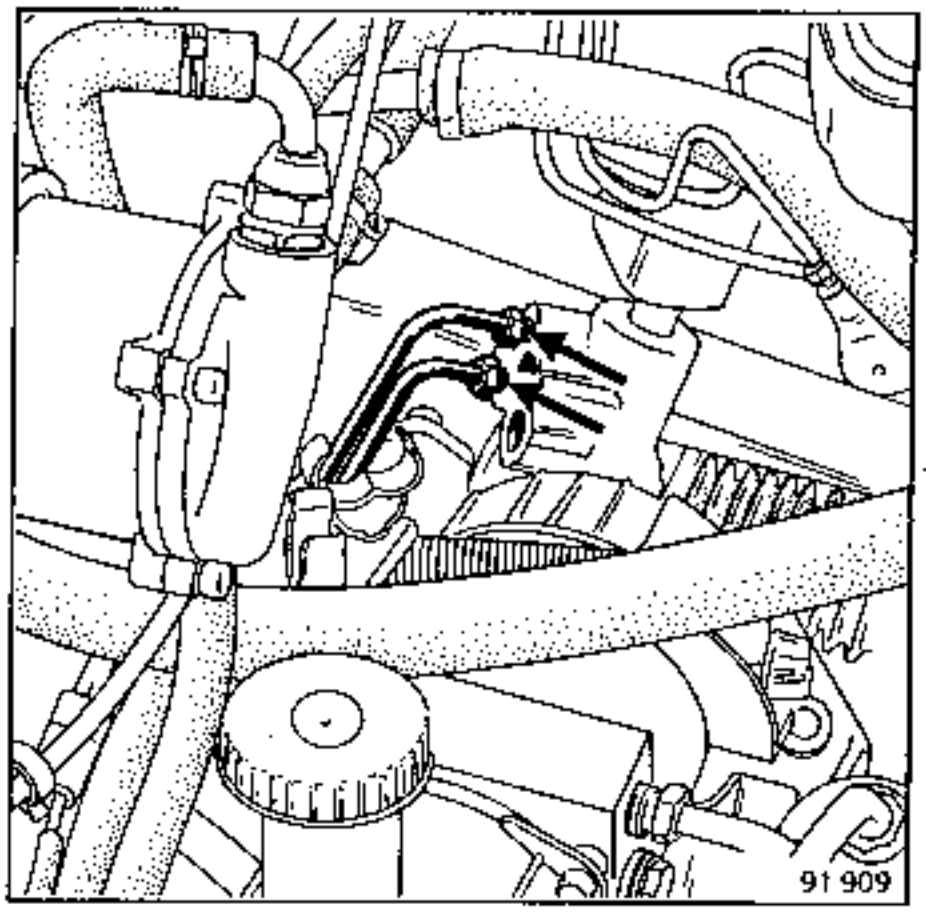


- the pipe retaining clip (B),

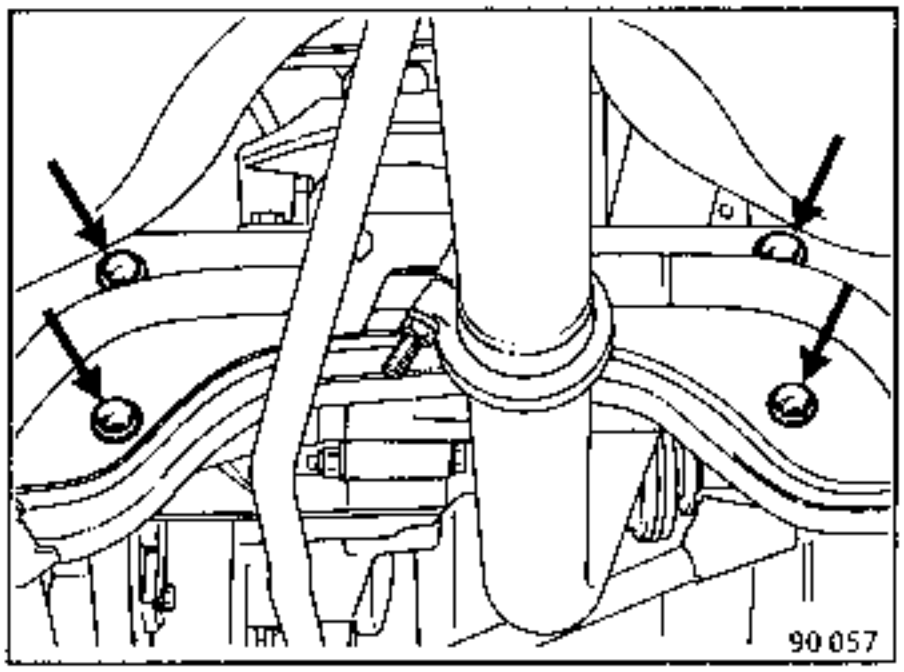


- the high and low pressure pipes from the rotary valve.

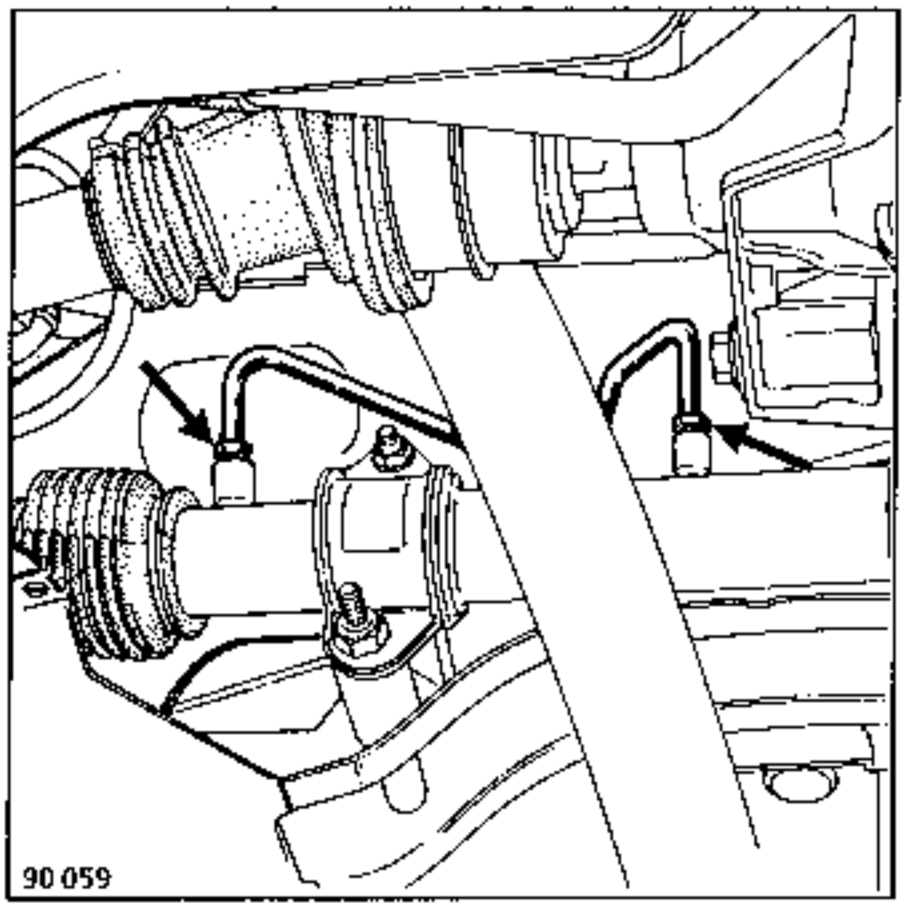
Fully unscrew the pipes leading to the ram (provide a container to catch the oil).



From under the vehicle :
- remove the protective casing under the engine,
- the four bolts that secure the steering box to the sub-frame.

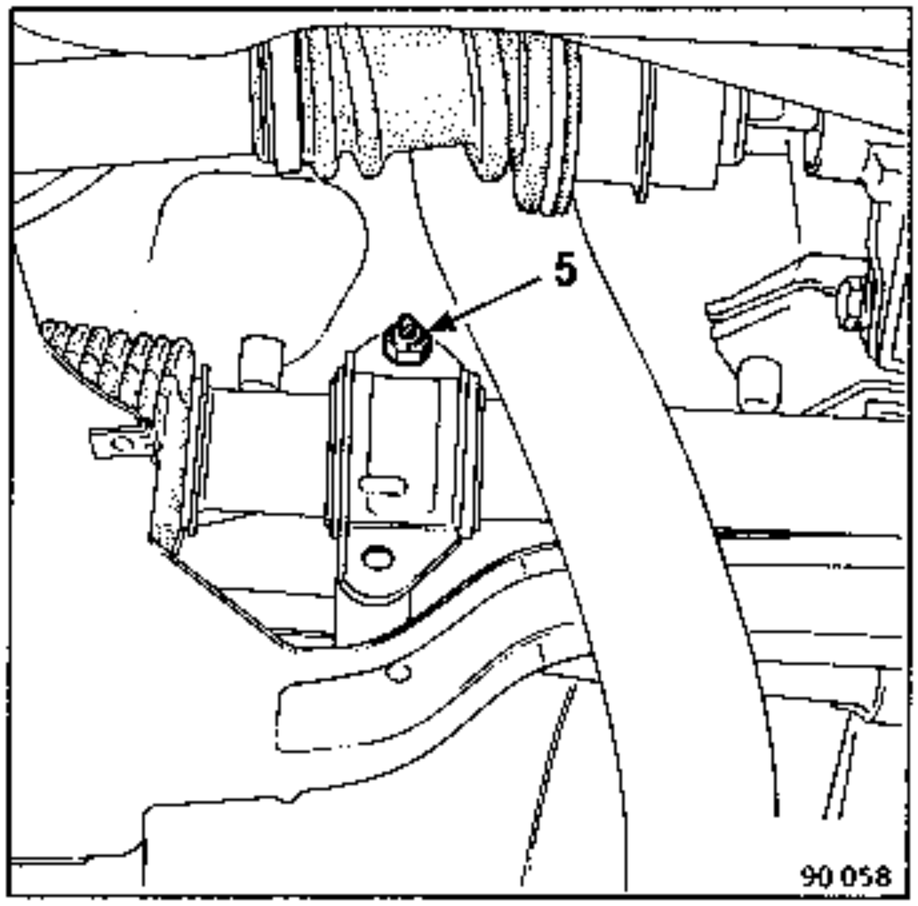


Lower the steering box and unscrew and remove the ram pipes (provide a container to catch the oil).

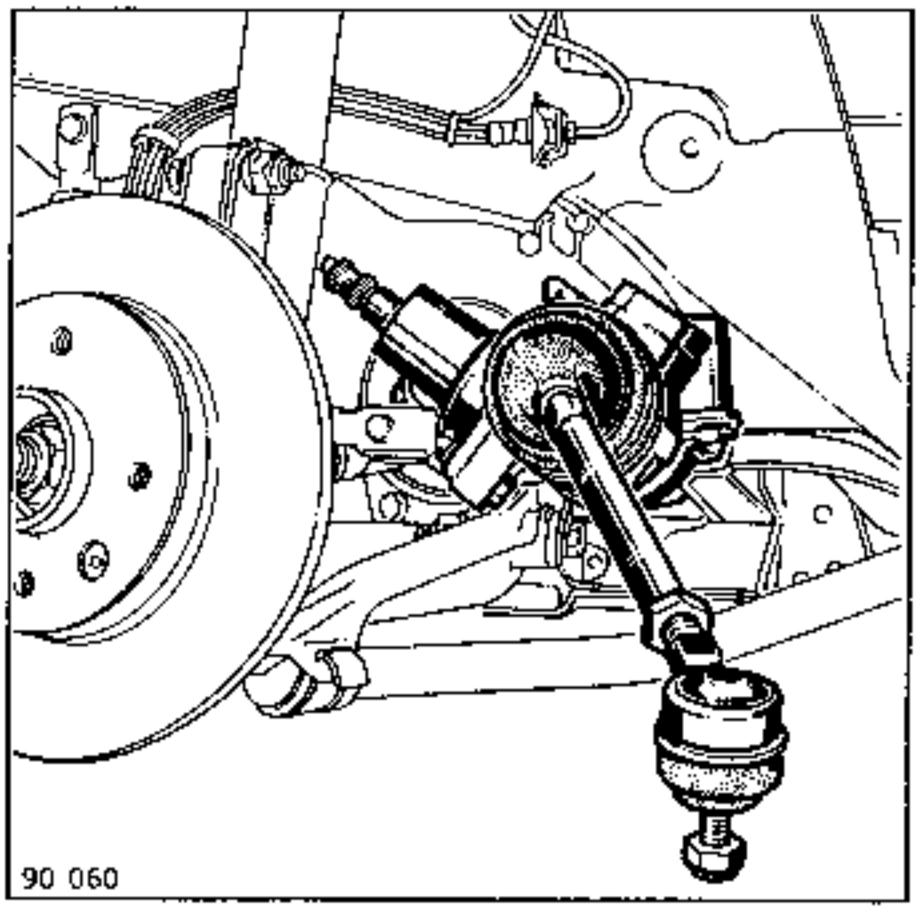


NOTE : place plugs in the steering box tappings to prevent dirt entering.

Unscrew bolt (5) and remove the right hand support from the steering box.



Take out the steering box through the left hand inner wing.

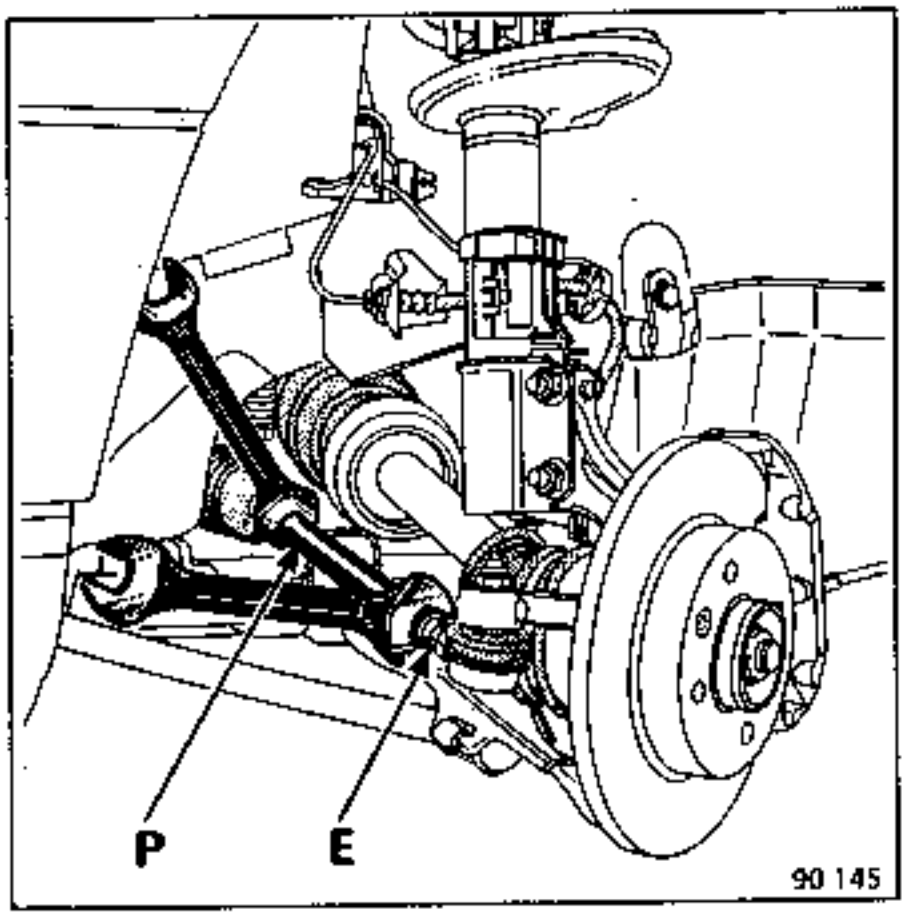


Never unscrew the axial ball joints from the rack unless they are to be replaced.

If the steering box is to be replaced, the ball joint casings at the stub axle end will have to be unscrewed and fitted to the new one.

To do this :

- loosen the lock nut (E) whilst holding the axial ball joint with an open ended spanner at (P),
- unscrew the ball joint casings whilst counting the number of threads engaged.



REFITTING

If a new steering box is fitted :

- fit the ball joint casings in the position noted during dismantling,
- remove the right hand support from the steering box,
- remove the pipes leading to the ram and plug the tappings to prevent dirt entering.

Fit :
- the steering box,
- the steering box right hand support, tightening it moderately,
- the pipes leading to the ram, to the valve and to the steering box body without tightening them.

Position the steering column universal joint at the position marks during removing and reconnect it.

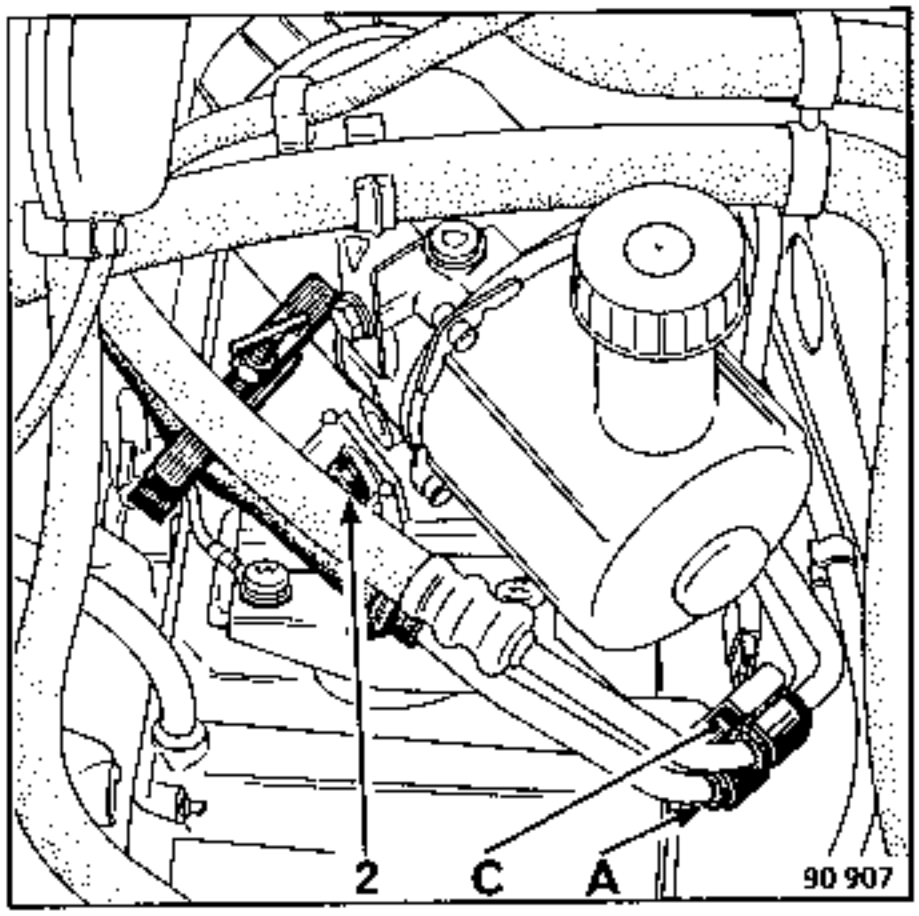
Secure the steering box in place.

Tighten :
- the pipes leading to the ram and the bolt on the right hand support,
- the steering universal joint.

Reconnect the pipes leading to the rotary valve.

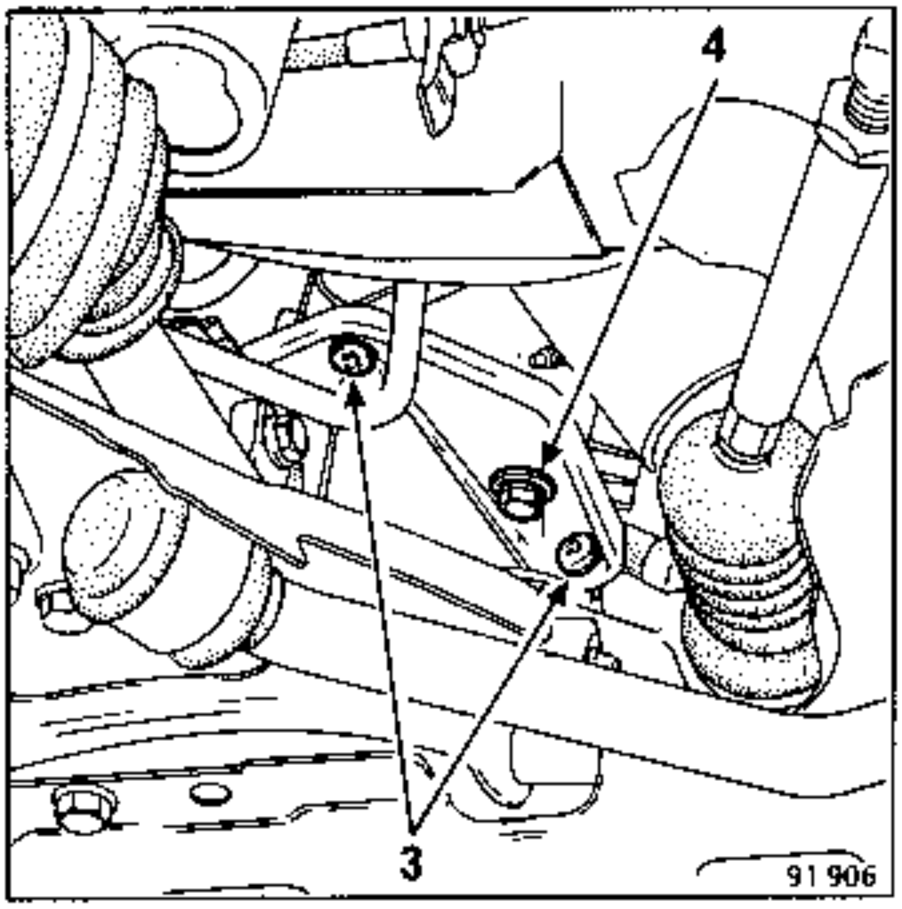
Fit the pipe retaining clip (B) and remove clamp Mot.453-01.

Place the pump in position on its support and resecure, without tightening them
- bolt (2) and clip (A),



NOTE : ensure that the plastic pad is in position at (C).

- the pump lower securing bolts (3) and (4).

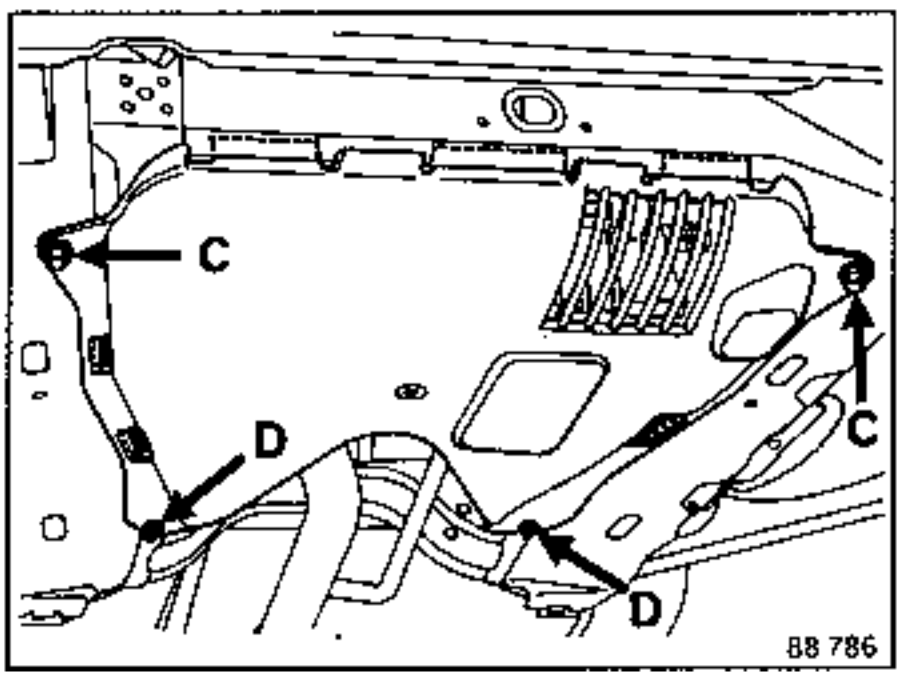


NOTE : bolts (3) and (4) are different lengths. It is essential to fit the short socket head bolt (4) in the position shown in this illustration to avoid the pump motor seizing.

Tighten the bolts securing the pump and the clip (A).

Reconnect the ball joints to the stub axle carrier.

Fit the protective casing under the engine.



Fill the power steering circuit with oil up to the max. mark on the reservoir.

Turn the steering to left and to right (with the pump stopped) to distribute the oil through the circuit.

Repeat this operation with the pump running then top-up the oil level (see section 13 "Filling the circuit").

Check, and if necessary adjust, the toe-out.

ADJUSTING

If rattling can be heard from the steering rack plunger, before replacing the steering box, ensure that the plunger is correctly adjusted.

This operation can be carried out on a vehicle without removing the steering box.

1. Checking on the source of the rattle

Grip the steering rack on the same side as the plunger and check it for axial play (backwards and forwards). If there is play at this point and a rattling noise can be heard the source is the rack plunger.

2. Adjusting a vehicle made before January 1986

Unlock the adjusting nut (1) by lifting the points where the flange on the nut has been peaned down.

Tighten the adjusting nut by 1/8 turn (1 notch) with a 10 mm allen key.

The steering should still be free to move, without stiffness, from one lock stop to the other.

Max. permissible take-up : 2 notches.

Re-lock the nut by peaning its flange into two diametrally opposed slots in the housing.

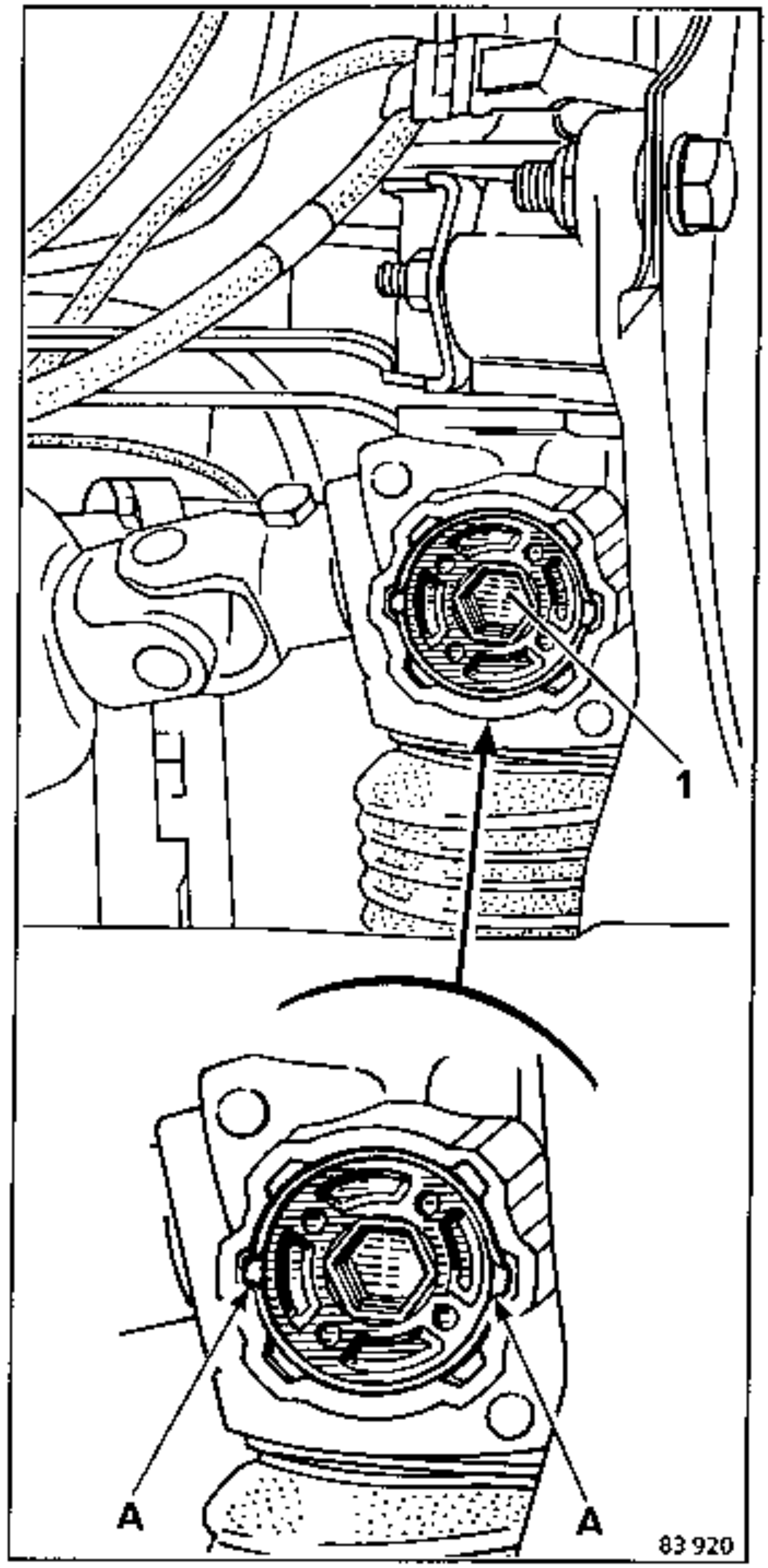
3. Adjusting a vehicle made after January 1986

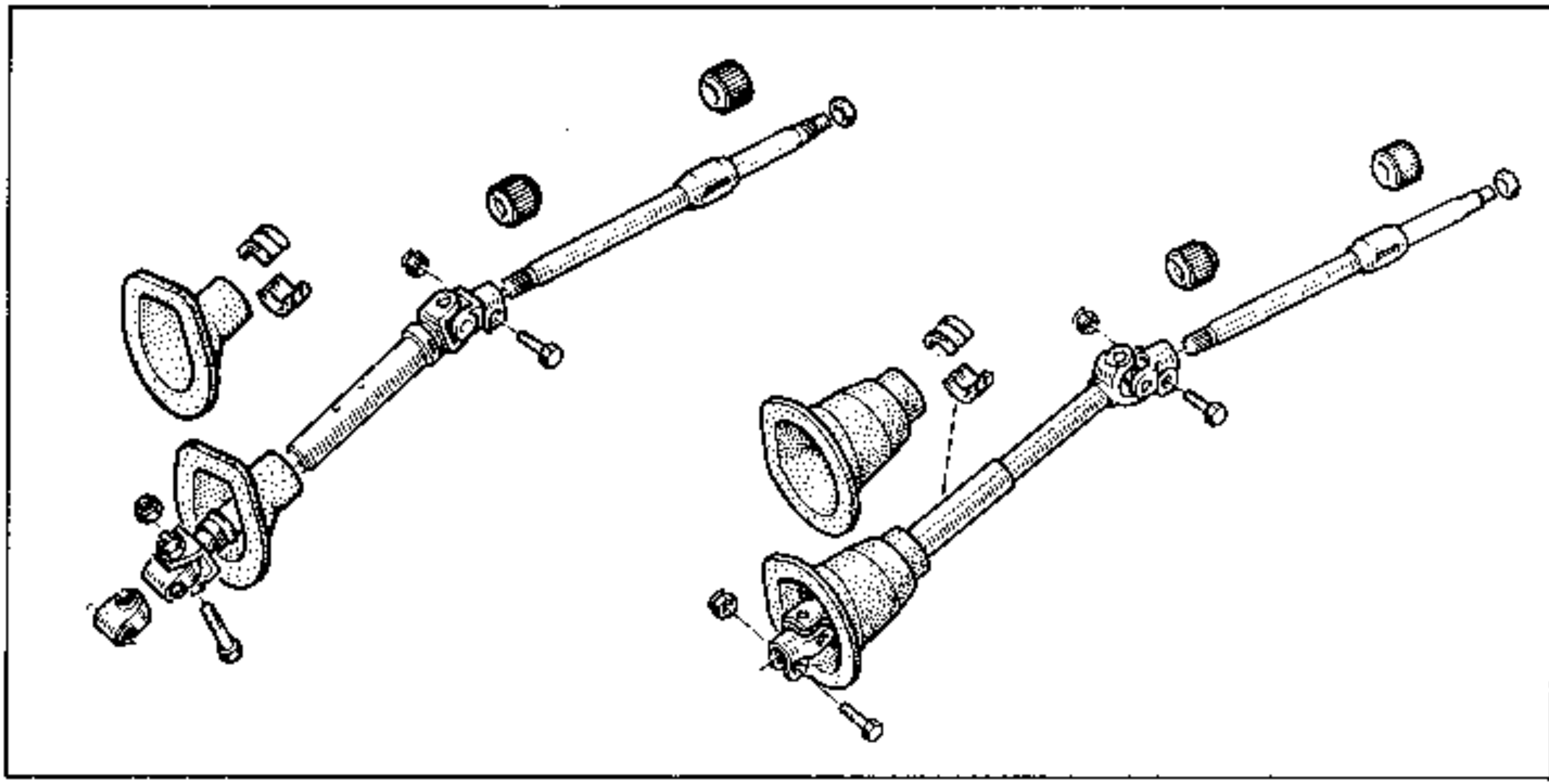
Unlock the adjusting nut (1) by lifting the peaned points (A) on the nut flange.

Tighten the adjusting nut through two notches using a 10 mm allen key and check that the play has been eliminated.

Max. permissible take-up : 3 notches.

Re-lock the nut by peaning its flange into two diametrally opposed slots in the housing.

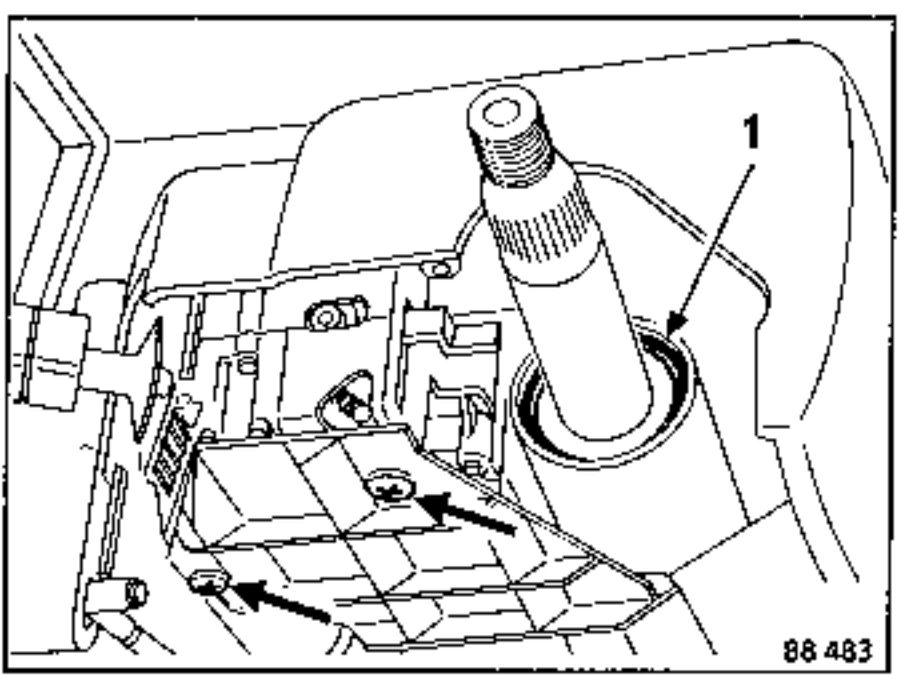




TIGHTENING TORQUES (in daN.m)	
Steering wheel nut	4
Column universal joint bolts (torque stated as an indication)	2.5

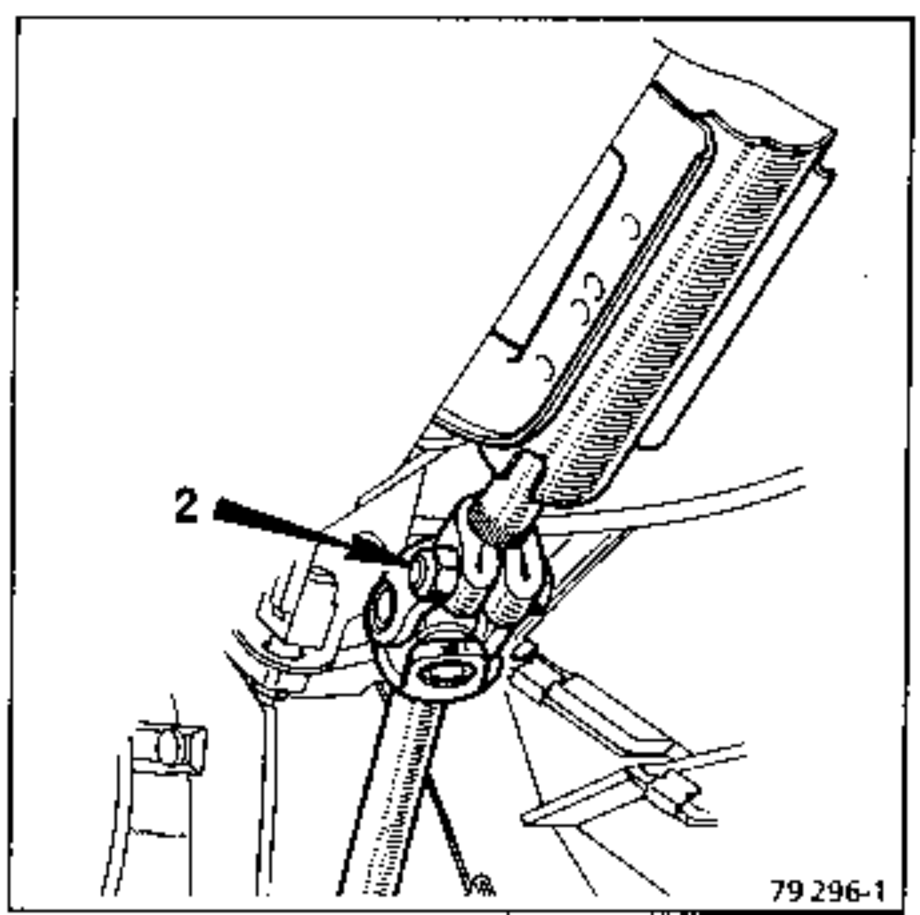
REMOVING

Remove :
- the half casing from the steering column and the steering wheel after marking its position,
- the screws securing the direction indicator light switch,
- the circlip (1) (on certain versions),

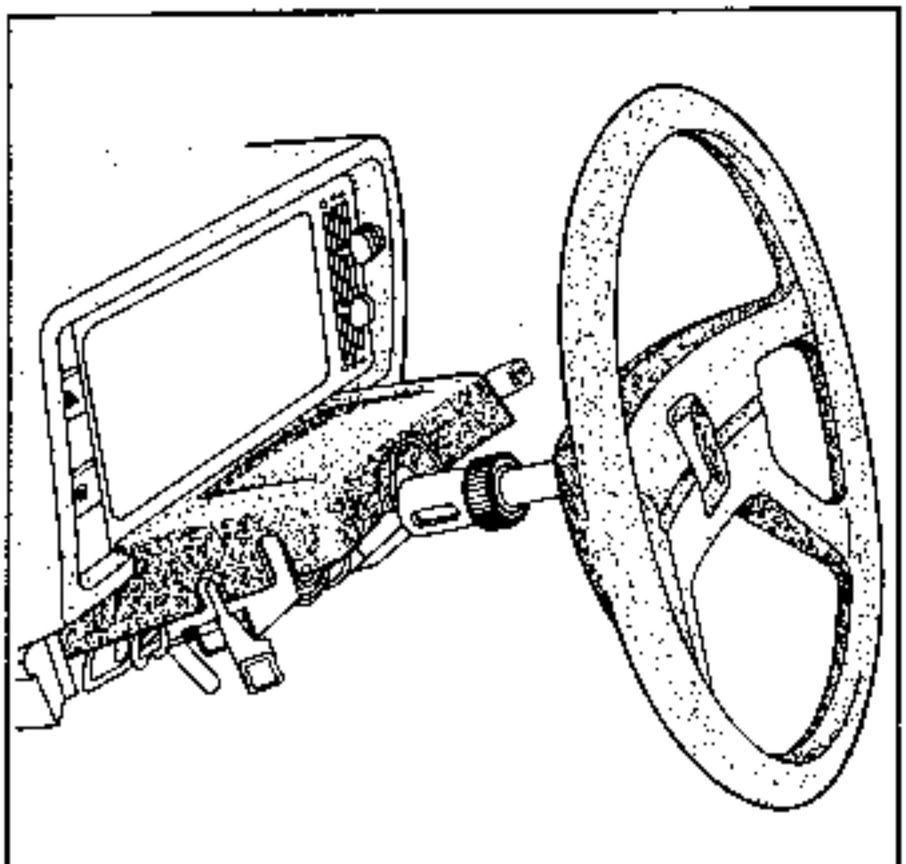


- the cotter bolt (2).

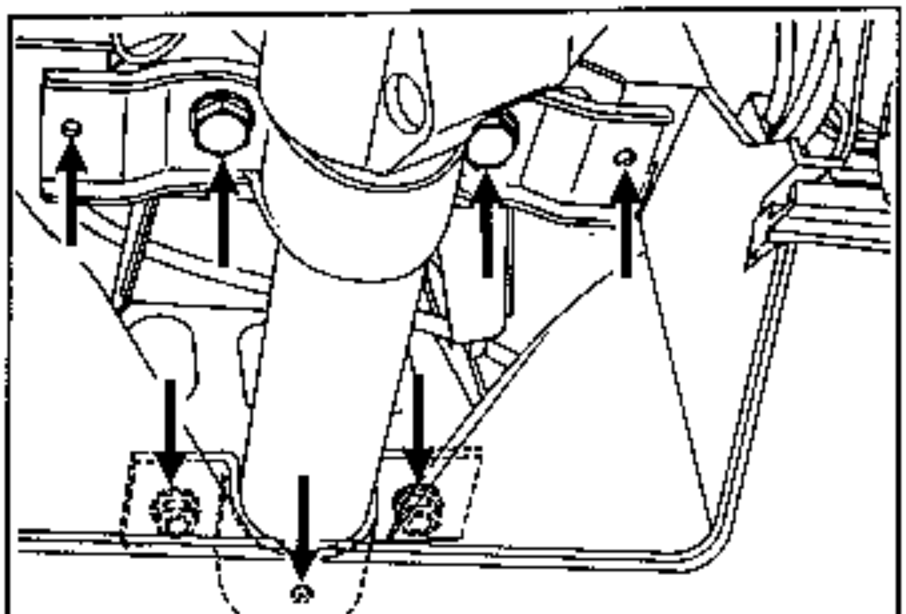
Temporarily refit the steering wheel and its nut, without tightening it.



Pull the steering wheel to pull out the shaft and the upper bush (first ensure that the steering lock is not engaged).


79 160

Remove :
- the three screws that secure the fascia panel to the steering column,
- the four steering column securing bolts,


88 484

- the four screws that secure the central console and pull it back as far as it will go (see "Electrical" section).

Unclip the fascia panel lower fastenings (see section 83).

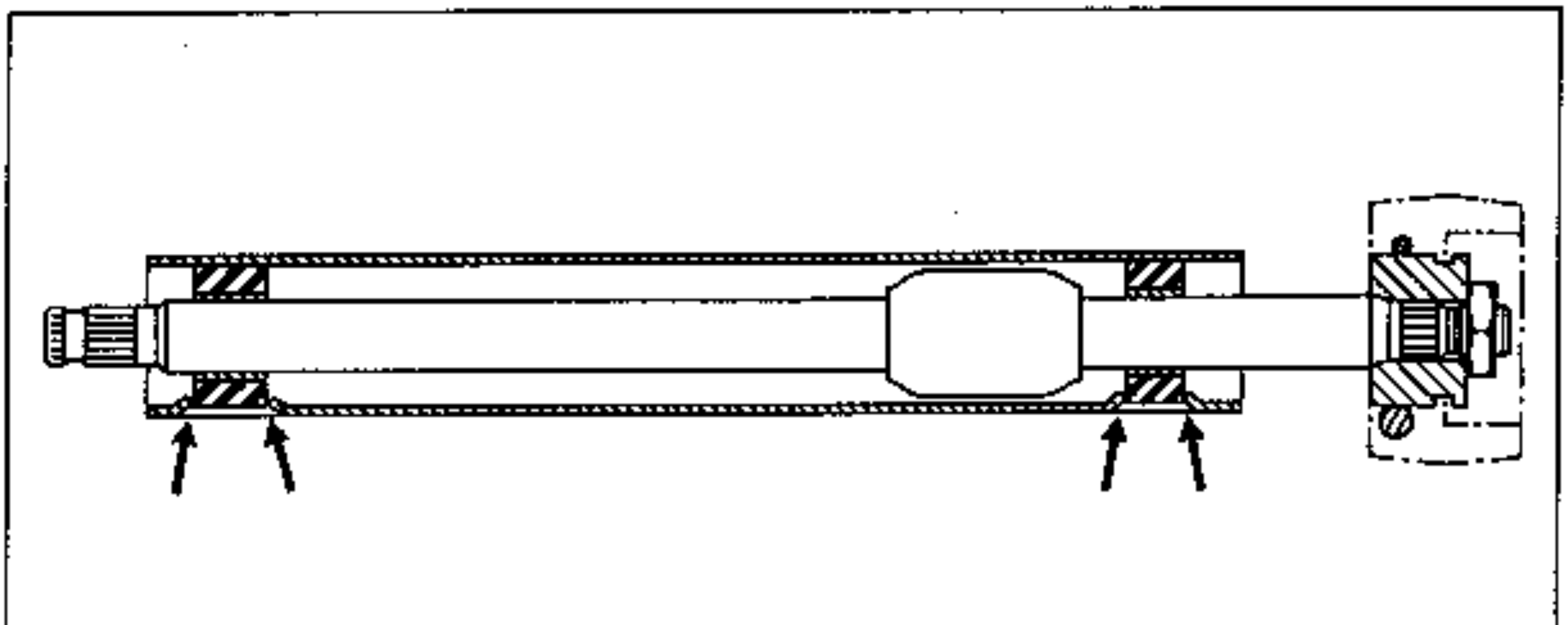
Disconnect the steering lock switch.

Lift the fascia panel and pull out the steering column at the same time.

Extract the lower bush using a tube with an outside diameter of 35 mm.

REFITTING

Fit :
- a new lower bush using a tube with an outside diameter of 35 mm, after first coating the bush with grease,
- the steering column shaft,
- the new upper bush using a tube with an outside diameter of 35 mm, after first coating the bush with grease,
- the circlip (on certain versions),

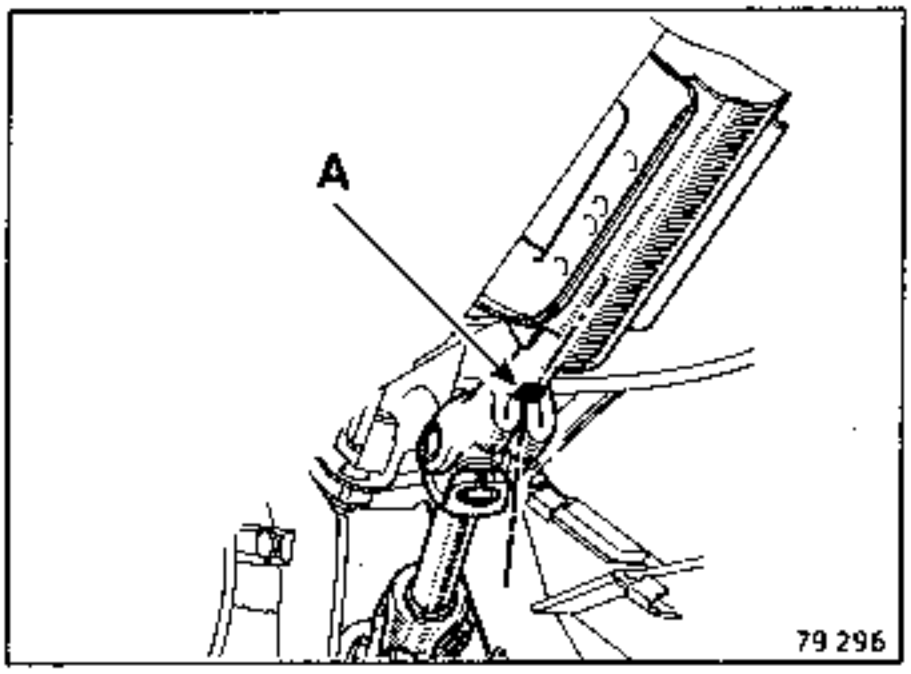


90312

- the steering column, whilst lifting the fascia panel.

Reconnect the steering lock switch.

Engage the steering column shaft into its universal joint, aligning the flat (A) with the centre of the slot and refit the cotter bolt.



79296

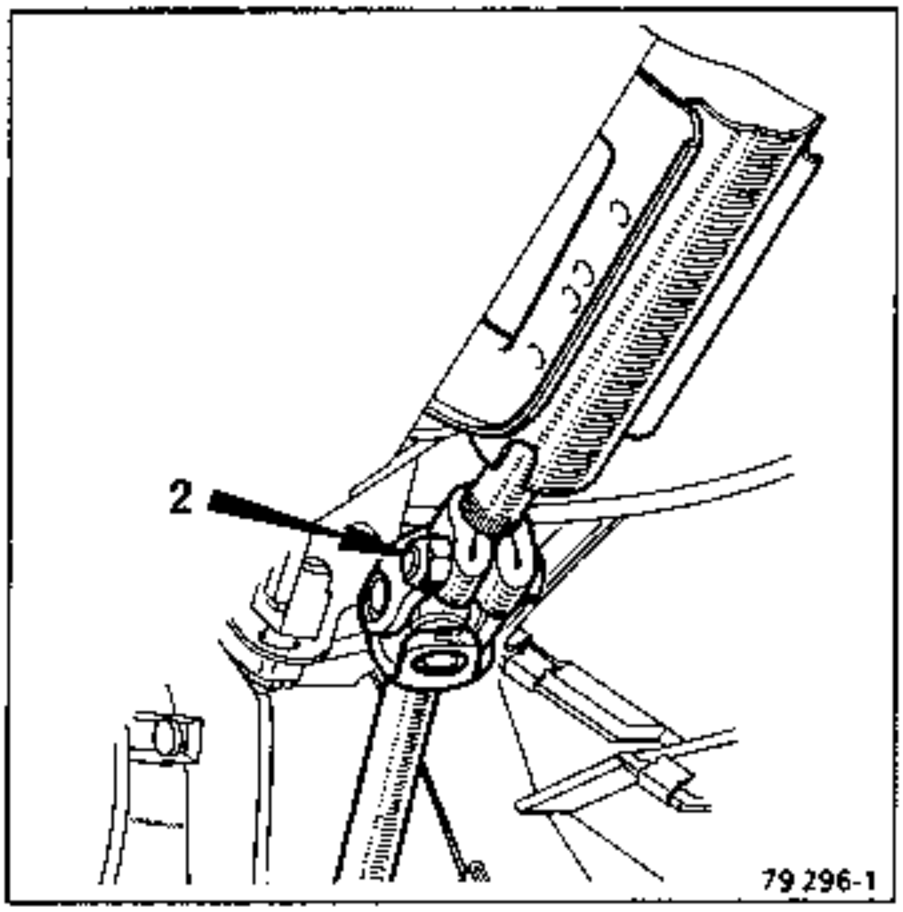
Re-secure the steering column.

Clip the fascia panel in place and re-secure the central console.

Fit :
- the direction indicator light switch,
- the steering column lower casing,
- the steering wheel in the position marked during dismantling.

REMOVING

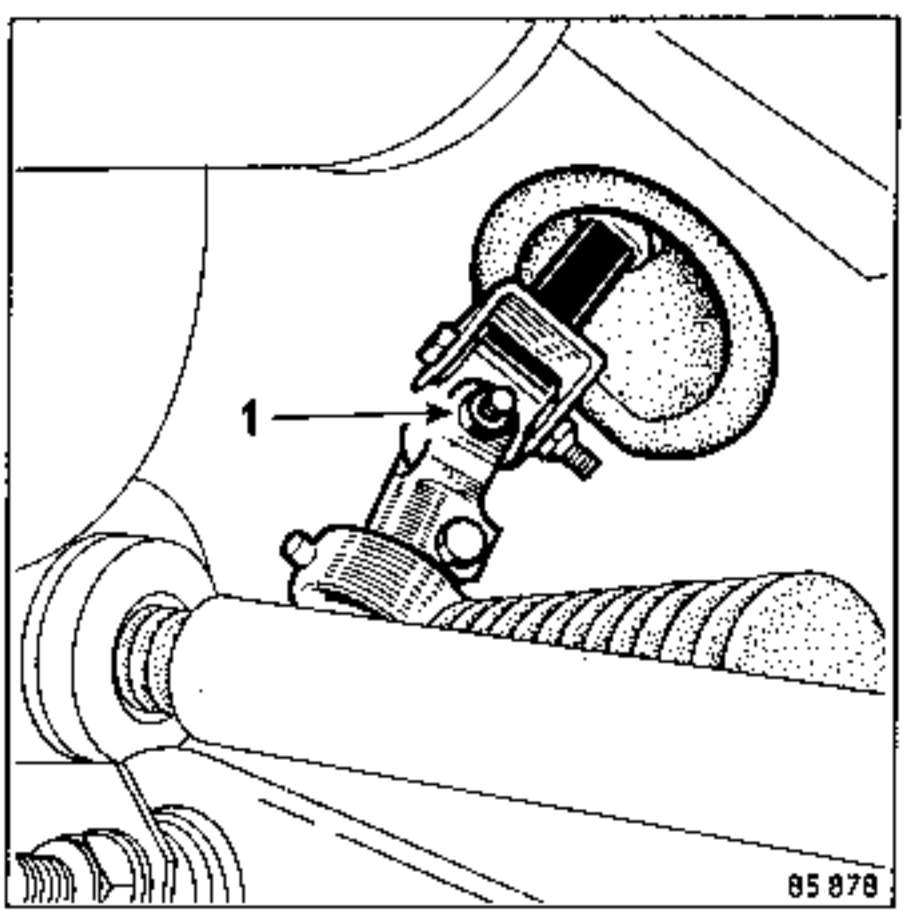
Remove :
- the half casing that protects the light switch,
- the bolt (2) connecting the intermediate shaft to the steering column shaft,



- the universal joint securing bolt (1).

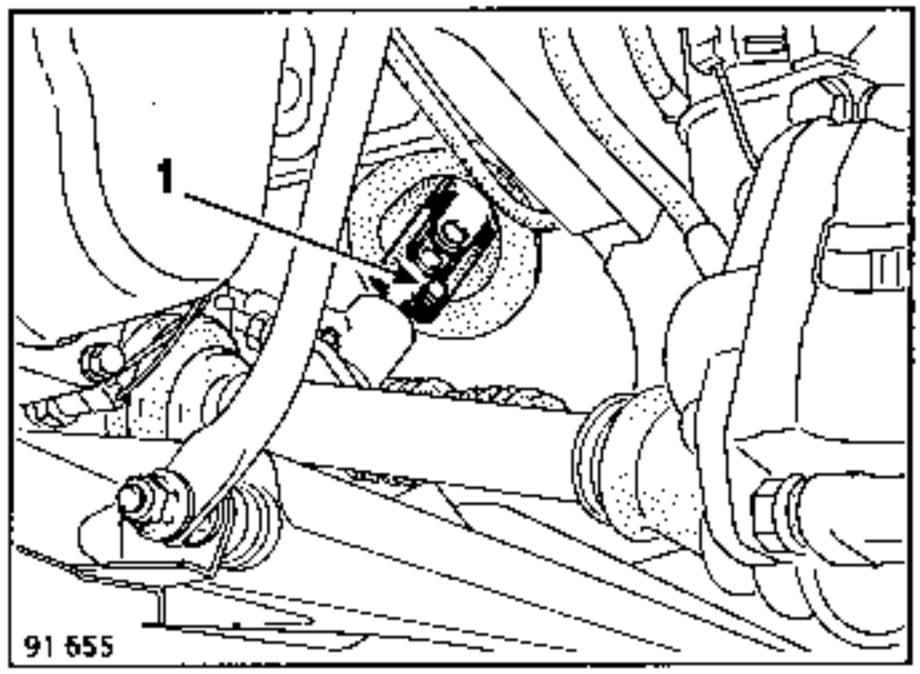
MANUAL STEERING

Remove the plastic protector.



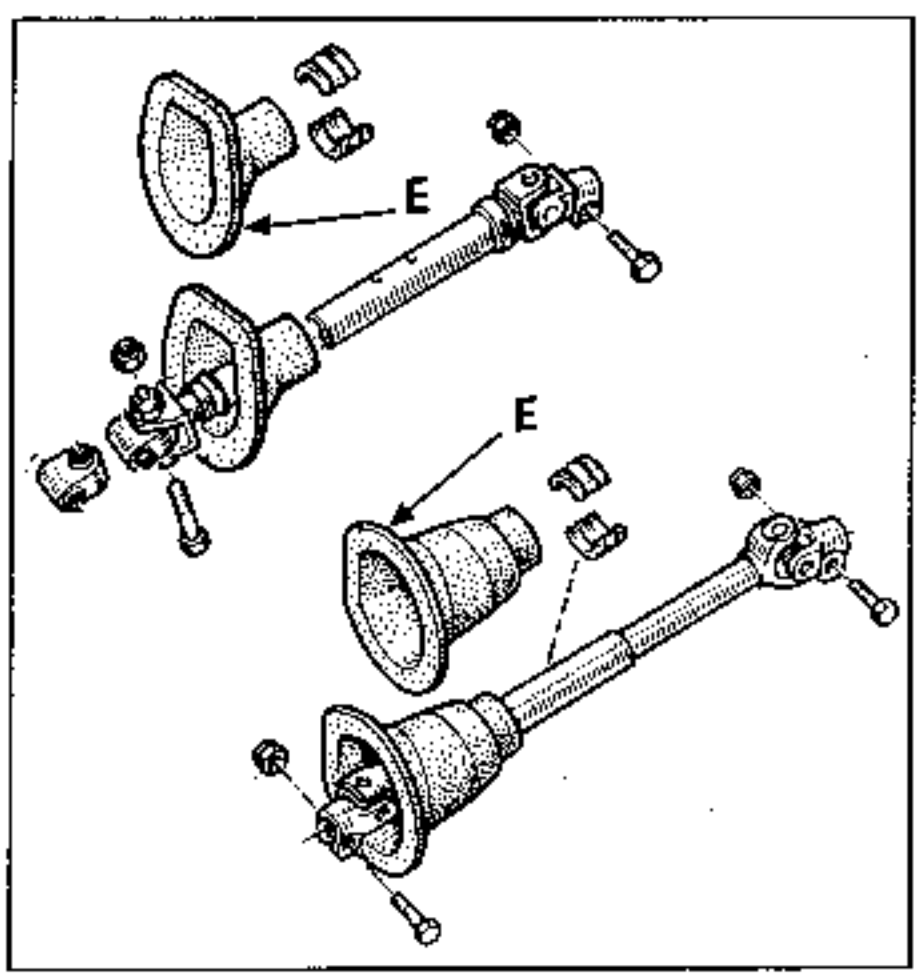
POWER STEERING

Remove the retractable shaft together with its rubber bellows.



REFITTING

Replace the bellows (E) on the scuttle if necessary.



Refit the retractable shaft.

MANUAL STEERING

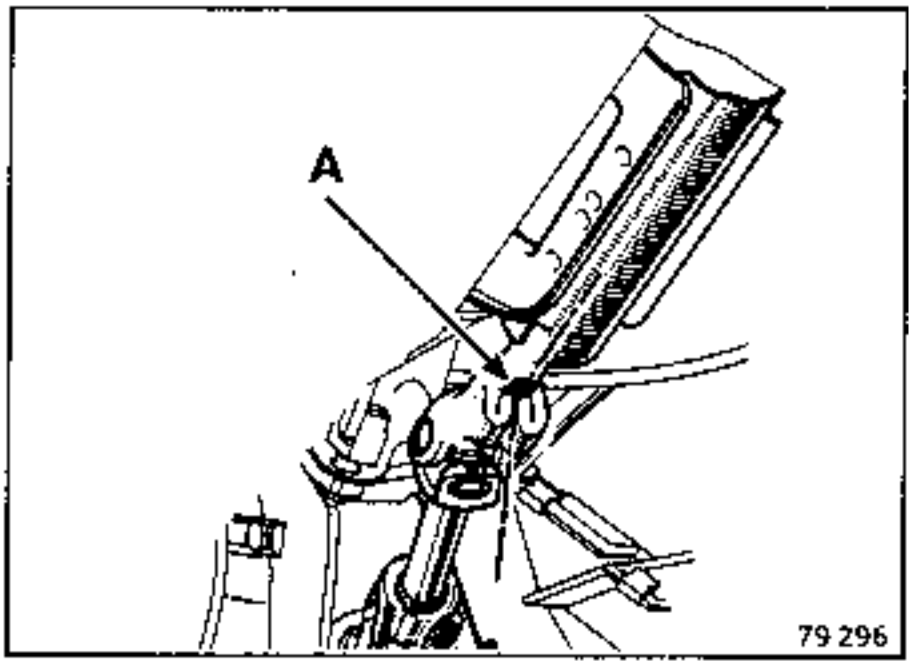
Connect up the lower universal joint without tightening the bolts.

POWER STEERING

Connect up the lower universal joint and tighten the bolt (1).

ALL TYPES

Fit the steering column shaft into its universal joint whilst aligning the flat (A) with the centre of the slot.



Refit :
- the cotter bolt,
- the upper 1/2 casing.

MANUAL STEERING

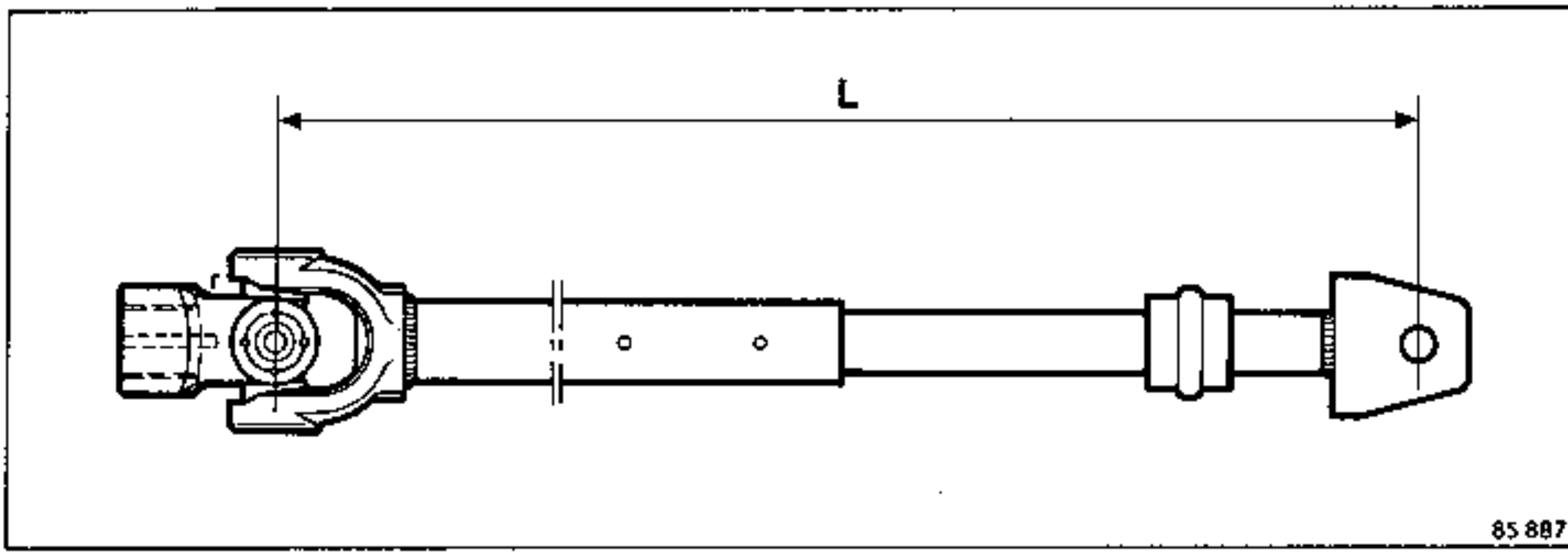
Tighten the bolts on the lower universal joint (see section "Manual steering universal joint").

Fit the plastic protector.

CHECKING

If it is impossible to engage the splines, fully, check that the steering column shaft is the correct length. If it is not, replace it by a new one.

MANUAL STEERING

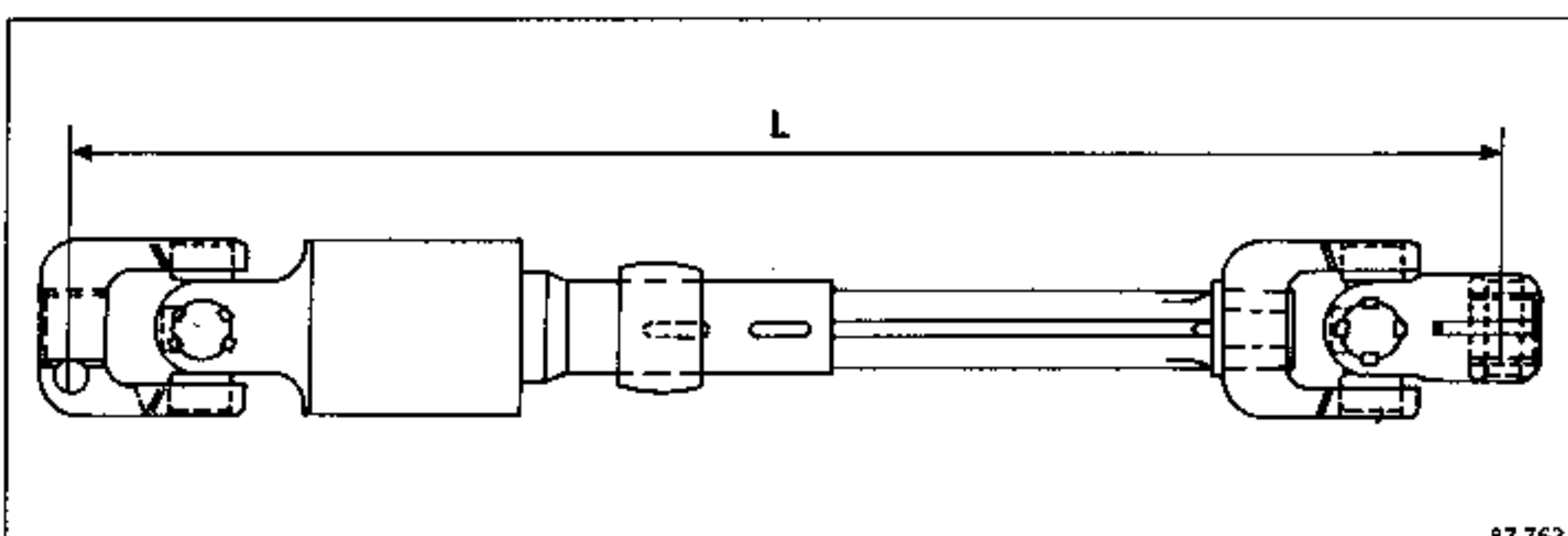


85 887

Left hand drive :
L = 378.5 ± 1 mm

Right hand drive :
L = 401 ± 1 mm

POWER STEERING



87 763

Left hand drive :
L = 381 ± 1 mm

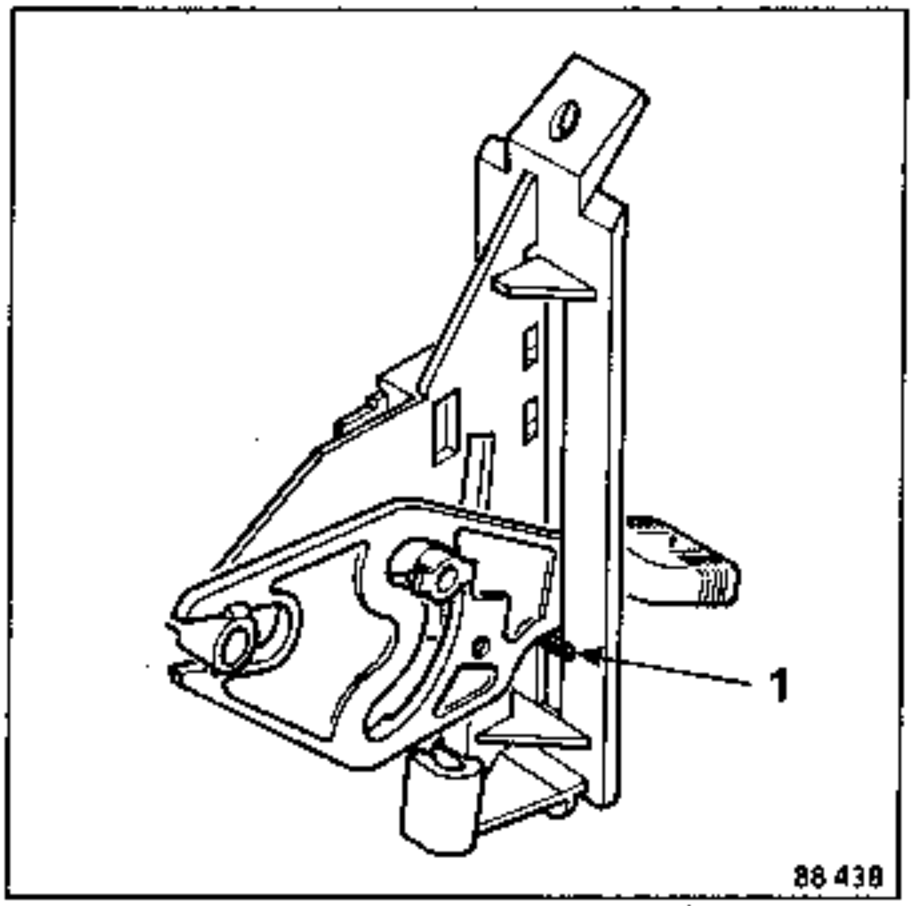
Right hand drive :
L = 401 ± 1 mm

SPECIAL FEATURES

The new choke control has a travel limitign stop (1) that fixes the normal position of the choke knob, that is to say with the choke flap open.

After adjusting the control, break off this stop by pushing the knob downwards.

After adjusting it, check that the control correctly carries out its two functions :
- of completely opening the flap,
- of completely closing the flap.



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

REMOVING

Empty, and remove, by pulling it upwards, the brake fluid reservoir.

Remove the pipes and mark their position.

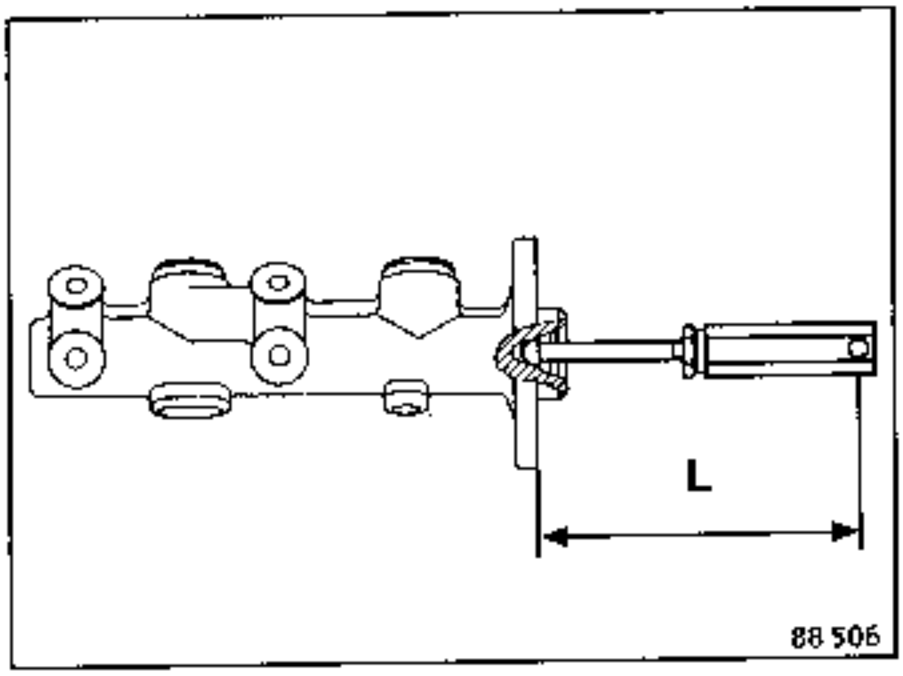
Remove the two nuts securing the master cylinder to the brake servo or to the body.

REFITTING

Check the length of the thrust rod.

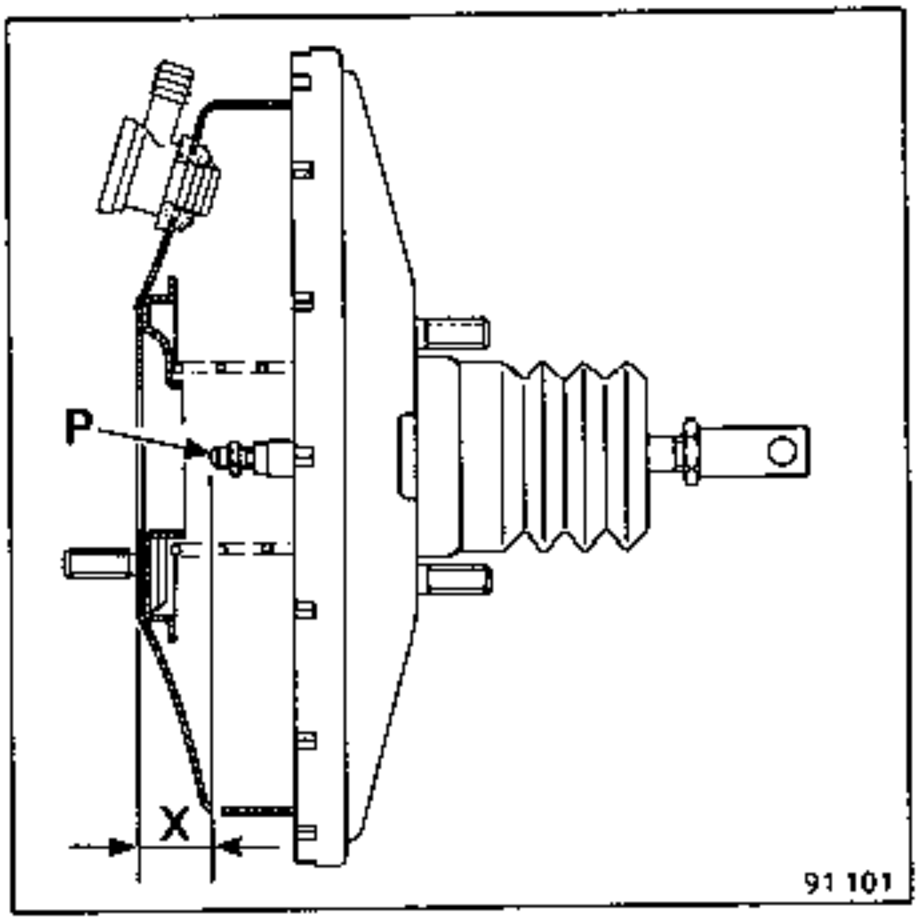
Vehicles without brake servo :

L = 110 mm



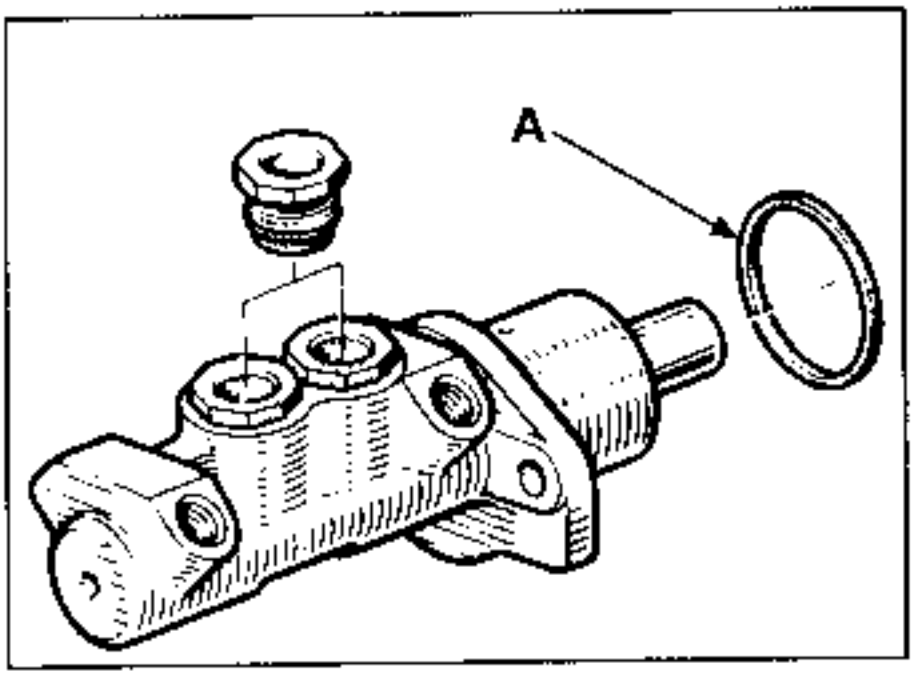
Vehicles with brake servo :

All types, LH and RH drive.
Dimension X = 22.3 mm.
The system is adjusted, to suit the model, at adjuster (P).



NOTE : these vehicles are equipped with master cylinders that are an integral part of the brake servo. There is a seal between the brake servo and the master cylinder. Whenever carrying out any work on these units, a new seal (A) must be fitted.

Fit the master cylinder in line with the brake servo so that the thrust rod (P) enters correctly into its location in the



master cylinder.

Reconnect :
- the pipes in the positions marked during dismantling,
- the brake fluid reservoir, pushing it down to click it into place in the master cylinder.

Bleed the braking system.

TIGHTENING TORQUES (in daN.m)	
Bolts securing master cylinder to brake servo	1.3
Nuts securing brake servo to scuttle	2

The brake servo cannot be repaired. The only operations that can be carried out on it are on :
- the air filter,
- the non-return valve.

REMOVING

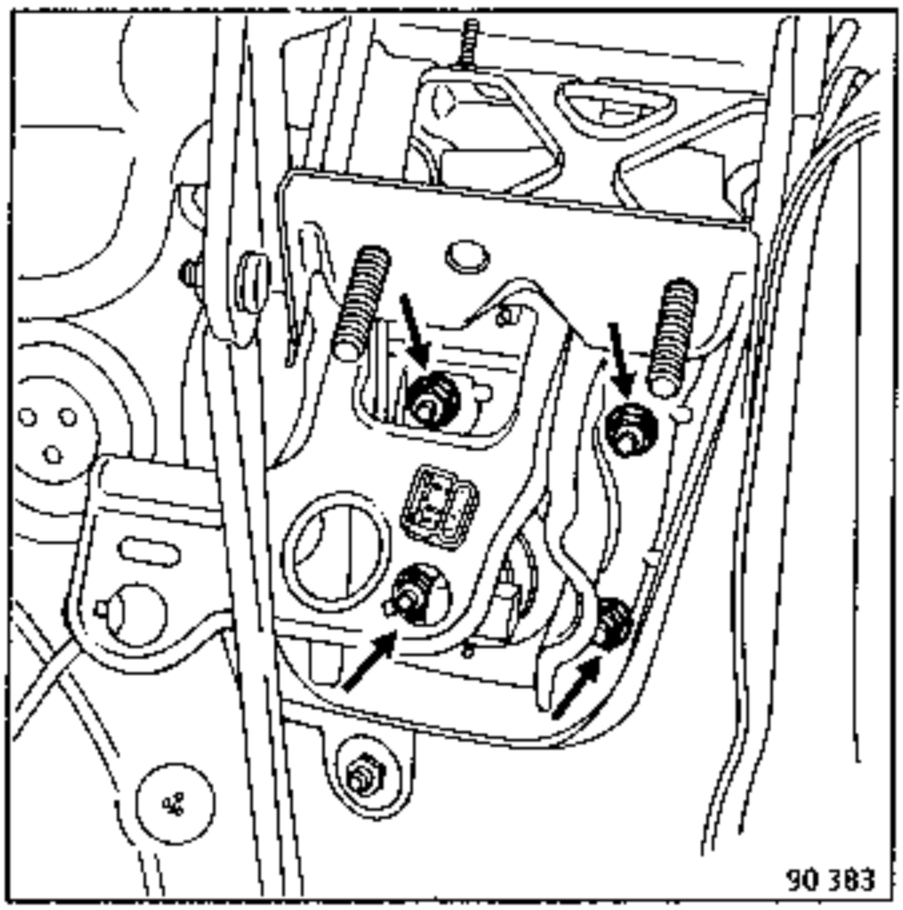
Disconnect the battery.

Remove the master cylinder.

Disconnect the vacuum hose from the brake servo.

Remove the clevice pin connecting the brake pedal to the thrust rod.

Unscrew the brake servo securing nuts and remove it.

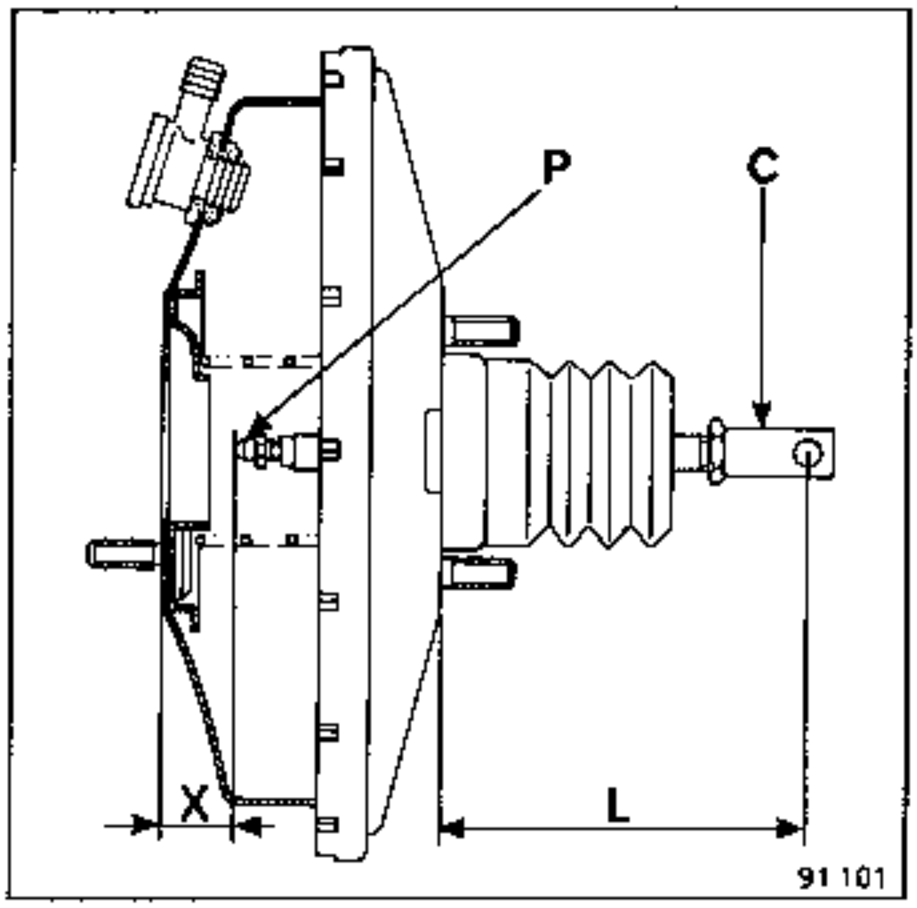


REFITTING

Before refitting, check :

On all left hand drive types :
- dimension L = 121 mm that can be adjusted to suit the model, at rod (C),
- dimension X = 22.3 mm that can be adjusted to suit the model, at rod (P).

On all right hand drive types :
- dimension L = 137.5 mm that can be adjusted to suit the model, at rod (C),
- dimension X = 22.3 mm that can be adjusted to suit the model, at rod (P).



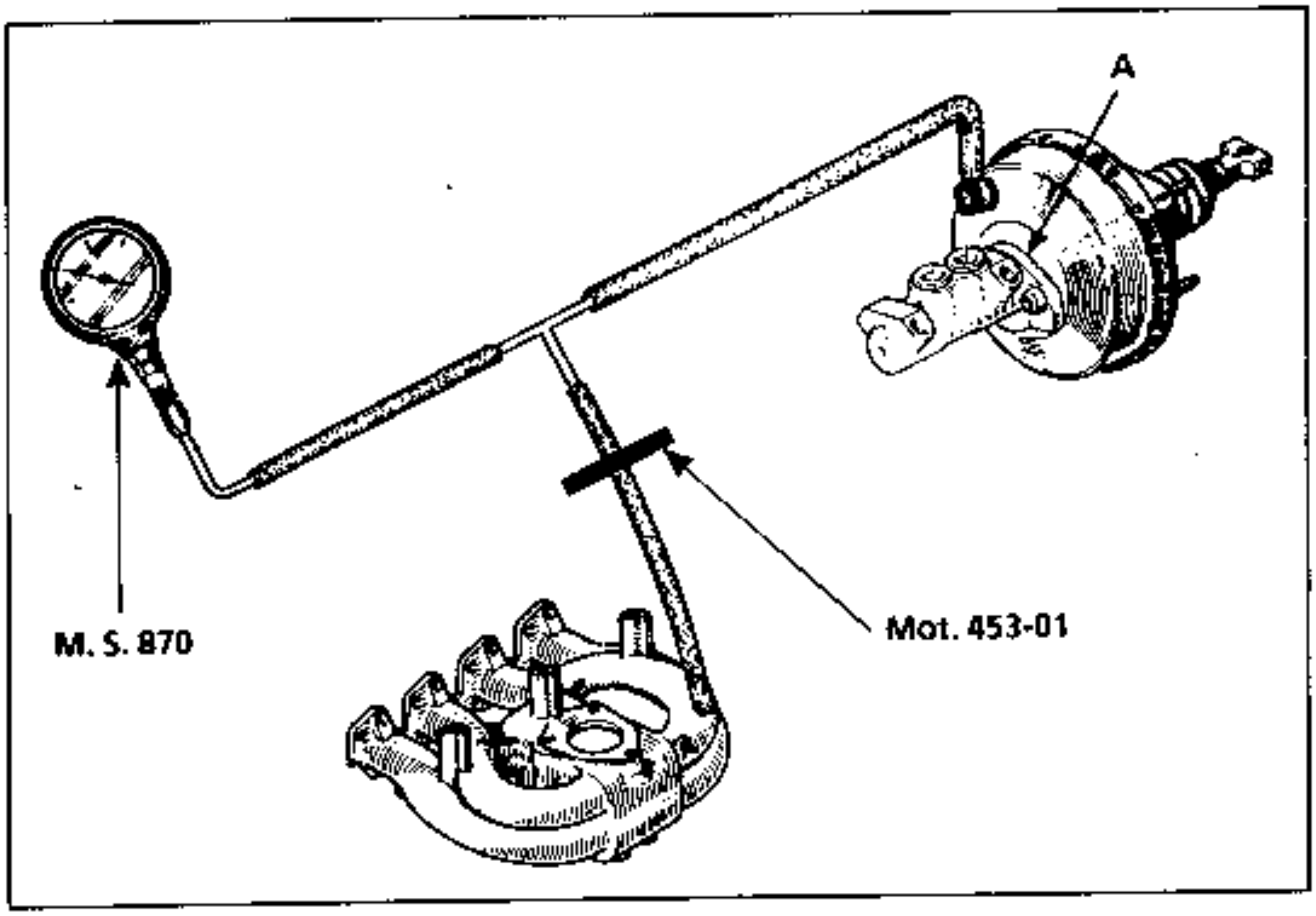
Fit the master cylinder (see instructions in the section concerned).

Bleed the braking system.

ESSENTIAL SPECIAL TOOLS		
Mot	453-01	Hose clamps
M.S.	870	Vacuum gauge

CHECKING THE SYSTEM FOR LEAKS

When checking the brake servo for leaks, ensure that the seal between it and the master cylinder is effective. If there is leakage at this point, replace seal (A).



The brake servo is to be checked for leaks on the vehicle with the hydraulic system in good working condition.

Connect the vacuum gauge M.S.870 between the brake servo and the vacuum source (the inlet manifold) with a "T" union and as short a length of pipe as possible.

Run the engine at idling speed for one minute.

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

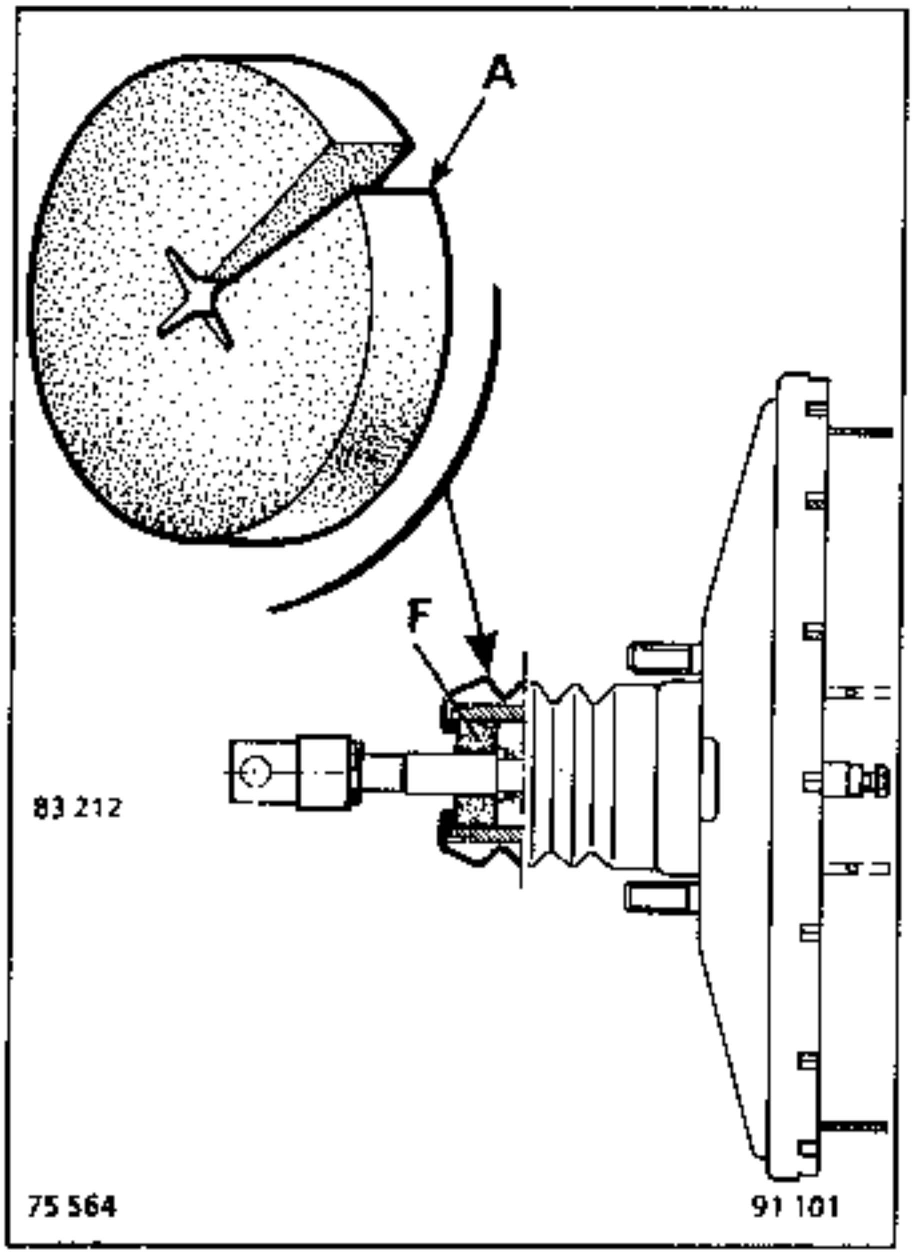
Stop the engine.

If the vacuum drops by more than 33 mbars (25 mm/Hg) in 15 seconds, there is a leak which may be at either

- the non-return valve (replace it by a new one),
- the thrust rod diaphragm (in this case replace the brake servo).

If the brake servo is not operating, the brakes will still work but the pedal pressure necessary to obtain the same deceleration as that with servo assistance, is much greater.

REPLACING THE AIR FILTER



It is not necessary to remove the brake servo to replace its air filter (F).

From under the pedal assembly, using a screwdriver or a metal hook, pull out the worn filter (F). Cut the new filter at A (see figure) and fit it round the rod then push it in to its location ensuring that it covers the entire aperture so that no unfiltered air can enter.

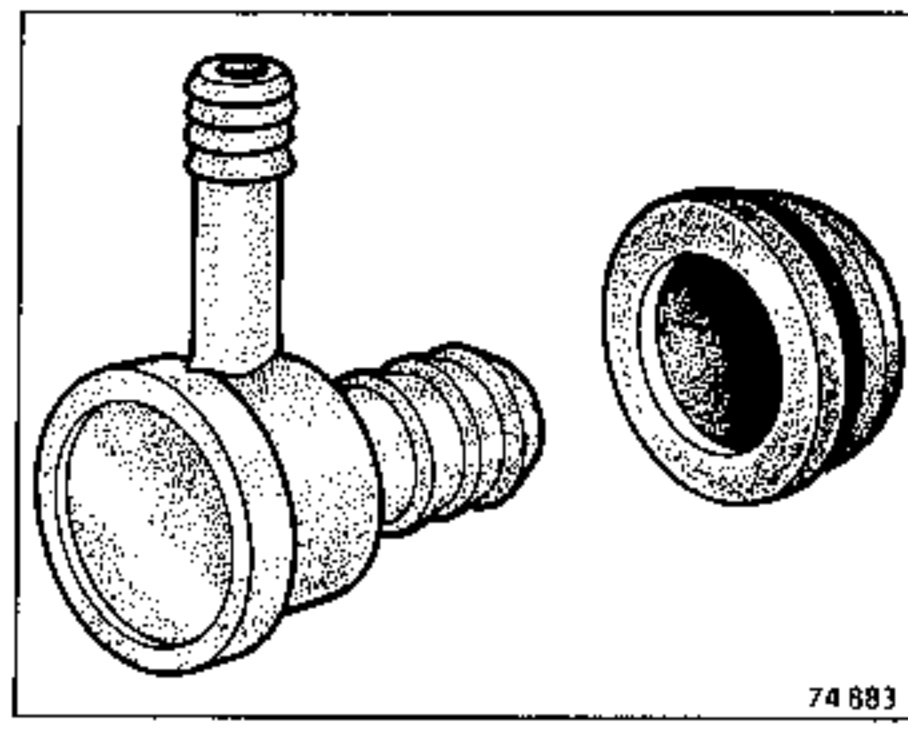
REPLACING THE NON-RETURN VALVE

This operation can be carried out on the vehicle.

REMOVING

Disconnect the vacuum input pipe from the brake servo.

Pull the non-return valve whilst twisting it to free it from the rubber seal.



REFITTING

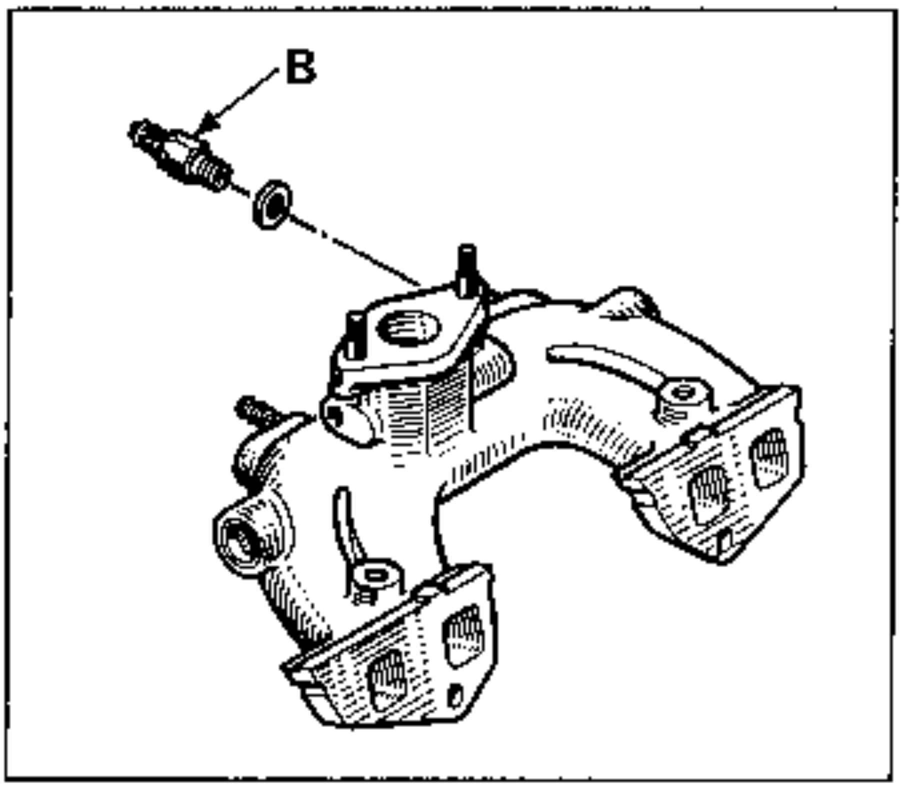
Check the condition of the rubber seal and the non-return valve.

Replace any defective parts.

Refit the assembly.

SPECIAL FEATURES

C405 vehicles are equipped with a valve (B) in the brake servo vacuum circuit.



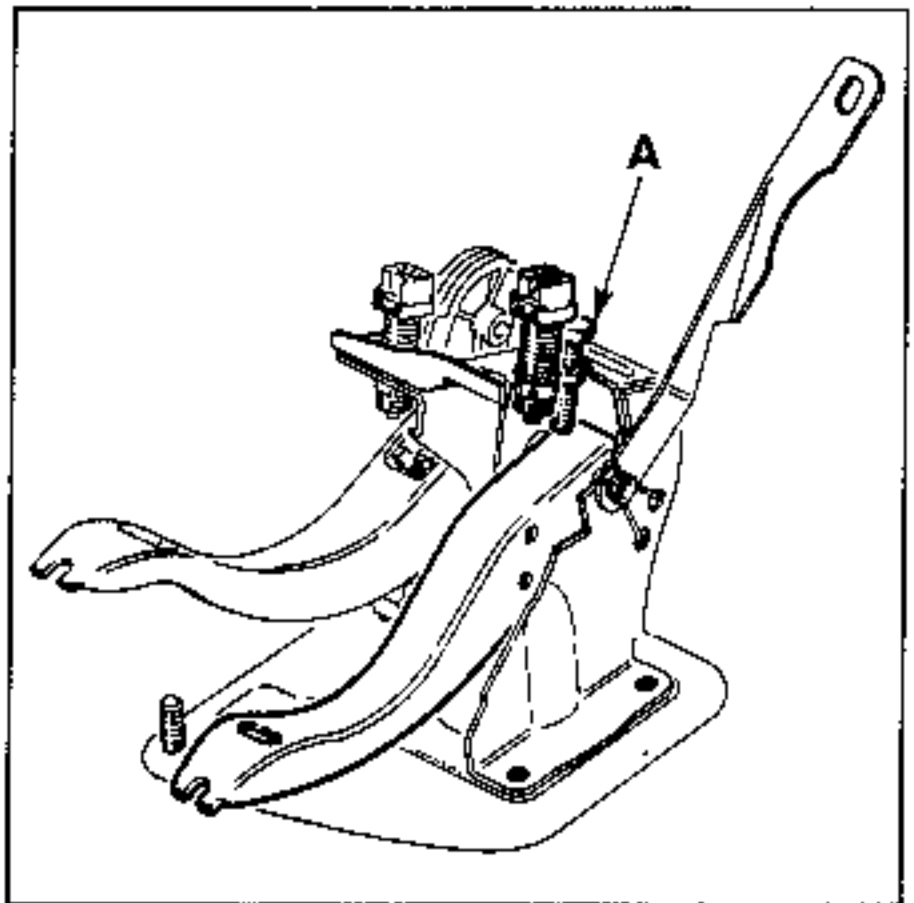
This valve avoids the brake servo being pressurised when the turbo charger is running.

When checking the brake servo for leaks, ensure that this valve operates freely.

Pedal assembly

SPECIAL FEATURES

When removing the brake control assembly, it is essential to fit bolts with a maximum length, under the head, of 20 mm (A).



REMOVING

Unhook the cable from the fork.

Press the pedal to pull out the cable.

Hold the cable against the cam (C), by hand.

Release the pedal. The cable end fitting will come out of its location.

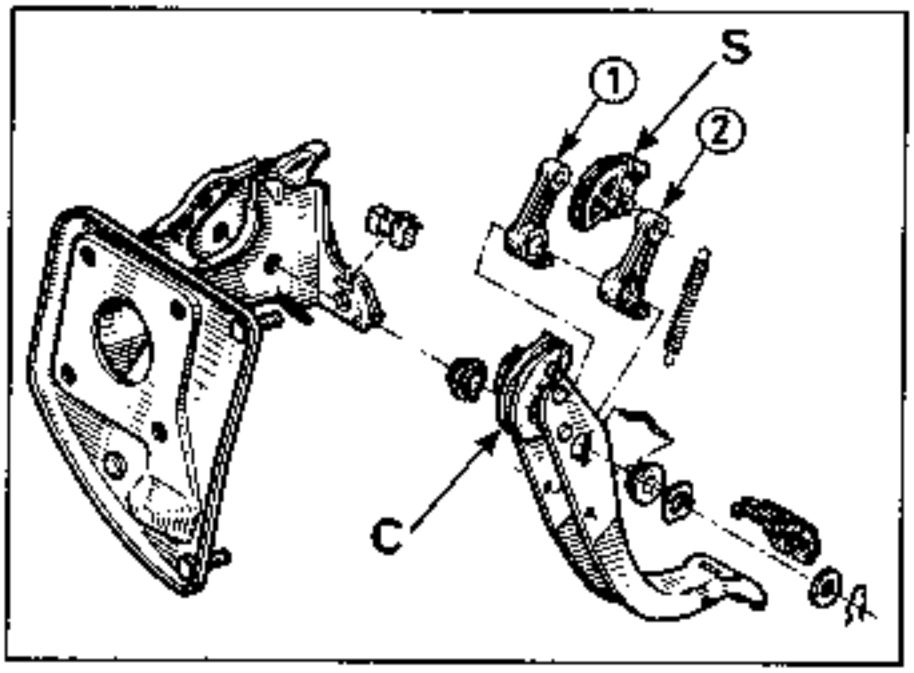
Free the cable from the pedal assembly.

Remove the cable cover end stop on the floor by pushing it with a screwdriver then pull out the complete cable assembly through the engine compartment.

REFITTING

Pass the cable through from the engine compartment into the passenger compartment.

Inside the vehicle, check that the rockers (1) and (2) return freely to their "at rest" position.



Place the cable on the cam (C) and the cable end fitting in its location on the serrated quadrant (S).

Fit the cable to the clutch fork.

Check that the cable cover end stop is correctly aligned with its location in the scuttle.

Press down the clutch pedal to engage the cable cover end stop into the scuttle. The adjustment is automatic.

PRINCIPLE OF OPERATION

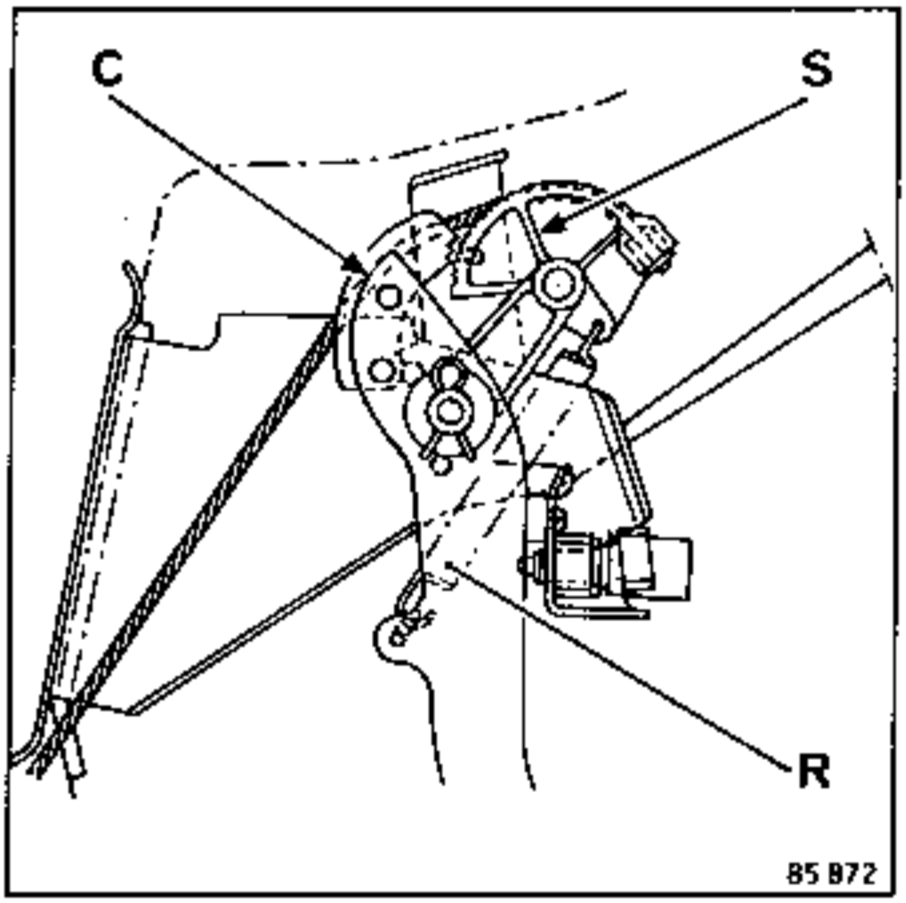
The spring (R) maintains a permanent tension on the wear take-up quadrant (S).

The cable is always under tension and this pulls the fork to keep the release bearing in permanent contact with the diaphragm.

The adjustment is automatic.

CLUTCH "DISENGAGEMENT" MOVEMENT

When the pedal is pressed down, the serrated cam (C) on the pedal engages with the serrations on the wear take-up quadrant (S) to prevent it pivoting and allow tension to be applied to the cable.



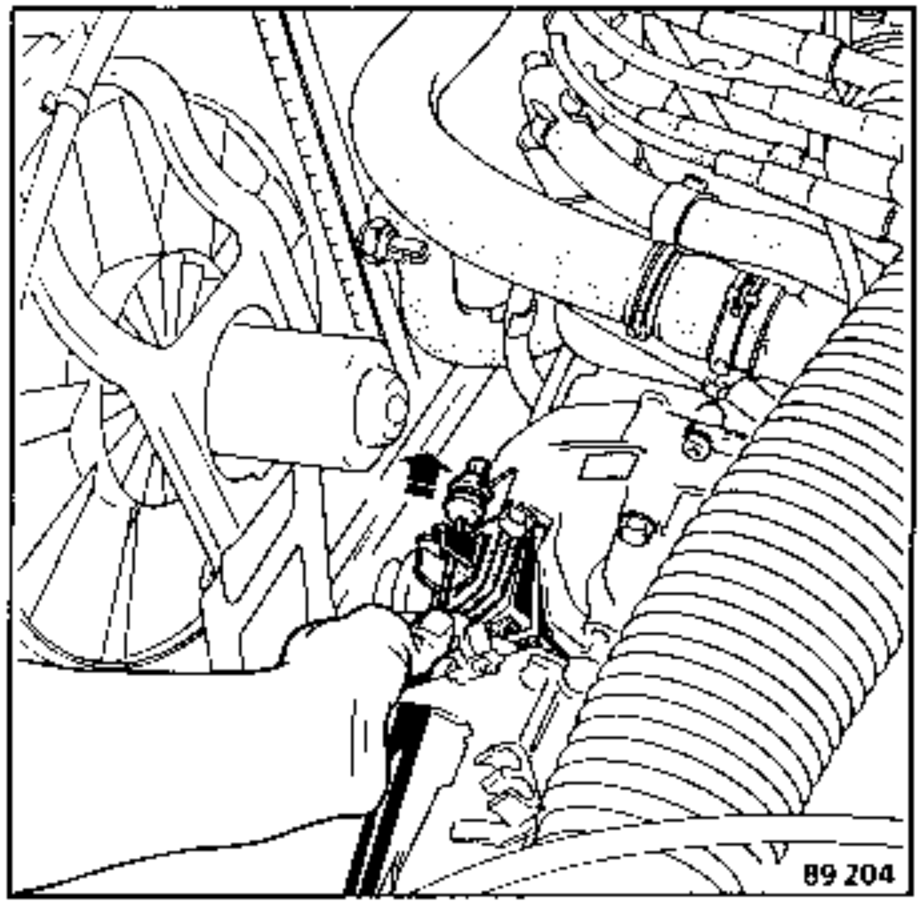
CHECKING

To ensure that the assembly is operating correctly :

1. Check that the serrated cam (C) pivots freely round its shaft.

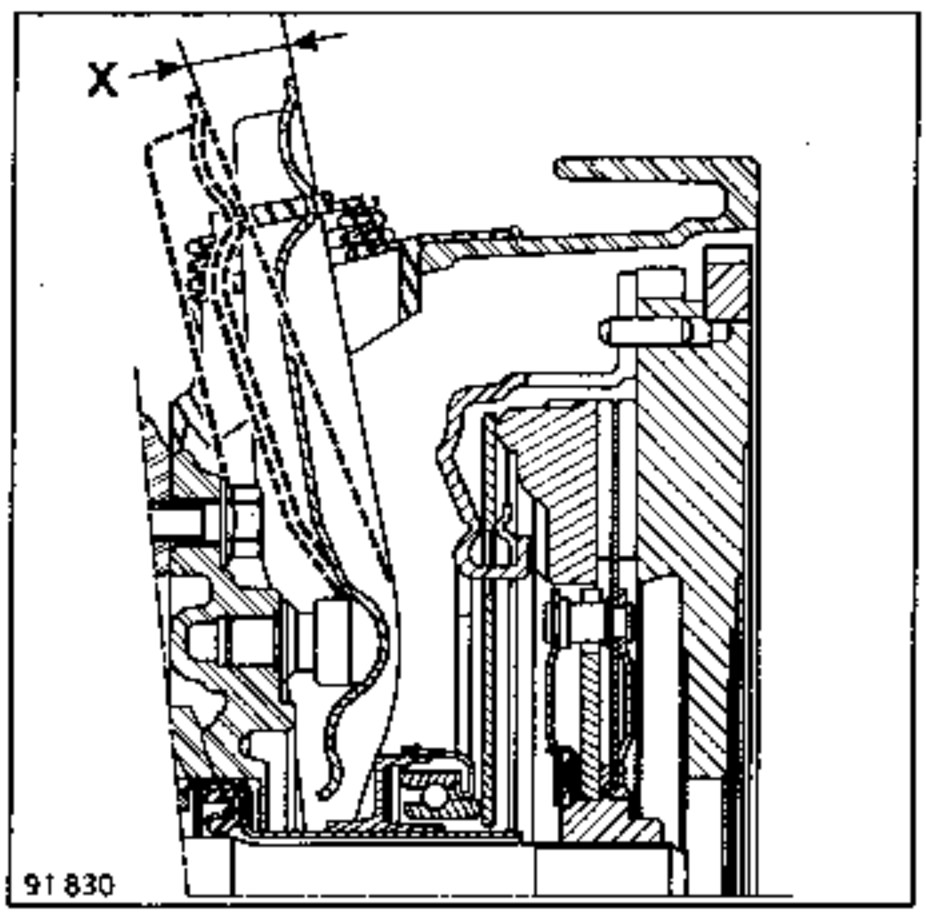
2. Pull the cable at the clutch fork end, on the gearbox.

   There should be at least 2 cm of "slack" in the cable.

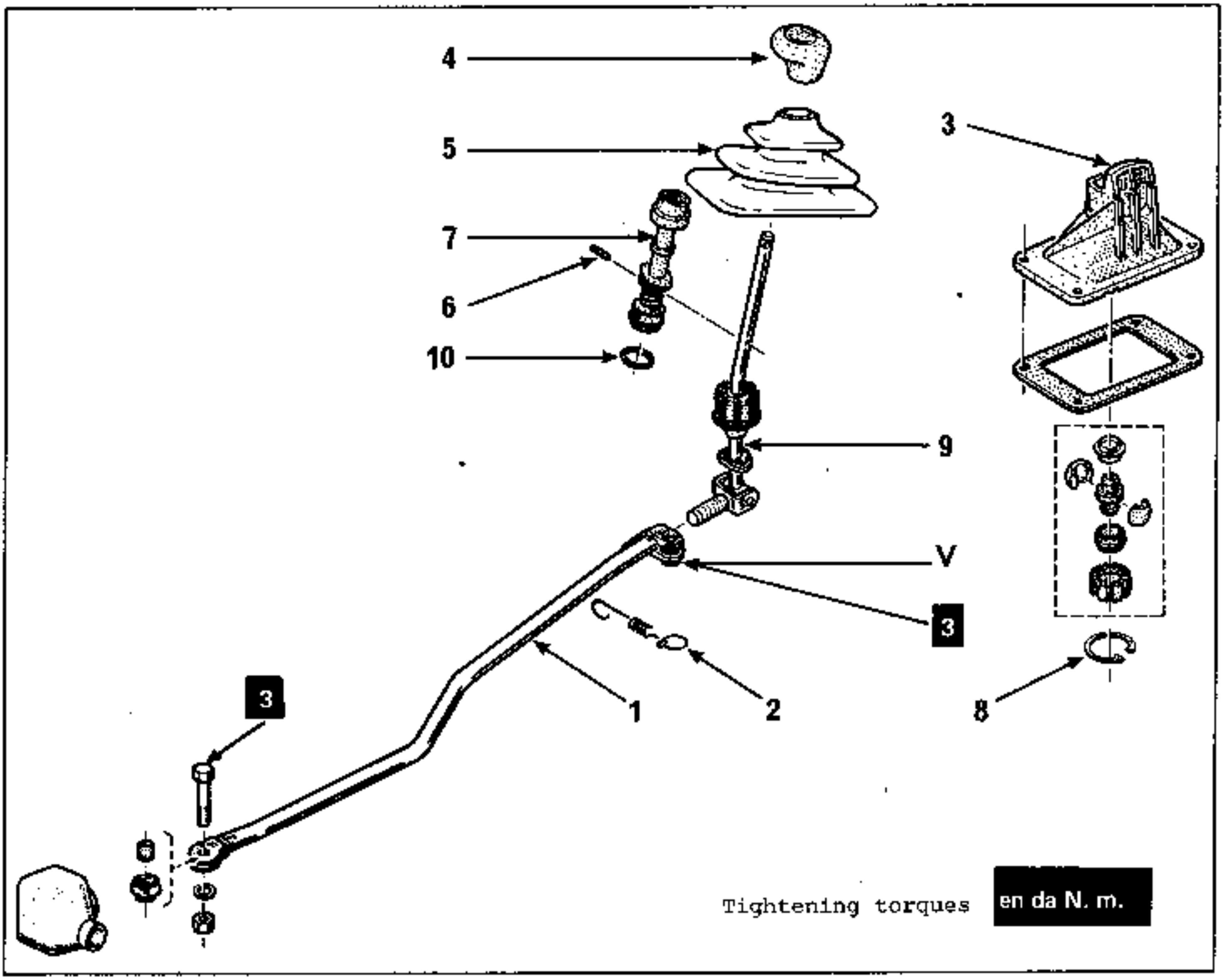


These checks permit one to ensure that the serrated cam (C) and the serrated quadrant (S) are free when in the clutch "engaged" position.

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



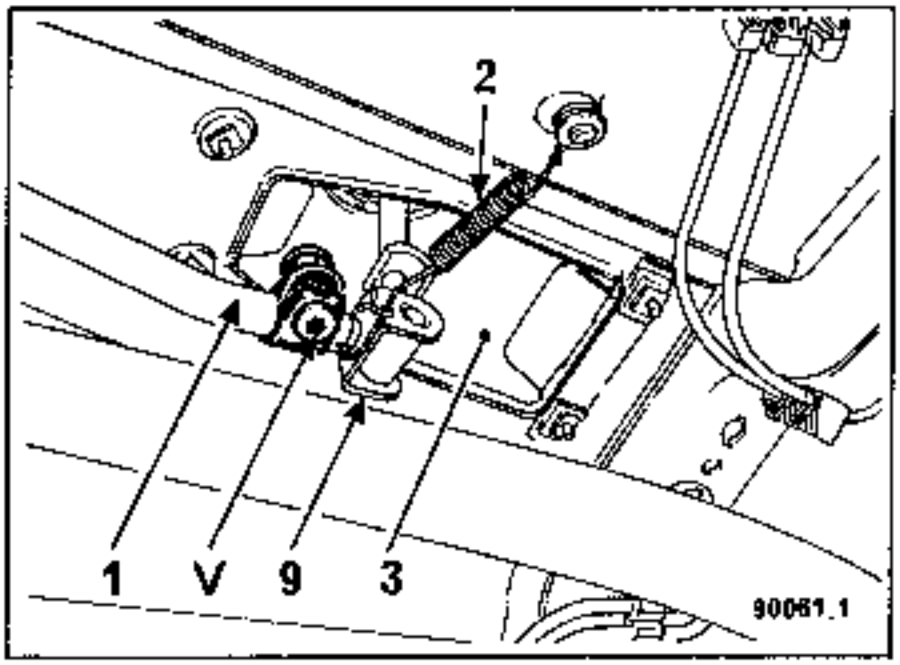
These checks are to be carried out prior to any oepration on the clutch itself.



1	Link	6	Spring pin
2	Spring	7	Reverse release
3	Casing	8	Circlip
4	Knob	9	Lever
5	Bellows	10	O ring seal

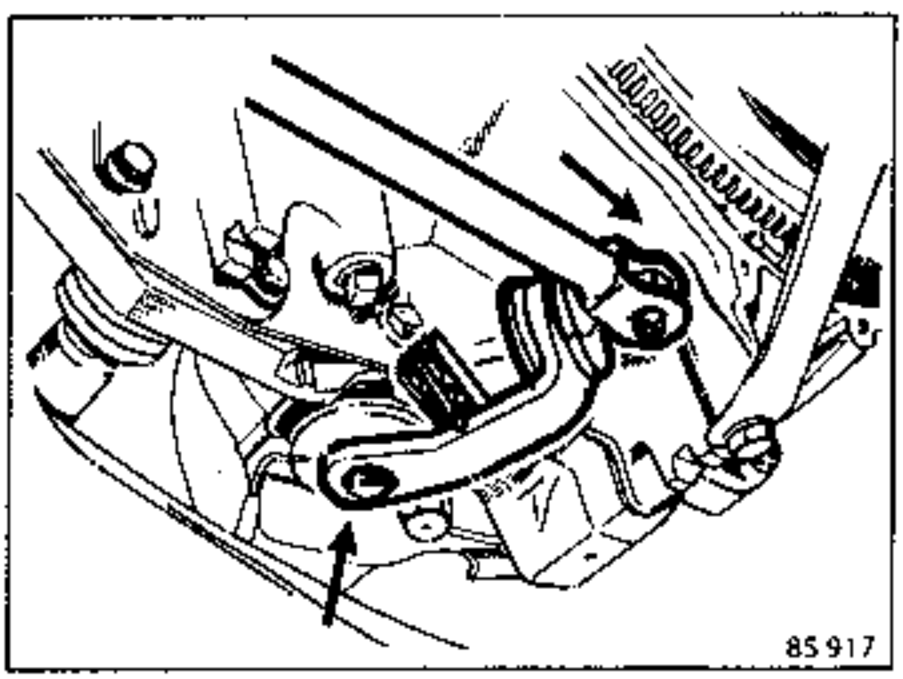
REMOVING

- Inside the vehicle : unclip the bellows (5) from the console.
- Under the vehicle : disconnect the link (1) from the clevice (9) and the spring (2) then remove the assembly formed by the casing (3) and the shift lever.
- Grip the shift lever clevice (9) in a vice fitted with soft jaws and remove the parts in the order (4) to (10).



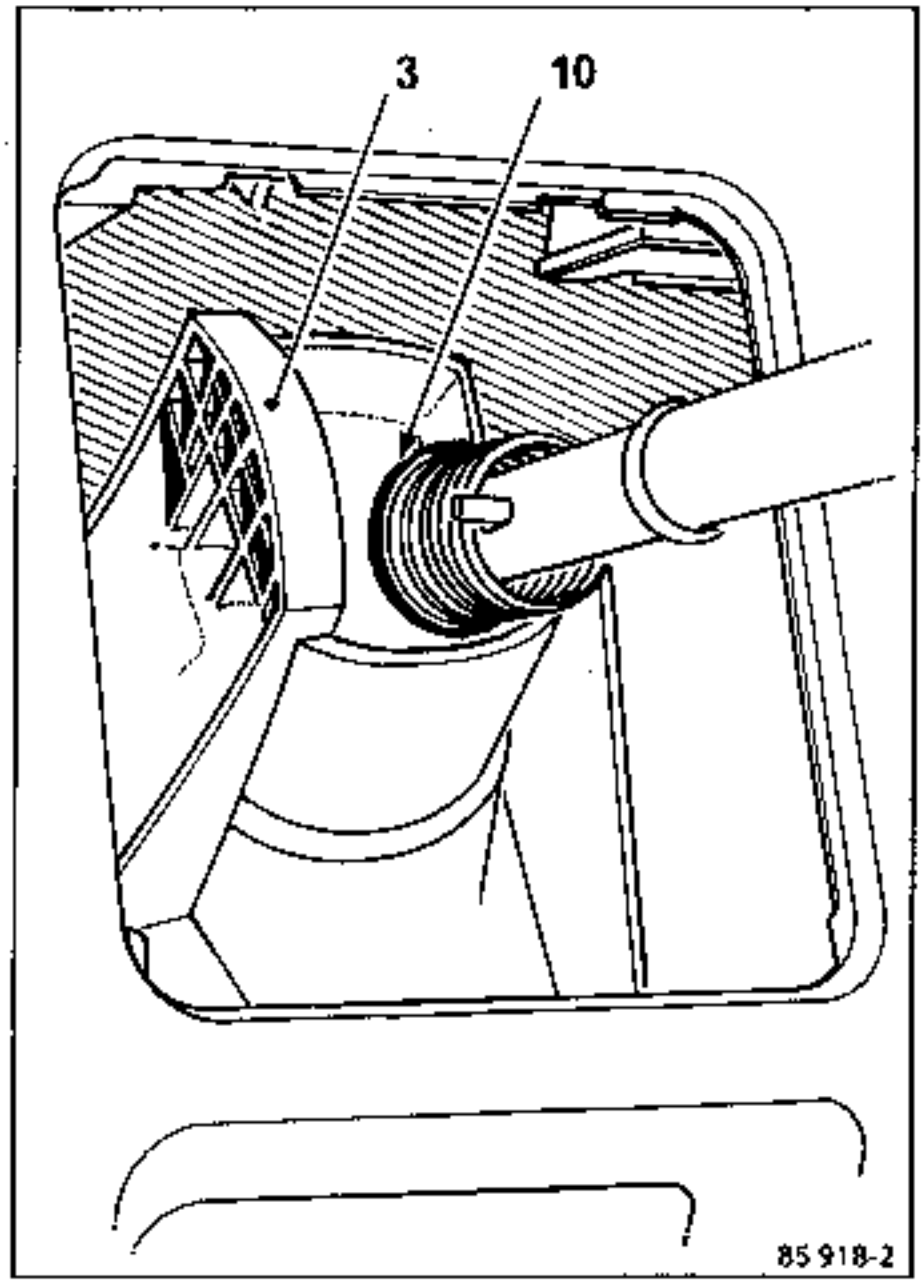
REFITTING (Special features)

Coat the pivot points on the gear shift lever with 33 Medium grease.



Select second at the gearbox and wedge the gearbox input lever against its stop.

Bring the O ring (10) against the ramp on the casing (3).

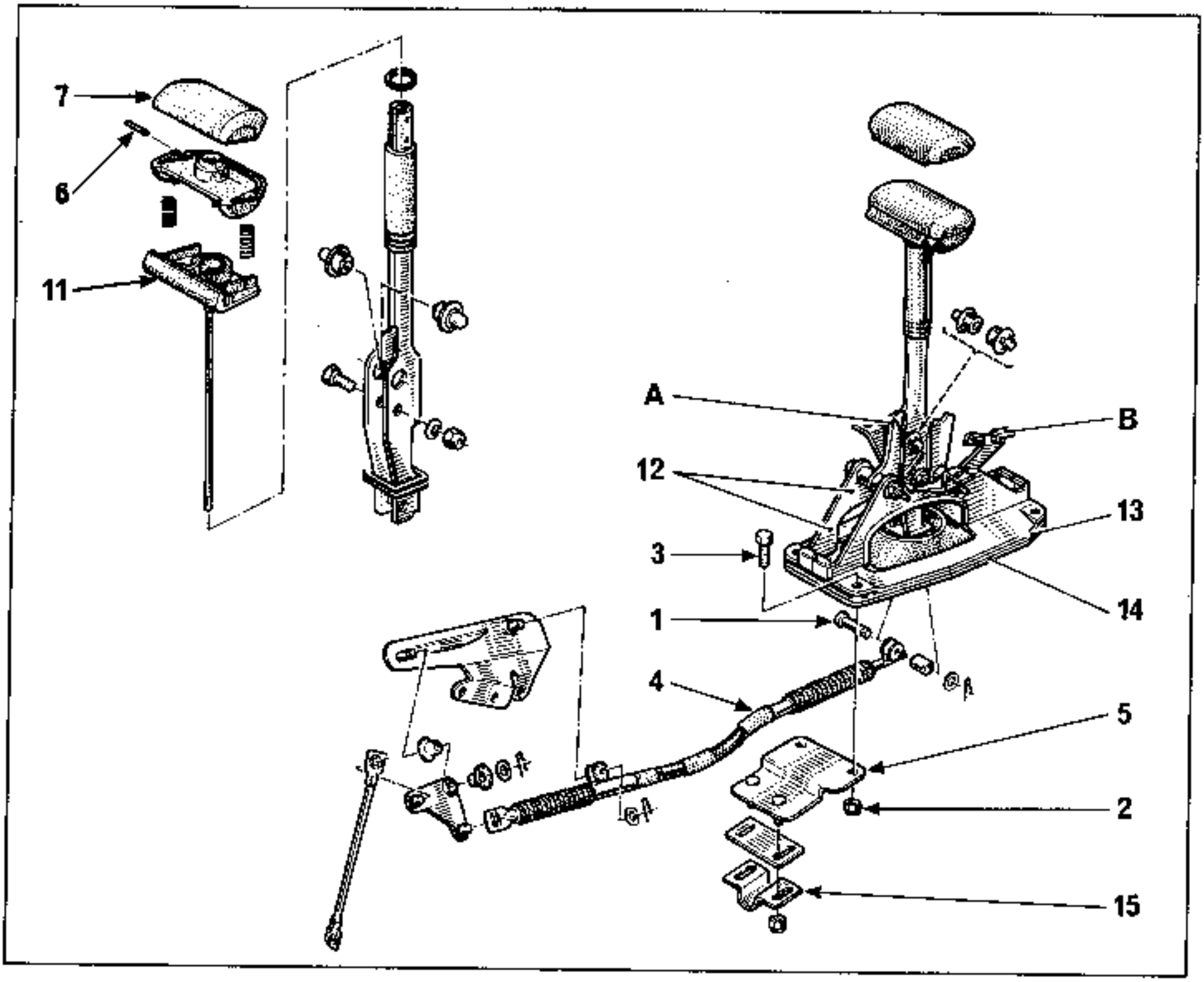


Fit the link (1) to the clevice on the lever (9).

Leave a clearance of 5 mm between the link and the body of the clevice.

In this position :
- tighten screw (V) to torque,
- check that the clamp is tight on the link (1),
- refit the spring (2) and the bellows (5).
- bond the knob (4) in place.

Check that the gears shift correctly.



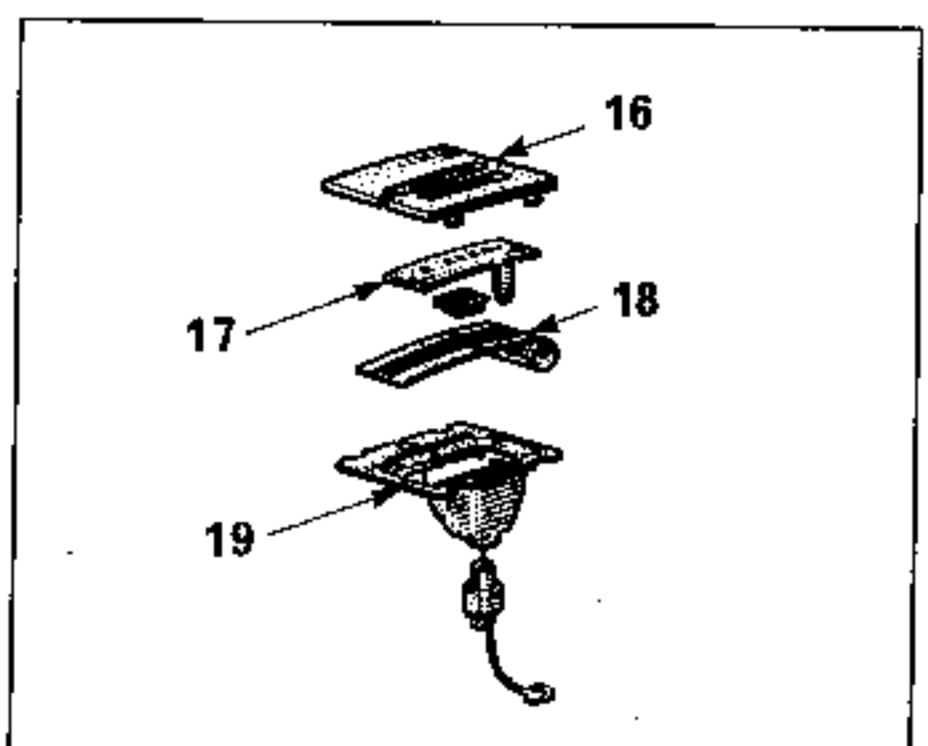
REMOVING

Remove, from under the vehicle :
- the pin (1) that secures the control cable (4),
- the two nuts (2) from the retaining plate (5).

Remove, inside the vehicle :
- the repeater support (16 and 17),
- the cover and its bush (18),
- the base (19),
- the centre console (4 screws),
- the control securing bolts (3) and take out the control assembly.

DISMANTLING (Special features)

To gain access to pin (6), one must unstick the upper cover (7).



REASSEMBLY (Special features)

Grease the control.

Place :
- the selection gate in position with notch (A) on the same side as the moving section (11),
- the support flanges (12) with the folded down edge (B) on the opposite side to the moving section (11).

Refit the support plate (13) and the bellows (14).

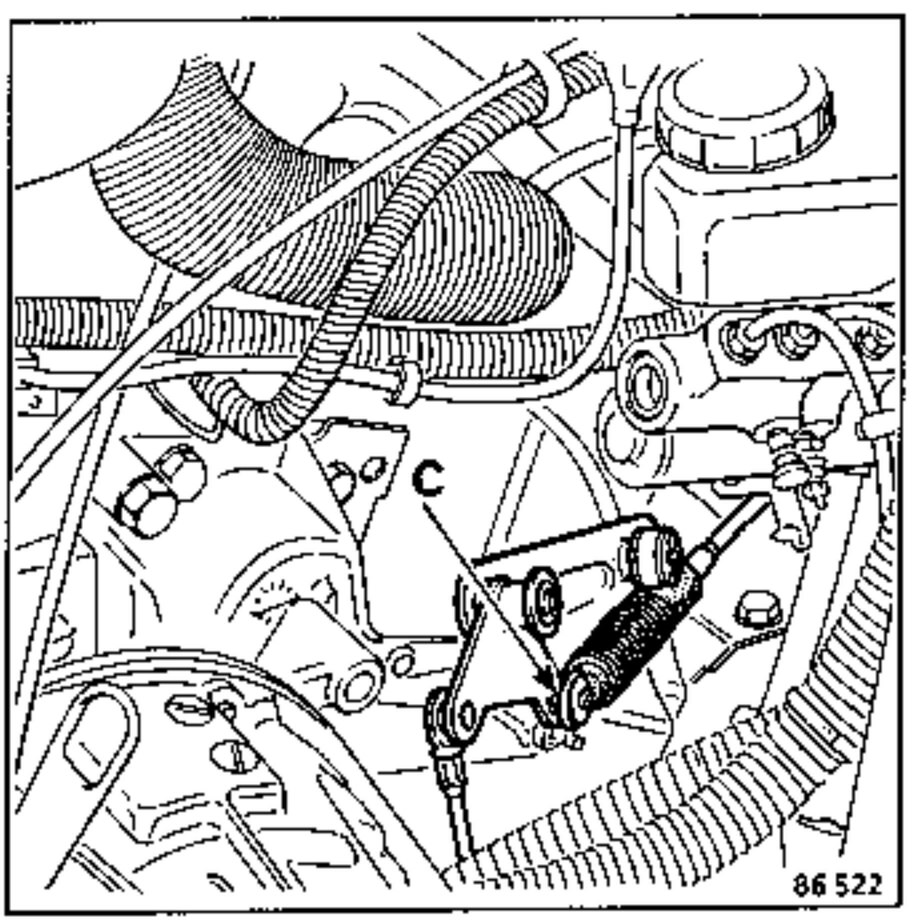
ADJUSTING

Place the selector lever in "N" (Neutral), inside the passenger compartment.

Place the control component on the transmission in position "N" with ball joint (C) disengaged.

Tighten the clevice (15) in the position in which the ball joint (C) is exactly in line with the end of the control cable.

Assemble the ball joints.



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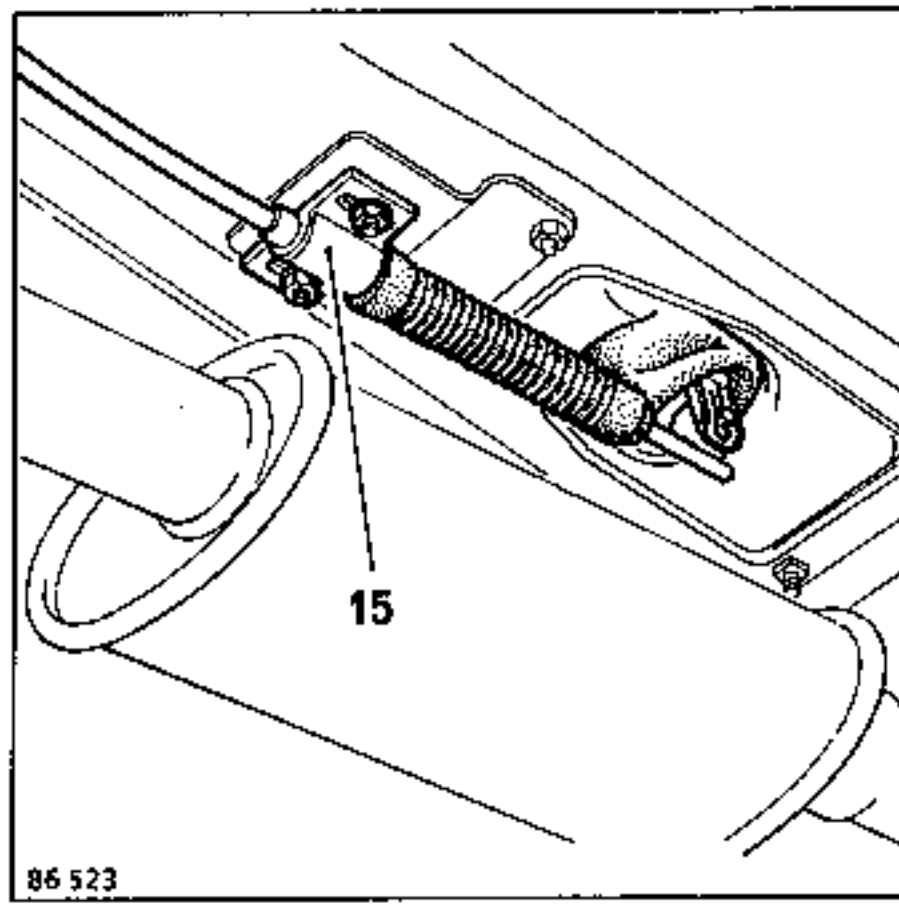


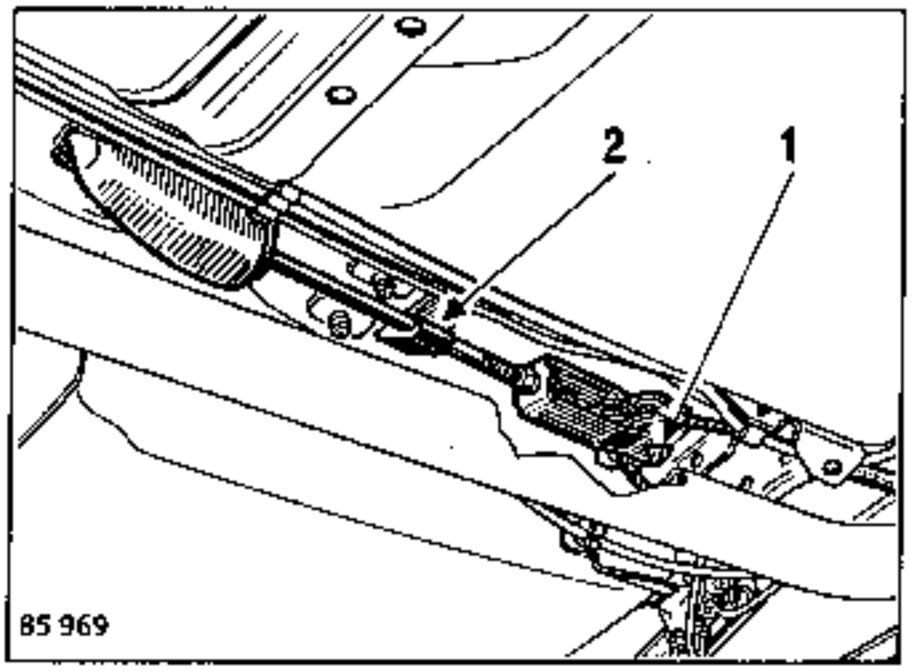
86 523

Ensure that the transmission speeds select correctly and that the starter operates in the "Park" and "Neutral" positions.

REPLACING

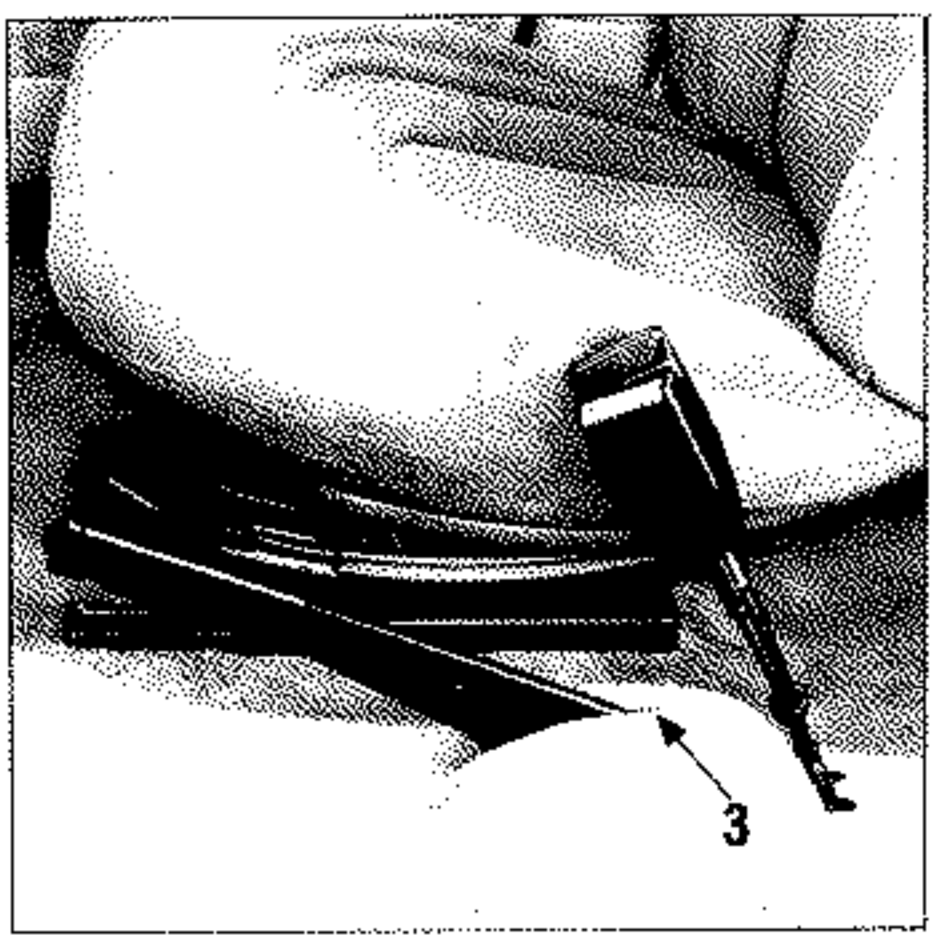
Release the hand brake and remove the pin that retains the swivel lever (1).

Free the control link from the clip (2).



Remove :
- the cover from the seat belt stalks,
- the two seat belt stalk securing bolts.

Make a small slit in the carpet (3).



Disconnect the wire from the hand brake switch.

Unscrew the two screws that secure the lever support to the floor.

Remove the hand brake lever.

When refitting, adjust the lever travel.

ADJUSTING

If the hand brake is incorrectly adjusted, with the cable too tight :

- the brake shoe automatic wear take-up system cannot operate correctly,
- the brake pedal travel will be too long.

Under no cirucmstances are the cables to be re-tensioned to remedy this defect as the problem would soon re-occur.

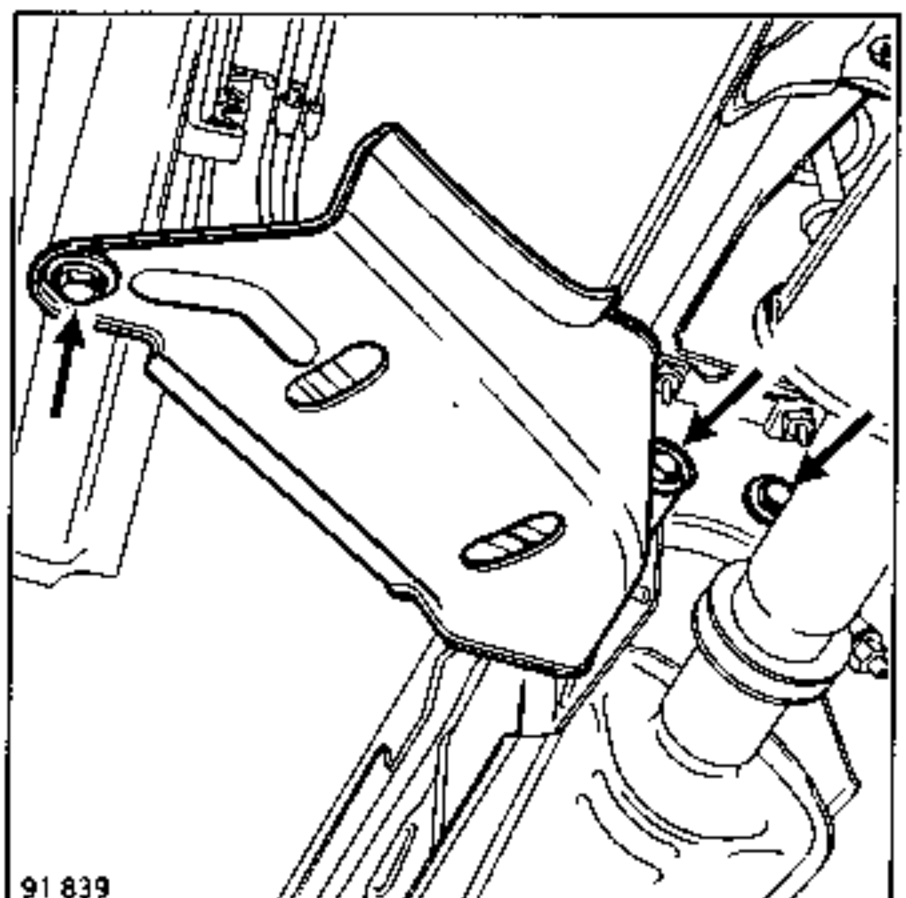
The hand brake is not a wear take-up system. It is only to be adjusted after the following have been replaced :
- the brake linings,
- the cables,
- the lever.

It is forbidden to adust the hand brake except after these operations.

ADJUSTING THE DRUM BRAKE SYSTEM

Raise the vehicle on a lift that locates under the body.

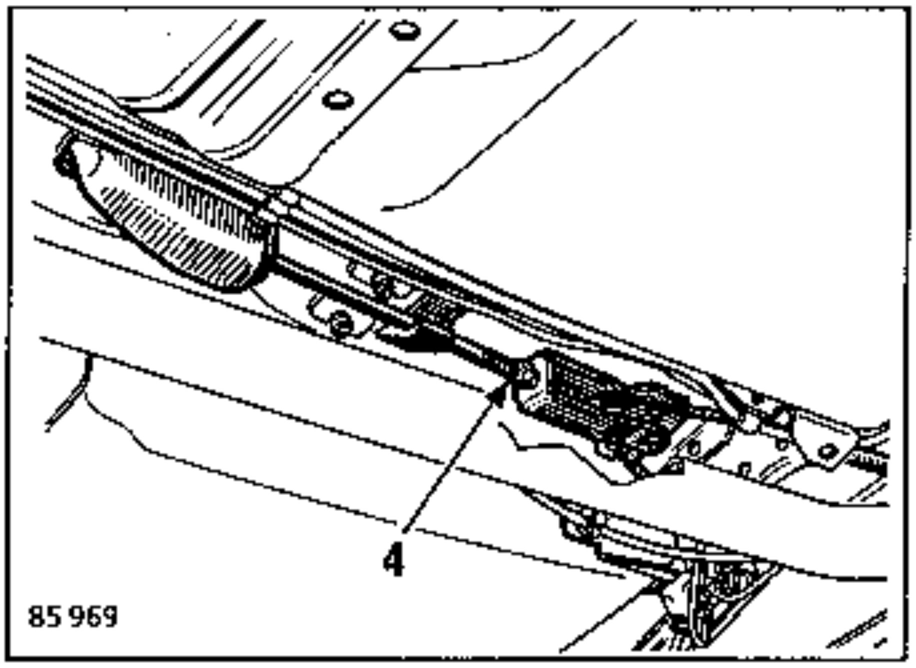
Depending on the version, remove :
- the plastic cover that protects the pipes,
- the heat shield.



91 839

NOTE : on vehicles fitted with a catalyser, the exhaust pipe will have to be disconnected from the catalyser flange to be able to remove the heat shield.

Loosen the lock nut (4) and fully unscrew the central swivel lever assembly.



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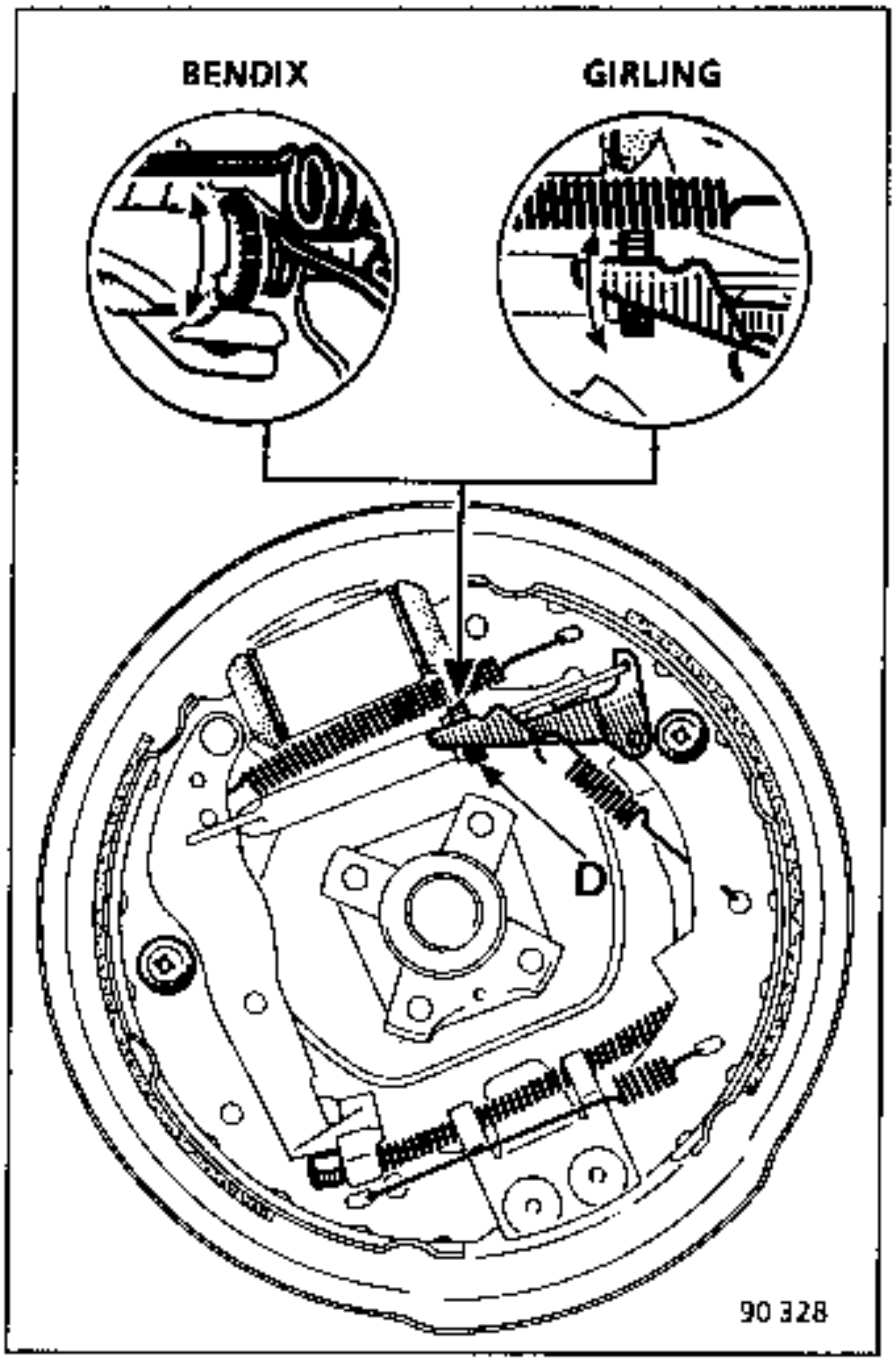
Remove both rear wheels.

I DRUM BRAKES

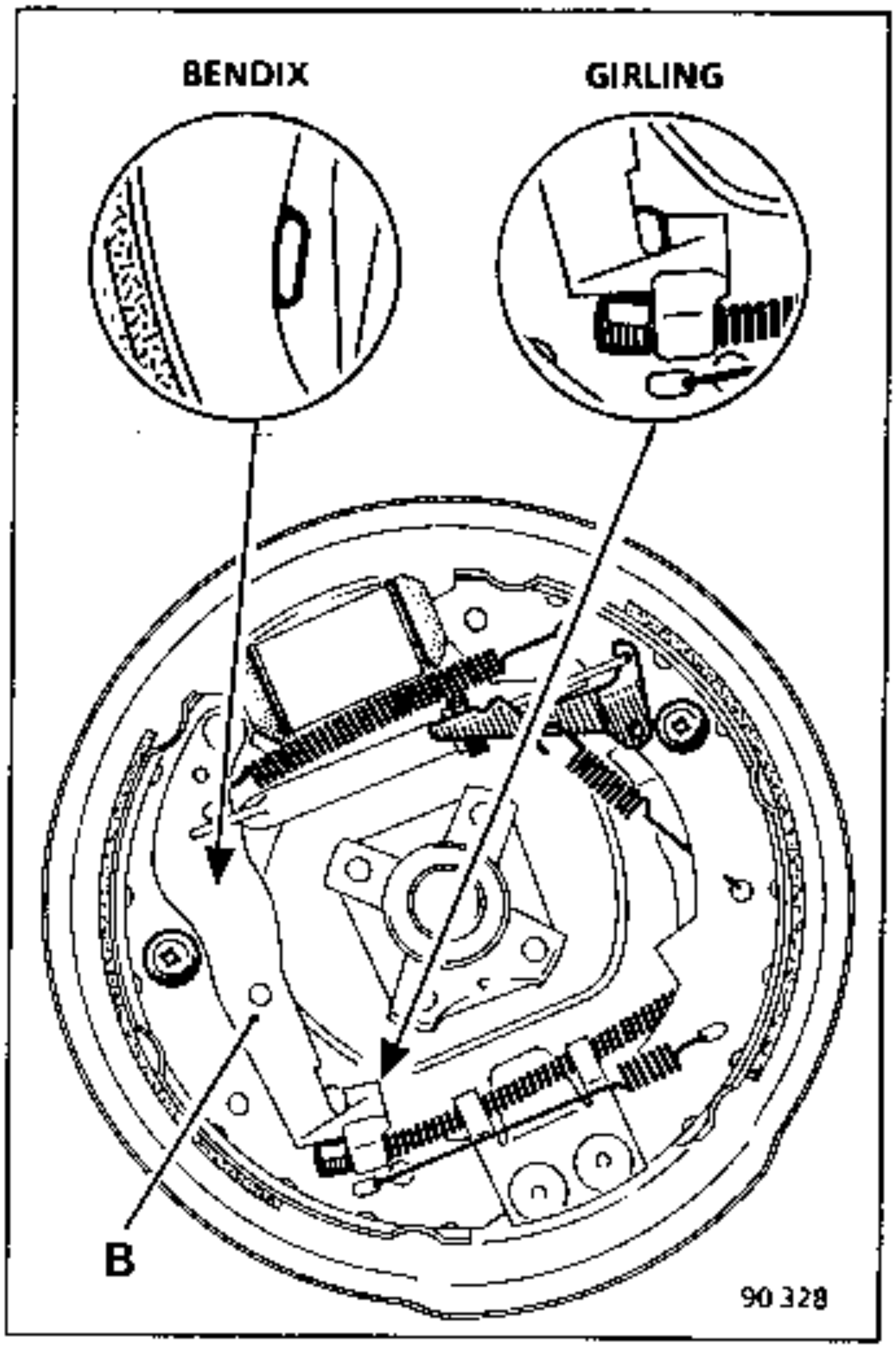
Remove both drums.

Check that the automatic wear take-up system is operating correctly by turning the toothed quadrant (D) (ensure that it can turn in both directions), then release its tension by 5 to 6 teeth.



Ensure :

- that the cables slide freely.
- that the hand brake levers (B) on the shoes locate correctly.



Gradually tighten the cables at the central adjuster until the levers (B) start to lift at between 1 and 2 notches on the hand brake lever travel and remain lifted at the 2nd notch.

Tighten the lock nut (4).

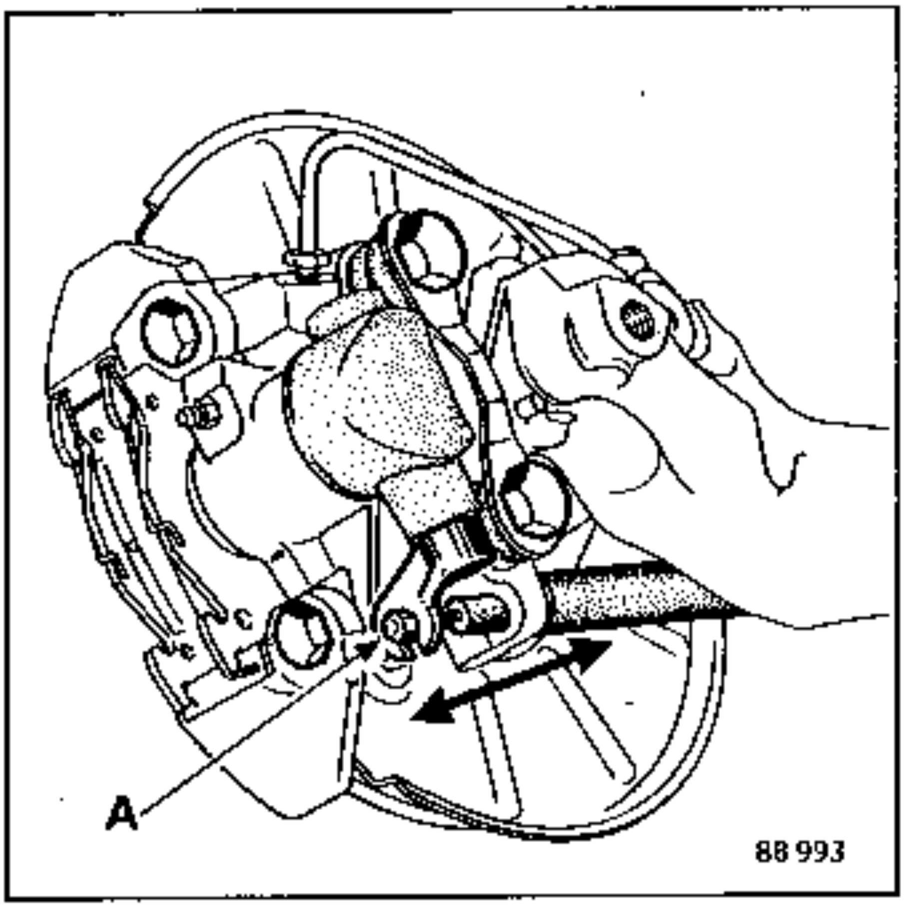
Fit the drums.

With the vehicle resting on its wheels :

Adjust the shoes by depressing the brake pedal firmly and gradually a number of times whilst listening for the automatic wear take-up system to operate.

II DISC BRAKES

Check :
- that the cables slide freely,
- the full movement of the hand brake levers and then bring them against their stops in a rearward direction.



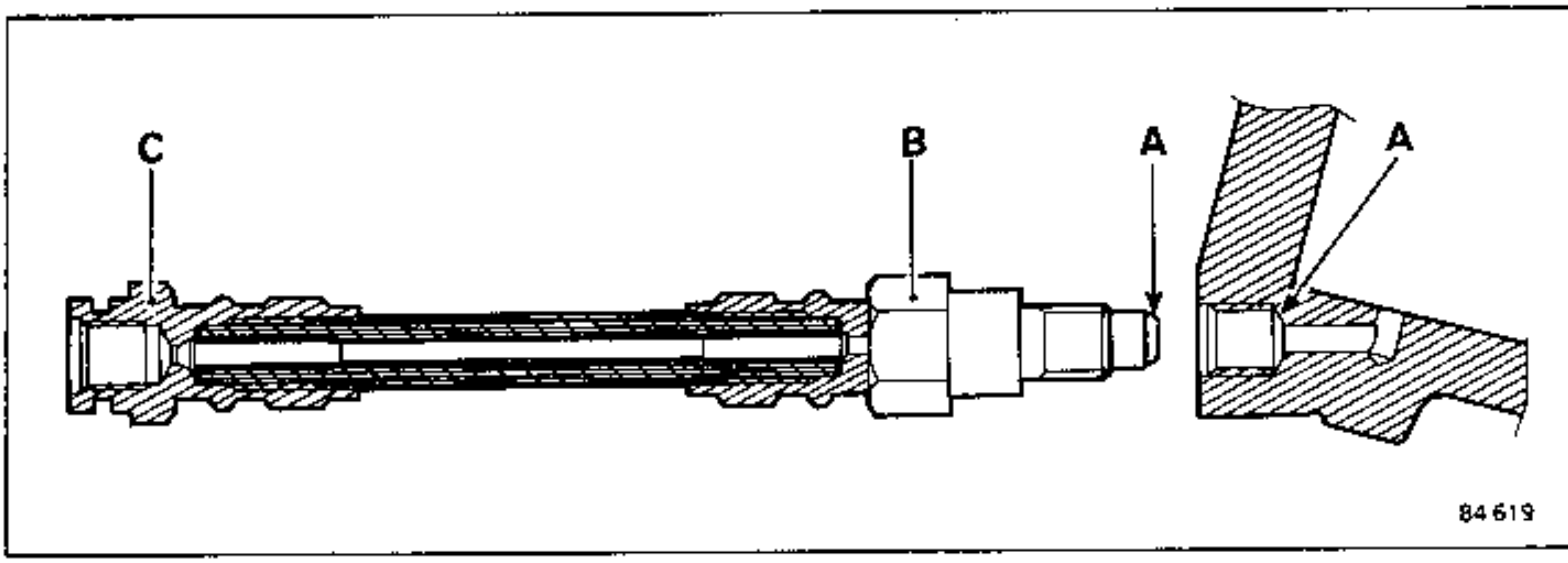
Gradually tension the cables at the central adjuster to bring the end fitting (A) into contact with the lever, without actually moving it.

Complete the adjustment so that the levers lift between the 1st and 2nd notch on the hand brake lever travel and remain lifted at the 2nd notch.

Tighten the lock nut (4).

These vehicles are fitted with hoses that have no copper seals.
They seal by contact between the taper on the hose shoulder (A) and that at the bottom of the tapping.

TIGHTENING TORQUES (in daN.m)
B = 1.3 C = 1.3

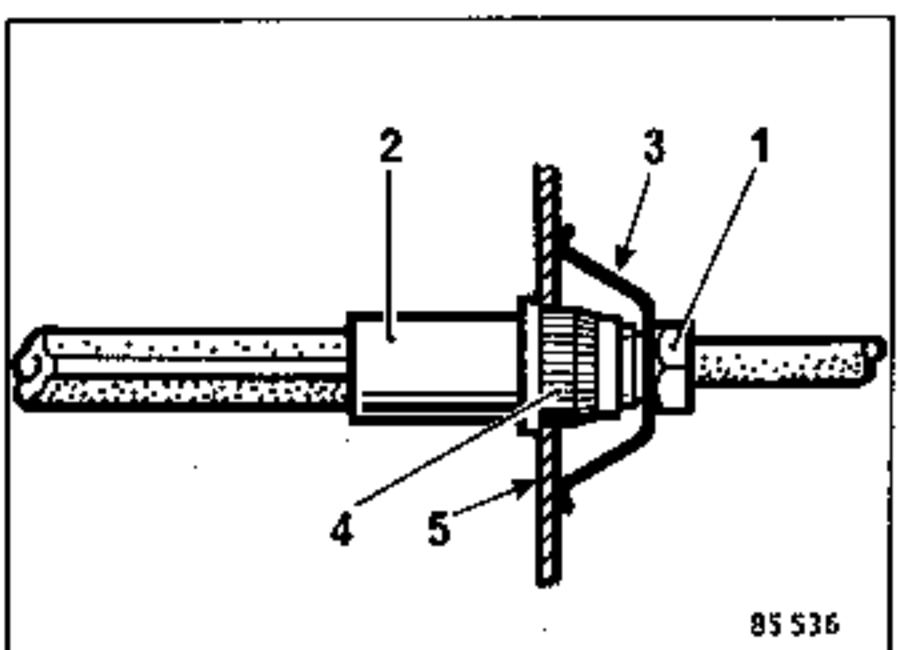


PRECAUTIONS TO BE TAKEN WHEN REMOVING - REFITTING A WHEEL CYLINDER OR A BRAKE HOSE

For safety reasons and to avoid the brake hose being twisted and making contact with one of the suspension components, the following operations must be carried out in the order listed :

REMOVING

Unscrew the union (1) that secures the rigid pipe to the hose (2) to the point where the spring (3) is released. This will free the hose from its splines (4).



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

REFITTING

Place the caliper in position on the brake assembly and screw the hose into it. Tighten it to a torque of 1.3 daN.m.

With the wheels hanging free in the straight ahead position, place the female end of the hose on the retaining lug (5) (the hose must not be twisted) and fit :
- the spring (3),
- the rigid pipe to the hose, ensuring that the hose does not turn as the union is screwed on.

Bleed the braking system.

THE PRINCIPLE OF THE TEST

These vehicles are equipped, depending on their version, with a brake compensator which is either load controlled or not. The pressure readings are taken on opposite sides of the vehicle to compare a given pressure on one of the rear wheels with that on one of the front wheels.

These double compensators have two totally independent bodies that act on an "X" circuit on one of the front wheels and one of the rear wheels.

It is essential to check both the circuits.

I : that for the front right hand and rear left hand wheels,
II : that for the front left hand and rear right hand wheels

The load controlled compensator

On load controlled compensators, the adjustment permits one to adjust the pressure at the rear as a function of the pressure on the front.

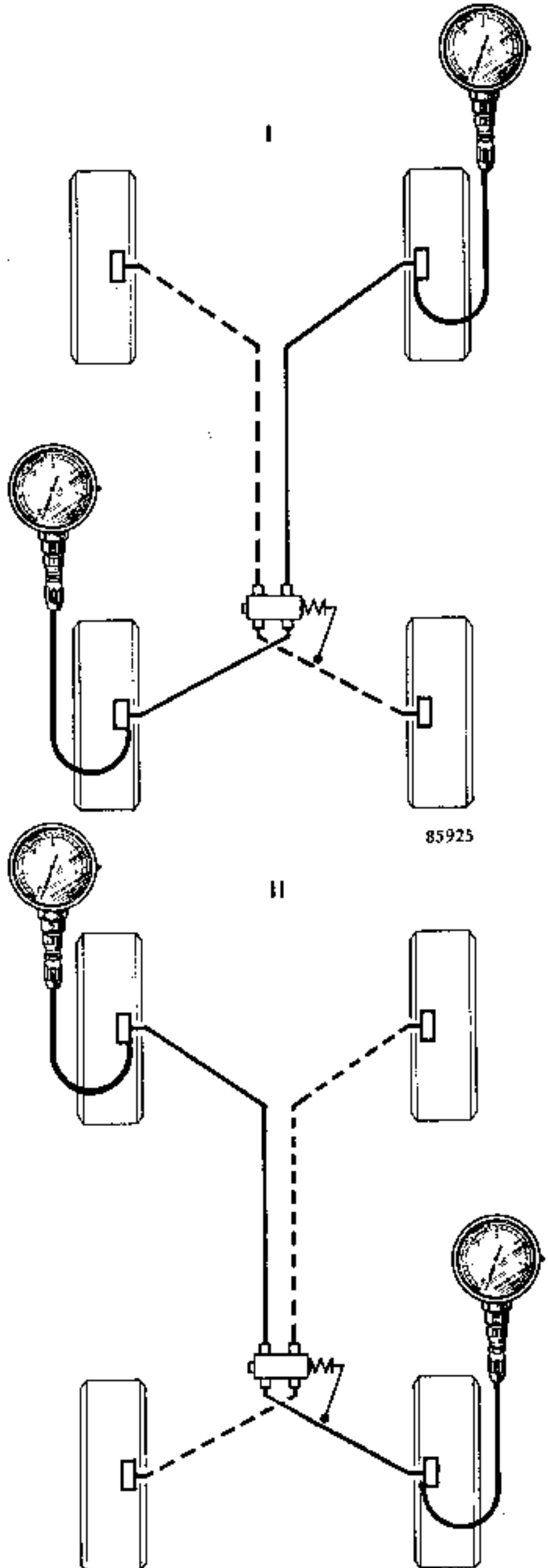
The adjustment acts simultaneously on both bodies and if the pressure is incorrect on only one of the two bodies, replace the compensator.

The fixed compensator (non-load controlled)

Only one test is to be carried out on this type of compensator and if the pressure is incorrect on one only or on both bodies, replace the complete unit.

The fixed compensator that is integral with the wheel cylinder

Only one test is carried out on this type of compensator. If the pressure is incorrect, replace the entire compensator-wheel cylinder assembly.



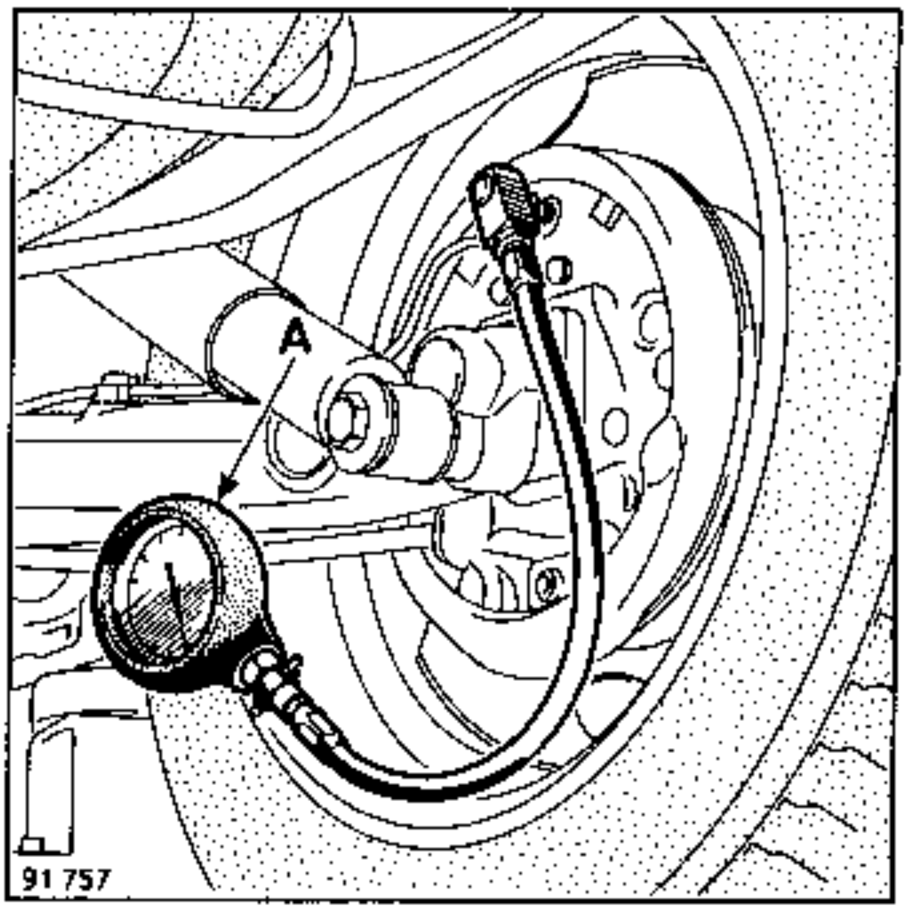
The brake compensator is to be adjusted with the vehicle on the ground and one person sitting in it.

ESSENTIAL SPECIAL TOOLS	
Fre. 244-04 or **Fre. 1085**	Pressure gauge for testing brake compensators

TESTING

Connect two pressure gauges (A) Fre.244-04 or Fre.1085 :
- one to the front right hand wheel,
- the other to rear left hand wheel.

Bleed the pressure gauges : screw (P).



Press gradually down on the brake pedal until the test pressure is obtained on the front wheels (see the pressure chart). Read the corresponding pressure on the rear wheels and correct it if necessary.

Carry out the same operations on the other circuit, that is to say :
- the front left hand one,
- the rear right hand one.

If, after adjustment, there is any considerable difference, replace the brake compensator.

ADJUSTING

EARLY TYPE

B400 B401 B402 B407
C400 C401 C402 C407
S400 S401

This compensator is not load controlled and is not adjustable.

LATER TYPE

B400 B401 B402 B403 B404 B407
C400 C401 C402 C403 C404 C407
S400 S401 S404

B408 B40F B40G B40H B40J
C408 C40F C40G C40H C40J
S40F

B40K B40M
C40K C40M

This compensator is an integral part of the wheel cylinder and is not adjustable.

LOAD CONTROLLED COMPENSATOR

EARLY TYPE

B403 B404 B408 B40F C405 C409
C403 C404 C408 C40F
S404

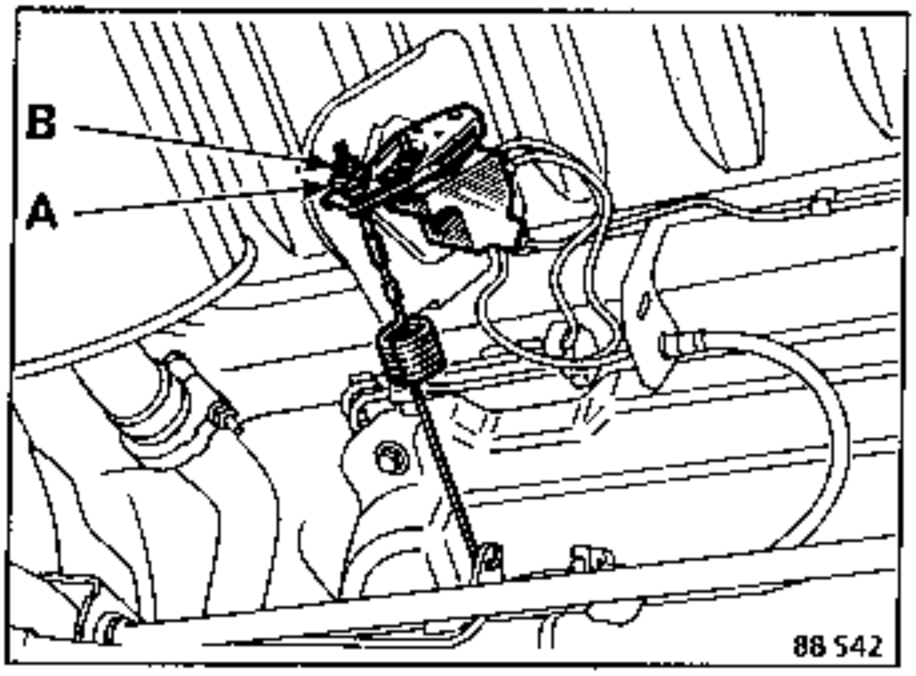
F400 F401 F402 F404 F407 F40F

F40H F40M

ADJUSTING

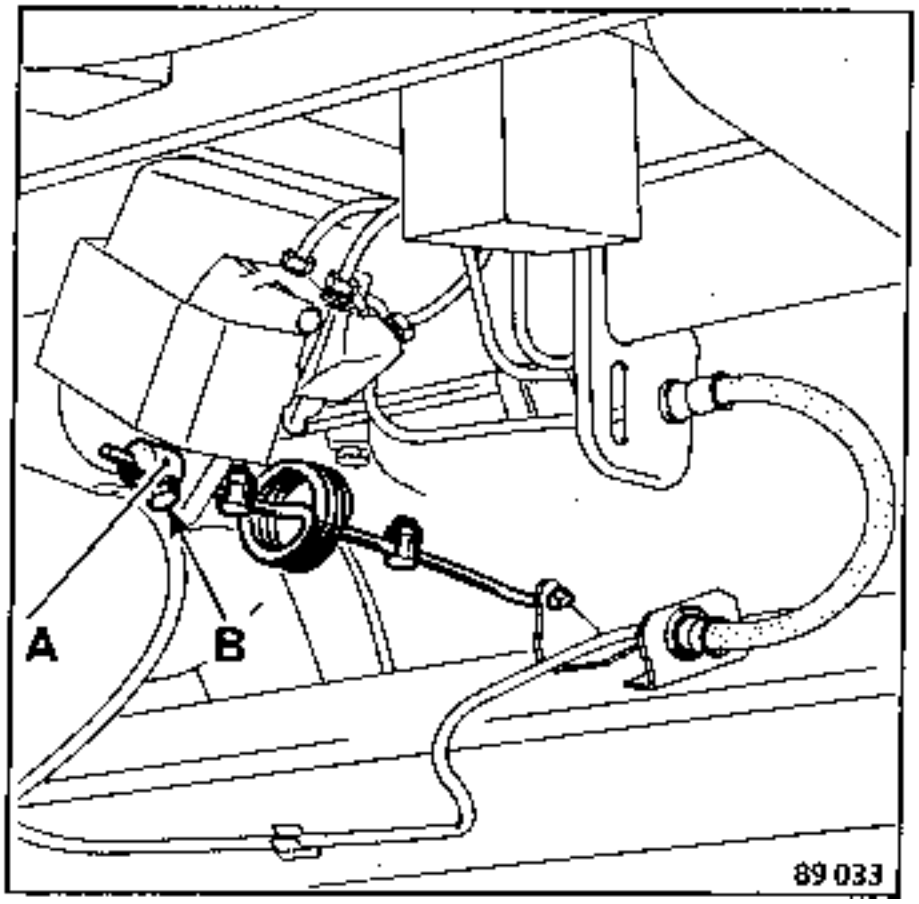
EARLY TYPE

The adjustment is carried out by changing the position of the nut (A). To do this, loosen lock nut (B) and turn nut (A) to adjust the compensator.



LATER TYPE

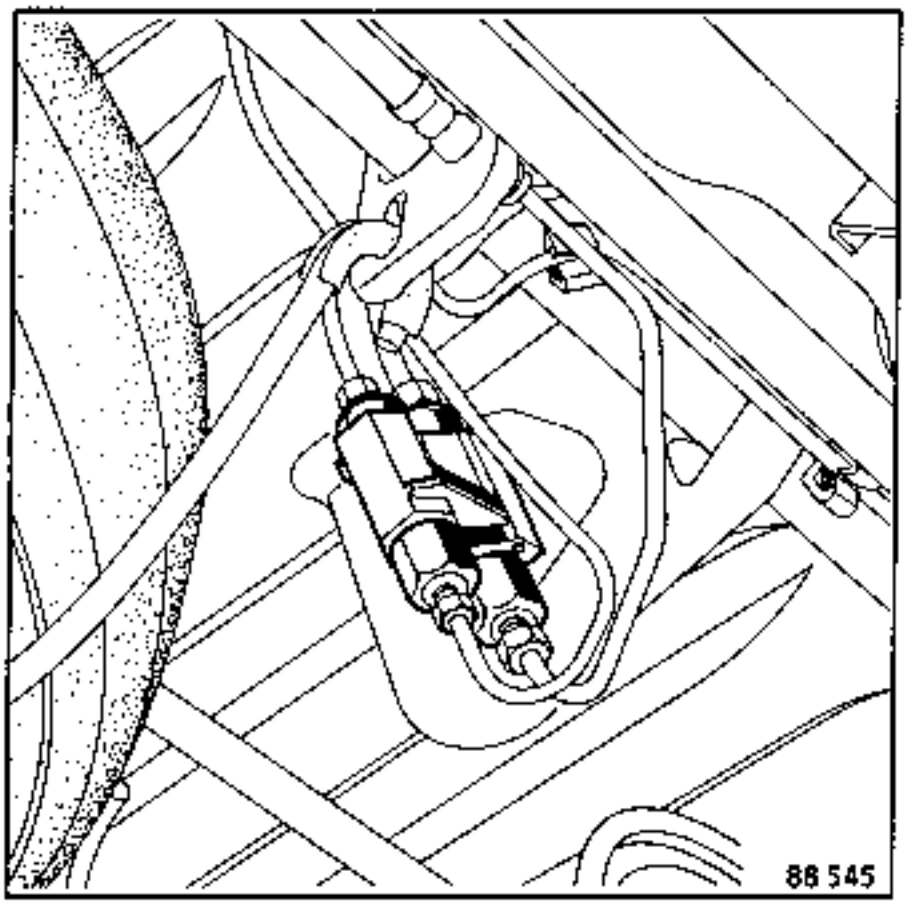
The adjustment is carried out by altering the position of the sliding sleeve (A). To do this, loosen screw (B) and move the sleeve (A) to adjust the compensator.



REMOVING

Disconnect :
- the pipes, marking their positions,
- the two bolts or nuts that secure the compensator to its support.

EARLY TYPE - Fixed compensator

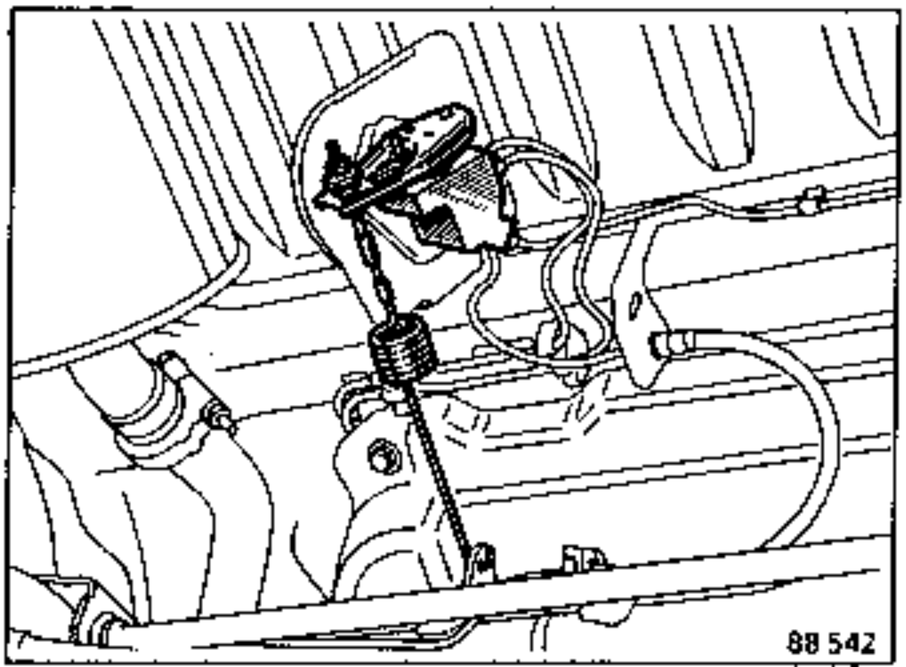

88 545

Remove the compensator.

LATER TYPE - Fixed compensator which forms part of the wheel cylinder (see section entitled "Rear wheel cylinder - Removing - Refitting").

LOAD CONTROLLED COMPENSATOR

Tilt the compensator, unhook the control spring from the axle and remove the compensator.

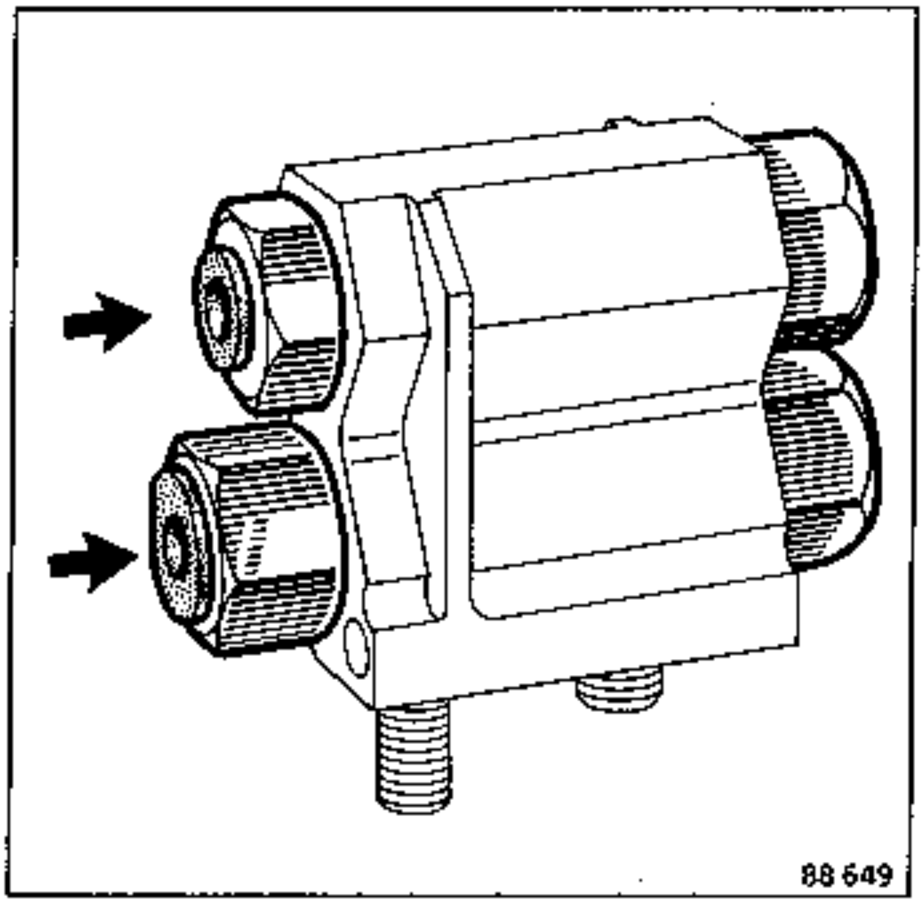

88 542

REFITTING (Special features)

Reconnect the pipes in the positions marked when the compensator was removed.

EARLY TYPE - Fixed compensator

The input side is that where the union sleeves are smallest (and are of unequal height).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All types

Bleed the braking system.

Check and, if necessary, adjust the pressure (see section entitled "Testing - Adjustment").

ADJUSTMENT FIGURES

Vehicle types :	**B400**	**B401**	**B402**	**B407**	**B40G**	**B40H**	**B40J**	**B40K**	**B40M**
	C400	**C401**	**C402**	**C407**	**C40G**	**C40H**	**C40J**	**C40K**	**C40M**
	S400	**S401**							

are fitted, depending on their version, with :
- a fixed brake compensator,
- fixed brake compensators that are integral with the wheel cylinders.

The following vehicles	**B403**	**B404**	**B408**	**B40F**
	C403	**C404**	**C408**	**C40F**
		S404		**S40F**

of the later type are equipped with fixed compensators that are integral with the wheel cylinders. They cannot be adjusted.

Vehicle type	Test pressure (Bars)	
	Front	Rear
B400 B408 C400 C408 S400 B40F B401 C40F C401 S40F S401 B40G B402 C40G C402 B40H B403 C40H C403 B40J B404 C40J C404 B40K S404 C40K B407 B40M C407 C40M	60 →	$26 {}^{+0}_{-4}$

The following vehicles: B403 B404 B408 B40F C403 C404 C408 C40F S404
of the early type and vehicle types : C405-C409-F400-F401-F402-F404-F407-F40F-F40H-F40M are equipped with load controlled brake compensators.

The compensator is to be tested and adjusted with the vehicle unladen, the fuel tank full and a person sitting in the driving seat.

Vehicle Type	Fuel tank contents	Test pressure (Bars)	
		Front	Rear
B403 C403 B404 C404 S404 B408 C408 B40F C40F	 Full 90 966	100 →	37^{+0}_{-4}
C405 C409		–	17^{+0}_{-8}
F400 F401 F402 F404 F407 F40F F40H F40M		100 →	30^{+0}_{-4}

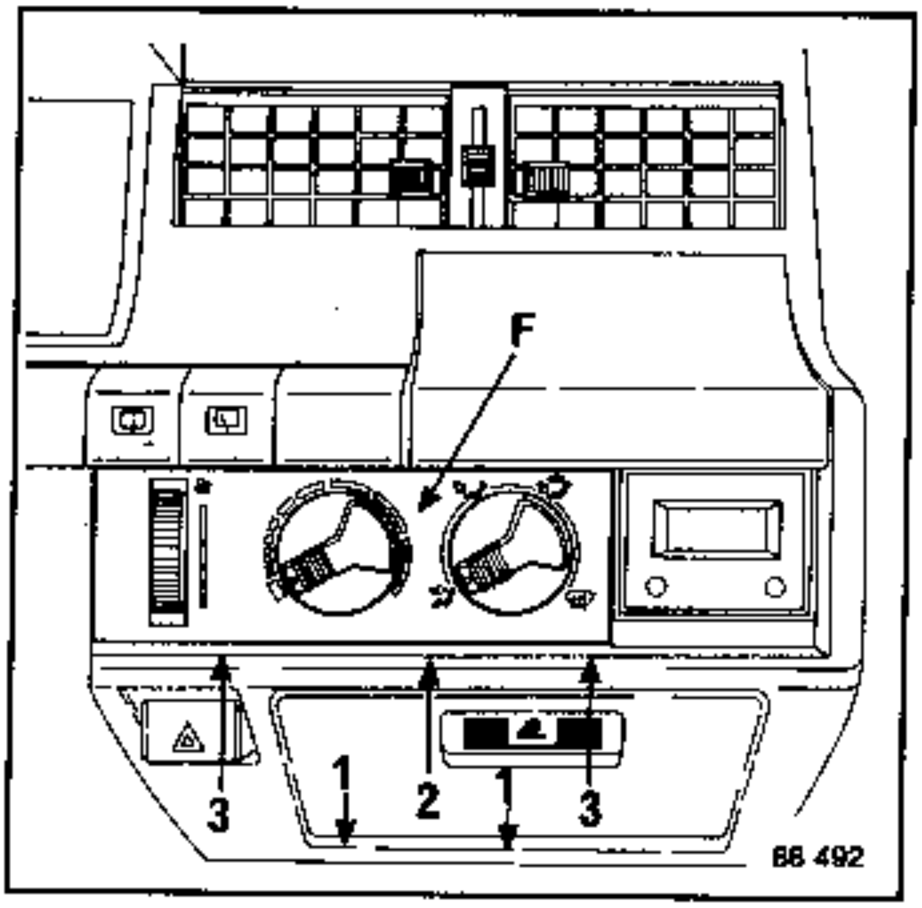
There is no heater hot water valve. The flow through the heater matrix is continuous and as this contributes to the engine cooling, these pipes are not to be blocked.

The matrix and air distribution casing are removed as one unit.

ESSENTIAL SPECIAL TOOLS	
Mot. 453-01	Set of two hose clamps
M.S. 583	Set of two hose clamps

REMOVING

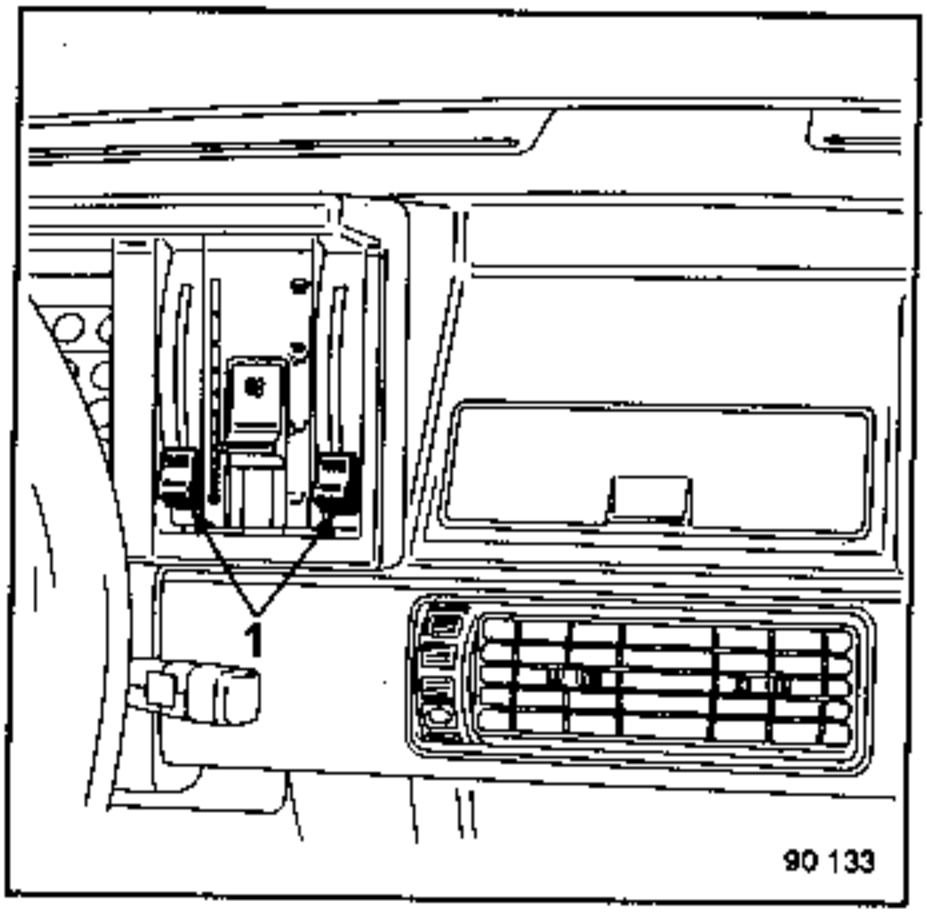
Disconnect the battery and then, depending on the version :



Open the ashtray.

Remove :
- the two screws (1),
- the ashtray,
- the screw (2).

Free the two clips (3) and push the front panel (F) into the fascia panel (do not disconnect the control cables).



Remove :

- The choke control.
- The instrument panel visor.
- The instrument panel.

Free the heater controls (1) (remove the screw at the bottom to free the studs at the top).

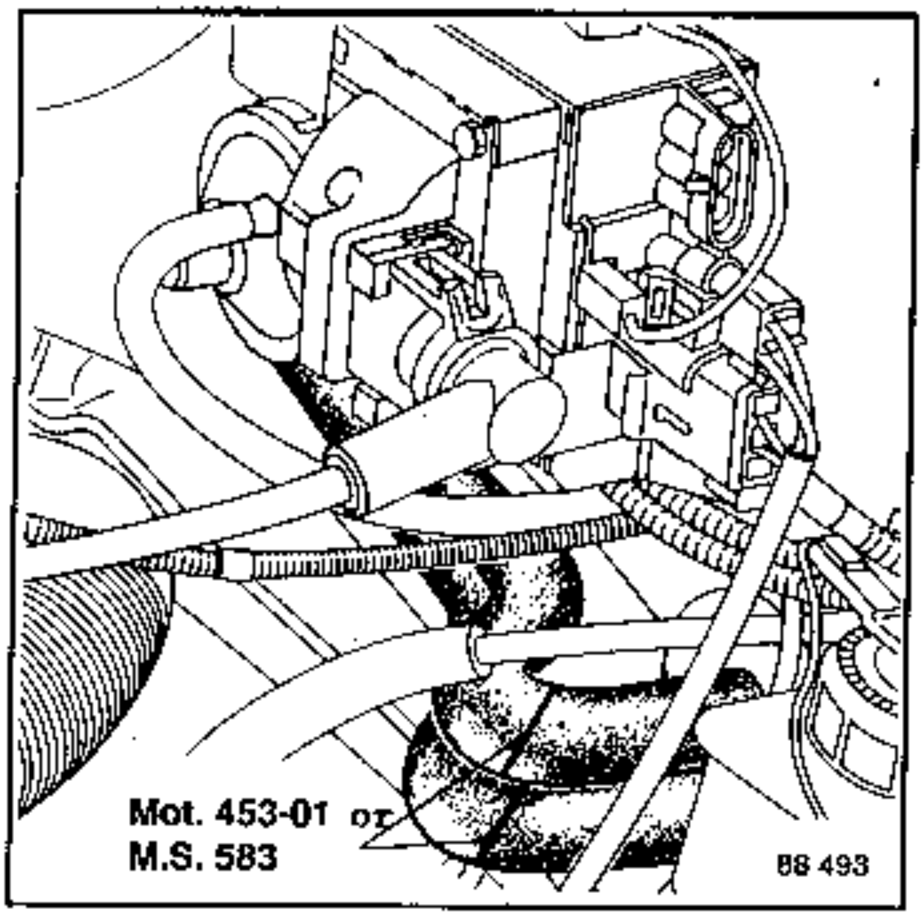
- Disconnect the cables from the air distribution casing.

Remove :
- the trim (see the Bodywork Manual),
- the fascia panel (see section "80").

Pinch flat the heater matrix hoses using clamps Mot.453-01 or M.S.583.

Mark the hoses and disconnect them.

NOTE : If the hoses are connected the wrong way round on refitting, the coolant flow through the heater matrix will be noisy.



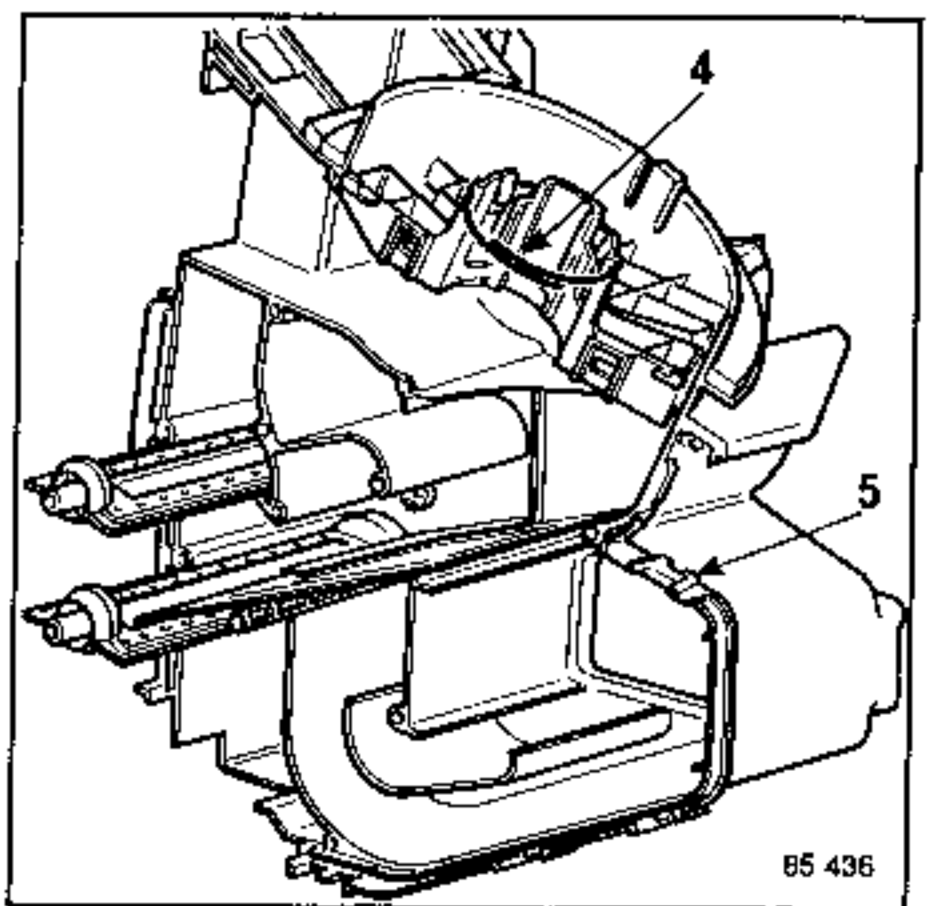
Remove the screws that secure the casing to the scuttle and remove the casing and the control unit.

Separating the two half casings

Remove the snap ring (4).

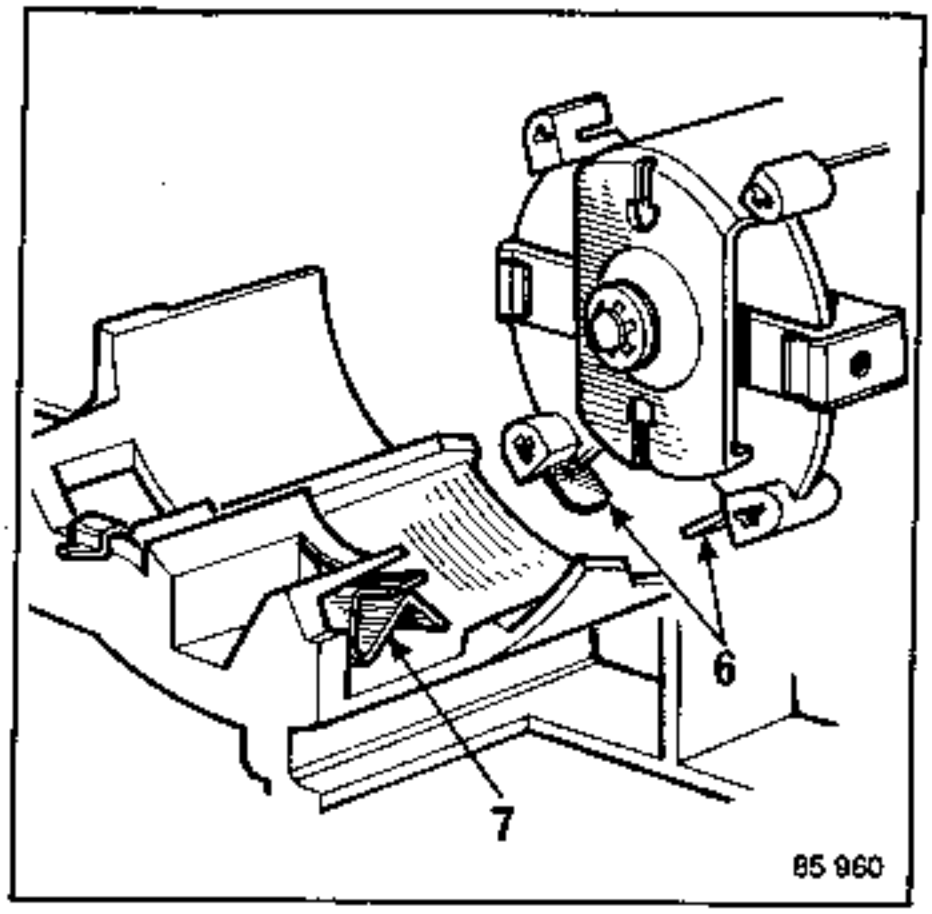
Remove the clips (5).

Separate the two half casings.



REFITTING (Special features)

Position the motor so that the lugs (6) enter their locations (7).



The distribution casing is refitted at the same time as the control unit and its cables.

Fill and bleed the cooling system (see section "19").

Access to the blower motor is gained through the engine compartment

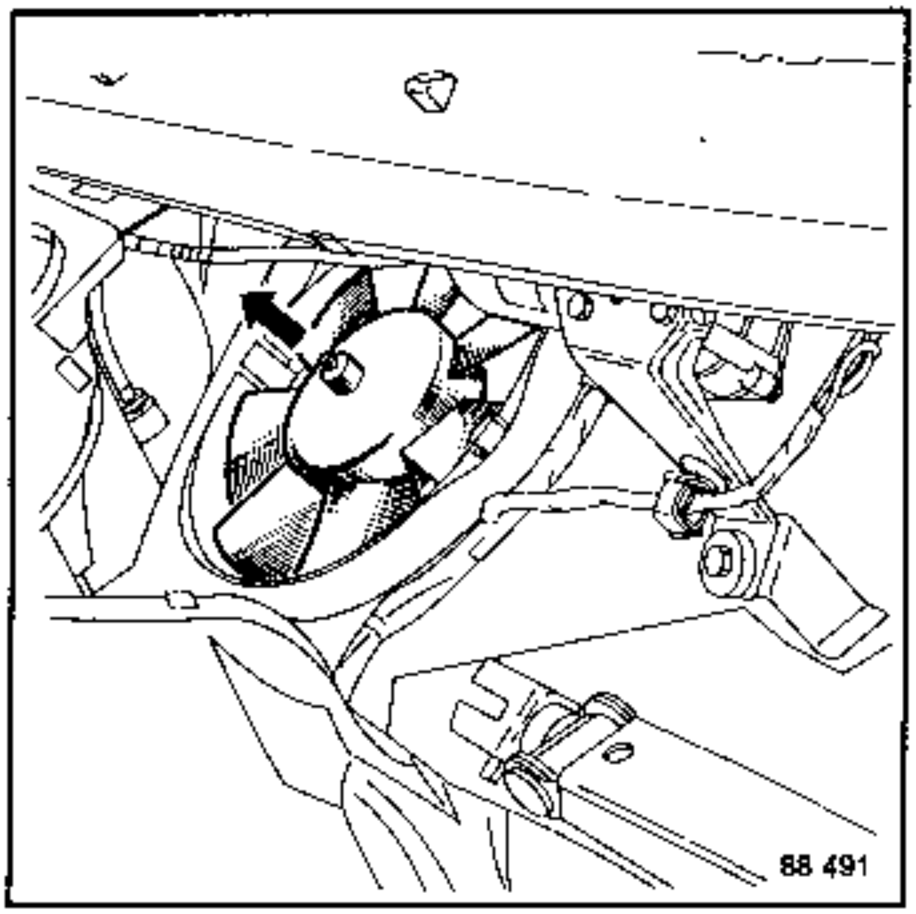
REMOVING

Disconnect the battery.

Remove the blower motor protection.

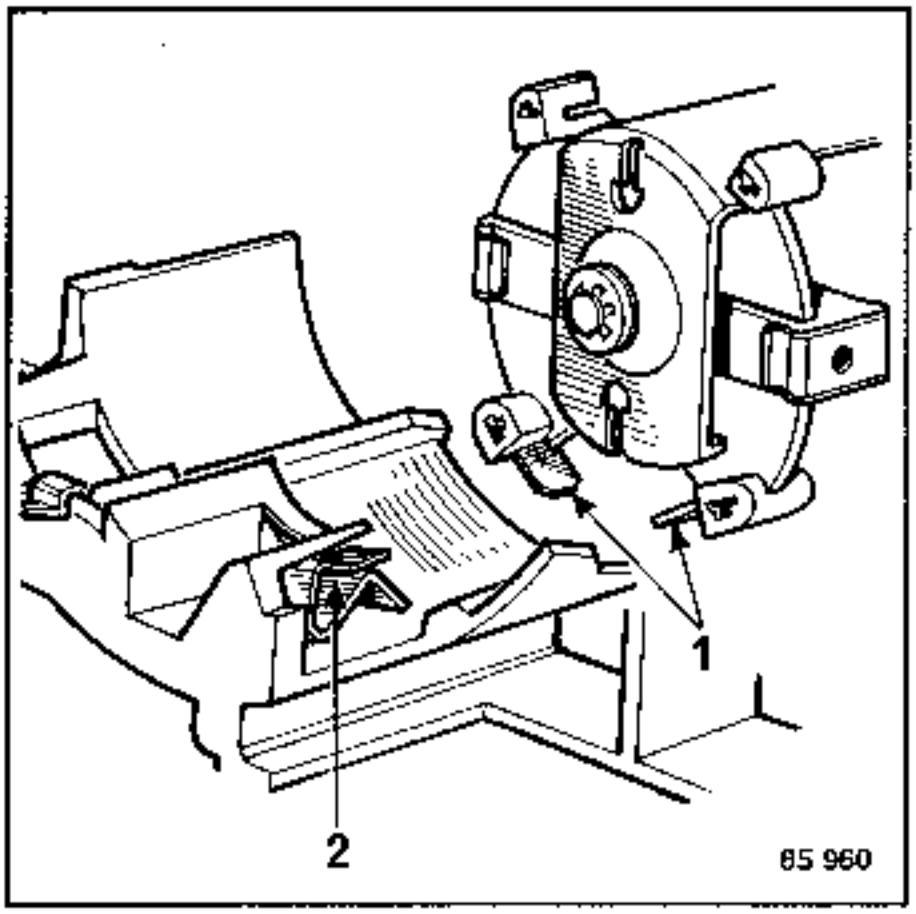
Remove the grille.

Take out the motor by pulling it upwards.



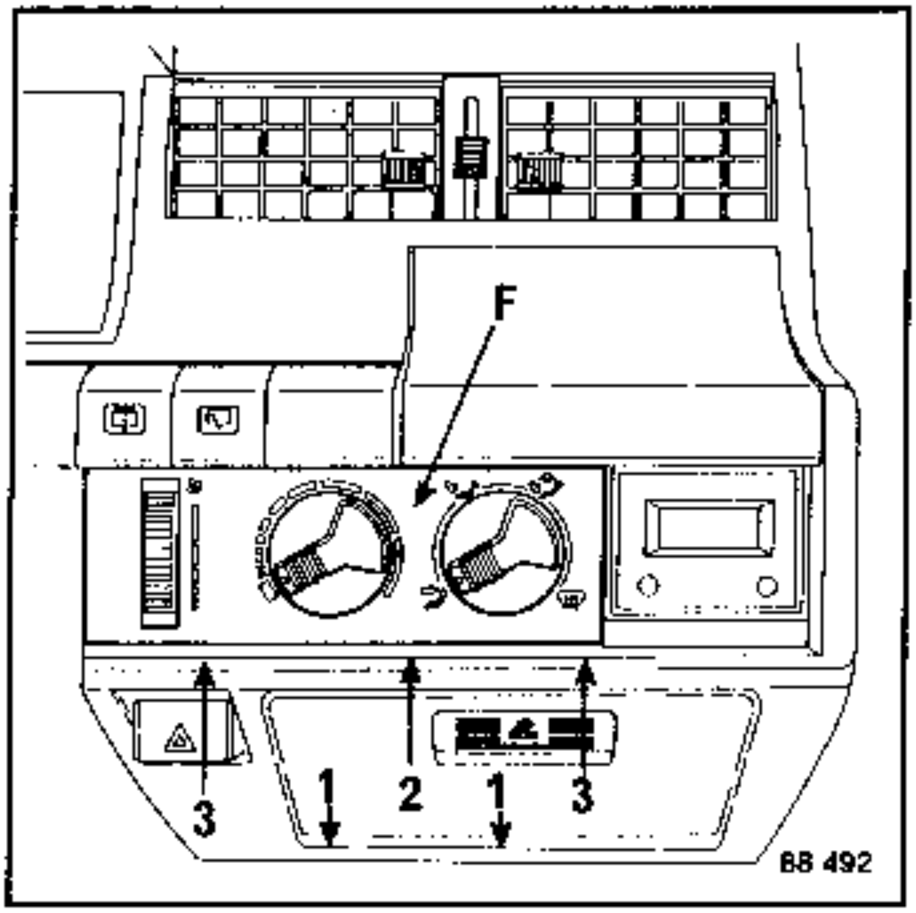
REFITTING

Position the motor so that its lugs (1) enter their locations (2).



REMOVING

Disconnect the battery then, depending on the version :



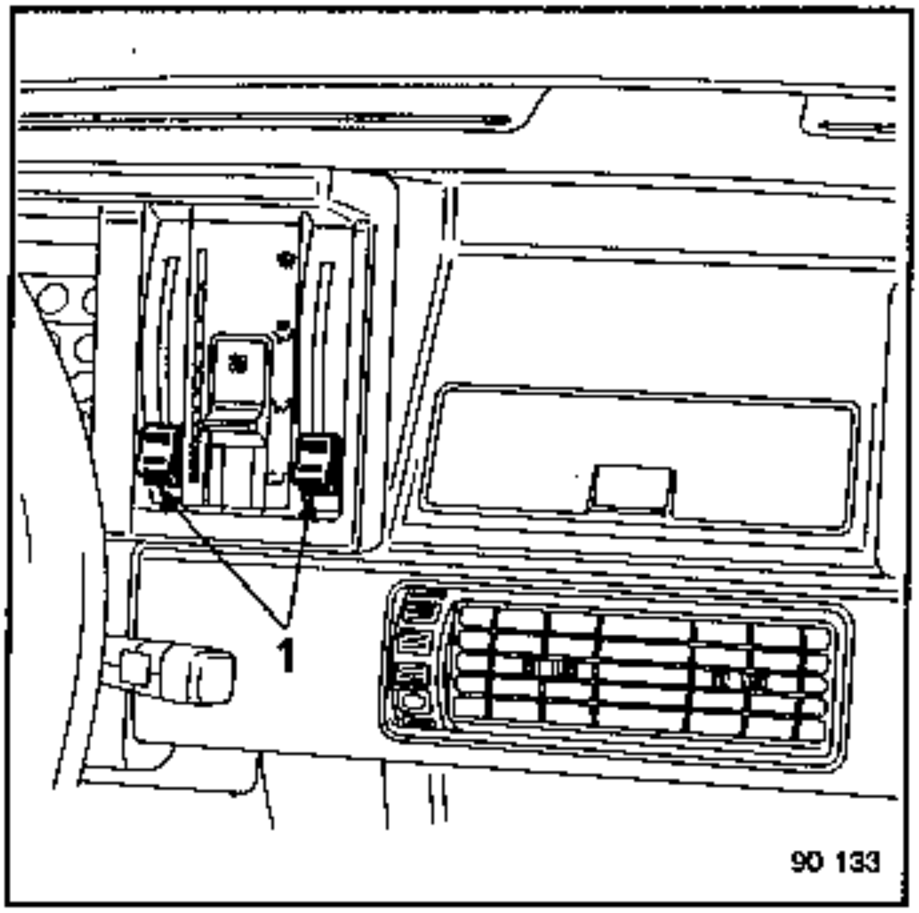
Open the ashtray.

Remove :
- the two screws (1),
- the ashtray,
- the screw (2).

Unclip the two clips (3) and push the front panel (F) into the fascia panel (do not disconnect the control cables).

Remove the fascia panel lower fastenings (see section "80") and slightly lift the panel.

Remove the cable or cables.



Remove :

- the visor.
- The instrument panel (see section "80").
- The lower screw from the control unit.

Disconnect the control cables from the air distribution casing (slightly lift the fascia panel to do so).

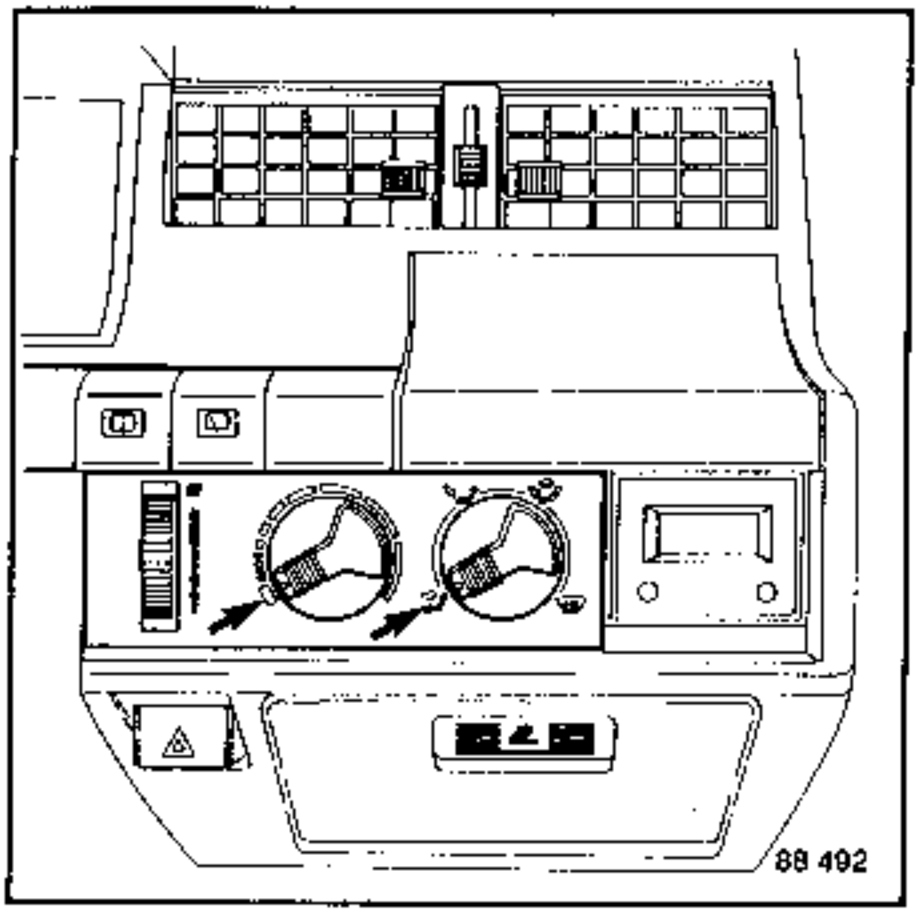
Free all the controls from the distribution casing and disconnect the blower fan switch.

REFITTING

Refitting is a straight forward operation.

ADJUSTING

Place the controls in the following position.



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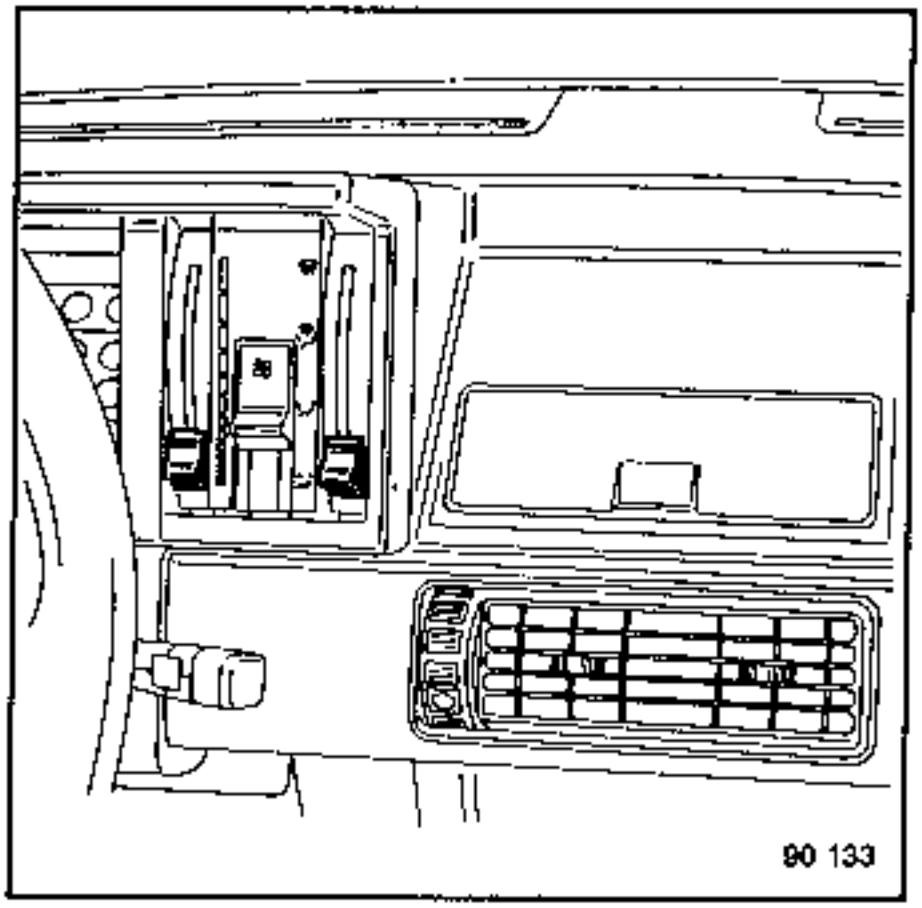
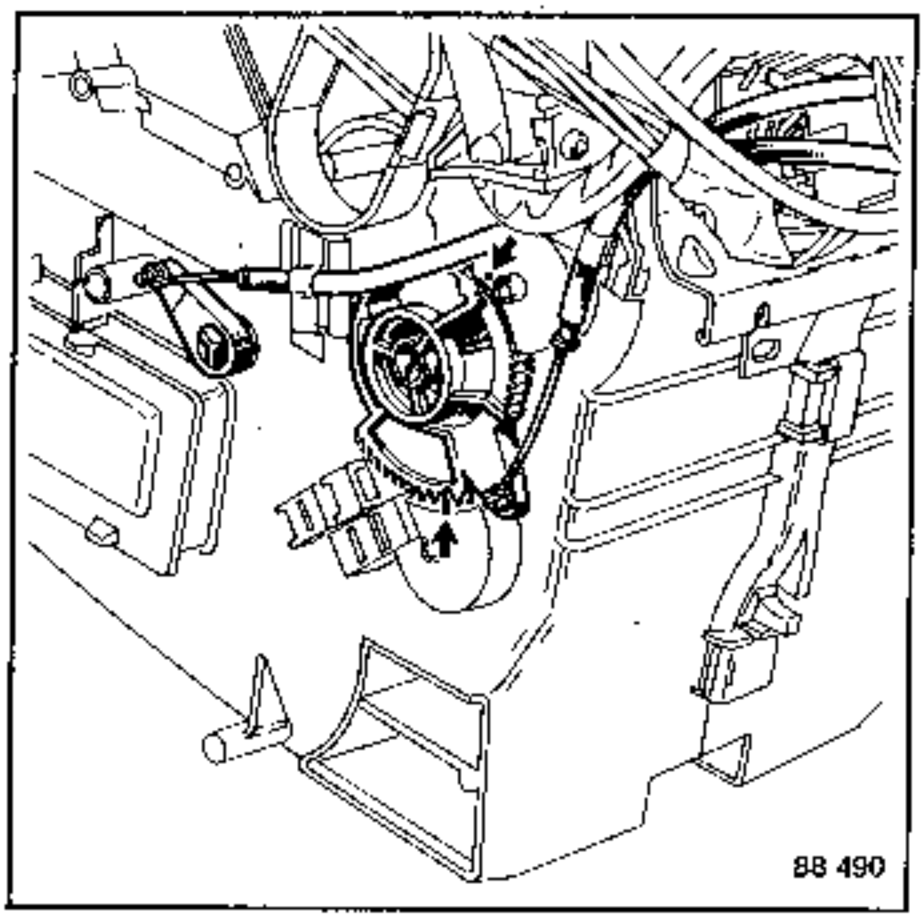
or



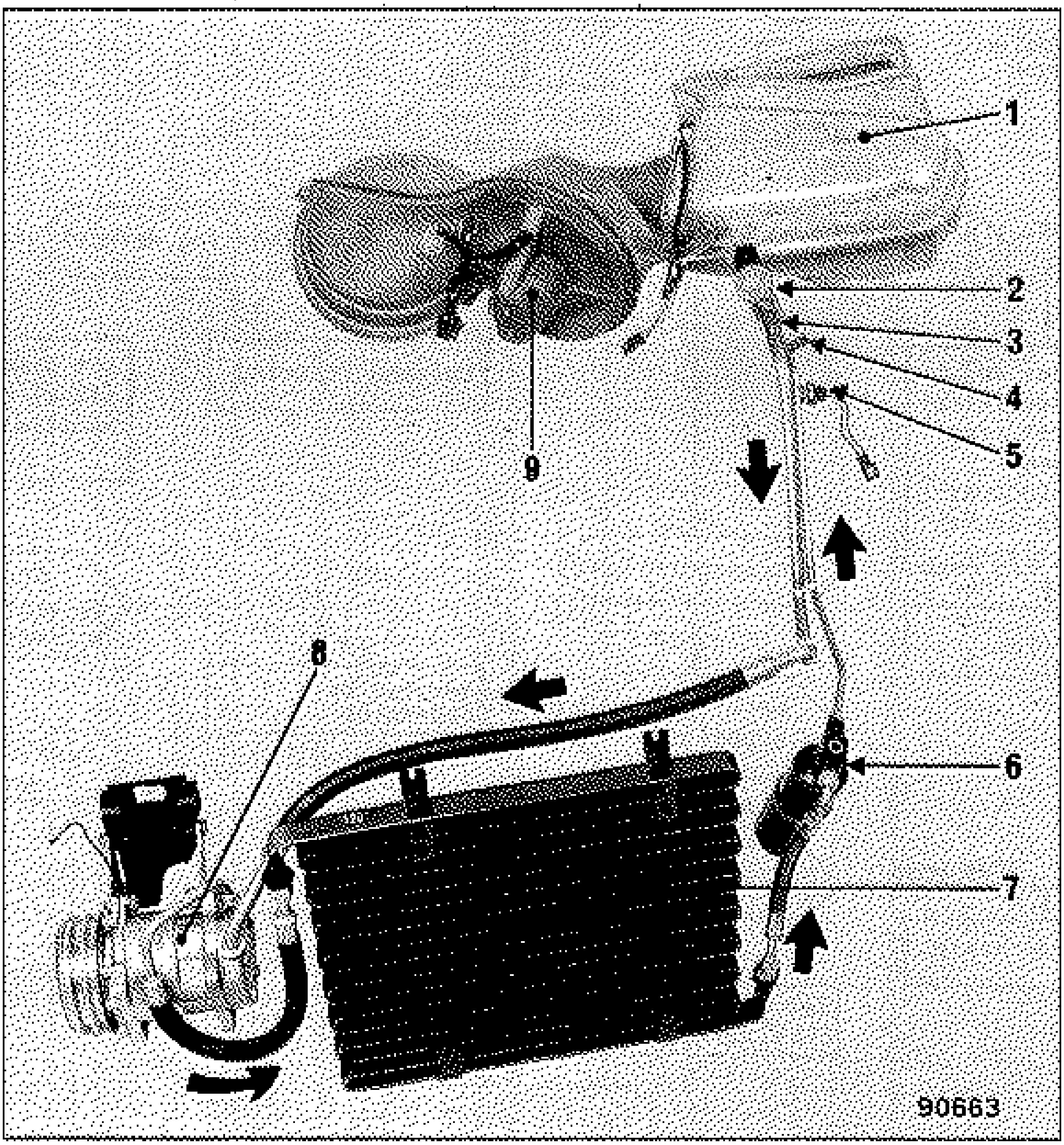
90 133

Align the position marks.



88 490

Clip the cable cover ends in place.



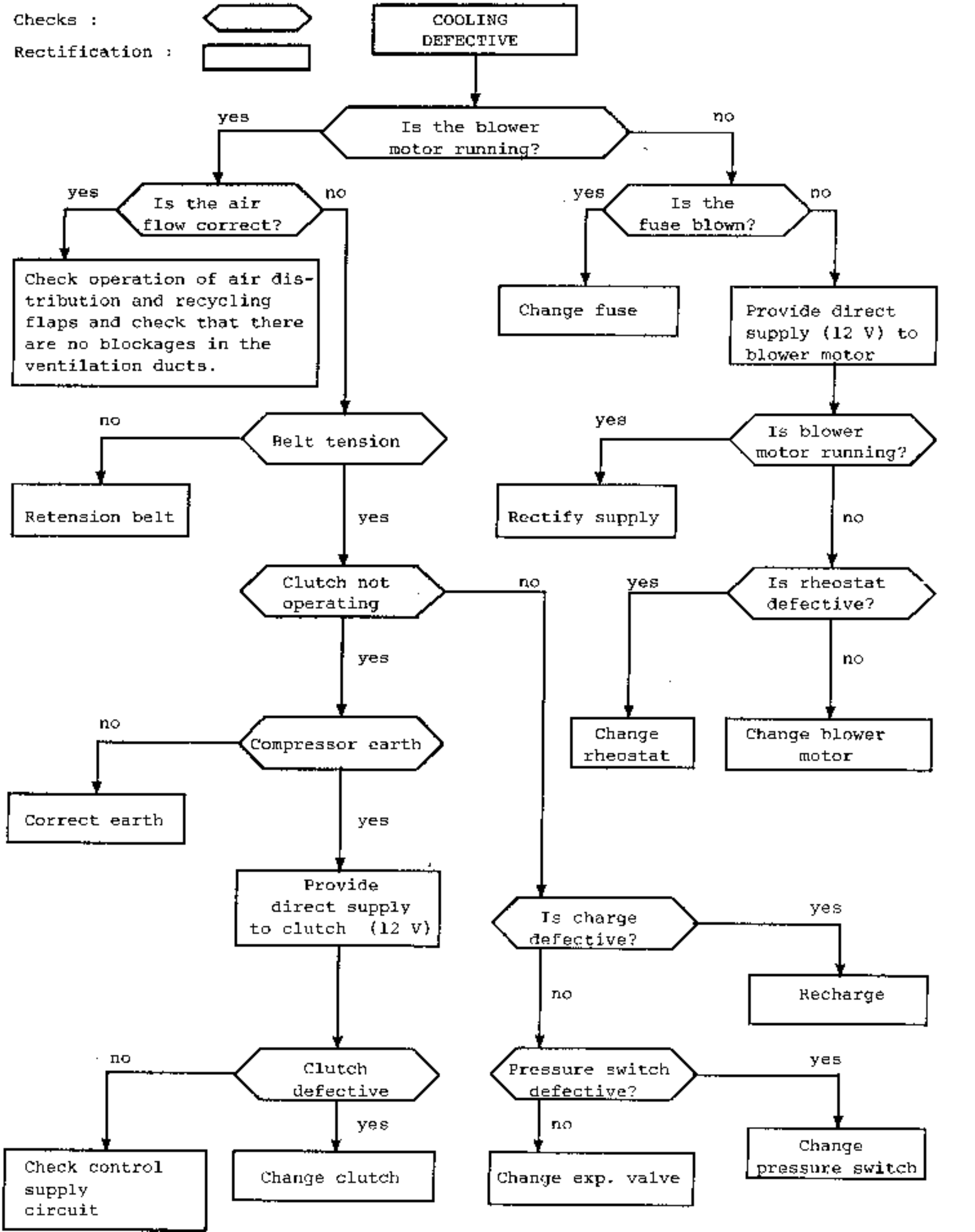
1 – Evaporator
2 – Expansion valve
3 – Low pressure bleed
4 – High pressure bleed
5 – Pressure switch
6 – Dryer bottle
7 – Condensor
8 – Compressor
9 – Fan unit

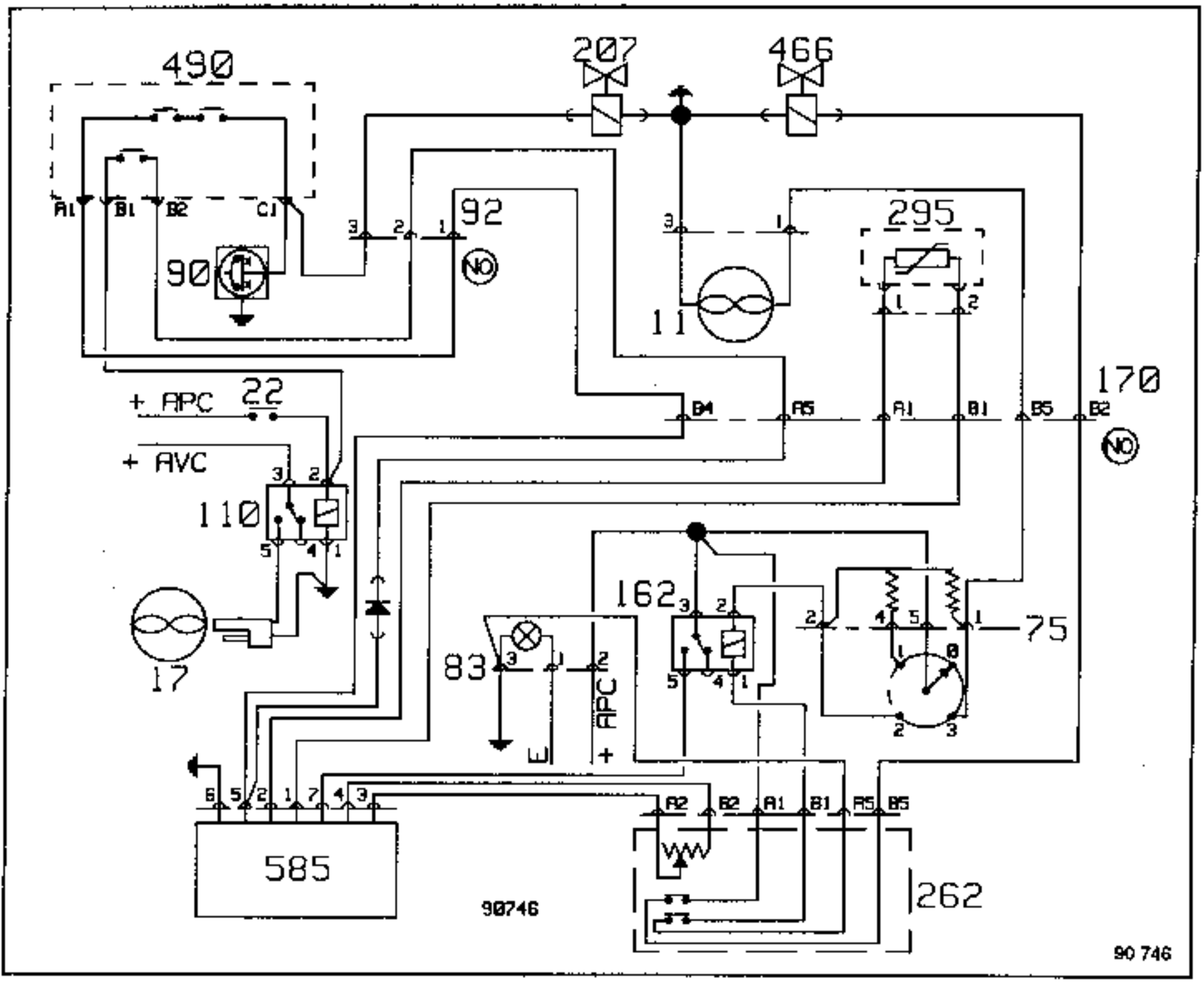
Air conditioning refrigerant gas :
use only freon R12 (R12 refrigerant)
750 to 800 gr.

Compressor oil :
ELFrima 100

Compressor :
SANKYO SD 508

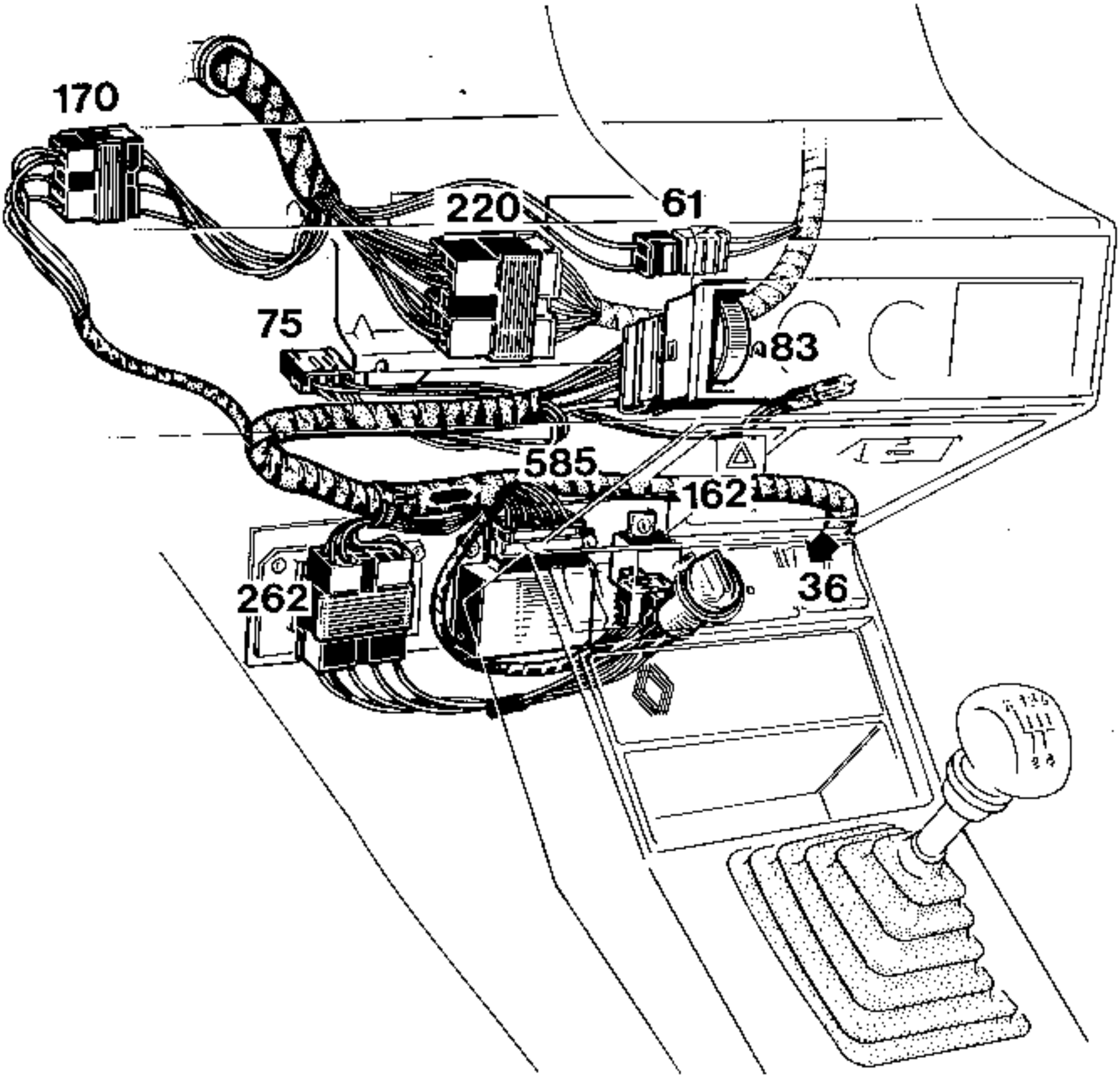
Expansion valve :
SINGER 1-5 TON


Checks :
Rectification :
COOLING DEFECTIVE
Is the blower motor running?
yes
no
Is the air flow correct?
yes
no
Check operation of air distribution and recycling flaps and check that there are no blockages in the ventilation ducts.
Is the fuse blown?
yes
no
Change fuse
Provide direct supply (12 V) to blower motor
Belt tension
no
Retension belt
yes
Is blower motor running?
yes
Rectify supply
no
Clutch not operating
no
yes
Is rheostat defective?
yes
no
Change rheostat
Change blower motor
Compressor earth
no
Correct earth
yes
Provide direct supply to clutch (12 V)
Is charge defective?
yes
Recharge
no
Clutch defective
no
Check control supply circuit
yes
Change clutch
Pressure switch defective?
no
Change exp. valve
yes
Change pressure switch

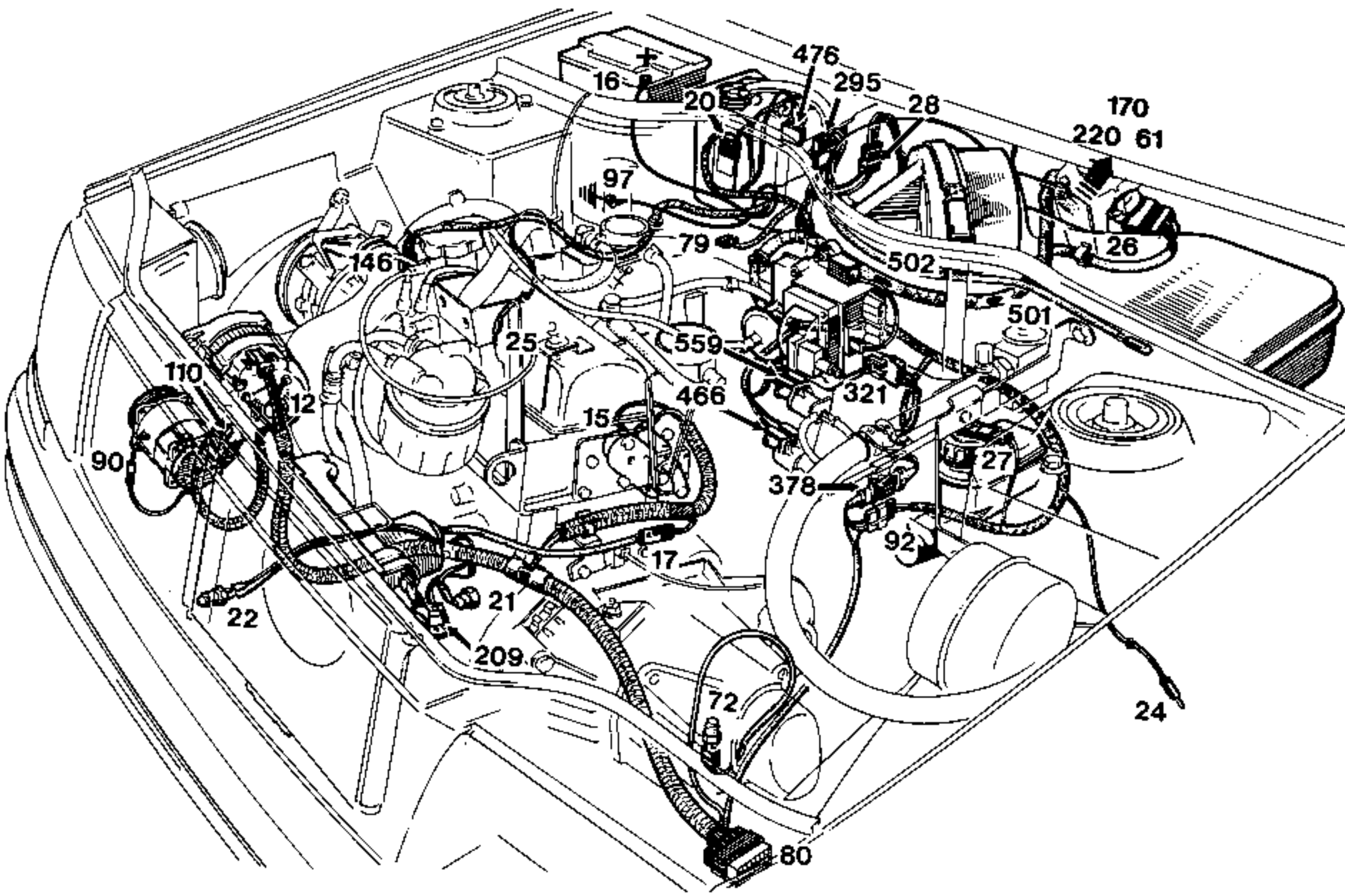


11 - Air conditioning blower fan
17 - Cooling fan
22 - Fan control temperature switch
75 - Heater blower switch
90 - Air conditioning compressor
92 - Connection to air conditioning wiring (engine end)
110 - Relay for cooling fan (17)
162 - Air conditioning relay
170 - Connection to air conditioning wiring
207 - Anti-stall solenoid valve
262 - Air conditioning control
295 - Evaporator sensor
490 - Air conditioning pressure switch
466 - Recycling flap solenoid valve
585 - Air conditioning control module
+AVC - + Before ignition switch
+APC - + After ignition switch
E - Lighting

NOTE : The fan unit 17 only operates when 22 or 490 are closed.



90 644-28


476
295
16
20
28
170
220 61
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79
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501
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559
110
12
321
466
15
90
27
378
92
17
22
21
209
72
24
80

90 644-27

CHECKING

Pressure sensors

A pressure switch (5) monitors the minimum and maximum operating pressures in the coolant circuit.

- Low pressure shut-off threshold 2 bars.
- High pressure shut-off threshold 28 bars.
- High speed operating threshold for electric fan (17) 19 bars (on certain versions).

(The quantity of freon in the circuit must be correct).

Pressure drop pressure switch (electric)

Carried out either on the vehicle or after removal.

- On the vehicle (with the engine running) using the refrigerant charging equipment.
- With the pressure switch removed using compressed air and a pressure gauge.
  The contacts should be closed at pressures above 2 bars.

Excess pressure switch (electric)

- On the vehicle (with the engine running) using the refrigerant charging equipment.
  The contact should be closed at pressures below 28 bars.
- On the vehicle (with the engine running at more than 4 500 rpm).
  The contact should be permanently closed.

CHECKING

The potentiometer

Disconnect the connector from control module 585.

Connect an ohmmeter across terminals 3 and 4 on the control module connector.

The resistance should vary from 0 to 10Ωk .

Thermistor sensor

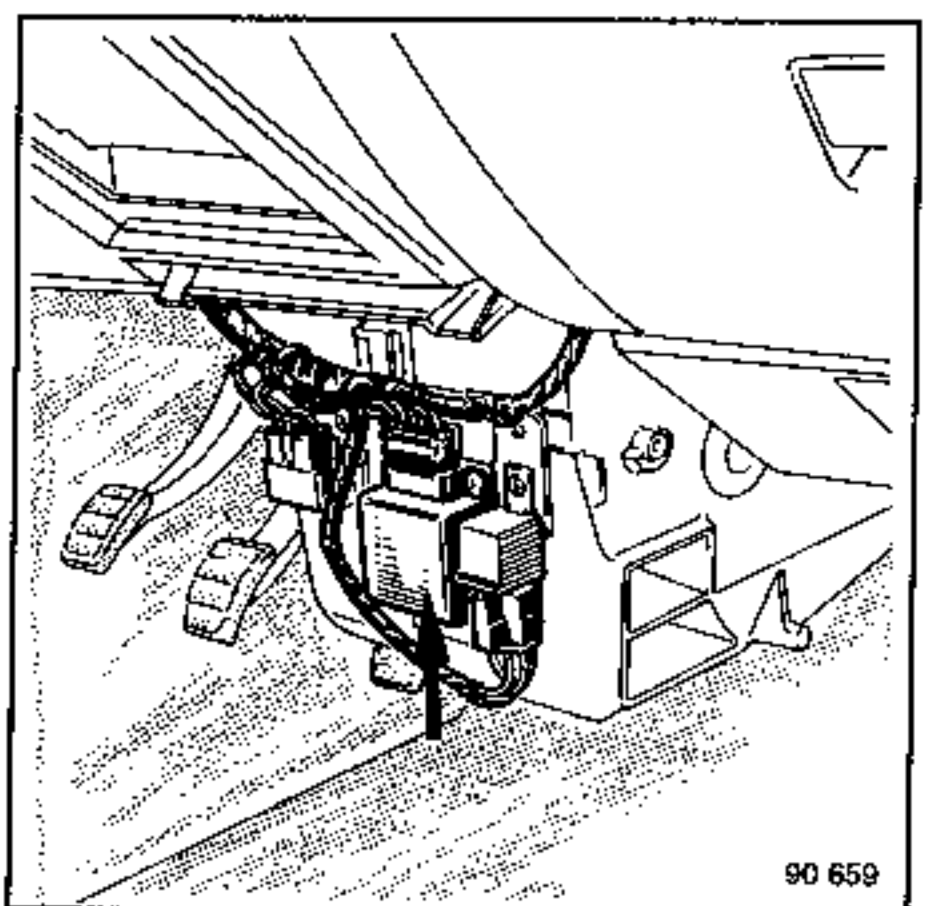
Disconnect the connector from the control module.

Connect an ohmmeter across terminals 1 and 2 on the control module connector.

Take the temperature at the sensor and check the resistance against the chart below :

10°C	10 000 Ω
15°C	7 500 Ω
20°C	6 000 Ω
25°C	4 750 Ω
30°C	4 000 Ω
35°C	3 000 Ω

Position of control module



ESSENTIAL SPECIAL TOOLS	
Ele.346-04	Belt tension tester

REMOVING - REFITTING

The cold air blower unit is in the water casing.

When carrying out any mechanical repair operations, we strongly recommend that the compressor or the condenser and its bottle should be removed so as not to damage one of the air conditioning components.

CONDENSER + DRYER BOTTLE

Disconnect the battery.

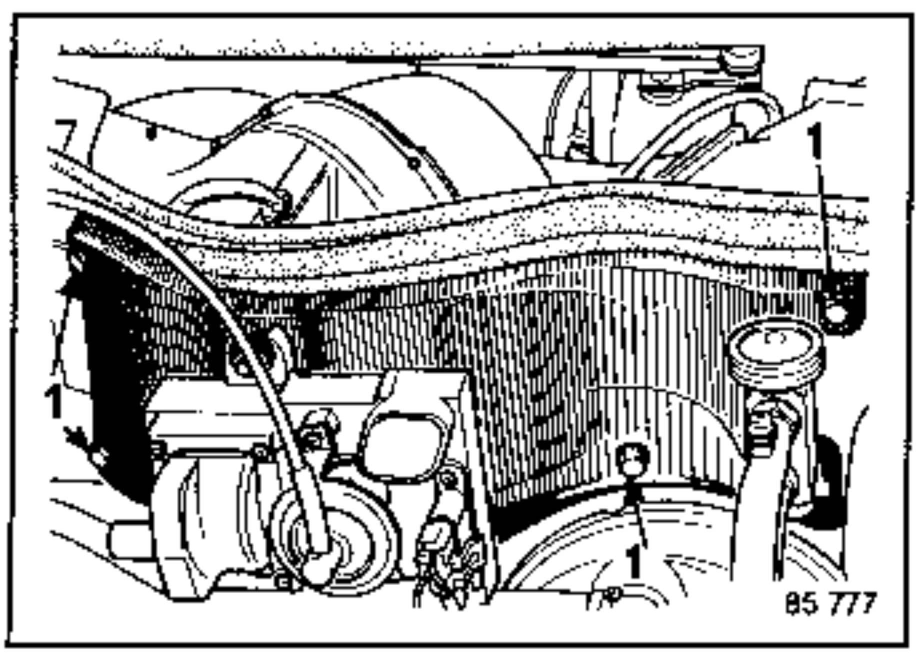
Lift up the radiator.

Free the condenser.

EVAPORATOR

Disconnect the connectors from the ignition unit.

Remove the 5 screws (1) that secure the water casing partition in place.

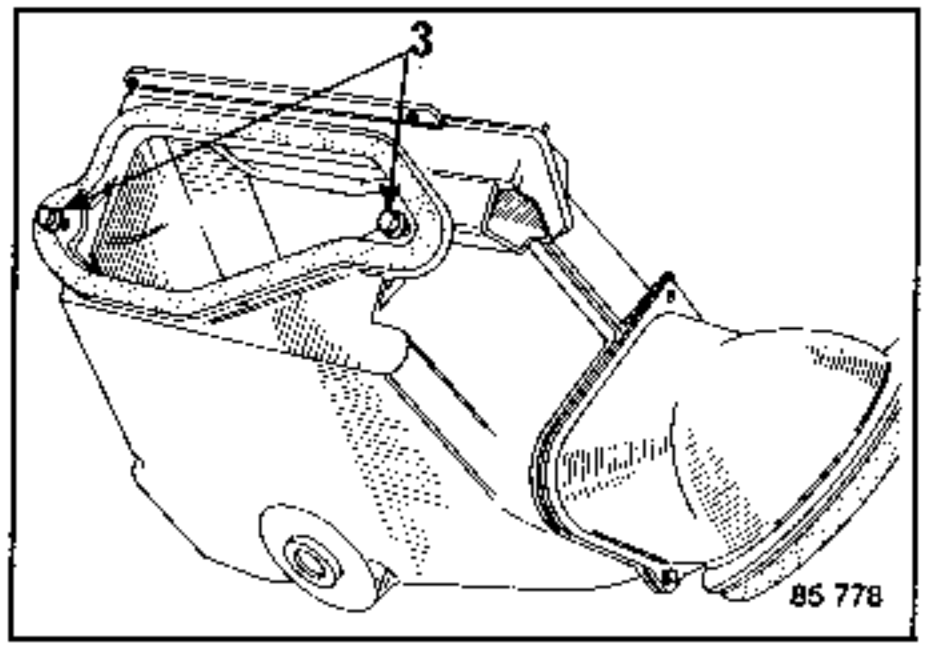


Remove the screw that secures the evaporator to the partition.

Remove the 2 screws that secure the evaporator (3) (these screws are accessible from inside the vehicle).

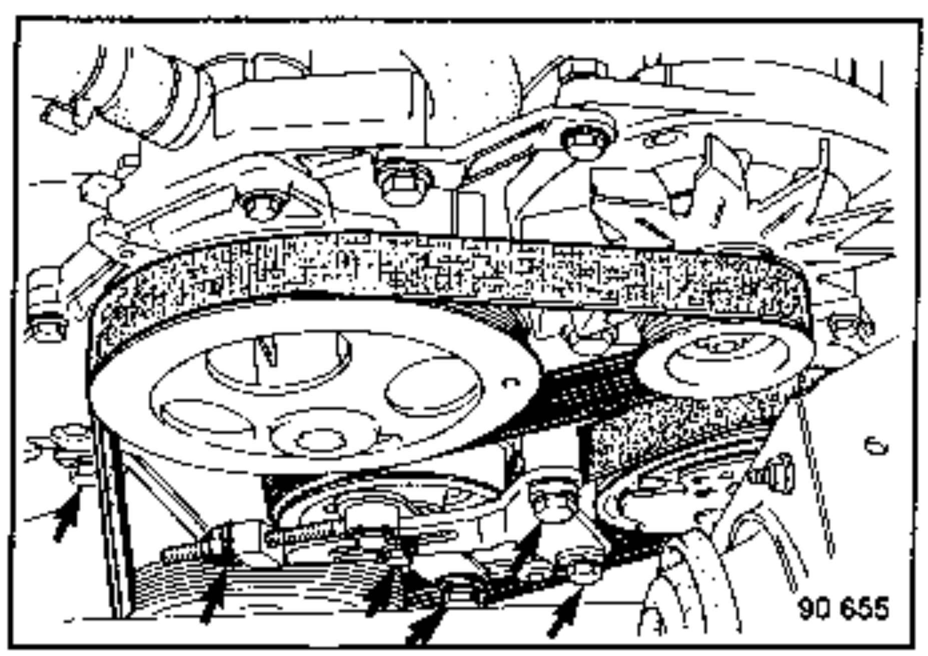
Unscrew the refrigerant pipe unions if necessary.

Take out the evaporator.



COMPRESSOR

Release the tension from the engine accessory drive belt (see section "19").



Remove the alternator.

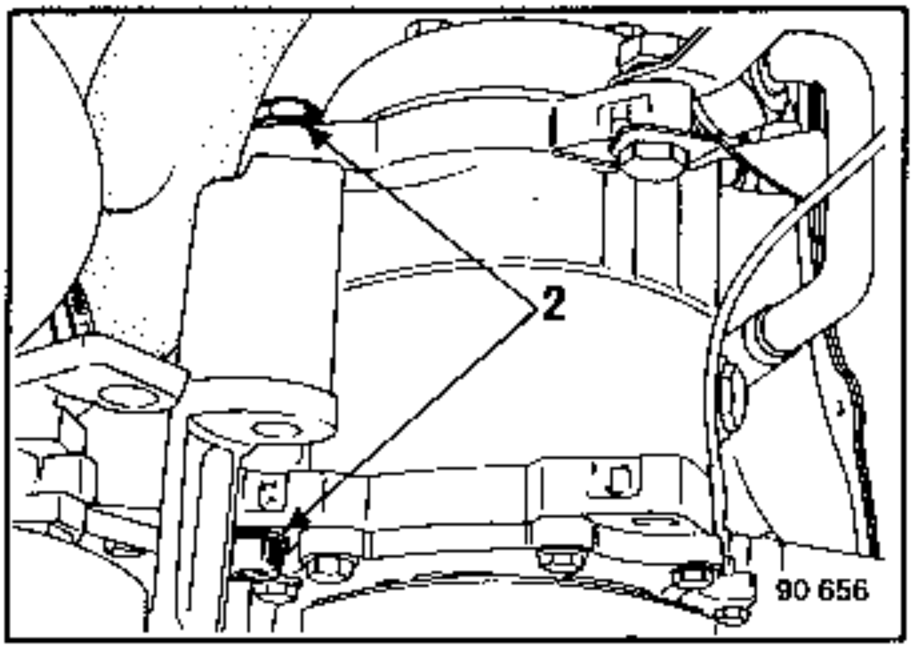
Remove the right hand side protector.

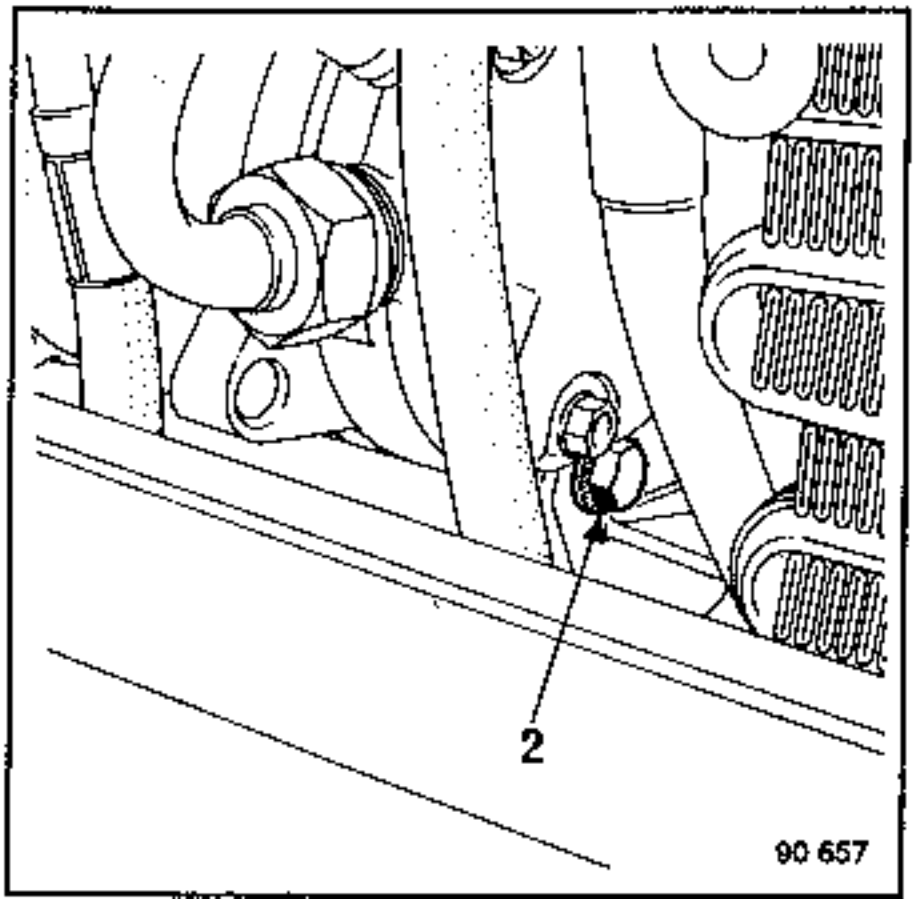
Remove the radiator grille.

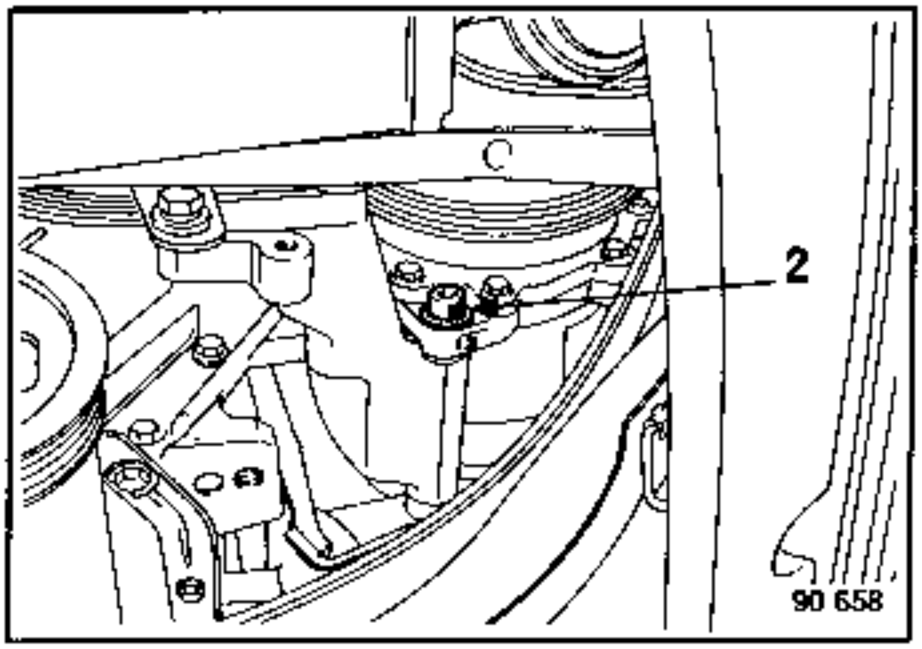
REMOVING - REFITTING

Remove the front right hand protector.

Remove the 4 bolts that secure the compressor (2) to its support.





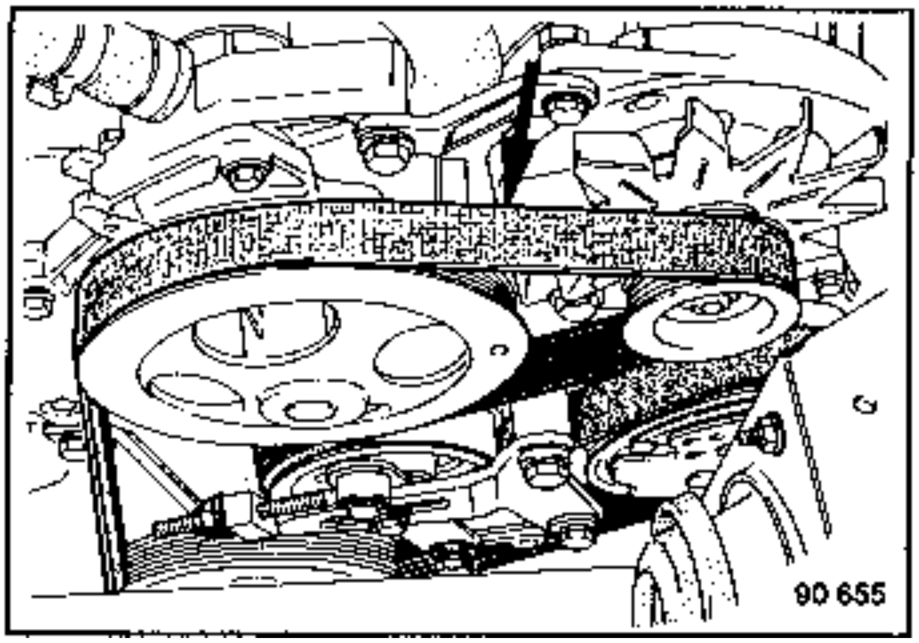


Unscrew the unions on the refrigerant pipes if necessary.

Remove the compressor.

BELT TENSION

3 to 4 mm when the belt is cold after the belt has been running for 1 minute, using Ele.346-04.



REMOVING - REFITTING

Special operations involved in fitting

Grease the battery posts before fitting the terminal rings.

Tightening torque for nut on positive ring : 0.5 daN.m.

Tightening torque for battery isolator : 0.3 daN.m.

Battery fastenings : 1 daN.m.

FOR B/C/S 40 VEHICLES

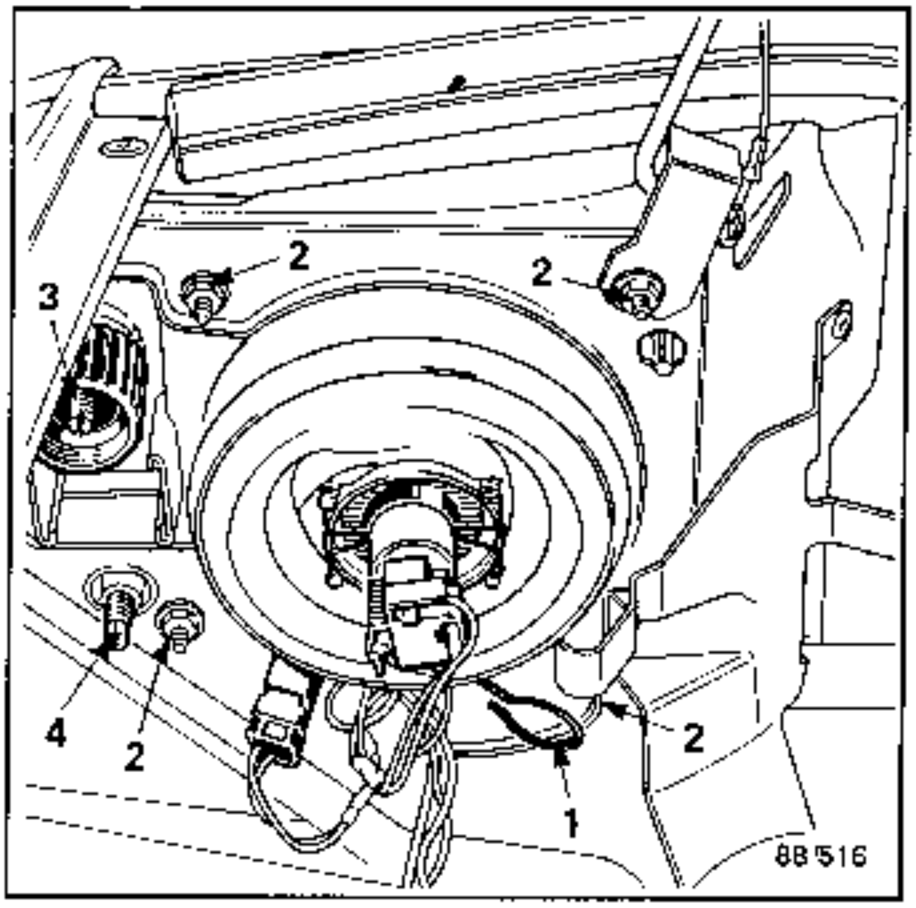
REMOVING - REFITTING

Disconnect the connectors.

Remove :

- the radiator grille and the three upper screws, unclip the bottom end,
- the direction indicator light by lifting the spring (1) and pulling forwards.
- the nuts (2).

Take out the beam unit.



Special operations during refitting

After refitting the beam units, they must be adjusted.

Adjusting :

Ensure that there is nothing in the vehicle.

The adjusting lever must be in the "vehicle unladen" position.

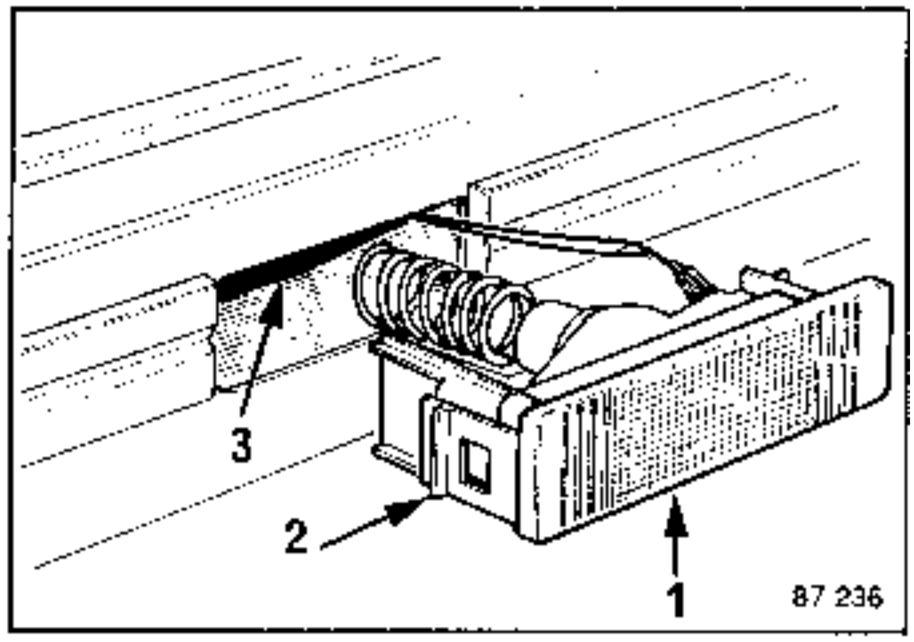
Turn screw (3) to adjust the height of the beam.

Turn screw (4) to adjust the beam laterally.

FOR F40 VEHICLES

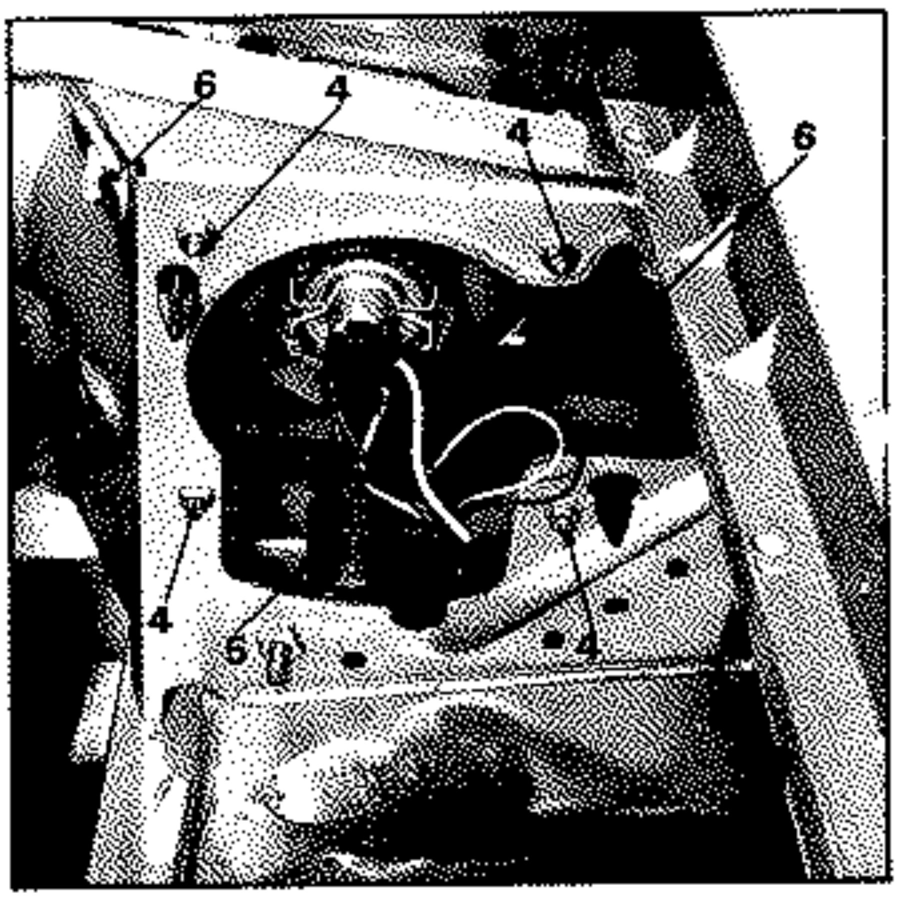
Remove :
- the direction indicator lights.

Press lightly on (1) and free the tab (2) with a thin blade.



- Screw (3) at the bottom of the direction indicator location.
- The radiator grille upper fastenings.
- The radiator grille.
- The nuts (4).

Take out the beam unit.



Special operations during refitting

After refitting the beam units, they must be adjusted.

Adjusting :
- Ensure that there is nothing in the vehicle and that the adjusting lever is in the "vehicle unladen" position.
- Turn screw (5) to adjust the height of the beam.
- Turn screw (6) to adjust it laterally.

ON B/C/S VEHICLES

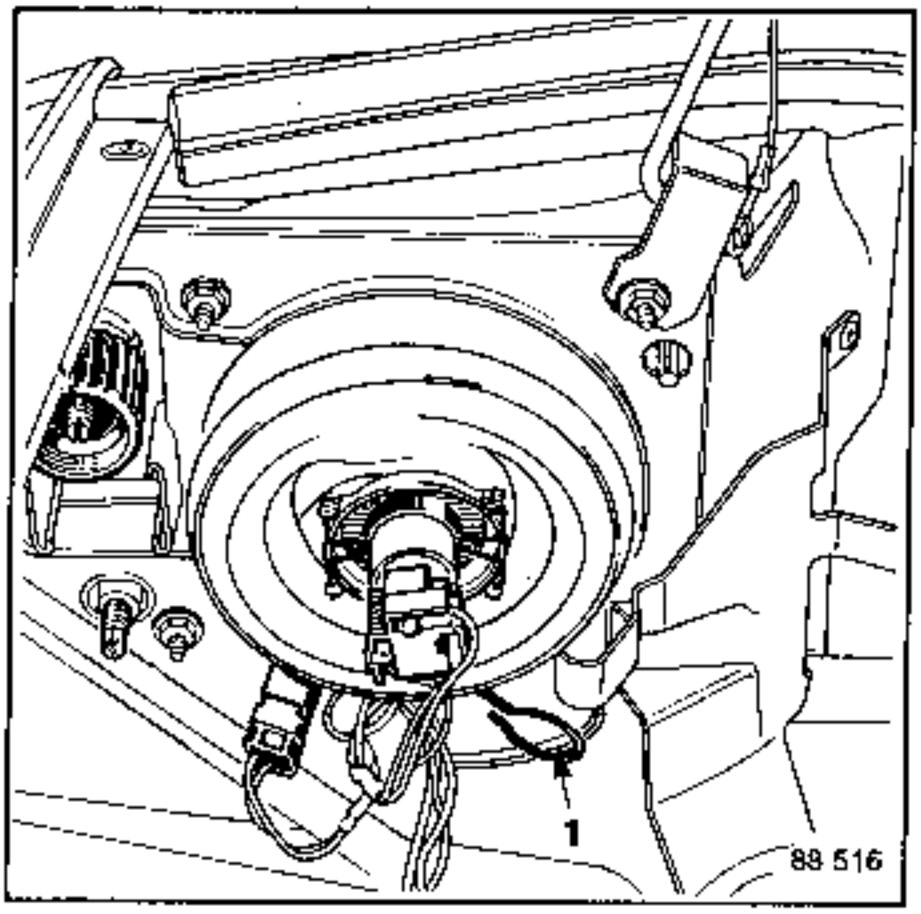
REMOVING - REFITTING

Free the spring (1).

Take out the light by pulling it forwards.

Special operations during refitting

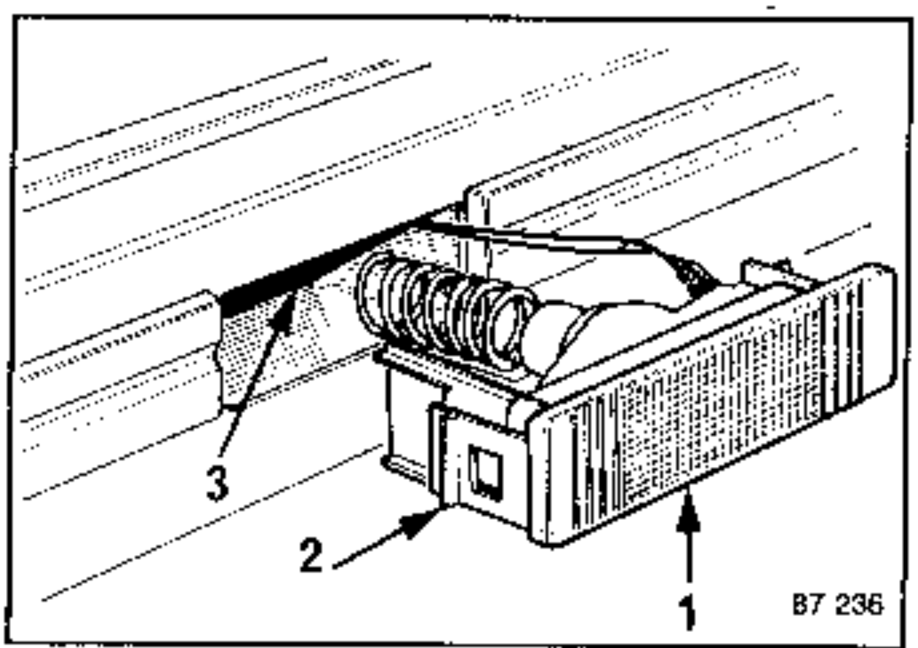
Ensure that the lugs at the bottom of the beam unit are correctly positioned.



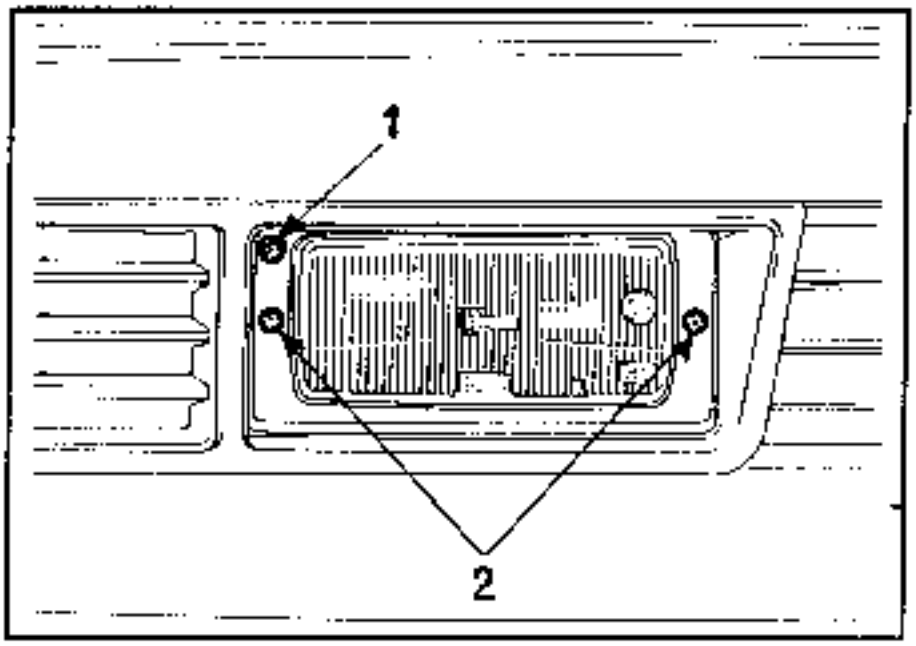
ON F40 VEHICLES

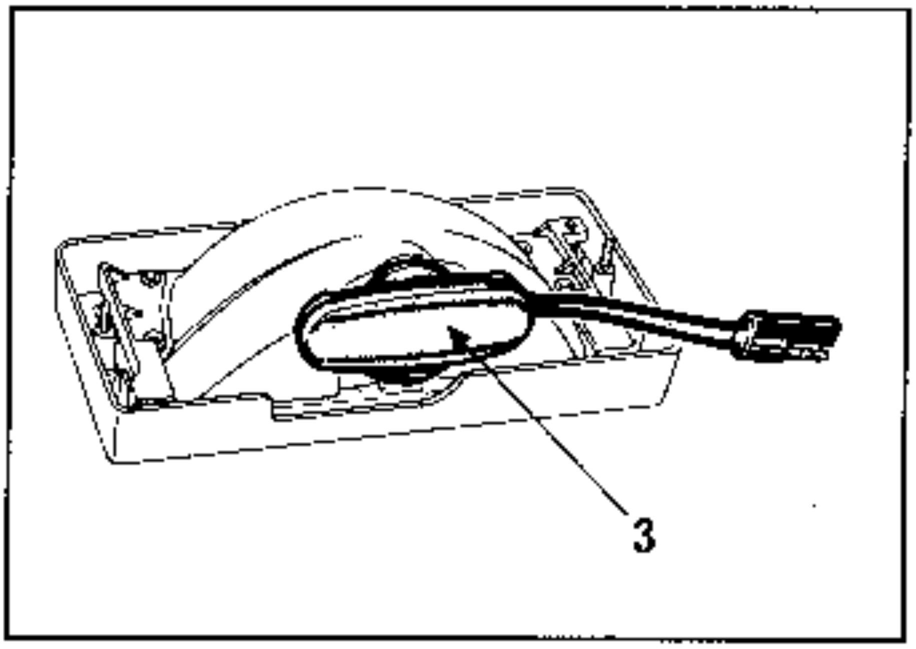
REMOVING

To remove the direction indicator lights, press lightly on (1) and free the lug (2) with a thin blade.



For vehicles fitted with foglights.





REMOVING

- Unscrew the securing screws (2).
- Remove the beam unit forwards.
- Disconnect the two wires.

Replacing the bulb

- Turn the bulb holder (3) through a quarter of a turn and remove it.
- Take out the bulb.
- Holding the new bulb with a cloth or piece of paper, slide it into its support.

Adjusting the Foglight

Adjust the height of the beam at screw (1).

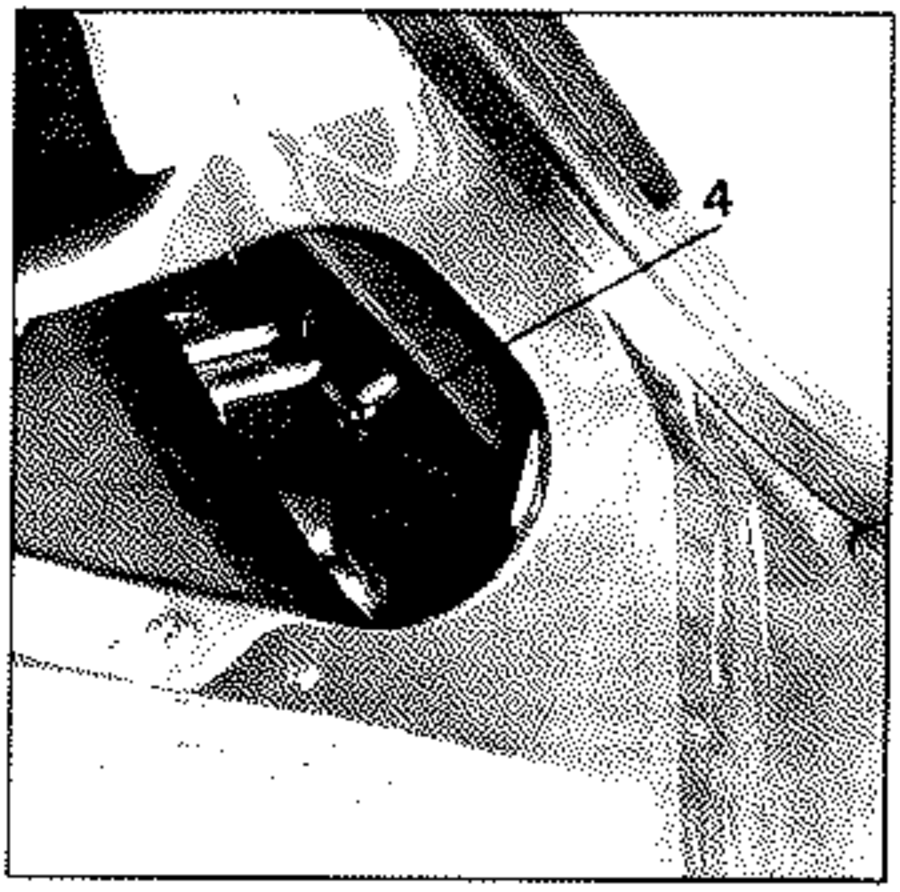
ON B/C/S 40 VEHICLES

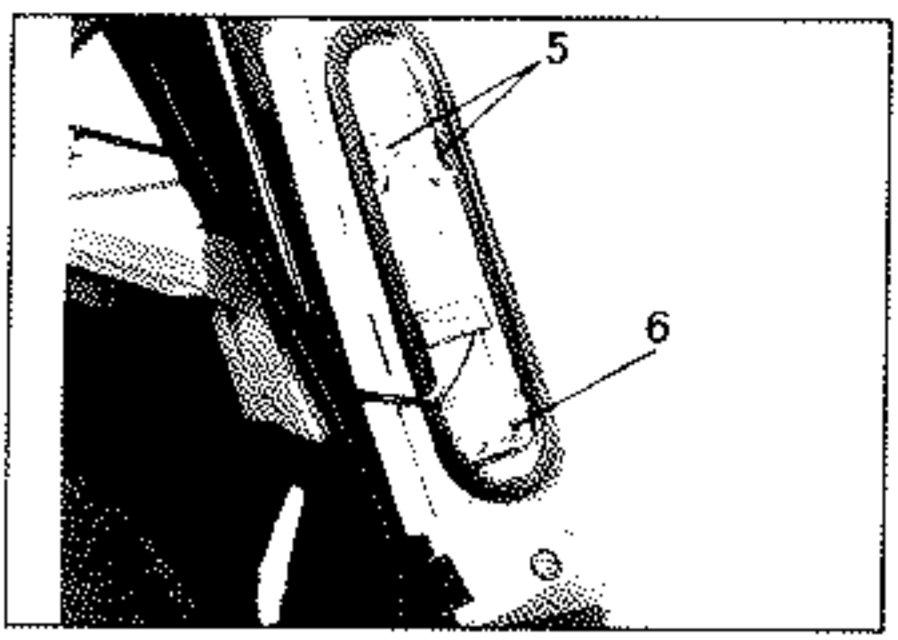
REMOVING - REFITTING

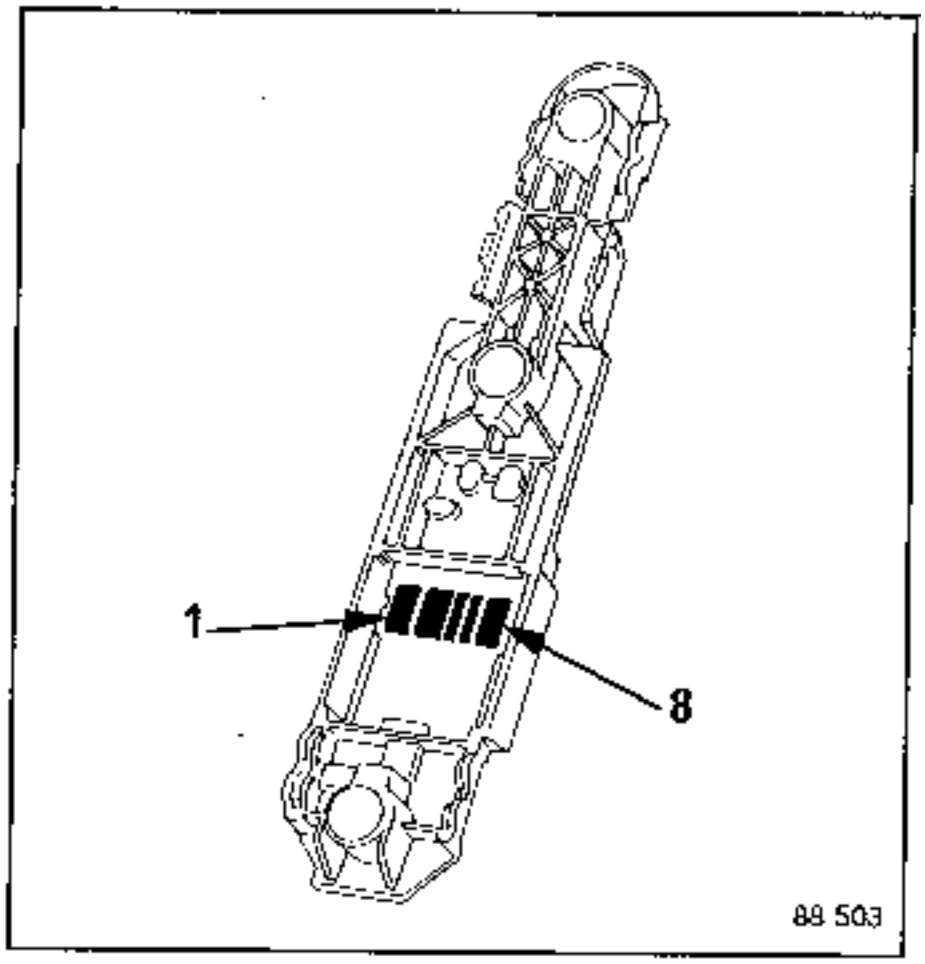
Unscrew the wing nut (4) from inside the boot.

Free the light unit (1) and turn it over.

Press the two plastic hooks (5) to separate the bulb holder from the reflector.







88 503

RIGHT HAND CONNECTOR

Pin	Description
2	Stop light supply
4	Rear RH light supply
5	Rear RH dir. ind. supply
6	Reversing light (LHD*) rear foglight (RHD*)
7	Rear RH light earth

LEFT HAND CONNECTOR

Pin	Description
2	Stop light supply
4	Rear LH light supply
5	Rear LH dir. ind. supply
6	Rear foglight (LHD*)/reversing light (RHD*)
7	Rear LH light earth

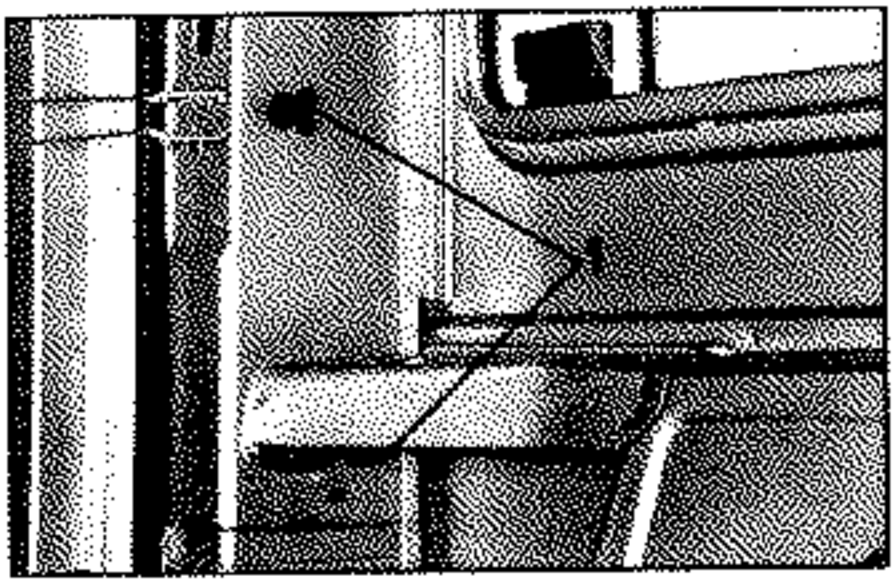
*LHD = Left hand drive
RHD = Right hand drive

ON F40 VEHICLES

REMOVING - REFITTING

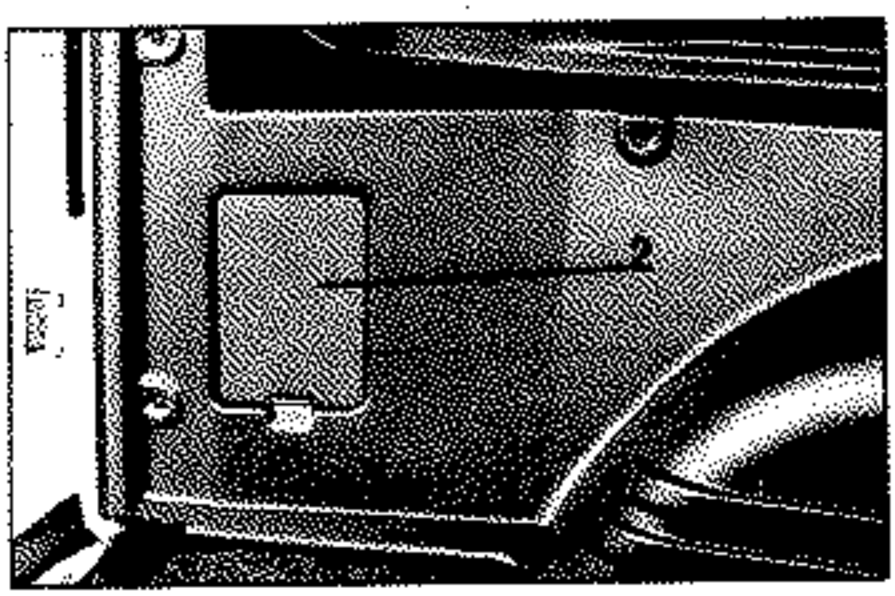
Versions without interior trim

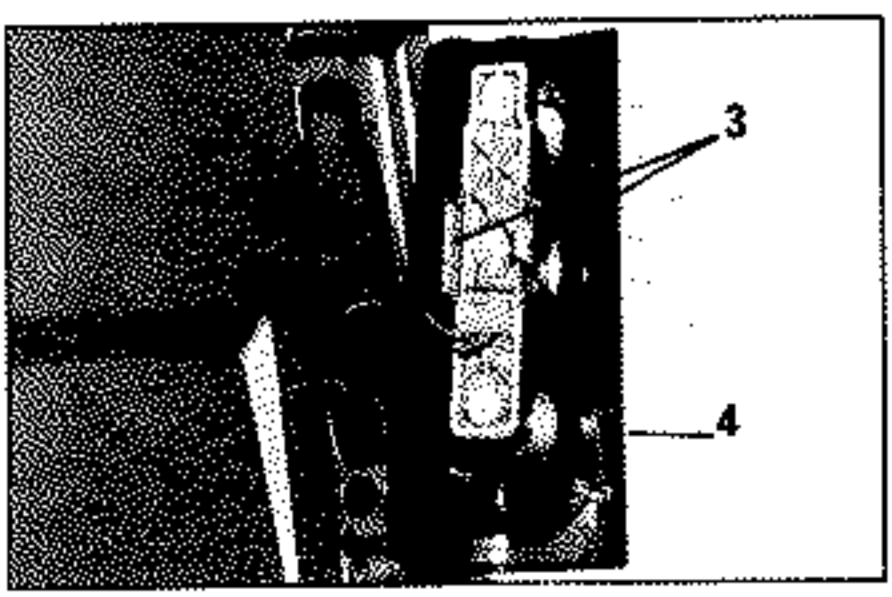
Unscrew the two nuts (1) inside the boot.



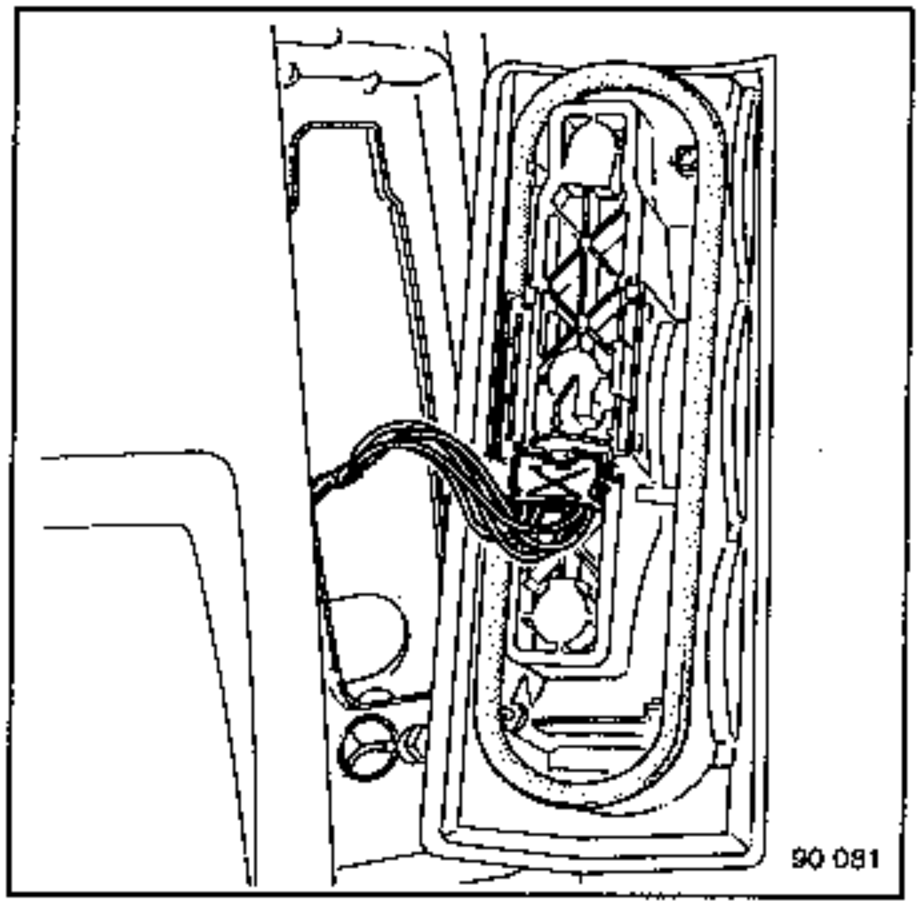
Versions with interior trim

Unclip cover (2) to gain access to the lower nut (1).





Free the light unit (4) and turn it over. Press the two plastic hooks (3) to separate the bulb holder from the reflector assembly.



RIGHT HAND CONNECTOR

Pin	Description
2	Stop light supply
4	Rear RH light supply
5	Rear RH dir. ind. supply
6	Reversing light (LHD*)/rear foglight (RHD*)
7	Rear RH light earth

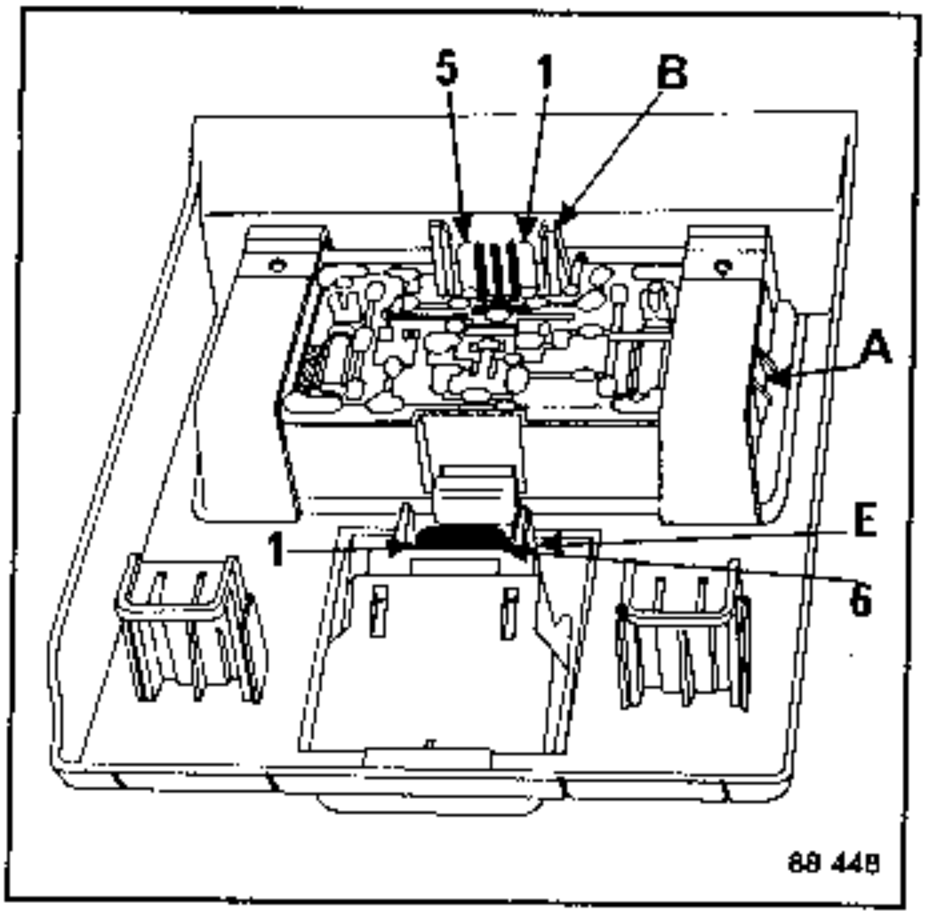
LEFT HAND CONNECTOR

Pin	Description
2	Stop light supply
4	Rear LH light supply
5	Rear LH dir. ind. supply
6	Rear foglight (LHD*)/reversing light (RHD*)
7	Rear LH light earth

*LHD = Left hand drive
RHD = Right hand drive

REMOVING

Release the tabs (A) to take out the interior lights.



INTERIOR LIGHT CONNECTOR (B)
Without IRC*

Pin	Description
1	Interior light earth
2	Interior light + before ig.switch
3	Door switch signal

With IRC*

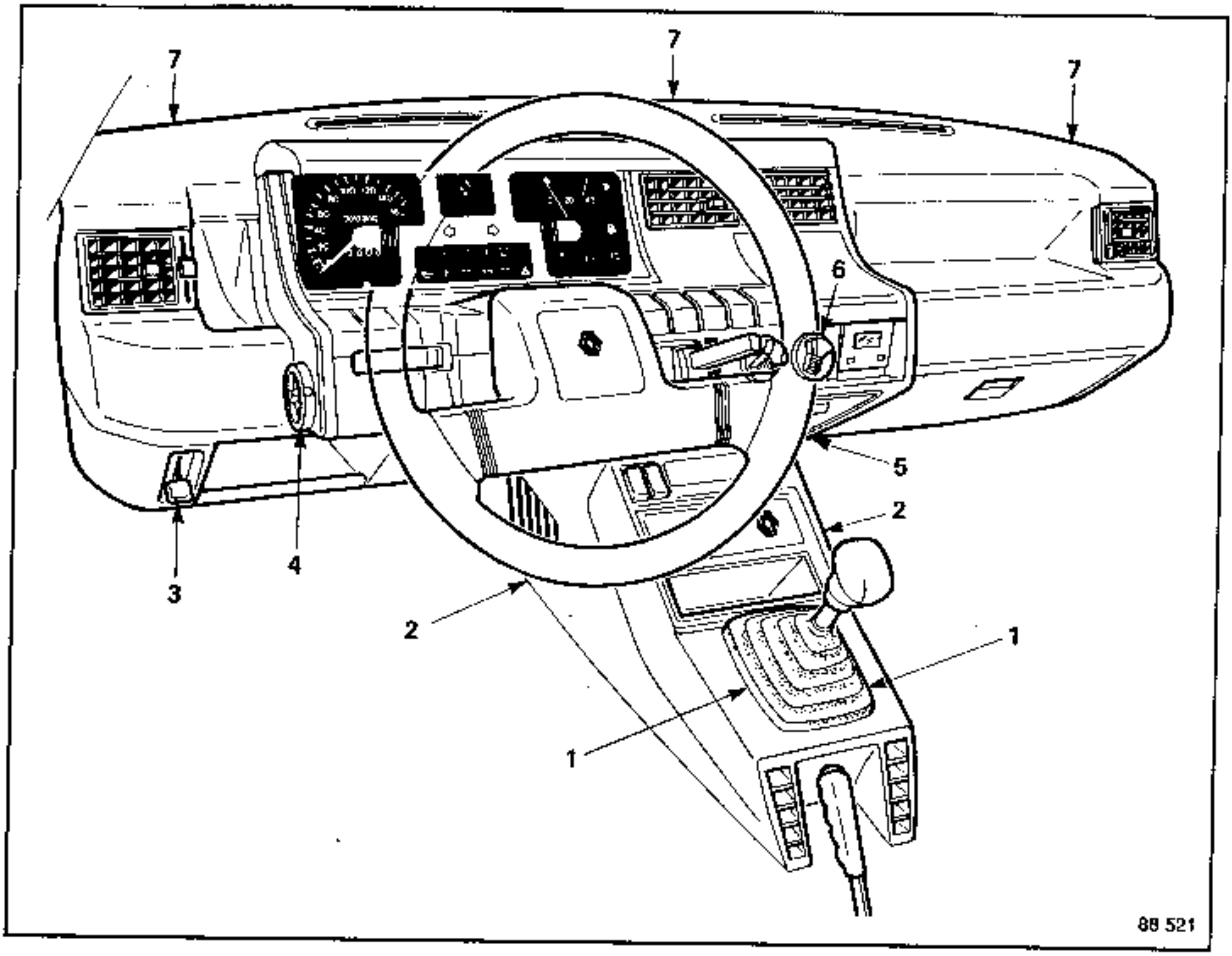
Pin	Description
2	Earth
3	+ before ignition switch
4	Door switch signal

IRC* CONNECTOR (E)

Pin	Description
1	Earth
2	EDLC* opening command
4	EDLC* closing command
6	+ before ignition switch

* IRC = Infra red control
EDLC = Electric door lock control

1st type fascia panel :



REMOVING

Disconnect the battery.

Remove (depending on the version) :

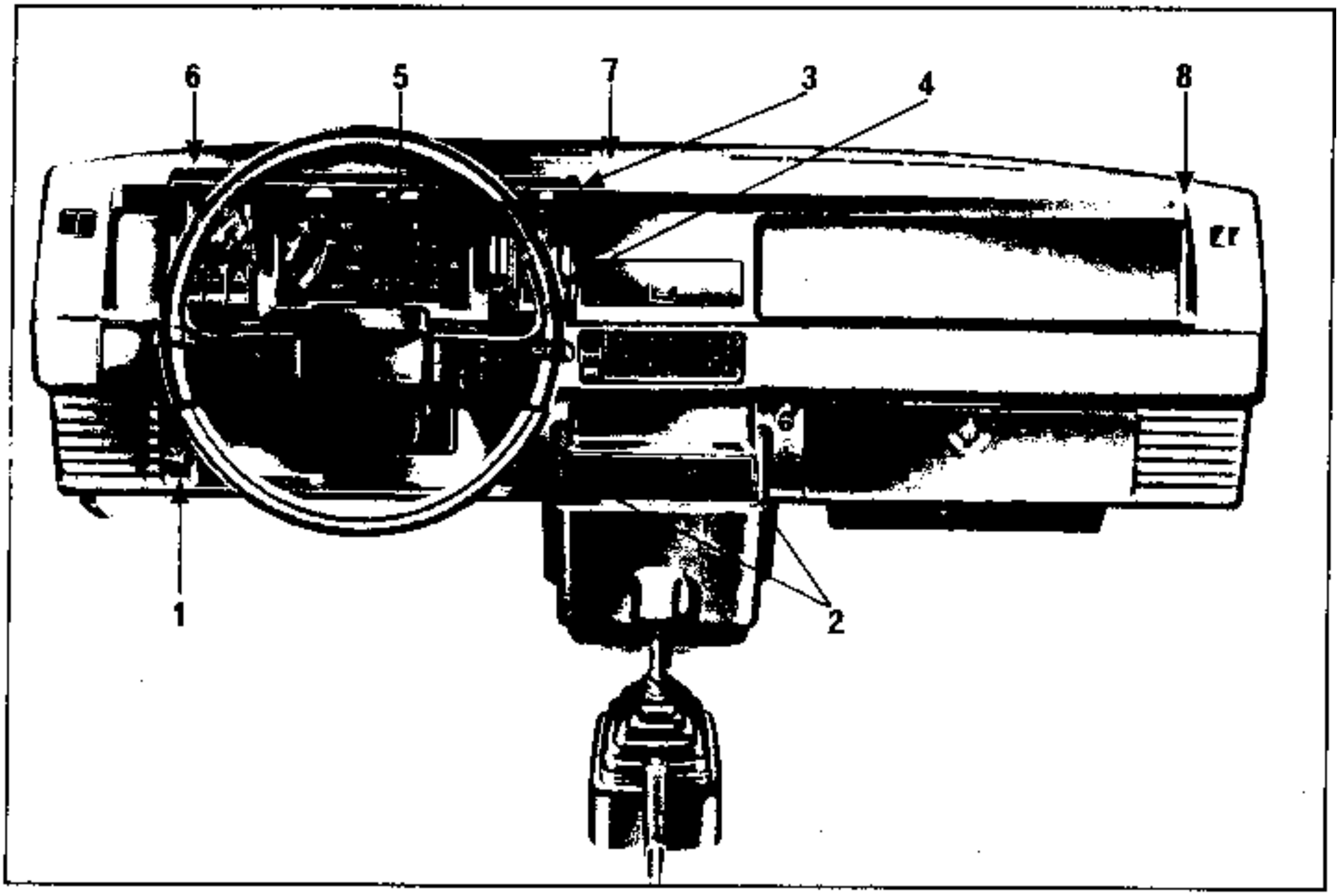
- the console, two screws (1) under the gear shift boot and one screw (2) on either side,
- the choke control (3) (certain versions)
- the headlight adjusting knob (4) (certain versions),
- the two screws (5) from the ashtray,
- the heater controls (6) (see heating - air conditioning section),
- the RH and LH upper and lower body trim (see Bodywork Manual),
- the earth wires,
- the steering column (see "Front axle" section).

Disconnect the following connectors :

- rear RH and LH wiring,
- door switch,
- RH and LH door wiring,
- RH and LH side member wiring,
- heater wiring,
- stop switch wiring.

Remove the fascia panel vertically to free fastenings (7).

2nd type Fascia panel :



REMOVING - REFITTING

Disconnect the battery.

Remove (depending on the model) :

- the choke control (1),
- the two screws (2),
- the instrument panel visor (3),
- free the heater controls (4) (take out the lower screws and push it in to free the upper tabs),
- the RH and LH upper and lower body trim (see Bodywork Manual),
- the earth wires,
- the steering column,
- the instrument panel (5).

Disconnect the following connectors :

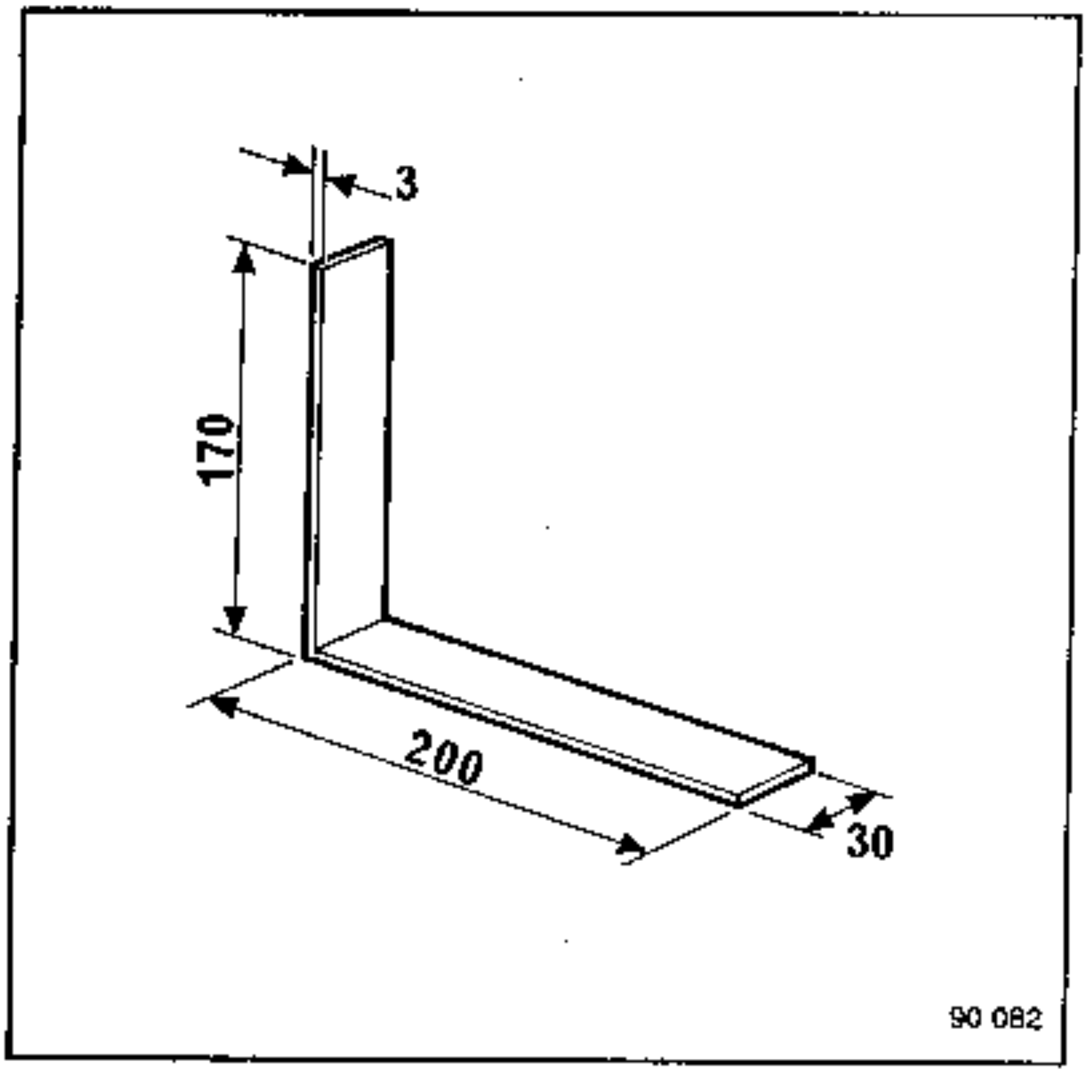
- rear RH and LH wiring,
- door switches,
- RH and LH door wiring,
- RH and LH side member wiring,
- stop switch wiring.

Using a tool manufactured locally (see drawing on following page), lever out the fastenings (6) and (7) access to which can be gained through the instrument panel location and fastening (8) by lifting the fascia panel vertically and taking it out.

Special operation during refitting :

Ensure that the cables lie in their original positions and that the connectors are fully connected.

Drawing of special tool for removing the 2nd type fascia panel.



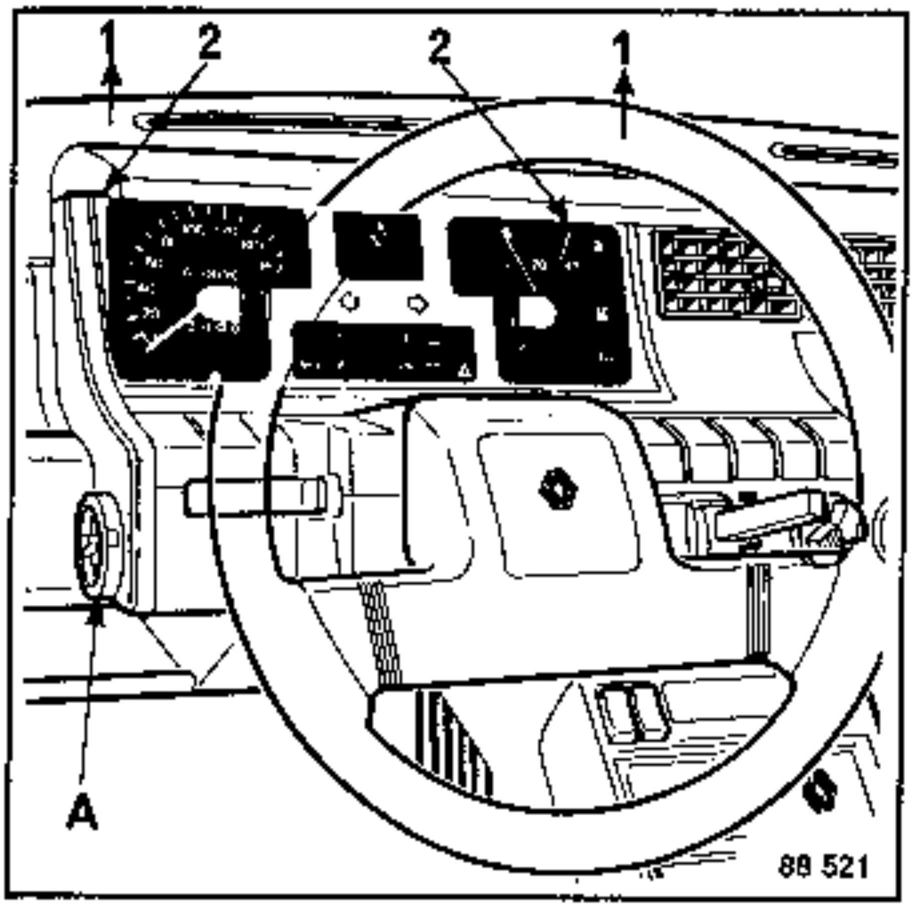
REMOVING - REFITTING THE 1st TYPE

Disconnect the battery.

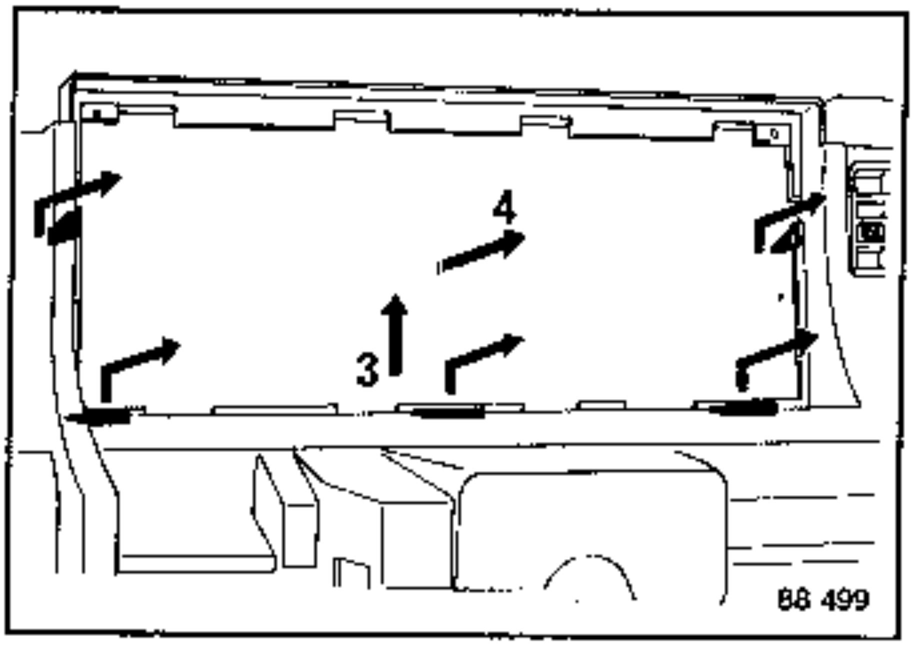
Remove :

- the visor by pulling it upwards (1),

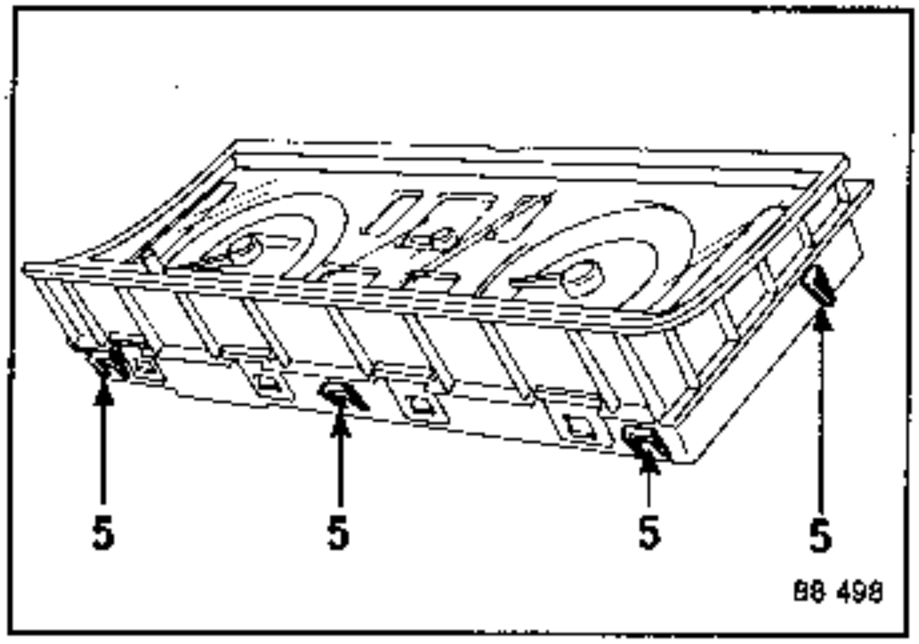
- the two screws (2).



Lift the instrument panel (3) as far as it will go by passing the hand through glove compartment hole (A).



Take out the instrument panel (4) holding it up to free the tabs (5).



Disconnect :

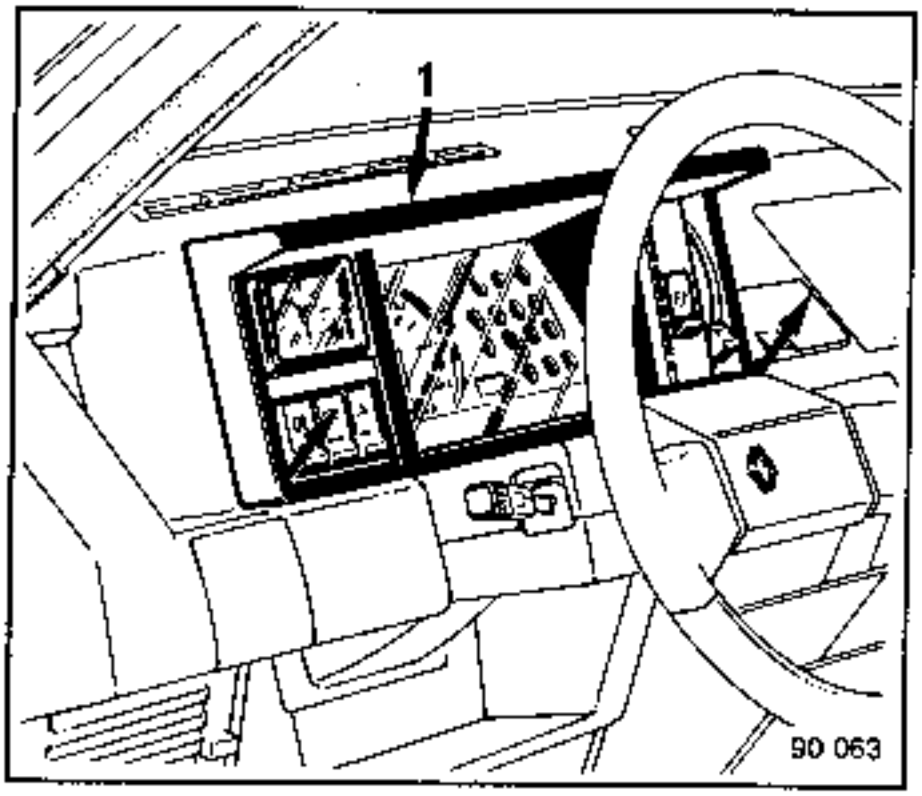
- the speedometer drive cable,
- the connectors.

REMOVING - REFITTING THE 2nd TYPE

Disconnect the battery.

Remove :

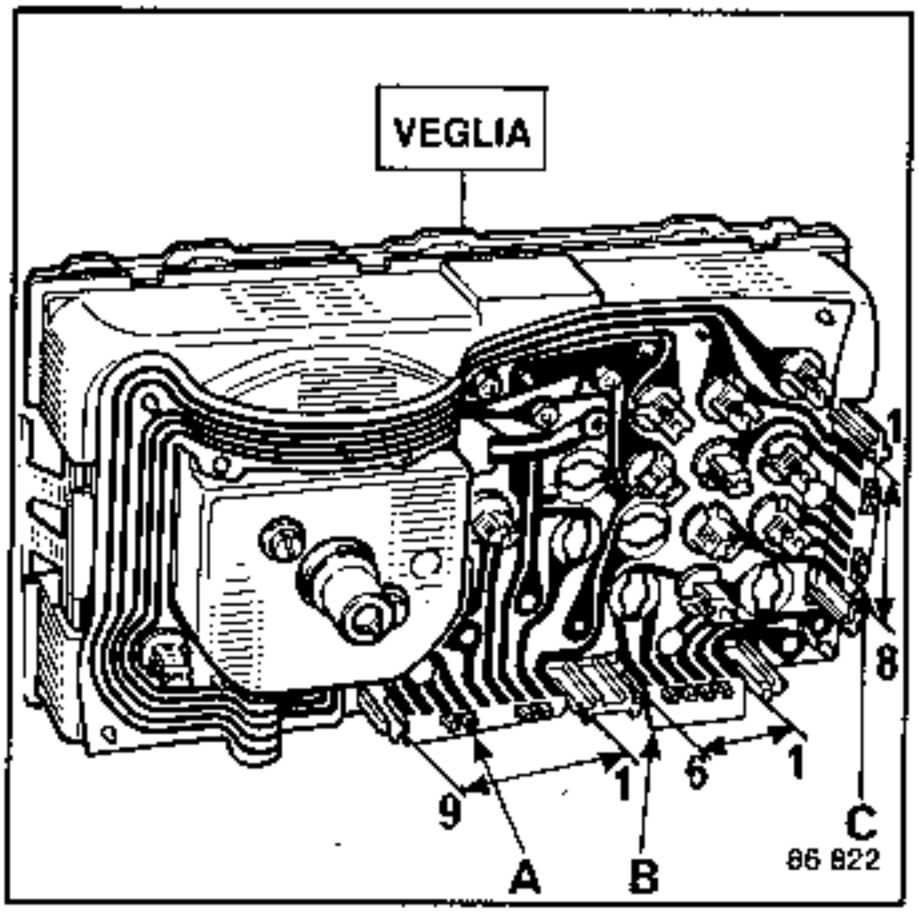
- the visor (1) by swinging its bottom upwards,



- the lower casing and disconnect the speedometer drive cable.

Take out the instrument panel and disconnect the connectors.

Connector connections



Connector A

1. Direction indicator light repeater
2. Dipped beam warning light
3. Brake pad wear warning light
4. Instrument panel lighting
5. Coolant temperature warning light
6. Fuel gauge
7. Oil pressure warning light
8. Hand brake and brake fluid level warning light
9. Charge/discharge warning light

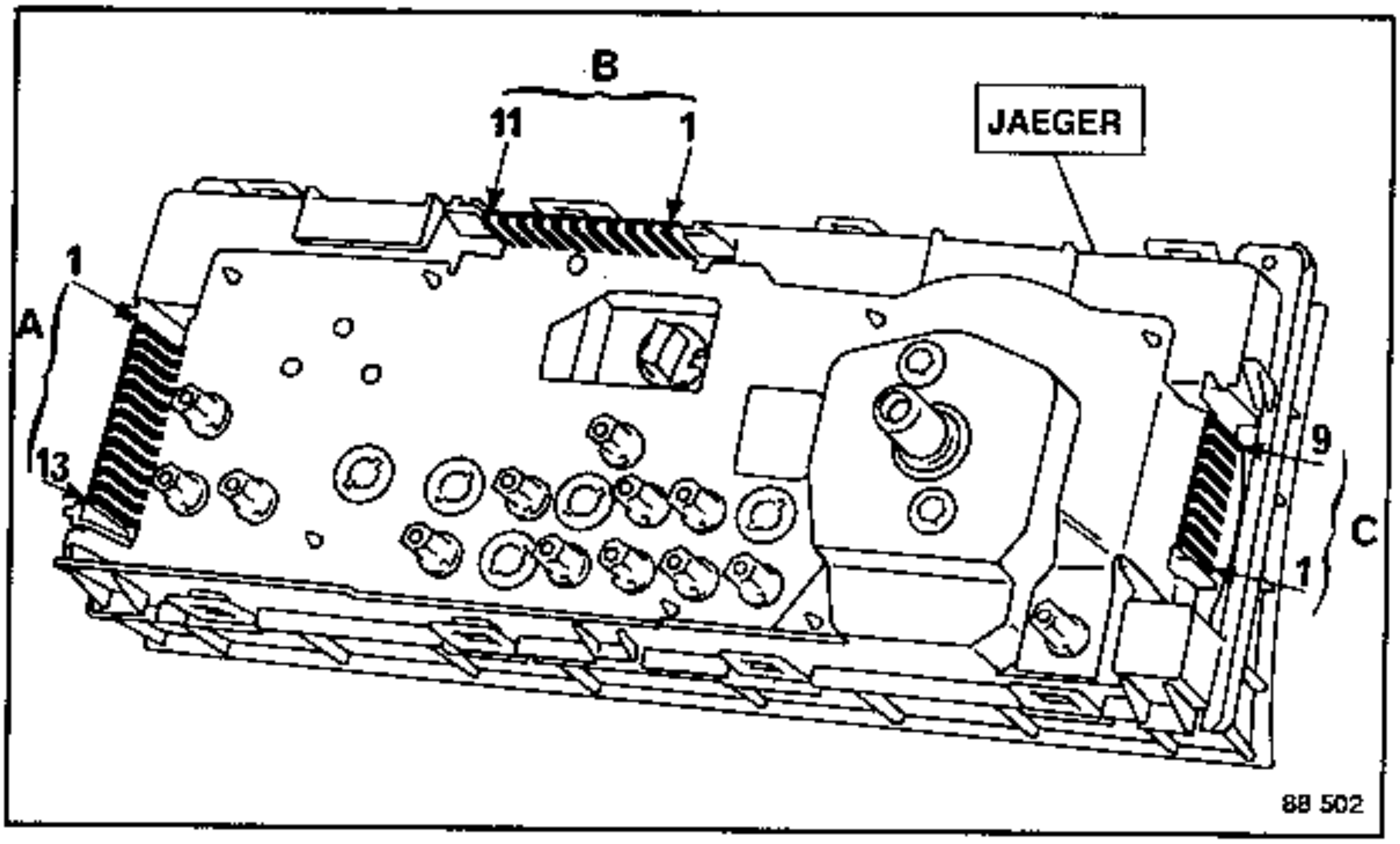
Connector B

1. Not used
2. Not used
3. Pre-heater plug warning light (diesel)
4. + after ignition switch pre-heater warning light (diesel)
5. + after ignition switch minimum fuel level warning light
6. Minimum fuel level warning light

Connector C

1. + after ignition switch panel
2. Choke warning light
3. Not used
4. Rear foglight warning light
5. Hazard warning light repeater
6. Heated rear screen warning light
7. Full beam warning light
8. Instrument panel earth

Connector connections



Connector **A**

1. Charge/discharge warning light
2. Hand brake and fluid level warning light
3. Pre-heater warning light
4. Hazard warning light repeater
5. Full beam warning light
6. Not used
7. Not used
8. Fuel level warning light
9. Not used
10. Warning light after ignition switch
11. Not used
12. Not used
13. Dipped beam warning light

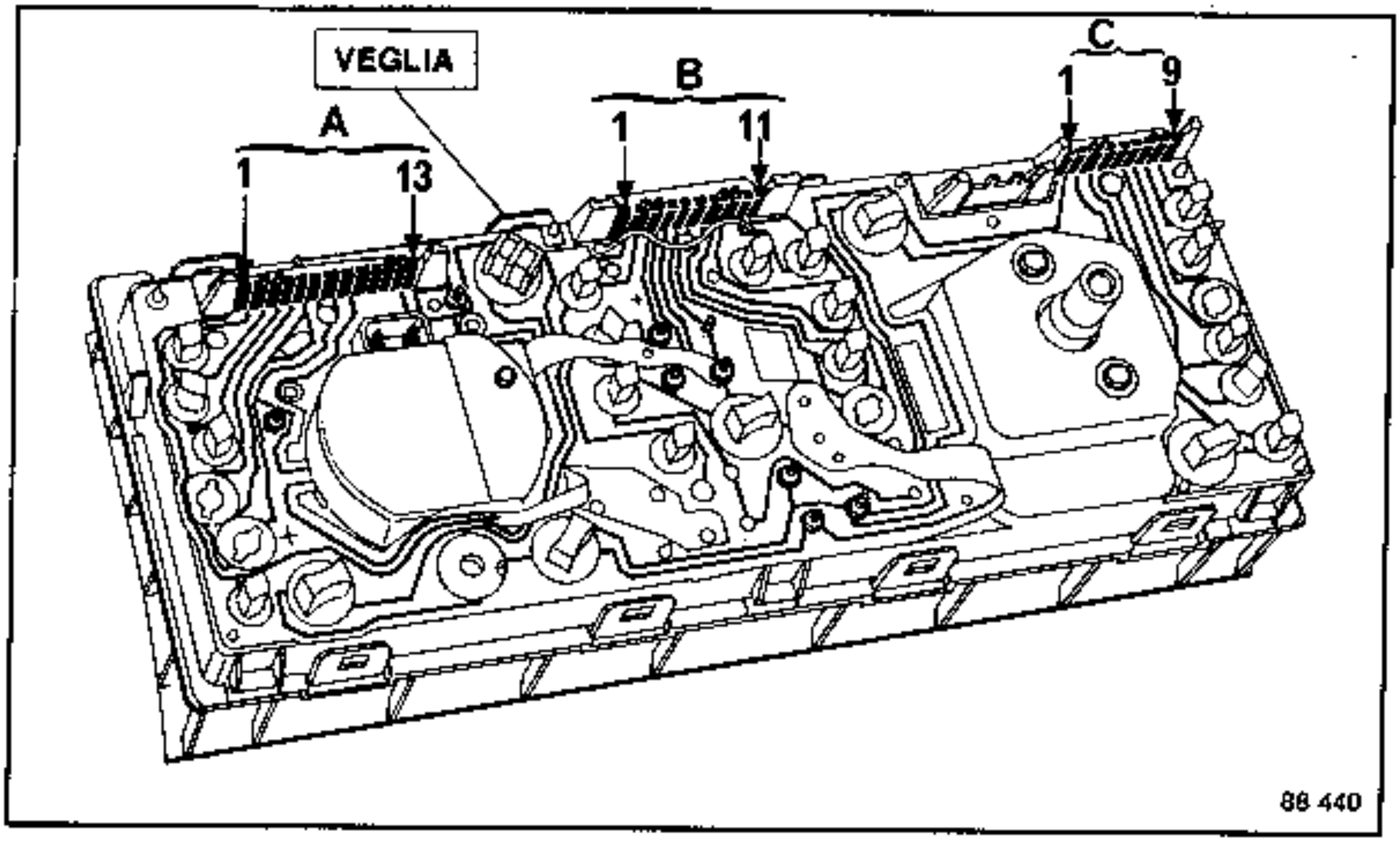
Connector **B**

1. Not used
2. Fuel gauge
3. Heated rear screen warning light
4. Not used
5. Not used
6. Not used
7. Direction indicator repeater
8. Not used
9. Not used
10. Not used
11. Not used

Connector **C**

1. Panel lighting
2. Panel earth
3. Rear foglight warning light
4. Brake pad wear warning light
5. Choke warning light
6. Not used
7. Not used
8. Oil pressure warning light
9. Coolant temperature warning light

Connector connections



onnector **A**

1. Hazard warning light repeater
2. Brake pad wear warning light
3. Minimum coolant warning light
4. Minimum windscreen washer fluid warning light
5. Pre-heater warning light
6. Automatic transmission warning light
7. Not used
8. Tachometer
9. Oil pressure
10. Not used
11. Not used
12. Not used
13. Fuel gauge

Connector **B**

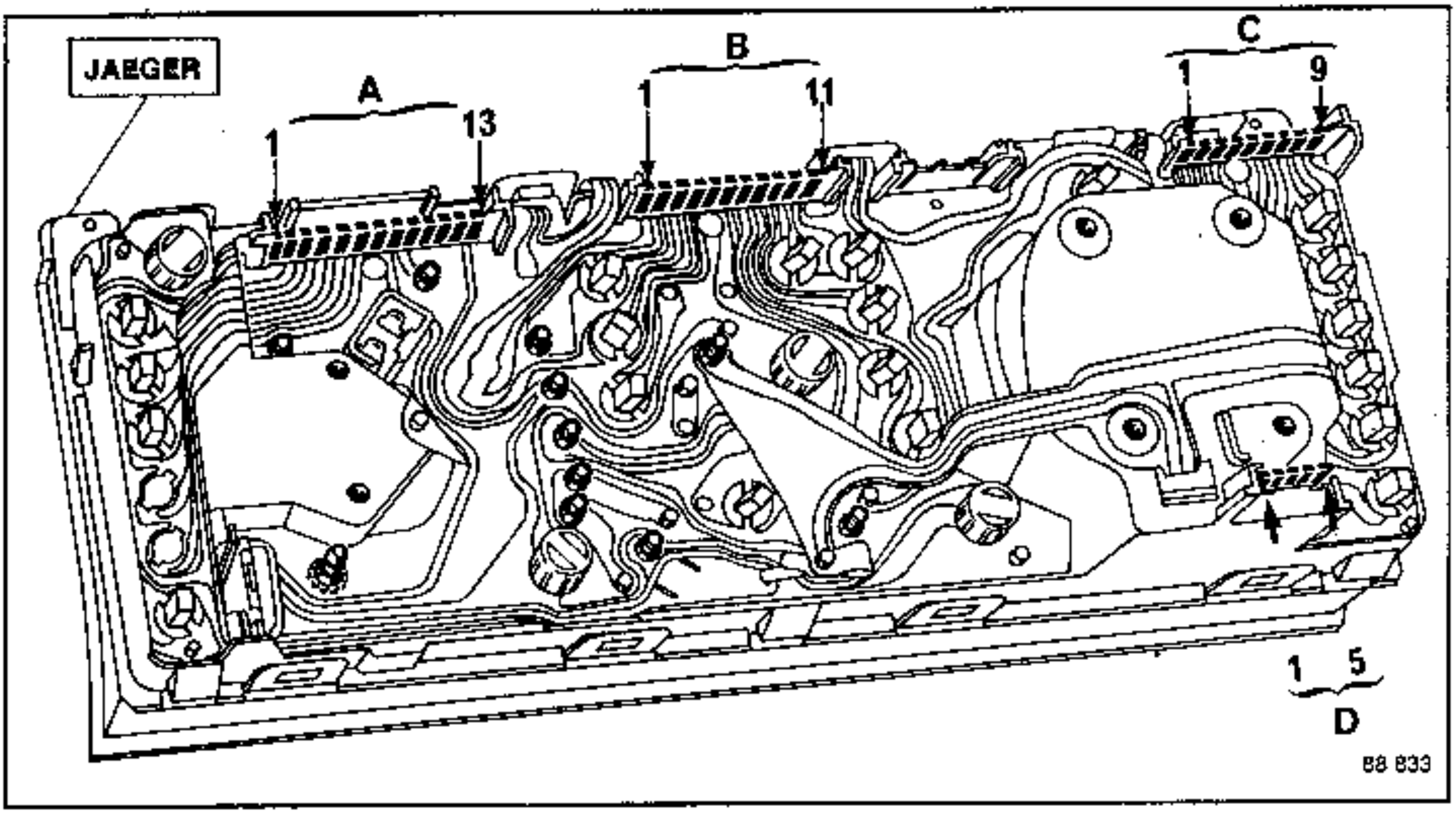
1. Minimum fuel warning light
2. Oil pressure warning light
3. + after ignition switch
4. Choke warning light
5. RH repeater through LH dir. ind.
6. Not used
7. LH repeater through RH dir. ind.
8. Coolant temperature warning light
9. Hand brake and brake fluid warning light
10. Not used
11. Charge/discharge warning light

Connector **C**

1. Coolant temperature indicator
2. Panel lighting
3. Full beam warning light
4. Dipped beam warning light
5. Sidelight warning light
6. Front foglight warning light
7. Rear foglight warning light
8. Heated rear screen warning light
9. Panel earth

Connector connections

C 405



Connector **A**

1. Hazard warning light repeater
2. Brake pad wear warning light
3. Coolant min. level warning light
4. Windscreen washer fluid warning light
5. Not used
6. Not used
7. Not used
8. Tachometer
9. Oil pressure
10. Not used
11. Not used
12. Not used
13. Fuel gauge

Connector **B**

1. Minimum fuel warning light
2. Oil pressure warning light
3. + after ignition switch
4. Choke warning light
5. Left hand direction indicator repeater
6. Not used
7. RH direction indicator repeater
8. Coolant temperature warning light
9. Hand brake and pressure drop warning light. Brake fluid level warning light
10. Not used
11. Charge/discharge warning light

Connector **C**

1. Coolant temperature indicator
2. Panel lighting
3. Full beam warning light
4. Dipped beam warning light
5. Sidelight warning light
6. Front foglight warning light
7. Rear foglight warning light
8. Heated rear screen warning light
9. Panel earth

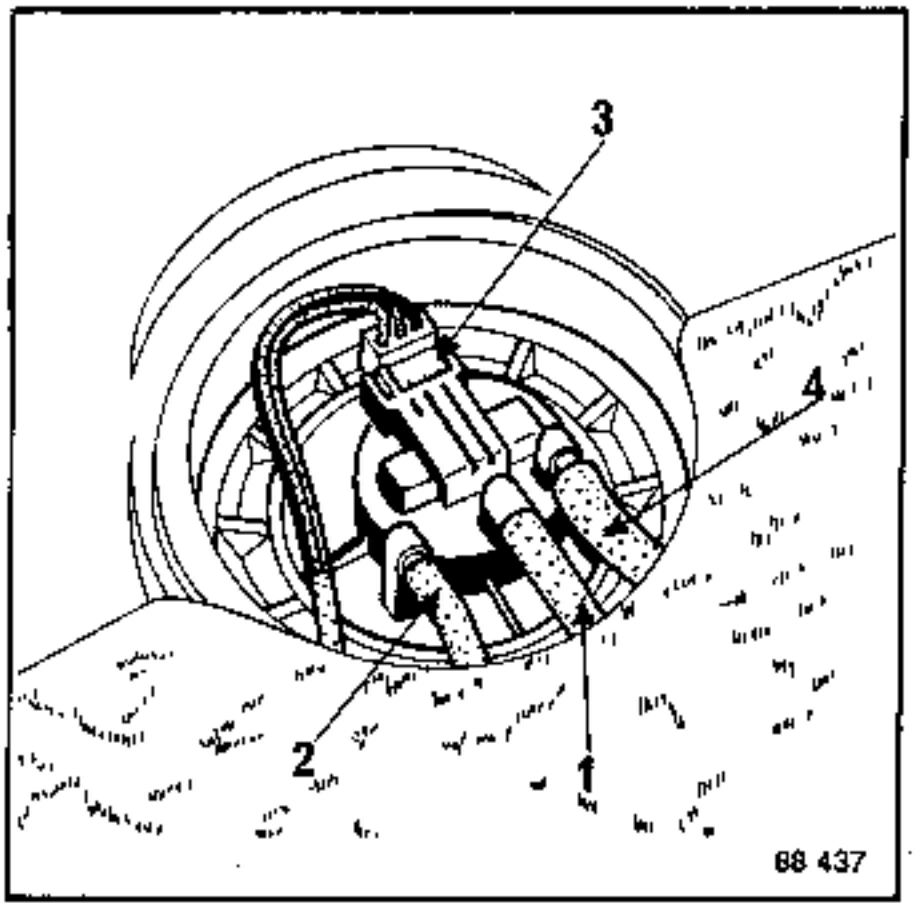
Connector **D**

1. Speed signal for computer
2. Sensor
3. Not used
4. Sensor screening
5. Sensor

REMOVING

Do not use a screwdriver and a hammer to unscrew the unit, there is a risk of damaging the lugs on the plastic nut and the sensor itself.

Access : Tilt .crward the rear seat and take out the plug.

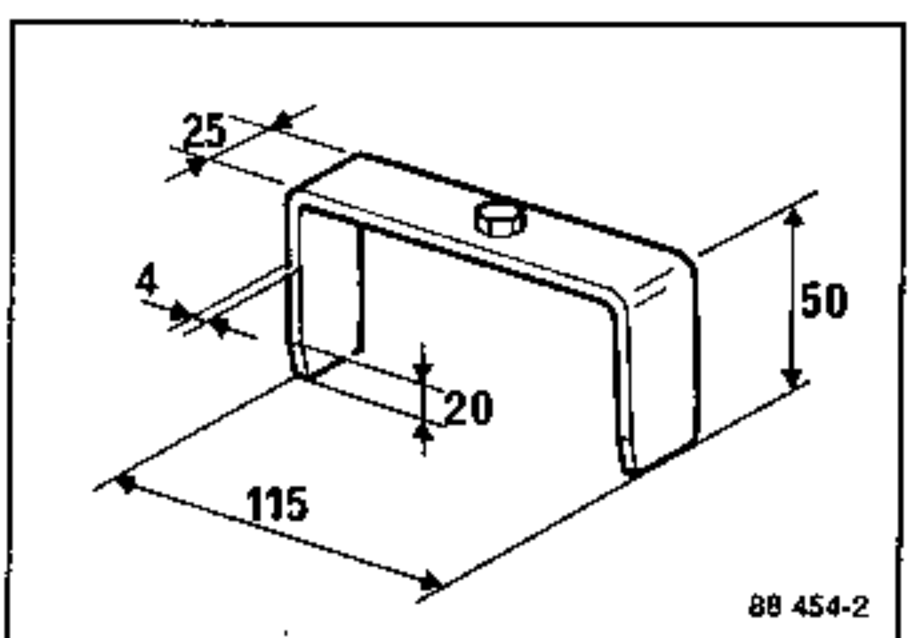


1 - Output pipe
2 - Return pipe
3 - Connector
4 - Vent

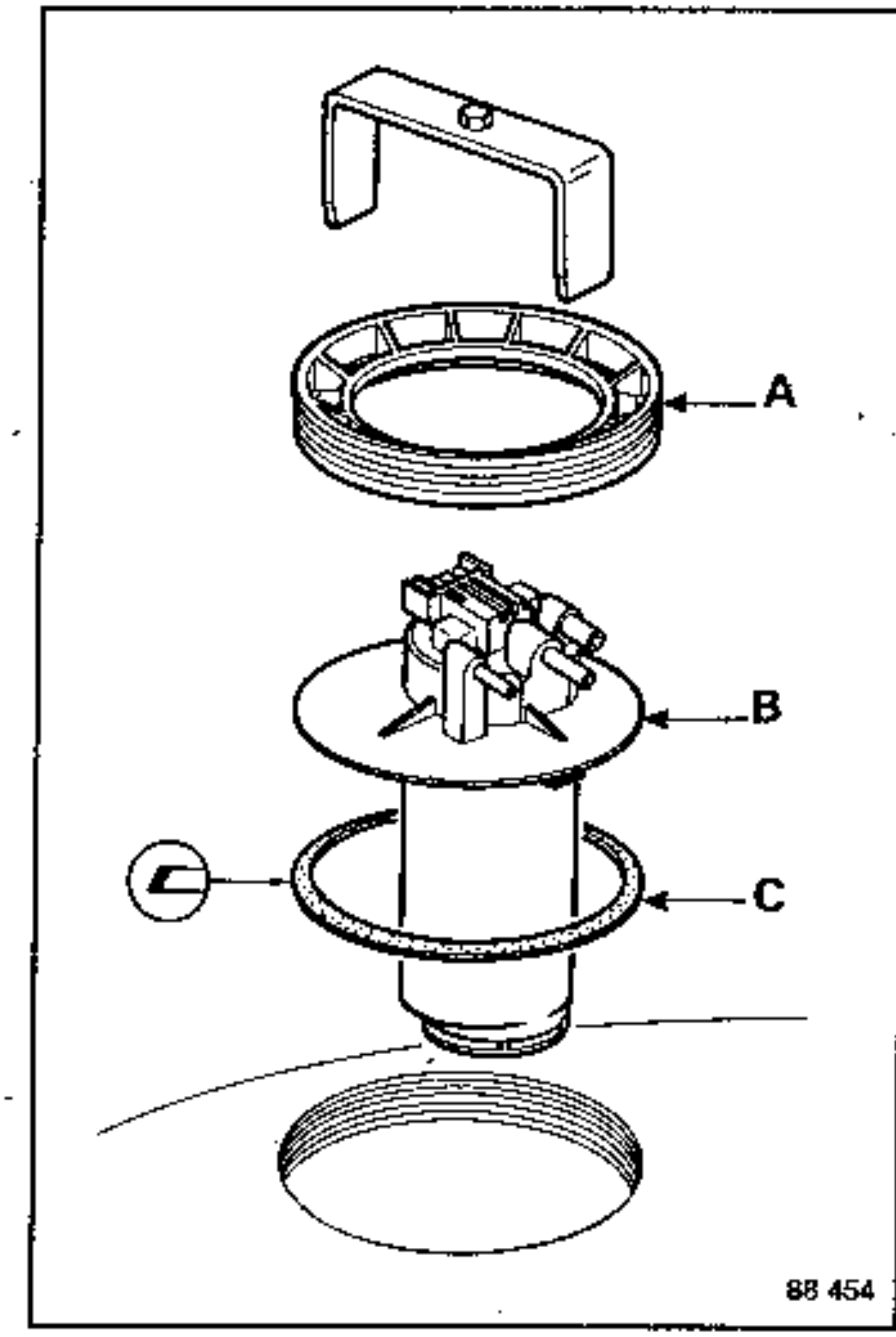
REFITTING

Make up a tool, locally, to apply the required torque (3 daN.m). This torque must be correct.

Drawing of tool

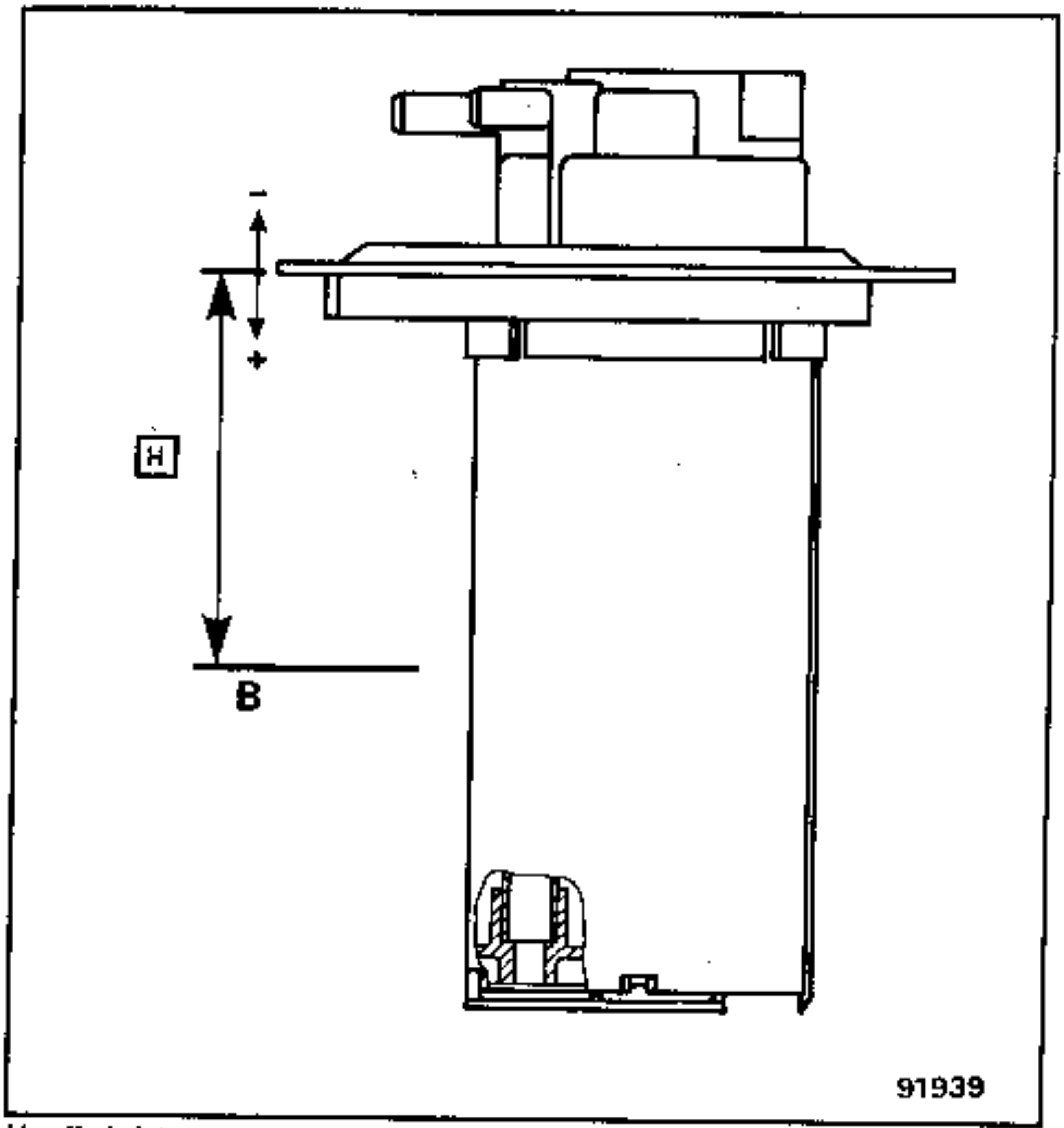


Drill a hole in the centre of a piece of flat bar 25 x 4 x 210 mm and weld a 13 mm hexagon bolt to the bar. Fold it to form a U section. Fit it so that it enters the slots in the plastic nut.



A - Nut
B - Tank unit
C - Seal

CHECKING



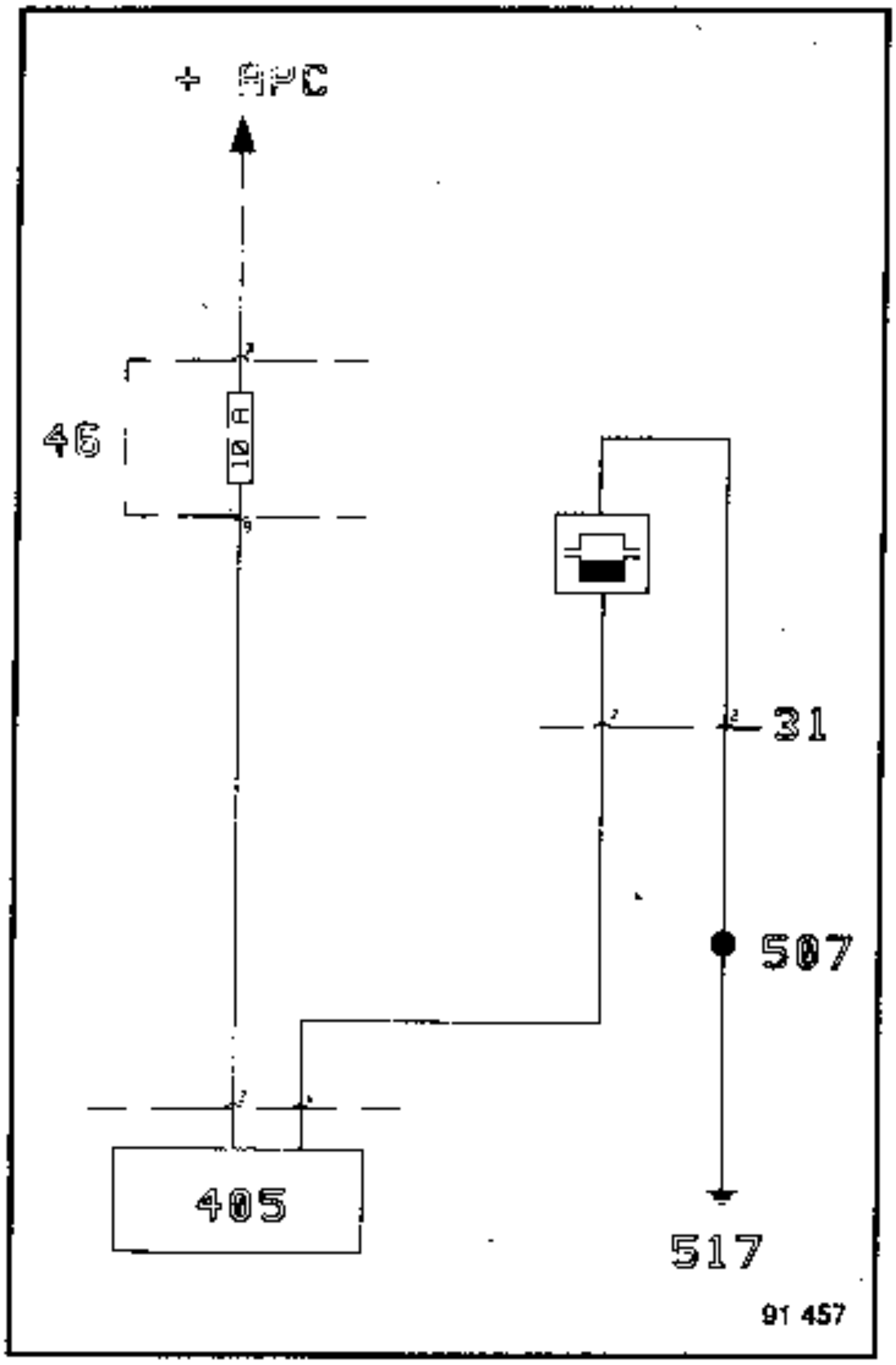
H Height
B fuel level

TANK UNIT	
Height H in mm	Resistance in ohms
Top stop less than -4	7 Ω ± MAXI
24*	63 Ω ± 10
51,5*	105 Ω ± 5
87*	155 Ω ± 10
107,5*	215 Ω ± 20
Bottom stop more than 113	280 Ω ± MINI

* These figures are given as an indication only. Check the variation in the resistance by moving the float.

Driving school vehicles produced since the 87 model year are equipped with a sensor for detecting the presence of water in the fuel filter

CIRCUIT DIAGRAM



Key

31	-	Instrument panel connector
46	-	Accessory plate connections
405	-	Water in fuel sensor
507	-	Connection
517	-	Earth on front LH pillar
A	-	Water in fuel warning light
+ APC	-	+ after ignition switch

PRINCIPLE OF OPERATION

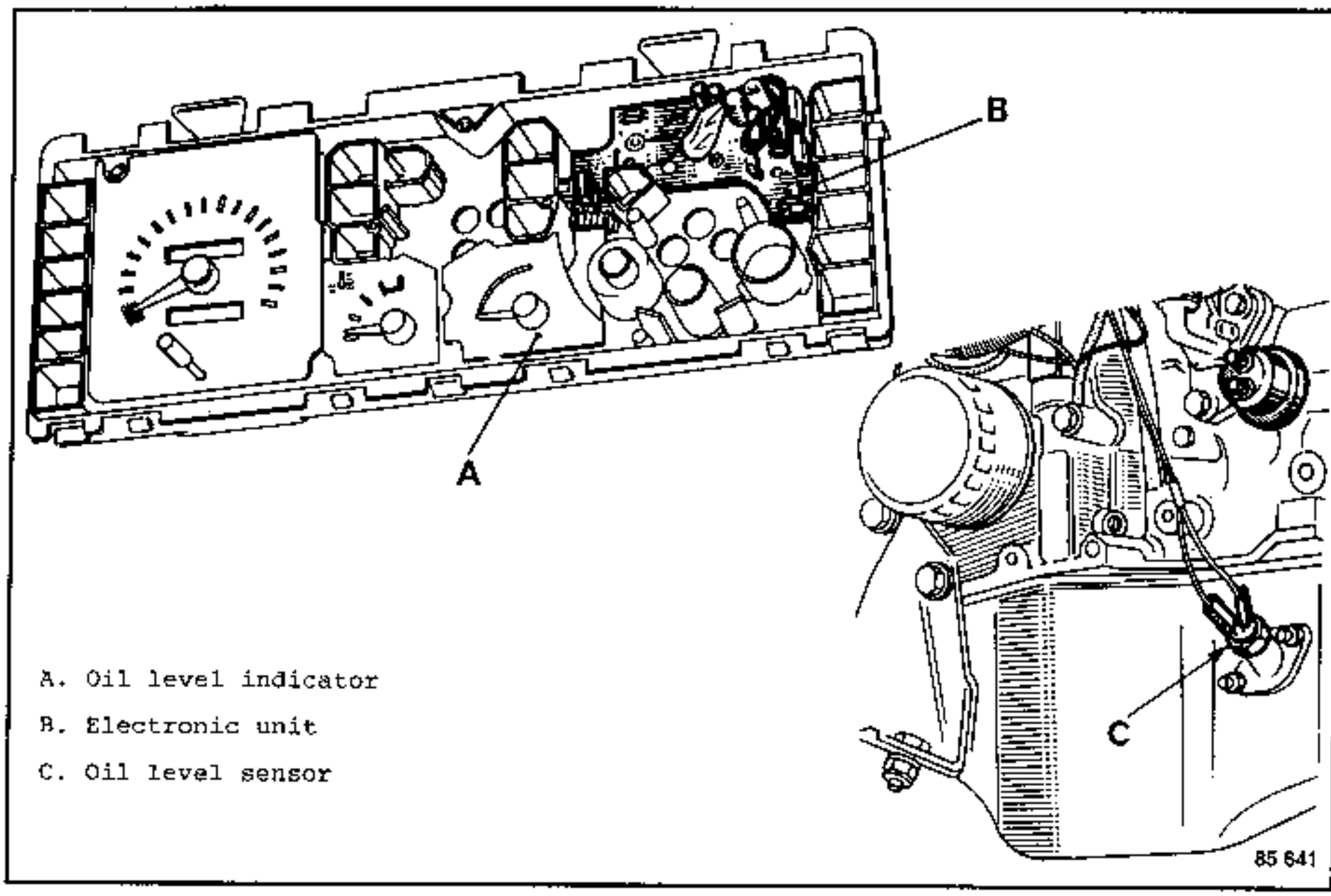
The indicator consists of :

- a stack pipe with a circuit breaker in it.
- a float which is weighted so that it remains in suspension between the layer of fuel and the layer of water.

When the water level reaches a pre-determined figure, the float reaches the height of the circuit breaker and closes it by means of a magnetic field. The electrical circuit is therefore made and the signal is sent to the instrument panel to illuminate a warning light.

When this warning light switches on, it is essential for the water in the fuel filter to be drained off.

DESCRIPTION



A. Oil level indicator

B. Electronic unit

C. Oil level sensor

PRINCIPLE OF OPERATION

The oil level sensor consists of a high resistance wire. The thermal conductability of the wire is different depending on whether it is immersed in a liquid or in air.

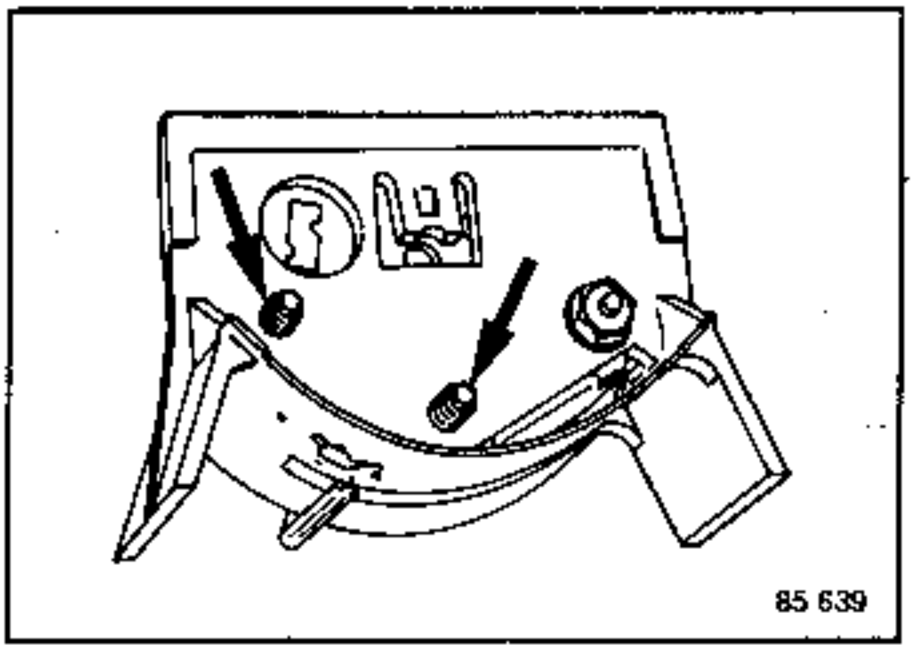
When the ignition is switched on, the oil pressure warning light also switches on and an electronic unit (in the instrument panel) passes a current through the terminals of the oil level sensor. After a fixed time, a voltage difference is established across the sensor terminals and this differs depending on the extent to which the sensor is immersed in the oil. This voltage difference is registered by the electronic unit and it, in turn, sends a corresponding signal to the oil level indicator.

When the engine is running and the oil pressure reaches the required level, the pressure switch cuts the warning light circuit and also cuts out the electronic unit so that the oil level indicator no longer operates.

CHECKING

OIL LEVEL INDICATOR UNIT

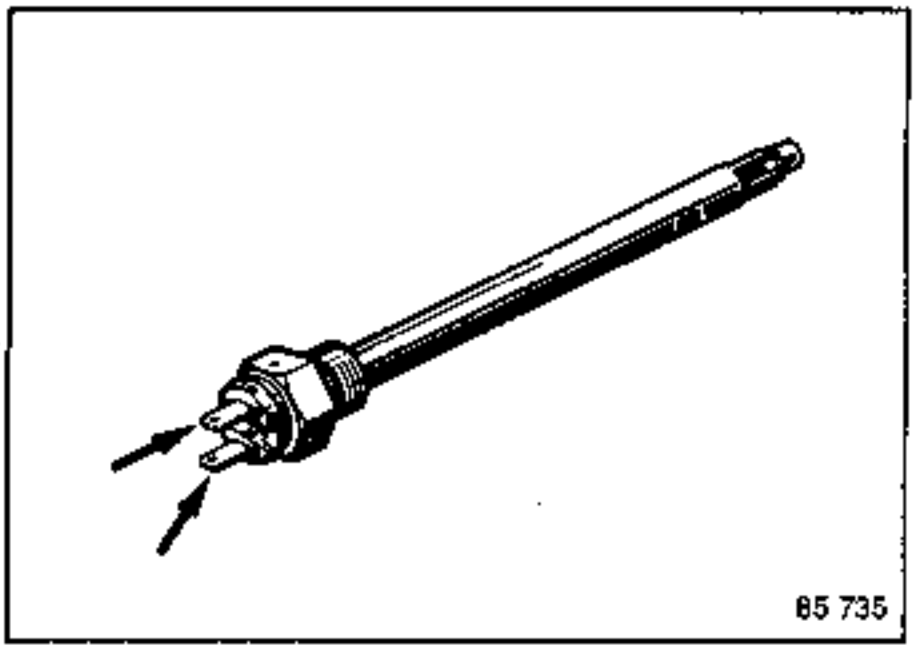
- Remove the indicator before testing it.
- Connect an ohmmeter across its two terminals. The pointer should move.



85 639

OIL LEVEL SENSOR

Connect an ohmmeter across the oil level sensor terminals. The pointer should move.



85 735

FAULT FINDING

The oil level sensor only operates when the ignition is first switched on (and the oil pressure warning light is on).

Check the oil level sensor

- The sensor is O.K.
- The sensor is defective : replace it

Check the continuity of the wires between sensor and in. panel

- The continuity is O.K.
- Continuity defective. Reconnect or rewire

Check the oil level indicator

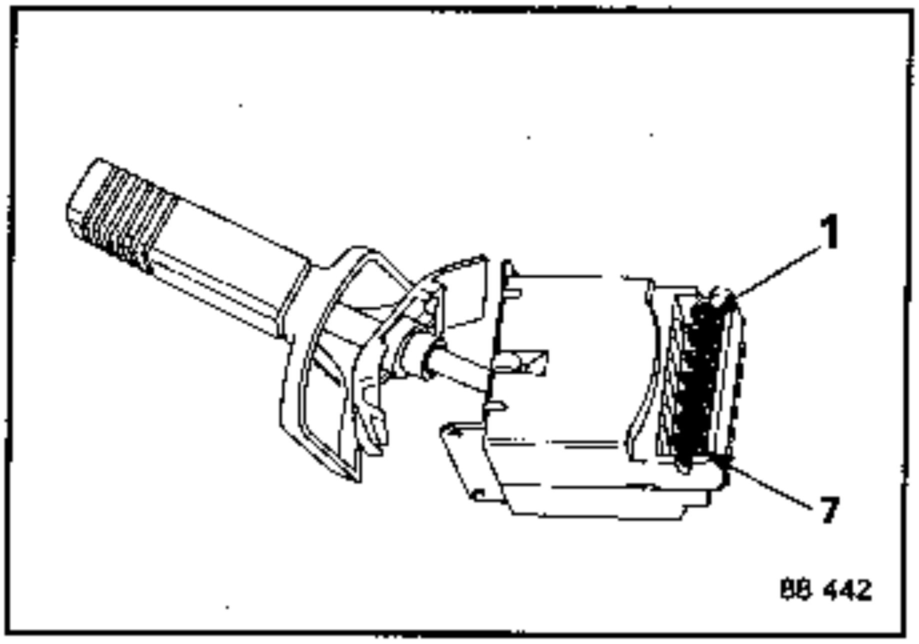
- Indicator and P.C. O.K. : Change electronic unit
- Indicator or P.C. defective : Replace defective part

REMOVING - REFITTING - CONNECTIONS

Disconnect the battery.

Remove :
- the lower casing,
- the two securing screws,
- the switch.

Remove the connector.



Without timed sweep

Pin	Description
2	High speed
3	+ after ignition switch
4	Low speed
5	Fixed parked position
7	+ windscreen washer pump

With timed sweep

Pin	Description
1	Sweep timer input
2	High speed
3	+ after ignition switch
4	Low speed
5	Park/timer +
6	+, w.w. control after ig. switch
7	+ windscreen washer pump

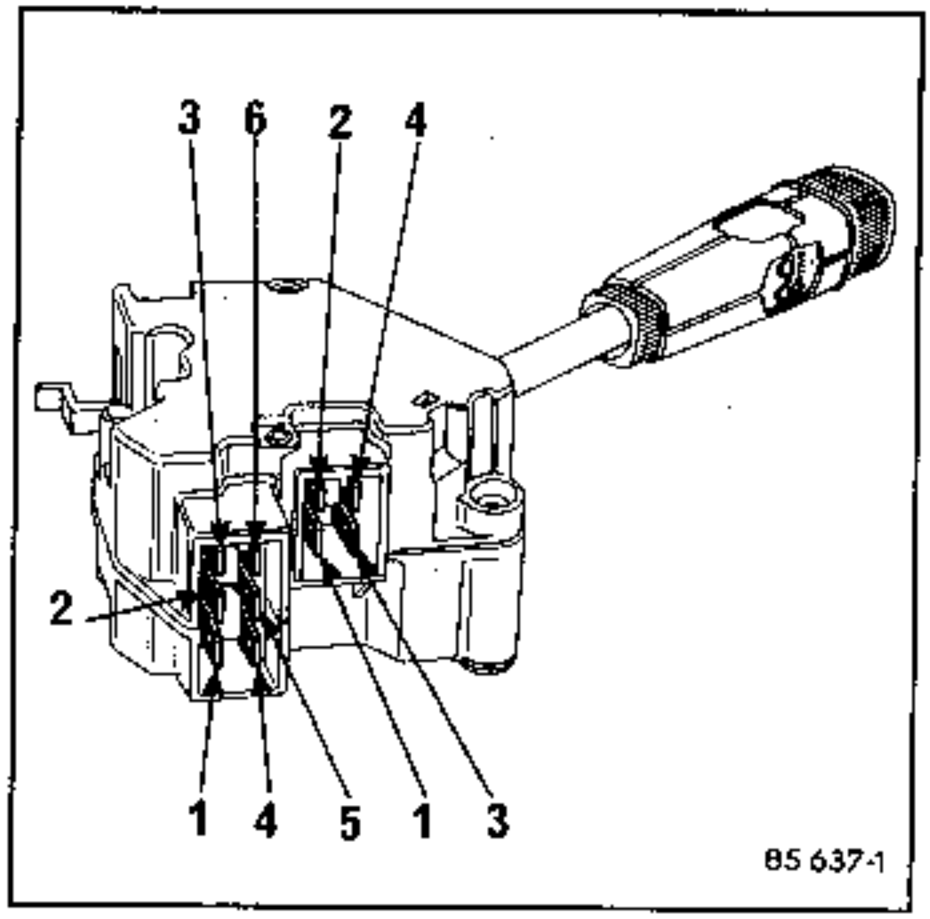
REMOVING - REFITTING - CONNECTIONS

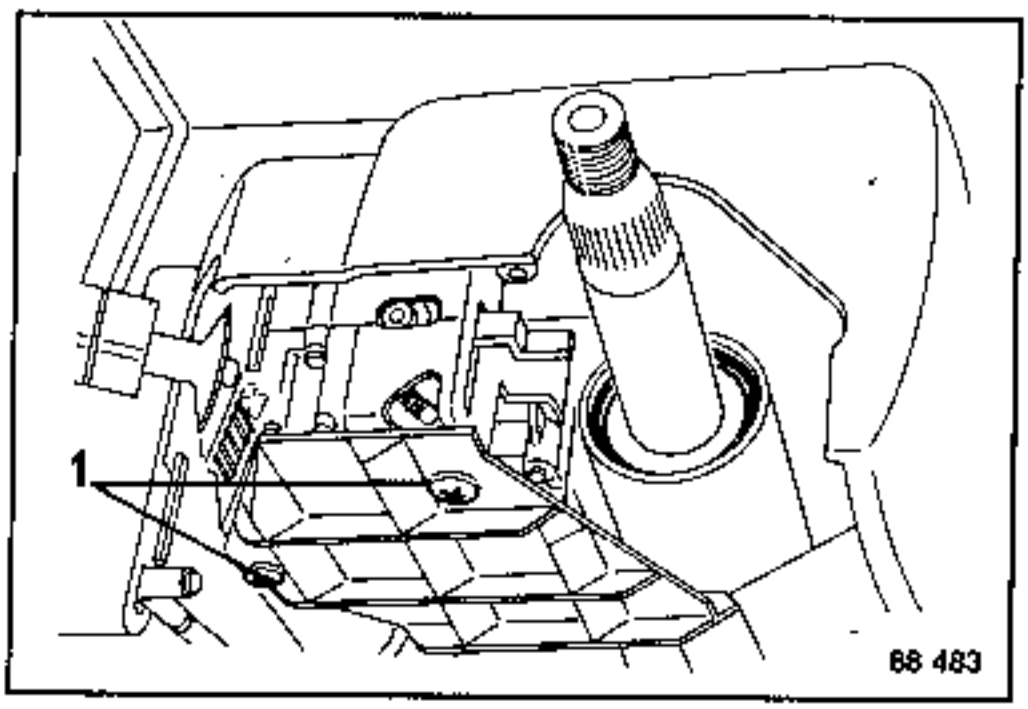
Disconnect the battery.

Remove :

- the steering wheel,
- the lower half casing,
- the two screws securing the switch (1),
- the three screws securing the fascia panel to the steering column,
- the two steering column securing bolts.

Loosen the two nuts on the steering column to free the switch and disconnect the connectors.





Lighting connector

Pin	Description
1	Full beam
2	Dipped beam
3	+ after ignition switch
4	Sidelights

Direction indicator - horn connector

Pin	Description
1	Horn
2	Rear foglight output*
3	+ before ignition switch
4	RH direction indicator
5	Flasher unit
6	LH direction indicator

* On certain versions

REMOVING - REFITTING - CONNECTIONS

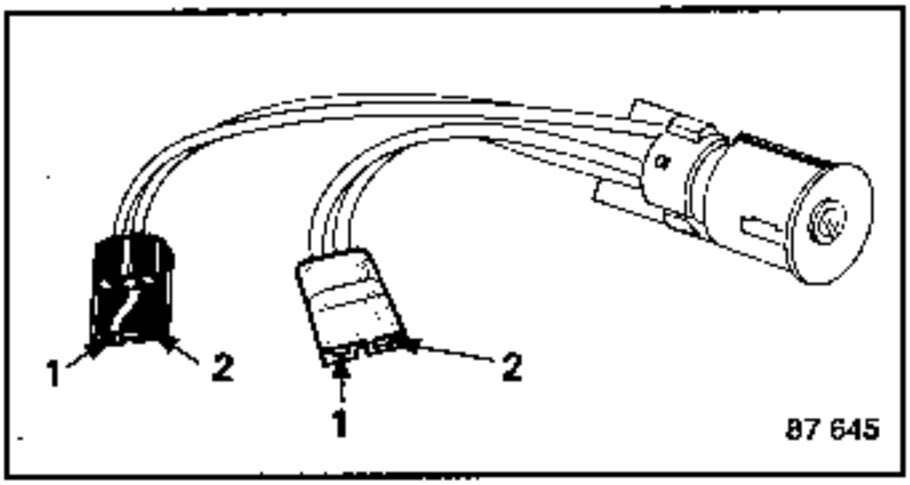
Disconnect the battery.

Remove :

- the steering column (see "Front axle" section).
- the switch securing screw.

Place the key in the "garage" position and remove it.

Press on the retaining tags and take out the switch.



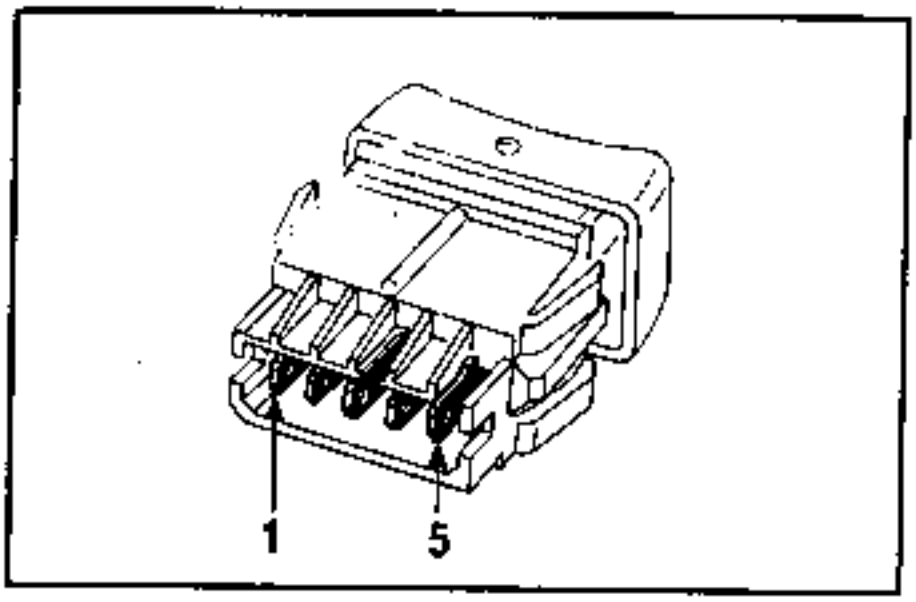
Black connector

Pin	Description
1	+ before ignition switch
2	Starter signal

Grey connector

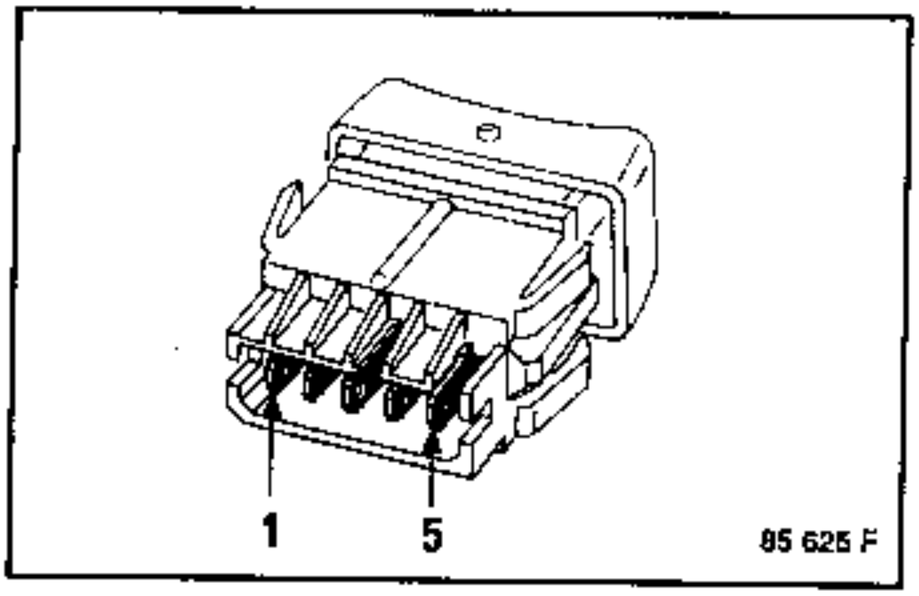
Pin	Description
1	Supply + Accessories
2	Supply + After ignition switch

E.D.L. CONTROL CONNECTIONS
(Electric door locks)



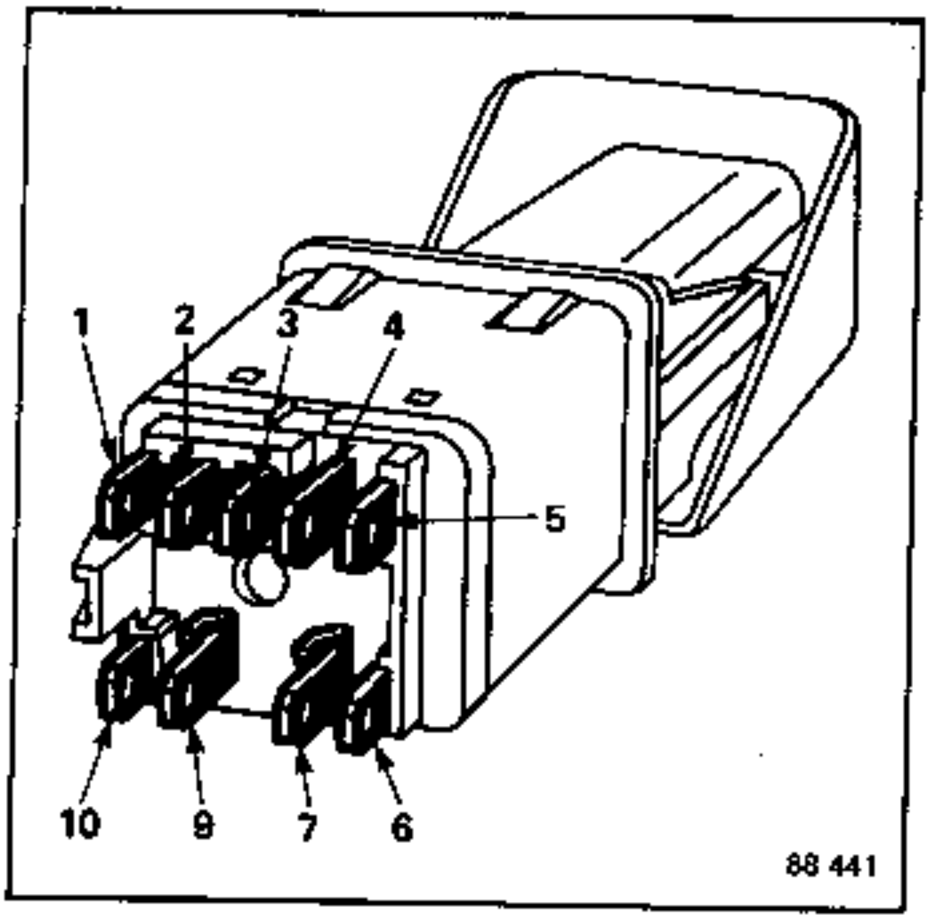
Pin	Description
1	E.D.L. close
2	Switch light earth
3	+ before ignition switch
4	Switch light
5	E.D.L. open

WINDOW WINDER CONTROL



Pin	Description
1	Motor + or -
2	Switch light earth
3	+ after ignition switch
4	Switch light
5	Motor + or -

HAZARD WARNING LIGHT SWITCH



HAZARD WARNING LIGHT CONTROL

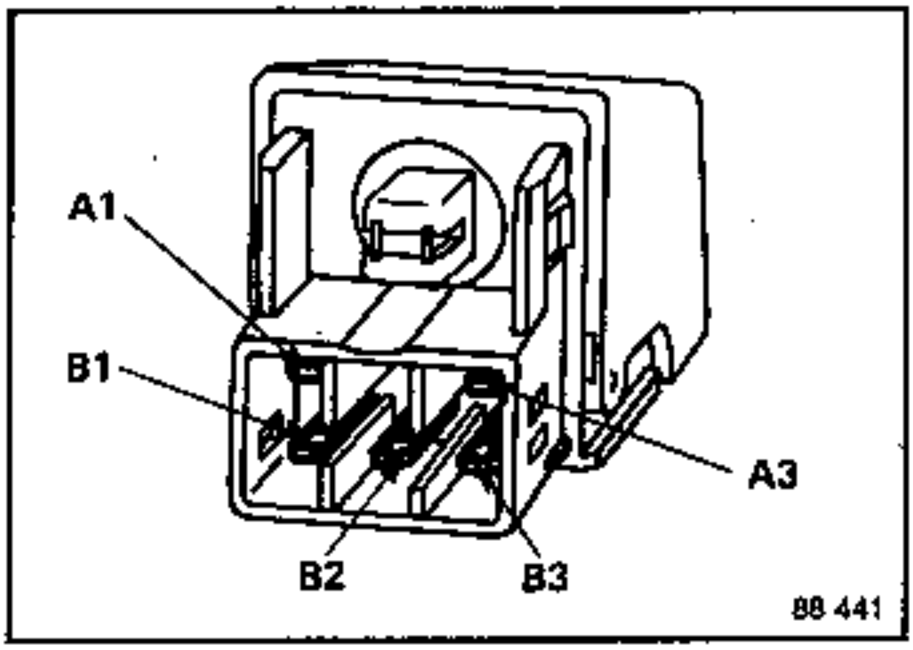
Push button switch

Pin	Description
1	RH direction indicator lights
2	LH direction indicator lights
3	Light earth
4	+ before ignition switch
5	+ accessories
6	+ flasher unit fuse
7	Switch light
9	Flashing signal at switch
10	Repeater light

Rocker switch

Pin	Description
1	+ accessories
2	+ before ignition switch
3	+ flasher unit fuse
4	Repeater light
5	RH dir. ind. light
6	LH dir. ind. light
7	Flashing signal at switch

CONNECTIONS



Heated rear screen switch

Pin	Description
A1.	Switch light
A3.	Earth
B1.	+ after ignition switch
B2.	Heated rear screen
B3.	Warning light

Rear foglight switch

Pin	Description
A1.	Switch light
A3.	Earth
B1.	Supply (through dipped beam)
B2.	Foglight (through fuse)
B3.	Warning light

Rear screen wiper switch

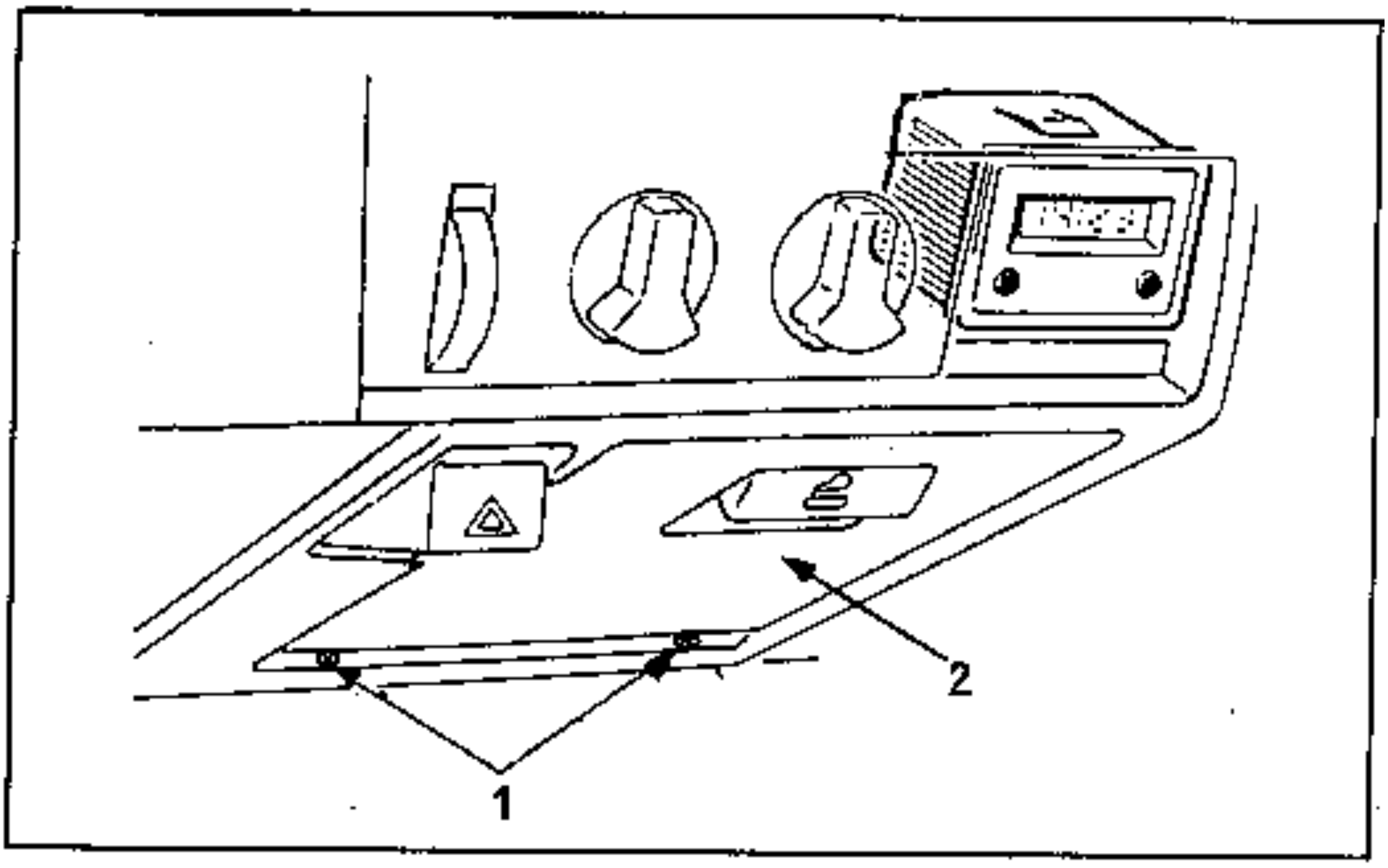
Pin	Description
A1.	Switch light
A3.	Earth
B1.	+ after ignition switch
B2.	Not used
B3.	Motor

Rear screen washer pump switch

Pin	Description
A1.	Switch light
A3.	Earth
B1.	+ after ignition switch
B2.	Not used
B3.	Pump

REMOVING - REFITTING

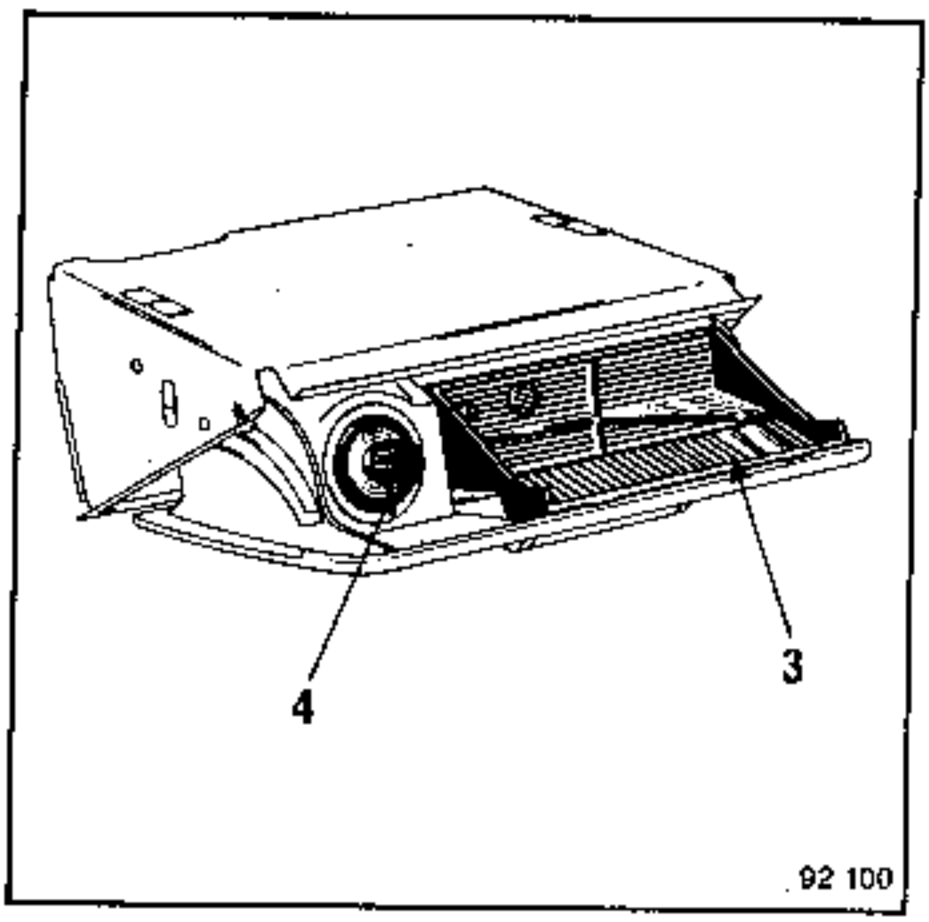
- Unscrew the two securing screws (1).



- Remove the cigar lighter-ashtray assembly (2) by unscrewing screws (1).

- Disconnect the two connectors behind the cigar lighter.

- Remove the ashtray-cigar lighter cover.



- Remove the ashtray (3) and the cigar lighter (4).

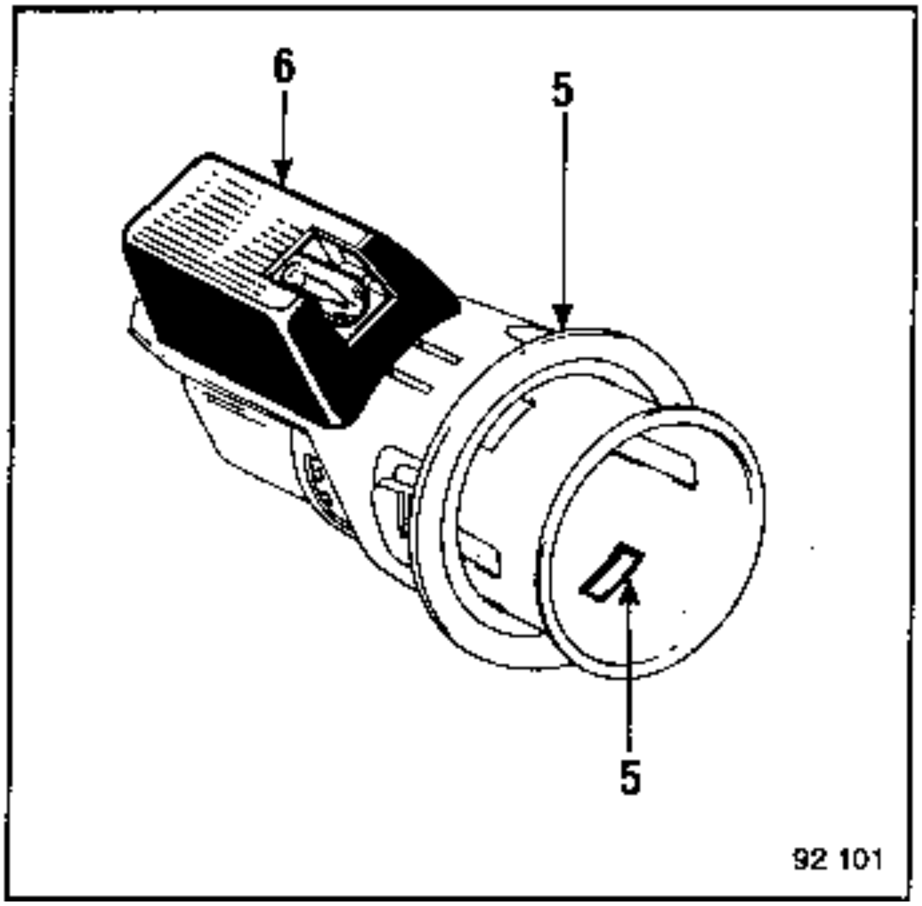
- To remove the fixed part of the cigar lighter, push the rear of the casing whilst unclipping the 2 studs (5).

The cigar lighter will come out together with its connector.

- Take out the plastic bulb holder around the cigar lighter body also by pushing from the back.
- To gain access to the small bulb, remove the black cover (6) by lifting its front end and pulling it backwards.

Refitting :

Carry out the removing operations in reverse.



REMOVING THE DRIVING SCHOOL UNIT

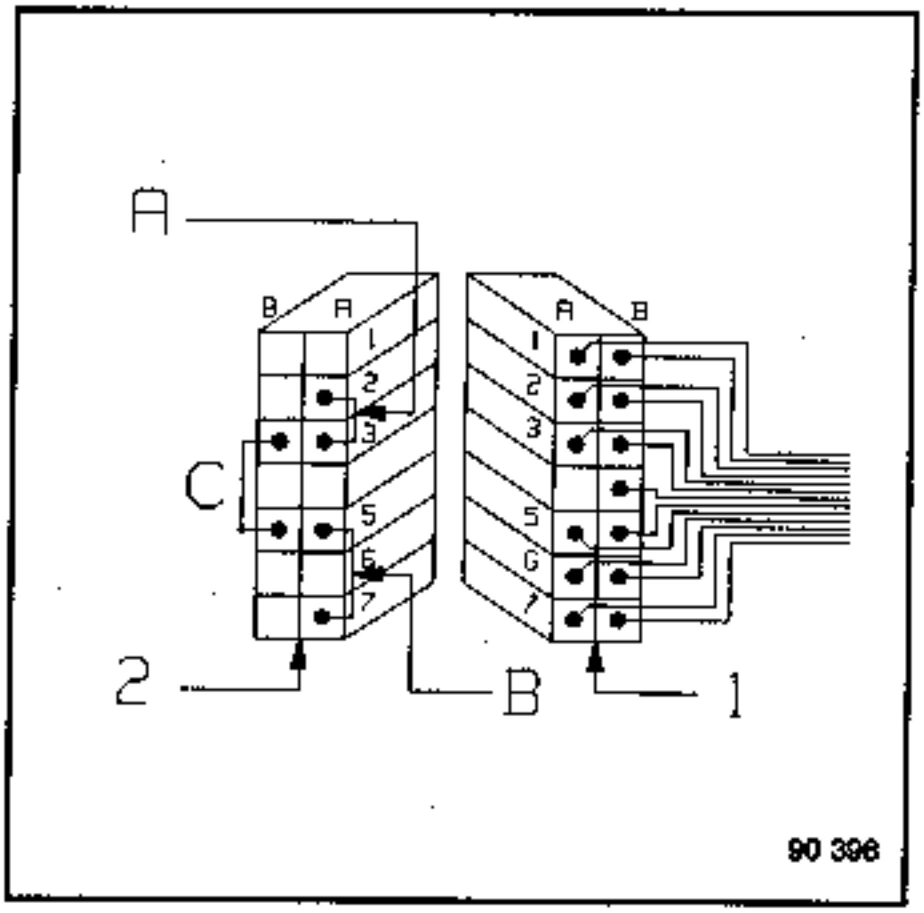
So that the direction indicator and headlight controls, on the steering wheel operate correctly after removing the driving school unit (for resale of the vehicle), carry out the following operations :

- Disconnect the battery.
- Remove the instructor's control unit.
- disconnect the black connector (double 7 pin).

Interconnect the following terminals :

A : 2A and 3A for the switch supply.
B : 5A and 7A for the sidelights.
C : 3B and 5B for the flasher unit.

1 : Engine front harness.
2 : Junction block to be added providing cross connections A - B - C.



After having removed the driving school unit, fit the cover part no. : 77 01 405 919.

NOTE : If the vehicle is equipped with a system of dipped headlights connected to the windscreen wiper high speed one must, in addition to the above instructions, remove the sidelight relay (563) which is on the relay support plate.

DRIVING SCHOOL VERSION

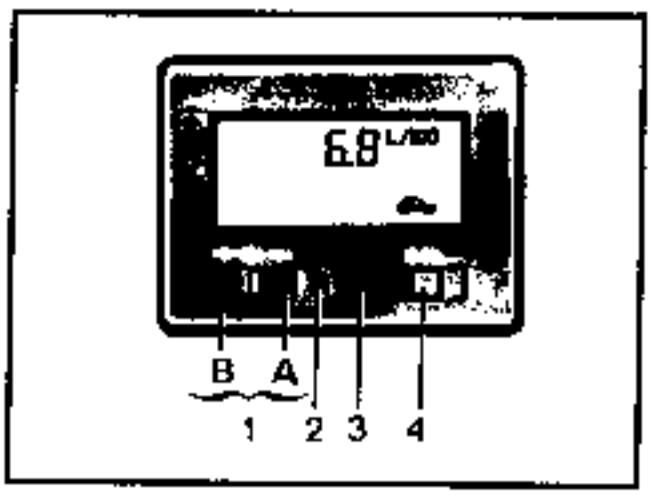
GENERAL

The data provided is as follows :

- the time,
- the amount of fuel consumed,
- the average consumption,
- the consumption at that moment,
- the average speed,
- the distance covered,
- the time elapsed.

This data is calculated from the information received from two sensors :

- a flowmeter providing one pulse every 80 mm³ of fuel consumed,
- a speed sensor providing one pulse every 0.2 meters of road covered.

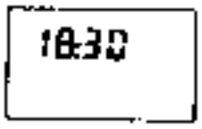


1. Display selection key
2. Hour setting key
3. Minute setting key
4. "Start pulse" initiating key

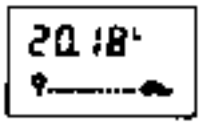
- The time is permanently displayed even when the vehicle is not being driven.
- When the ignition is switched on, the amount of fuel consumed is the first item displayed.

OPERATION

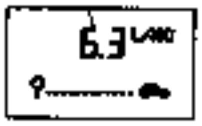
Ignition off
Hours, minutes.



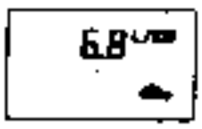
Ignition on
Fuel consumed
(in litres)
(or gallons)



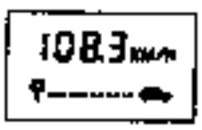
1st pressure on B
Average consumption since the "Start Pulse"
(in lit/100 km)
(or miles per gallon)



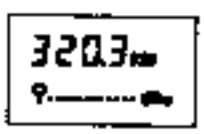
2nd pressure on B *
Consumption at that point (in lit/100 km)



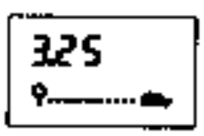
3rd pressure on B
Average speed since "Start Pulse"
(in km/hr) (or mph)



4th pressure on B
Distance covered since "Start Pulse"
(in km) (or miles)



5th pressure on B
Time elapsed since "Start Pulse"
(in hours and minutes).



6th pressure on B
Hours, minutes.

ZEROING - "START PULSE"

By pressing on key 4, all the various memories are returned to zero.

* Not for UK

NOTE :

If the maximum capacity of the computer in any of the readings is exceeded, all the indicators return to zero (Start Pulse).

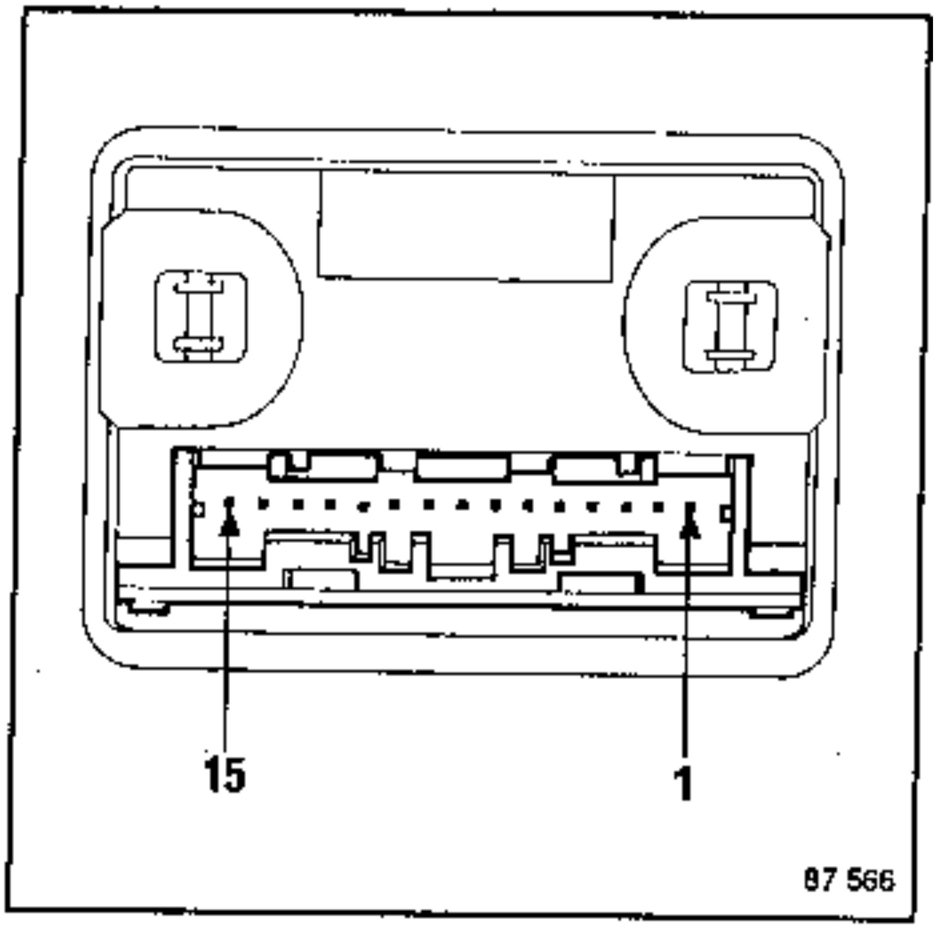
After the current has been switched off (by disconnecting the battery) press key 4 to stop the display flashing and restart all the functions.

Correct the hour and minutes display.

Connections

CONNECTOR

Pin	Description
1.	Not connected
2.	+ bulbs = + accessories
3.	Not connected
4.	+ before ignition switch
5.	+ after ignition switch
6.	Speed data
7.	Not connected
8.	Not connected
9.	Flowmeter data
10.	Not conencted
11.	Not connected
12.	Trip computer earth
13.	Flowmeter - (*)
14.	Not connected
15.	Speed sensor - (*)



(*) Electronic earths passing through the trip computer.

The "fascia panel" earth is connected to the front right hand door pillar and distributed to the various sensors through the trip computer.

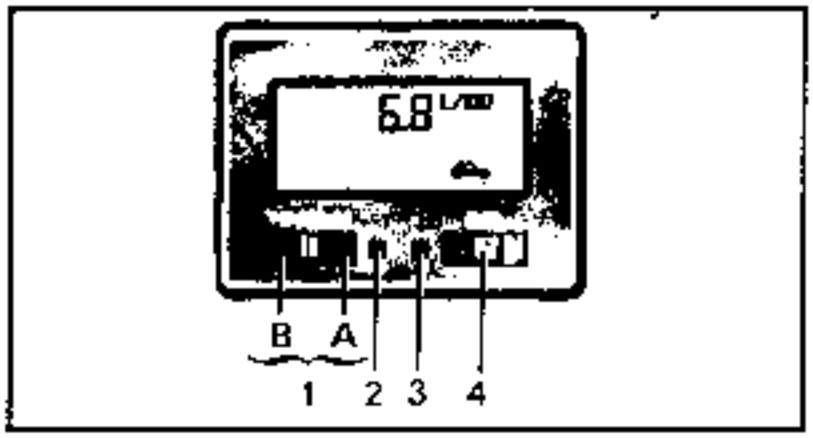
DEFECT DETECTION

The trip computer memorises any flowmeter sensor defects and causes all the displays other than the time to flash.

NOTE : For speed sensor defects, see the section : Checking the speed sensor.

FAULT FINDING SEQUENCE

- disconnect the battery (negative post),
- press key (4) (Start Pulse) for 30 seconds,
- reconnect the battery,
- switch on the ignition.

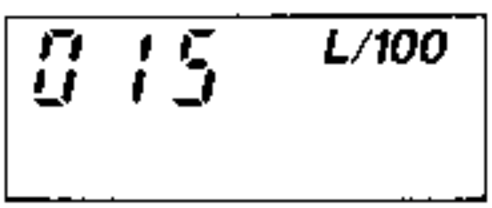


1) Check the display

All sections should flash.

2) Check the flowmeter

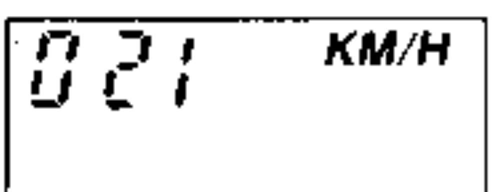
Press key 1 side B.



Frequency of pulses received from the flowmeter (more than 0 when the engine is running).

3) Check the speed sensor
(with the vehicle moving)

Press key 1 side A.



Frequency of pulses received from the speed sensor (more than 0 when the vehicle is moving).

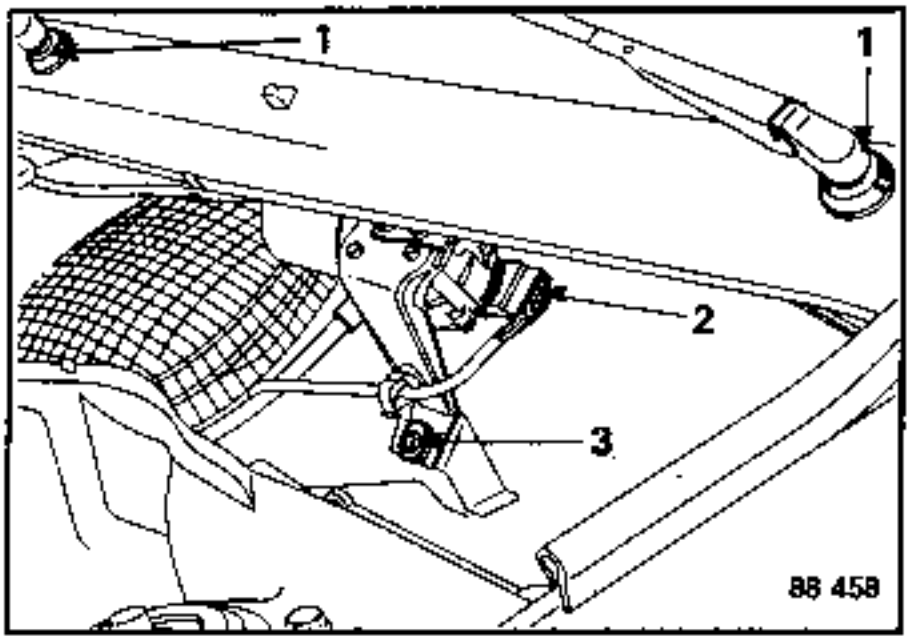
REMOVING - REFITTING

Disconnect the battery.

Remove :

- the wiper arms,
- the outer secu.ing nuts (1),
- the electri.al junction block (2),
- the plate securing screw (3).

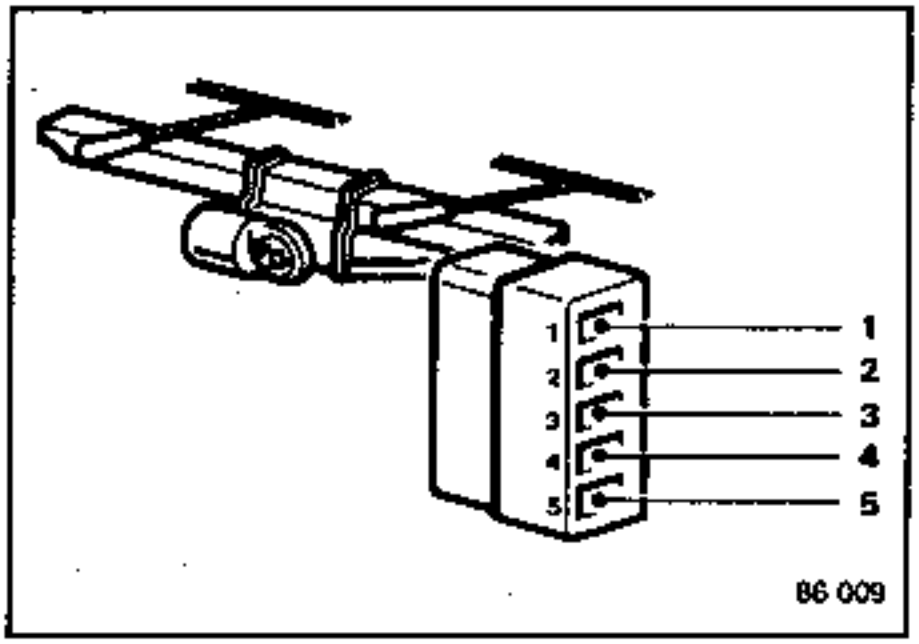
Tak. out the mechanism.



REFITTING

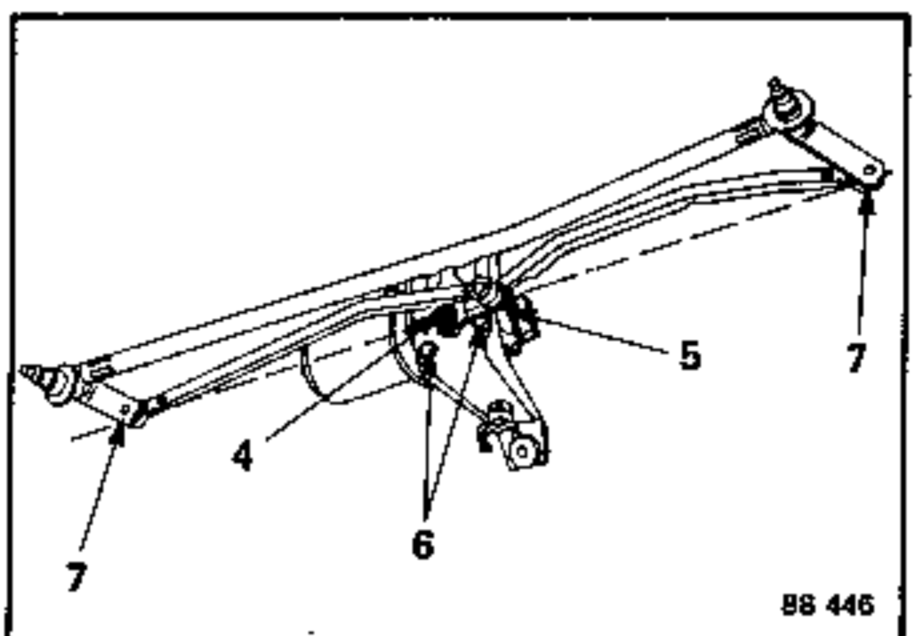
Reconnect the junction block after refitting the mechanism.

Check that the motor is in the fixed park position before refitting the wiper arms.



1. Windscreen wiper high speed
2. Windscreen wiper motor earth
3. + fixed park position
4. Windscreen wiper low speed
5. Fixed park position

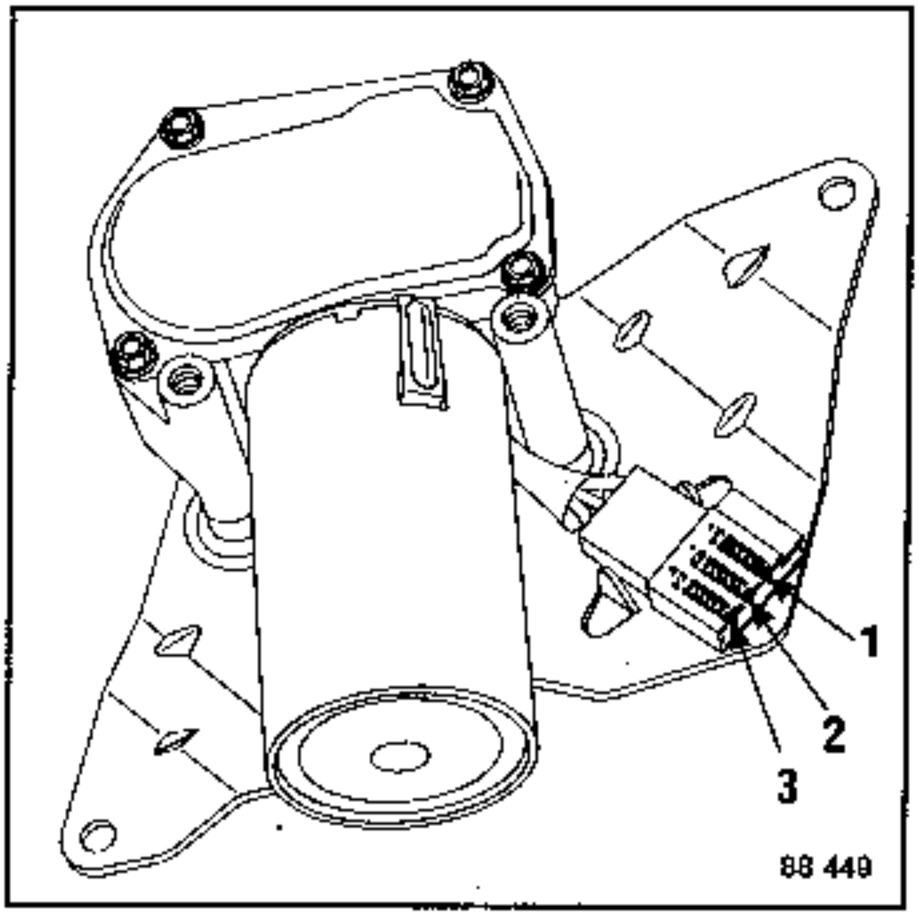
REMOVING AND REFITTING THE MOTOR (after removing the mechanism)



Unscrew the securing nut (4) from the drive link (5).

Remove the three screws (6) that secure the motor in place and take out the motor.

On refitting, check that the drive link (5) is correctly aligned with an imaginary line passing through the two points (7) when the motor is in the fixed park position.



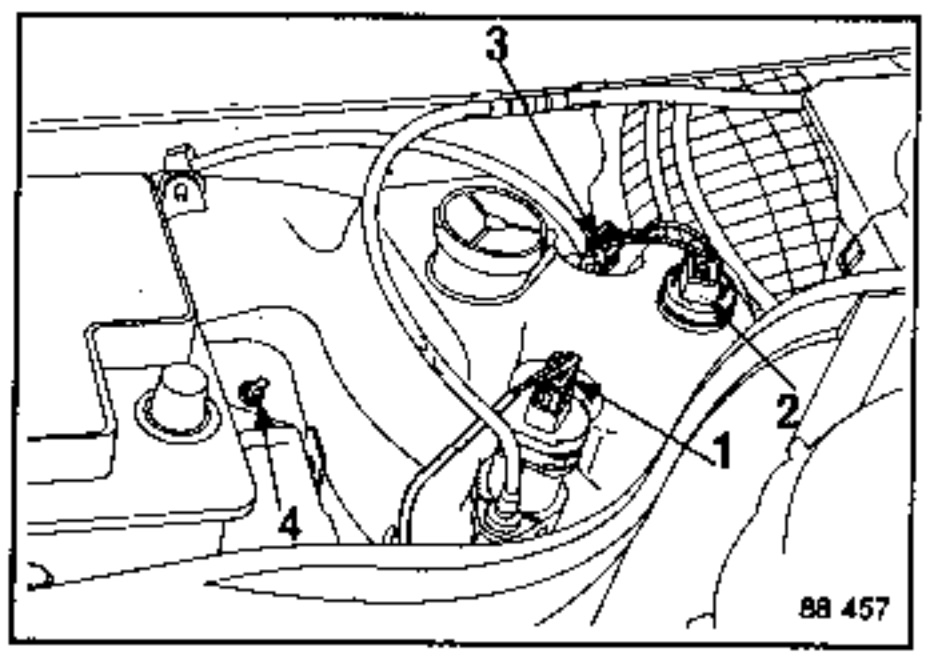
Pin	Description
1	+ motor
2	Motor earth
3	+ fixed park

Screen washers

REMOVING - REFITTING

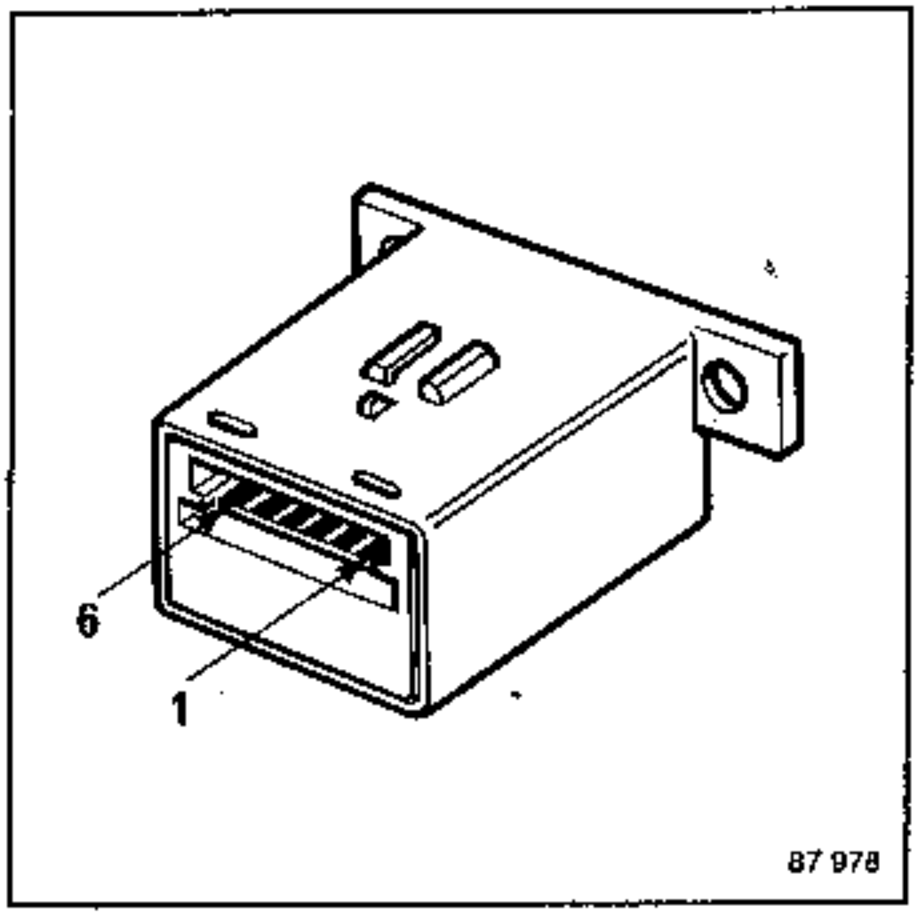
Disconnect :

- the washer-pump connector (1),
- the minimum level connector (2),
- the rear screen pump connector (3),
- the securing nut (4),
- the pipes.



Connector 1 or 3

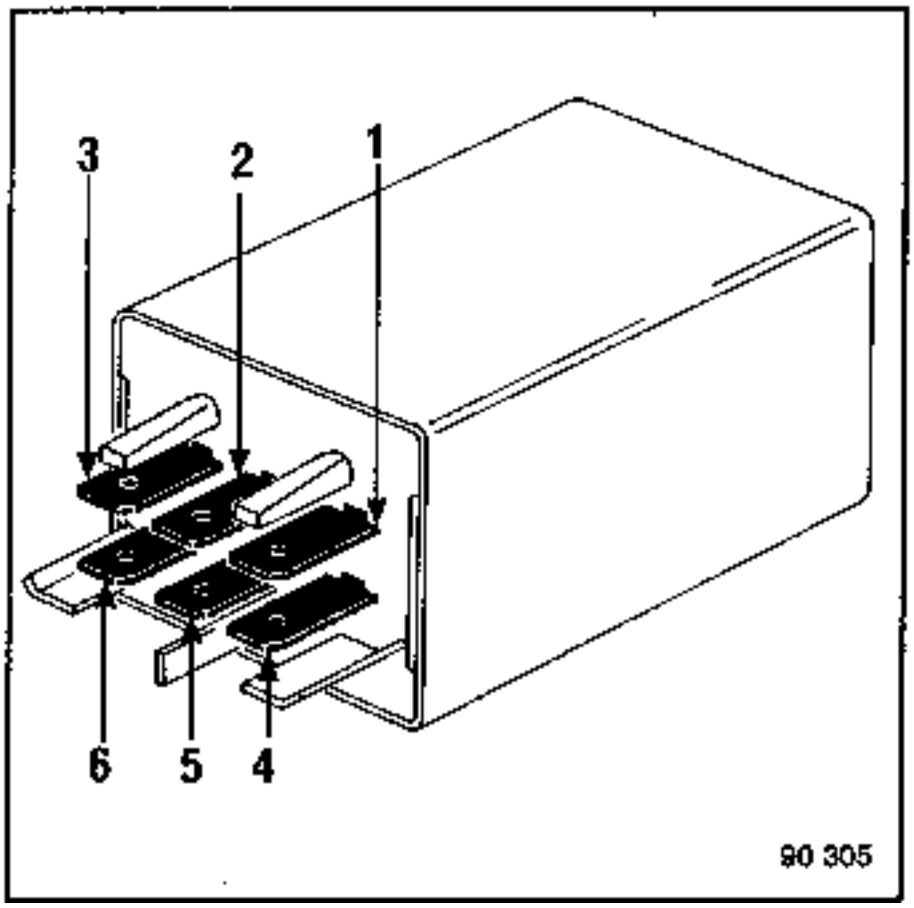
Pin	Description
1	Pump earth
3	+ pump



Front or rear screen wiper timer connections :

Pin	Description
1	Earth
2	+ washer pump
3	Timer control
4	Wiper fixed park position
5	+ after ignition switch
6	Timed output to motor

Door lock timer relay



Timed period : 3 seconds ± 1

Connections :

Pin	Description
1	Closing control
2	Timer earth
3	Opening control
4	E.D.L.* motor closing supply
5	+ before ignition switch
6	E.D.L.* motor opening supply

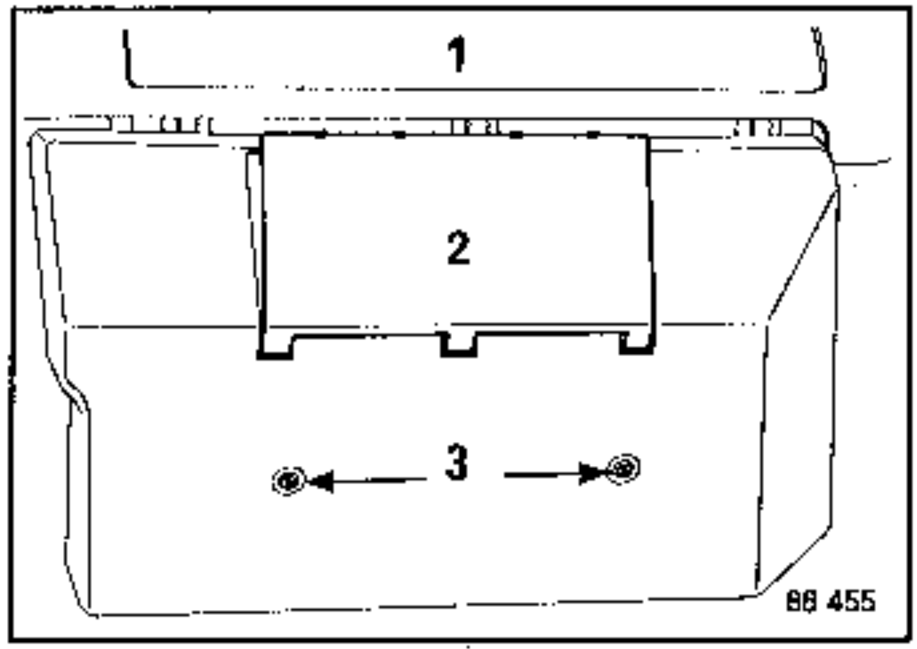
* E.D.L: Electric door locks

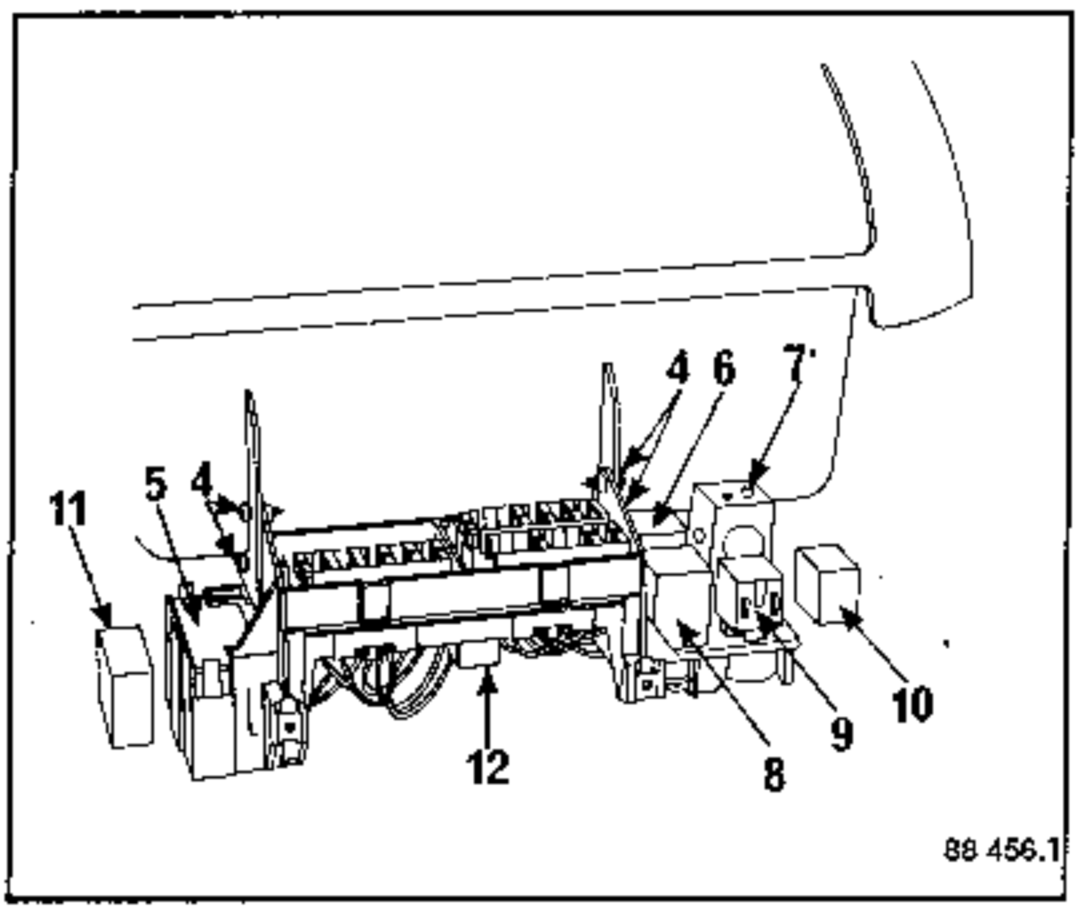
REMOVING - REFITTING

Disconnect the battery.

Remove :

- under the glove compartment (1),
- under the fuse box (2), the two screws (3).





The 4 screws (4)

*

RELAY POSITIONS

5. Windscreen wiper timer
6. Lighting warning buzzer or sidelights relay
7. Electric door lock timer
8. Direction indicator flasher unit
9. Rear foglight relay
10. Main lighting relay (Sweden, Norway)
11. Dipped beam relay (Sweden, Norway)
12. Rear screen wiper timer

REPAIRING

The heated rear screen consists of a screen printed element applied to the inside face of the screen. Any accidental cut in it would render ineffective the part of the circuit affected.

The point at which the break occurs can be found with a voltmeter.

Such breakages can be repaired with special heated rear screen varnish supplied under the part no. 77 01 421 135 (2 g bottle).

Determining the exact point of the breakage with a voltmeter.

Switch on the ignition.

Switch on the supply to the heated rear screen.

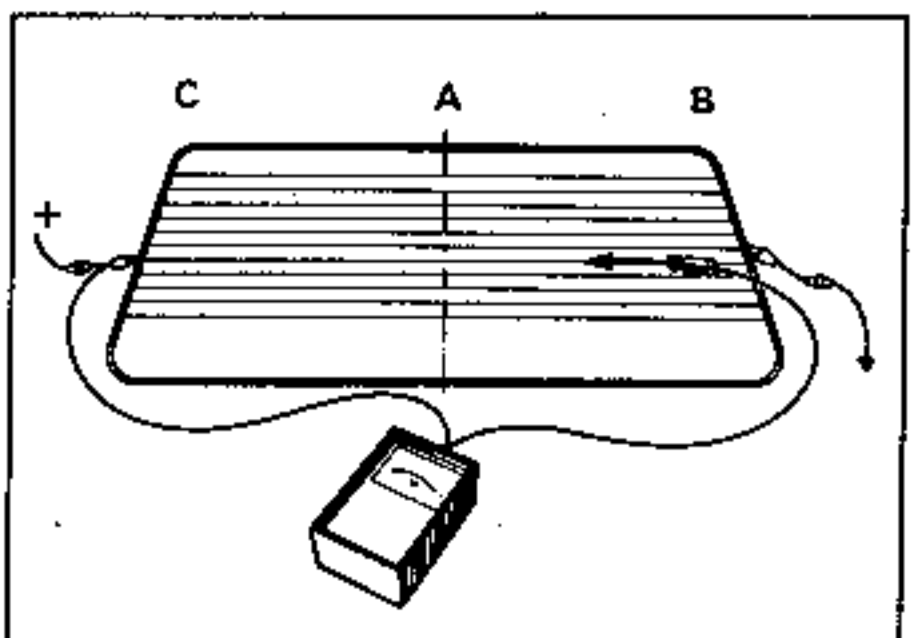
Detection between lines B and A.

Connect the + wire of the voltmeter to the + supply terminal of the screen.

Place the negative wire of the voltmeter on a filament on the negative side of the screen (line B). At this point the voltage should be roughly the battery output voltage.

Move the - wire towards line A (arrow) : the voltage should gradually fall.

If the voltage falls suddenly, the filament is broken at that point (carry out the same operation on each filament).



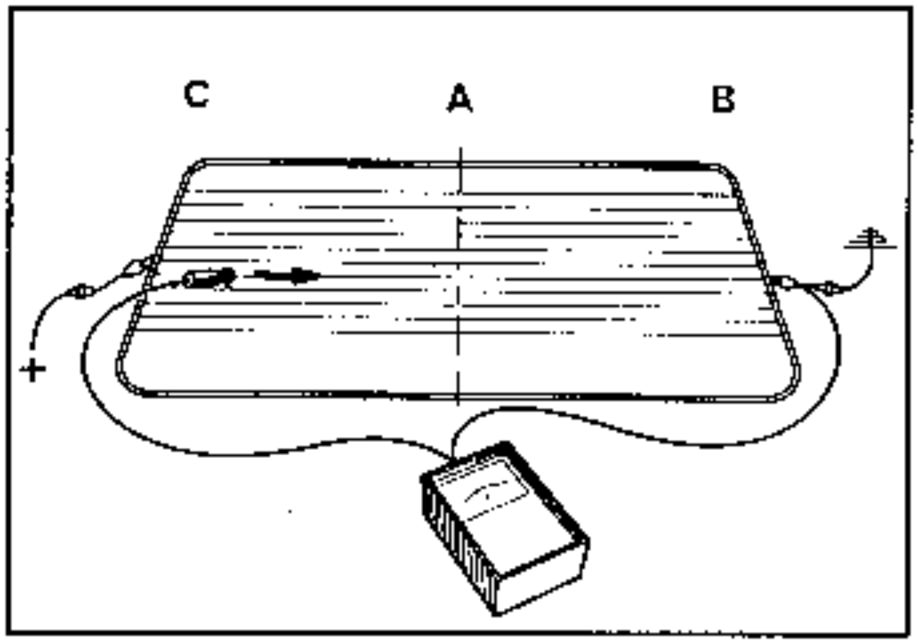
Detection between lines C and A

Connect the - wire of the voltmeter to the screen - terminal.

Place the + wire of the voltmeter on a filament on the + terminal side of the screen (line C). The voltage should be roughly the battery output voltage.

Move the + wire towards line A (arrow) : the voltage should gradually fall.

If the voltage falls suddenly, the filament is broken at that point (carry out this operation on each filament).



REPAIRING A FILAMENT

Clean the area to be treated locally to remove all dust or grease using, preferably, alcohol or a glass cleaner and wiping it with a dry clean cloth.

To obtain a neat repair, apply adhesive tape of the cellotape type on either side of the area to be repaired leaving the conductor filament uncovered.

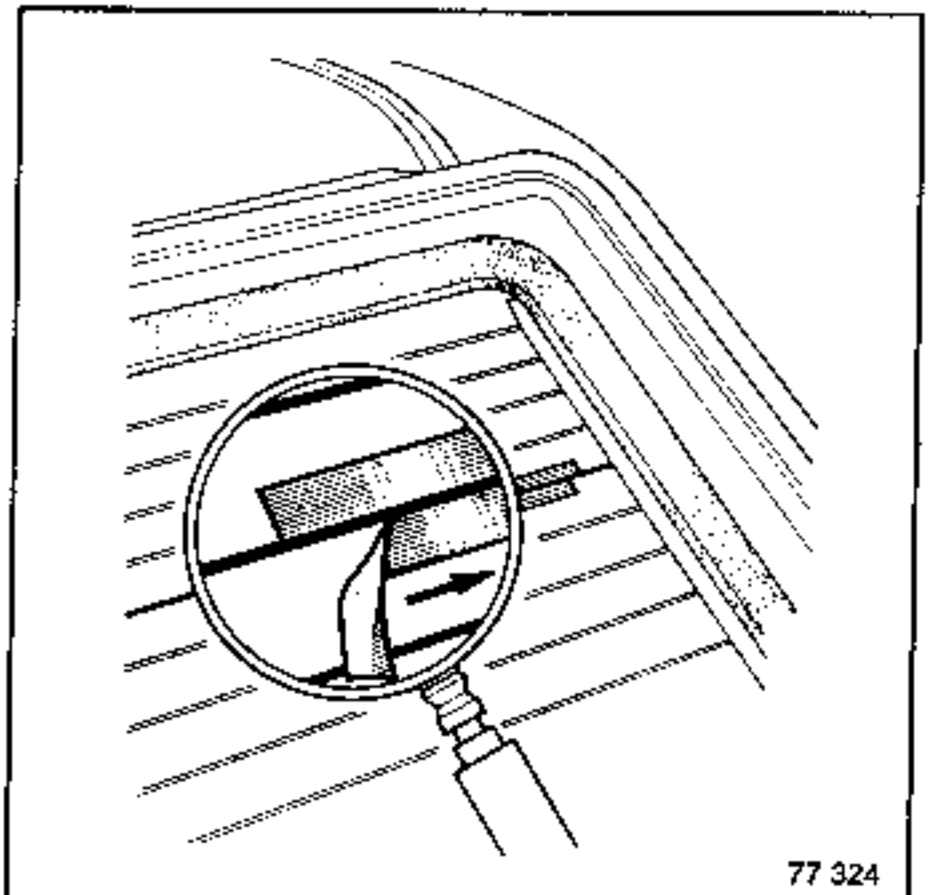
Before using the varnish, shake the bottle to mix in any silver particles that are deposited at the bottom of it.

REPAIRING

With a fine brush, apply a sufficient thickness of the varnish to carry out the repair. If several coats are required, leave time between each coat for the varnish to dry and do not apply more than three coats.

Should there be any runs, they can be removed with the point of a knife or a razor blade but only after leaving the product to dry, fully, for several hours.

The adhesive tape used as a guide is not to be removed until approximately one hour after application. The tape is to be pulled off perpendicular to the filament in the direction shown by the arrow. The varnish, if applied at an ambient temperature of 20°C, will be fully dry in three hours. At lower temperatures the drying time will be slightly longer.



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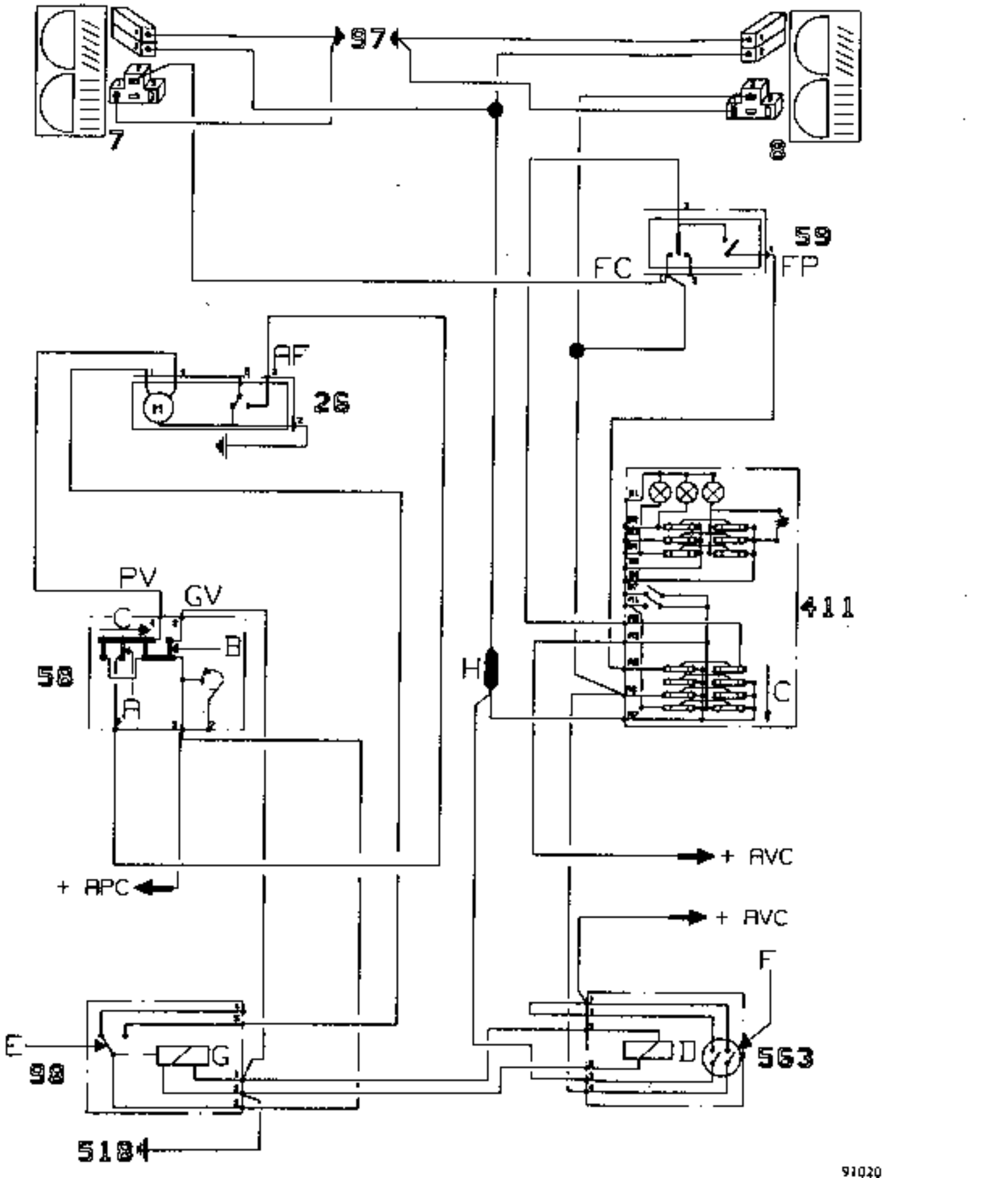
RENAULT 5 DRIVING SCHOOL VERSION (The beginning of the 87 model year)

Switching on of the headlight dipped beams at windscreen wiper high speed.

On driving school vehicles, the dipped beam headlights will be switched on when the windscreen wipers are placed in the high speed position.

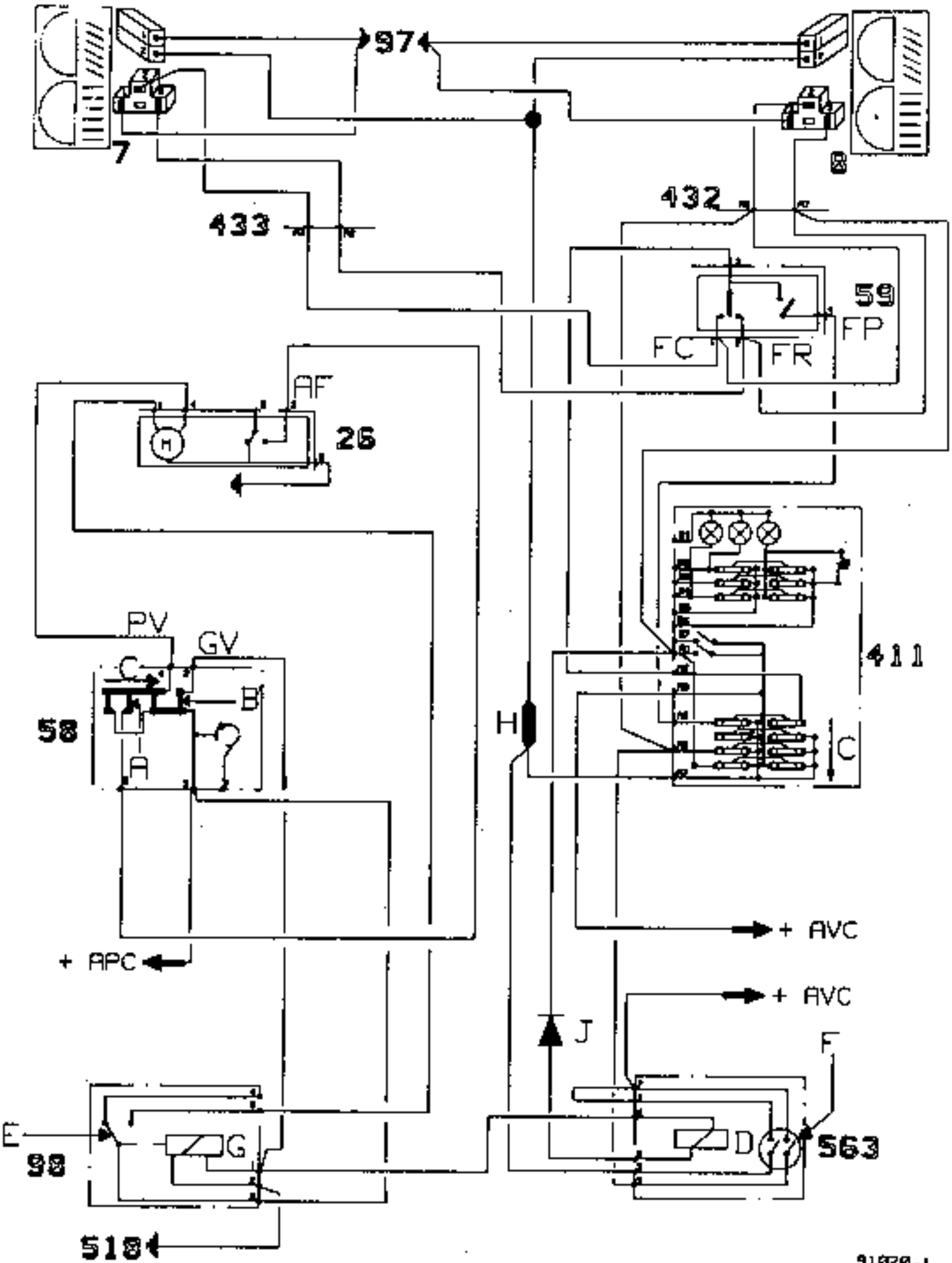
You will find below two circuit diagrams that show how this system works. The first is specified for Renault 5 models, at the start of the 1987 model year. The second, on the following page, is specified only for Renault 5 (the last models manufactured), a modification having been introduced to switch off the dipped beams when the headlights are moved to full beam.

CIRCUIT DIAGRAM



MODIFICATION - SPECIAL RENAULT 5 DRIVING SCHOOL FEATURES

CIRCUIT DIAGRAM



KEY TO SPECIFIC DRIVING SCHOOL DIPPED BEAM ARRANGEMENT

7	-	Sidelight/dipped beam unit, LH
8	-	Sidelight/dipped beam unit, RH
26	-	Windscreen wiper motor
58	-	Wiper/washer control
59	-	Light switch
97	-	Bodywork earth
98	-	Windscreen wiper high speed relay
411	-	Driving school control unit
432	-	Front RH wiring connection
433	-	Front LH wiring connection
518	-	Front RH pillar earth
563	-	Sidelight/dipped beam relay
AF	-	Fixed park
PV	-	Low speed
GV	-	High speed
FP	-	Sidelights
FC	-	Dipped beams
+ APC	-	+ After ignition switch
+ AVC	-	+ Before ignition switch
C	-	Switch movement
H	-	Sidelight fuse
J	-	Diode

PRINCIPLE OF OPERATION OF THE SPECIFIC DRIVING SCHOOL DIPPED BEAM HEADLIGHTS

The sidelights and dipped beam headlights operate, in conjunction with the windscreen wiper high speed as follows :

- The switch is moved from A to B (following movement) C of the wash/wipe control (58).
- Coil (G) on the windscreen wiper high speed relay (98) and coil (D) on the sidelight relay (563) are supplied with current.
- Motor (M) on the windscreen wipers (26) is supplied with current in the high speed mode.
- Contact (E) on the windscreen wiper high speed relay (98) and contacts (F) on the side-light relay (563) close .

The sidelights and dipped beam headlights are switched on.

Diode J switches off the dipped beams when the headlights are selected into the full beam position.

This appears on two plates :

- one rectangular and one oval plate on the left hand cowl side.

The rectangular plate displays* :

At A : the manufacturer's name.

At B : the E.E.C. approval number comprising :

at B1 : the identification number of the country that granted the E.E.C. approval,

at B2 : the vehicle type approval number.

At C : the French official type number preceeded by the manufacturer's international identification code (the code for Renault France for example is VF1).

At D : the chassis number.

At E : the gross vehicle weight.

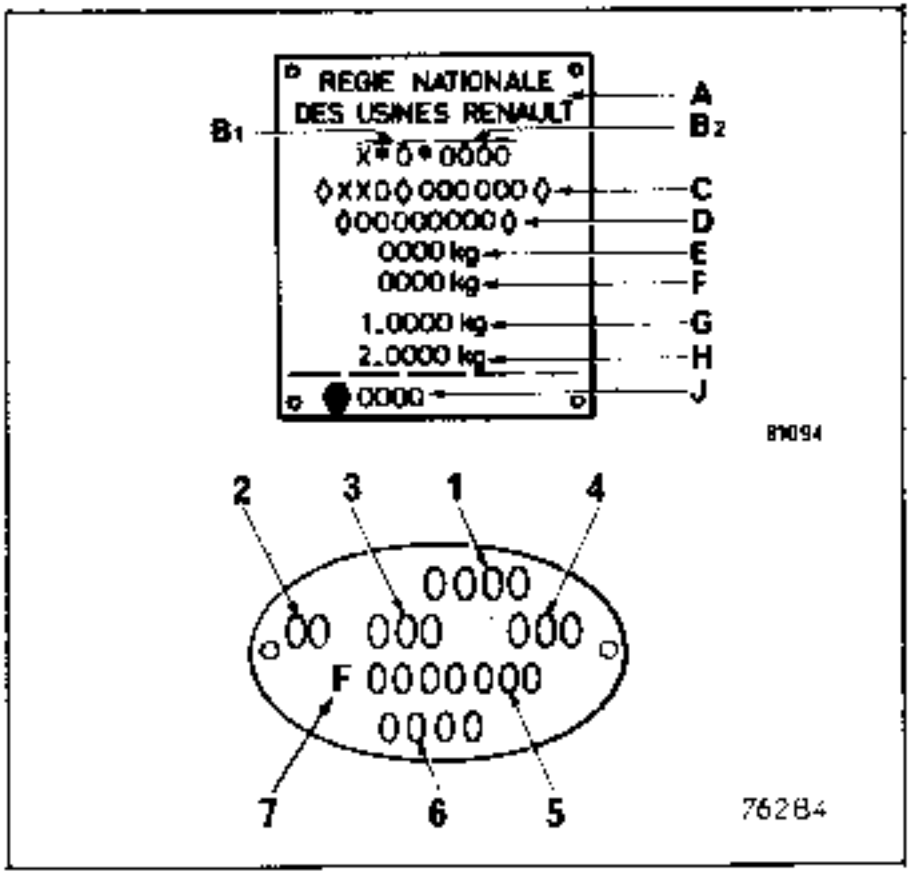
At F : the gross train weight.

At G : the maximum permissible front axle loading.

At H : the maximum permissible rear axle loading.

At J : the vehicle model year.

*Note : on some export models, certain of the items stated above may not appear, this being a description of all the details that may be shown on the plate.



The oval plate displays :

- at (1) : the manufacturer's symbol for the vehicle
- at (2) :
  - the first figure states the gearbox or automatic transmission type,
  - the second figure indicates the model grading,
- at (3) : is the basic version, depending on the market (see chart),
- at (4) : is an indication of any factory fitted option (sun roof, tinted windows)
- at (5) : the fabrication number,
- at (6) : the model year (certain markets only),
- at (7) : the factory at which the car was built, F = Flins

The meanings of the version numbers

Good road		Poor road		Special equipment	
Steering		Steering		Steering	
LH drive	RH drive	LH drive	RH drive	LH drive	RH drive
series 100	series 600	series 200	series 700	series 500	series 800

ESSENTIAL SPECIAL TOOLS	
Cha.280-02	Trolley jack cross bar
Cha.408-01	Trolley jack adaptor
Cha.408-02	Trolley jack adaptor

If a trolley jack is used, so must suitable axle stands.

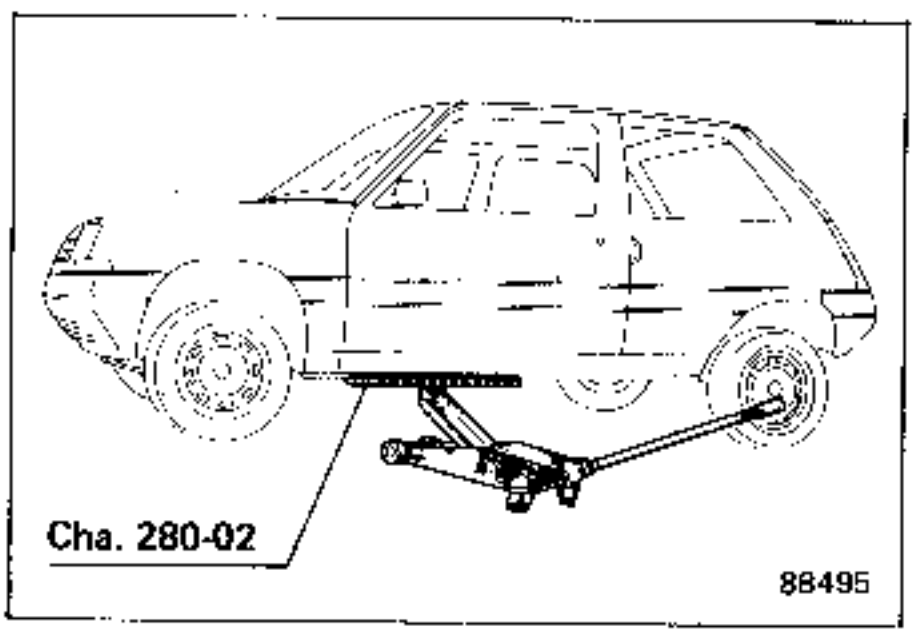
It is forbidden to lift the vehicle by taking the load under the front or rear suspension arms or under the front cross member, between the side members.

Depending on the trolley jack type, use adaptor Cha.408-01 or Cha.408-02 to mount cross bar Cha.280, Cha.280-01 or Cha.280-02.

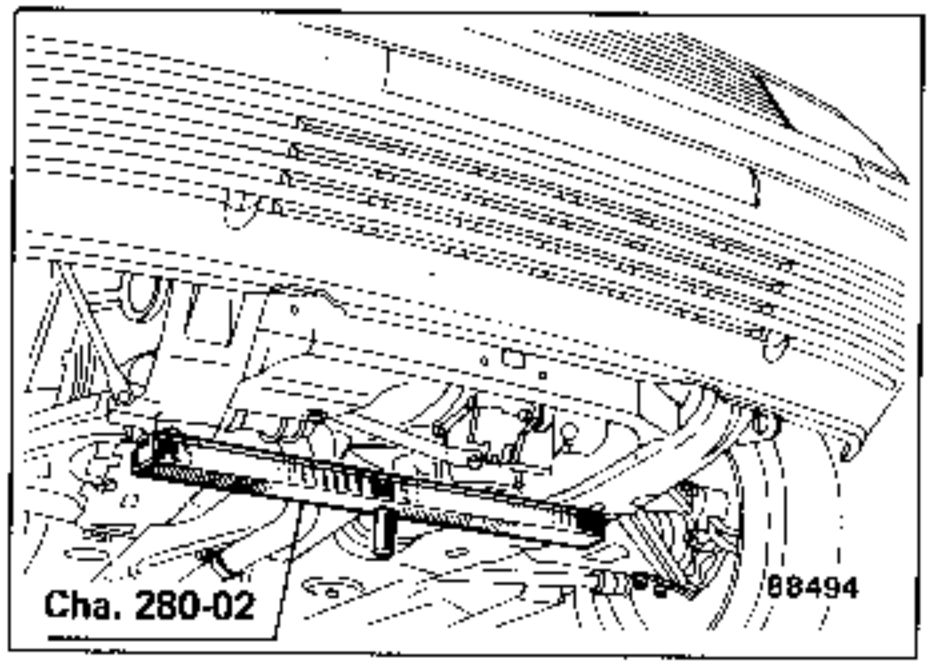
Whether lifting the front or the rear, take the load under the vehicle jacking points.

USING THE TROLLEY JACK FROM THE SIDE

- Use cross bar Cha.280-02.
- Take the load under the front door sill.
- Ensure that the panel flange locates correctly in the slot in the cross bar.



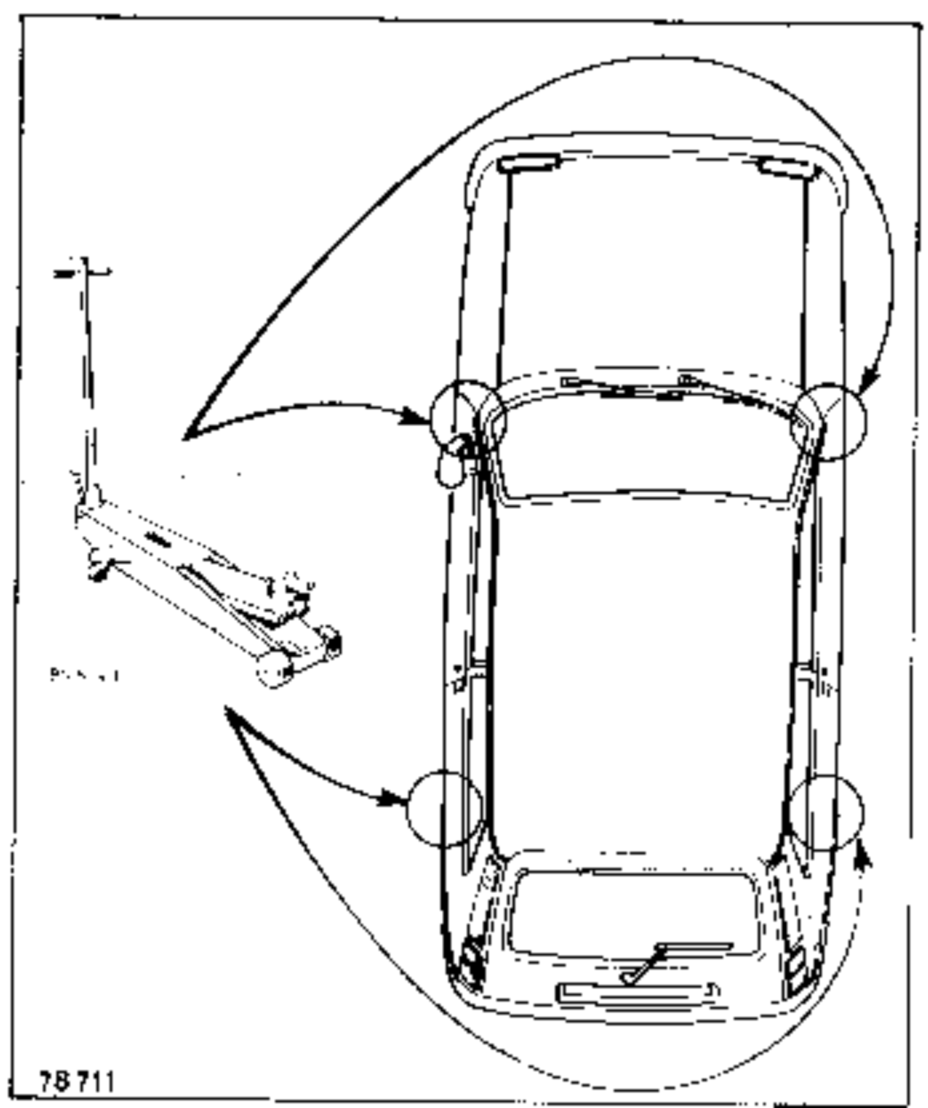
USING A TROLLEY JACK FROM THE FRONT



AXLE STANDS

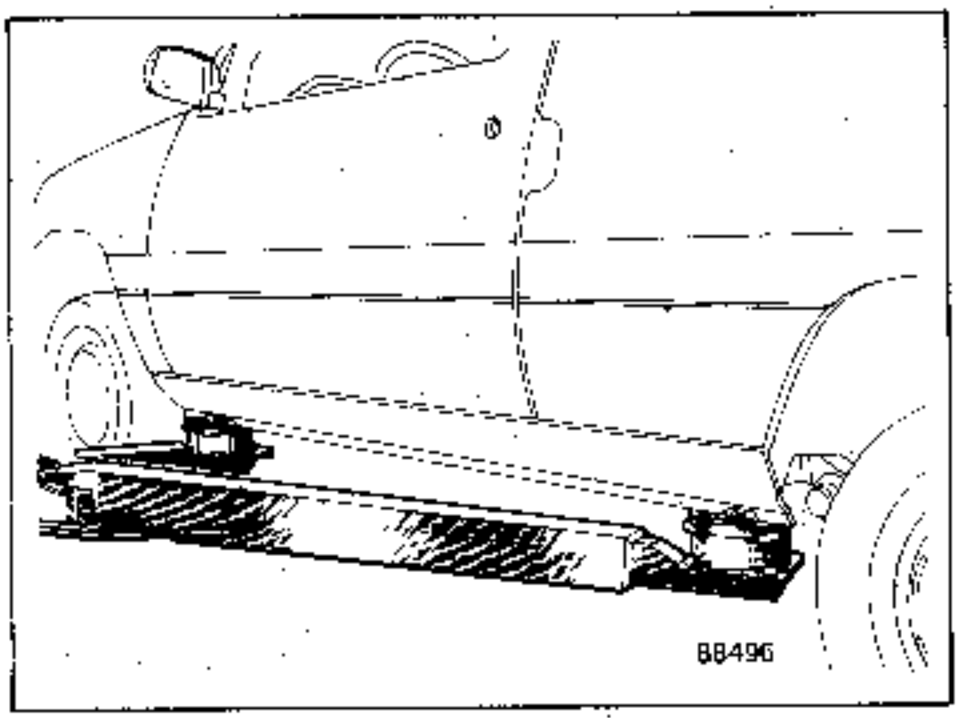
When the vehicle is supported on axle stands, they must be placed under the stiffeners at the jacking points provided for the vehicle's own jack.

To fit axle stands under the rear of the vehicle, lift it from the side.



SAFETY PRECAUTION

When using a two column lift, it is essential that the lifting pads remain under the jacking points. To ensure this, it is FORBIDDEN to remove any components that would cause a change in the weight distribution on such a lift.

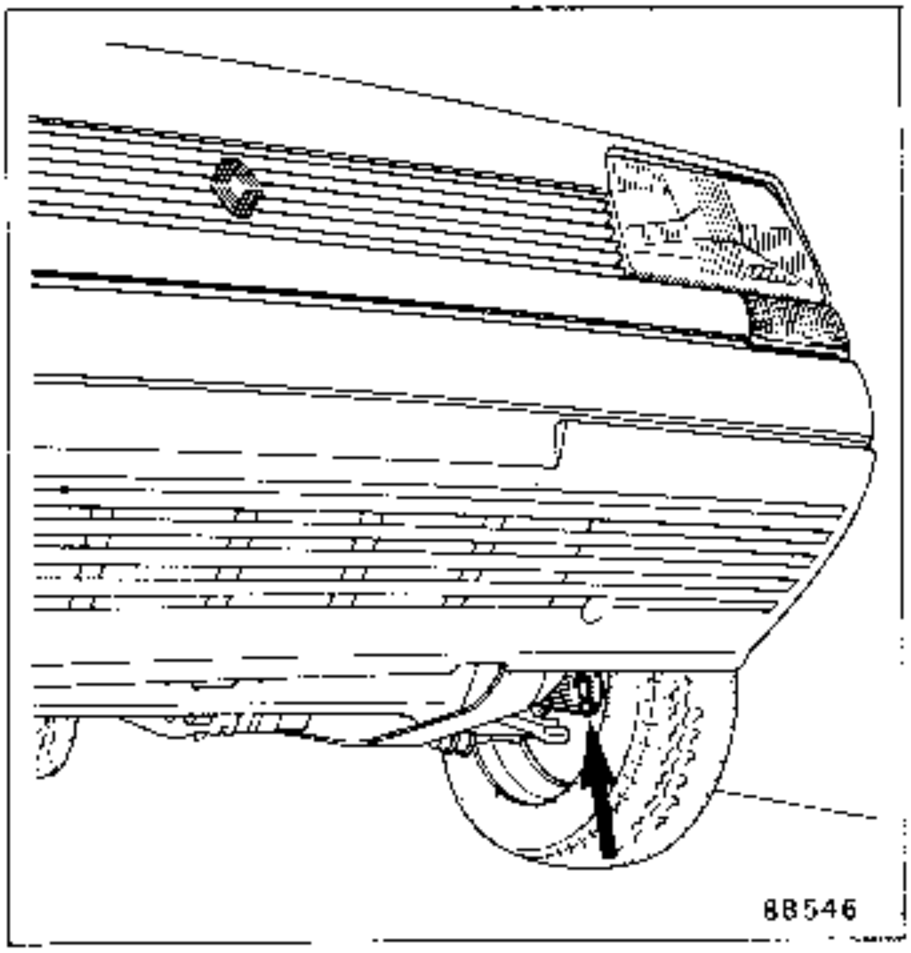


Place the lifting pads under the body sill flange in line with the vehicle jacking points.

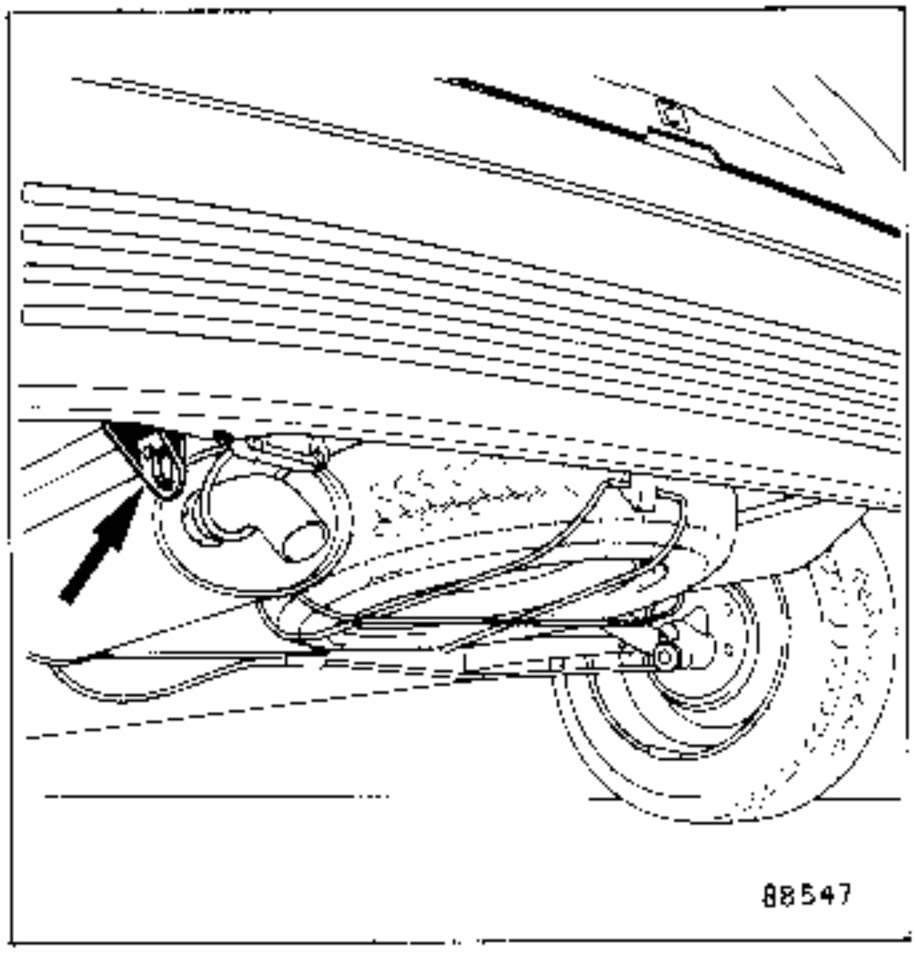
NEVER ATTACH THE TOW ROPE TO THE DRIVE SHAFT TUBES

The towing brackets are only to be used for towing the vehicle on the road. Under no circumstances are they strong enough to pull the vehicle out of a ditch, or any other similar emergency operation, or to lift the vehicle, whether directly or indirectly.

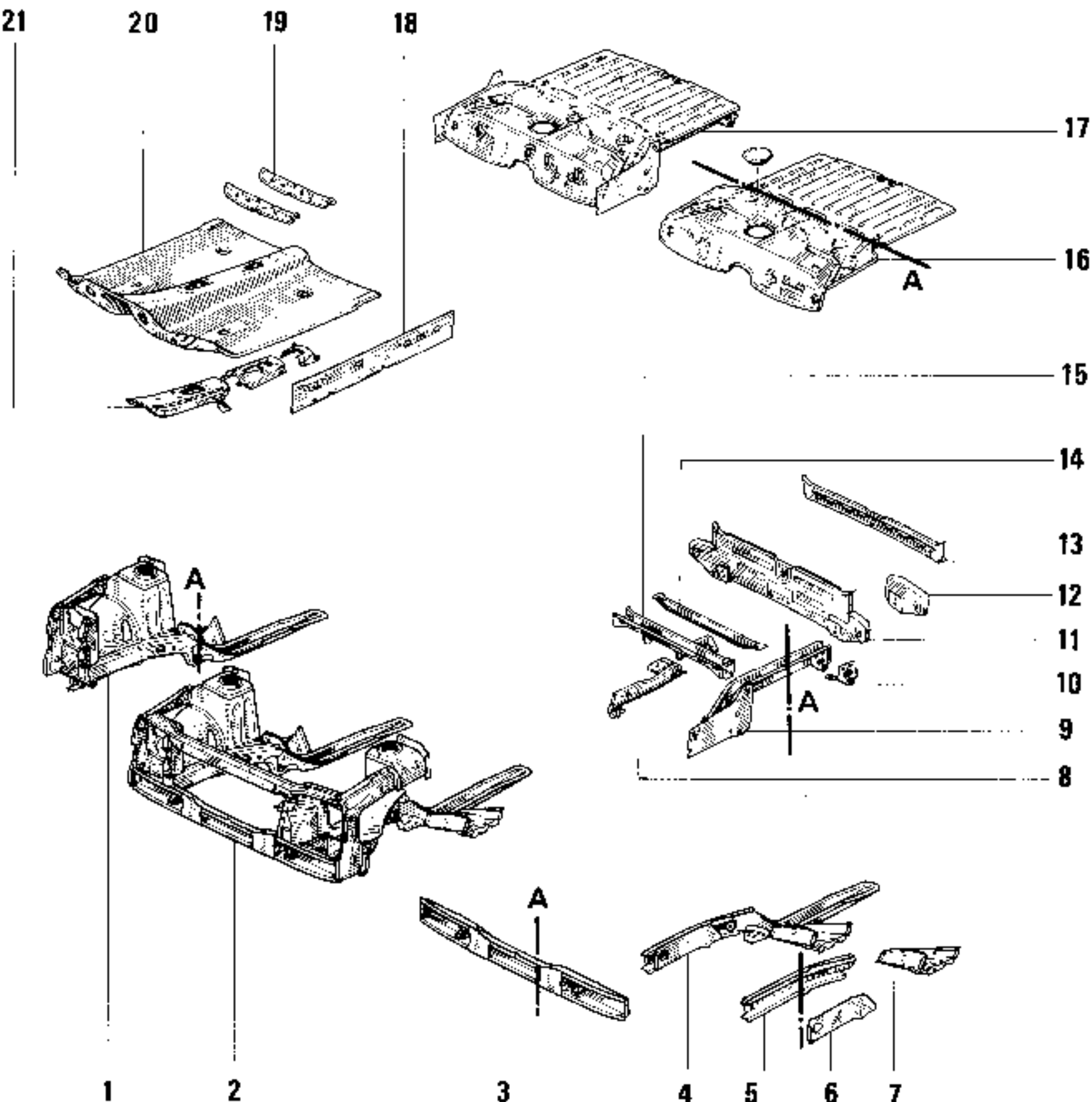
FRONT



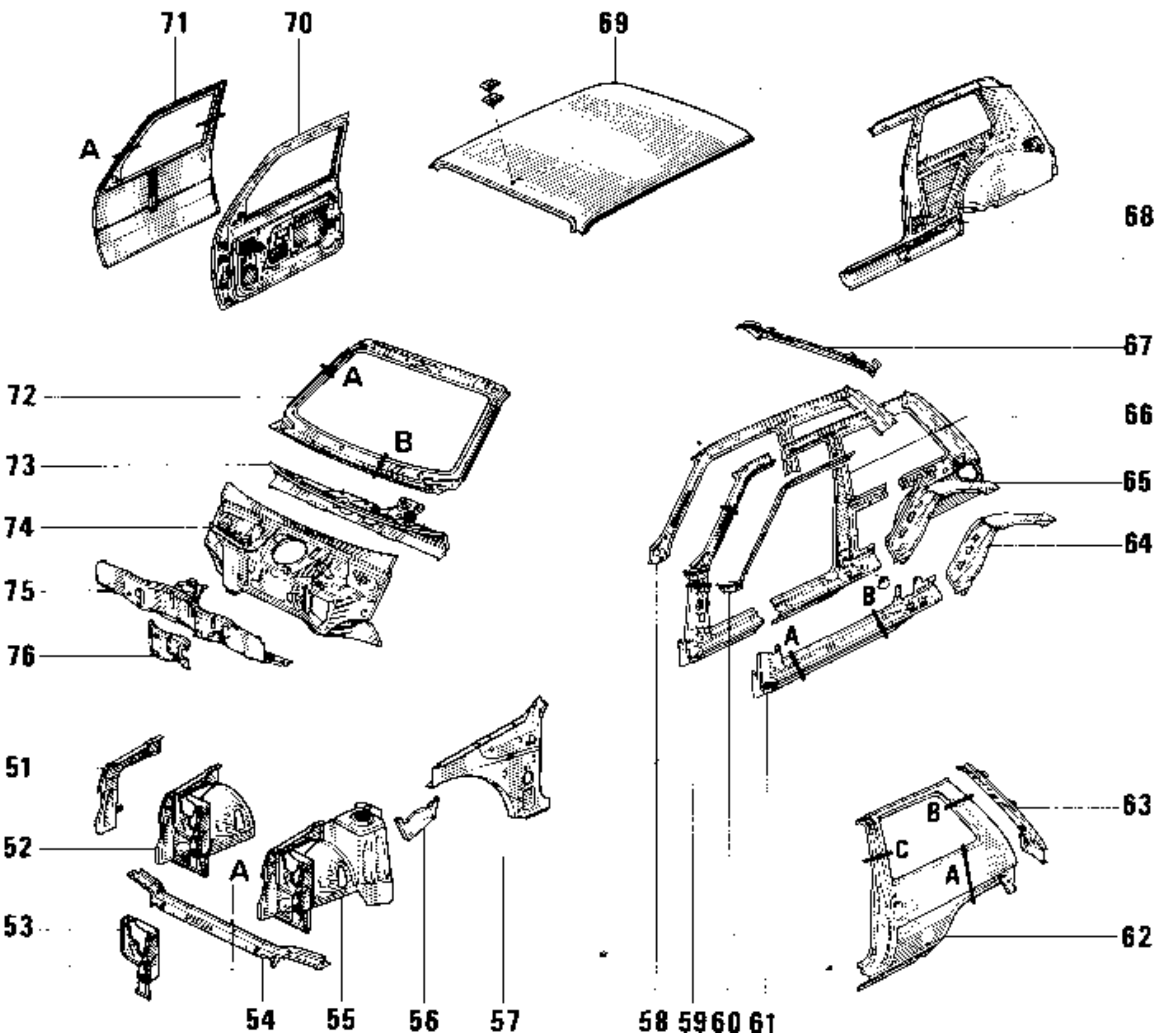
REAR



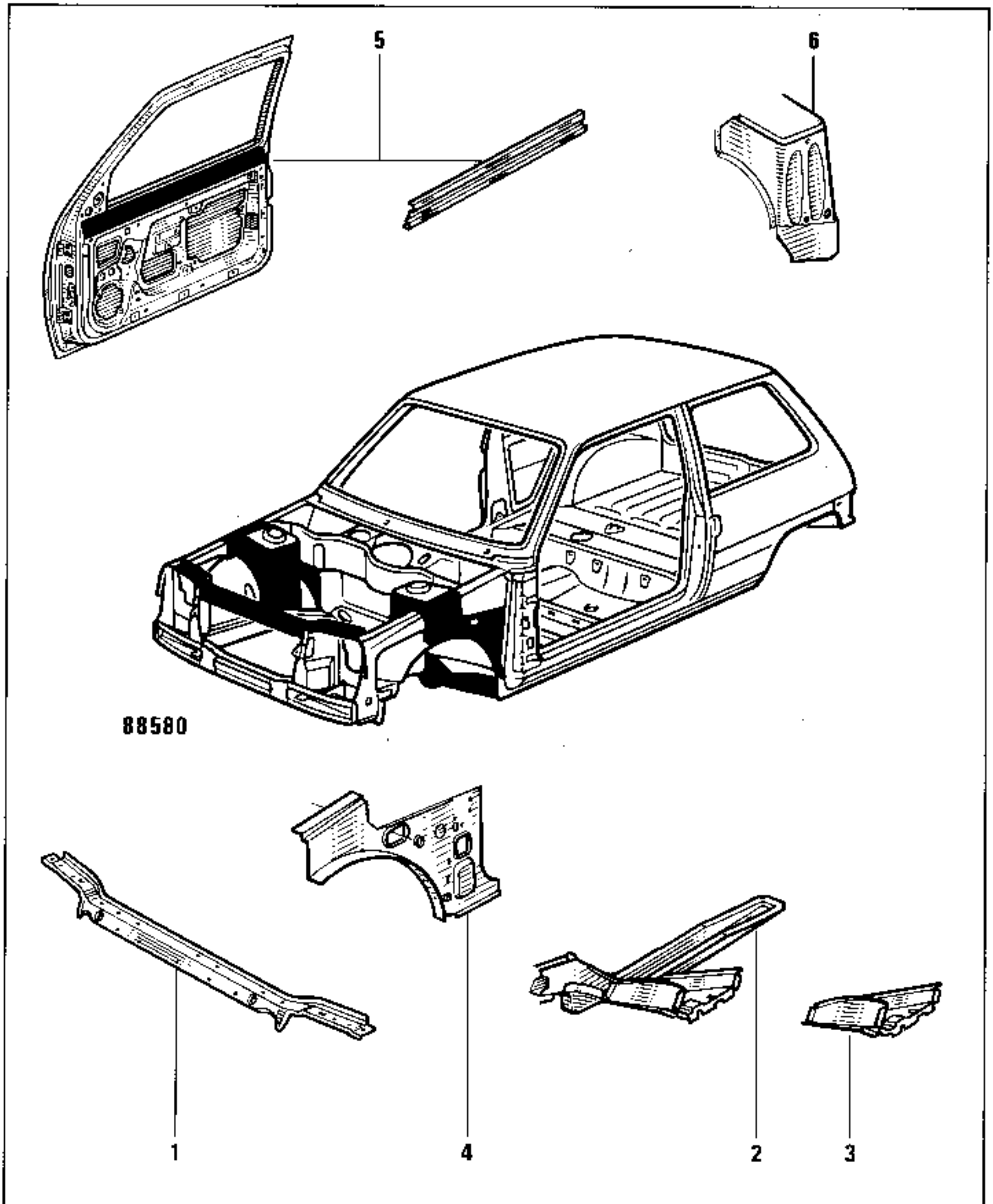
1 - Front half section
1A - Half section cut along line A
2 - Front end unit
3 - Front lower cross member
3A - Cross member cut along line A
4 - Complete front side member
5 - Half front side member
5A - Half front side member cut along line A
6 - Front side member closing panel
7 - Side cross member
8 - Rear floor stiffener
9 - Rear side member
9A - Side member cut along line A
10 - Towing ring
11 - Rear end panel
12 - Rear end panel side gusset
13 - Rear end panel cross member
14 - Rear floor transverse stiffener
15 - Cross member under rear floor
16 - Stripped rear floor panel
16A - Floor panel cut along line A
17 - Rear floor panel assembly
18 - Body sill closing panel
19 - Cross members under front seat
20 - Front floor panel
21 - Floor tunnel stiffener

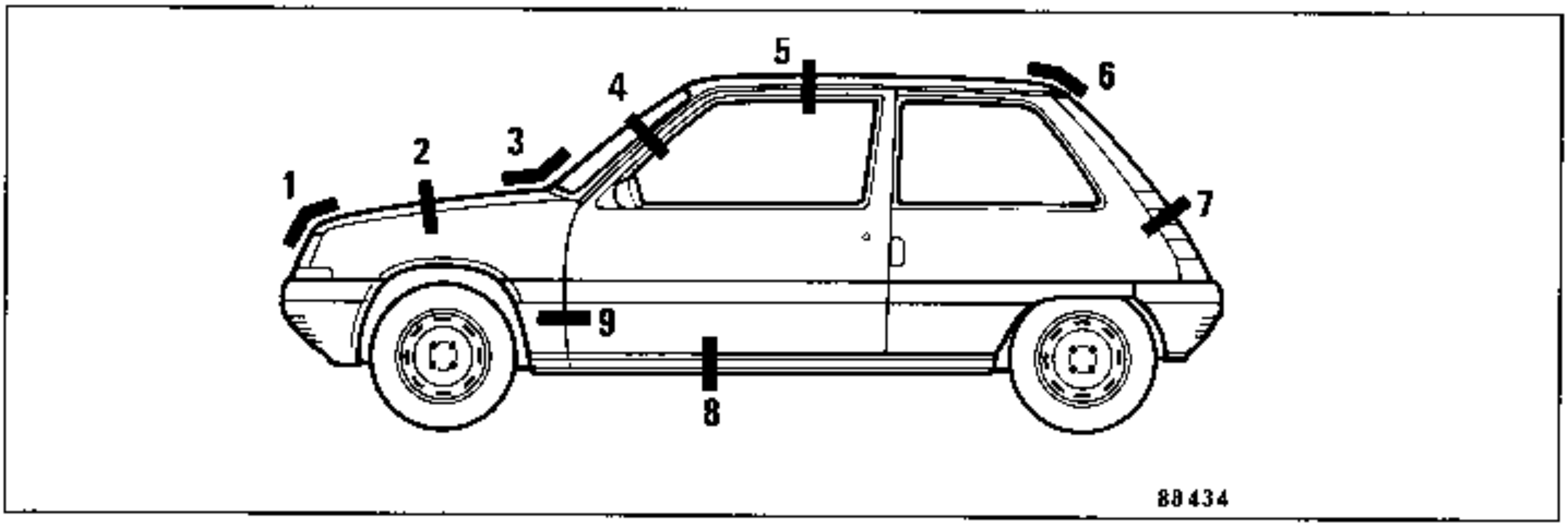


51 - Cowl side panel
52 - Simplified cowl panel assembly
53 - Headlight support panel
54 - Front upper cross member
54A - Cross member cut along line A
55 - Cowl side assembly
56 - Cowl side to scuttle connection
57 - Front door pillar lining
58 - Upper body side
59 - Front door pillar
59A - Door pillar cut along line A
59B - Door pillar cut along line B
60 - Front door frame cover
61 - Body sill
61A - Body sill cut along line A
61B - Body sill cut along line B
62 - Wing panel
62A - Wing panel
62B - Wing panel
62C - Wing panel
63 - Wing panel drip channel
64 - Wheel arch
65 - Wheel arch assembly
66 - Centre door pillar
67 - Rear roof cross member
68 - Half rear end assembly
69 - Roof
70 - Side door
71 - Door panel
71A - Door panel cut along line A
72 - Windscreen frame
72A - Windscreen frame cut along line A
72B - Windscreen frame cut along line B
73 - Windscreen lower cross member
74 - Scuttle
75 - Heater bulkhead
76 - Removable bulkhead (air conditioning)



1 - Front upper cross member
2 - Side members under floor
3 - Side cross members
4 - Front door pillar lining
5 - Door waist stiffener
6 - Shock absorber turret




1
2
3
4
5
6
7
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9
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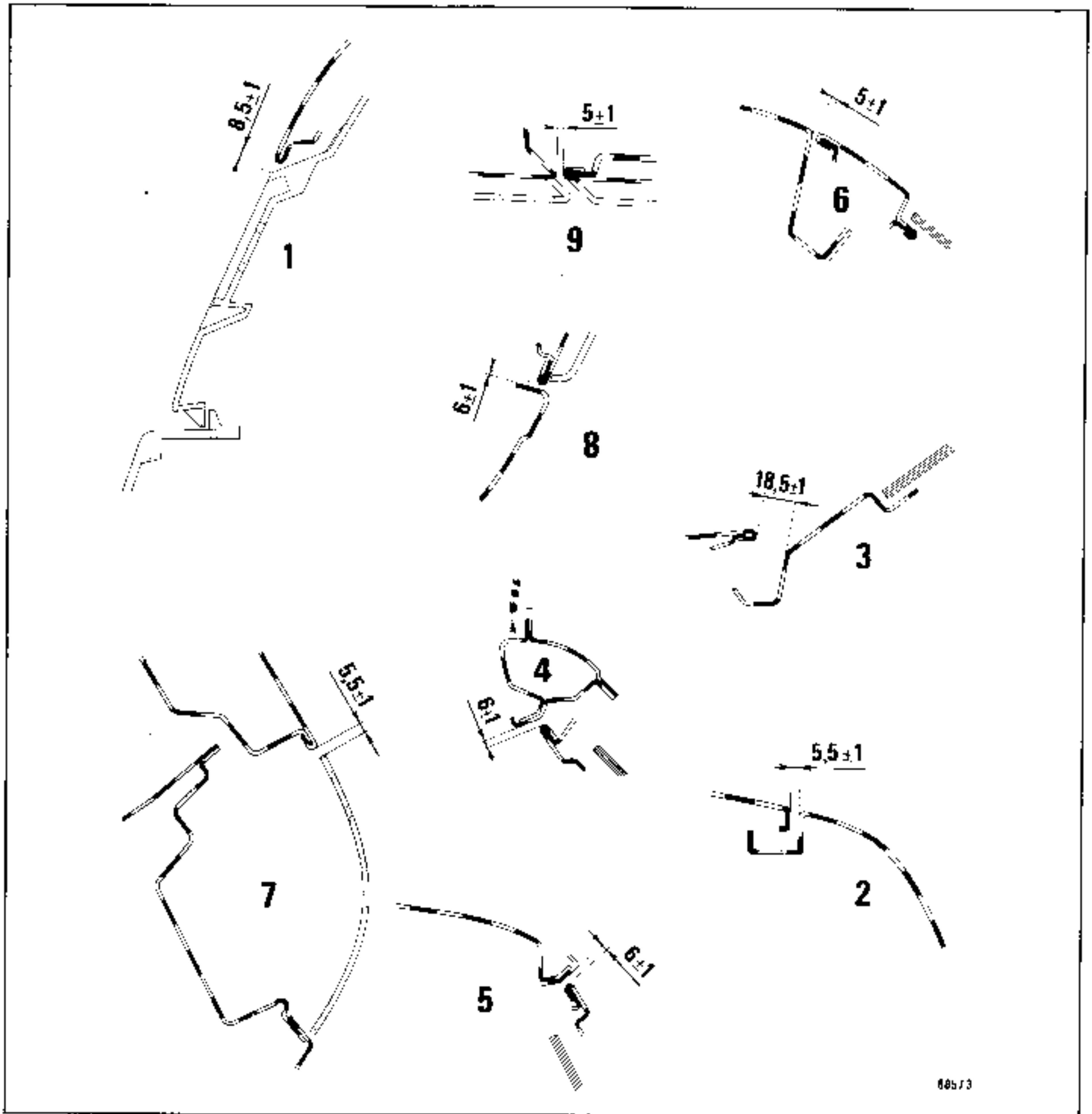

8,5±1
1
5±1
9
5±1
6
6±1
8
18,5±1
3
5,5±1
4
6±1
7
5,5±1
2
6±1
5
88573


"Cut with chisel".


"Free welds on strip".


"Cut with saw".
Reciprocating pneumatic saw.


"Grind off weld fillet or spots".
Straight grinder with plastic impregnated disc Ø 75, th. 1,8 to 3,2 mm.


"Grind off spot welds".
20 000 rpm straight grinder with spherical cutter Ø 10 or 16 mm.

"Cut out part by grinding flange" or "Grind down remaining spot weld traces"

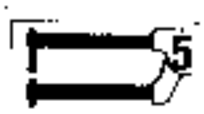

Vertical grinder with rubber pad and fibre disc Ø 120 to 180 mm, grit size P 36.

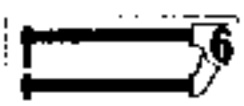
Sizes and types of electrodes to be used for operation :

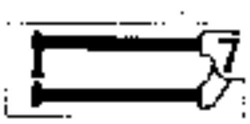

L = 100


L = 100 + ball joint


L = 100 + flat


L = 250


L = 350 + ball joint


L = 330


Gas tack welds under MAG gas envelope.

Note : to obtain a good quality weld we recommend using a gas consisting of Argon + 15% CO2, which is considered as an active gas (MAG).


Plug welds with MAG gas envelope.


Fillet weld under MAG envelope.


Oxyacetylene welds.


Soft solder finishing
Torch with 300 nozzle, slipper + 33% tin solder + tallow.

Note : Soft solder finishing compensates, in a large part, for the risk of fusion distortion caused by welding.


Safety symbol : this means that the welding operation in question concerns one or more vital components of the vehicle.


Electroplastic mastic application.
This mastic is a current conductor and is placed between two sections to be spot welded. It seals the panelling and prevents spot welds corroding.


Zinc paint application.
This paint is to be applied to the joint faces of each of the parts to be welded.
The paint is a current conductor and resists high temperatures. It provides corrosion protection around the spot welds.

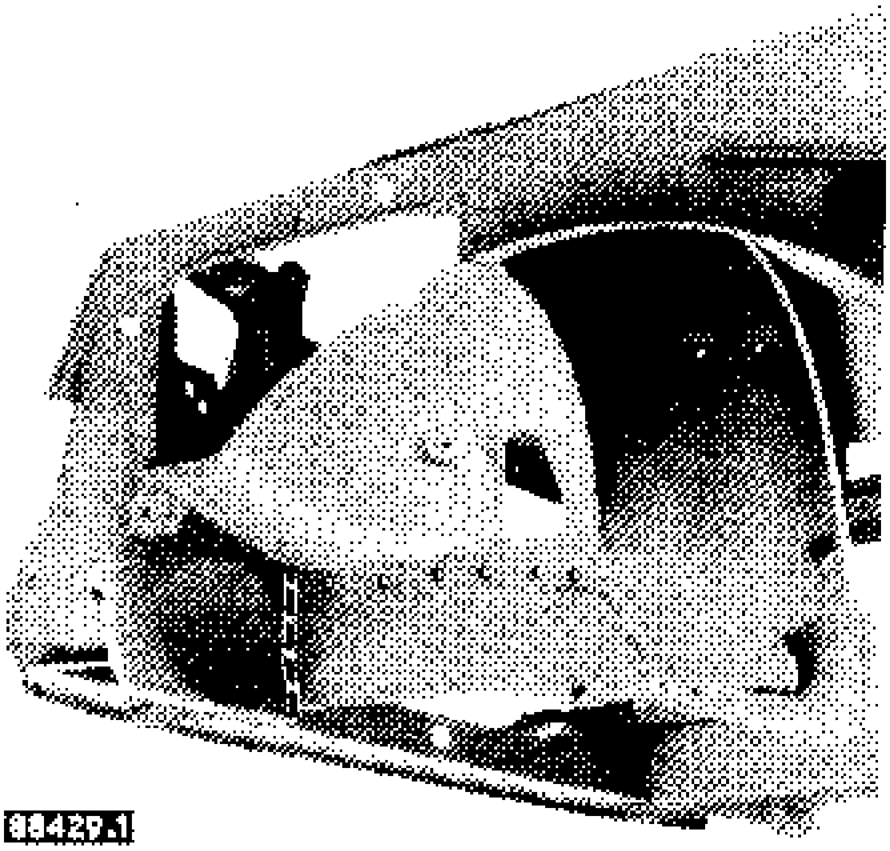

Extruded mastic fillet application :
- manual or pneumatic cartridge gun,
- application to crimped areas and the joints between two components.


Spray mastic application :
- pressure gun,
- two pot anti-chipping and anti-corrosion mastic.


Inject into hollow sections with a cranked nozzle.


Inject into hollow sections with a straight nozzle.
Pressure gun with flexible end and various nozzles.

CUTTING - WELD SEPARATION



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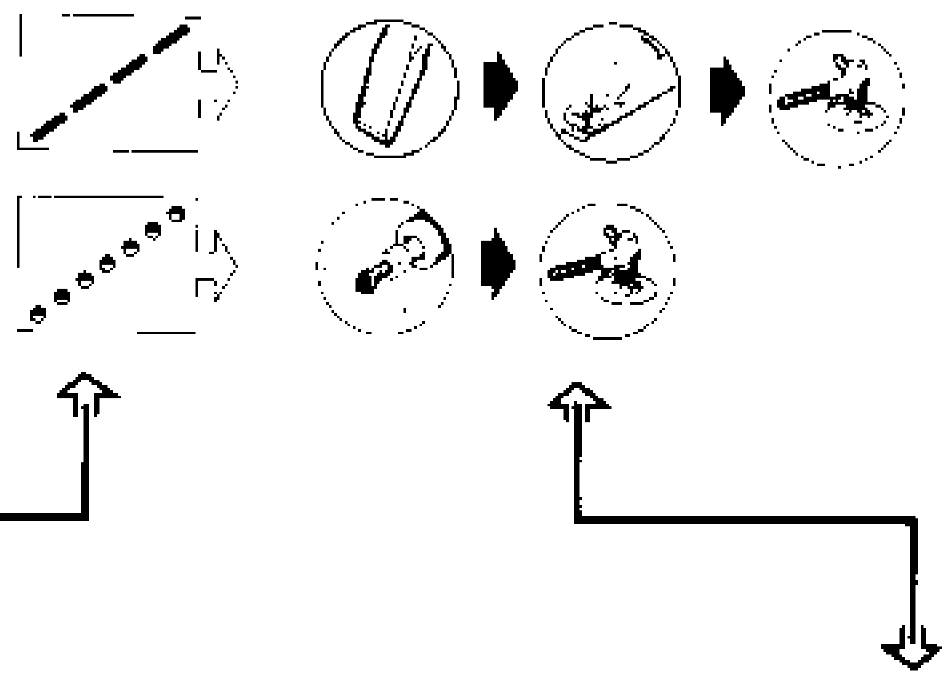


Operation symbol

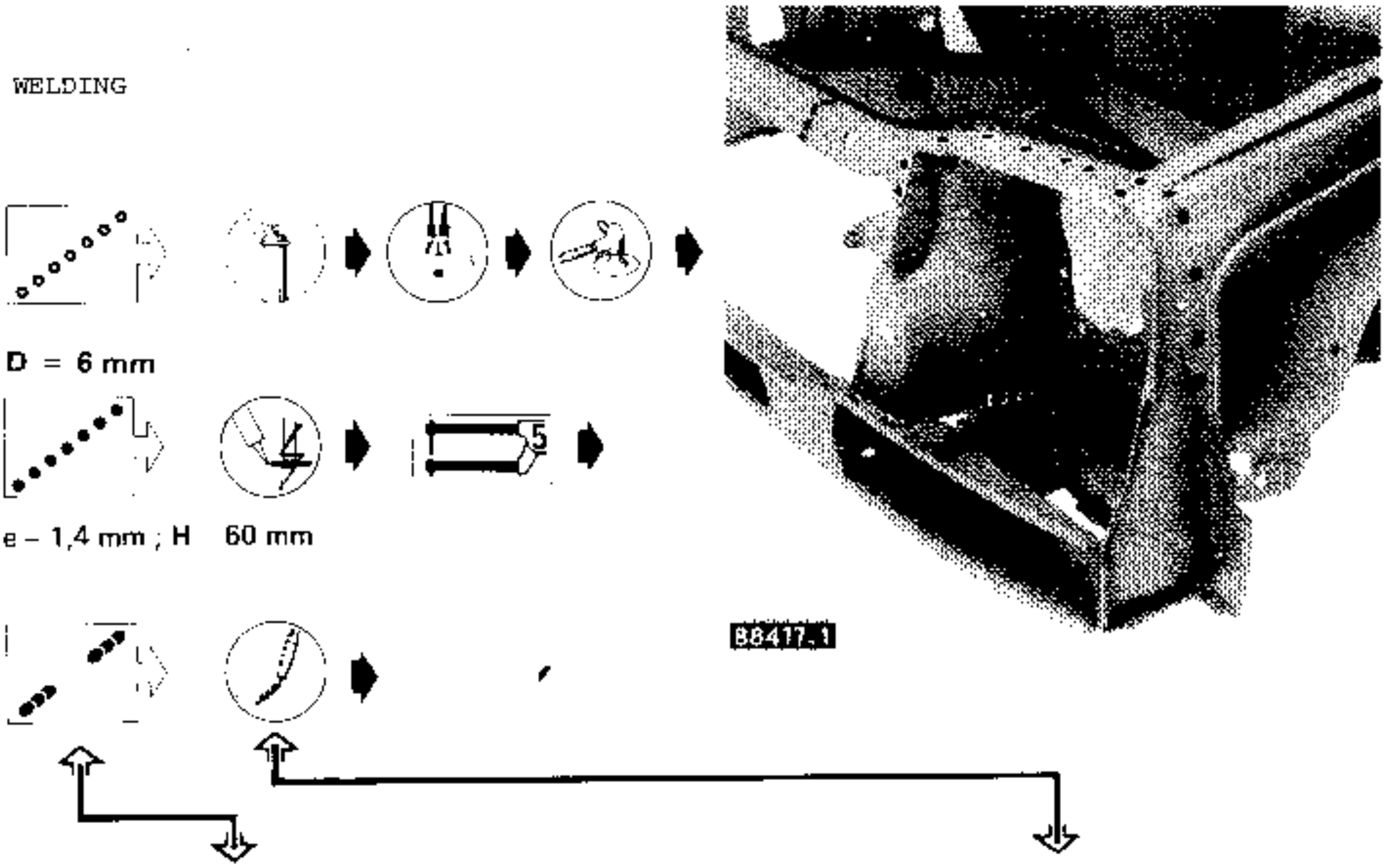
This shows the type of operation and the exact point at which it is to be carried out.

Tool symbols

This shows the type of tooling to be used and their logical application at the points concerned.

Note : the operation of removing a strip of panelling and grinding down the remaining spot welds on the support panelling can only be carried out after the part to be replaced has been completely removed.

WELDING



Operation symbol

This shows the type of operation and the exact point at which it is to be carried out.

Tool symbols

This shows the type of tooling to be used and their logical applications at the points concerned.

Note : the operations involved in protecting the spot welds (electroplastic mastic and zinc paint) are to be carried out before fitting the new part.

SAFETY SYMBOL

Instructions affected by current legislation concerning vital components are preceeded by the symbol . The operator is to pay particular attention to these operations when carrying out work on the vehicle.

We should like to draw your attention, in particular, to welds classified as vital.

These welds are classified as "vital" following impact tests on vehicles and body endurance tests.

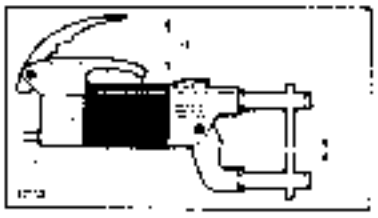
It is therefore very important that they should be carefully applied, under repair conditions, to return the structure to its original strength. Ensuring this will guarantee the quality and the safety of the repair.

We should like to remind you that all welds on seat belt stiffening points are also classified as vital.

All adjustments are to be confirmed by tests on panelling identical to that to be welded, the results being taken from the thinnest panelling used.

ELECTRIC SPOT WELDING

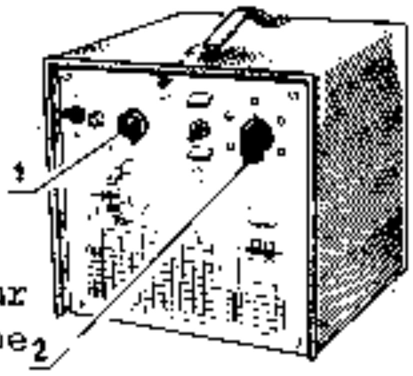
1 - Adjusting the pressure (dimension H)



The corresponding values of (e) and (H) are stated under each drawing, at the operation concerned.

- Dimension H is adjusted by placing a thickness (e) which is the same as the actual thickness to be welded, between the electrodes. Dimension H is to be selected to allow for the thinnest of the panelling forming the joint to be welded.
- The thickness of the panelling (e) required to obtain the dimension (H) can be represented by a set of mechanic's feeler gauges (Eg. : Facom 804).

2 - Adjusting the welding current and time

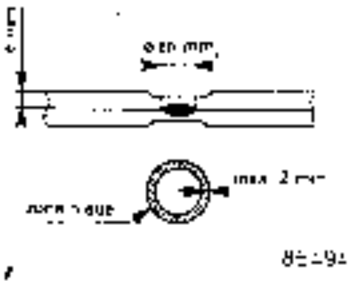


This adjustment will have to be carried out to suit the current supply in your workshops. It is to be obtained by carrying out tests on samples of panelling identical to that used on the vehicle.

Norme RNUR 01 50 903

e mm	0,6	0,7	0,8	1	1,1	1,3	1,5
ø mm	4,5	5	5	5,5	5,5	6	6,5

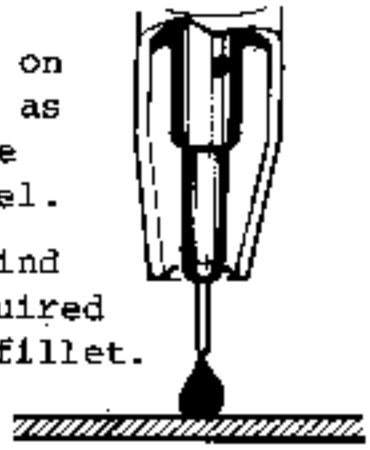
Place the welding time adjusting knob (1) on the 1st graduation.
Progressively increase the current strength by turning knob (2) until the fusion point bursts, then move back by one graduation.
Then, increase the welding time (knob 1) to obtain the spot Ø shown in this chart.



3 - Note :
On this vehicle, certain of the parts are made from "high tensile steel". They require special adjustment of the spot welding gun, when compared with standard steel :
- Current : I - 20%
- Welding time T - 25%
- Pressure H + 50%
The figures, stated, for H allow for these special requirements.

WELDING UNDER A MAG GAS ENVELOPE

1 - Continuous fillets



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- Set the current knob on the figure estimated as being correct for the thickness of the steel.
- By trial and error find the power output required to obtain a uniform fillet.
- Turn the test piece over to check that the penetration is correct. If it is not, correct the current strength and redetermine the wire output required.

2 - Tack welds

The same adjustment method is to be used as for continuous welds but the current is to be increased by one point to make striking the tack easier.

Special points affecting stitched butt welds :

Setting up the panelling :

- Distance between stitches
  d ≈ 30e (thickness)
- Gap between the panel ends
  = thickness e.

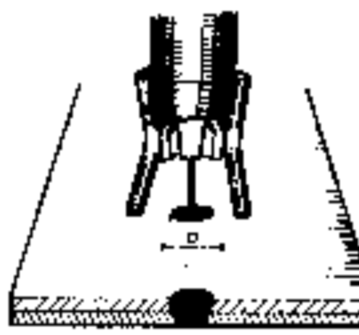
Do not make stitches on the edges or in the corners of flanges to maintain a better control on the gap.

Welding :

Apply a series of stitch welds, straddling the gap. Leave 4 to 5 seconds between the stitches so that the blue area does not exceed 10 mm.

Special aspects of plug welding

The weld is made by punching or drilling the upper panel and plug welding through it. Tests are to be carried out to obtain a flat plug.



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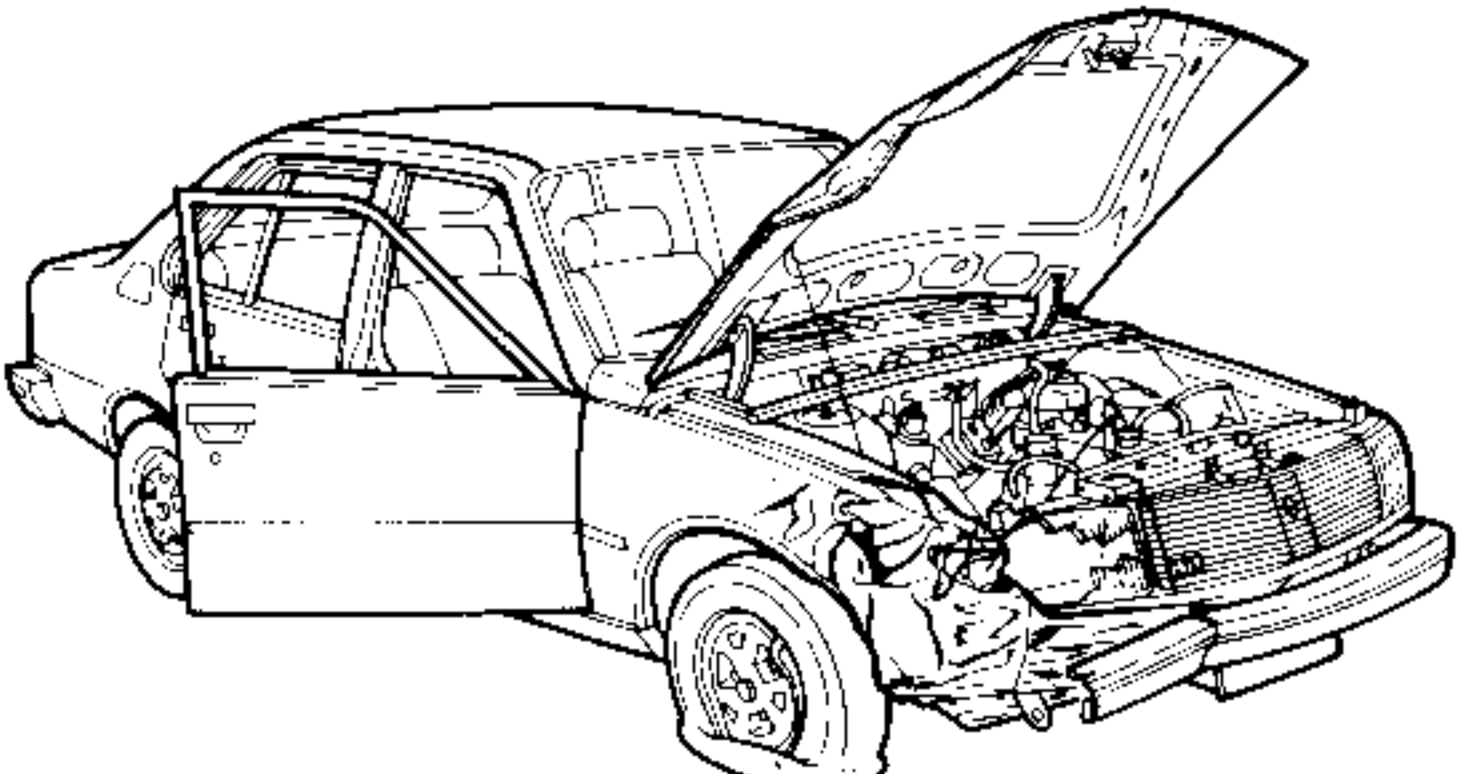
A - CHECKING BEFORE REMOVING MECHANICAL UNITS

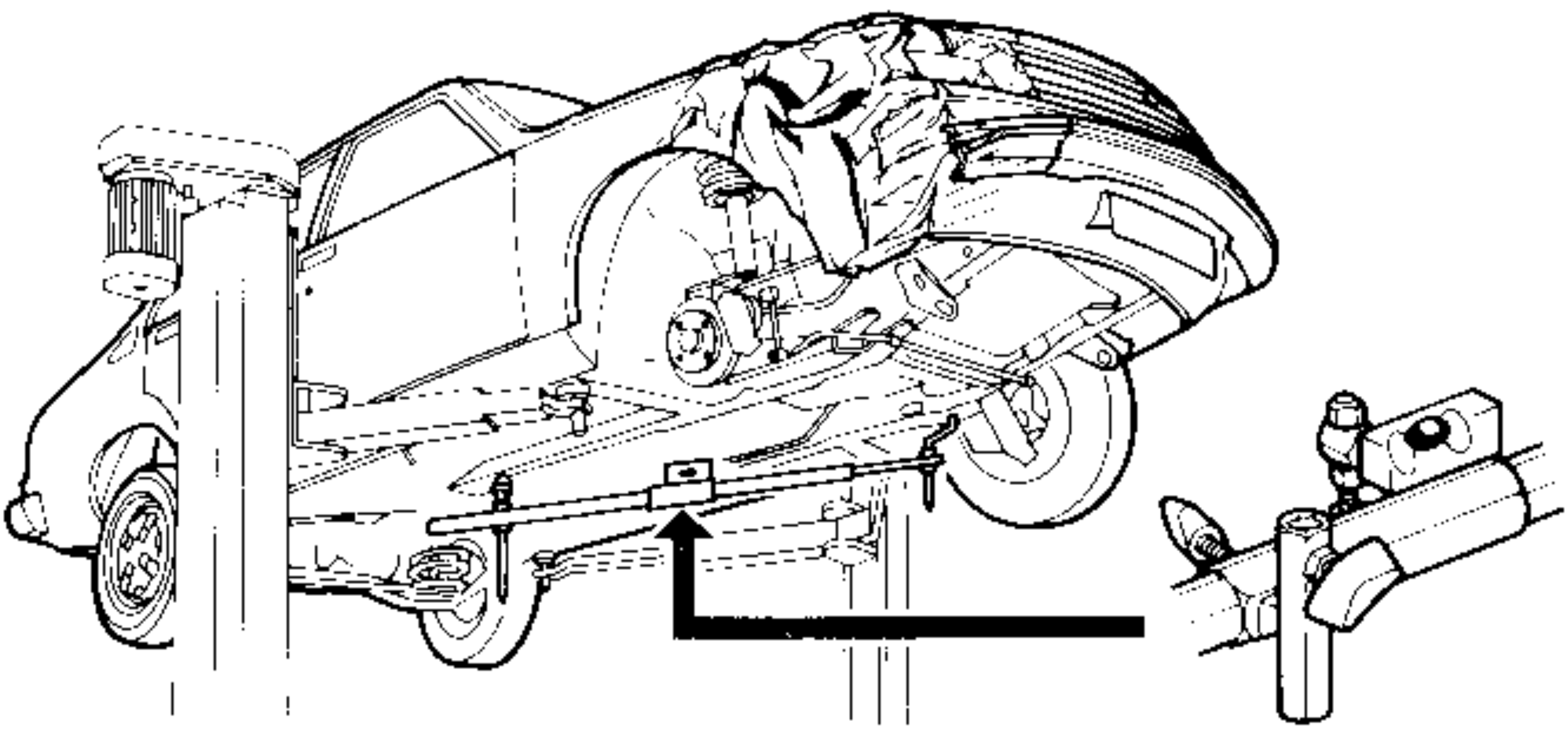
Before attempting a body repair on a car however slightly it may appear to have been damaged, a series of checks must be carried out.

VISUAL INSPECTION



CHECKING WITH THE TRAMMEL GAUGE

Amongst other things, these checks will show whether or not the sub-frame components have been subjected to extensive distortion. If this is the case, it will be essential to remove the mechanical units and carry out the repair on a body jig.



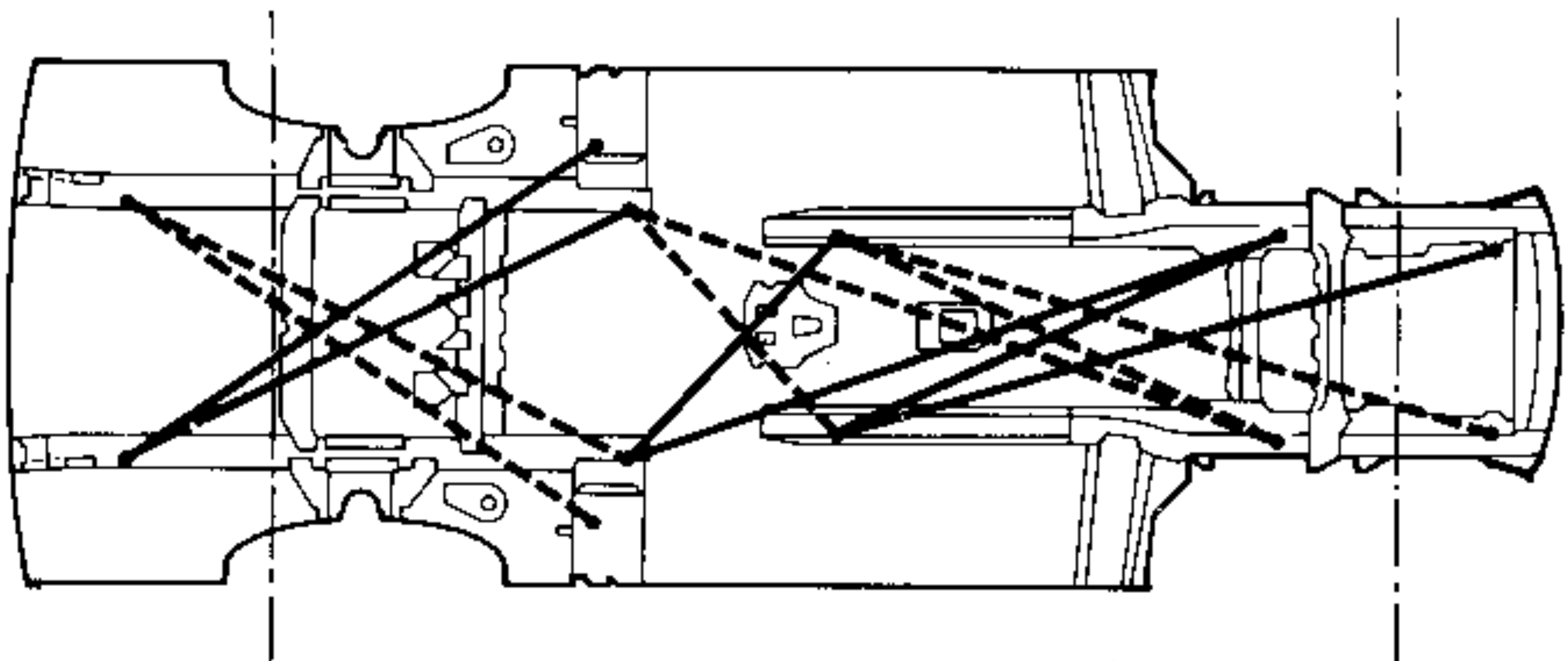
CHECKING THE AXLE GEOMETRY

If there is any doubt, these checks are to be followed up by a check on the front and rear axle geometry.

It is a basic principle that no welded body shell component is to be replaced without first checking that the sub-frame has not been distorted by the impact.

There are various traditional methods used to carry out a preliminary check on a damaged vahicle when visual inspection has left some doubt as to the extent of the damage and the repair operations to be undertaken.

CHECKING THE DATUM POINTS LAID DOWN BY THE DESIGN OFFICE FOR THE CONSTRUCTION OF THE BODY



ANY DISTORTION IN THIS AREA MAKES IT ESSENTIAL THAT A REPAIR SHOULD BE CARRIED OUT ON THE BODY JIG

Note : A diagnosis method is described in this manual under the heading : BODY DAMAGE DIAGNOSIS.

B - STRAIGHTENING- REBUILDING - CHECKING ON BODY JIG

For reasons of SAFETY and to ensure that the repair is of good QUALITY, it is FORBIDDEN :

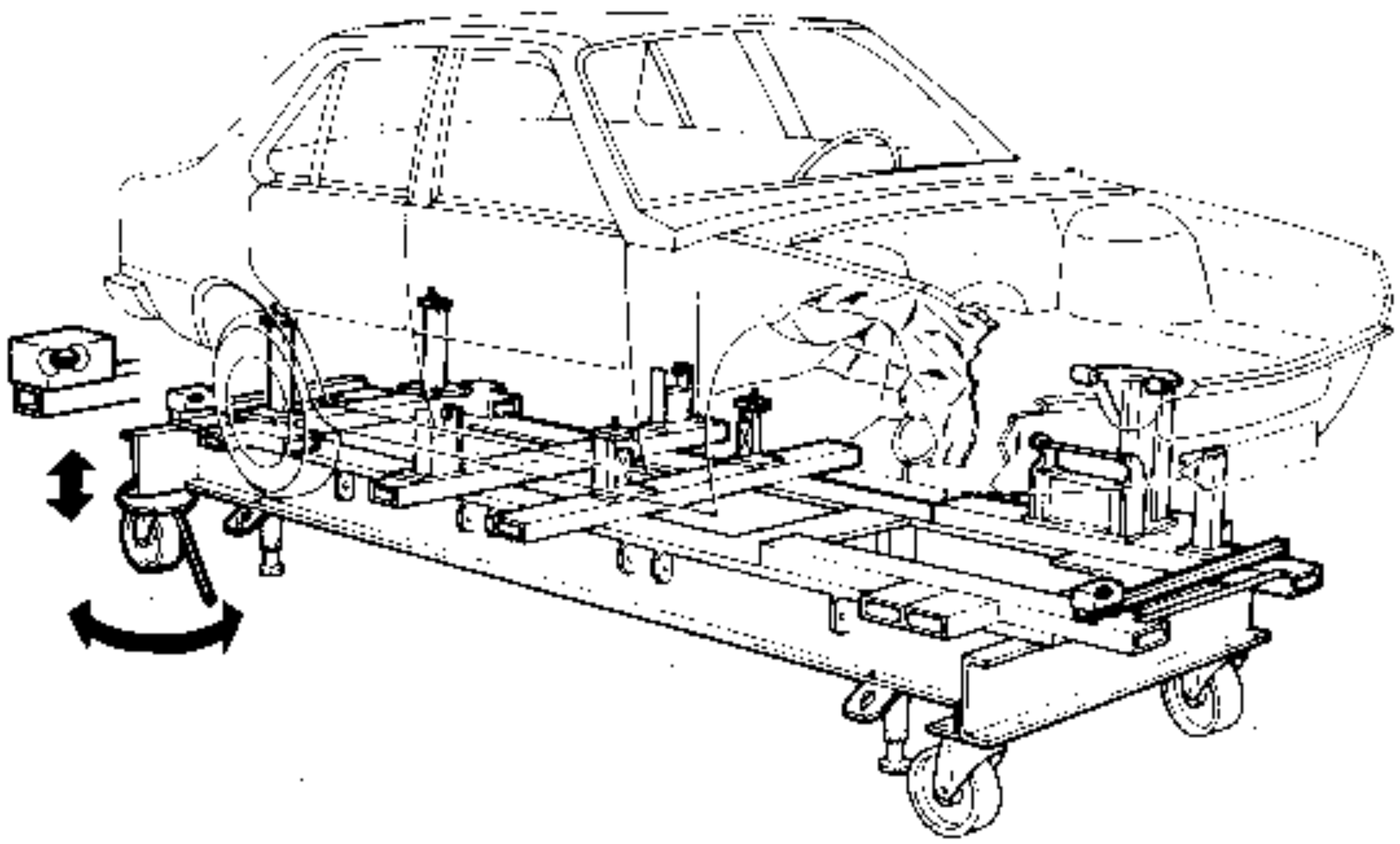
- To replace a side member, a front end half assembly or unit, other than on the body jig.

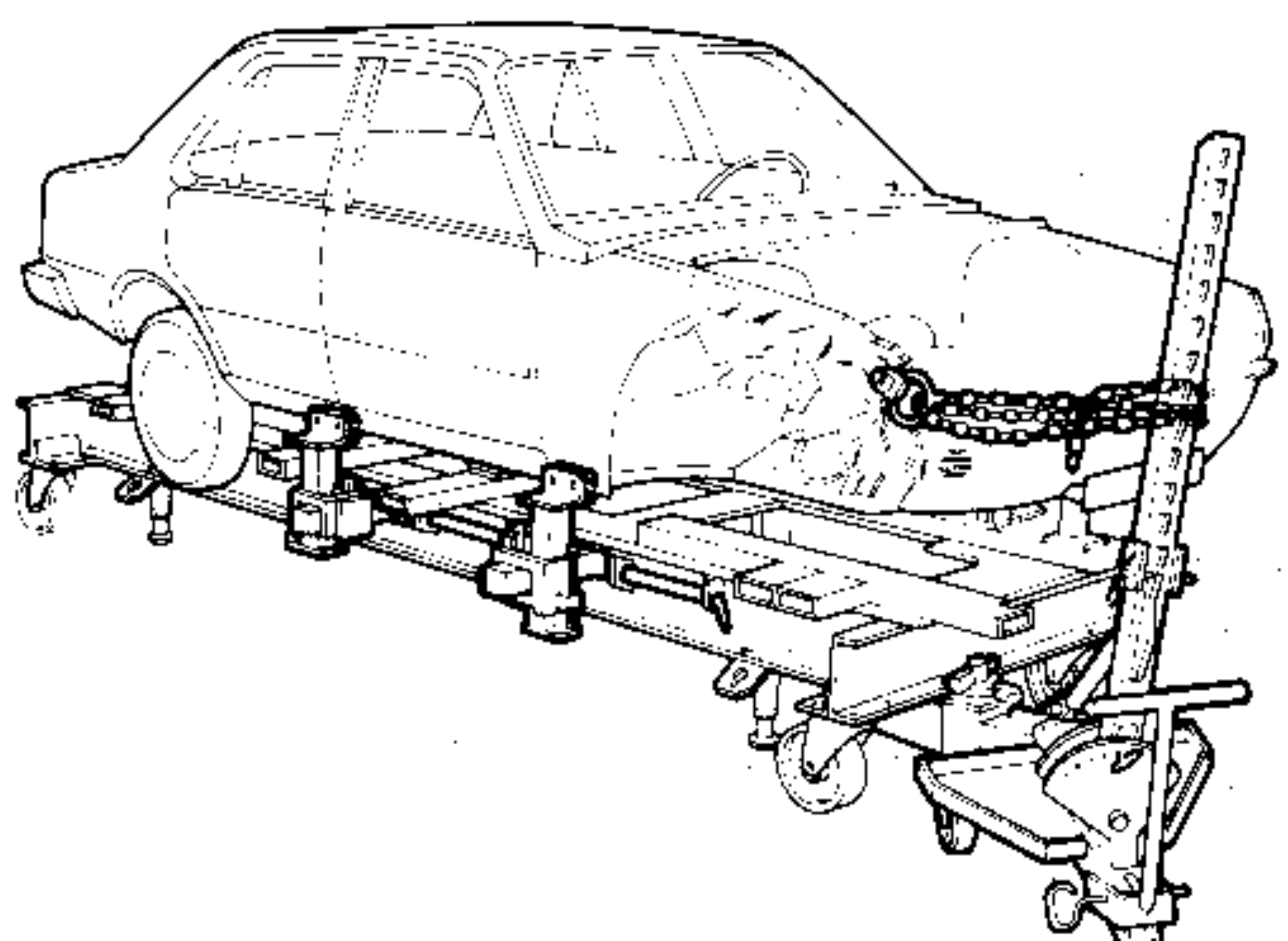
  The body jig ensures that the vehicle is rebuilt to its original manufacturing dimensions and that the front and rear axle components are correctly positioned.

it is FORBIDDEN :

- To apply tension to parts of a vehicle mounted on jig brackets without first anchoring the bodywork to the jig frame by means of at least two body sill clamps. These clamps are to be as near as possible to the area where tension is to be applied to prevent the jacking loads being carried on to the brackets as this could distort them.

- It is also very important, when bodywork has suffered damage involving the replacement of a welded component, to straighten out the component to be replaced before removing it so as to return the bodywork as nearly as possible to its original shape and thus relieve the adjacent components of the stresses set up by the distortion (see MR 501, F 001).





C - STRAIGHTENING BOX SECTIONS USING INERTIA EQUIPMENT

When a body component has suffered little damage and thus does not require replacement, even partial, it can be repaired without the necessity for stripping or cleaning its internal face using inertia panel straightening equipment of the "Stud puller" type (see sheet 10-27 of MR 500**).

STRAIGHTENING METHOD

- Strip back the distorted area to the bare metal.
- Weld the studs supplied with the equipment in place (copper plated steel).
- Grip each stud with the inertia tool and return the distorted area as near as possible to its original shape.

- Cut the studs off flush with the panelling with wire cutters.
- Grind flush the remaining parts of the studs.
- Finish the area with soft solder and a torch fitted with a 300 nozzle, or a hot air unit (650°).

Note : welding the studs to a box section exposes, locally, the inside face of the unit. This is why, after external painting, a hollow section protection product must be injected into the inside of the unit (see paint section).

D - REPLACING WELDED COMPONENTS

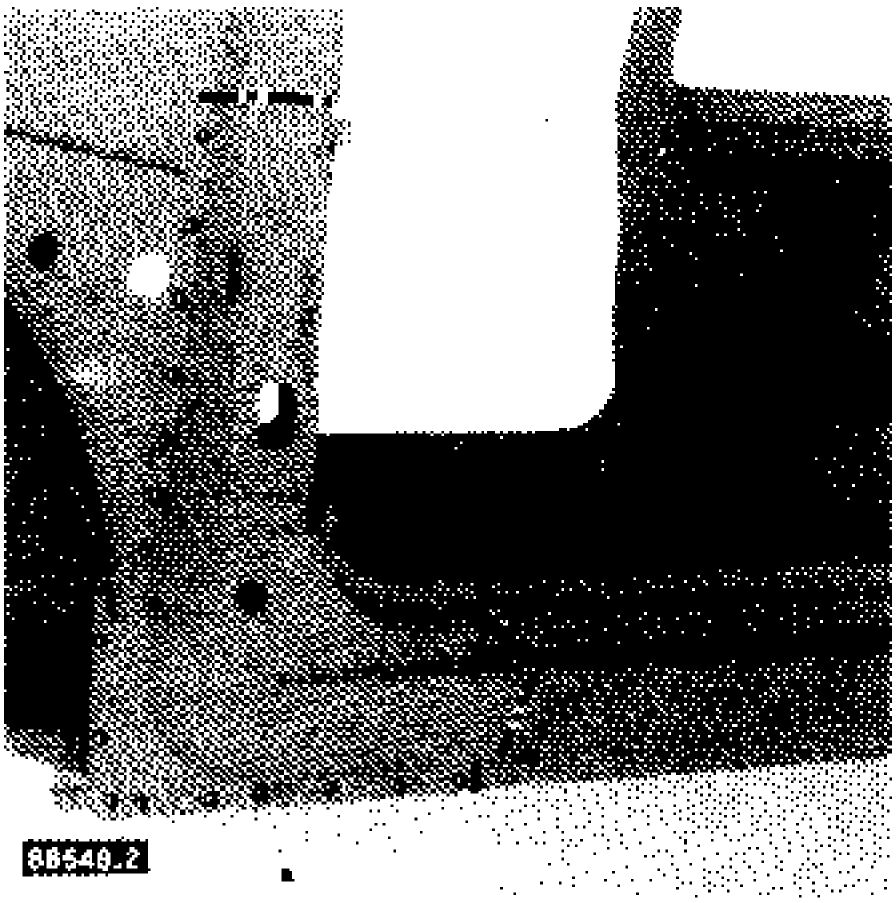
Operations involved in replacing welded components, and the lines along which they are to be cut, are defined to suit production requirements for the parts to be replaced and the following criteria :

FOR EXTERNAL BODY PANELS :

- The avoidance of extensive distortion during butt welding.
- Leaving clearance for panel beating tools and anti-corrosion protection equipment.

FOR SUB-FRAME COMPONENTS AND OUTER PANEL LININGS :

- The cut lines to be used during the repair of damaged components have been determined to reduce the risk of distortion of the passenger compartment and the side members outside the areas to which the mechanical units are secured (a risk arising from the fact that the areas heated by welding set up thermal distortion stresses).



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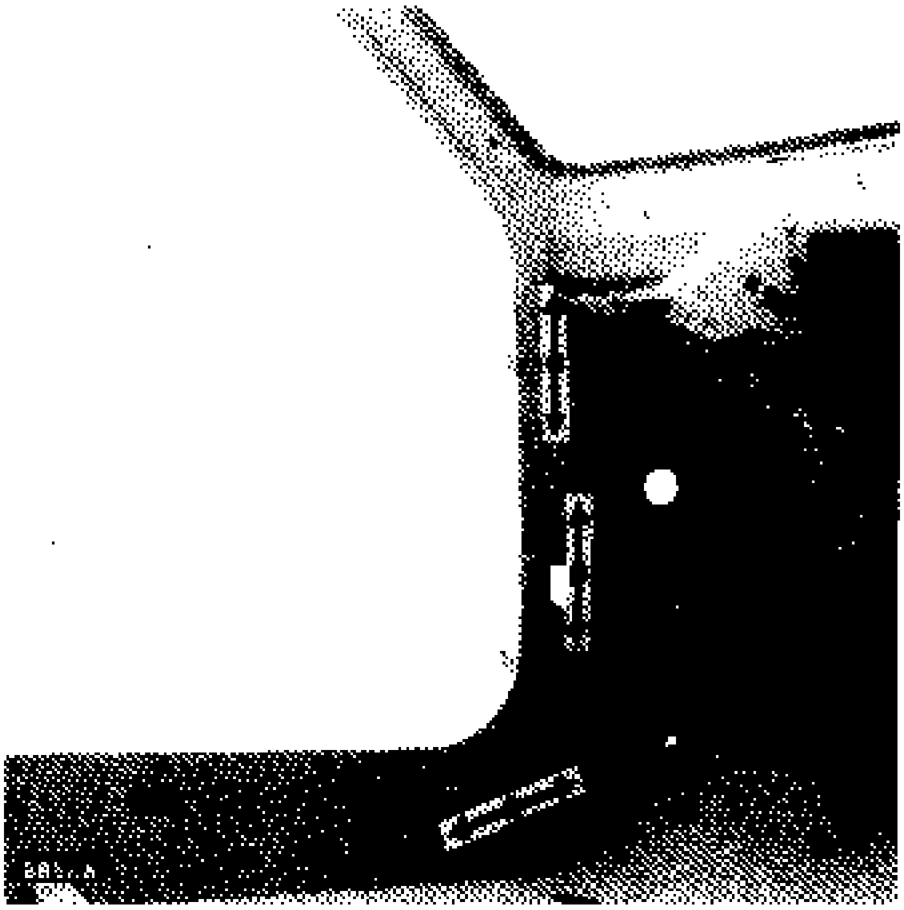
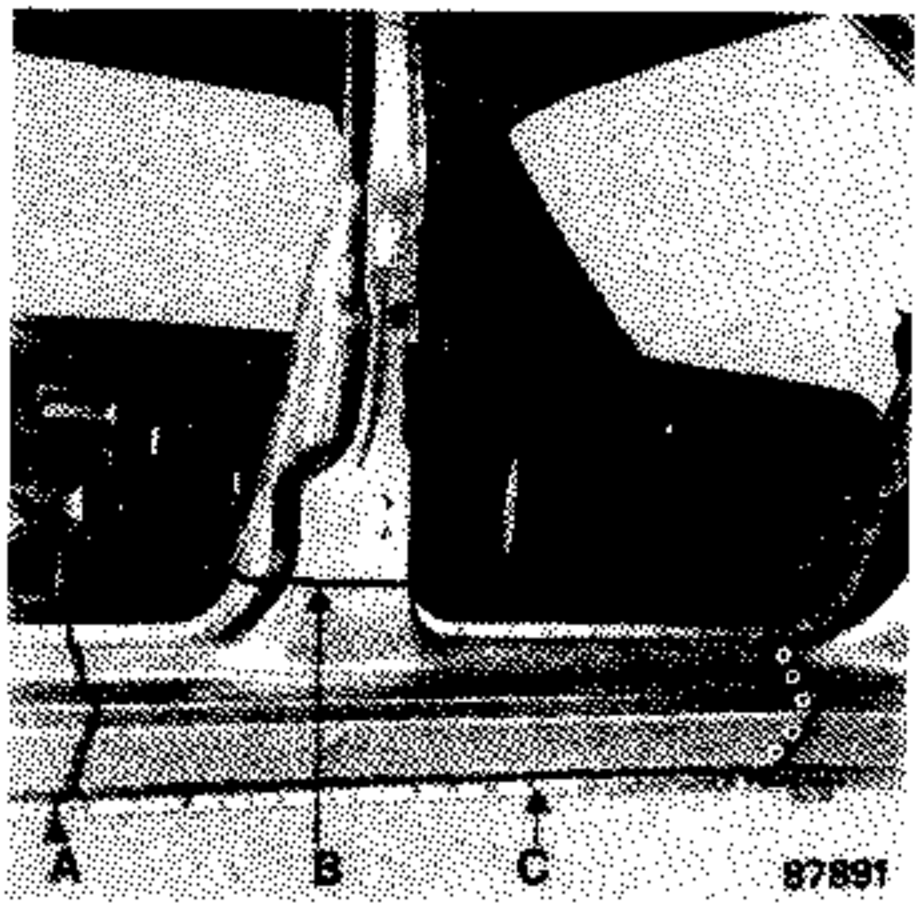


E - PROTECTING REPAIRED AREAS

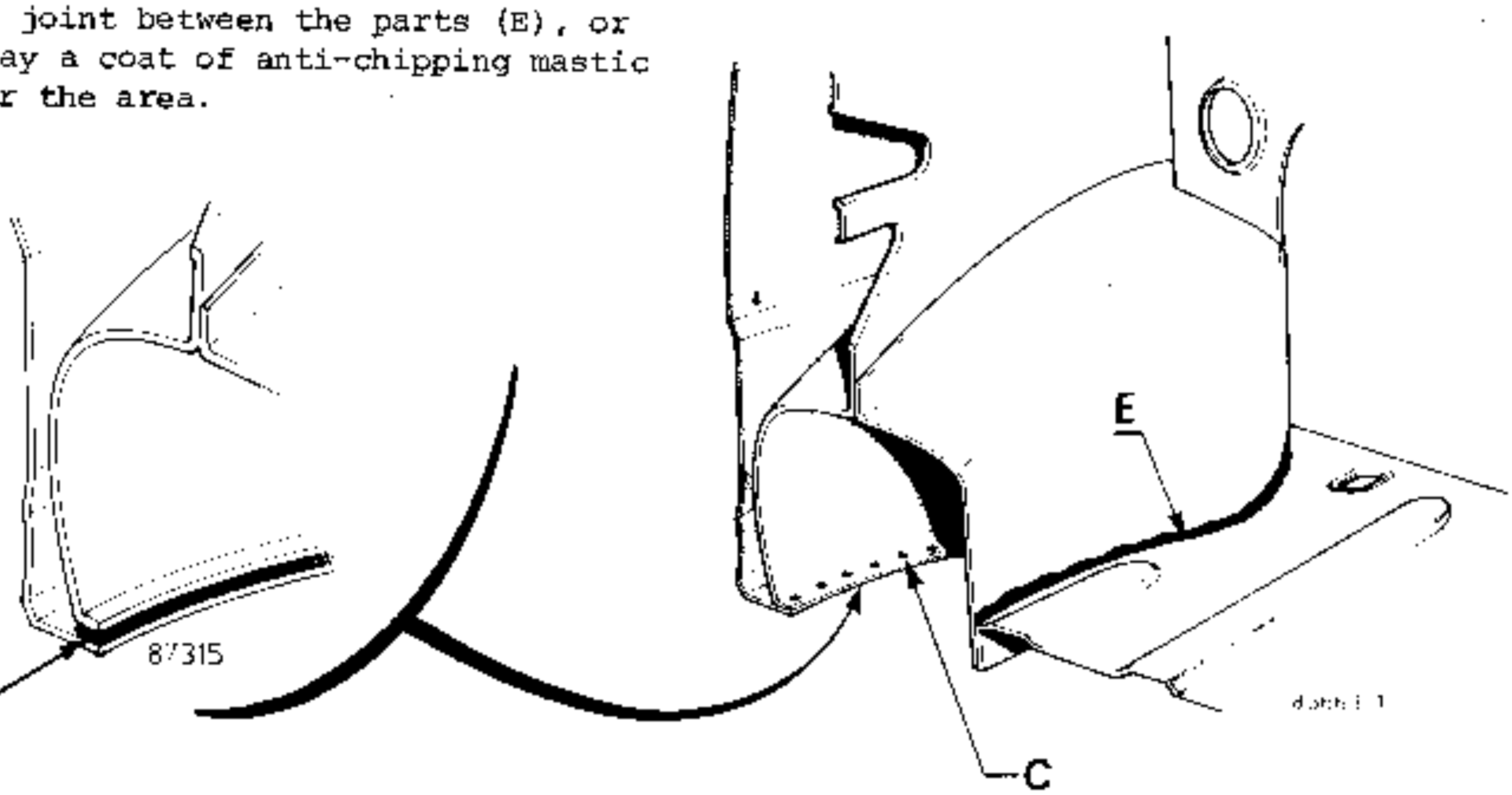
It is very important that the internal and external protection should be re-applied, effectively, after repair or replacement of a body component, to avoid future problems and to obtain a specification that is identical to that of the original components, thus guaranteeing the quality of the repair.

Various different types of protection are to be used, depending on the case :

1. Butt welds (A) or (B)
   - before welding : strip back the internal and external surfaces around the area to be welded,
   - after welding : in accessible box sections, protect the weld area with chrome phosphate primer, applied with a brush followed by chrome phosphate surfacer and finish coat,
   - after painting : in non-accessible box sections, inject a hollow section protection product into the unit.



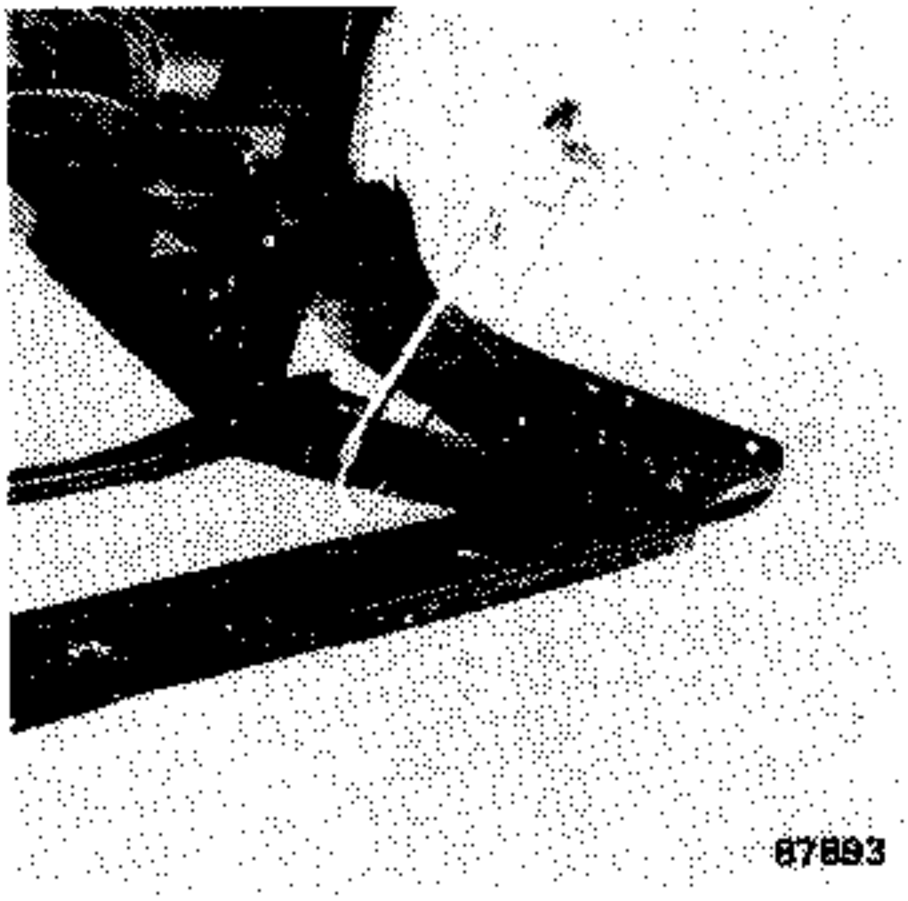
2. Electric spot welding (C)
   - before welding : apply a fillet of electroplastic mastic (D) between the parts over the entire joint area,
   - after welding : on areas which have been stripped back to the bare metal, apply a coat of chrome phosphate primer and then a fillet of 297 mastic at the joint between the parts (E), or spray a coat of anti-chipping mastic over the area.



For reasons of safety, it is FORBIDDEN :

- to cut and butt weld or to heat, to straighten them :
  - side members in those areas between the mechanical unit securing points and the passenger compartment (only the ends of the side members, in front of these points, can be replaced by butt welding),
  - the body pillars at the seat belt anchor points
- to cut and butt weld any body component and its inner lining along the same line.

  Offset the joints by a few centimetres so that the thermal stresses set up by welding are widely distributed.



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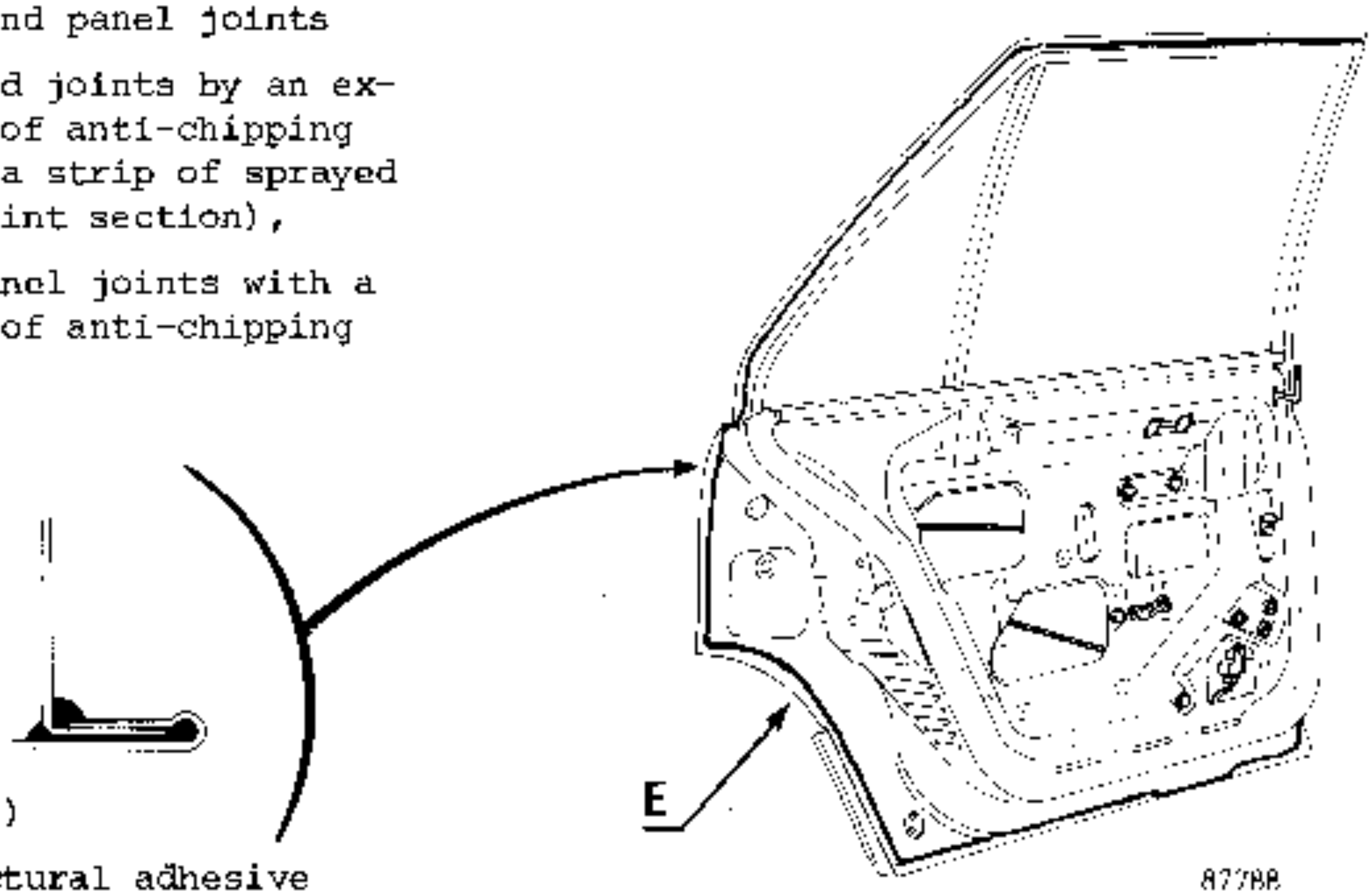
- to braze side members or any other of the body structural components (only external panelling is to be brazed at the points laid down in the methods described in this section).

  When it is impossible to use spot welding, gas envelope welding methods can be applied (MIG or MAG) either in the form of plug welds or fillets (see welding section in the body repair handbook).

3. Crimped joints and panel joints

- protect crimped joints by an extruded fillet of anti-chipping mastic (E) or a strip of sprayed mastic (see paint section),
- protect the panel joints with a sprayed strip of anti-chipping mastic.

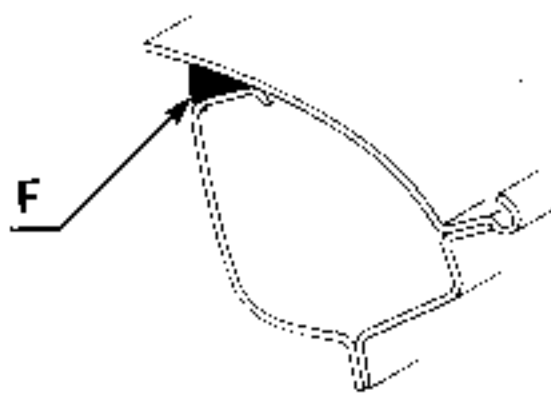


87708

4. Bonded panels (F)

- use only structural adhesive mastic (adhesive mastic type 514),
- this permits one to bond a stiffener to an external panel without any effect on the finish.

Examples : roof cross members, bonnet stiffeners, door panel to door body joints (before crimping).



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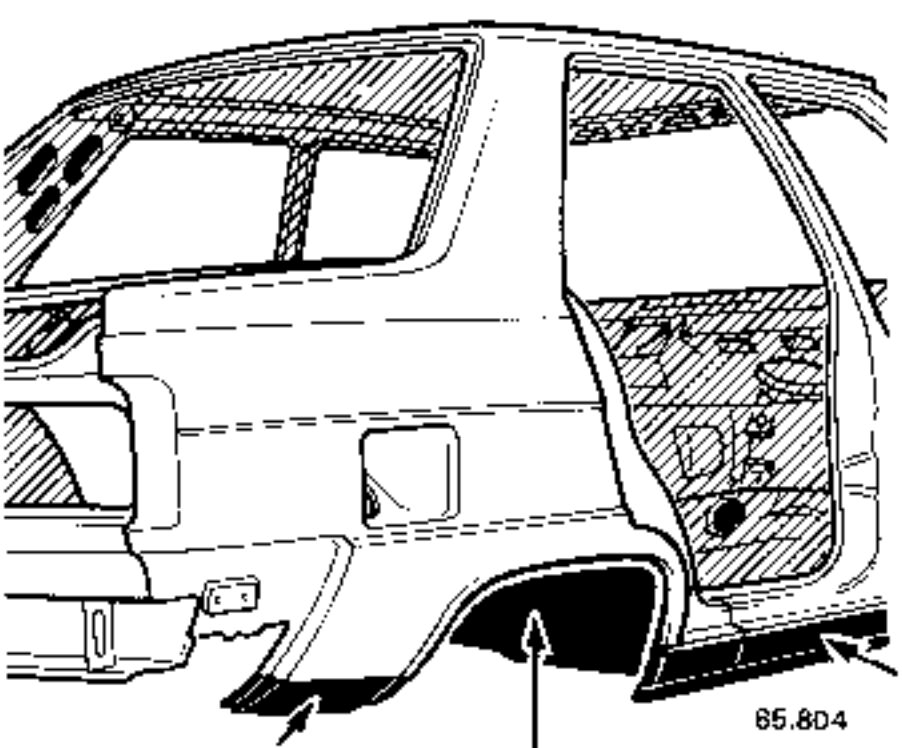
5. Protection by spraying anti-chipping mastic

This is a two pot product (see paint section) and is to be used on all areas originally protected in this way : the front end panel, the radiator grille, the body sills, inside the front wings, front and rear wheel arches, the outer lower surfaces of the front and rear wings, to guarantee the quality of the repair.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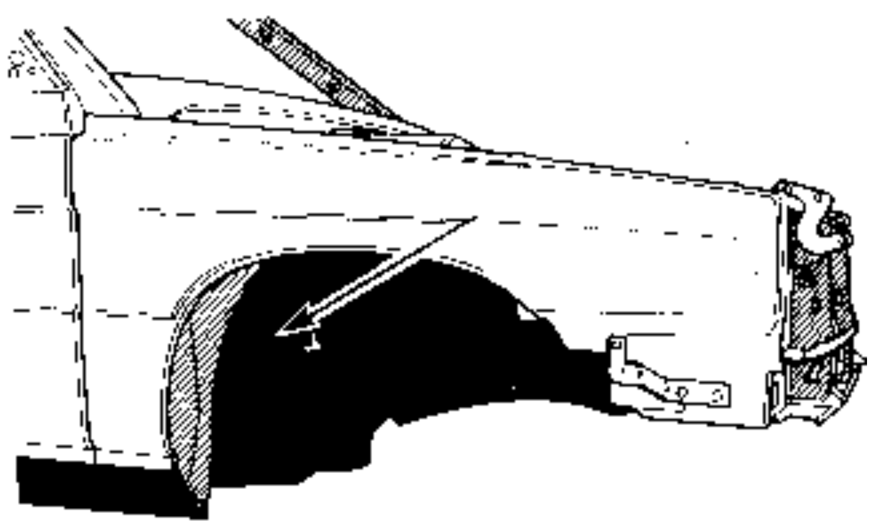
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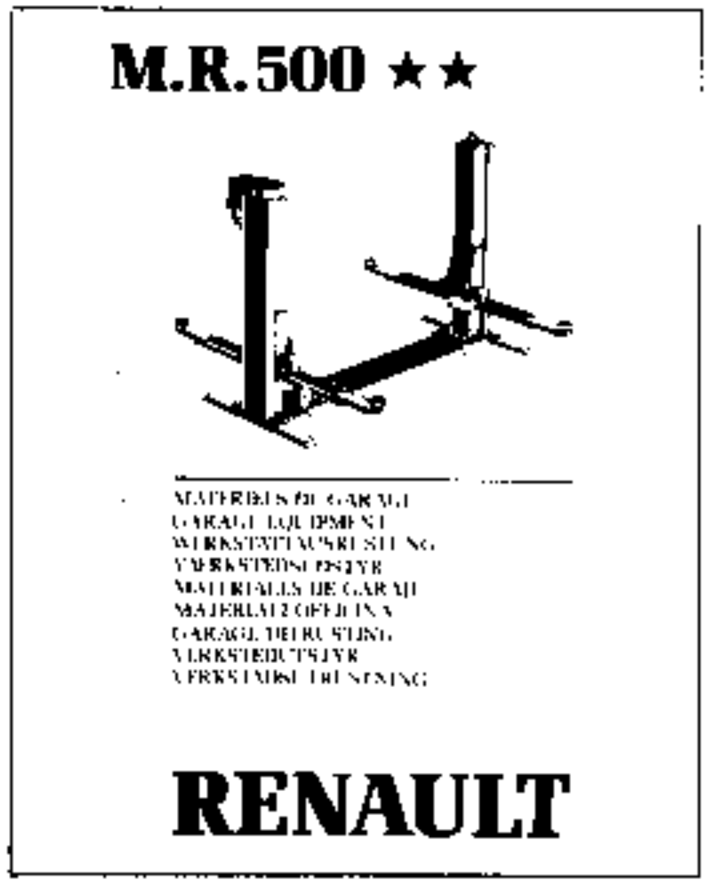
F - EQUIPMENT AND LITERATURE

The panels can be cut at various points depending on the size of the part to be replaced.

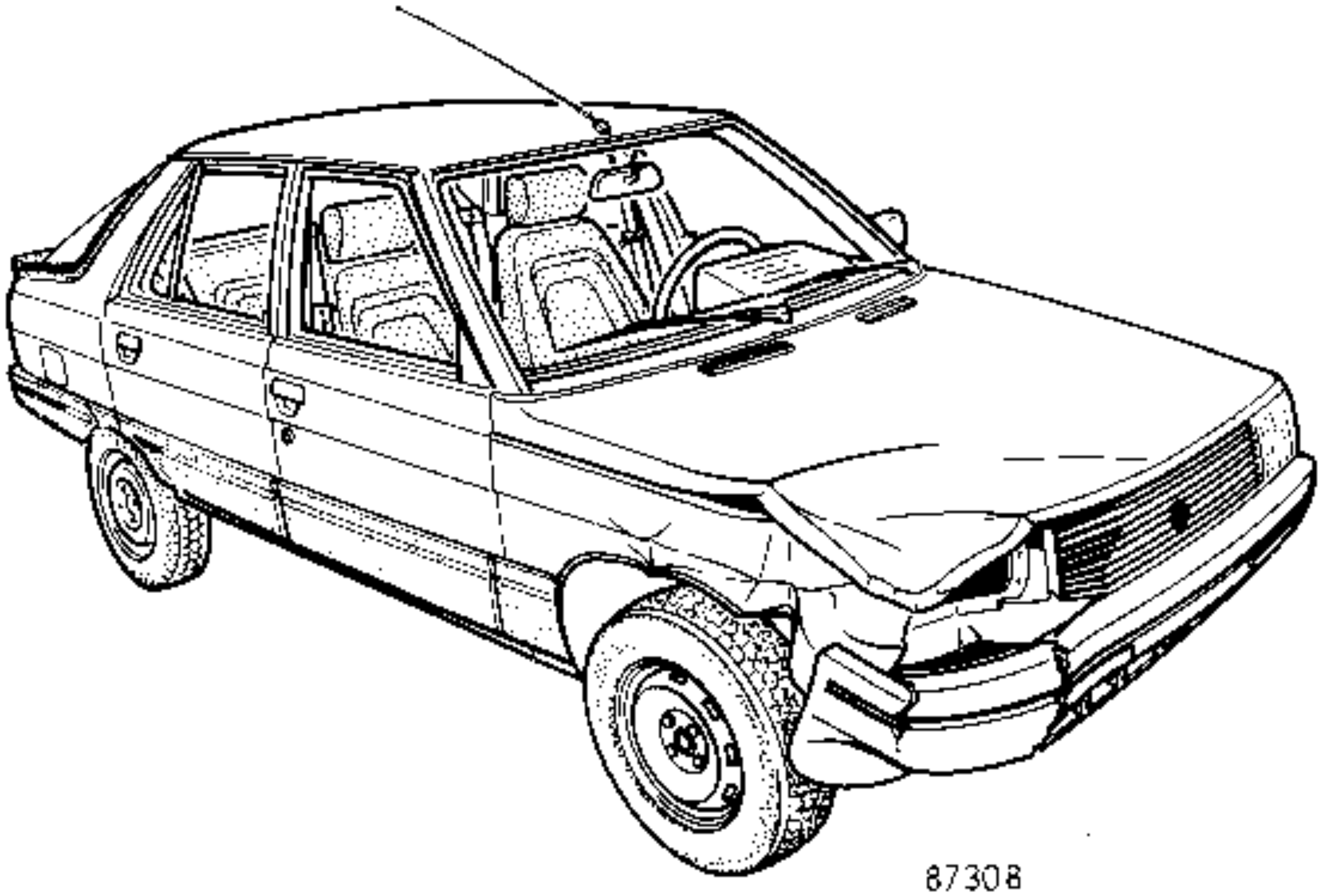
They can be cut with :
- hand snips, a pneumatic or hand hack saw or a pneumatic nibbler.

You will find all the necessary information on this equipment in MR 500** section 10.



Certain operations described on the following pages involve the use of neutral gas envelope welding equipment (MIG or MAG). We shall remind you of certain of the main features of this method (for more details on adjusting the equipment, see the booklet entitled "Bodywork checking and adjustment data") :

- We recommend that :
  - a few tests should be carried out before starting welding on sheet steel off- cuts of the same thickness to obtain the correct adjustment,
  - that a gas consisting of argon + 15% CO2 should be used for the MAG operation.
- Using gas envelope welding equipment permits one, amongst other things, partially to replace components impossible, up to the present, unless one could gain access to the area to eliminate distortion caused by welding. This "straightening" or "planishing" that is essential when oxyacetylene butt welds are made, is not necessary with this method.



87308

WHAT IS ACHIEVED BY THE DIAGNOSIS

Efficient diagnosis permits one :

- to estimate, quickly, the approximate cost of body repairs,
- to inform the customer of the length of time his vehicle is going to be off the road for repair,
- to provide guidance in the work to be carried out,
- to determine the number of hours so that the body shop work load can be efficiently organised.

THE USERS OF BODY DAMAGE DIAGNOSIS SYSTEMS

- The receptionist
- The estimater
- The operator
- The shop foreman or section leader
- The person responsible for buying in used cars

PERSONS CONCERNED

- Insurance inspectors
- The customer

HOW TO DIAGNOSE DAMAGE EFFICIENTLY

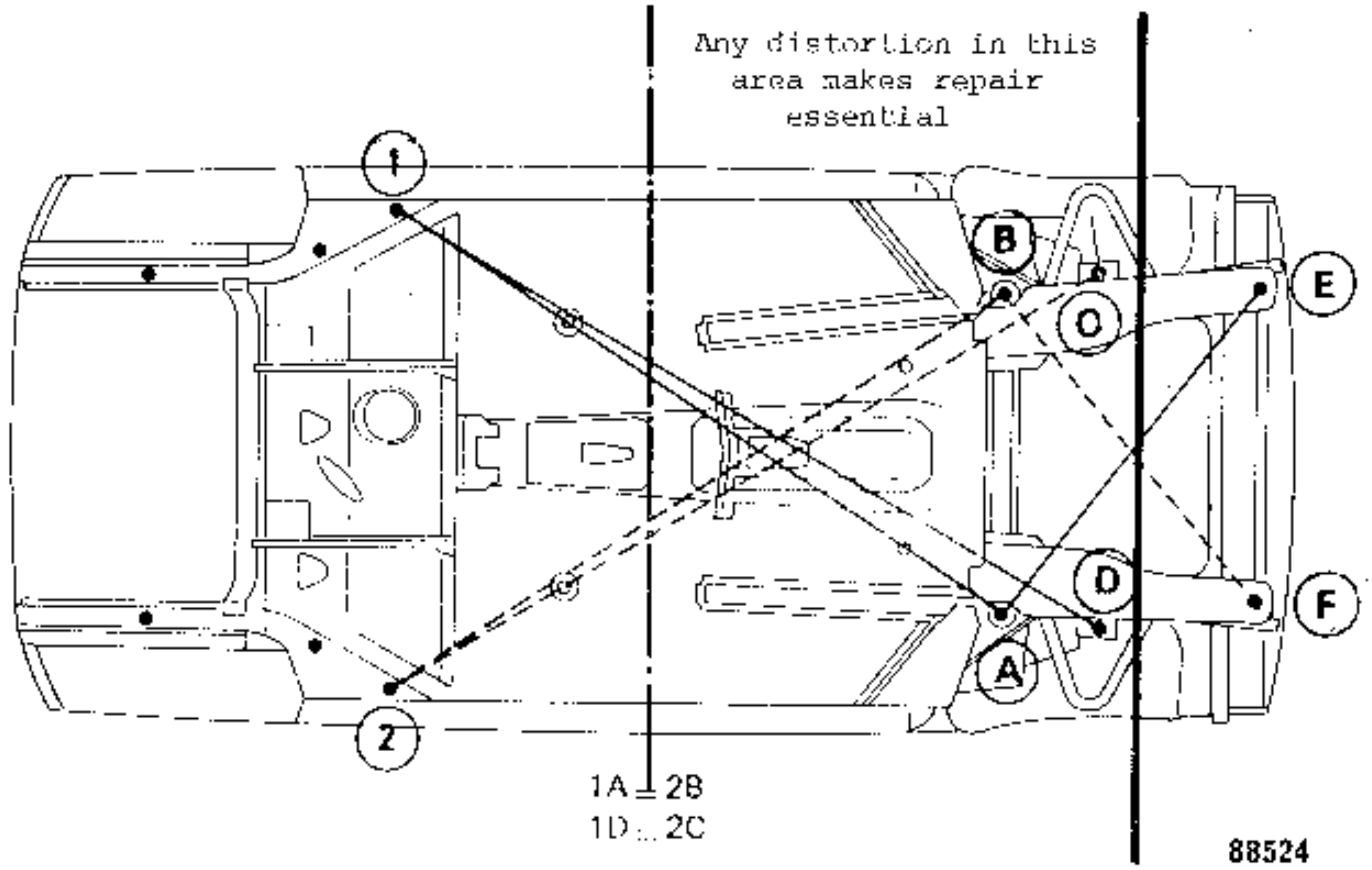
There are 3 ways, depending on the degree of accuracy required :

1 - VISUAL INSPECTION
2 - CHECKING WITH A TRAMMEL GAUGE (Car.759-02)
3 - CHECKING THE AXLE GEOMETRY (see the mechanical workshop manual)

Note : The areas to be inspected, visually, for sub-frame distortion are described as part of the rebuilding operation descriptions in each section.

Checking the side members :
Compare the diagonals
1A = 2B
1D = 2C
If there is any difference, the vehicle is to be placed on the body jig.

If there is no difference, compare the diagonals :
BF = AE
If there is any difference, the engine cradle must be replaced but it is not necessary to place the vehicle on the body jig.



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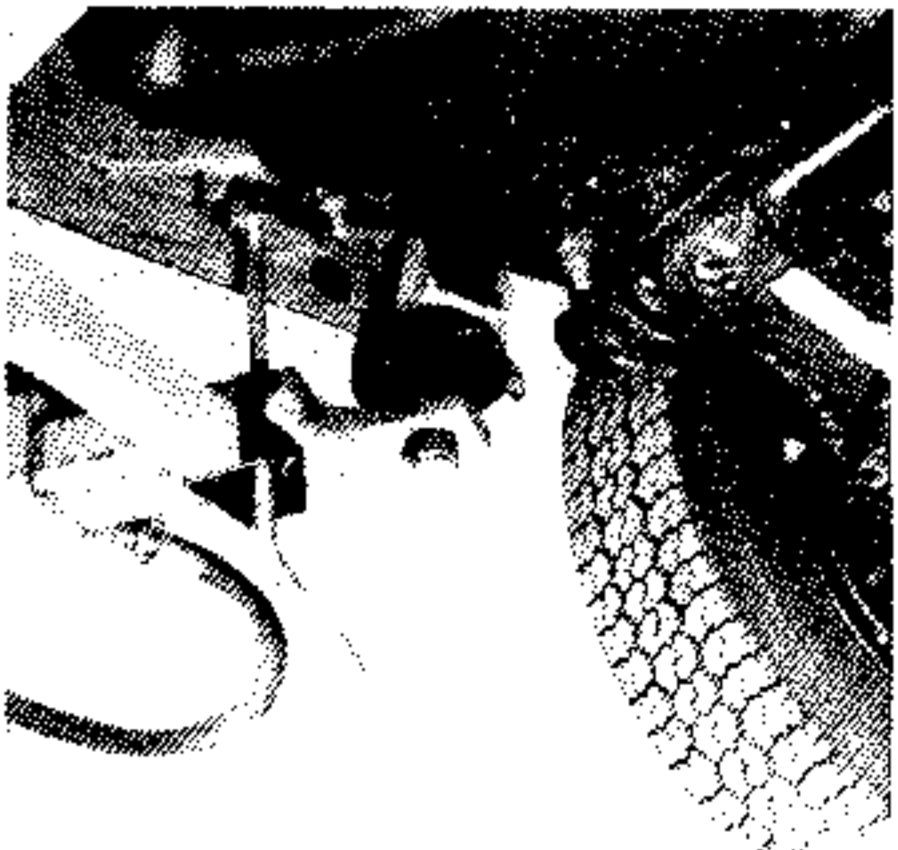

points (1) and (2)

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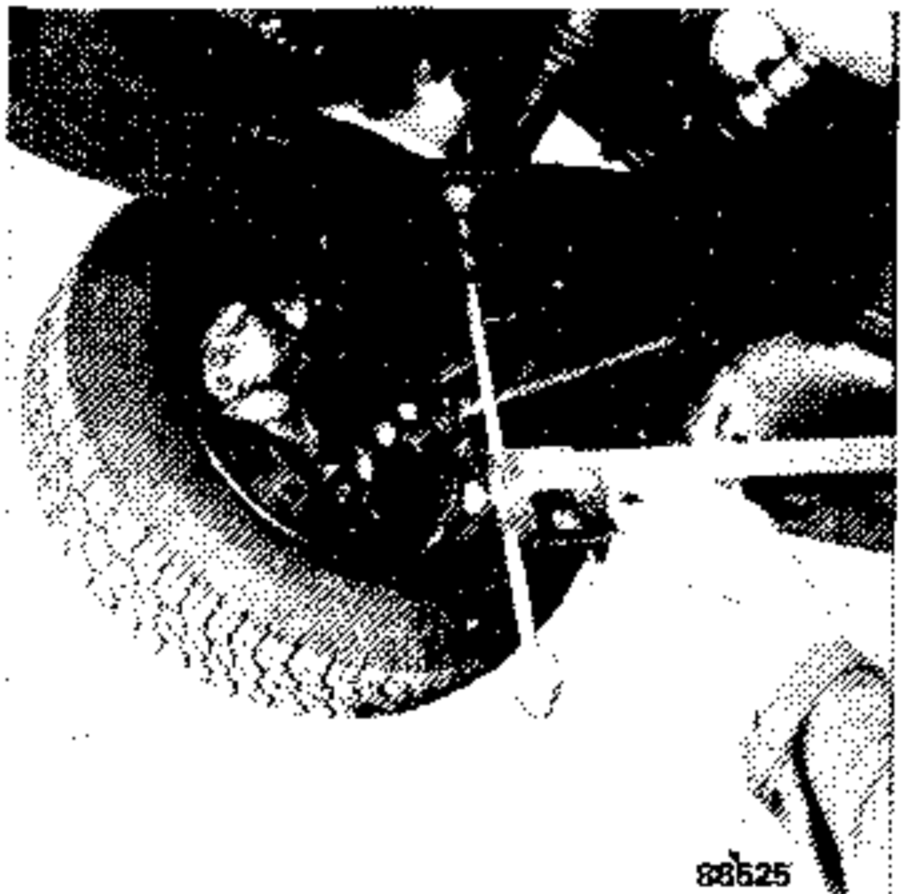

points D and C

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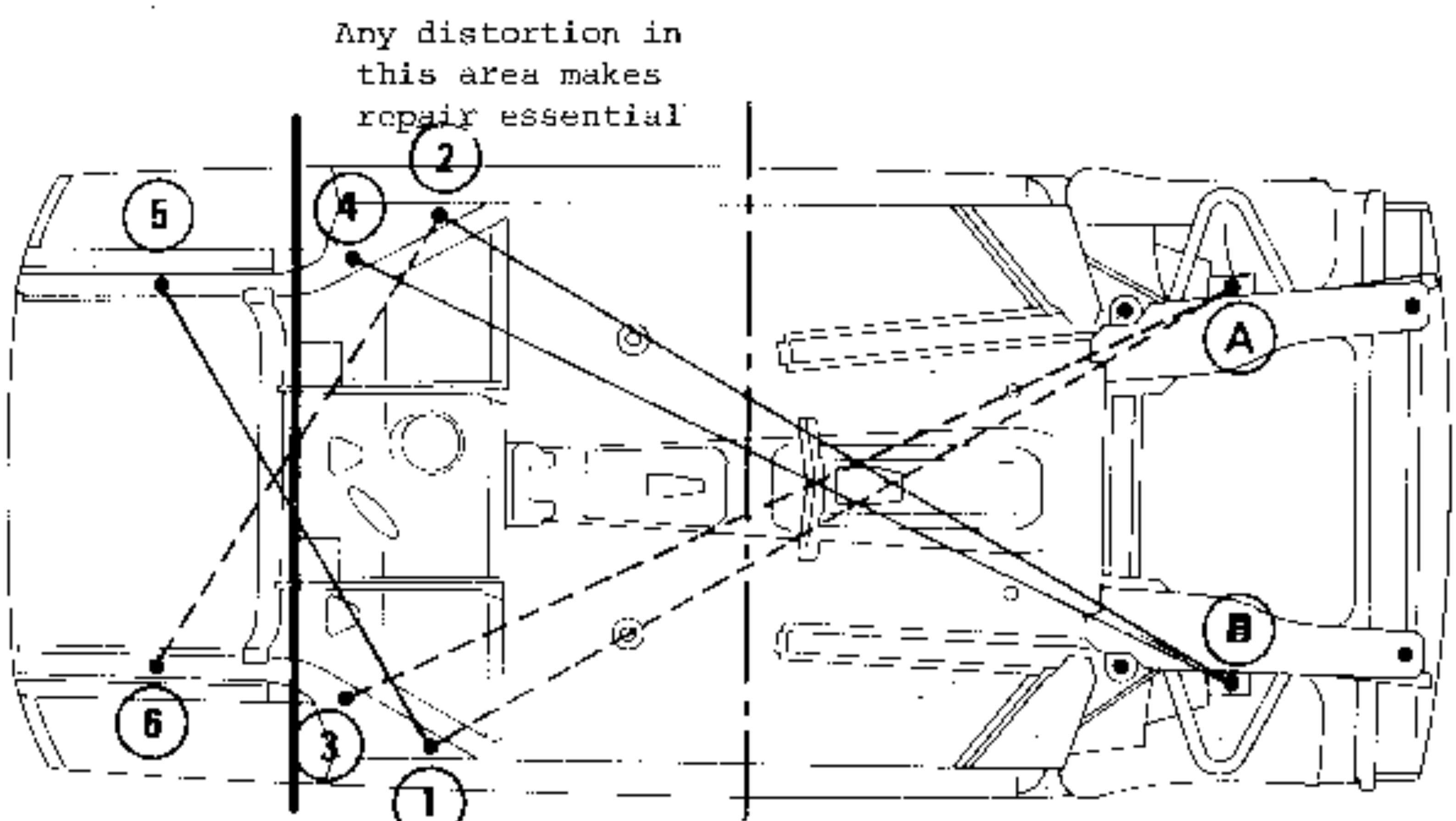
Compare the diagonals :
A1 = B2
A3 = B4
- If any difference is noted during the check, the vehicle will have to be placed on the body jig.
Compare the diagonals :
1 - 5 = 2 - 6
- If any difference is noted it is not necessary to place the vehicle on the body jig.
- But the axle geometry must be checked.



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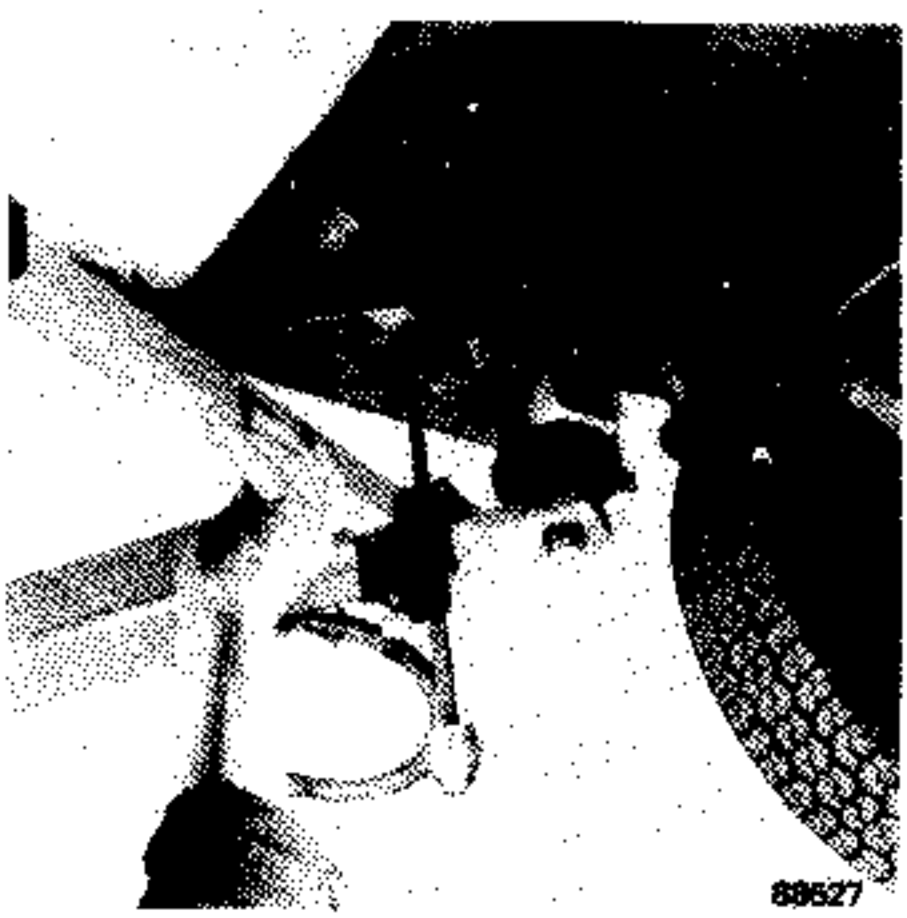
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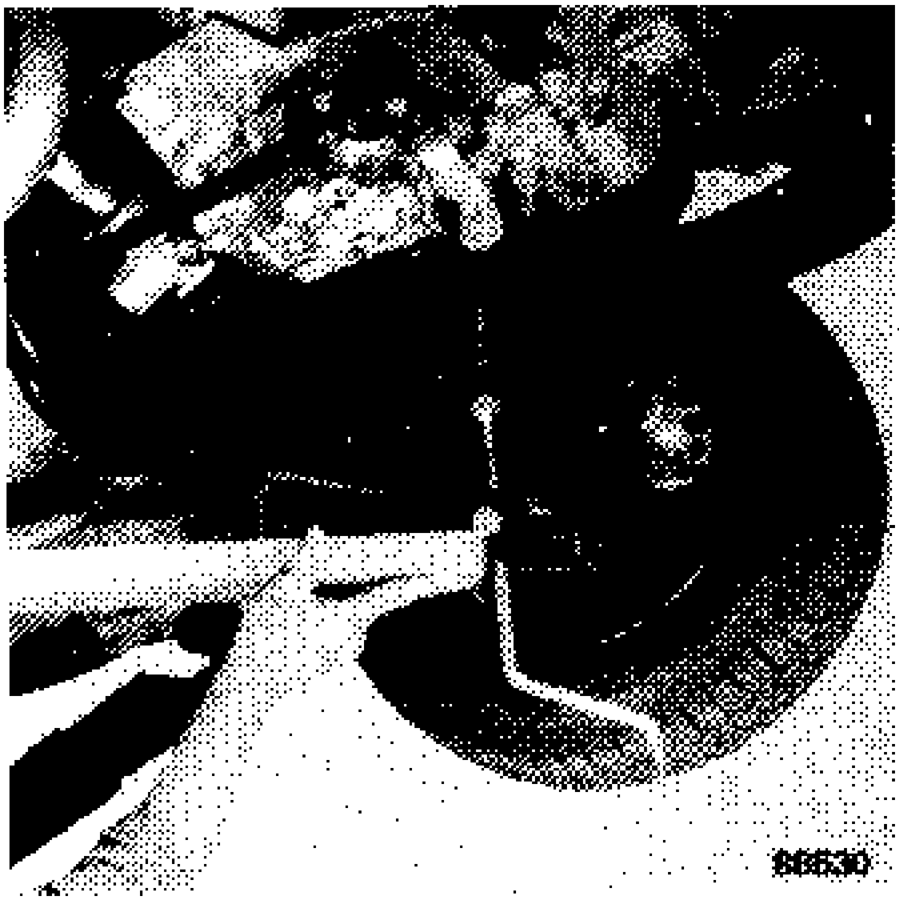
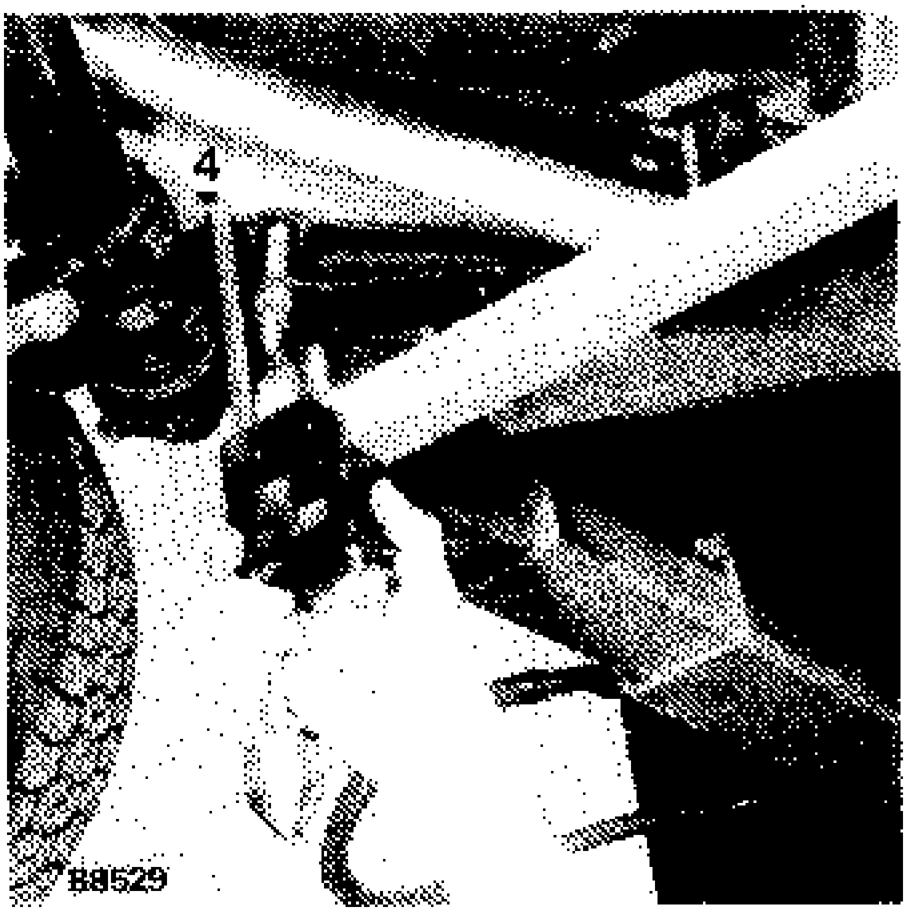
CHECKING THE DIAGONALS A1 = B2

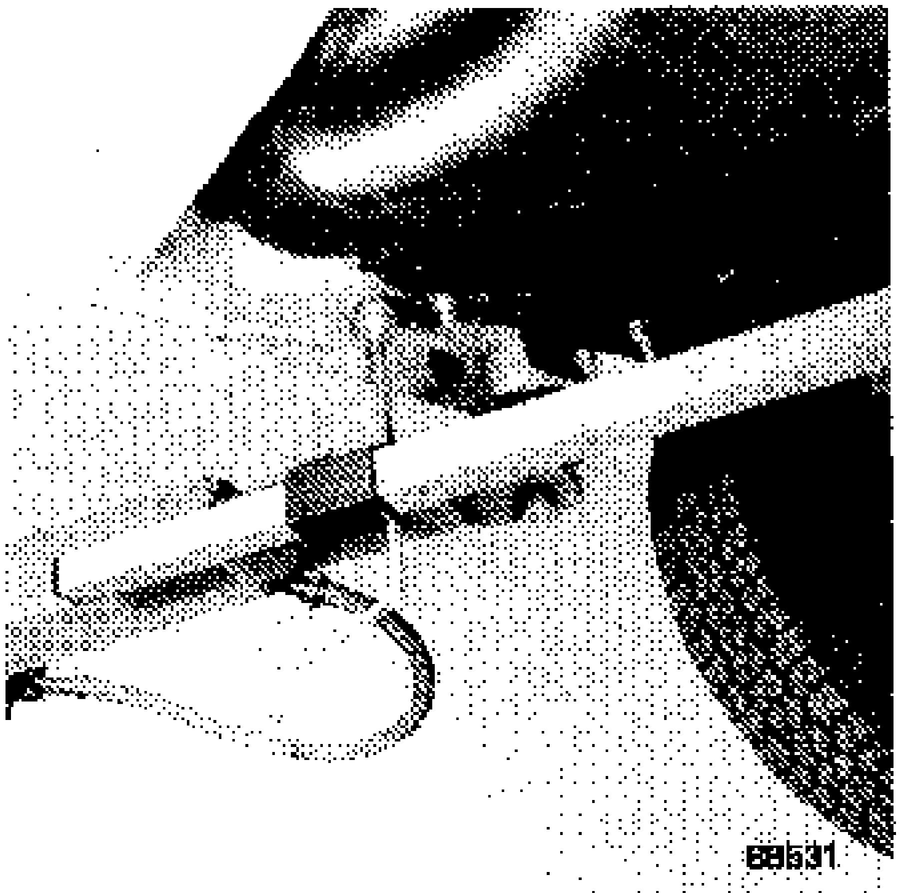
DIAGNOSIS

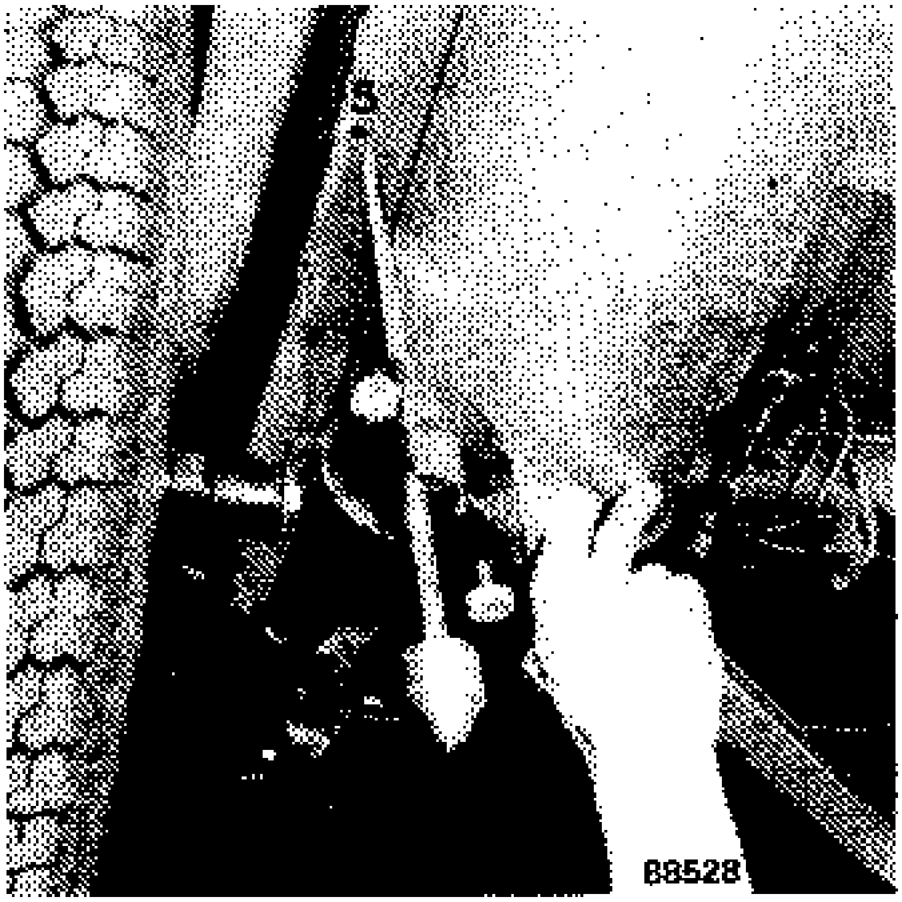




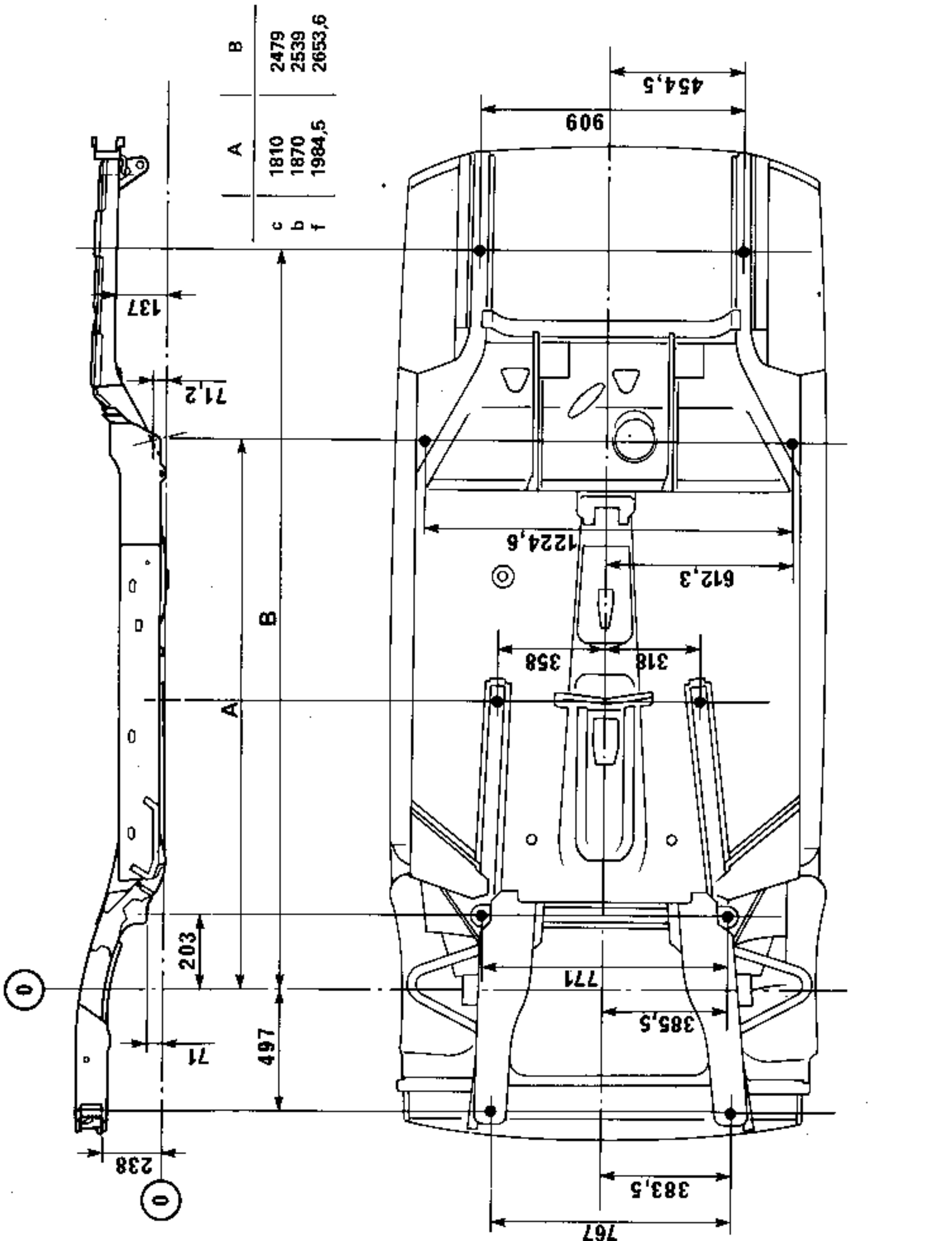
CHECKING THE DIAGONALS A3 = B4

The rear ends of the side members are checked by comparing diagonals 1 - 5 = 2 - 6





CHECKING THE DIAGONALS 1 - 5 = 2 - 6



	A	B
c	1810	2479
b	1870	2539
f	1984,5	2653,6

Note : for : a description of the body jig,
the positions of the various holes,
converting old body jigs to the modular system,
anchoring and jacking systems,

SEE MR 501 bodywork section, section F 001

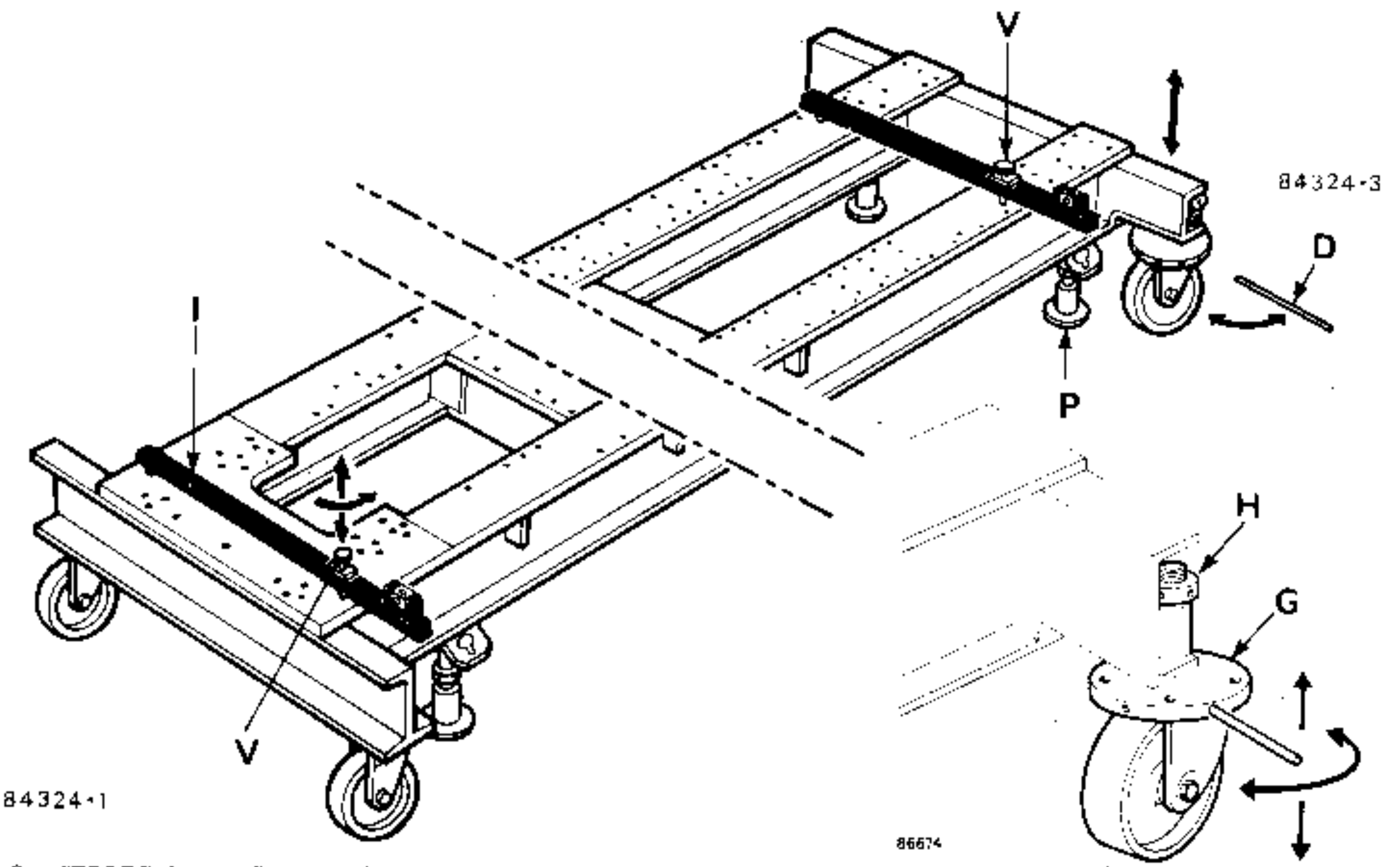
SETTING UP THE BODY JIG FOR USE

Important note

Before any checking, straightening or rebuilding operations on a vehicle mounted on its body jig, the jig itself must be set up without twist.

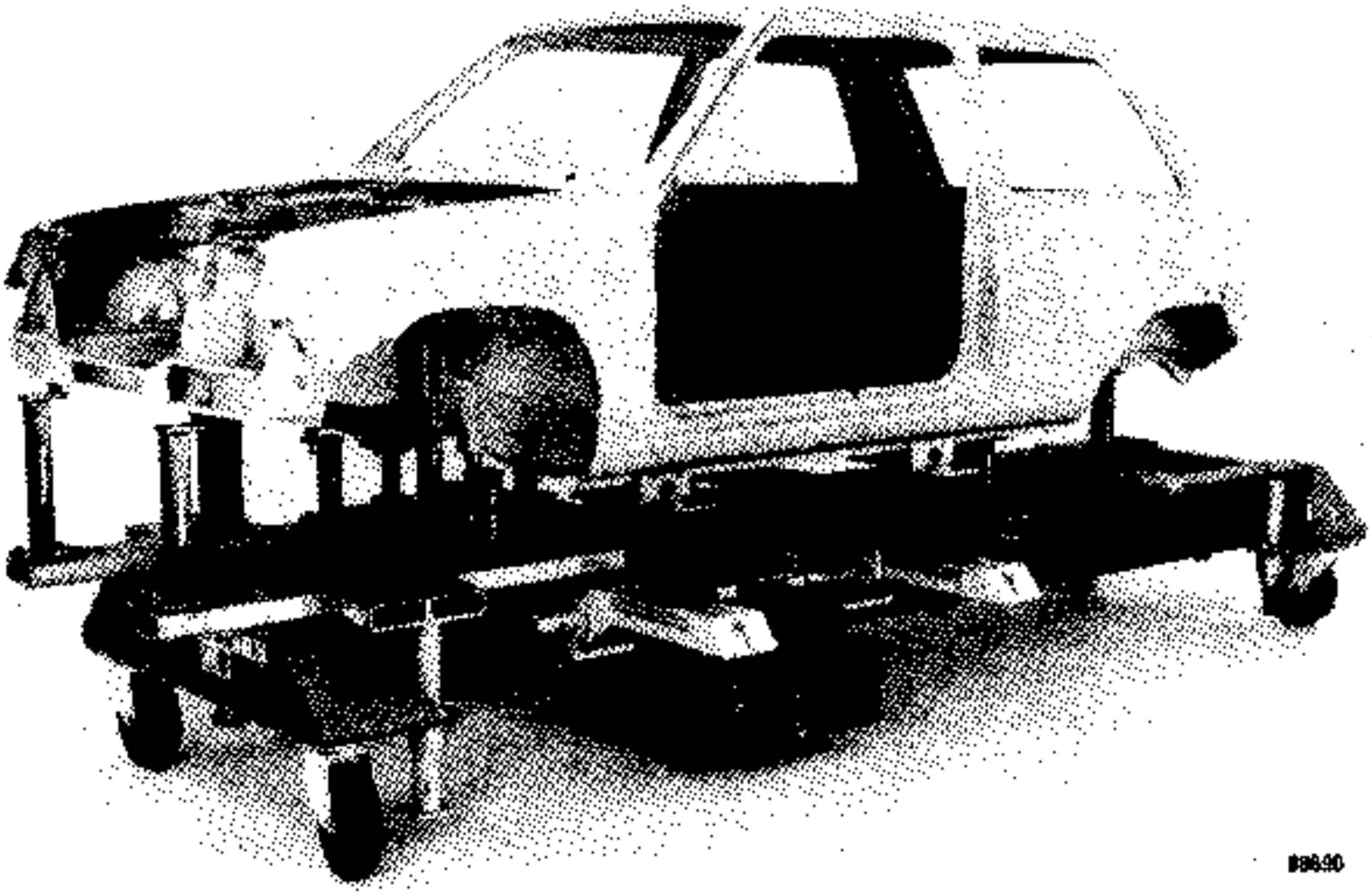
1. PREPARATION

- Place the jig brackets required for the repair to be carried out on the jig.
- Place the vehicle on the jig brackets, only the mechanical units around the area to be repaired need to be removed.
- Fit the anchor clamps.



2. STRAIGHTENING THE BODY JIG

- Place a straight-edge (1) on the front end of the machined part of the jig.
- Turn the screw (V) to bring the spirit level bubble between the two marks.
- Take the straight-edge to the rear machined area on the jig bench, leaving the straight-edge in the same position (with the adjusting screw V on the same side of the jig).
- Loosen the lock nut (H), on the rear wheel. This can be adjusted by inserting a tommy bar at (D).
- Turn the wheel flange (G) to bring the spirit level between the two marks.
- Recheck the other end and repeat these operations as described above if necessary.
- When the jig is level, tighten lock nut (H).
- Before using floor anchor points bring down the screw jacks (P) to take the load.



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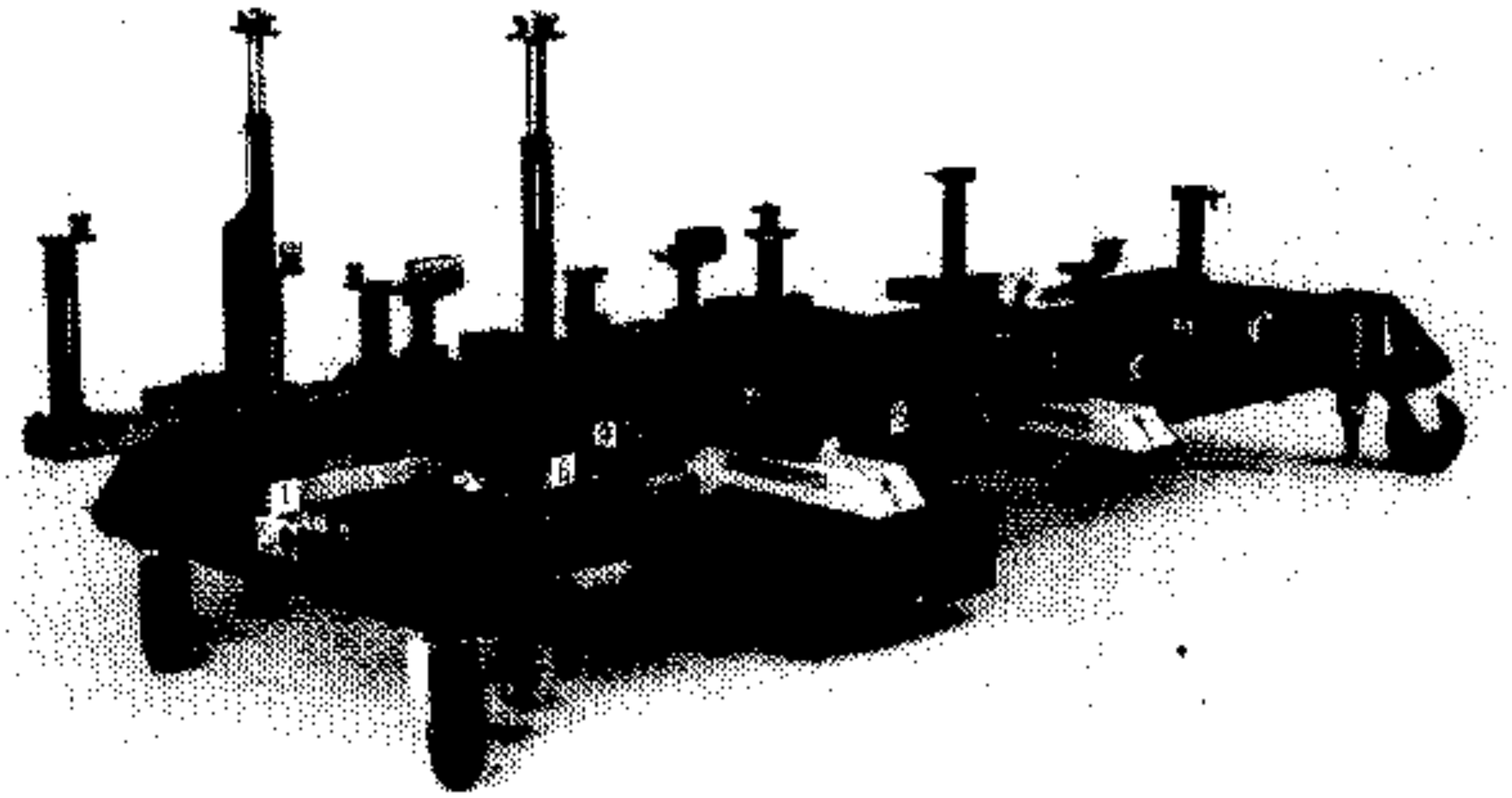
Special adjustments to be carried out on body jig MUF 7 R.C.

- Body jig MUF 7 R.C. is levelled in the same way and with the same straight-edge as jig MUF 6 R.C., by turning the adjustable foot, no matter what working position is to be used.

3. REPAIR OPERATIONS

   - Secure the anchor clamps to the body sills.
   - Carry out the actual repair by straightening the distorted area.
   - If the jig brackets are used, a permanent check is maintained.
   - The body is rebuilt to the correct dimensions by positioning the components replaced on the jig brackets.

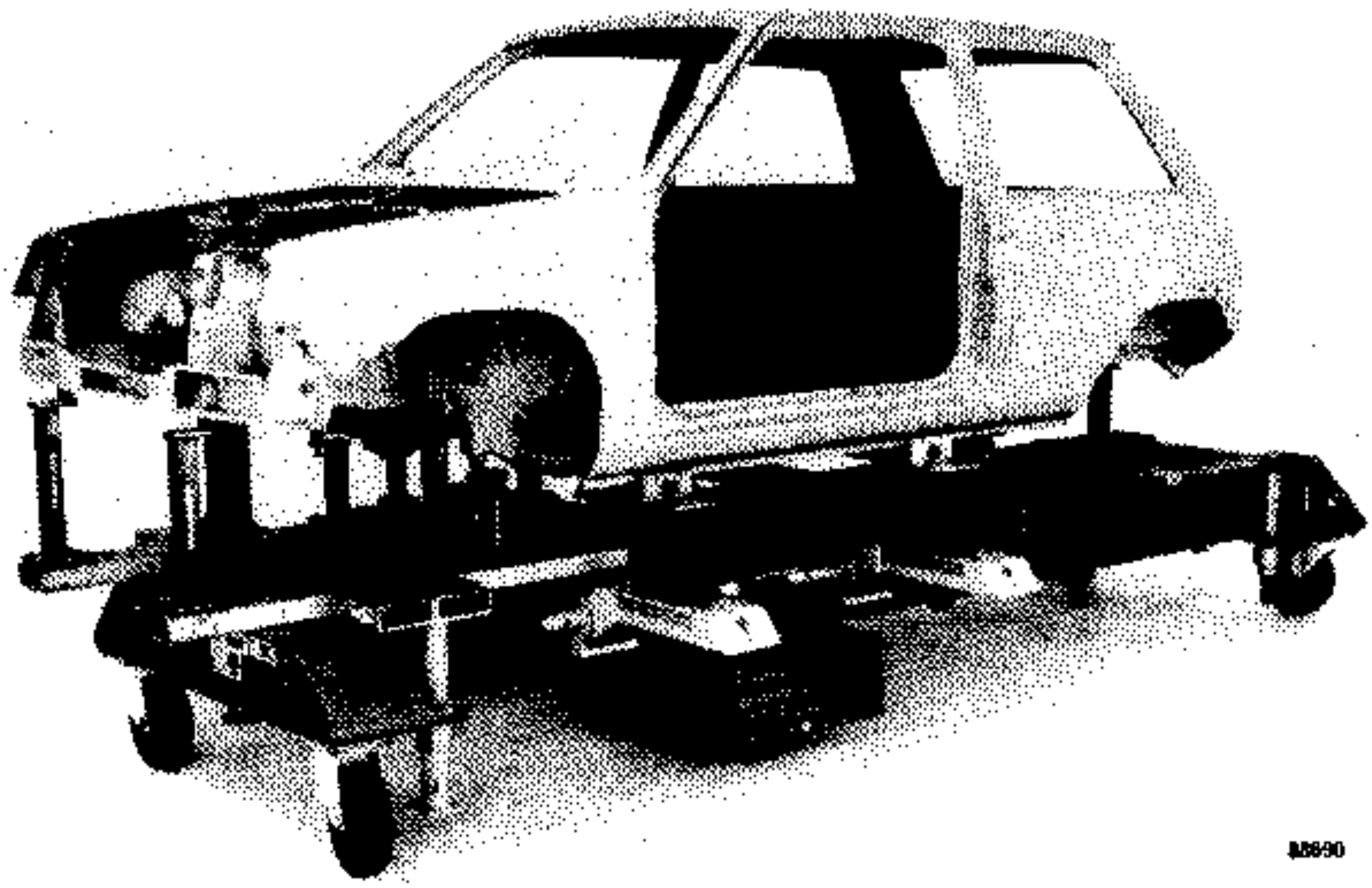


88691

Jig brackets Car. 1028 are designed to be used with the modular system and fit on the RENAULT - CELETTE MUF 6 R.C. or MUF 7 R.C. body jigs, equipped with CELETTE modular cross members.

They can also be used on BLACKHAWK body jigs with modular cross members.

For the method of using these jig brackets on other body jigs, see MR 501, bodywork section - section F 001.



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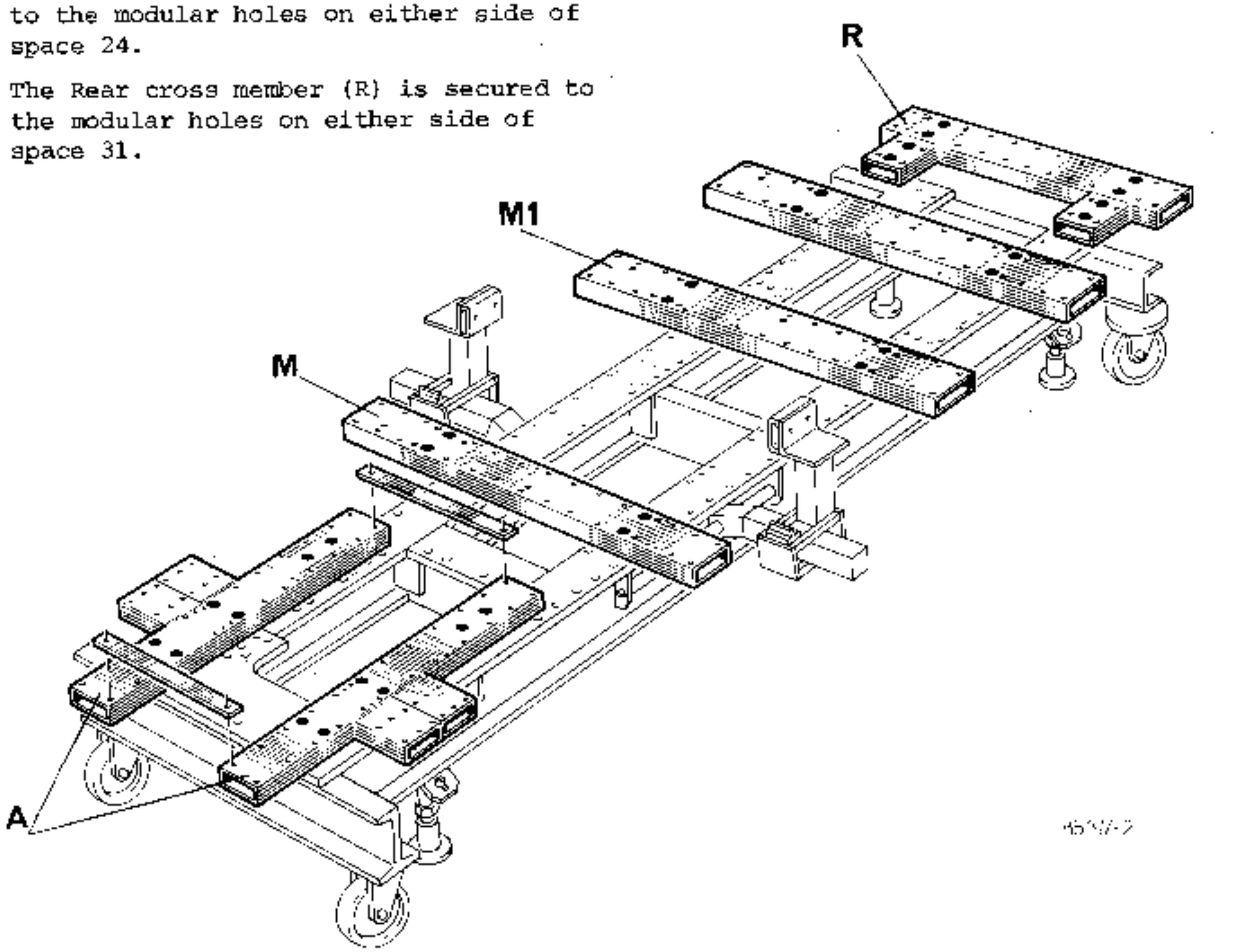
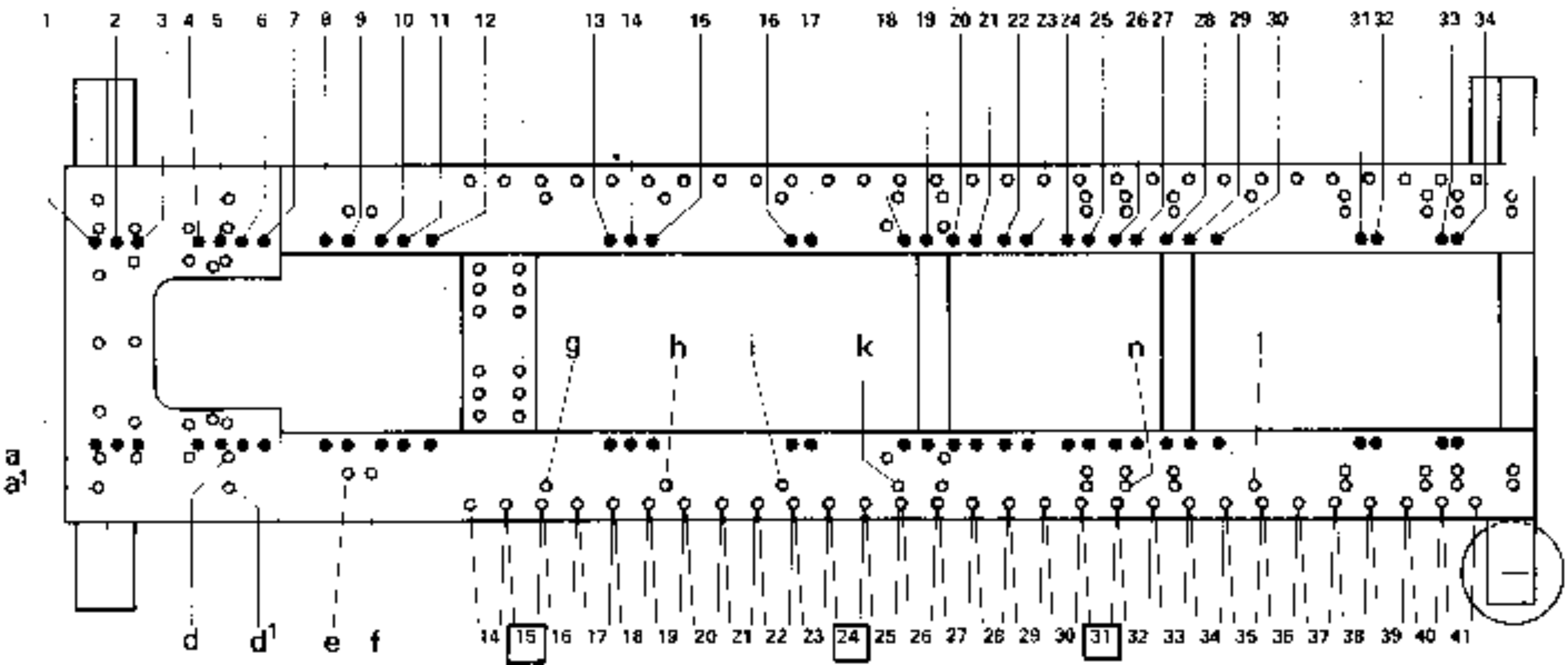
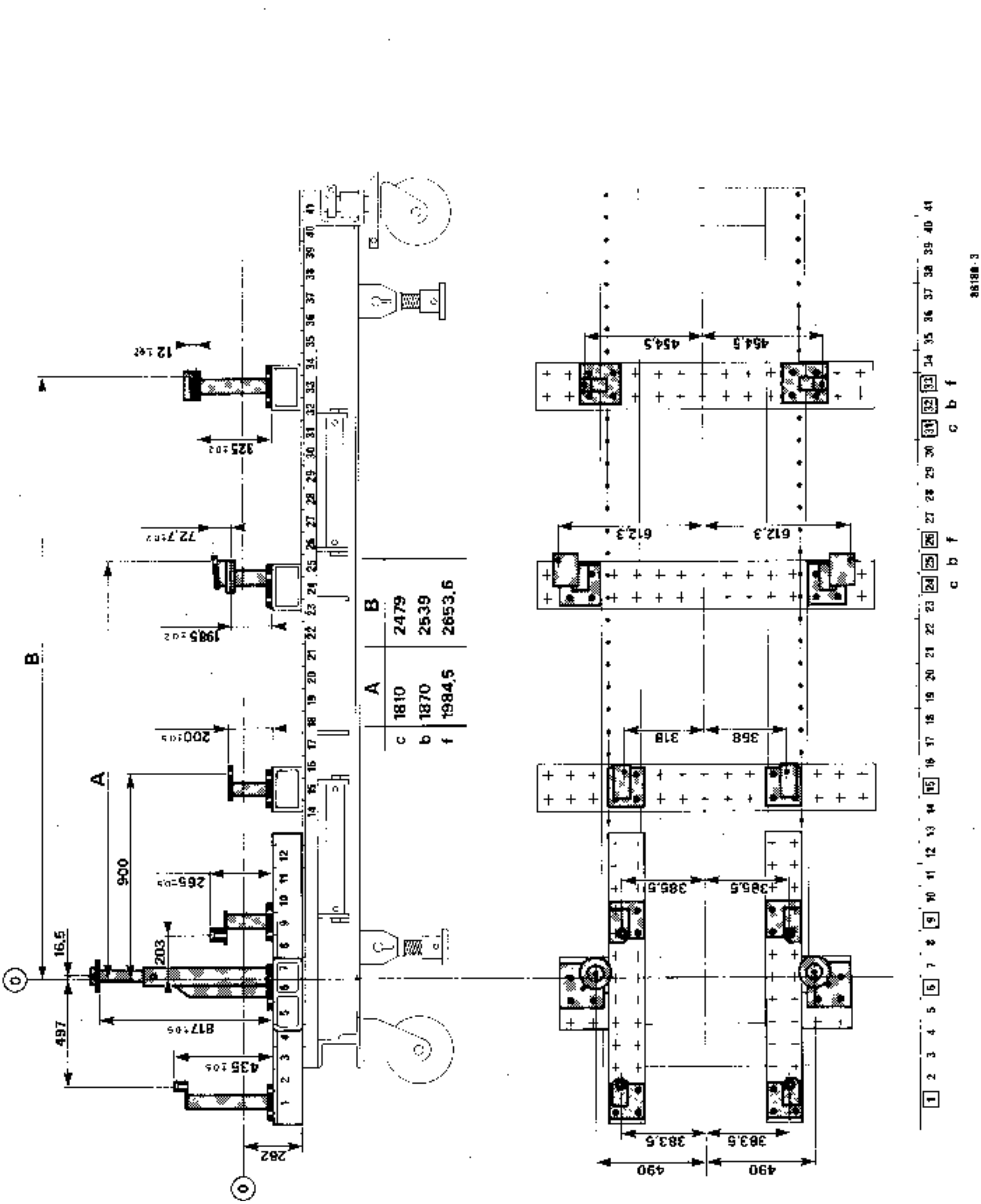
- The Front cross members (A) are secured to holes a and a', d and d' and f on the jig.
- The Centre cross member (M) is secured to the modular holes on either side of space 15.
- The Centre cross member (M1) is secured to the modular holes on either side of space 24.
- The Rear cross member (R) is secured to the modular holes on either side of space 31.







	A	B
c	1810	2479
b	1870	2539
f	1984,5	2653,6

To make repair operations easier, we have designed jig brackets that permit one to place a vehicle on the jig without removing the FRONT or REAR mechanical units unless they are in the area to be repaired.

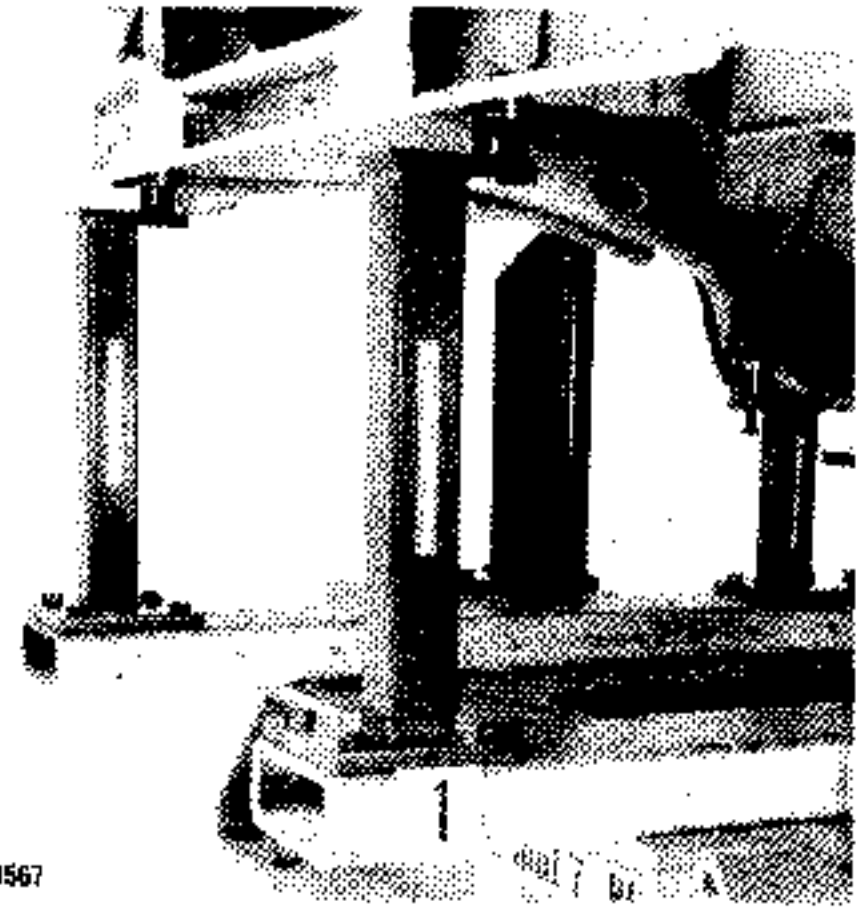
These jig brackets are designed to fit over the FRONT and REAR mechanical unit securing bolt heads or nuts, when the mechanical units are left in position and, furthermore, locate on the datum points that determined the original geometry, when the mechanical units are removed.

They can be used :

1. on CELETTE or RENAULT-CELETTE MUF 6 R.C. and MUF 7 R.C. body jigs equipped with CELETTE modular cross members,
2. on BLACKHAWK jigs, with modular hole positions, equipped with BLACKHAWK modular cross members.

JIG BRACKET No. 1

- When repairing front collision damage : with the mechanical units removed, this determines the position of the front end cross member, with the spacers in position.
- When repairing rear collision damage : this can be used with the mechanical units in position and the spacers (A) removed. They assist in aligning the vehicle on the jig. In this case the front bumper shield must be removed.



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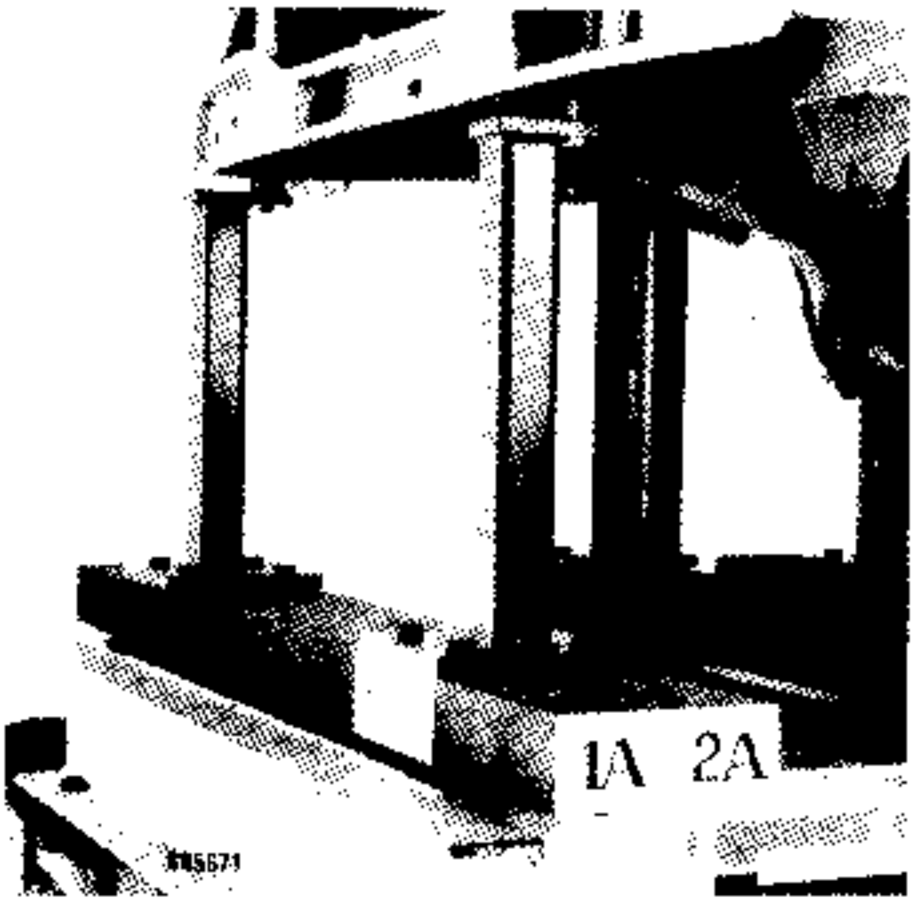
- On the CELETTE modular system, this support is secured to the end of the front cross members at space no. 1



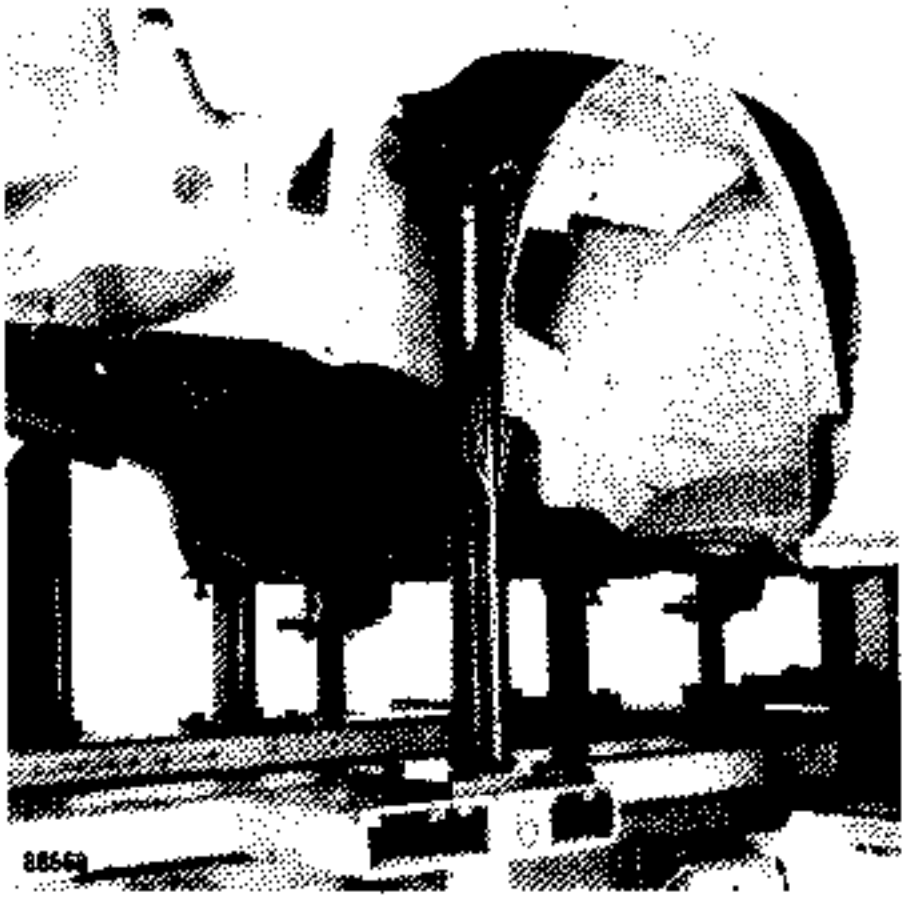
85671

- On the BLACKHAWK modular system, this support is secured to holes 3 and 4 in the front cross member positioned at the BLACKHAWK modular holes 1A and 2A.

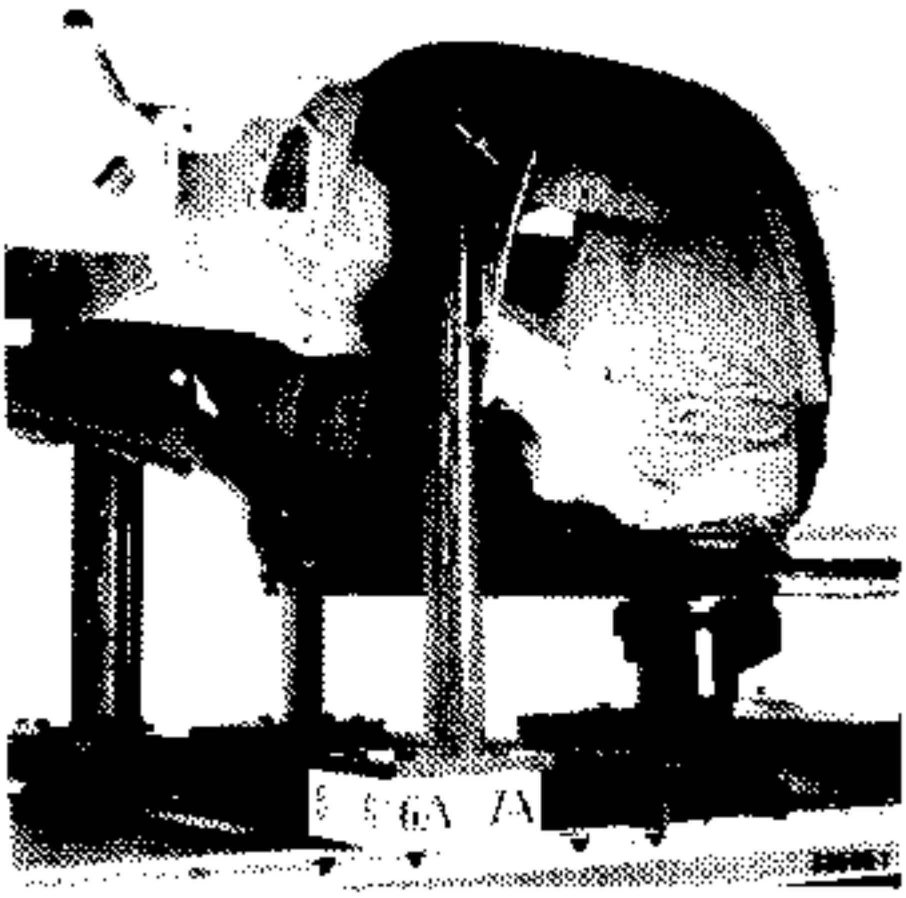
JIG BRACKET No. 2

This is used only for repairing front end collision damage with the mechanical units removed : it correctly locates the shock absorber turret when replacing a cowl side assembly (operation covered in the front end collision section).

Note : when straightening a cowl side, the upper part can be lowered by removing the pin.



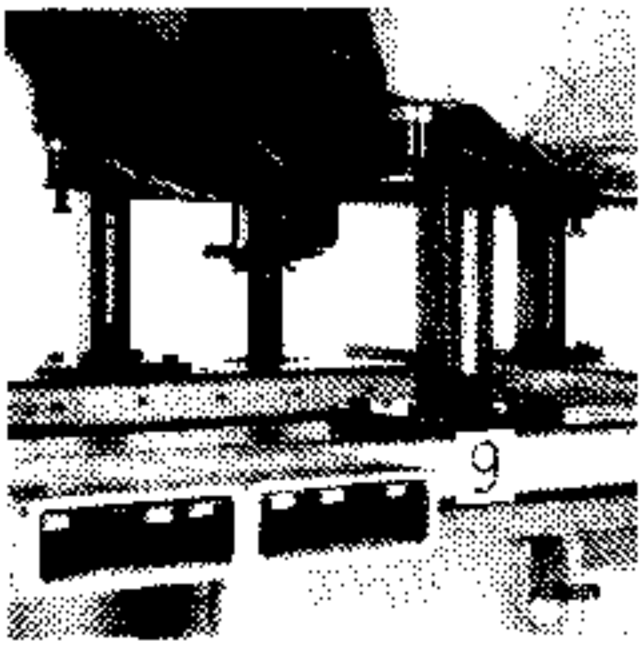
- On the CELETTE modular system, it is secured by 4 bolts to the front cross member extension, at space 6.



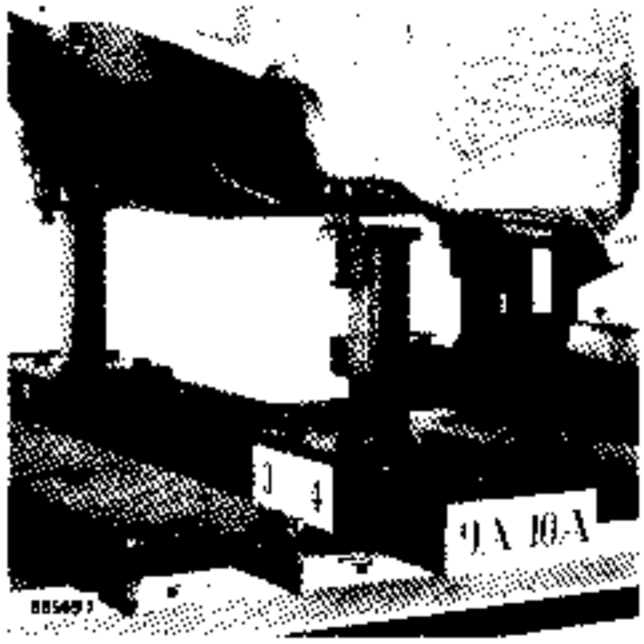
- On the BLACKHAWK modular system, it is secured to holes 5 and 6 on the front cross member, which is positioned at modular holes nos. 7A and 8A.

JIG BRACKET No. 3

- When repairing front collision damage : depending on the extent of the damage, with its spacers fitted, it permits one to align the vehicle on the jig or to position the side member (or front end unit).
- When repairing rear collision damage : it is used with the mechanical units in position and the spacers removed, to align the vehicle on the jig.



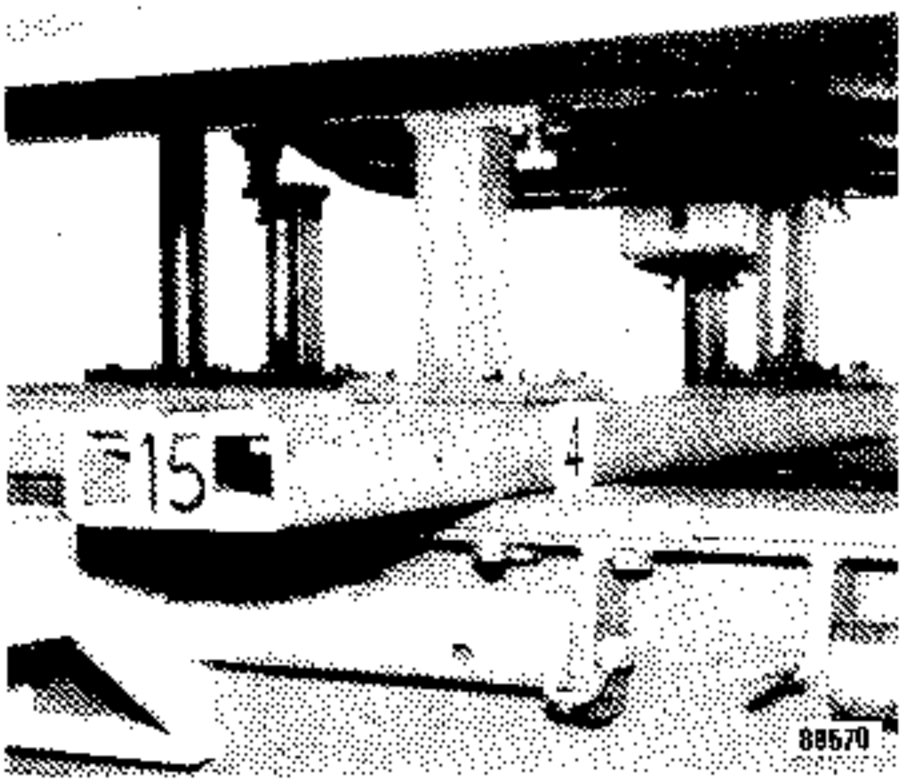
- On the CELETTE modular system, this support is secured to the front cross members at space no. 9.



- On the BLACKHAWK modular system this support is secured to holes 3 and 4 in the front cross member, positioned at BLACKHAWK modular holes 9A and 10A.

JIG BRACKET No. 4

- When repairing front collision damage : depending on the extent of the damage, this is used to align the vehicle on the jig or to position a side member (or a front end unit).
- When repairing rear collision damage : it helps to align the vehicle on the jig and support its weight.

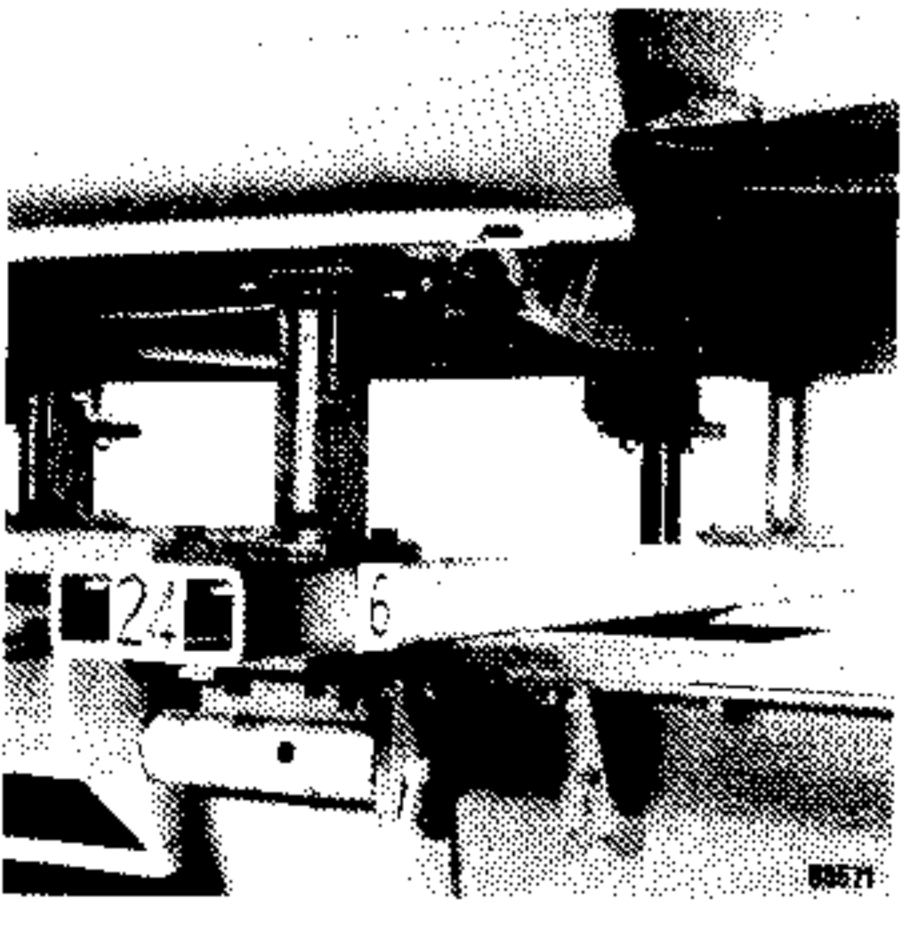


- On the CELETTE modular system, it is secured to cross member space no. 4, positioned at space no. 15 on the jig.

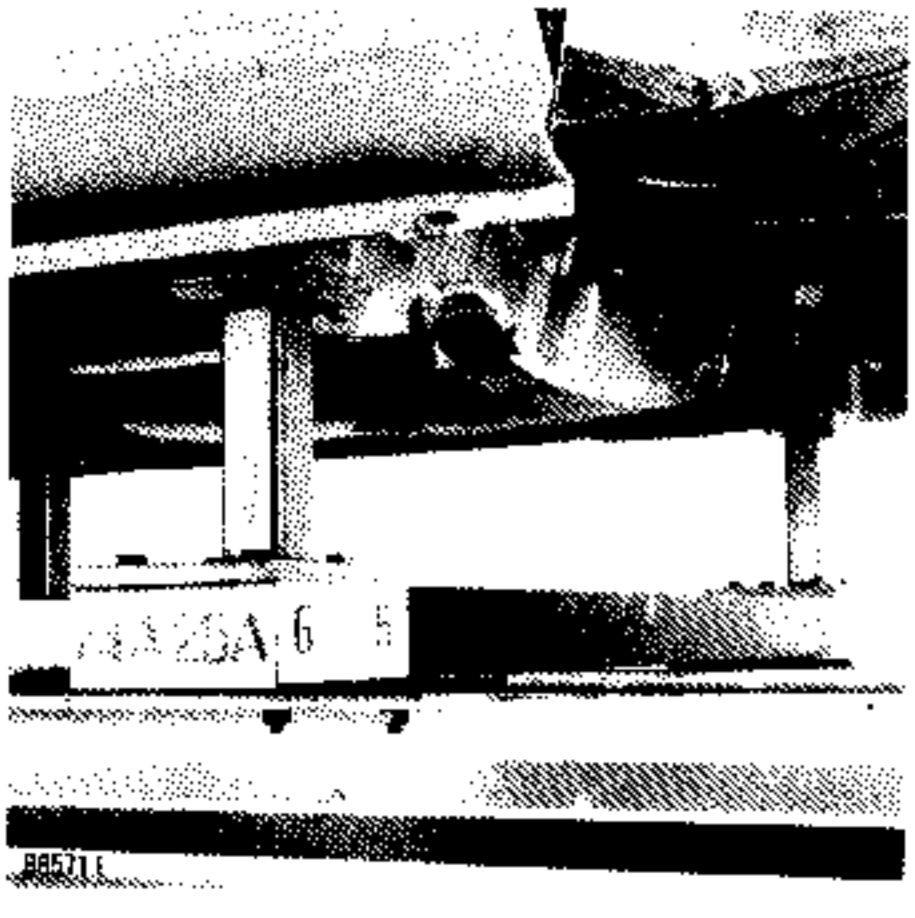
- On the BLACKHAWK modular system it is secured to holes 3 and 4 in the cross member, positioned at holes 15A and 16A on the jig.

JIG BRACKET No. 5

- When repairing front collision damage : it aligns the vehicle on the jig without removing the rear mechanical units.
- When repairing rear collision damage : depending on the extent of the damage, it aligns the vehicle on the jig or positions the side member (or the rear end unit).



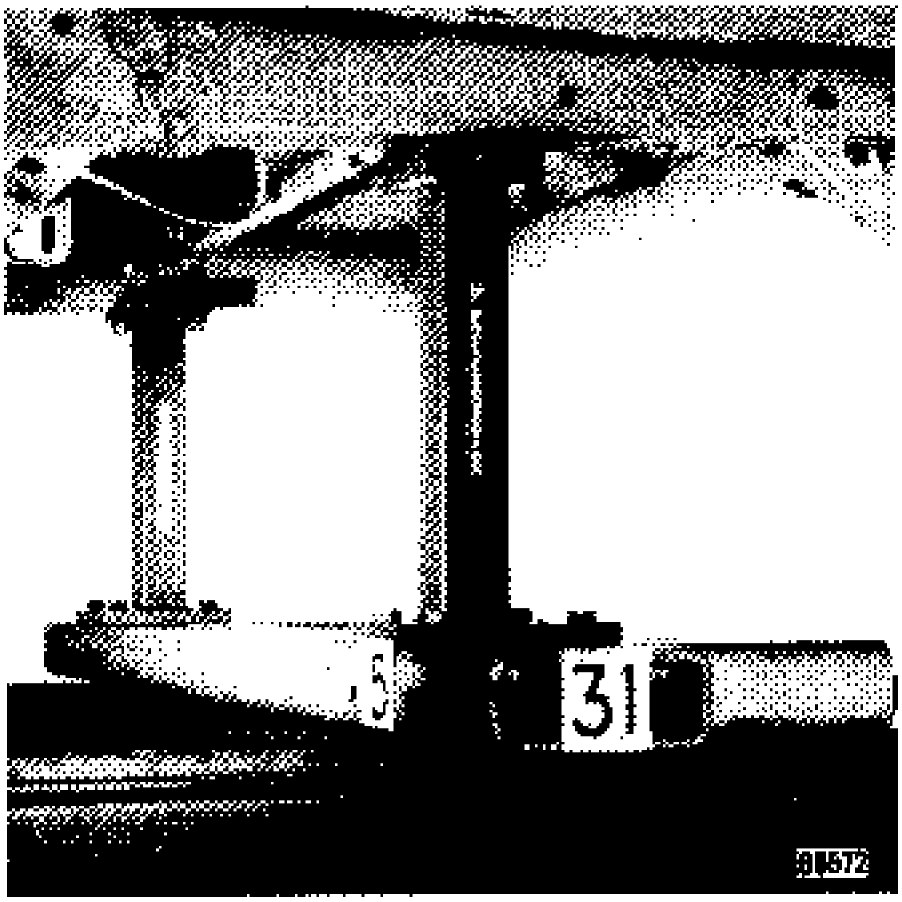
- On the CELETTE modular system it is secured to space no. 6 on the cross member positioned at space no. 24 on the jig



- On the BLACKHAWK modular system it is secured to holes 5 and 6 in the cross member positioned at modular holes 24A and 25A on the jig.

JIG BRACKET No. 6

- When repairing front collision damage : it assists in aligning the vehicle on the jig. Fitting it involves removing the exhaust (and the additional fuel tank on sports versions).
- When repairing rear collision damage : it positions the side member (or rear end unit).

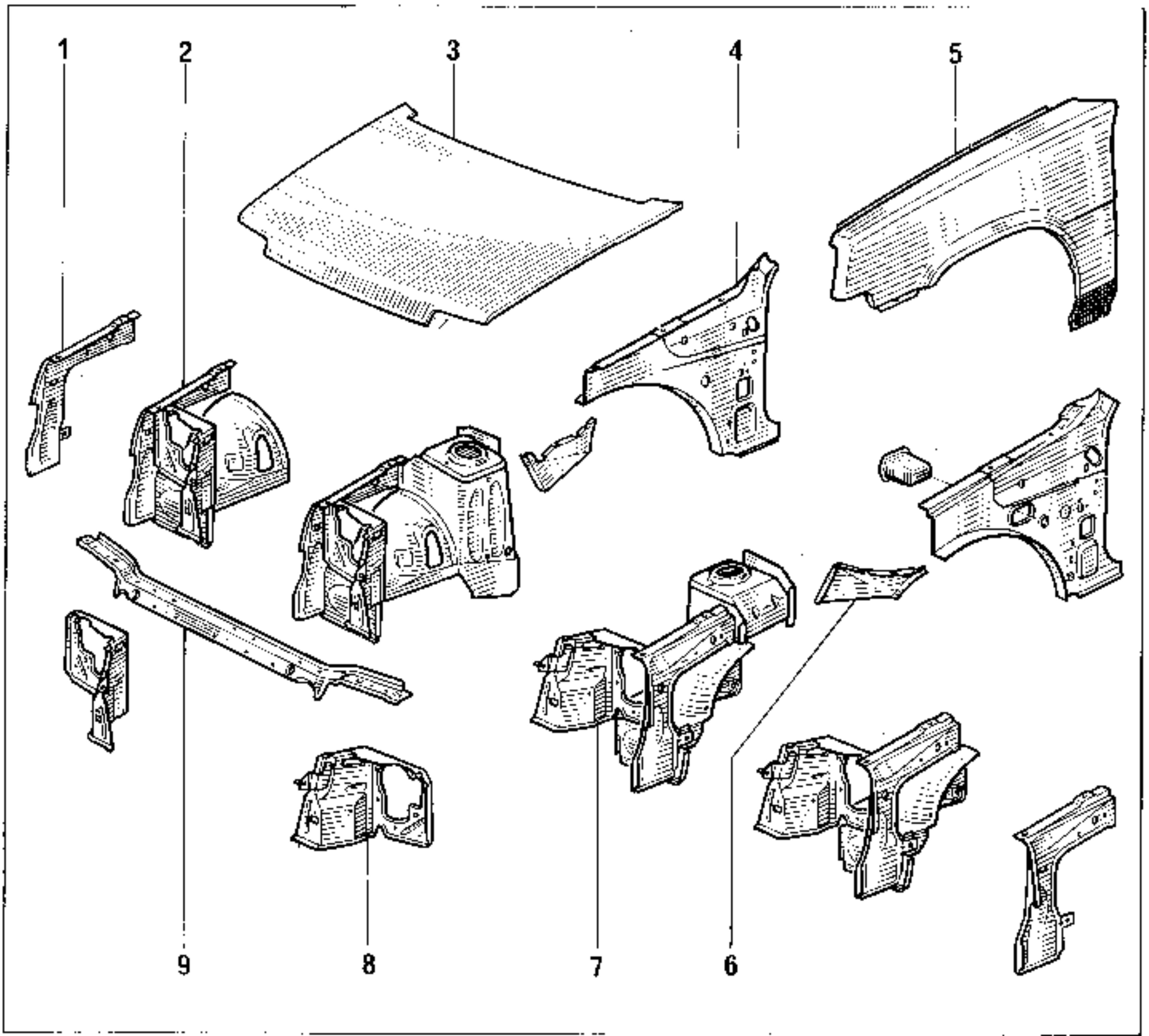


- On the CELETTE modular system it is secured to space no. 5 on the rear cross member positioned at space no. 31 on the jig.

- On the BLACKHAWK modular system it is secured to holes 4 and 5 in the cross member positioned at holes 31A and 32A on the jig.

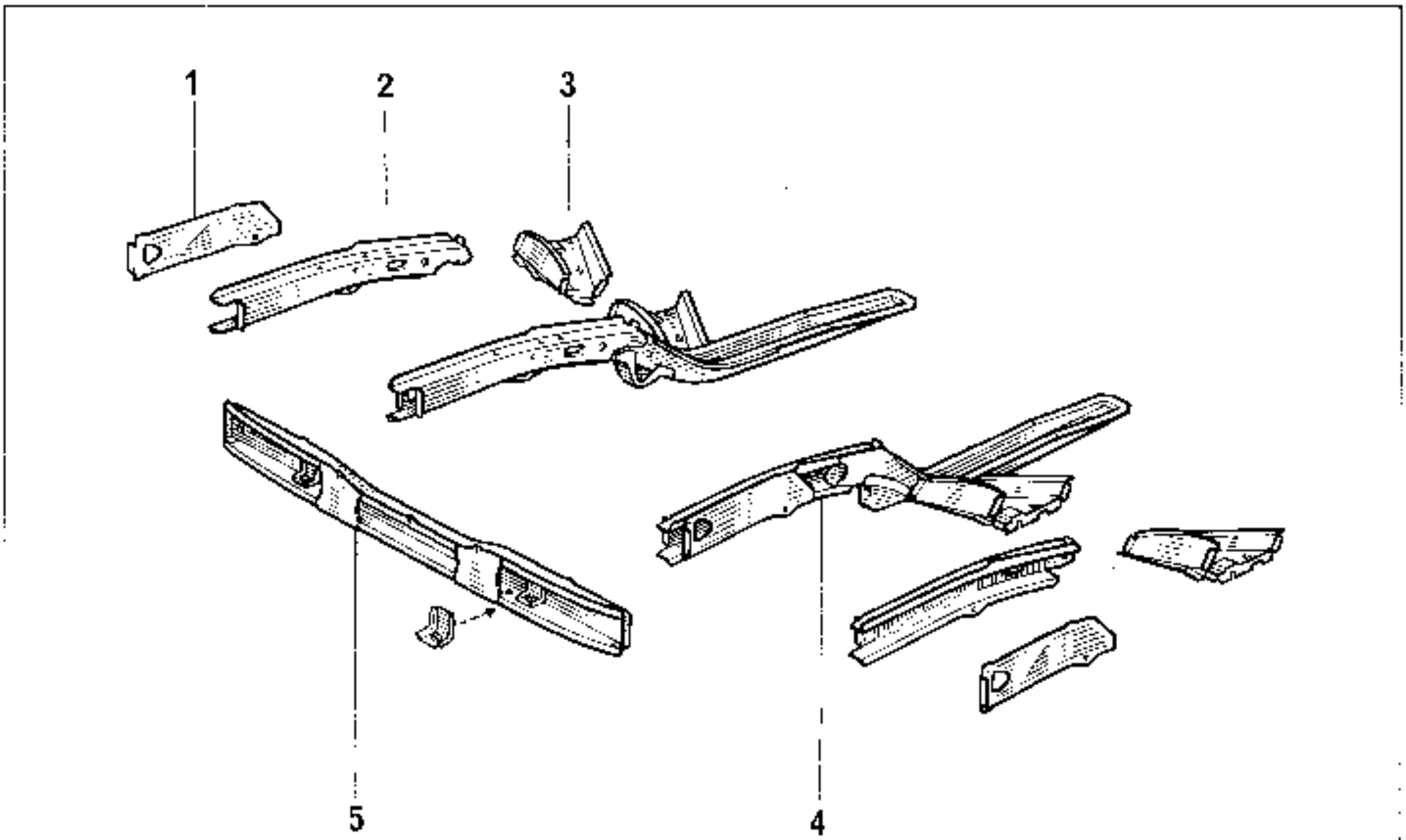
UPPER STRUCTURE

1 - cowl side panel
2 - simplified cowl side assembly
3 - bonnet
4 - door pillar lining
5 - front wing
6 - cowl side to shock absorber turret connection
7 - complete cowl side
8 - headlight support panel
9 - upper cross member



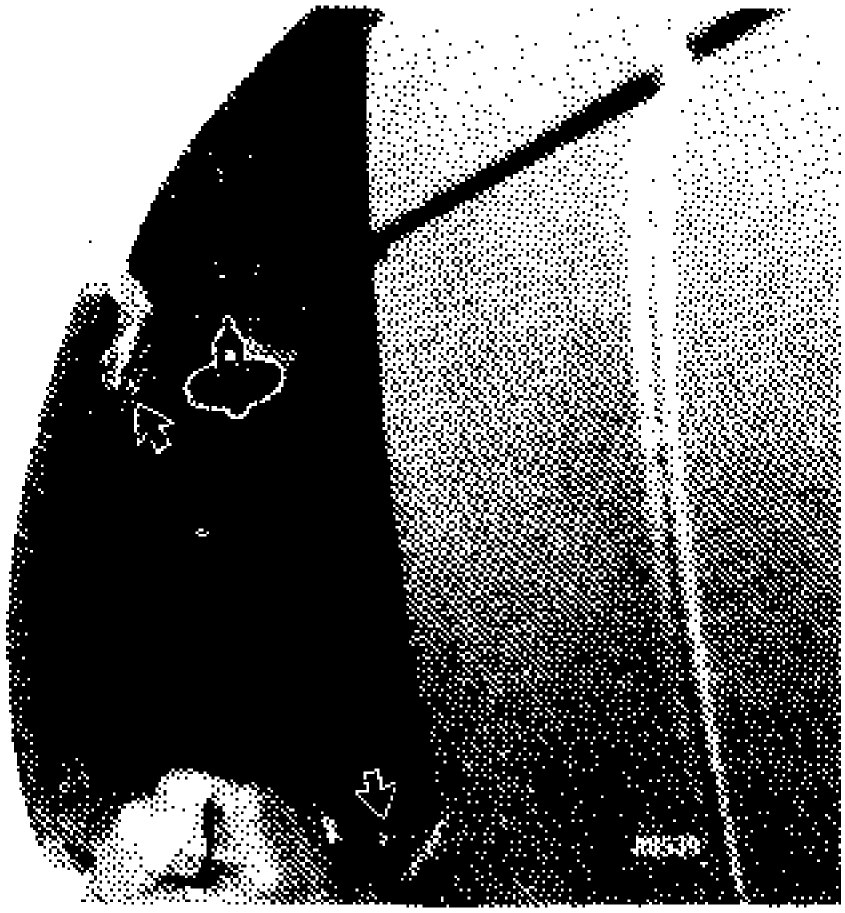
LOWER STRUCTURE

1 - side member closing panel
2 - side member front section
3 - side cross member
4 - complete side member
5 - lower cross member



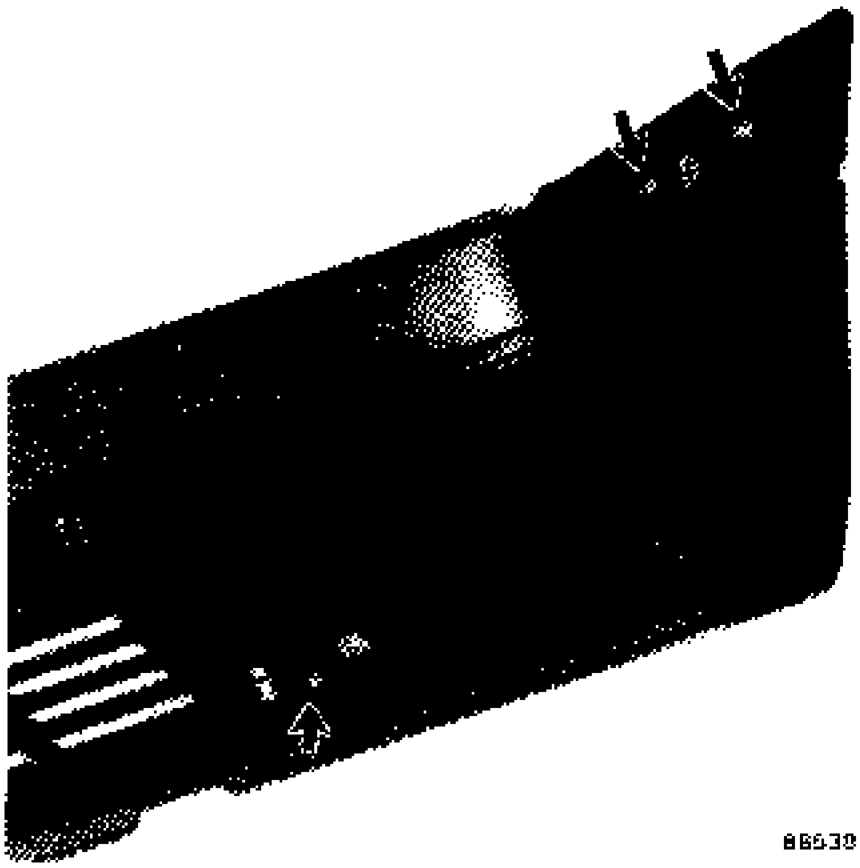
Removing

- Remove the four bumper shield securing bolts.



Stripping

- Take off the two side brackets and the two lower brackets.



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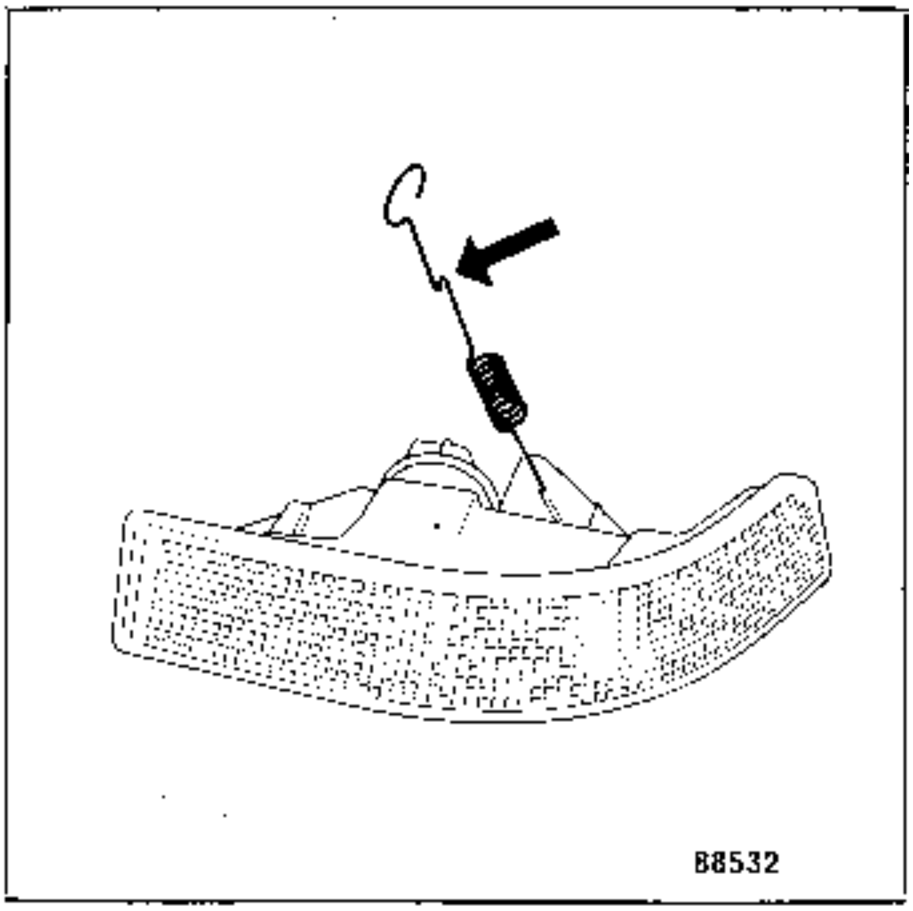
Refitting

Carry out the removing operations in reverse.

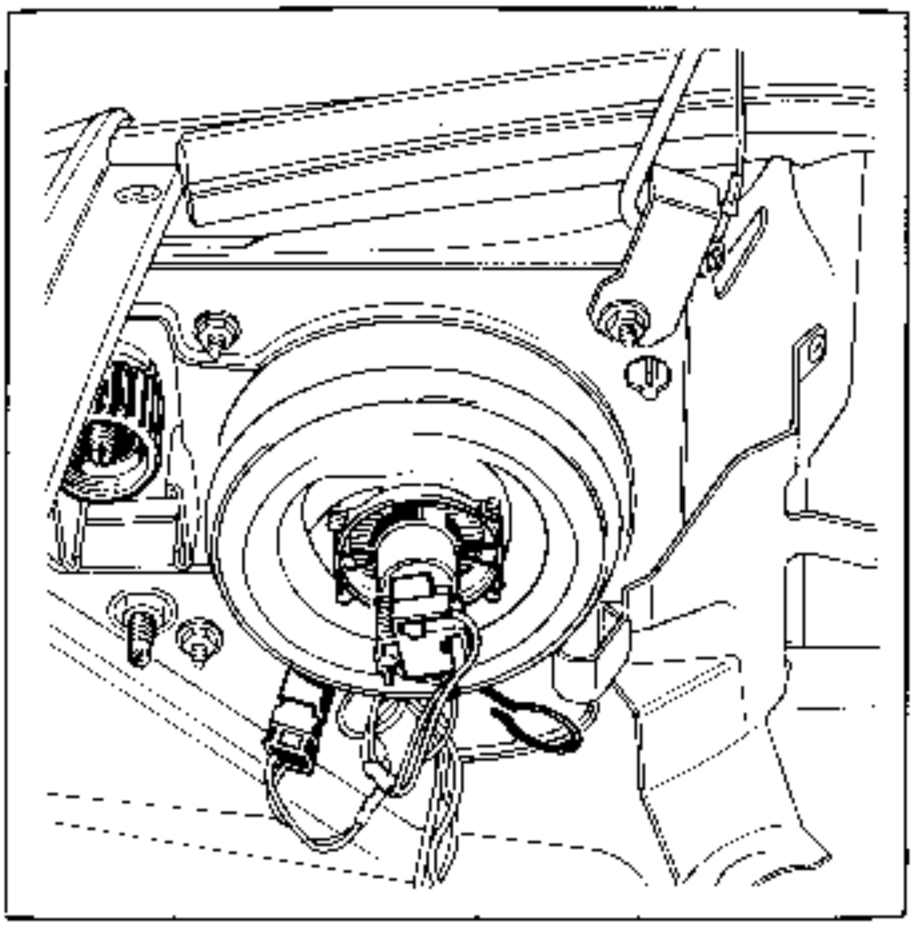
Removing

- Pull the ring on the direction indicator securing spring to remove the direction indicator.



- Remove the four headlight securing screws.

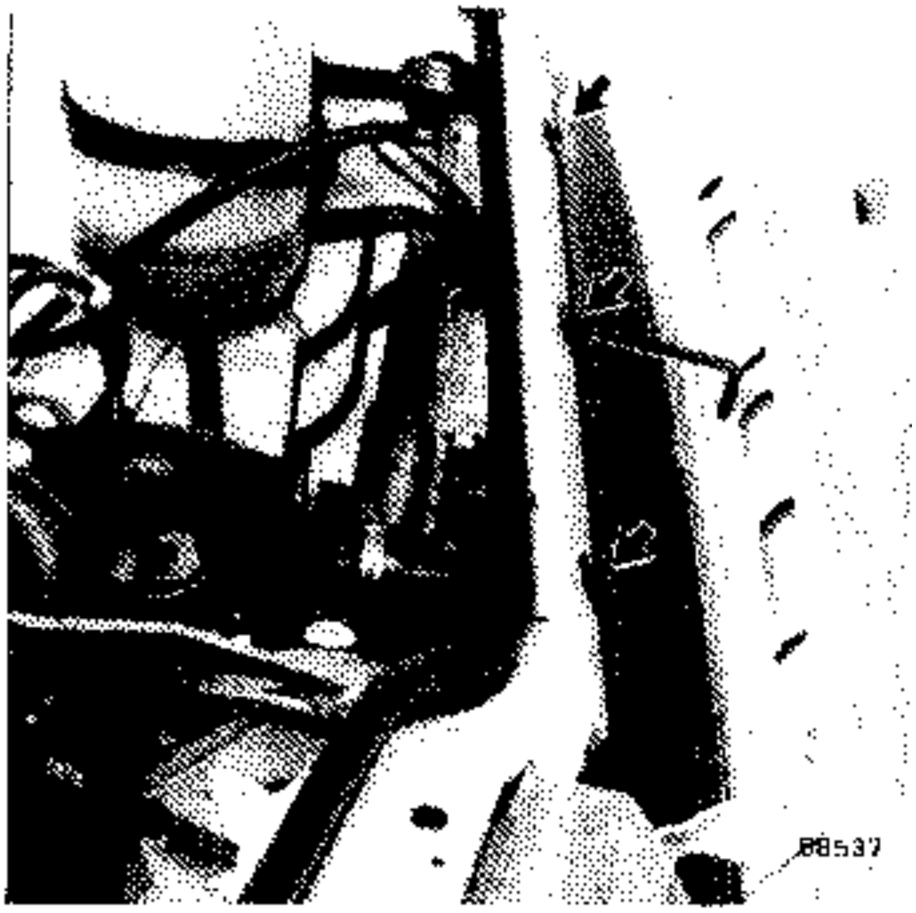
Note : The beam-unit cannot be dismantled. Only the bulbs can be re-used, if in good condition.



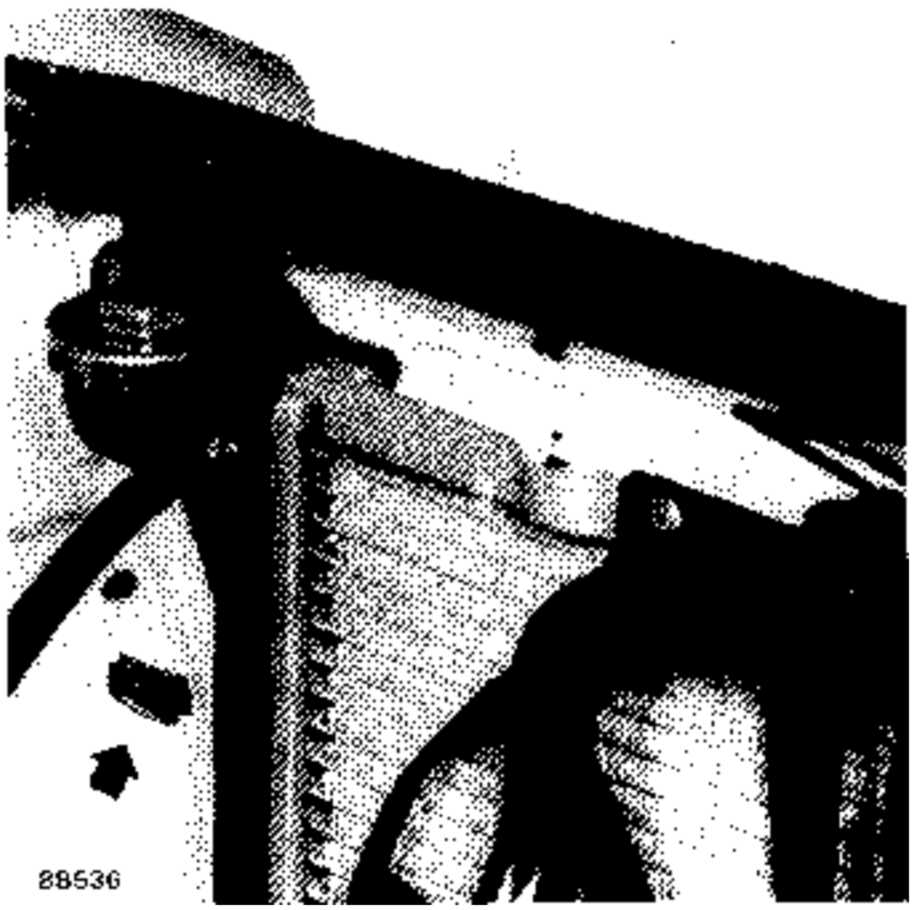
Removing

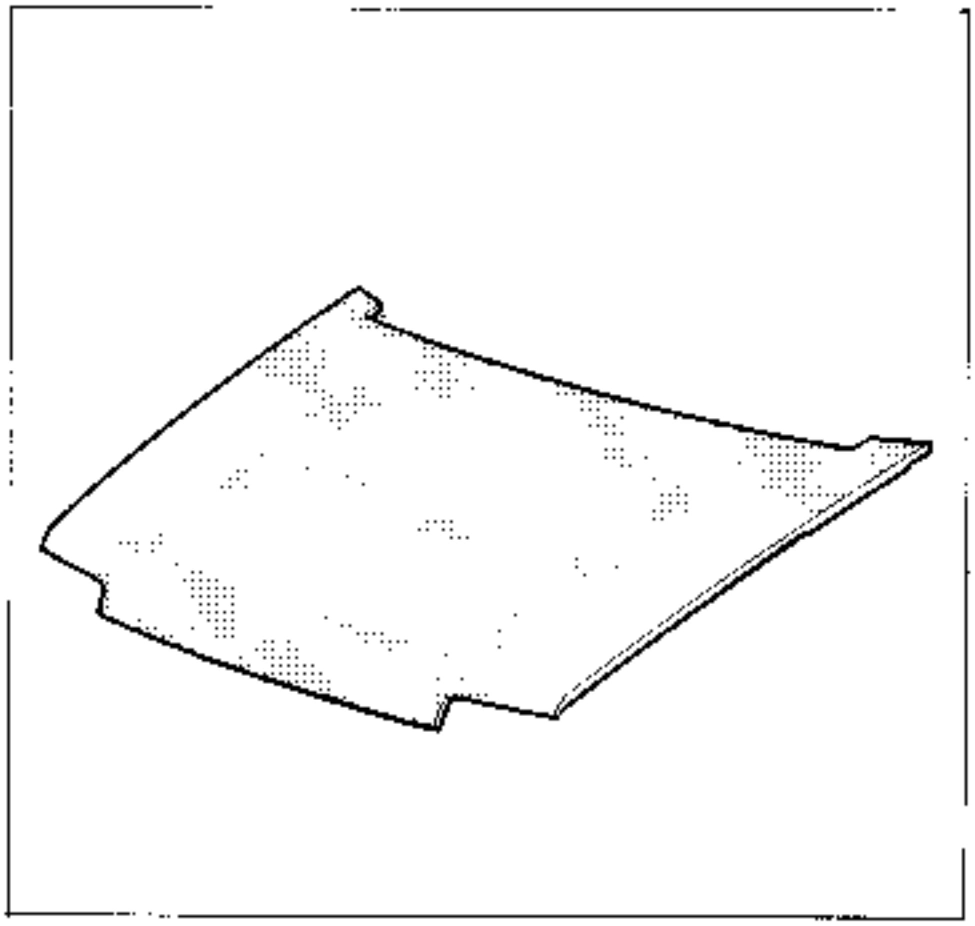
- Open the bonnet.

- Remove the upper securing screws using a cranked torx T wrench.



- Unclip the two lower fastenings.





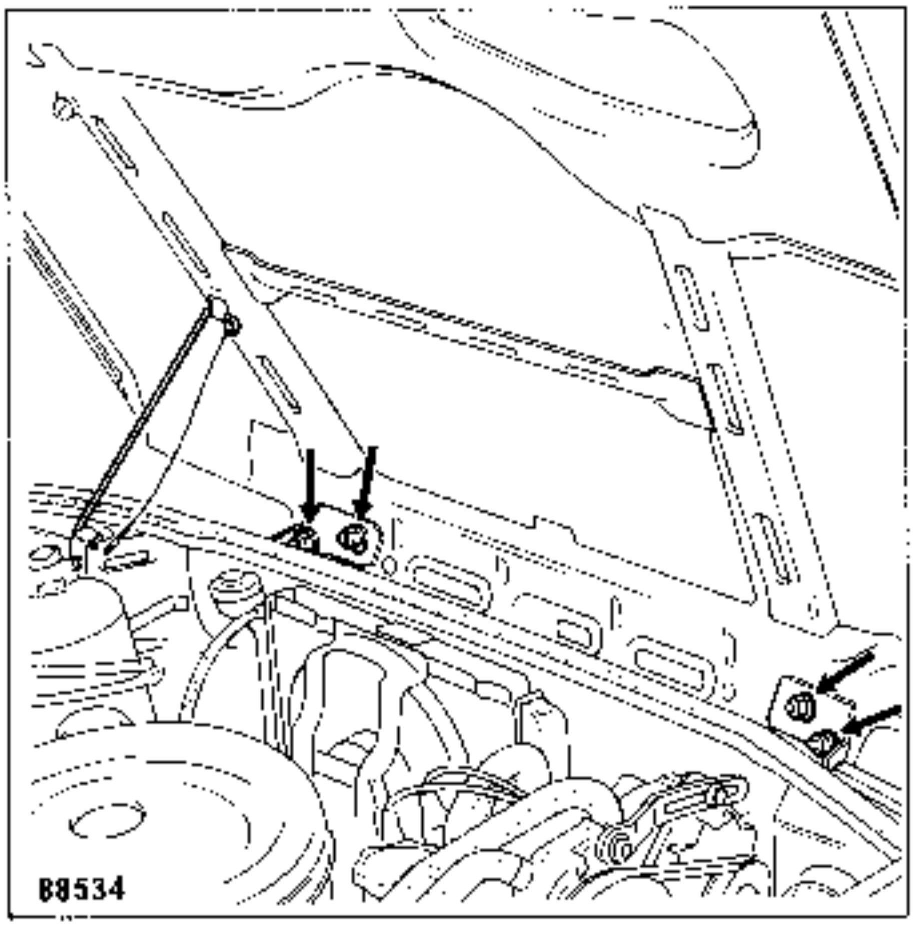
- Carry out paint sequence No. 5 (See "Painting" section).

- After painting, apply the hollow section protective treatment to the inside face of the area which has been repaired.

Removing

- Drill out the head of the rivet which secures the bonnet retaining cable to the headlight support panel, with a 6 mm drill.

- Remove the four bonnet securing bolts.



88534

Stripping

- Take off : the prop,
  the retaining cable,
  the prop clip.

Refitting

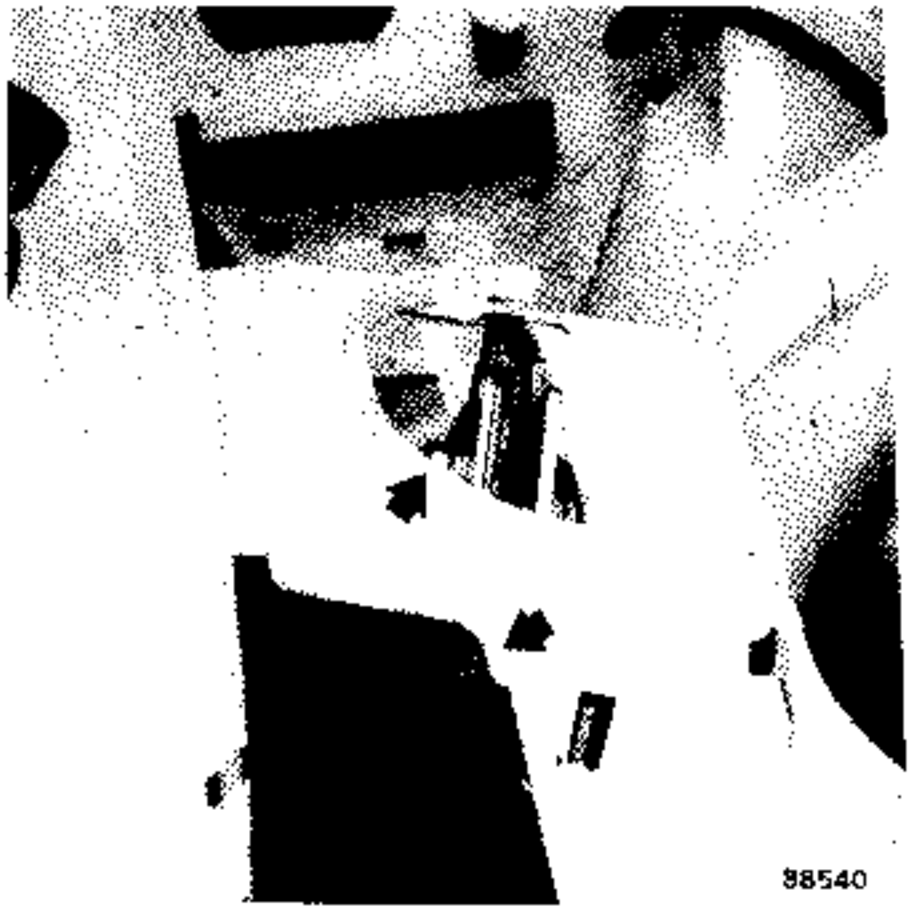
- Fit the accessories removed from the old bonnet to the new bonnet, fit the bonnet and screw up the securing bolts without tightening them.

- Secure the retaining cable to the headlight support panel.

Adjusting

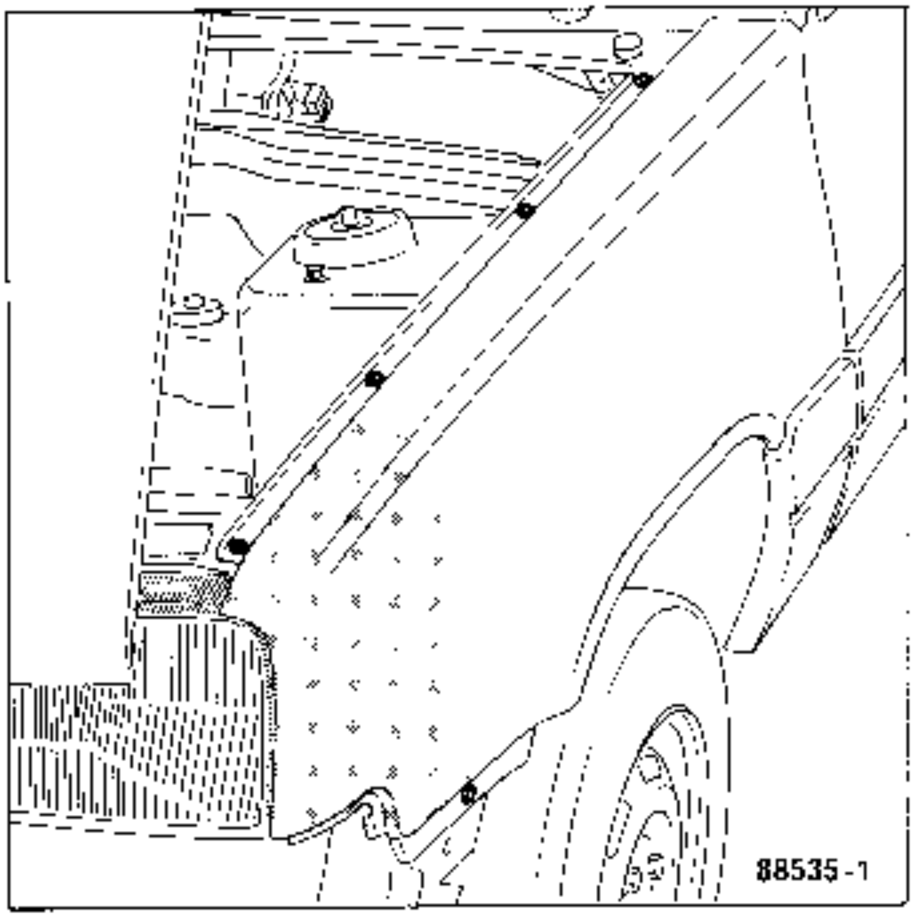
- The clearances around the bonnet are adjusted at the four hinge securing bolts.

- Its height is adjusted :
  - at the front by shims between the hinges and the bonnet,
  - at the rear, at the clearances on the 2 lock securing bolts.



88540

Note : Under no circumstances are the clearances round the bonnet to be adjusted at the lock. The lock adjustment is only for re-aligning the lock with its striker after the bonnet has been correctly adjusted at the hinges.

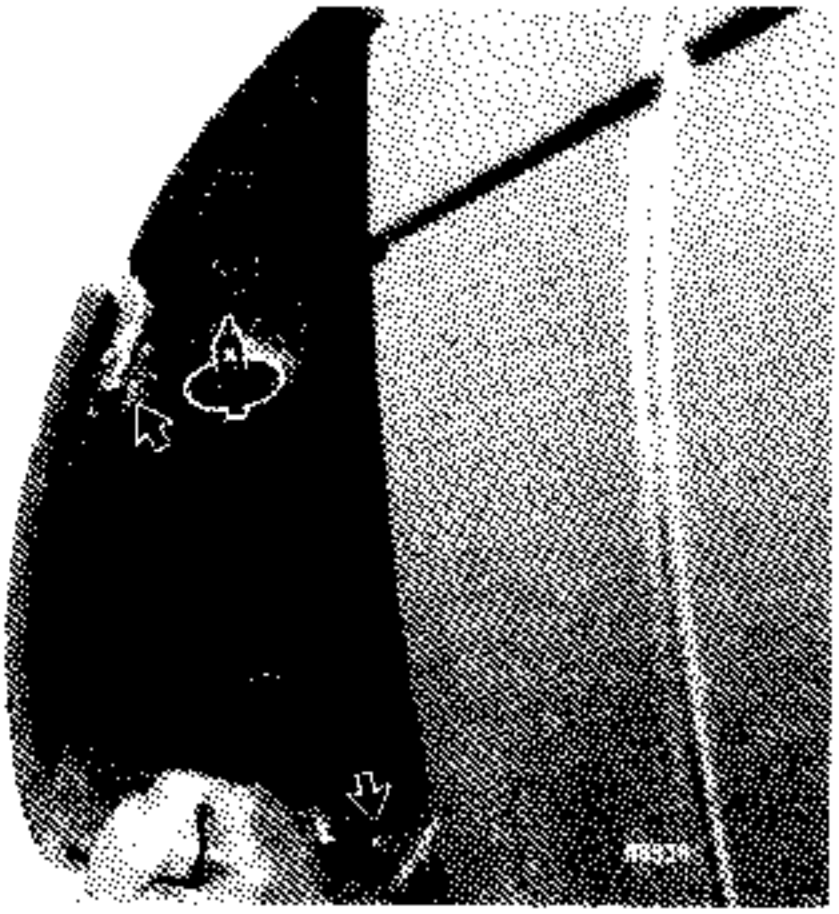


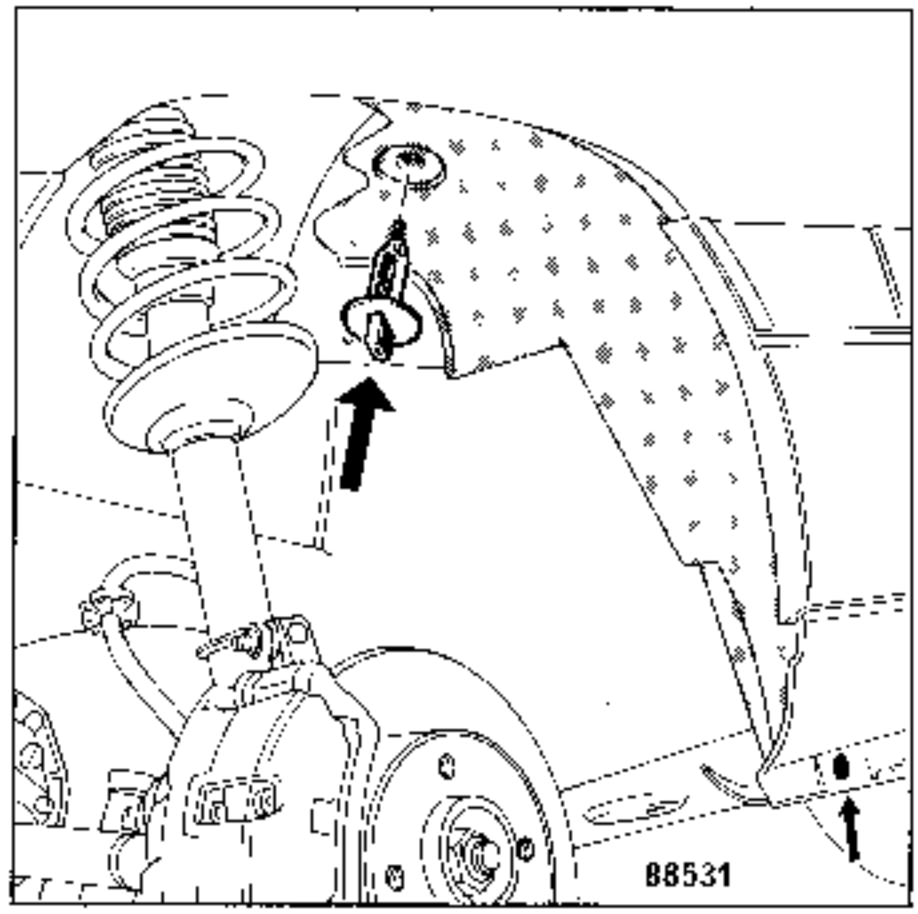
- Carry out paint sequence No. 5 (See "Painting" section).

- After painting, apply hollow section protective treatment to the inside face of the repaired area.

Removing

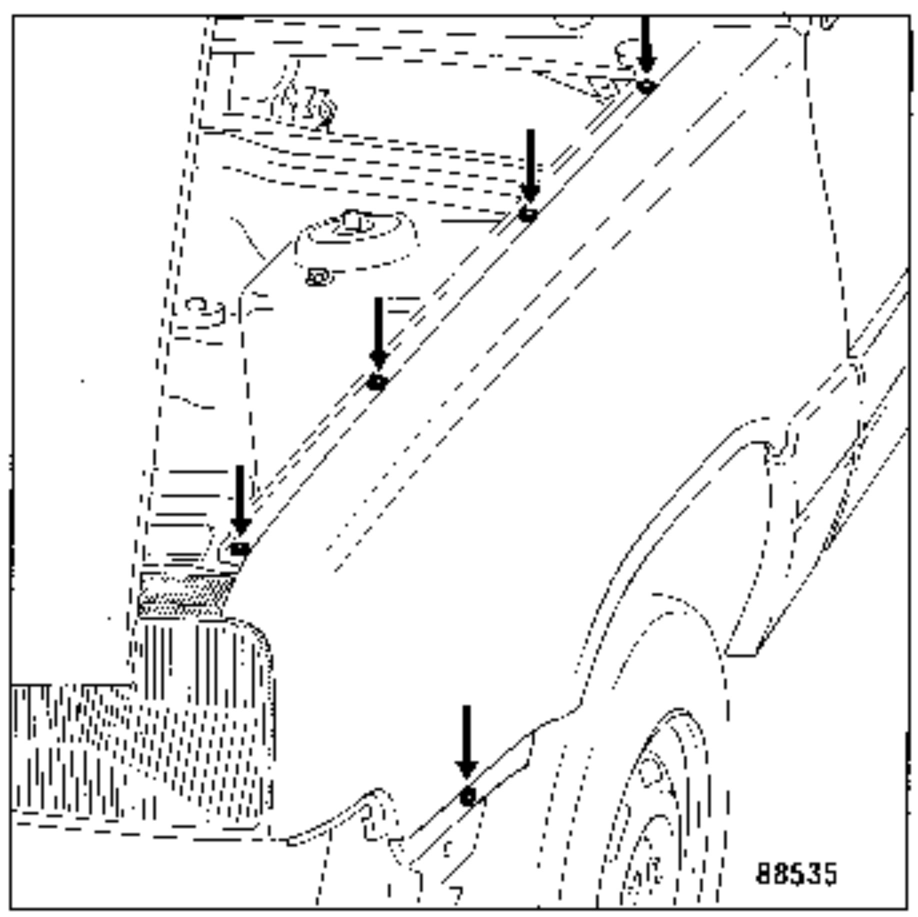
- Support the vehicle on axle stands and remove : the wheel and the bumper shield (see corresponding section).





- Remove the plastic protector.

- Remove the securing bolts on the front door pillar and on the body sill.

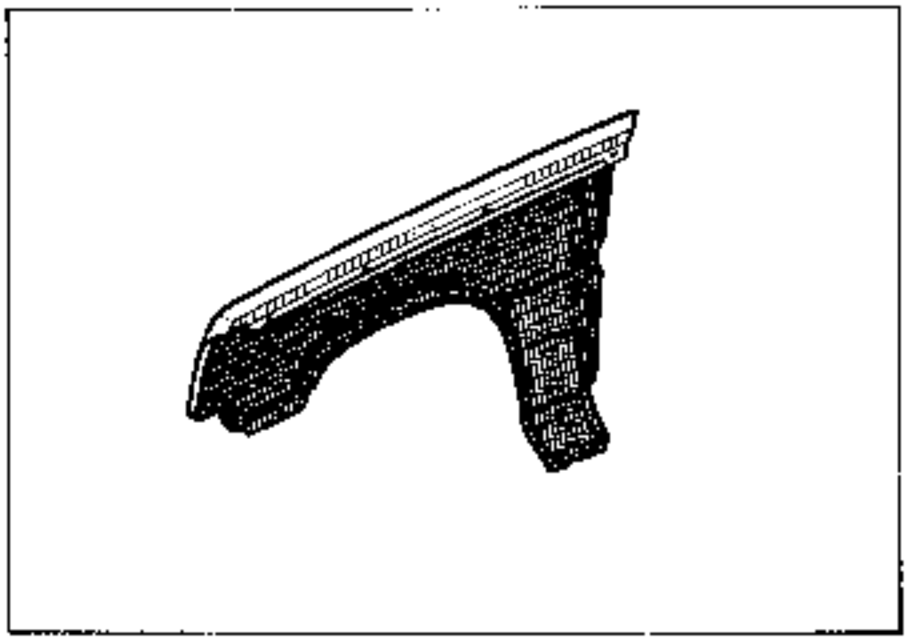


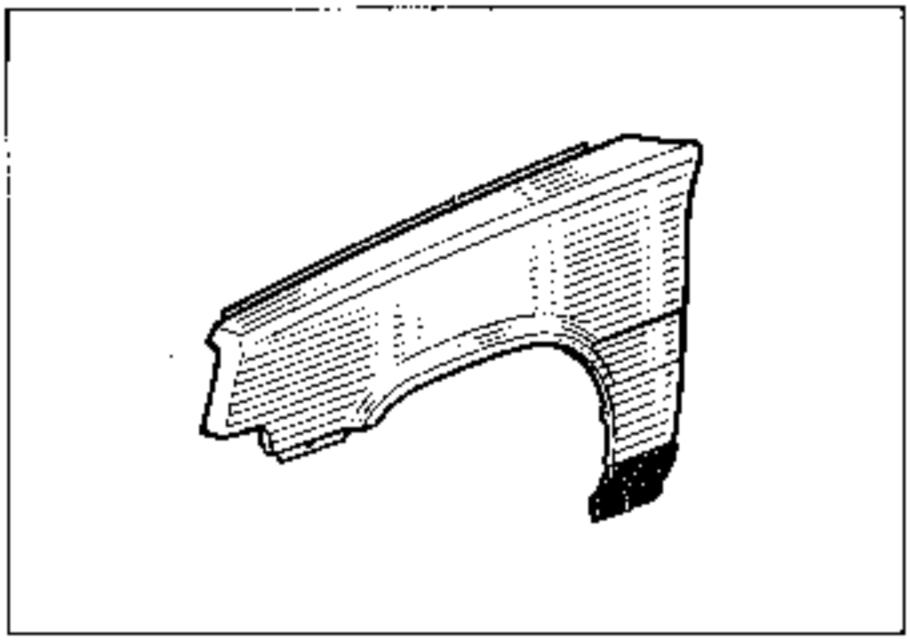
- Drill out the rivets securing the wing to the wheel arch with a 6 mm Ø drill.

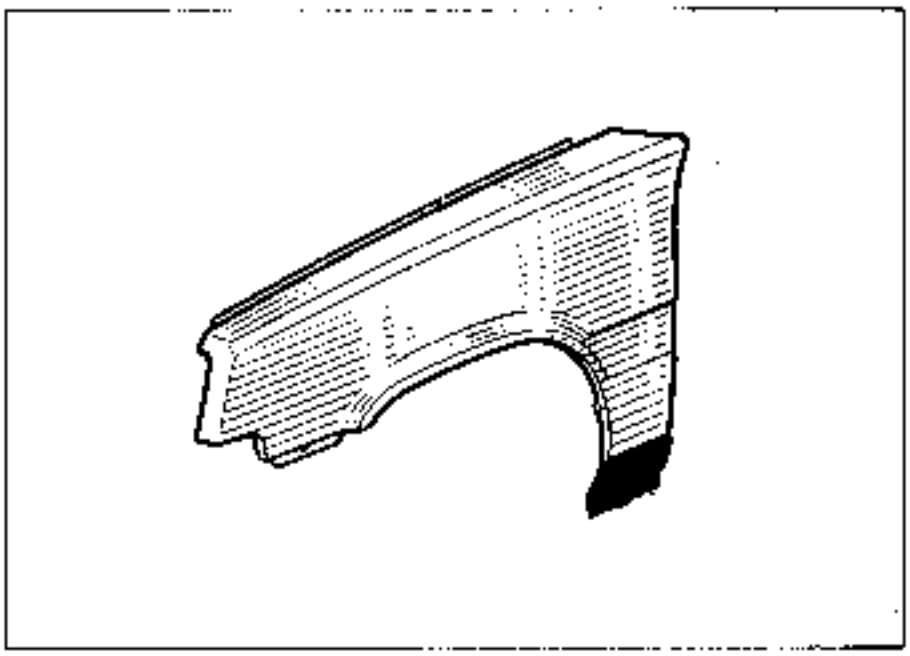
Note : If the wing is to be re-used, its upper edge will have to be freed from the wheel arch with a flame torch or a hot air gun.

PAINTING

Carry out paint sequence No. 1 (See "Painting" section).







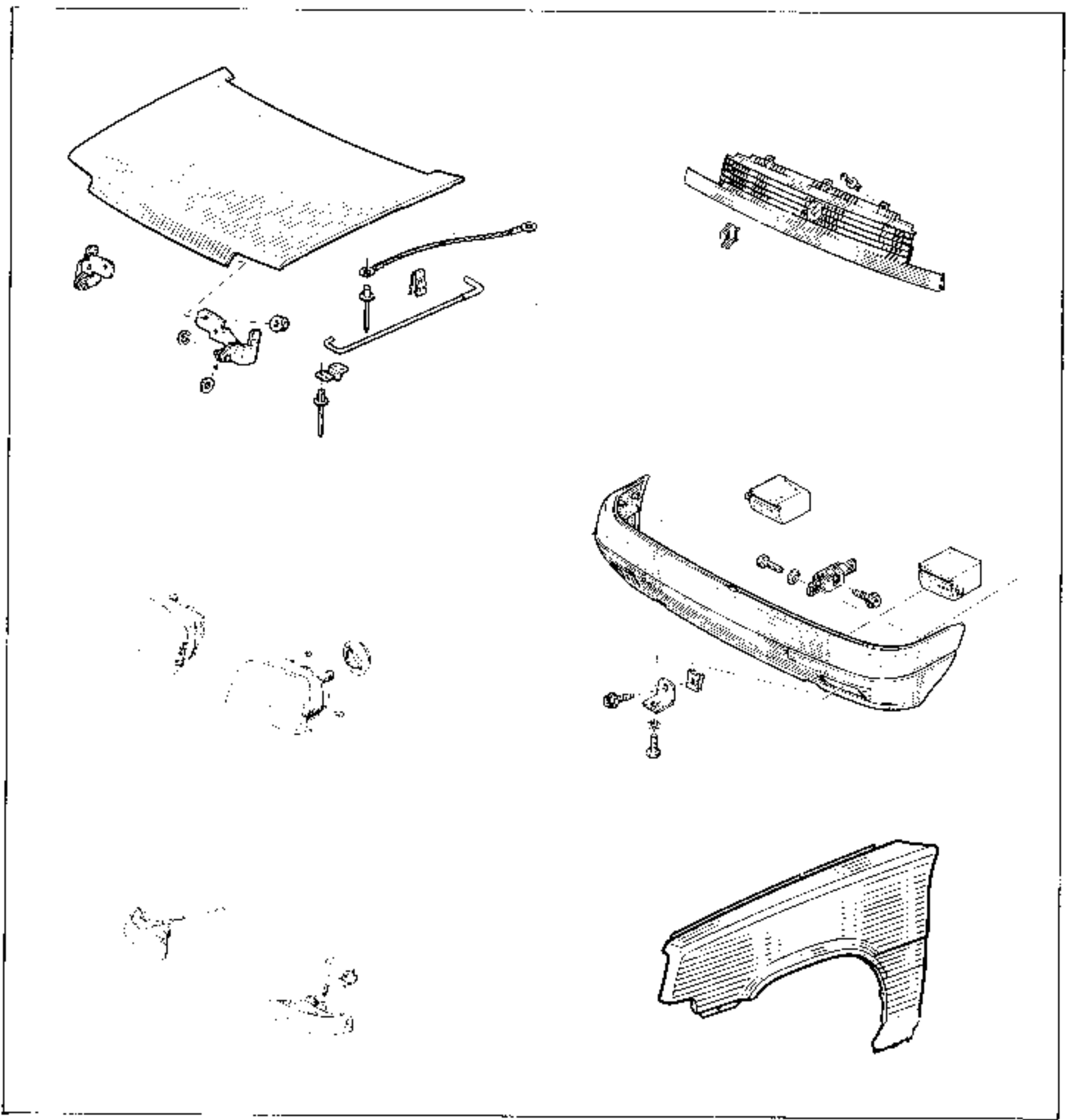
Note : We recommend that the wing should be refitted to the vehicle before its external surface is painted.

STRIPPING

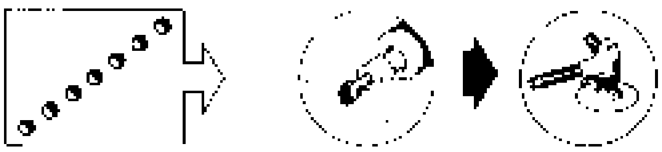
Remove :

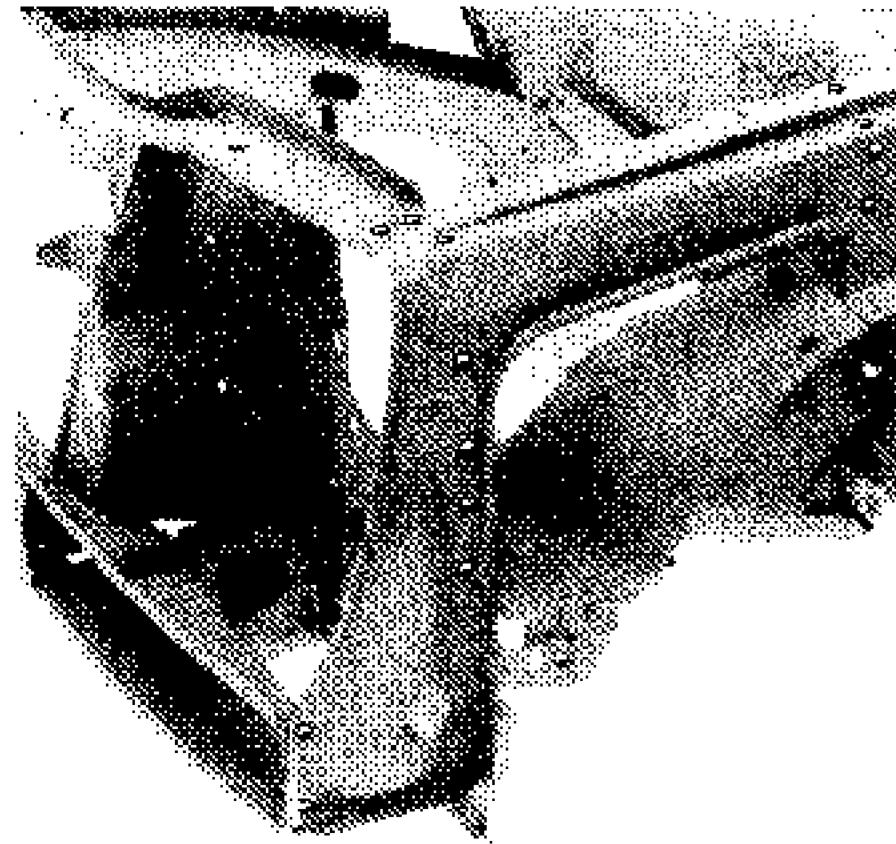
- the bonnet,
- the headlight,
- the direction indicator,
- the radiator grille,
- the bumper shield,
- the wing.

Note : For more details on removing the various parts, see the section dealing with the part in question.



CUTTING - JOINT SEPARATION





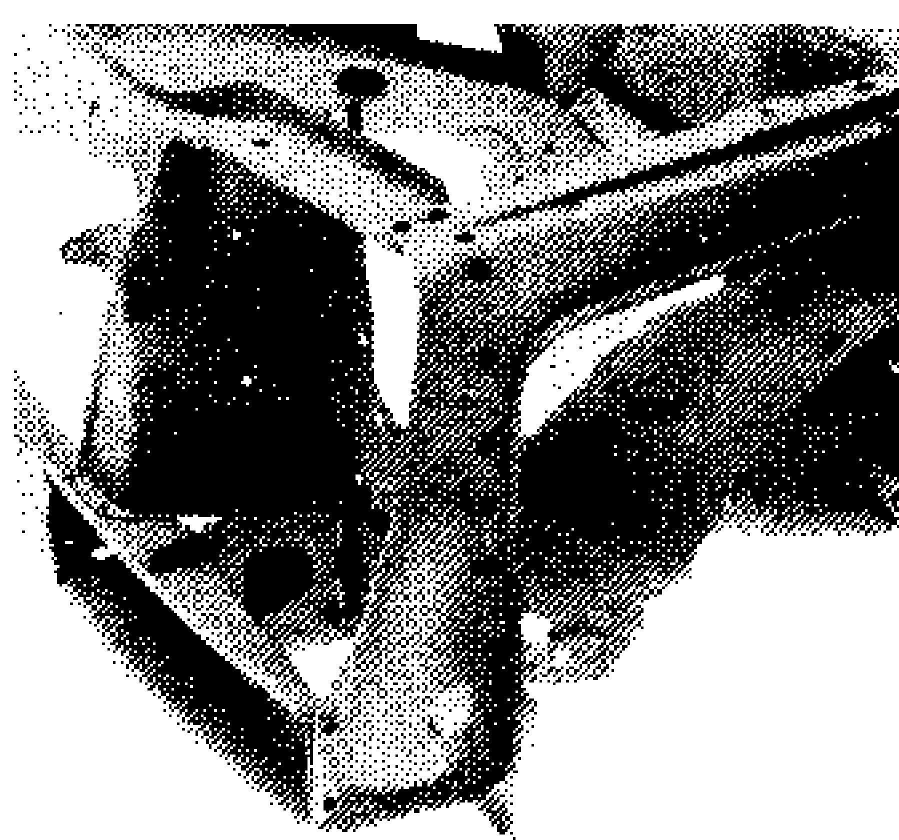
- Remove the damaged part by following the methods represented by the above symbols.
- Grind back the pieces of spot weld adhering to the support panels.

88416

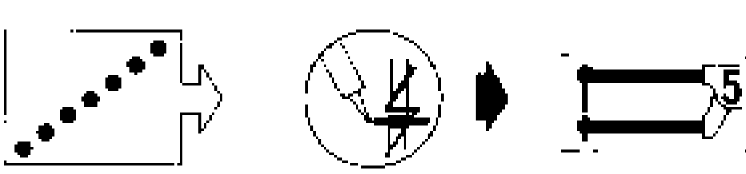
PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Adjust the new part and secure it with grip clamps.

WELDING



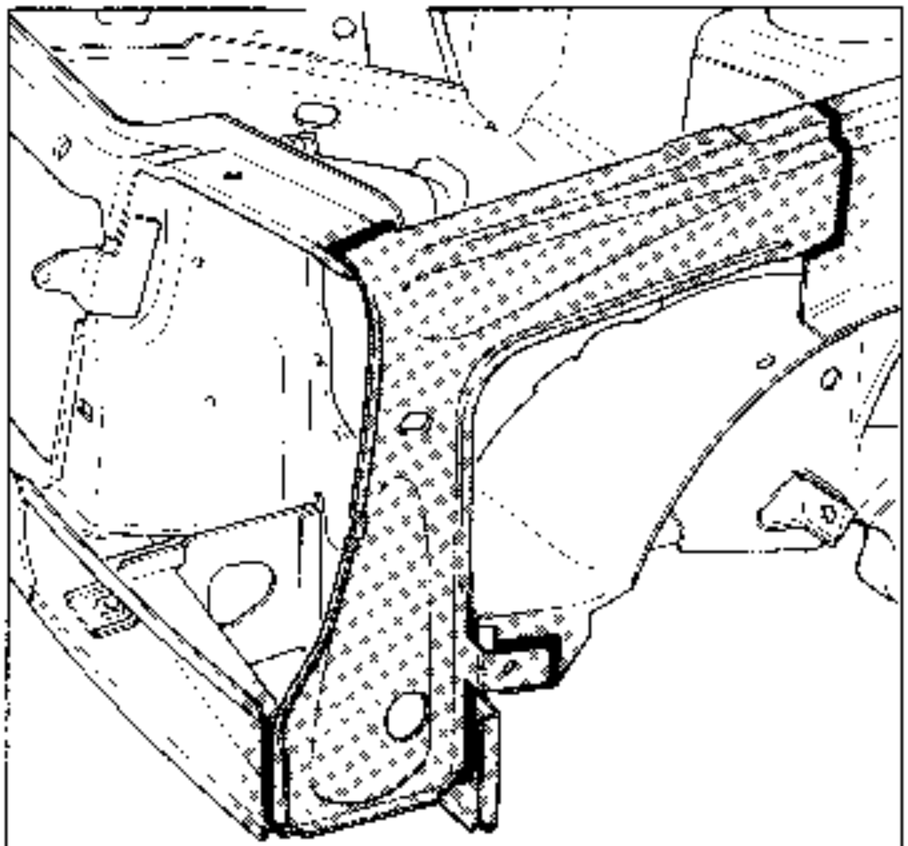
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.



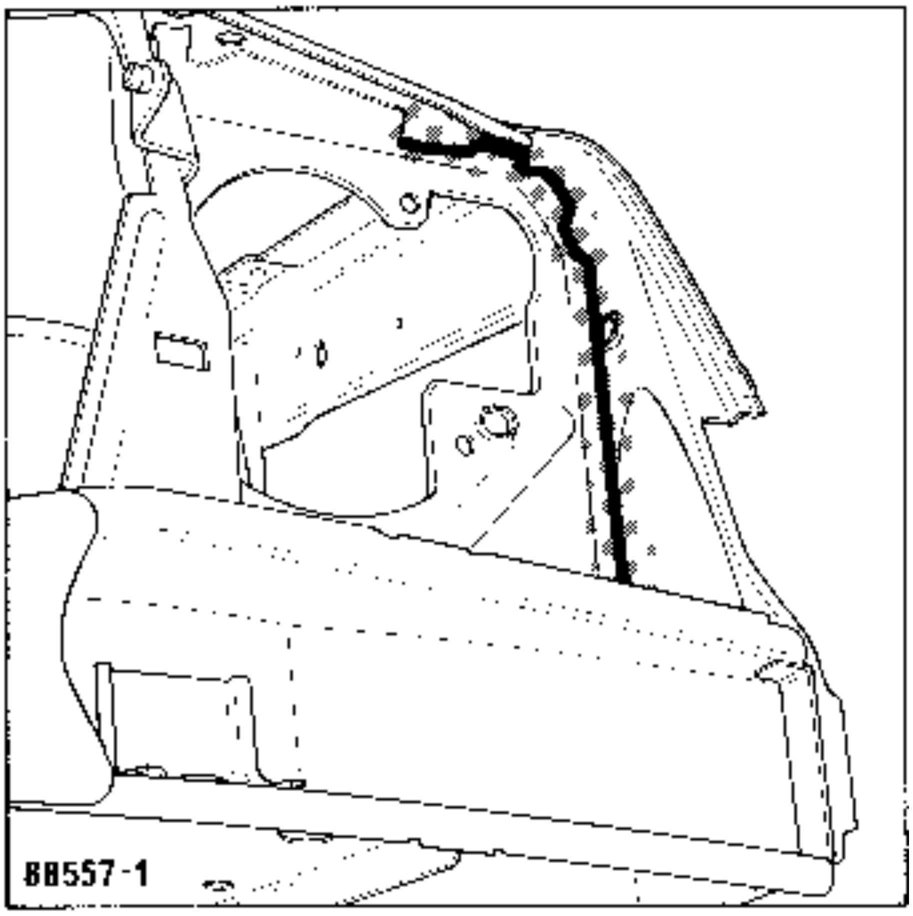
• e = 1,4 mm; H = 55 mm
⊡ e = 2,2 mm; H – 50 mm

88416.1

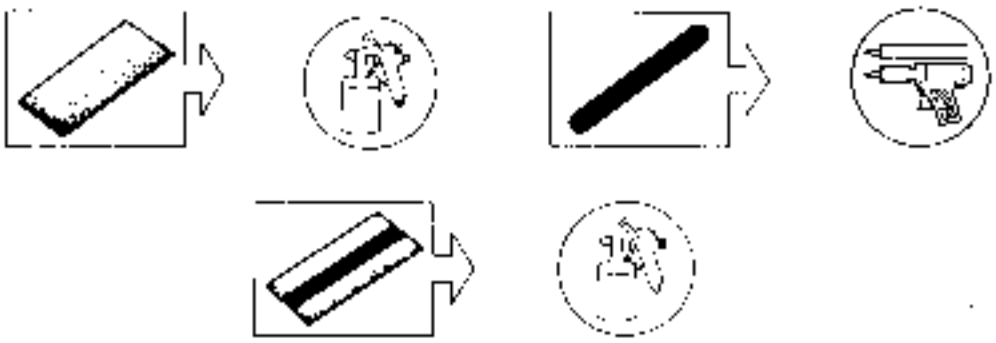
PAINTING



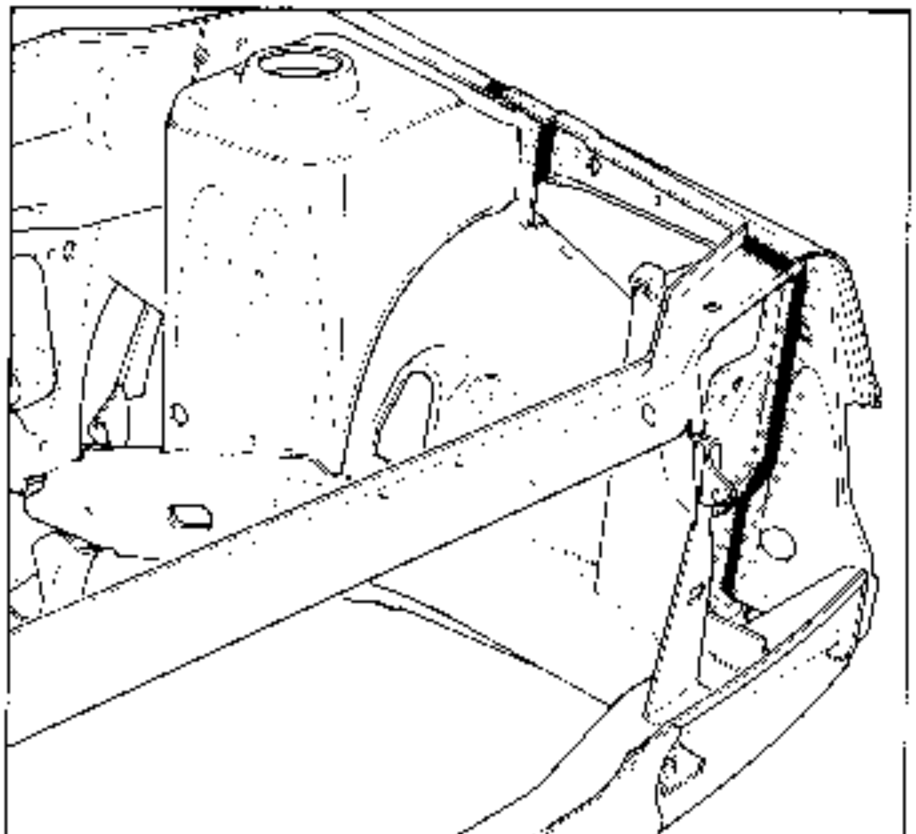
88556-1



88557-1



- Carry out paint sequence No. 5 (see "Painting" section).



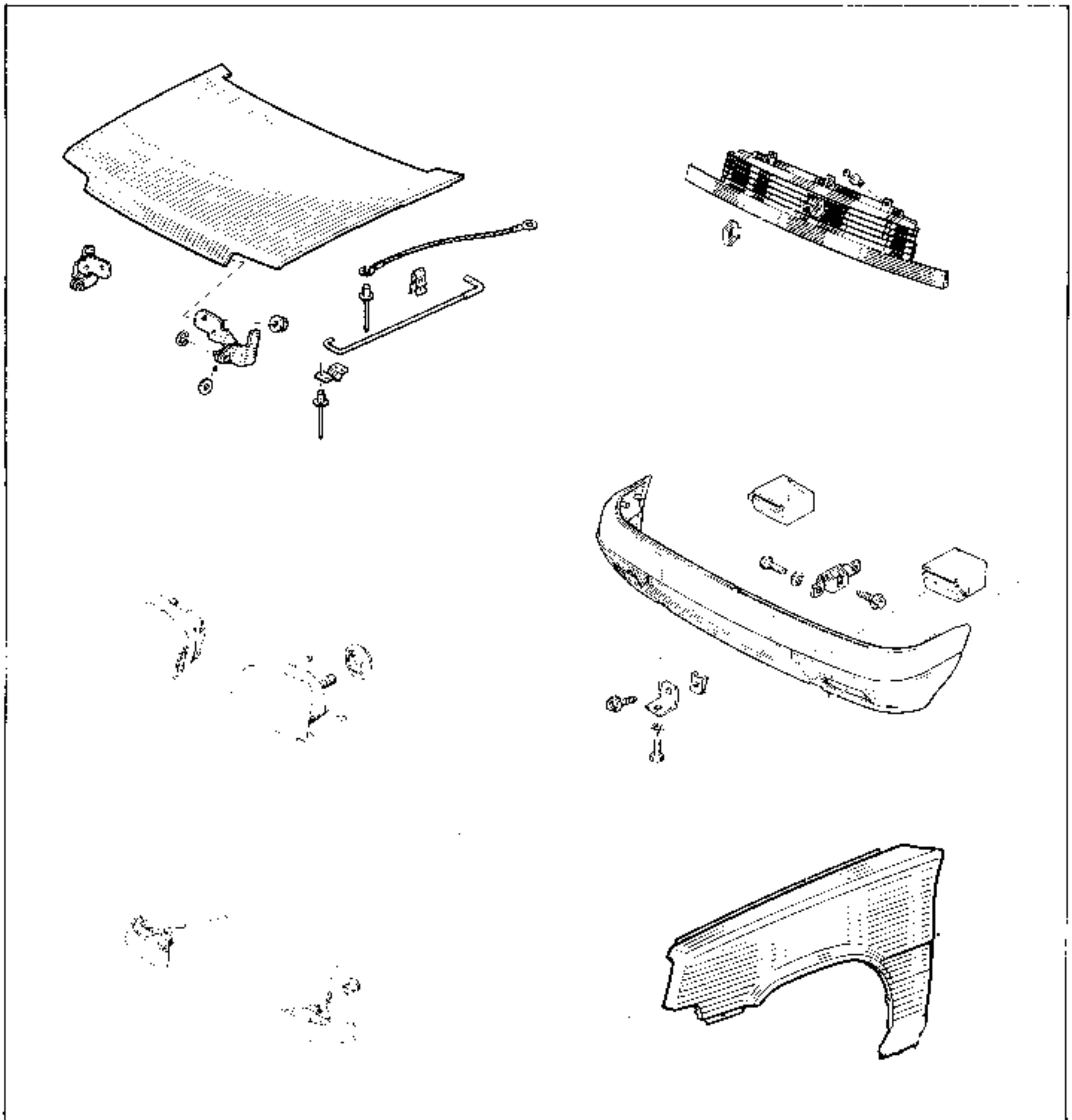
88558-1

STRIPPING

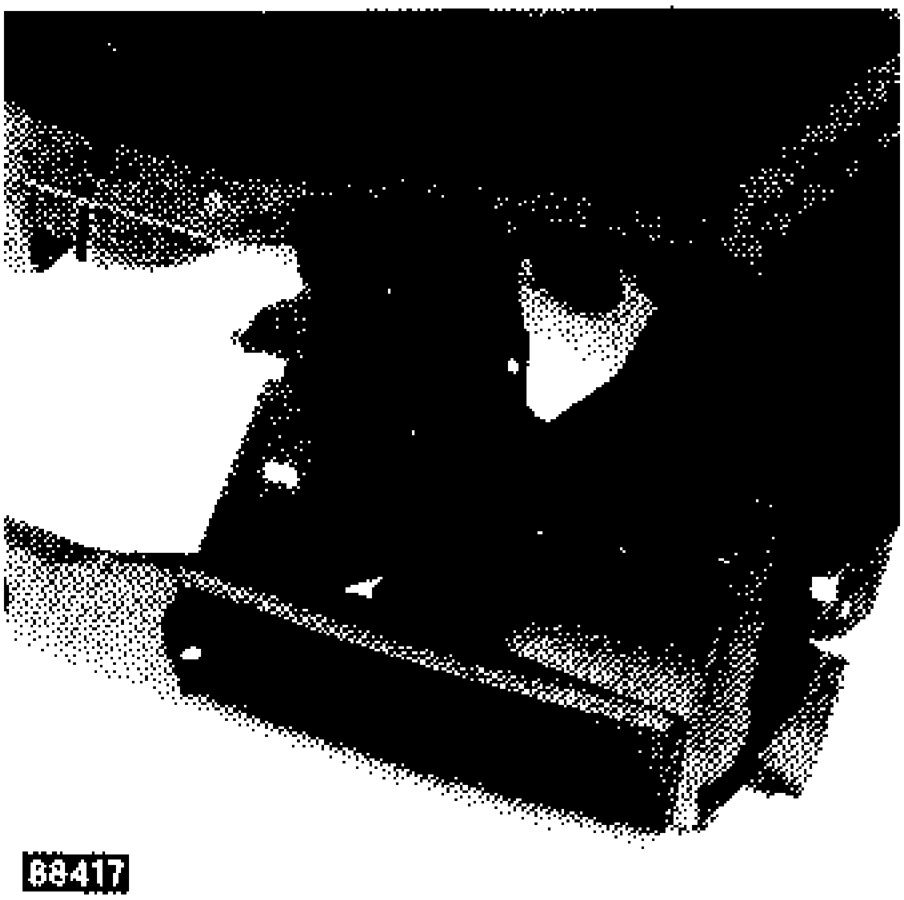
Remove :

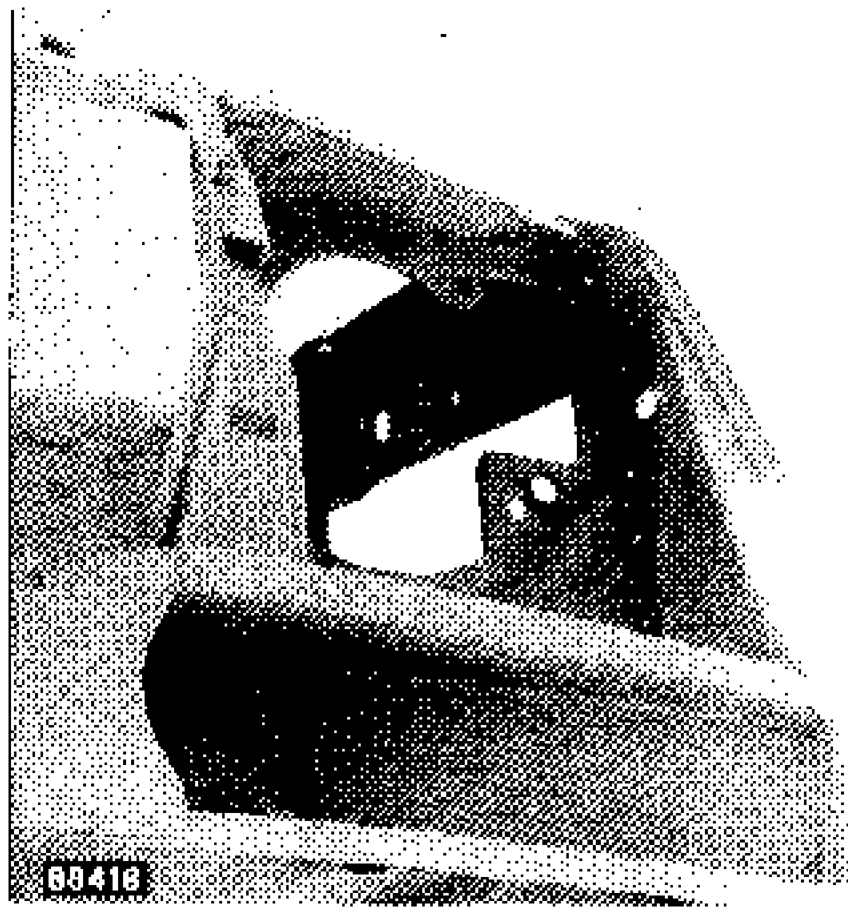
- the bonnet,
- the headlight,
- the direction indicator,
- the raditor grille,
- the bumper shield,
- the wing.

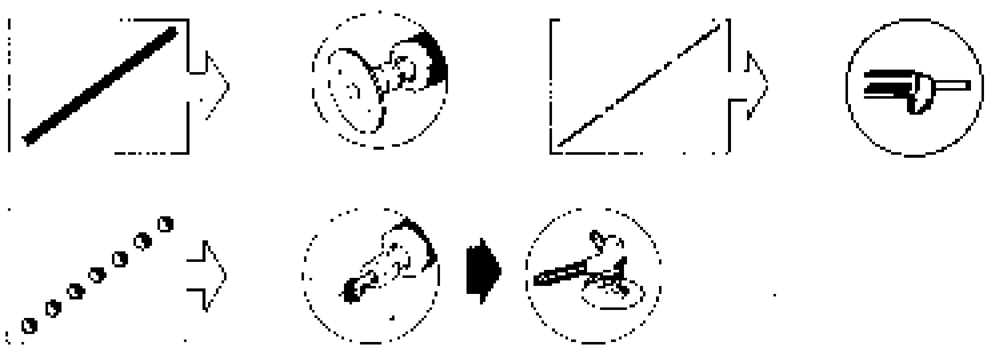
Note : for more details on removing the various parts, see the section that deals with the part in question.



CUTTING - JOINT SEPARATION





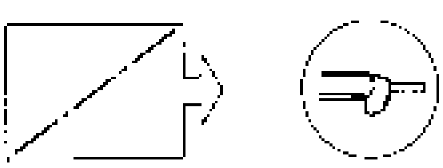


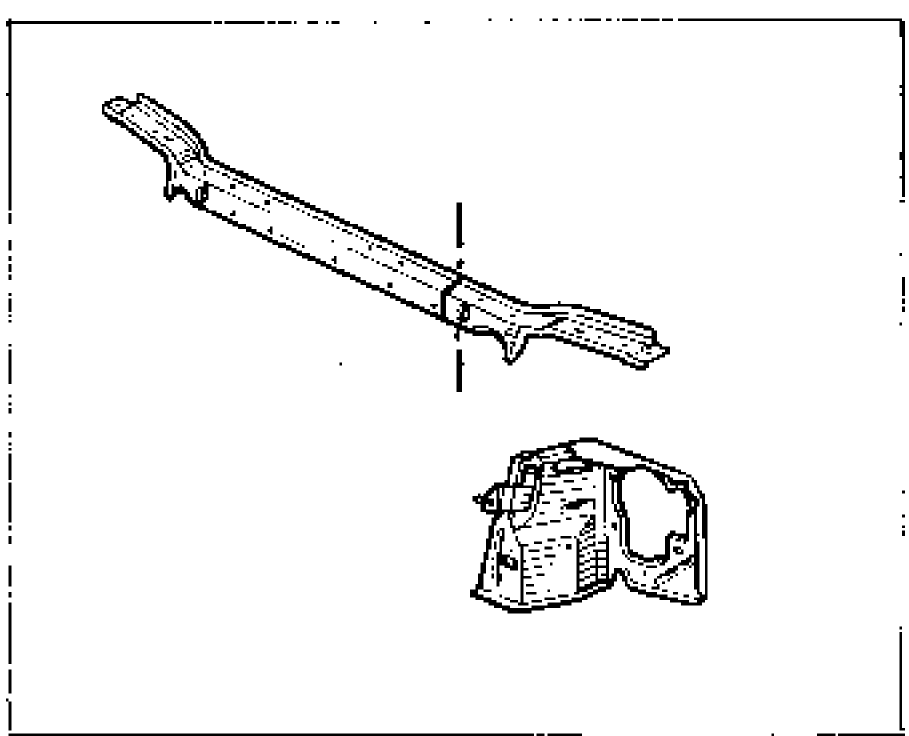
- Remove the damaged part by following the methods represented by the above symbols (see description of symbols at the beginning of this section).

- Grind back the pieces of spot weld adhering to the support panels.

PREPARATION PRIOR TO WELDING

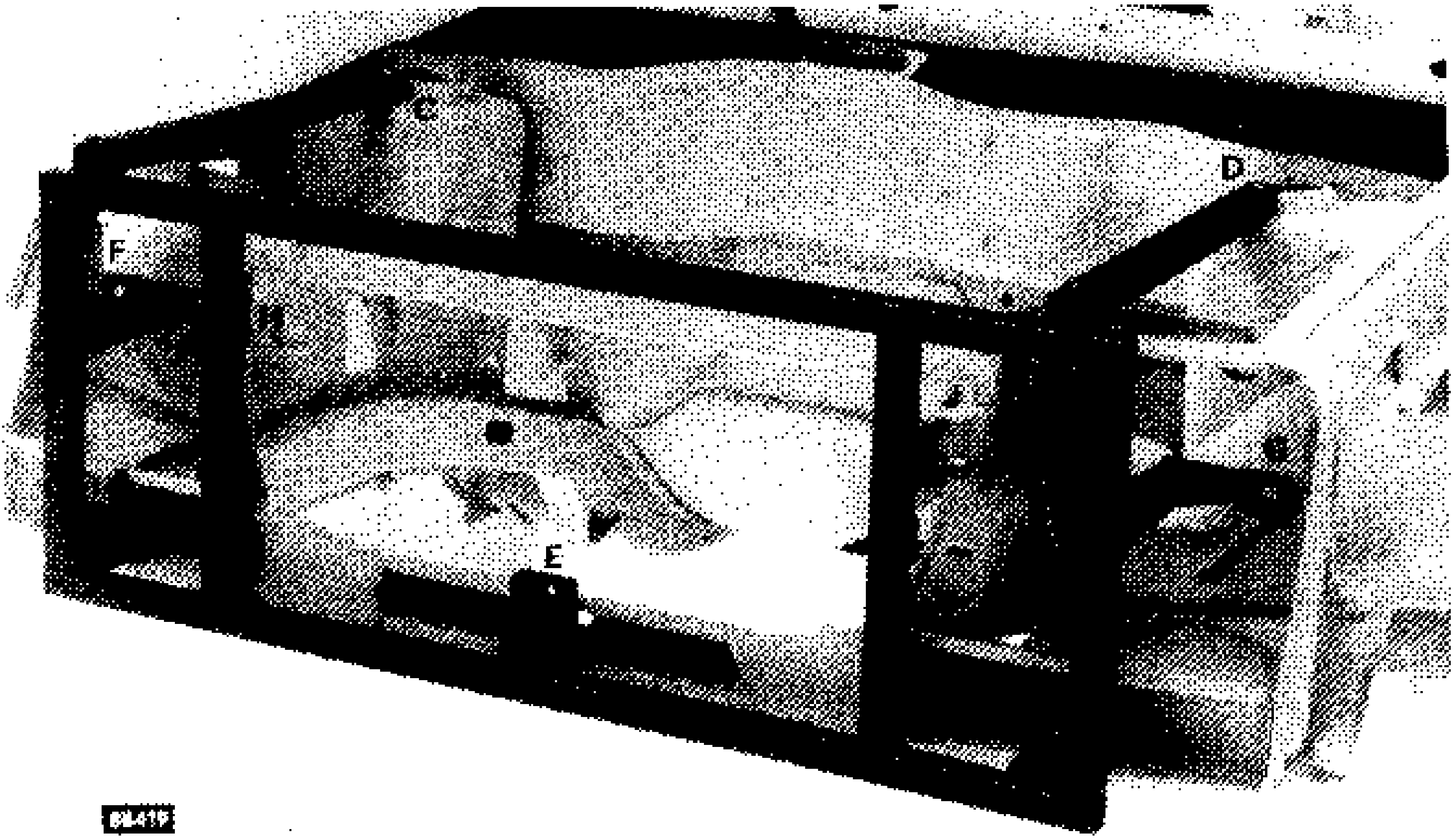
- Cut, from the new part, a length approximately 50 mm larger than the part cut out on the vehicle.



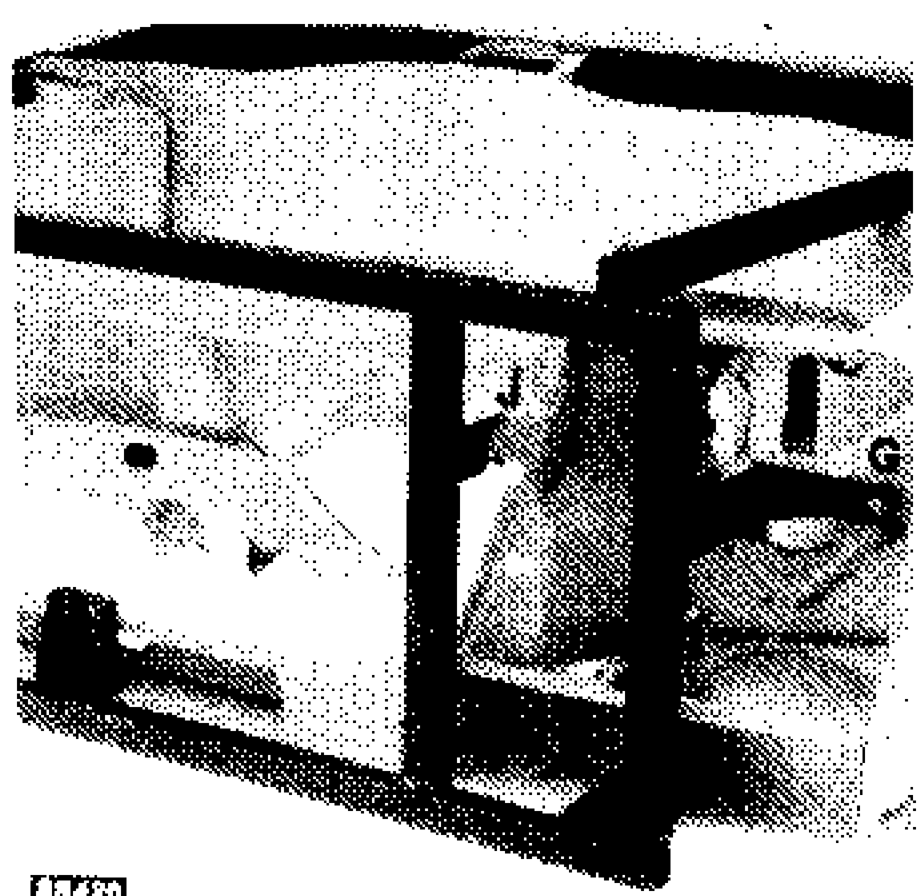


Fitting frame jig : Car.1027

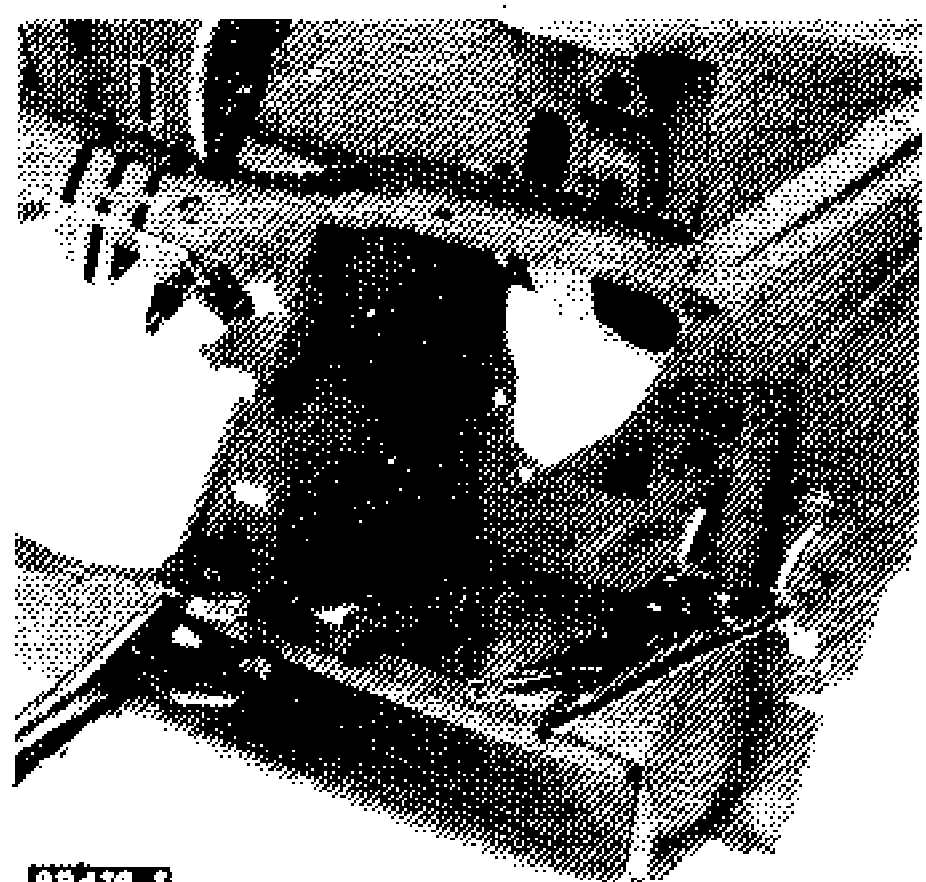
Points A-B-C-D-E are the jig locating points on the vehicle. Before fitting it ensure, with the trammel gauge, that these points are correctly positioned. When one of the points A or B cannot be used as a jig location (as is the case for this operation) use securing points G-J or F-H, depending on the side, instead.



Points F-G-H-J are the securing and locating points for the parts being replaced.



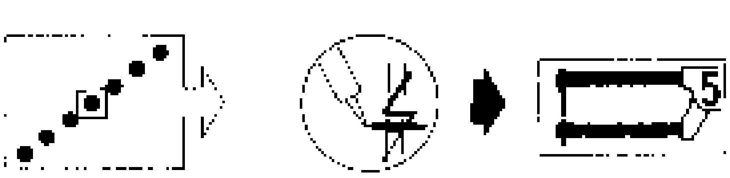
- Fit the new part so that it overlaps the original part, on the vehicle, and secure it with grip clamps.
- Saw through both thicknesses of metal simultaneously to make adjusting the joint easier.
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new part).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).

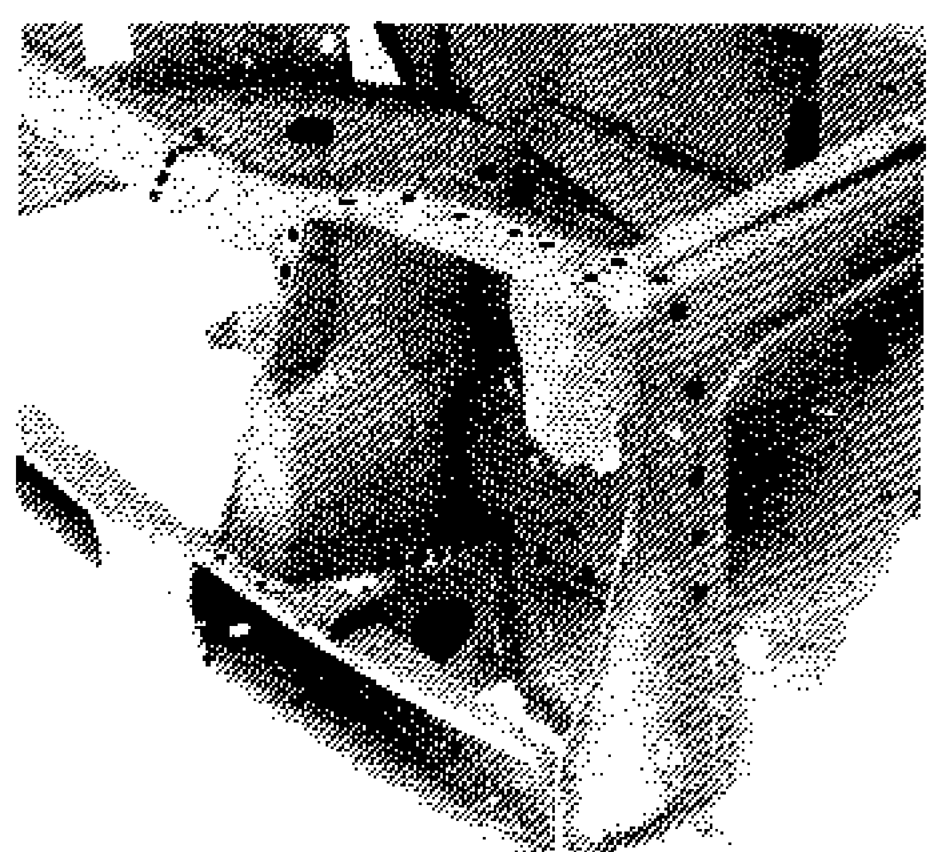


88418.1

WELDING

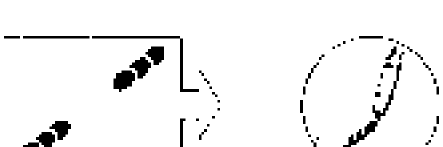
- Tack the butt welds to secure them in place.
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.
- Apply the stitched fillets using the gas envelope welding process. (These joints may also be gas welded using a 75 to 100 nozzle).
- Grind flush the butt welds and fill them with soft solder.



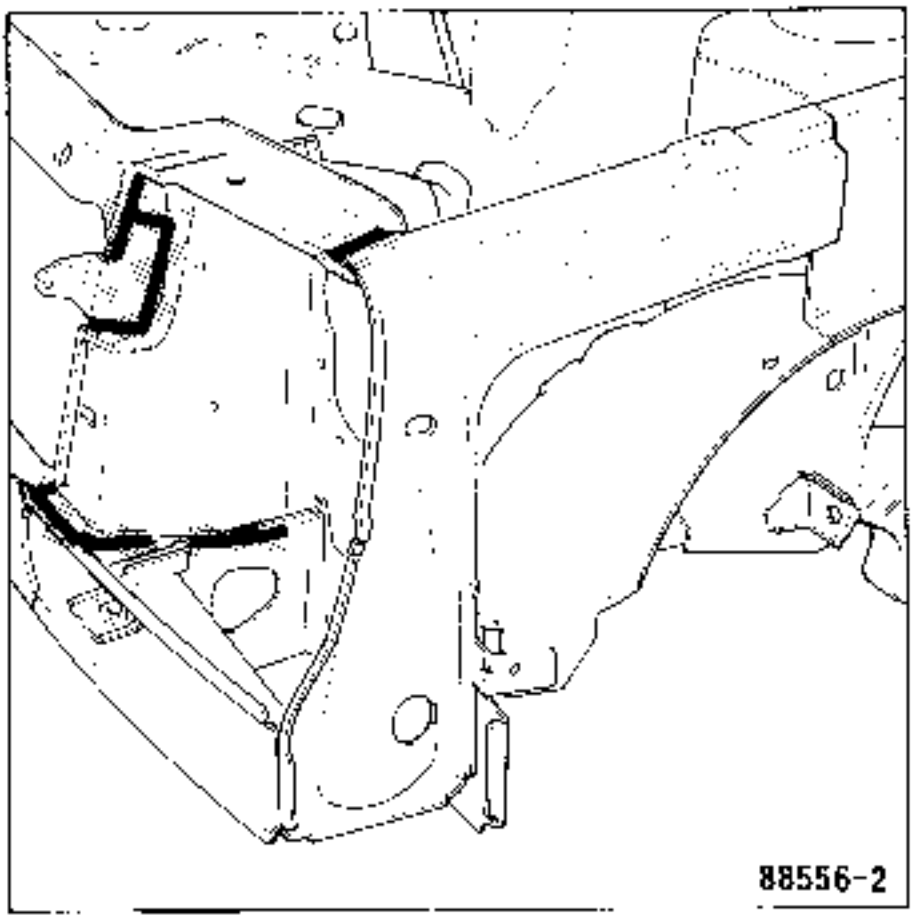


88417.1

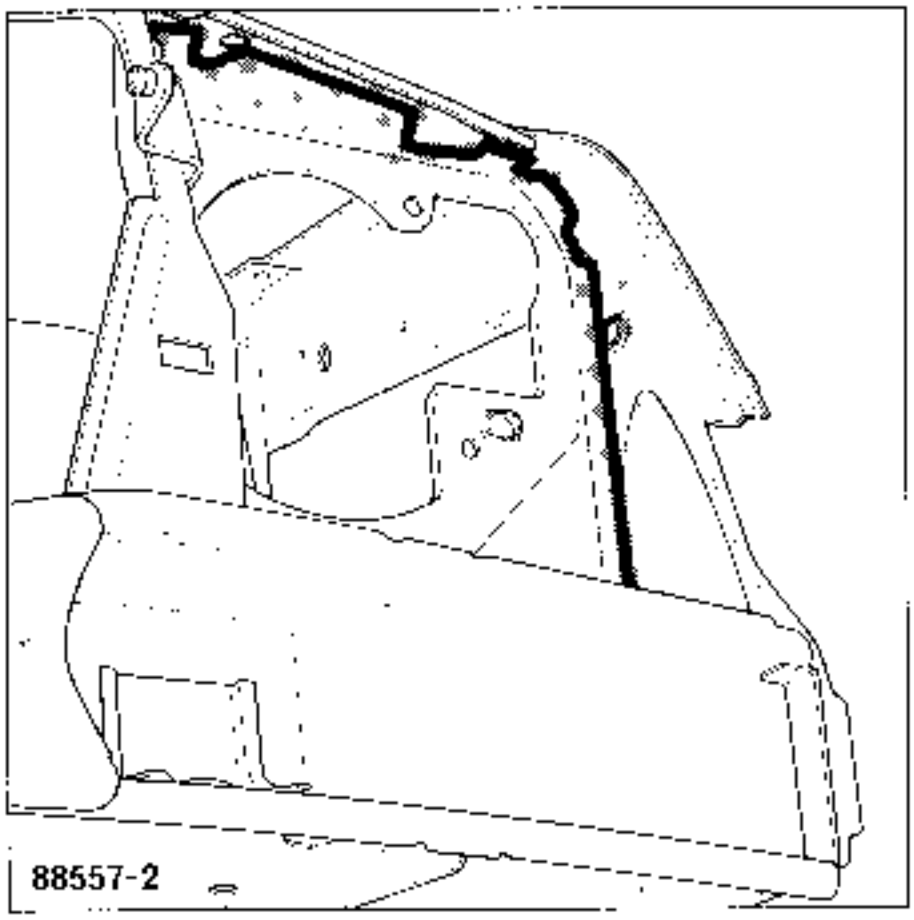
▣ : e – 2,2 mm; H – 50 mm
• : e – 1,4 mm; H – 55 mm



PAINTING

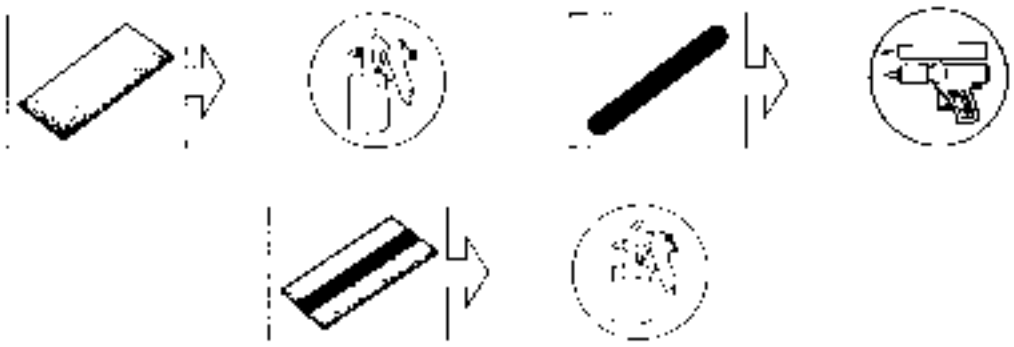


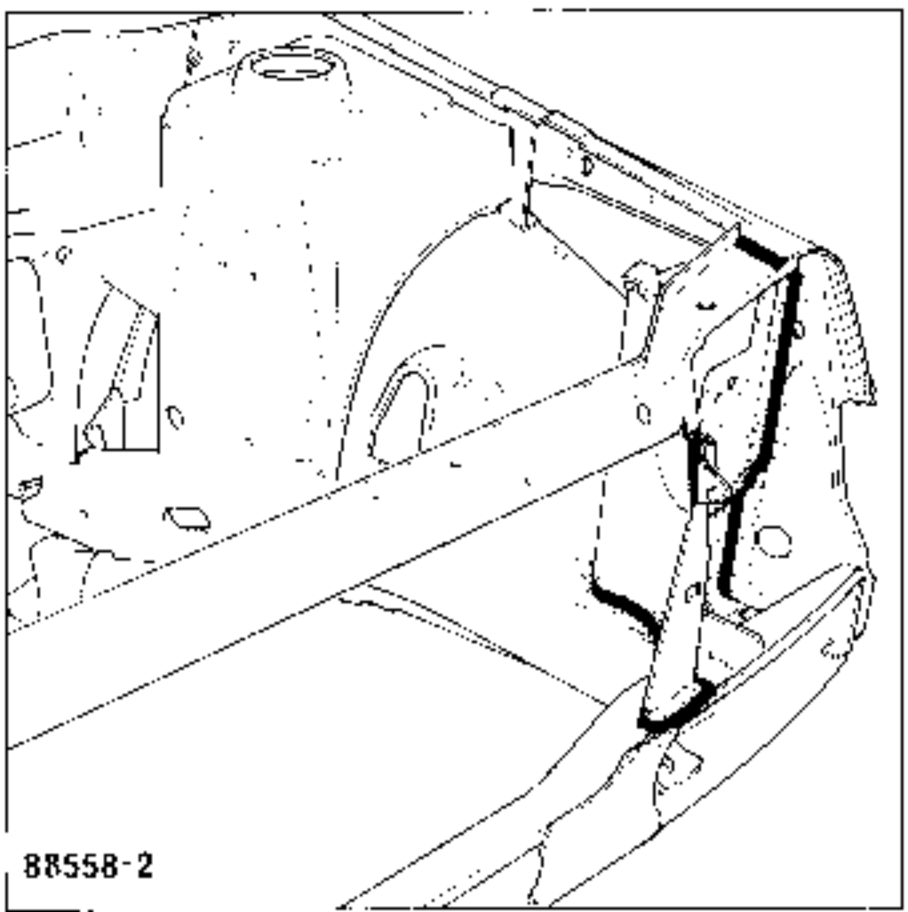
88556-2



88557-2

- Carry out paint sequence No. 5 (see "Painting" section).





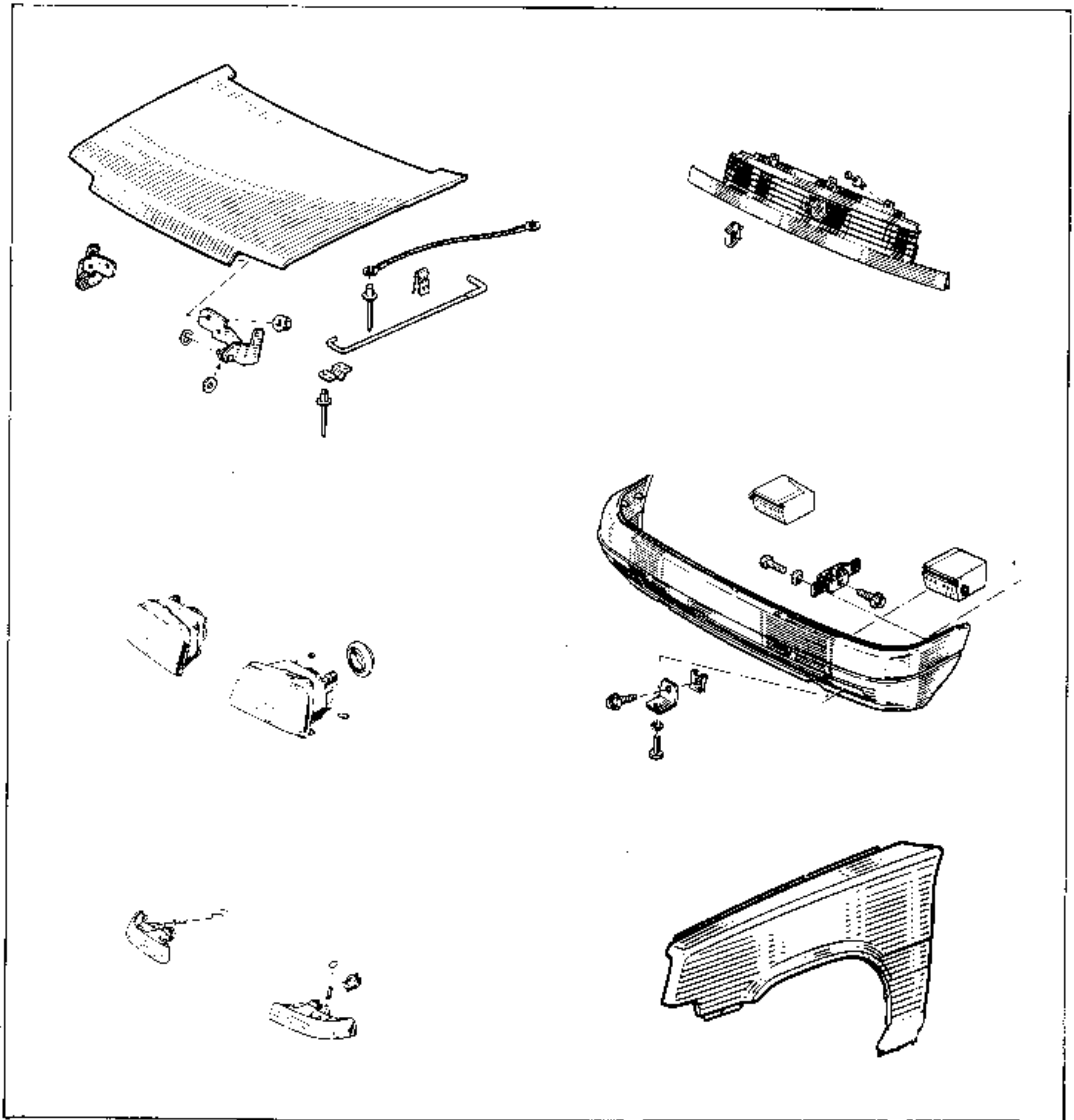
88558-2

STRIPPING

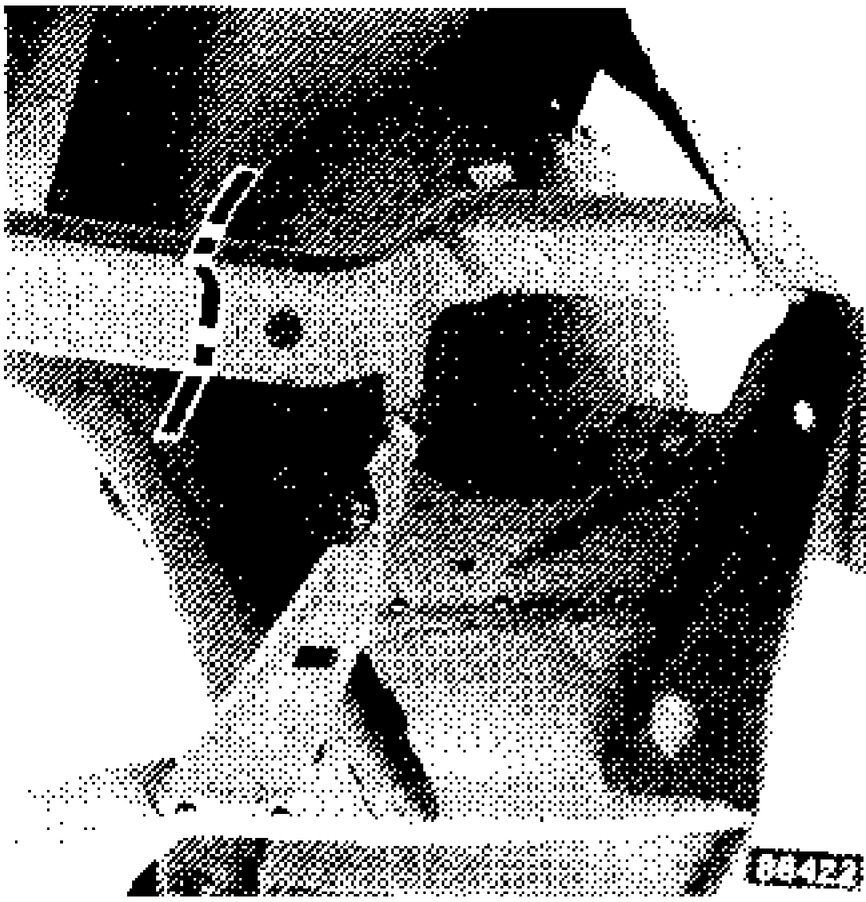
Remove :

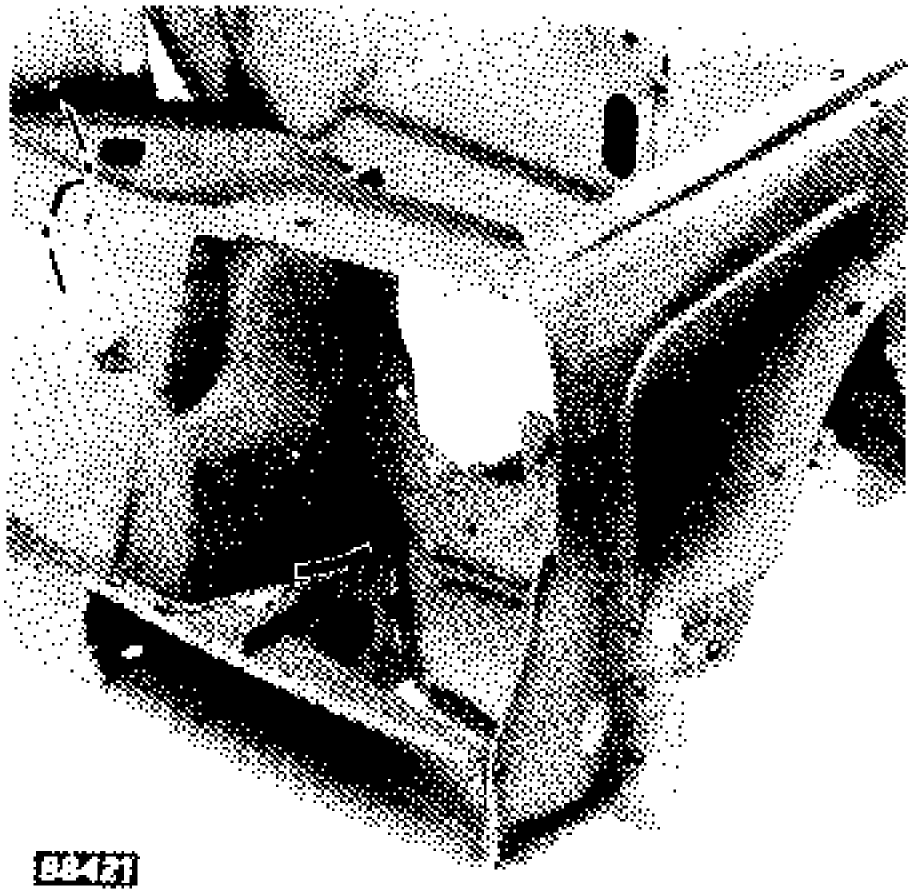
- the bonnet,
- the radiator grille,
- the headlight,
- the direction indicator,
- the bumper shield,
- the wing.

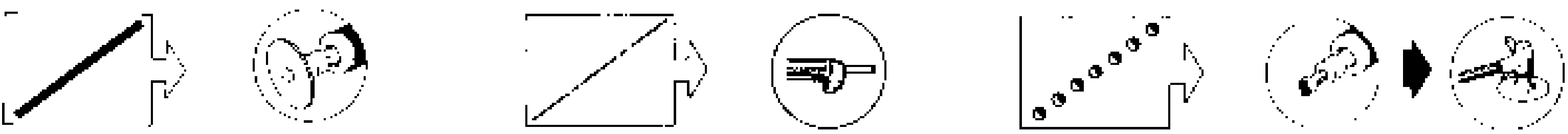
Note : For more details on removing the various parts, see the section that deals with the part in question.



CUTTING - JOINT SEPARATION



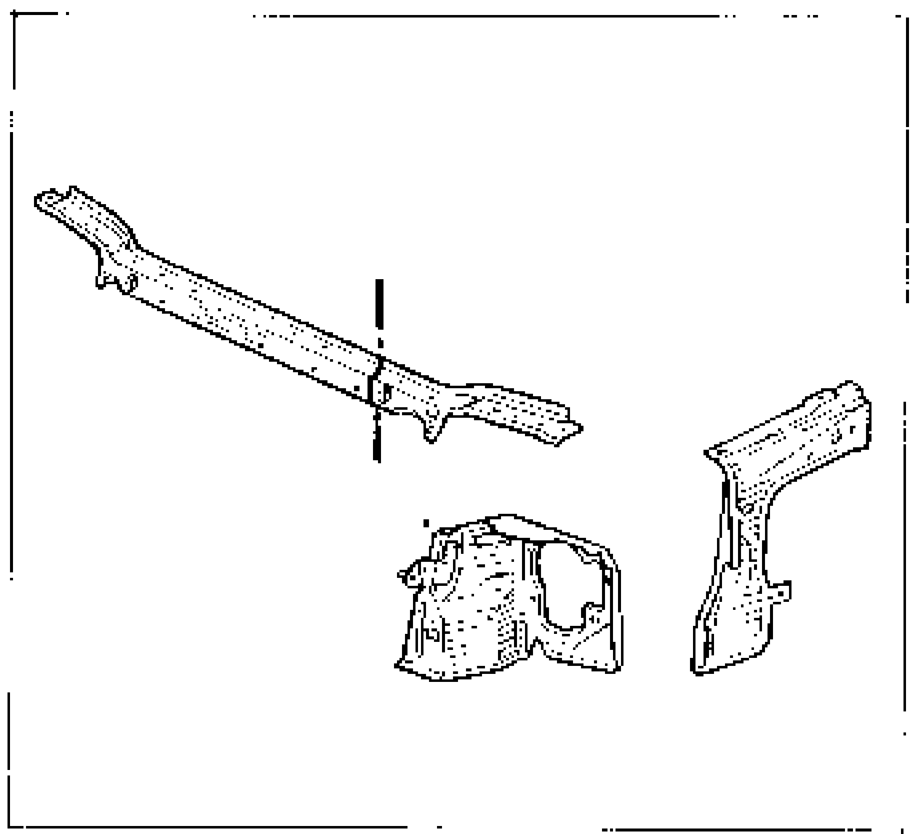




- Remove the damaged part by following the methods represented by the above symbols (see the description of the symbols).
- Grind back the pieces of spot weld adhering to the support panels.

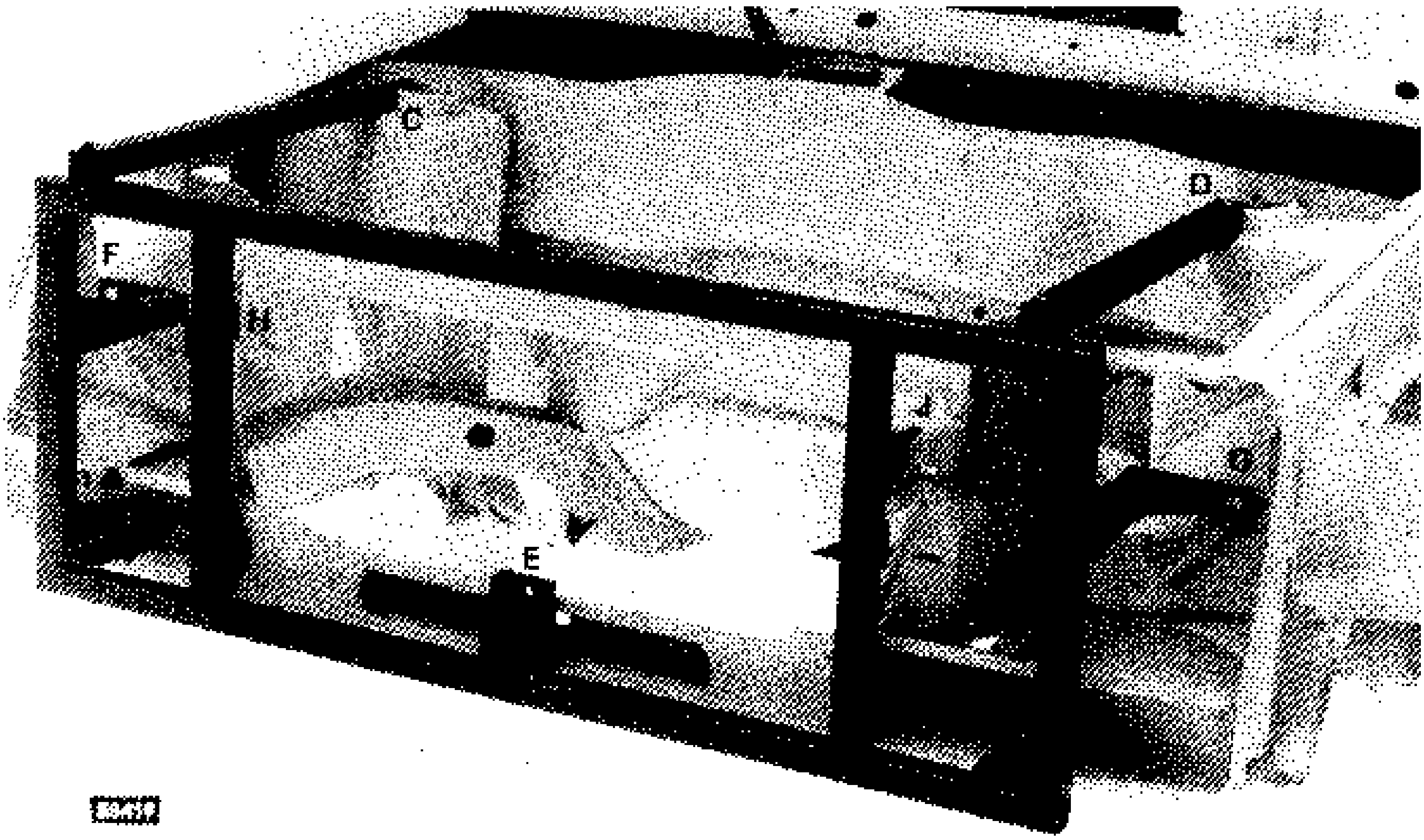
PREPARATION PRIOR TO WELDING

- Cut a length from the new part approximately 50 mm larger than that cut out on the vehicle.

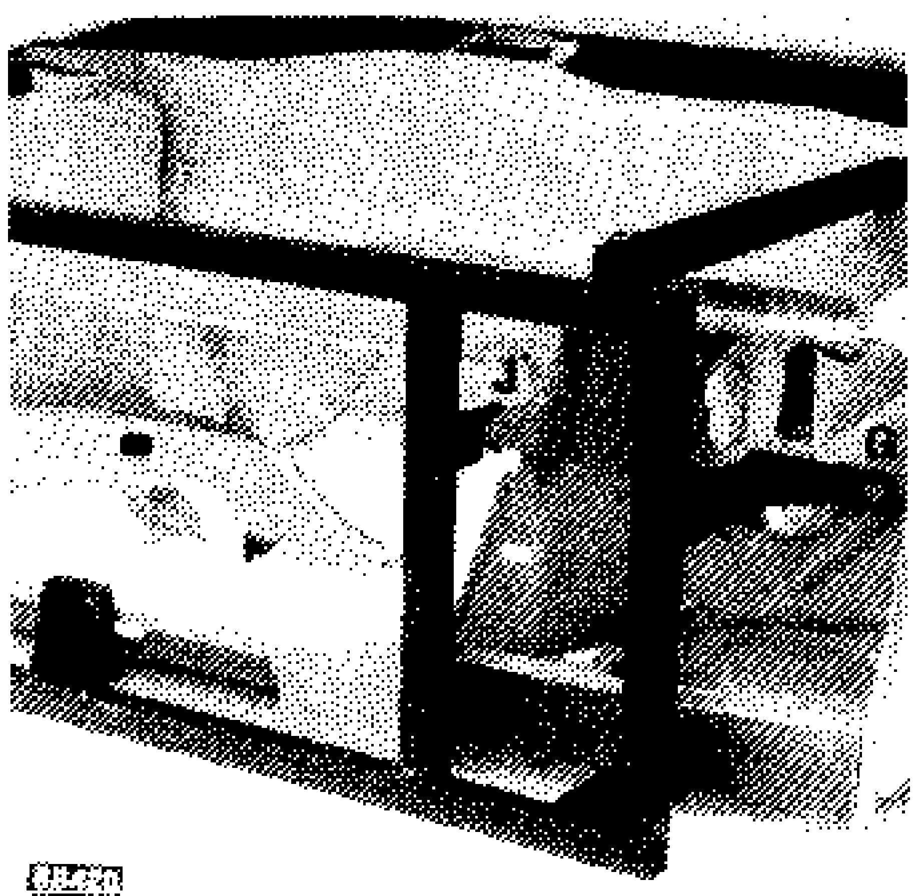


Fitting frame jig : Car. 1027

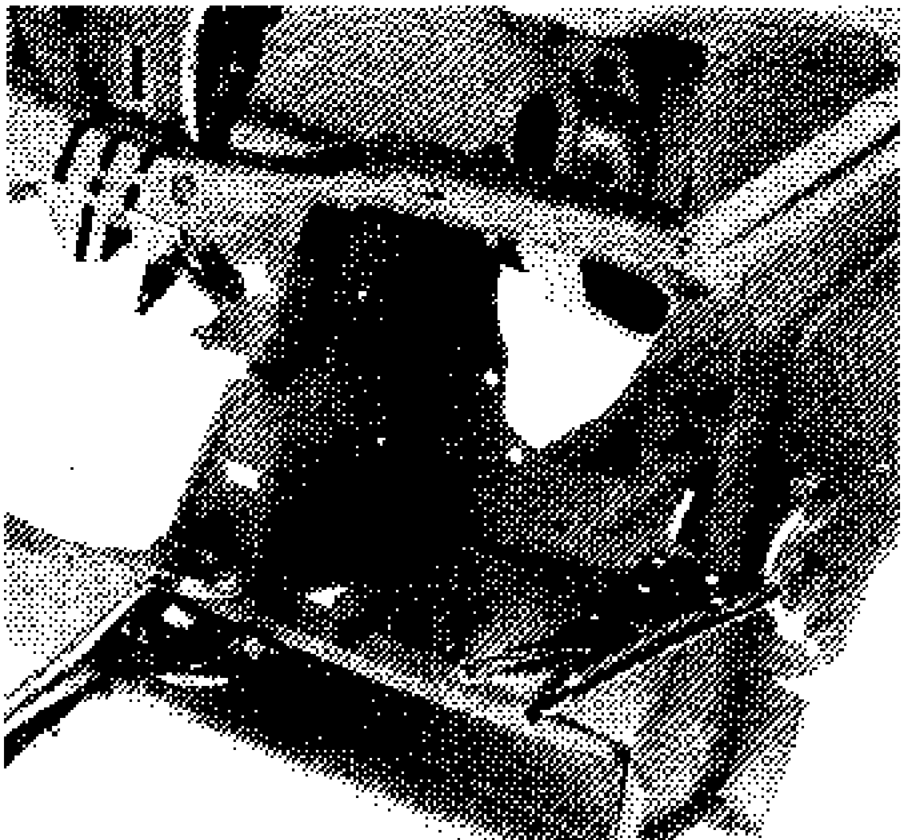
Points A-B-C-D-E are the jig locating points on the vehicle. Before fitting it ensure, with the trammel gauge, that these points are correctly positioned. When one of the points A or B cannot be used as a jig location (as is the case for this operation) use securing points G-J or F-H, depending on the side, instead.



Points F-G-H-J are the securing and locating points for the parts being replaced.



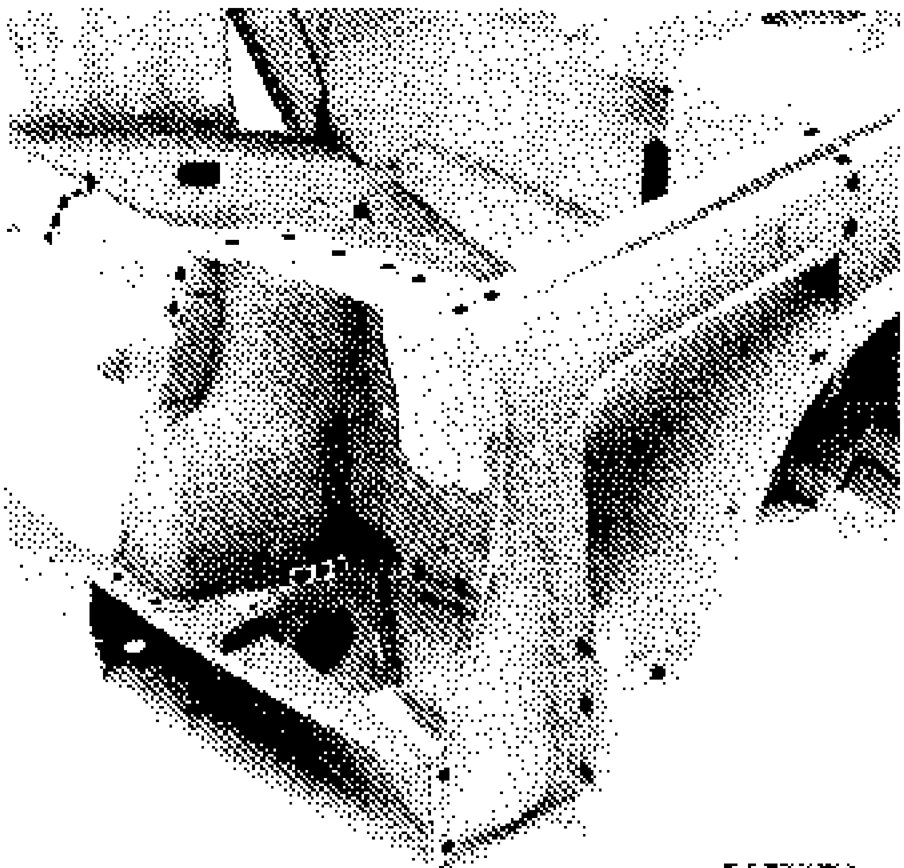
- Fit the new part so that it overlaps the original part, on the vehicle and secure it with grip clamps.
- Saw through both thickness of metal simultaneously to make adjusting the joint easier.
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).

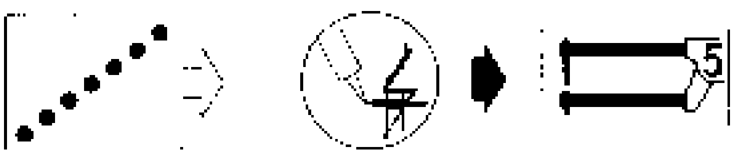


88418.1

WELDING

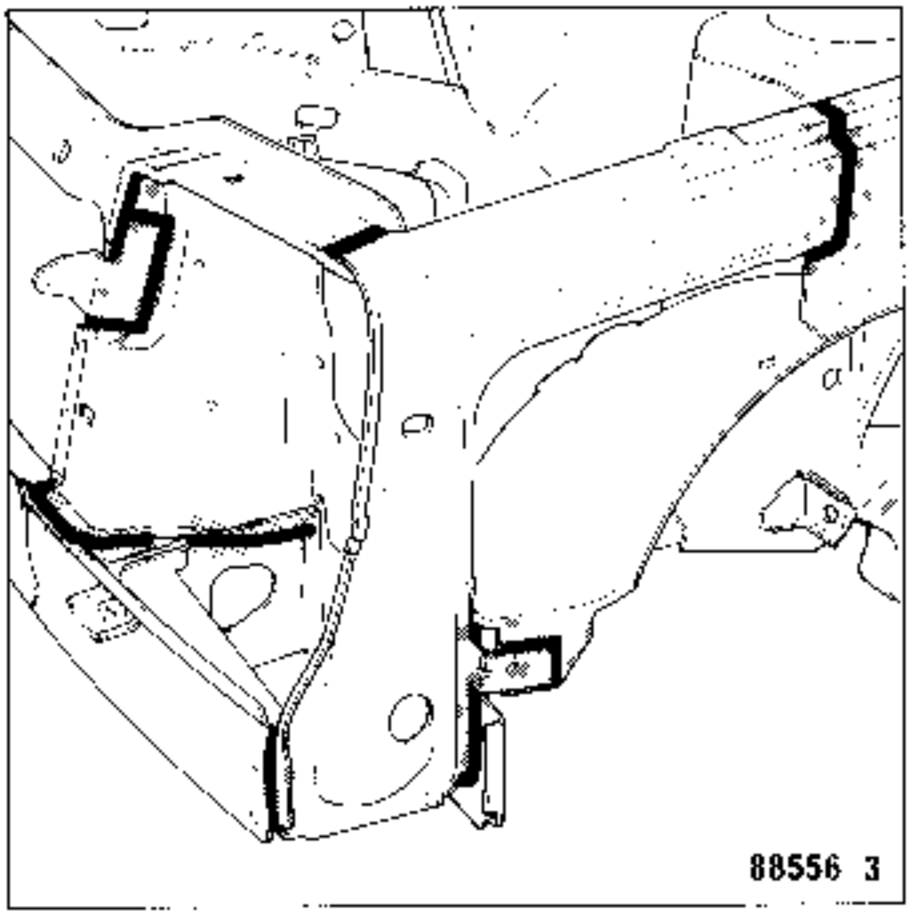
- Tack weld all the butt joints to secure them in place.
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.
- Apply the stitched fillets using the gas envelope welding process. (These joints may also be gas welded using a 75 to 100 nozzle).
- Grind flush the spot welds and fill them with soft solder.

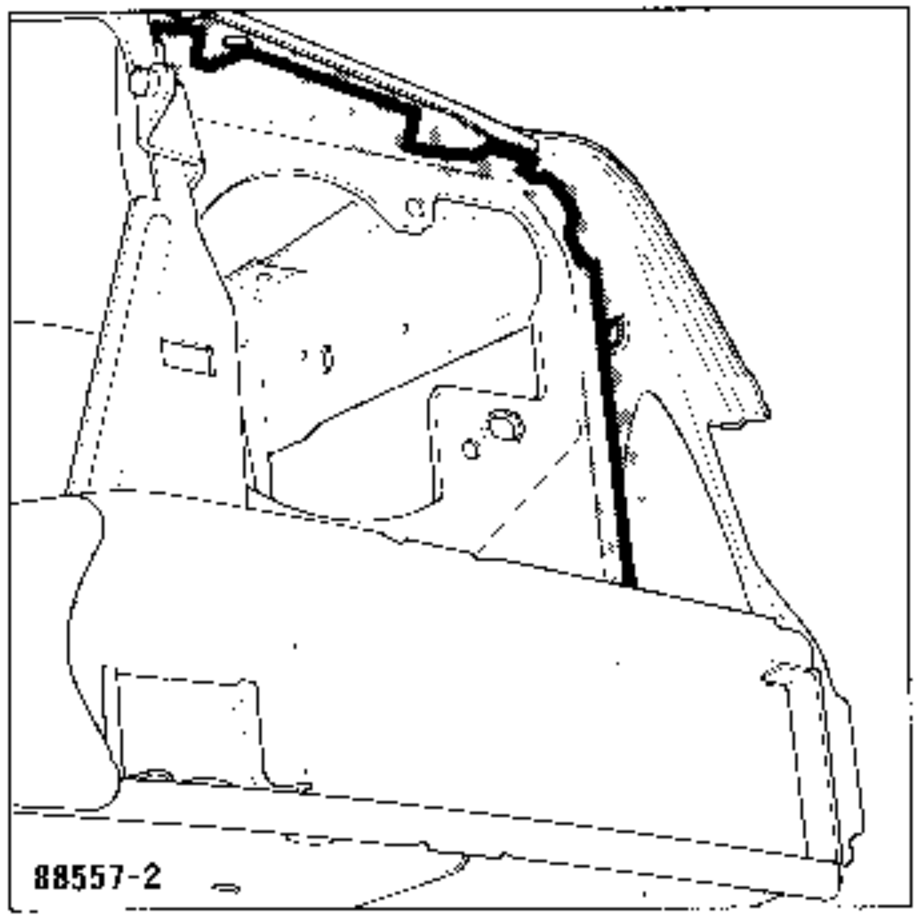




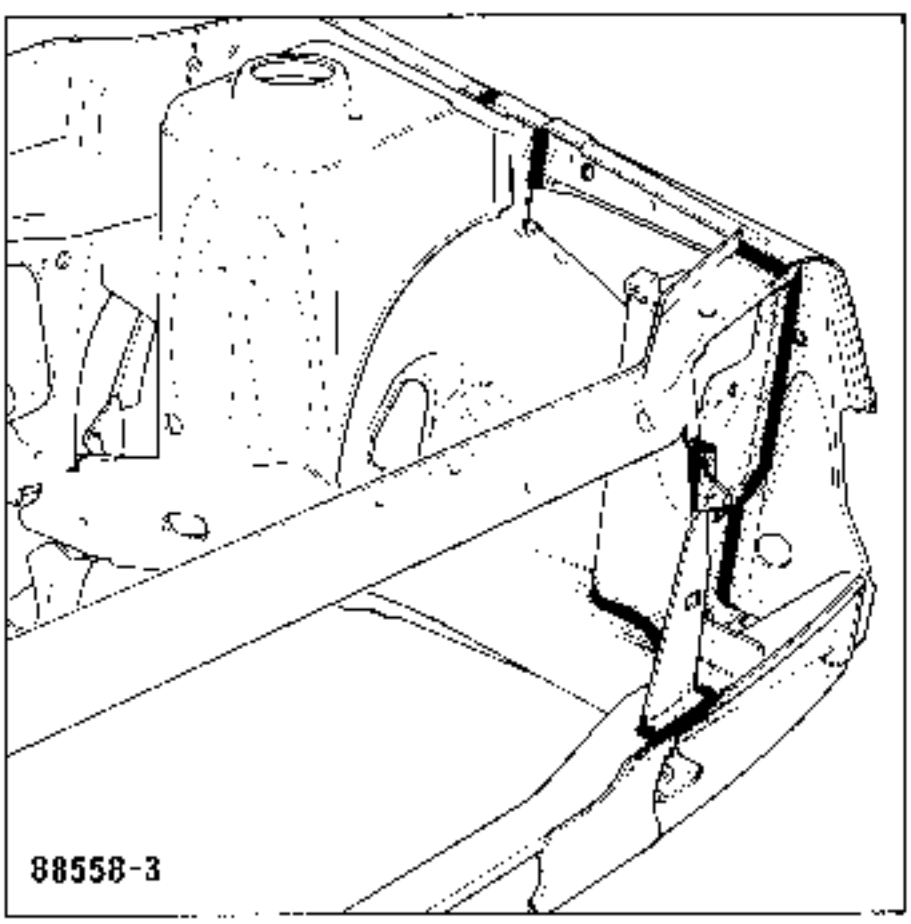
■ : e - 2,2 mm; H = 50 mm
• : e - 1,4 mm; H - 55 mm

PAINTING





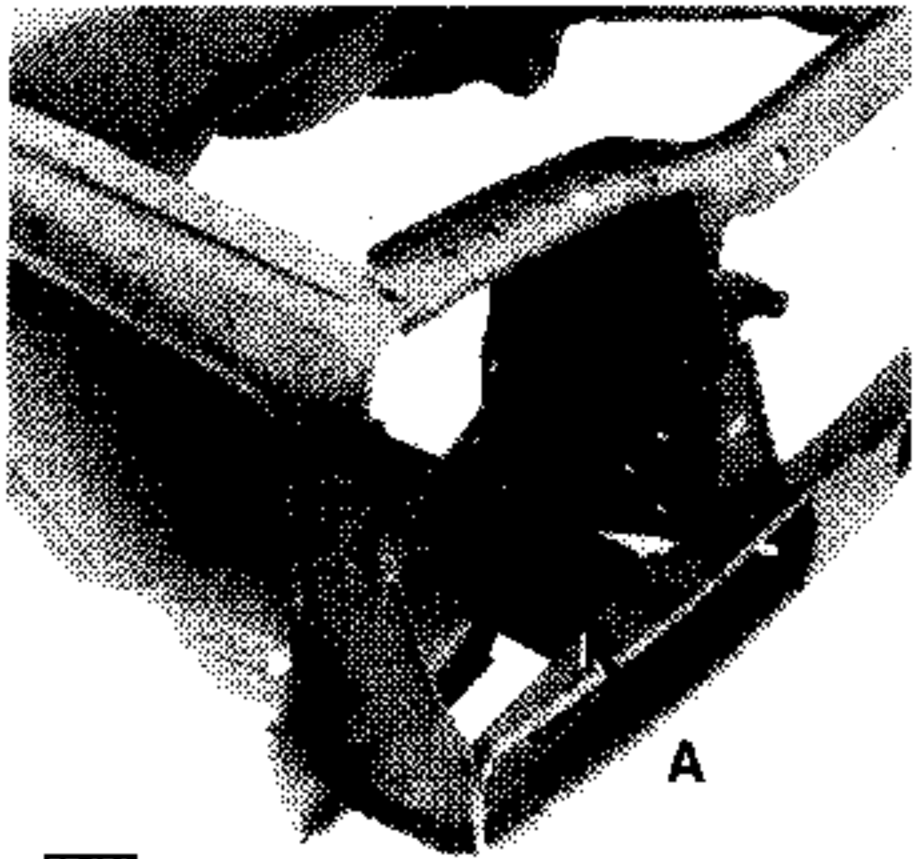
- Carry out paint sequence No. 5 (see "Painting" section).



DAMAGE DIAGNOSIS

The side member closing panel has an aperture at one end which acts as a "crumple point".

If the damage does not extend past this point, the end of the side member can be replaced (the operation is described in the next sub-section) or straightened and its closing panel replaced, as is the case for this operation.



This operation can be carried out without the body jig, however it is very important to check that the engine cradle is square and, if it is not, to use a new cradle to align the end of the side member and to adjust the position of the cross member.

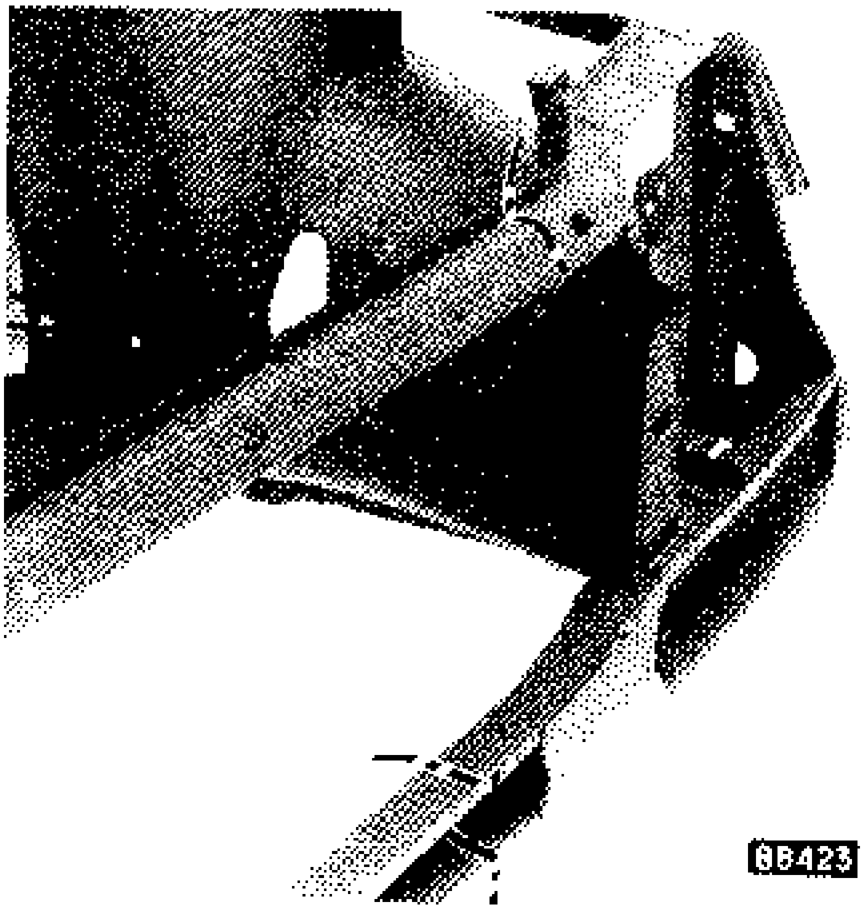
STRIPPING

Remove :

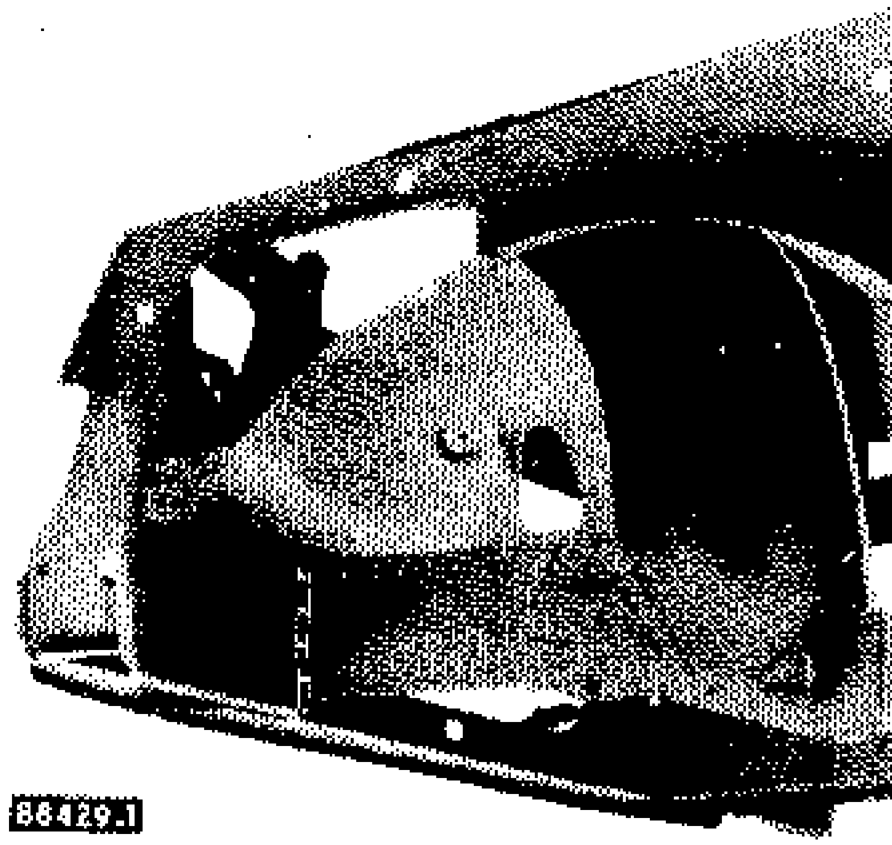
- the bonnet,
- the headlight,
- the direction indicator,
- the radiator grille,
- the bumper shield,
- the wing.

Note : For more details on removing the various parts, see the section that deals with the part in question.

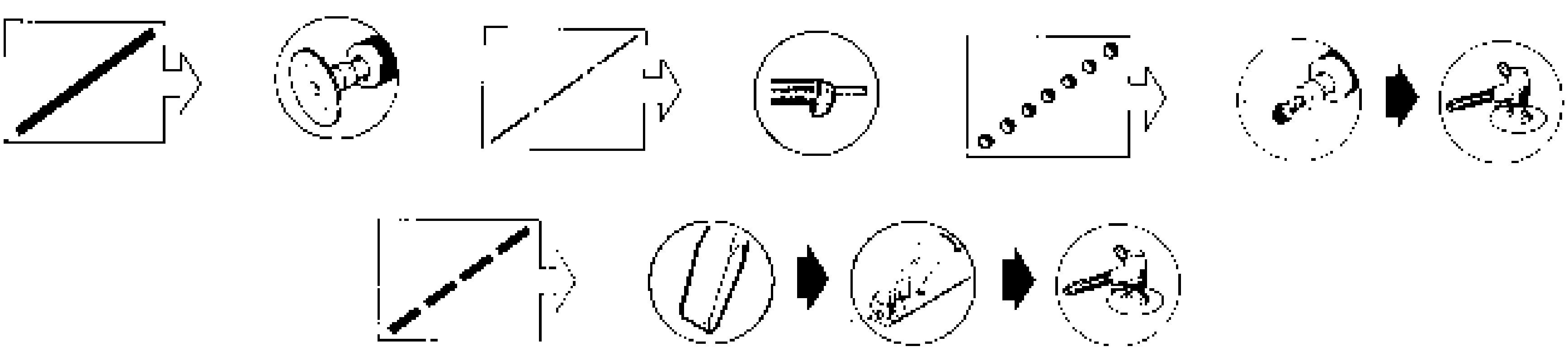
CUTTING - JOINT SEPARATION



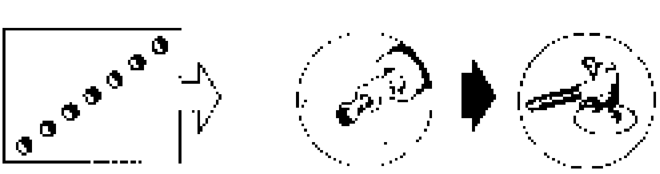
88423

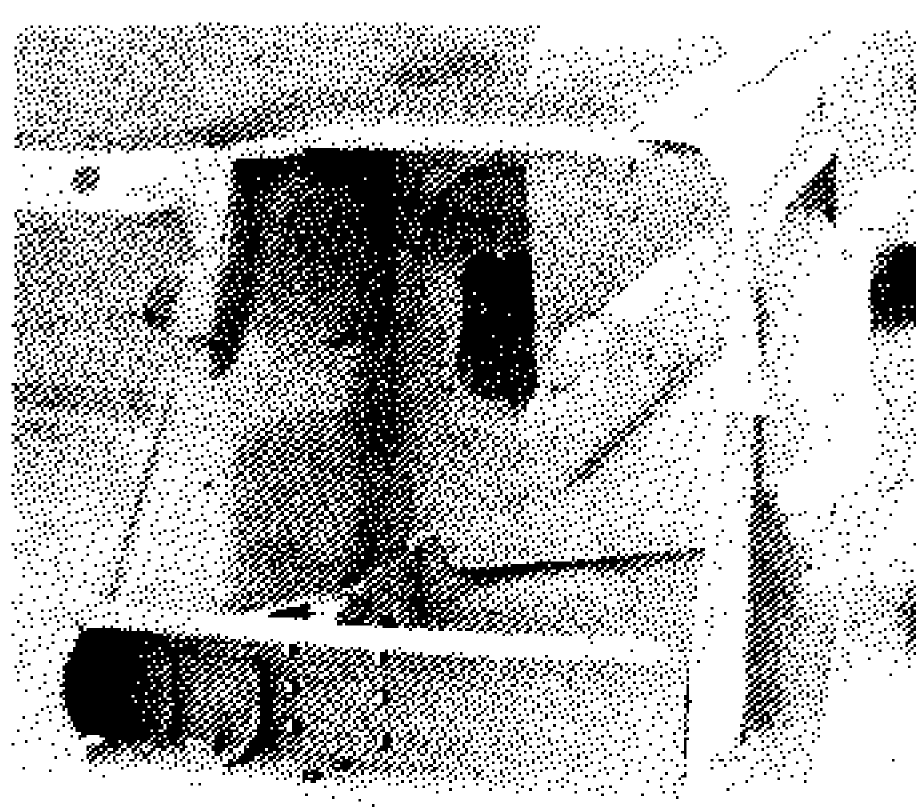


88429.1



- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).
- Grind back the pieces of spot weld adhering to the support panels.

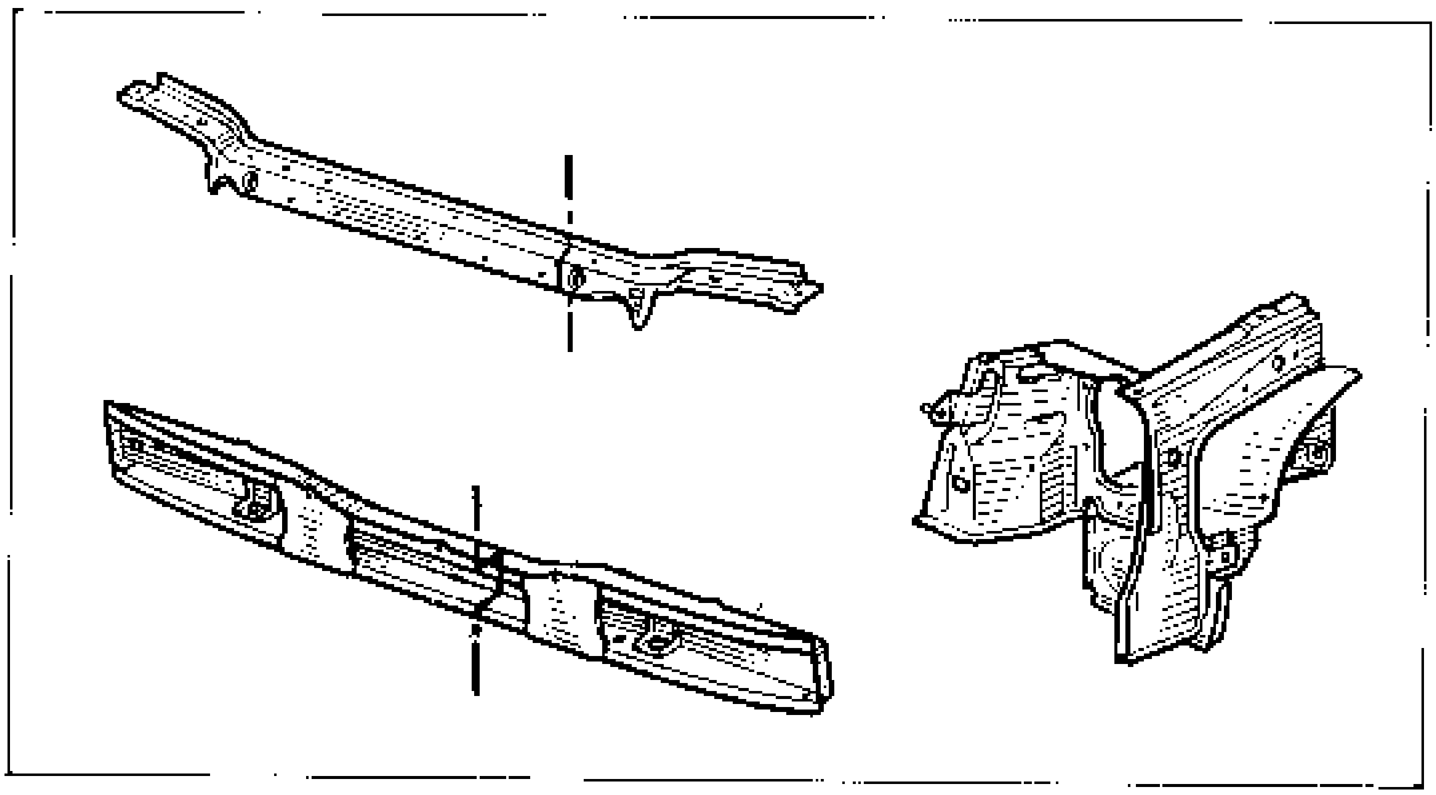




88431

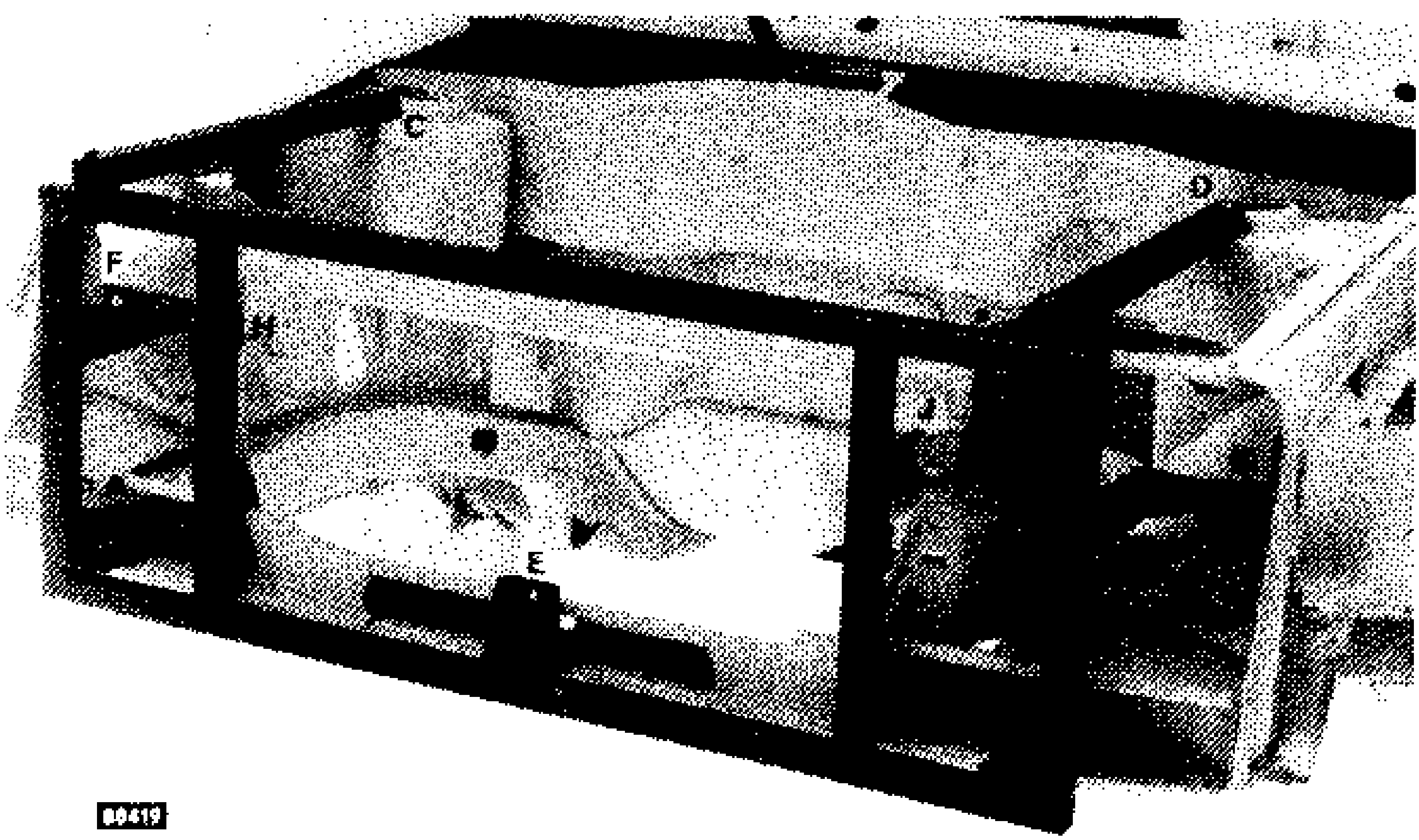
PREPARATION PRIOR TO WELDING

- Cut a piece, from the new part, approximately 50 mm larger than that cut out on the vehicle.

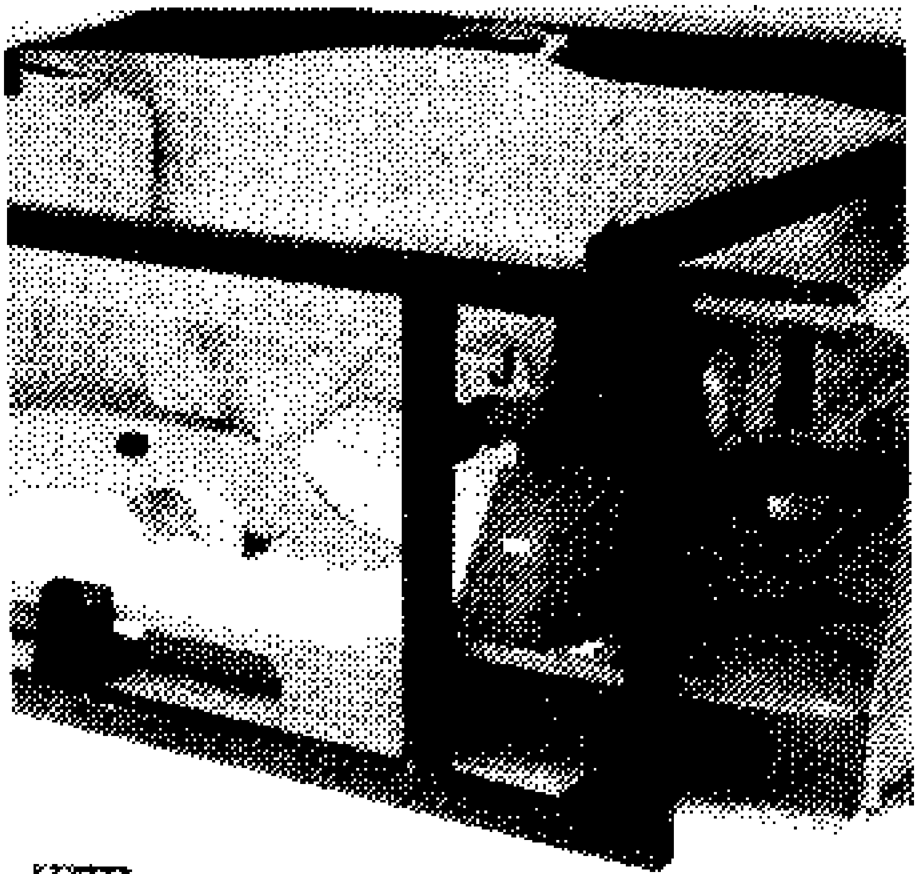


Fitting the front end frame jig :

Points A-B-C-D-E are the jig locating points on the vehicle. Before fitting it ensure, with the trammel gauge, that these points are correctly positioned. When one of the points A or B cannot be used as a jig location (as is the case for this operation) use securing points G-J or F-H, depending on the side, instead.

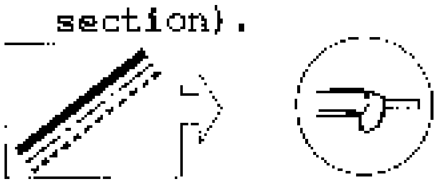


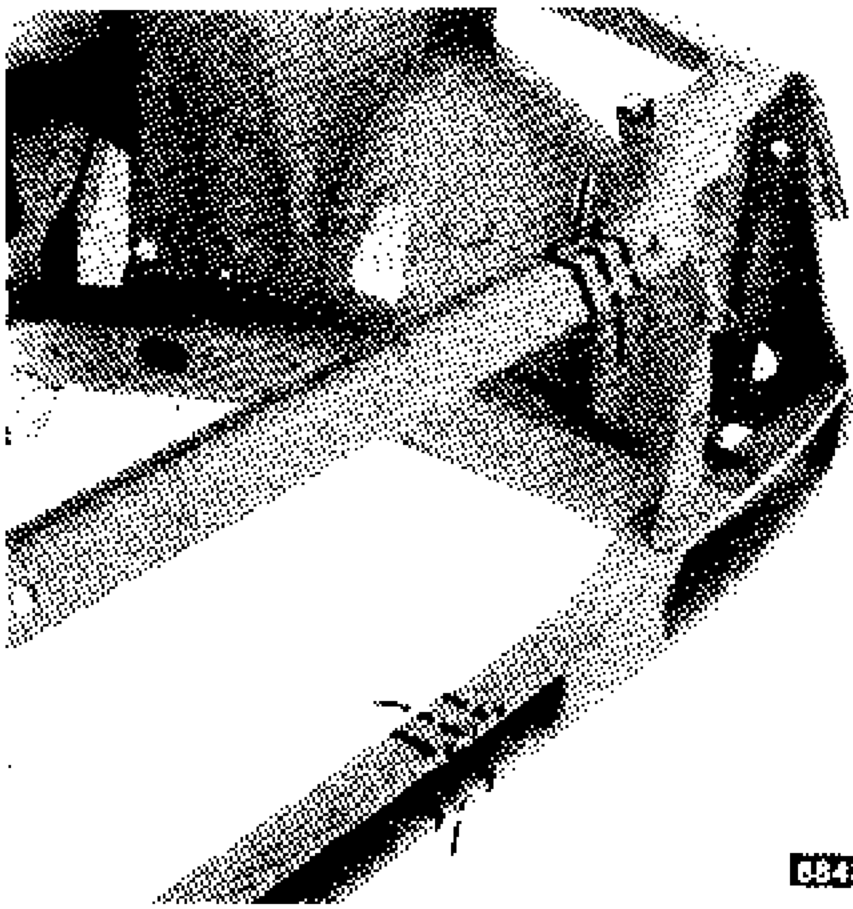
Points F-G-H-J are the securing and locating points for the parts being replaced.



88420

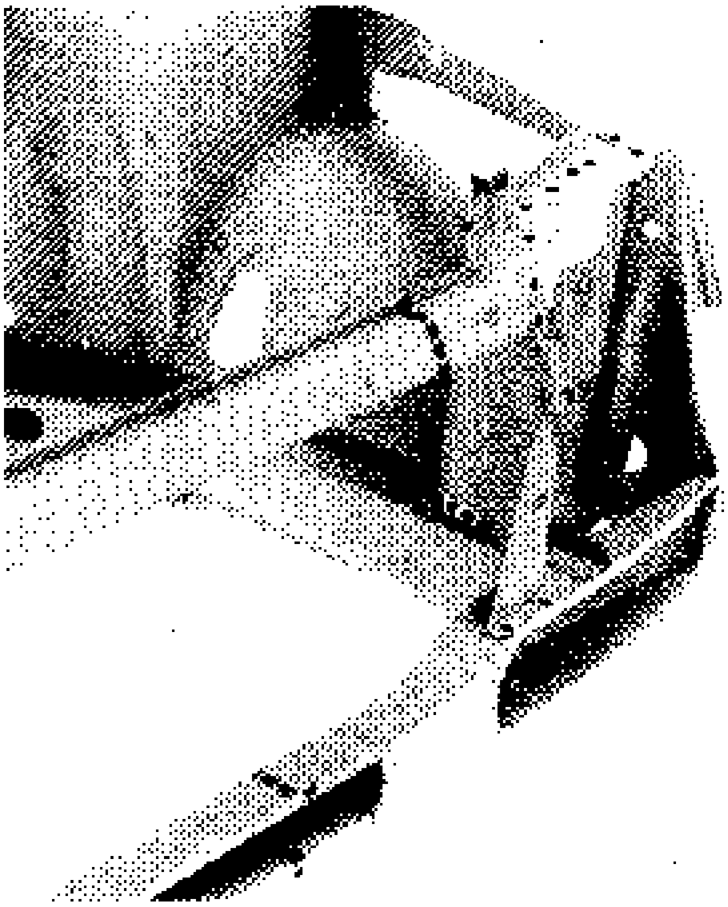
- Fit the new part so that it overlaps the original part on the vehicle and secure it with grip clamps.
- Saw through both thicknesses of metal simultaneously to make adjusting the joint easier.
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).



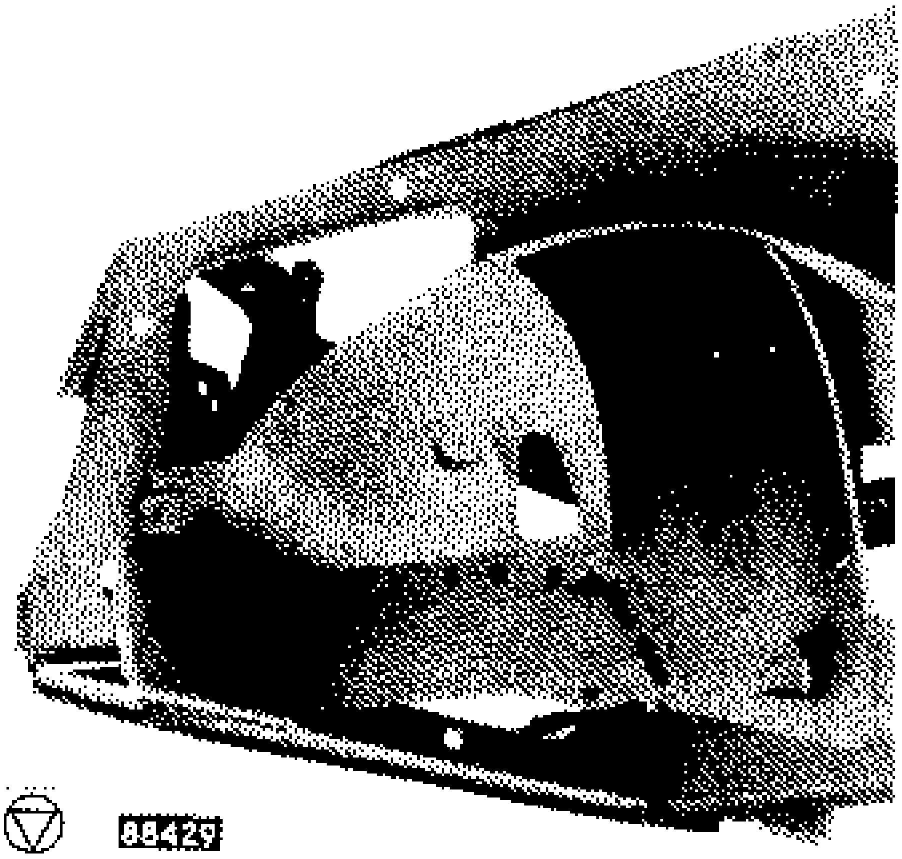


88425

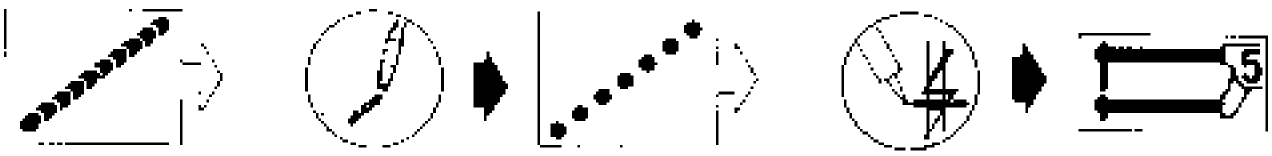
WELDING



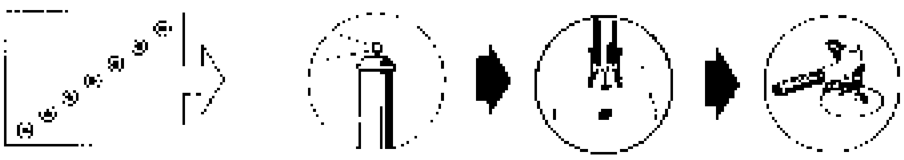
88423.1



88429

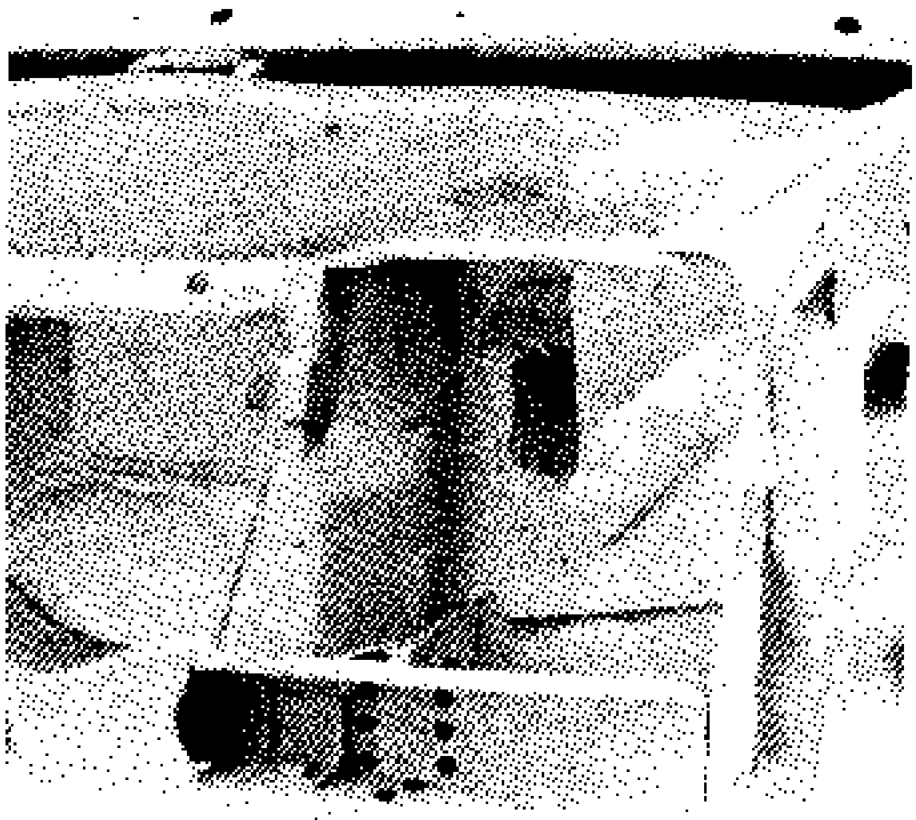


■ : e – 2,2 mm ; H – 50 mm
• : e – 1,4 mm ; H – 55 mm

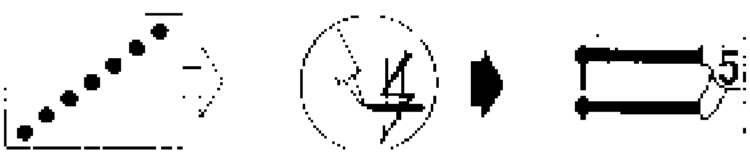


D: 5mm

- Tack weld the butt joints to secure them in place.
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.
- Apply the stitched fillets using the gas envelope welding process. (These joints may also be gas welded using a 75 to 100 nozzle).
- Apply the plug welds using the gas envelope welding process. To do this, drill holes in the top panel to the diameter D stated under the drawings.

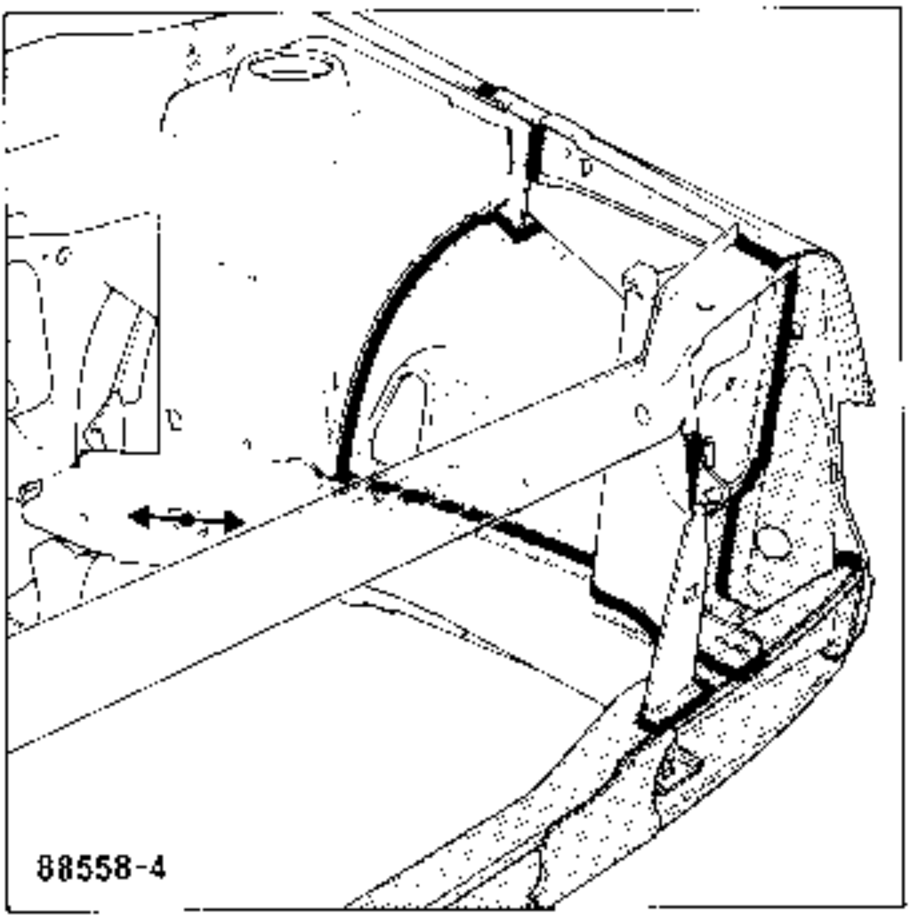


88437.1

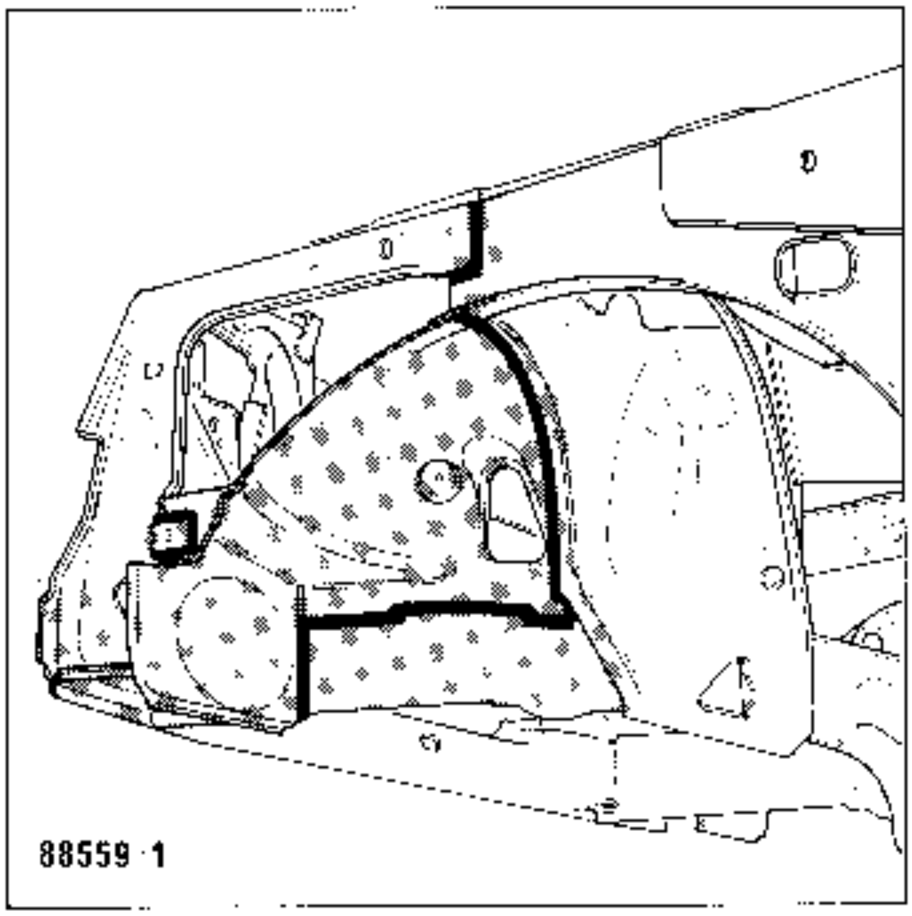


e = 2,2 mm
H = 50 mm

PAINTING



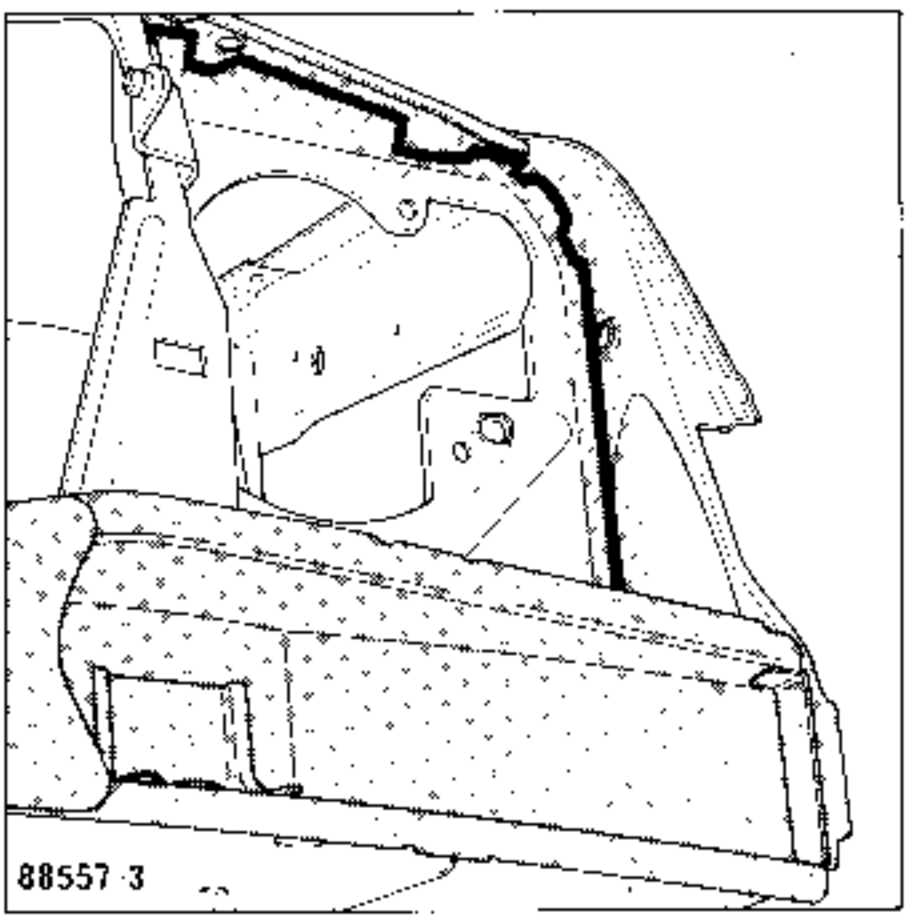
88558-4



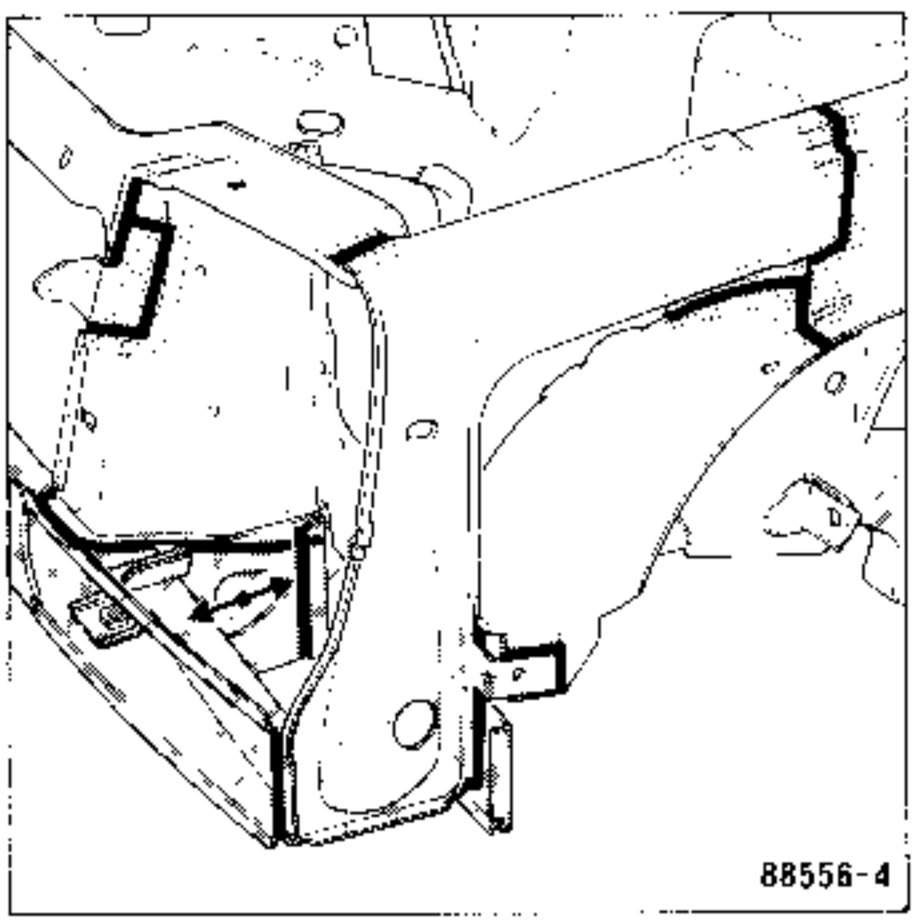
88559-1

Carry out paint sequence No. 5 (see "Painting" section).

After painting apply hollow section protection treatment.



88557-3

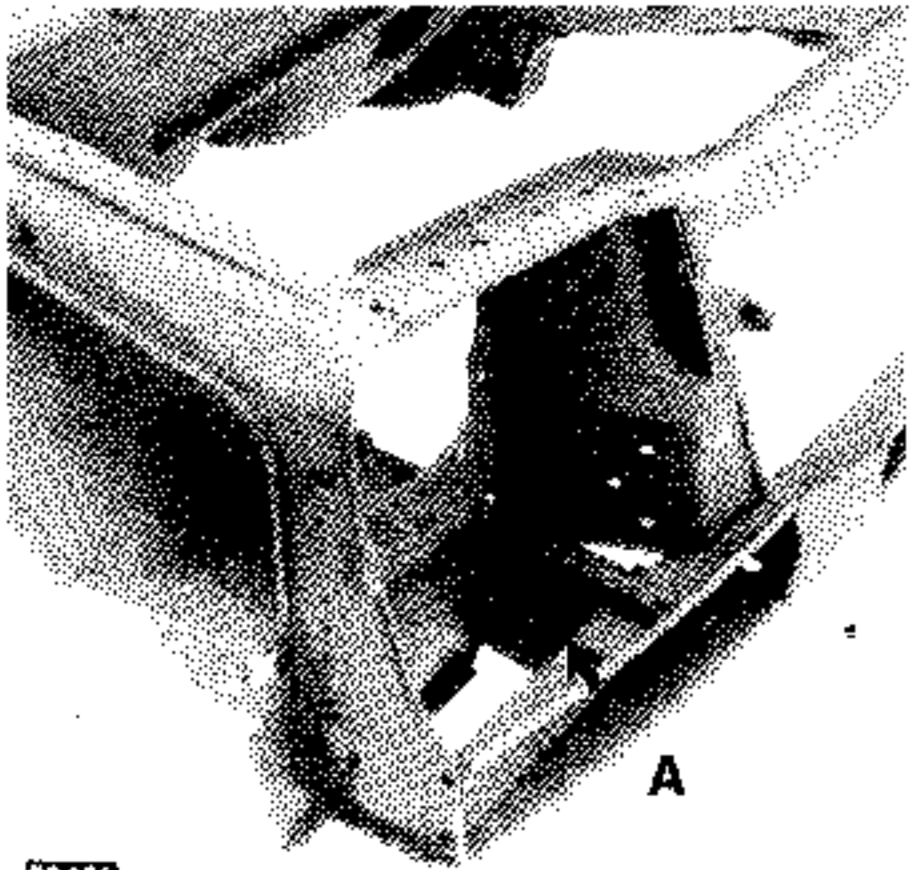


88556-4

DAMAGE DIAGNOSIS

The side member closing panel has an aperture at one end which acts as a "crumple point". If the damage does not extend past this point, the end of the side member can be replaced.

This operation can be carried out without the body jig. However it is very important to check that the engine cradle is square and, if it is not, to use a new cradle to align the end of the side member and to adjust the position of the cross member.



88426

The side member can be cut at a number of different points, when partially replacing it. The operation described on the following pages uses the cut line which is the farthest back. Past this point the entire side member will have to be replaced, on the body jig.

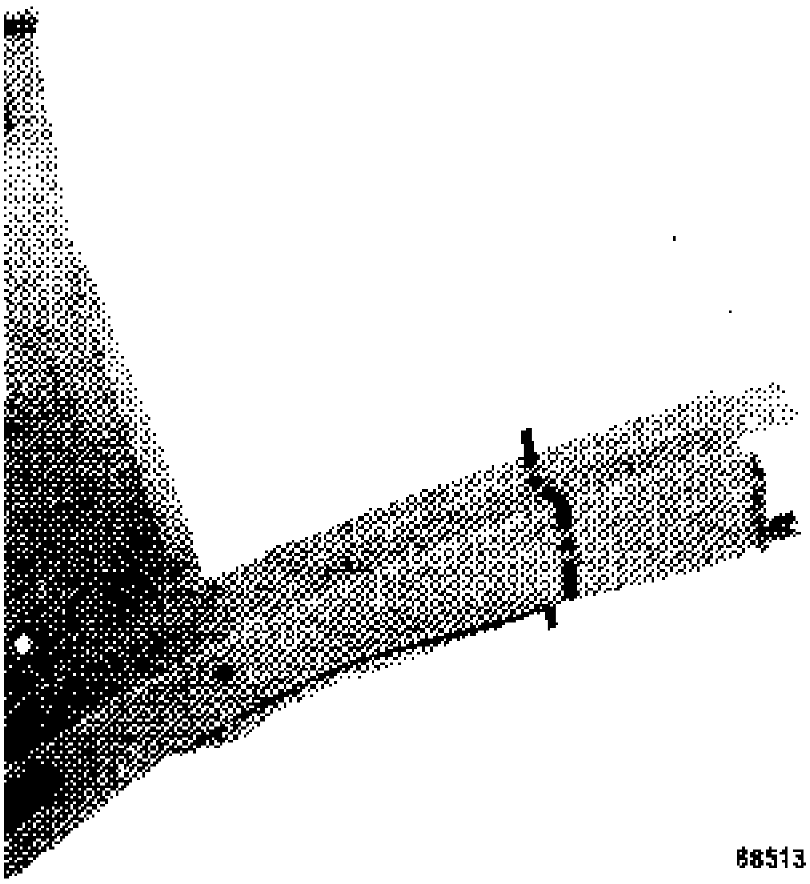
STRIPPING

This is identical to the previous operation described.

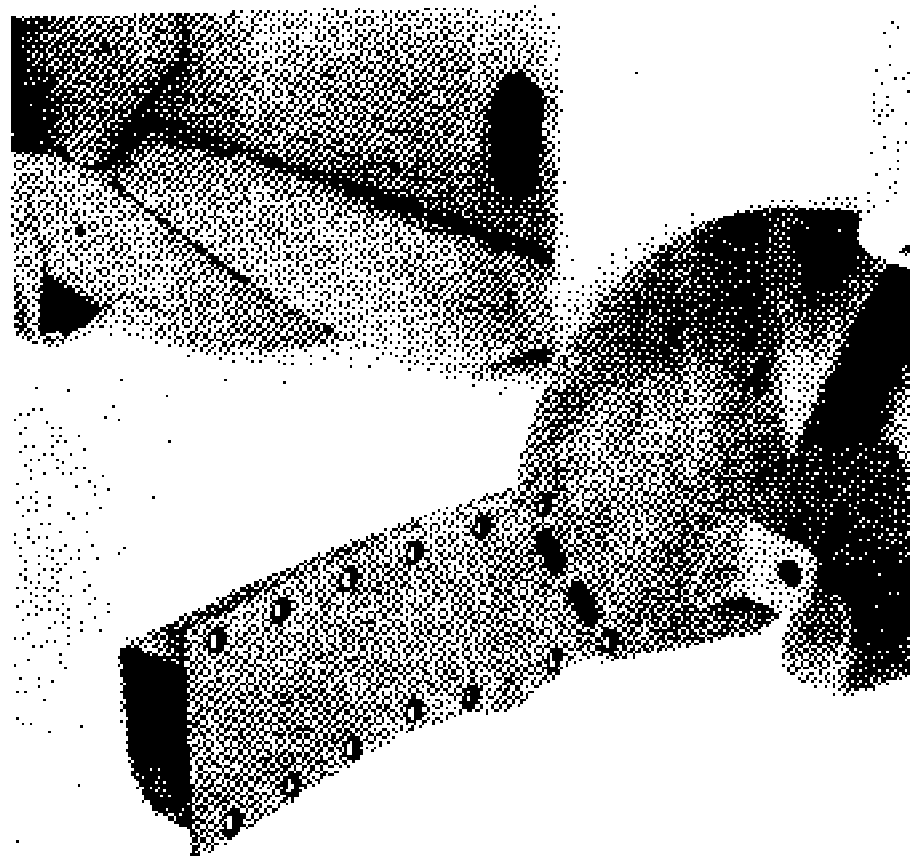
CUTTING - JOINT SEPARATION

- Remove the upper section :
  - the simplified cowl side assembly,
  - parts of the upper and lower cross members,

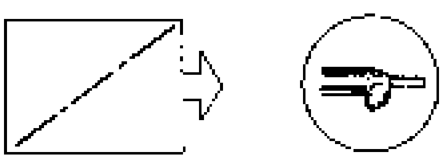
  by following the instructions given in the preceeding sub-section.
- Remove the end of the side member as shown in the diagrams overleaf (see description of symbols).

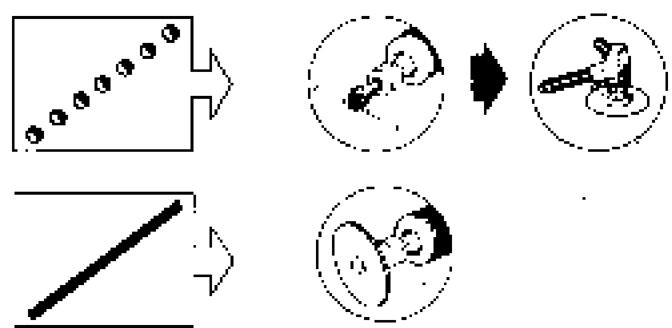


88513

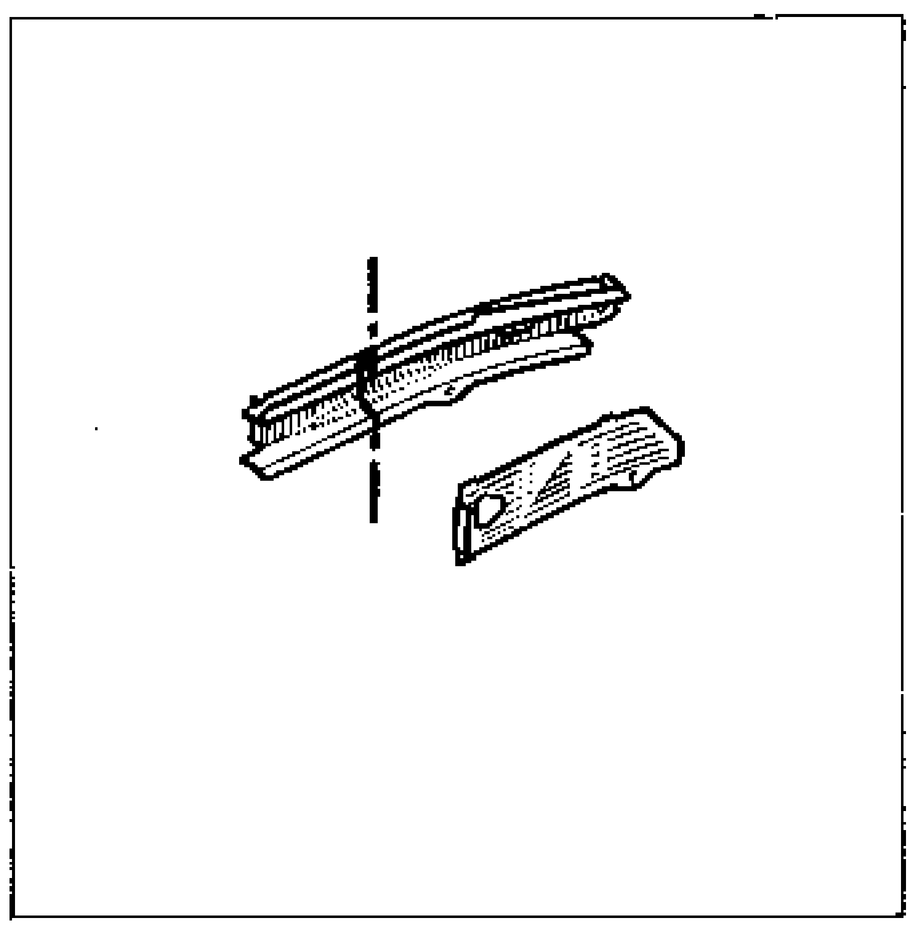


88513-1

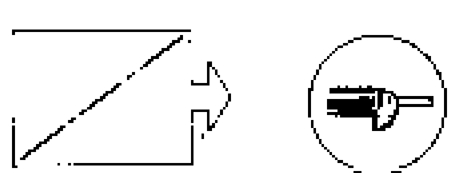




- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).
- Grind back the pieces of spot weld adhering to the support panels.



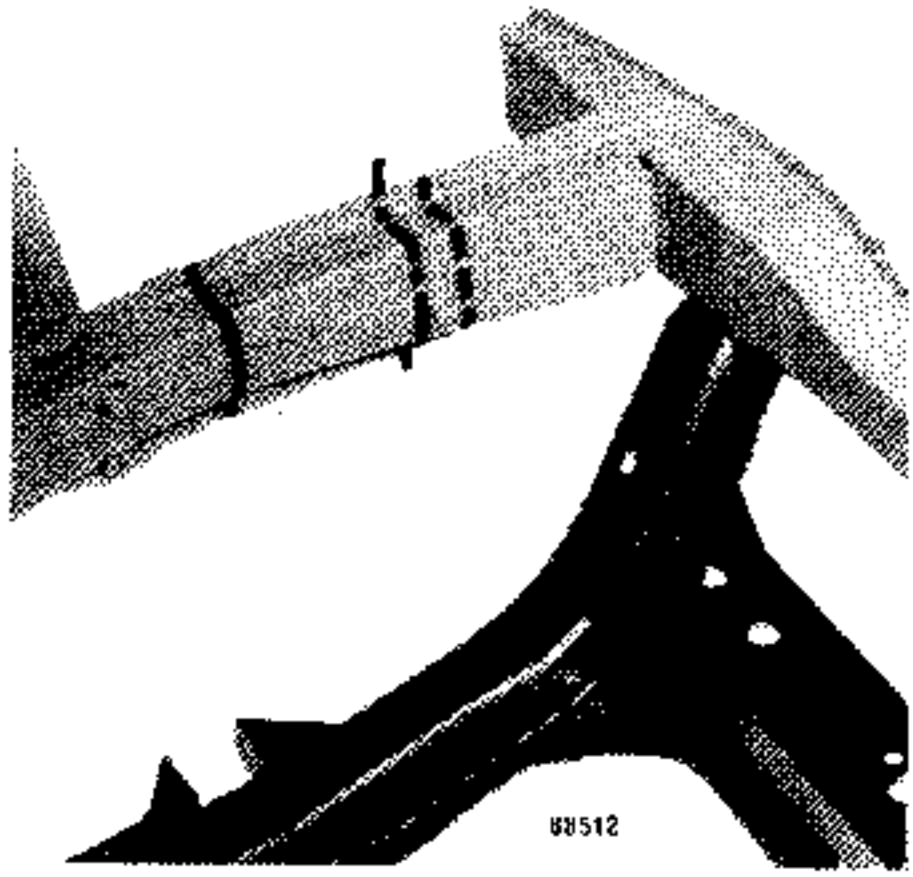
- Cut a piece from the new part approximately 50 mm larger than that cut out on the vehicle.



- Fit the new engine cradle and lower cross member.
- Fit the new part so that it overlaps the original part on the vehicle and secure it in place with grip clamps.
- Saw through both thickness of metal simultaneously to make adjusting the joint easier.

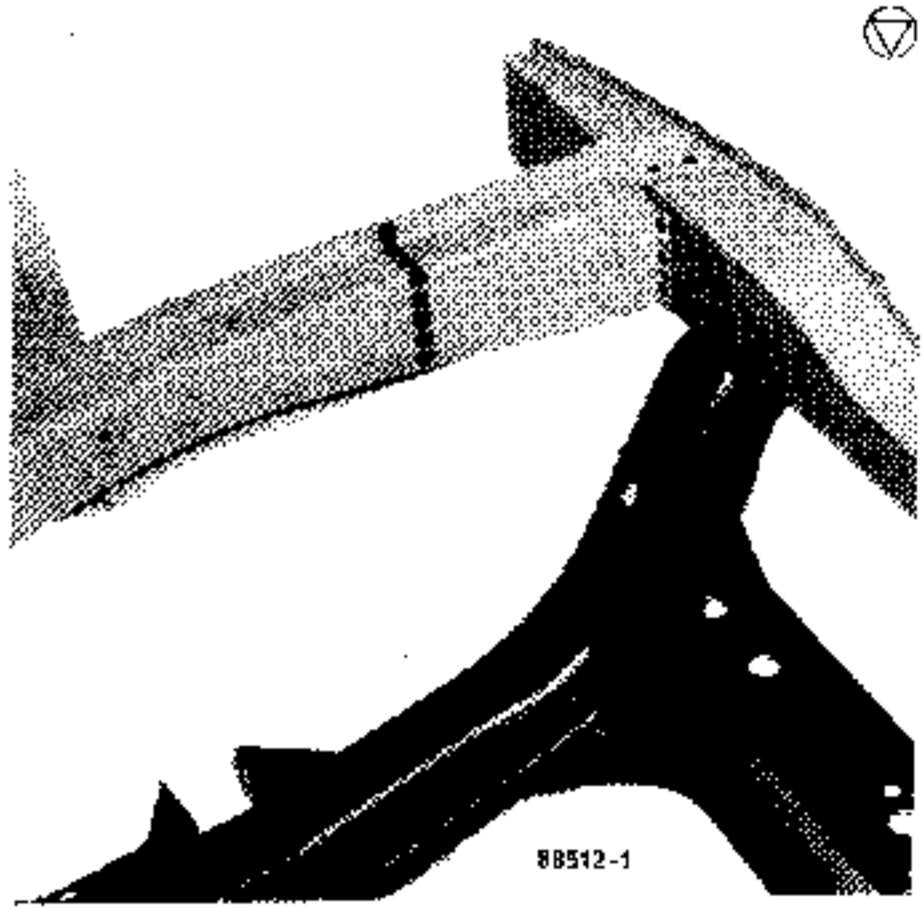
PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Adjust the new part and secure it in place with grip clamps.



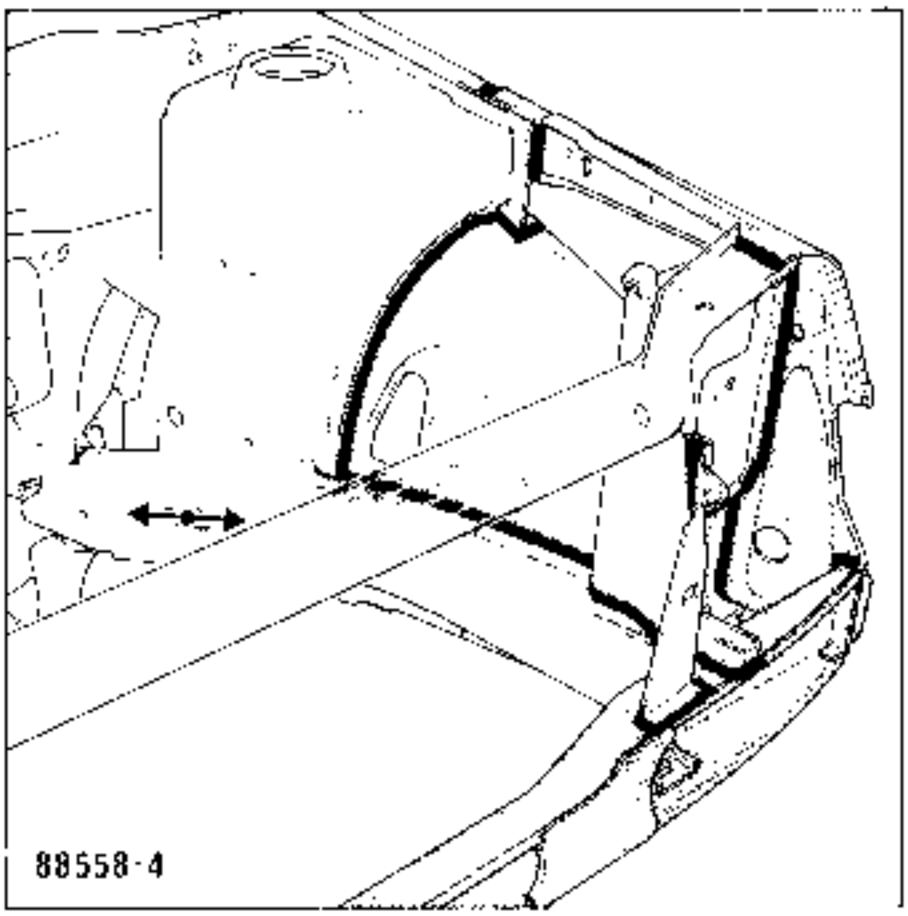
WELDING

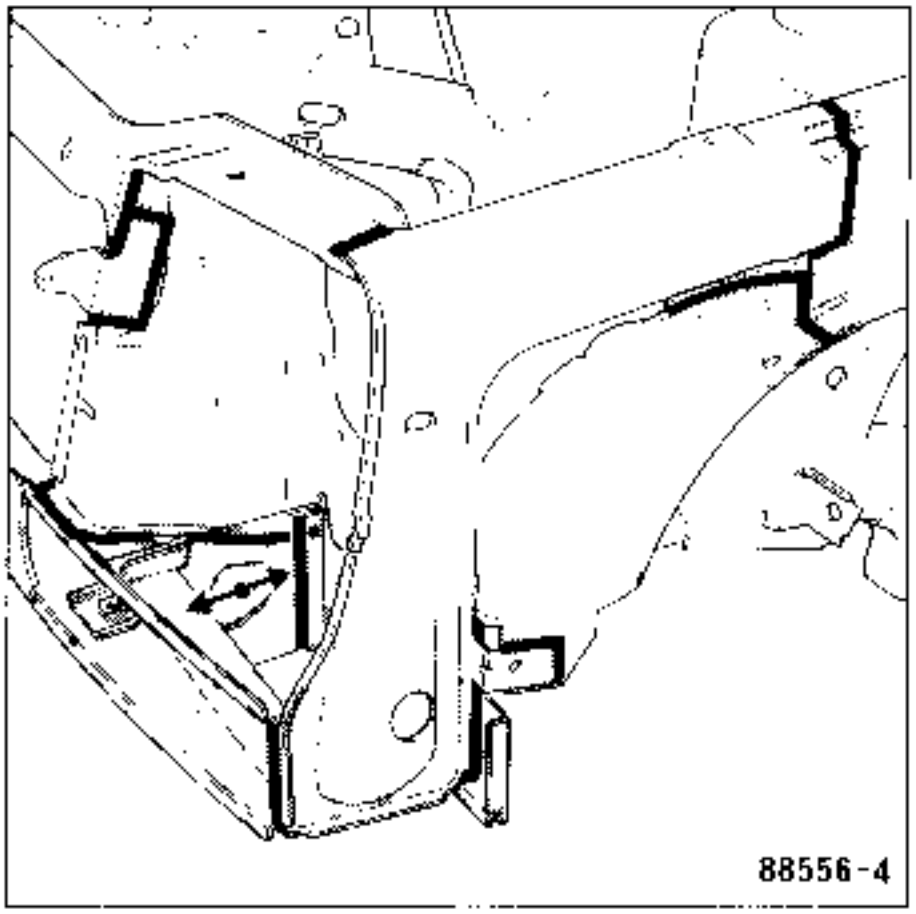
- Tack weld all the butt joints to secure them in place.
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.
- Apply the stitched fillets using the gas envelope welding process. (These joints may also be gas welded using a 75 to 100 nozzle).
- Grind flush the butt welds and fill them with soft solder.



e = 2,2 mm; H = 50 mm

ANTI-CORROSION PROTECTION

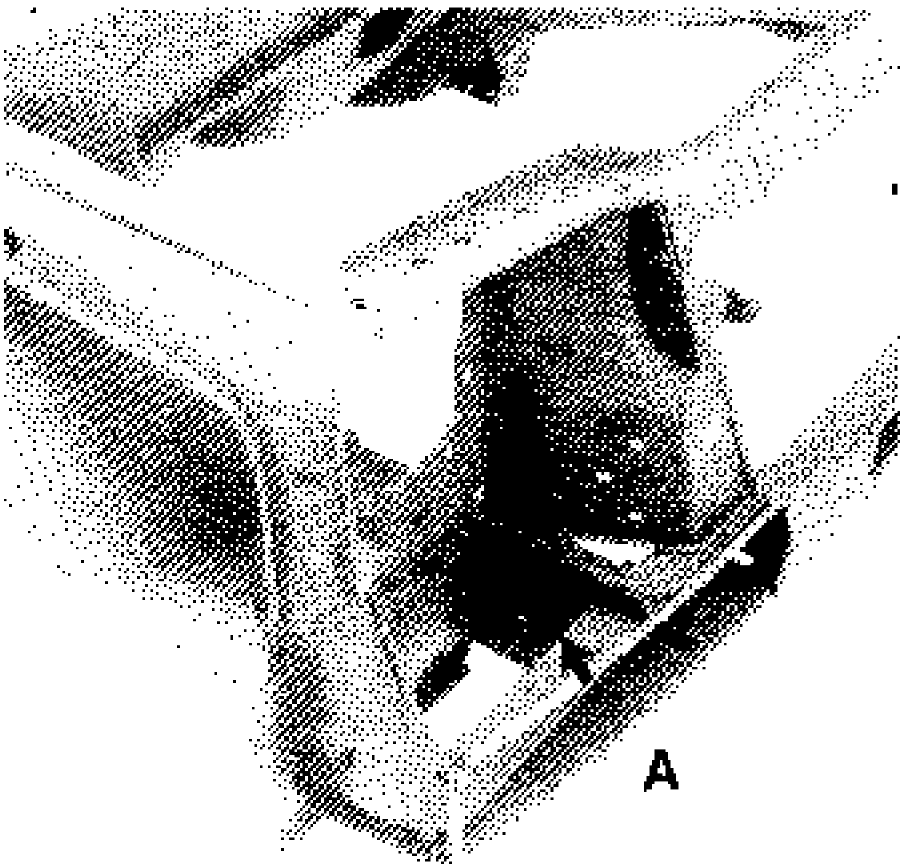

88558-4


88556-4

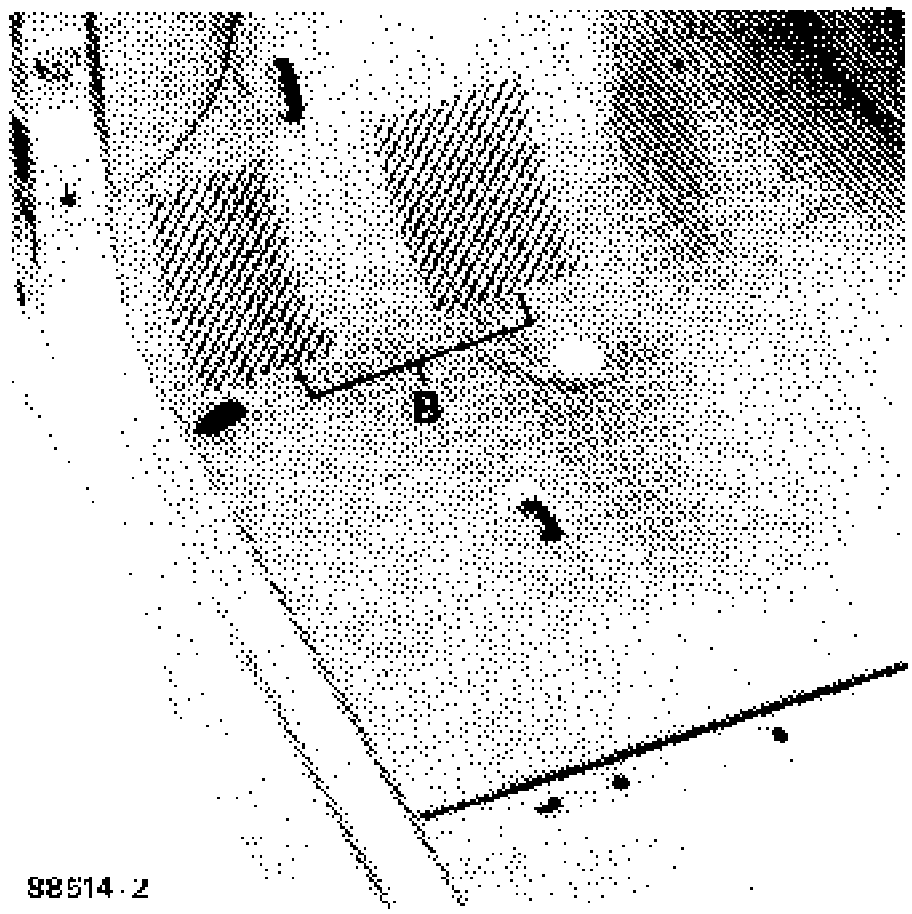
After painting, and before refitting the other components, apply hollow section protective treatment.

DAMAGE DIAGNOSIS

The side member closing panel has an aperture at one end which acts as a "crumple point". Depending on the extent of the damage past this point, either the end of the side member can be replaced or the entire side member using the body jig.



Distortion in section A.
No distortion in section B : replace the side member front section.



Distortion in section B : replace the complete side member.

STRIPPING

Support the vehicle on axle stands and remove :

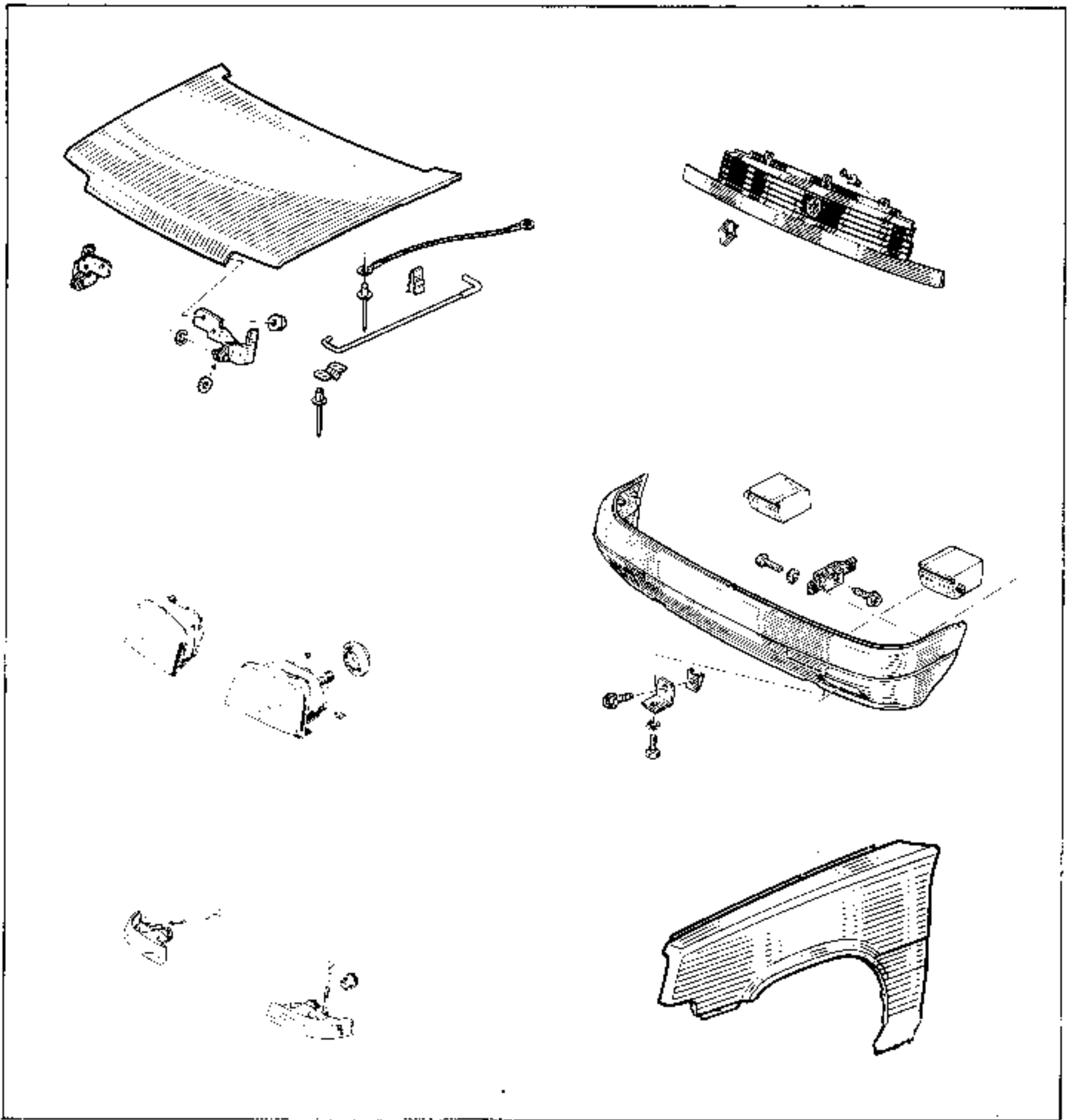
- the bonnet,
- the radiator grille,
- the headlights,
- the bumper shield,
- the wings,
- the power unit assembly (see mechanical workshop manual)

STRIPPING

Remove :

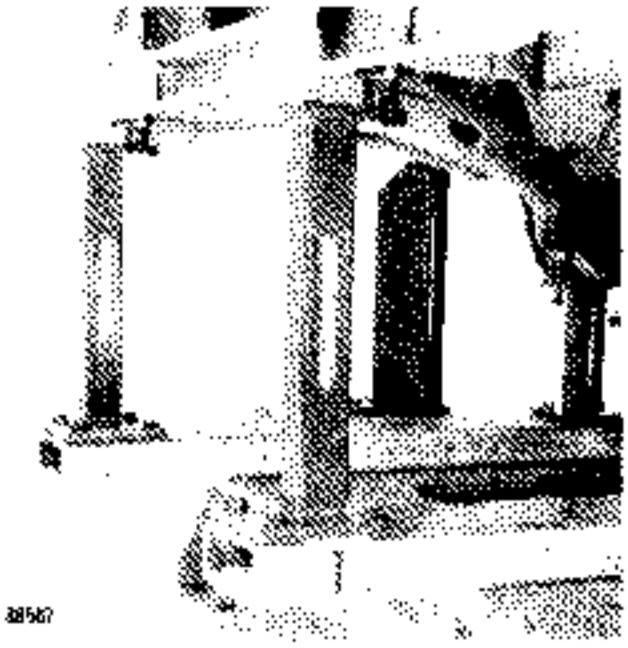
- the bonnet,
- the headlight,
- the direction indicator,
- the radiator grille,
- the bumper shield,
- the wing.

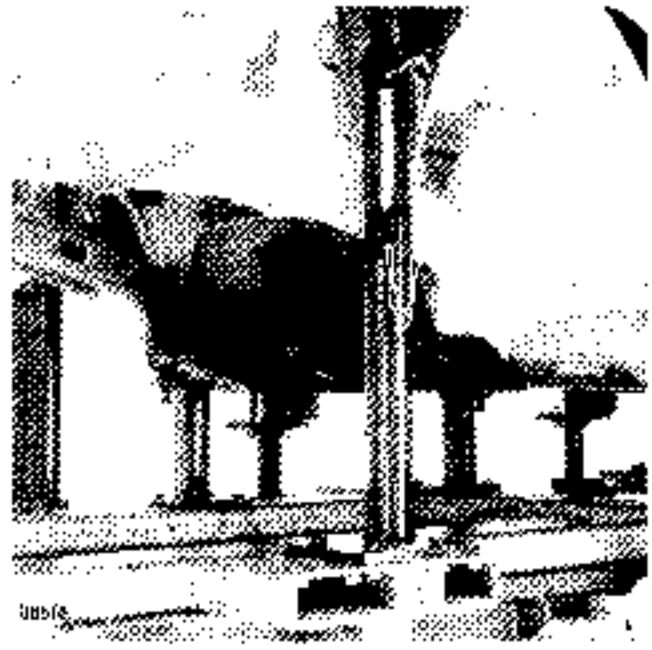
Note : For more details on removing the various parts, see the section that deals with the part in question.

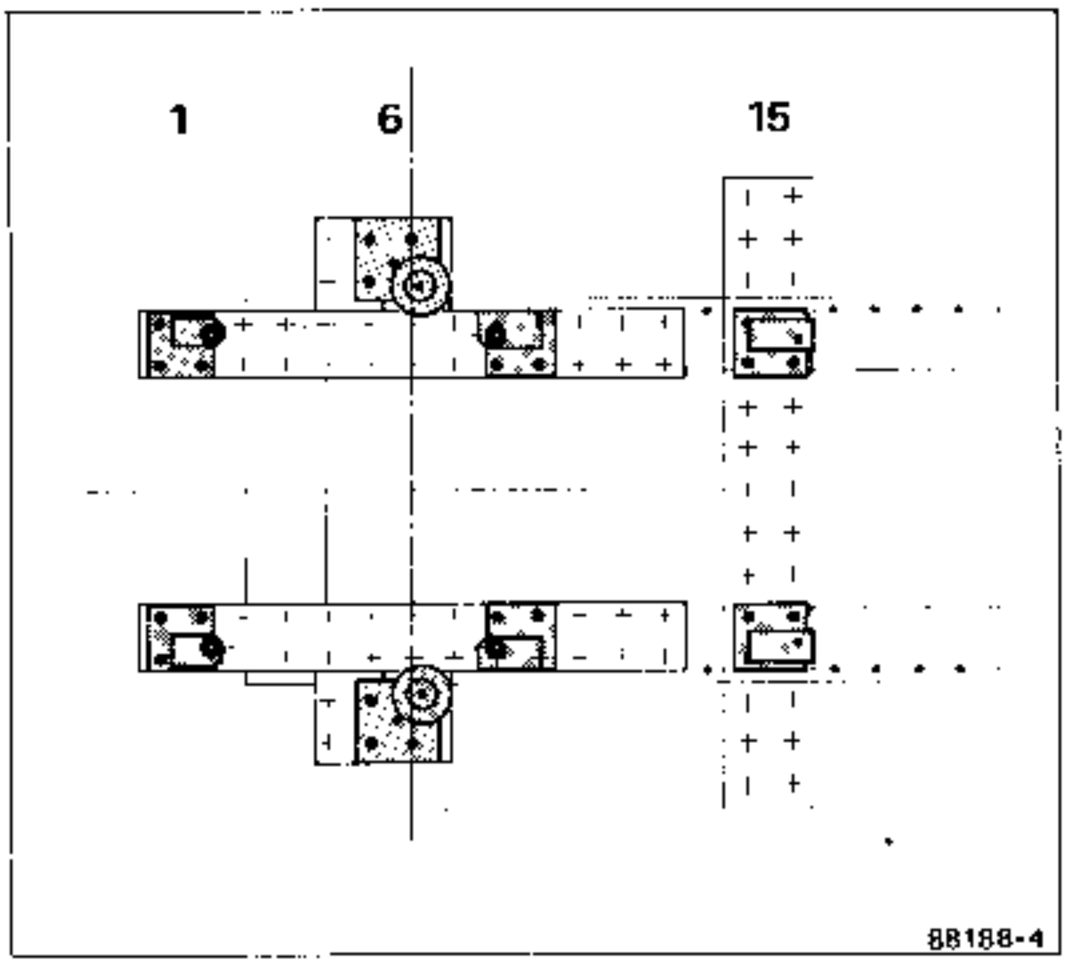


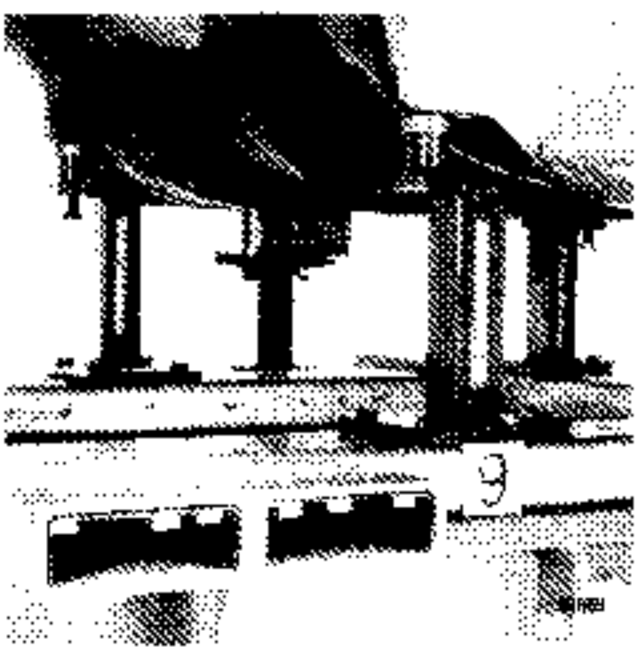
FITTING THE JIG BRACKETS TO THE BODY JIG

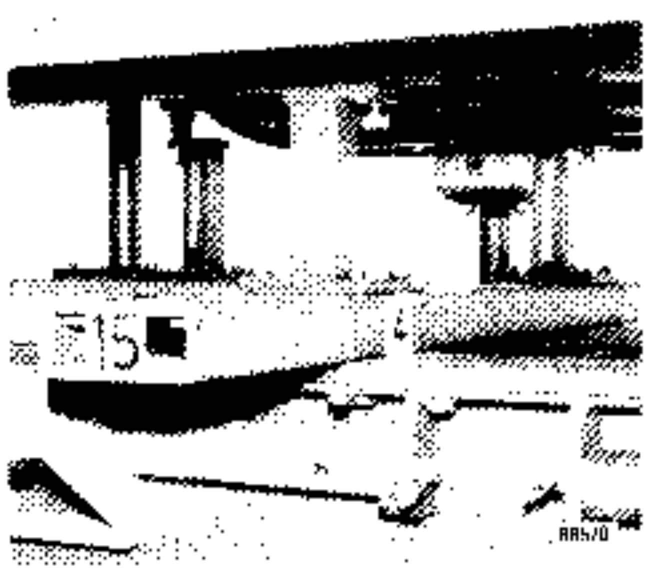
Front section :



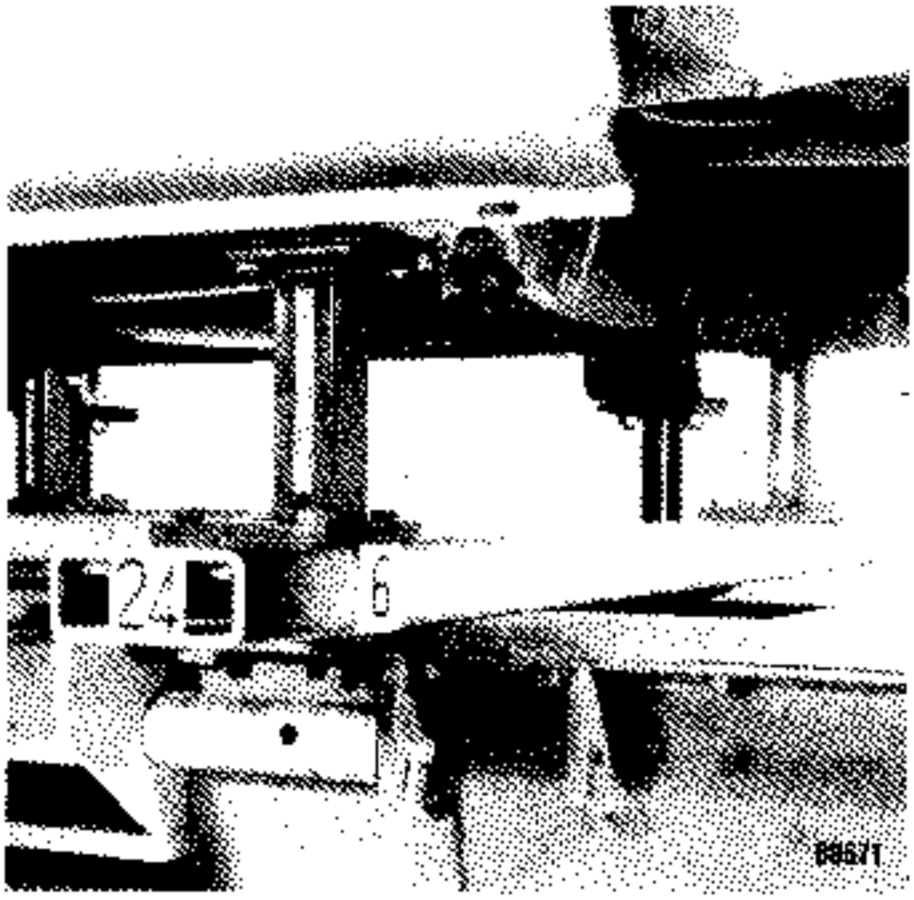


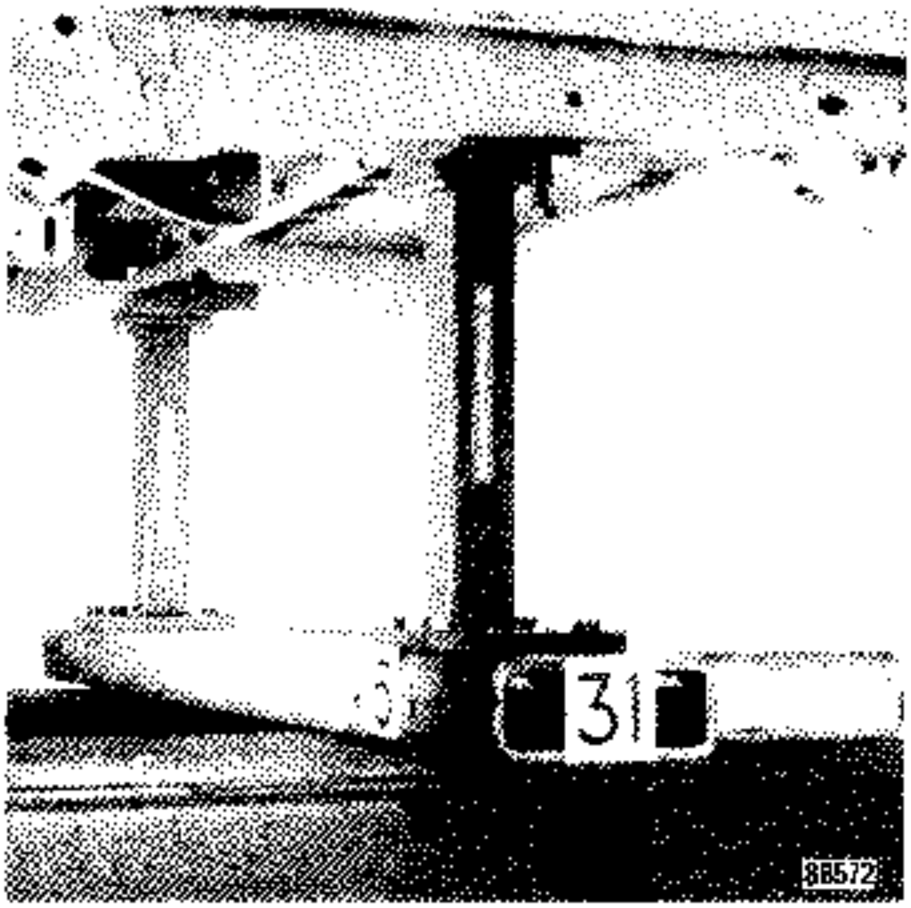


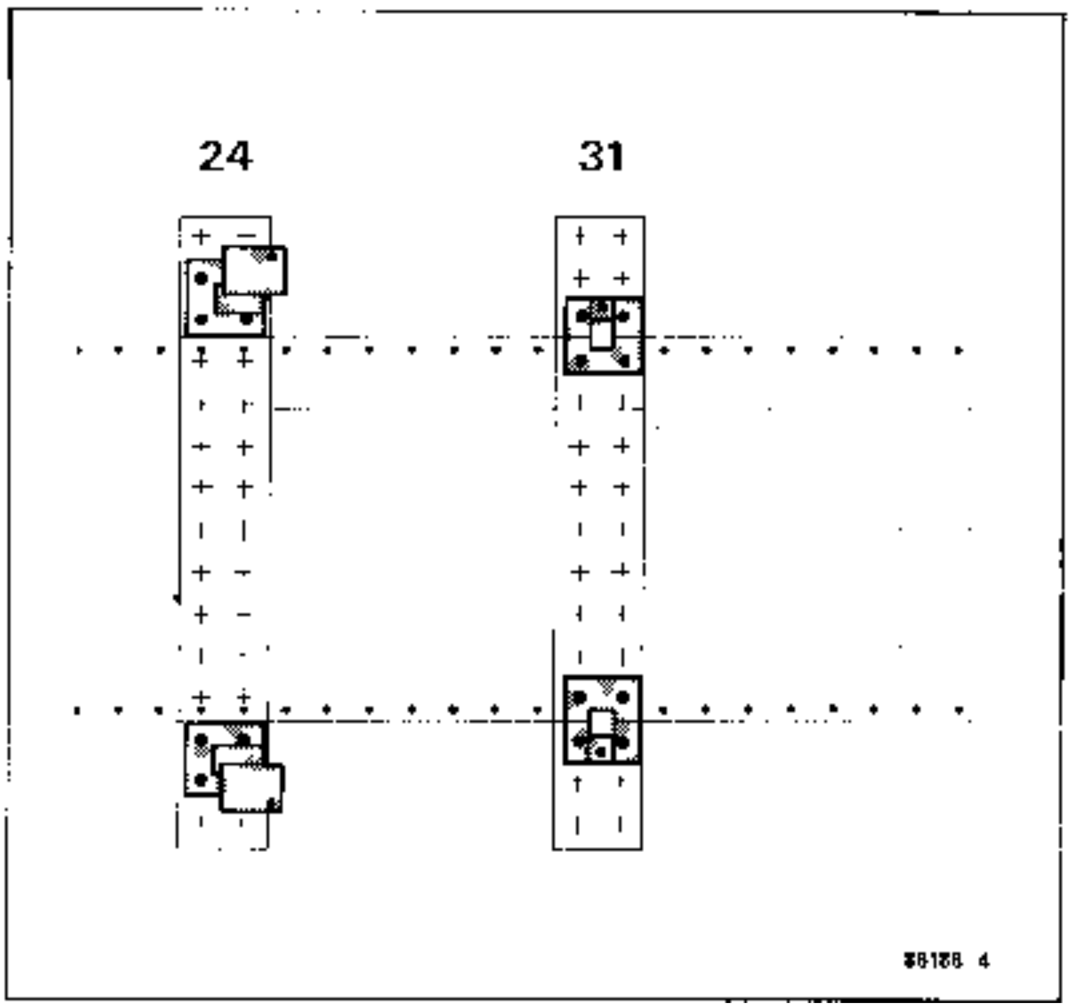




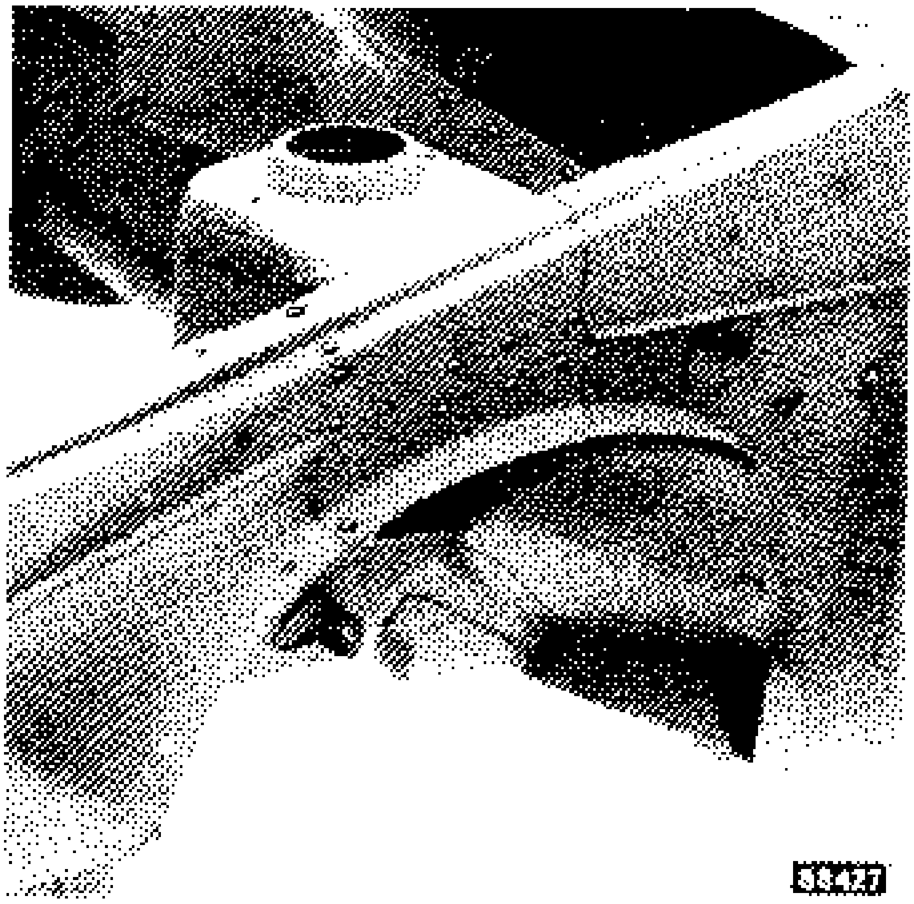
Rear section

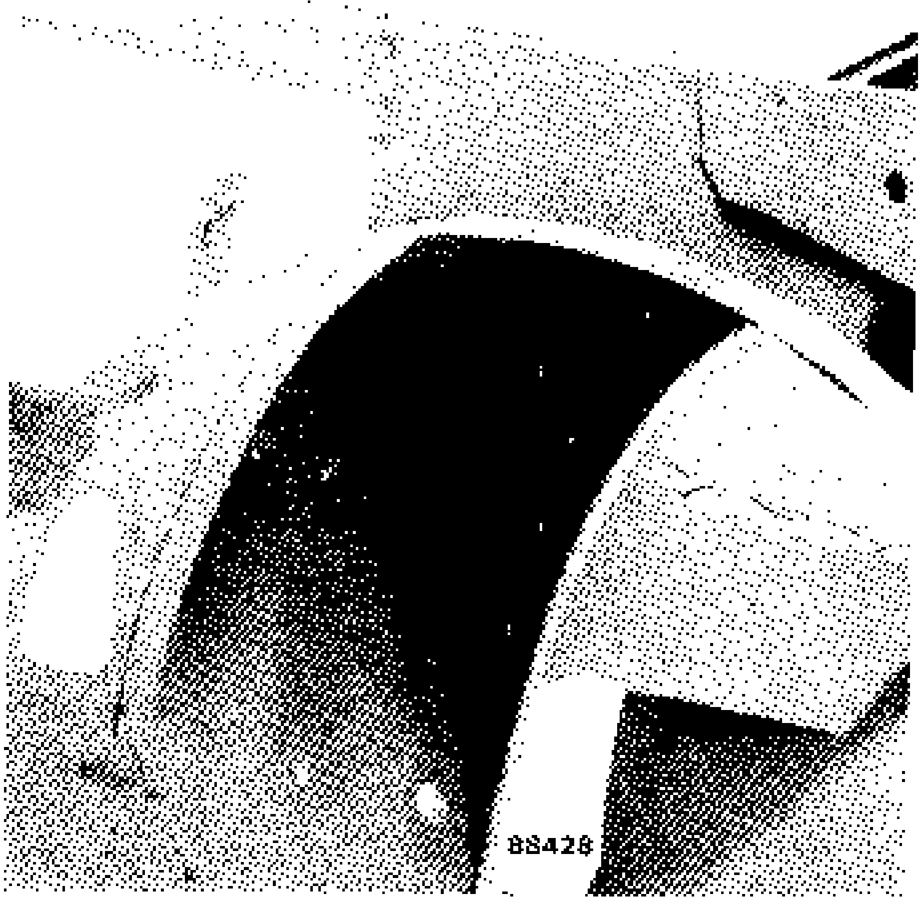


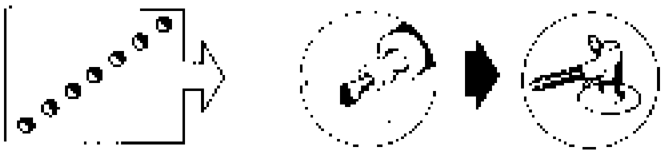


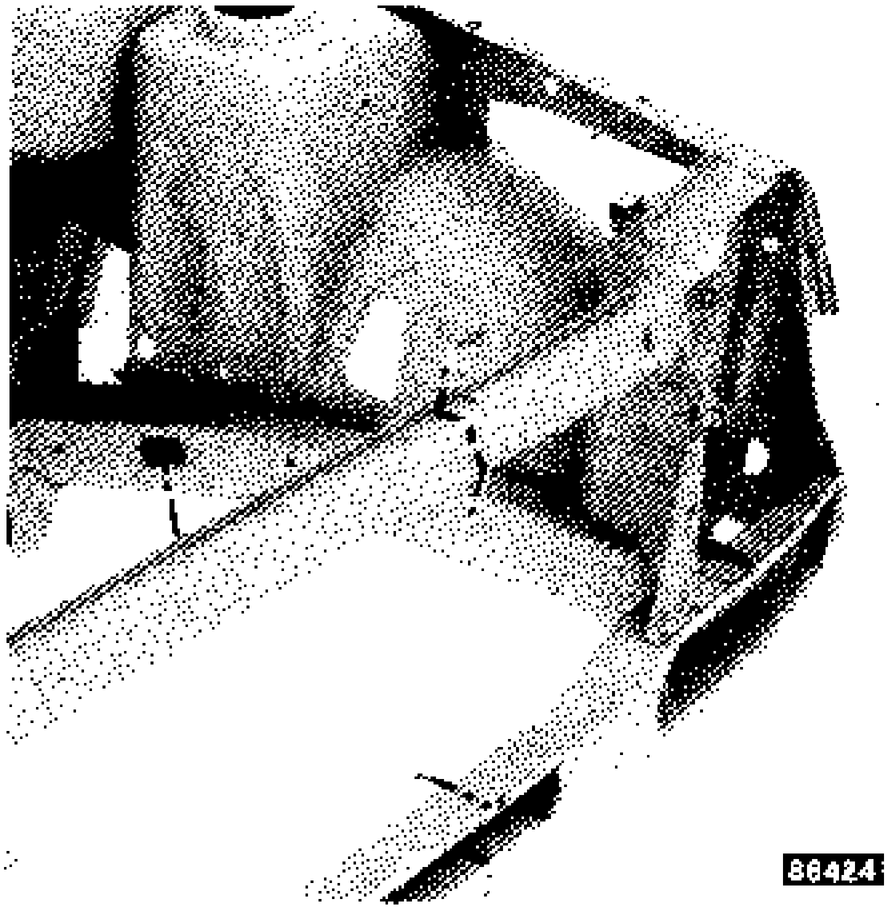


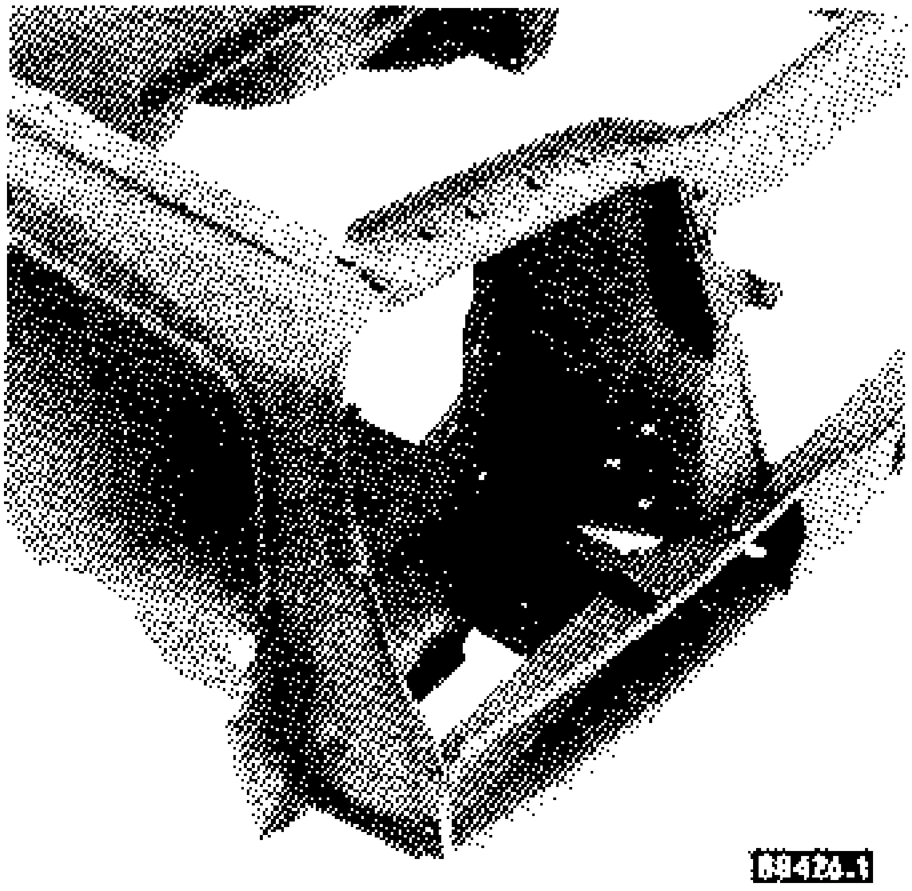
CUTTING - JOINT SEPARATION

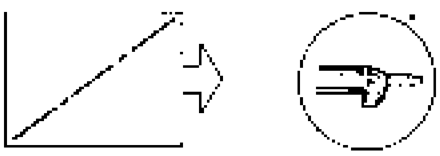






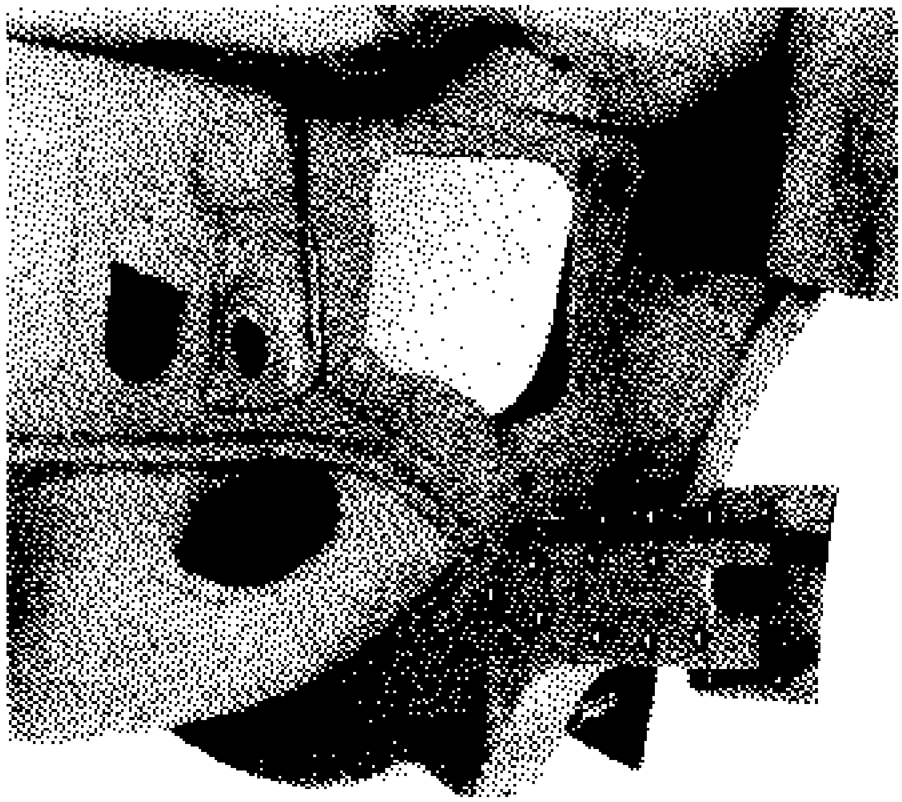






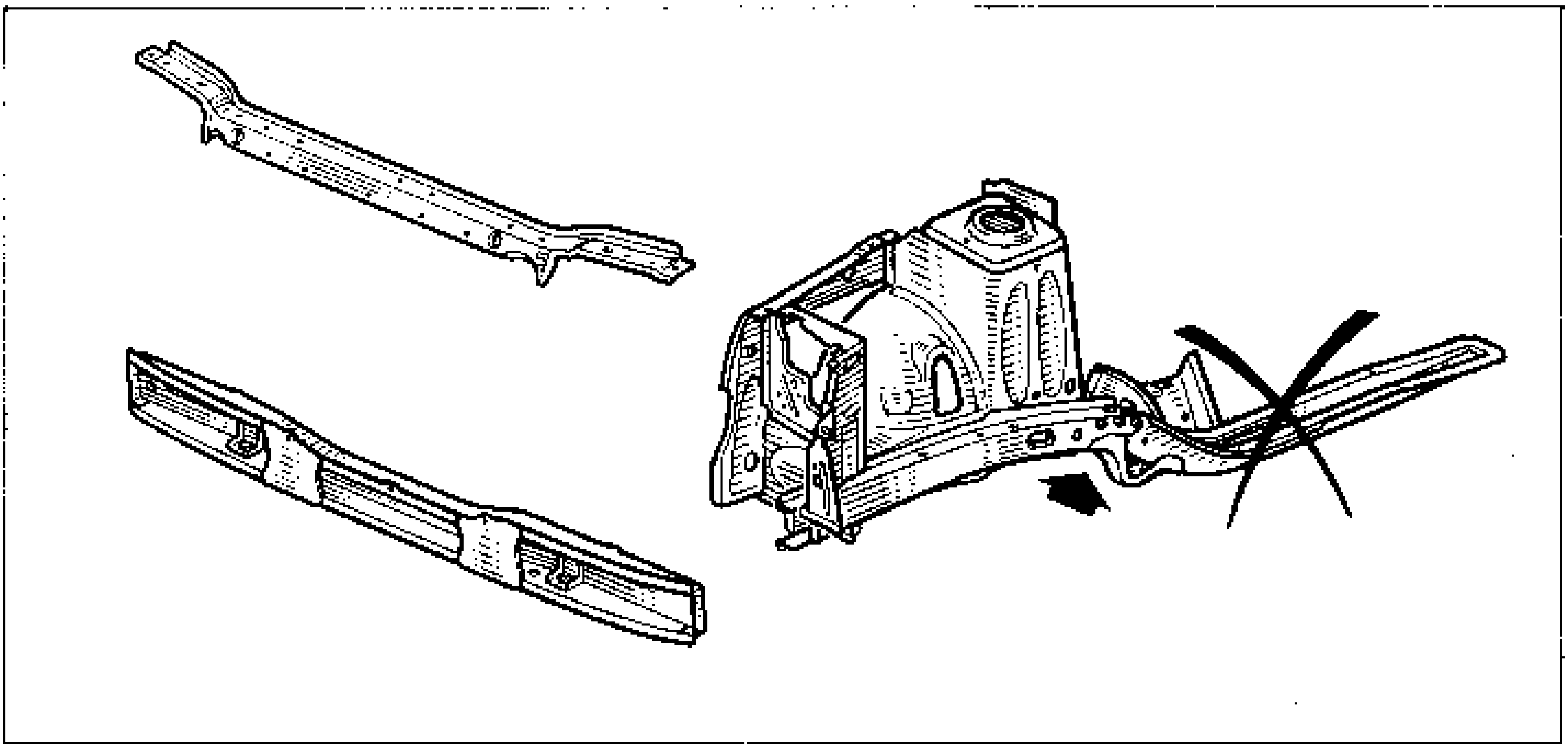
- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).
- Grind back the pieces of spot weld adhering to the support panels.

- Remove the remaining piece of the side member.



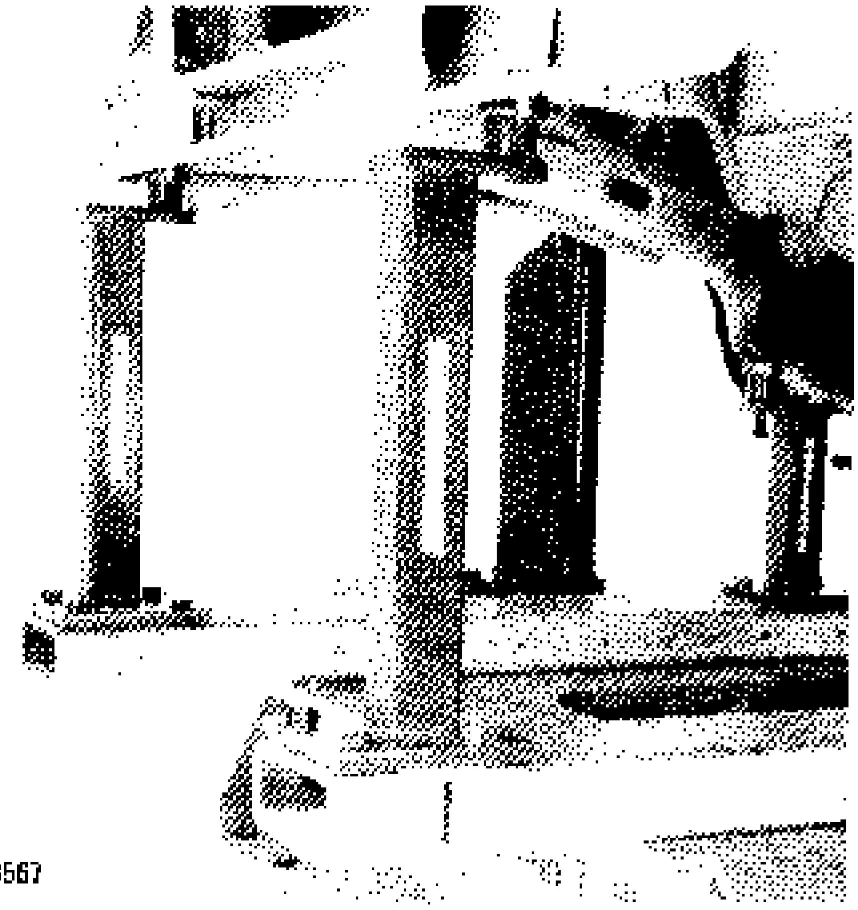
B8513-2

PREPARATION PRIOR TO WELDING



-- Free the rear part of the side member from the front half section.

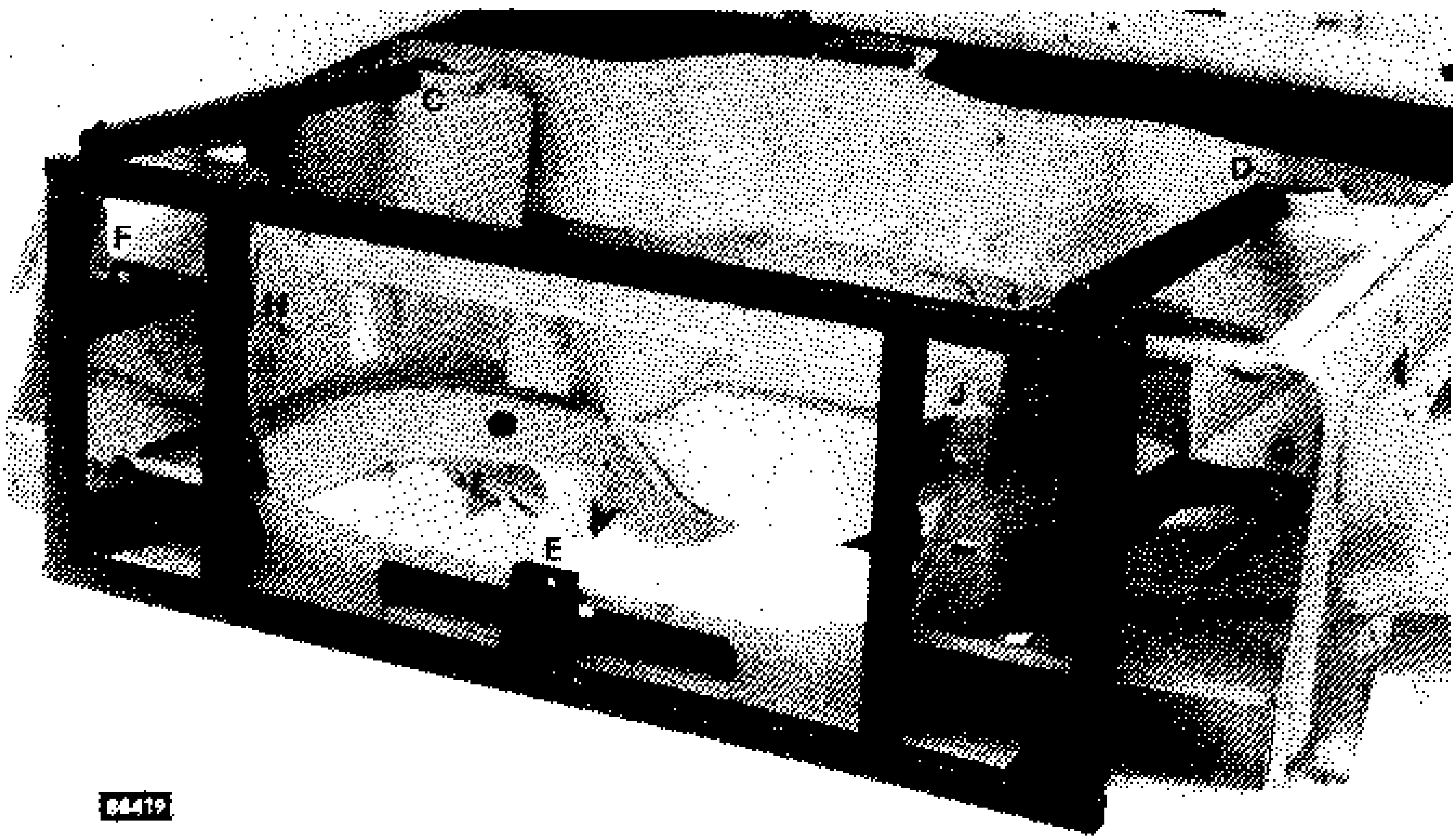
- Fit the jig brackets to the very front of the body jig.
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Apply zinc paint to the area to be plug welded.
- Adjust the new part and secure it with grip clamps.



88567

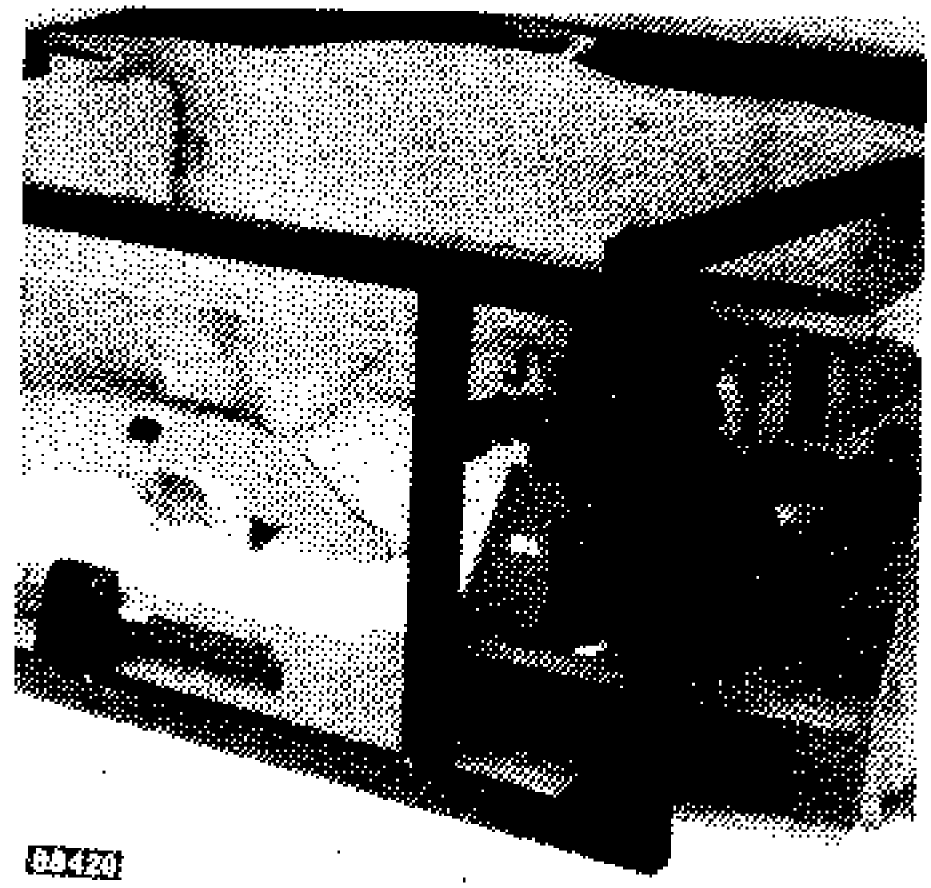
Fitting the front end frame jig :

Points A-B-C-D-E are the jig locating points on the vehicle. Before fitting it ensure, with the trammel gauge, that these points are correctly positioned.
When one of the points A or B cannot be used as a jig location (as is the case for this operation) use securing points G-J or F-H, depending on the side, instead.

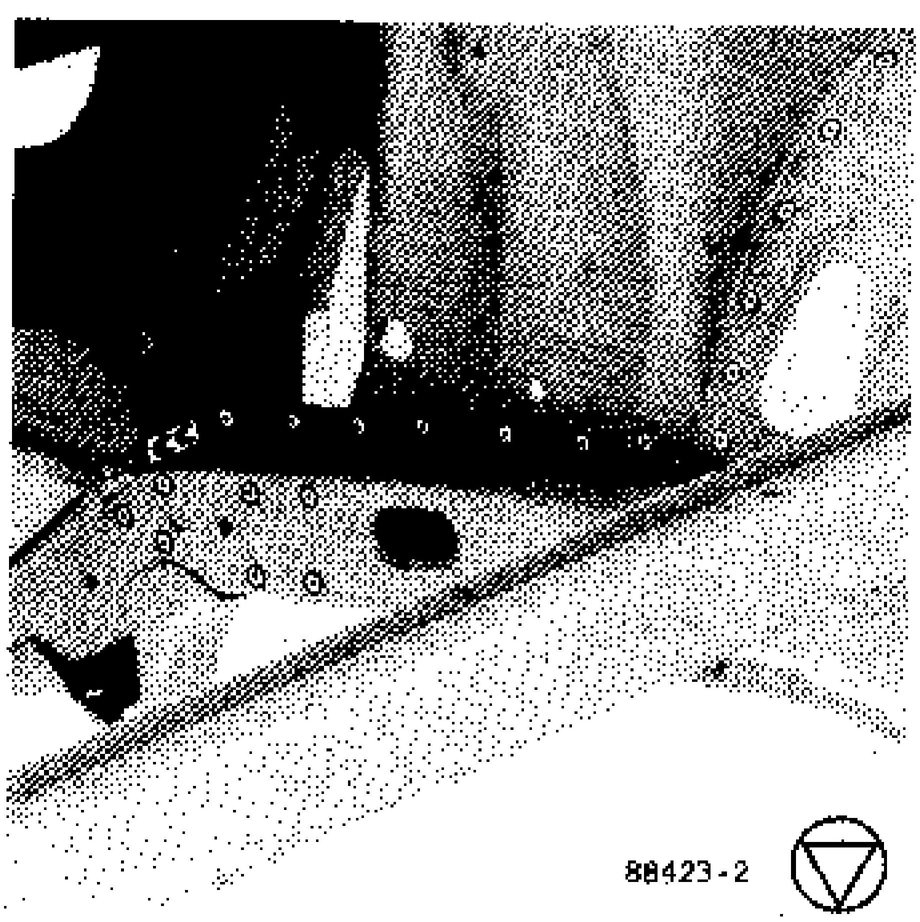


84419

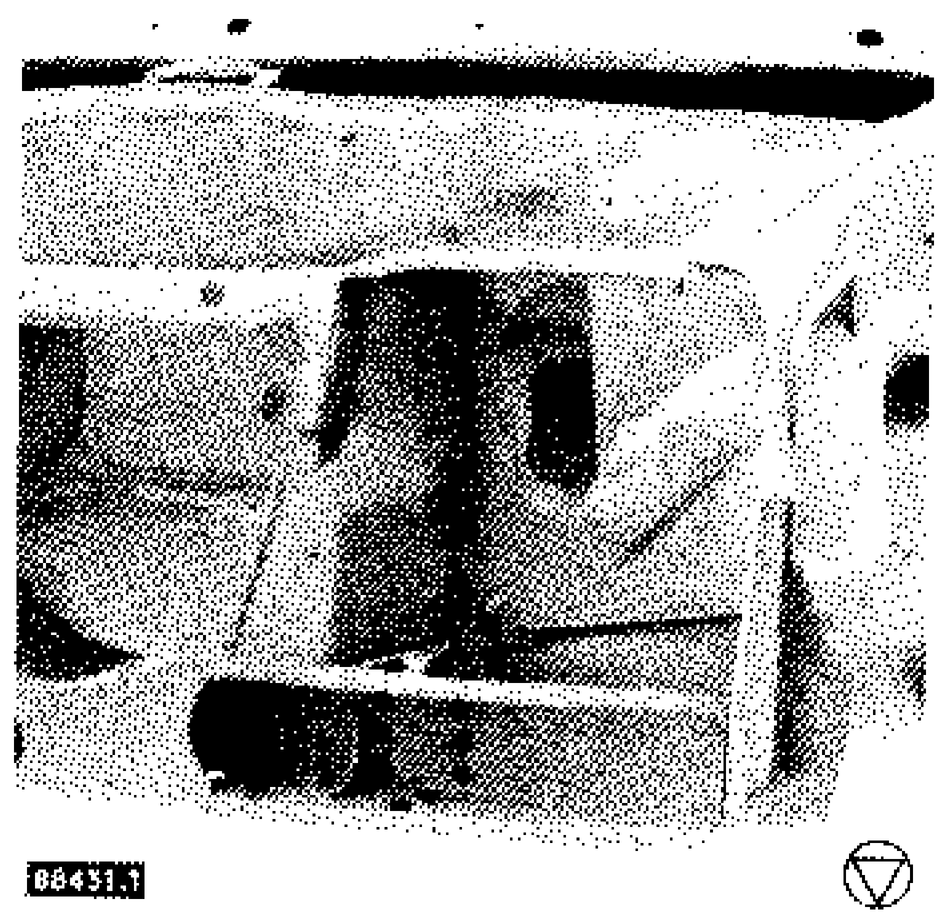
Points F-G-H-J are the securing and locating points for the parts being replaced.



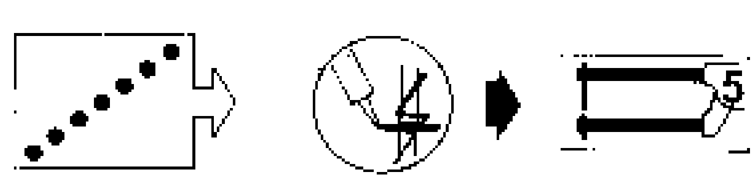
88420



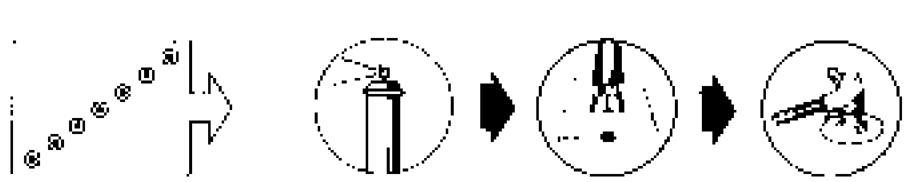
88423-2



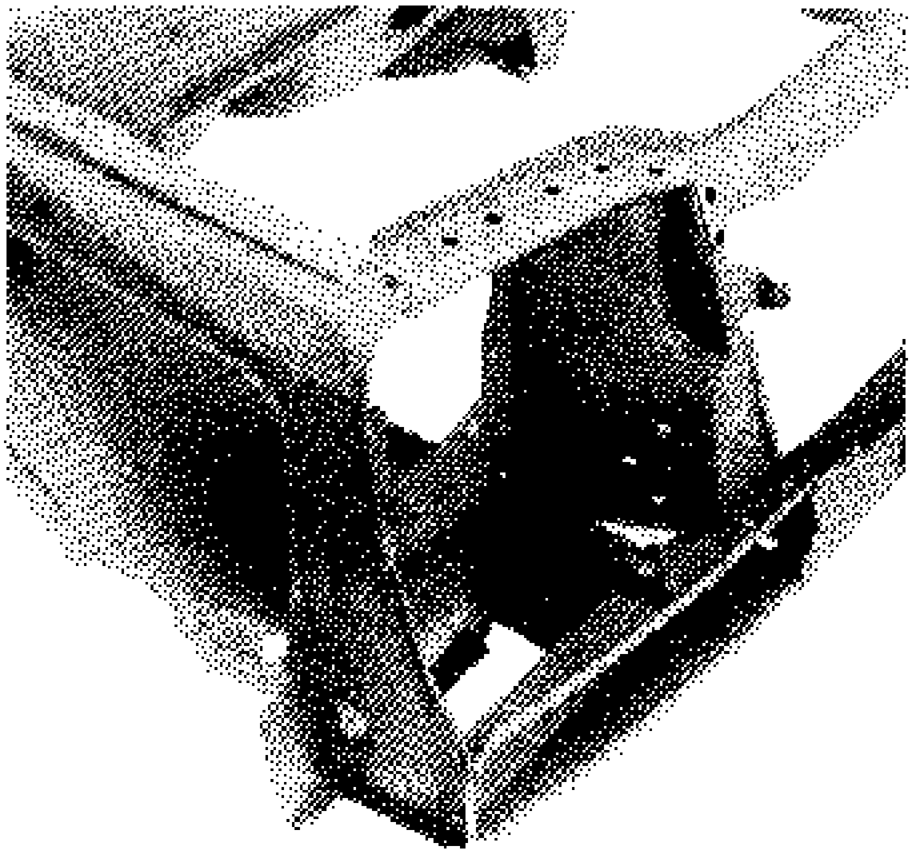
88431.1



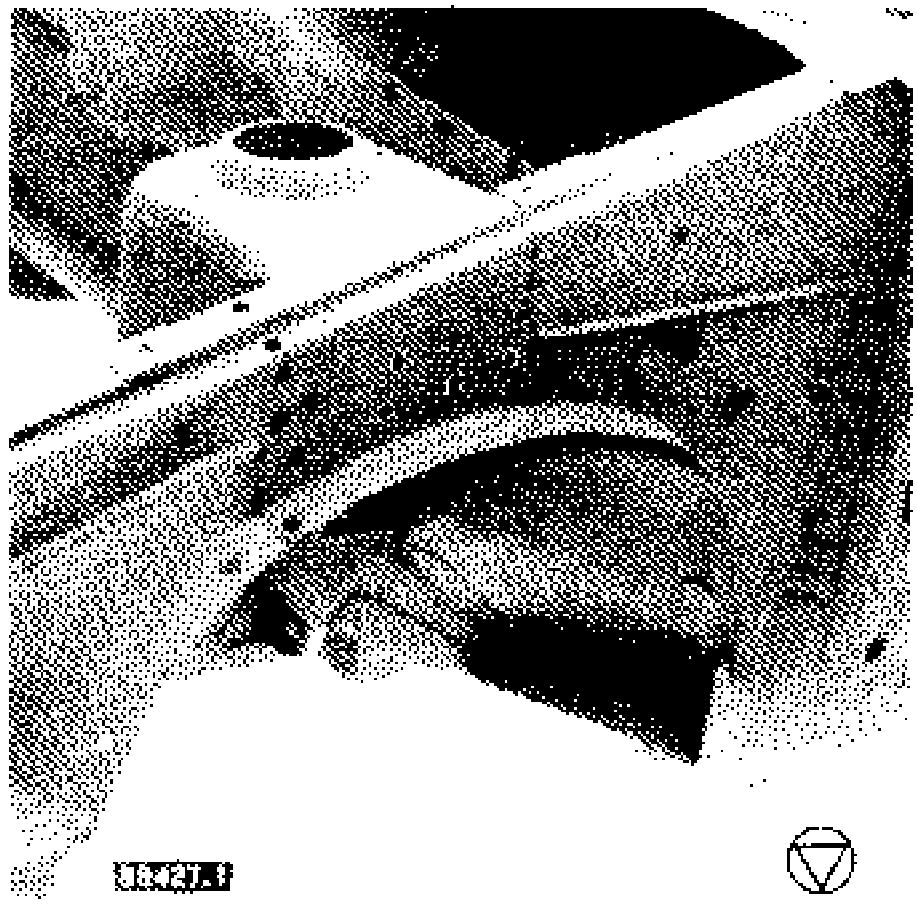
e = 2,2 mm; H = 50 mm



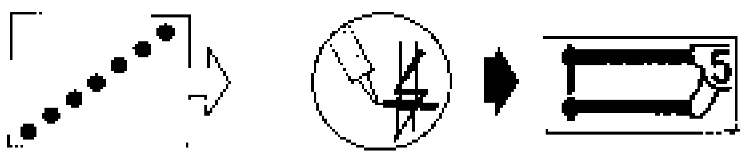
D = 6 mm



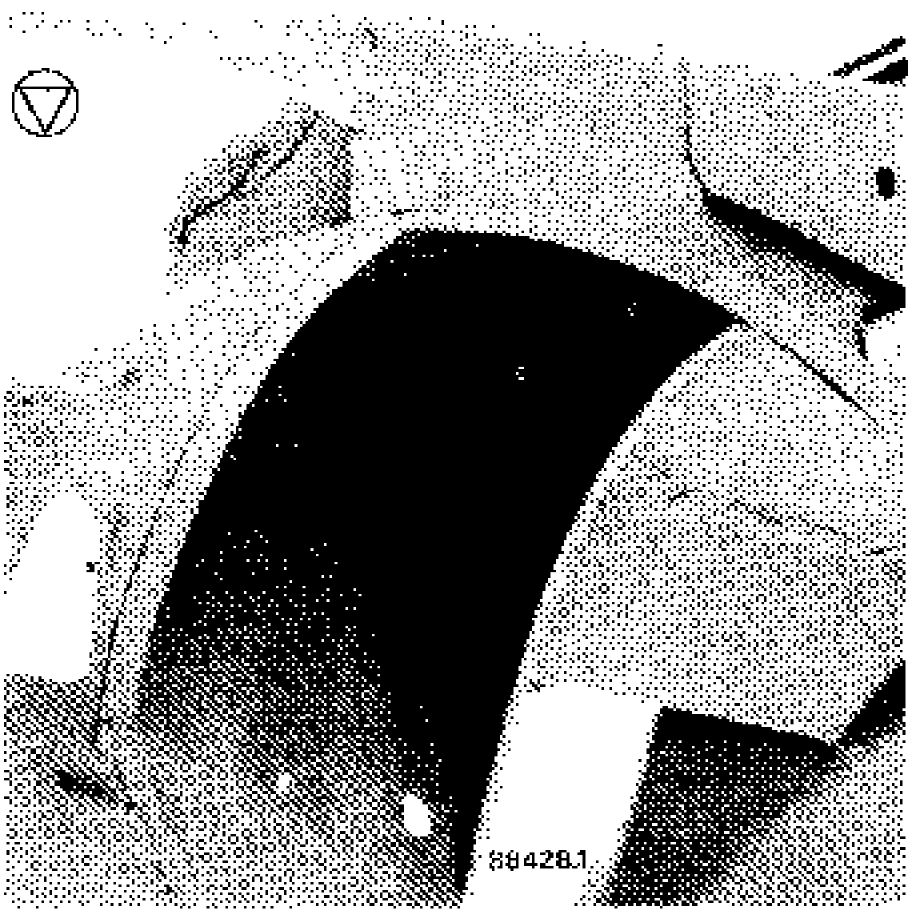
88426.2



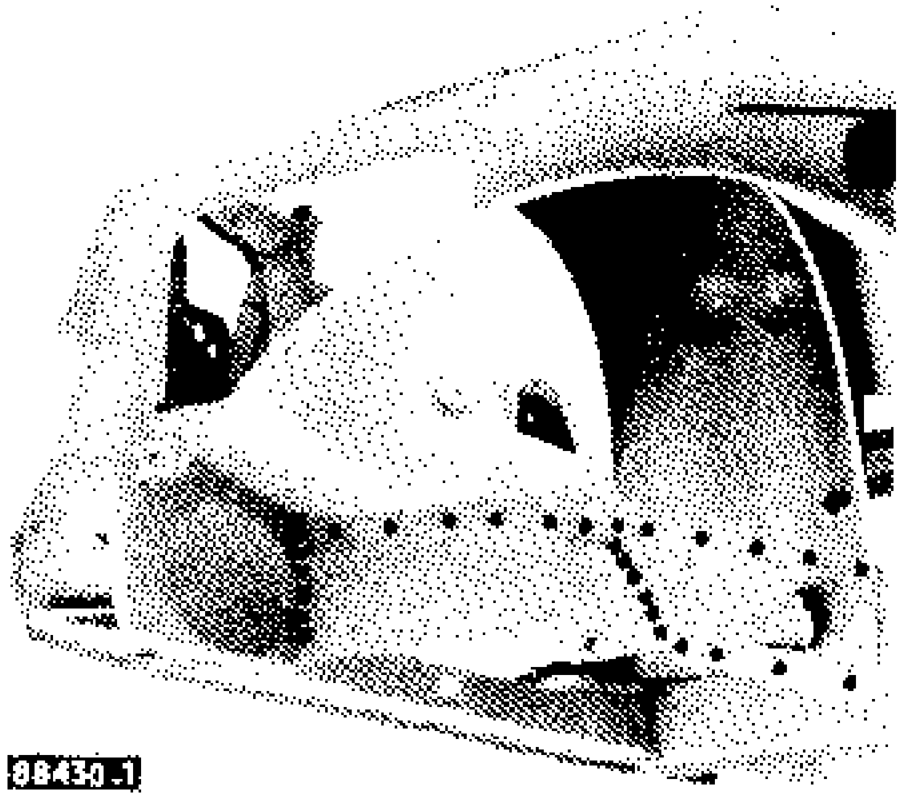
88427.1



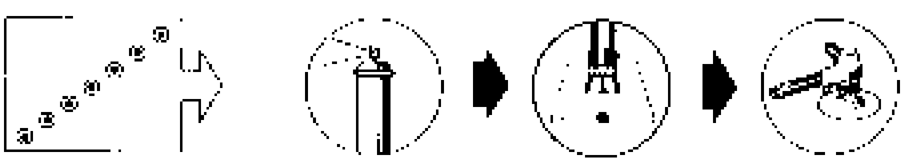
▣ e = 2,2 mm; H – 50 mm — • e – 1,4 mm; H = 55 mm

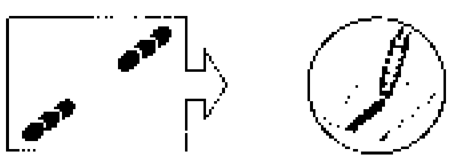


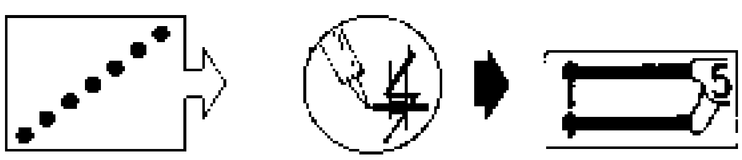
88428.1



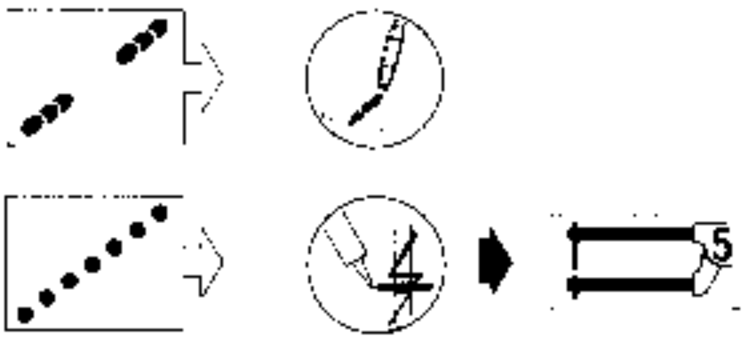
88430.1



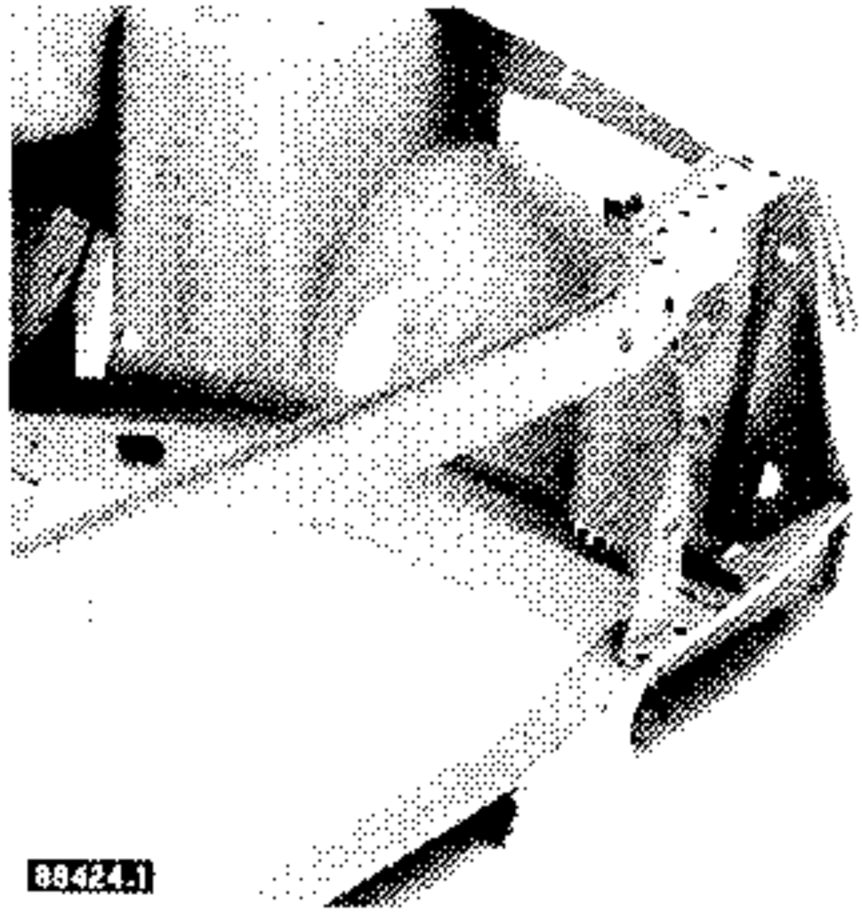




e = 1,4 mm; H = 55 mm



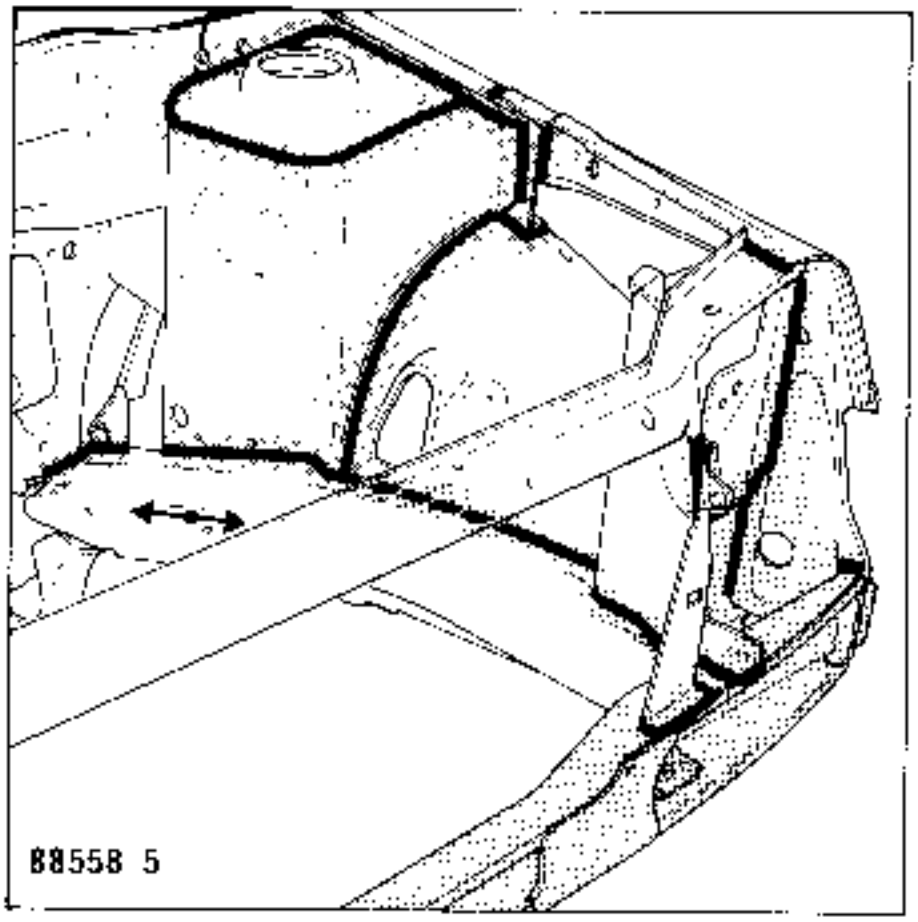
• e = 1,4 mm; H = 55 mm
▣ e = 2,2 mm; H = 50 mm



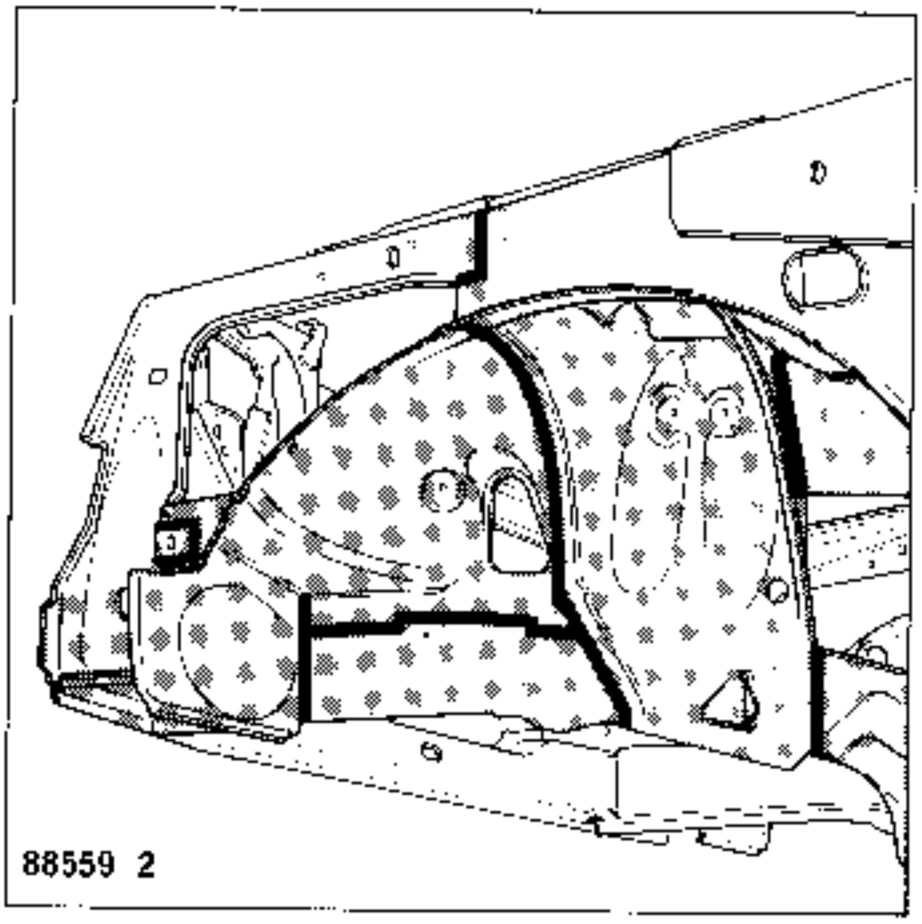
88424.1

- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.
- Apply the stitched fillets using the gas envelope welding process. (These joints may also be gas welded using a 75 to 100 nozzle).
- Apply the plug welds using the gas envelope process. To do so drill holes in the upper panel to the diameter shown under the drawings.

PAINTING

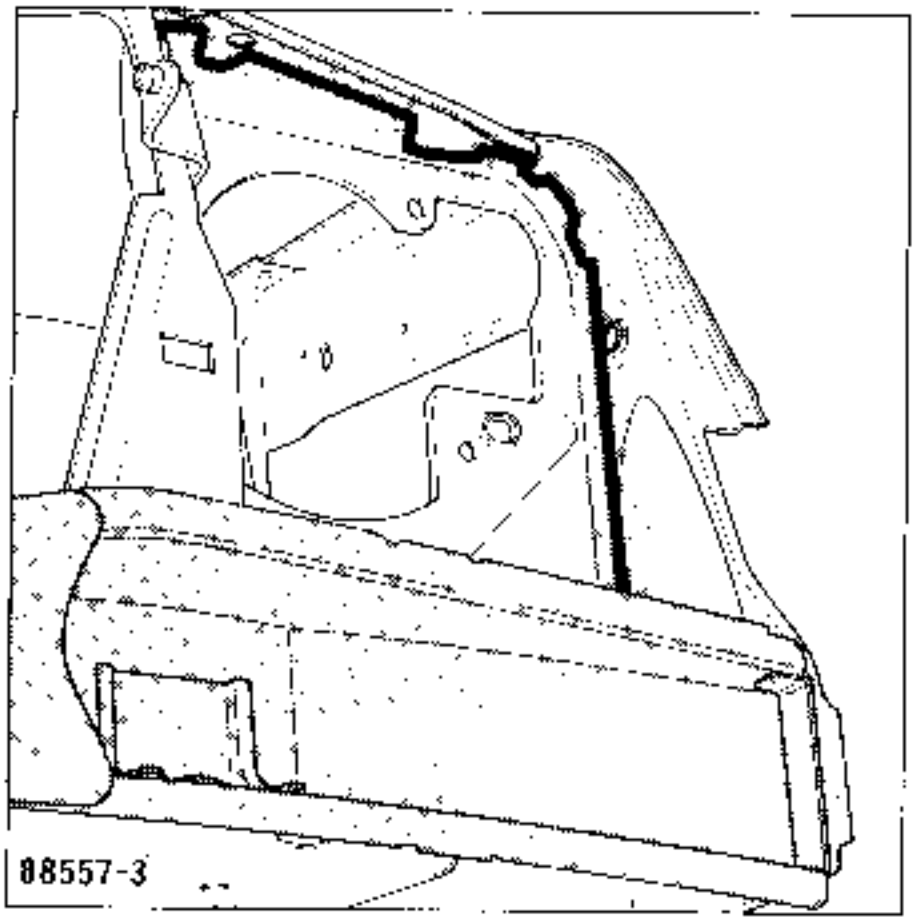


88558 5

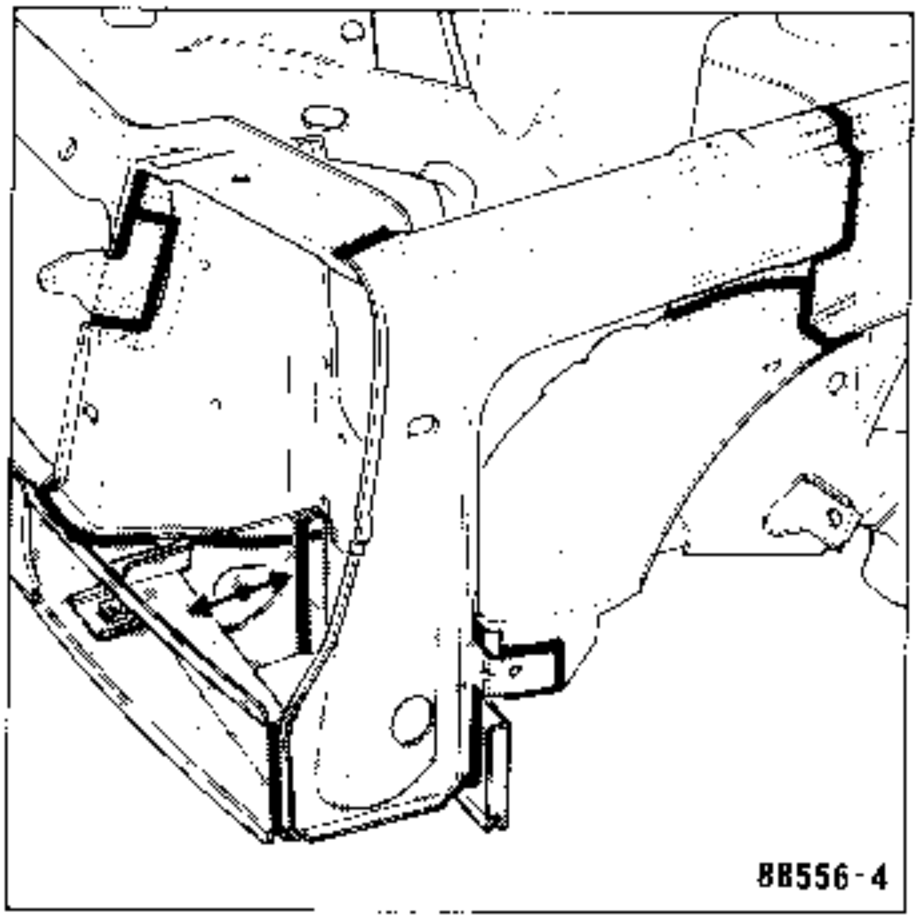


88559 2

- Carry out paint sequence No. 5 (see "Painting" section).



88557-3



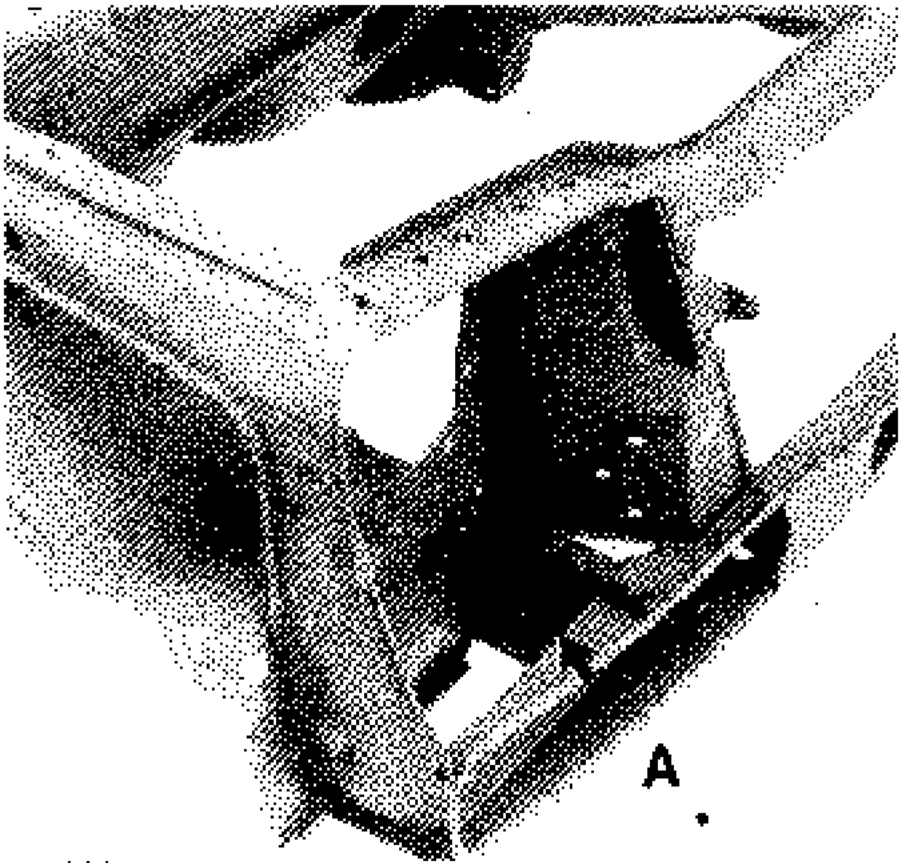
88556-4

After painting, but before fitting the other components, apply hollow section protective treatment.

Additional to above operation

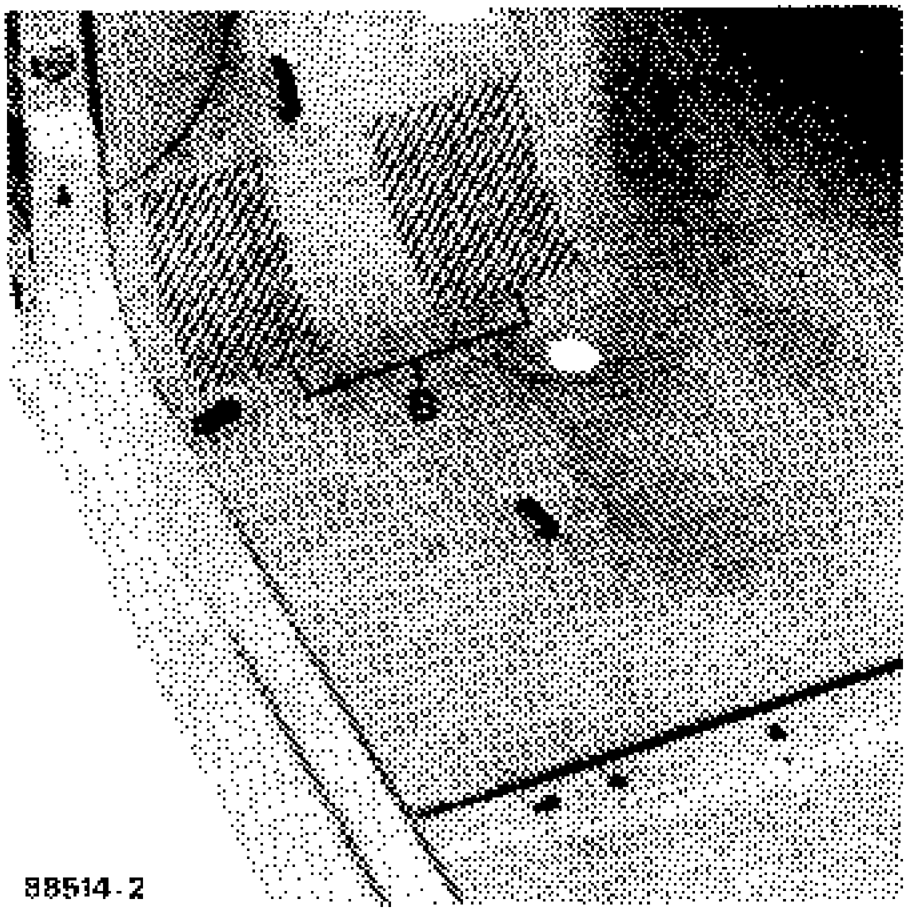
DAMAGE DIAGNOSIS

The side member closing panel has an aperture at one end which acts as a "crumple point". Depending on how far the damage extends past this point, either the front end of the side member can be replaced or the complete side member, using the body jig.



88426

Distortion in section A.
No distortion in section B : replace the side member front section.



Distortion in section B : replace the complete side member.

STRIPPING

Support the vehicle on axle stands and remove :

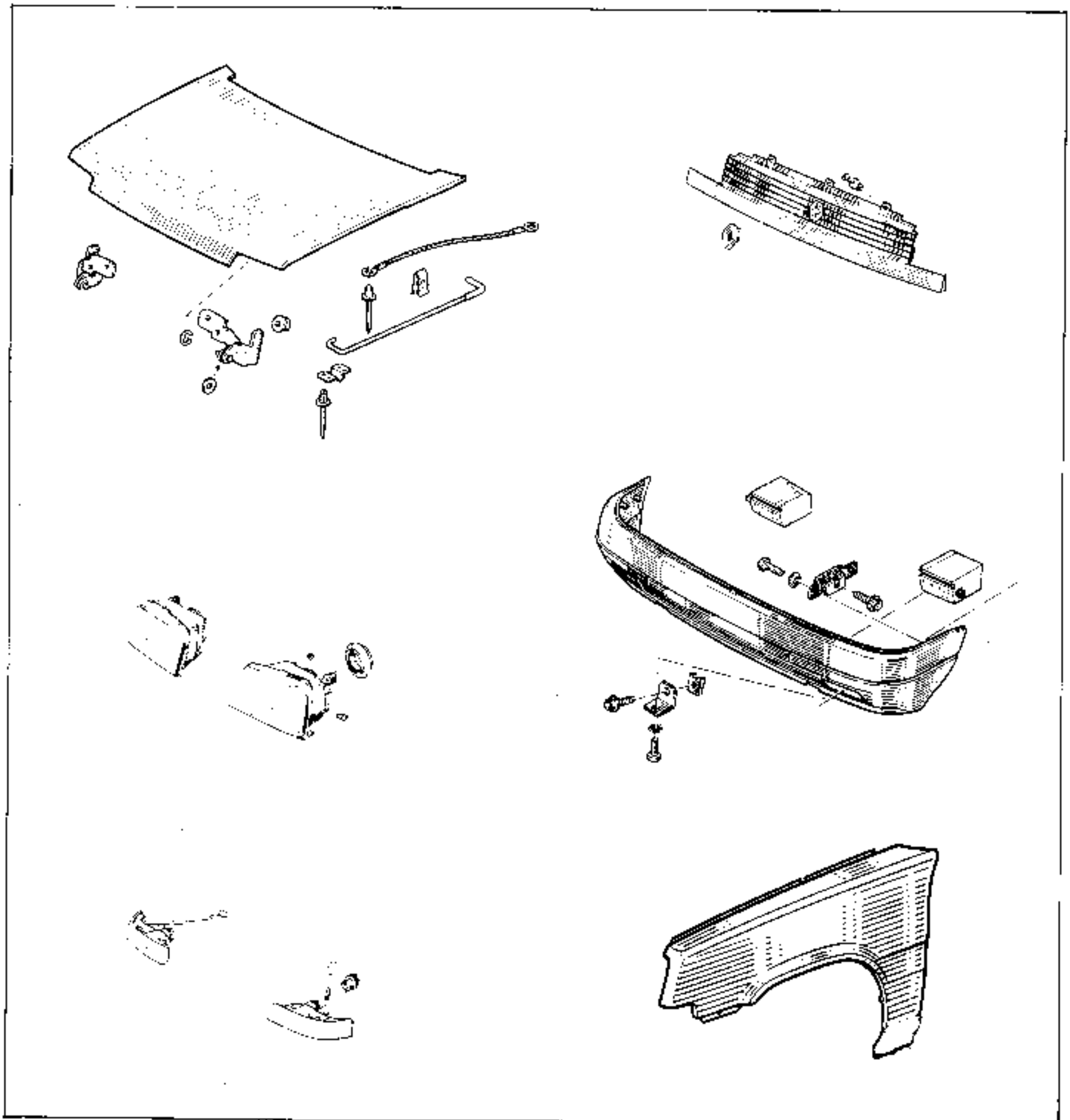
- the bonnet,
- the radiator grille,
- the headlights,
- the bumper shield,
- the wings,
- the power unit assembly (see mechanical workshop manual).
- the front seat on the side concerned,
- the rear seat cushion,
- the side trim on the side concerned,
- the centre console,
- the floor covering.

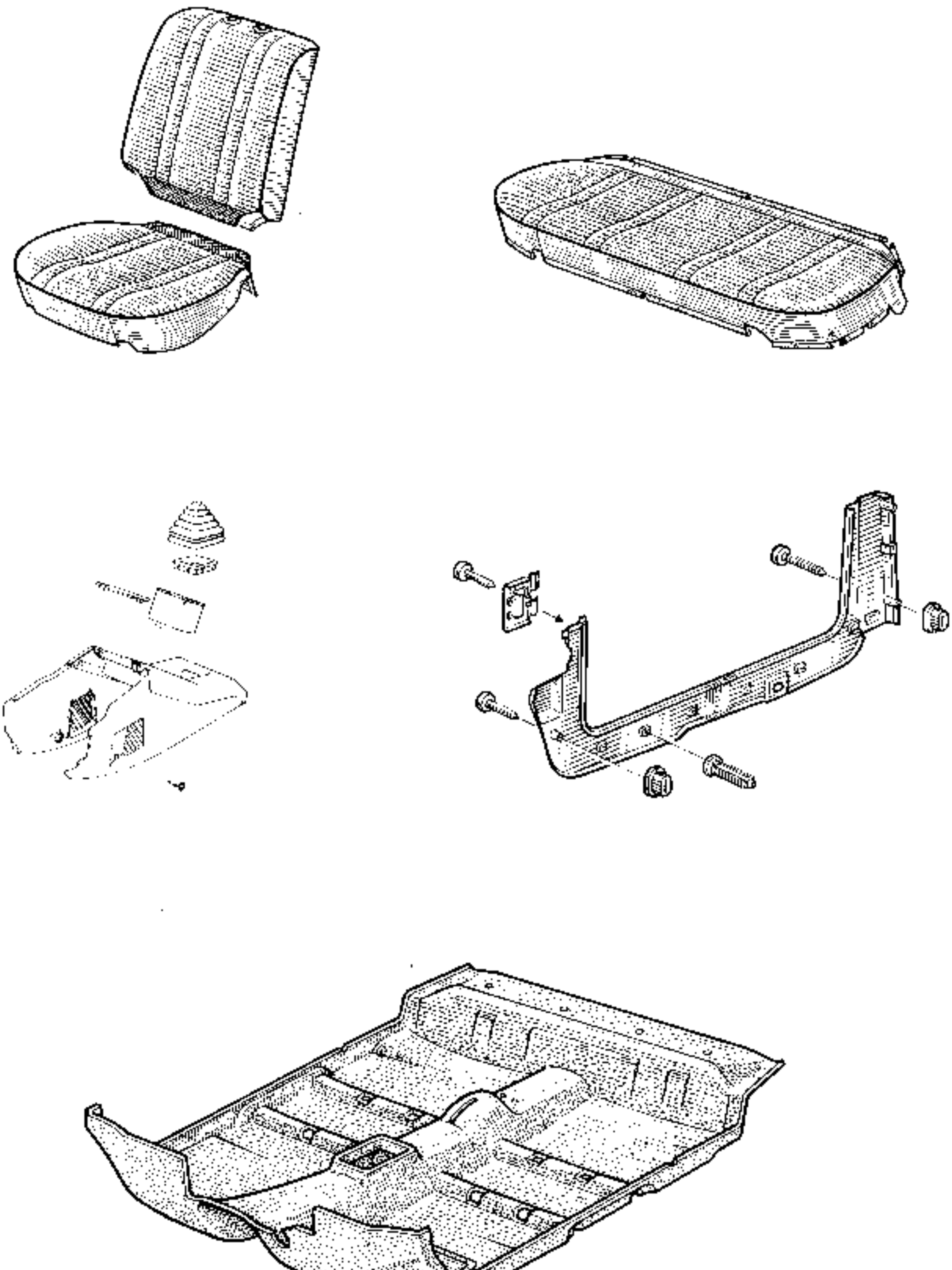
STRIPPING

Remove :

- the bonnet,
- the headlight,
- the direction indicator,
- the radiator grille,
- the bumper shield,
- the wing.

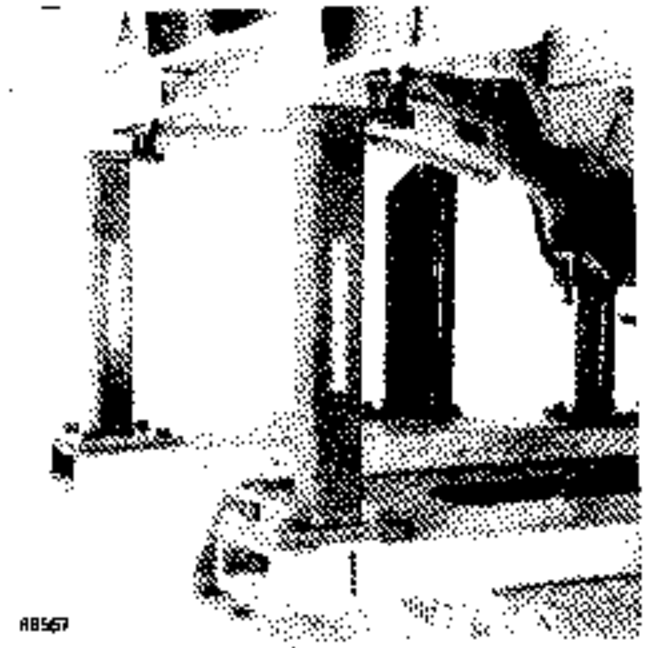
Note : For more details on removing the various parts, see the section that deals with the part in question.

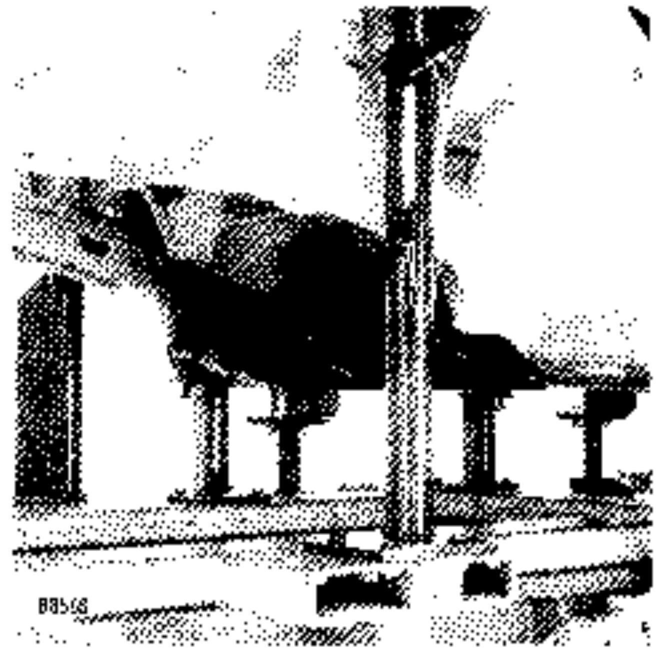


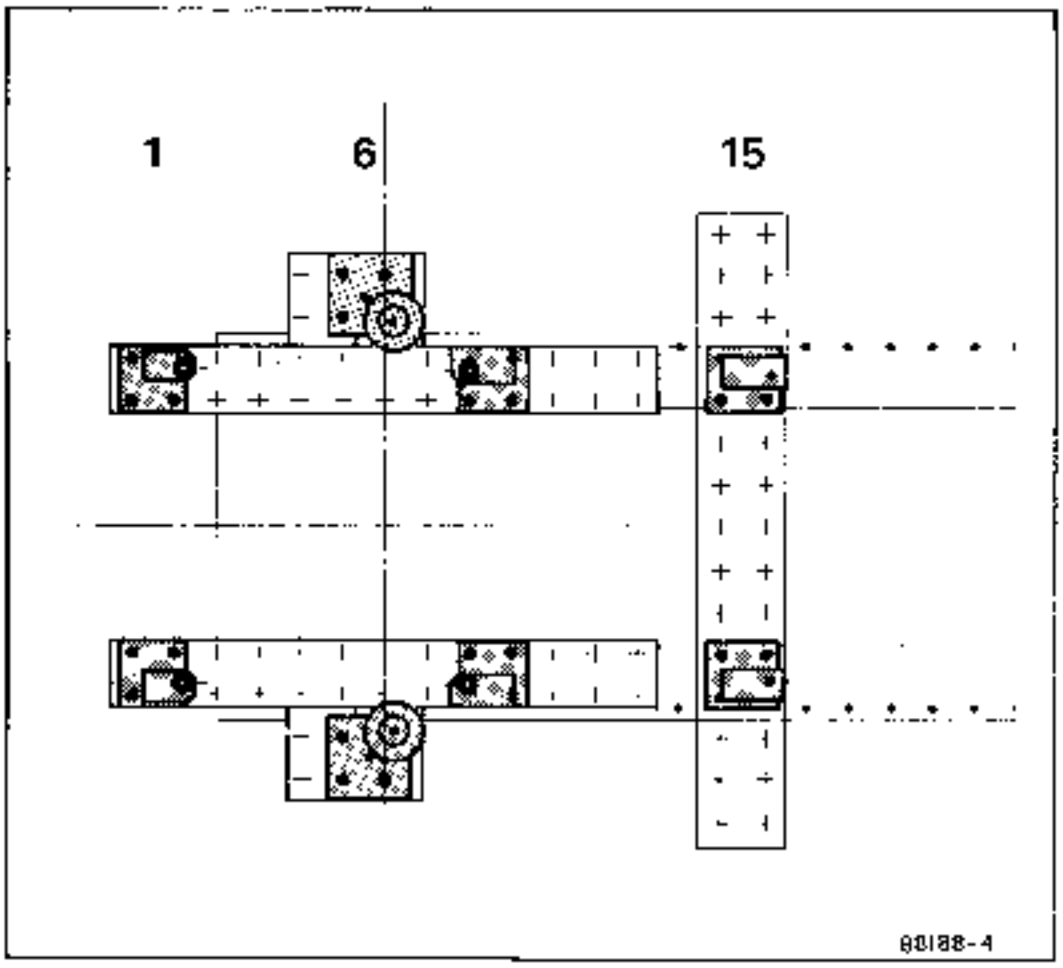


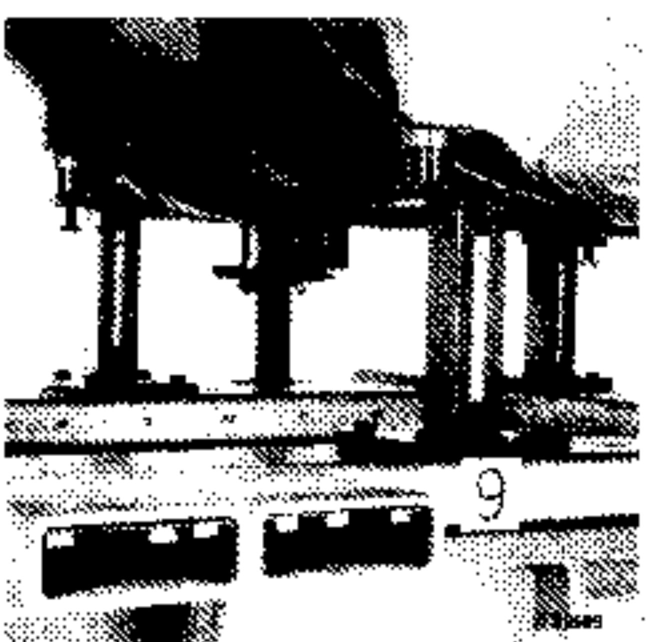
FITTING THE JIG BRACKETS TO THE BODY JIG

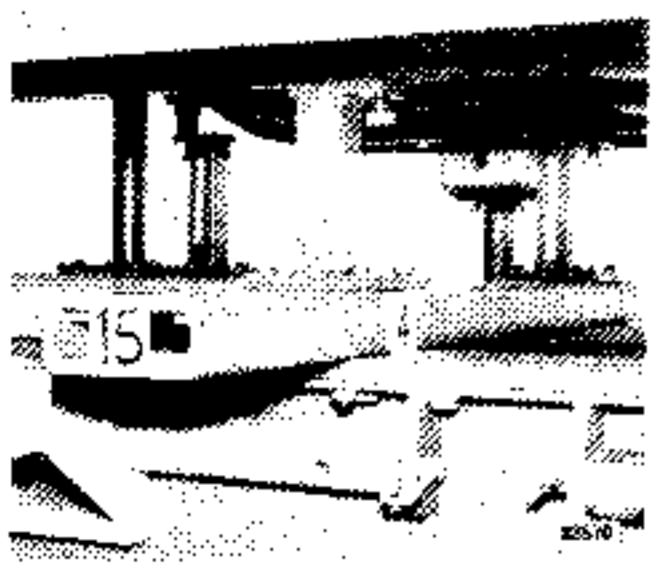
Front section :



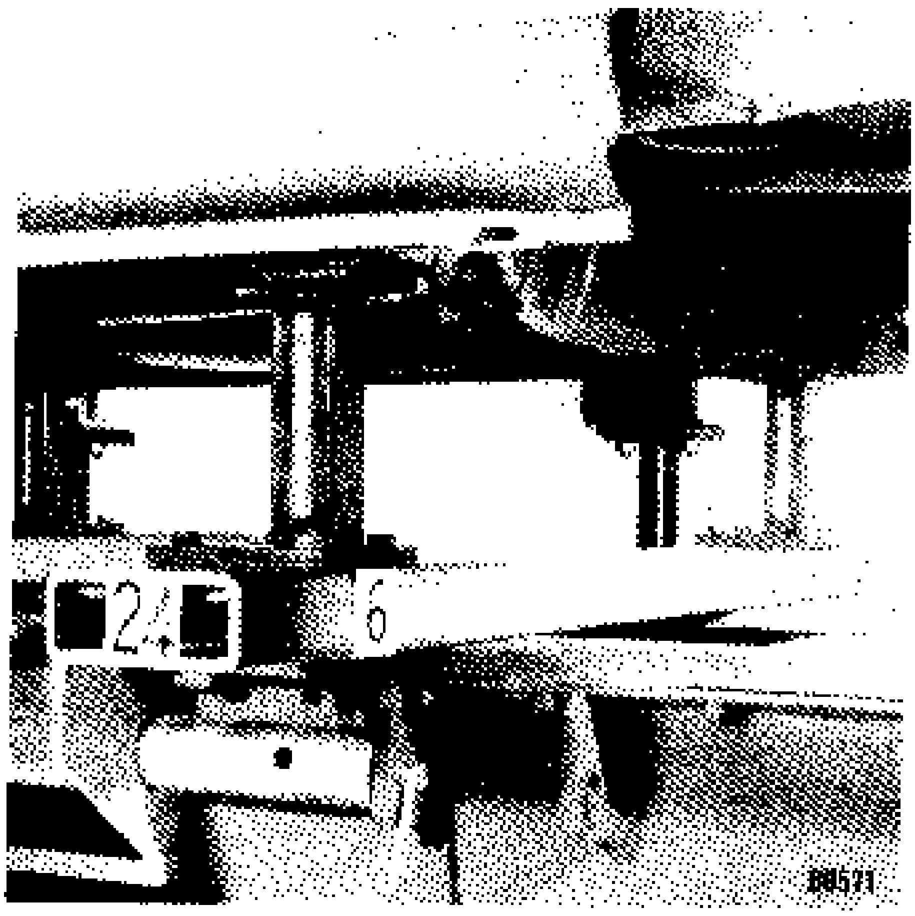


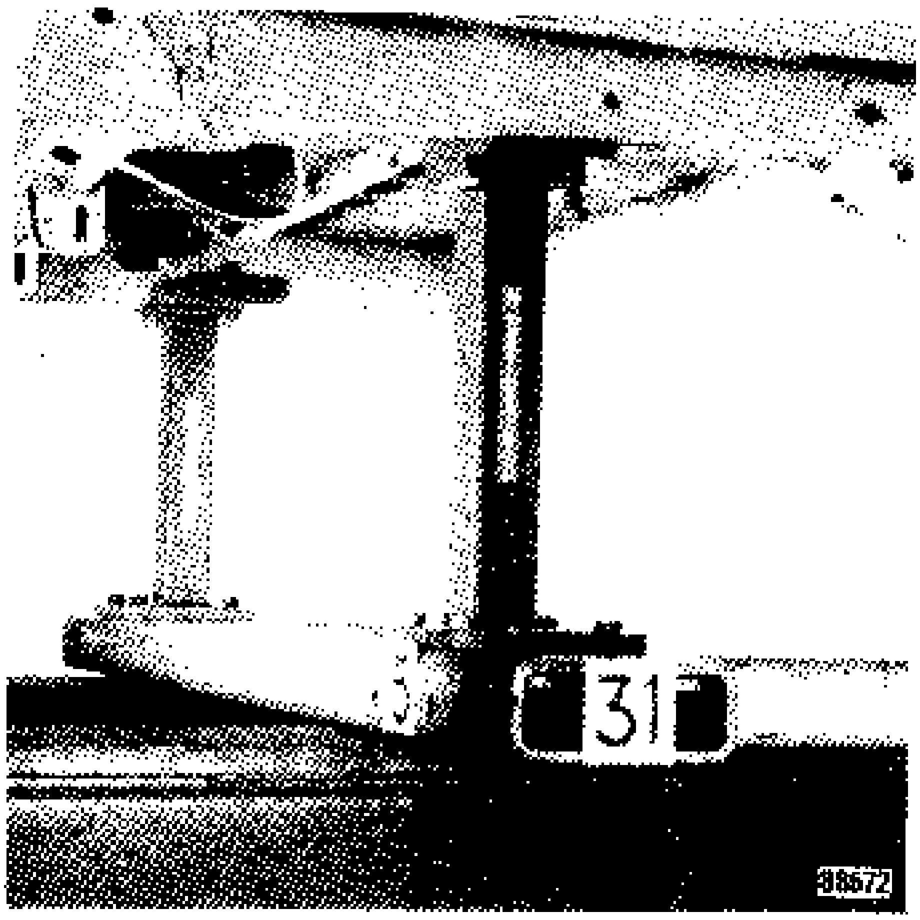


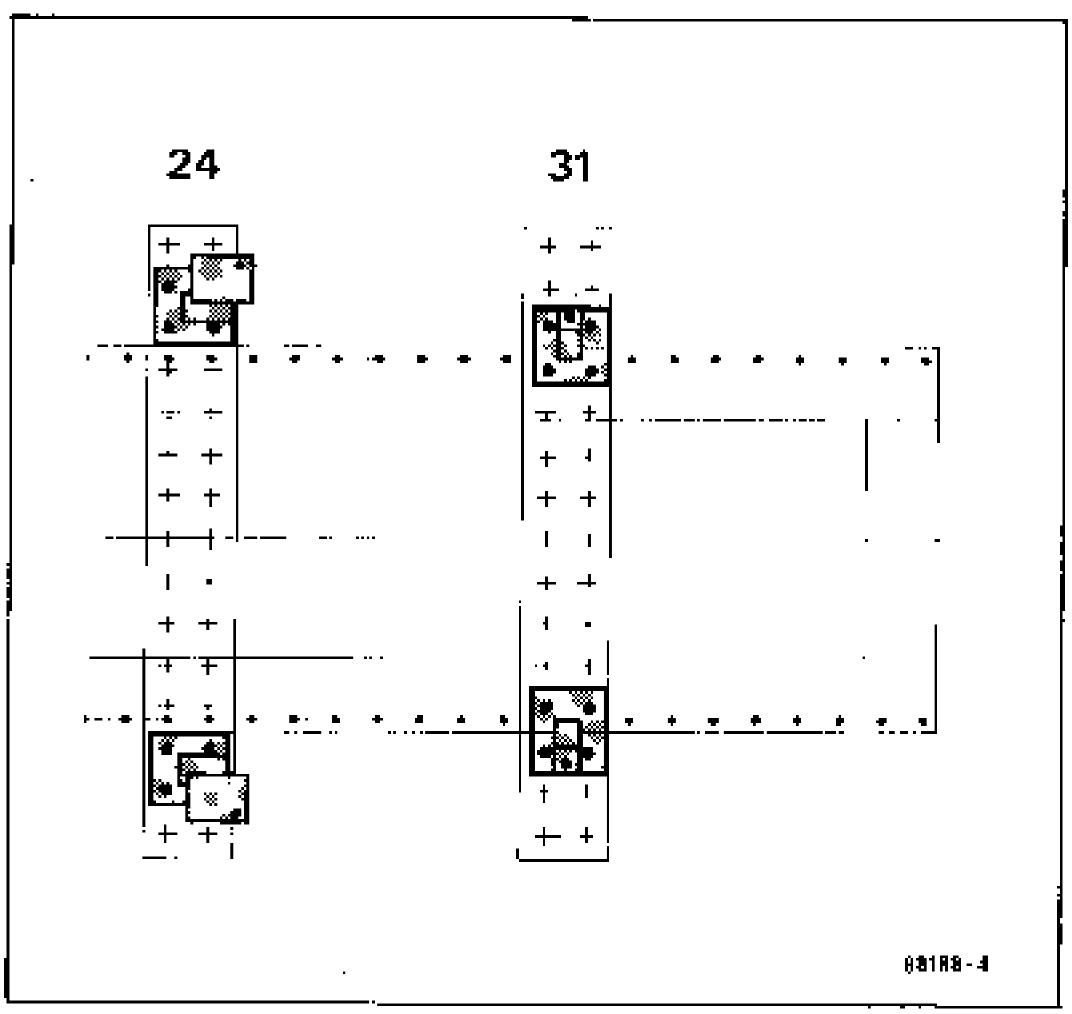




Rear section :

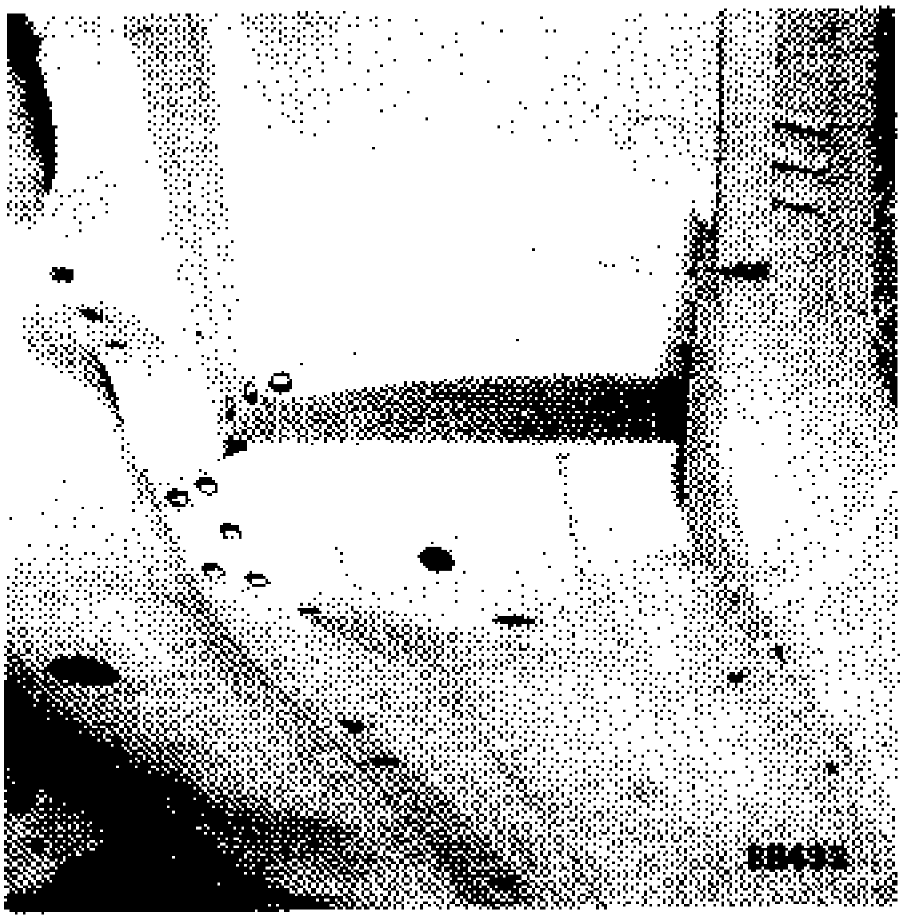




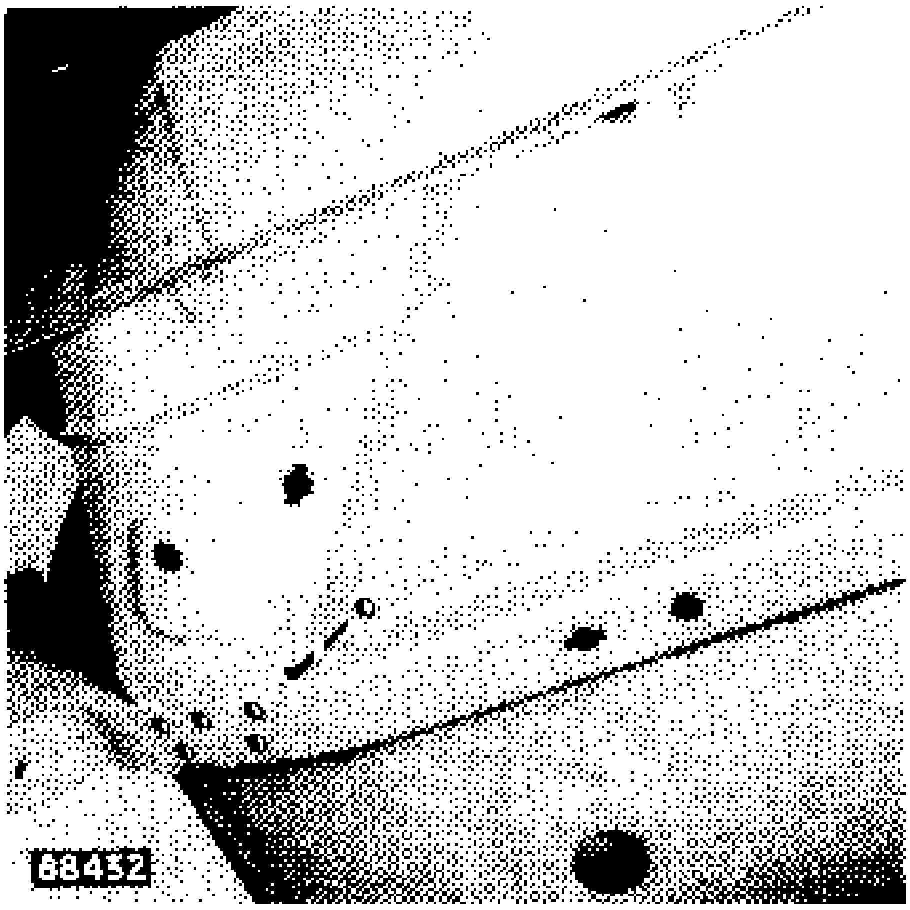


CUTTING - JOINT SEPARATION

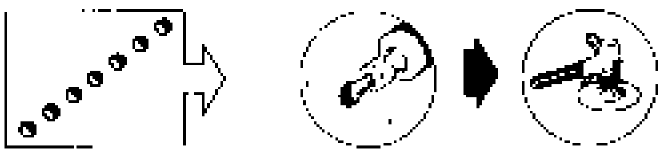
- Remove all the cowl side parts and the cross members by following the instructions given in the previous sub-section.
- Removing the underfloor side member :



68433



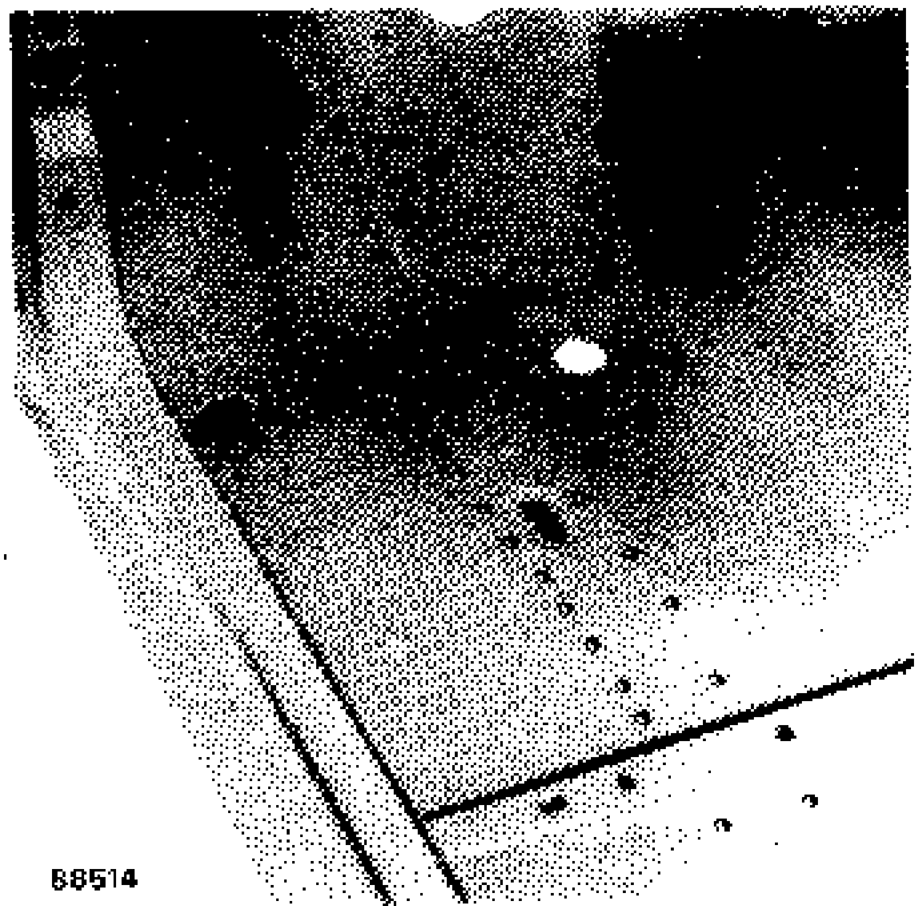
68432



- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).
- Grind back the pieces of spot weld adhering to the support panels.

PREPARATION PRIOR TO WELDING

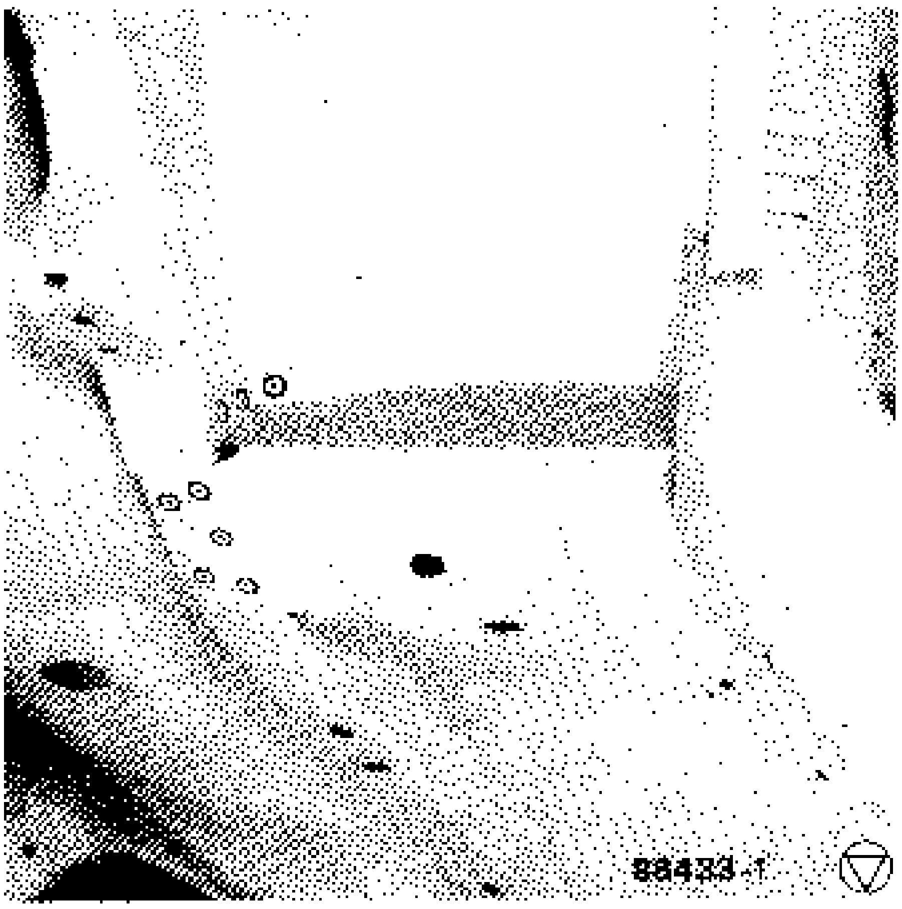
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Coat the parts to be plug welded with zinc paint.
- Adjust the new part and secure it with grip clamps.
- Fit the front end frame jig.



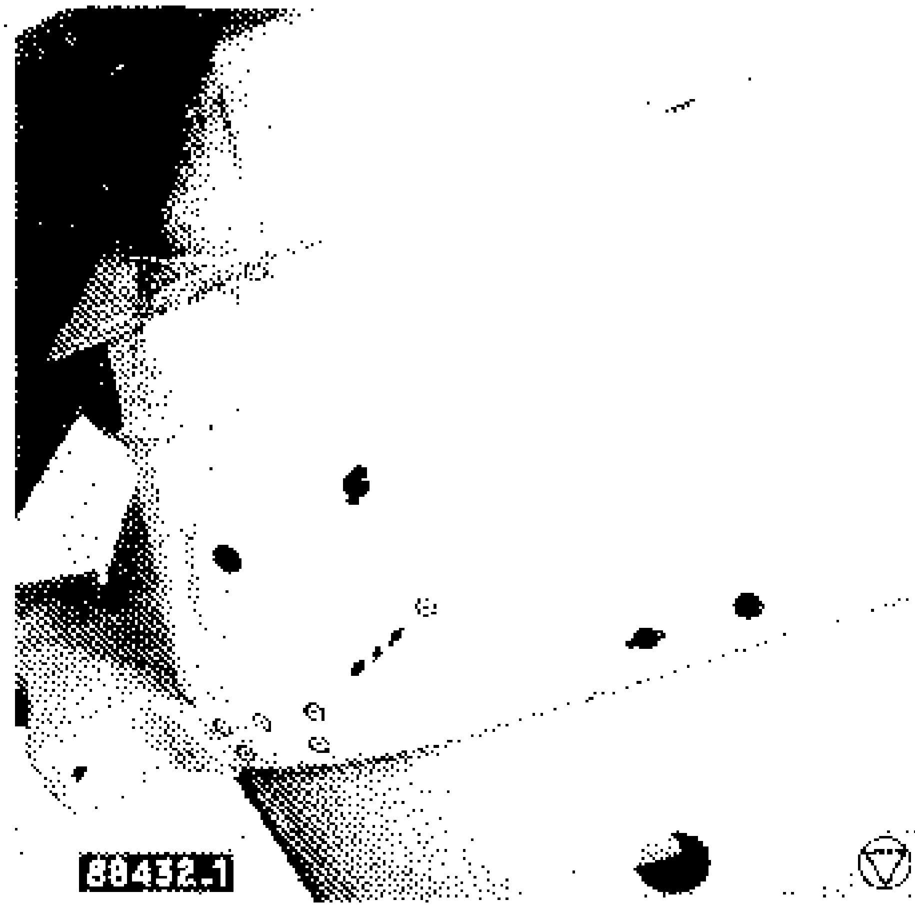
68514

WELDING

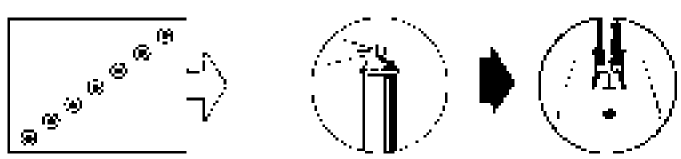
- Weld the cowl side parts and the cross members in place by following the instructions given in the previous sub-section.
- Welding the underfloor side member in place.



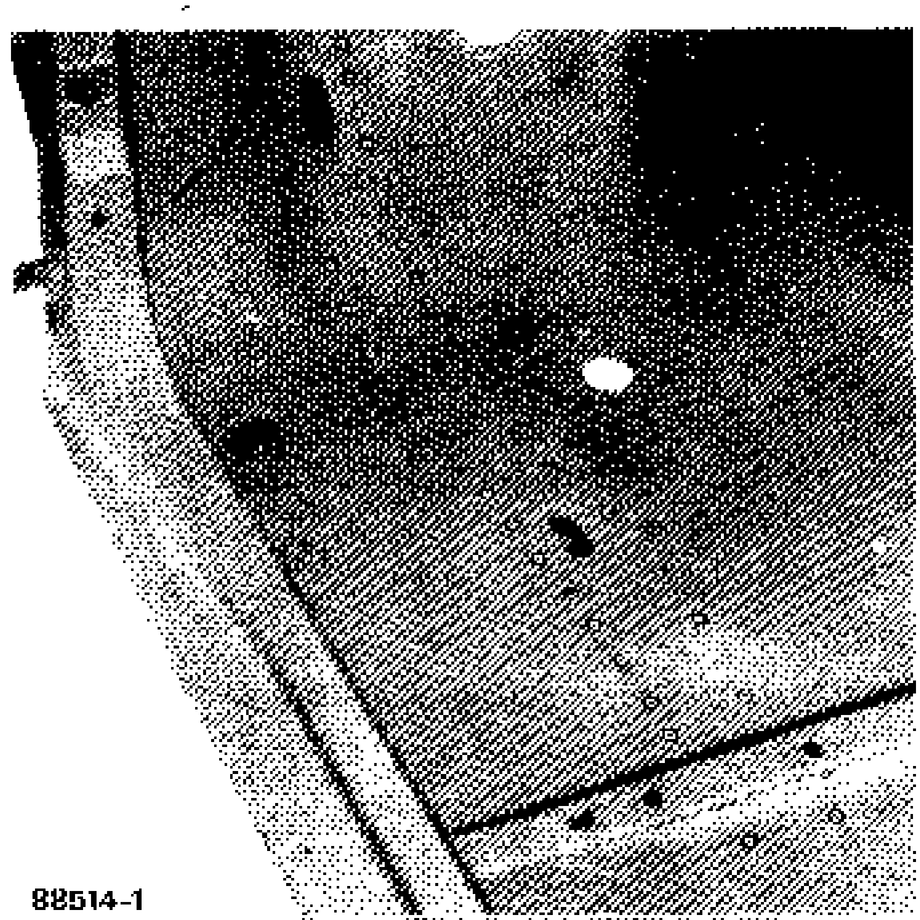
88433-1



88432.1

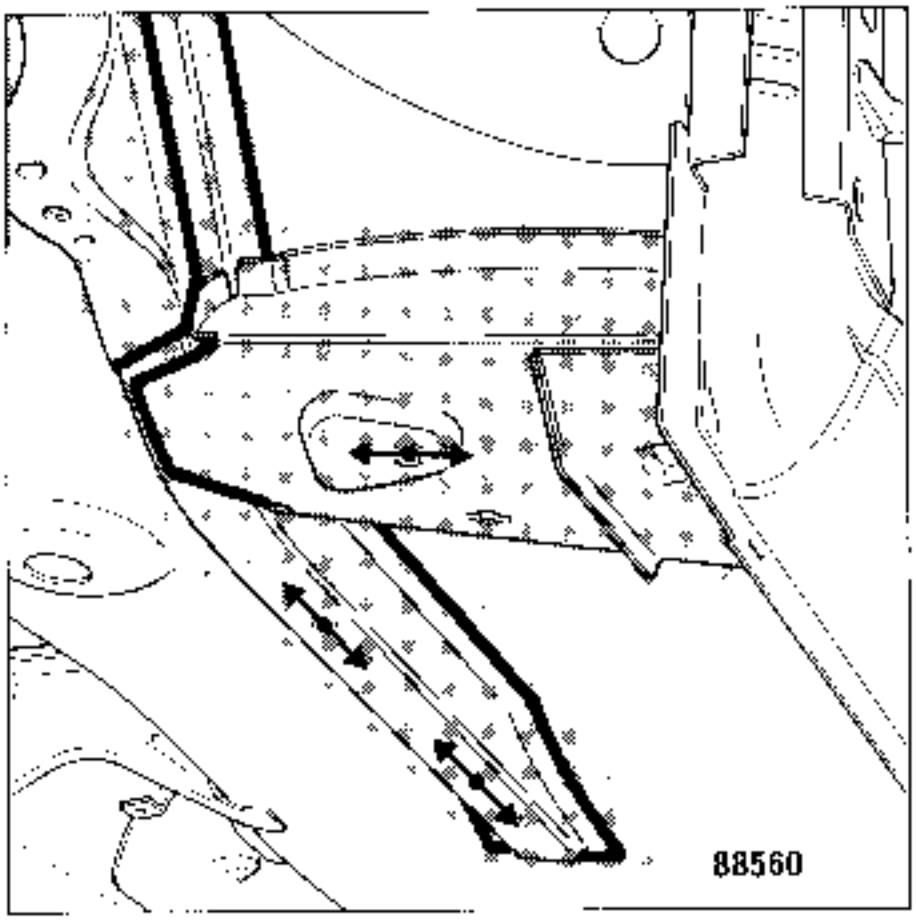


- Apply a number of plug welds, side by side, in a spiral pattern.



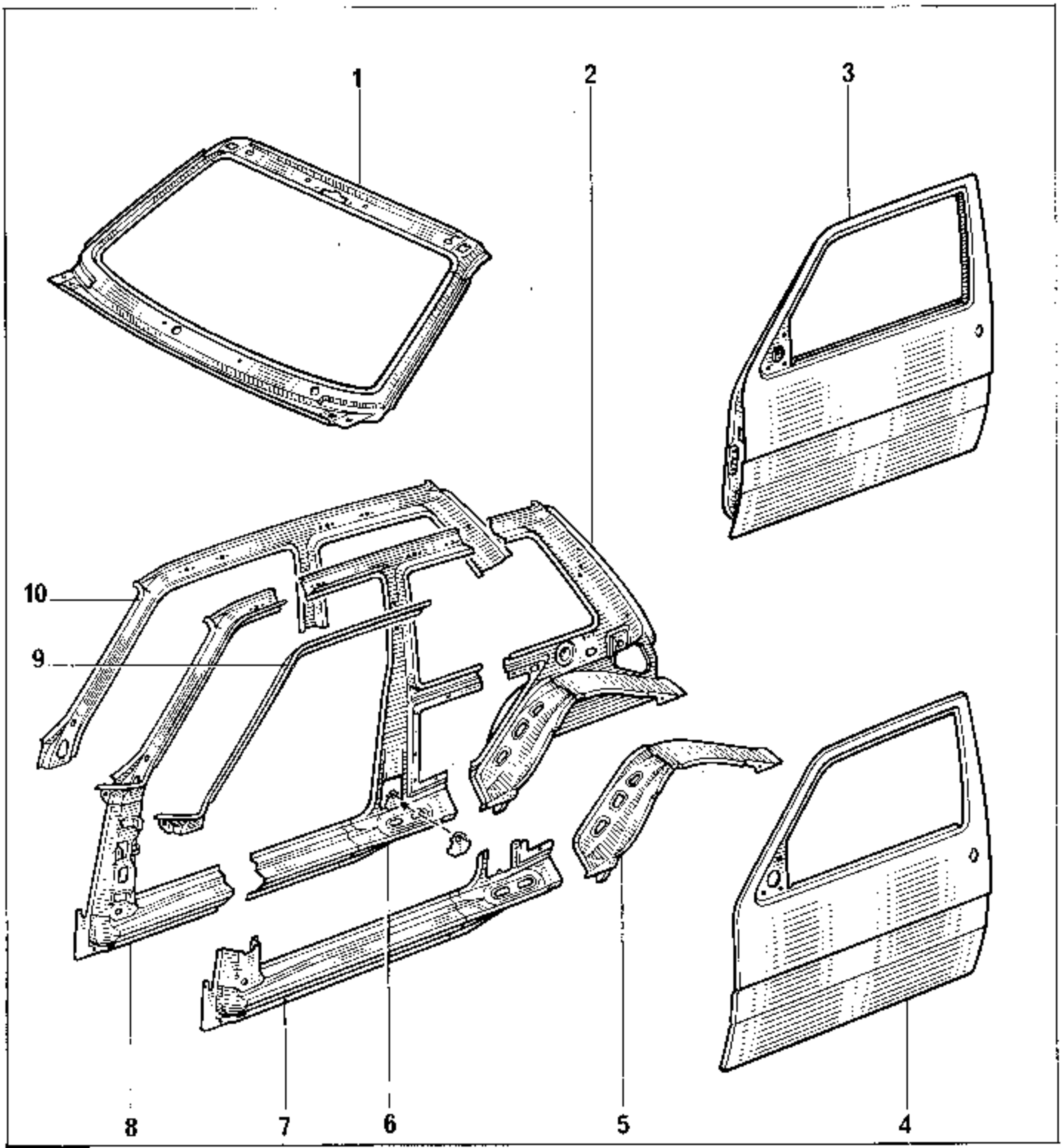
88514-1

PAINTING

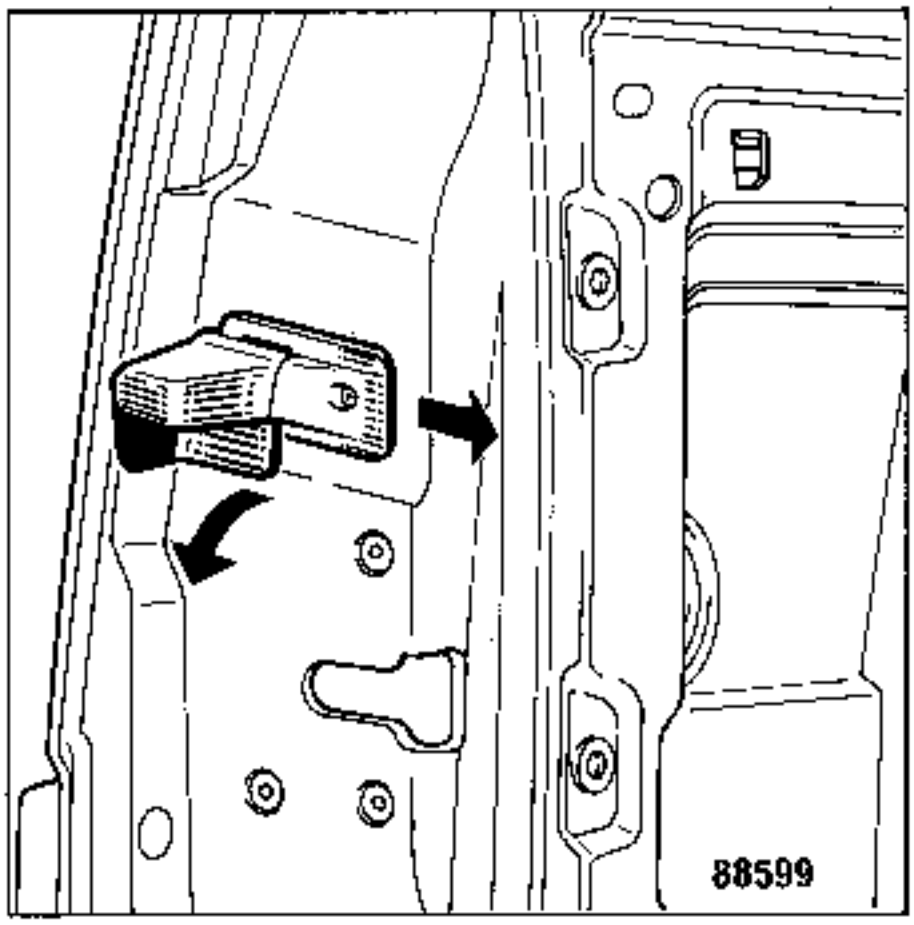


- Carry out paint sequence No. 5 (see "Painting" section).
- After painting, apply hollow section protective treatment.

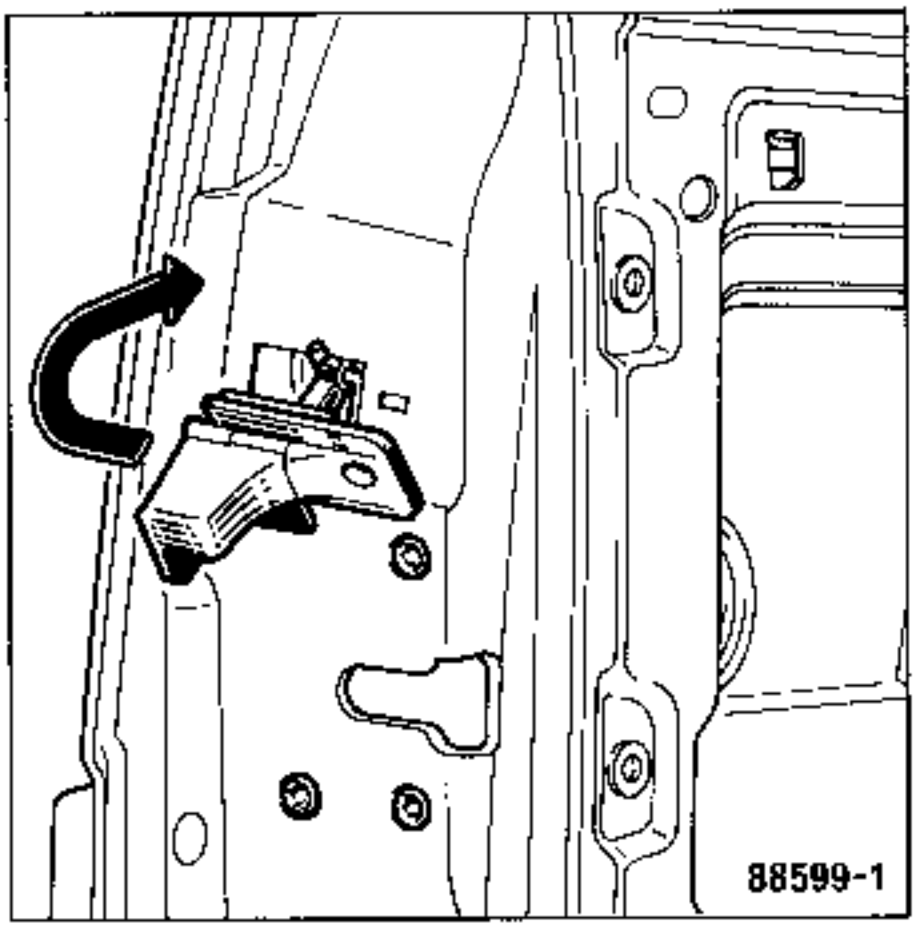
1 - windscreen frame
2 - quarter panel lining
3 - complete door
4 - door panel
5 - wheelarch
6 - door pillar lining
7 - body sill
8 - front door
9 - door frame cover
10- upper body side



- Removing the latch mechanism.



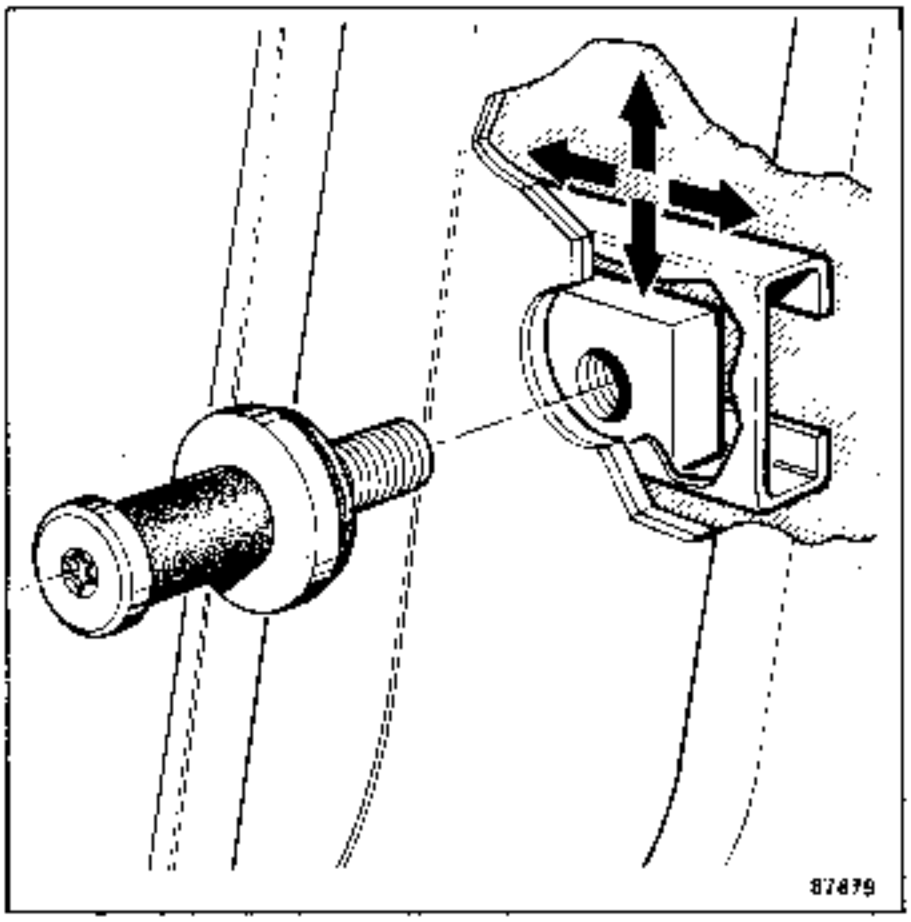
- Remove the door handle fastening and take it out as shown.



- Remove the handle as shown.
- Disconnect the lock connector.
- Unclip the links from the lock.
- Remove the lock fastenings and take out the lock through the aperture in the door.

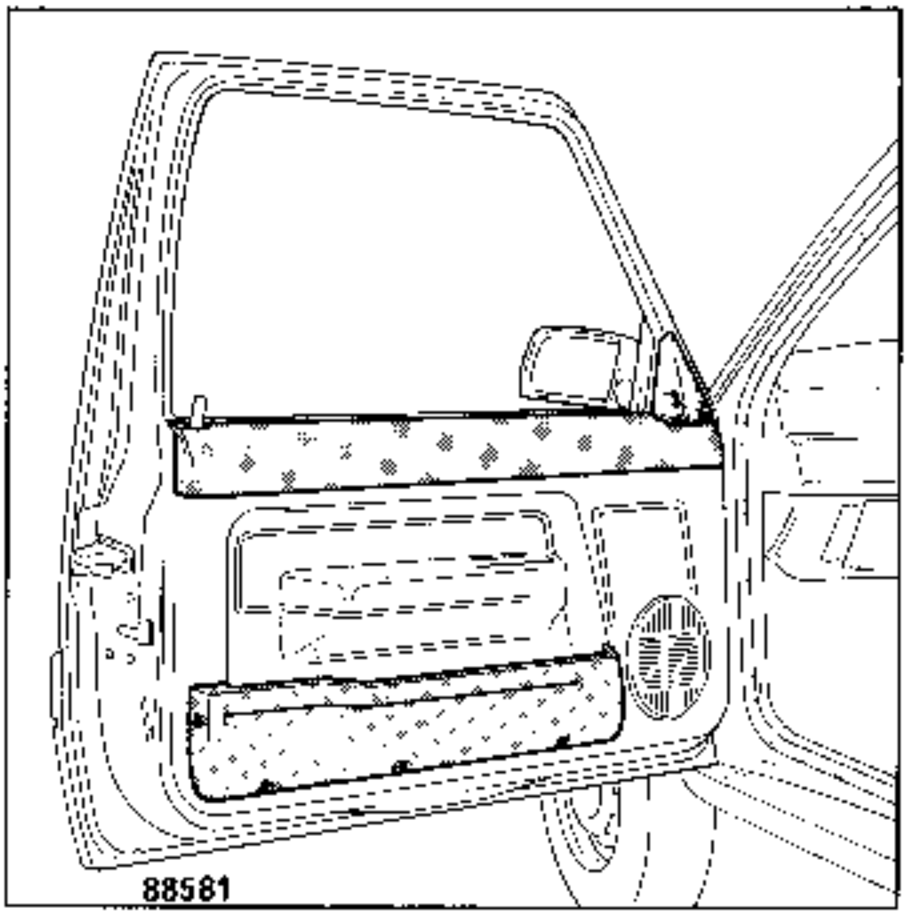
NOTE:

- The handle can be removed with the trim still in place.

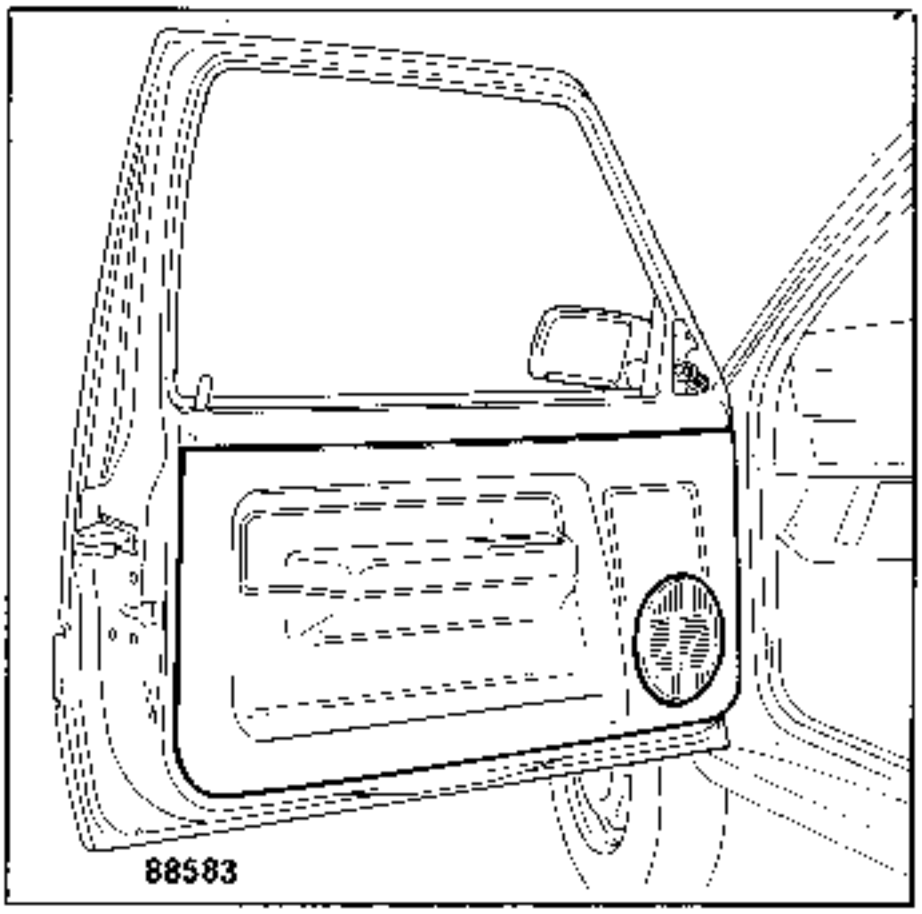


- The door latch is adjusted at the striker plate, using a "torx" type screwdriver.

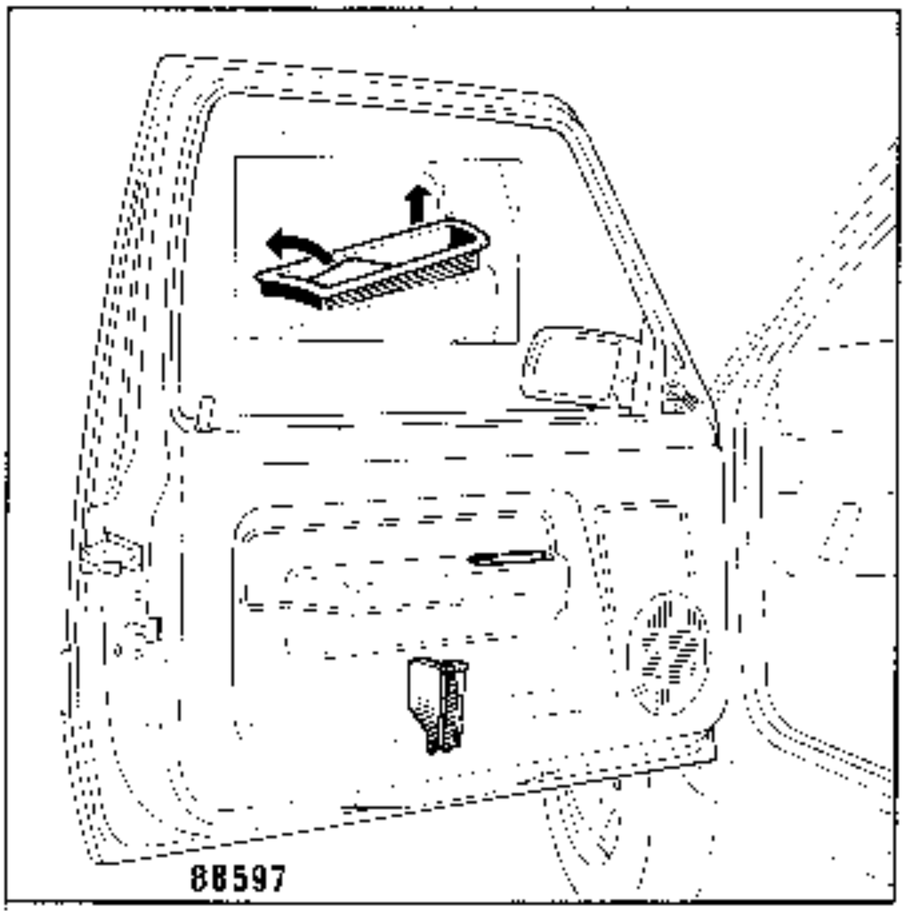
- Remove the trim.


88581

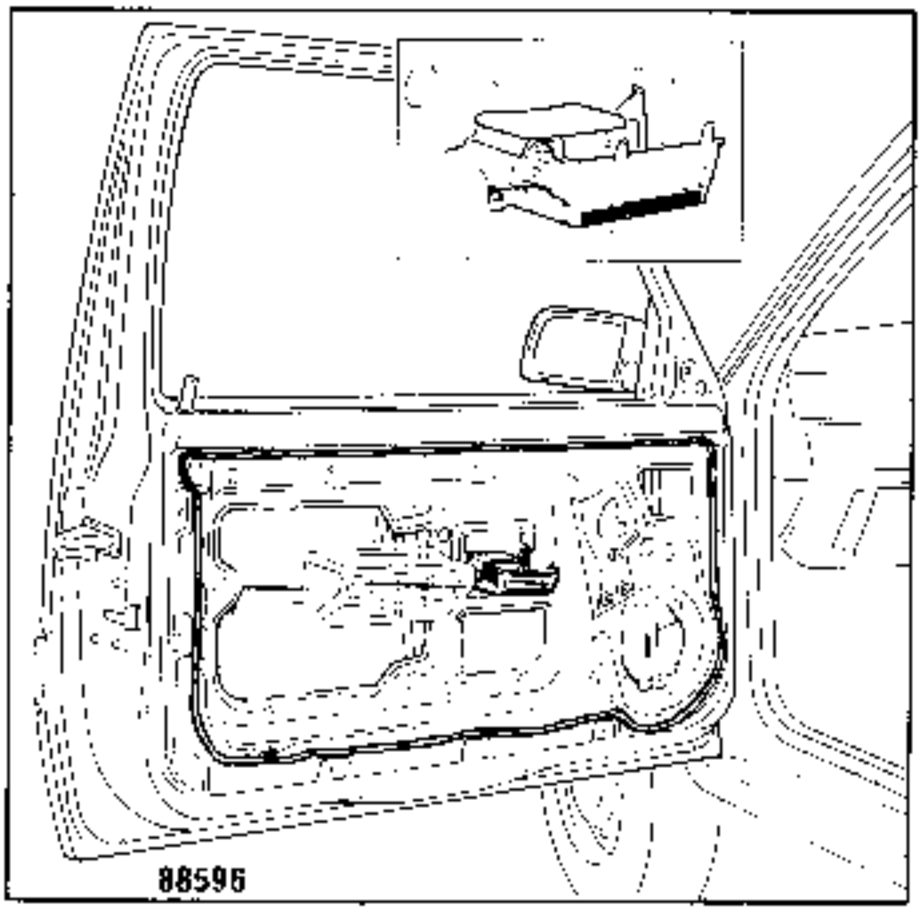
- Remove: - the rear view mirror control trim,
  - the upper trim strip,
  - the map pocket.


88583

- Remove the trim with tool Facom D115.

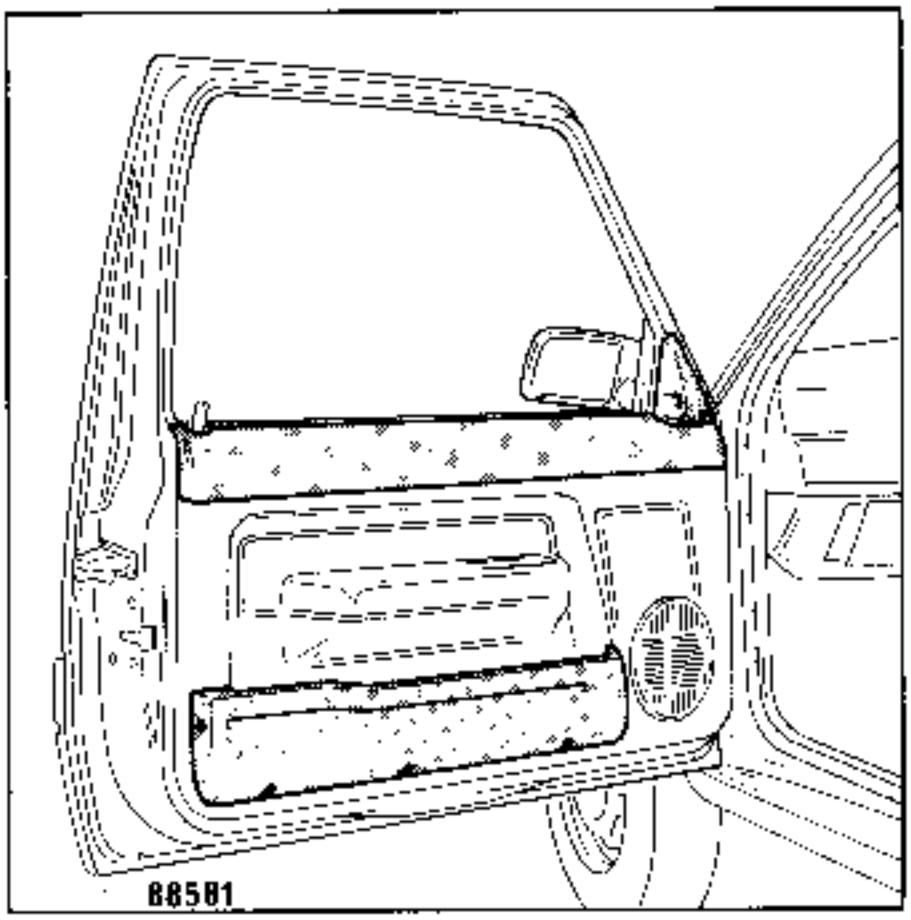

88597

- Remove: - the door handle bezel and the map pocket stiffener.

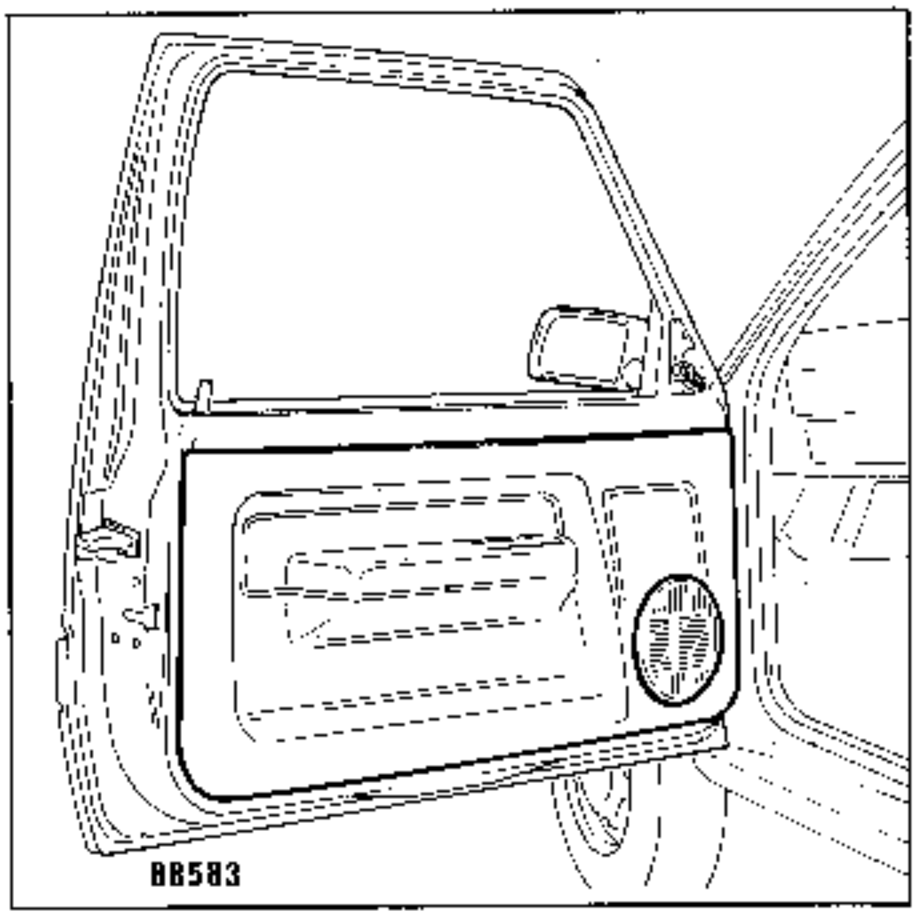

88596

- Remove the handle and the vinyl sealing sheet.

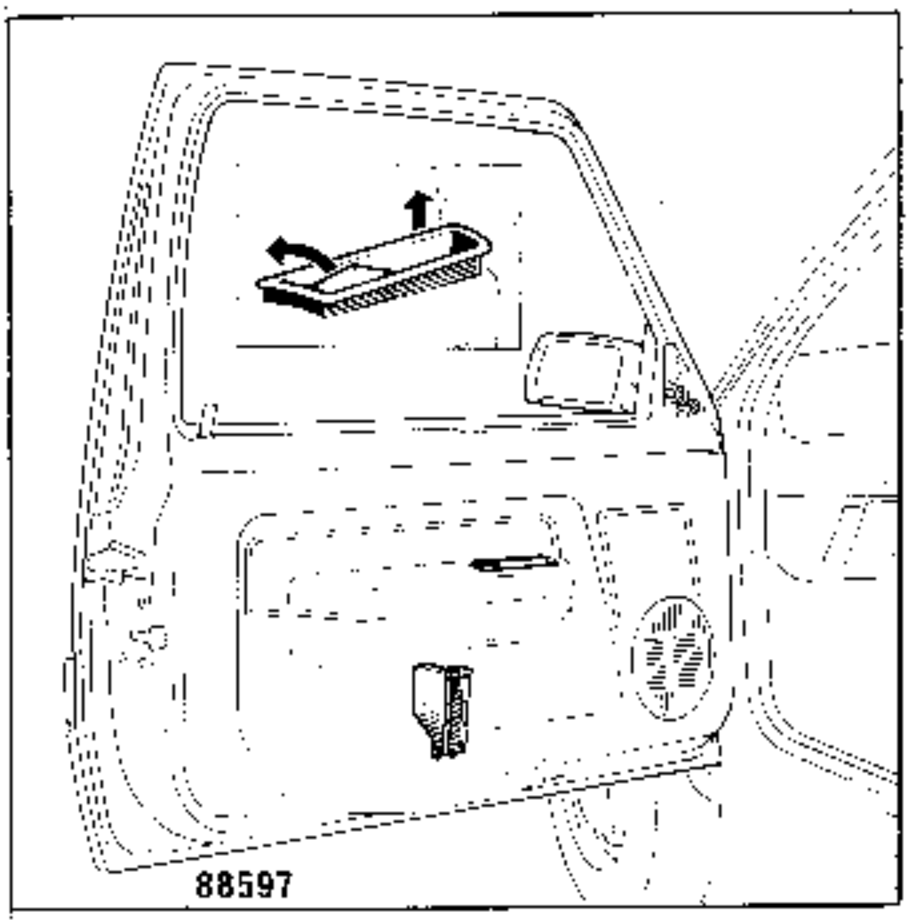
- Remove the trim.


88581

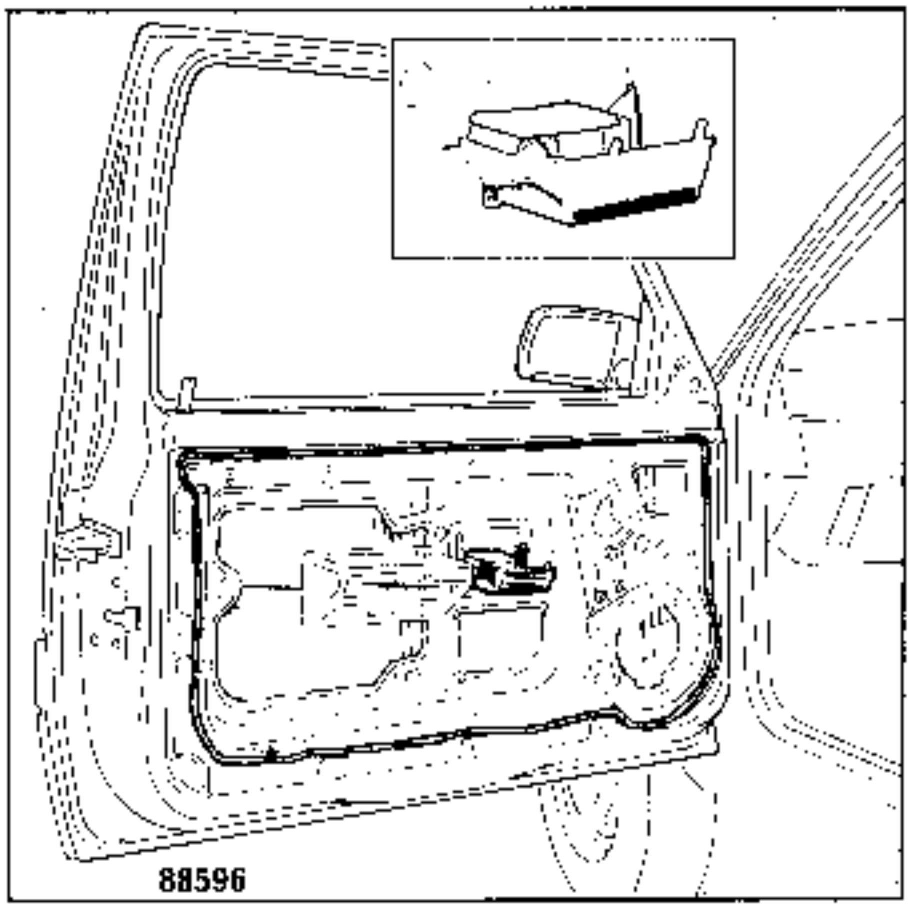
- Remove: - the rear view mirror control trim,
  - the upper trim strip,
  - the map pocket.


88583

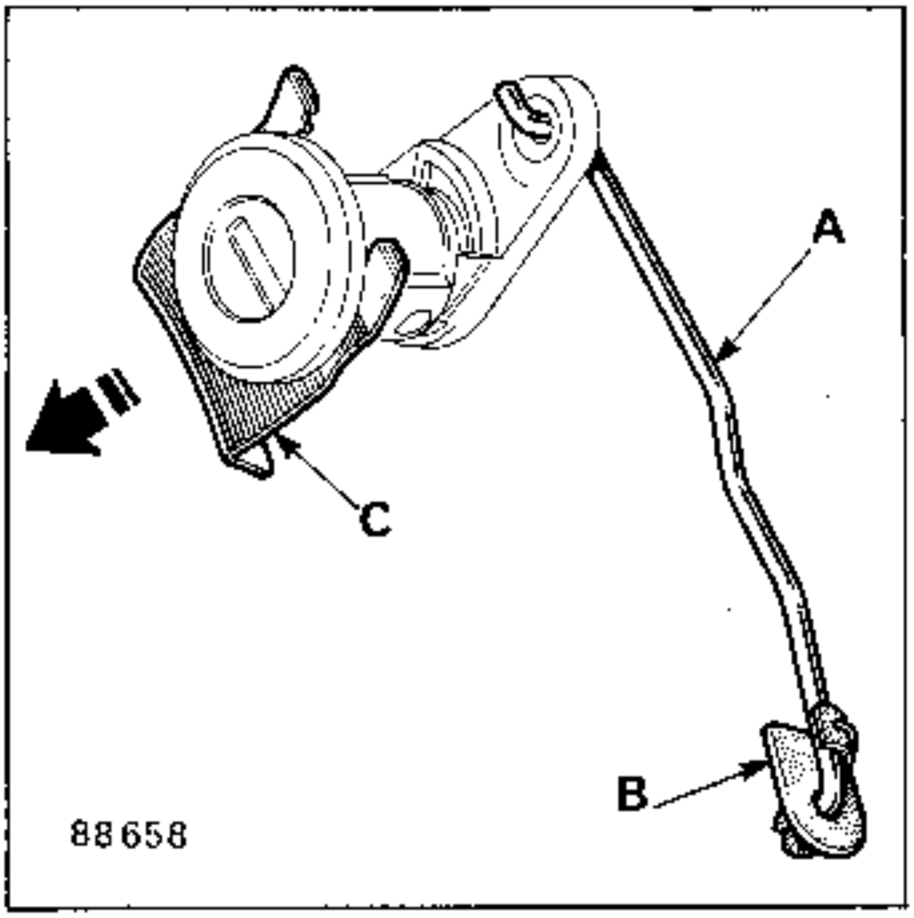
- Remove the trim, using tool Facom D115.


88597

- Remove: - the door handle bezel and the map pocket stiffener.


88596

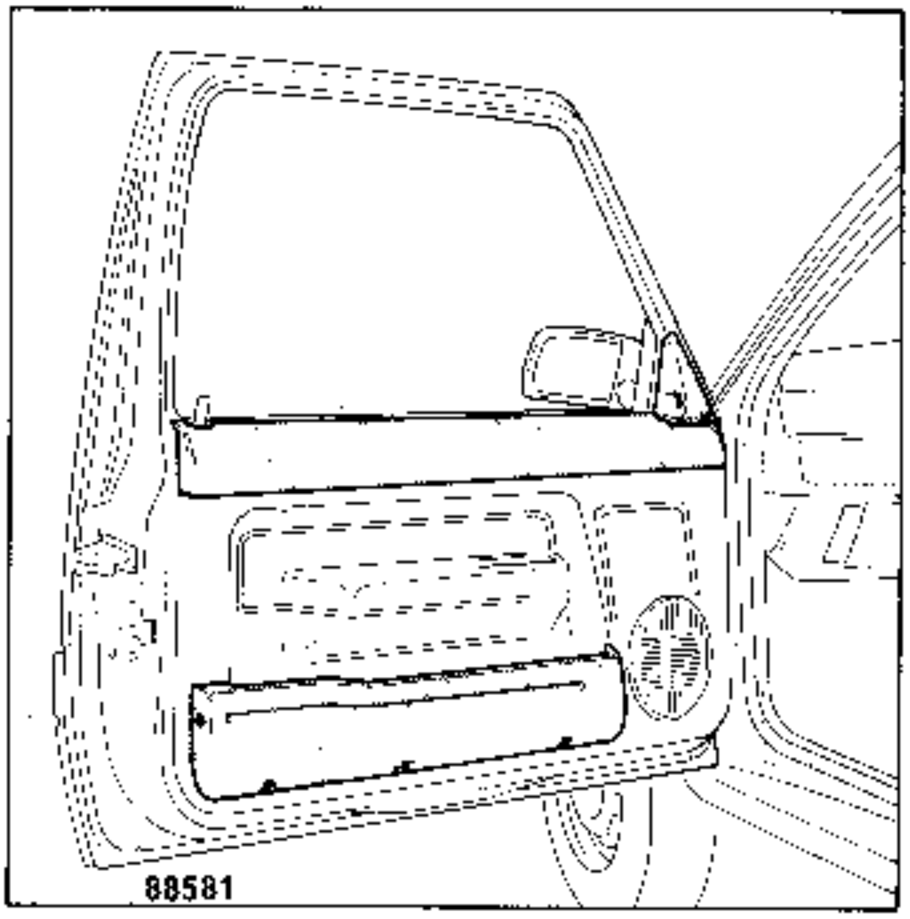
- Remove the handle and the vinyl sealing sheet.



- Unclip link (A) at clip (B), on the lock.
- Remove link (C).
- Take out the lock barrel from the outside of the door.

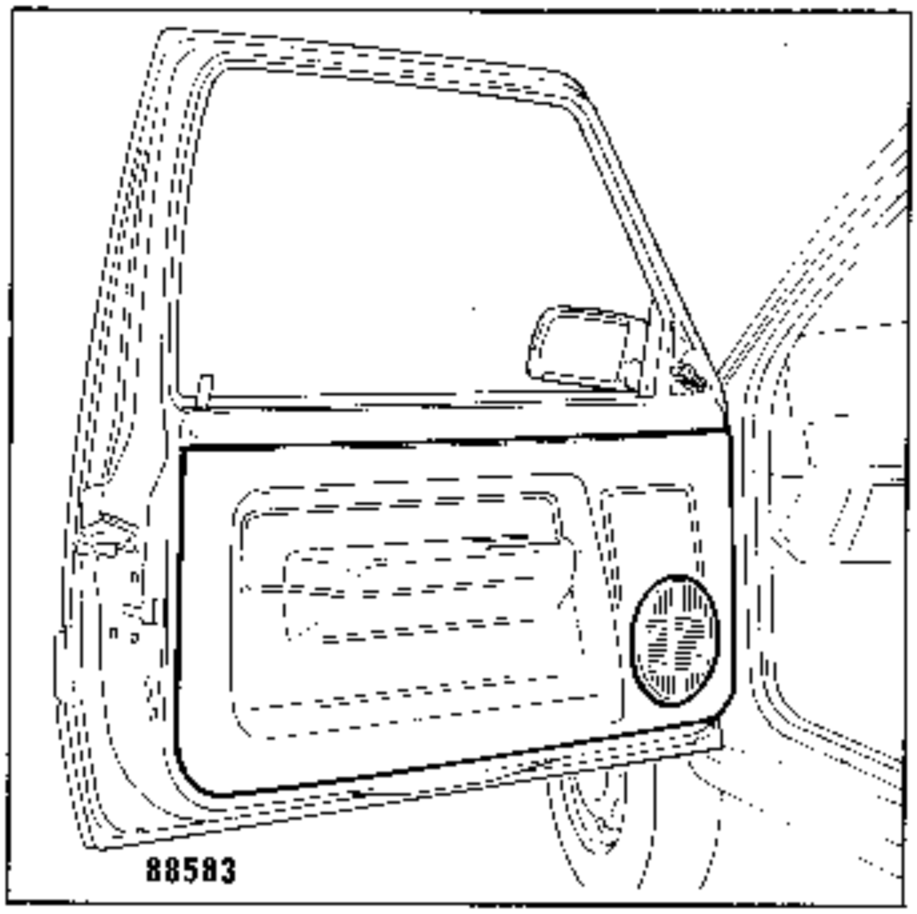
DOORS WITH ELECTRIC WINDERS

- Remove the trim.



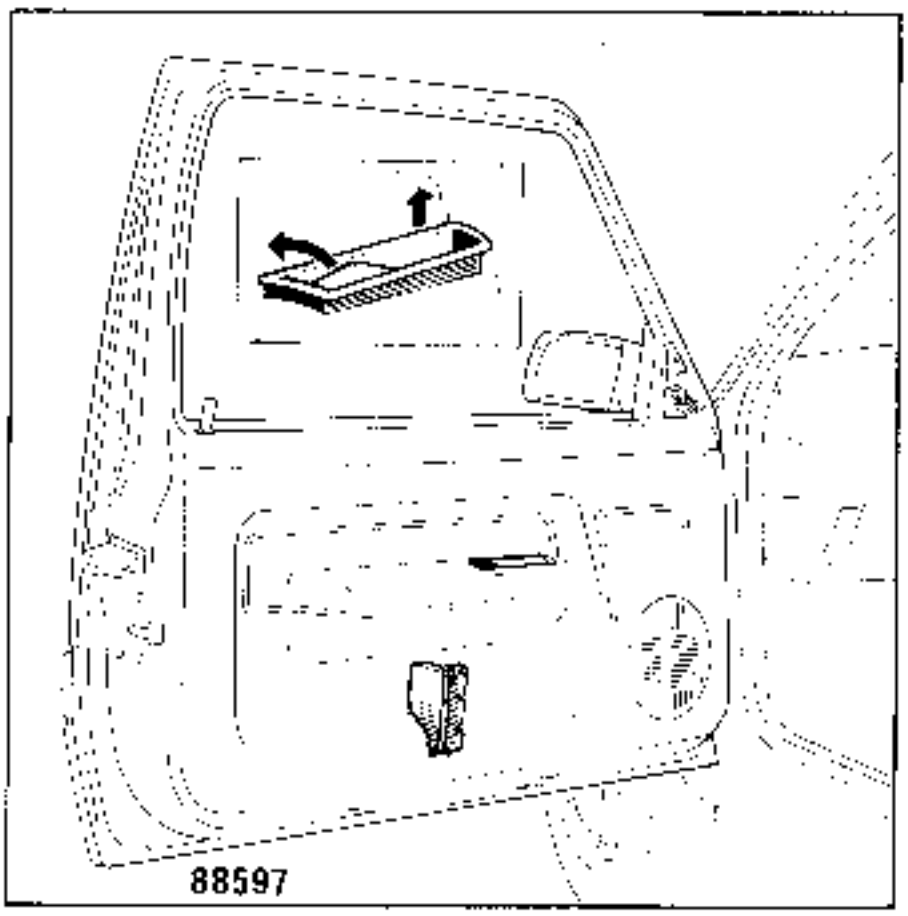
88581

- Remove: - the rear view mirror control trim,
  - the upper trim strip,
  - the map pocket.



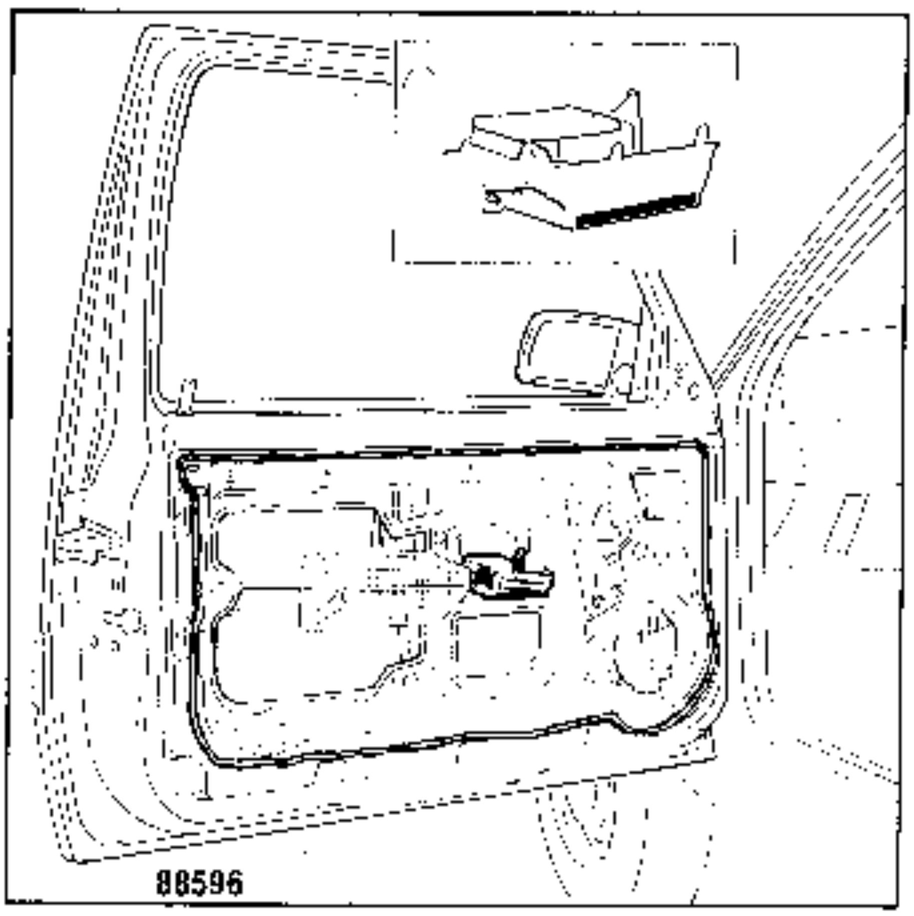
88583

- Remove the trim using tool Facom D115.



88597

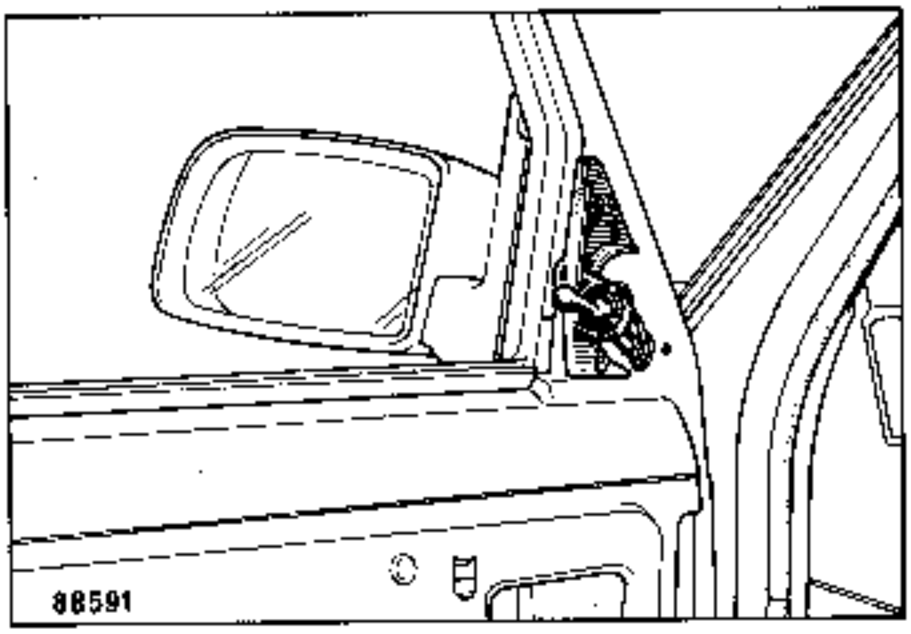
- Remove: the door handle bezel and the map pocket stiffener.



88596

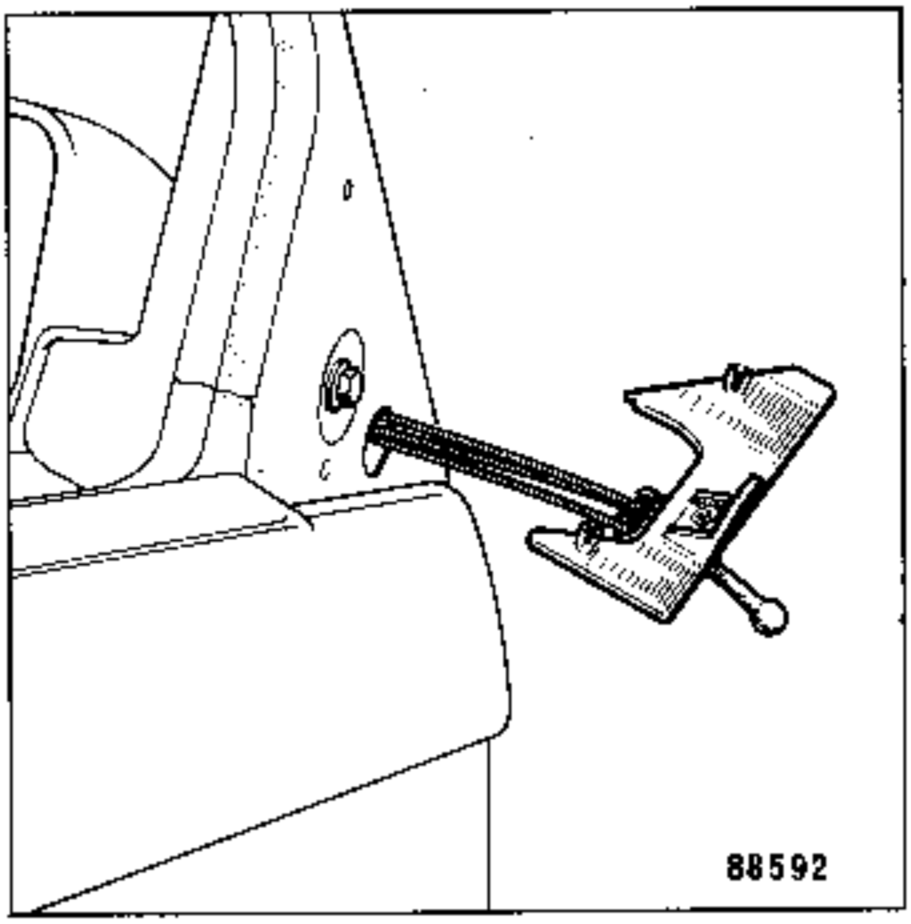
- Remove the door handle and the vinyl sealing panel.

- Removing the rear view mirror.



88591

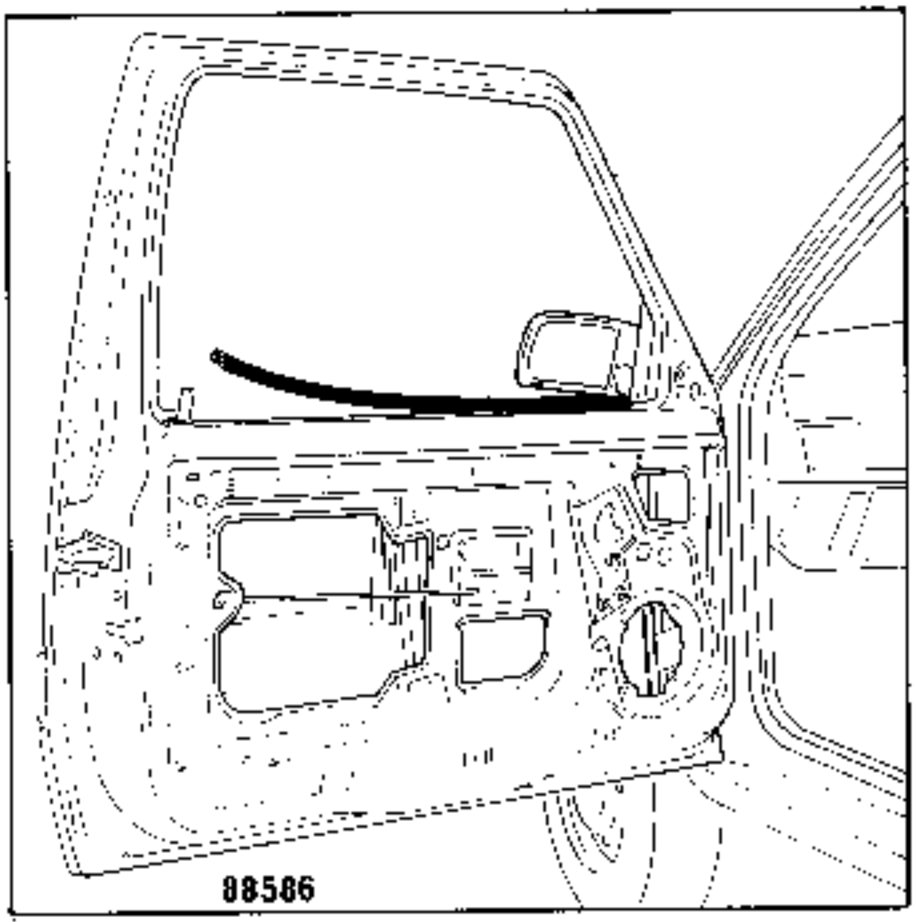
- Remove the rear view mirror control support fastenings.



88592

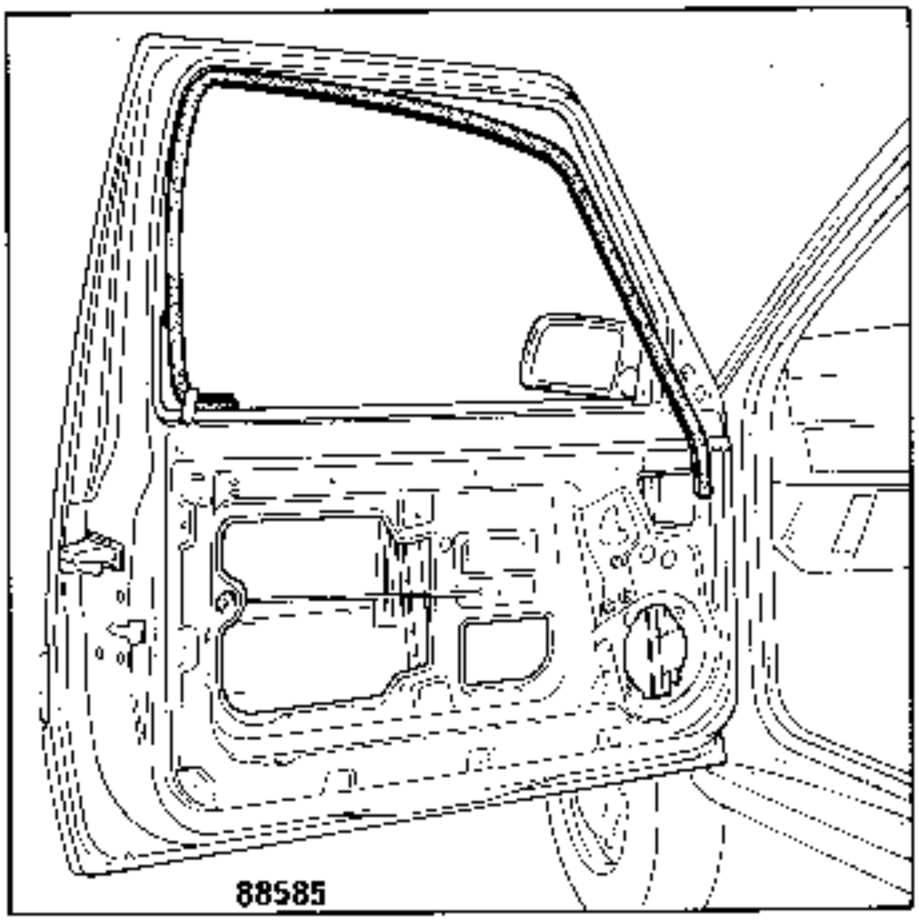
- Remove the rear view mirror control fastenings,
- Remove the mirror securing screw.

- Removing the window.



88586

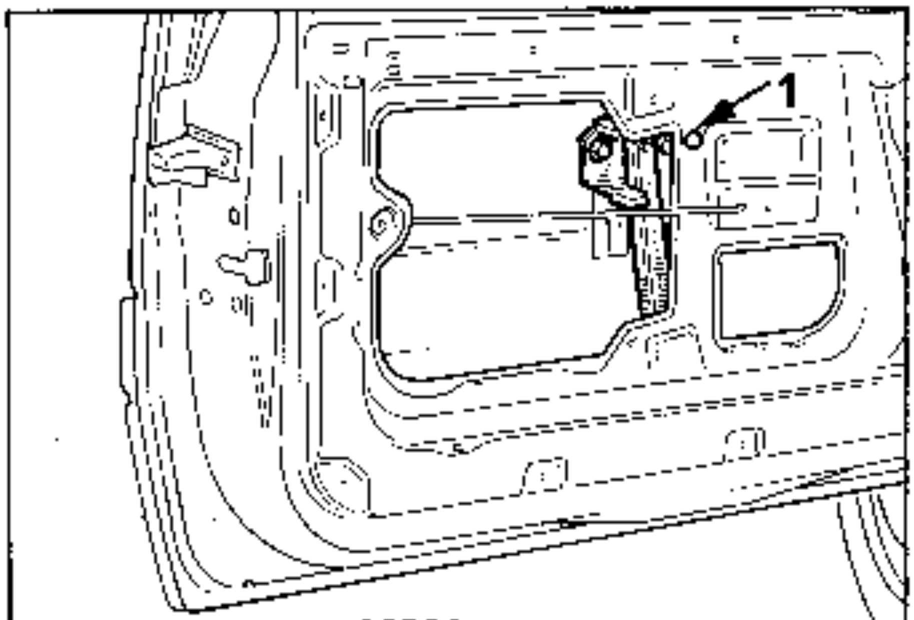
Wind down the window.
Remove the lower part of the inner wiper strip.
Warning: this part has a metal framework which is very fragile.



88585

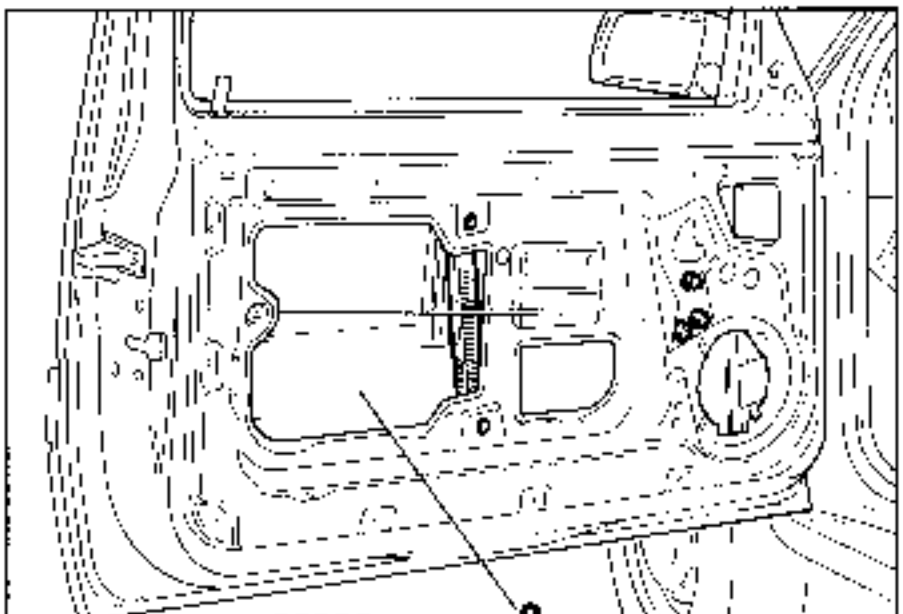
- Remove: - the upper part of the inner wiper strip,
  - the outer wiper strip.

Take the same precautions as above.



88590

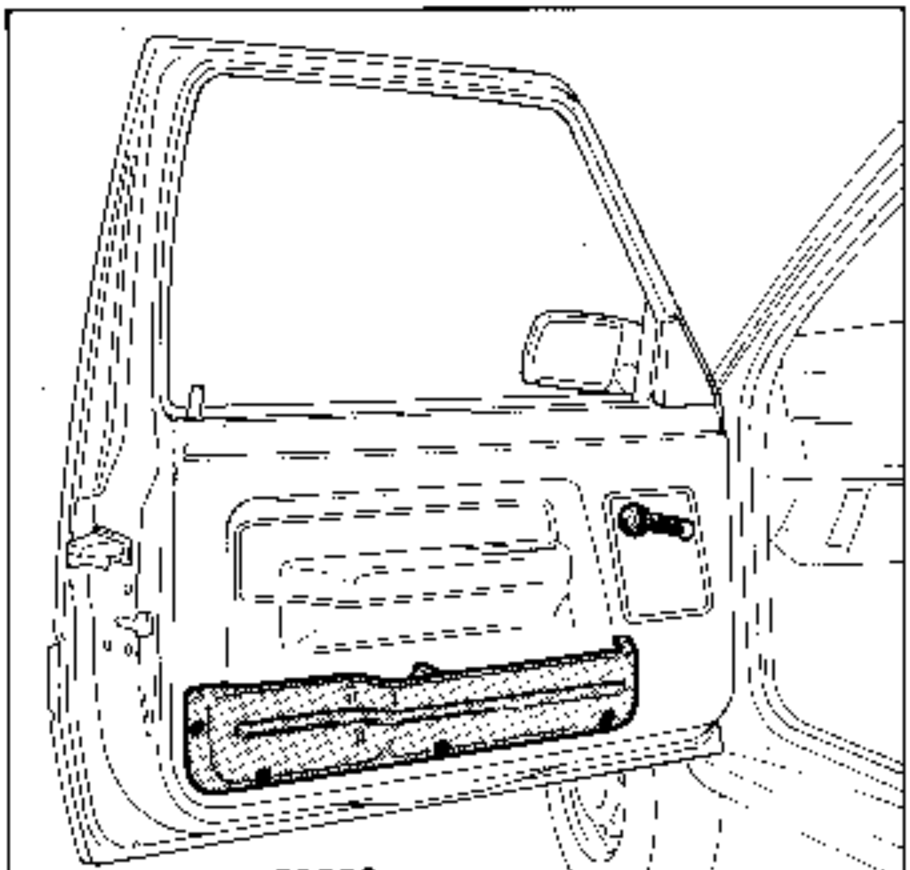
- Position the window so that the window support RH securing screw is in line with hole (1)
- Remove the 2 window support securing screws.
- Lower the window-winder mechanism and take out the window from outside the door.
- Removing the window-winder mechanism.



88588

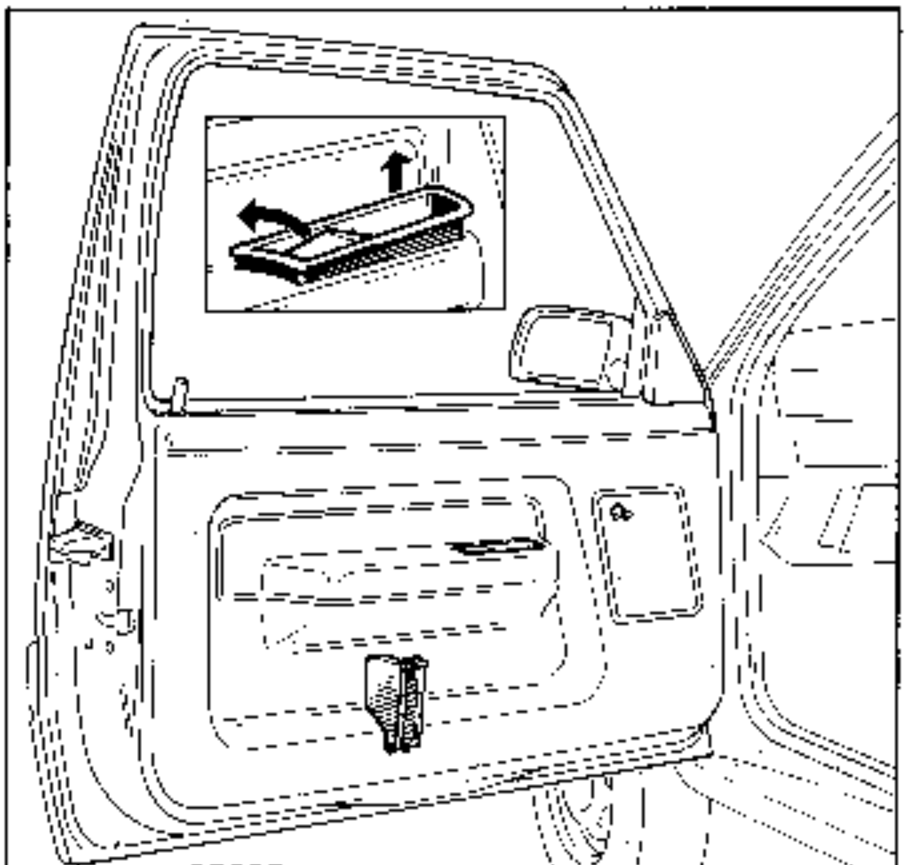
- Disconnect the connector from the motor.
- Remove the window-winder pillar fastenings (rivets).
- Remove the motor fastenings (nuts).
- Take out the mechanism through aperture (2) in the door.

DOORS EQUIPPED WITH MANUAL WINDOW-WINDERS



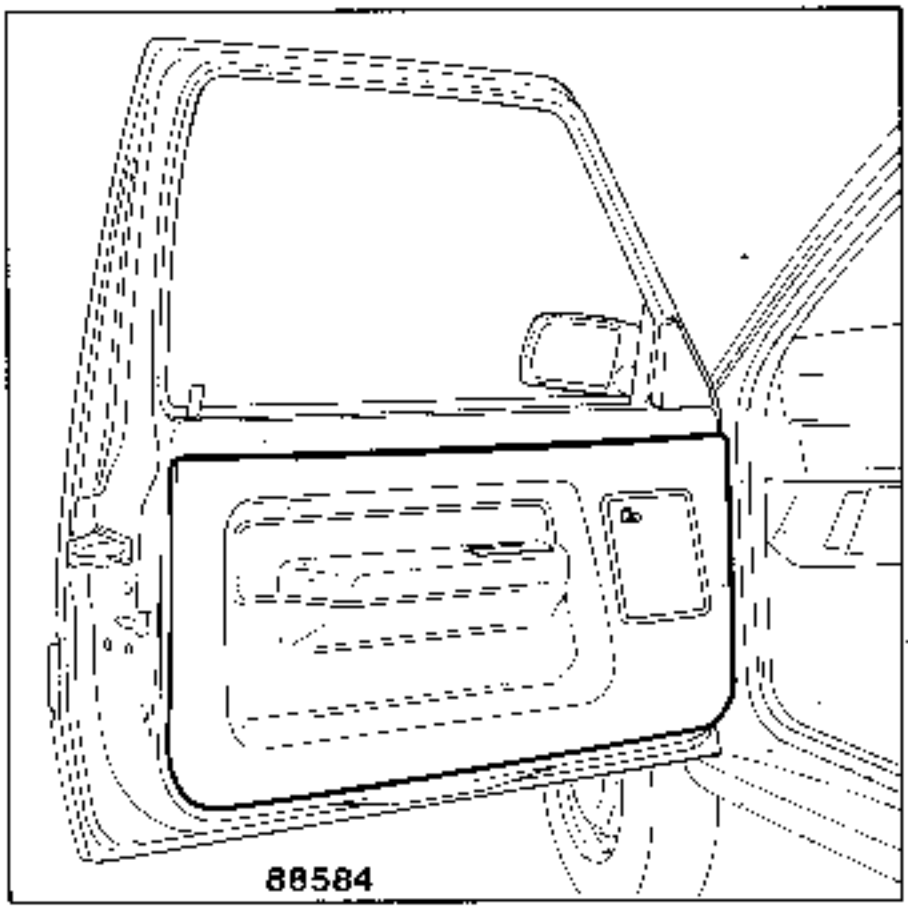
88582

- Remove: - the map pocket.
  - the window-winder handle using tool Facom D115.

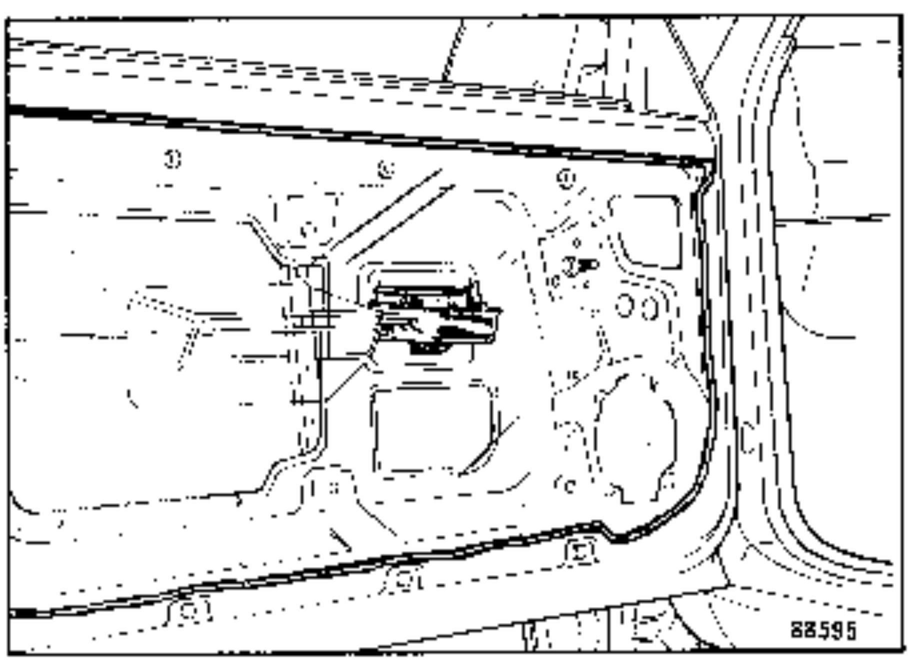


88598

- Remove the door handle bezel and the map pocket stiffener.

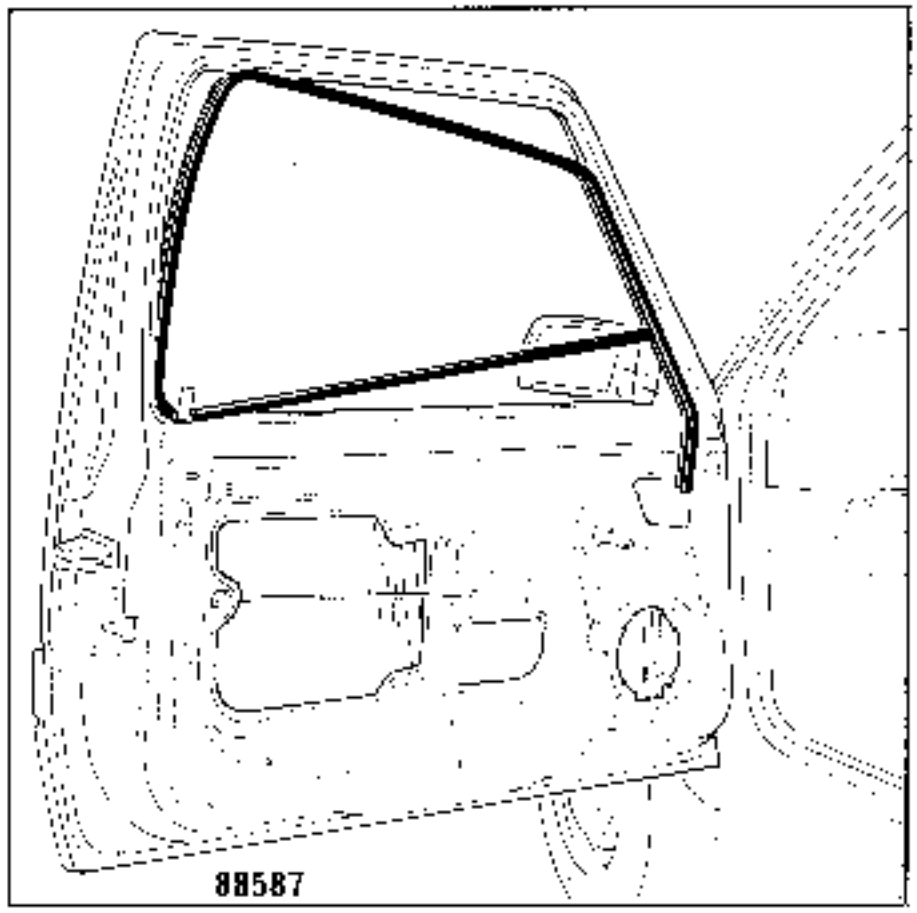


- Remove the trim, using tool Facom D115.



- Remove the handle as shown.

- Remove the vinyl sealing sheet and the cover from the rear view mirror fastenings.



- Wind down the window.

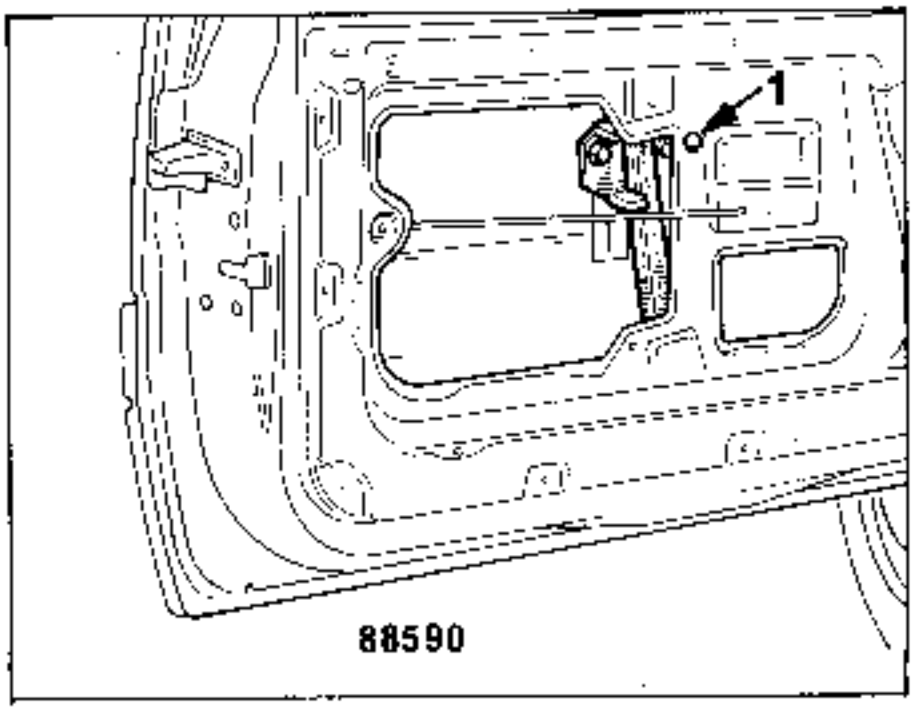
- Remove the inner wiper strip, starting at the bottom end.

- Take care when removing the wiper. It has a metal centre which is very fragile.

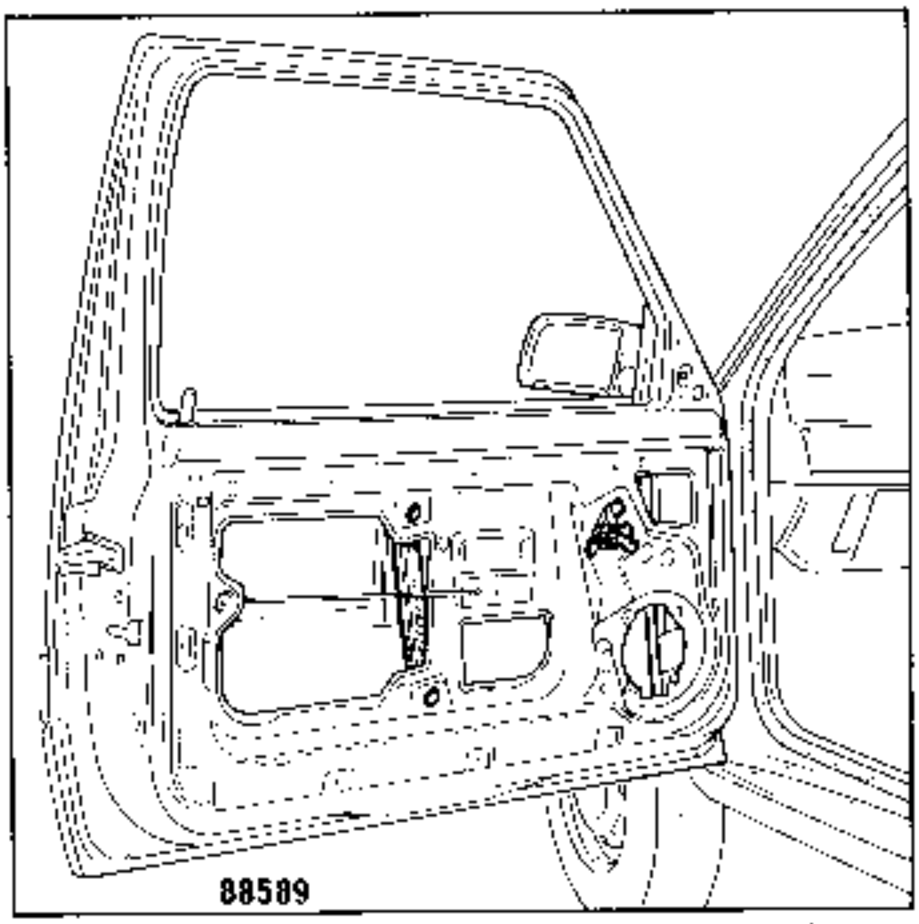
- Continue the operation from the other end, finishing at the lower rear corner.

- Remove the rear view mirror.

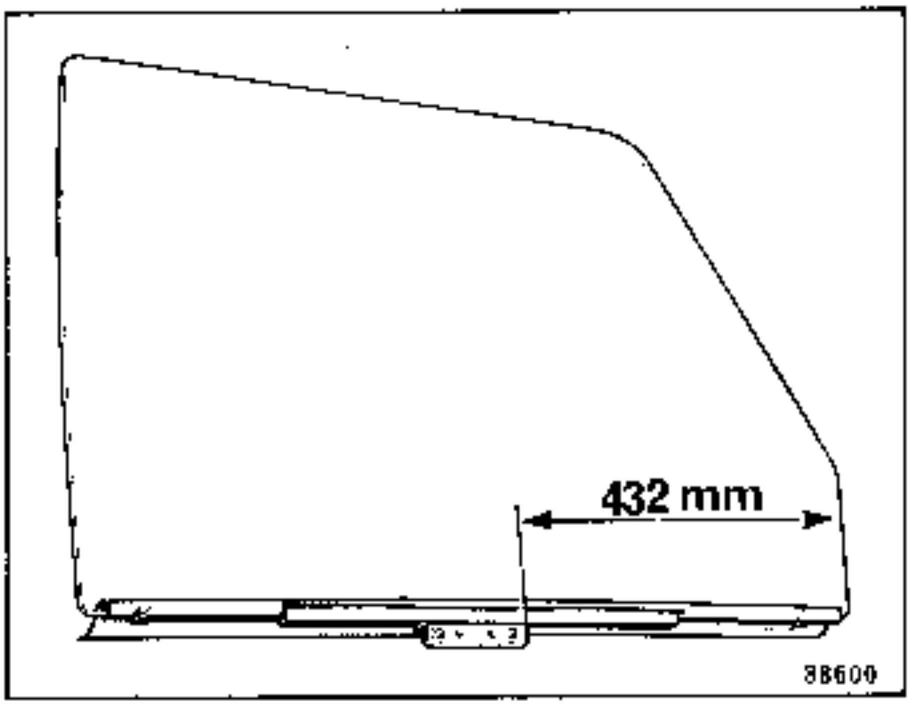
- Remove the outer wiper strip, taking the same precautions as above.



- Position the window so that the window support RH securing screw is in line with hole (1)
- Remove the 2 window support securing screws.
- Lower the window-winder mechanism and take out the window from outside the door.



- Remove the window-winder pillar fastenings (rivets).
- Remove the window-winder gear securing rivet.
- Take out the mechanism through the aperture in the door.



- If the window support is to be replaced, the new one is to be fitted in the position shown above.

PRODUCTS REQUIRED

KIT: (available from the Parts Department) Part Nos. 7701 202 273

7 - Cartridge of GURIT MASTIC Ref. GURIT BETASEAL 71 904 HV 2.

8 - Cartridge nozzle.

9 - Tin of glass primer Ref. GURIT 84 132 11.

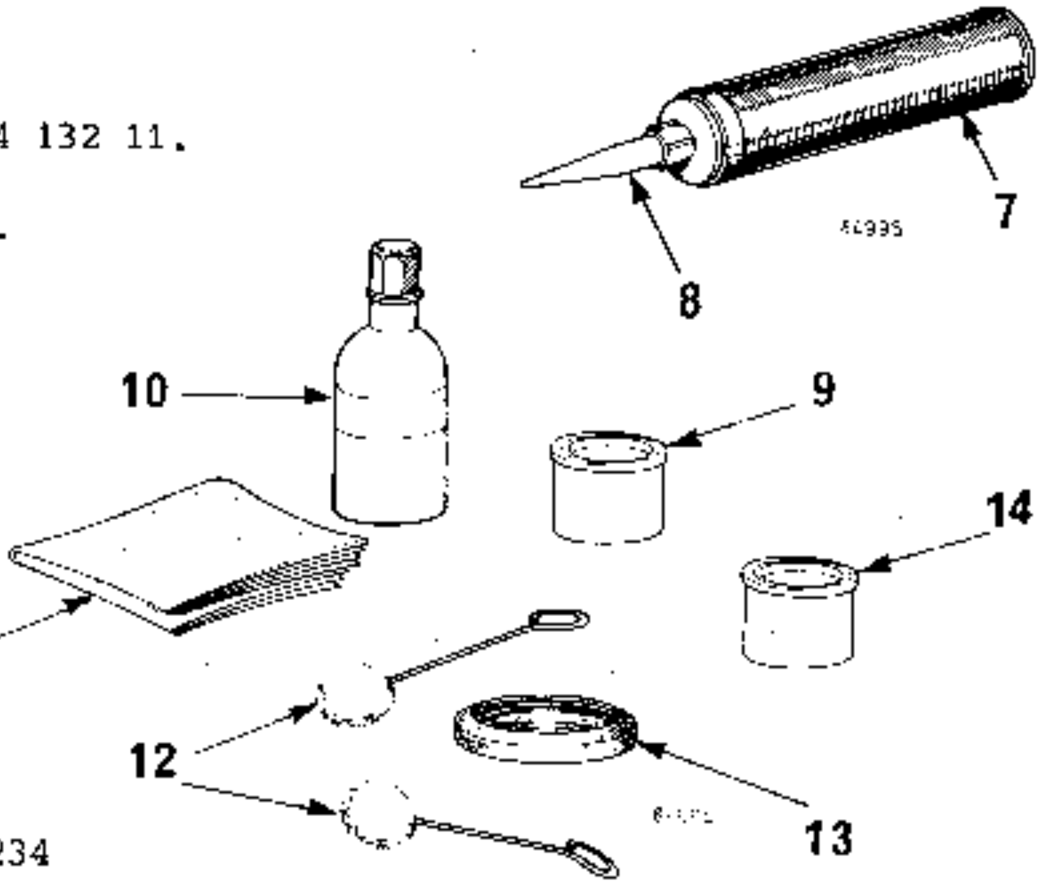
10 - Bottle of degreasing solvent Ref. GURIT VP 04 604.

11 - Cloth for degreasing solvent.

12 - Pads for primer.

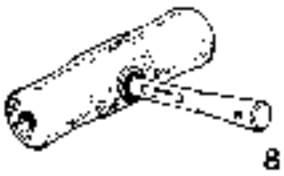
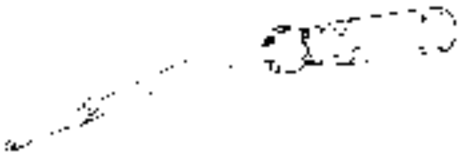
13 - Piano wire (steel).

14 - Can of primer for sheet steel Ref. GURIT 435-46.

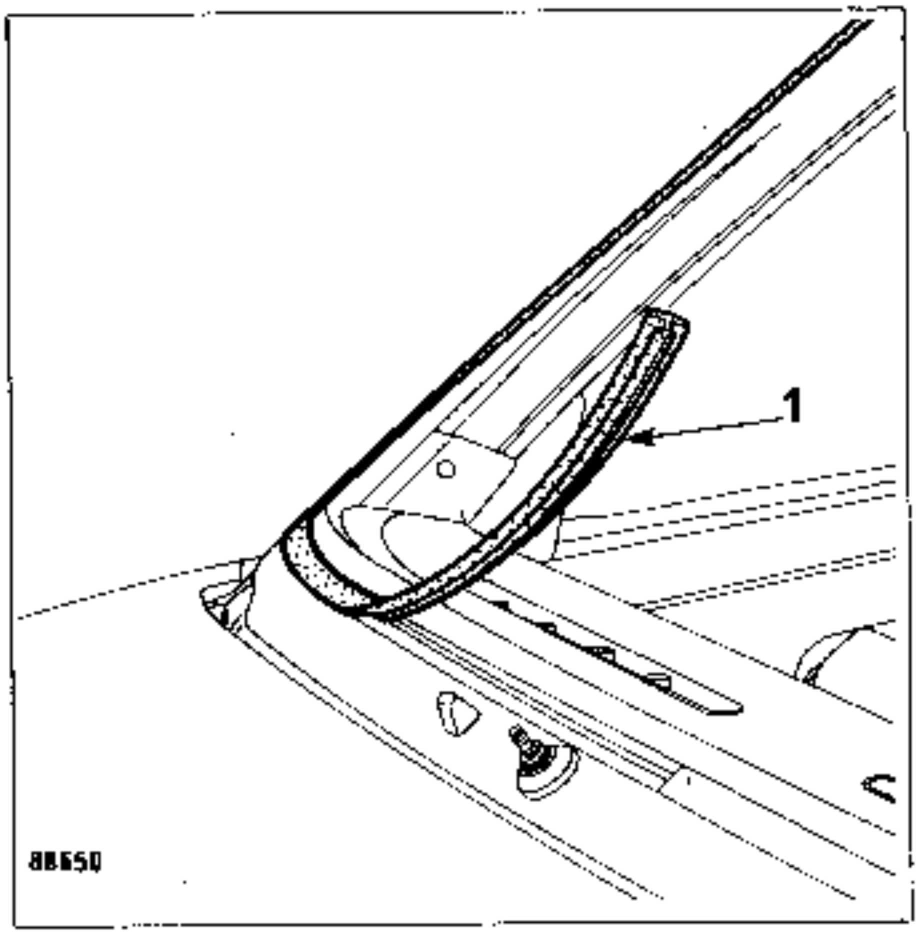


CARTRIDGE OF MASTIC + 1 NOZZLE SUPPLIED SEPARATELY (available from Parts Department) Part No. 77 01 202 234

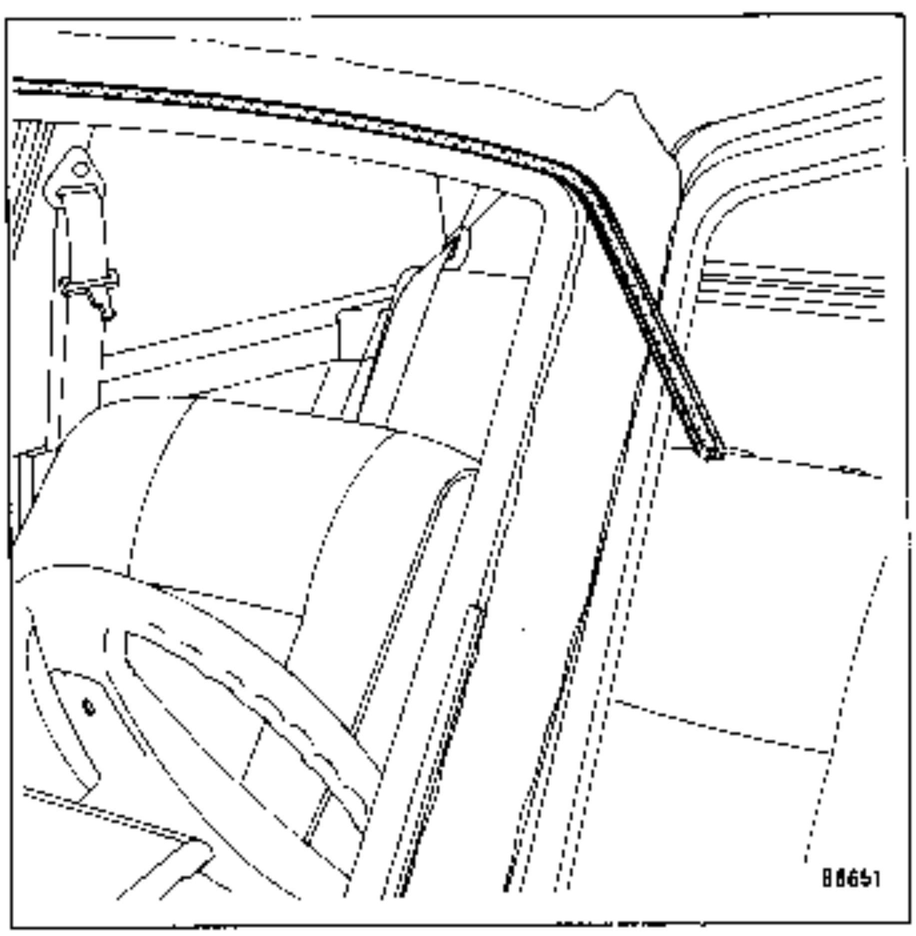
EQUIPMENT

<table>
<tr><th></th><th>Supplier's Ref.</th><th>Approval No.
MR 500 xx</th></tr>
<tr><td>Puller handle  87 270</td><td rowspan="3">STW 10351</td><td rowspan="3">55 70 00</td></tr>
<tr><td>Pricking tool </td></tr>
<tr><td>Roll of piano wire </td></tr>
<tr><td>Pair of suction pads for handling the windscreen  87 274</td><td>STW 10352</td><td>55 70 01</td></tr>
<tr><td>Wire puller needle </td><td colspan="2">REF. Renault: Car.1033</td></tr>
</table>

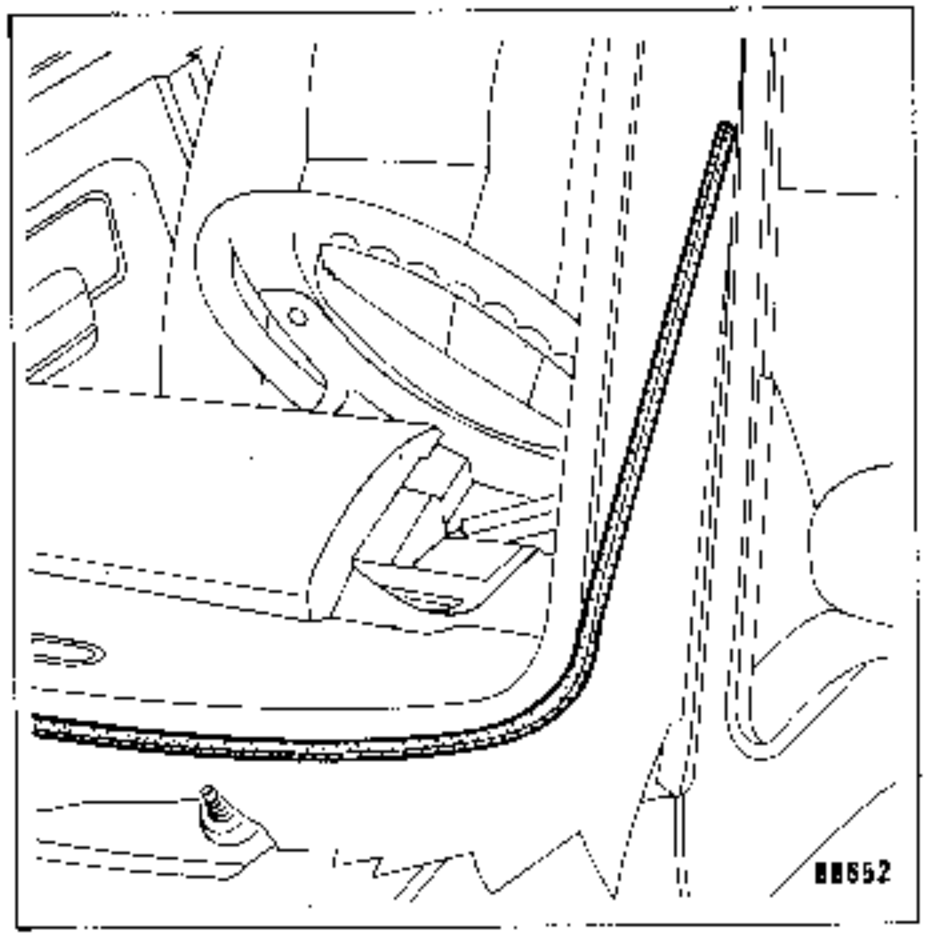
STRIPPING



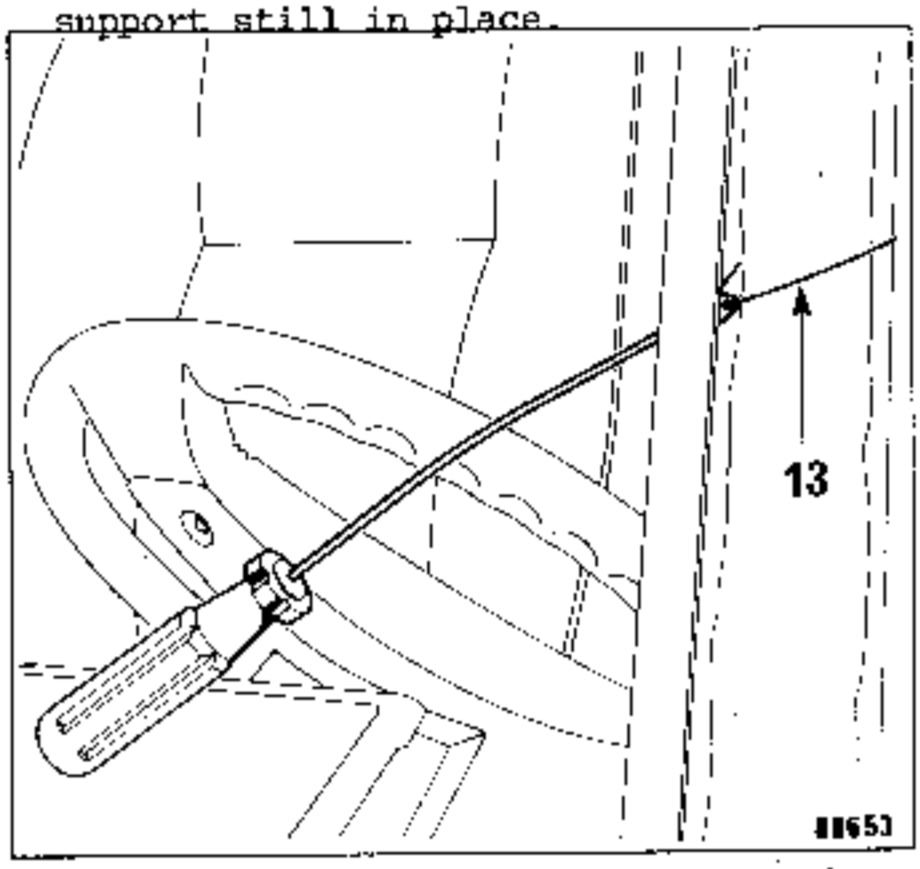
- Remove the windscreen wiper arms.
- Unclip the trim (1) from its support, starting at one of its ends which are at the bottom centre of the screen.
- Warning: the trim is very fragile.



- Protect the windscreen frame with a strip of masking tape 50 mm wide.
- Remove the upper part of the trim support, starting at one end. Do not press down on the roof as this could cause distortion.



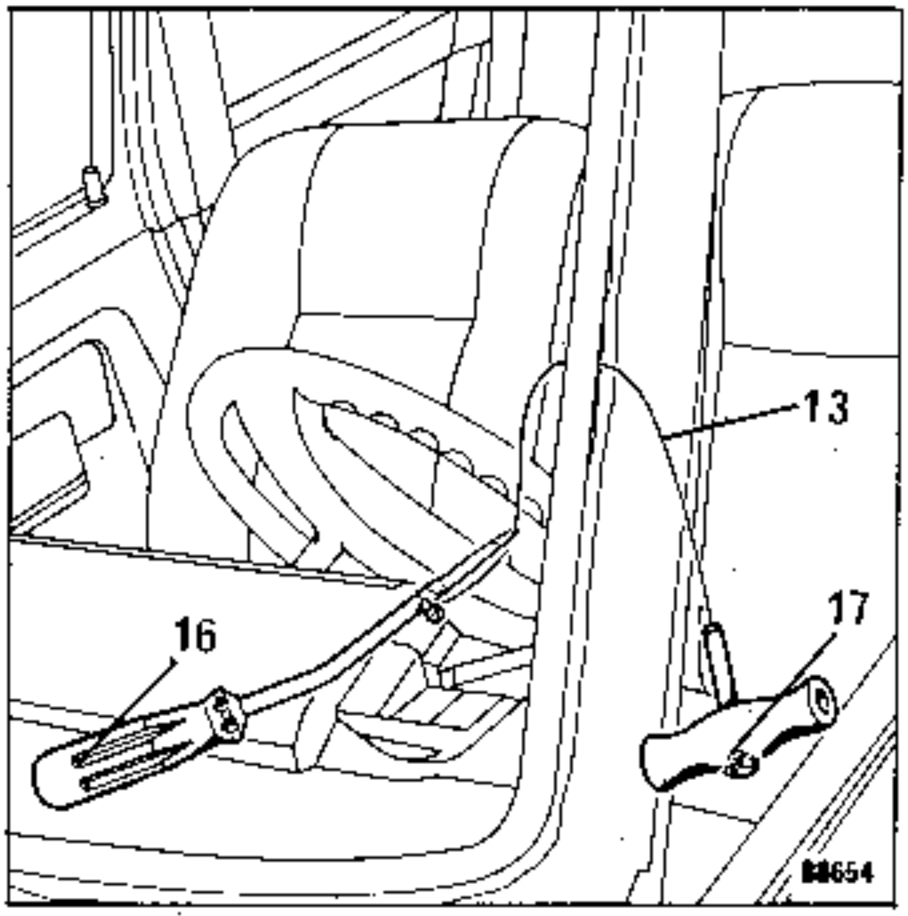
- Remove the lower part of the surround section in the same way as the upper part.
- If the support is coated with mastic and will not come out of its location, do not force it (there is a risk of breaking the windscreen and damaging the windscreen frame).
- Continue the operation with the trim support still in place.



- Remove the anti-run seal or seals from inside the vehicle.
- Protect the facia panel with a dust sheet or by masking it.
- Mark the point, on the windscreen

periphery at which there is the largest clearance between the edge of the windscreen and the edge of its frame.

- From inside the vehicle, push the wire puller needle through the mastic fillet.
- Cut a length of wire (13) approximately 500mm long.
- Pass the wire through the hole made by the needle, from outside.
- From inside, pull the needle so that the wire passes through the mastic fillet.



- Secure the pricker tool to the inside end of the wire and the puller handle to the outside end.

One operator, inside the vehicle, is to force the pricket (16) into the mastic approximately 300mm from the point at which the wire has been passed through.

The other operator, outside, pulls on the handle (17), without lifting it, around the edge of the windscreen, to cut the mastic (1).

This operation is to be repeated at 300mm intervals until the mastic is cut around the entire windscreen.

- Take shorter cuts in the corners.
- The operator inside the vehicle is to continually watch the wire to ensure that it does not cut the trim.

There should be sufficient clearance between the windscreen pillar trim and the windscreen to insert the pricker.

If there is not, it can be forced in, although care must be taken not to damage the trim. If there really is not sufficient room, remove the trim.

The windscreen is now removed.

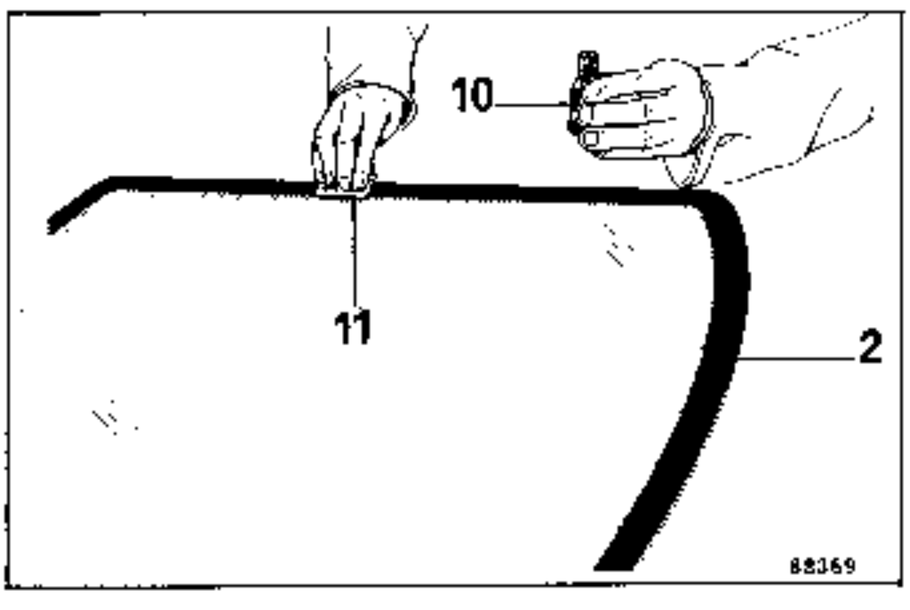
CLEANING THE WINDSCREEN APERTURE

- With a spatula, approximately 20 to 25mm wide, the edge of which has been sharpened, cut and smooth down the mastic to leave a thickness of approximately 0.5 to 1mm on the frame.
- NOTE: Under no circumstances are you to cut back to the paint. It is essential that a film of mastic should be left on the frame to act as a bond for the new fillet.
- Wipe the frame with a clean dry cloth.
- Generally speaking, no cleaning or degreasing product should be used on the film of mastic.
  Under no circumstances is alcohol to be used. Exceptionally, the "S25" (heptane) solvent is acceptable.

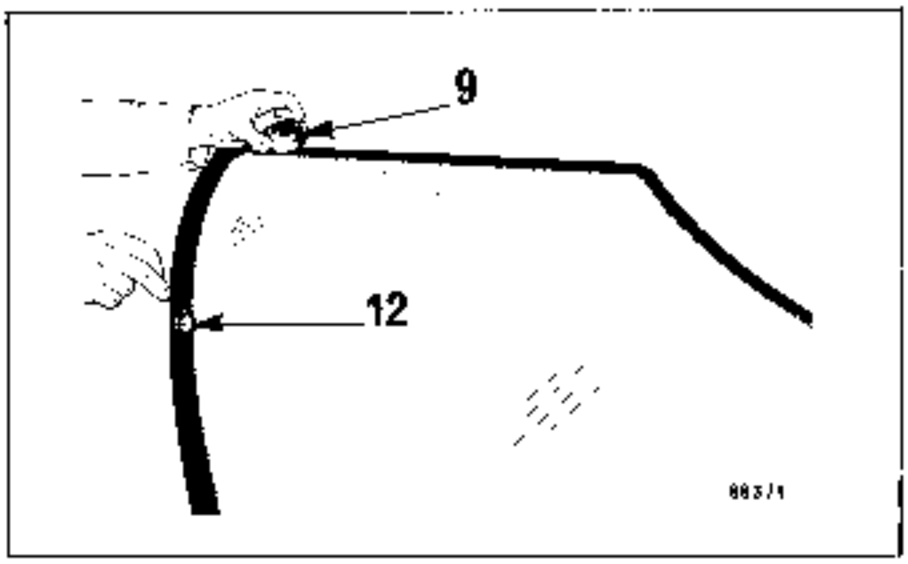
  Part No. 7701 407 086: 0.5l.
  7701 407 087: 0.25l.

PREPARING THE NEW WINDSCREEN

- Carefully clean the enamelled surface (2) around the entire periphery of the windscreen.
  Initially with, if possible, demineralized water and then a clean dry cloth.



Secondly, with a degreasing solvent (10) and cloth (11).



- Apply the glass primer (9) using pad (12) to the enamelled surface to within a few millimetres of the shaded area. After this operation, do not touch the cleaned area with the fingers.

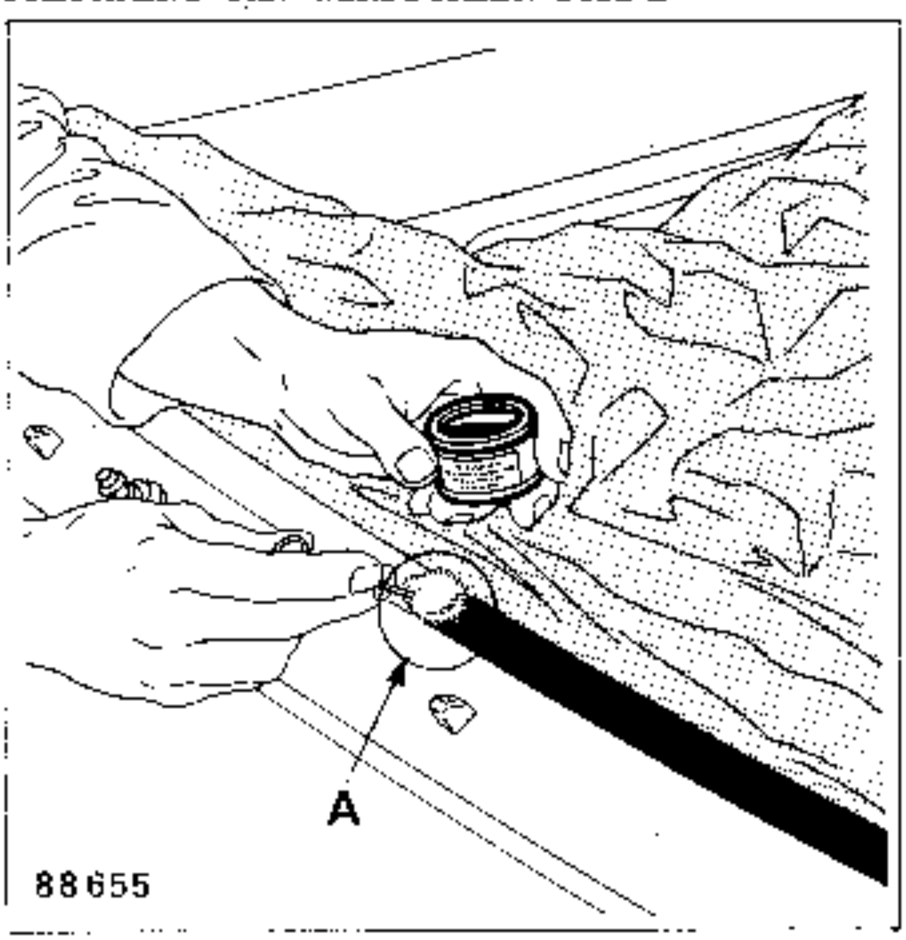
CLEANING A WINDSCREEN AFTER REMOVAL

- Using a sharpened spatula approximately 20mm wide, smooth down the remaining mastic, leaving a thickness of approximately 1mm. It is not necessary to remove all the mastic unless it comes unstuck by itself. Never damage the black enamel.

PREPARING A REMOVED WINDSCREEN

- When applicable, lightly degrease the area where the mastic has not adhered to the primer. Do not touch the remaining film of mastic.

PREPARING THE WINDSCREEN FRAME



- Mark the points at which the frame has been damaged back to the bare metal during removal or cleaning, and the points at which the mastic has not adhered to the paint.
- Using the same felt pad as for the windscreen, apply the sheet steel primer only to the areas concerned (detail A). Do not apply it to the film of mastic.

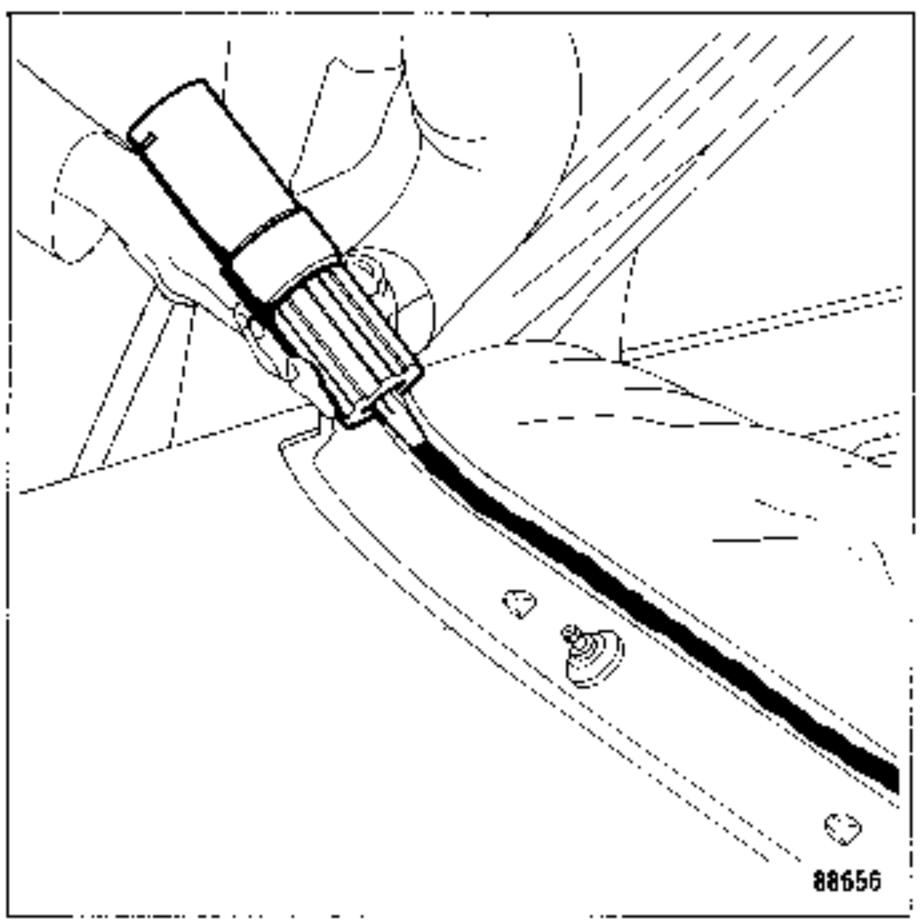
Note: It is absolutely forbidden to protect damaged areas with phosphate primer.

- Fit the new anti-run seal or seals to the aperture flange.

REFITTING

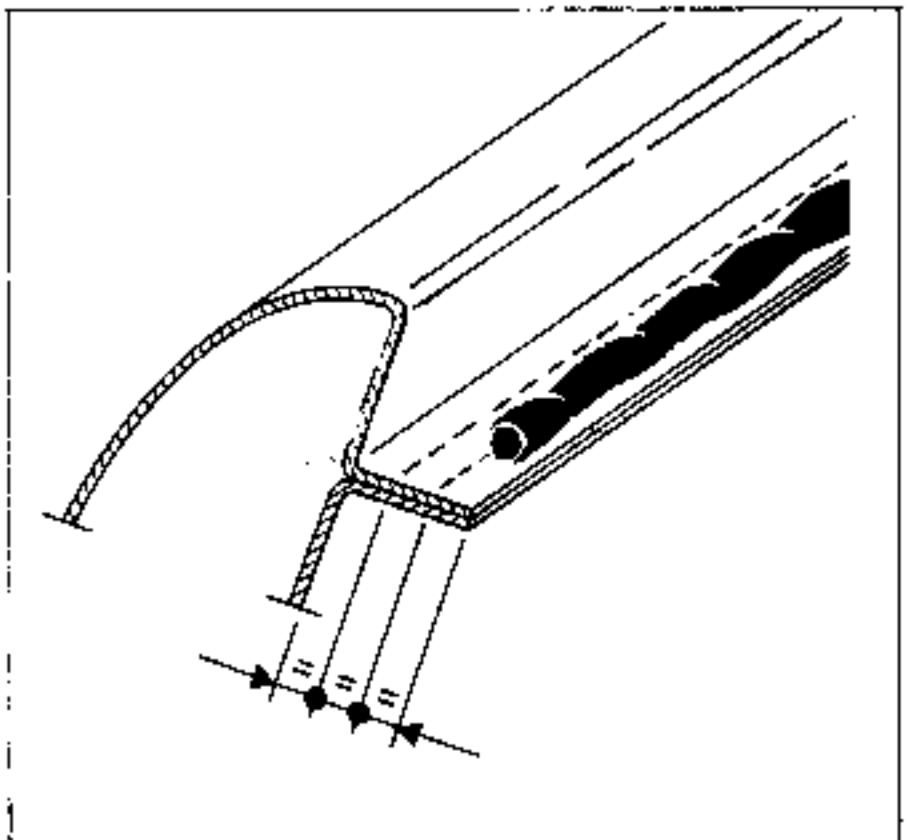
- With a rubber mallet or a tightly rolled cloth pad, push the trim support onto the windscreen, avoiding touching the primer with the fingers.

NOTE: Be ready, before fitting the seal, to apply a second cartridge of mastic (the part number for spare cartridges is given on page 2). If the two ends of the fillet cannot be joined during the first operation, it will be too late to order an additional cartridge.
- Clip the trim to its support before fitting the windscreen to the vehicle.



- Take the cartridge (7), pierce its diaphragm with a screwdriver and screw on nozzle (8).

- Remove the bottom of the cartridge and take out the damp absorbing material.
- With a pneumatic gun, apply a mastic fillet to the windscreen aperture, starting at the top, in the centre of the frame.



88500.1

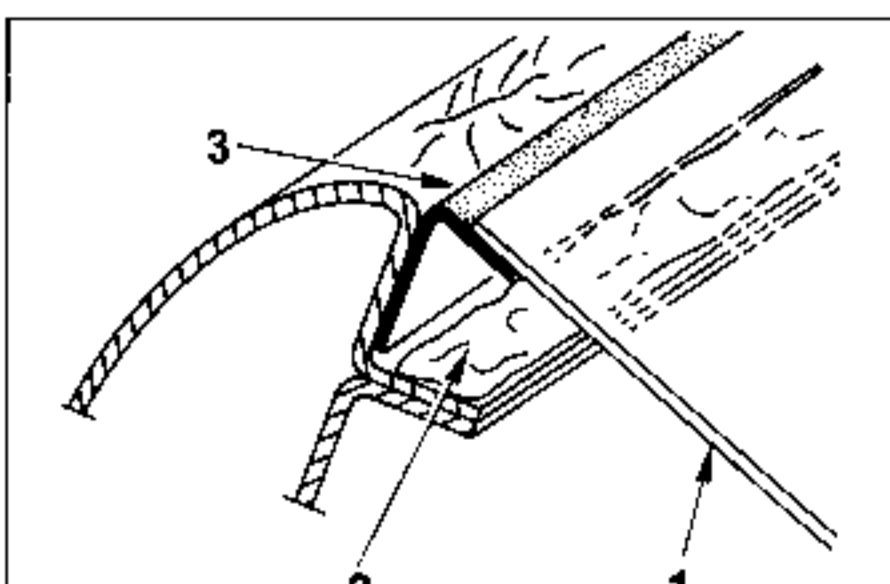
- The fillet is to be applied to the flange as shown in the above diagram.
- Make it as even as possible, except in the corners where it can be increased in diameter to 10 mm. Smooth out the joint at the ends of the fillet with a spatula.
- Fit the windscreen, using the suction pads, immediately after the application of the mastic, centralizing it in the windscreen aperture.
- With a tightly rolled ball of cloth, push the windscreen into its frame by tapping it evenly round its periphery until the trim is flush with the windscreen pillars and the roof.
- NOTE: Do not apply excessive force to any particular point (there is a risk of breakage).
- Immediately after fitting the windscreen, remove any excess mastic from both the inside and outside of the windscreen. If necessary, clean the paint and the windscreen, using only a clean cloth and "S27" (heptane).
- The vehicle is not to be driven for approximately 2 1/2 to 3 hours. During this time, hold the windscreen in place with one or two straps.
- Refit the windscreen wiper arms.

NOTE:

If the windscreen breaks on fitting.

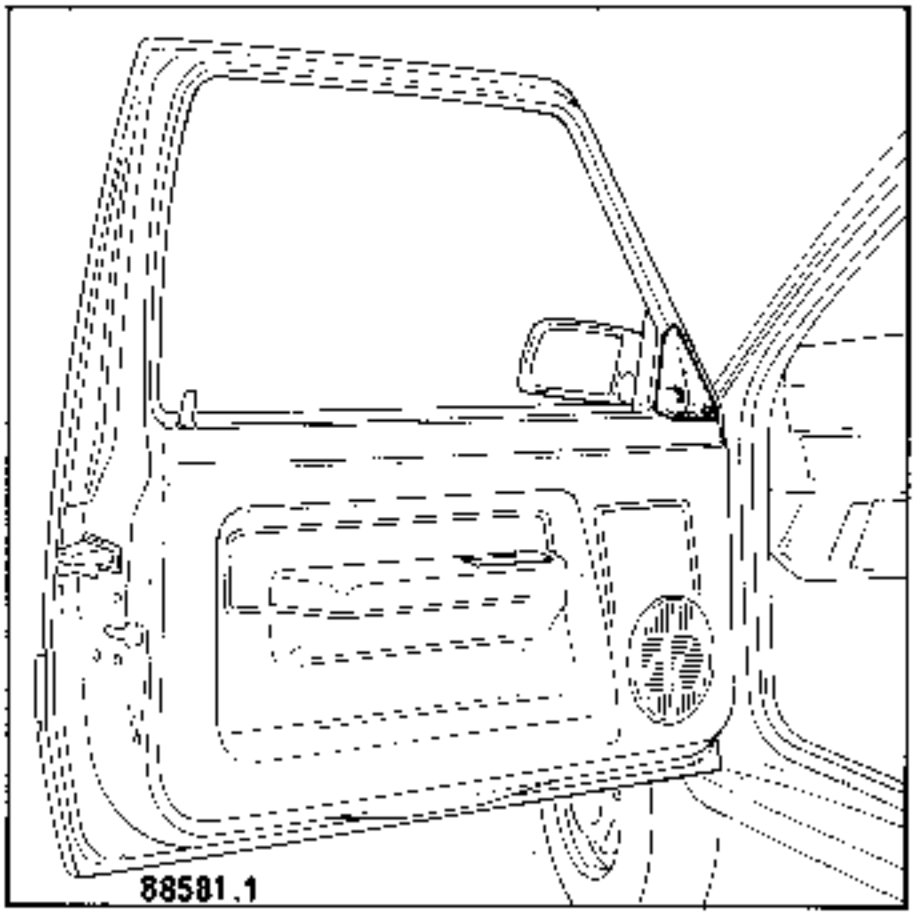
- Leave it, if possible for 1 1/2 to 2 hours before removing it. The mastic will then have started to cure, and removing the windscreen will be a much cleaner operation than if carried out immediately.
- Fully protect the inside and outside of the vehicle.
- Apply the suction pads to the outside of the windscreen.
- One operator is to push the windscreen from the inside to free it whilst the other supports it from the outside.
- Repeat the operating sequence from cleaning the windscreen aperture, avoiding staining the vehicle with the mastic.

If the external parts of the windscreen frame have been damaged, we strongly recommend that the frame should be masked-off up to the edge of the windscreen flange. This will protect the mastic film from any paint overspray. Do not stick the adhesive tape to the remaining film of mastic.

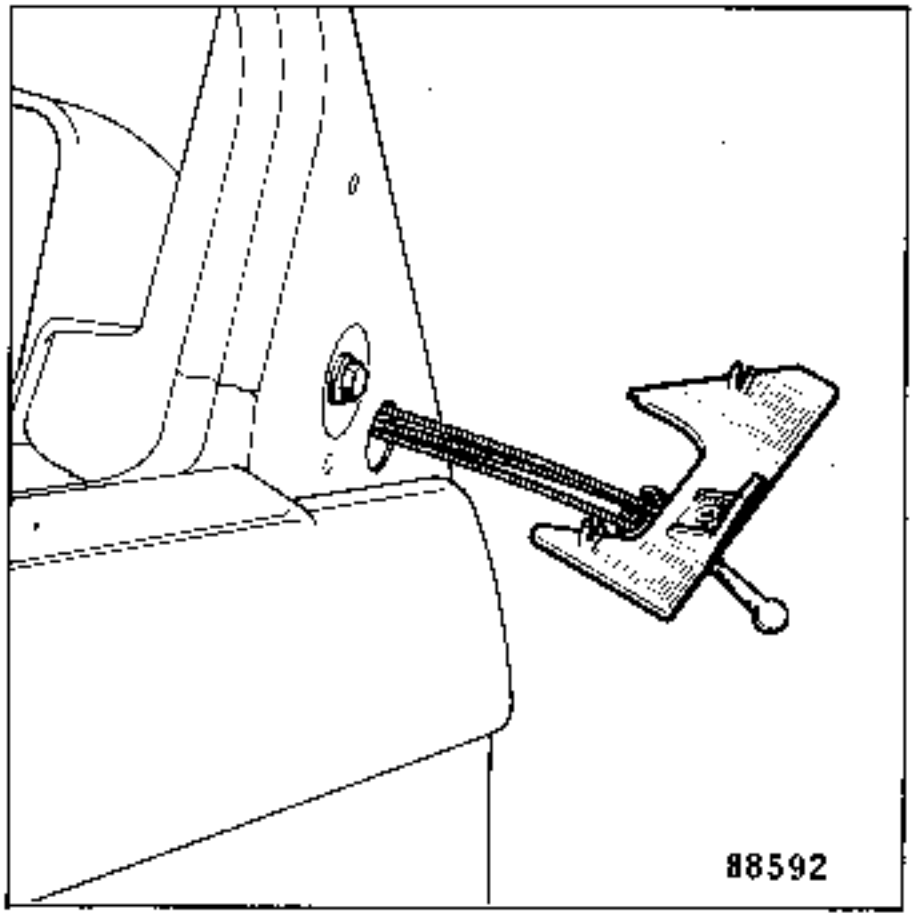


88678

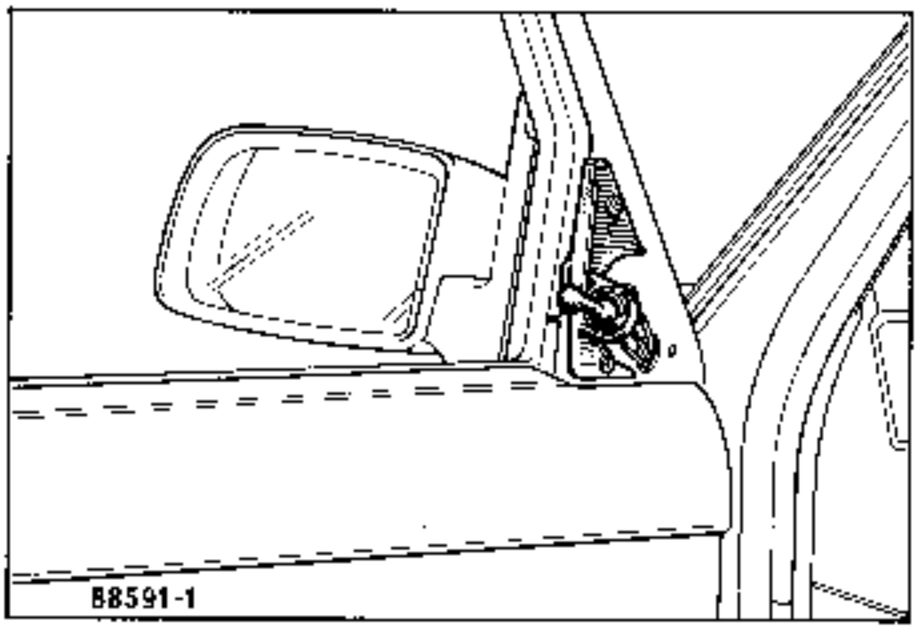
1 - masking paper
2 - mastic film
3 - masking tape



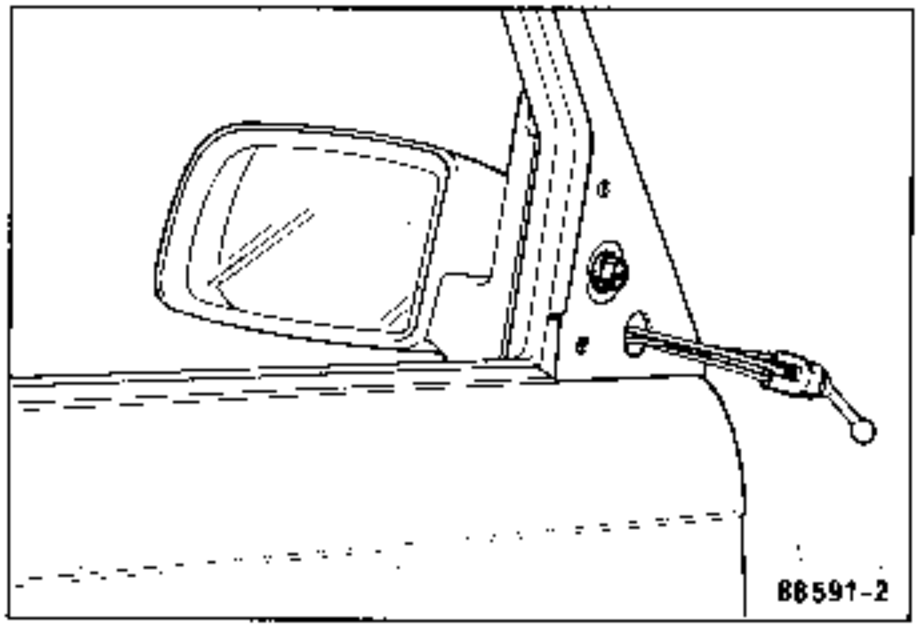
- Remove the rear view mirror control cover.



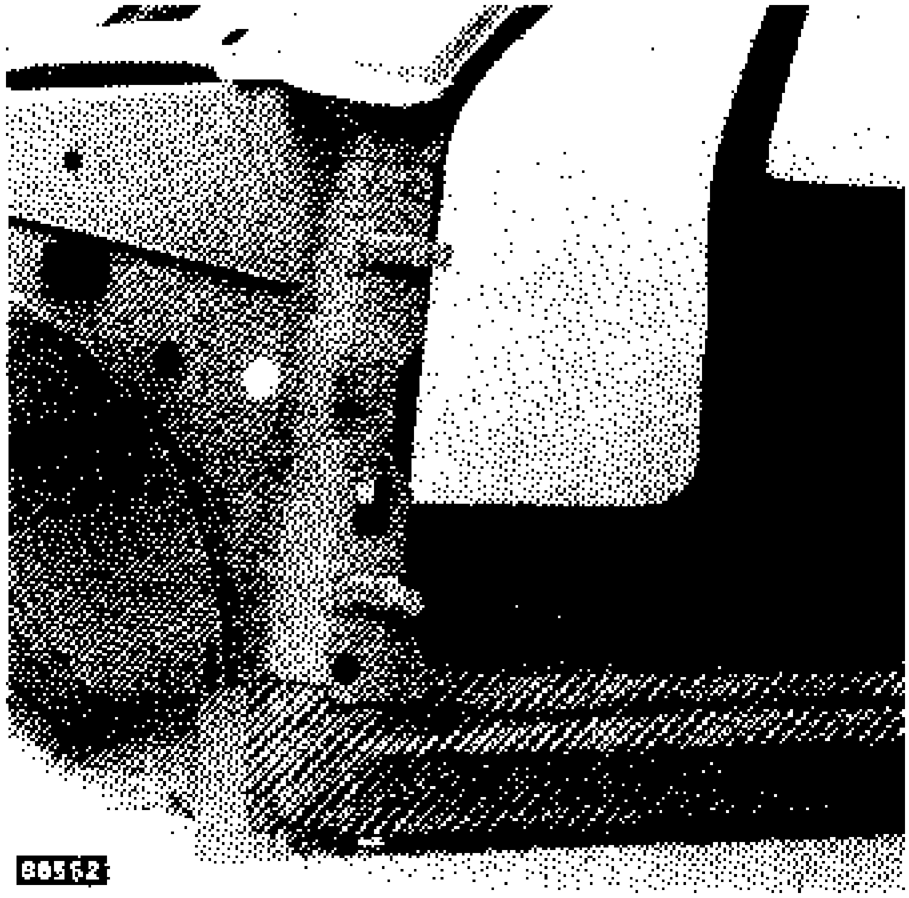
- Remove the control knob securing screw.

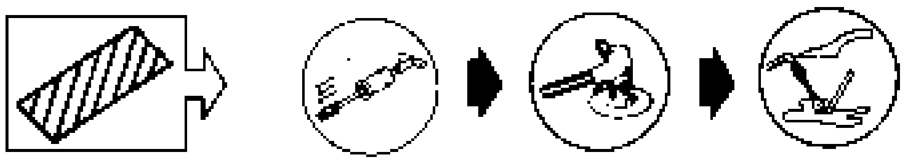


- Remove the 2 control support securing screws.



- Remove the mirror securing screw and take off the mirror and its control.





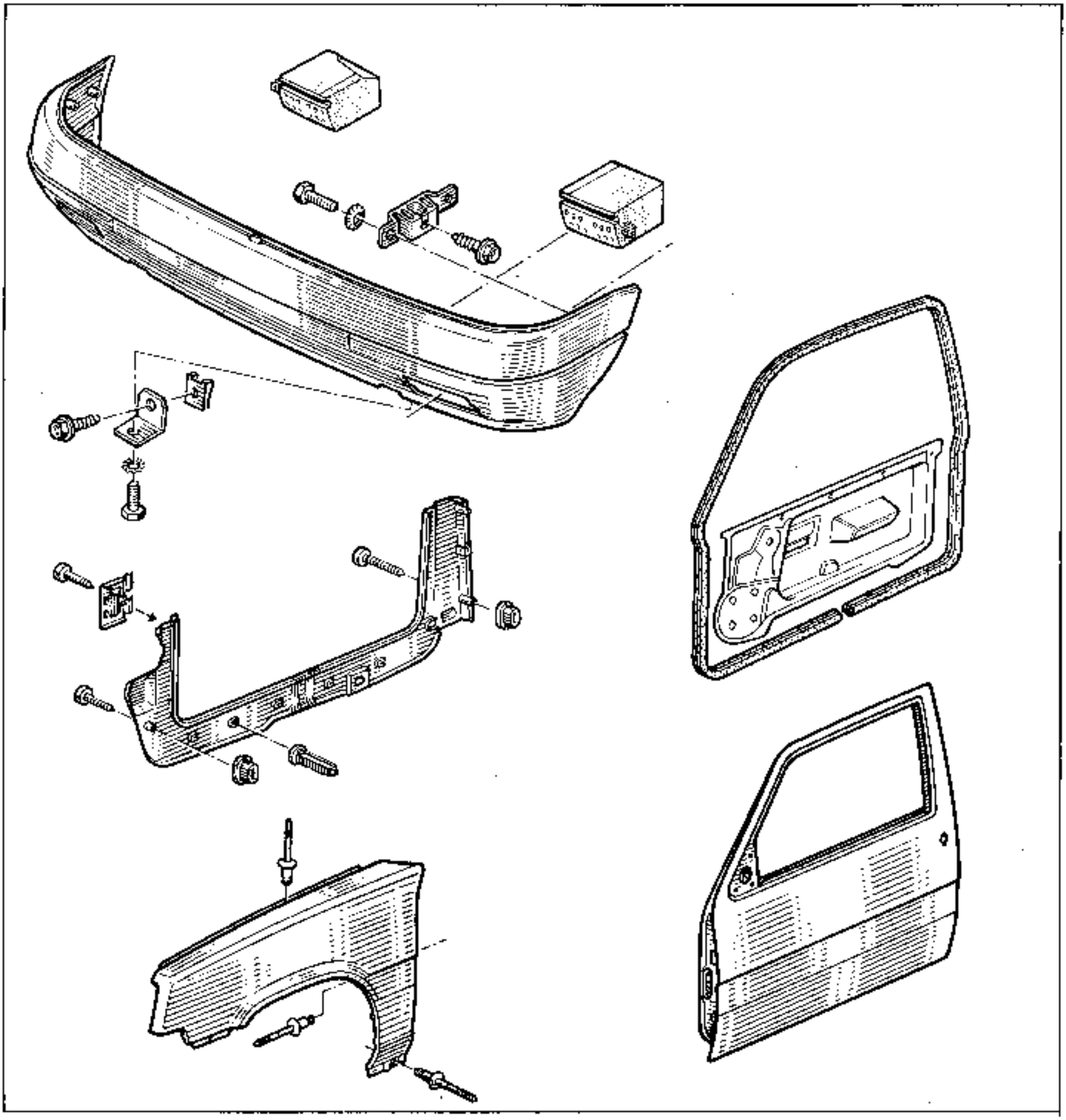
Carry out paint sequence no. 5 (see "Painting" section).

After painting, apply hollow section protective treatment.

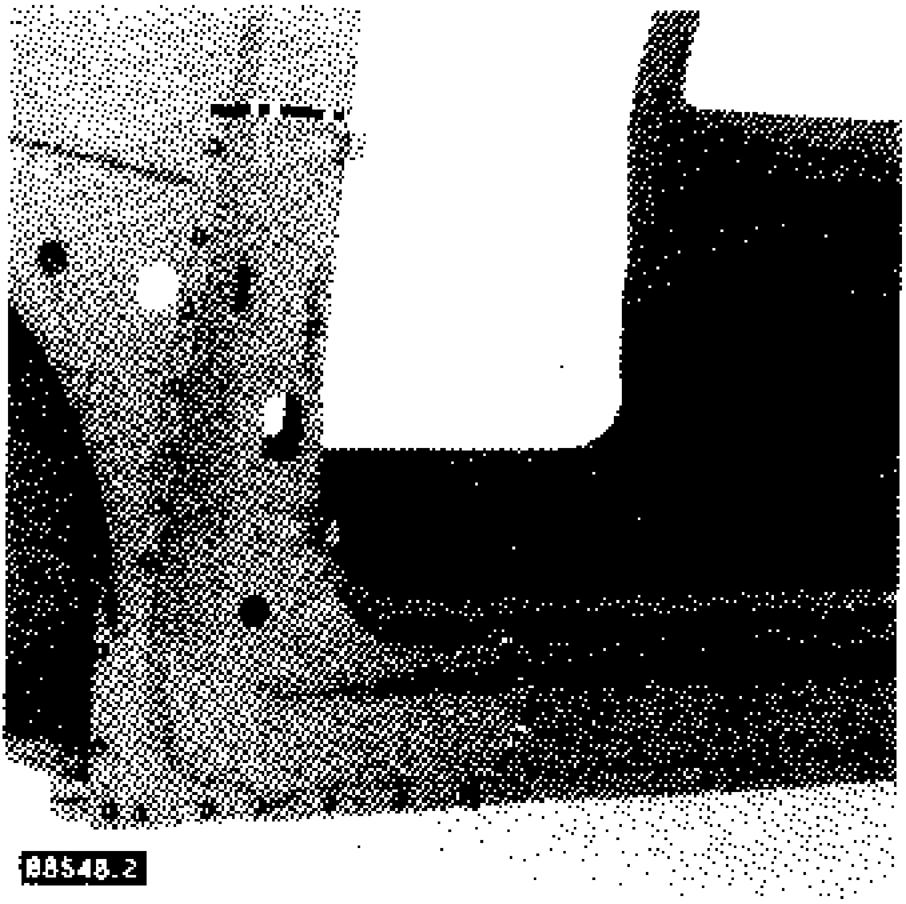
STRIPPING

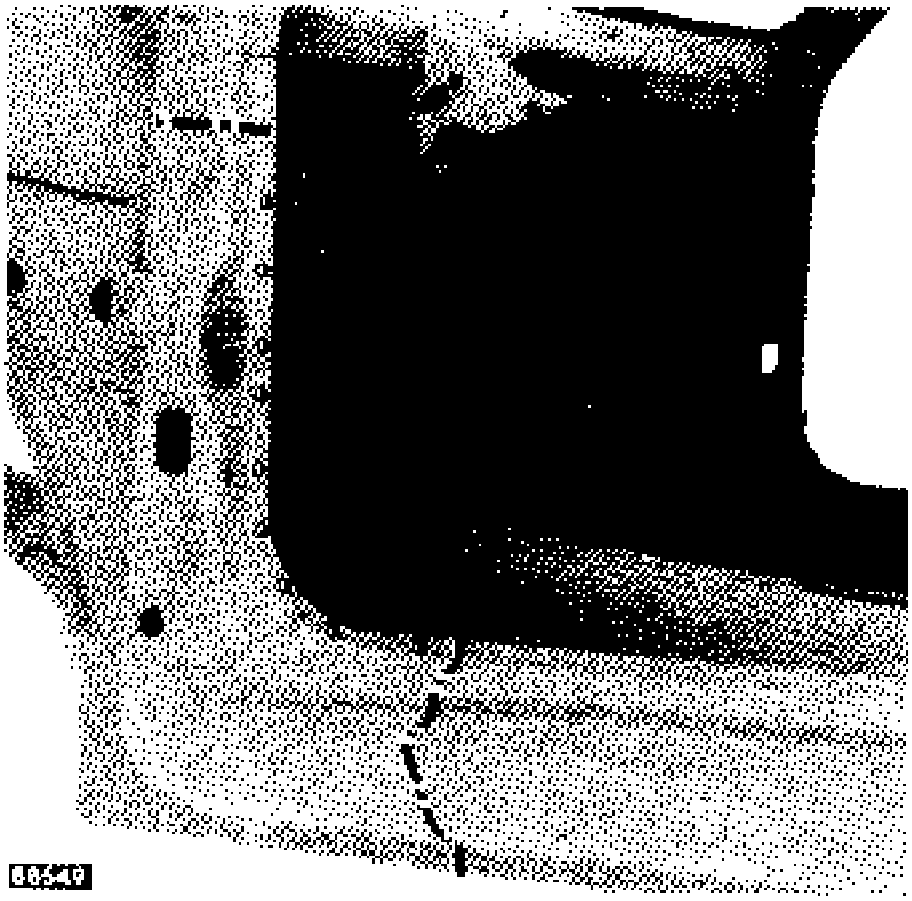
Remove:

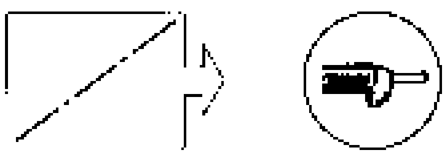
- the bumper shield
- the front wing
- the door
- the door pillar interior trim
- the door seal



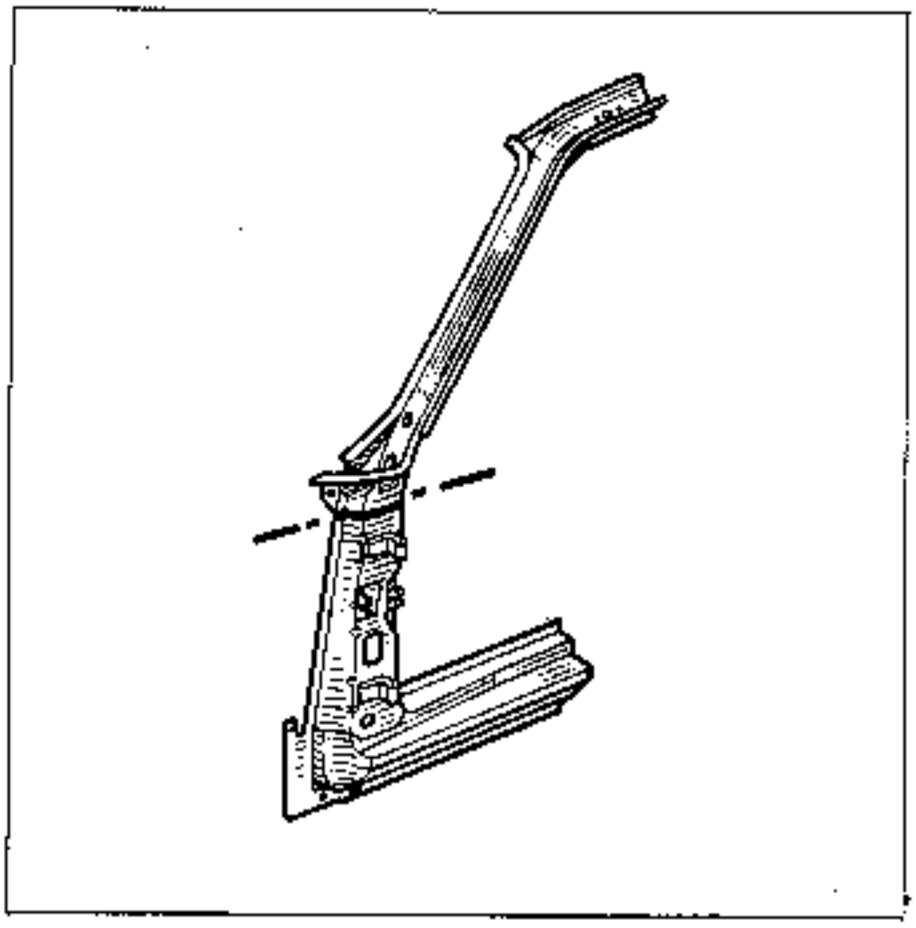
CUTTING - JOINT SEPARATION

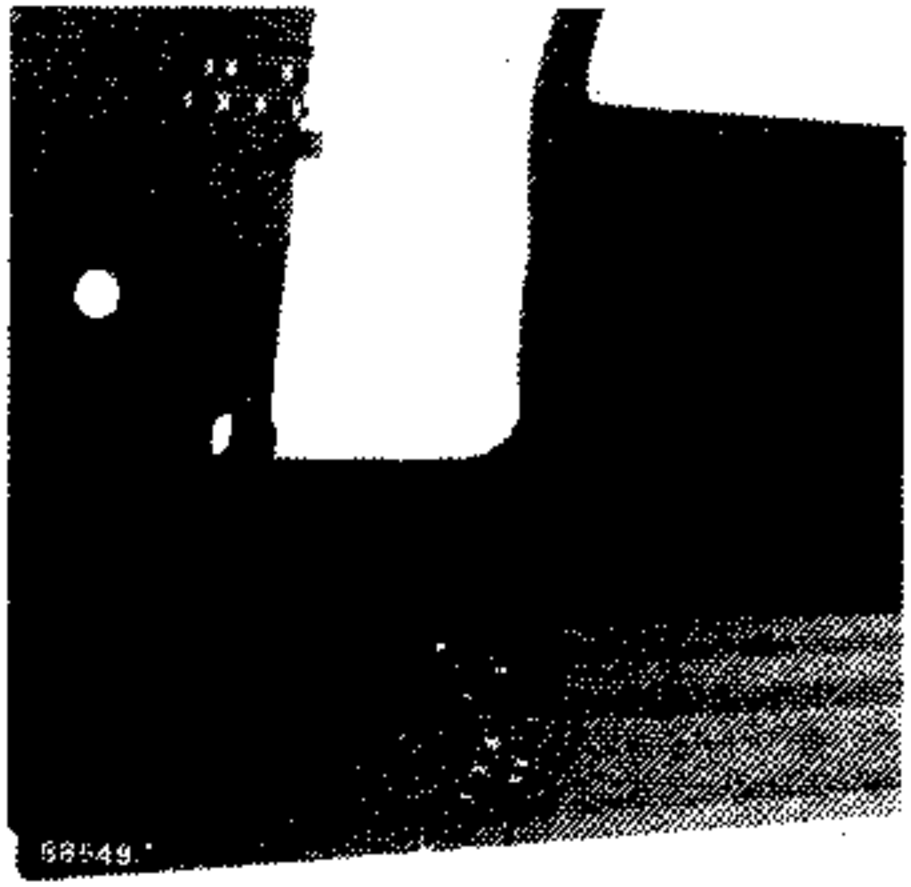

88548.2

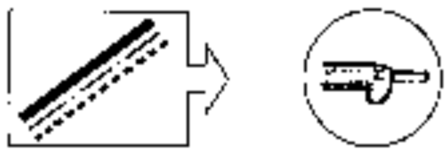

88549



- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).
- Grind back the pieces of spot weld adhering to the support panels.



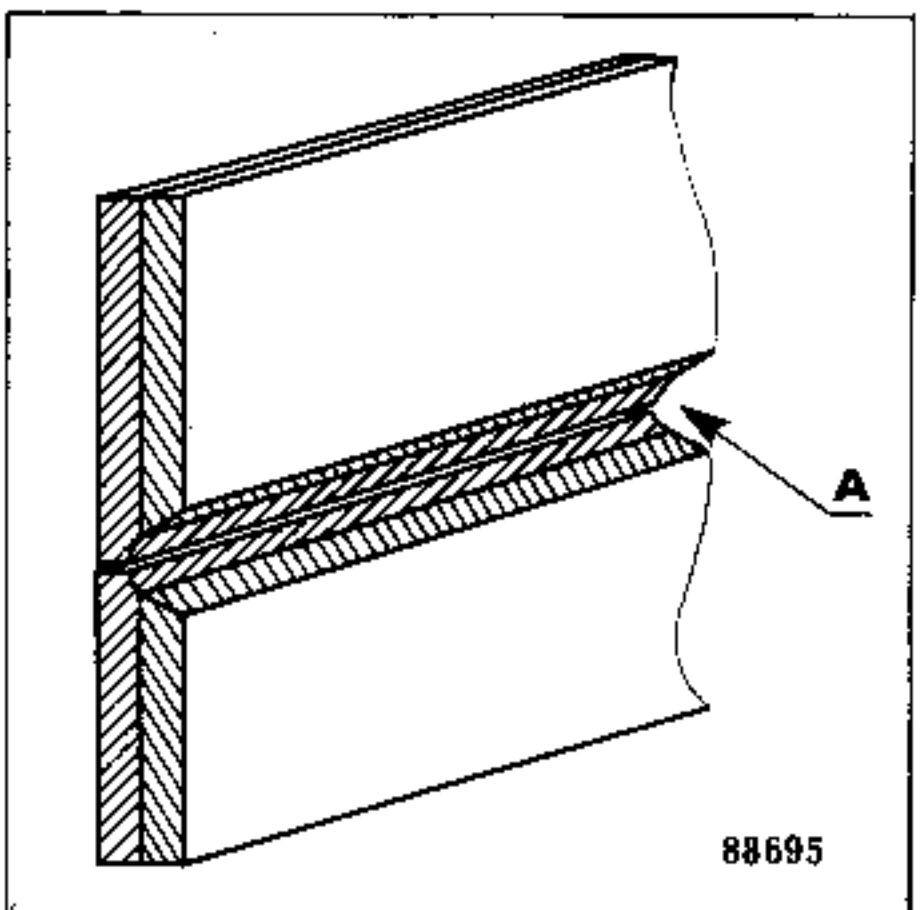




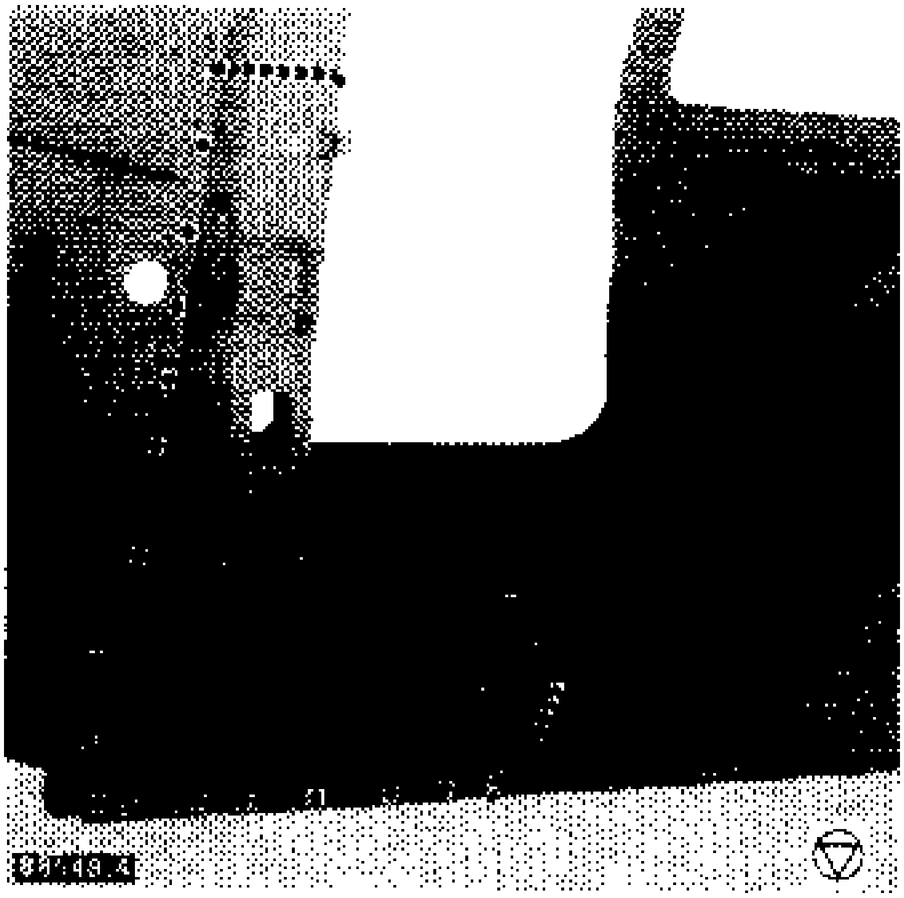
- Cut, from the new part, a length approximately 50 mm larger than that cut out on the vehicle.
- Fit the new part so that it overlaps the original part on the vehicle and secure it with grip clamps.
- Saw through both thicknesses of metal simultaneously to make adjusting the joint easier.

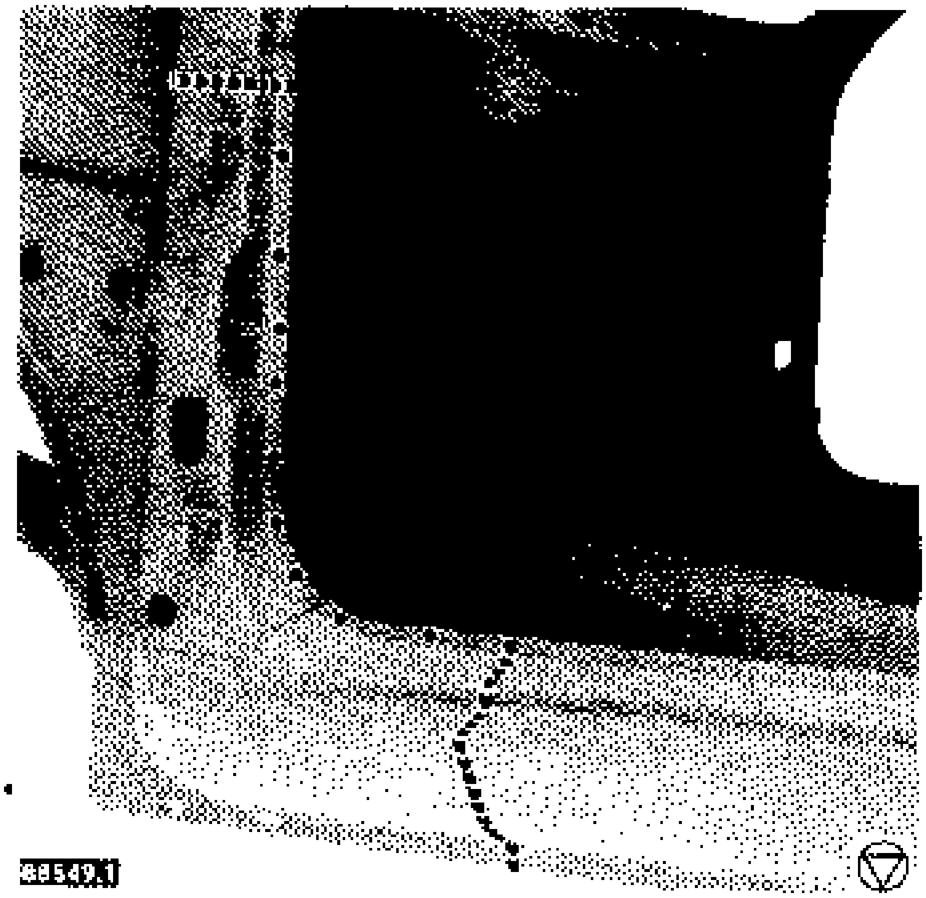
PREPARATION PRIOR TO WELDING

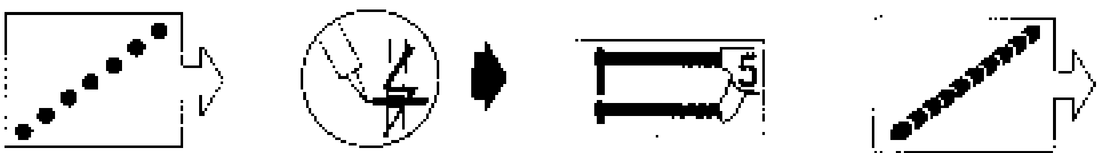
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols).
- Adjust the new part and secure it with grip clamps.
- Grind a chamfer (A) at the upper cut on the pillar, using a bakelite grinding disc 3 mm thick, so that both thicknesses of metal are welded.



WELDING







e = 1,4mm; H = 55mm

WELDING

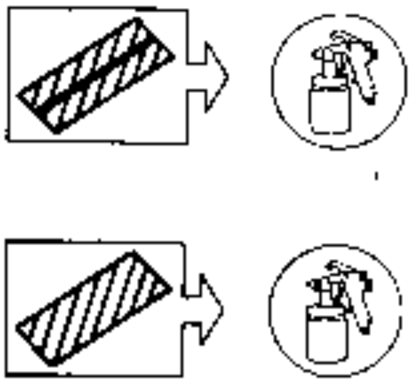
- Secure the butt joints with tack welds.

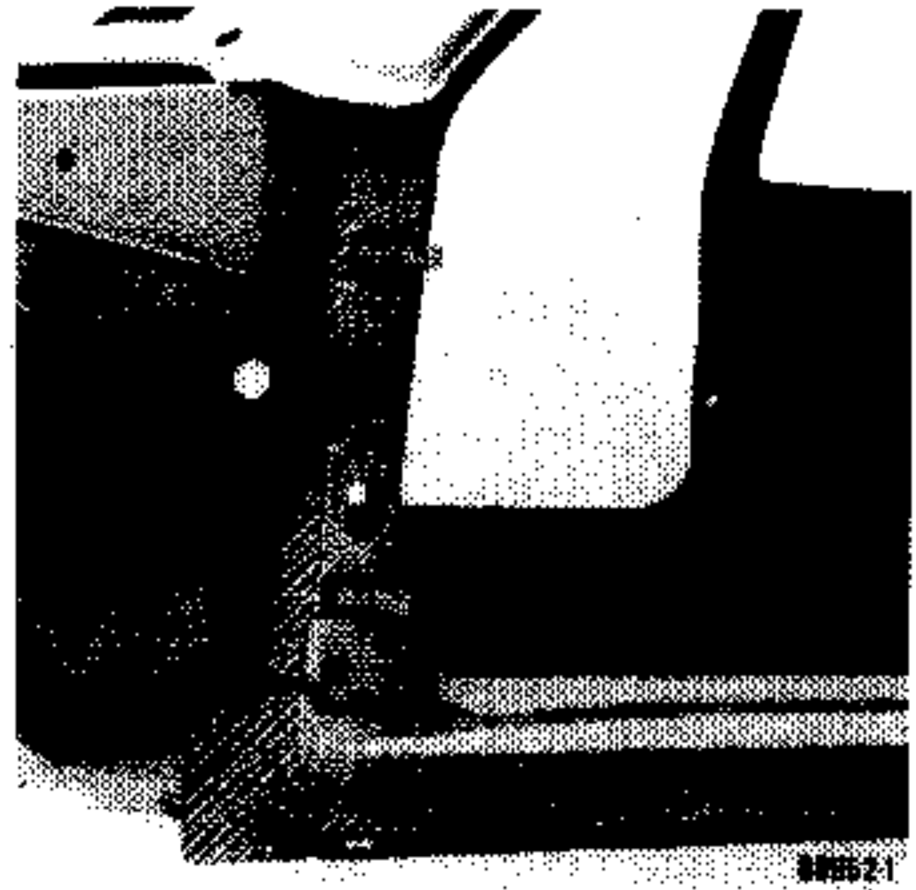
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.

- Apply the stitched fillets, using the gas envelope welding process. (These joints may also be gas welded, using a 75 to 100 nozzle).

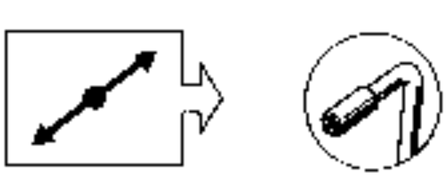
- Grind flush the butt welds and fill them with soft solder.

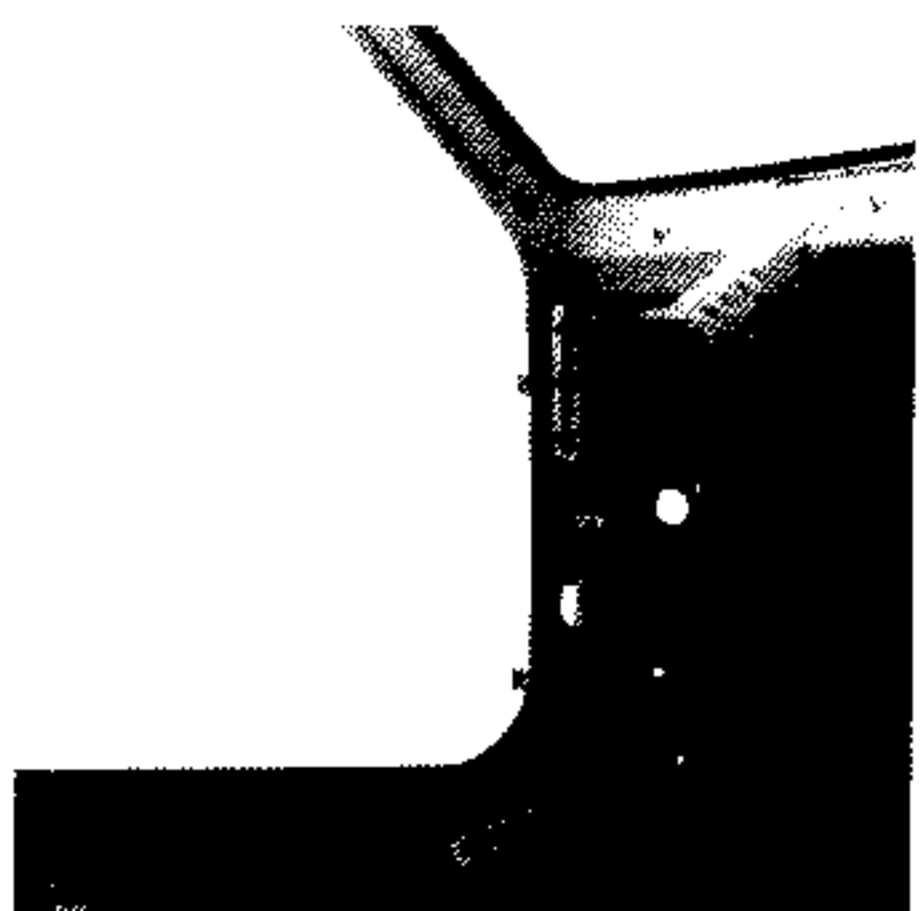
PAINTING

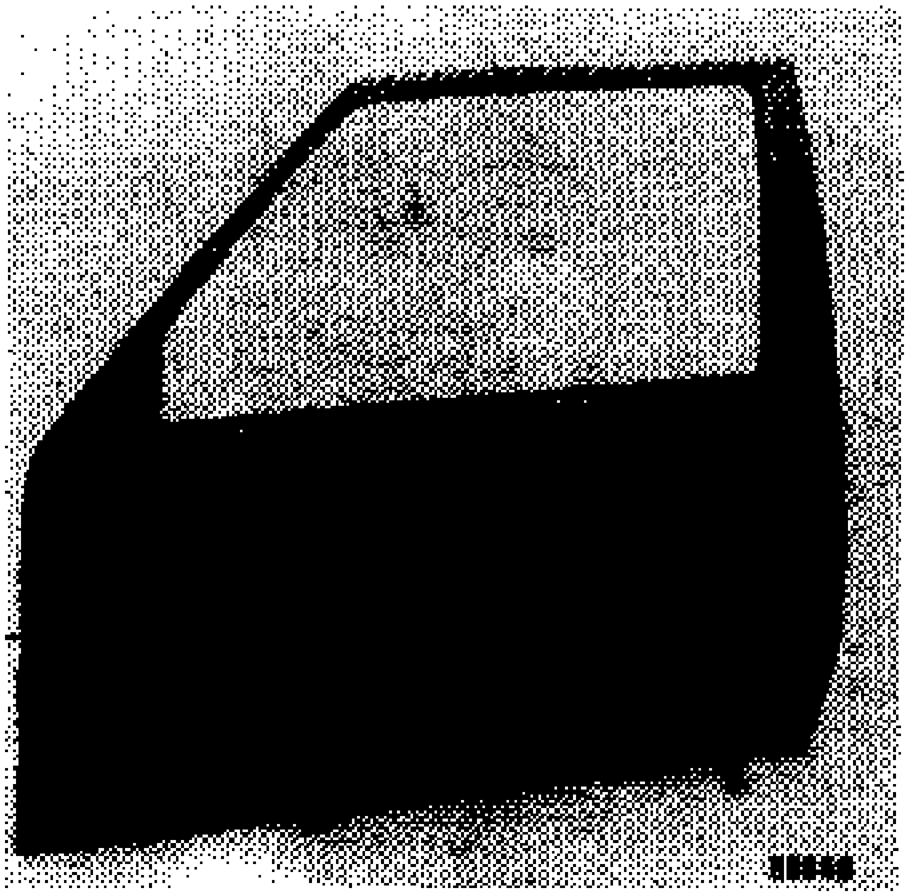


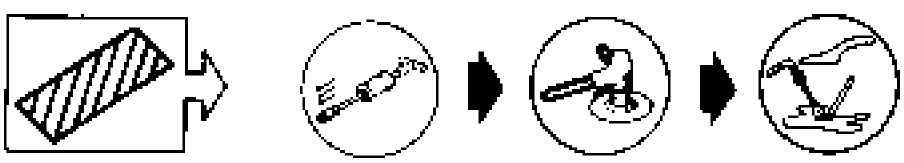


- Carry out paint sequence No. 5 (see "Painting" section).
- After painting, apply hollow section protective treatment.









PAINTING

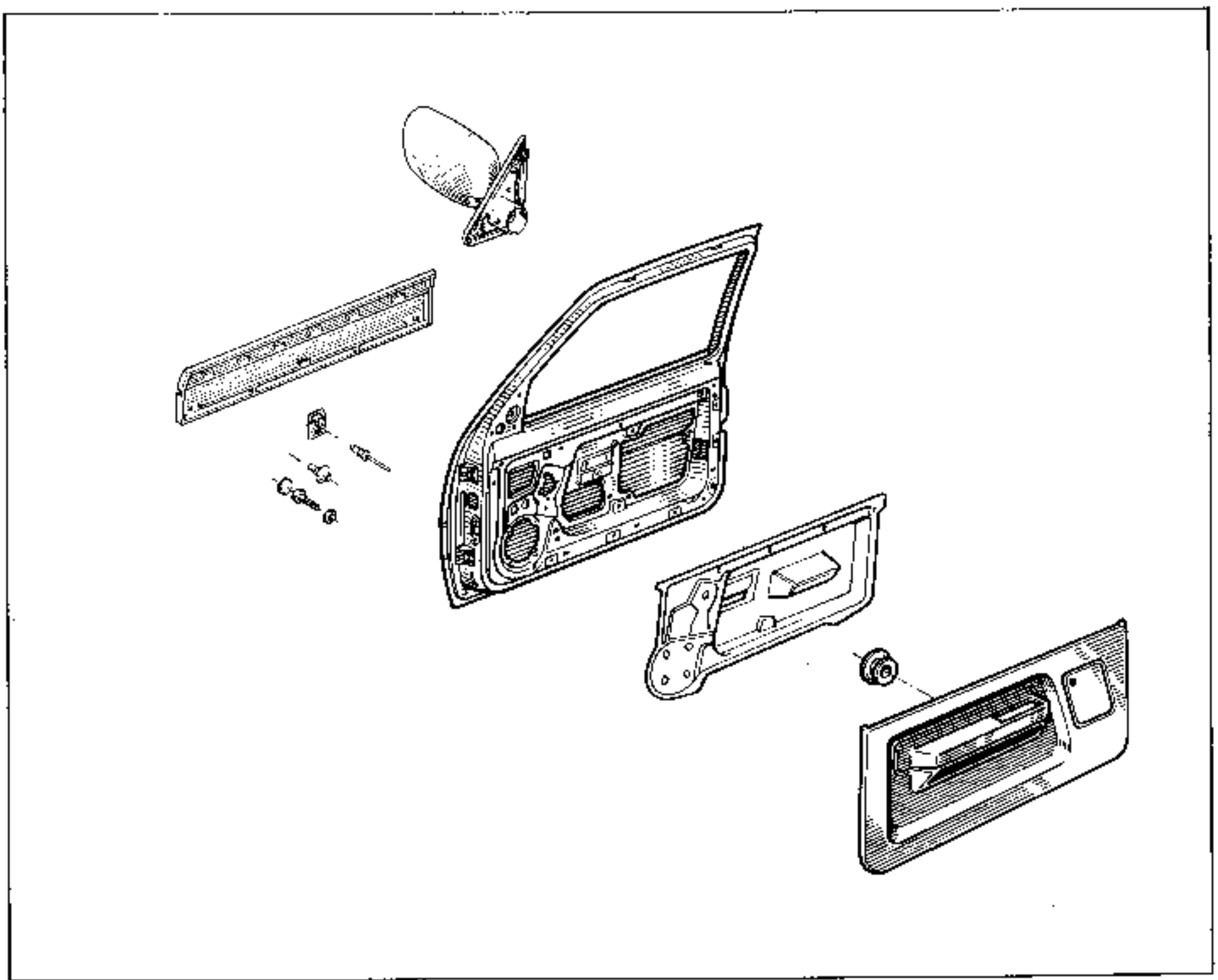
- Carry out paint sequence No. 5 (see "Painting" section).

- After painting, apply hollow section protective treatment.

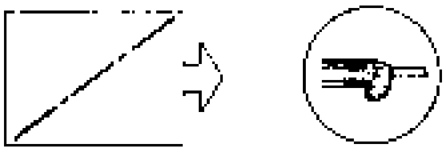
STRIPPING

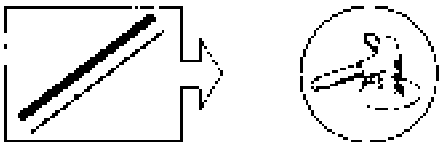
- remove the trim from the door
- remove the external rear view mirror and the trim strip
- remove the door

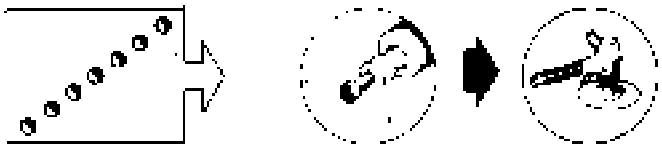
Note: For more details on removing the various parts, see the section which deals with the part in question.

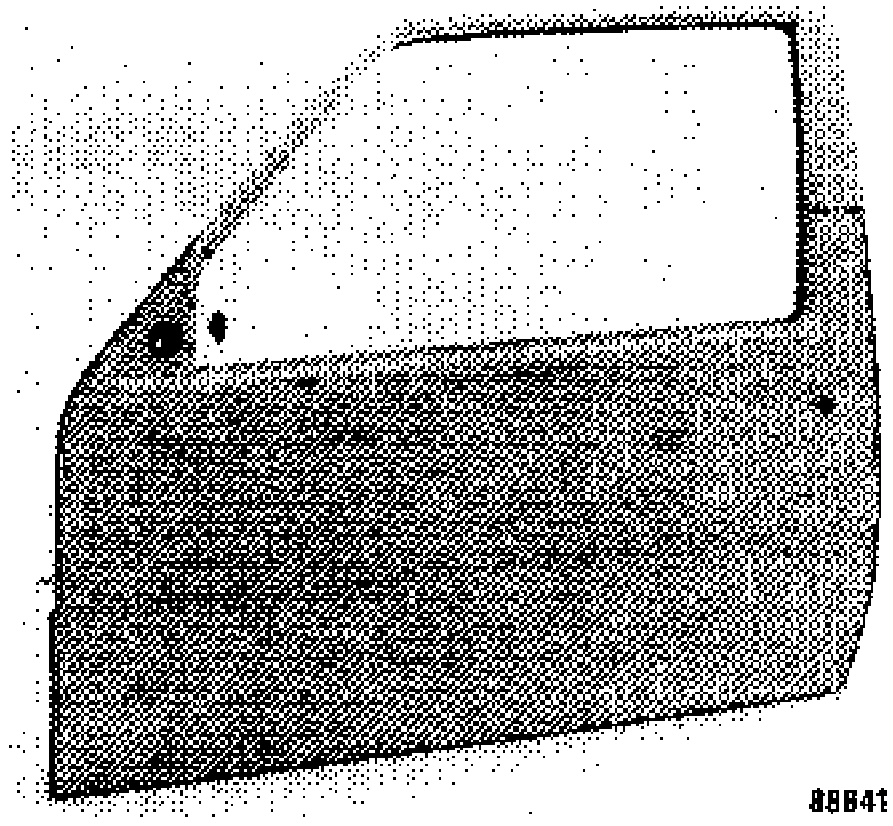


CUTTING - JOINT SEPARATION









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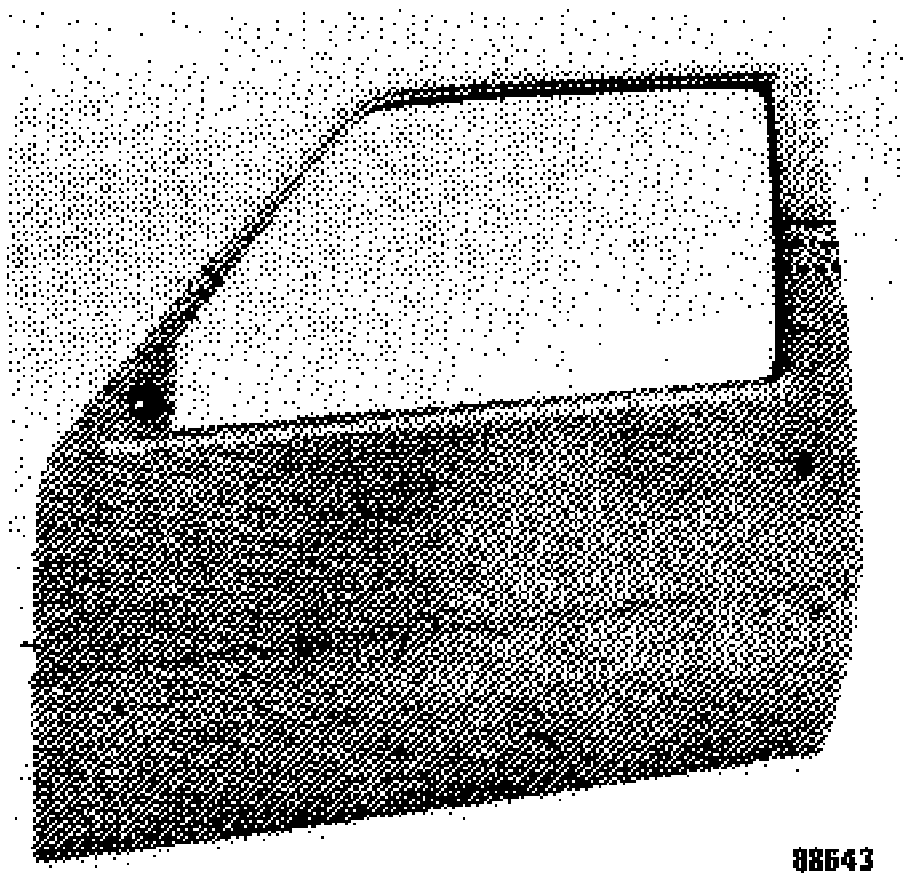
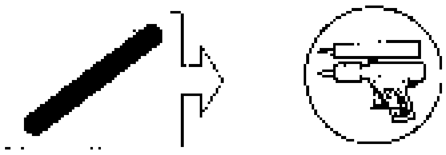
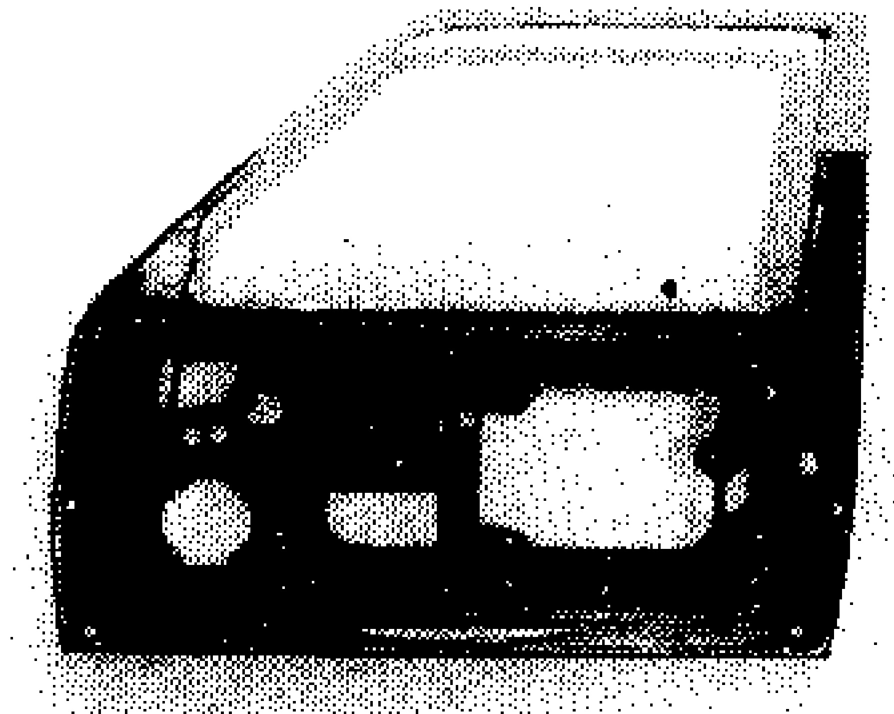
- Remove the damaged part by following the method represented by the above symbols (see description of symbols).
- Grind back the pieces of spot weld adhering to the support panels.
- Remove the strip of metal remaining on the inside of the door body.



88643

- Cut, from the new part, a section approximately 50 mm larger than that cut out on the vehicle.
- Fit the new part so that it overlaps the original part on the vehicle and secure it with grip clamps.
- Saw through both thicknesses of metal simultaneously to make adjusting the joint easier.

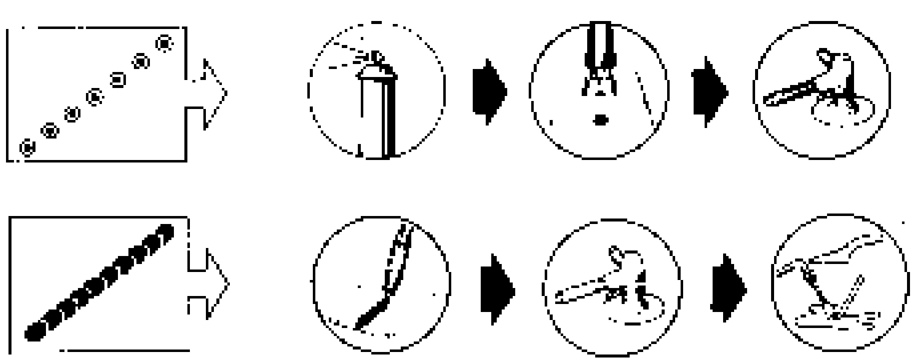




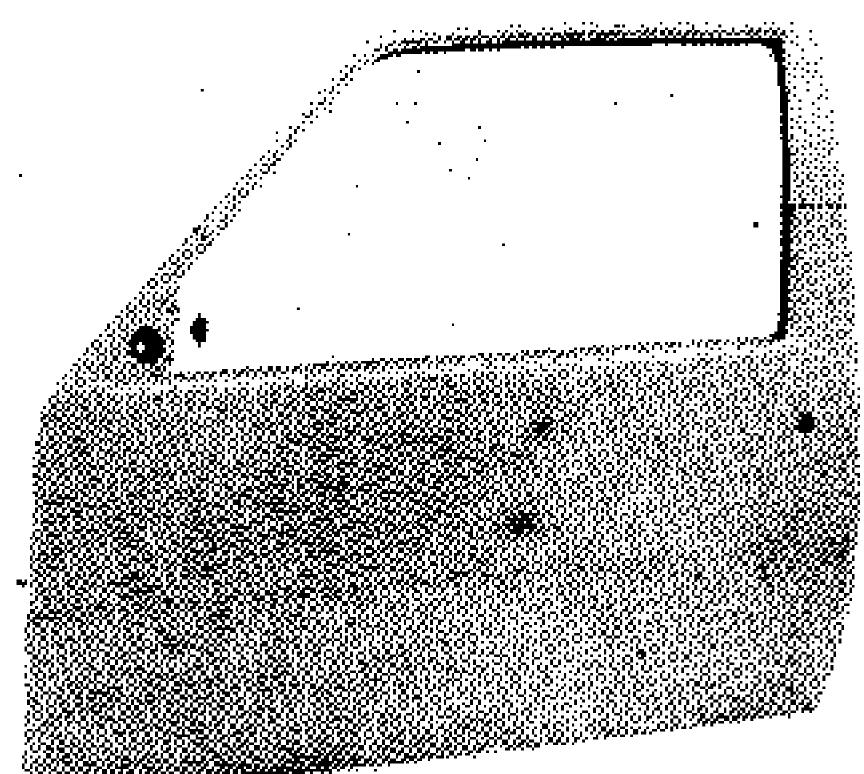
88642

PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply zinc paint to the areas to be plug welded.
- Adjust the new part and secure it with grip clamps.
- Crimp, evenly, round the periphery of the panel.



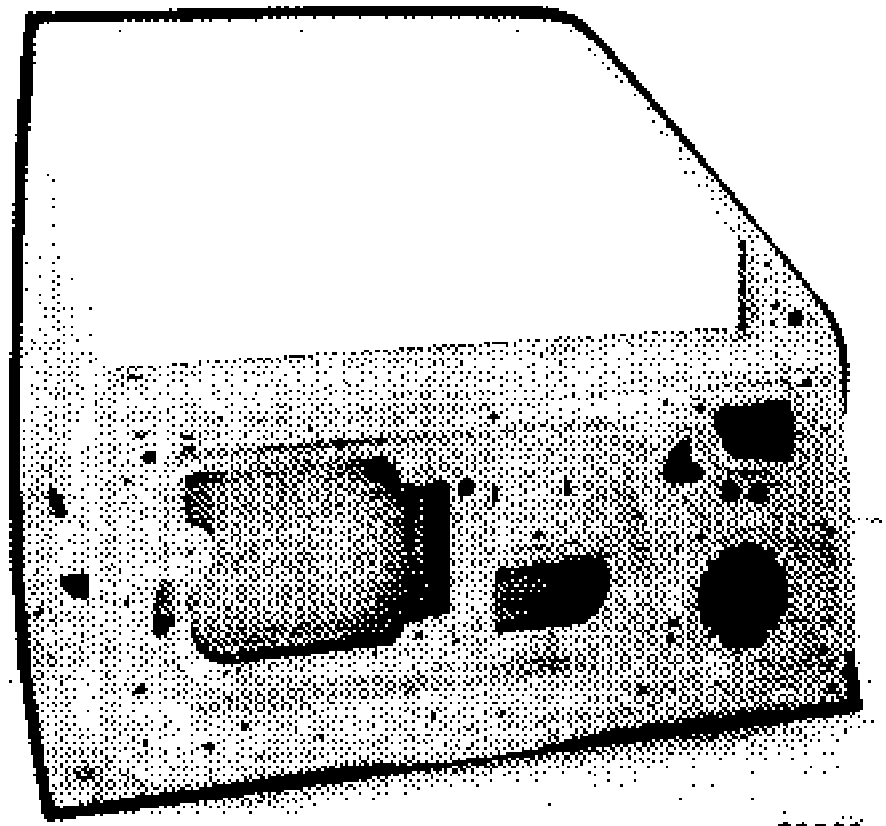
D = 4.5 mm



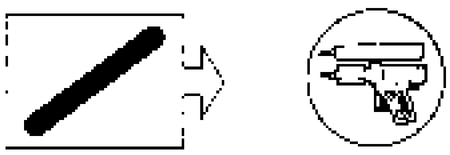
88644

- Apply the plug welds, using the gas envelope welding process. To do this, drill holes in the upper panel to the diameter D stated under the drawings.
- Apply the stitched fillets, using the gas envelope welding process. (These joints may also be gas welded, using a 75 to 100 nozzle).
- Grind flush the butt welds and fill them with soft solder.

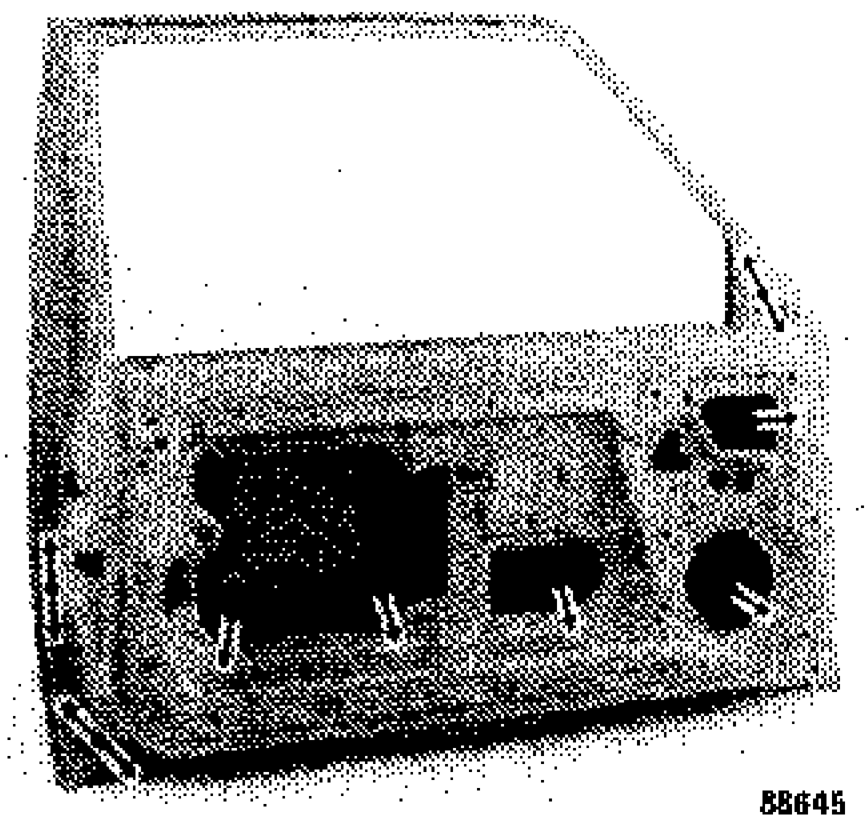
PAINTING



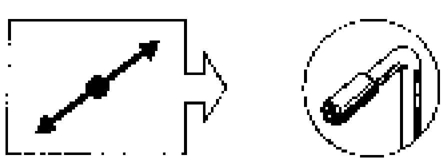
88646



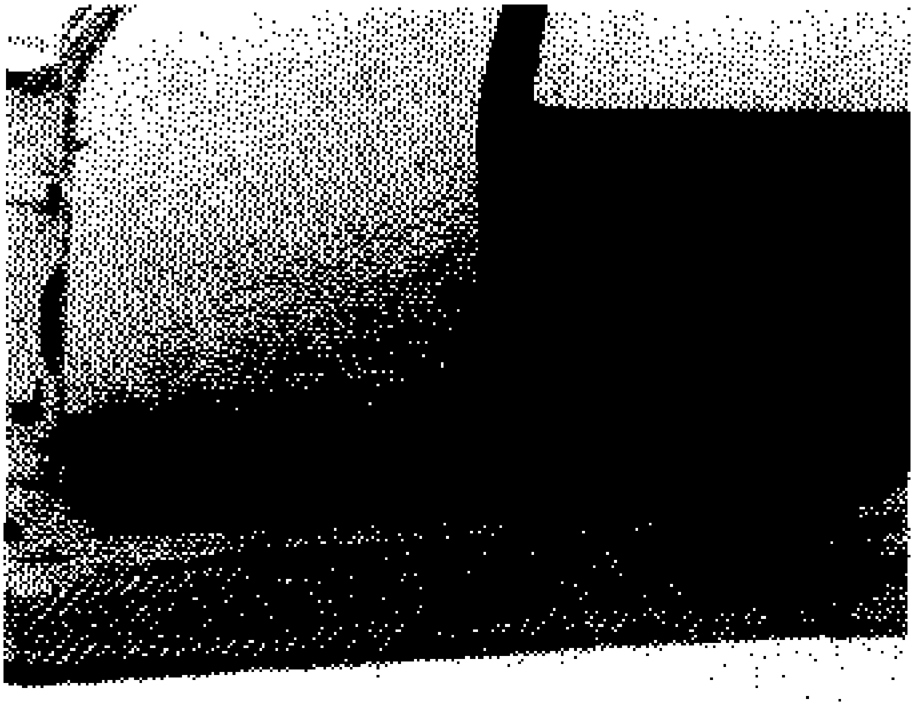
- Refit the door to the vehicle.
- Carry out paint sequence No. 1 (see "Painting" section).

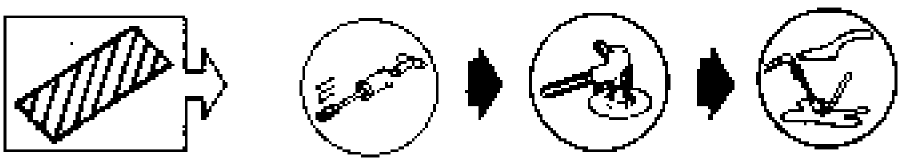


88645



- After painting and refitting the trim, apply hollow section protective treatment.





PAINTING

- Carry out paint sequence No. 3 (see "Painting" section).

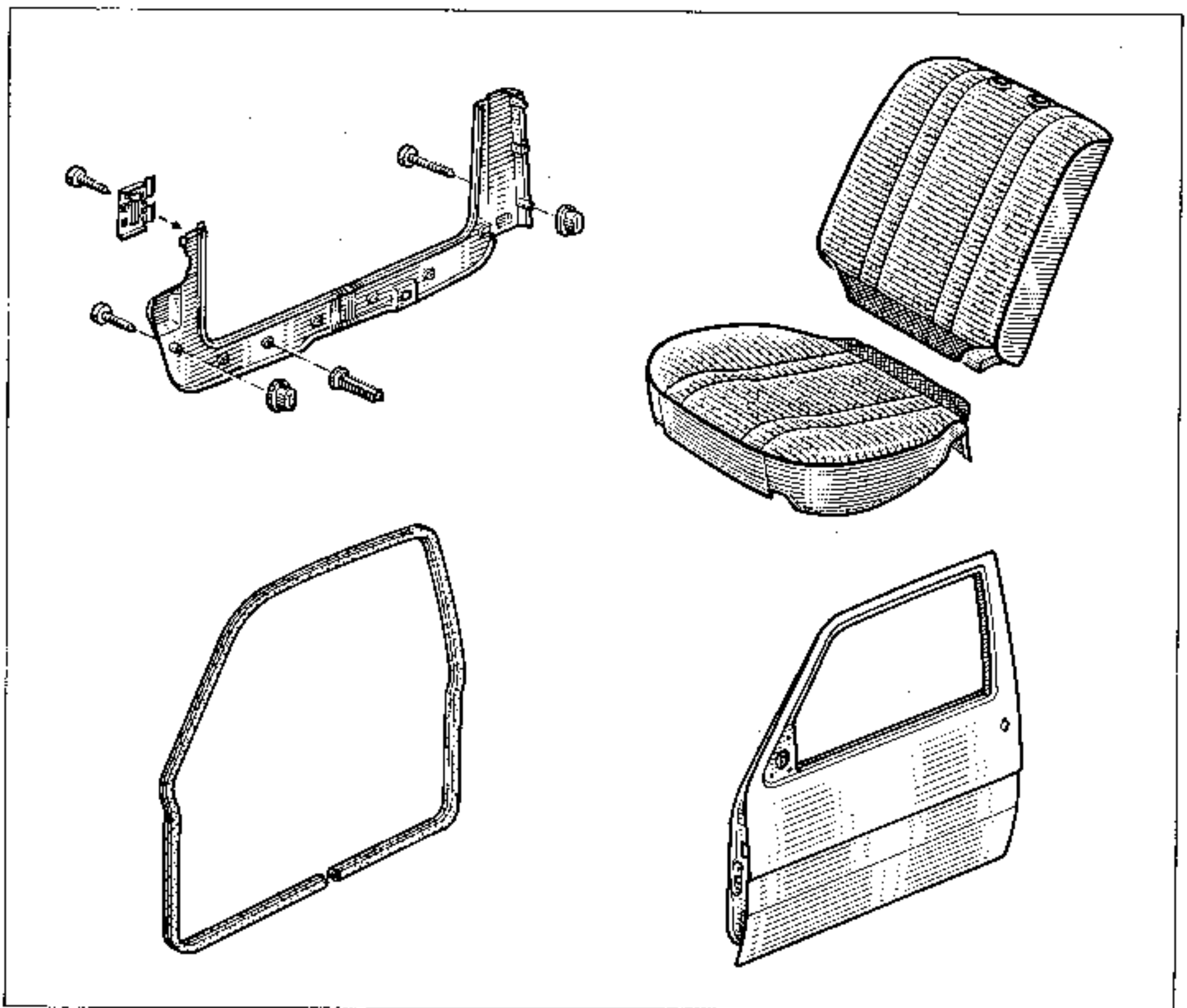
- After painting, apply hollow section protective treatment to the inside face of the repaired area.

STRIPPING

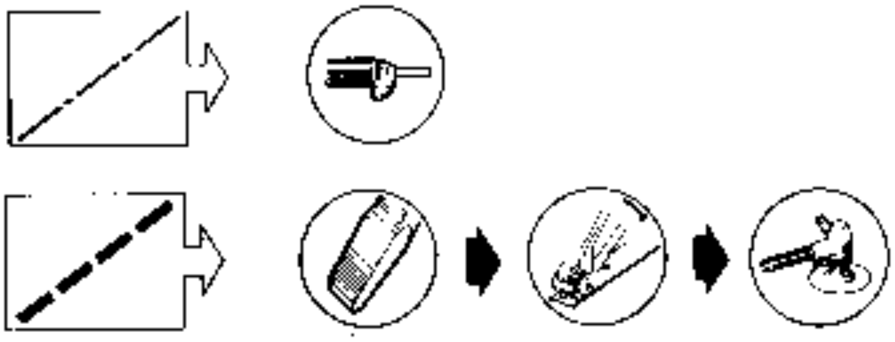
- Remove:

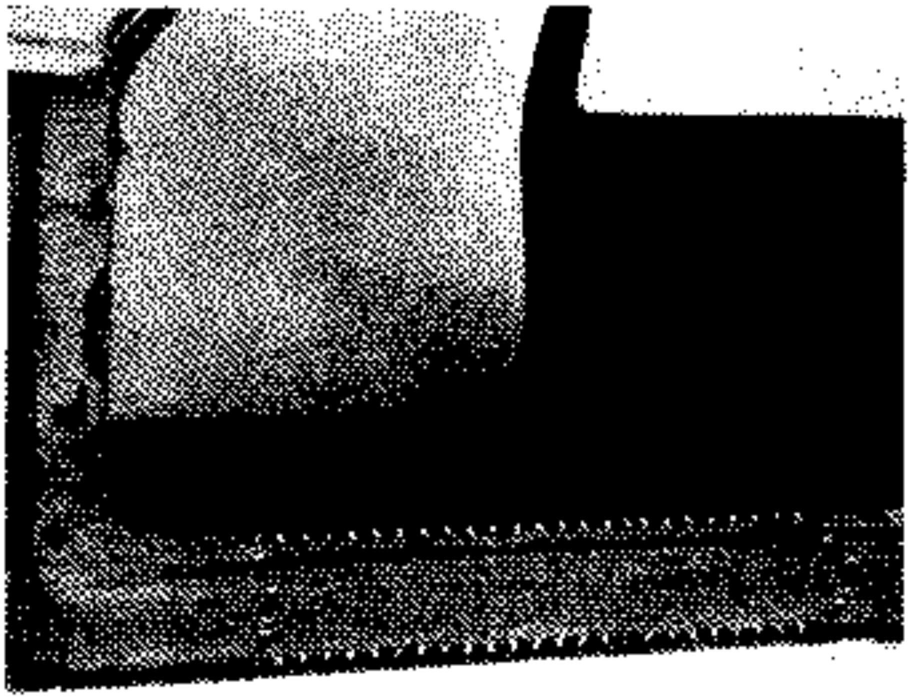
    - the door
    - the front seat
    - the interior trim
    - the door seal
- Fold back the floor covering

Note: For more details on removing the various parts, see the section which deals with the part in question.



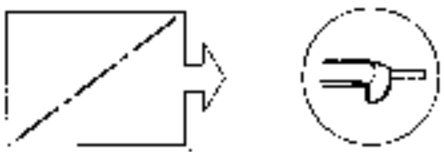
CUTTING - JOINT SEPARATION

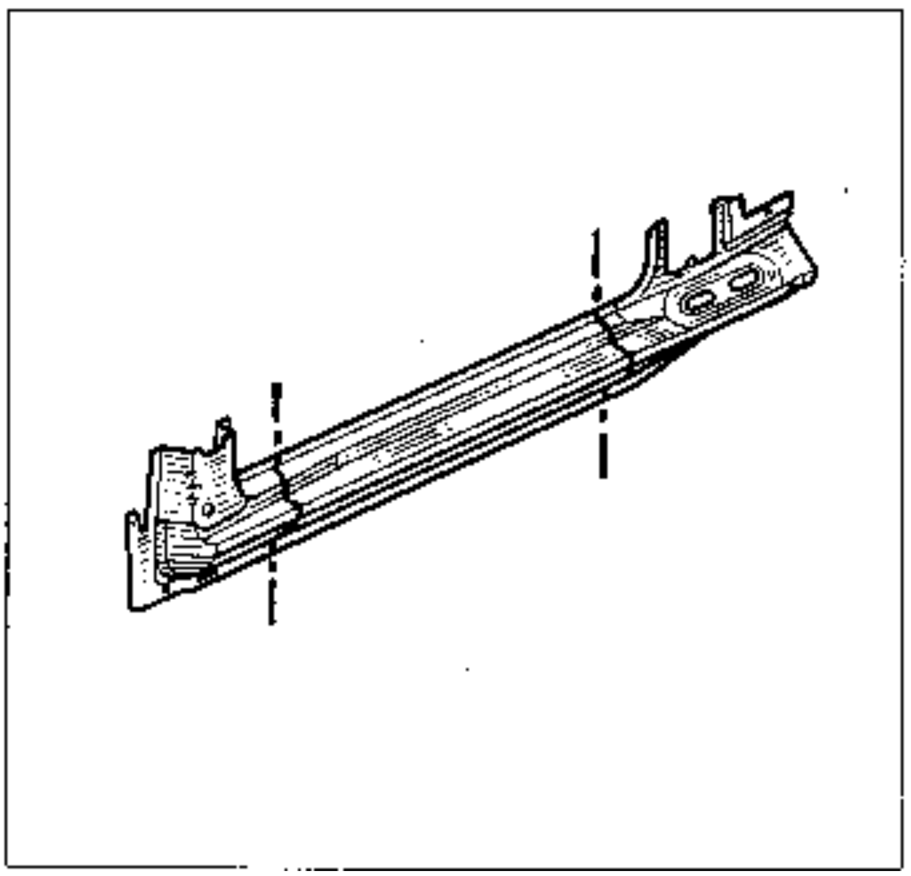




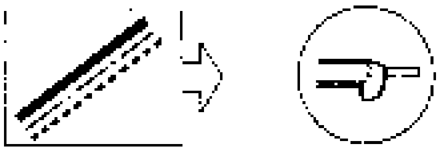
- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).

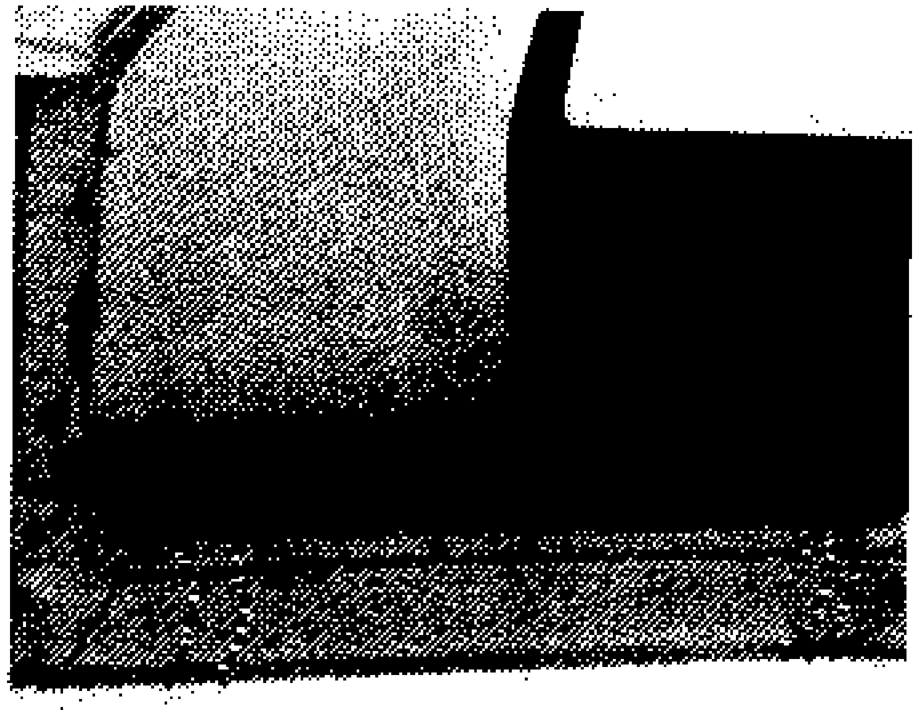
- Grind back the pieces of spot weld adhering to the support panels.





- Cut, from the new part, a section approximately 50 mm larger than that cut out on the vehicle.





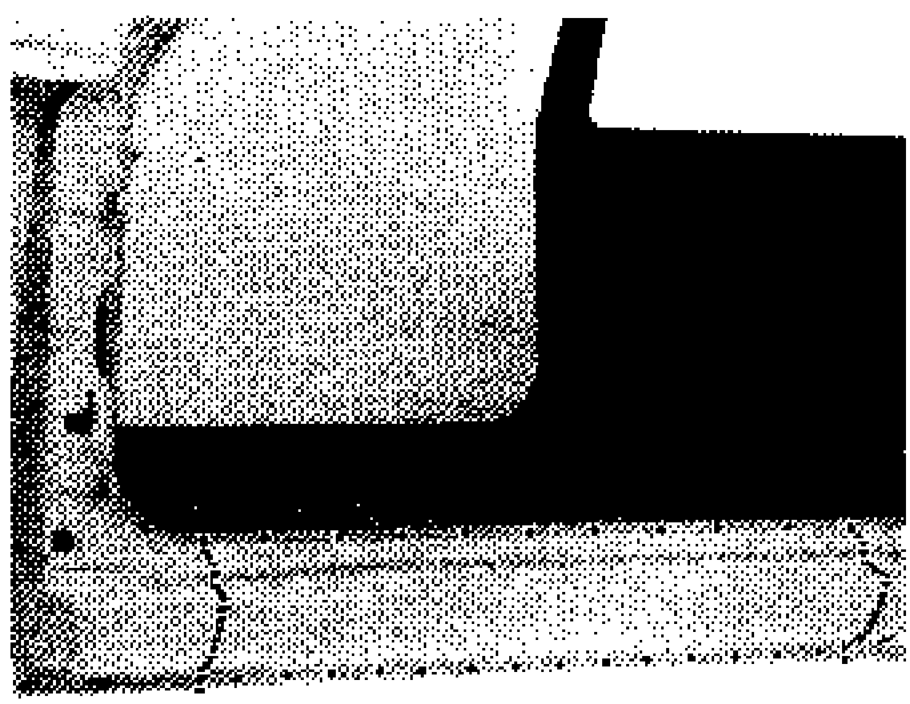
- Fit the new part so that it overlaps the original part on the vehicle and secure it with grip clamps.
- Saw through both thicknesses of metal simultaneously to make adjusting the joints easier.

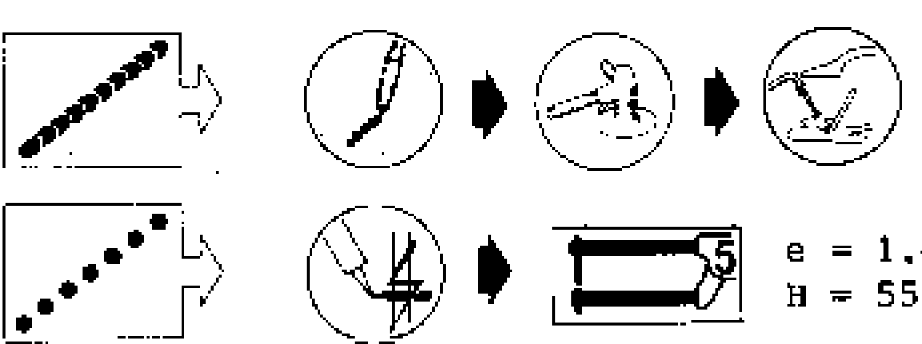
PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded (both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols).
- Adjust the new part and secure it with grip clamps.

WELDING

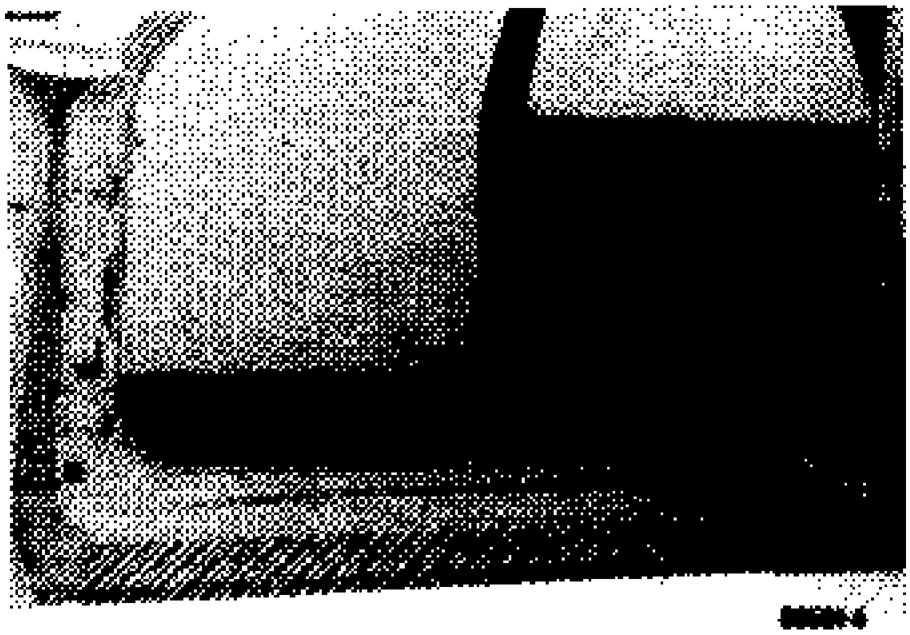
- Secure the butt joints by tack welding them.
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.
- Apply the stitched fillets, using the gas envelope welding process. (These joints may also be gas welded using a 75 to 100 nozzle).
- Grind flush the butt welds and fill them with soft solder.

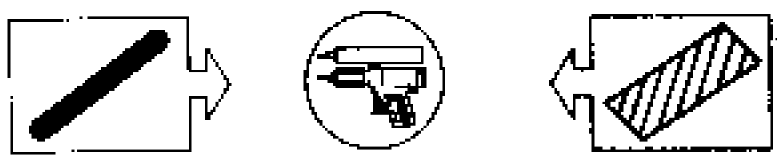




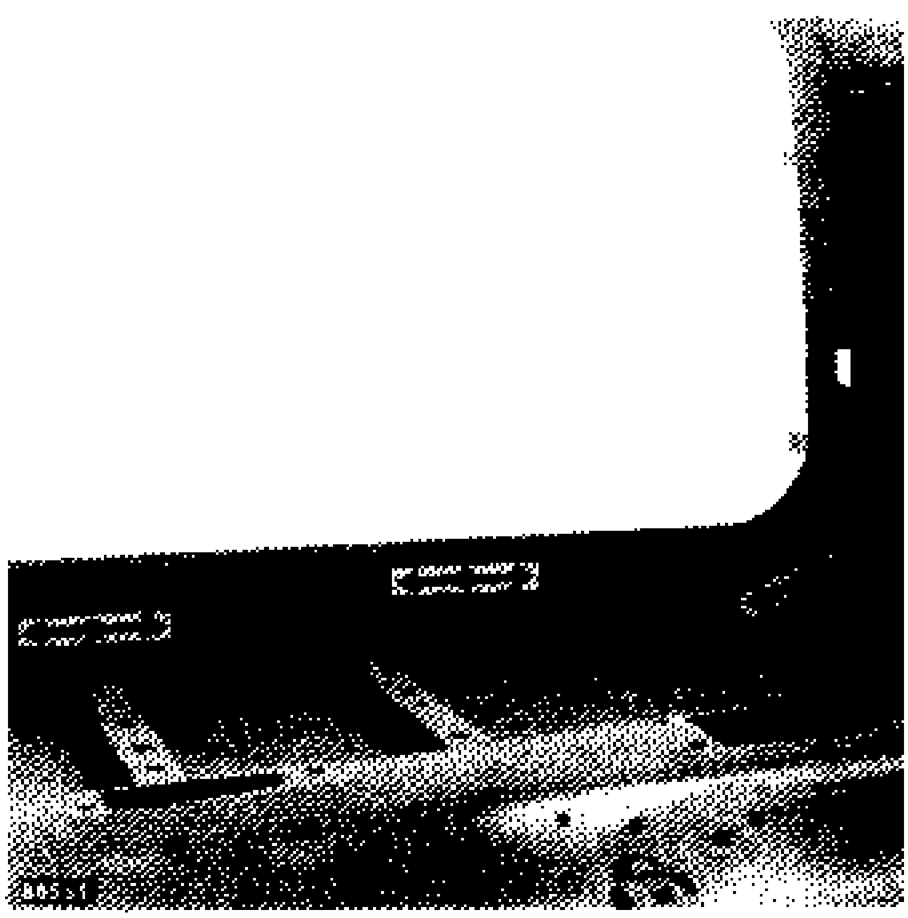
e = 1.4mm
H = 55 mm

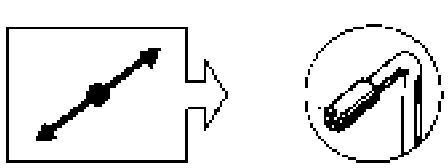
PAINTING





- Carry out paint sequence No. 3 (see "Painting" section).





- After painting but before refitting the trim, apply hollow section protective treatment.

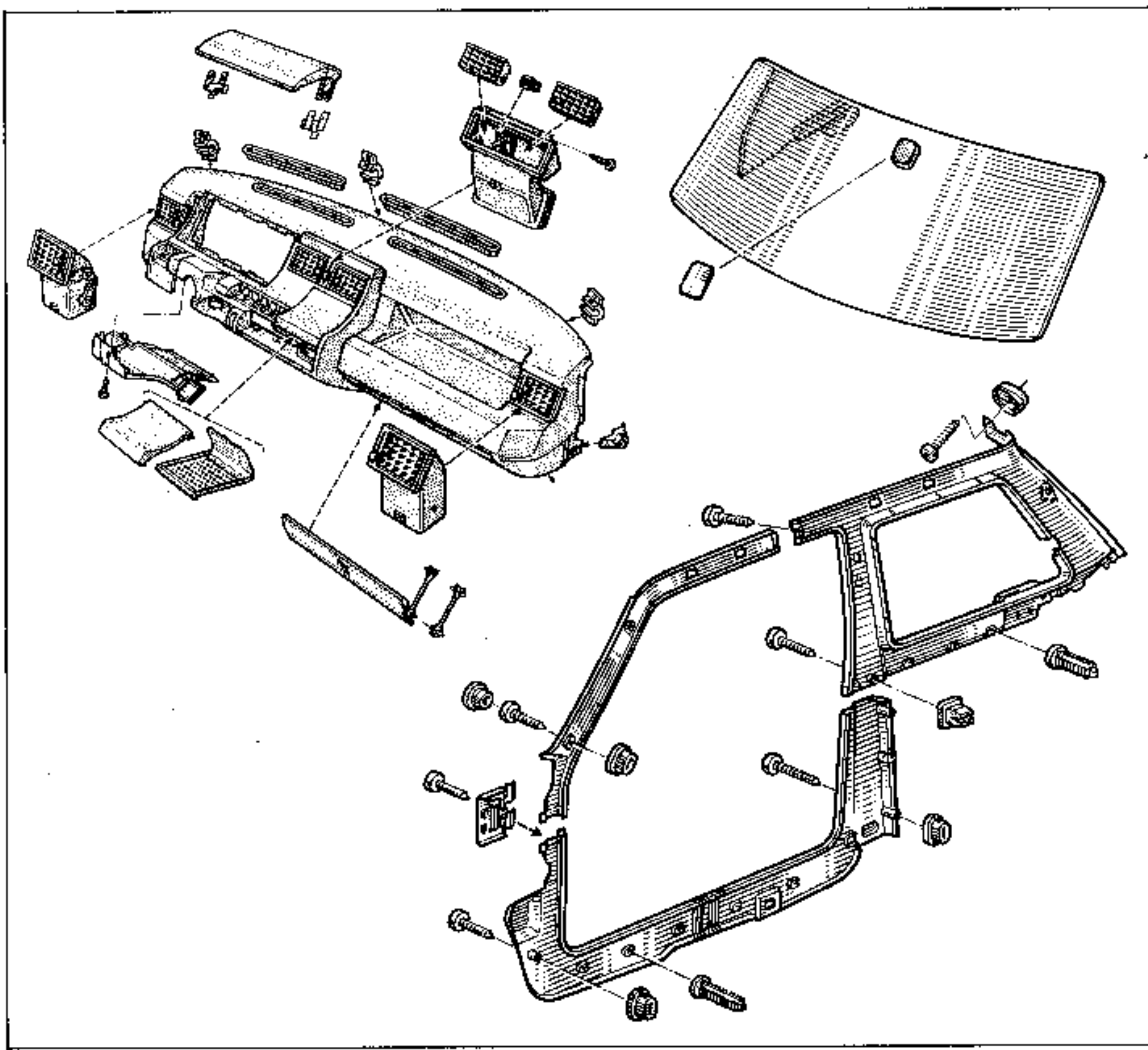
STRIPPING

Remove:

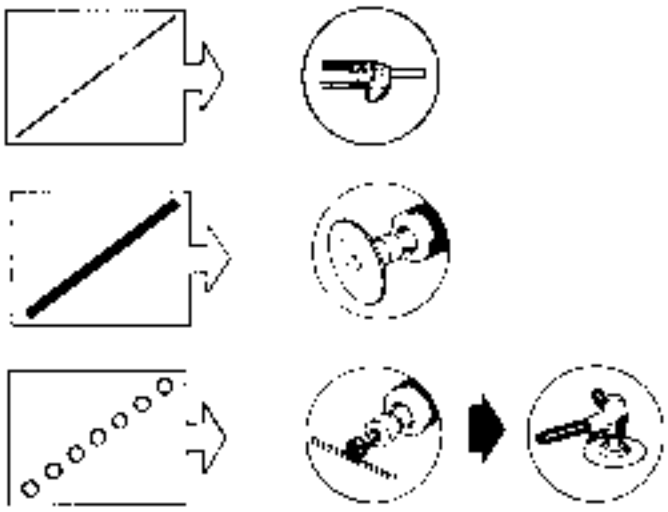
- the facia panel
- the windscreen
- the windscreen frame and front door pillar trim.

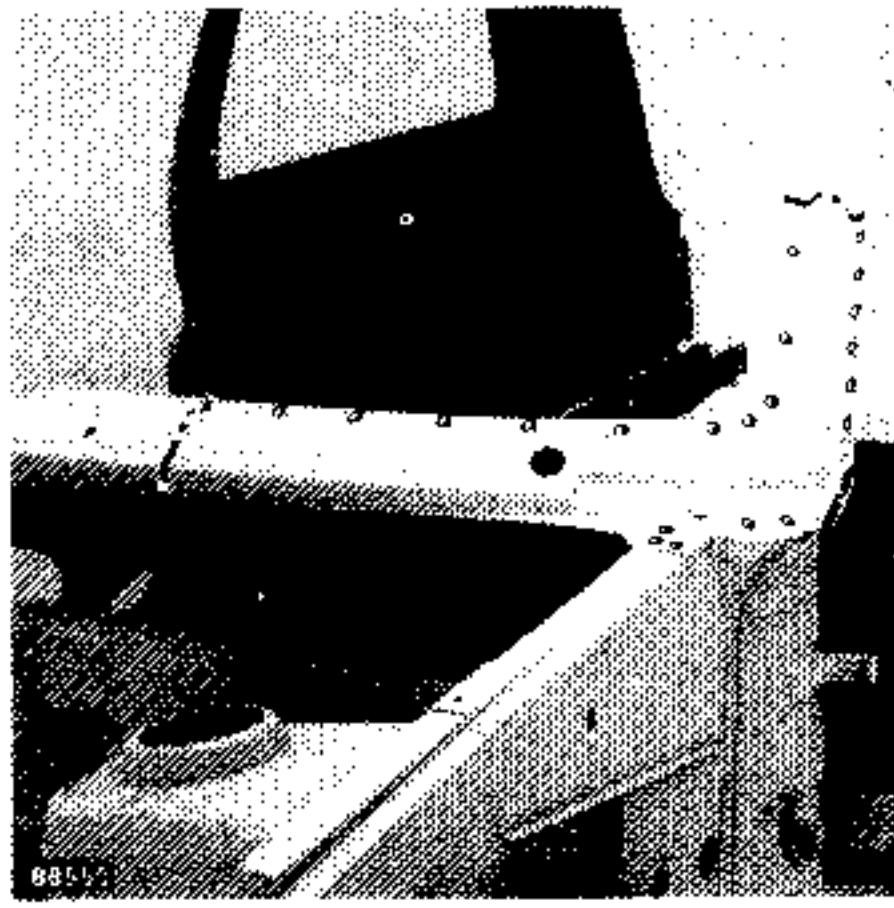
Note:- For more details on removing the various parts, see the section which deals with the parts in question.

- Place all these parts in a trolley bin.

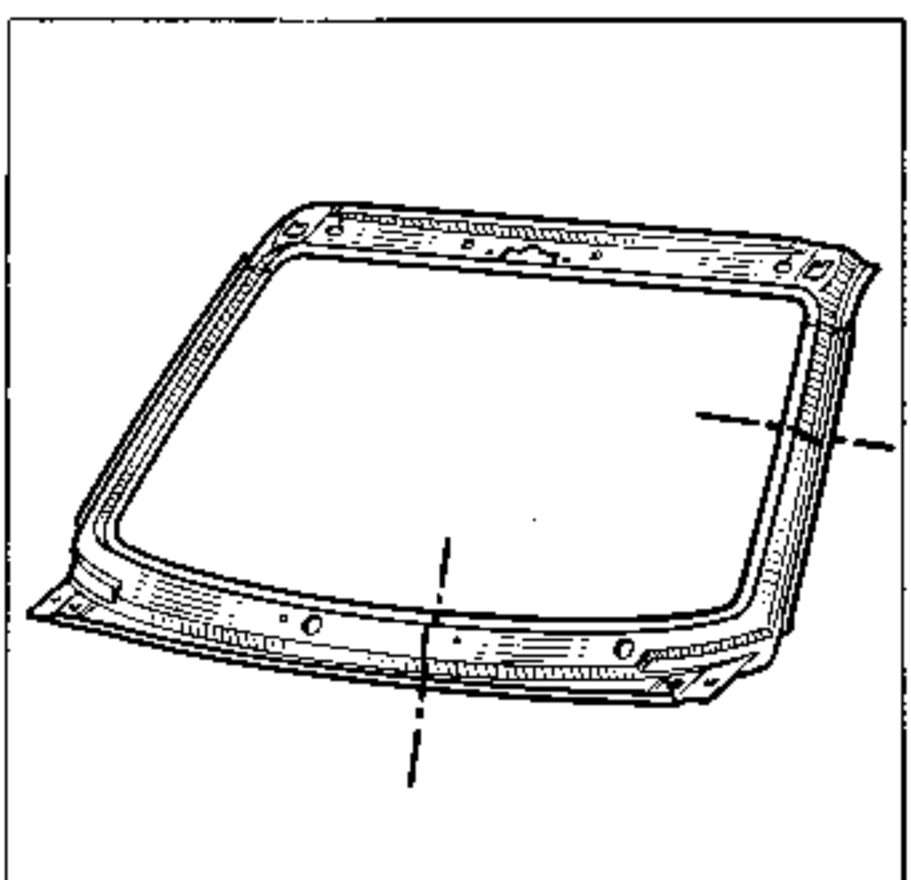


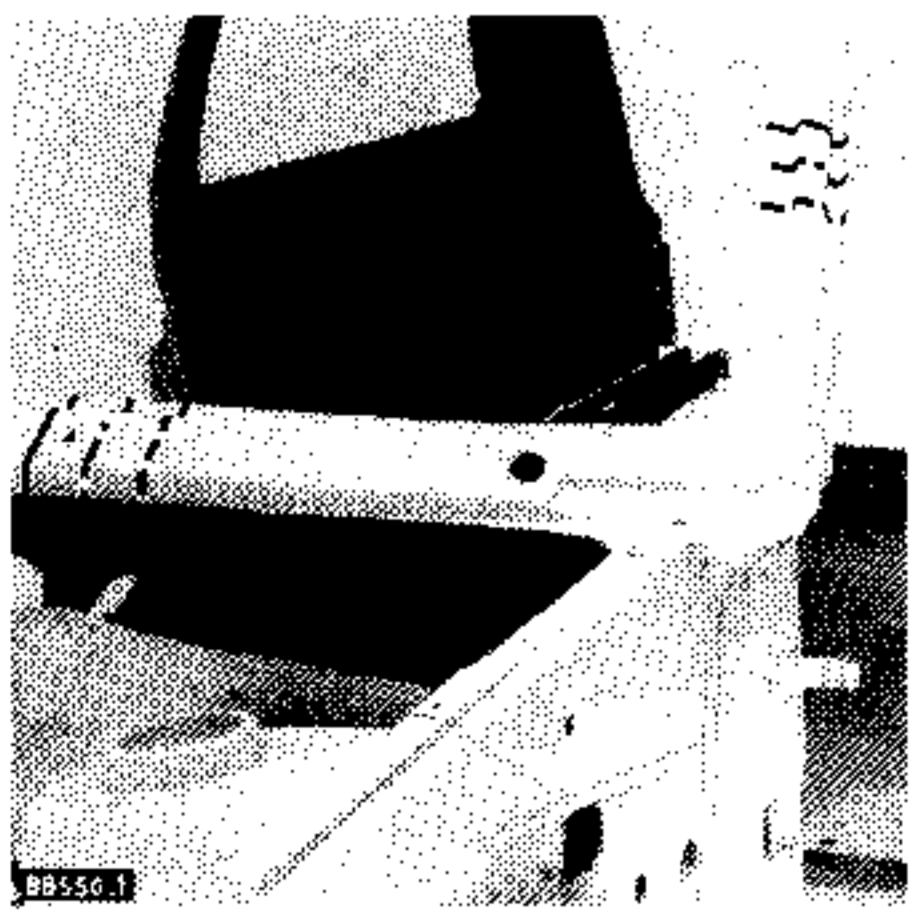
CUTTING - JOINT SEPARATION

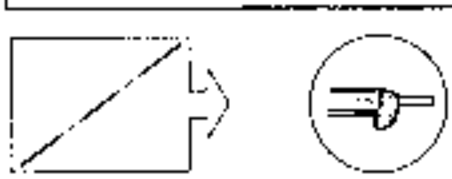




- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).
- Grind back the pieces of spot weld adhering to the support panels.







- Cut, from the new part, a section approximately 50 mm larger than that cut out on the vehicle.
- Fit the new part so that it overlaps the original part on the vehicle and secure it with grip clamps.
- Saw through both thicknesses of metal simultaneously to make adjusting the joints easier.

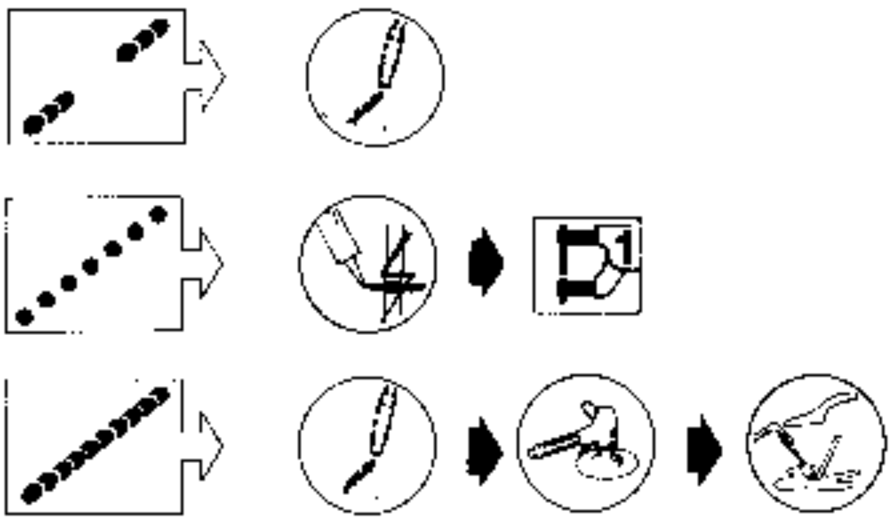
PREPARATION PRIOR TO WELDING

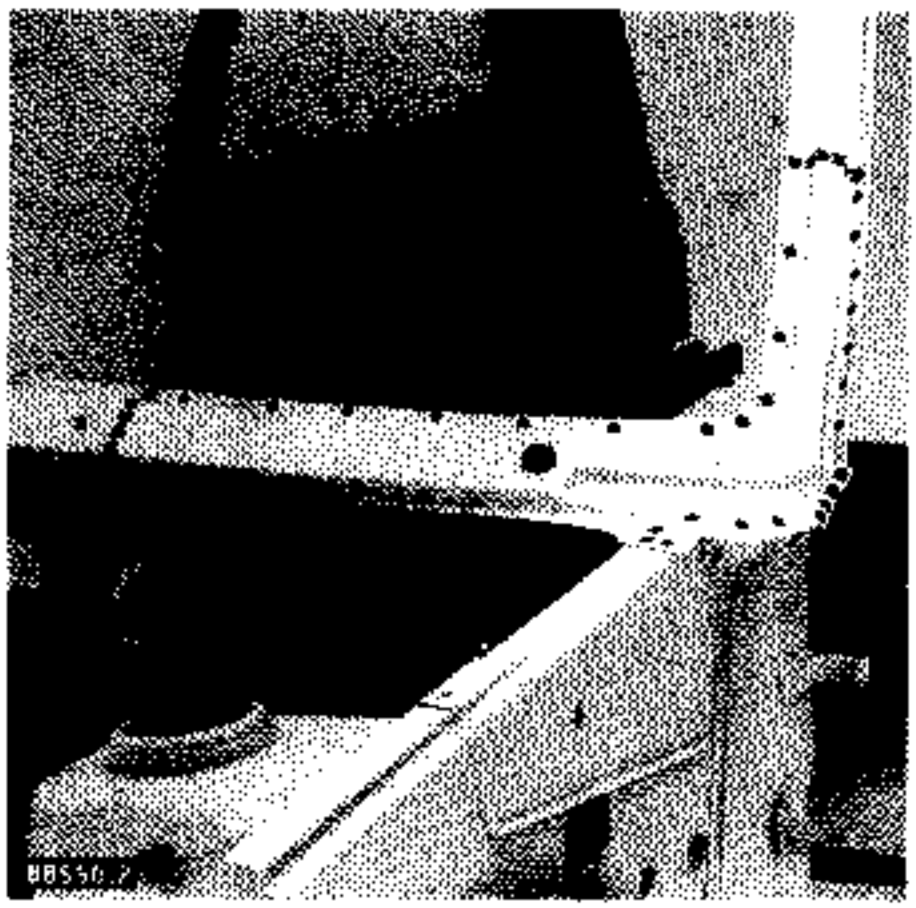
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).

- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols).

- Adjust the new part and secure it with grip clamps.

WELDING





- Secure the butt joints by tack welding them.

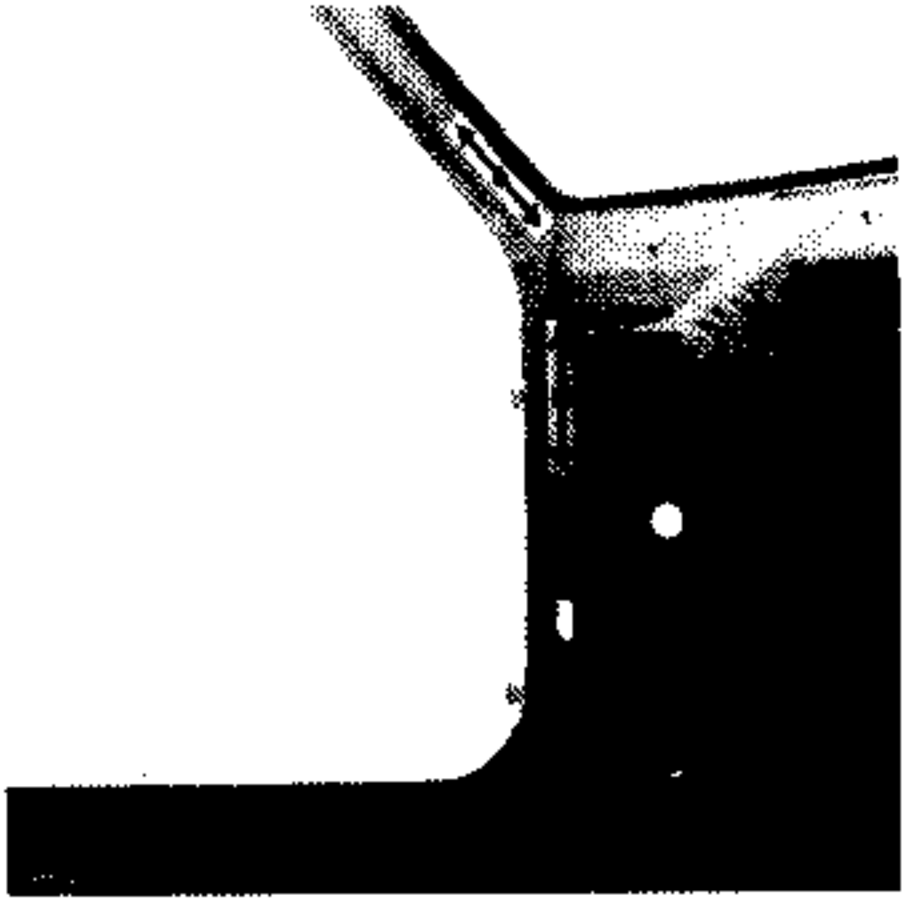
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.

- Apply the stitched fillets, using the gas envelope welding process. (These joints may also be gas welded, using a 75 to 100 nozzle).

- Grind flush the butt welds and fill them with soft solder.

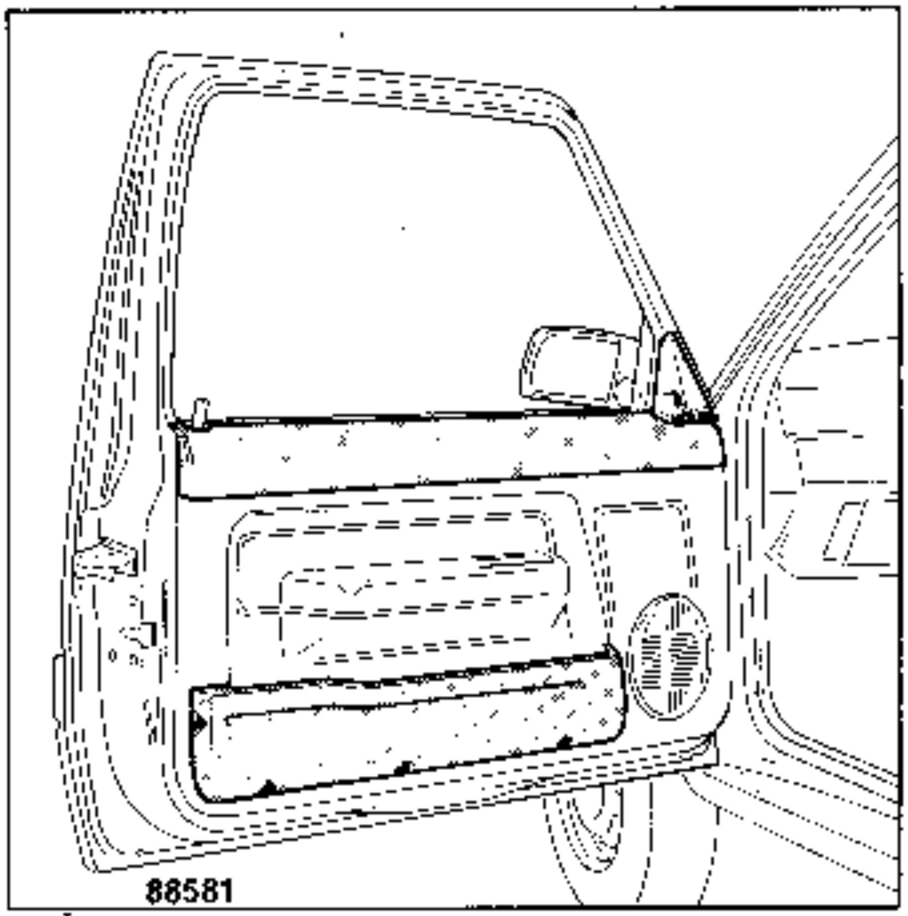
PAINTING

- Carry out paint sequence No. 3 (See "Painting" section).



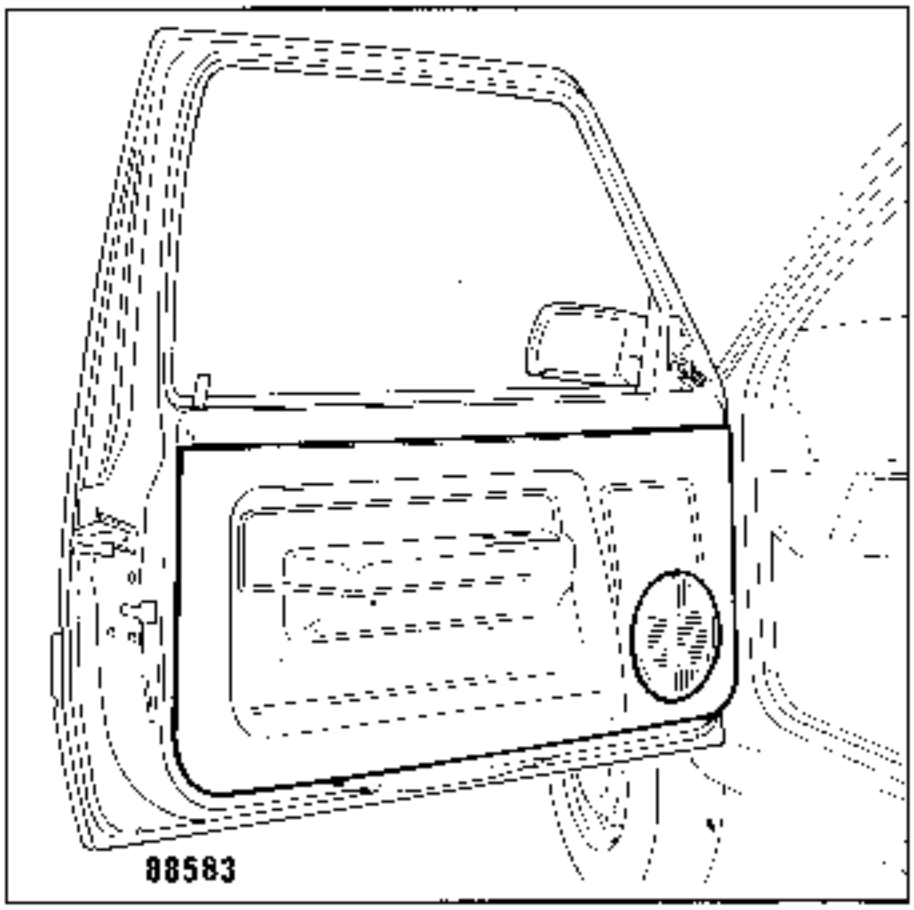
- After painting, but before refitting the trim, apply hollow section protective treatment.

- Removing the trim.



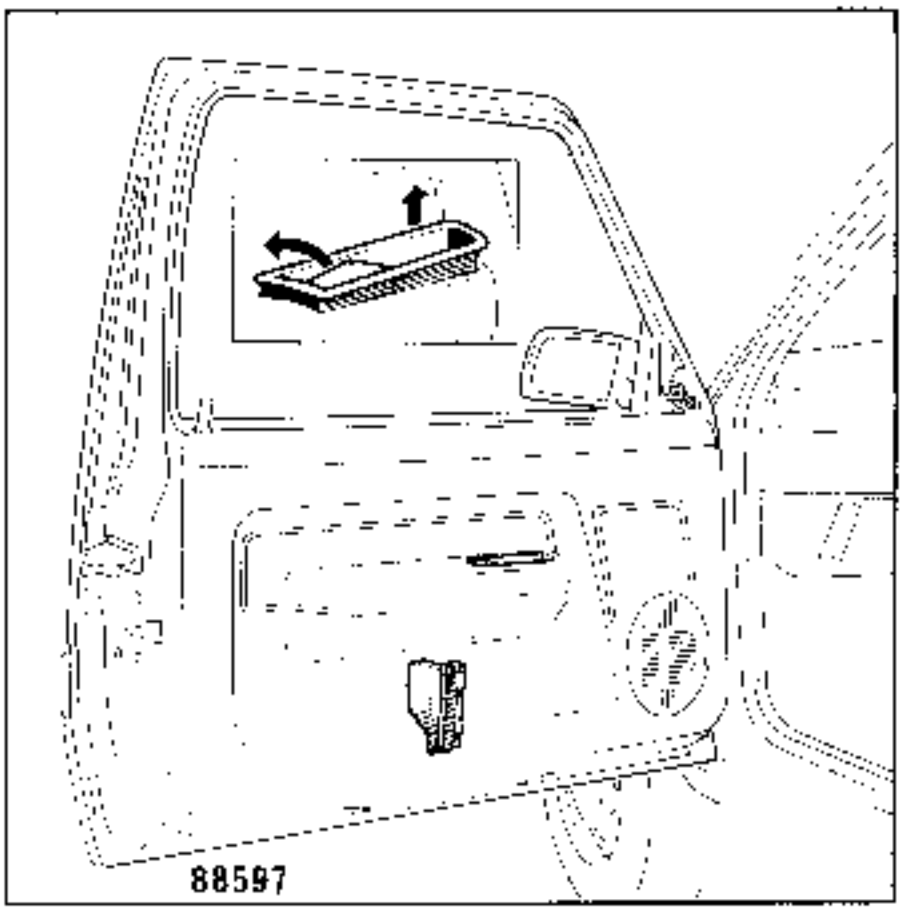
88581

- Remove:- the rear view mirror control trim,
  - the upper trim strip,
  - the map pocket.



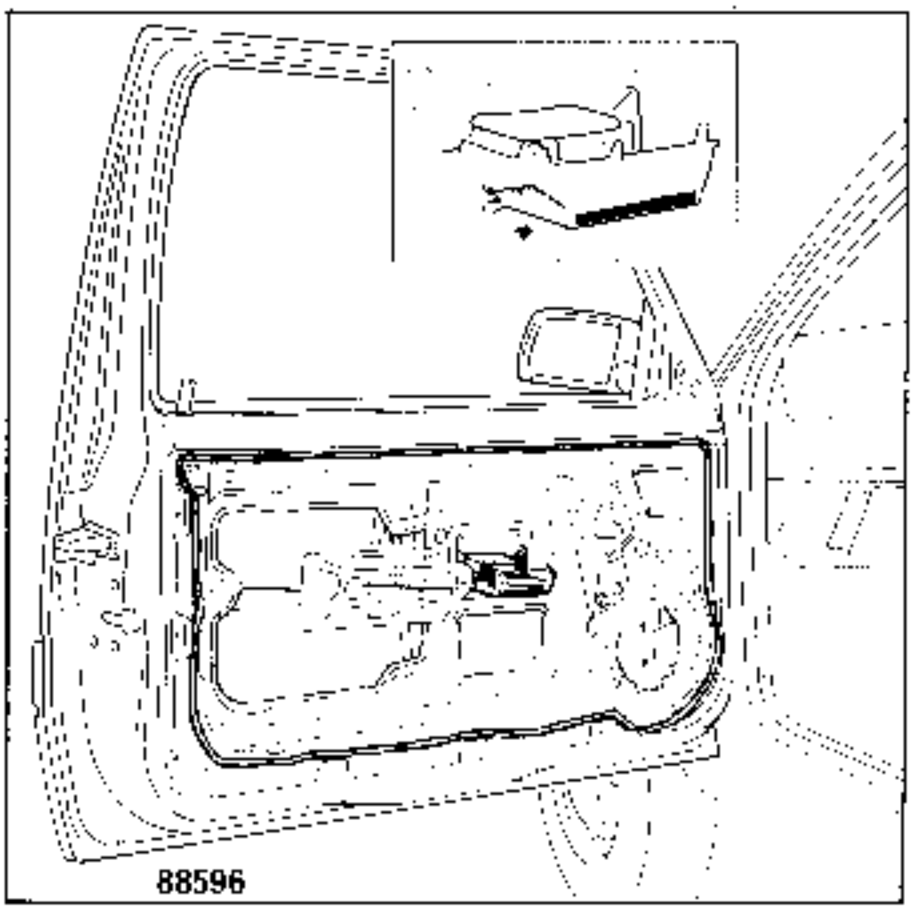
88583

- Remove the trim, using tool Facom D115.



88597

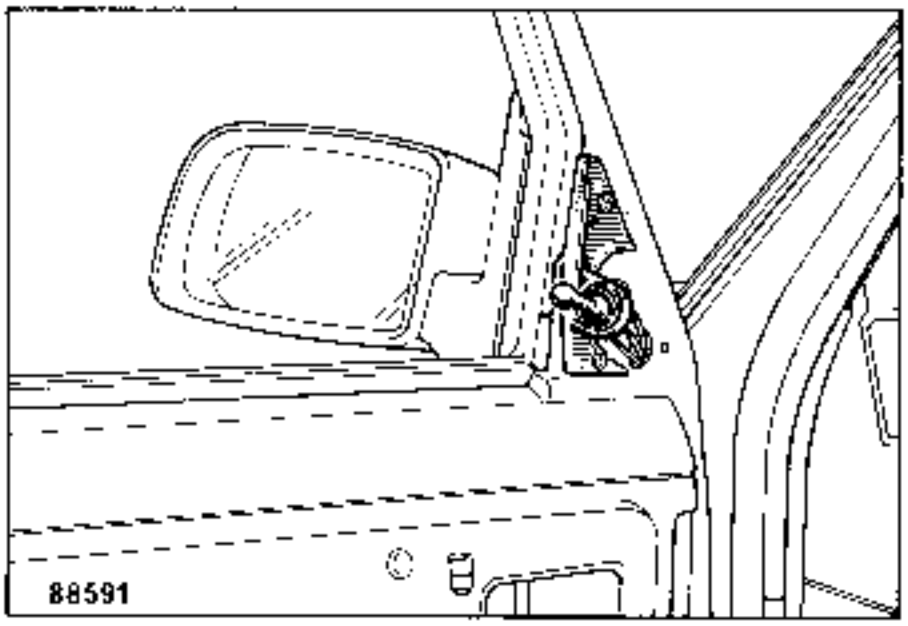
- Remove:- the door handle bezel and the map pocket stiffener.



88596

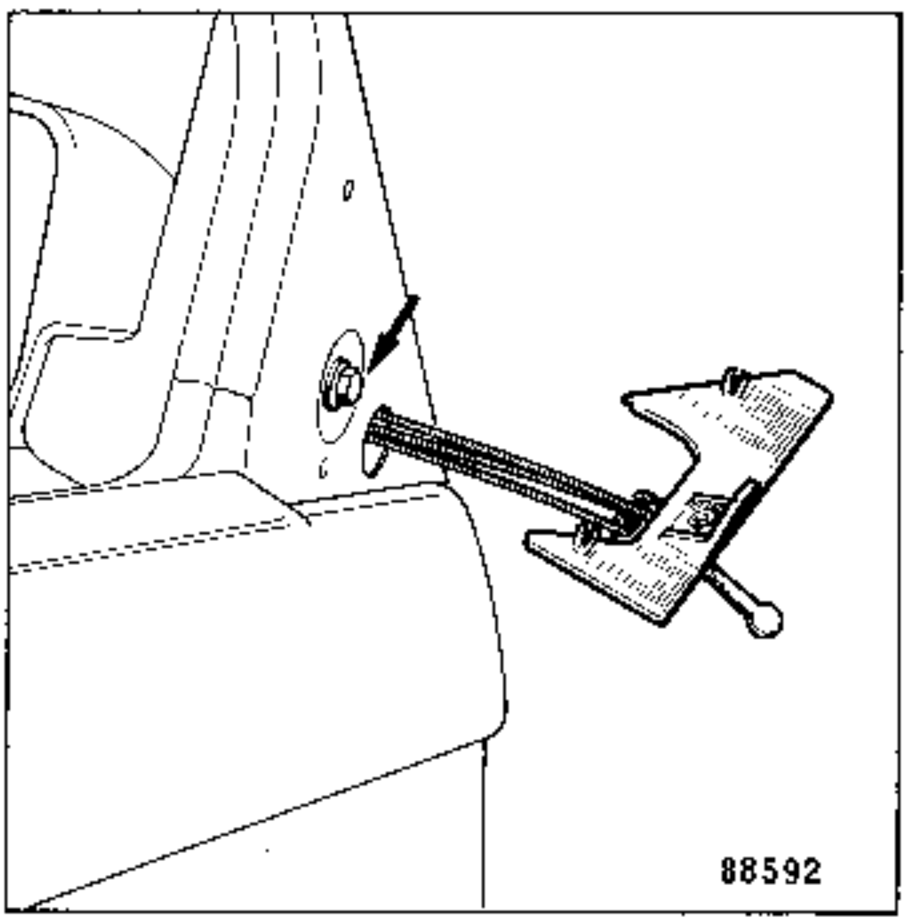
- Remove the door handle and the vinyl sealing sheet.

- Removing the rear view mirror.



88591

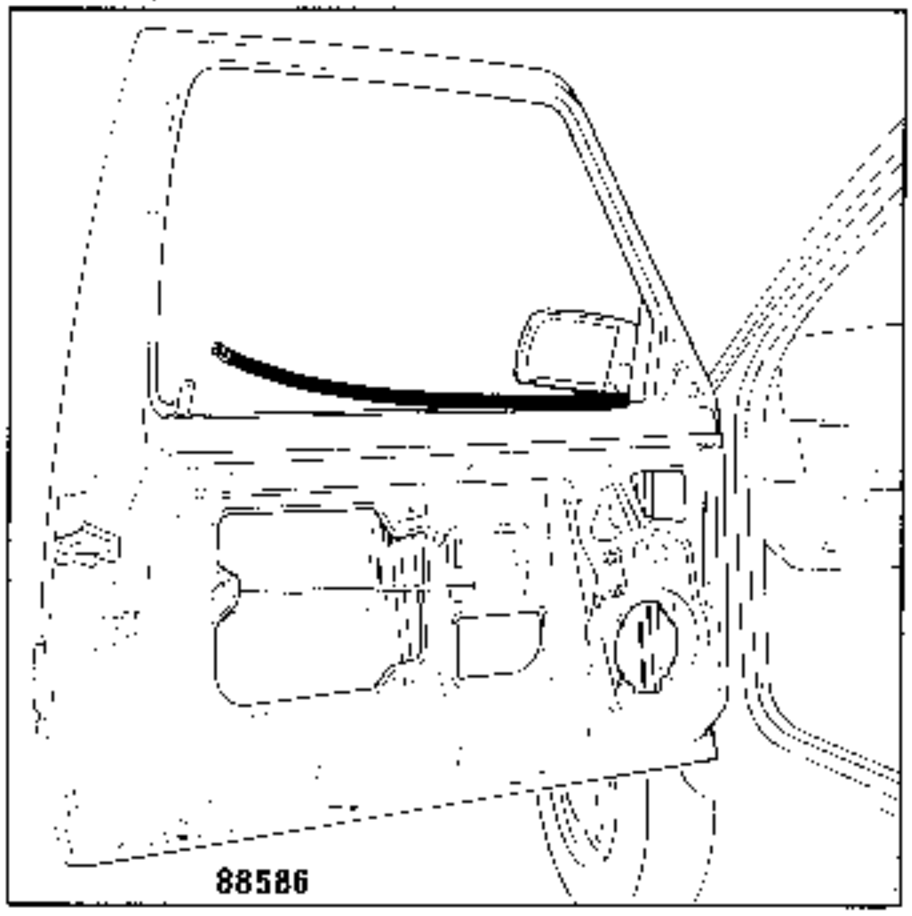
- Remove the rear view mirror control support fastenings.



88592

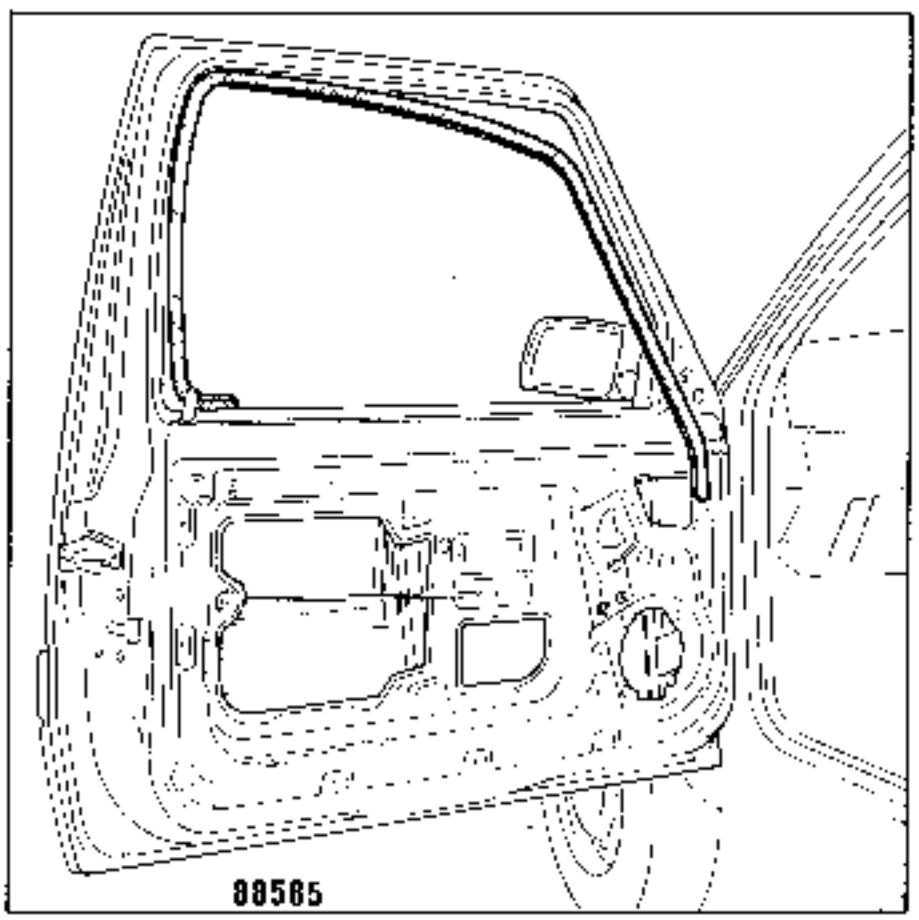
- Remove the rear view mirror control fastenings.
- Remove the mirror securing screw.

- Removing the window.



88586

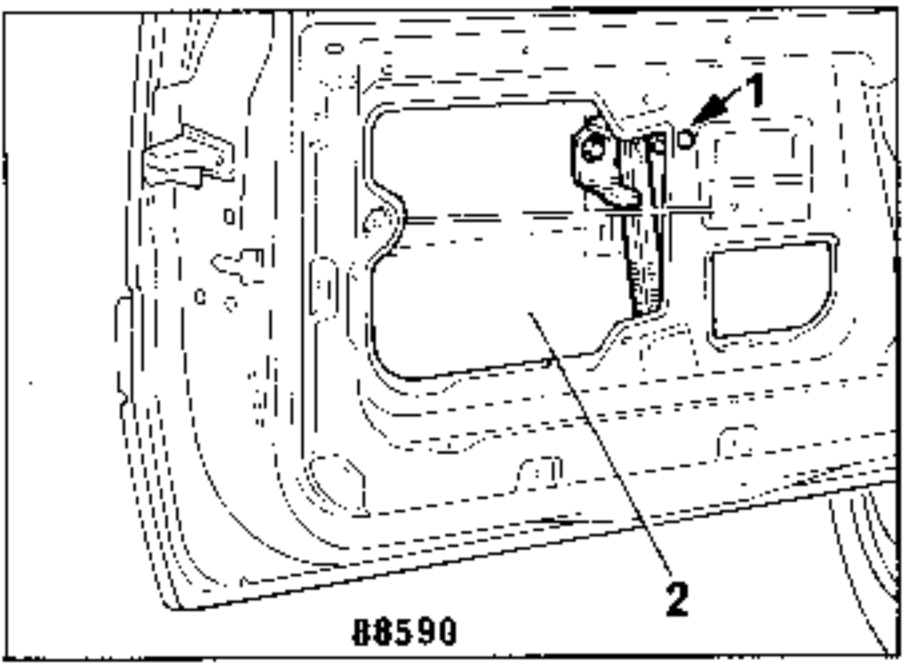
Wind down the window.
Remove the lower part of the inner wiper strip.
Take care: the strip has a metal centre and is very fragile.



88585

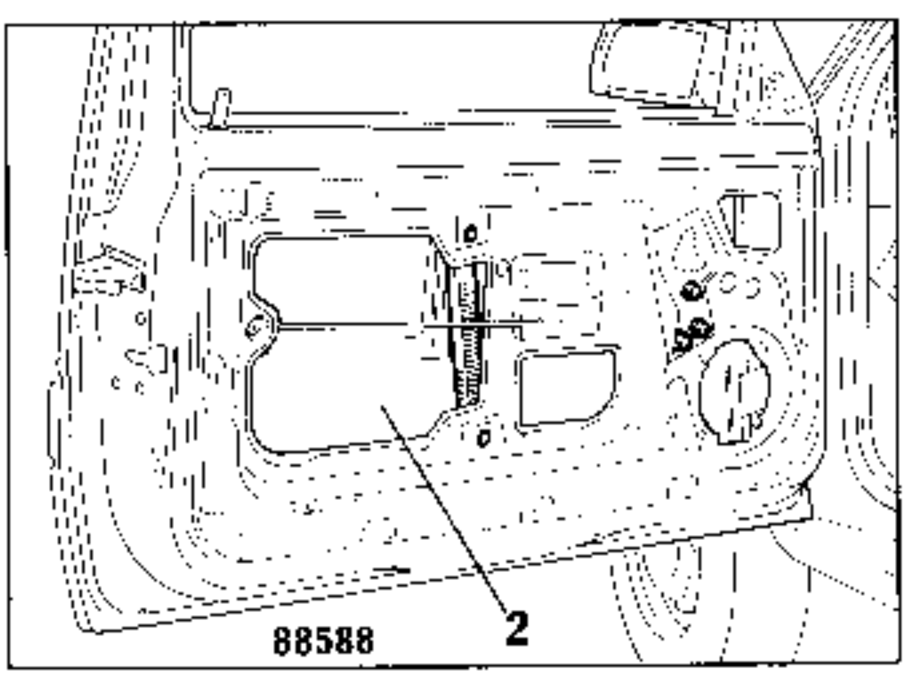
Remove:- the upper part of the inner wiper strip,
- the outer wiper strip.

Take the same precautions as for the preceding operation.



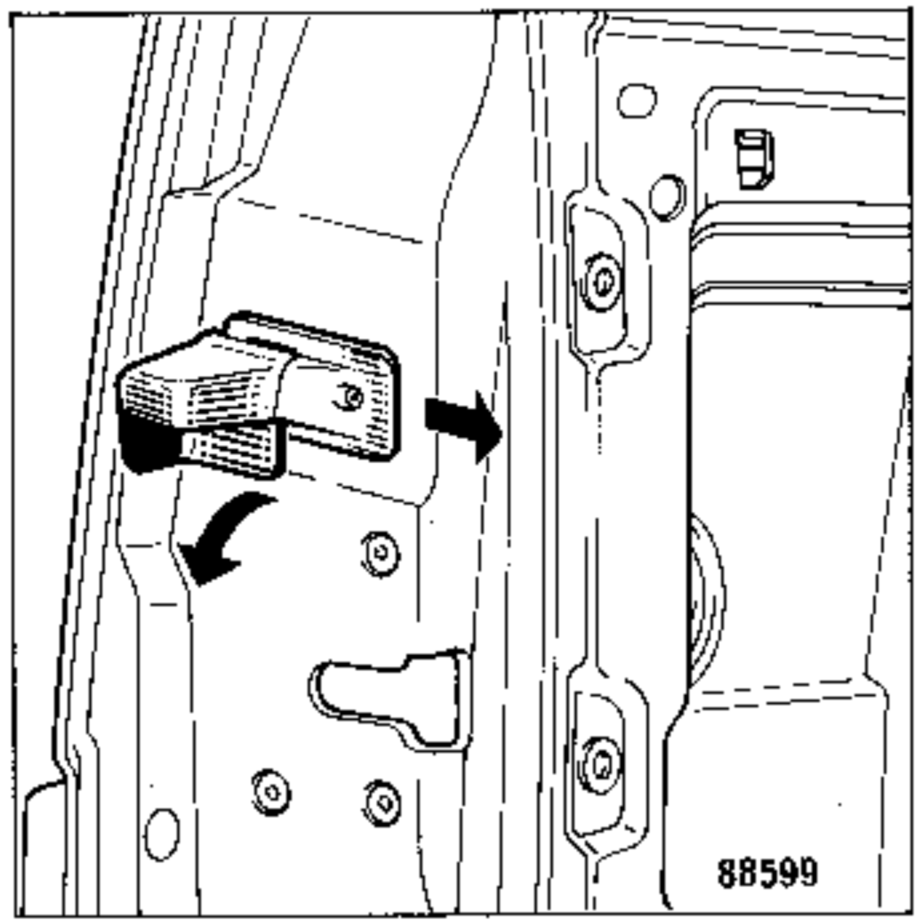
- Position the window so that the window support RH securing screw is in line with hole (1).
- Remove the 2 window support securing screws.
- Lower the window-winder mechanism and take out the window from the outside.

- Removing the window-winder mechanism.

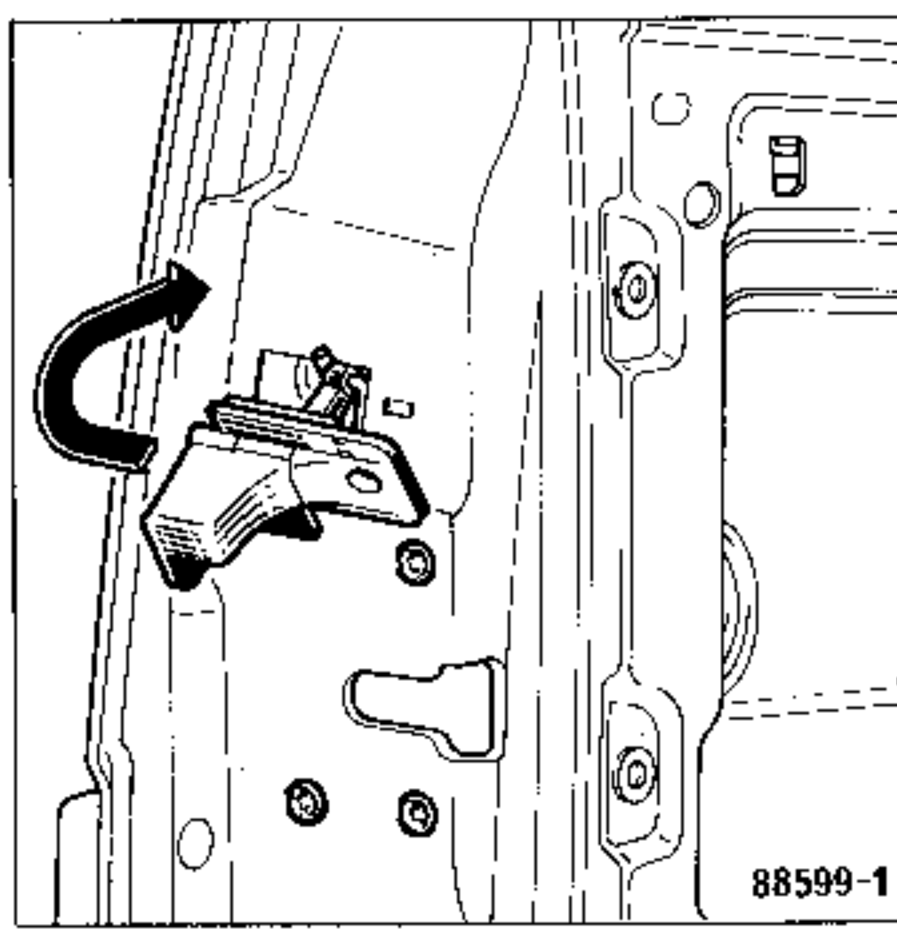


- Disconnect the connector from the motor.
- Remove the window-winder pillar fastenings (rivets).
- Remove the motor fastenings (nuts).
- Take out the mechanism through the aperture in the door (2).

Removing the latch mechanism.

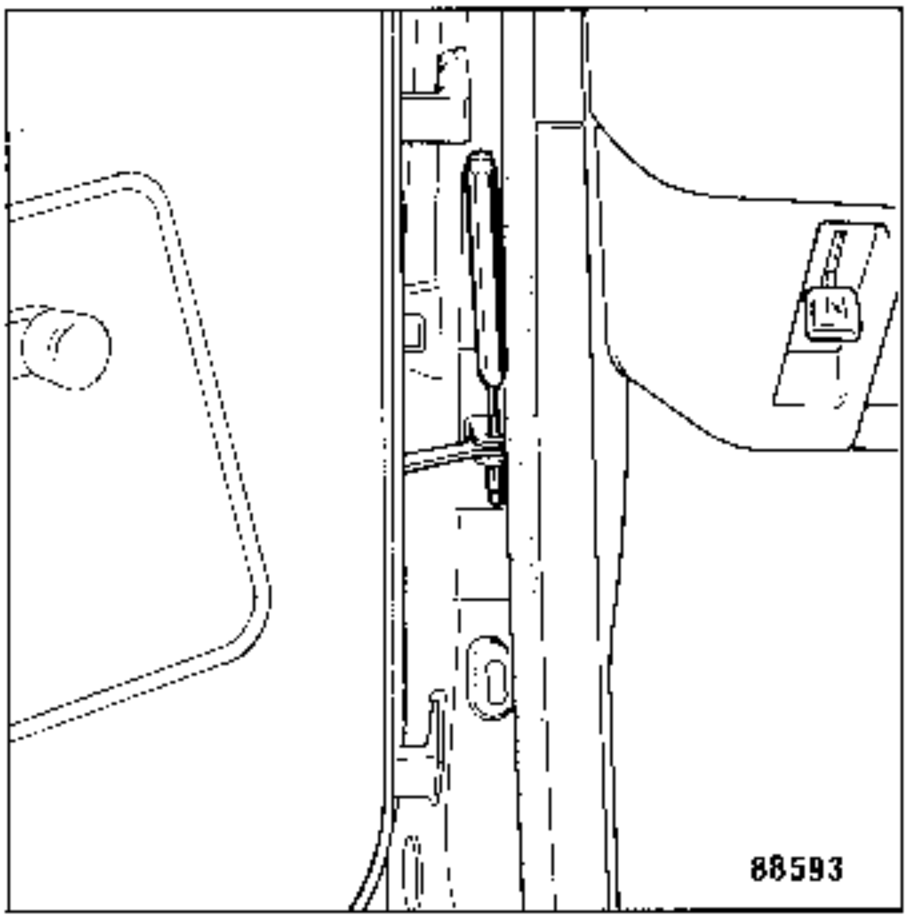


- Remove the door handle fastening and take it out as shown.



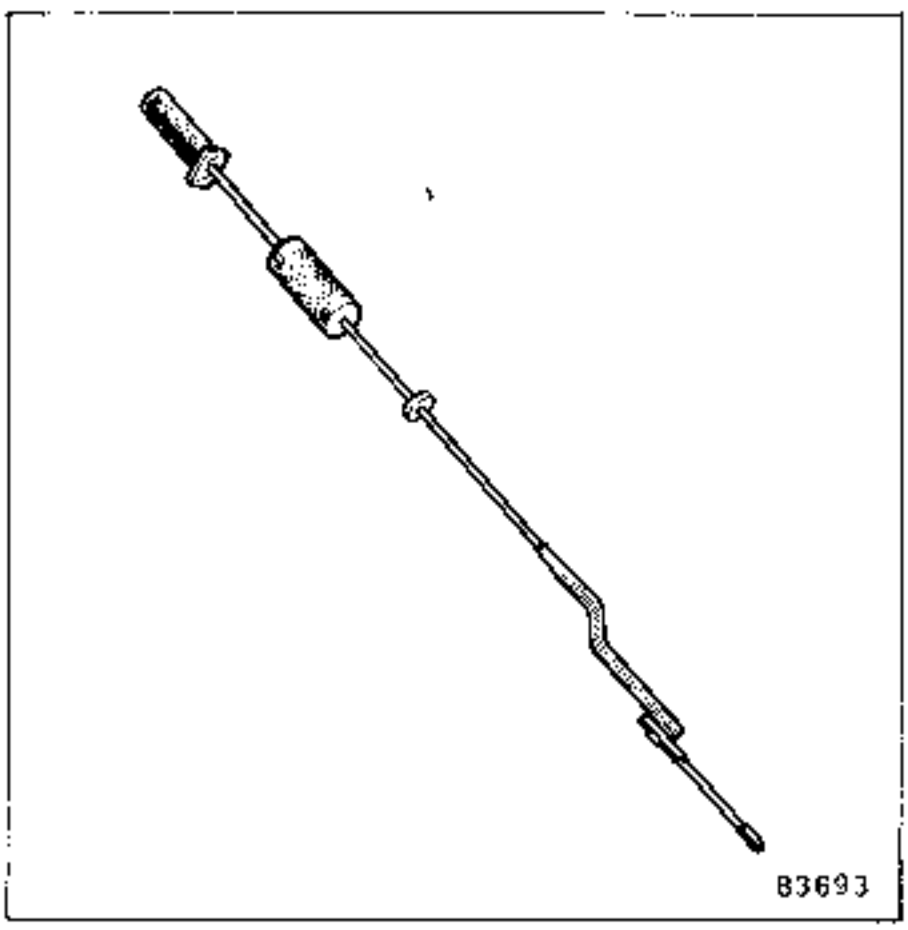
- Remove the handle as shown.
- Disconnect the door lock connector.
- Unclip the links from the lock.
- Remove the lock fastenings and take it out through the aperture in the door.

*Removing the door.

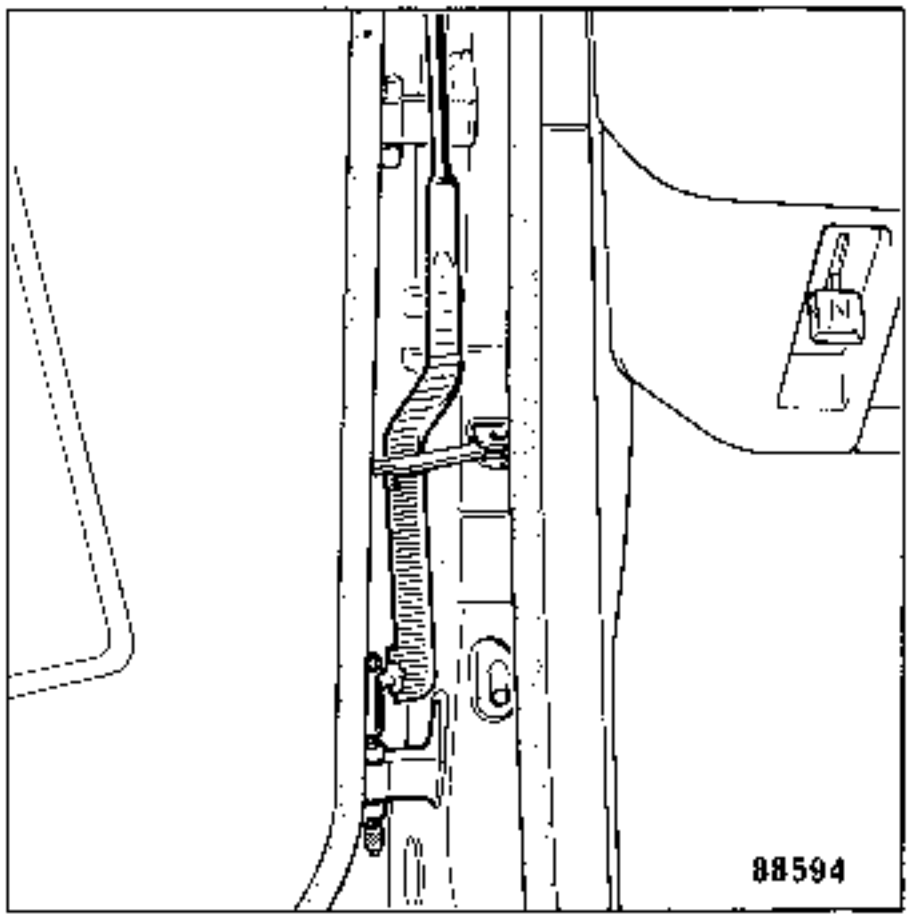


- Remove the door stop pin.

- Remove the electrical wiring from the door body.



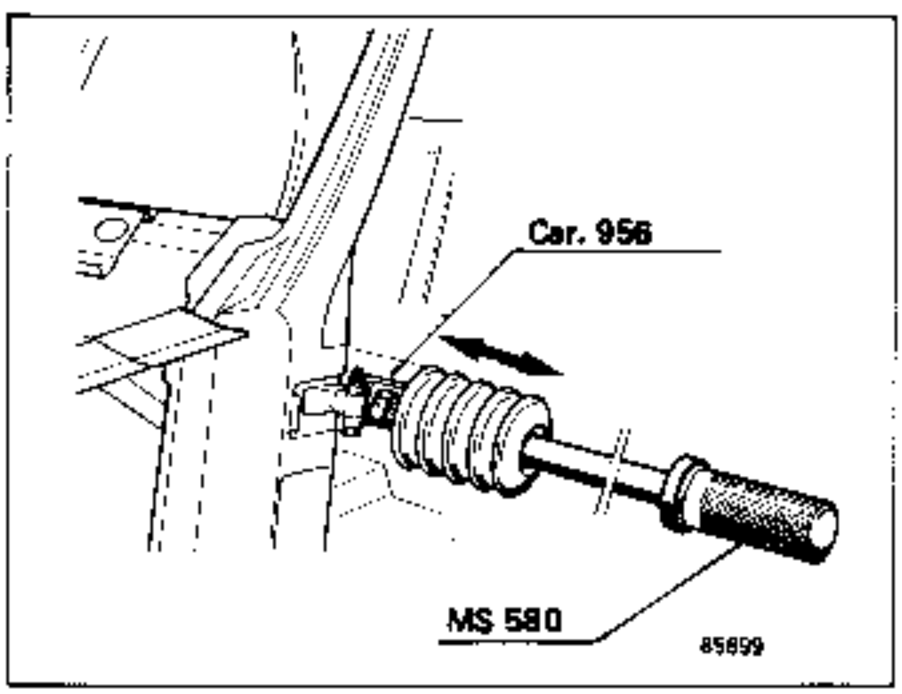
- Remove the door hinge pins with the special tool.



REFITTING

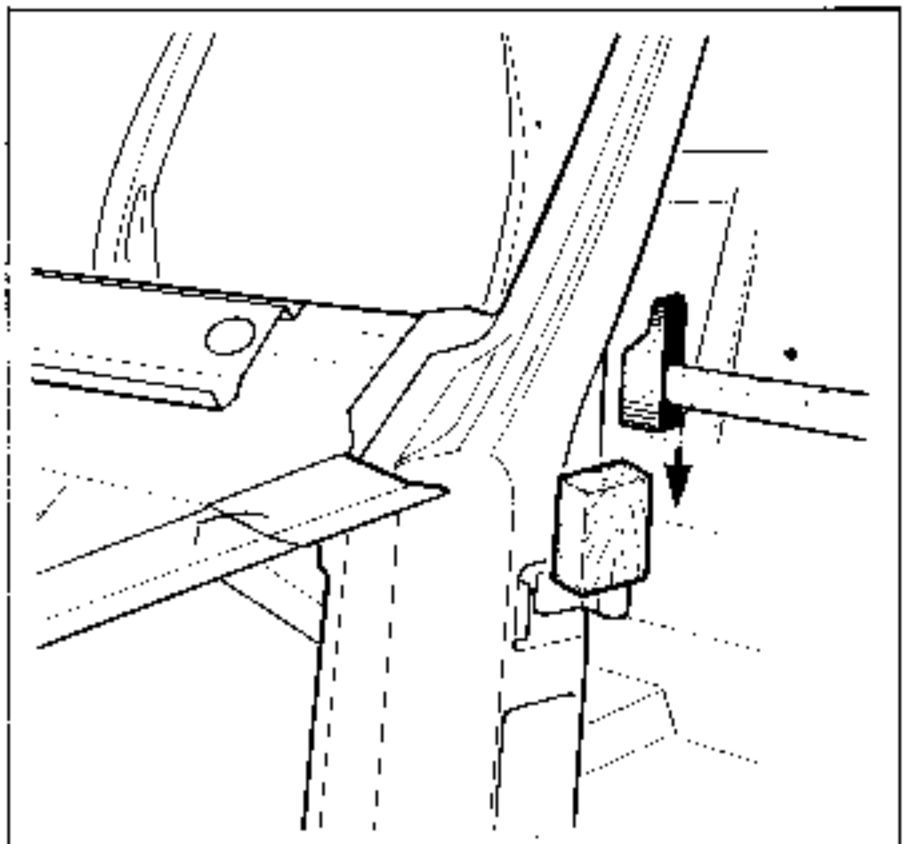
On this vehicle, the door hinges are welded to the body components.

Neither the clearances round the door nor its depth can be adjusted mechanically. When replacing a door, therefore, it must be offerred-up to the body before painting to check its alignment and correct it if necessary.



Adjusting the depth of the door:

This is adjusted by pushing or pulling one or two of the hinges, using tool Car.956 fitted to impact extractor MS.580.


85900

Adjusting the Door Upwards (or Downwards):

This is done by lowering or lifting the two male sections of the hinge by the same amount (maximum 3 mm).
Refit the door to check it.

Lengthwise and Angular Adjustment:

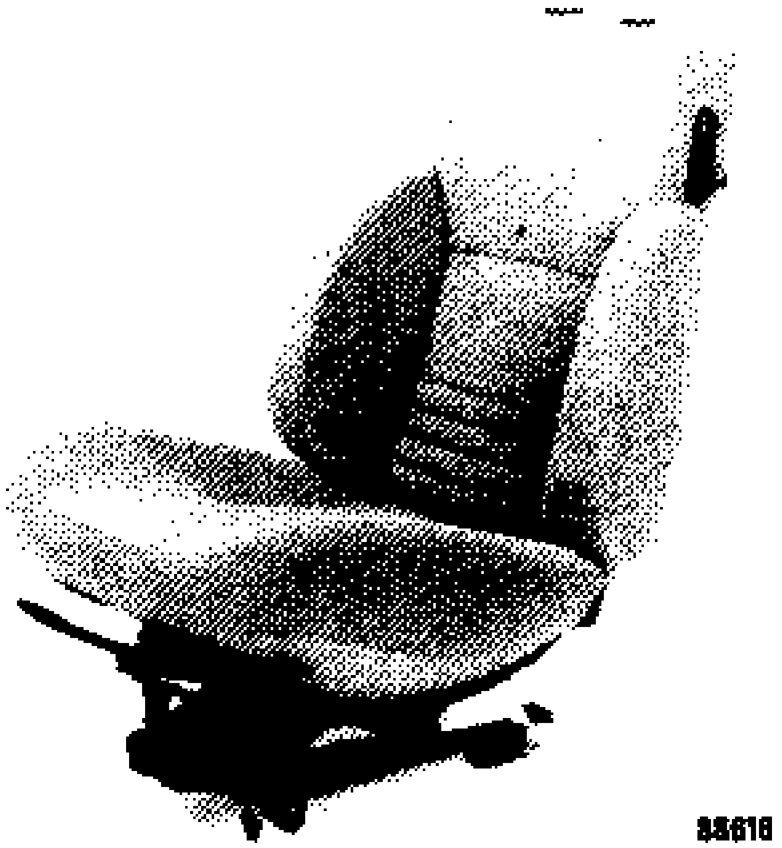
This is done by bending the male sections of the hinges with a claw lever.

WILMONDA Ref.:BHA

Note:

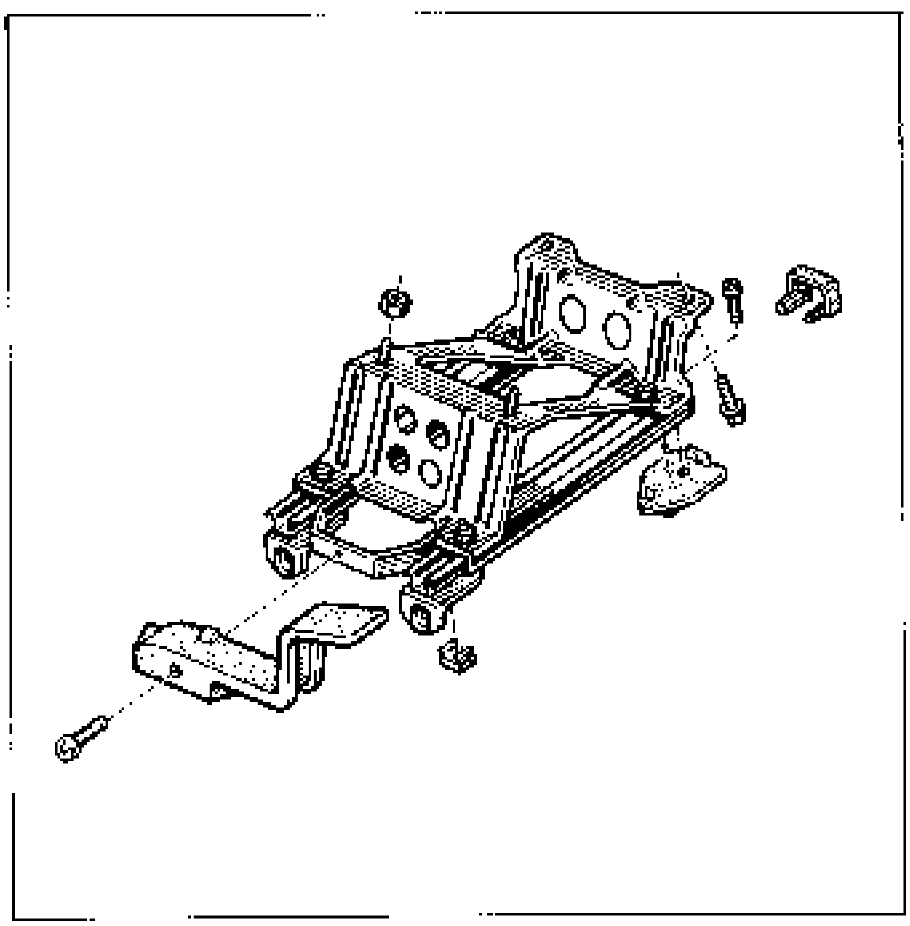
This adjustment can be carried out without removing the door.

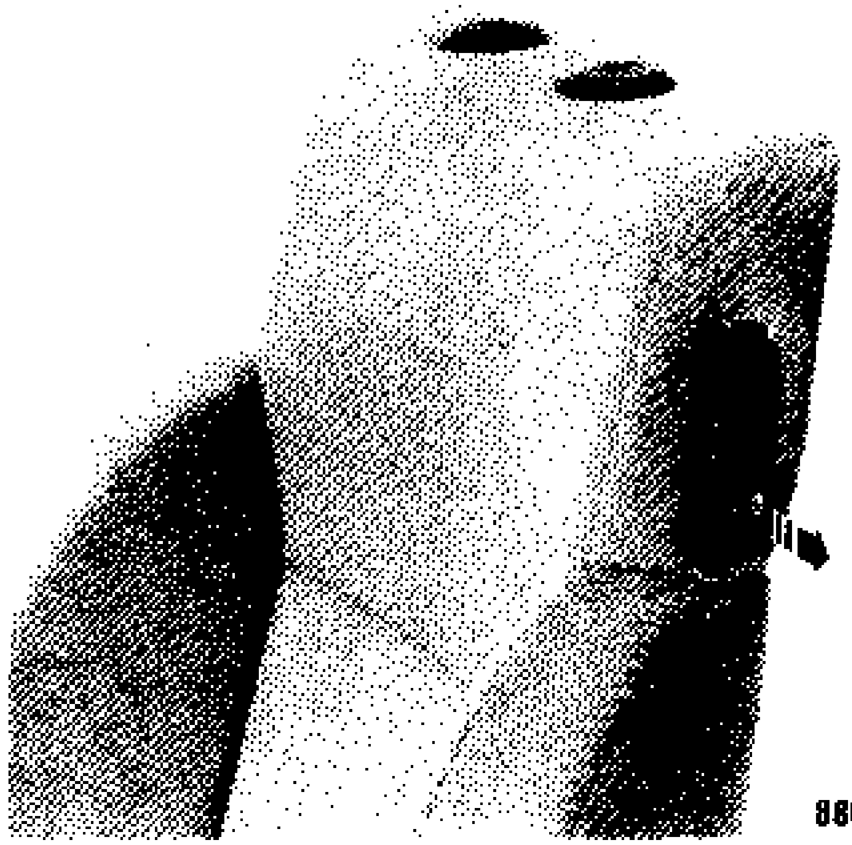
Stripping the Seat Back.



88616

- Remove the seat after first removing the slide securing screws.



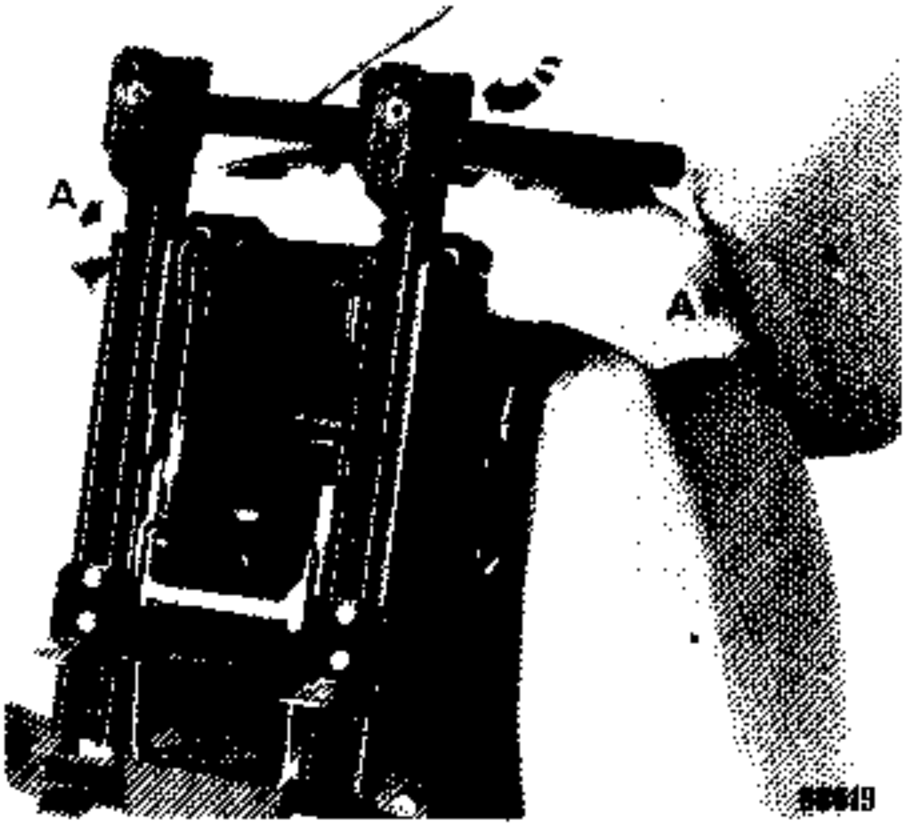


88617

Remove:

- the 2 screws from the cover on the lever which allows the seat to fold forward.
- the lever, by pulling it.

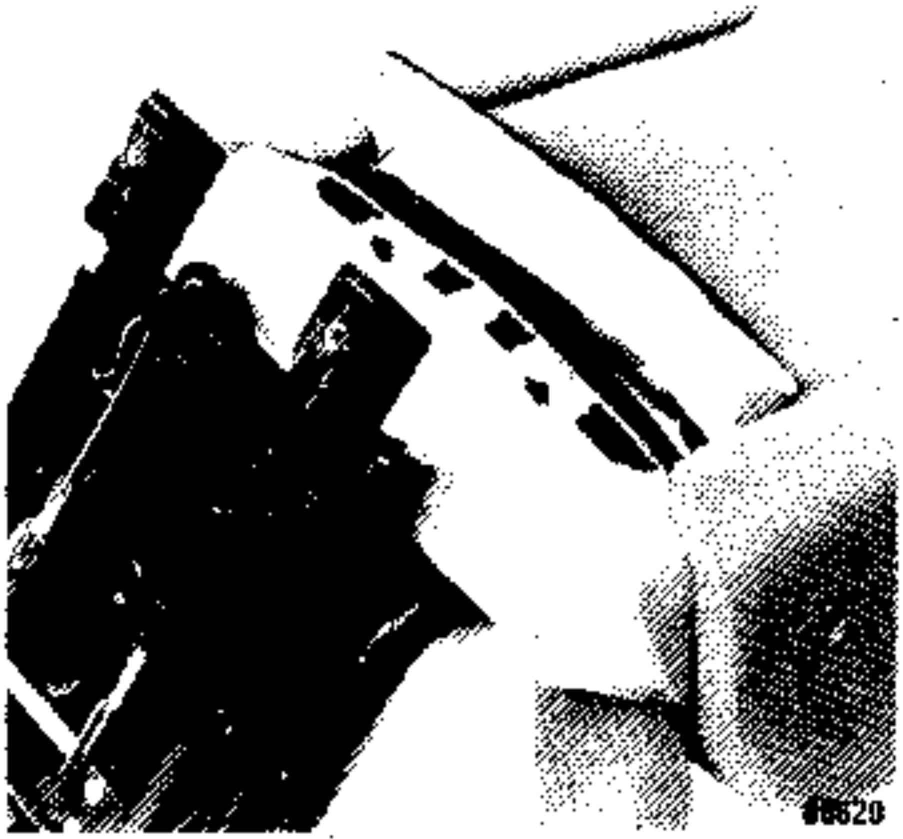
88638



- Remove the two clips (A) from the bottom of the seat back.

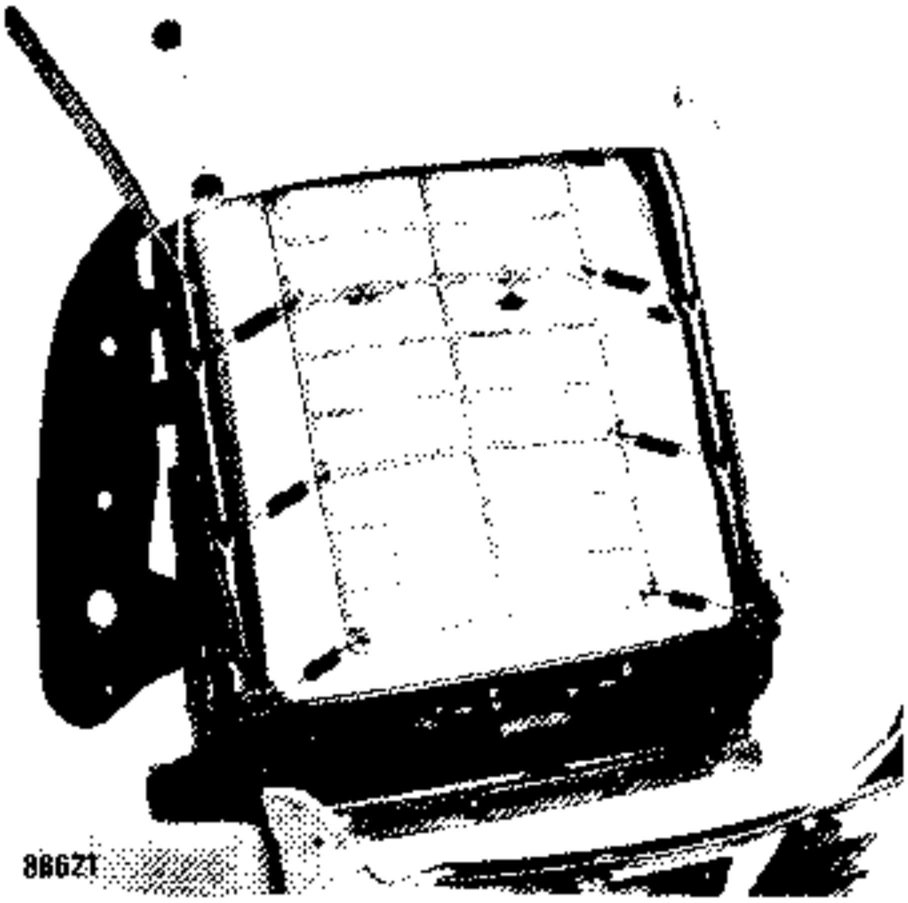
- Unclip the tab which secures the bottom of the cover.

- Take out the side links from the lower section and fold the cover upwards.

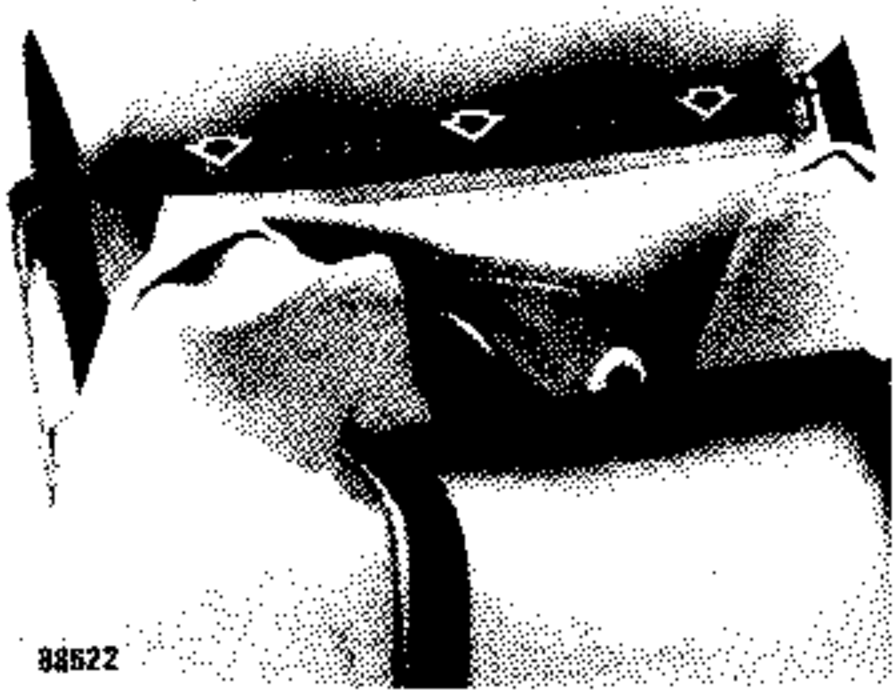


- Remove the two plastic rivets from the bottom of the cover.

- Unclip the two side covers and remove them.

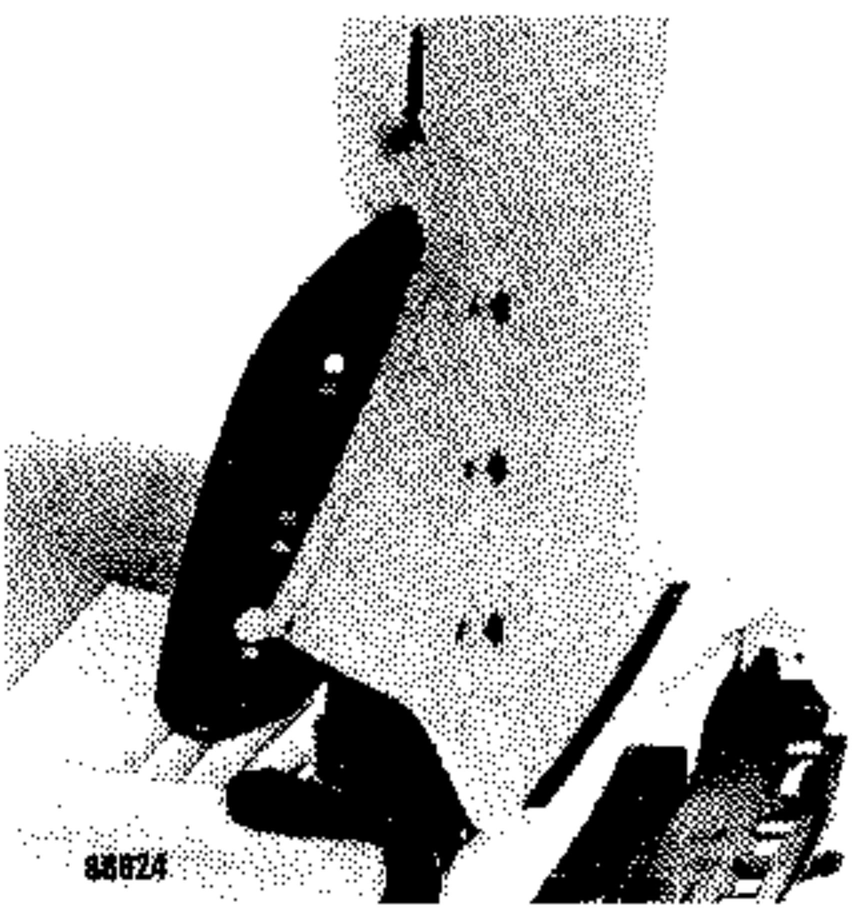


- Remove the clips which secure the cover to the seat back support.



- Remove the clips which secure the upper part of the seat back cover.
- Remove the seat back cover.

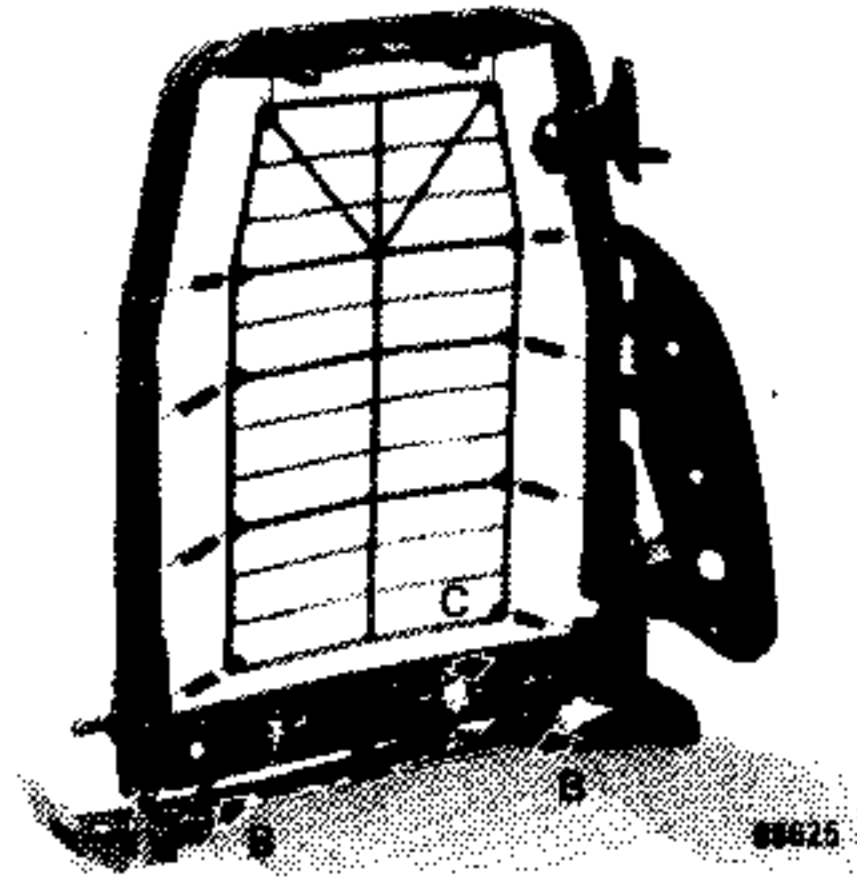
Special points, on refitting



- Place the cover over the seat, starting at the top of the seat back and securing it to the frame.

- When refitting the side sections, clip them to the seat back inner links through the holes in each side of the cover.

- Adjusting the Seat Back.



Noise from the Seat Back.

This is caused by excessive play in the seat back retaining hook. This play can be eliminated by unscrewing the 2 stops (B).

Seat Back Difficult to Lock.

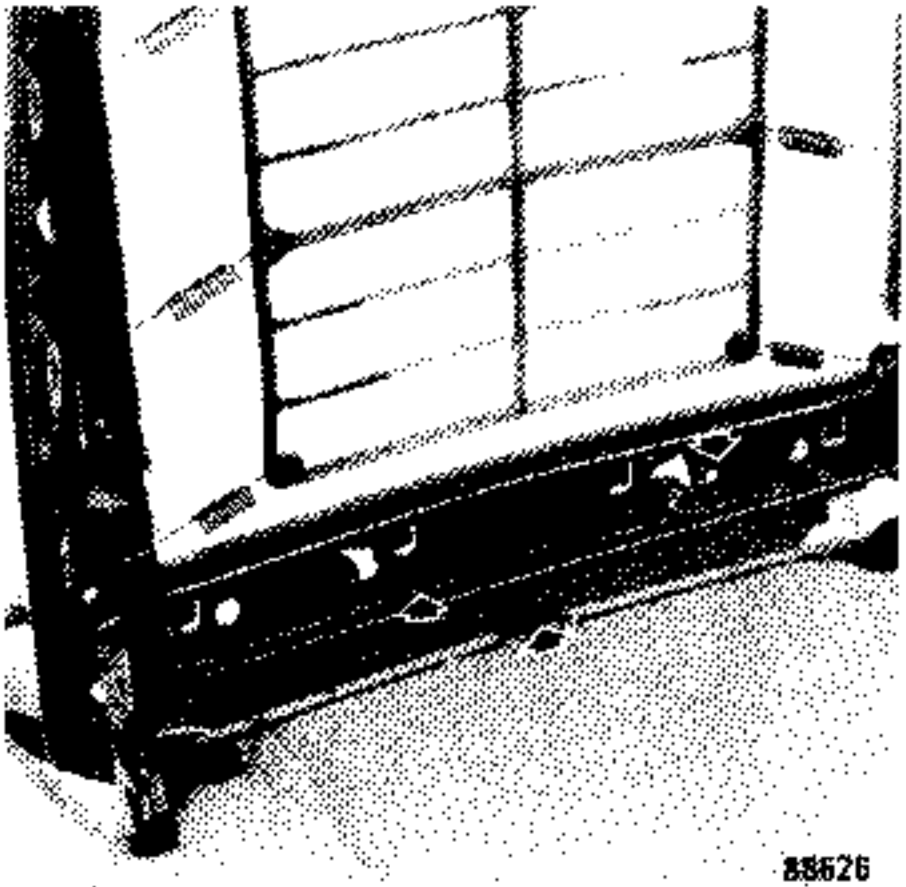
The stops (B) are too far out and are preventing the feedback locking hook from fully engaging.

If the stops (B) are screwed in, the lock will be able to engage properly.

Impossible to Unlock the Seat Back.

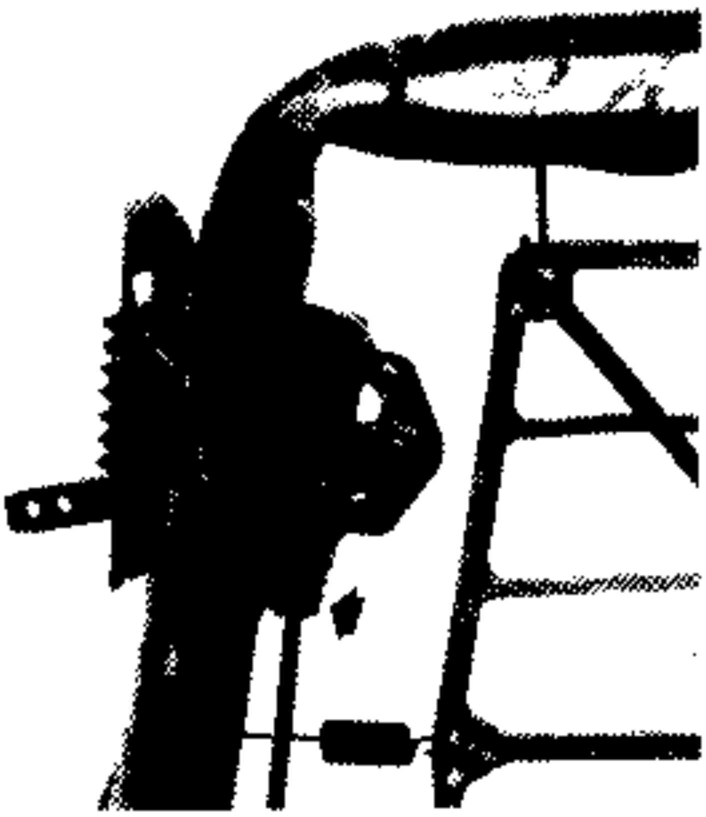
The seat back lock release cable may be broken or the cable cover stop (C) out of place.

- Replacing the Seat Back Control Cable.



88626

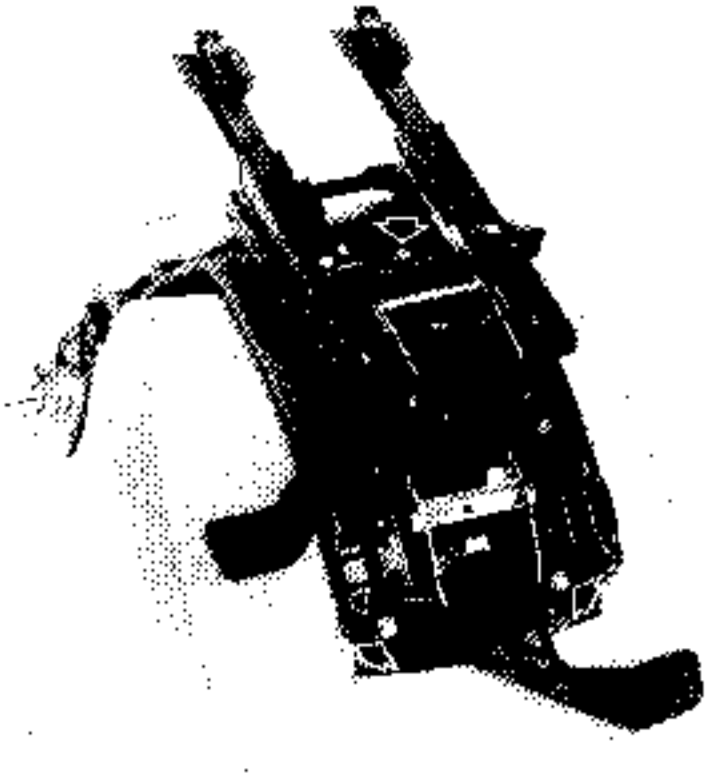
- Release the lock hook return spring.
- Take out the cable cover end stop from its location.
- Disconnect the end of the cable from the hook.



88627

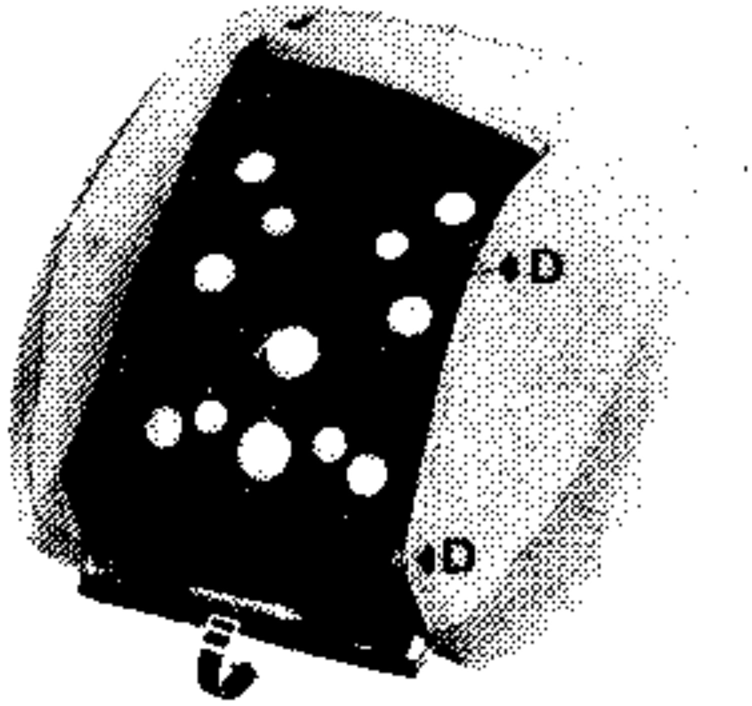
- Disconnect the cable cover end stop from its location.
- Disconnect the end of the lock control cable.

- Stripping the Cushion.



88628

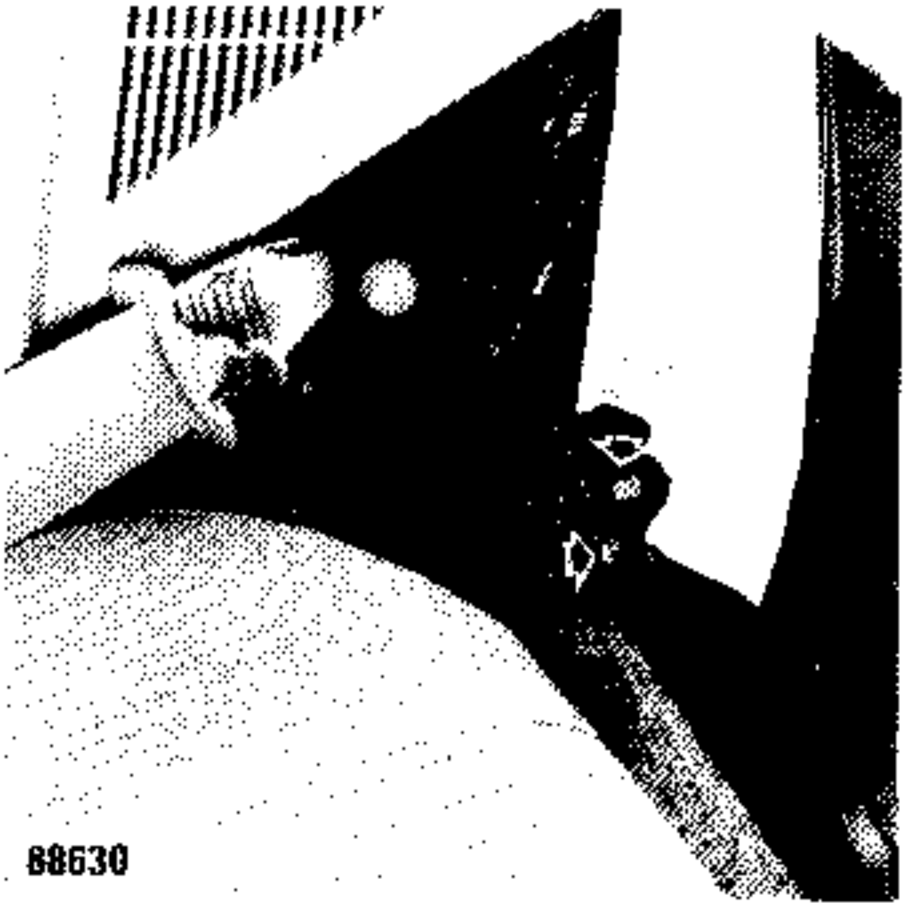
- Remove the three screws which secure the slide control to the cushion casing.



88629

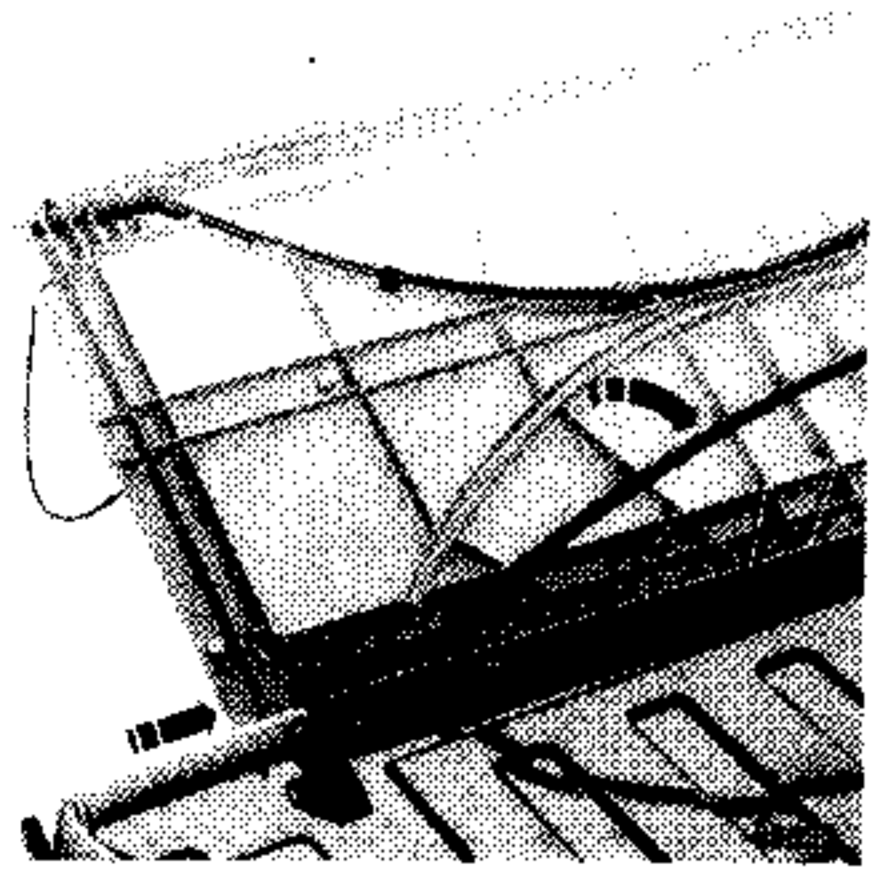
- Remove the four clips (D) which secure the cover to the casing.
- Free the cover front link with a screwdriver.
- Remove the two side links.
- Fold the cover over onto the cushion and cut the clips which maintain the shape of the centre of the cushion.
- These are hooked onto a link which is embedded in the foam.

- STRIPPING the rear seat back.

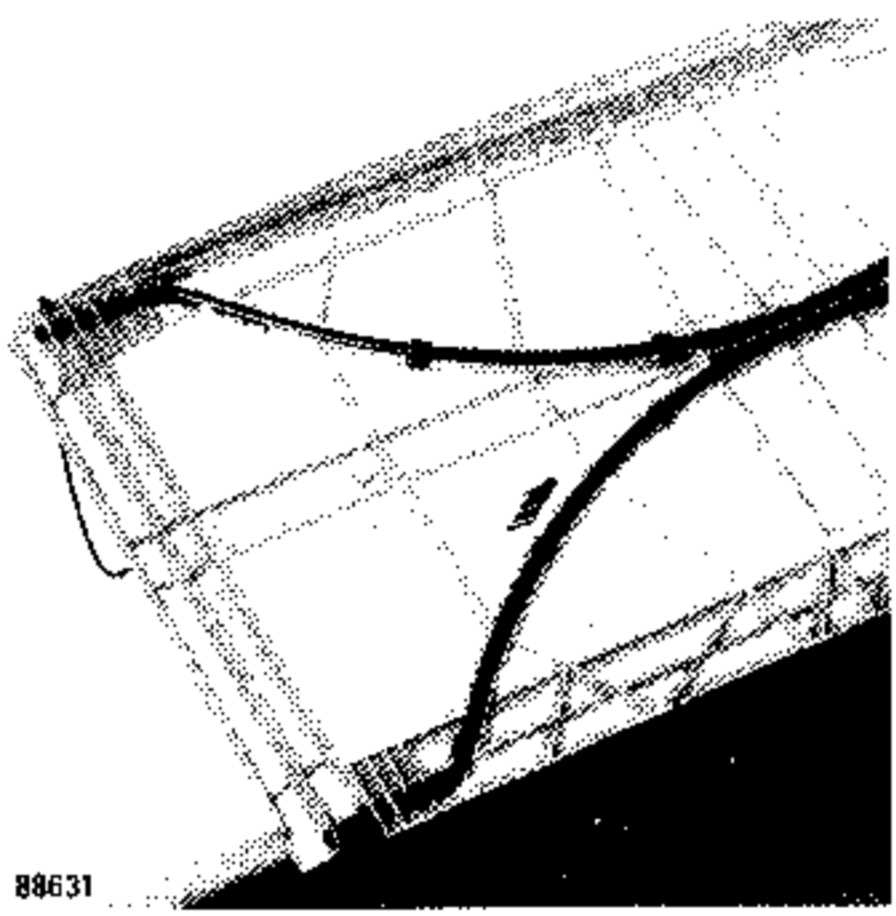


88630

- Tilt the seat cushion forwards.
- Remove the seat back side securing screws.

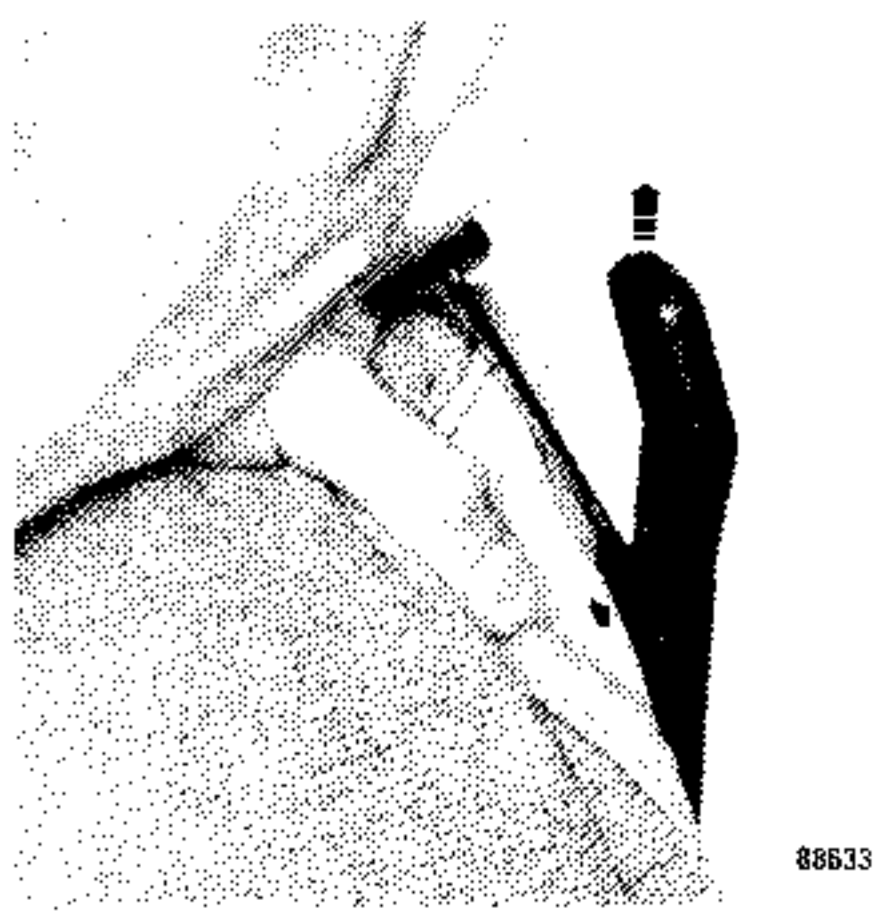


- Swing the hinge bar and push it to one side to free the parcel shelf from the seat back hinge.
- Carry out the same operations on the other side and take out the shelf.



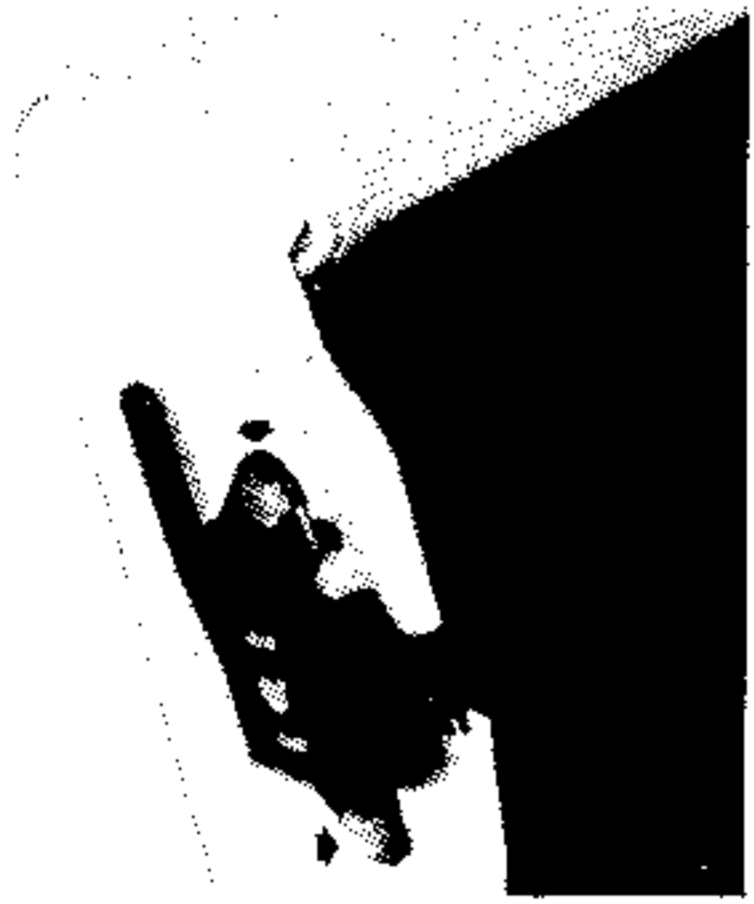
88631

- Swing up the parcel shelf and remove the clips from the hinge bar by pulling it upwards.



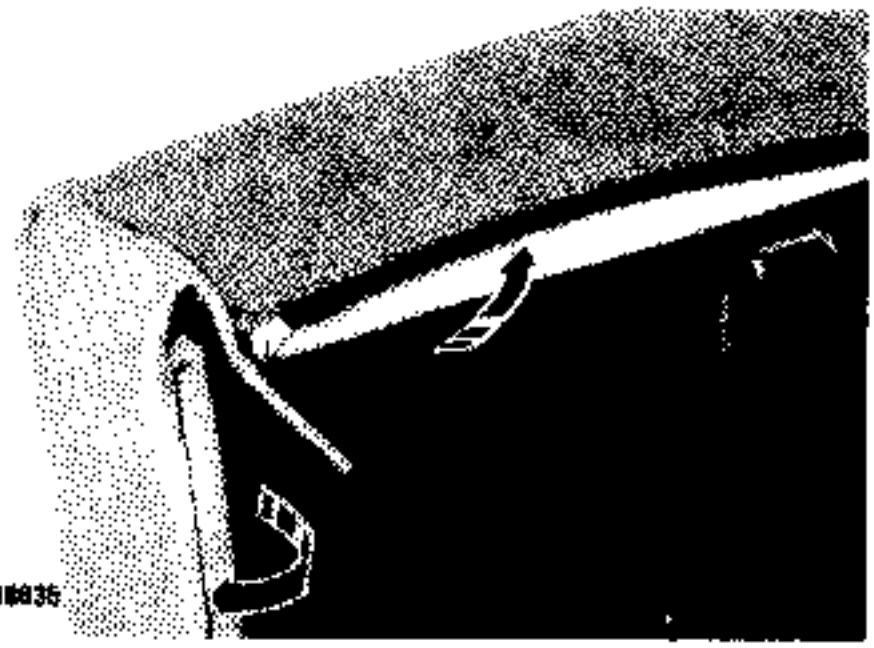
88633

- Unclip the side lock protectors with a screwdriver and remove them by pulling them upwards.



88834

- Remove the two screws which secure the locks to either side of the rear seat back.

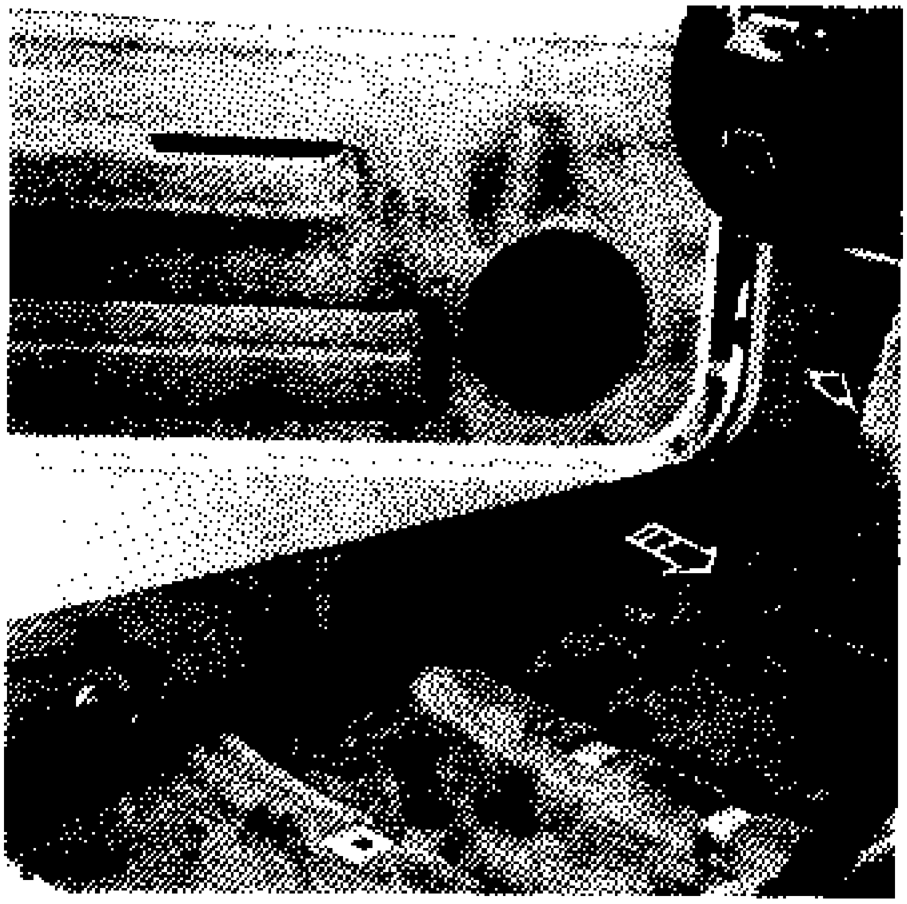


88835

- Free the retaining tab from the top of the seat back.

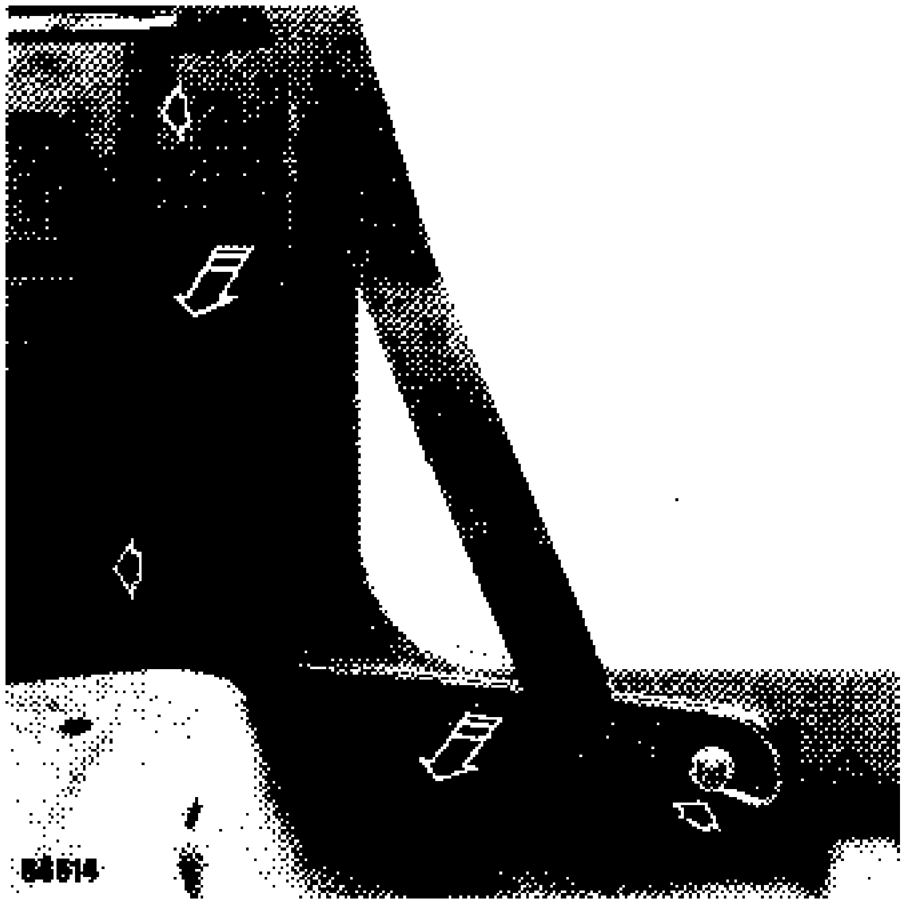
- Free the trim from round the edge of the seat back and remove it.

Note: Two-piece rear seats are stripped in exactly the same way except for the operations involved in removing the rear parcel shelf which, in this case, is not secured to the seat backs.



- Remove the body sill trim securing screws.

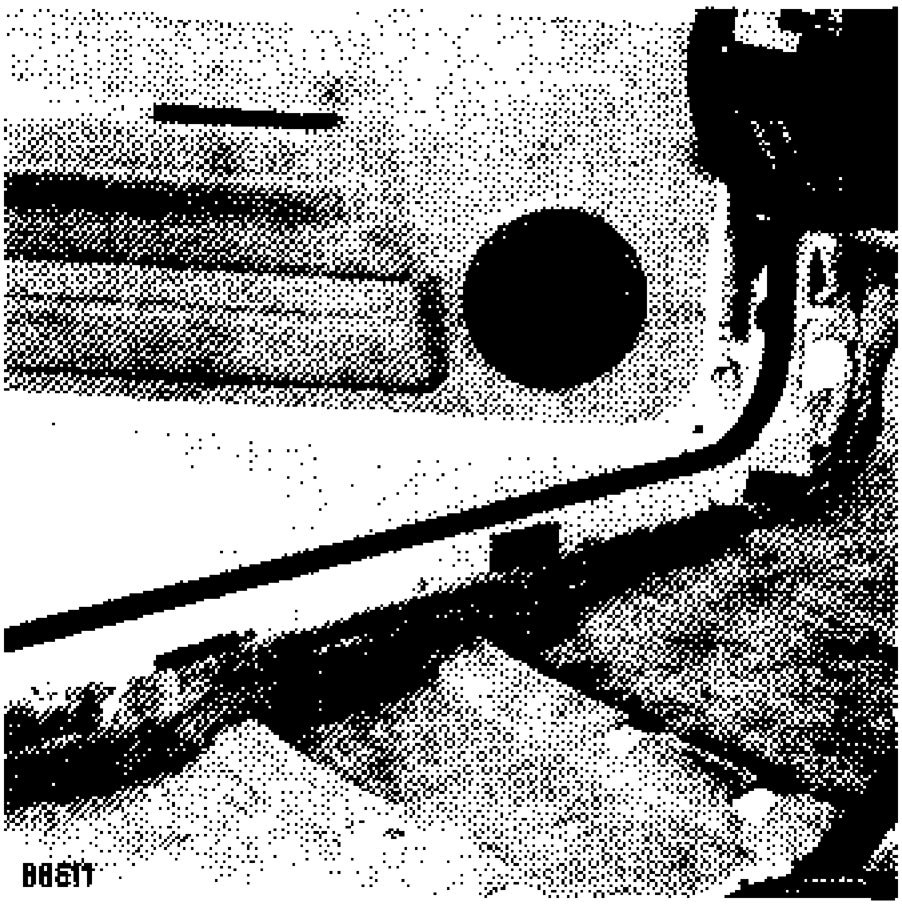
- Pull the trim to release it (it is secured by clips). The trim can pivot round its centre.



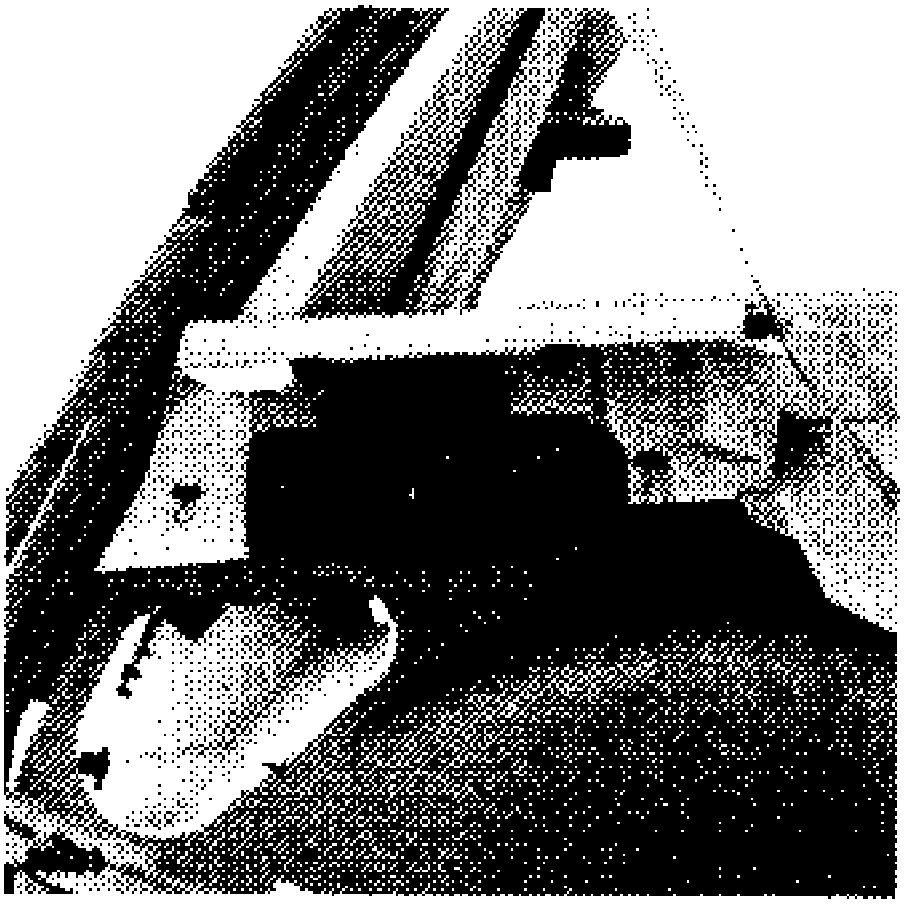
- Remove the 2 rear door pillar trim securing screws.

- Remove the seat belt lower securing bolt.

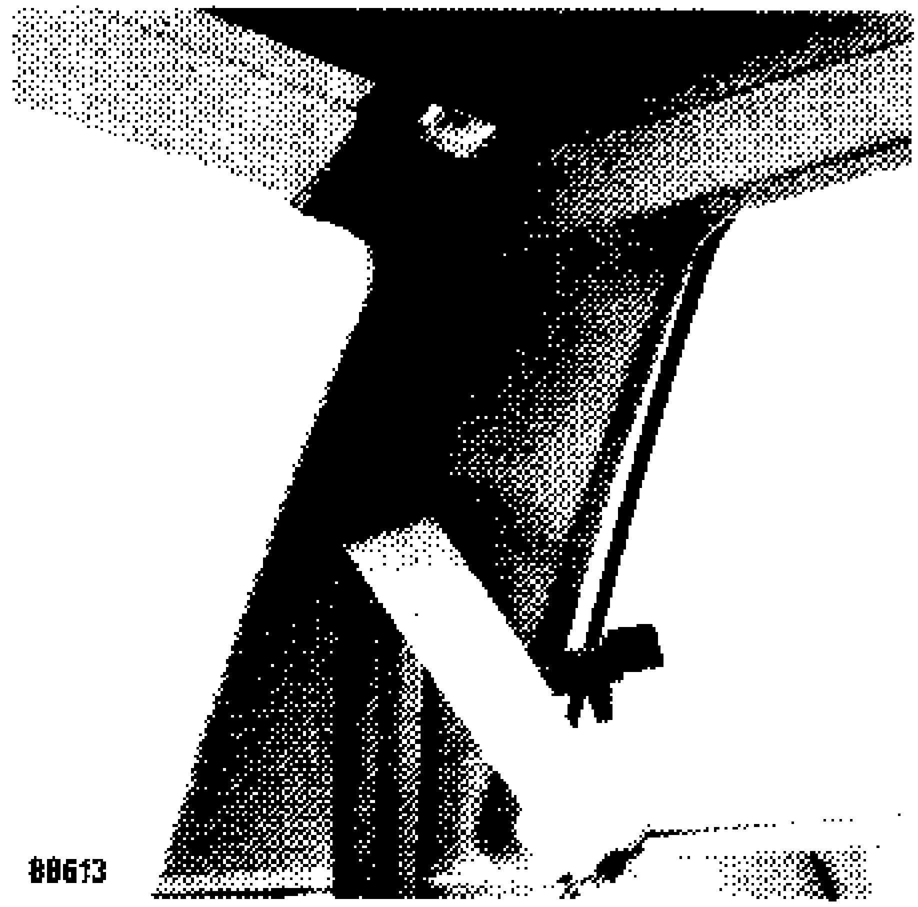
- Pull the trim to release it (it is secured by clips).



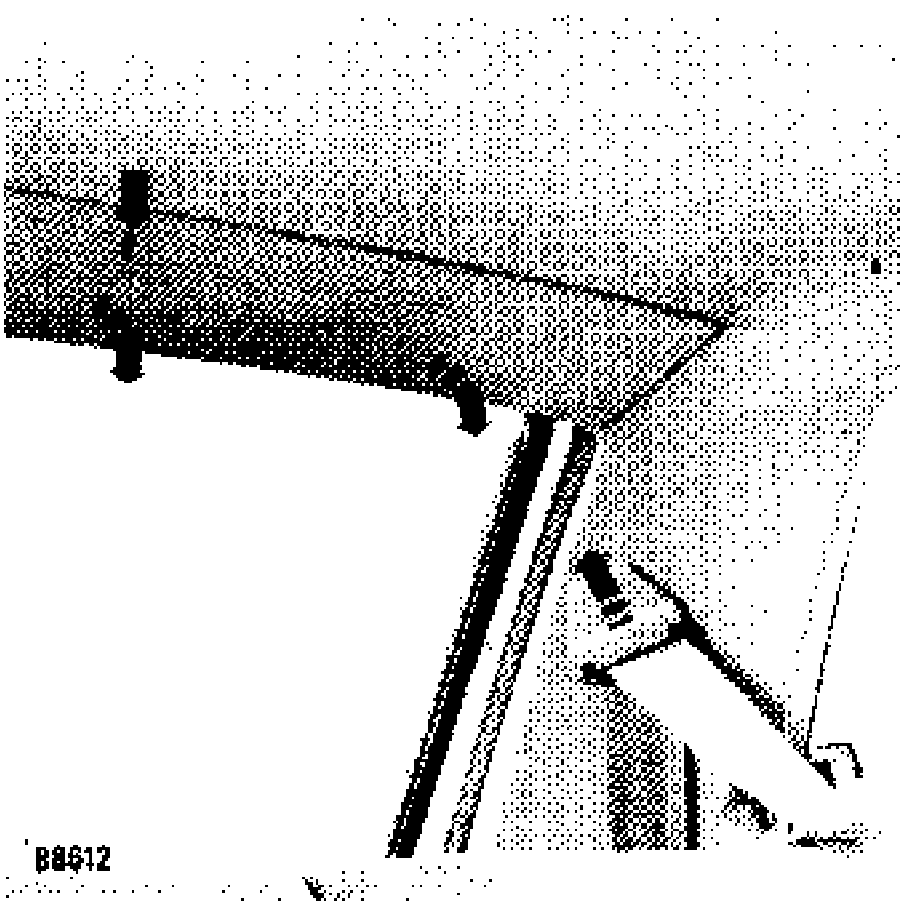
- Remove the 2 screws which secure the upper part of the trim.



- Remove the 4 screws which secure the rear side shelf in place.



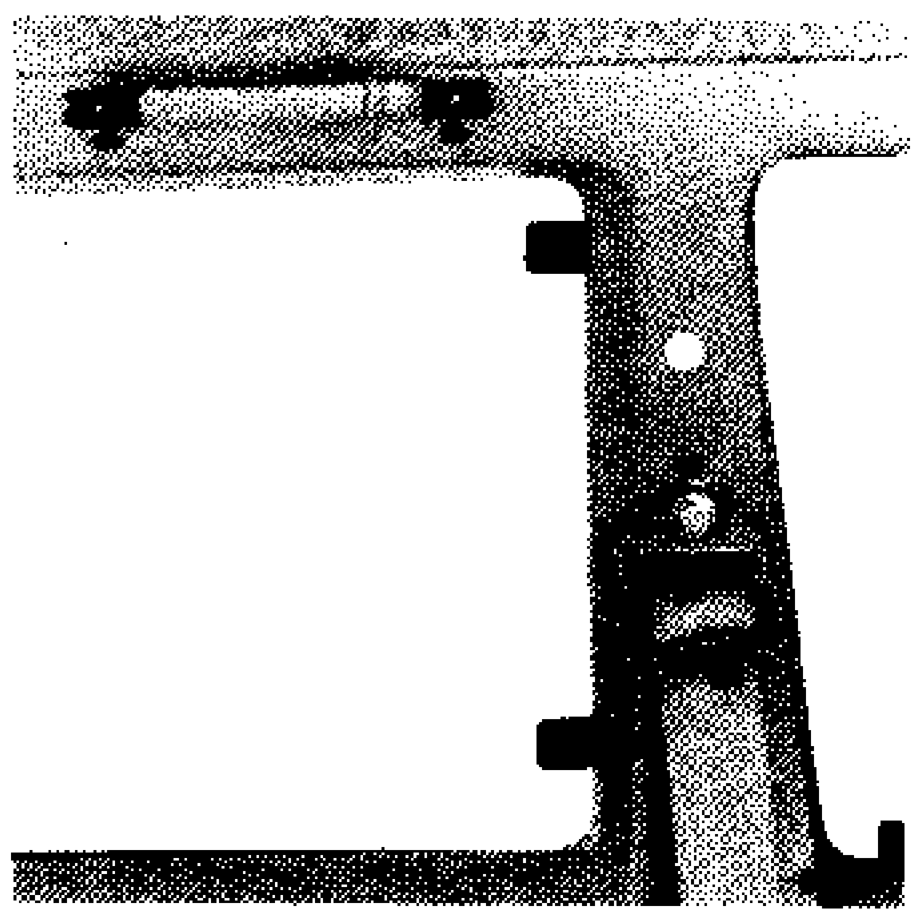
- Remove the rear seat belt securing bolt. Note the order in which the parts are assembled to refit them in the same order.
- Remove the side panel trim securing screw.



- Remove the screws from the roof rear trim strip.

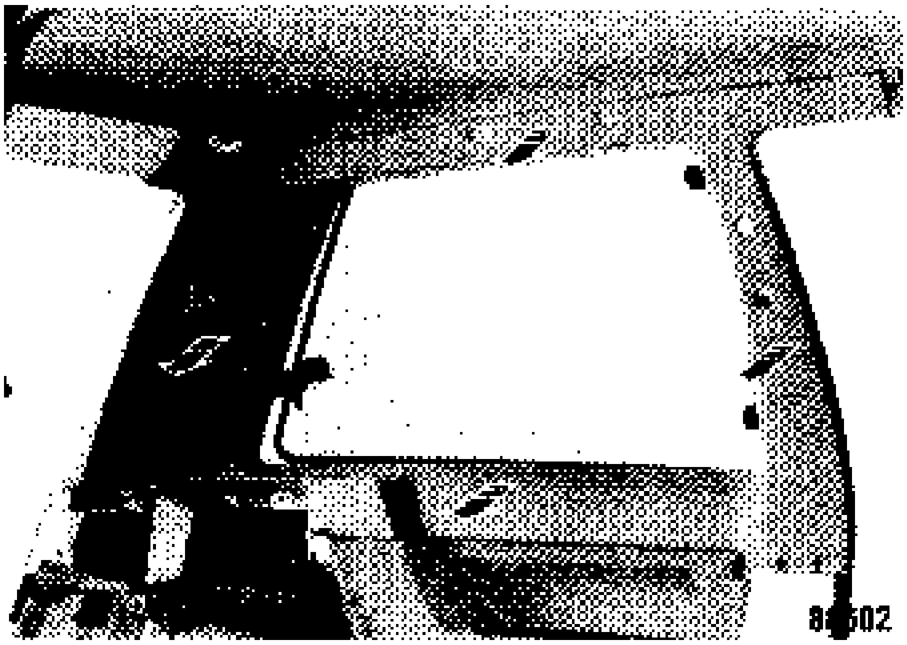
- Tilt it downwards to remove it.

- Remove the rear seat belt anchor point cover.



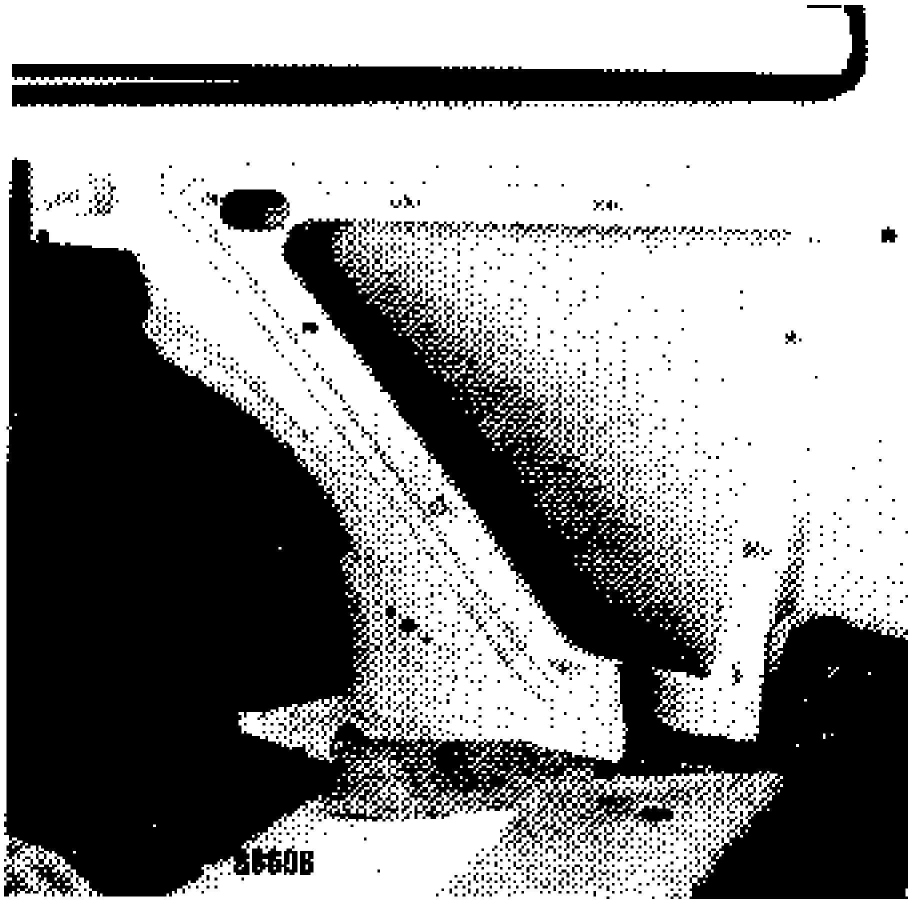
- Remove the 2 rear grab handle securing screws.

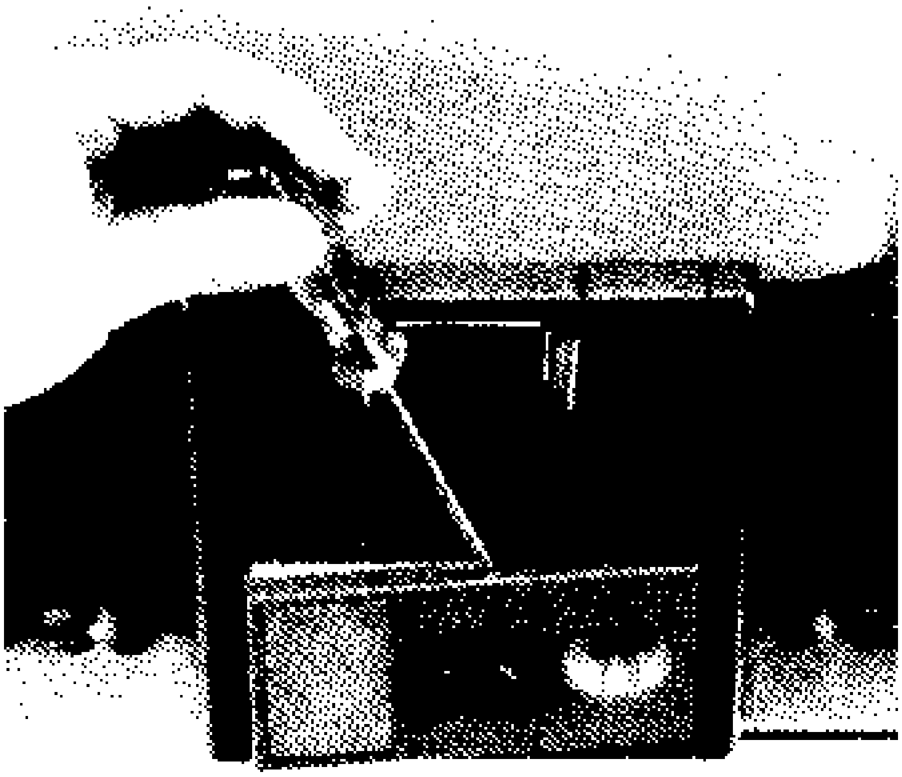
- Remove the front seat belt securing bolt.



- Remove the side trim by pulling it.

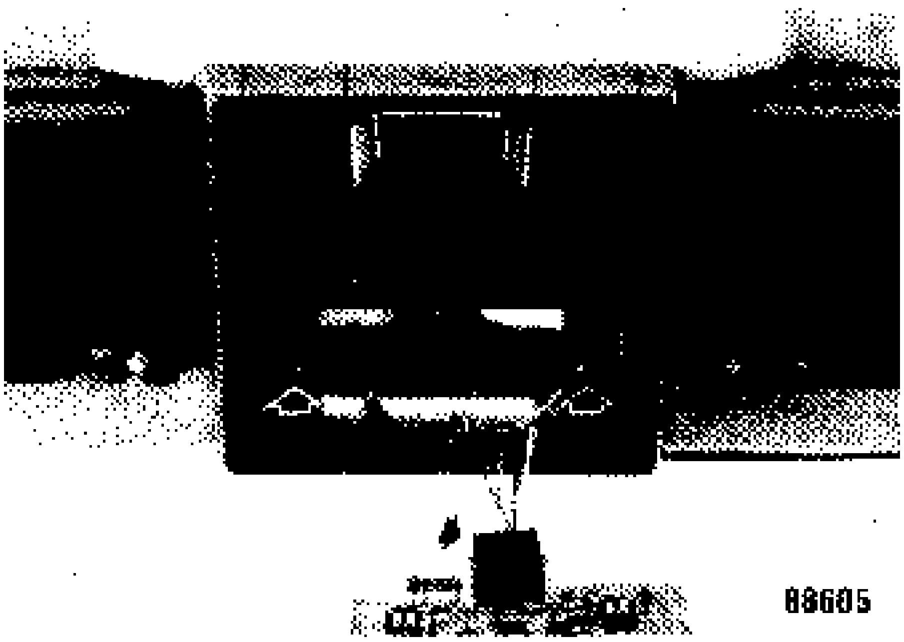
- It is clipped into the window frame.





88606

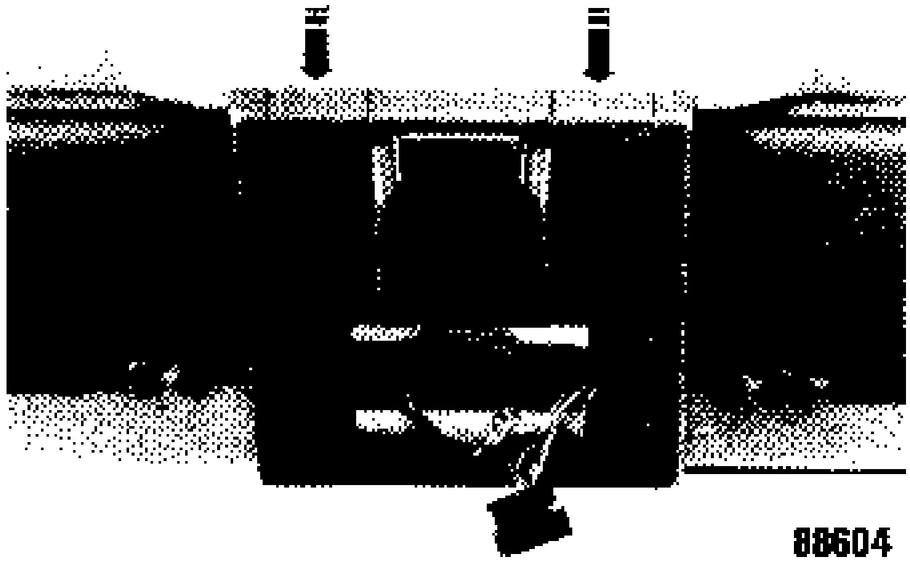
- Unclip the light casing with a screwdriver.



88605

- Disconnect the casing switch.

- Remove the 2 console securing screws.

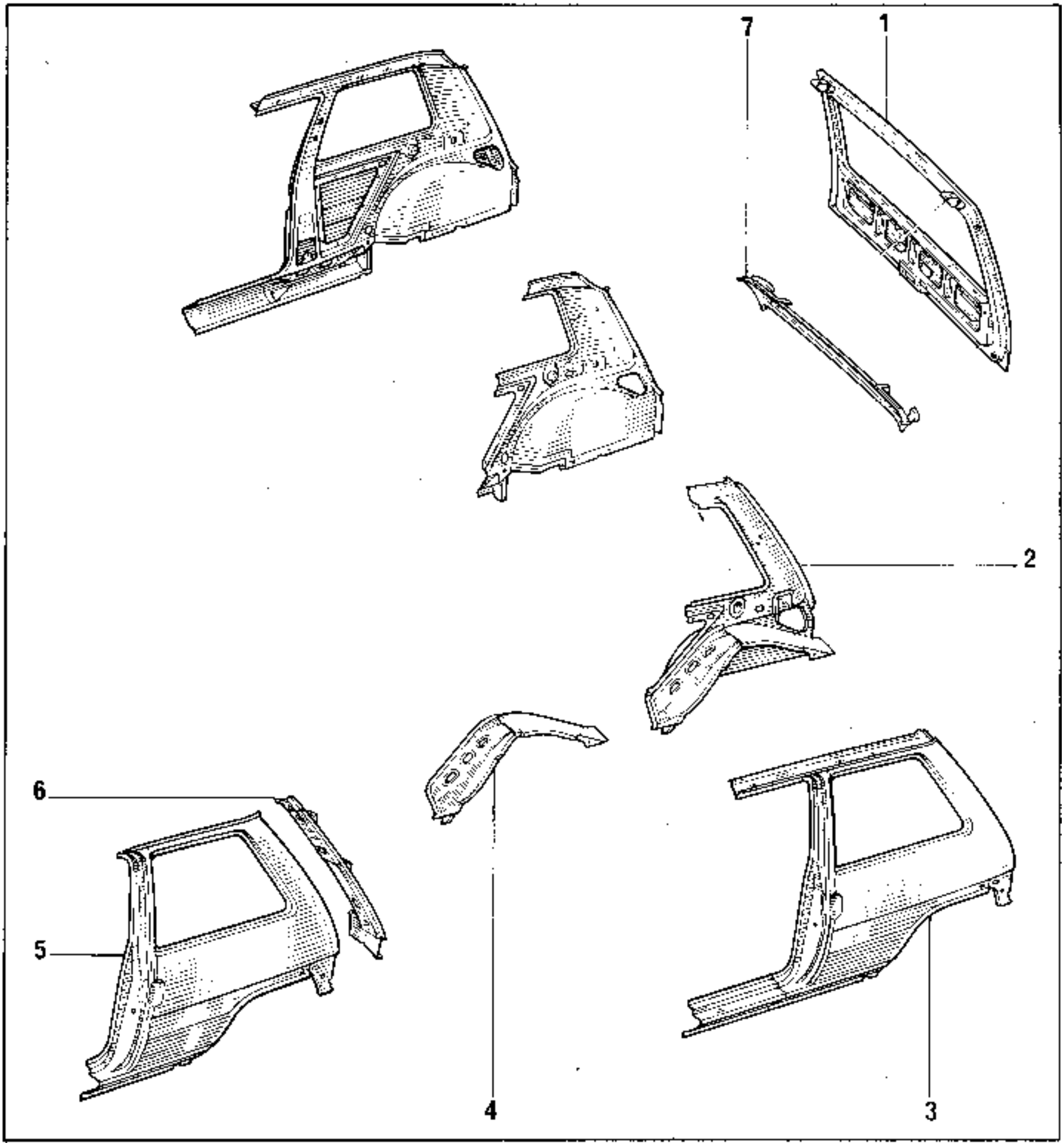


88604

- Free the console from the head lining and disconnect the infra-red receiver.

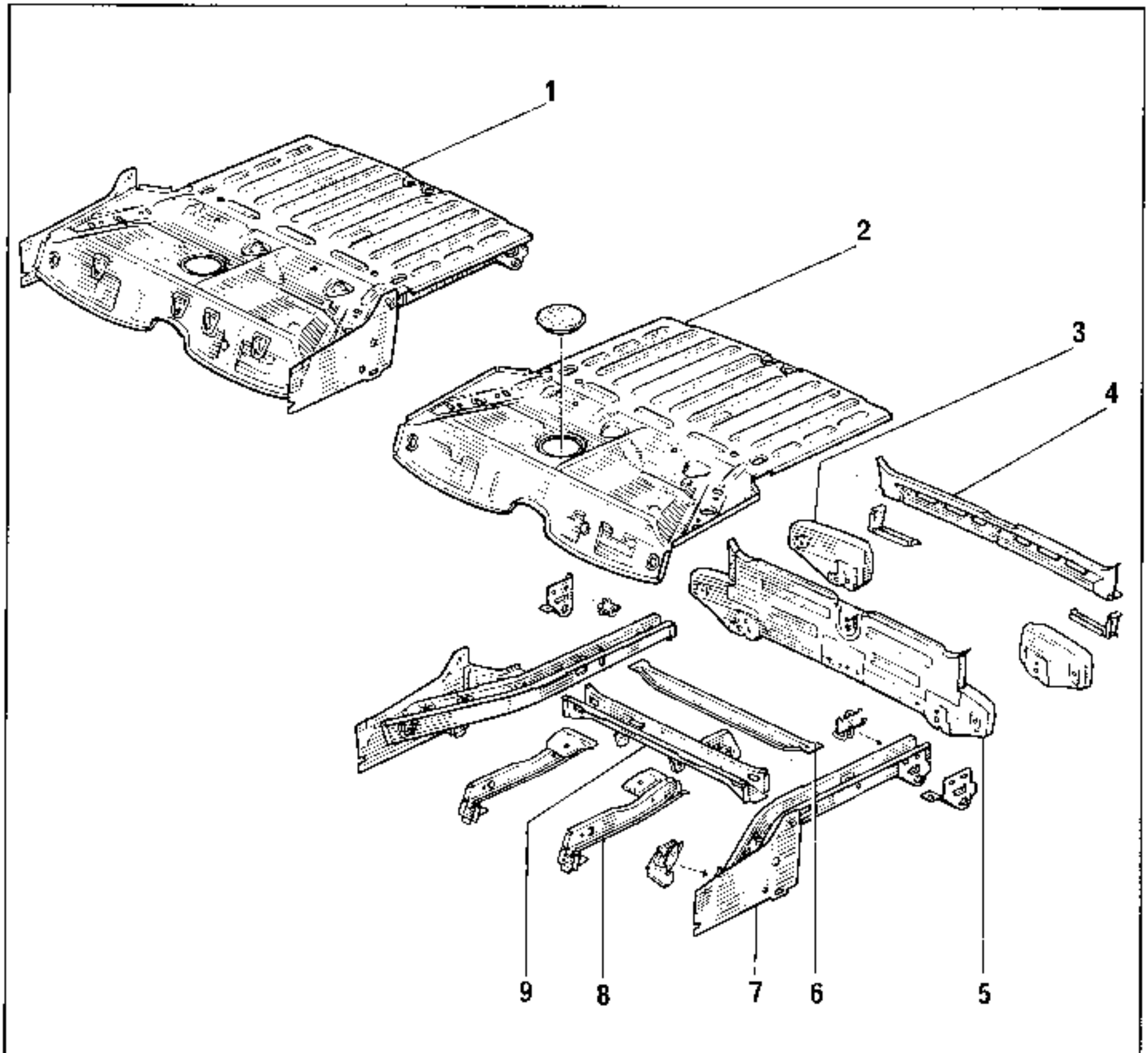
UPPER STRUCTURE

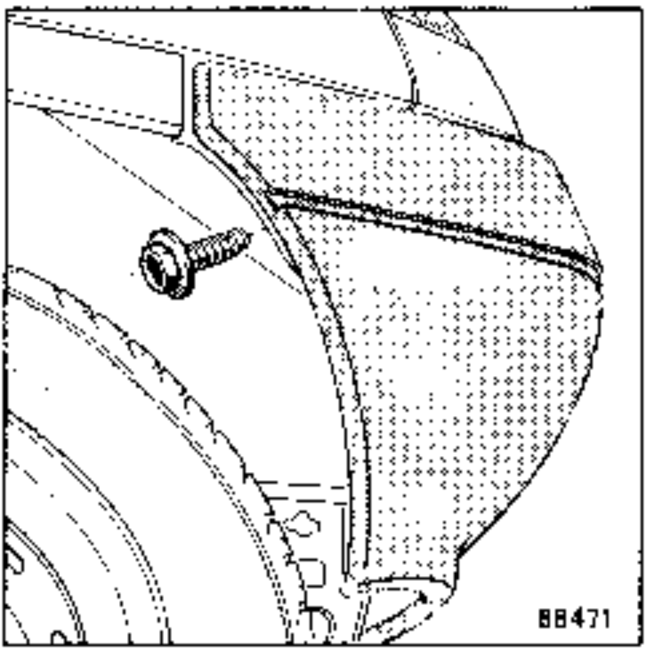
1-tail gate
2-wheel arch assembly
3-rear half section
4-wheel arch
5-wing panel
6-drip channel
7-roof cross member

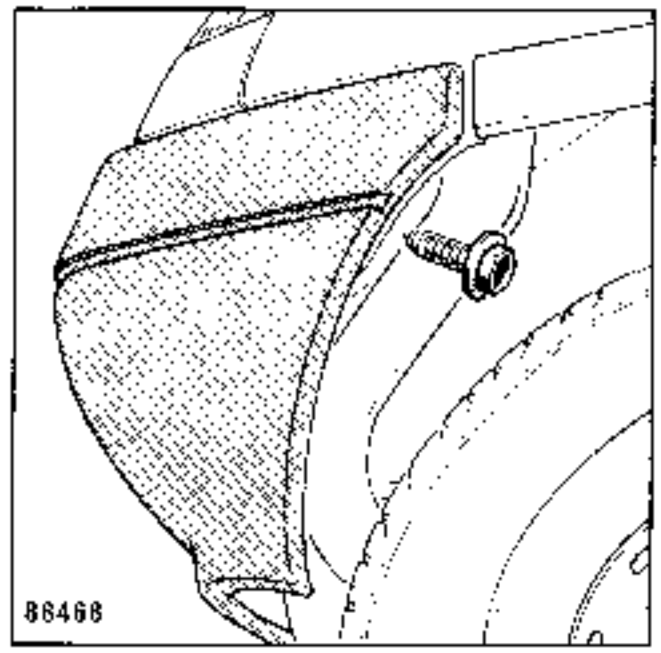


LOWER STRUCTURE

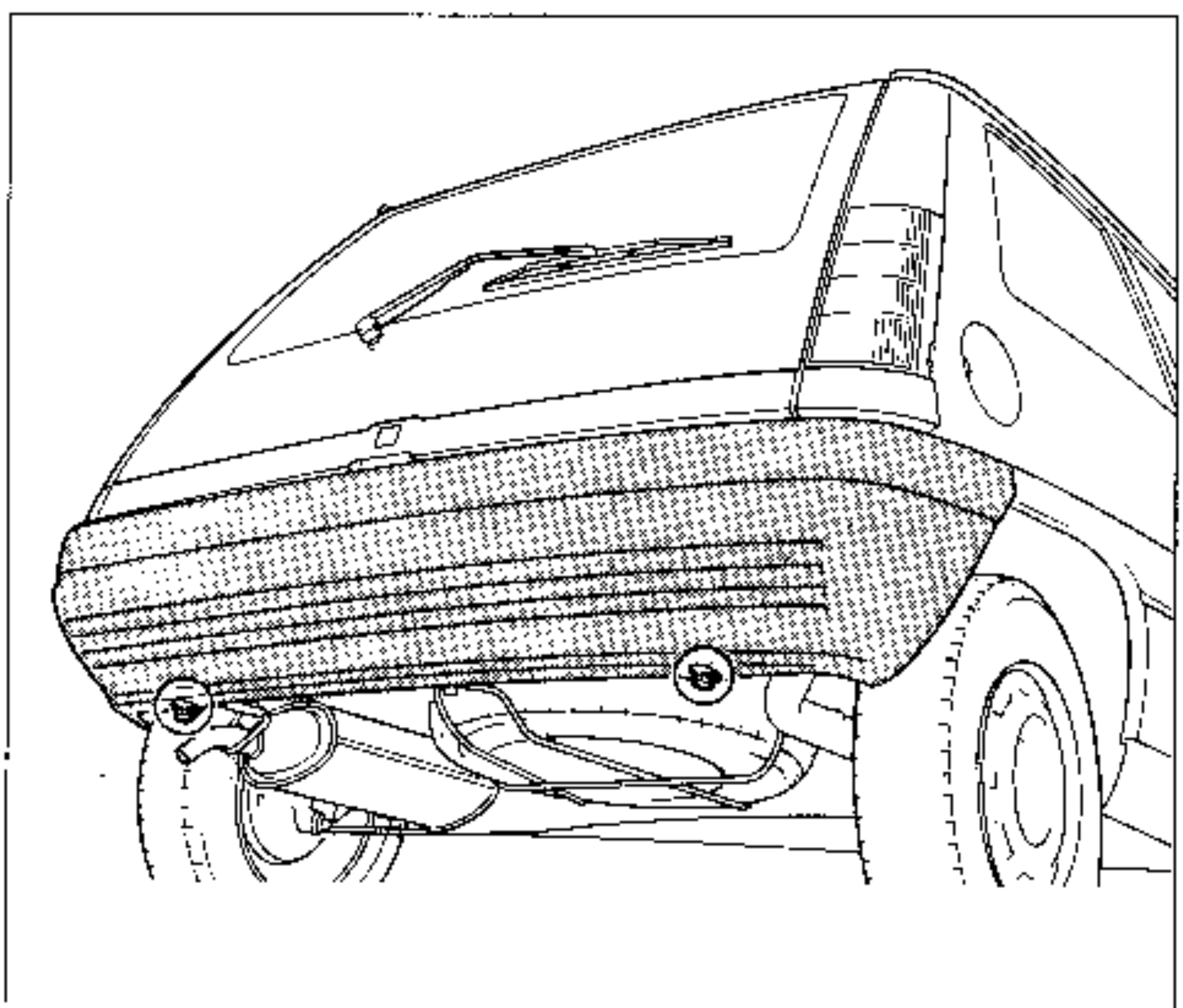
1-floor assembly (side members, cross members)
2-floor (without stiffeners)
3-rear end panel gusset
4-rear end panel cross member
5-rear end panel
6-floor stiffeners
7-side member
8-floor longitudinal member
9-floor cross member



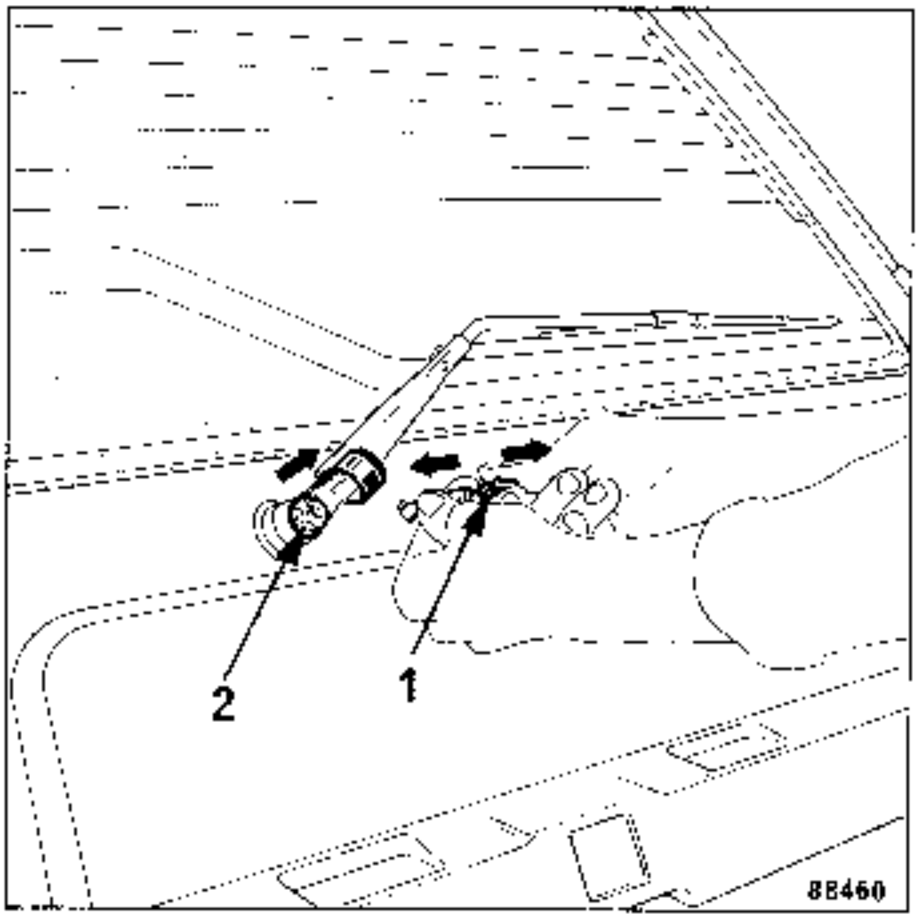

88471


88468

Remove the screws at the sides.


88466

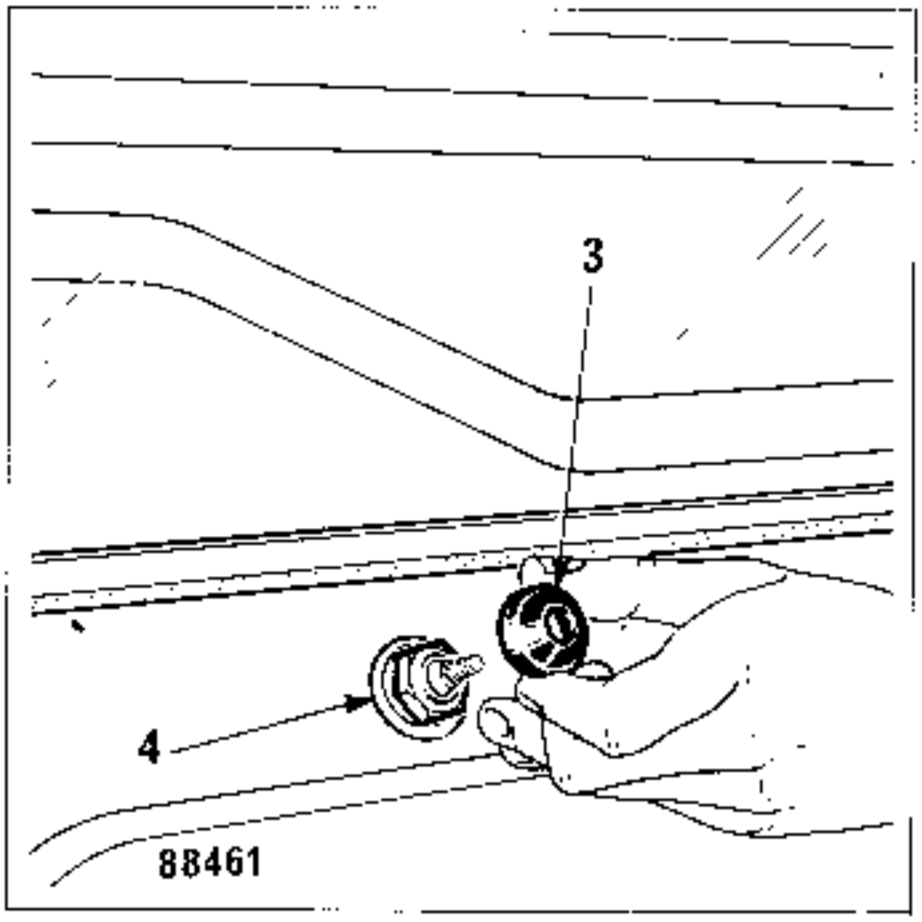
Remove the screws at the bottom and take off the bumper shield.



Remove the following parts :

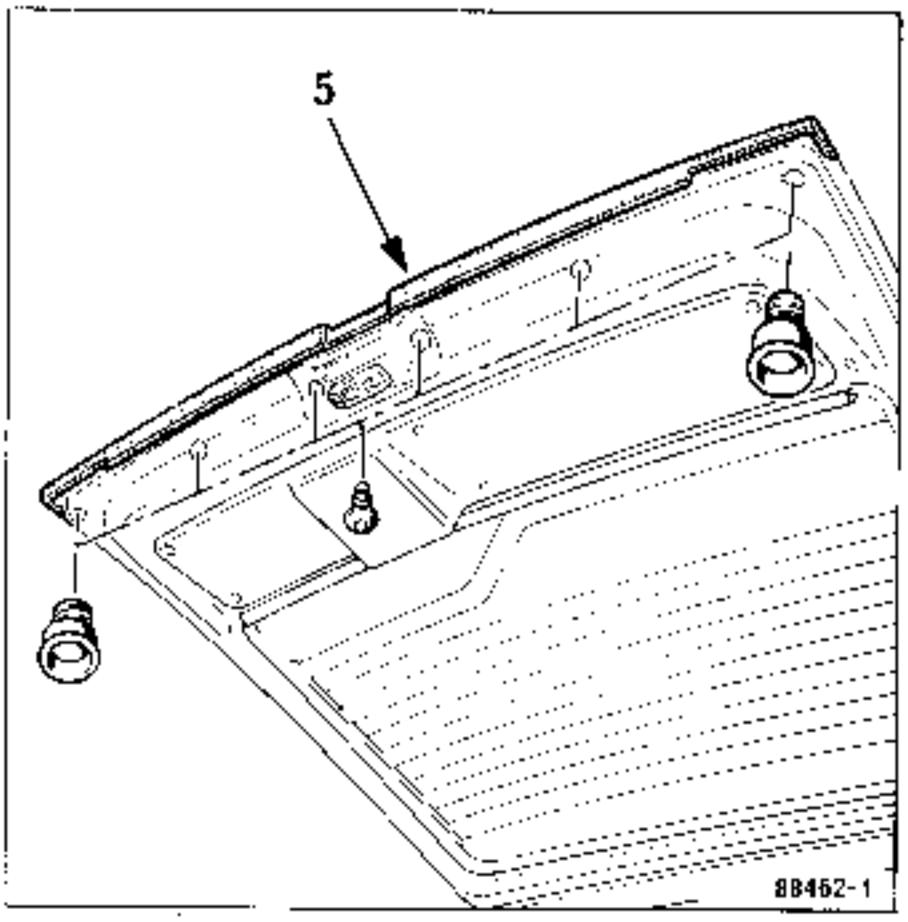
- the nozzle (1),

- the rear screen wiper arm (2),

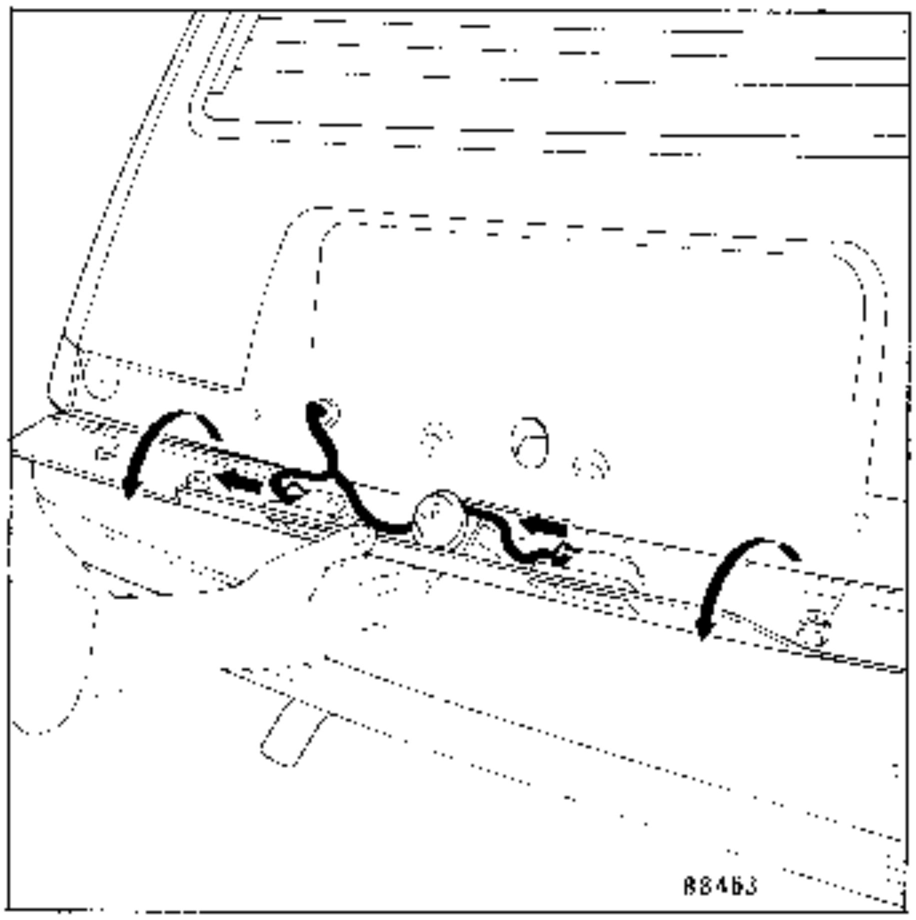


- the nut cover (3),

- the nut (4) that holds the rear screen wiper in place.



Remove the tail gate trim (5).



Disconnect the number plate lights.

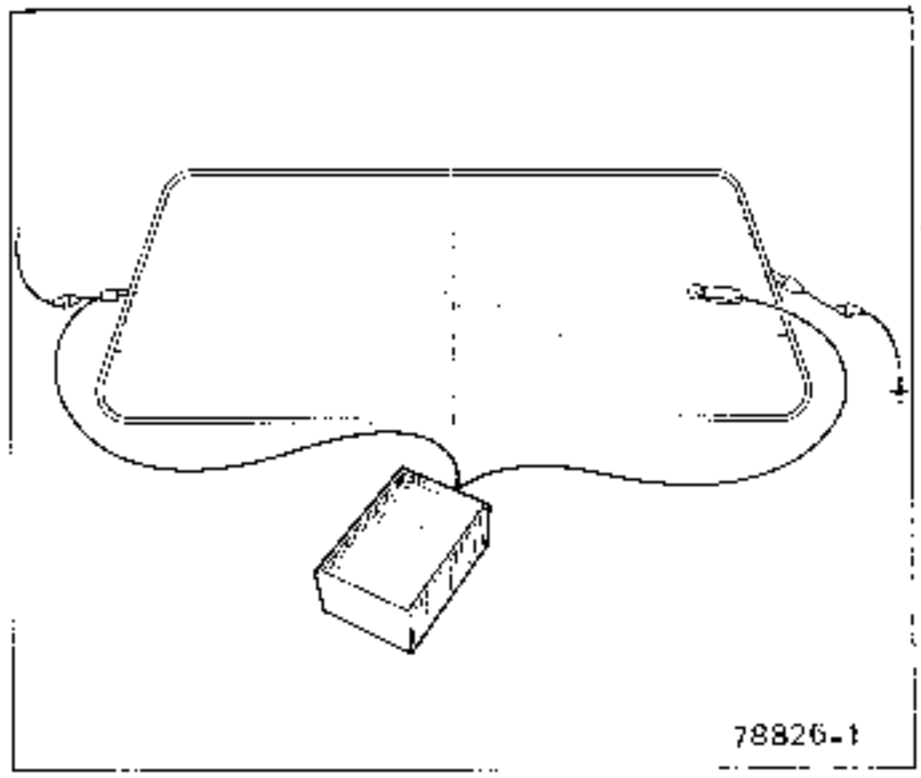
REPAIRING THE HEATING ELEMENT

The heating is silk screen printed on the inside face of the glass.

It can be repaired with a special varnish part no. 77 01 400 794.

NOTE :

When the break is not visible to the naked eye, it can be located with a volt-meter (see method described in the electrical section of the mechanical workshop manual).


78826-1

REPAIRING

Clean, locally, the part to be repaired, to remove any dust or grease. It is preferable to use alcohol or a glass cleaner for this purpose. Wipe it with a clean dry cloth.

To obtain a neat repair, apply adhesive tape, such as cellotape, to either side leaving a gap of the same thickness as the conducting area.

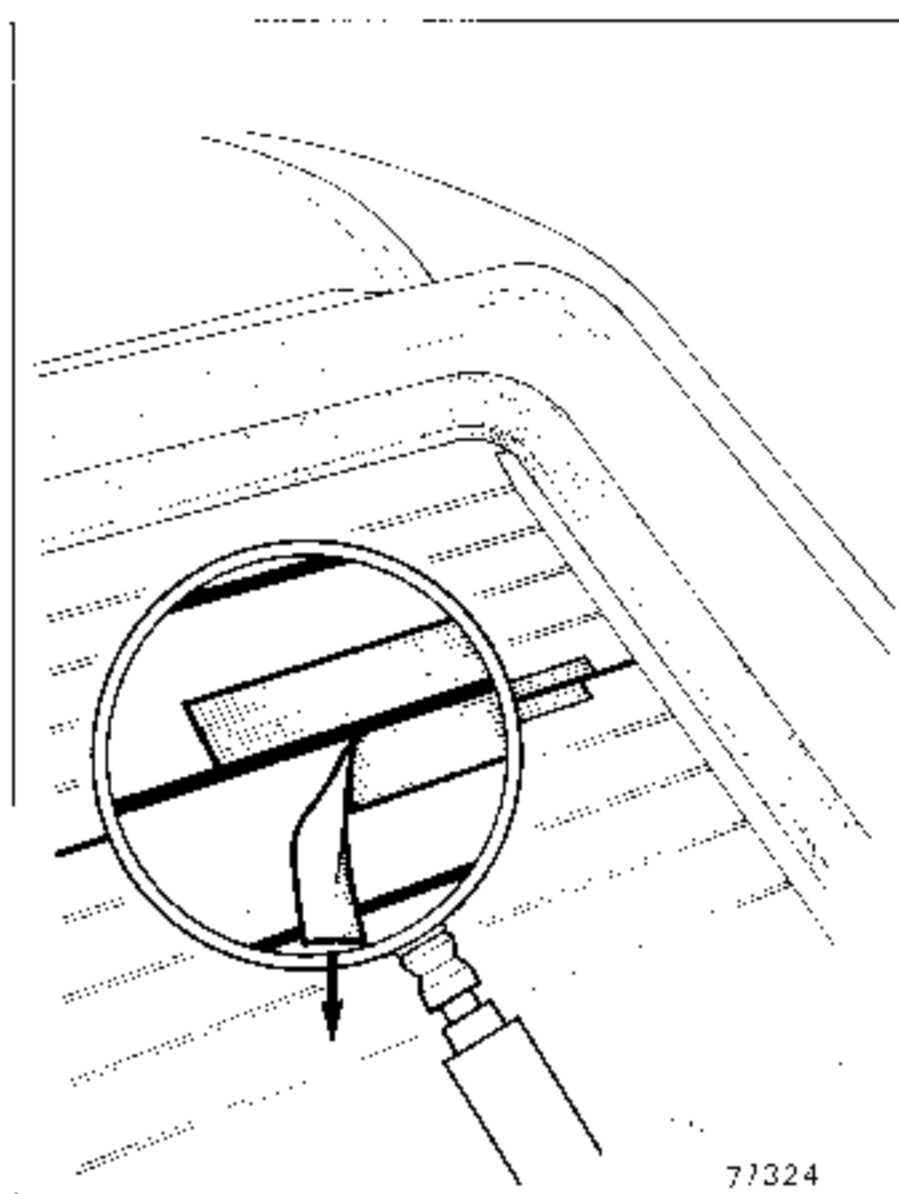
Before applying the varnish, shake the flask to avoid the silver particles being left as a deposit at the bottom of it.

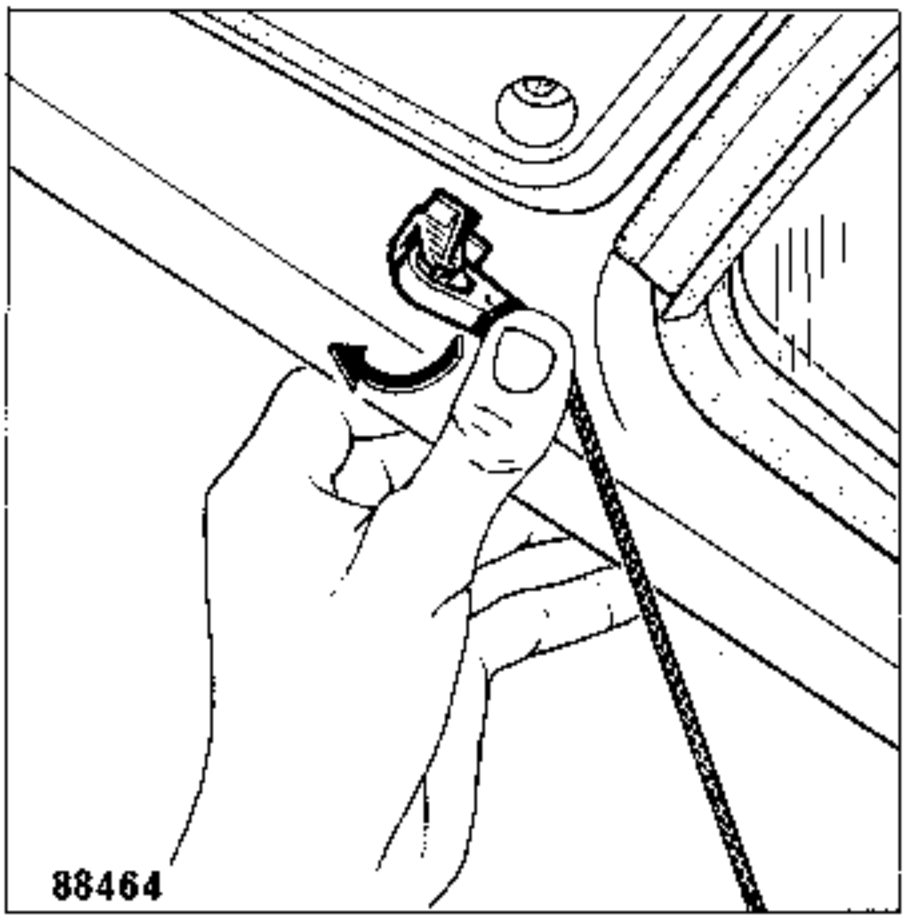
Touch up the element, with a small brush, ensuring that the coat is sufficiently thick. If more than one coat has to be applied, leave sufficient time between coats for them to dry and never apply more than three.

Any runs can be cleaned off with the point of a knife or a razor blade but leave the product to dry for several hours before doing so.

The adhesive tape which acted as guides, is not to be removed until approximately one hour after application.

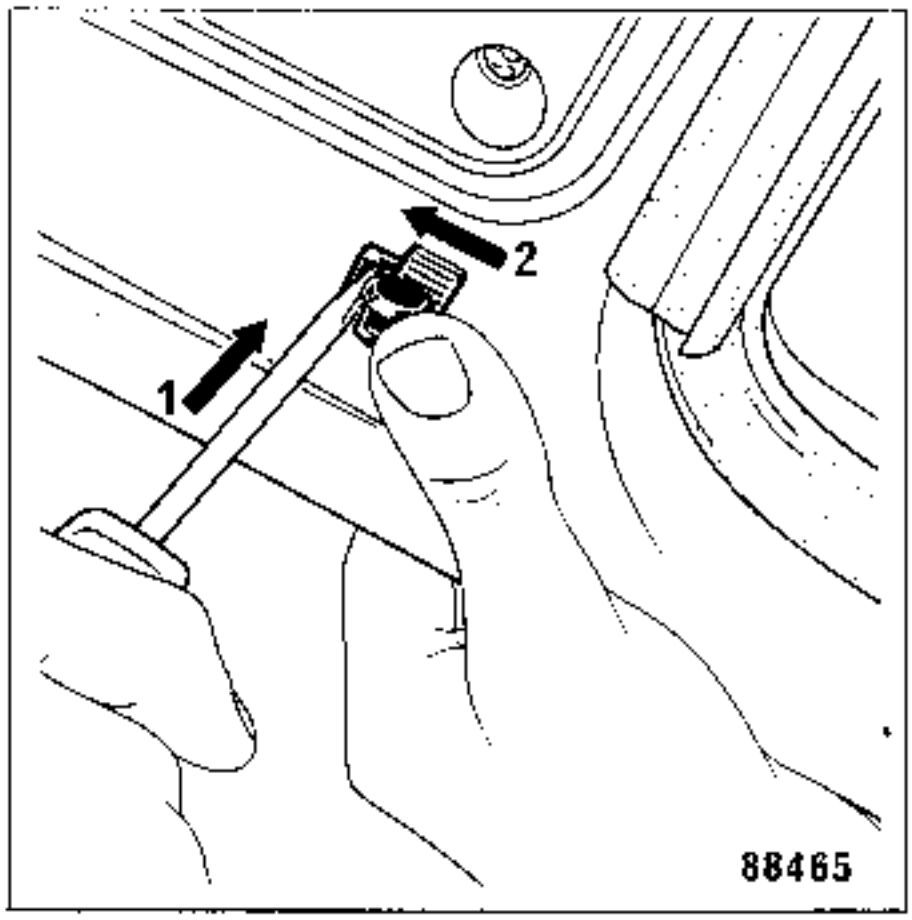
The tape is to be pulled off square with the element, in the direction shown by the arrow. The varnish, when applied at an ambient temperature of 20° C, is fully dry after three hours. At lower temperatures it takes slightly longer.


77324

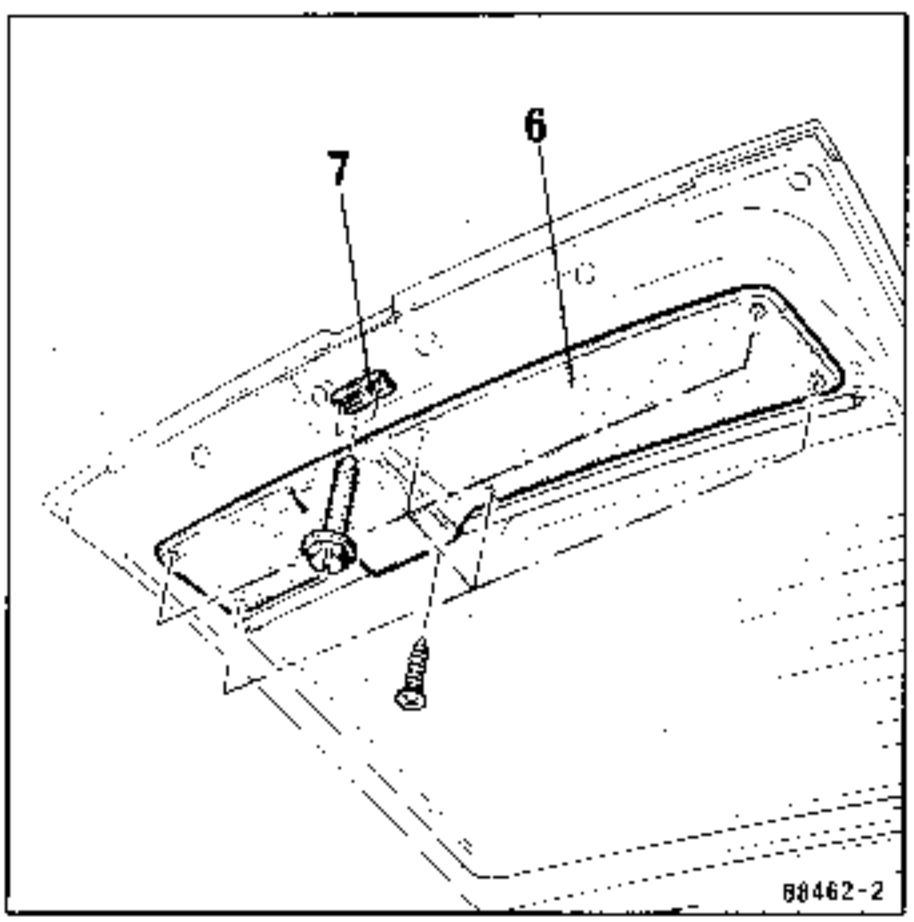


Unhook the cords from the rear parcel shelf.

1-push the ball joint parallel with the tail gate.
2-twist it to disconnect the ball joint.



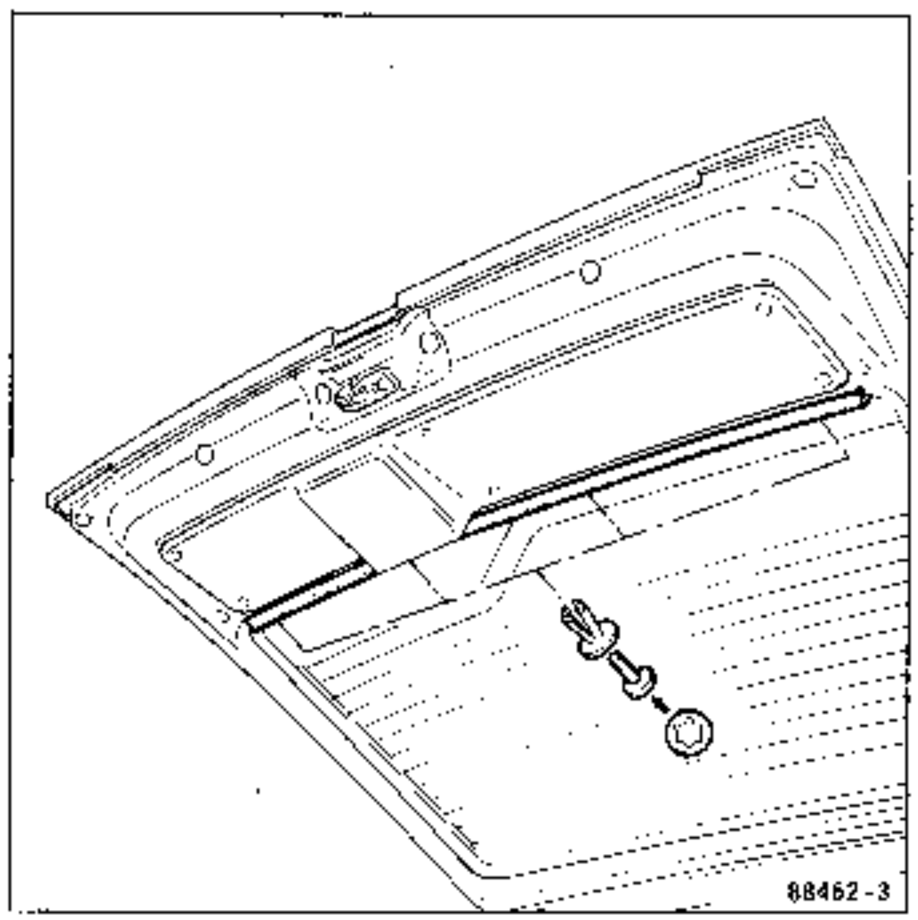
Remove the cord anchor points on the tail gate.



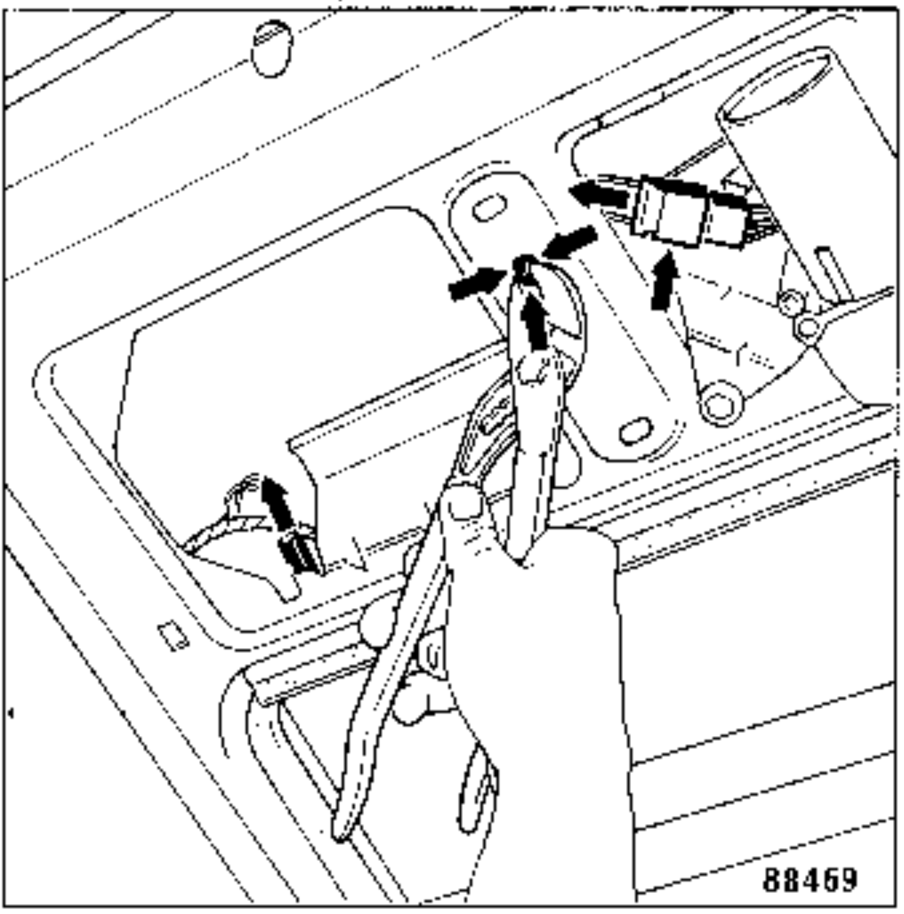
Remove the following components :

- the plastic trim (6),

- the lock (7).

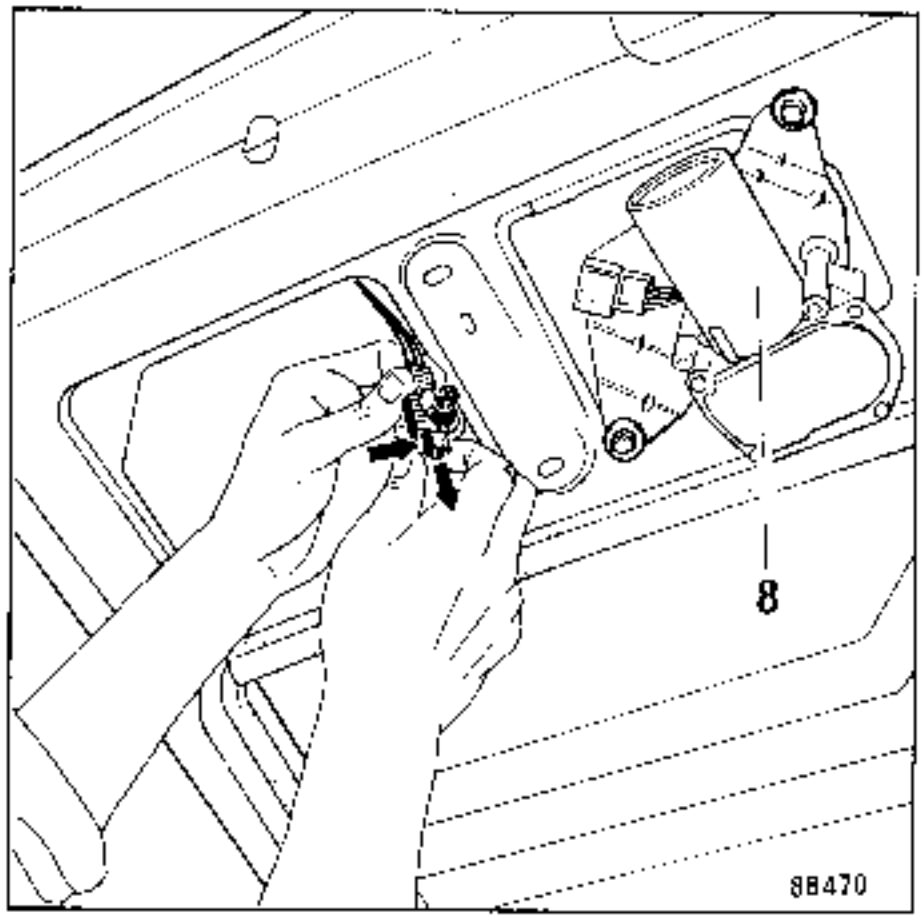


Remove the lower seal.



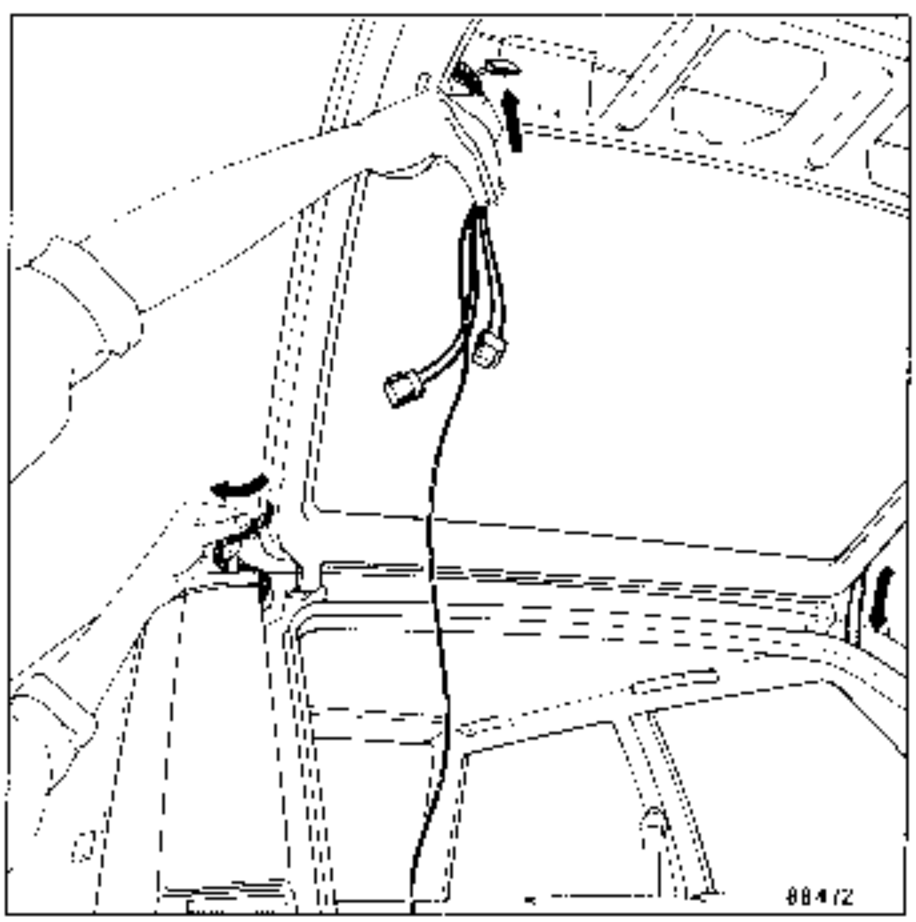
Disconnect the following electrical terminals :

- the rear screen wiper terminal,
- the heated rear screen terminals, with a pair of pliers, freeing the number plate light terminal,



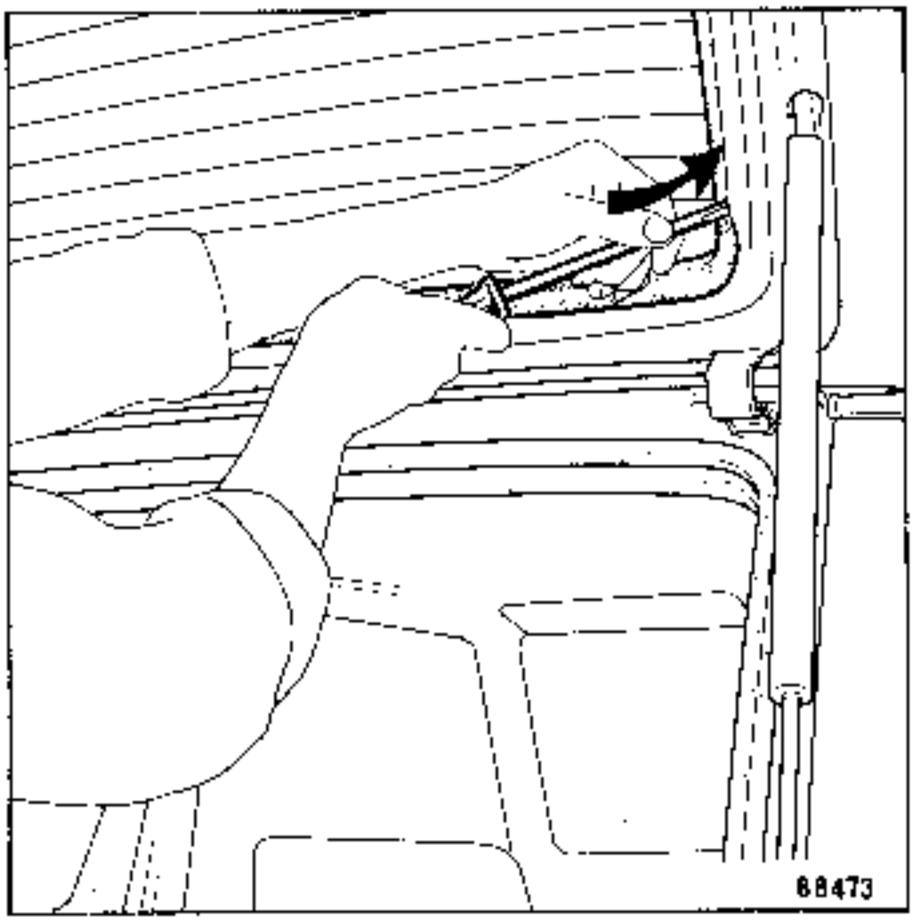
- the number plate light terminal.

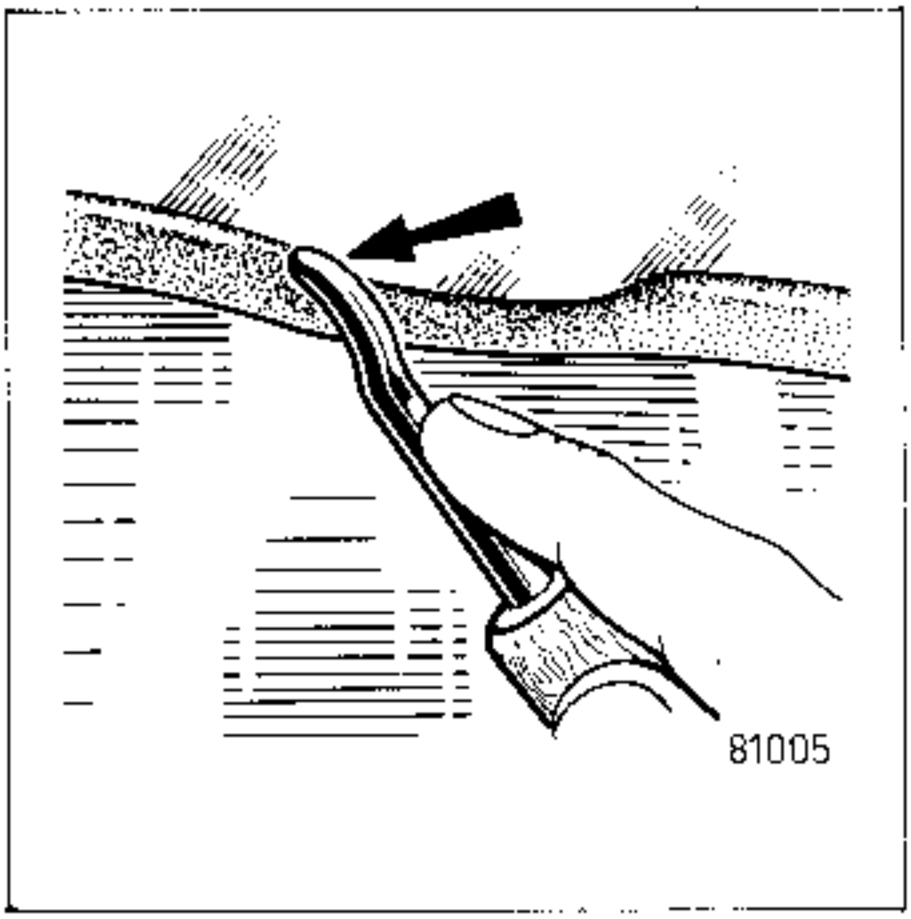
Remove the rear screen wiper motor (8).



Remove the wiring and the rear screen washer pipe from the tail gate uprights.

Remove the rear screen.

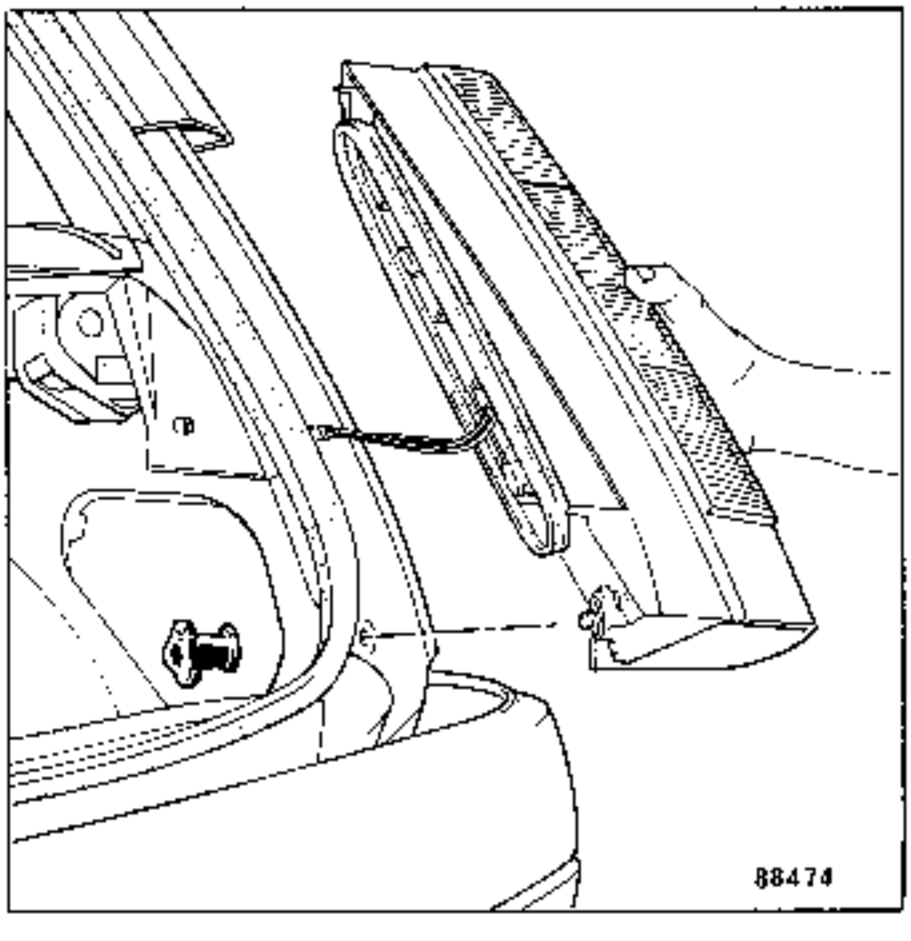




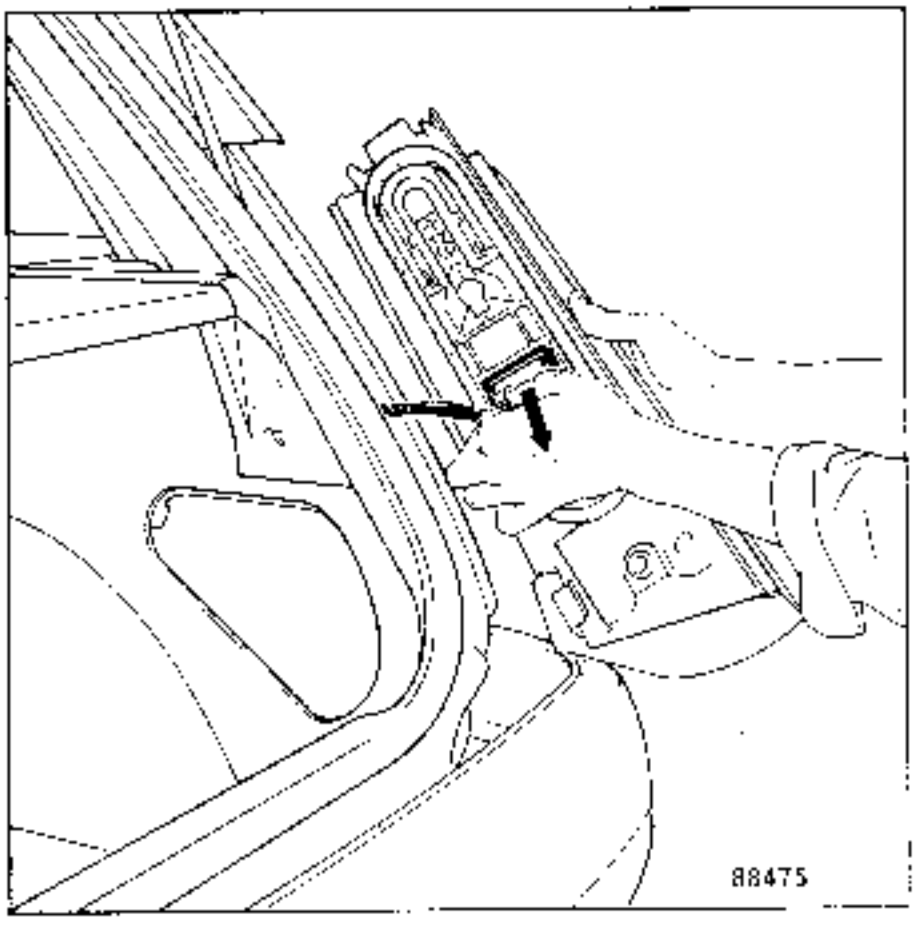
If the rear screen is broken and all or part of it is still in position, removing the tail gate and cleaning up afterwards will be made easier by sticking a sheet of paper to either side of the broken glass.

Using a spoon ended spatula or a flat screwdriver with rounded edges, push the inner lip of the seal under the rear screen flange, starting at the top.

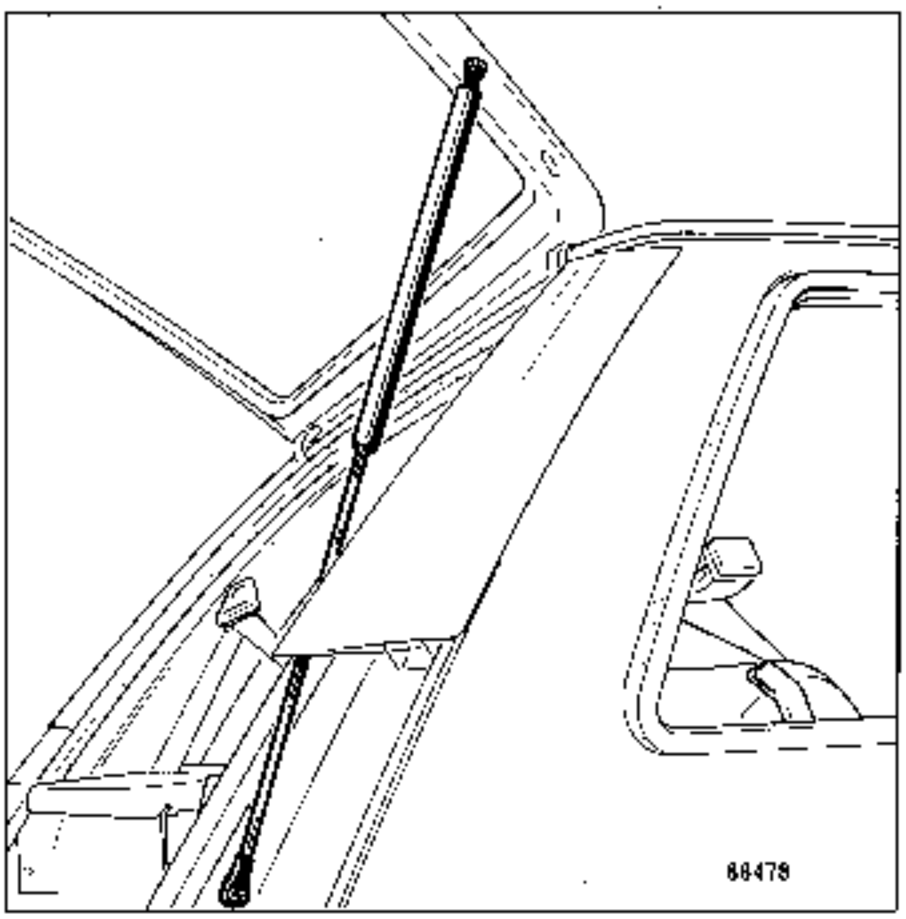
Remove the rear screen and its seal.



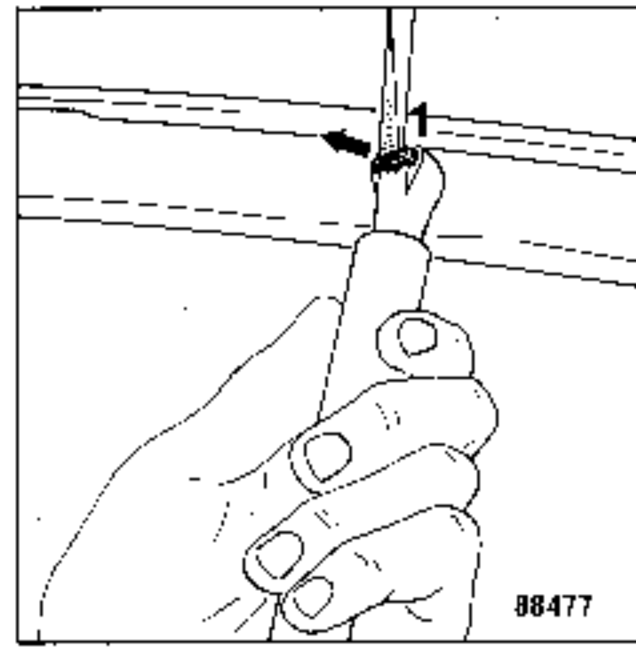
Remove the rear light assembly.



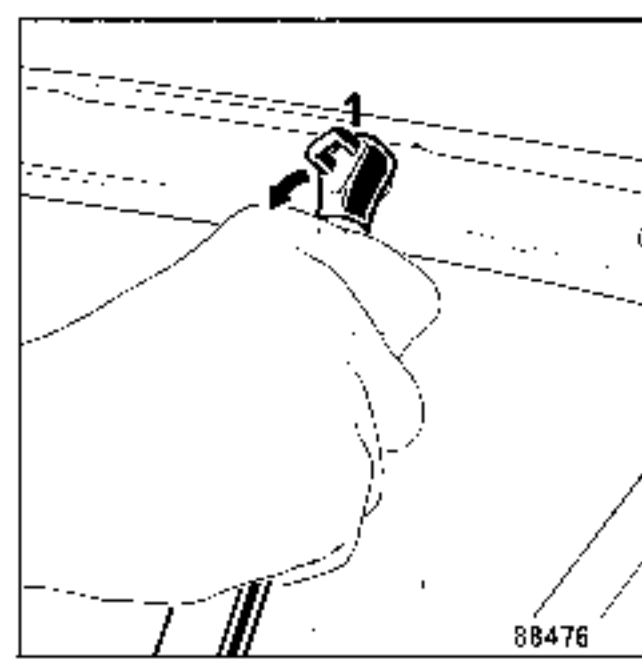
Disconnect its connector.



Remove the gas strut.



Lift tab (1) with a flat screwdriver.



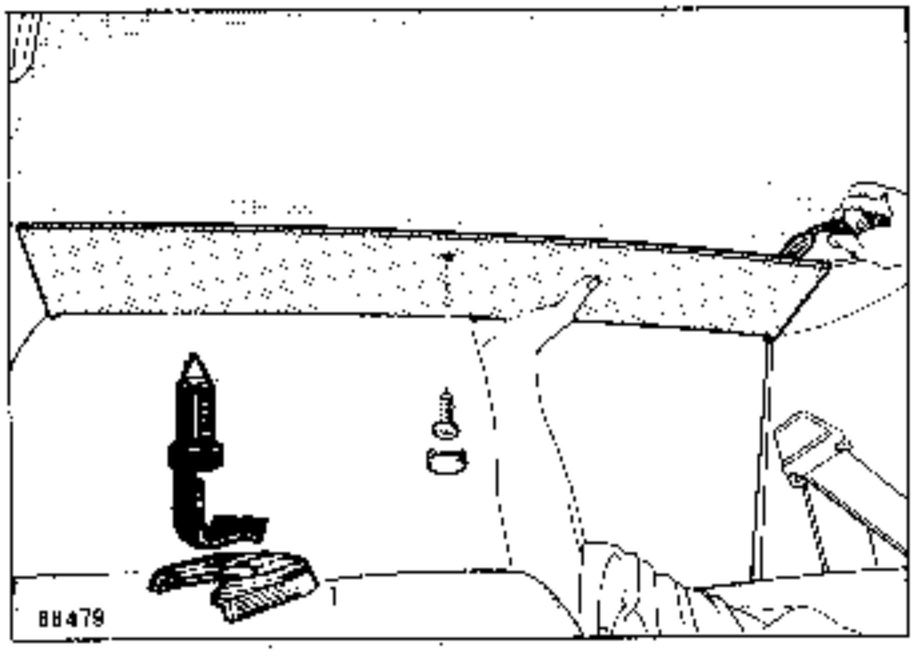
Disconnect the gas strut from the ball joint

Precautions to be taken with gas struts.

The cylinder and, in particular, the piston rod are to be protected from any possible damage or penetration by foreign bodies (protect it from scoring, traces of paint or grease on the piston rod). The consequence would be damage to the seal over a given period.

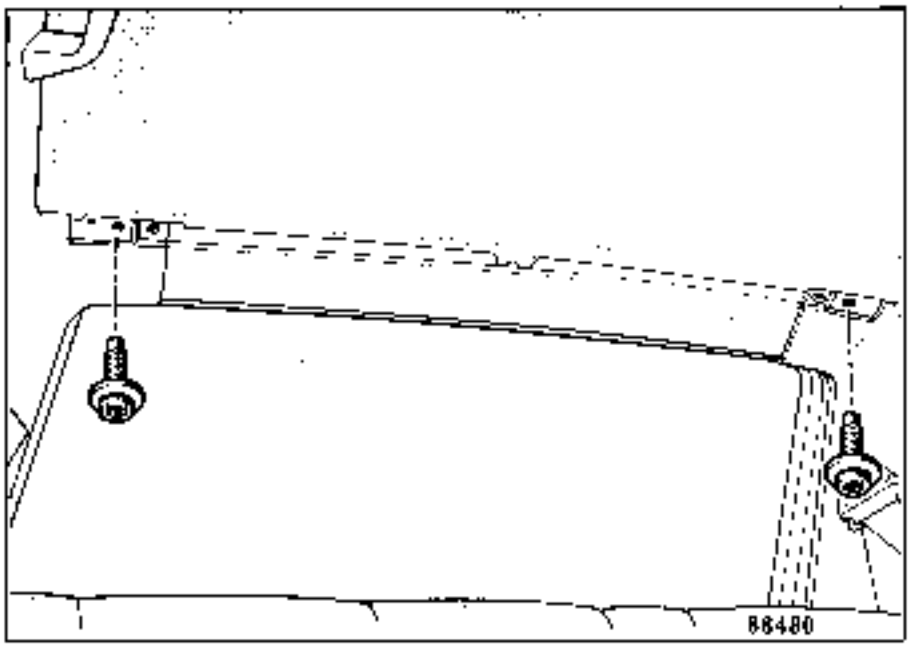
The gas strut system is not to be subjected to temperatures of 120° C for more than 20 minutes. Take all the necessary precautions, therefore, to protect them against heat exposure when using infra-red panels.

The gas struts are pressurised to a high pressure. We strongly advise you not to attempt to dismantle them.



Removing the roof cross member trim.

Remove the cover and the screw.



Removing the tail gate.

Remove the 2 screws at the sides and remove the tail gate from its frame.

END OF OPERATION.

If the tail gate is to be replaced, take off the plastic trim clips and the wiring.

Before painting the new tail gate, drill the holes for the rear screen wiper bearing and its nozzle, if the vehicle is to be fitted with one (for the dimensions see the section dealing with repairing the tail gate).

PAINTING

- Carry out paint sequence no. 1 (see "Painting" section). Refit the tail gate after having repainted its inside surfaces.

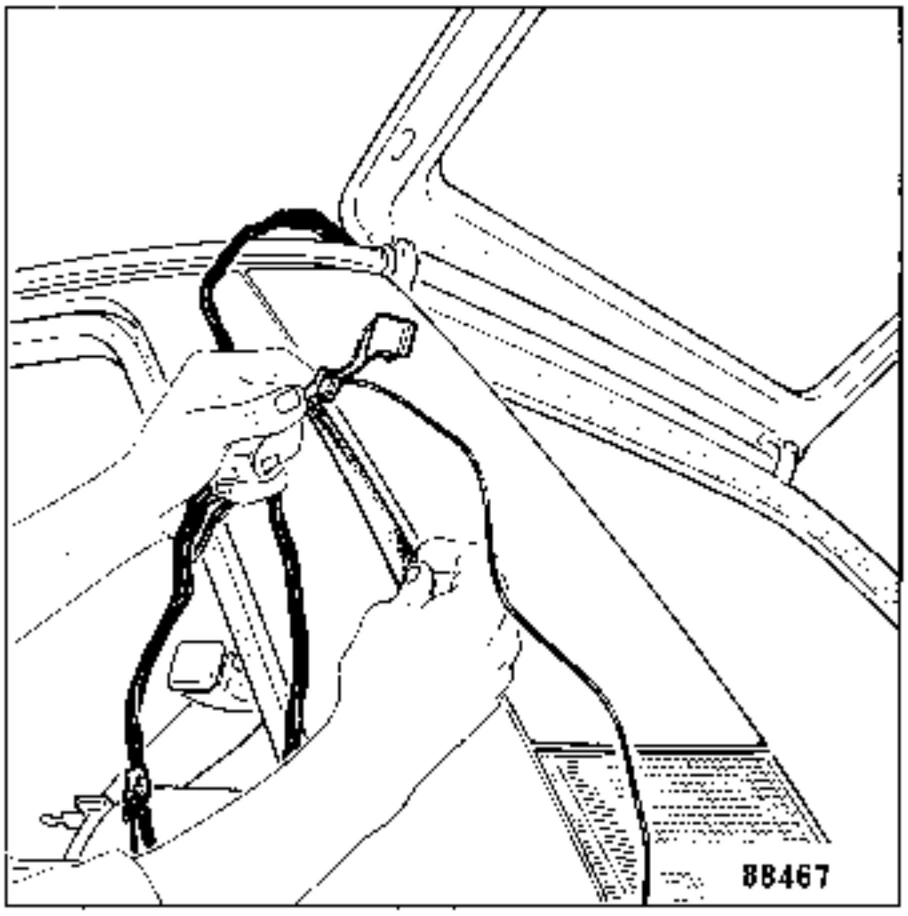
Adjusting the tail gate

- The tail gate is to be adjusted before refitting the gas strut.
- Use the slots in the roof cross member to adjust the clearances round the tail gate.
- To adjust its height, place shims between the hinge and the roof cross member.
- To adjust so that it is flush with the sides, use the clearance at the tail gate striker plate, on the rear end panel.

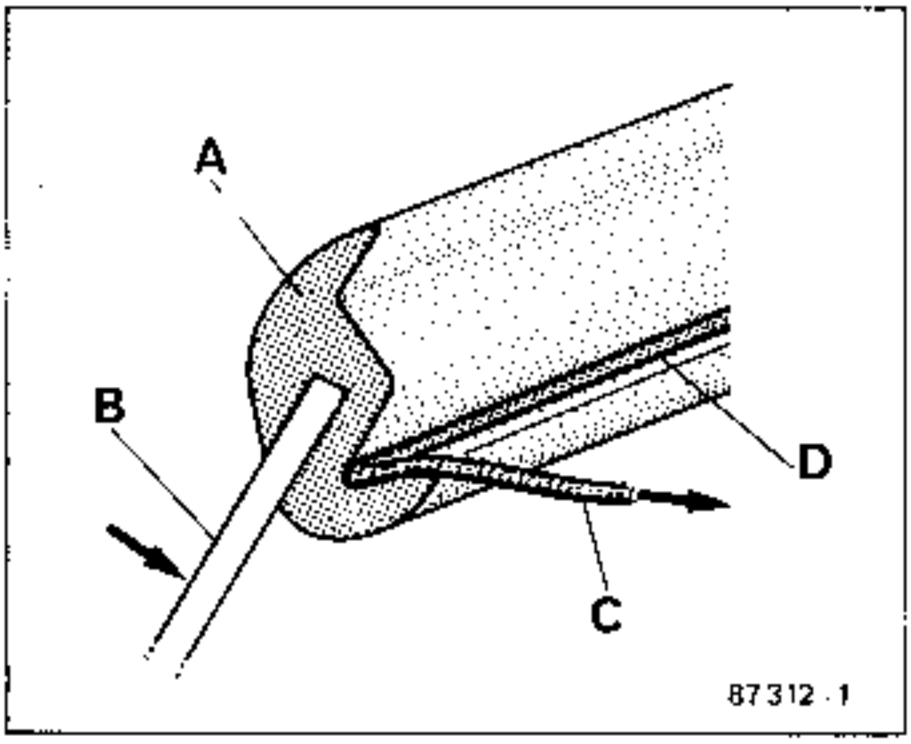
Paint the outside of the tail gate.

After painting and before refitting the trim inject hollow section protection compound into the holes already in the tail gate.

PRECAUTIONS TO BE TAKEN WHEN FITTING THE WIRING



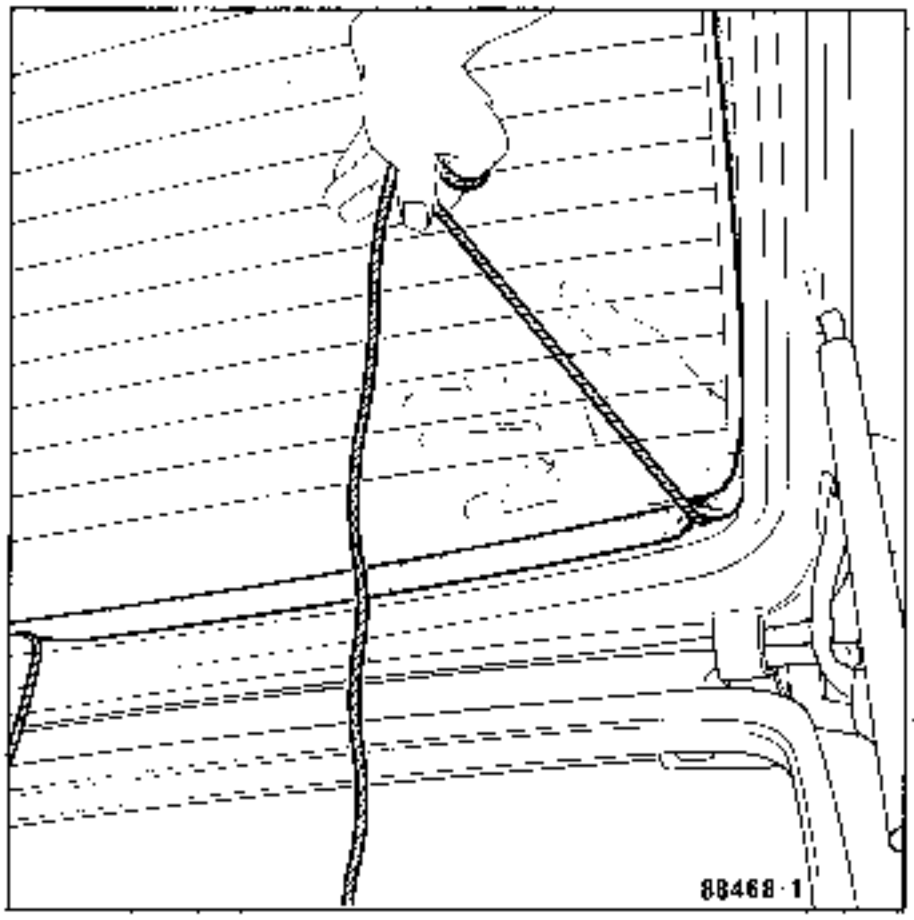
Wrap the connector blocks with adhesive tape to assist them to pass through the upright.

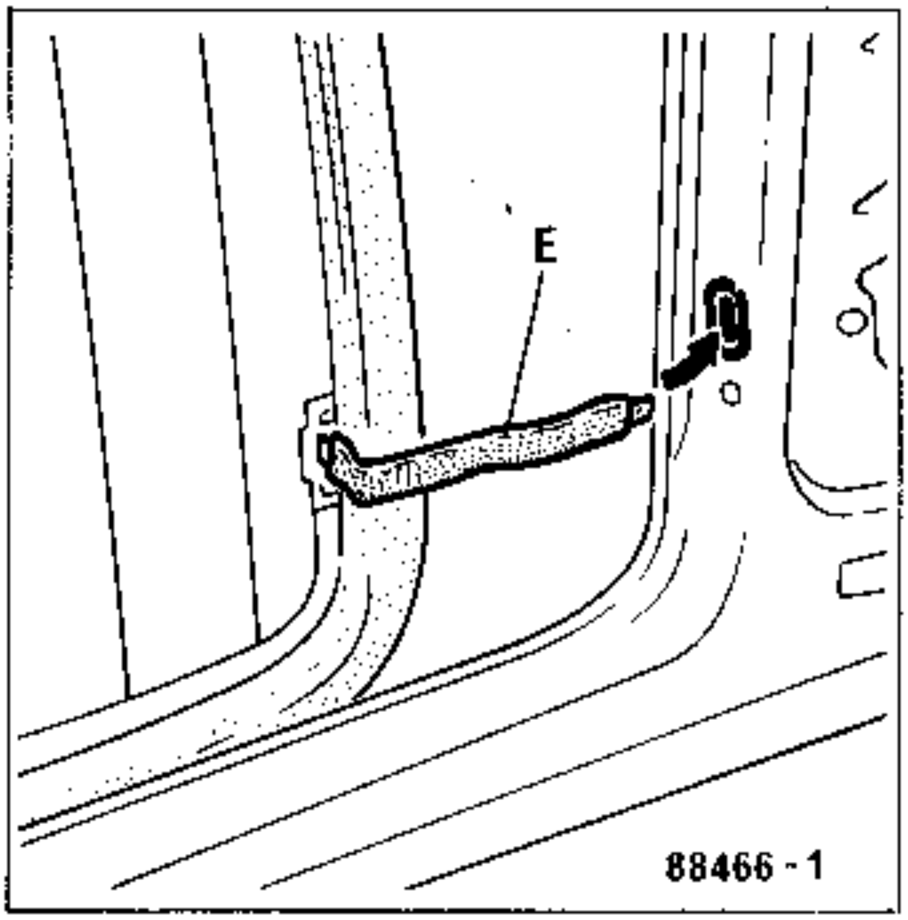


Refitting the rear screen.

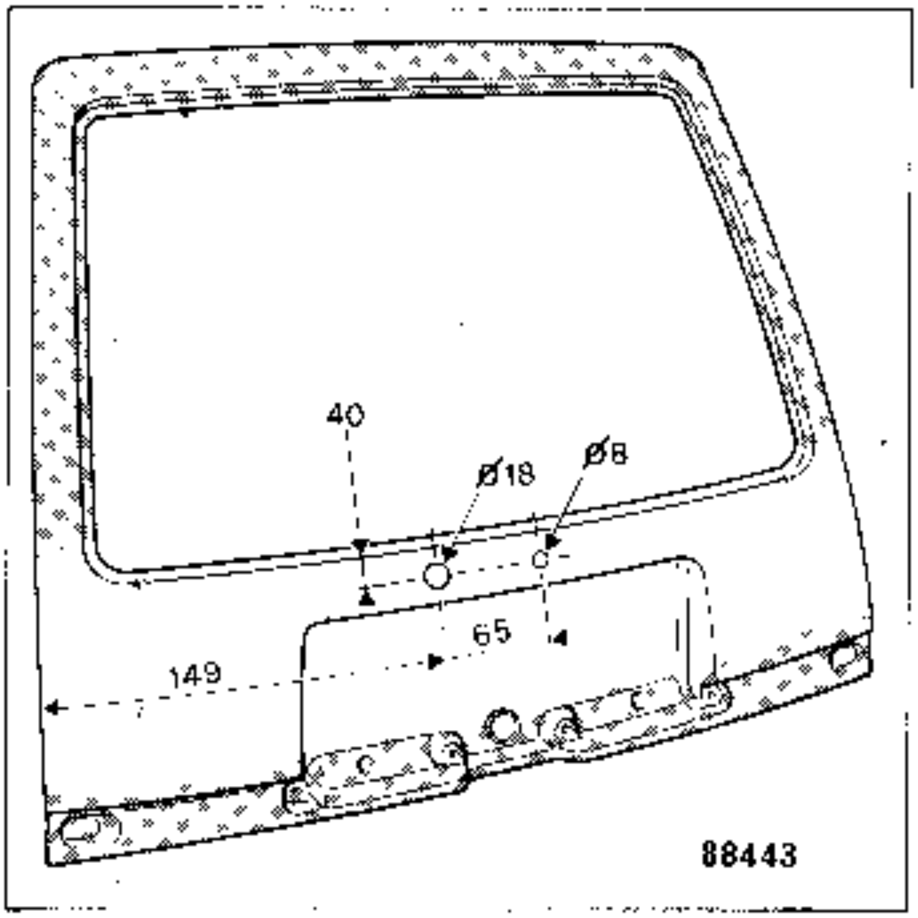
Fit the rubber seal (A) to the screen (B) and insert the cord (C) into groove (D) so that its ends hang out of the groove at the bottom of the screen.

Cross the ends of the cord by approximately 200 mm.





Place the assembly against the tail gate frame (take care with the heating element connectors (E) (passing the ends of the cord into the car and push the screen assembly firmly downwards from under the tail gate, which should be open. Start pulling one end of the cord to place the lip on the seal over the panelling flange. As the cord is pulled out, push the rear screen to help it to enter. When the cord is at the centre of the screen, repeat these operations, pulling the other end of the cord (take care with the heating element connectors (E) when pulling out the cord).



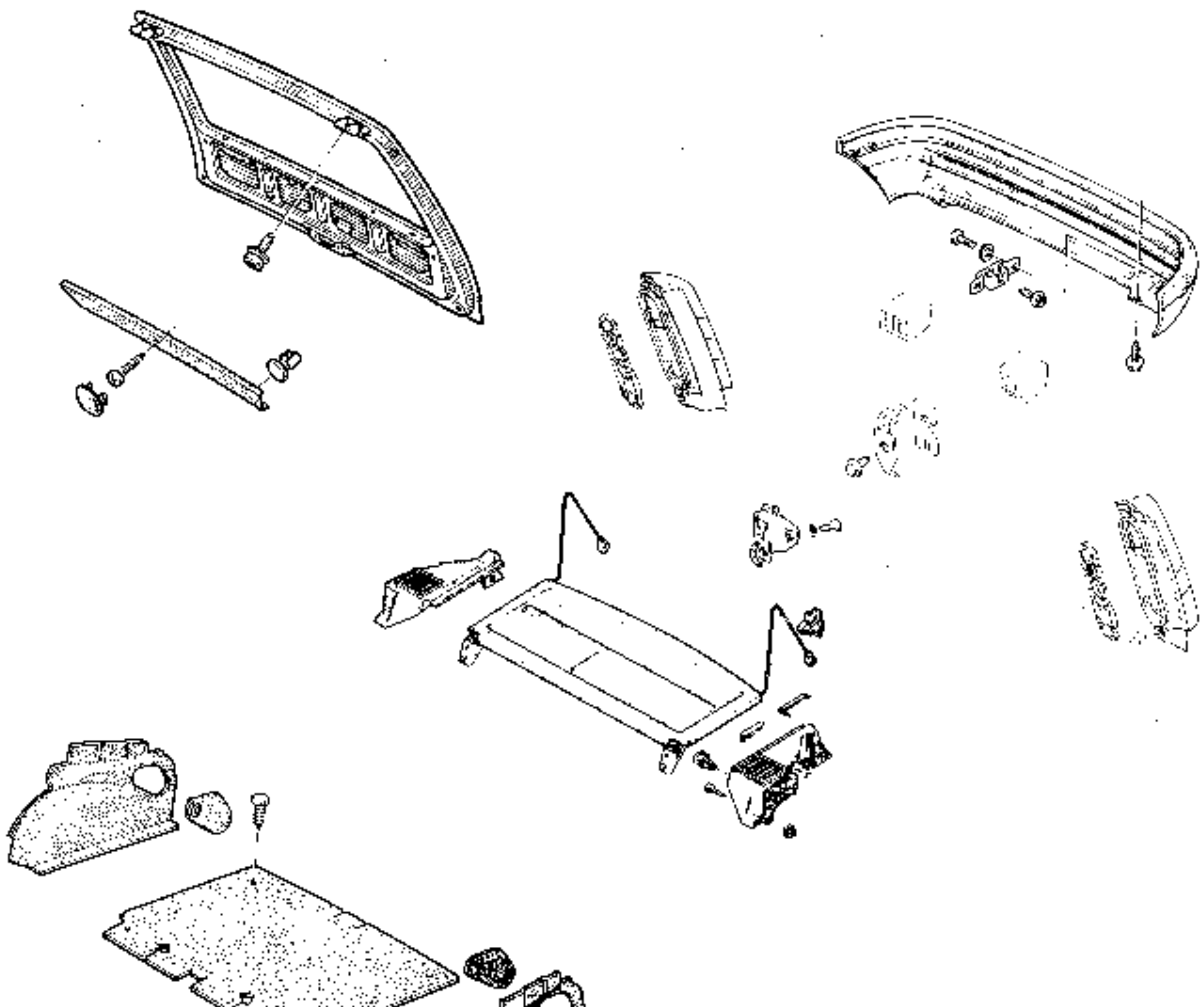
PAINTING

- Before painting, apply hollow section protective treatment to the inside face of the repaired area.

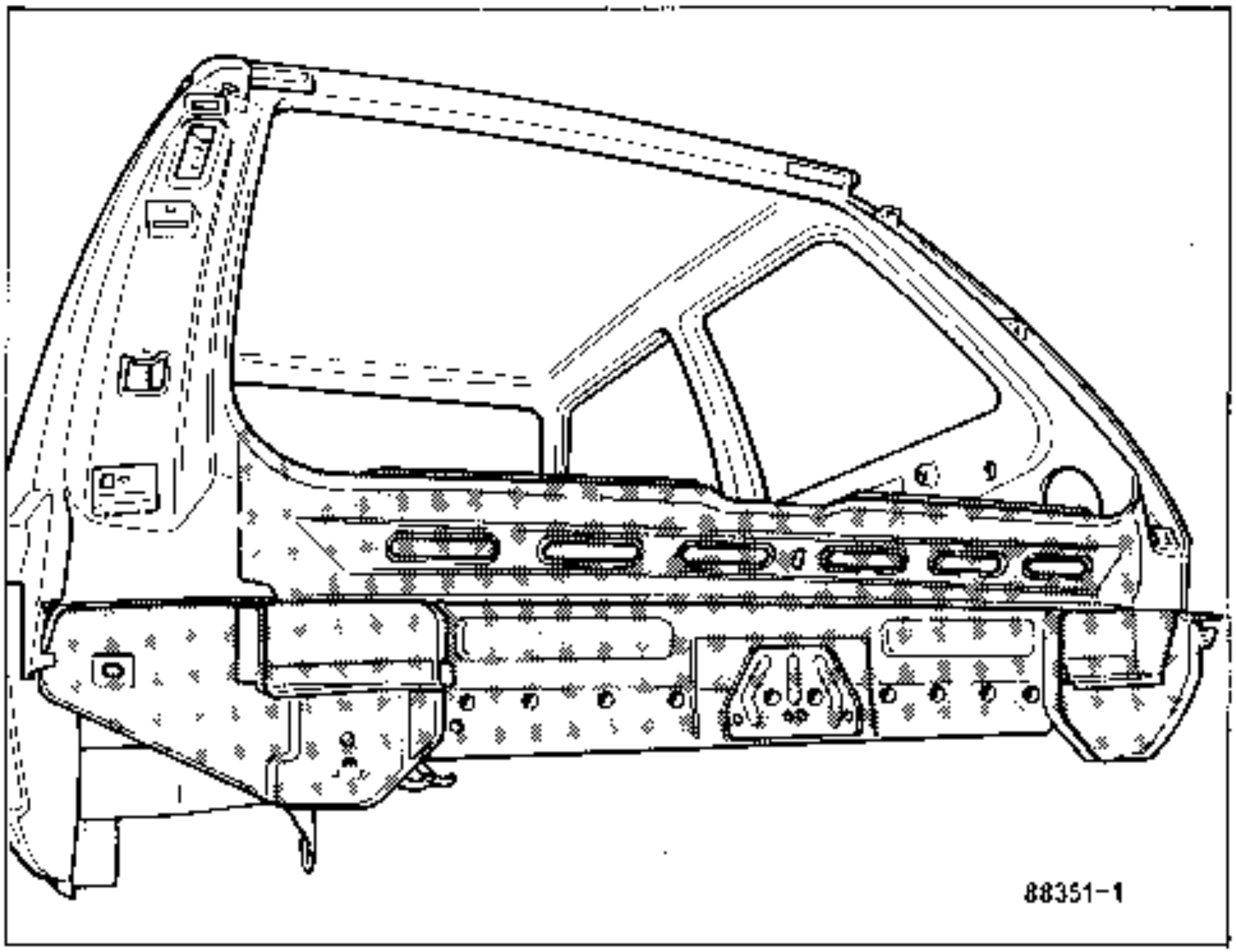
- Carry out paint sequence No. 5 (see "Painting" section).

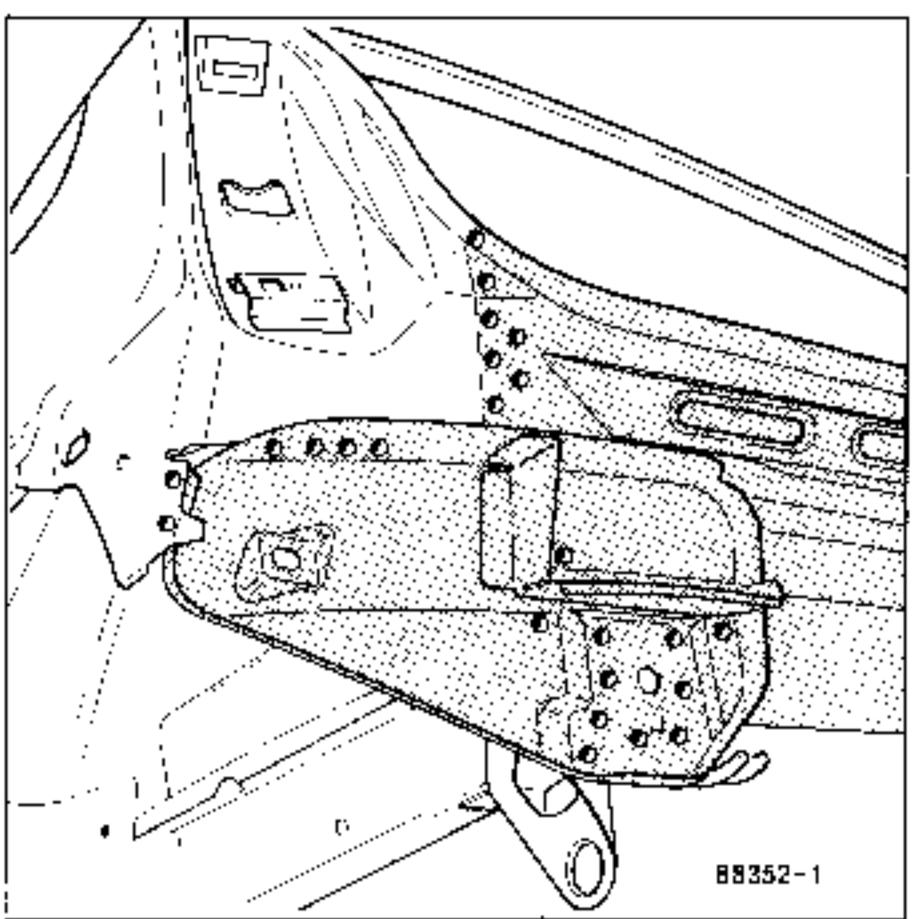
STRIPPING

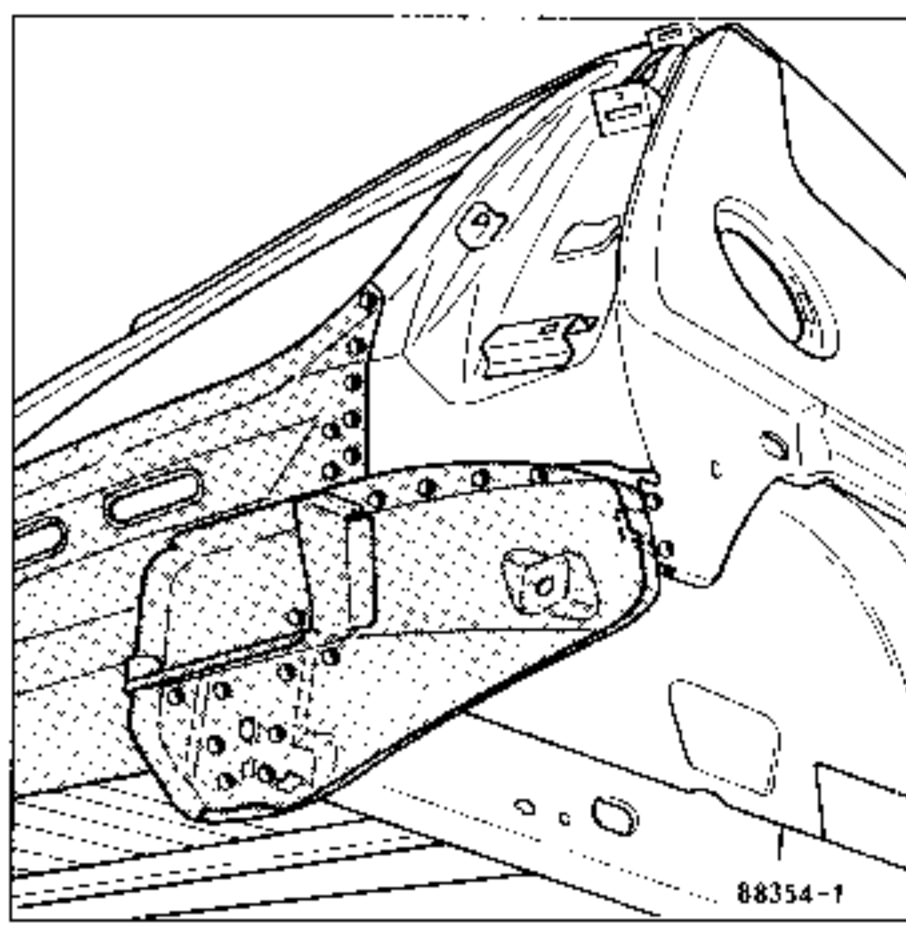
All these parts are to be placed in a trolley bin.



CUTTING - JOINT SEPARATION







NOTE :

Carry out the cutting and joint separation on the side to be replaced.

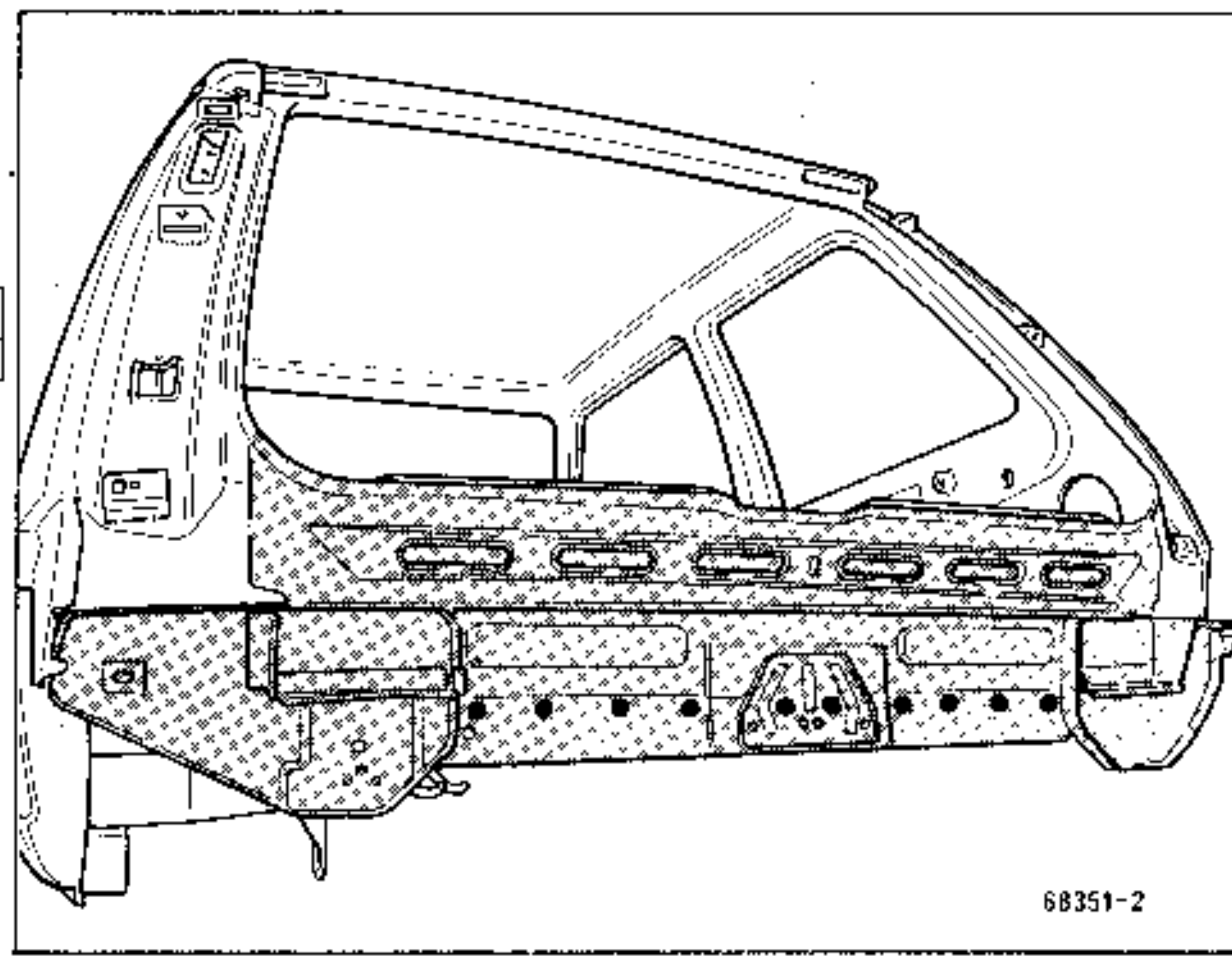
- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).

PREPARATION PRIOR TO WELDING

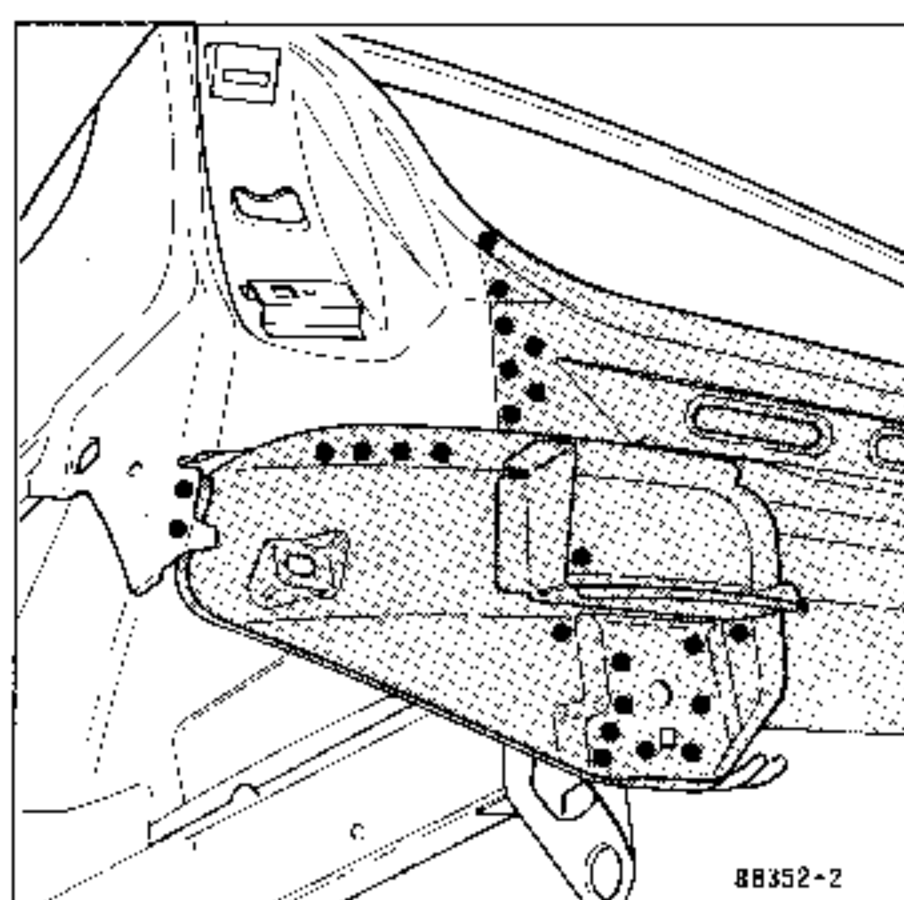
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded (both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Adjust the new part and secure it with grip clamps.

WELDING

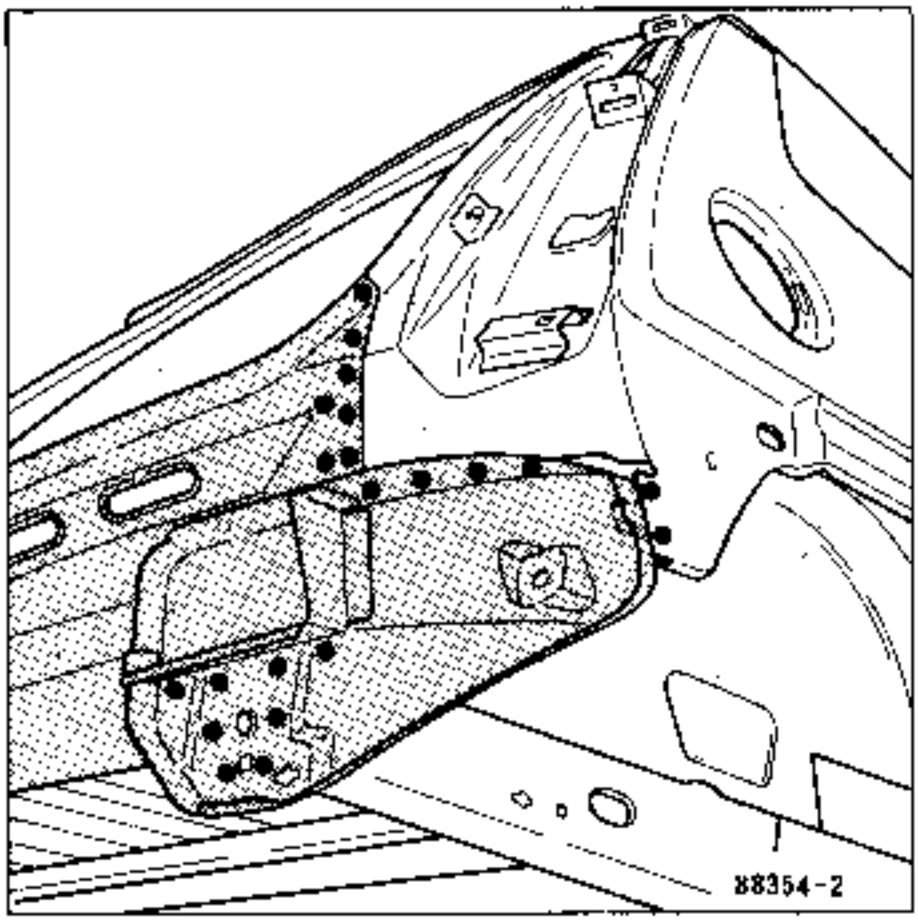
e:1,4 mm
H:35 mm



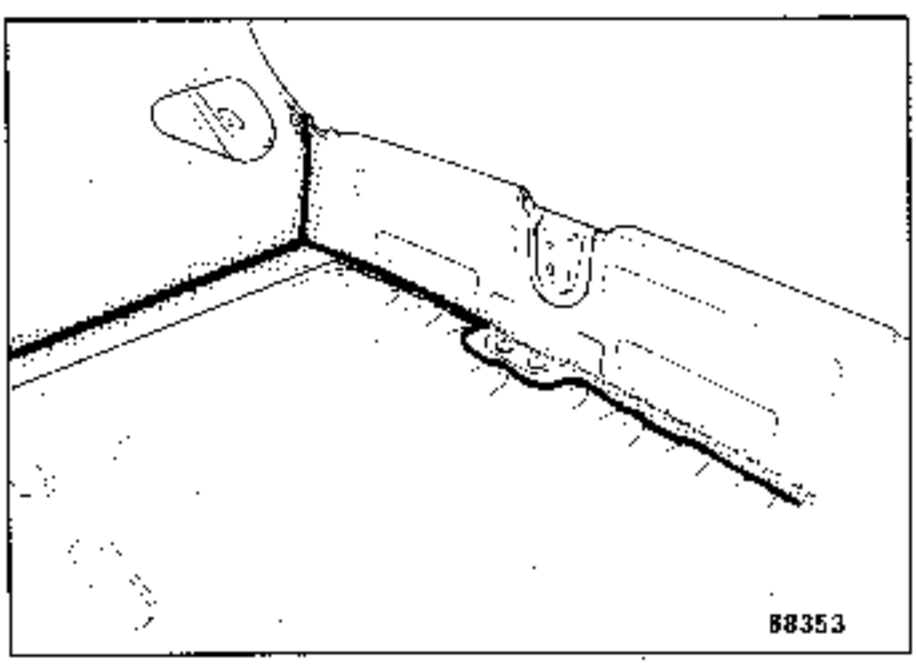
e:1,4 mm
H:35mm

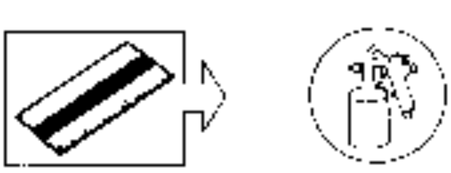


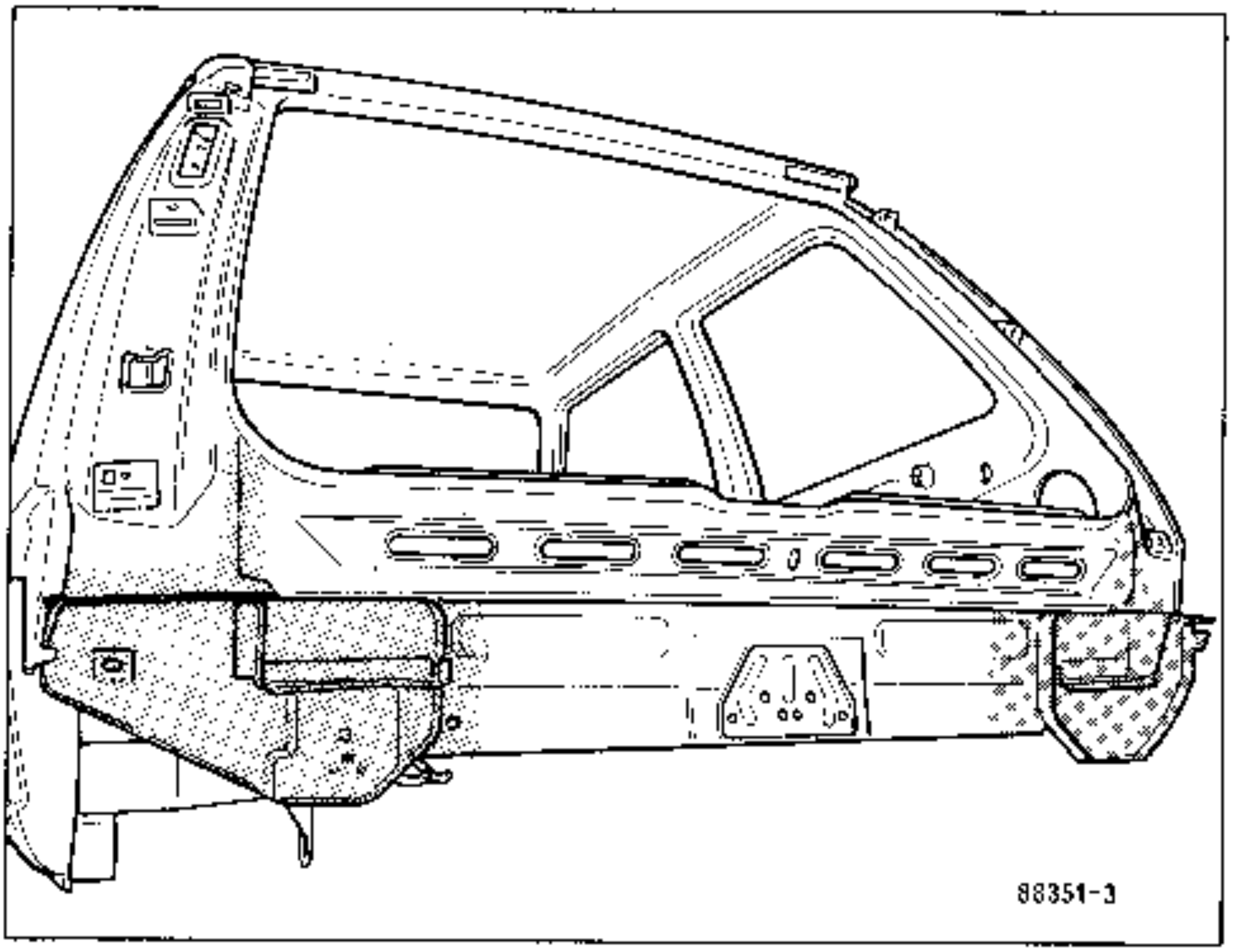
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.



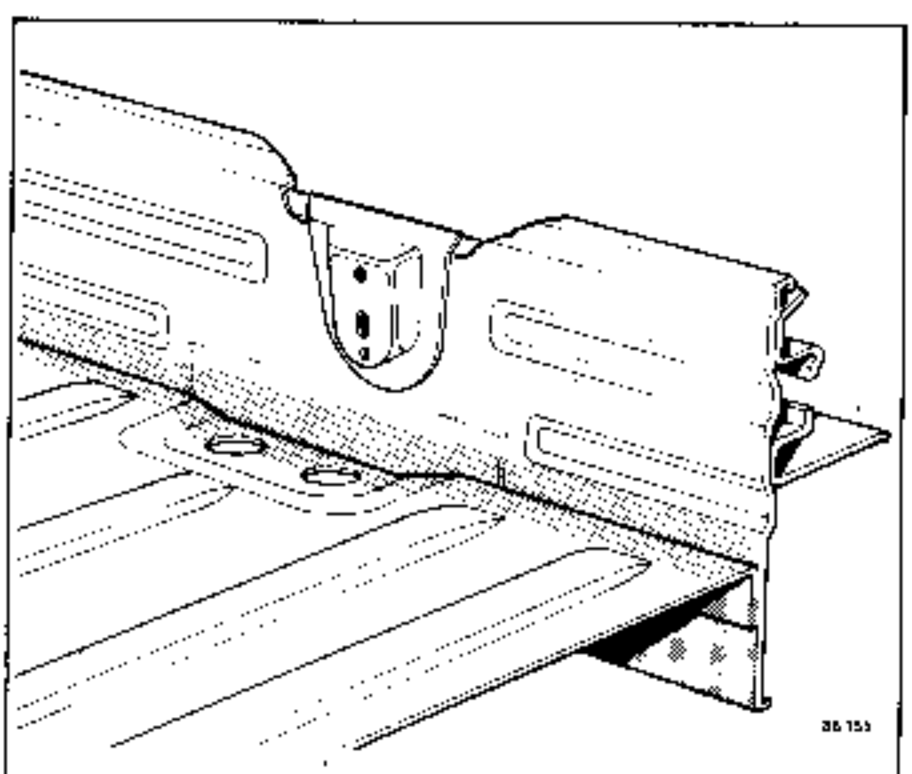
PAINTING

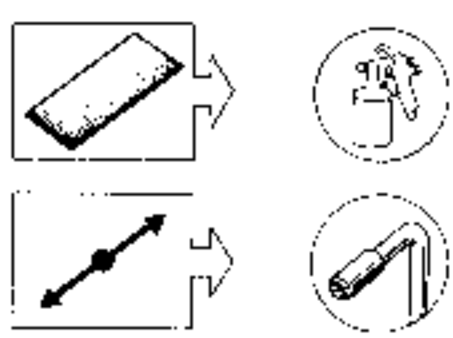




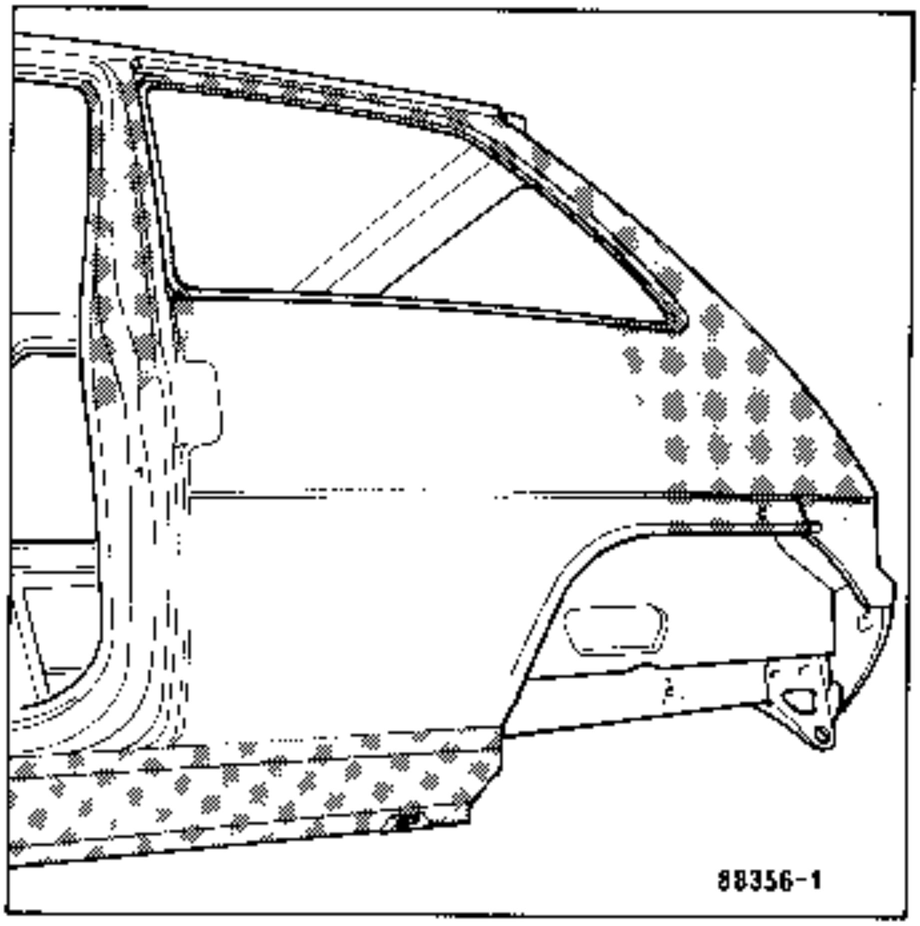


Spray anti-chipping mastic on the joint between the floor and the rear end panel.





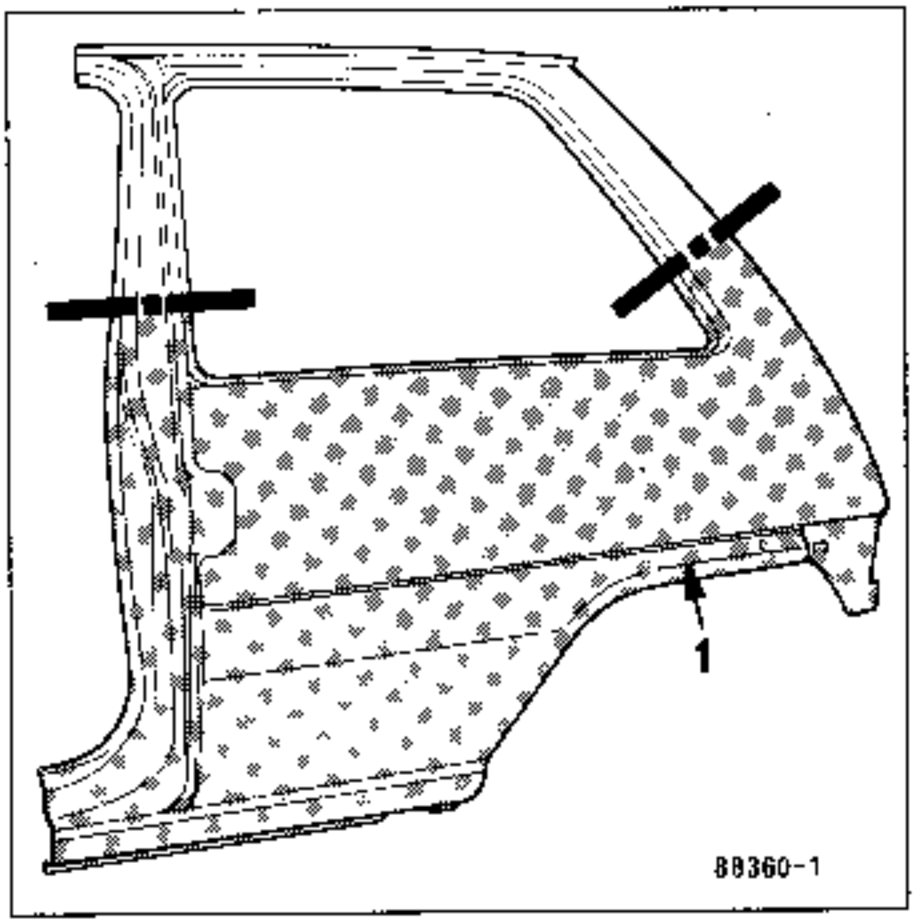
Carry out paint sequence No. 5 (See "Painting" section) followed by paint sequence No. 3.



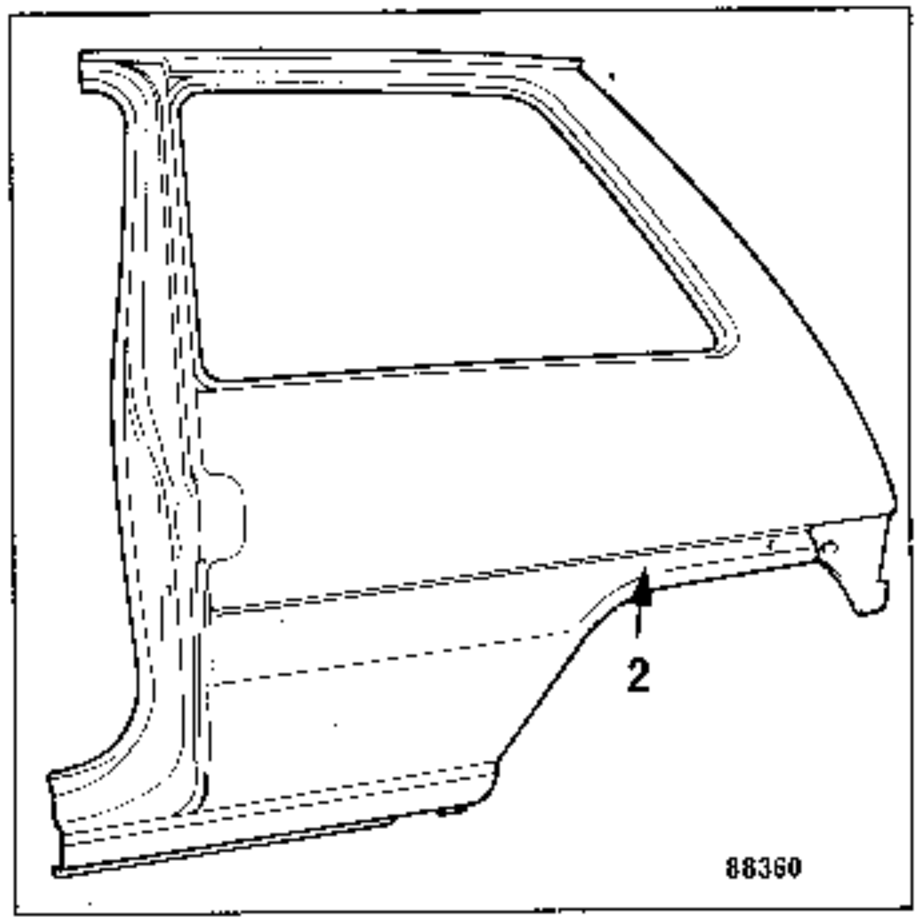
- Before painting, apply hollow section protective treatment to the inside face of the repaired area.

Carry out paint sequence No. 5.

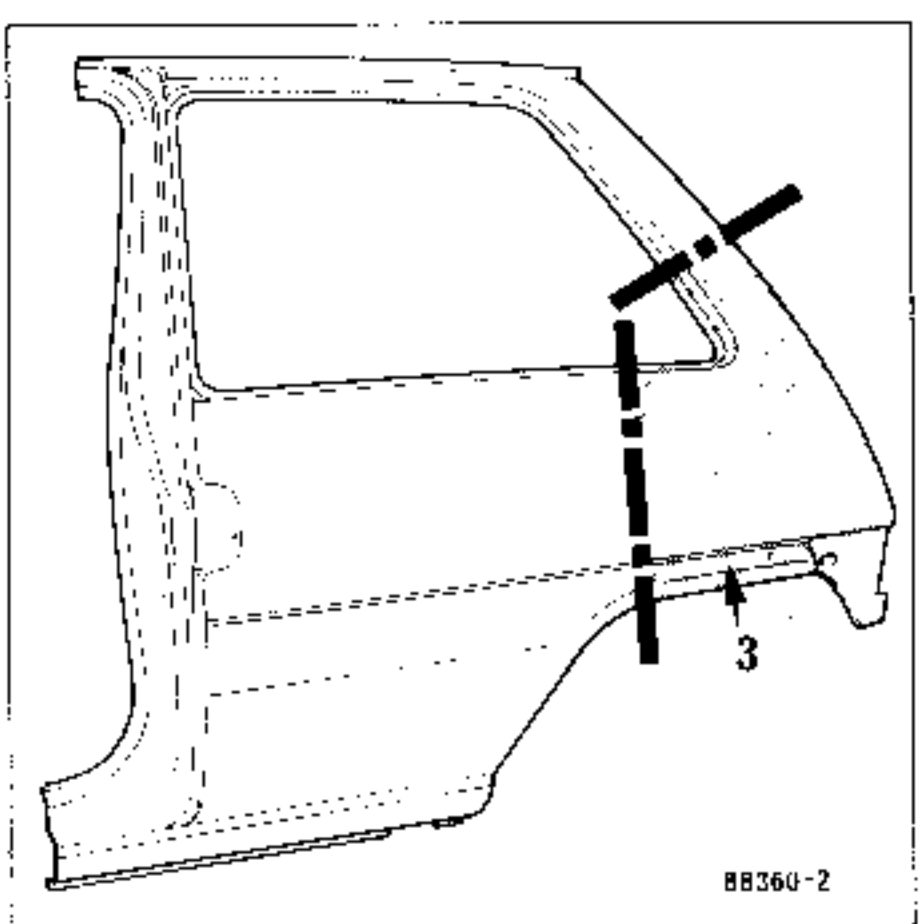
There are several ways of replacing the panel, depending on the extent of the damage :



1 - Partial replacement by cutting at the door pillars 20 mm below the seat belt anchor points.



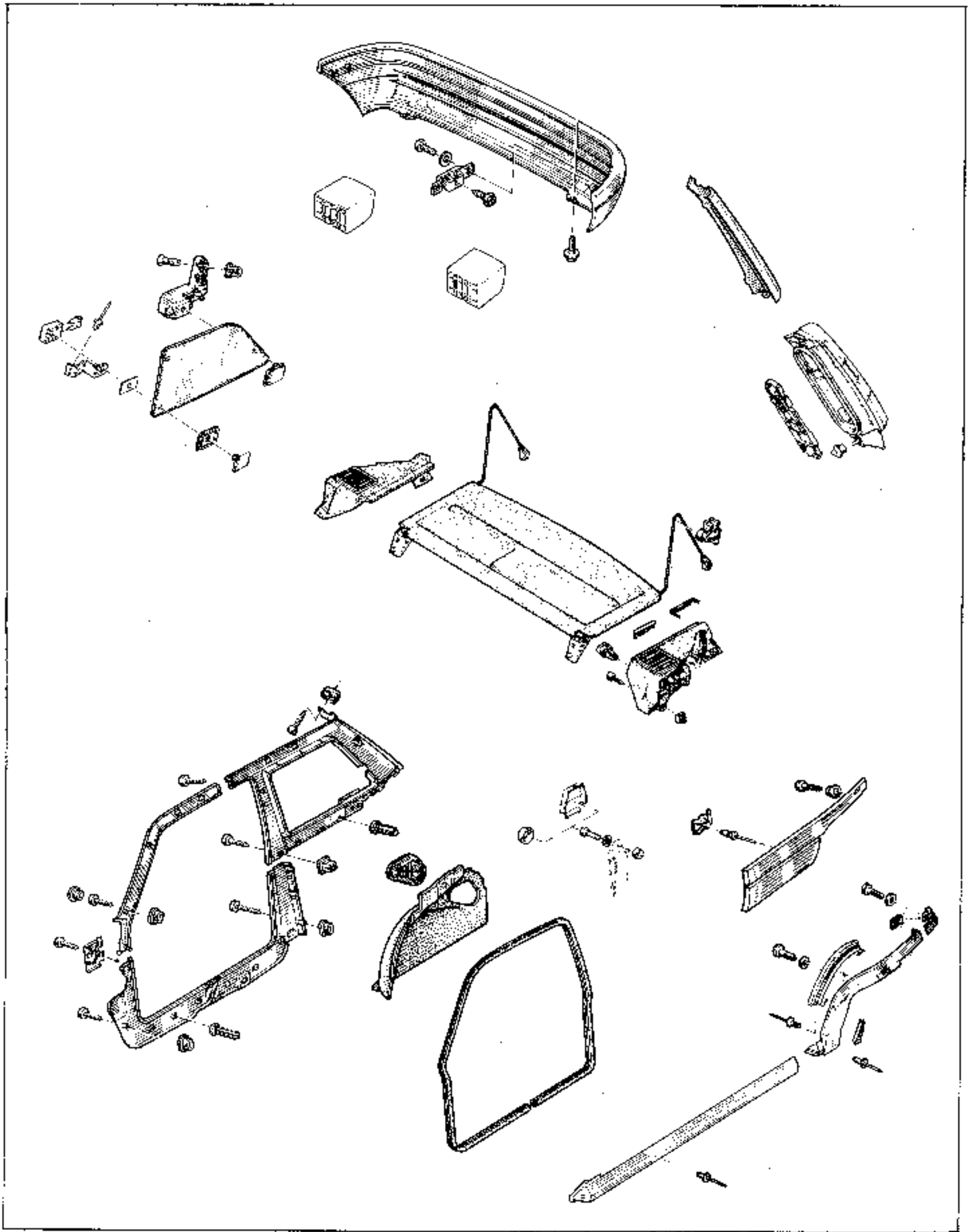
2 - Complete replacement.



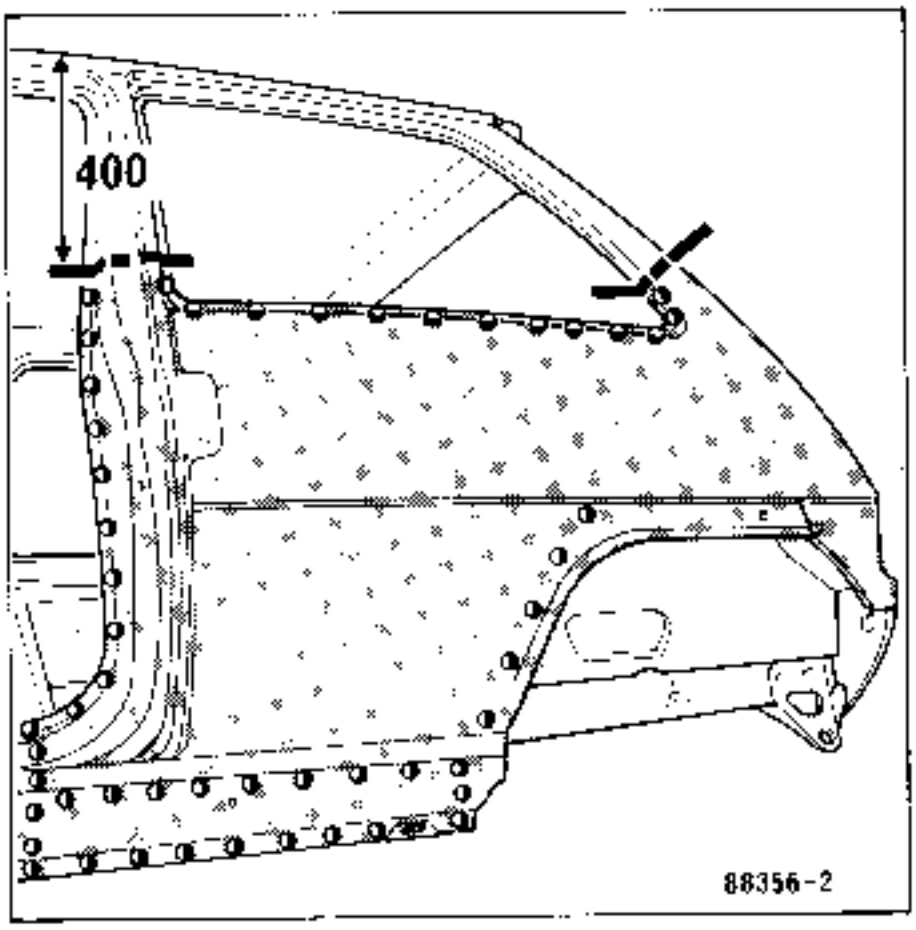
3 - Partial replacement of rear section.

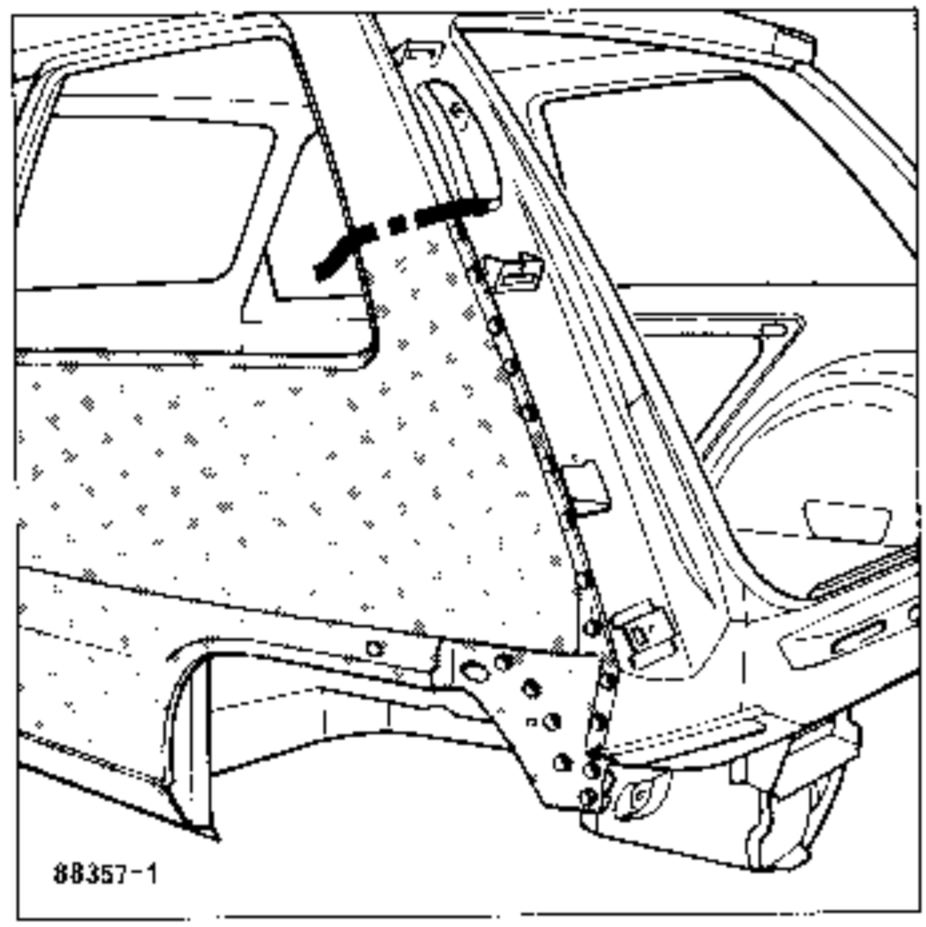
STRIPPING

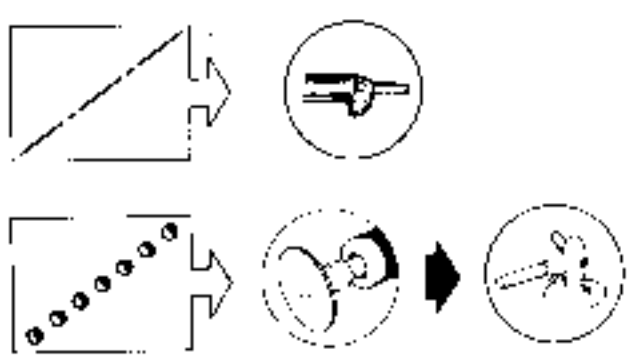
All these parts are to be placed in a bin trolley.

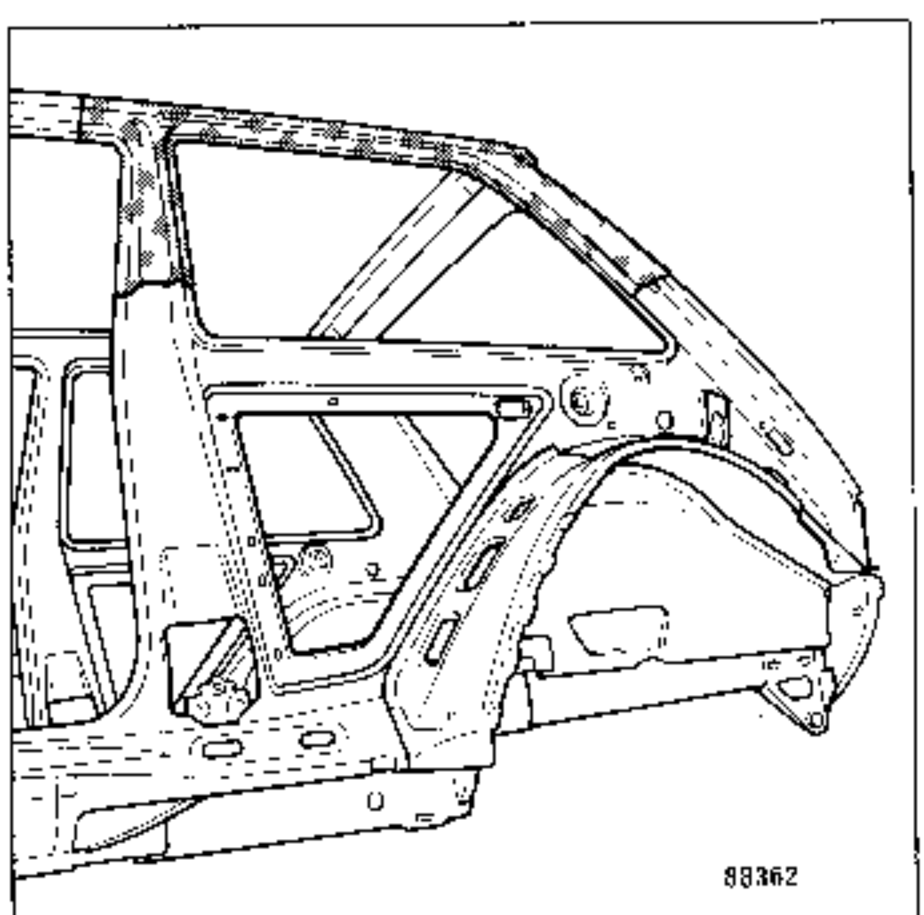


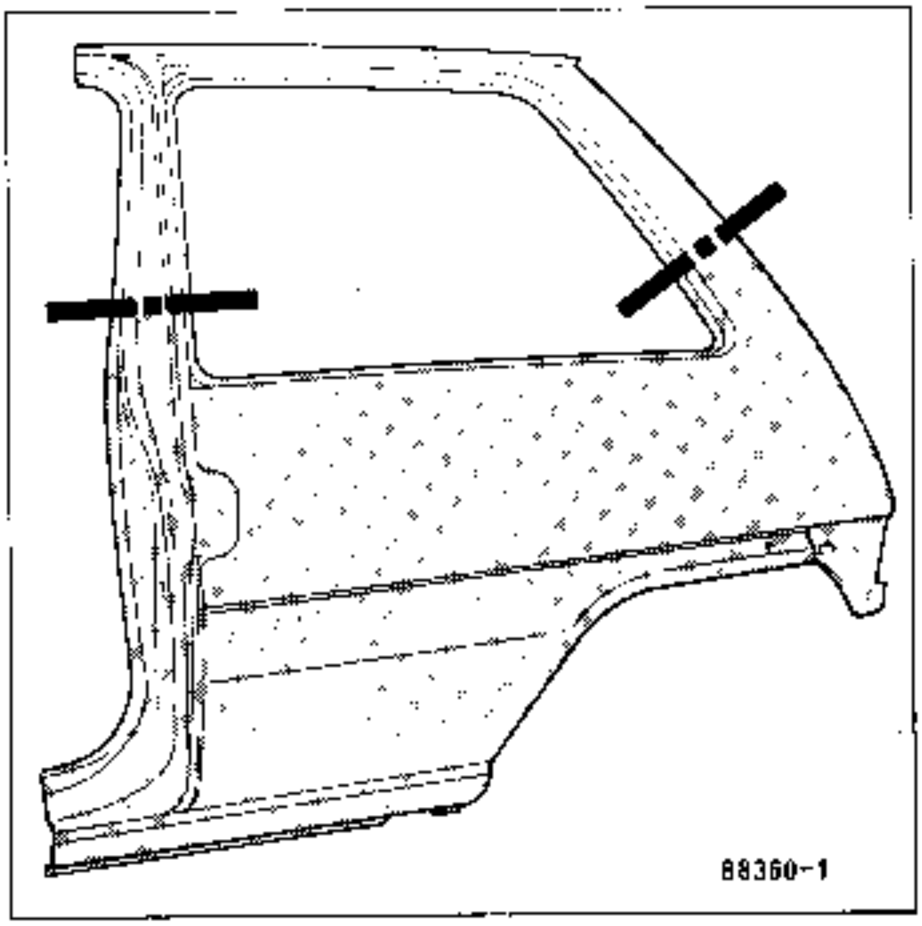
CUTTING - JOINT SEPARATION

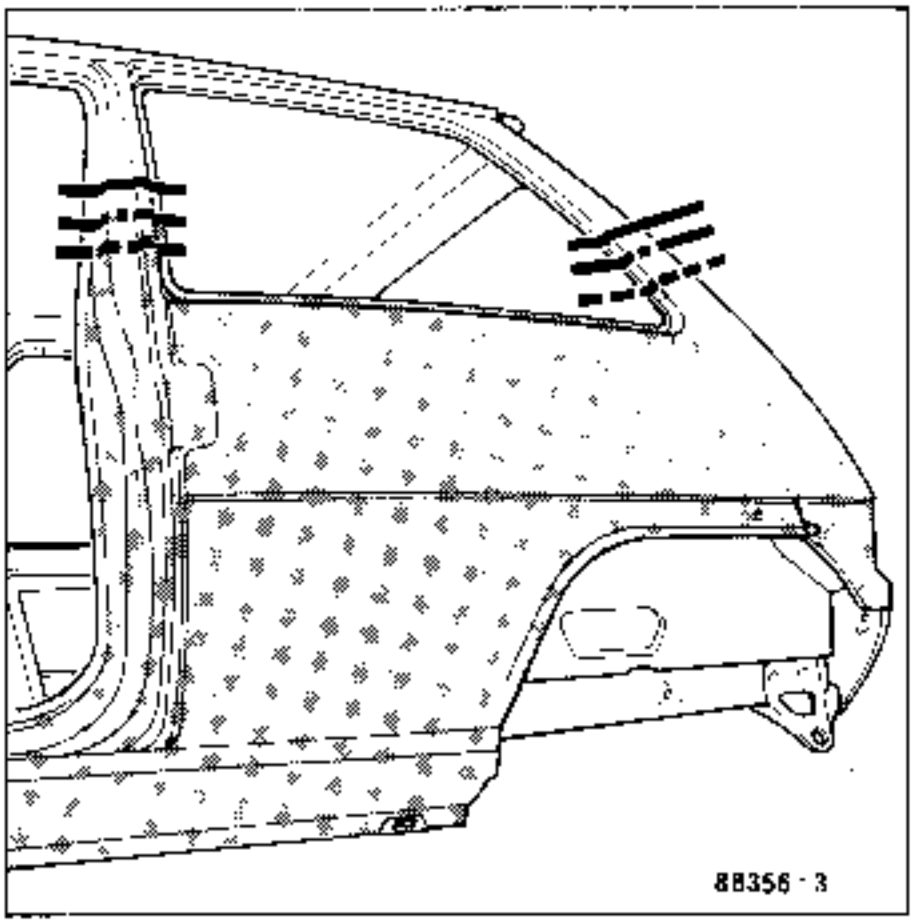












PREPARING THE PANEL

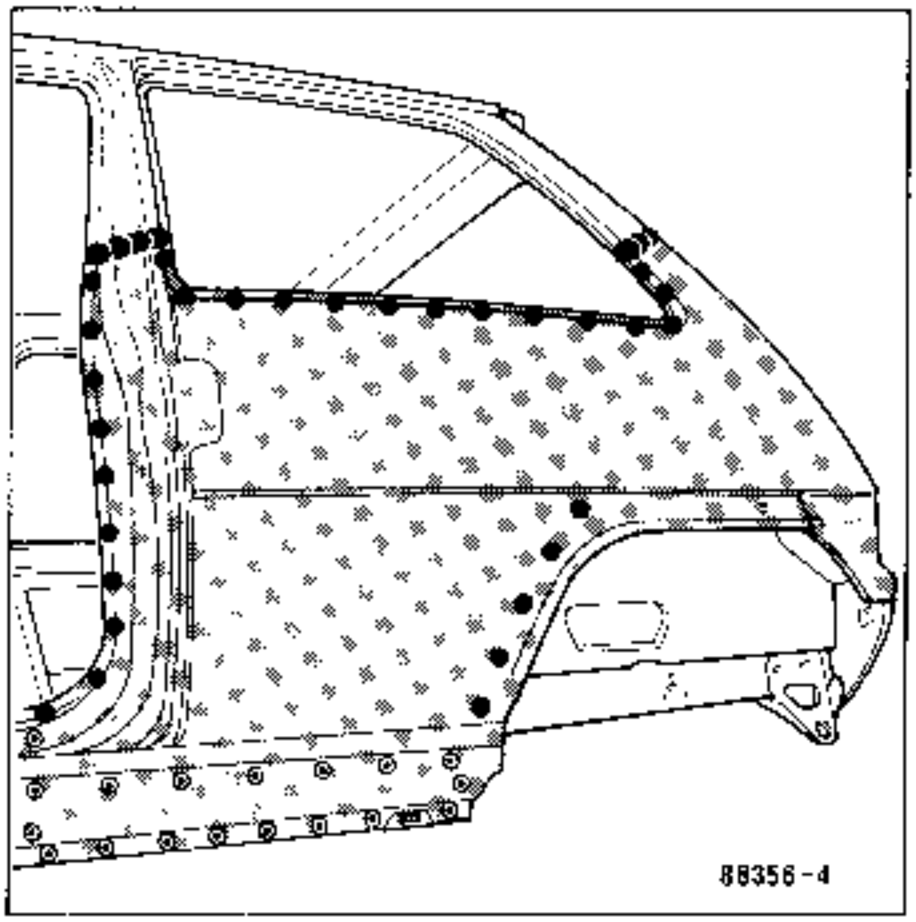
- Cut a section from the new part approximately 50 mm larger than that cut out on the vehicle.

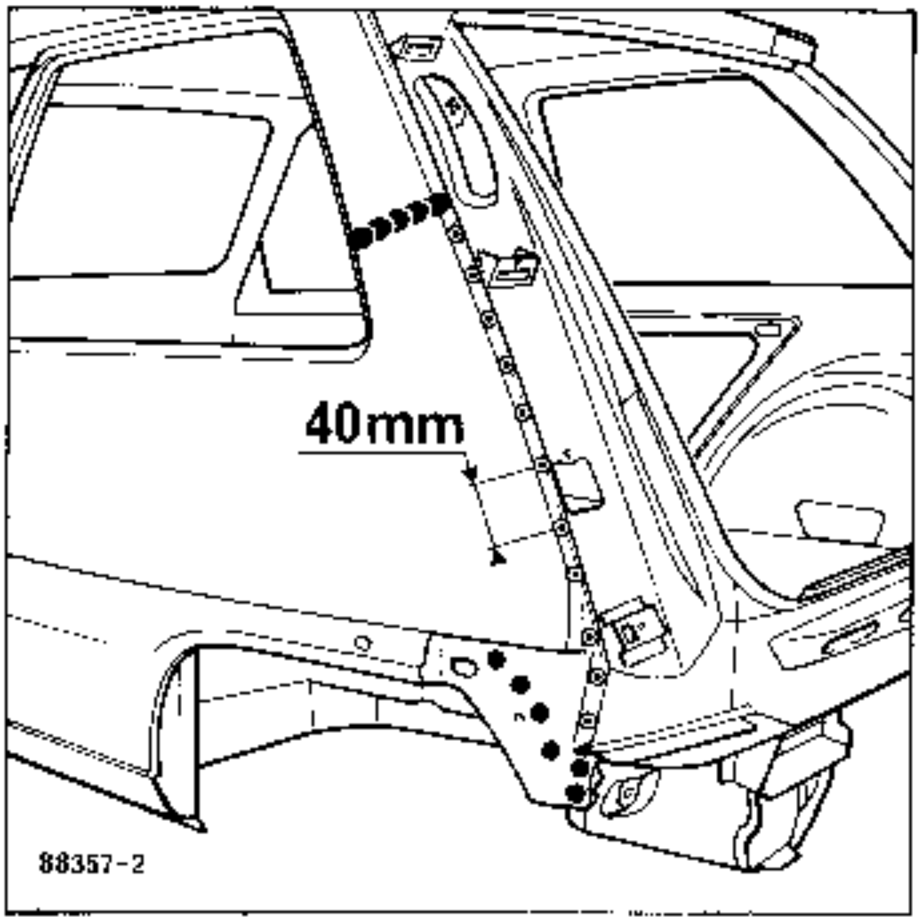
- Fit the new part so that it overlaps the original part, on the vehicle, and secure it in place with grip clamps.
- Adjust it to fit the door.
- Saw through both thicknesses of metal simultaneously to make adjusting the joints easier.
- Remove the new section and take off those parts remaining on the vehicle at the points where the sections overlap.

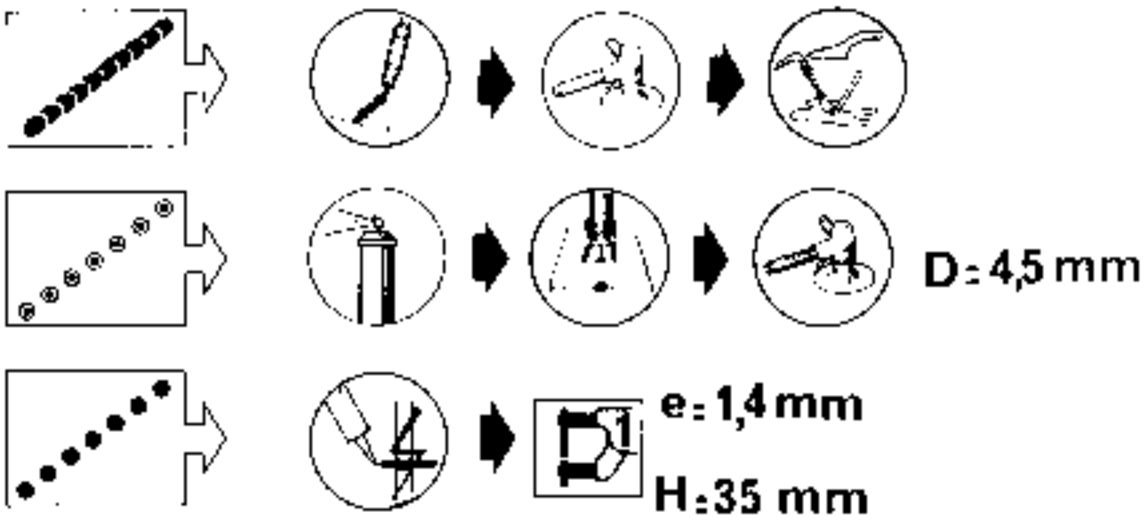
PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Apply zinc paint to the areas to be plug welded.
- Adjust the new part and secure it with grip clamps.

WELDING

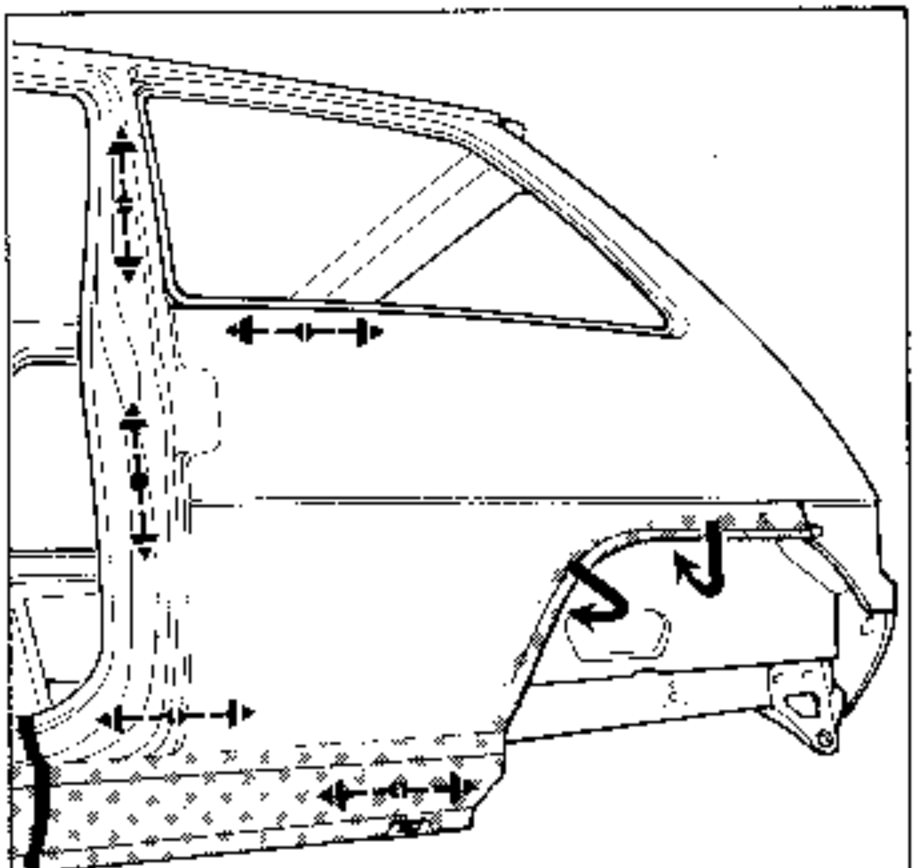


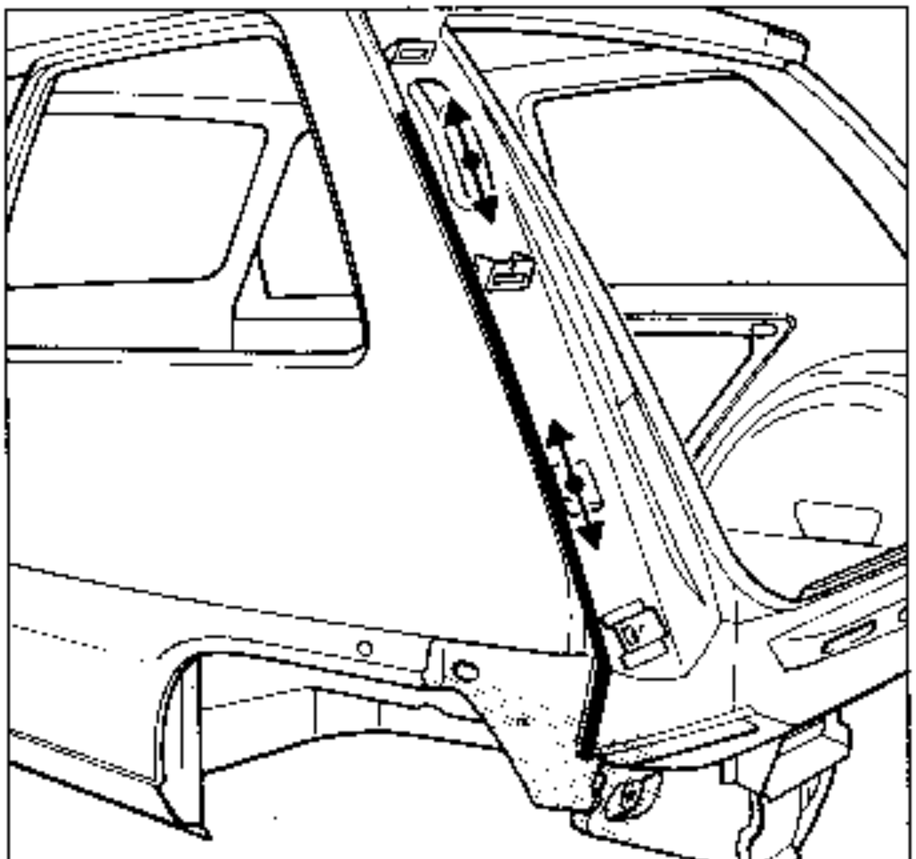


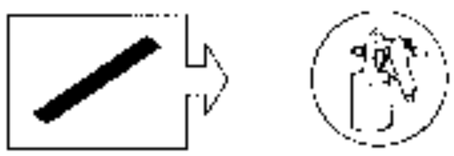


- Tack weld the butt joints to secure them in place.
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.
- Apply the stitched fillets, using the gas envelope welding process. (These joints may also be gas welded using a 75 to 100 nozzle).
- Apply the plug welds using the gas envelope welding process. To do this, drill holes in the upper panel to the diameter D shown under the drawings.
- Grind flush the butt welds and fill them with soft solder.
- The soft solder can be applied using a 650° hot air gun.

PAINTING


88356-5


88357-3

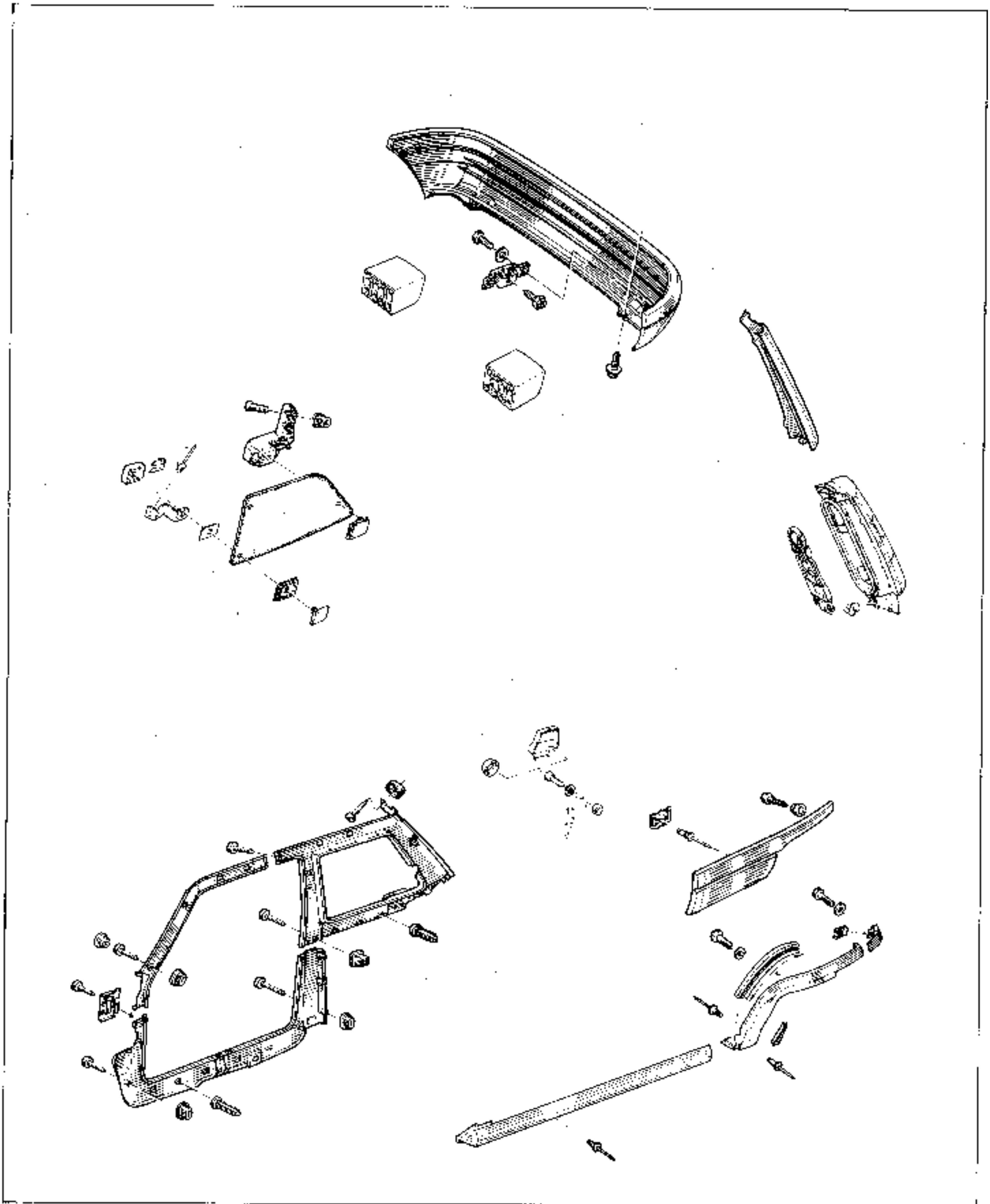


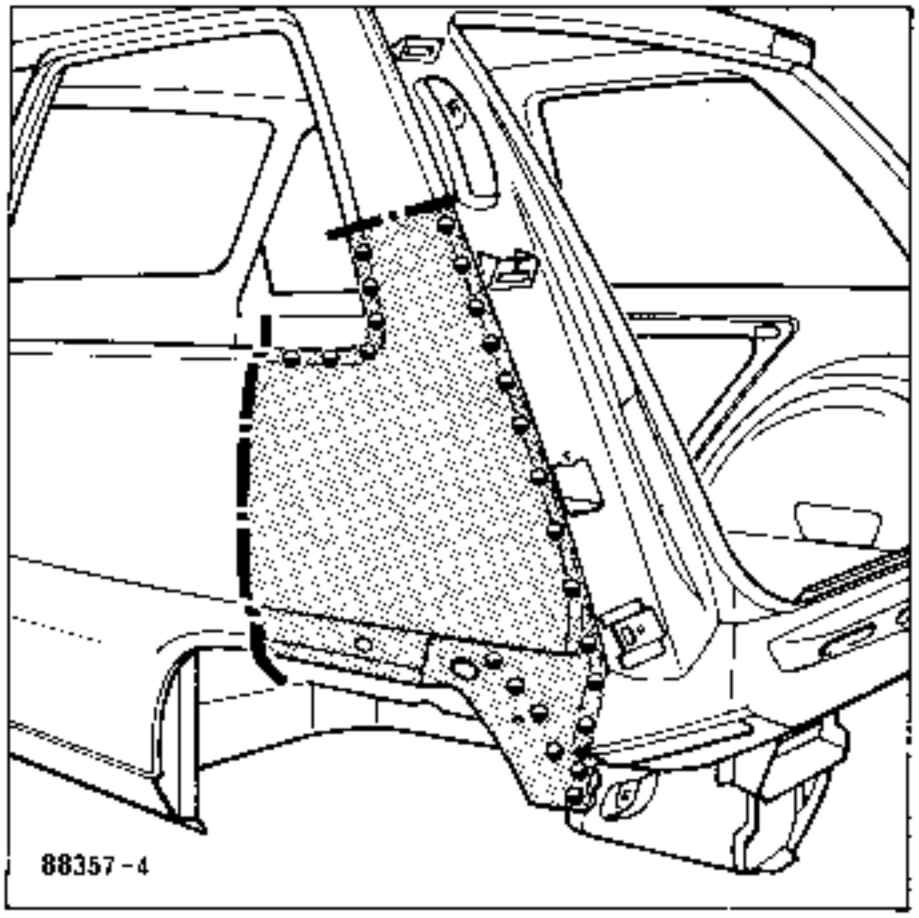
Carry out paint sequence No. 5 (See "Painting" section) and then paint sequence No. 3.

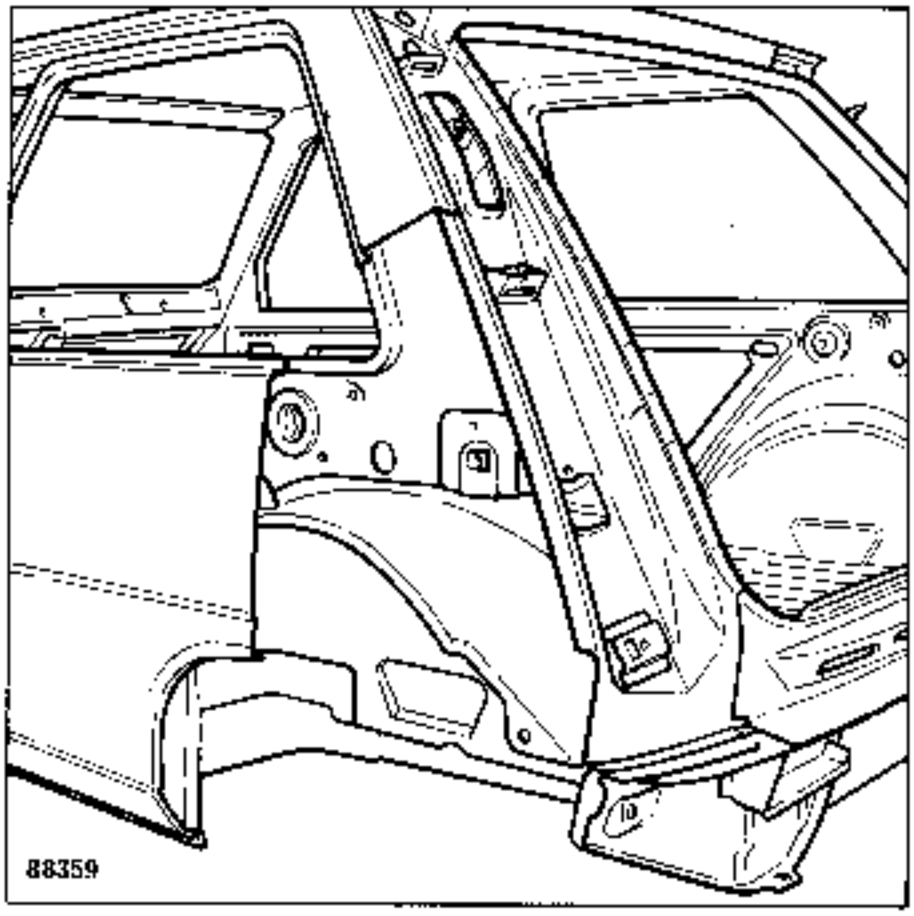
After painting apply hollow section protective treatment through the internal holes in line with the welds.

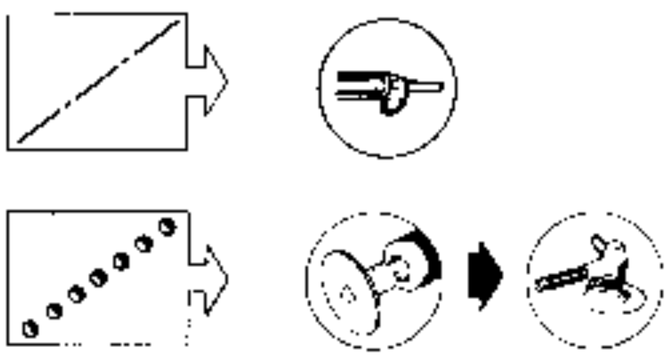
STRIPPING

All these parts are to be placed in a trolley bin.

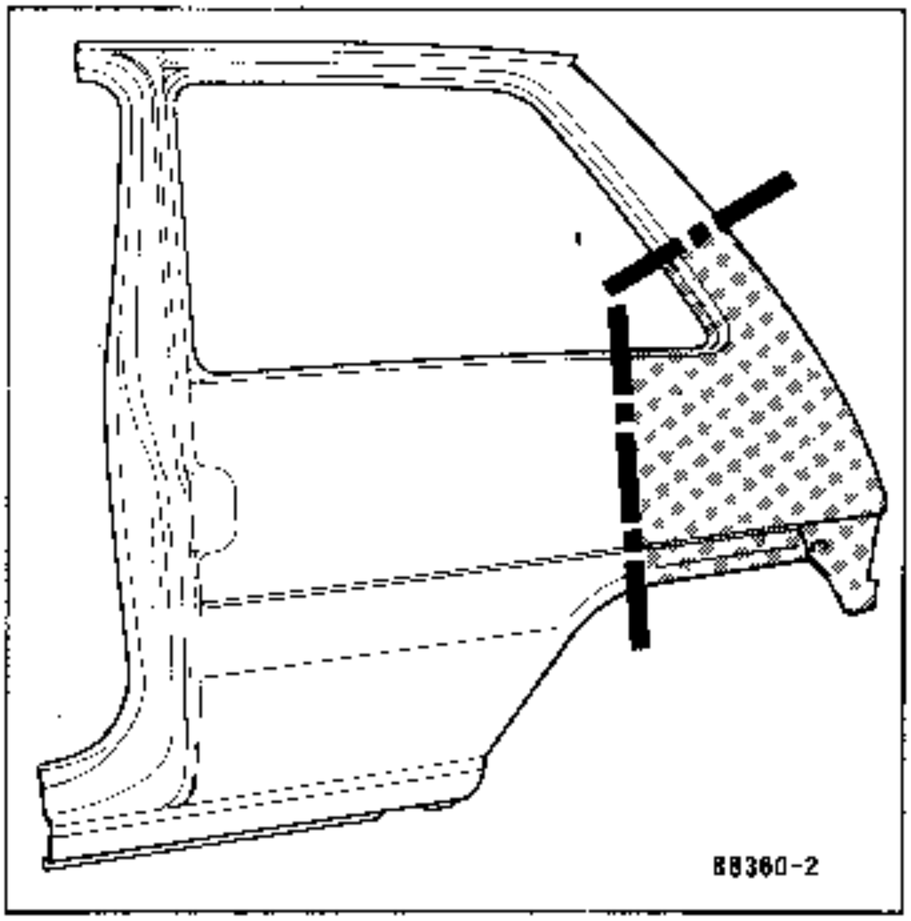


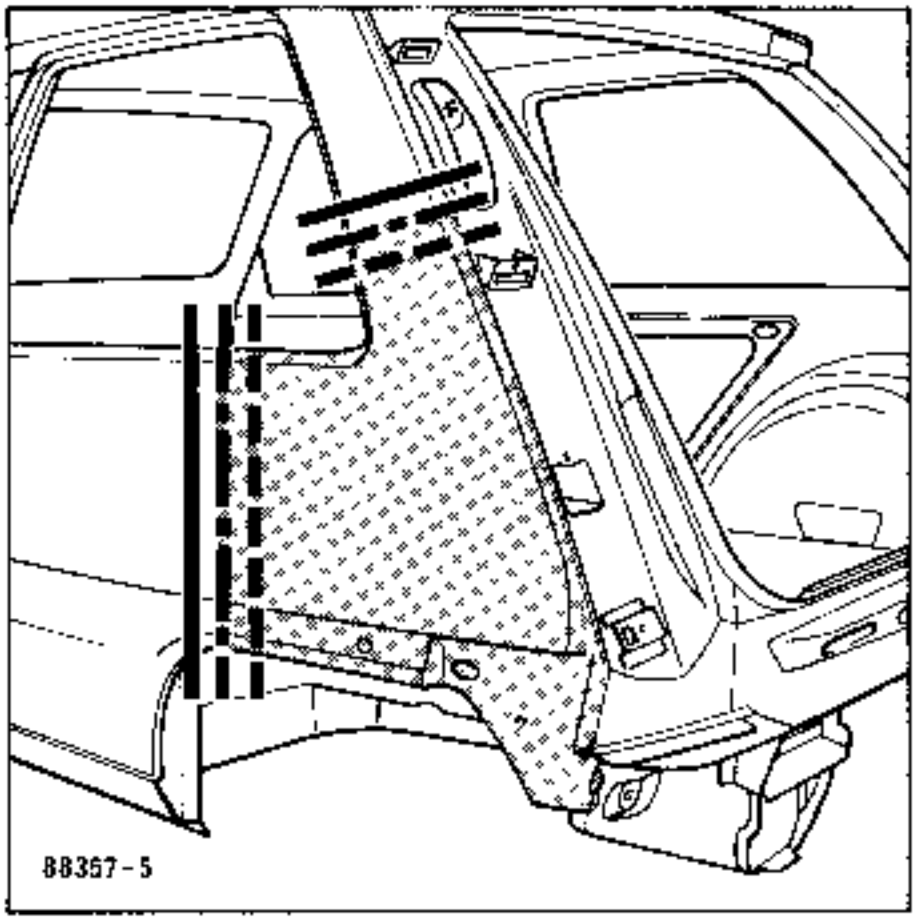

88357-4


88359



- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).





PREPARING THE PANEL

- Cut a section, from the new part, approximately 50 mm larger than that cut out on the vehicle.

- Fit the new part so that it overlaps the original part on the vehicle and secure it with grip clamps.

- Saw through both thickness of metal simultaneously to make adjusting the joints easier.

- Remove the new section and take off the parts remaining on the vehicle in the overlapping areas.

PREPARATION PRIOR TO WELDING

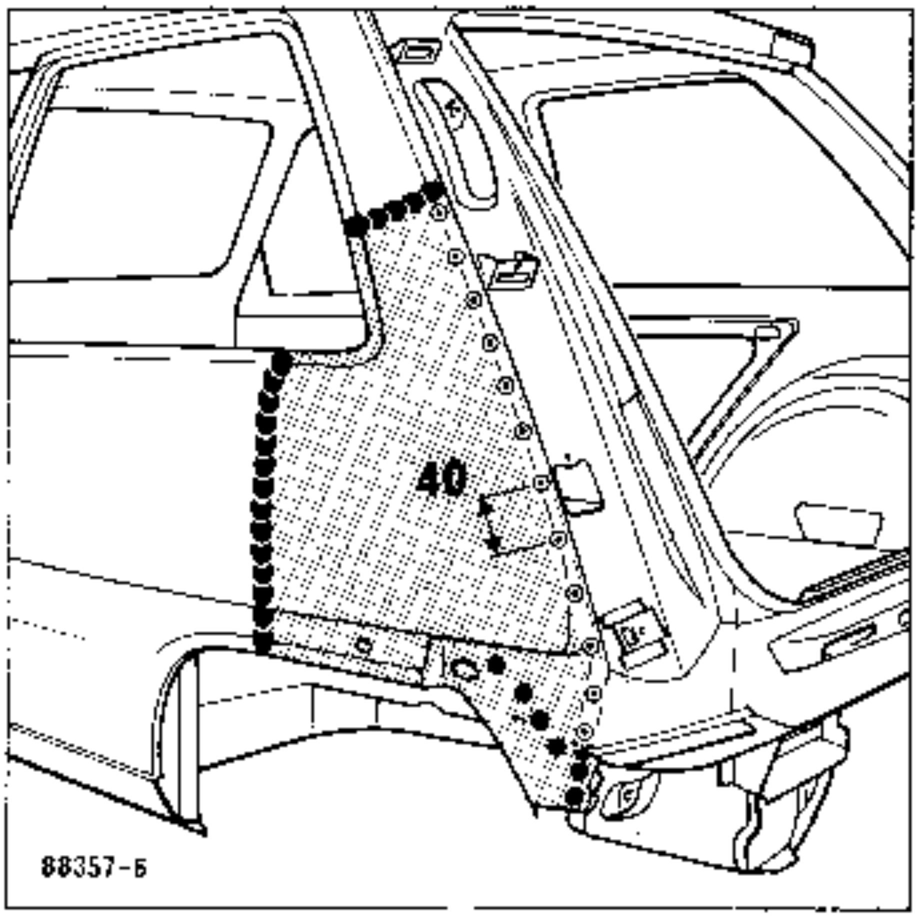
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).

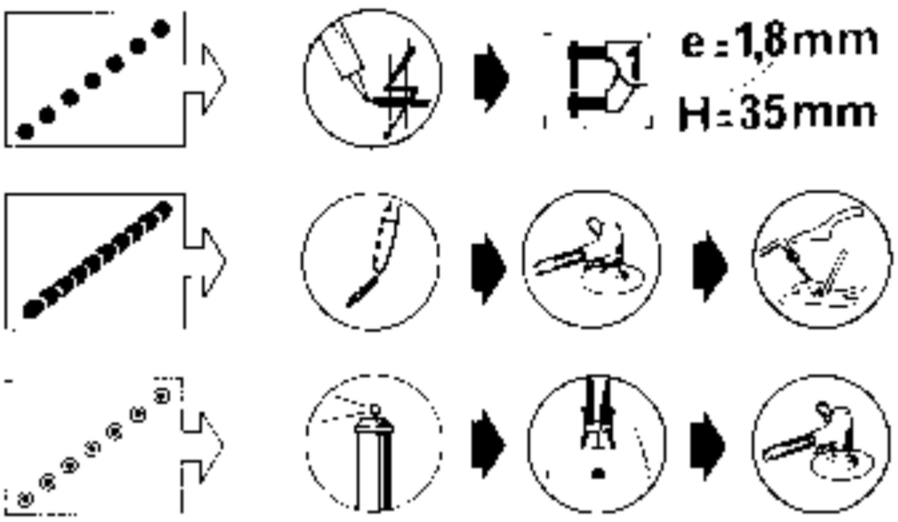
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).

- Apply zinc paint to the areas to be plug welded.

- Adjust the new part and secure it with grip clamps.

WELDING

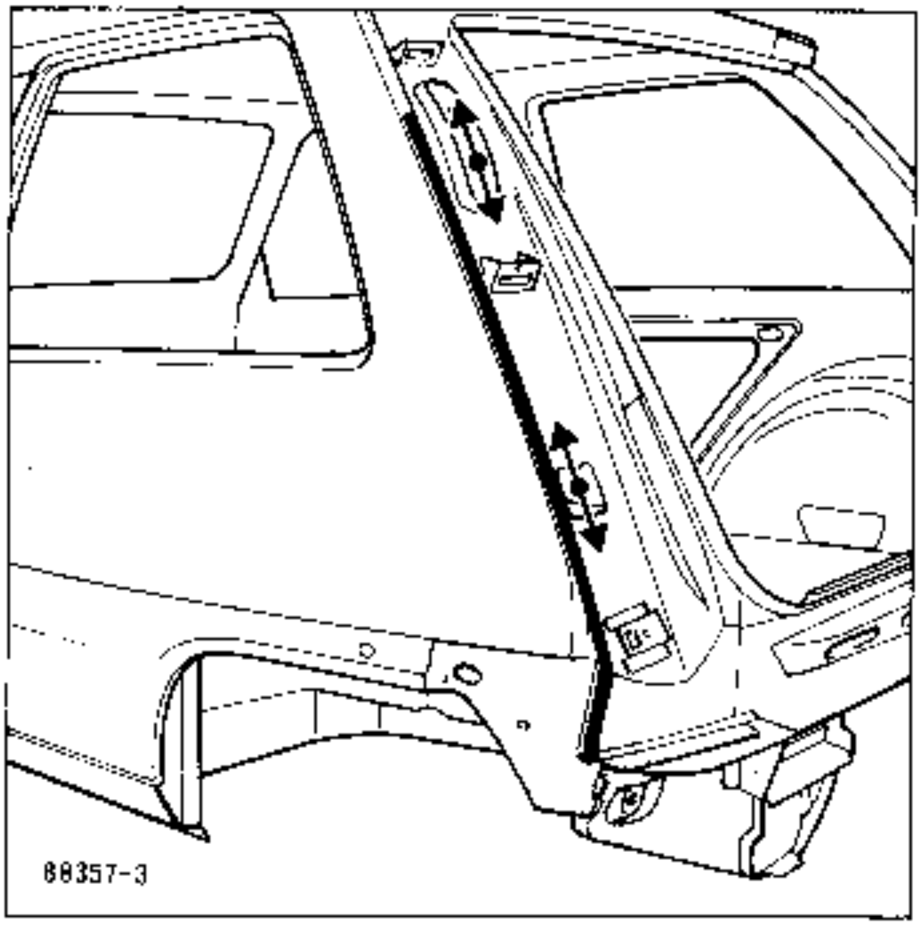


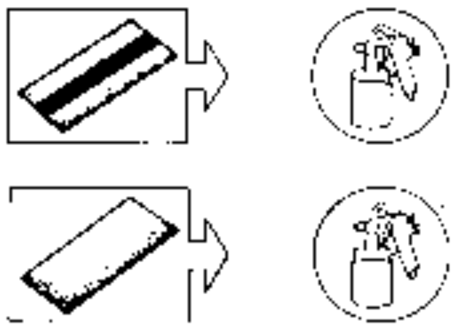


D=4,5mm

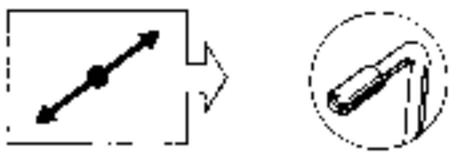
- Apply the stitched fillets using the gas envelope welding process. (These joints may also be gas welded using a 75 to 100 nozzle).
- Apply the plug welds, using the gas envelope welding process. To do this, drill holes in the upper panel to the diameter D stated under the drawings.

PAINTING



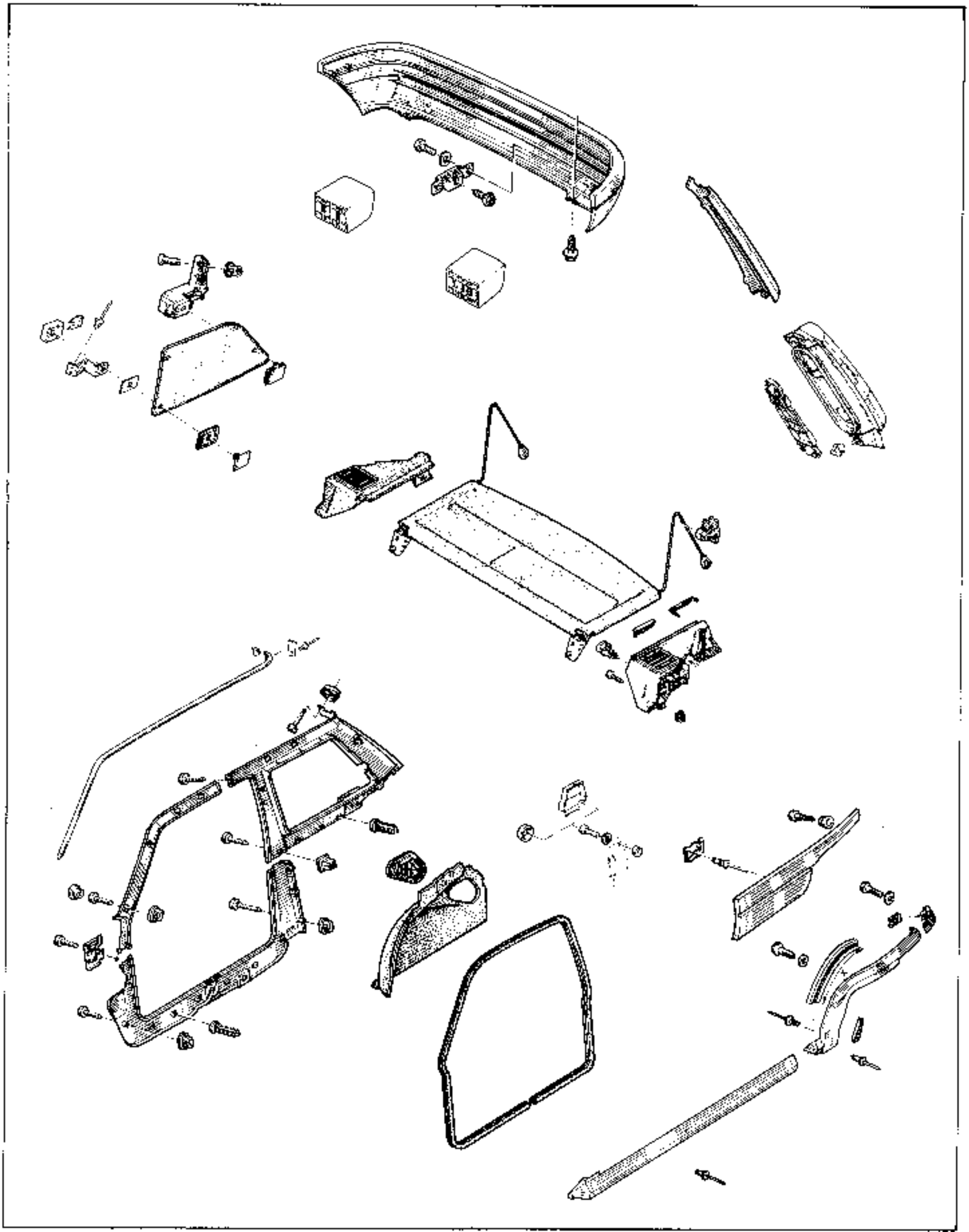


- Carry out paint sequence No. 5 (see "Painting" section).
- After painting, apply hollow section protective treatment.

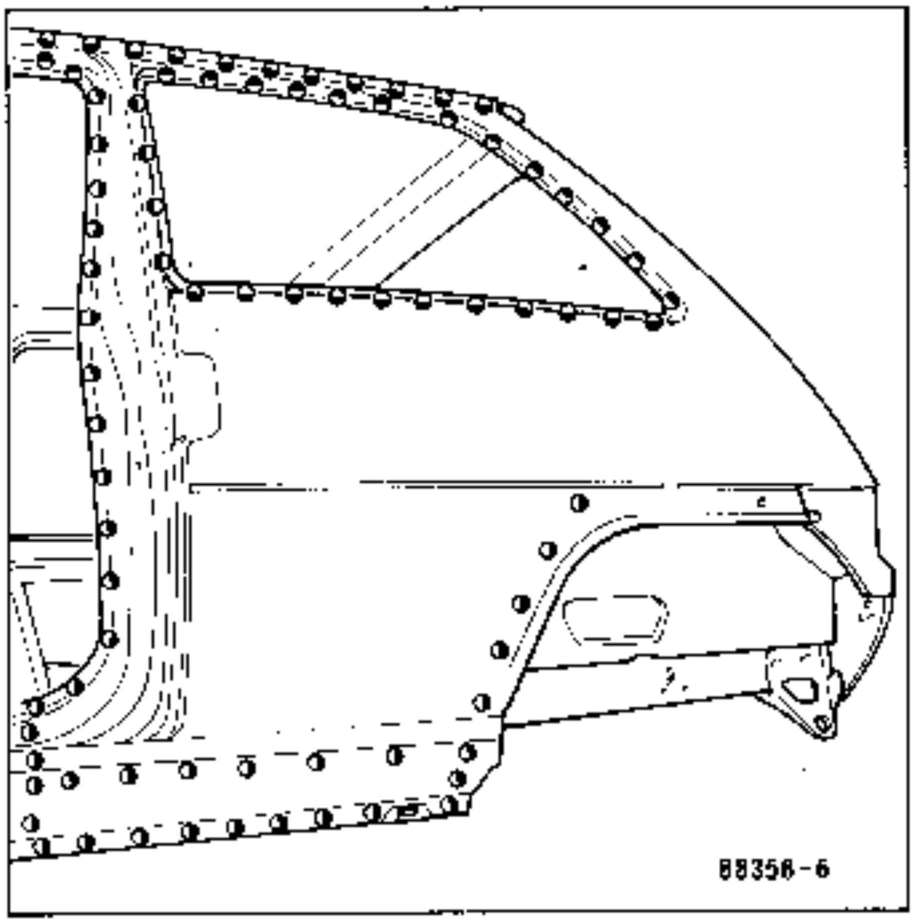


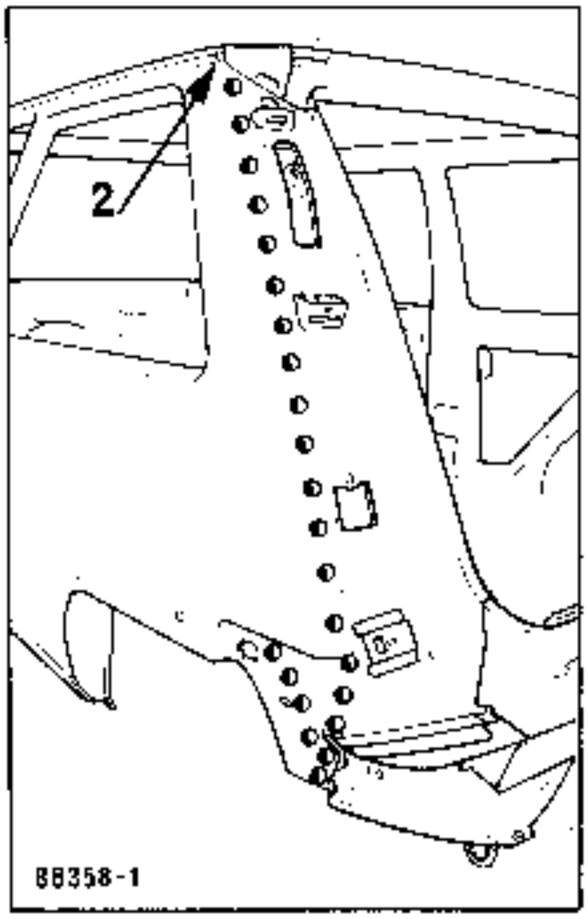
STRIPPING

All these parts are to be placed in a trolley bin.

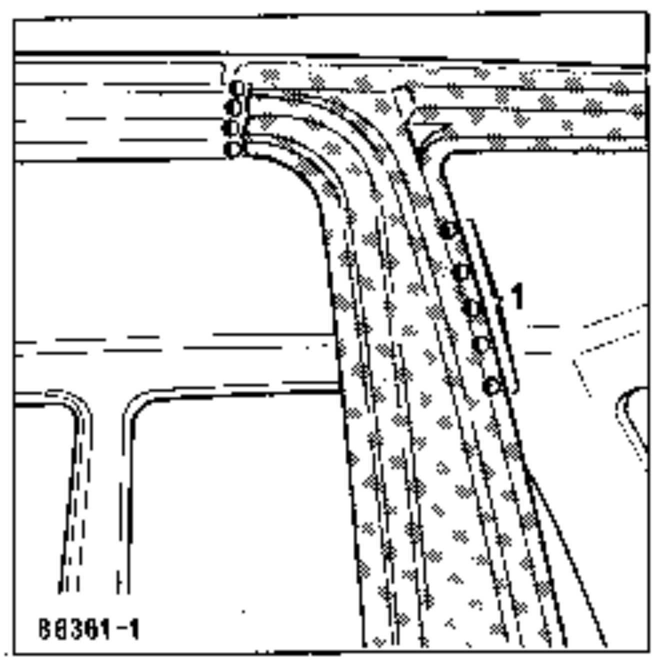


JOINT SEPARATION





Grind back the brazed fillet (2).



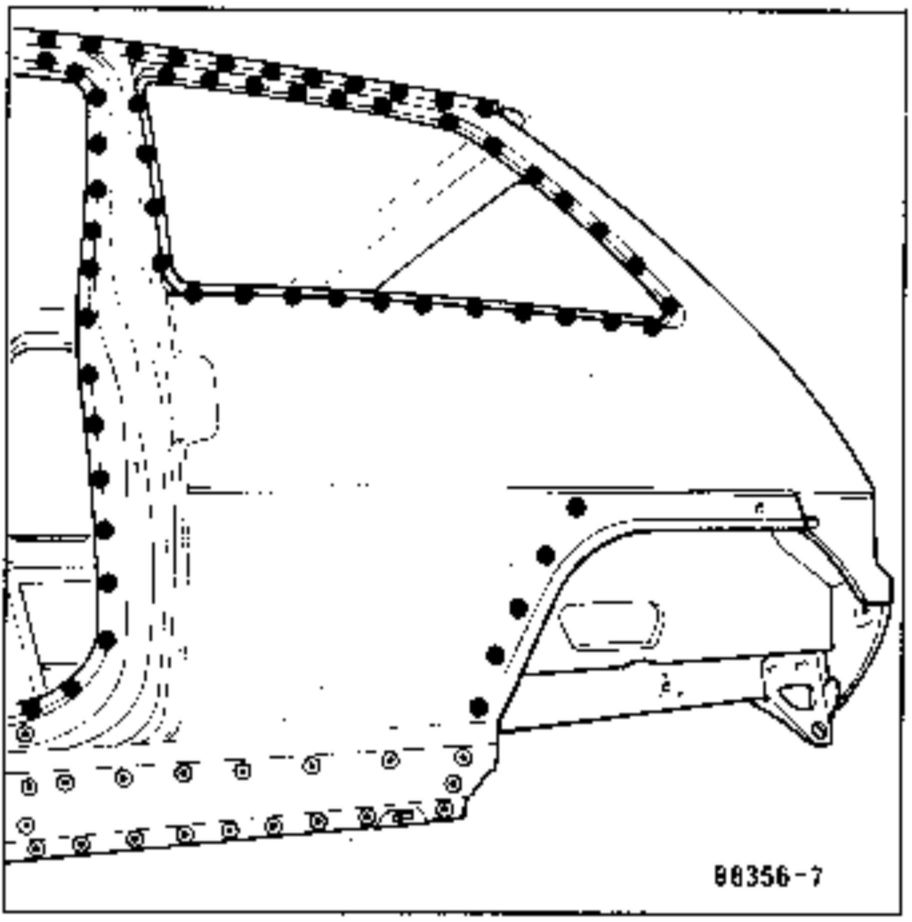
NOTE :

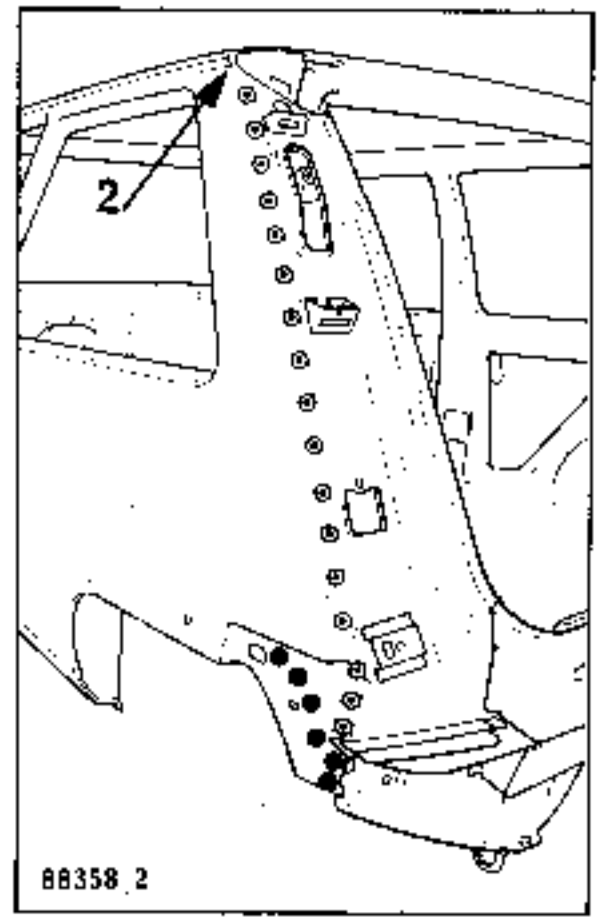
Drill through two thicknesses in the seat belt anchor area (1).

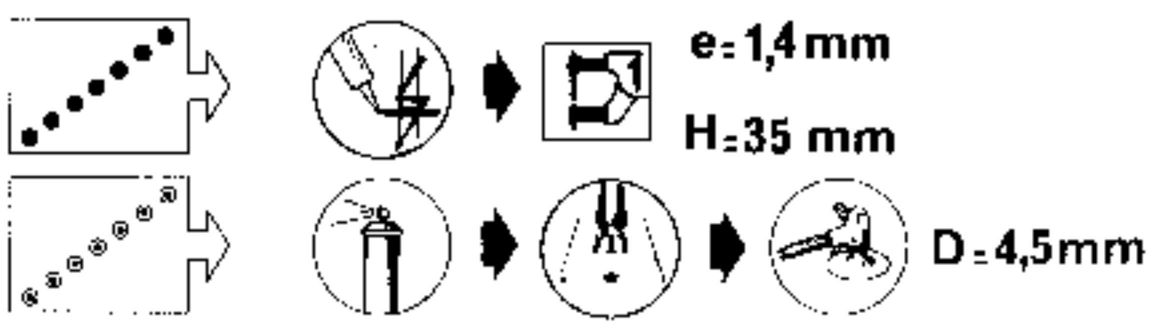
The new part is supplied complete with the seat belt anchor point.

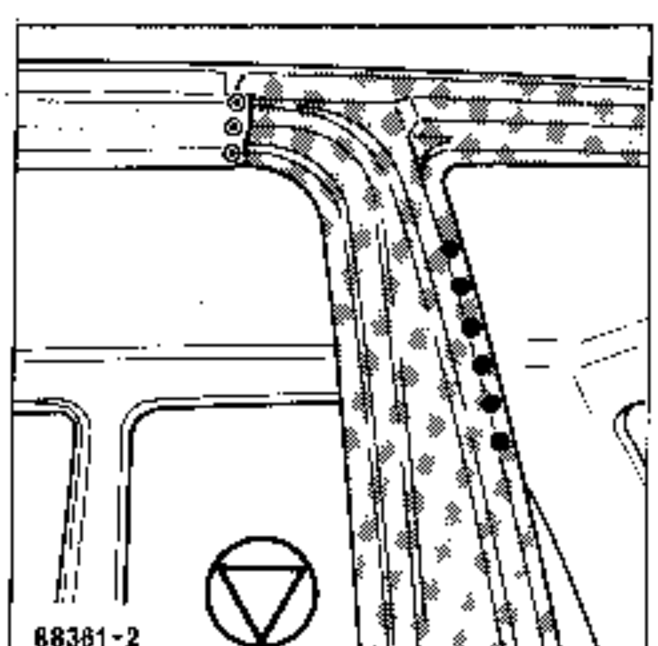
- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).

WELDING





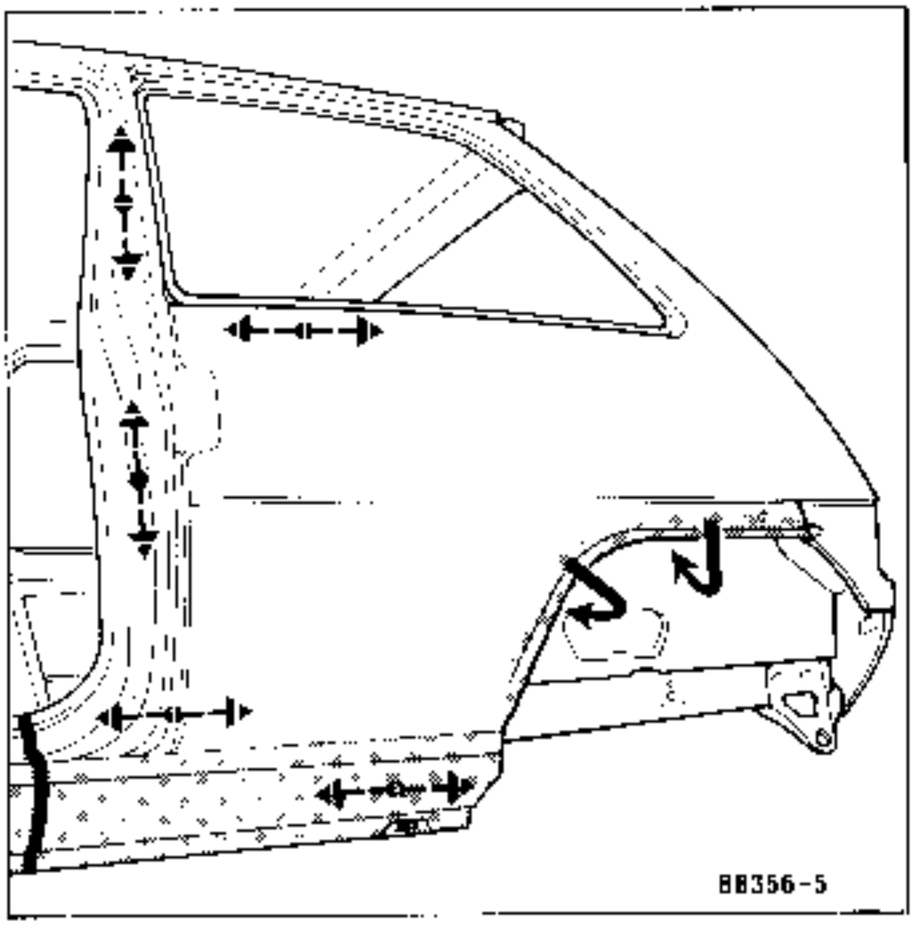


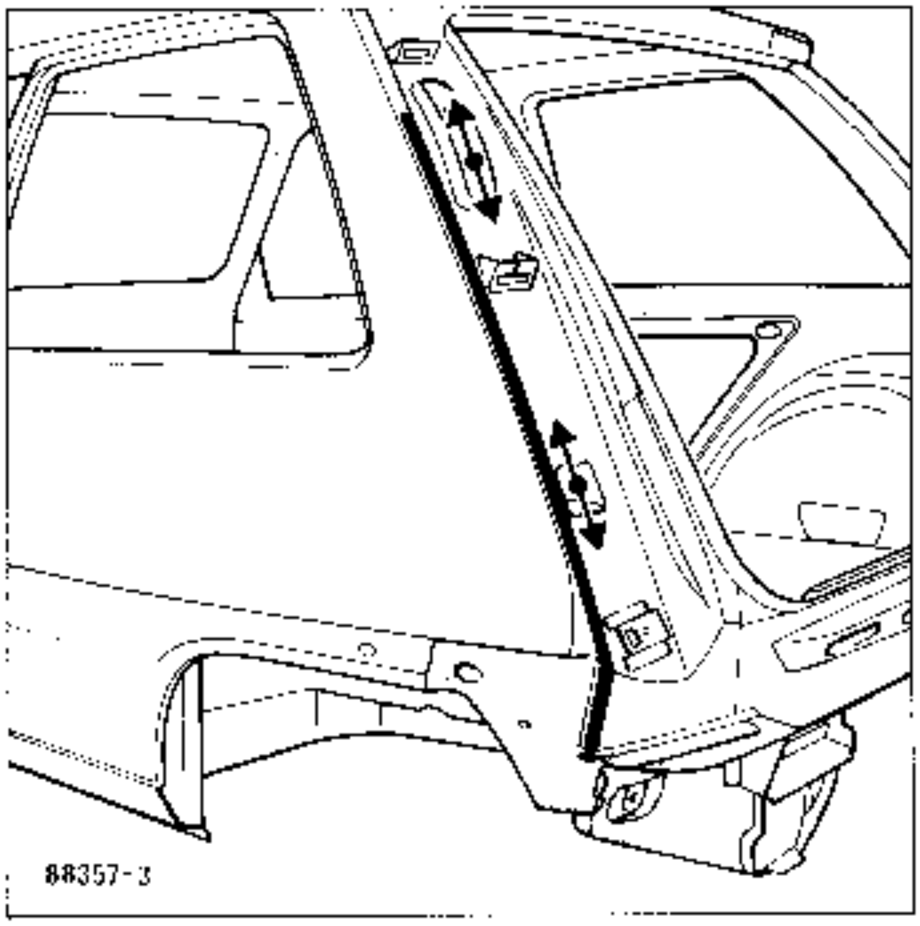


PREPARATION PRIOR TO WELDING.

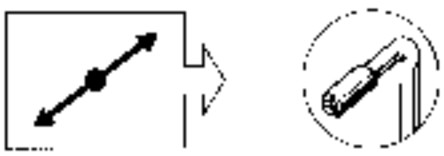
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Apply zinc paint to the areas to be plug welded.
- Adjust the new part and secure it with grip clamps.

PAINTING





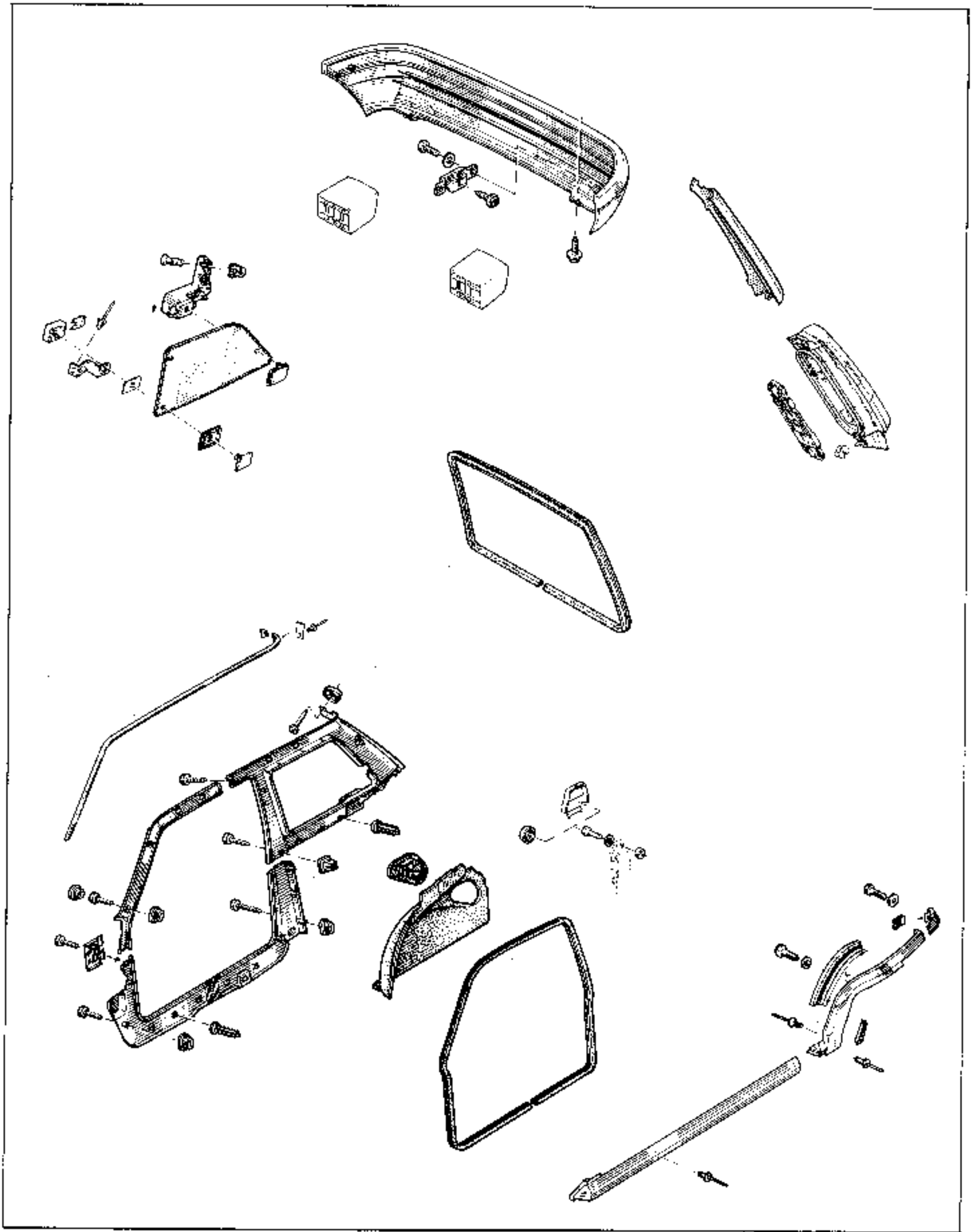
Carry out paint sequence No. 5 (See "Painting"section) and then paint sequence No. 3.



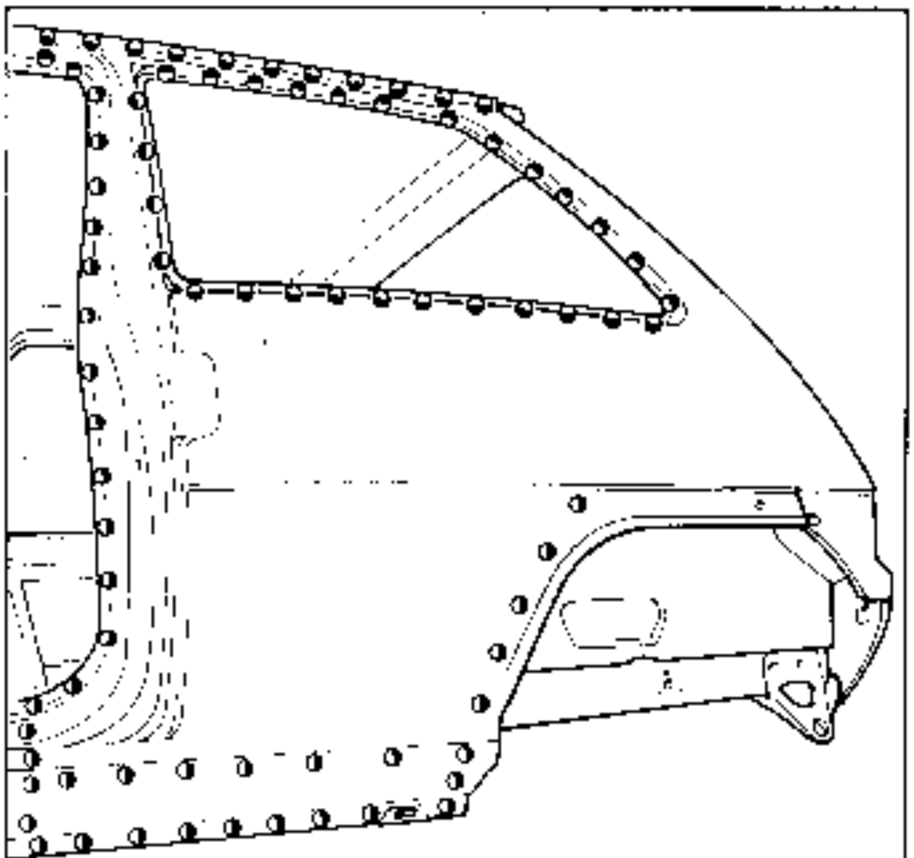
After painting, apply hollow section protective treatment through the internal holes in line with the welded areas.

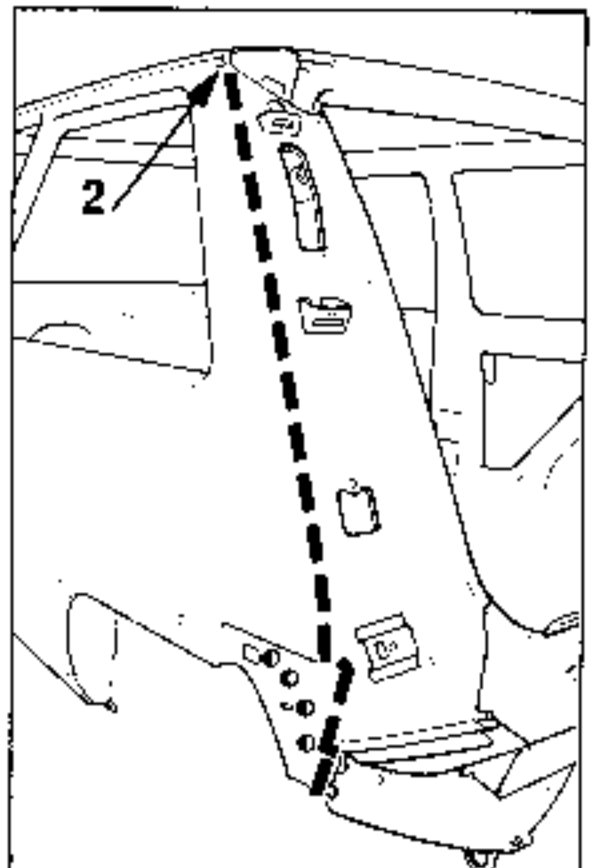
STRIPPING

All these parts are to be placed in a trolley bin



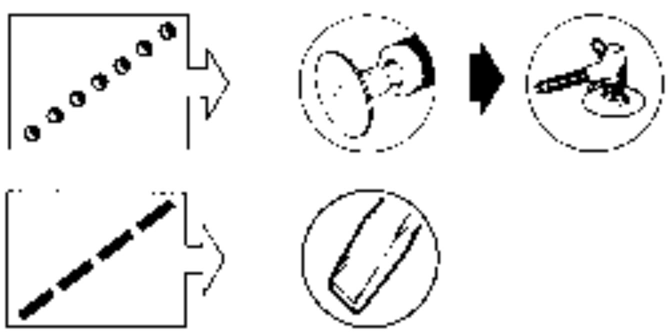
CUTTING - JOINT SEPARATION

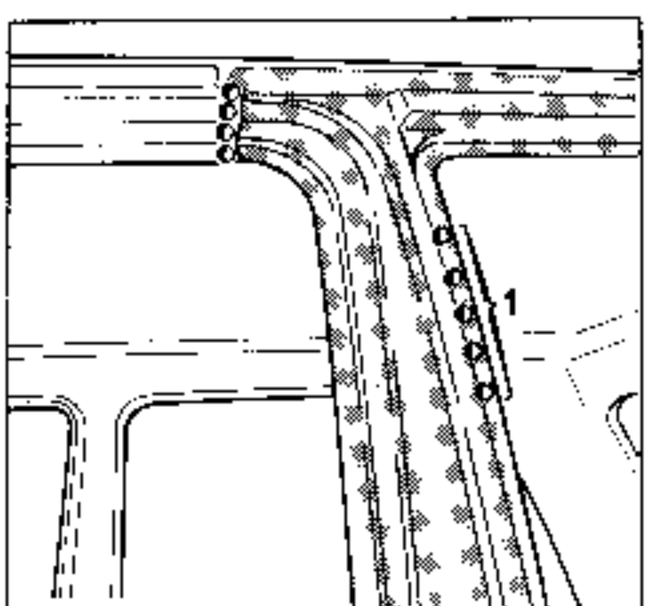

88356-6



88358-3

Grind back the brazed fillet (2).





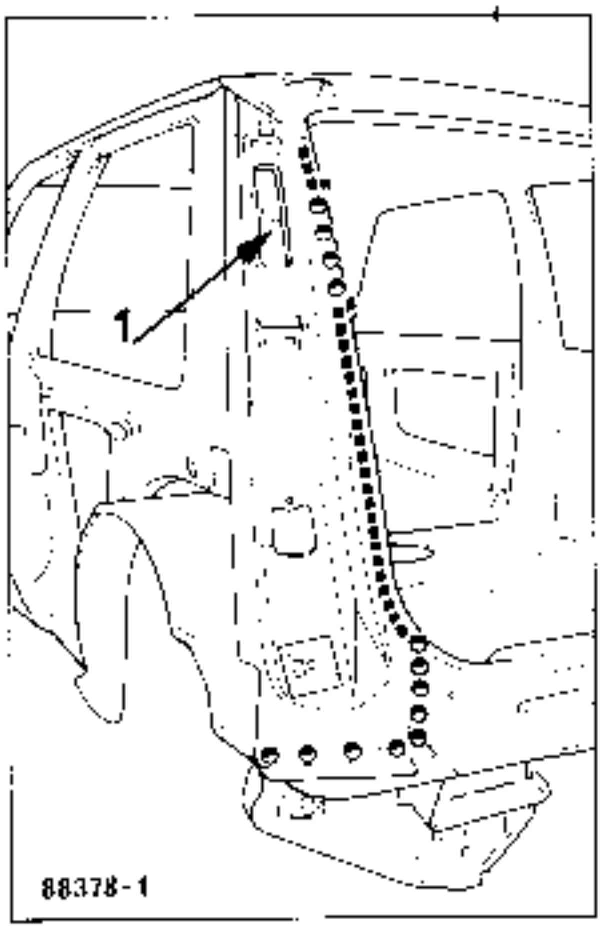
88361-1

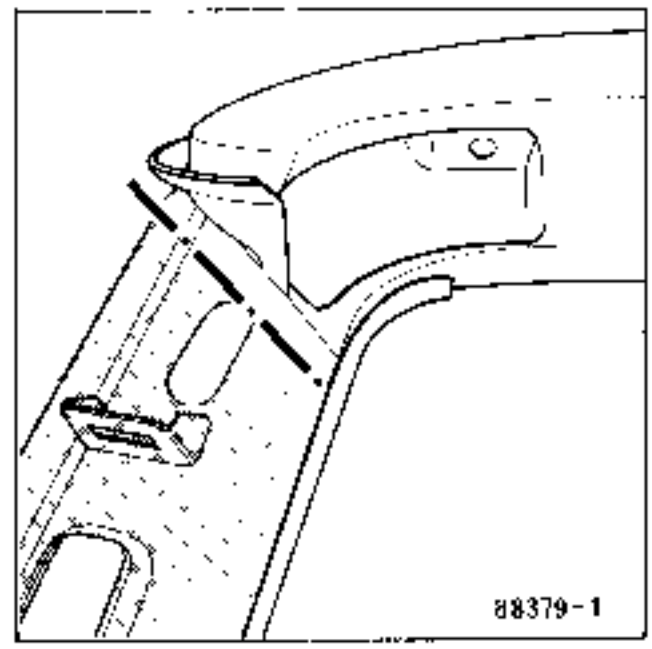
NOTE :

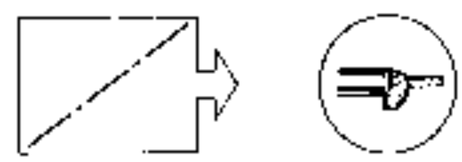
Drill through two thicknesses in the area around the seat belt anchor point (1).

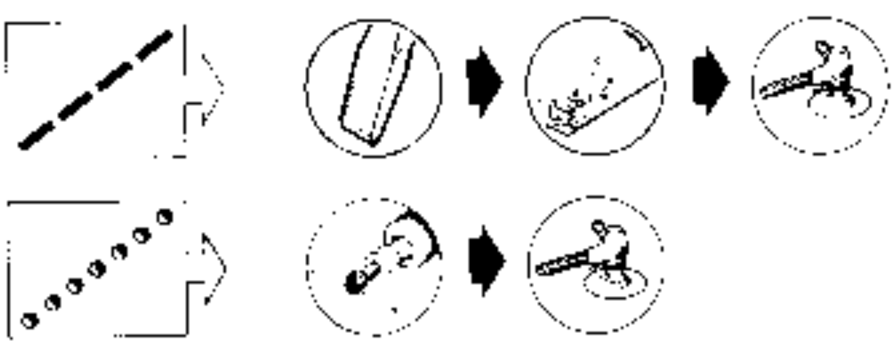
The new part is supplied with the seat belt anchor point already fitted.

- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).



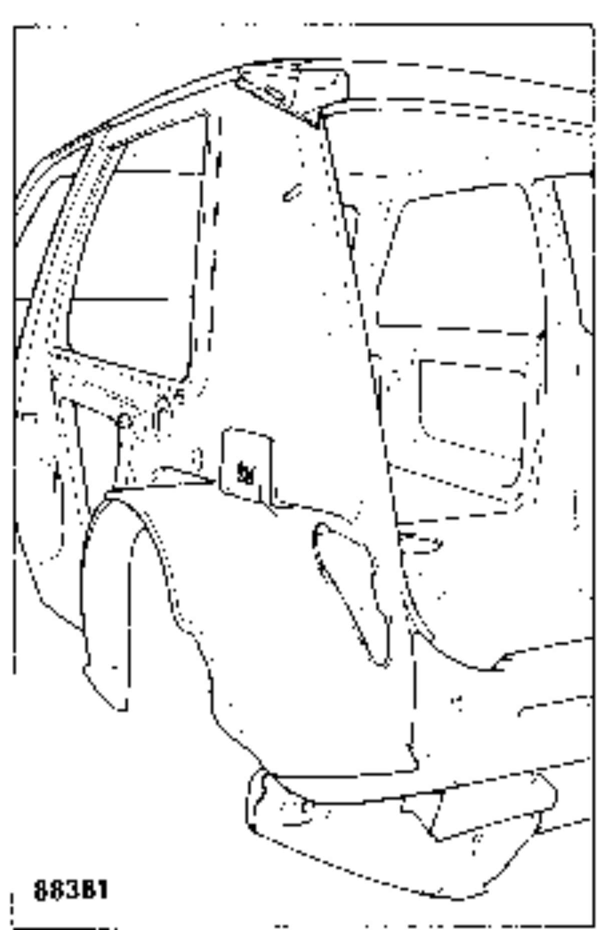


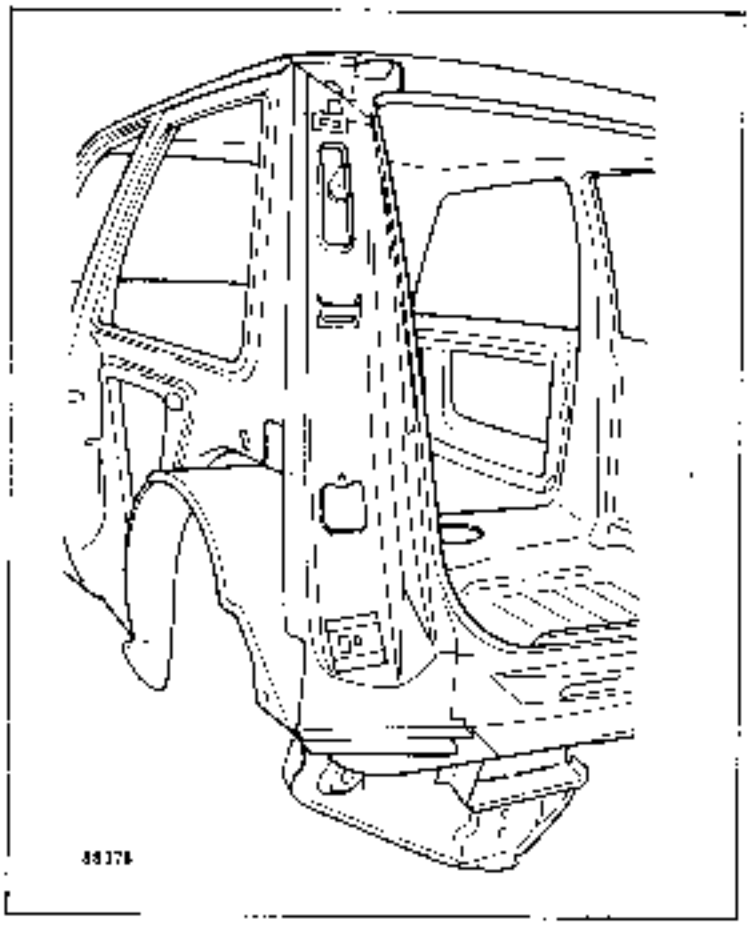




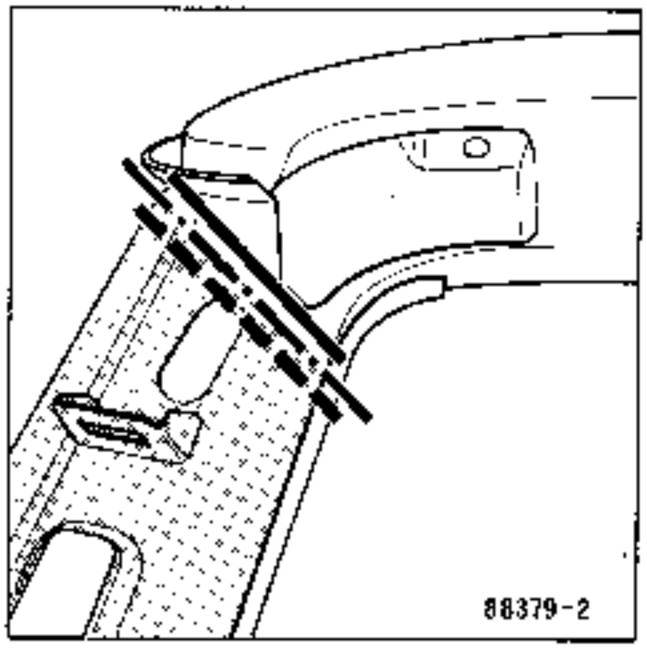
NOTE :

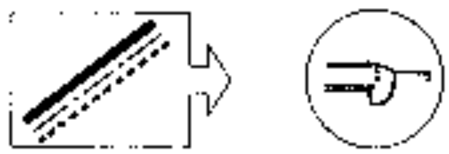
Drill out and remove the drip channel and seat belt anchor point assembly (1).





Cut a section from the new part 20 mm larger than the section cut out on the vehicle.



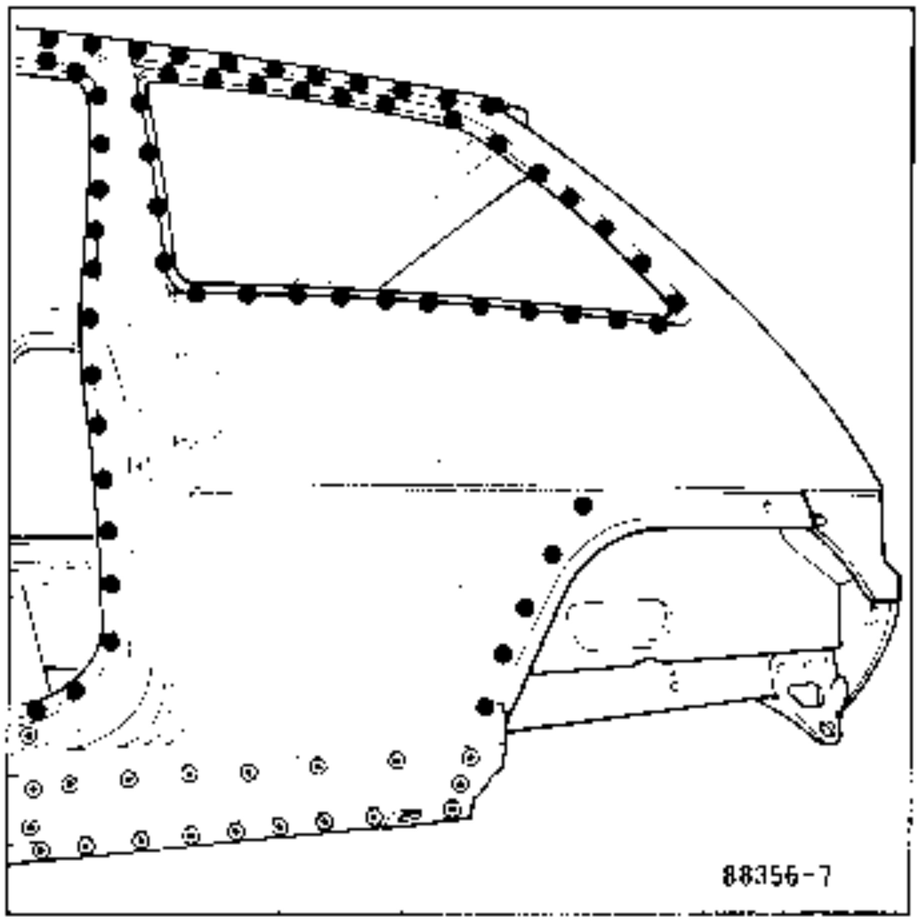


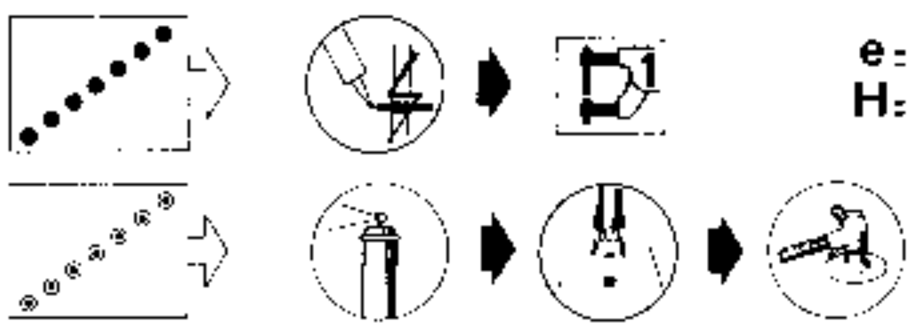
- Fit the new part so that it overlaps the original part on the vehicle and secure it with grip clamps.
- Adjust the wing panel and the tail gate.
- Saw through both thicknesses of metal simultaneously to make adjusting the joints easier.
- Remove the new section and take off the parts remaining on the vehicle, at the overlapping areas.

PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Apply zinc paint to the areas to be plug welded.

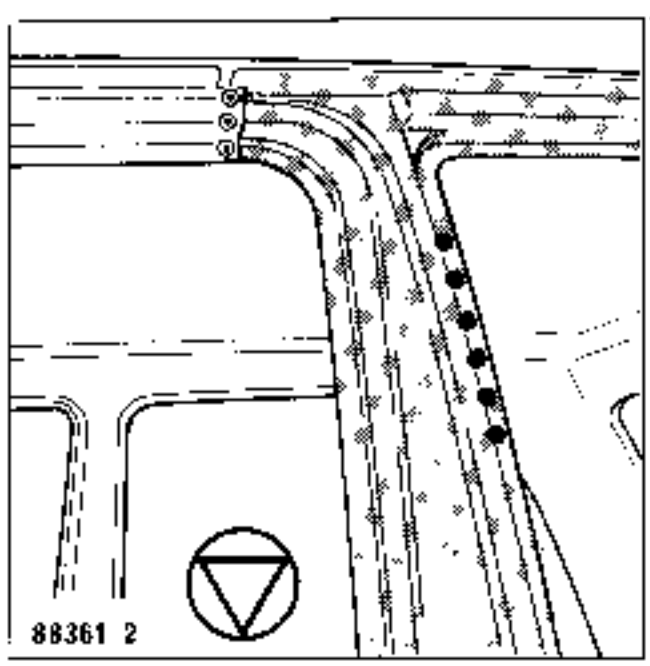
WELDING





e = 1,4 mm
H = 35 mm

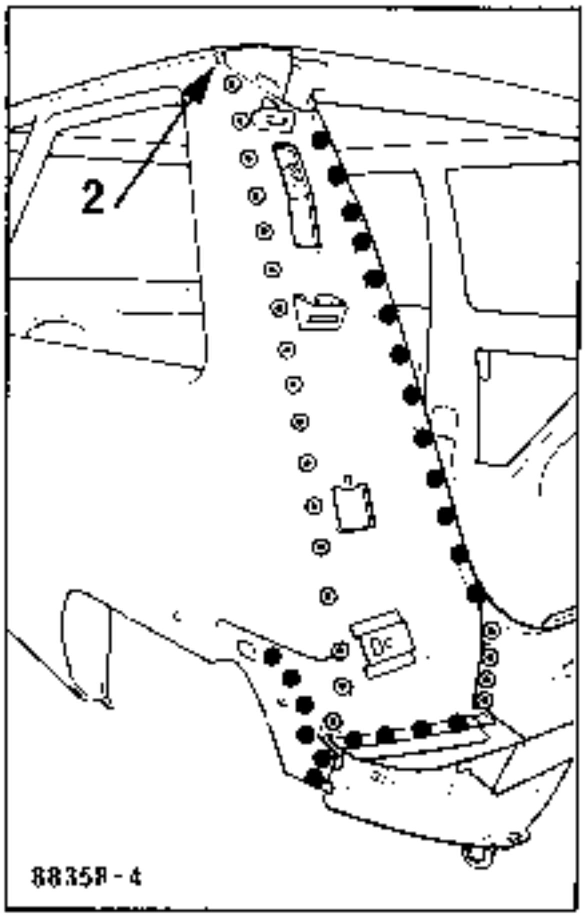
D = 4,5 mm

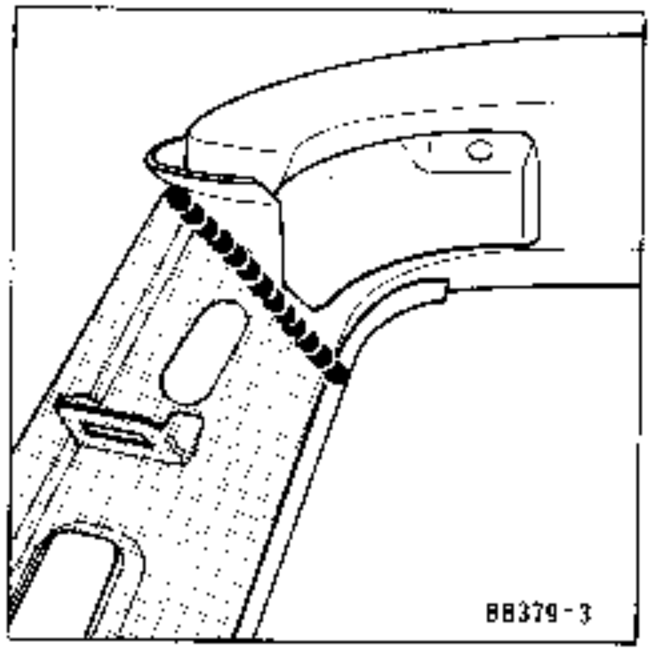


PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Apply zinc paint to the areas to be plug welded.
- Adjust the new part and secure it with grip clamps.

WELDING

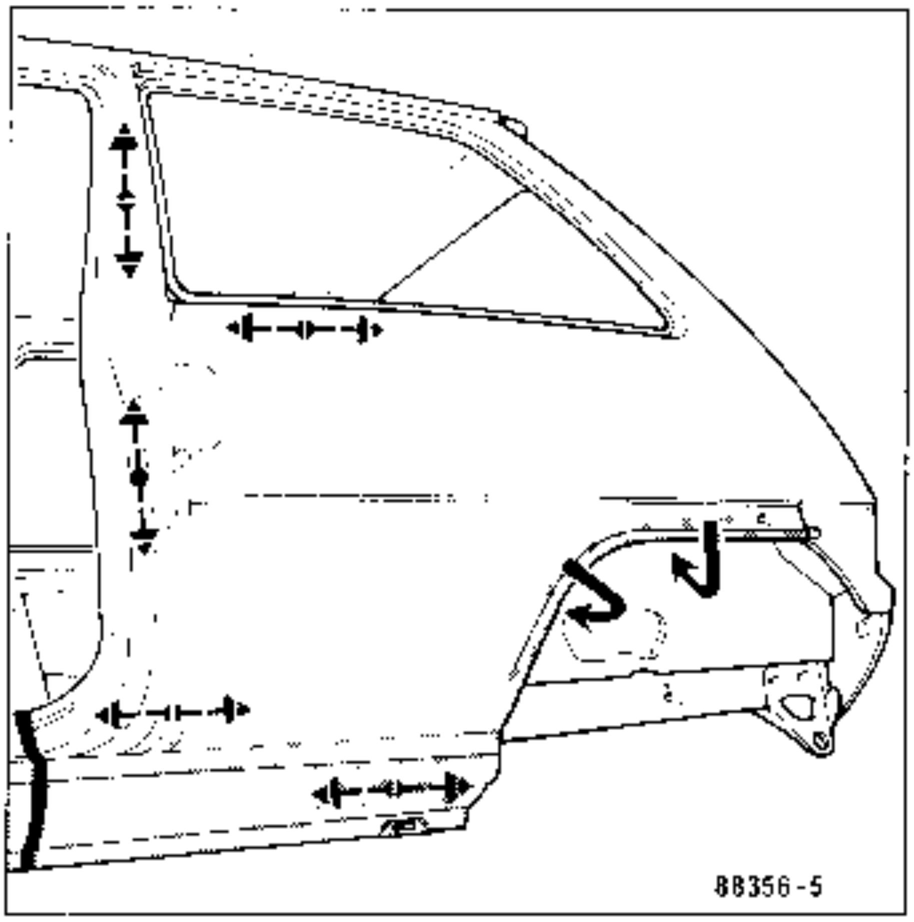


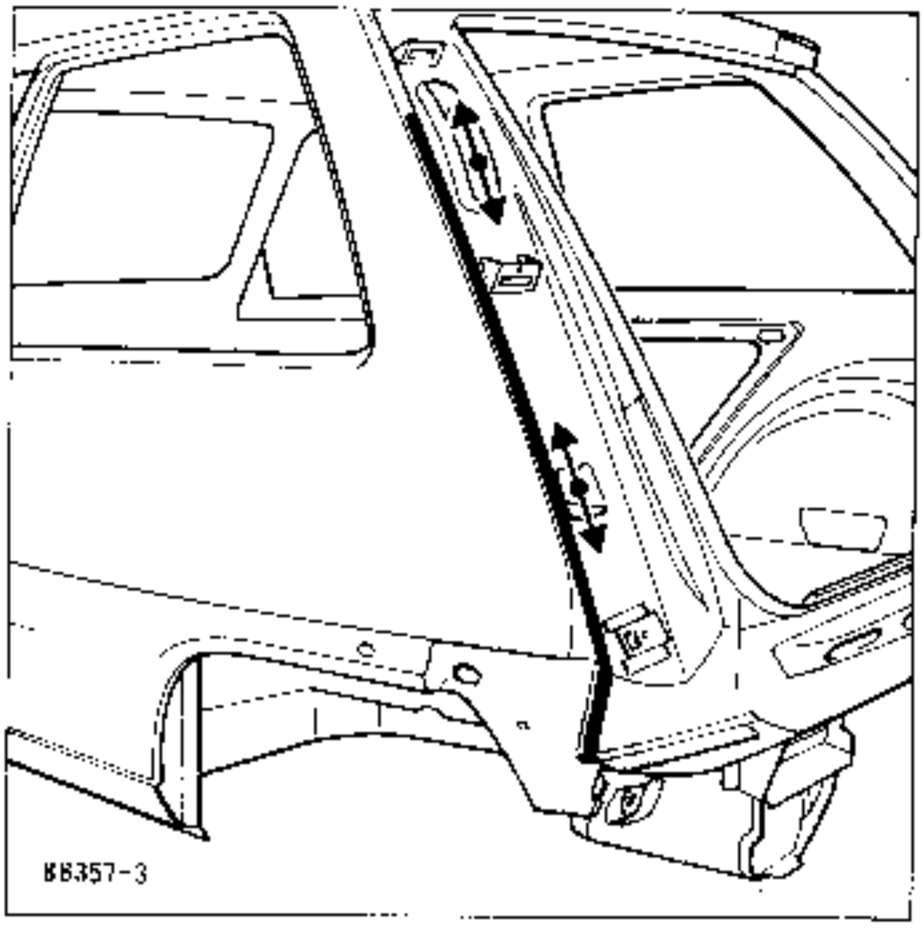


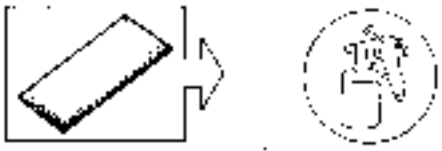
Apply a brazed fillet in the corner (2).

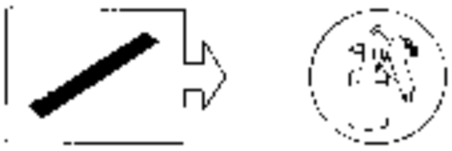
- Apply the stitched fillets using the gas envelope welding process. (These joints may also be gas welded using a 75 to 100 nozzle).
- Apply plug welds using the gas envelope welding process. To do this, drill holes in the upper panel to the diameter D stated under the drawings.

PAINTING



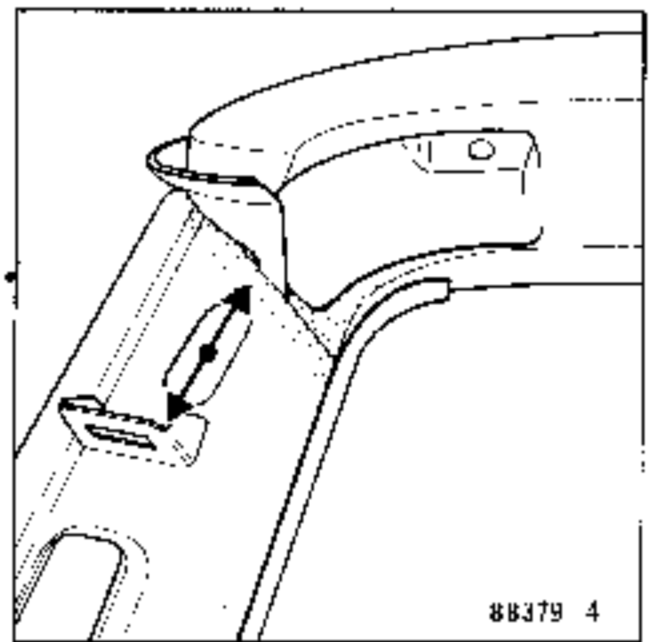






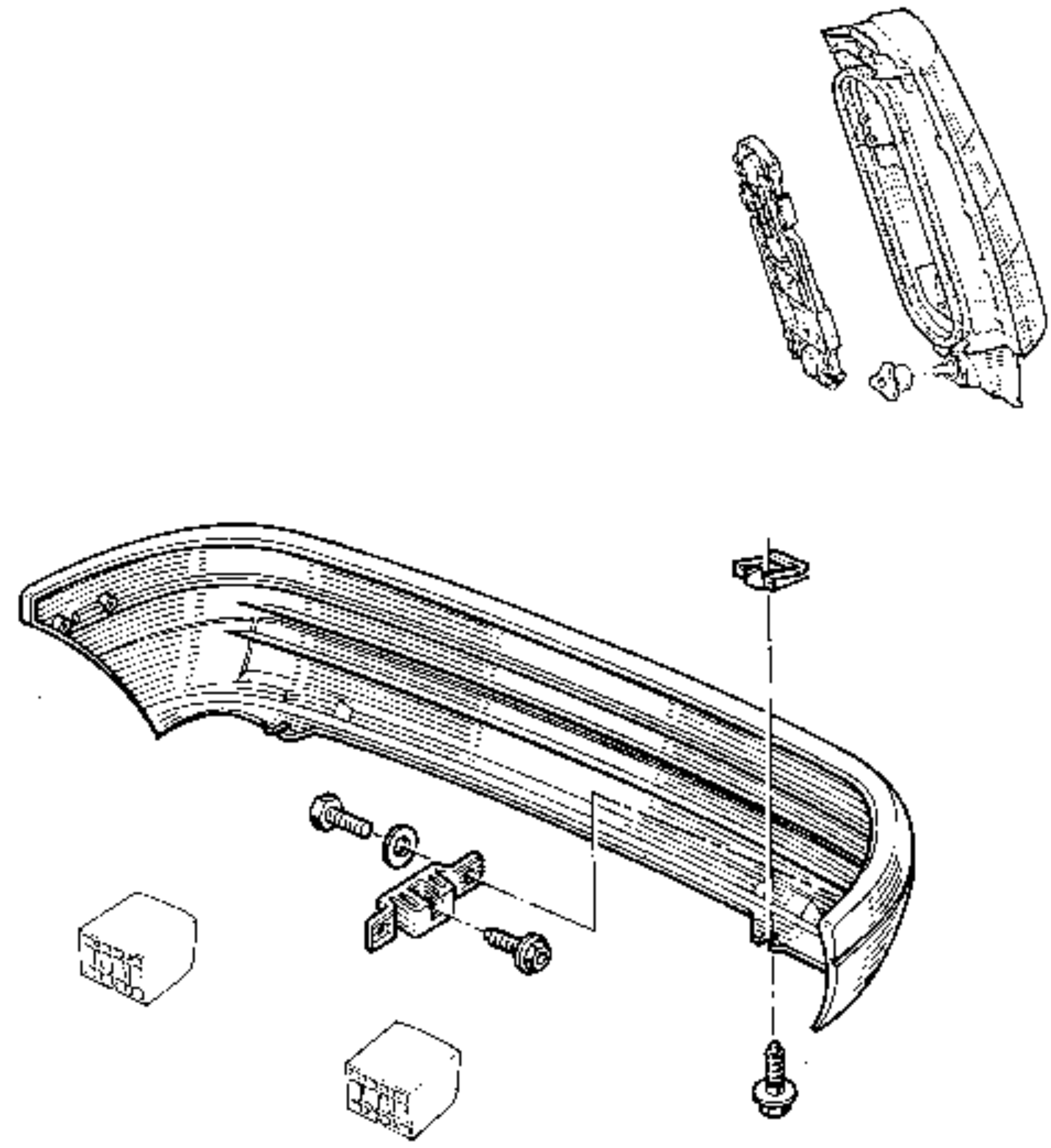
Carry out paint sequence No. 5 (See "Painting" section) followed by paint sequence No. 3.

After painting, apply hollow section protective treatment through the interior holes in line with the welded areas.

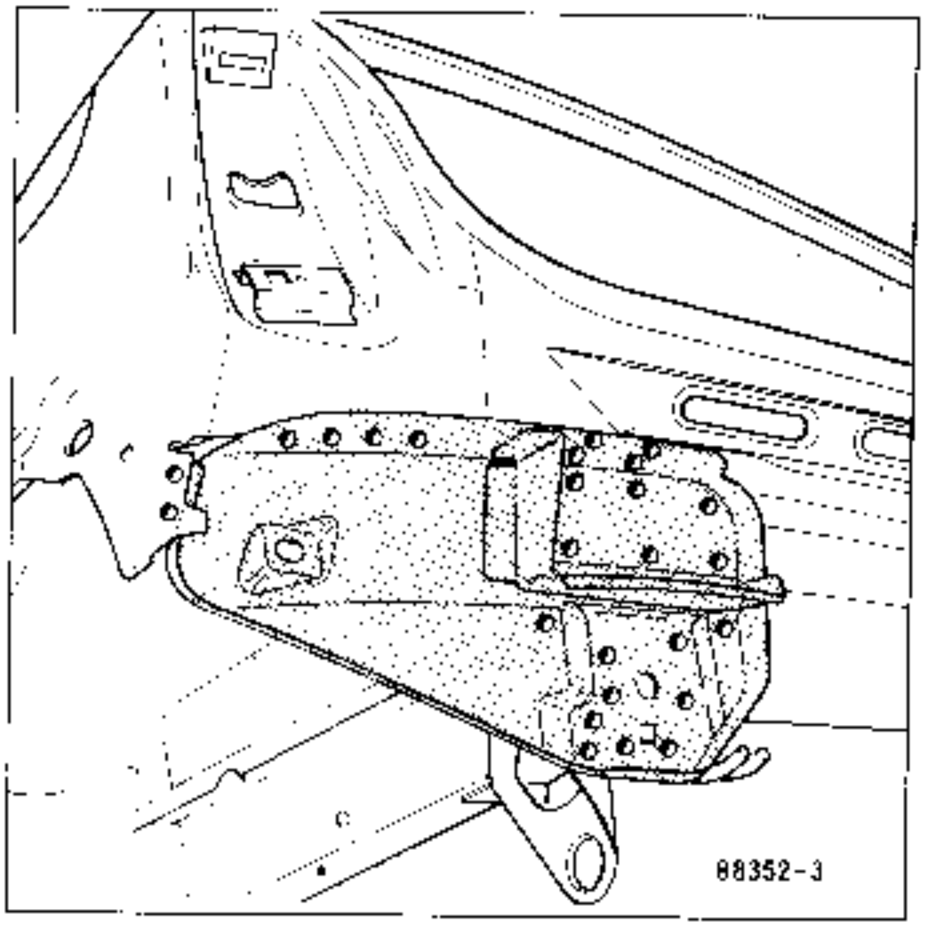


STRIPPING

All these parts are to be placed in a bin trolley.



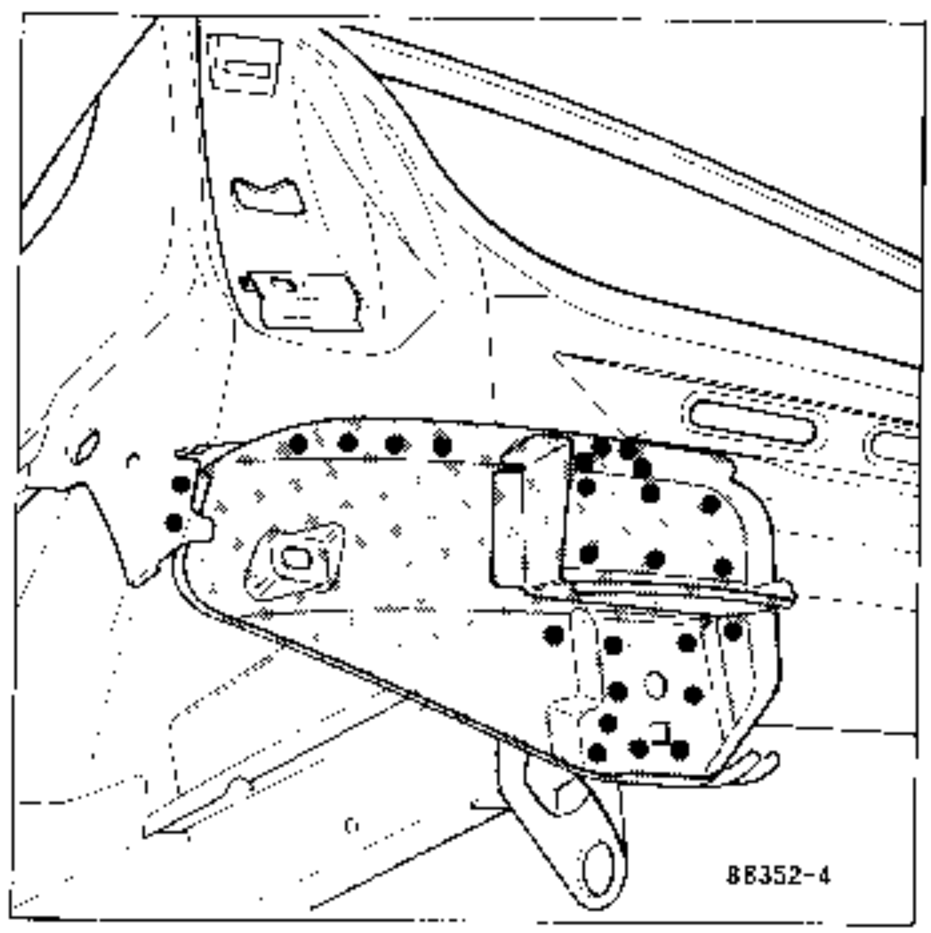
ANTI-CORROSION PROTECTION

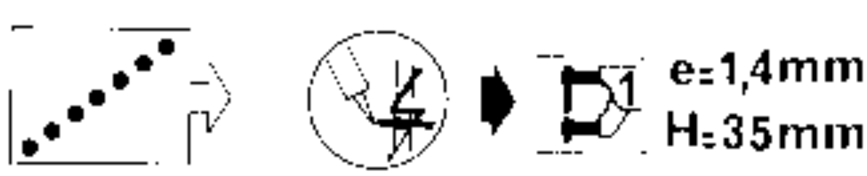


- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).

PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Adjust the new part and secure it with grip clamps.
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.

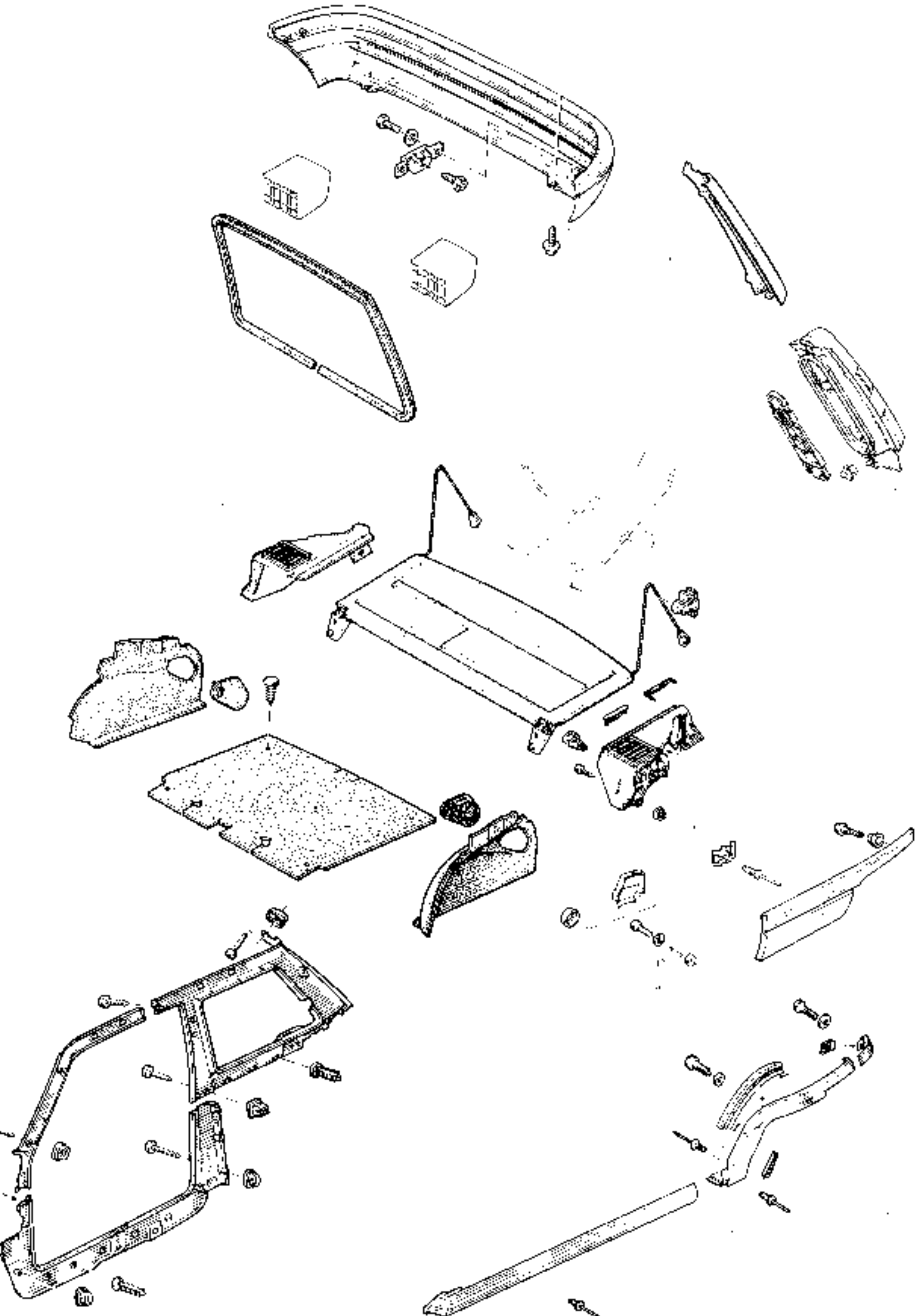




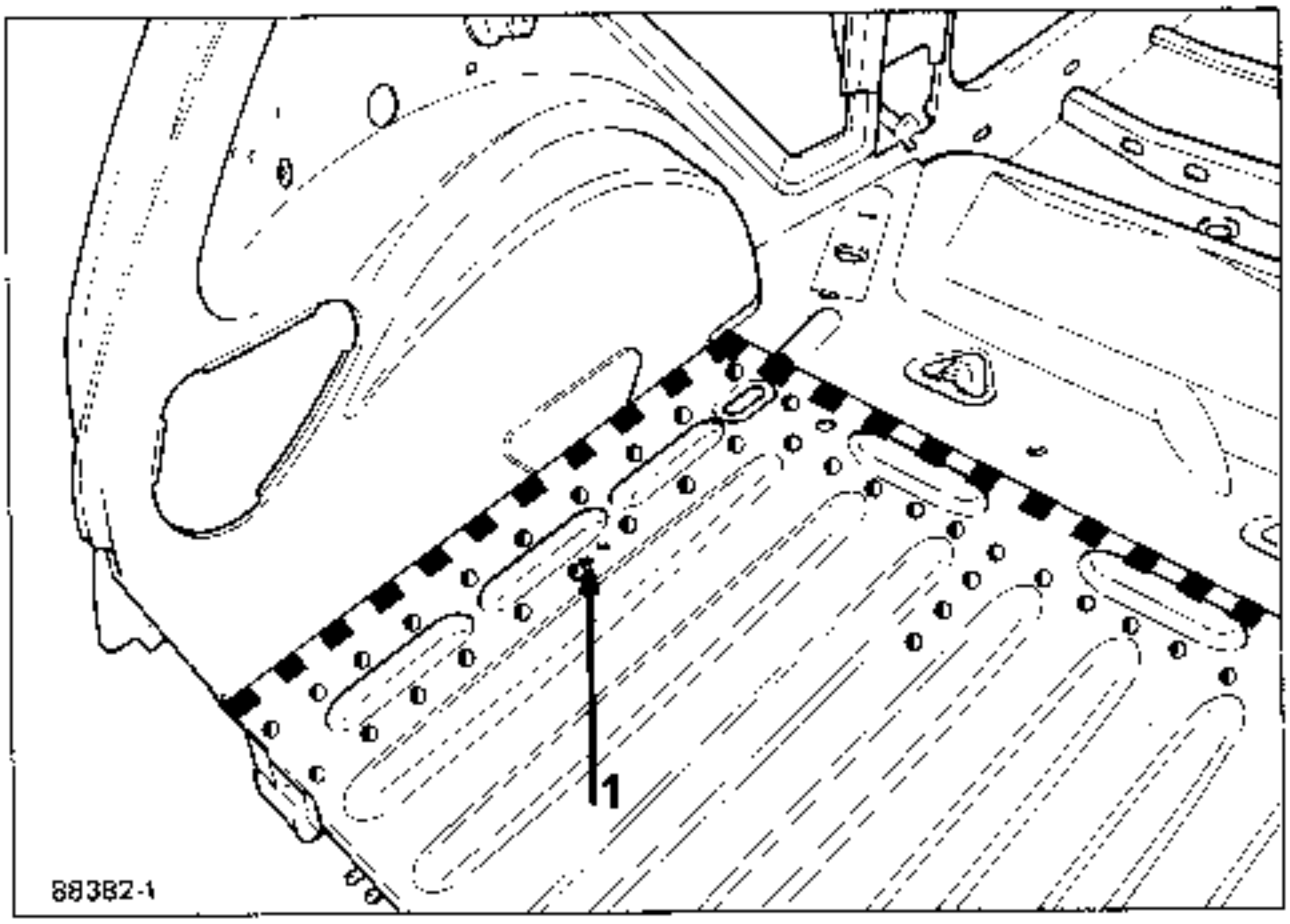
This operation can be combined with the following operations : partially or completely replacing the wing panel and drip channel.

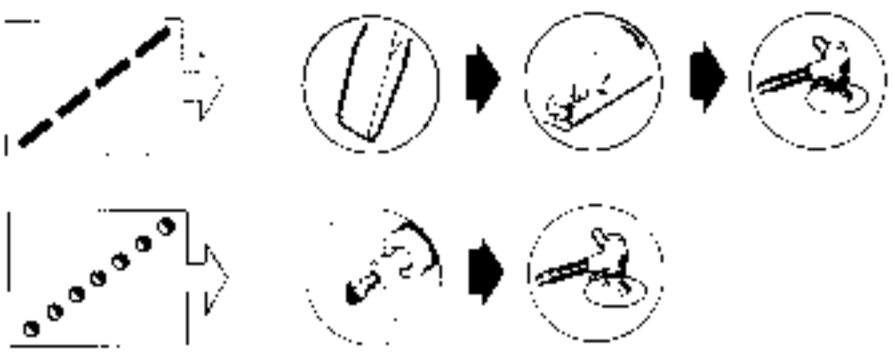
STRIPPING

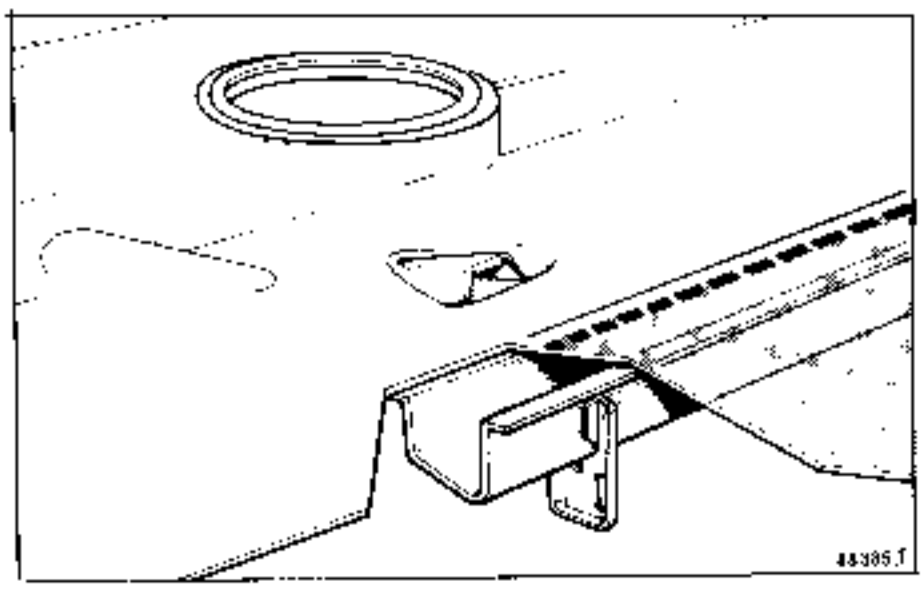
All these parts are to be placed in a bin trolley.



CUTTING - JOINT SEPARATION







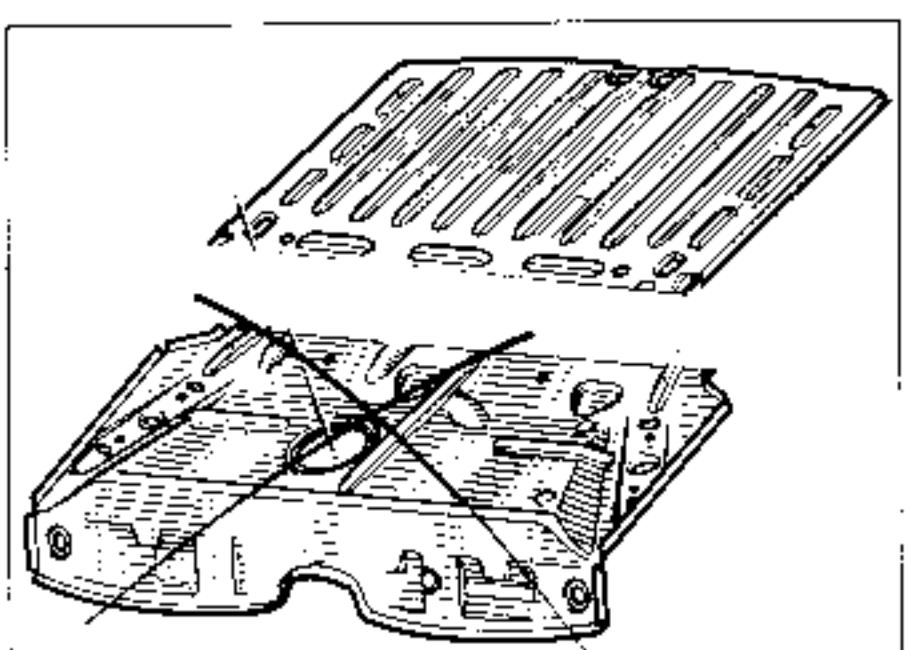
NOTE :

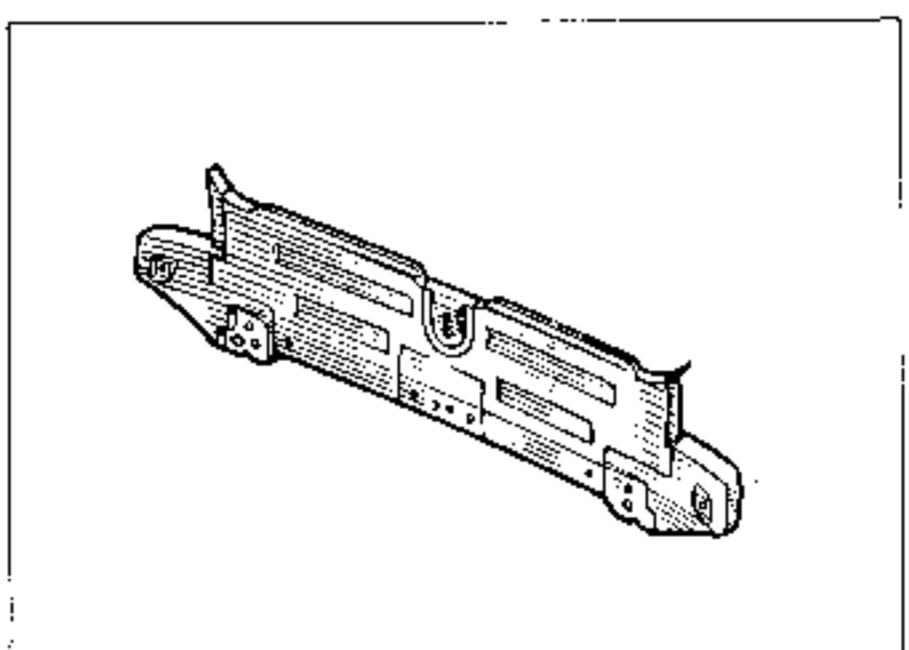
Remove the floor panel and its stiffener (1).

- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).

PREPARATION PRIOR TO WELDING

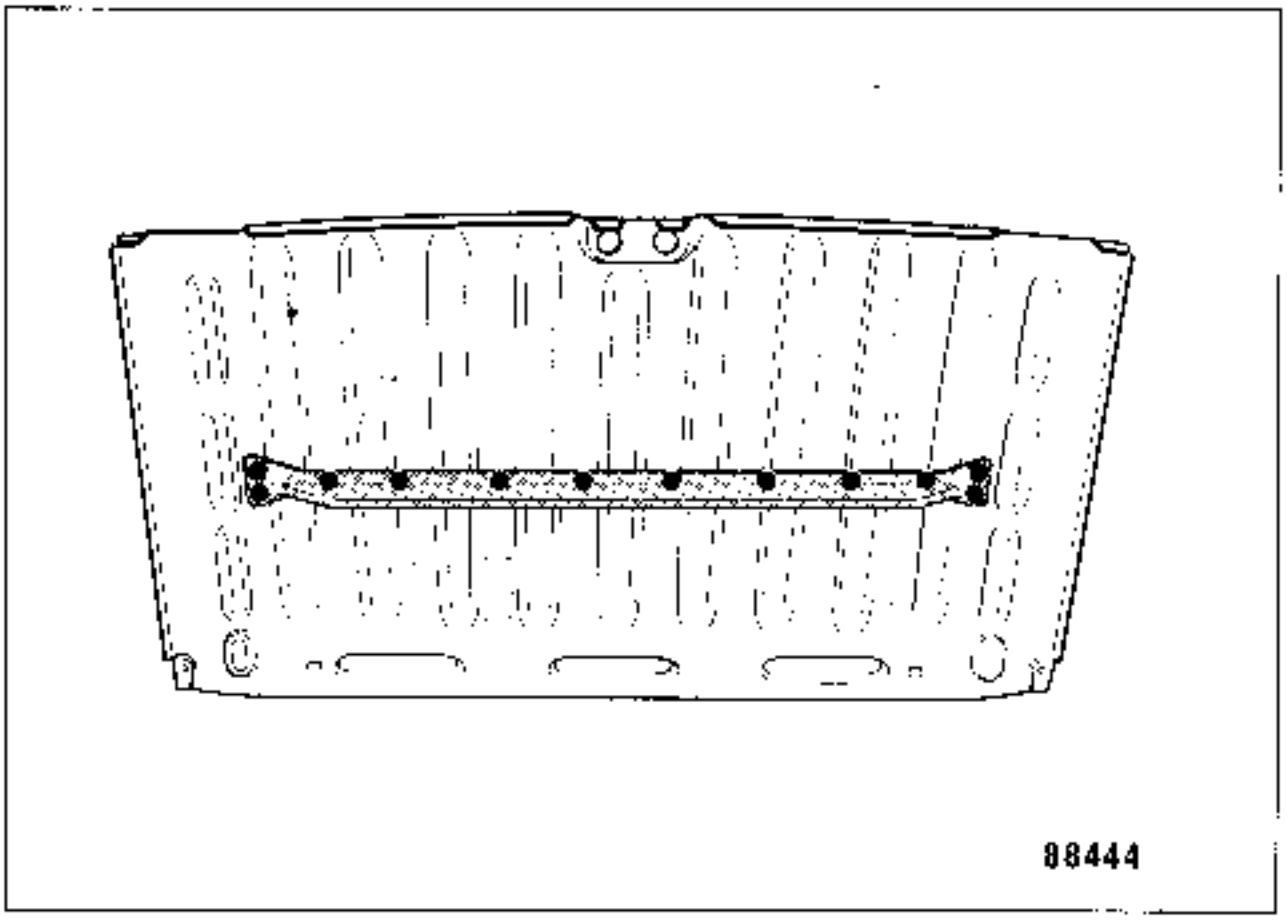
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded.





Cut, from the new part, a section 20 mm larger than that cut out on the vehicle.

- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Apply zinc paint to the areas to be plug welded.

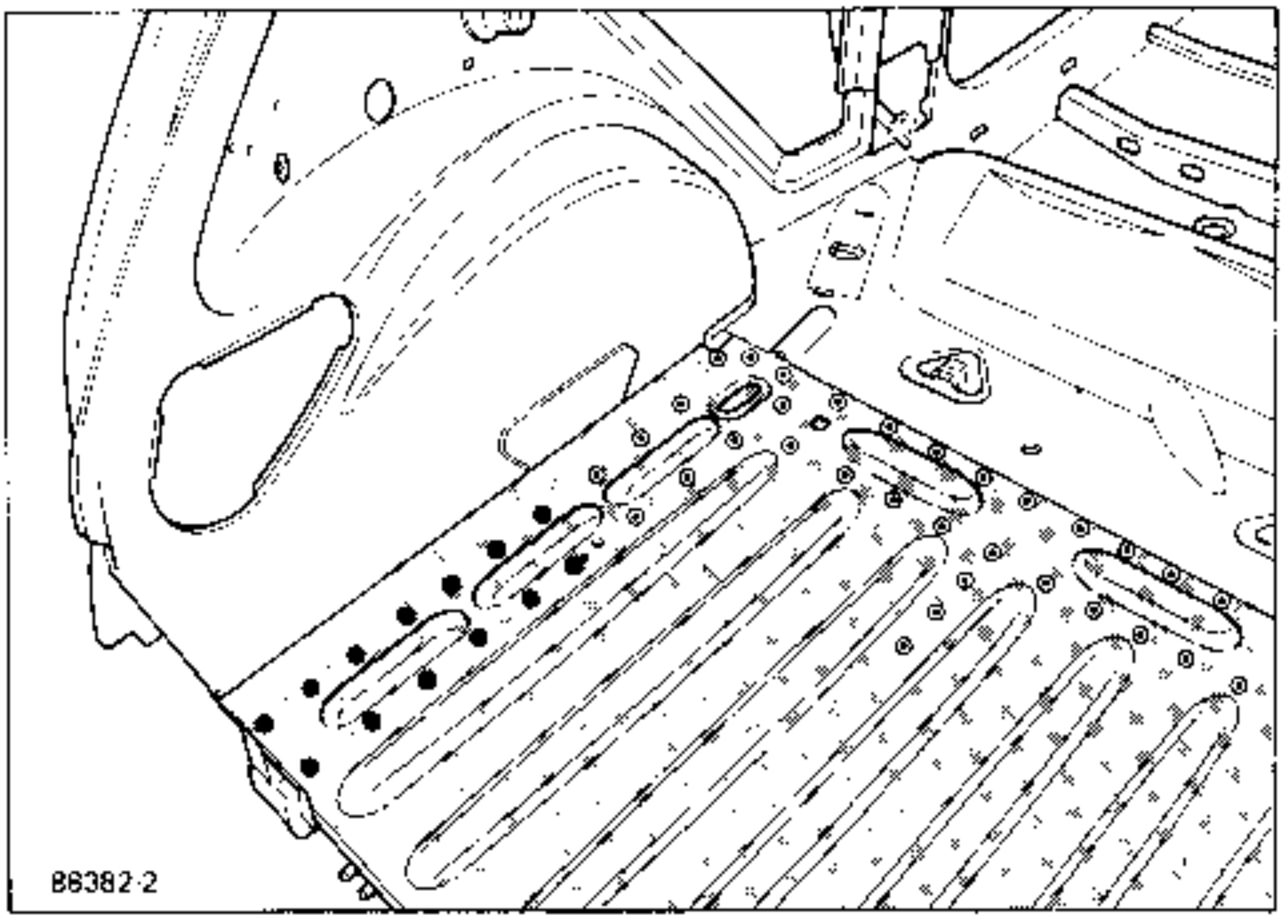


Weld the stiffener to the new floor panel.

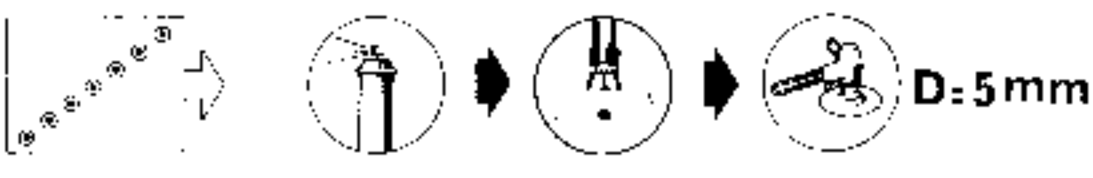
e: 1,4 mm
H: 75 mm

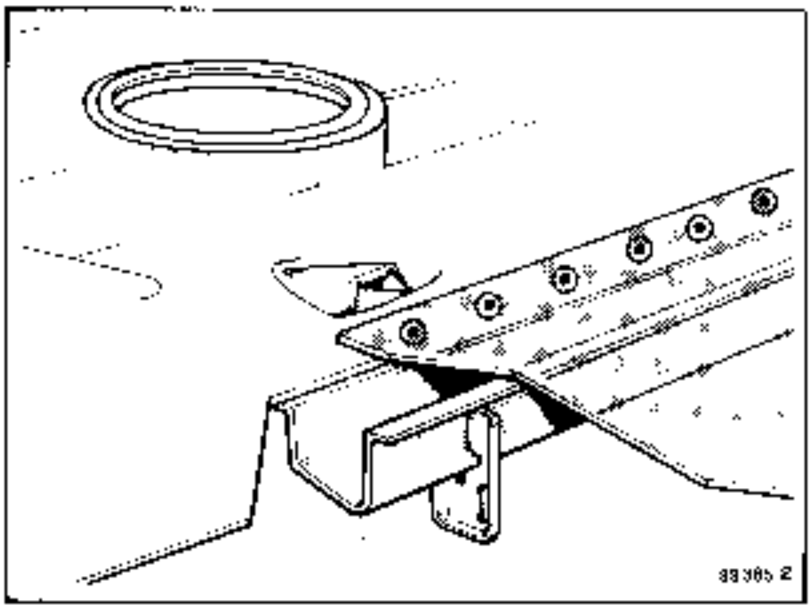
- Adjust the new part and secure it with grip clamps.
- Apply the spot welds. The corresponding values of (e) and (H) are given under each drawing.

WELDING

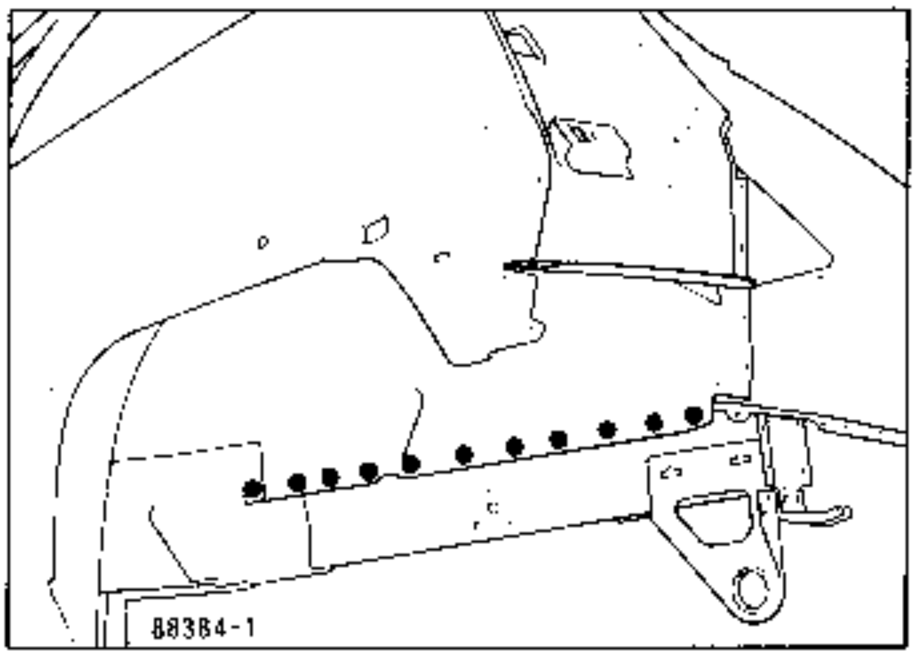


86382-2

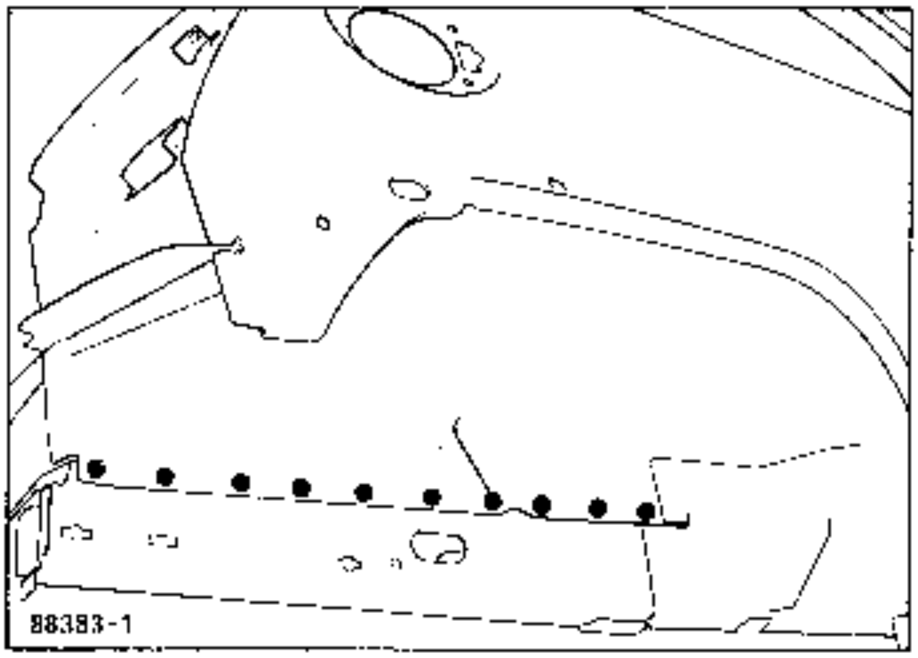




88385-2



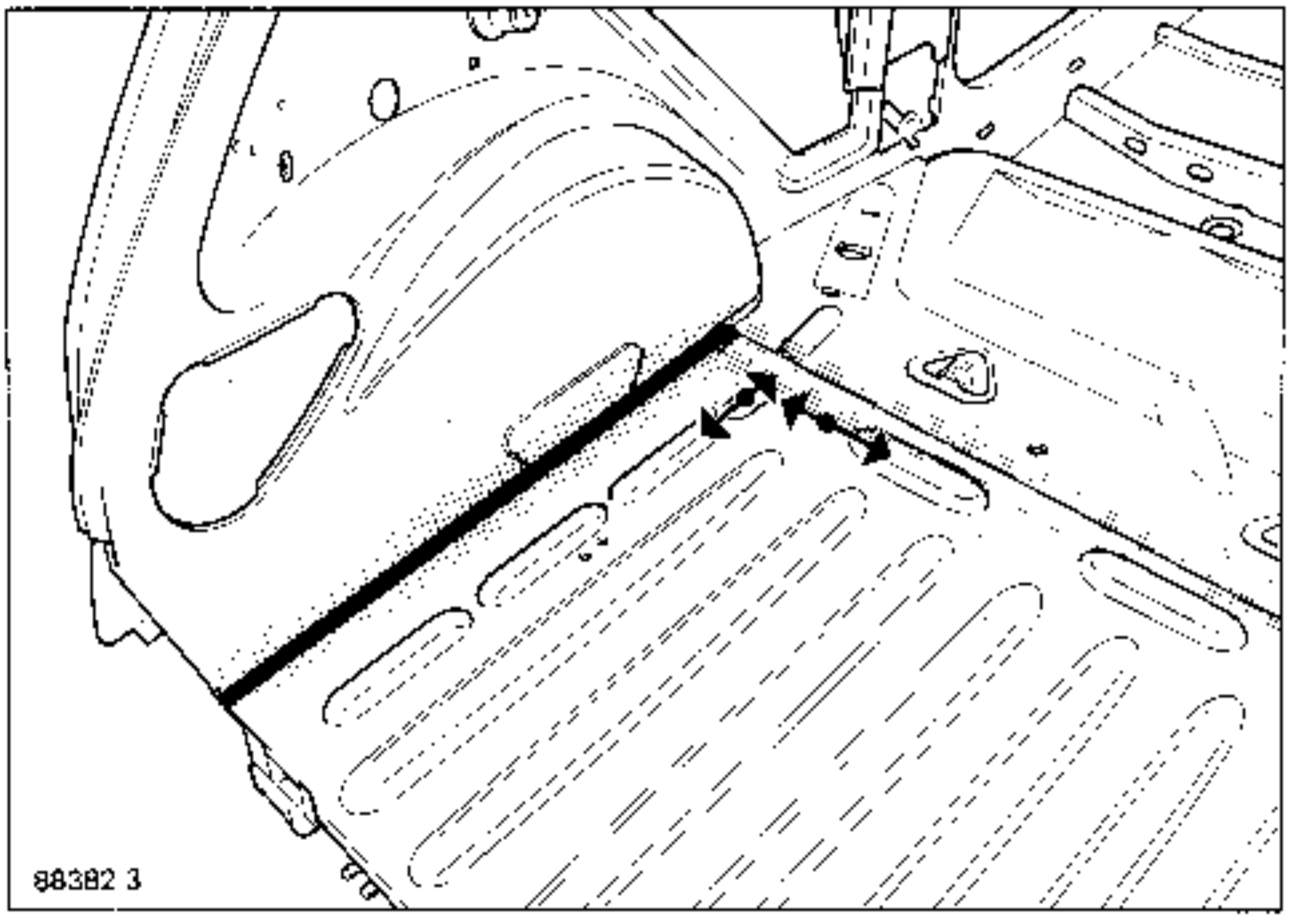
88384-1



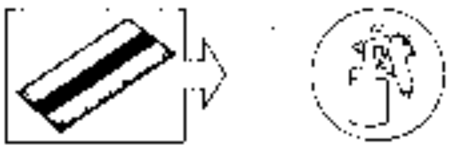
88383-1

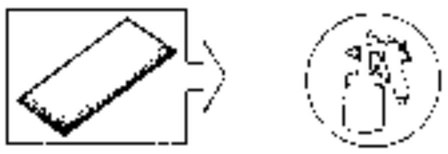
(See the section "Replacing the Rear End Panel" for the continuation of this operation).

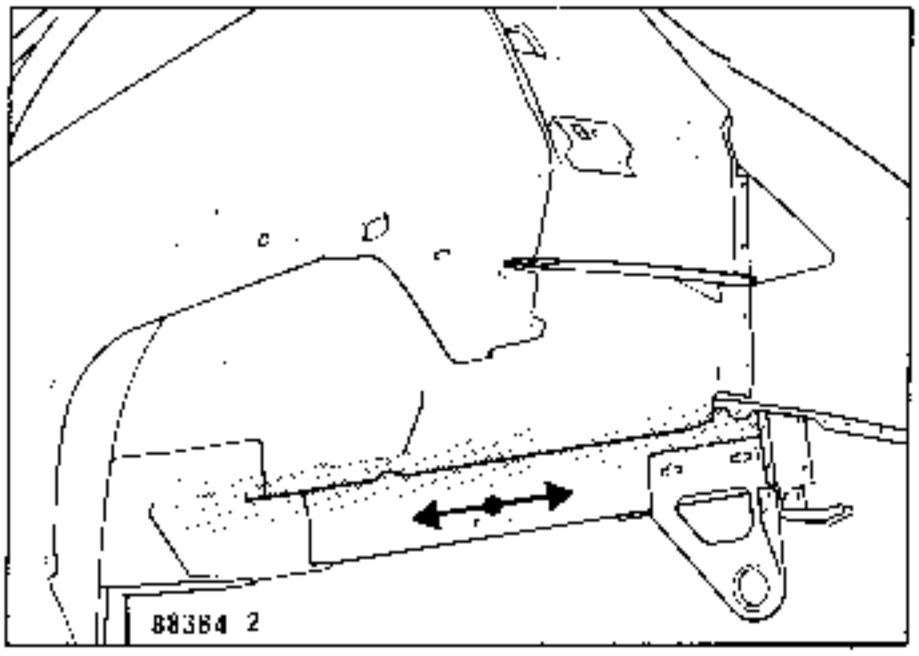
PAINTING



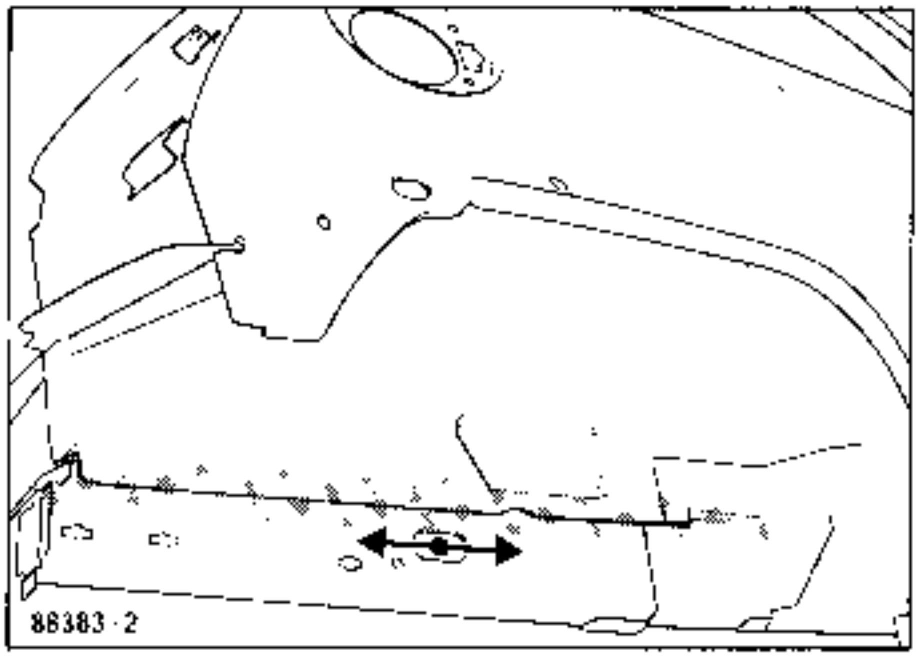
88382 3







88384 2



88383 2

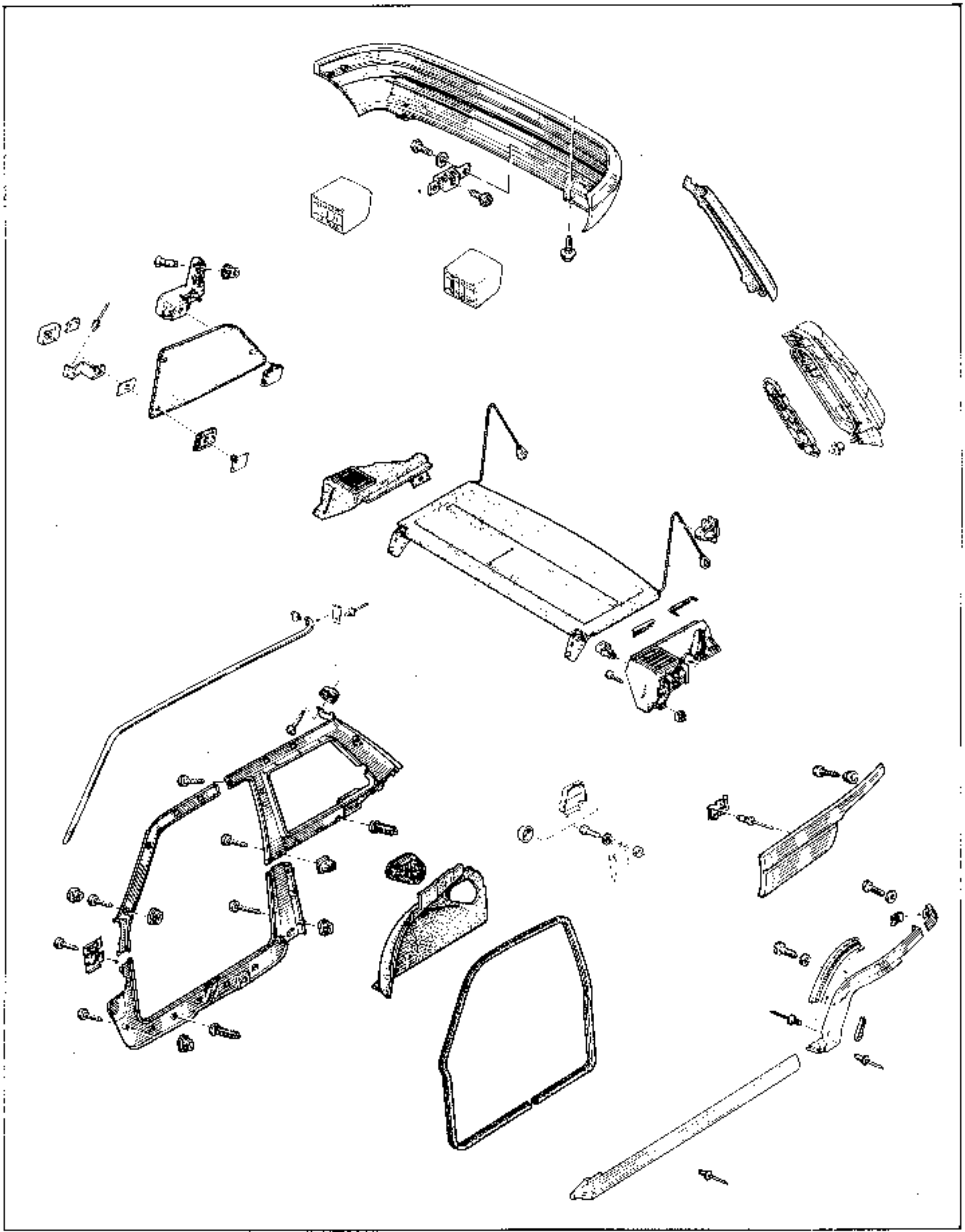
Carry out paint sequence No. 5 (see "Painting" section) followed by paint sequence No. 3.

Spray anti-chipping mastic to the underside of the floor.

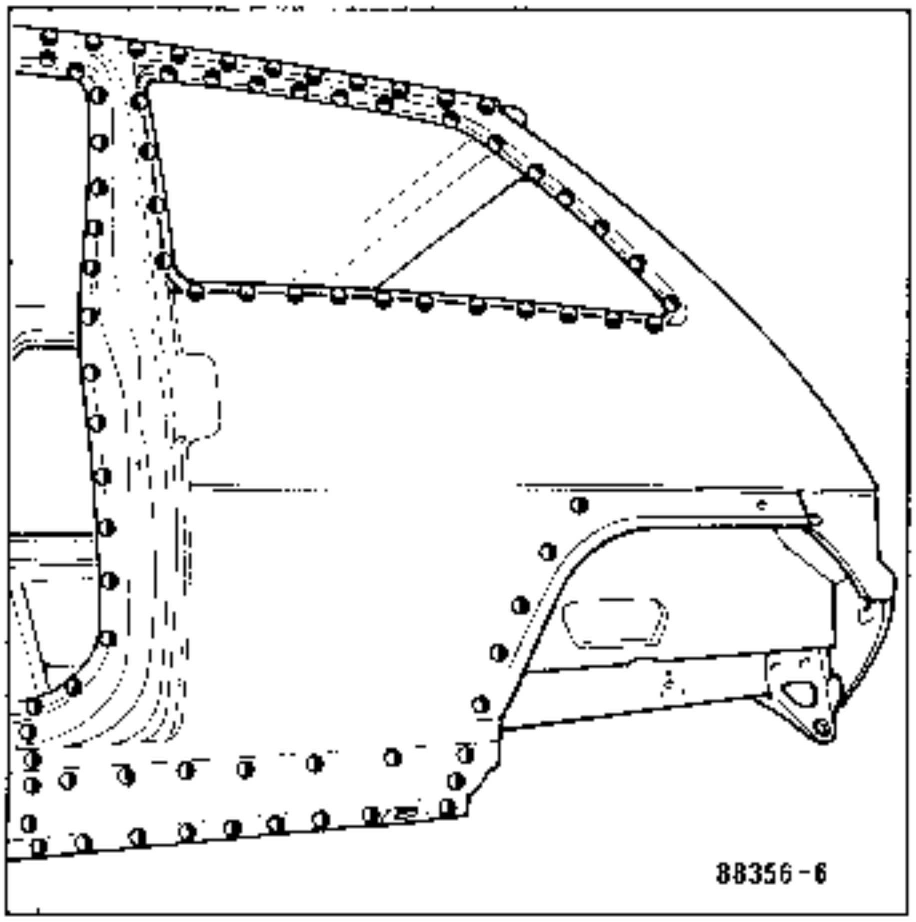
- After painting, apply the hollow section protective treatment in the side members and the cross member.

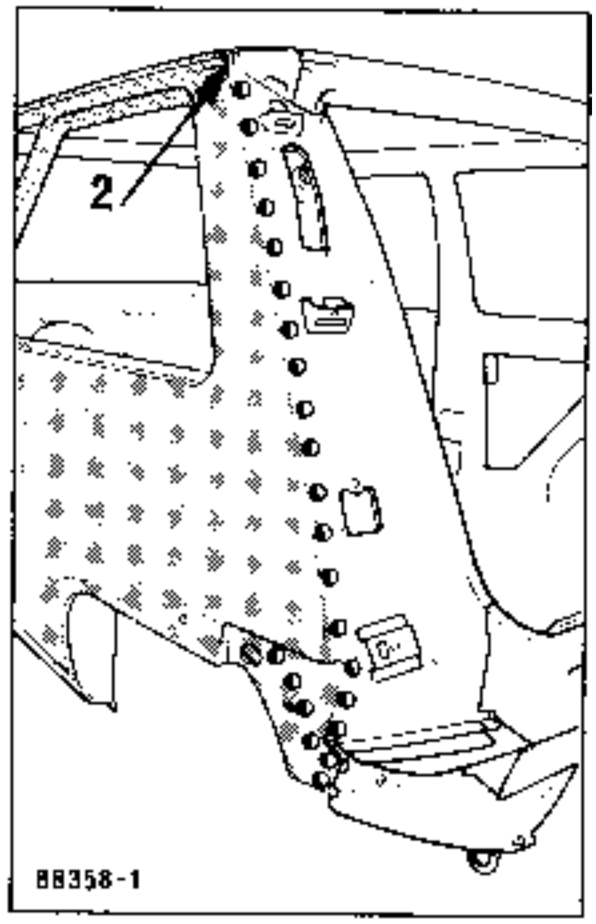
STRIPPING

All these parts are to be placed in a trolley bin.

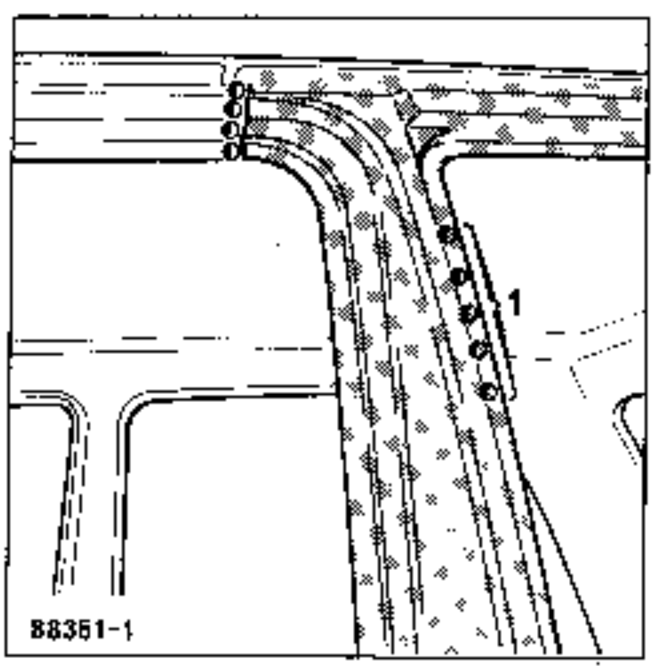


REMOVING THE WING PANEL





Grind back the brazed joint (2).



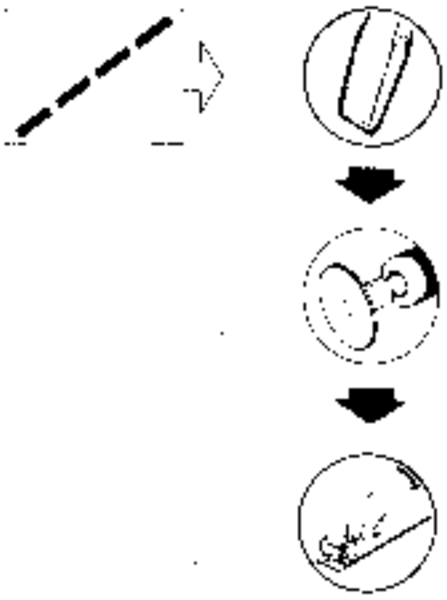
NOTE :

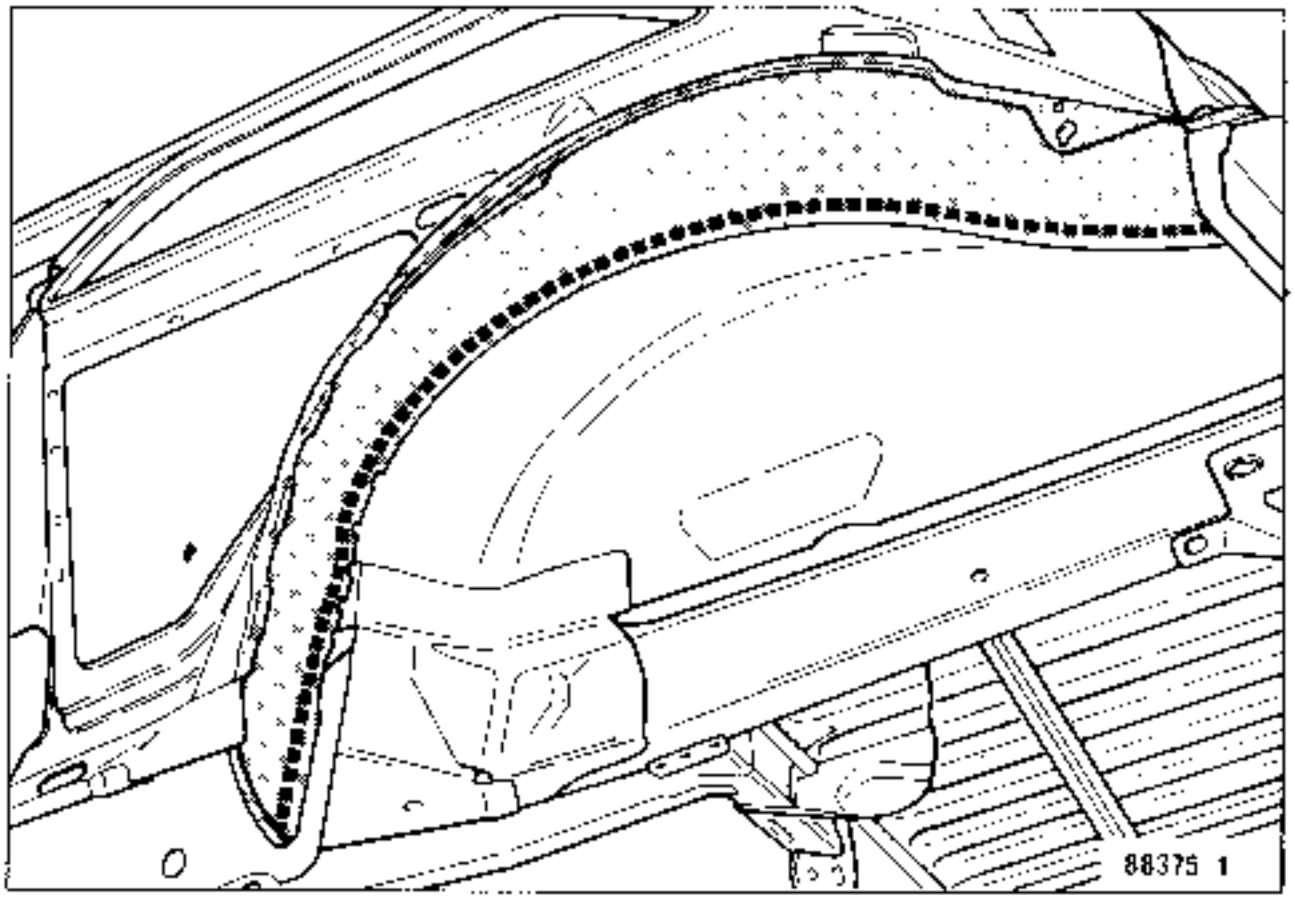
Drill through two thicknesses in the area round the seat belt anchor point (1).

The new part is supplied with the anchor point already fitted.

- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).

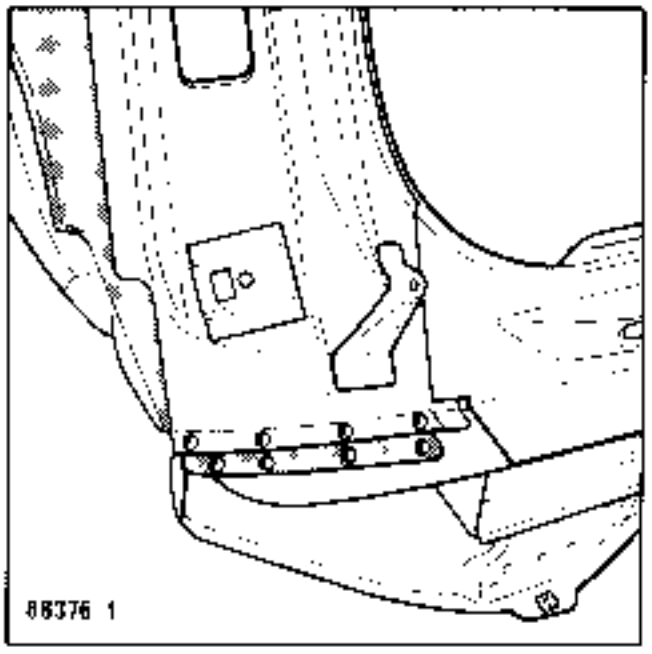
CUTTING - FREEING THE WHEEL ARCH

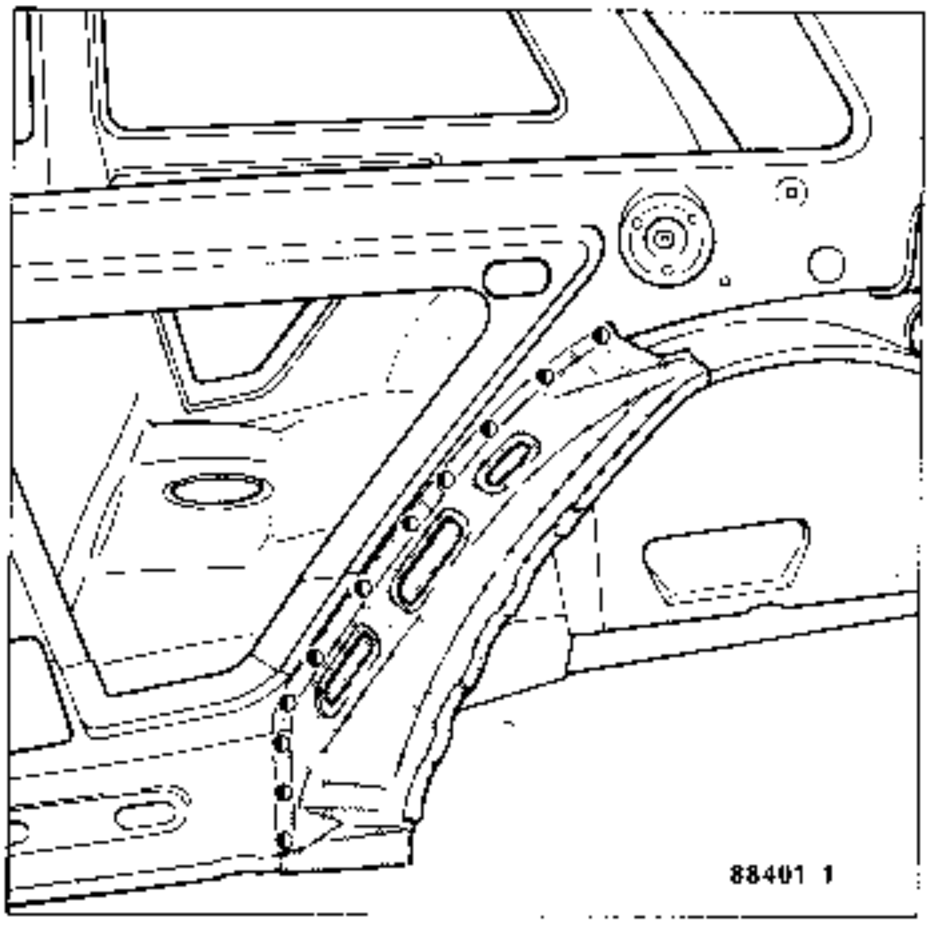




NOTE :

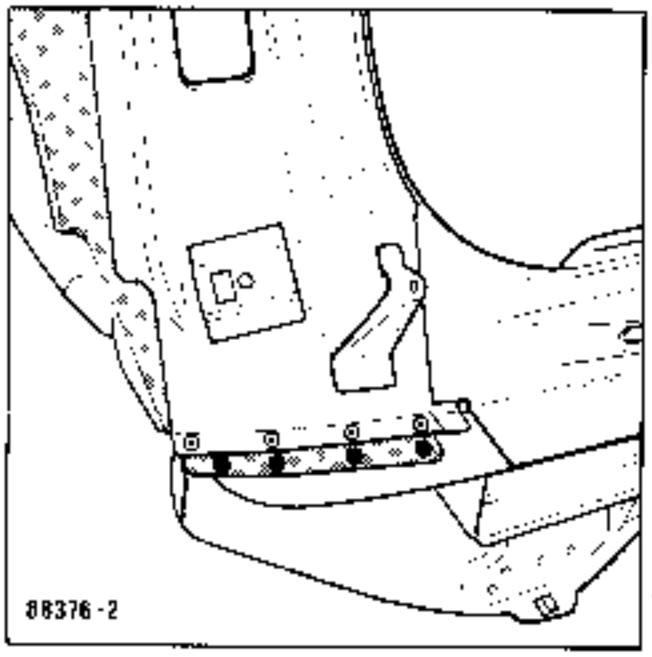
So as not to distort the support panel, use a 76 mm Ø grinding wheel 3,2 mm thick to grind back the spot welds on the strips of panelling remaining on the vehicle.

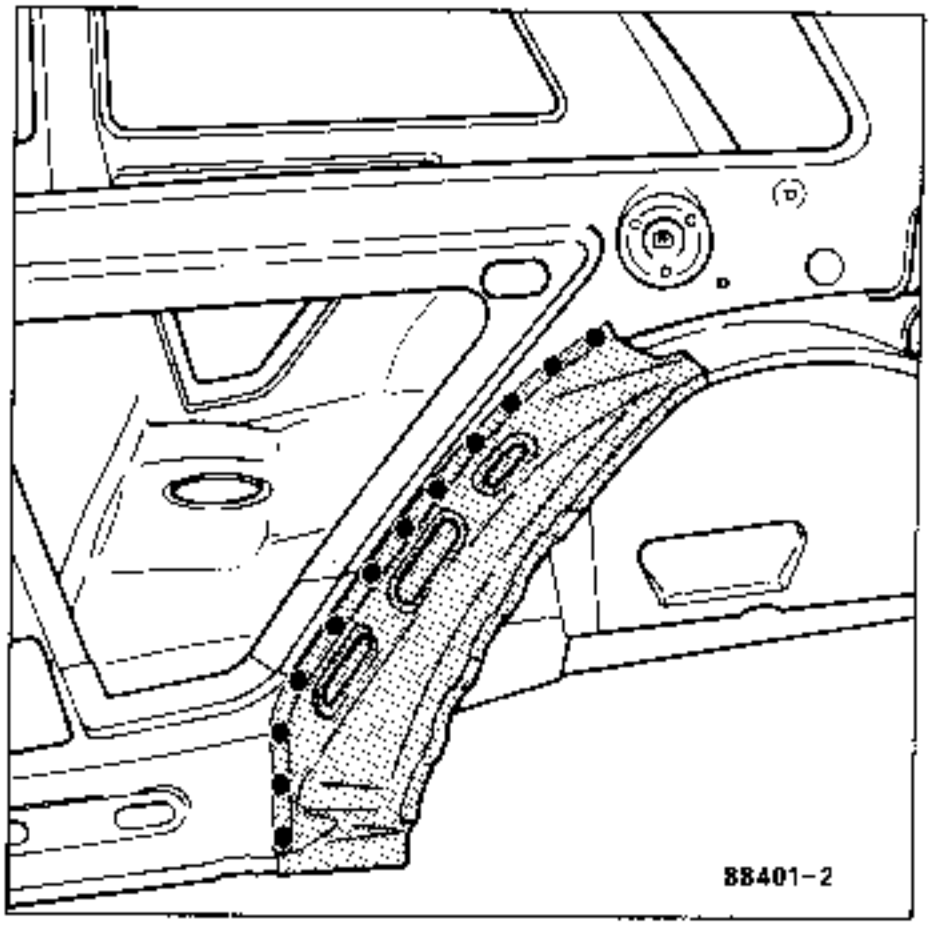


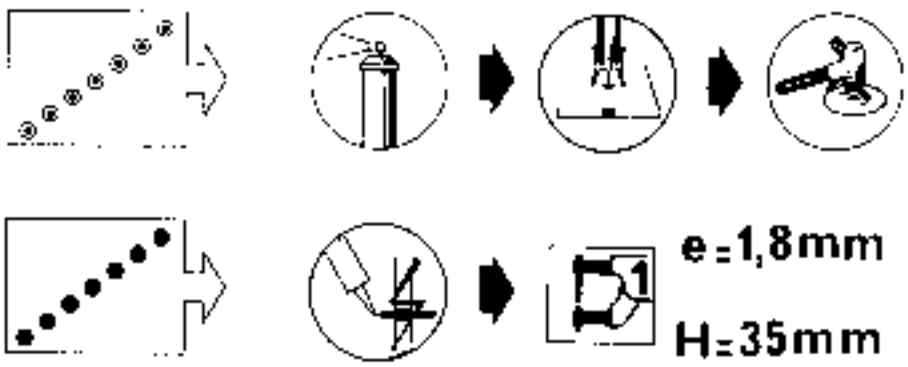


- Remove the damaged part by following the methods represented by the above symbols (see description of symbols).

WELDING

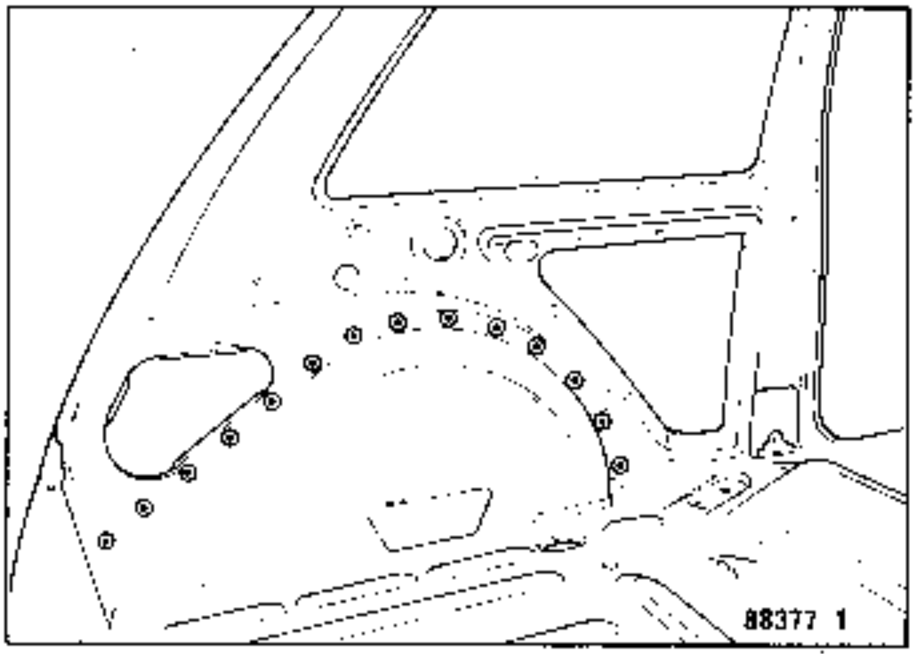


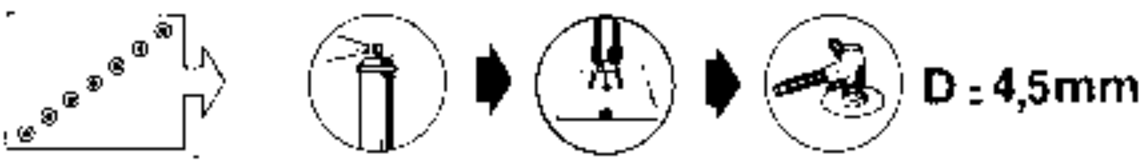


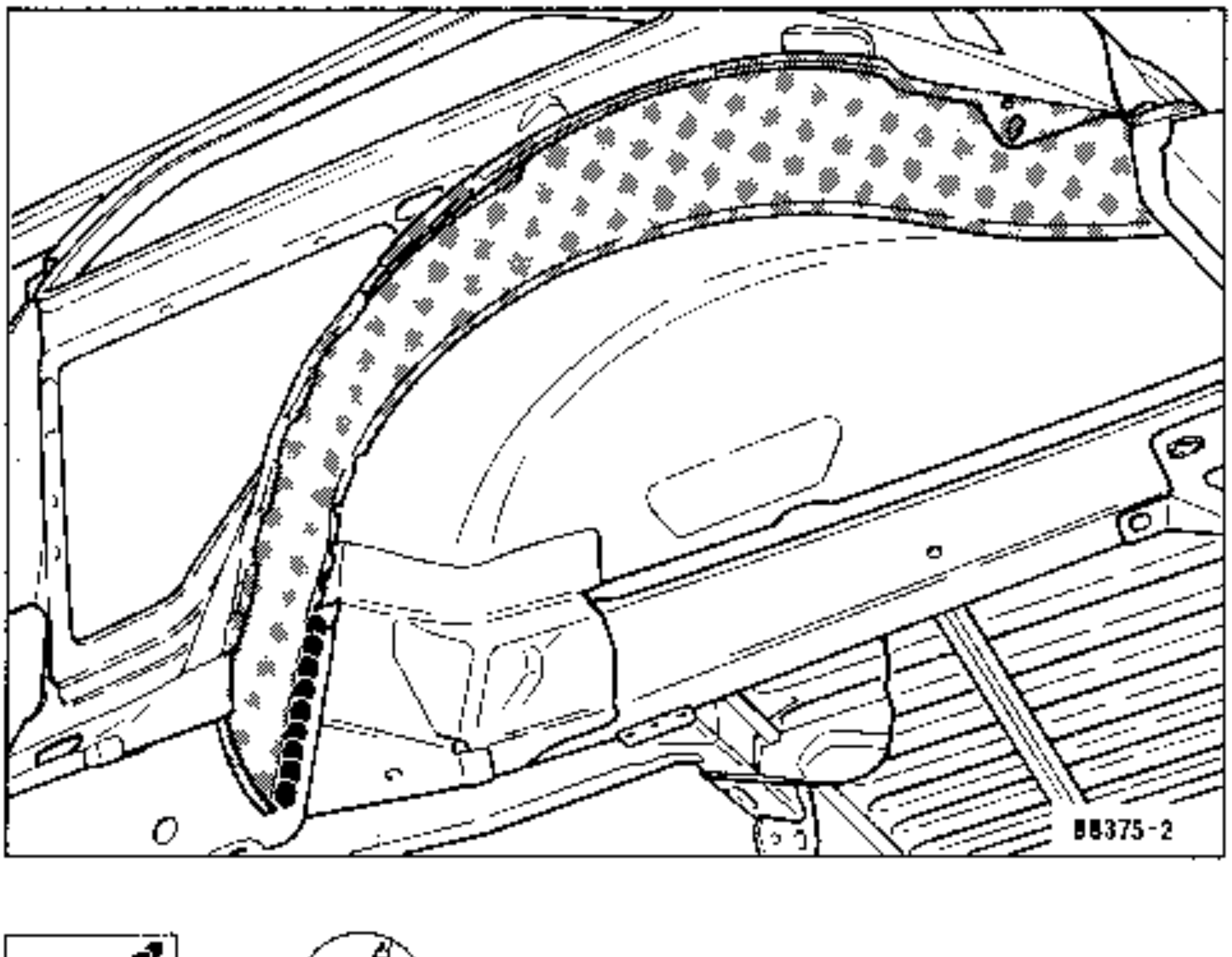


PREPARATION PRIOR TO WELDING

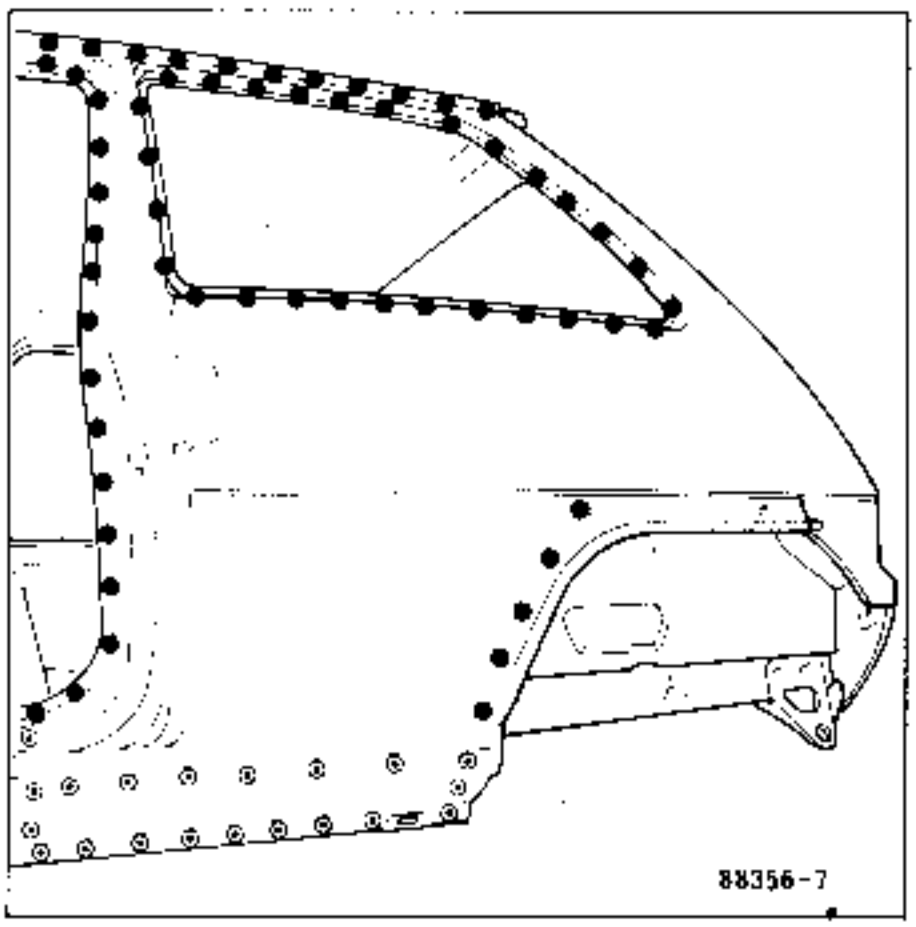
- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Apply zinc paint to the areas to be plug welded.
- Adjust the new part and secure it with grip clamps.

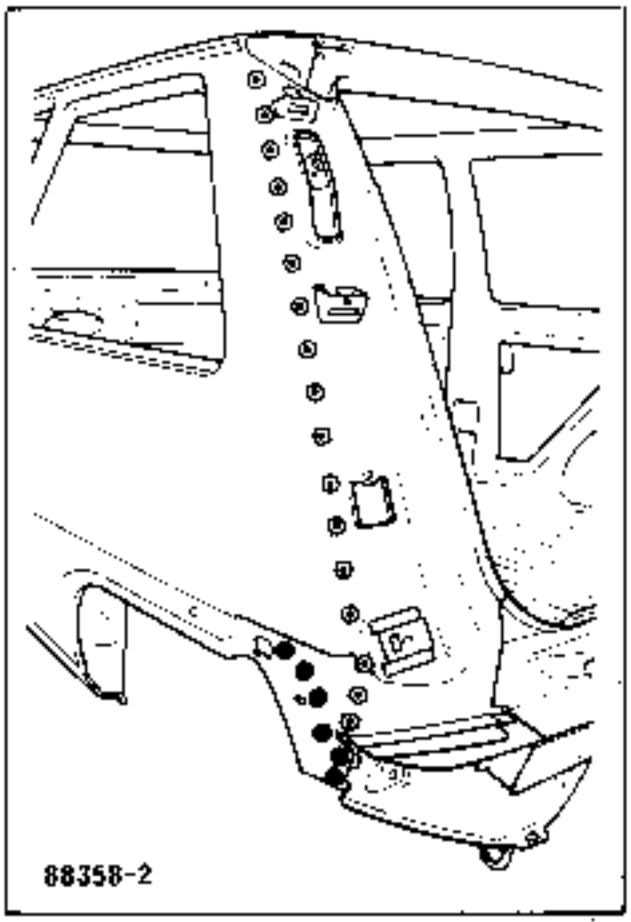

88377 1

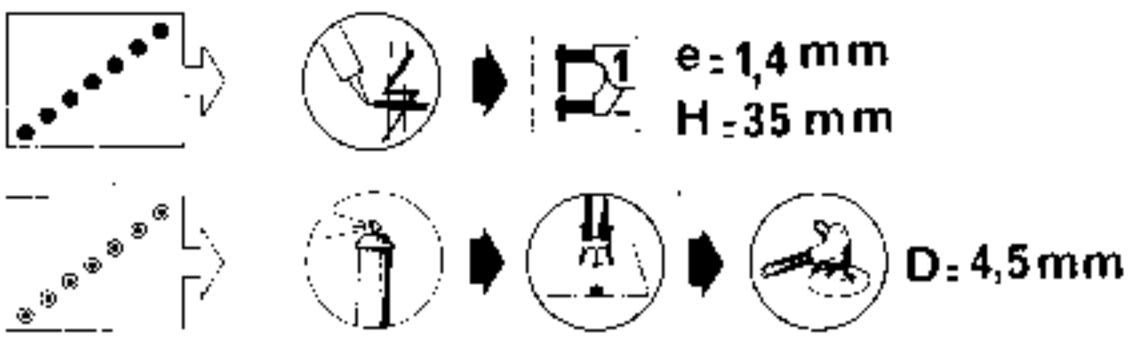

D : 4,5mm

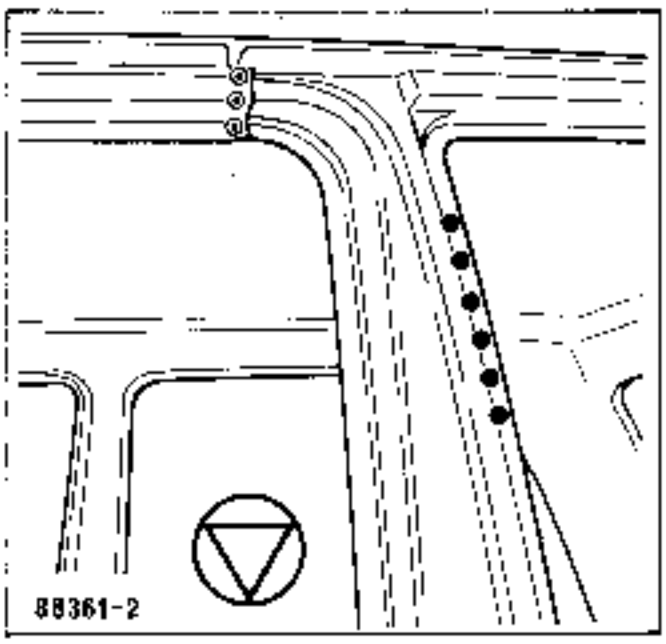

88375-2

WELDING





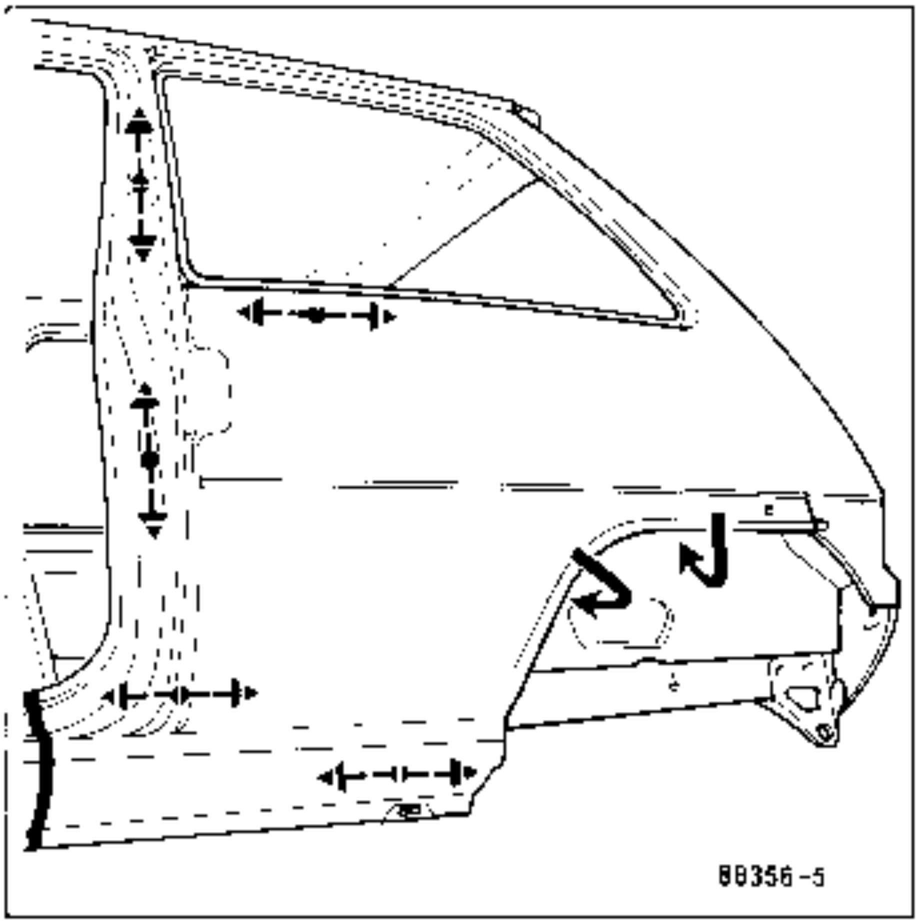


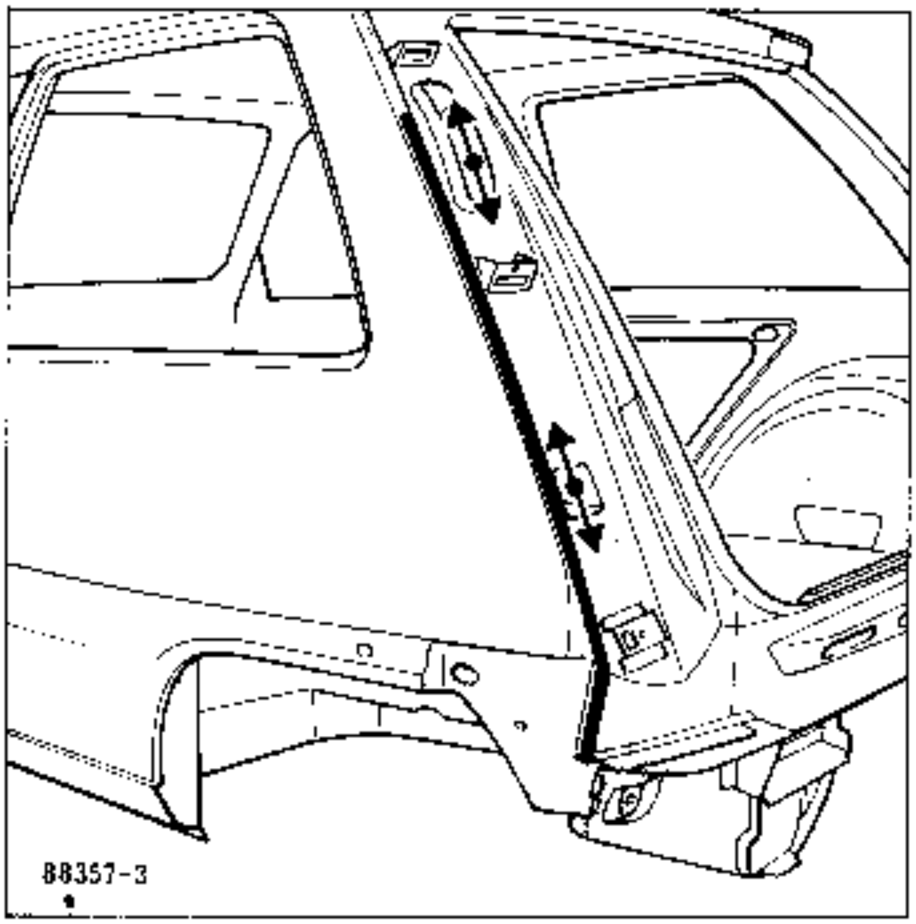


PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description symbols at the beginning of this section).
- Apply zinc paint to the areas to be plug welded.
- Adjust the new part and secure it with grip clamps.

PAINTING





Carry out paint sequence No. 5 (See "Painting" section) followed by paint sequence No. 3

After painting apply hollow section protective treatment through the inside holes near the areas which have been welded.

NOTE :

It is important to spray anti-chipping mastic under the new wheel arch.

DAMAGE DIAGNOSIS

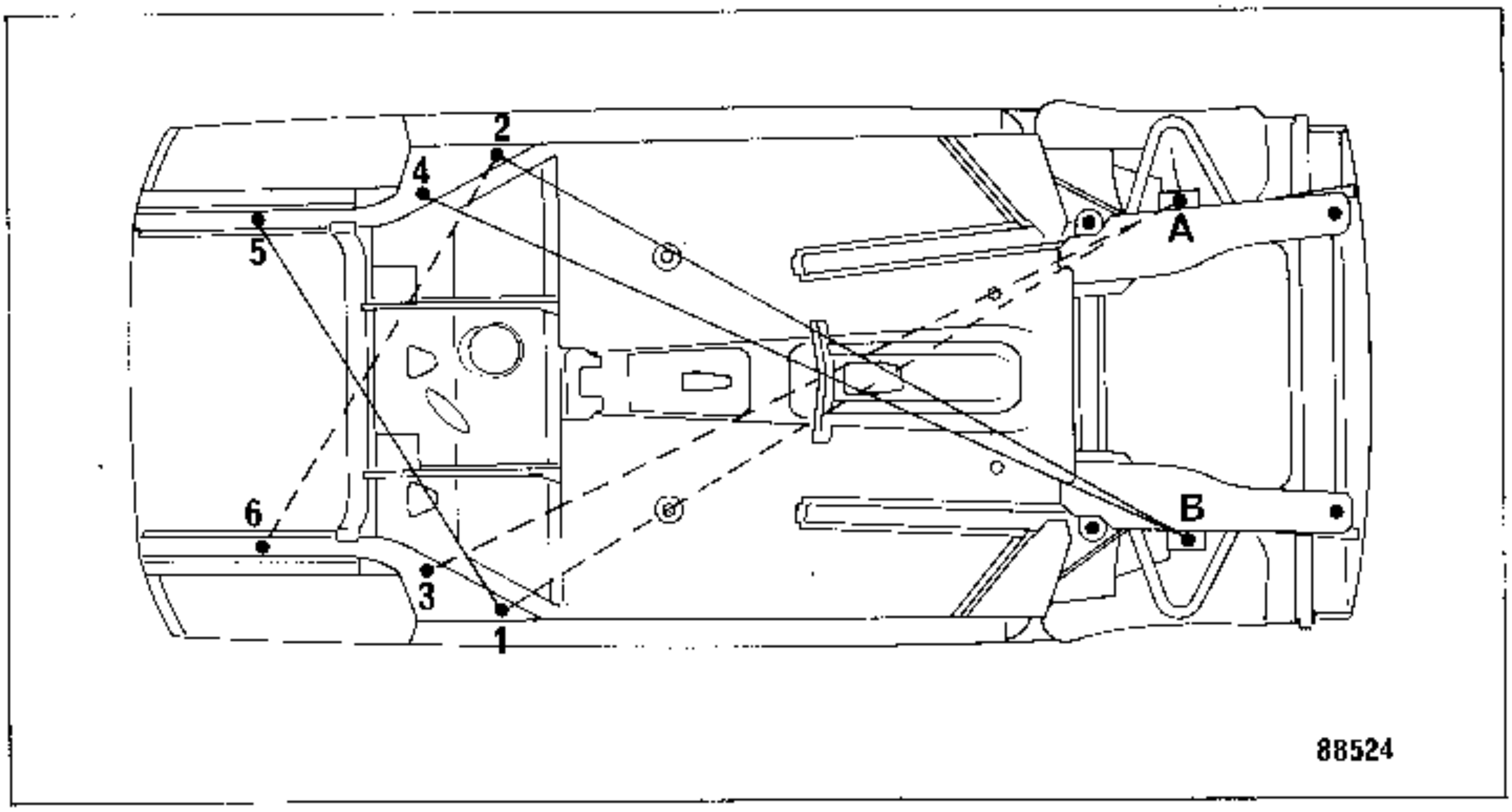
Compare the following diagonals :

A1 - B2
A3 = B4

- If any difference is noted during this check, the vehicle must be placed on the body jig.

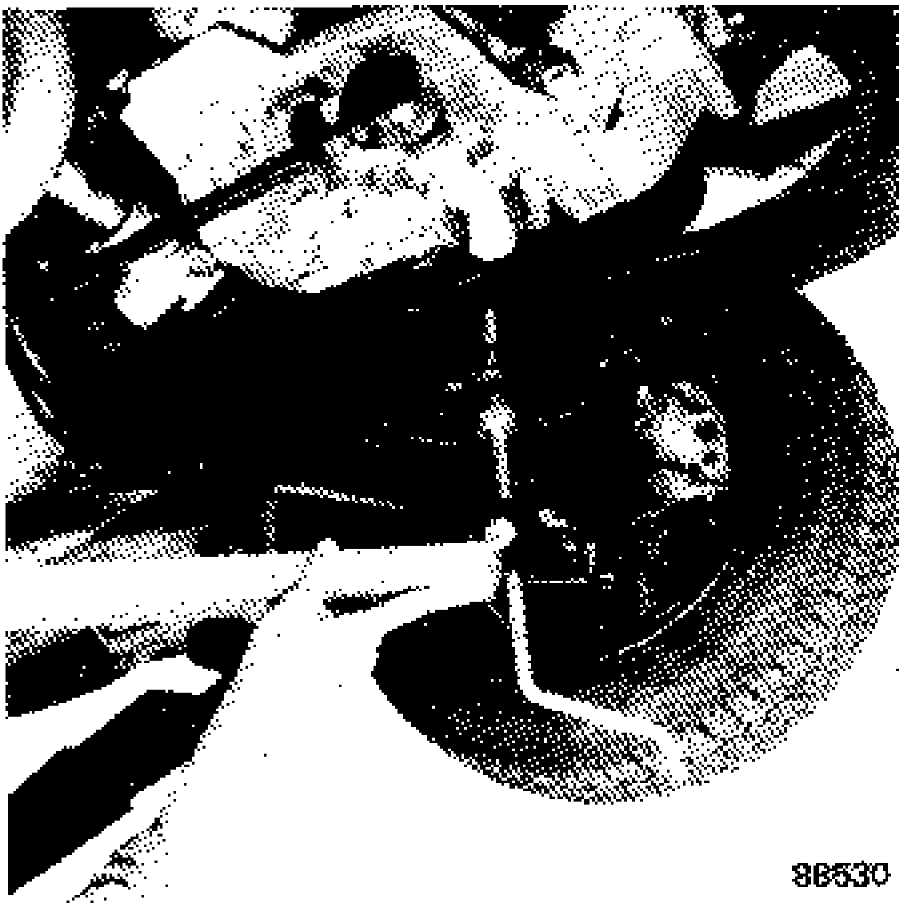
Compare the diagonals :
1-5 = 2-6

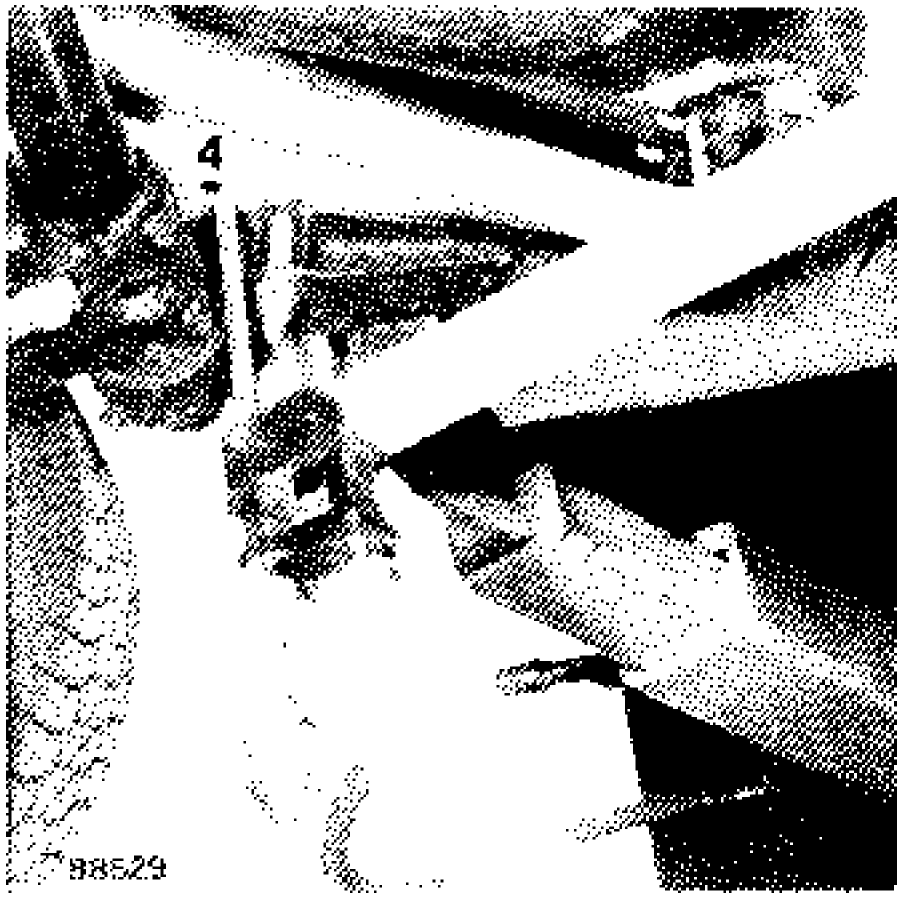
- If any difference is noted, it is not necessary to place the vehicle on the body jig.
- But it is necessary to check the axle geometries.



CHECKING THE DIAGONALS A1 = B2

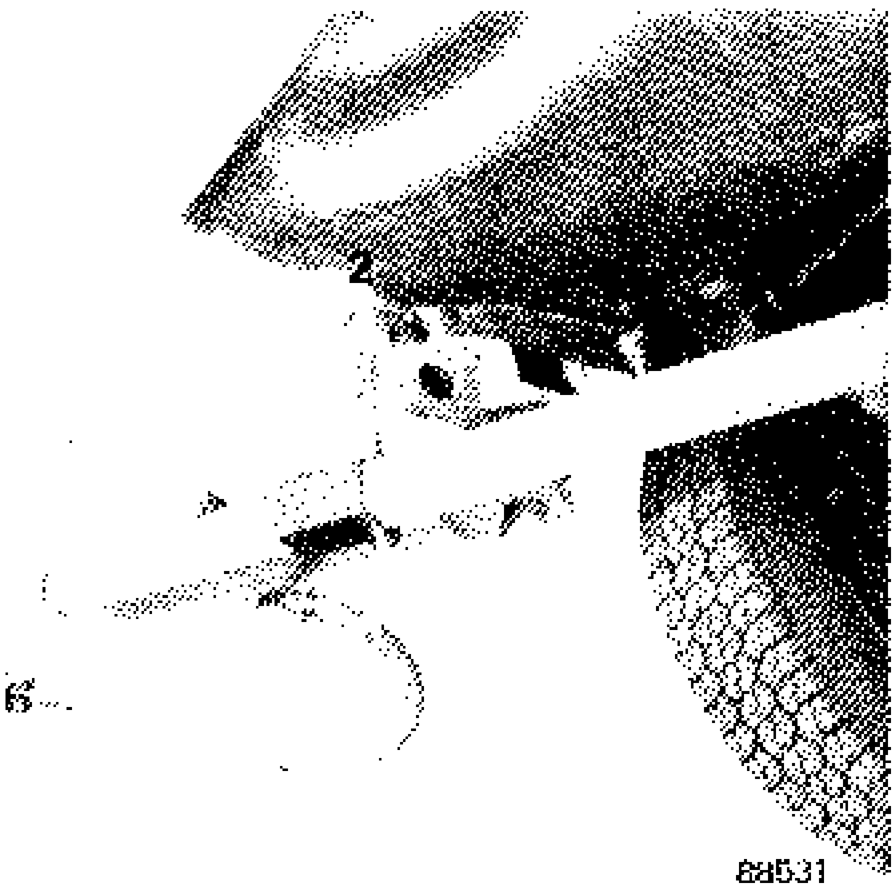
DAMAGE DIAGNOSIS

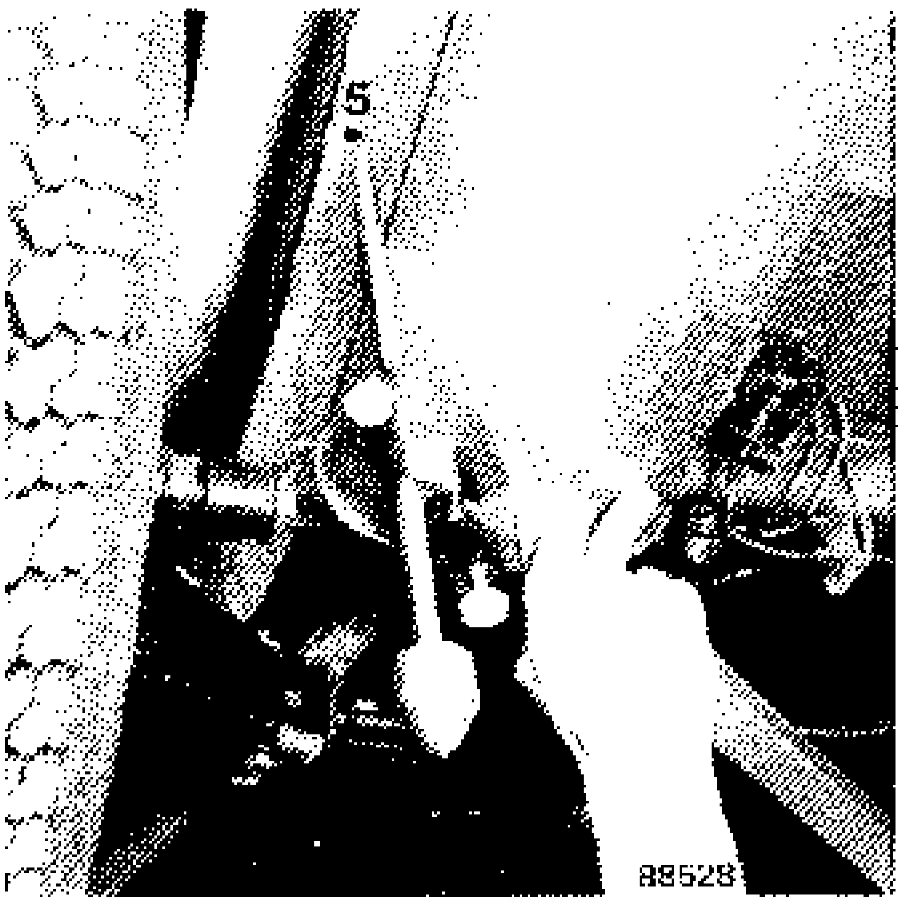




CHECKING THE DIAGONALS A3 = B4

The positions of the ends of the side members are to be checked by comparing diagonals 1-5 = 2-6

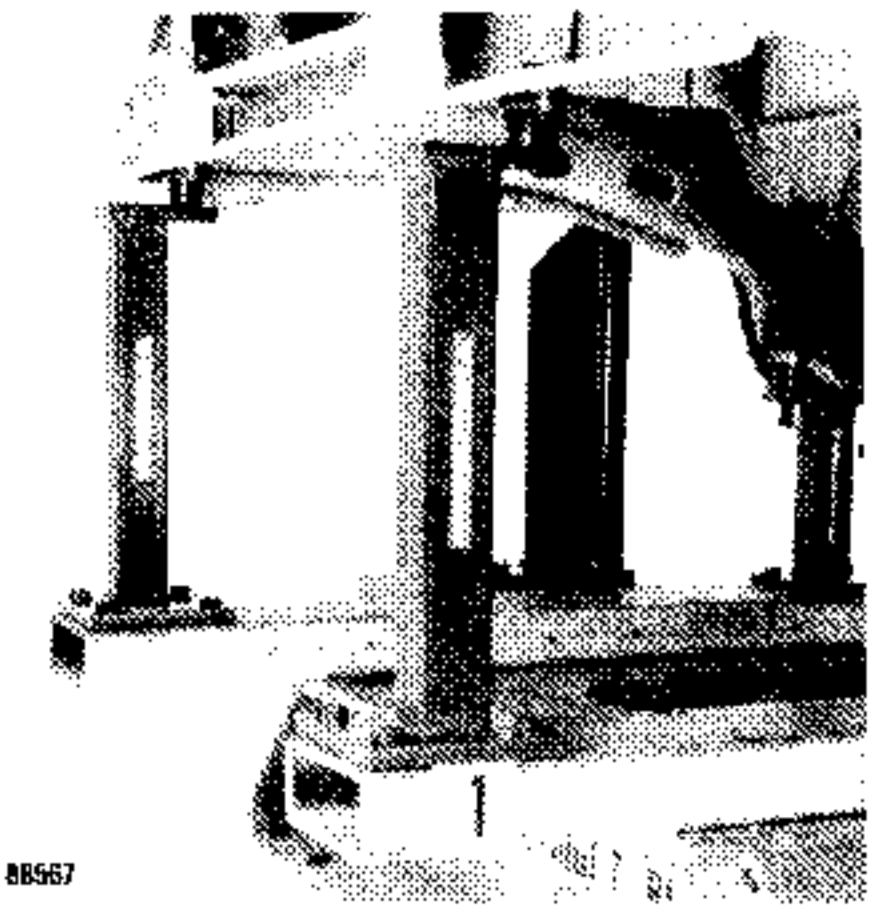


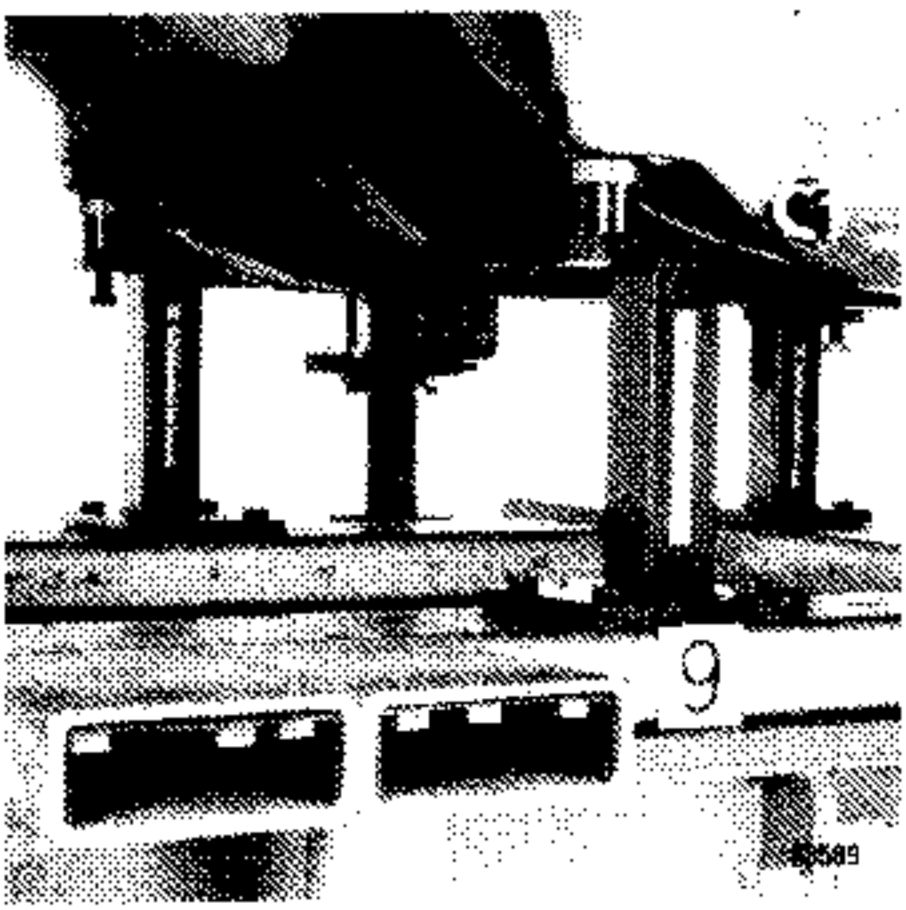


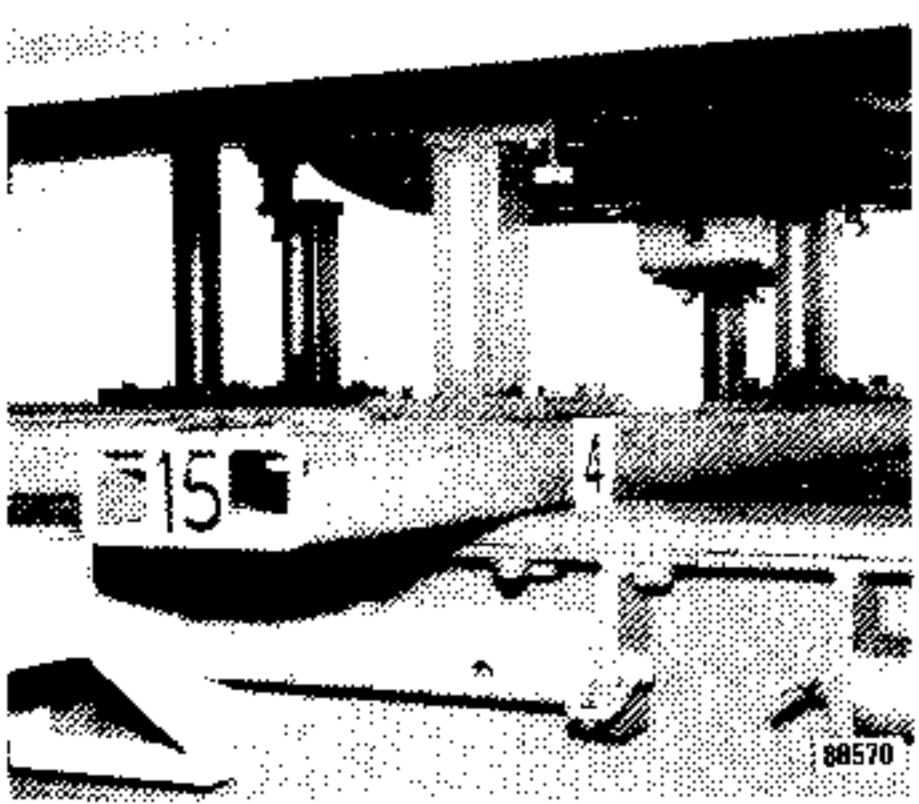
CHECKING THE DIAGONALS 1-5 = 2-6

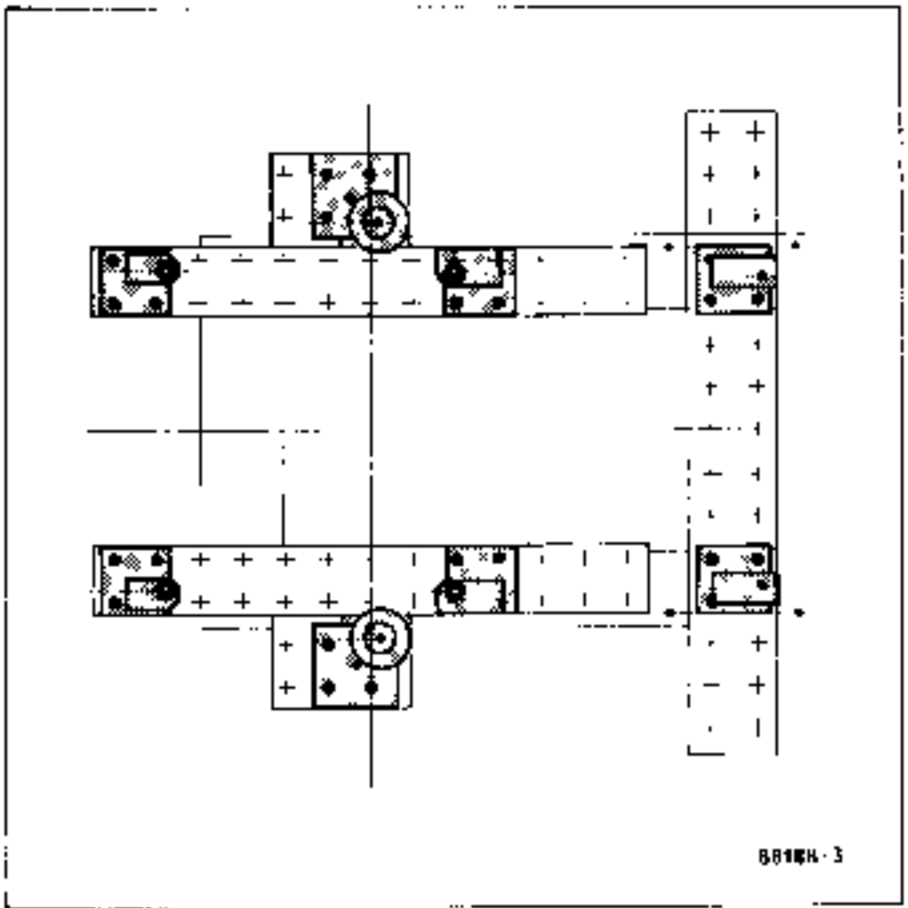
THIS OPERATION IS CARRIED OUT ON THE BODY JIG

FRONT SECTION

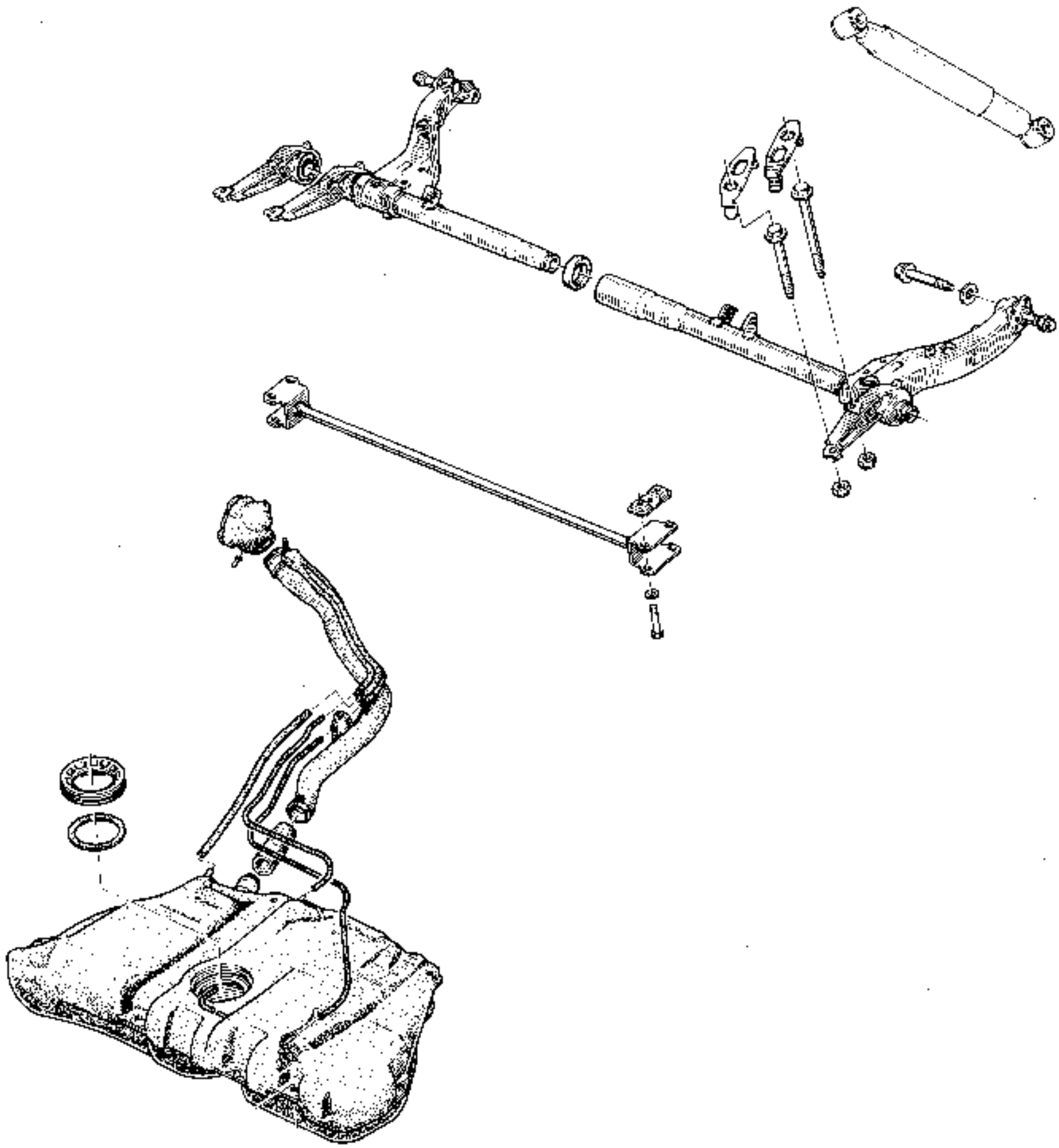




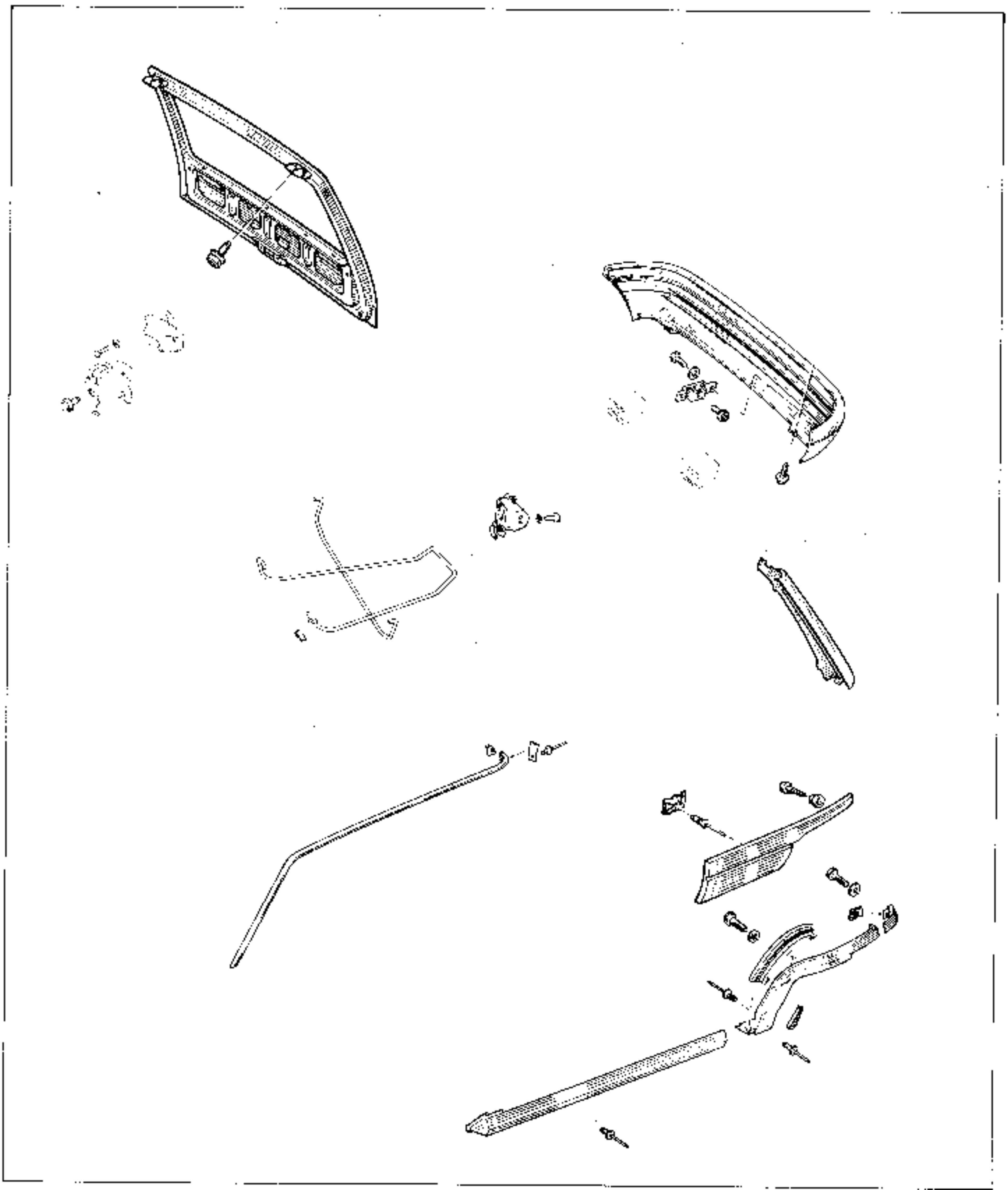




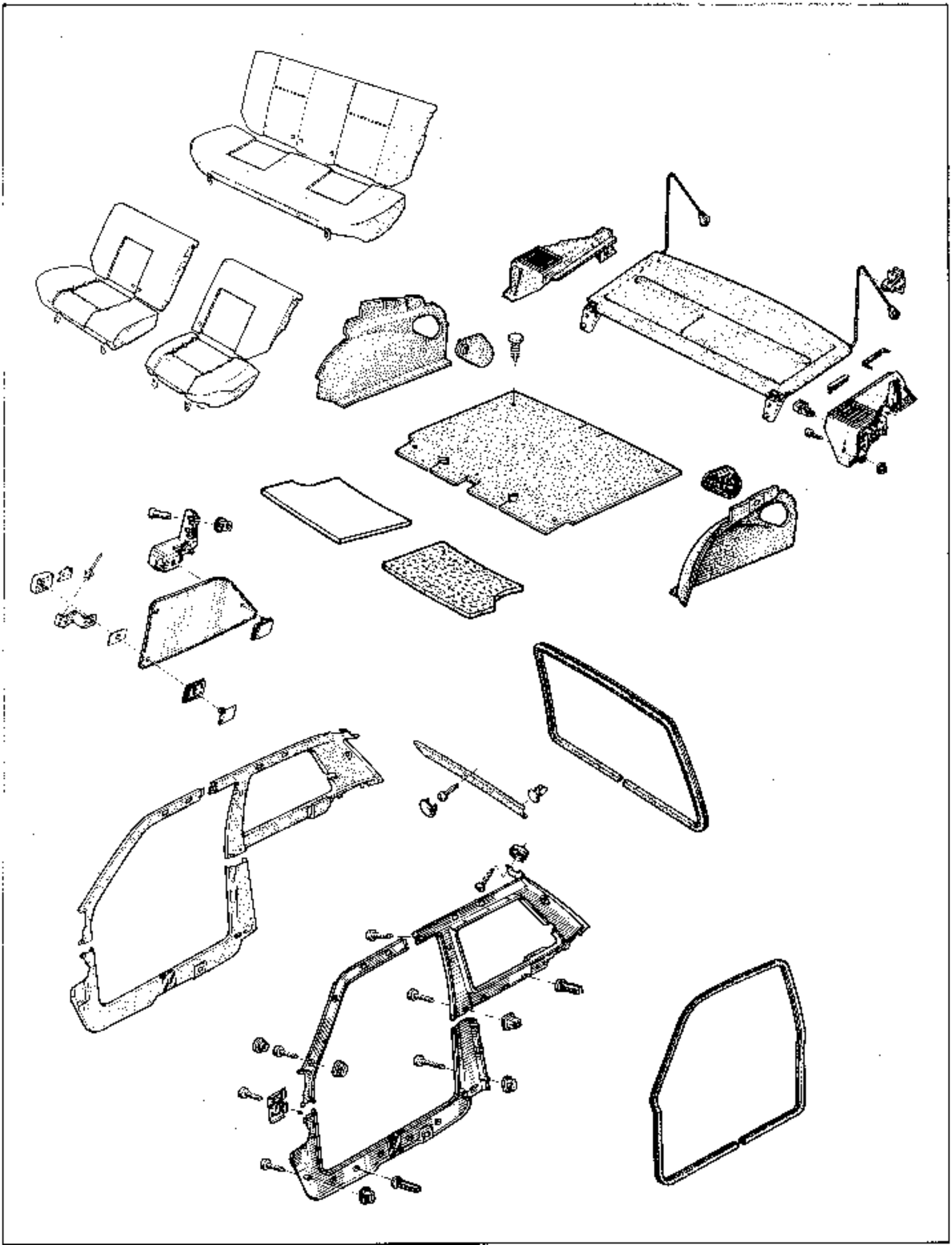
STRIPPING All these parts are to be placed in a trolley bin.



STRIPPING All these parts are to be placed in a trolley bin.



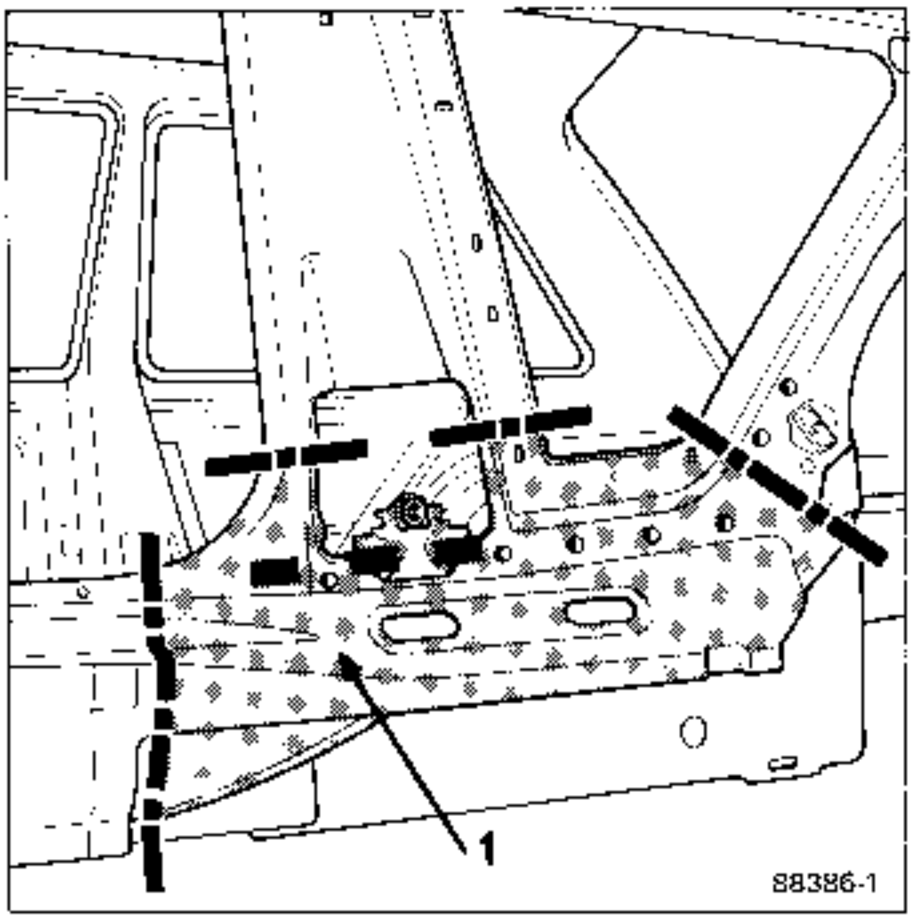
STRIPPING All these parts are to be placed in a trolley bin.

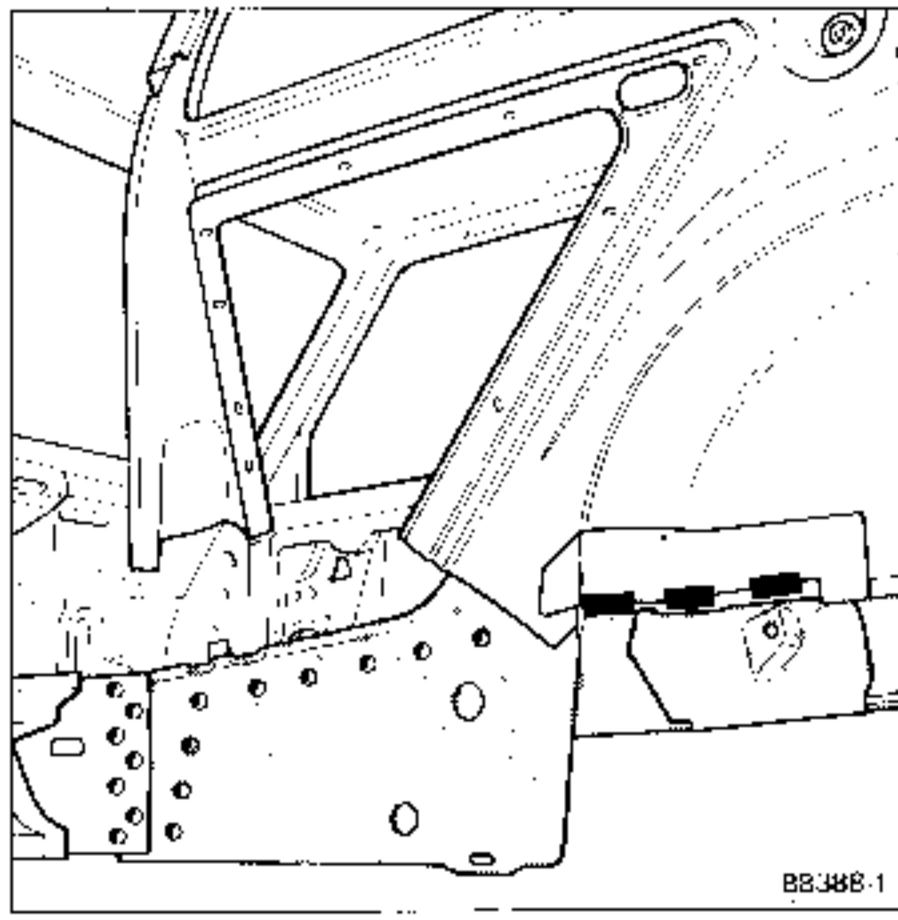


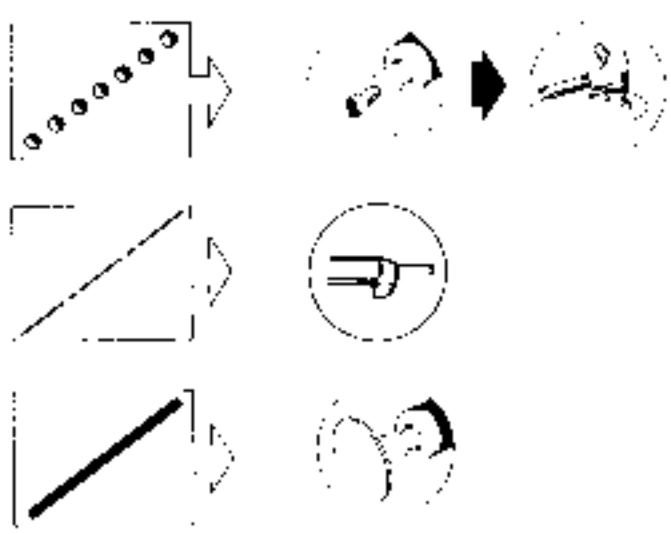
After first removing the rear end panel, part of the floor, the wing panel and the wheel arch (see corresponding section).

This operation is additional to the combined replacement of the rear end panel-floor type 2 - part of the rear wing.

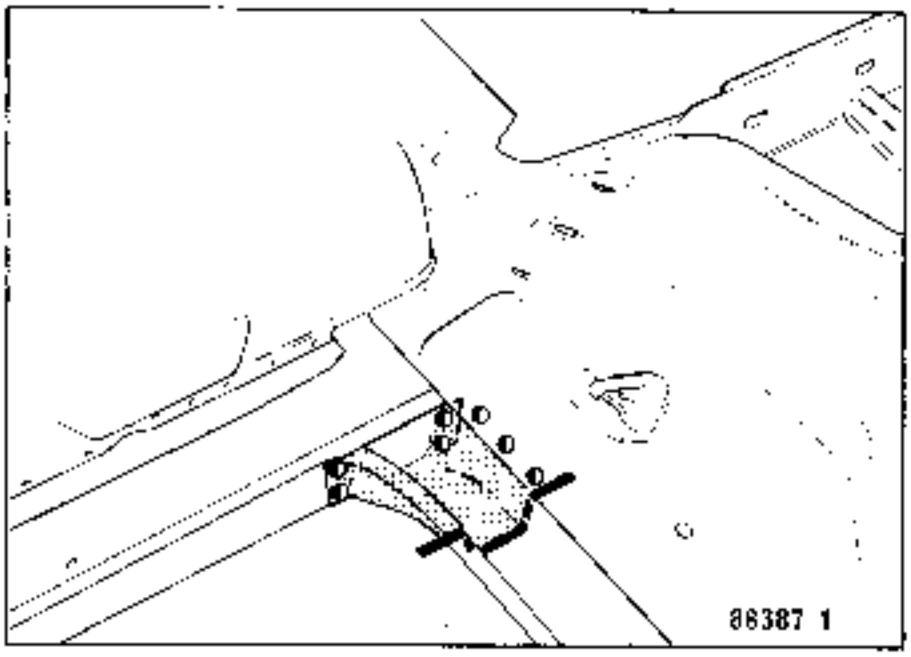
CUTTING - JOINT SEPARATION

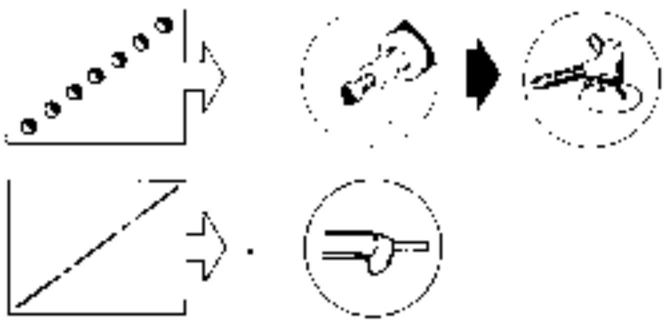


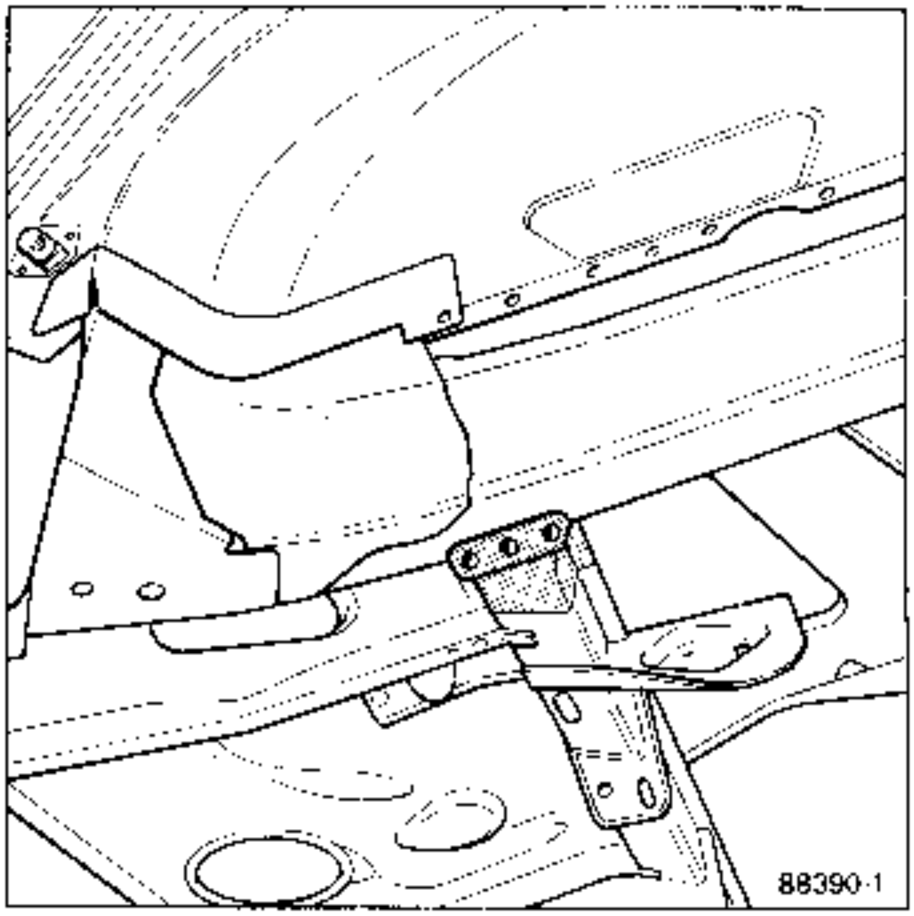




Note : Part (1) is to be removed cleanly as it will be refitted at the end of the operation. To do this, cut out the spot welds with a conical cutter.





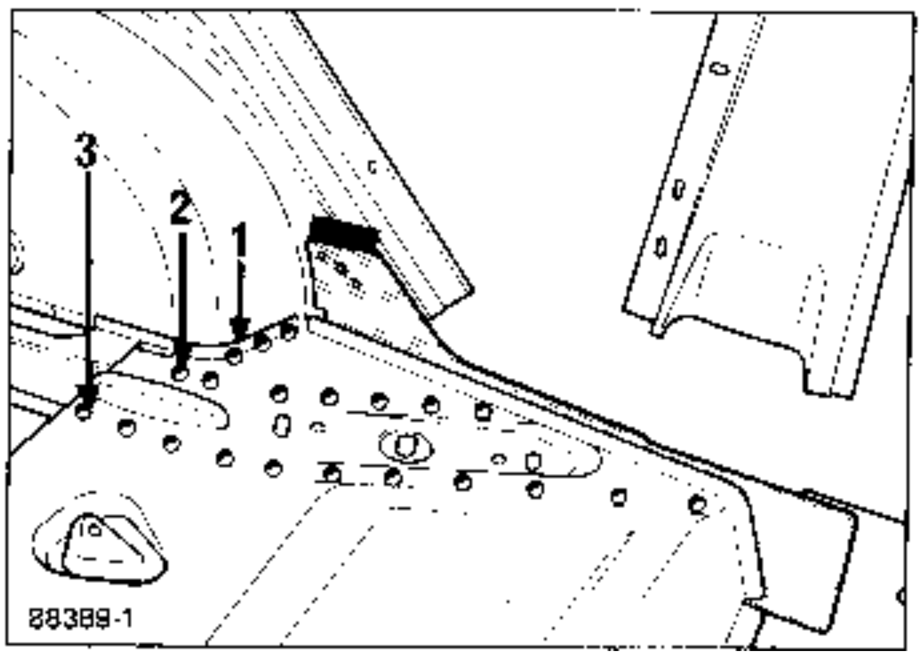


Note : this part of the cross member
is also to be retained.

(1)

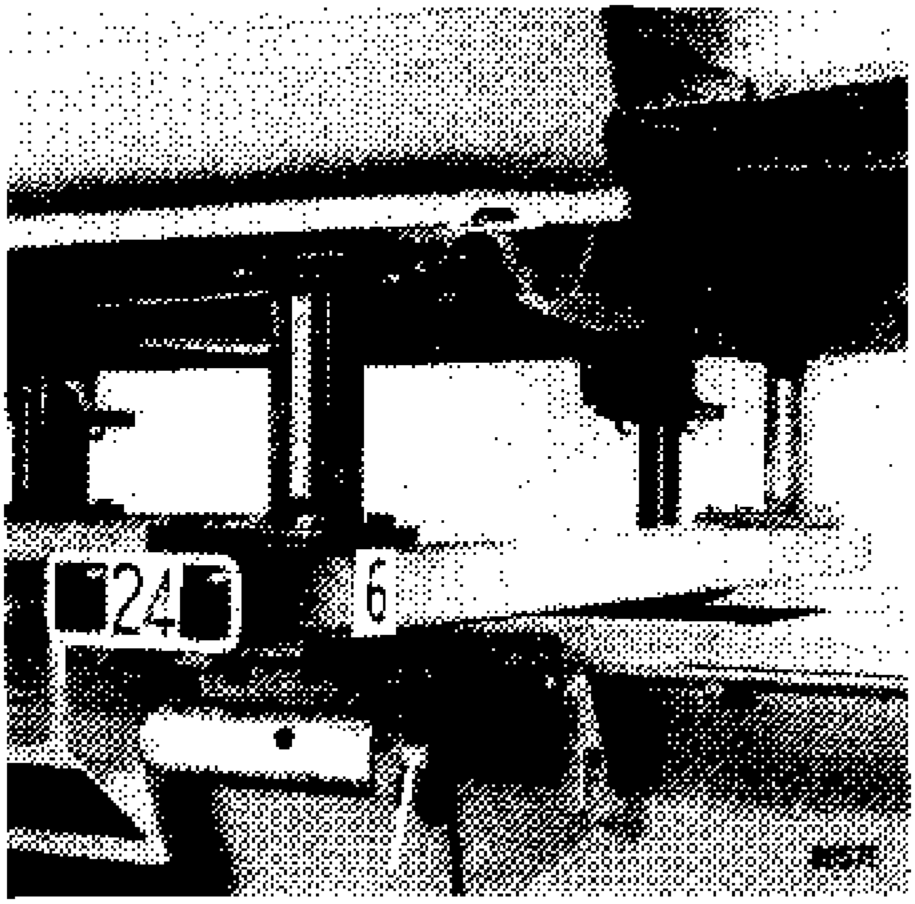
(2)

(3) Use a conical cutter.

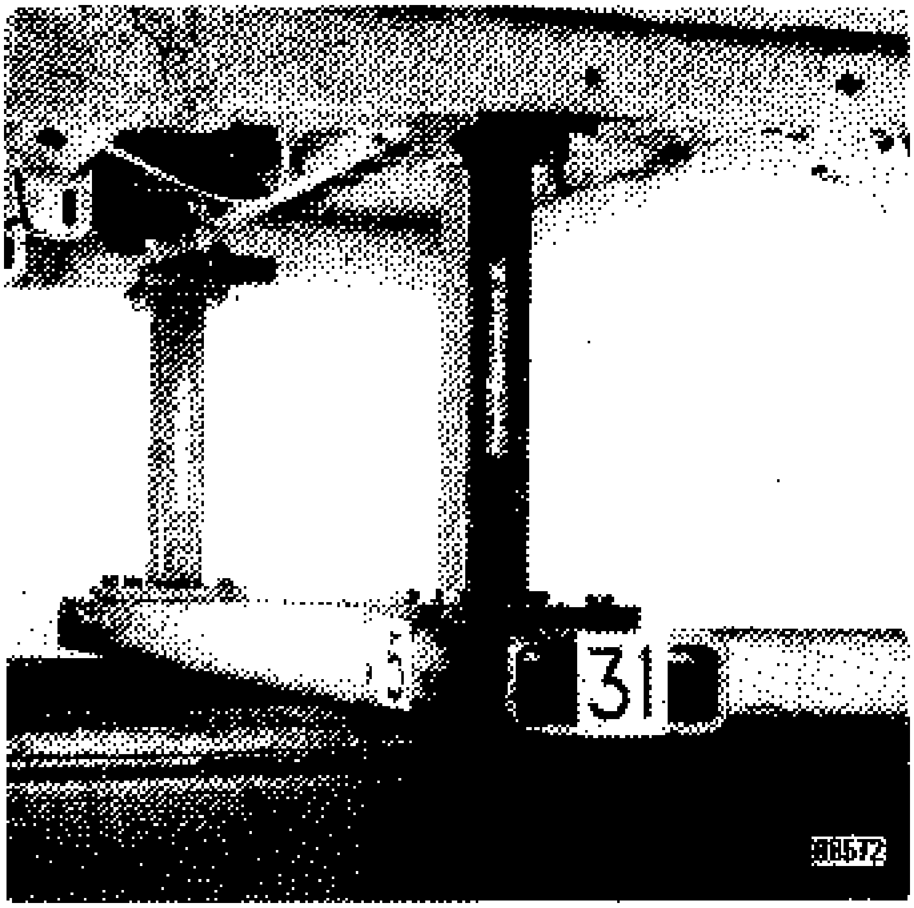


PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded. (Both on the vehicle and on the new parts).
- Apply a coat of electroplastic mastic to the areas to be spot welded (see description of symbols at the beginning of this section).
- Apply zinc paint to the areas to be plug welded.
- Adjust the new part and secure it with grip clamps.

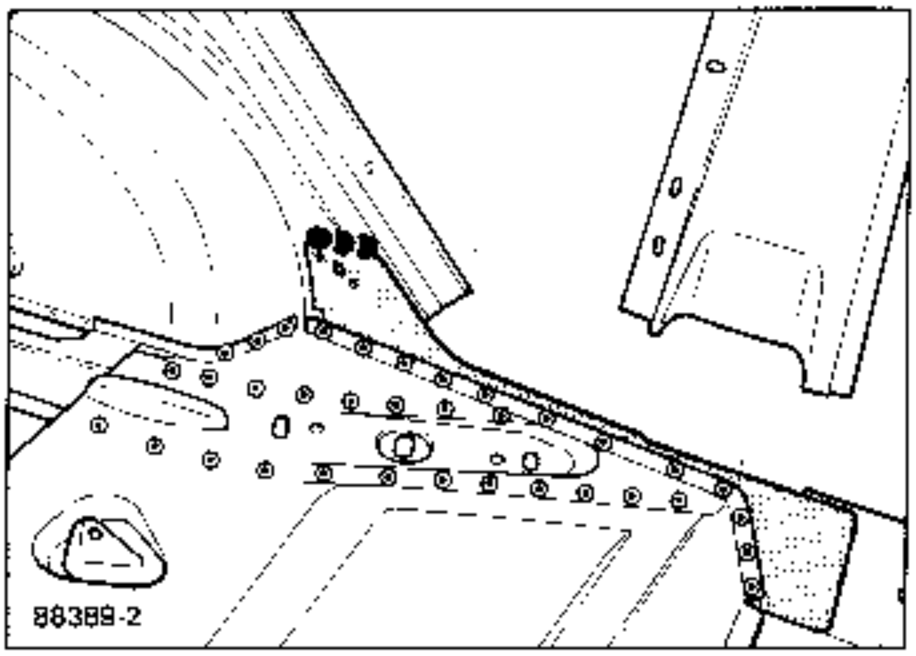


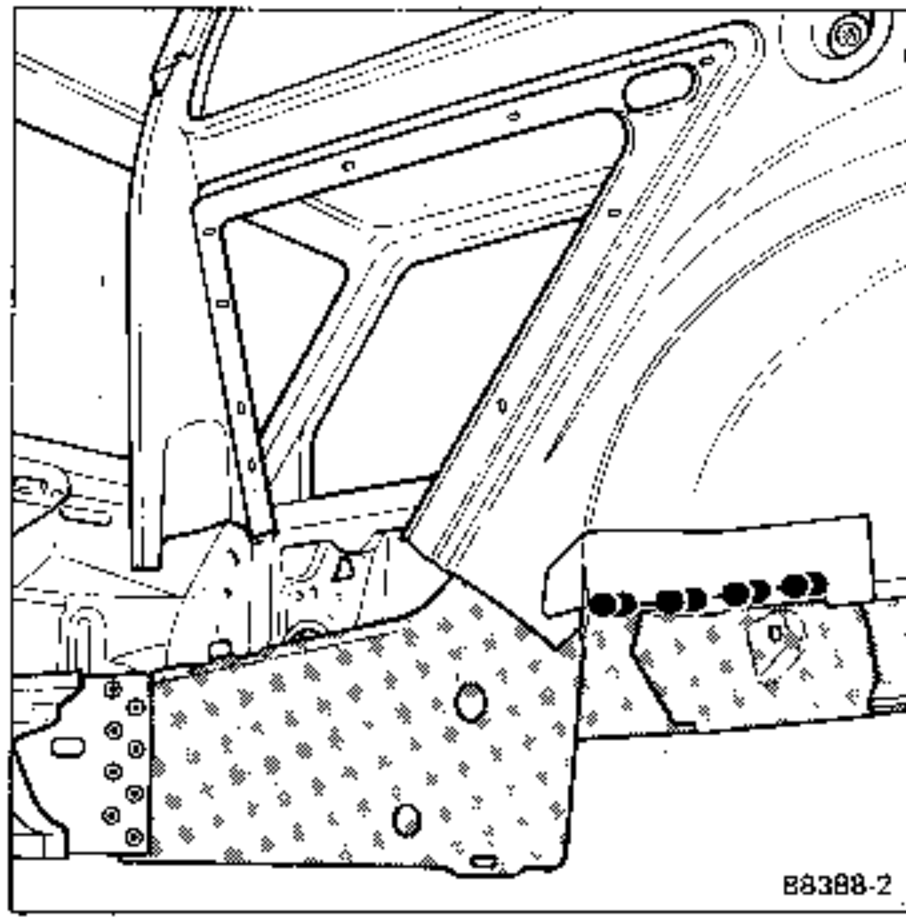
Fit jig bracket no. 5

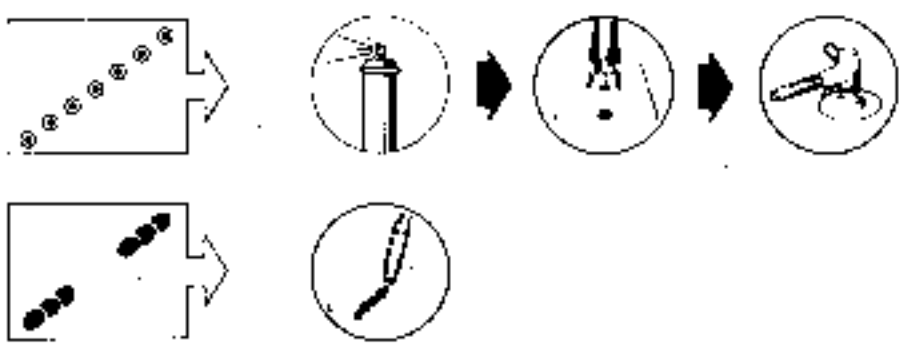


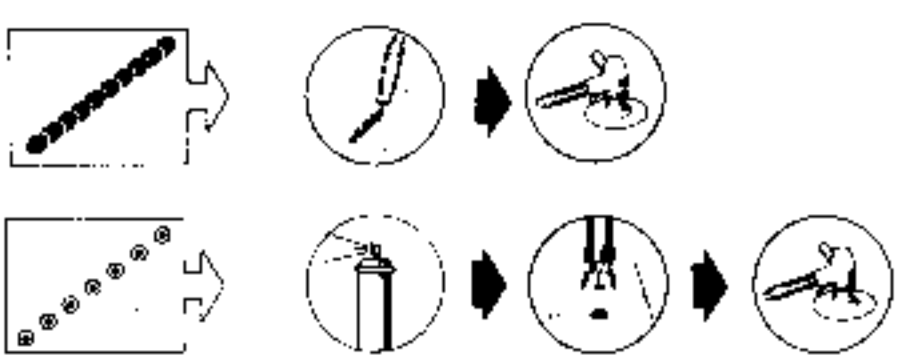
Fit jig bracket no. 6

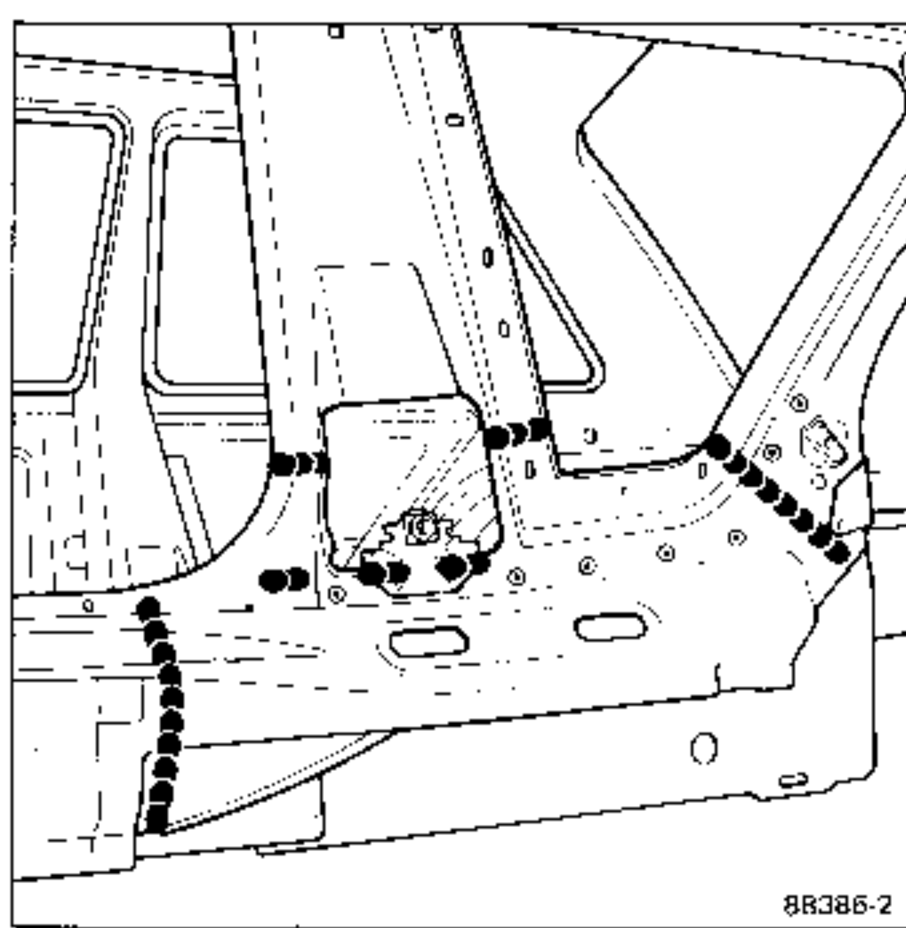
WELDING

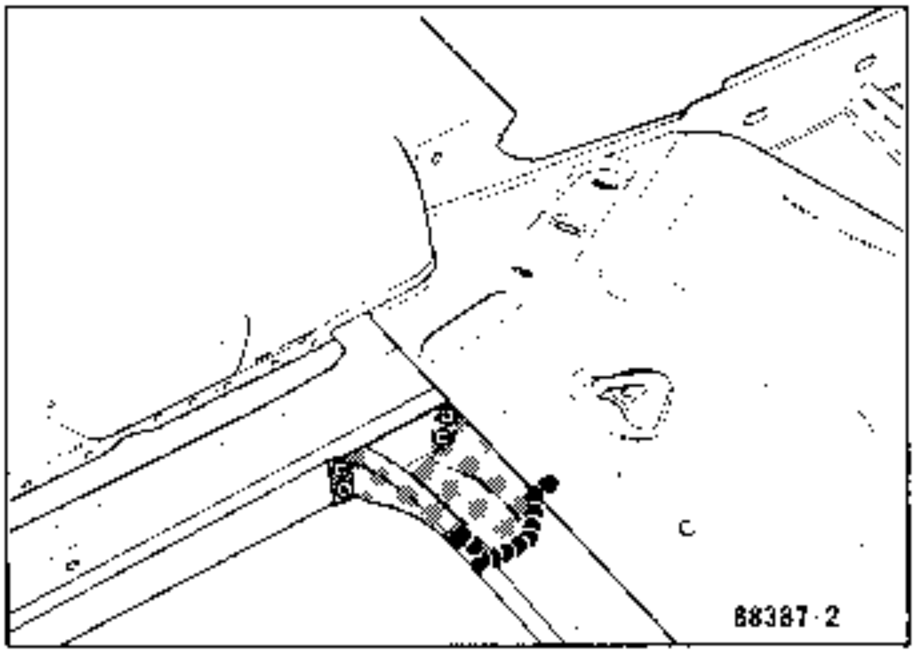


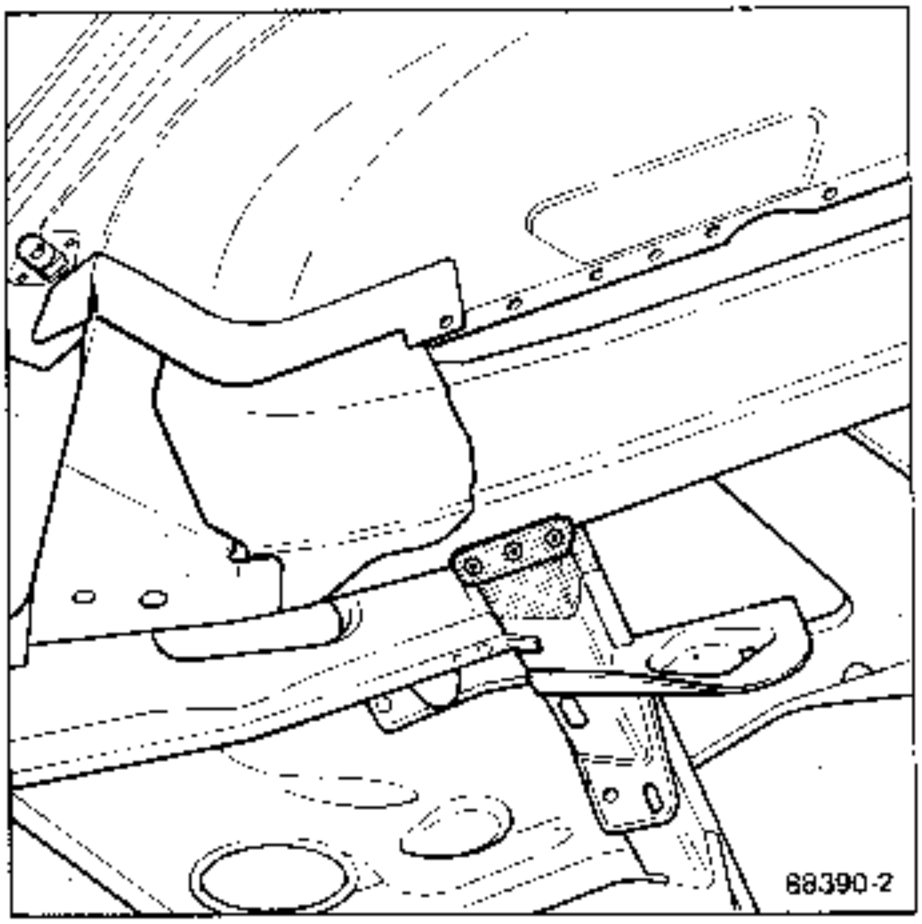


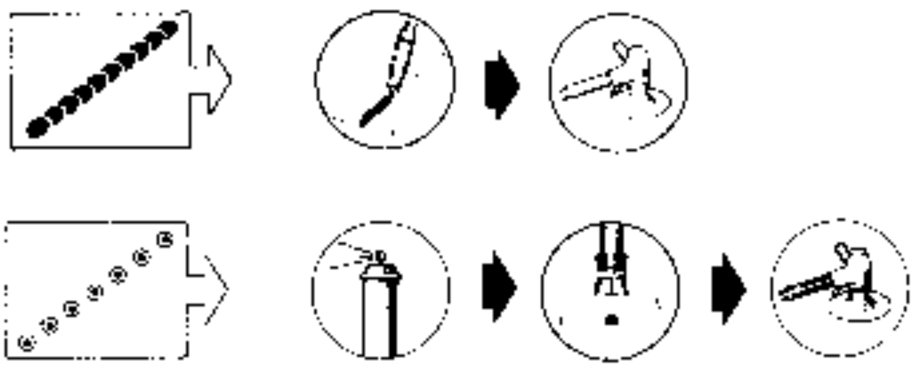










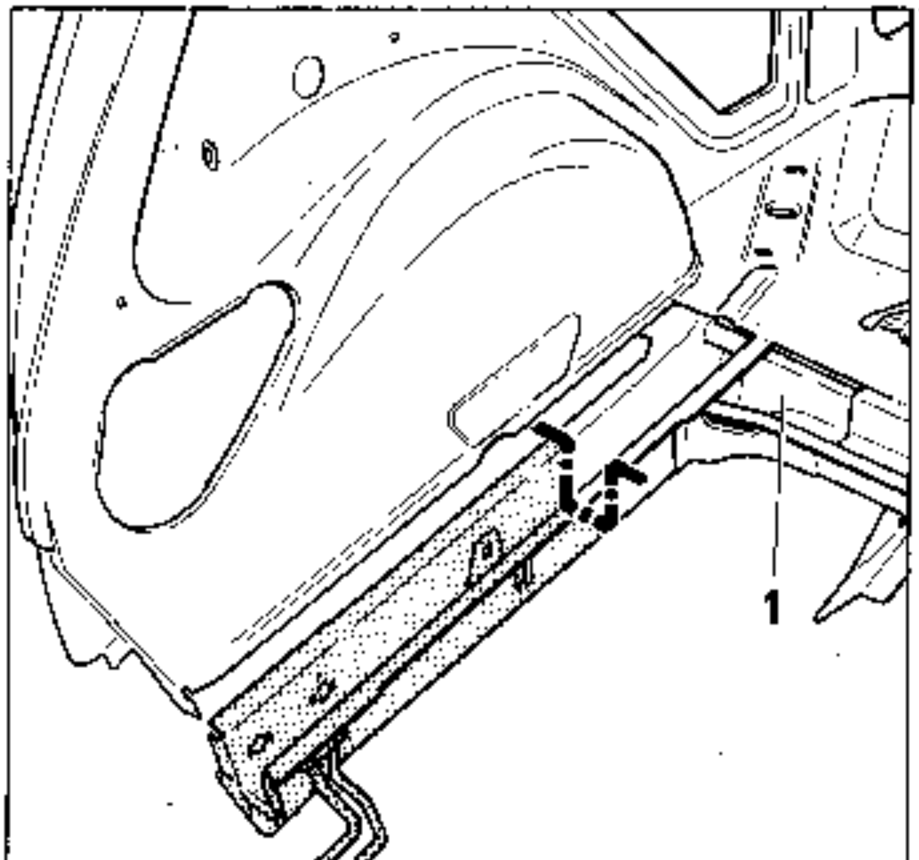


PAINTING : after refitting the rear end panel, part of the floor, the wing panel and drip channel (see corresponding section), spray on a coat of anti-chipping mastic.

After painting, apply hollow section protective treatment inside the side member and the cross member.

If it is found, on inspection (see this section) that the mechanical unit securing points have remained intact, this operation can be carried out without using the body jig.

CUTTING



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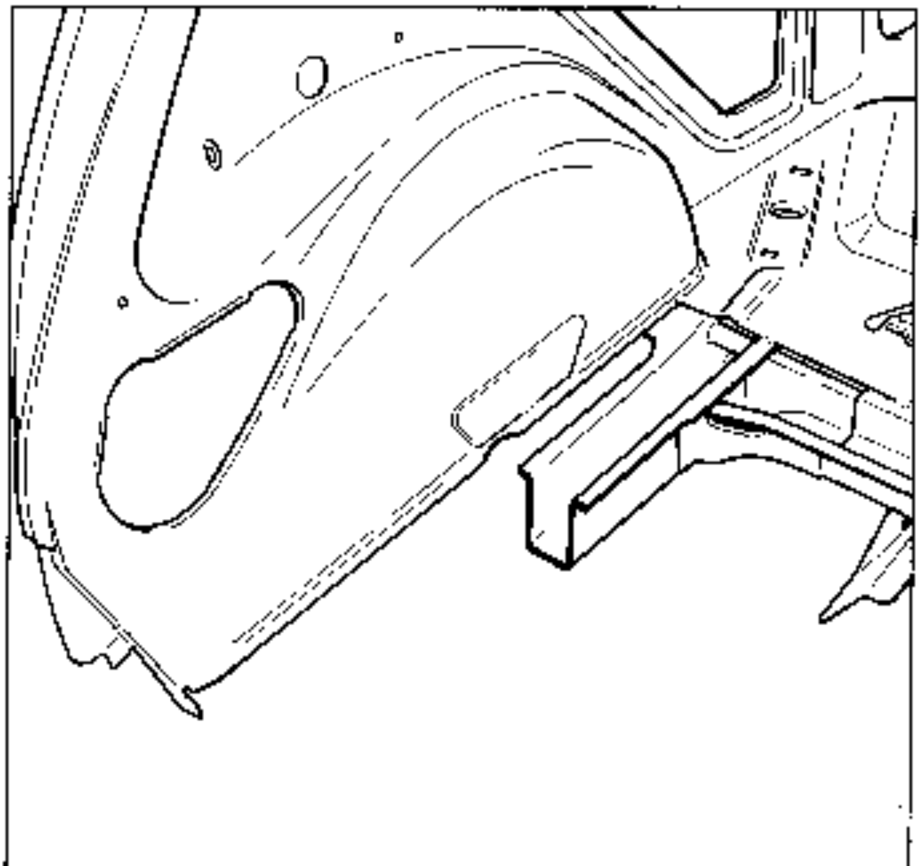

88391-2

NOTE :

If the distortion has extended past the cross member (1) it is essential that the entire side members should be replaced.

- Remove the damaged section by following the methods represented by the above symbols (see description of symbols).

PREPARATION PRIOR TO WELDING

- Strip back, to the bare metal, the inner and outer faces of all the areas to be welded.

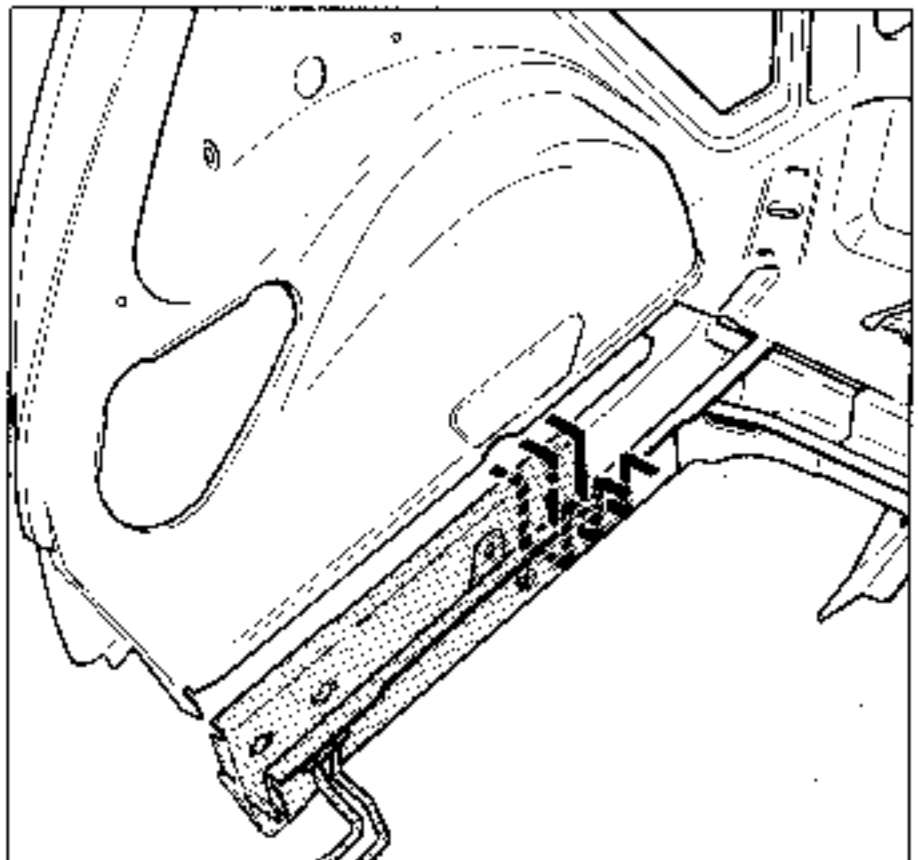
PREPARING THE NEW SIDE MEMBER

Cut a section, from the new side member, 20 mm longer than the part cut out.

- Fit the new part so that it overlaps the original part on the vehicle and secure it with grip clamps.

Superimpose the two side members. Check the height and length against the side member on the opposite side either with a rule, over a flat floor, or visually.

- Saw through both thicknesses of metal simultaneously to make adjusting the joint easier.

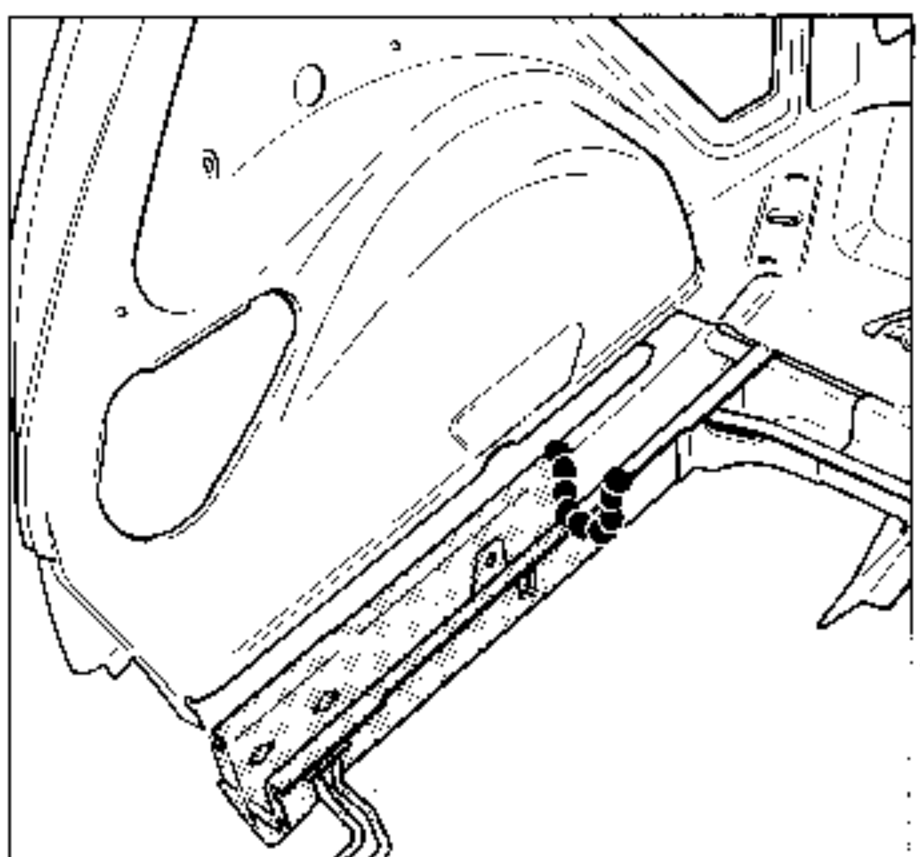


88391-3

- Adjust the new part and secure it with grip clamps.

WELDING

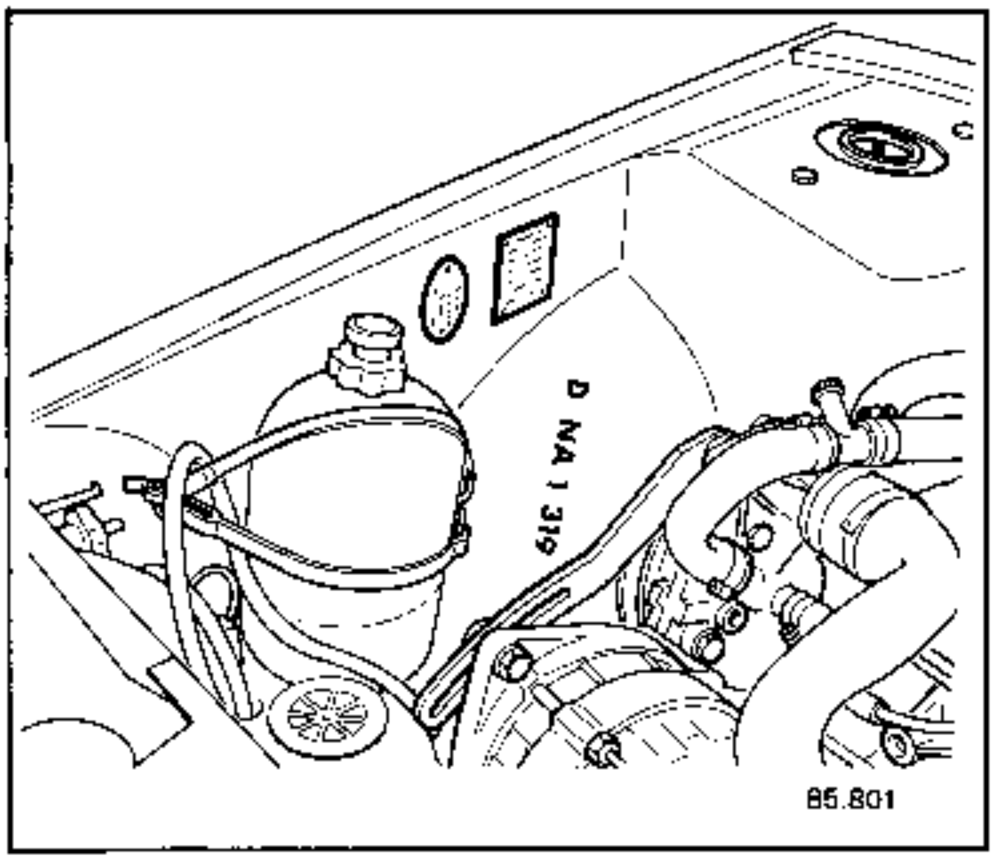
- Apply the stitched fillets using the gas envelope welding process.



88391-4

A/INK STAMP

The paint applied in production is identified by a code stamped on the upper part of the right hand cowl side.



1° - One or more letters indicate the paint type

S	Synthetic	VR	Super gloss (HERBOL)
A	Acrylic (solution)	VRR	Super gloss (RENAULT)
NA	High quality acrylic (NAD dispersion)	VRV	Super gloss (VALENTINE)
		VRU	Super gloss (URUZOLA)

2° - A number (1 or 2 figures) which is the supplier's reference number

1	Renault	11	Sikkens
2	Nitrolac	12	Rinshed Mason
3	Valentine	13	Corona
4	Ripolin	14	Herberts
5	Duco	15	Semelac
6	Villemer	16	Glasurit Herbol
7	Dupont de Nemours	17	Bolling Kemper
8	Soudee	18	Blancome
9	Astral	19	Levis
10	ICI	20	Uruzola

3° - A letter showing where the vehicle was built :

F	Flins	D	Douai	D.S	Dunstable (RVI)
LH	Sandouville	V	Valladolid (Spain)	D.P	Dieppe
C	Creil	P	Palencia (Spain)	V.V	Villa Verde (Spain)
H	Haren	N.M	Novo Mesto (Yugoslavia)	B.L	Blainville (RVI)
B	Billancourt	S.T	Setubal (Portugal)	B.G	Bourg (RVI)
M	Maubeuge	B.T	Batilly		

4° - A 3 figure number shows the colour reference

OPAQUE	NAD
WHITE	355
SCHIST	402
AZURE BLUE	466
MOSS	914

The first figure indicates the colour :

1 - Beige
3 - Yellow, white, orange
4 - Blue
6 - Grey and black
7 - Red
9 - Green

5° - For certain factories, dots identify the assembly line

EXAMPLES :

High grade acrylic paint

NA	13	M	353

Butter cup Yellow

Supplier Corona

Assembly factory : Maubeuge

Assembly factory : DOUAI

D	NA	1	725

Jasper Red

High grade acrylic paint

Supplier : Renault

Renault super gloss

VRR	3	F	153

Topaze Beige

Valentine base

Assembly factory : Flins

Herbol super gloss

VR	1	LH	477

Saphire Blue

Renault base

Assembly factory : Sandouville

High grade acrylic paint

NA	1	F	921

Line 6

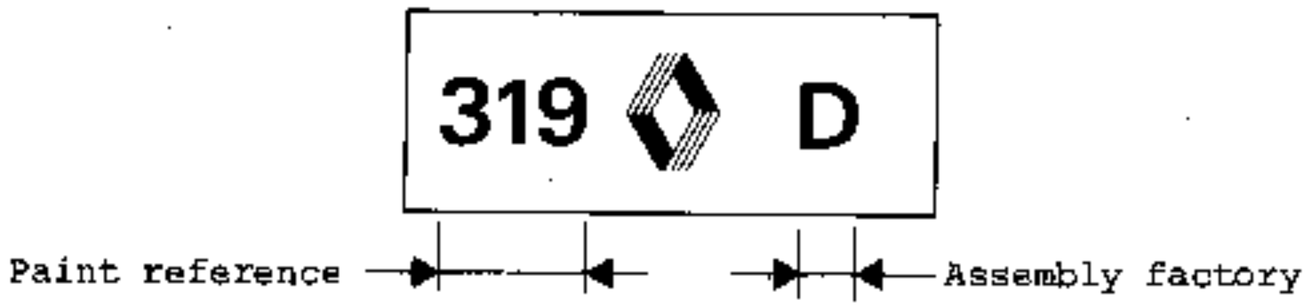
Supplier Renault

Factory Flins

Green

B/SELF ADHESIVE LABEL

From the 1983 model year, the paint identification code is no longer applied by an ink stamp. A self-adhesive label is now used stating the paint reference and the factory at which the car was assembled. The label is stuck in the same place as the former ink stamp.



HEALTH AND SAFETY INSTRUCTIONS

A/HEALTH

- The special polyurethane mask must be worn.
- The paint booth must be clean and fulfil the requirements of current legislation (air flow velocity 0,5 m/sec.).
- Clean, dust-free overalls must be worn for spraying.
- Never use thinners for washing the hands (cracking, allergy etc.).

B/SAFETY

- If the vehicle is to be stoved or if paint is to be dried with infra-red panels, we recommend that plastic trim (radiator grille, door handles, rear lights, drip channel trim etc.) be protected either with covers or with damp cloths, or should be removed.
- Earth the vehicle.
- No pots of thinners or paint should be stored in the spray booth.
- Never smoke in the spray booth.

NOTE :

The fuel tank must be removed from the vehicle before it is taken into the spray booth.

BODY COLOURS

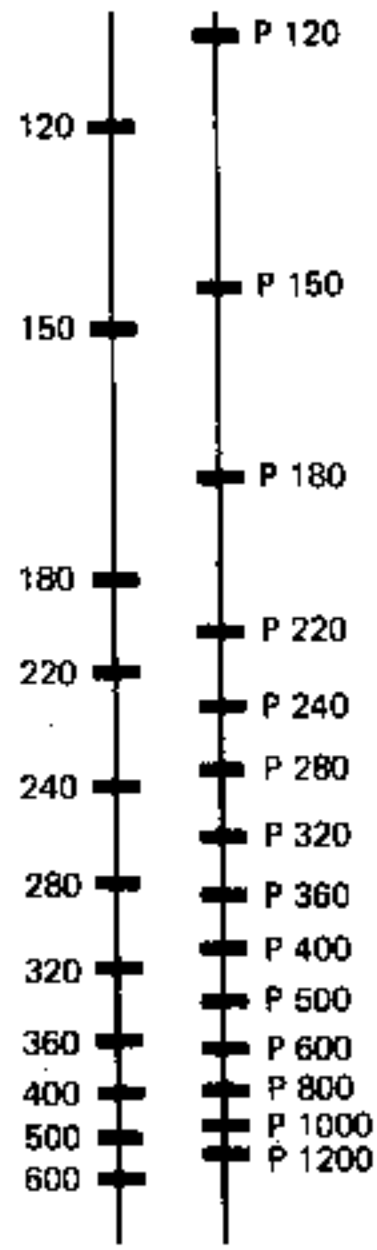
OPAQUE		SUPER GLOSS		METALLIC SUPER GLOSS	
White	355	Black	694	Granada	761
Bordeaux	721			Aurora	116
Grege	159			Schist	402
Red	705			Silver	620
				Cloud	624
				Alpine Blue	485
				Turquoise	443

Very careful preparation is required if a good finish is to be obtained with polyurethane paints.

The correct choice of abrasive paper for finishing purposes is of the utmost importance.

There are standards governing the grain sizes of abrasives and these must be stated by abrasive suppliers. There is the American standard and, very recently, a European standard (F.E.P.A.) has been introduced, with a conversion table showing the equivalent, in the two standards, for 3 M abrasive paper.

American Standard European Standard (F.E.P.A.)



If we consult this table we can see that :

A paper classified as P600 in the European standard is the equivalent of a 360 grain paper in the American standard.

To obtain the required finish for two coat systems, abrasive P1200 (the equivalent of 600) is to be used.

The American standard is still used, by all suppliers, in their data sheets. Conversion is therefore necessary to obtain the correct abrasive.

To obtain effective corrosion resistance, our replacement parts are protected according to a SPECIFICATION that requires that they should resist 400 hours exposure to salt spray, no matter what type of paint system is used (cataphoresis or any other process).

- These parts can be identified by the reference letter "C" applied to the part number label.

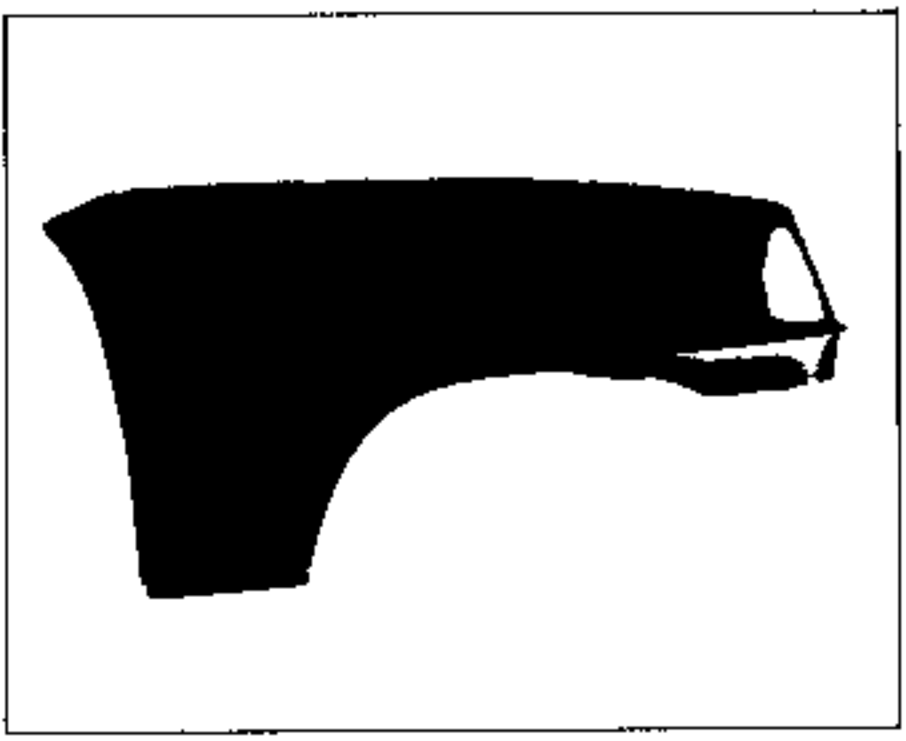
- However, even parts that are not identified by the letter "C" are protected to an equivalent quality standard.

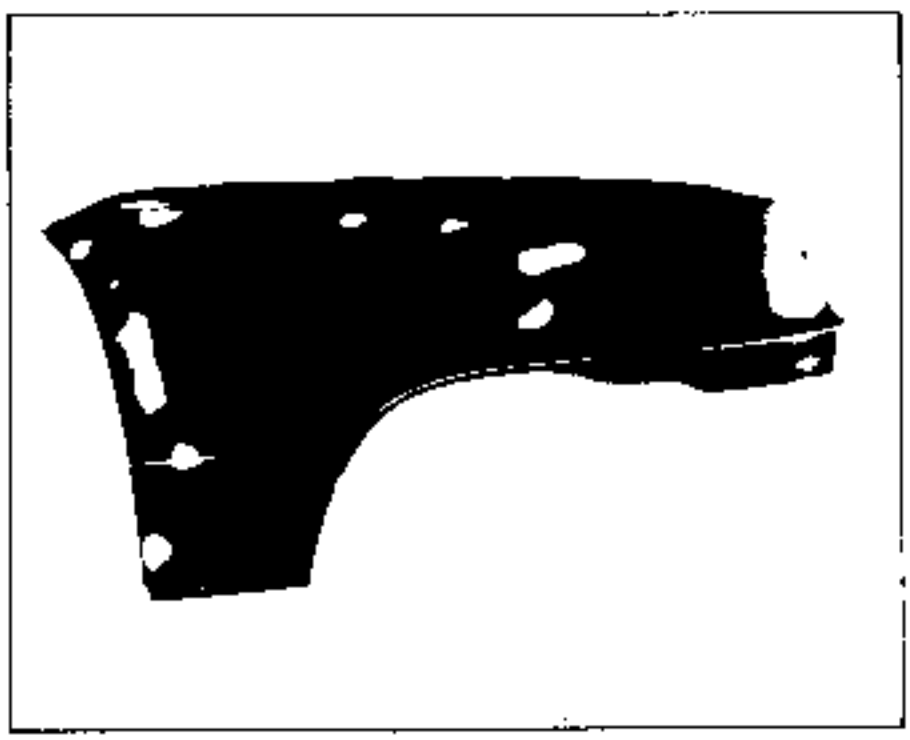
Furthermore all external components are protected by a heat shrunk film against possible damage during handling (scoring, impact etc.) as this would make it necessary to rub the parts back to the bare metal and thus destroy the protection.

CONSEQUENTLY TO MAINTAIN THE ORIGINAL ANTI-CORROSION PROTECTION, ON REPLACEMENT PARTS, IT IS FORBIDDEN TO RUB THEM BACK TO THE BARE METAL. SIMPLY "KEYING" THE SURFACE WITH P240, USED DRY, IS SUFFICIENT PRIOR TO APPLYING THE SURFACER COAT.

If it is absolutely essential, because of accidental damage to the external undercoating, carry out the following sequence :

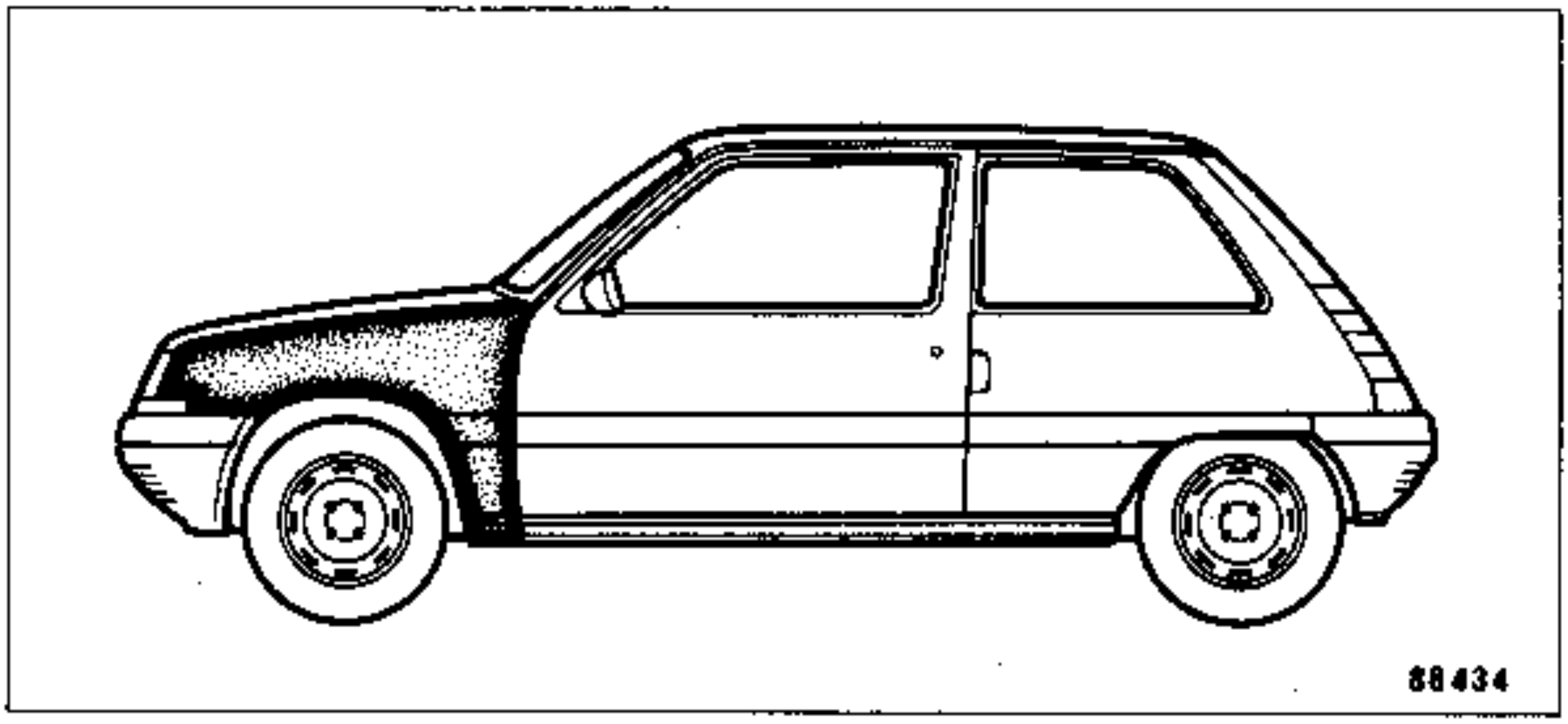
- Degrease.
- Rub back, dry with P150.
- Blow off - degrease.
- Apply phosphate primer to the stripped areas.
- Apply a coat of surfacer (single or two pot).
- Rub down with P800, wet, for opaque finishes, P1000 to P1200, wet, for super gloss finishes.
- Apply two pot paint (Polyurethane).





NEVER STRIP BACK TO THE BARE METAL, ON INTERNAL SURFACES, EVEN IF THE FINISH IS POOR (RUNS, INCLUSIONS etc.).

Degrease.
Rub down both faces with P120, P150 or P240, dry.
Blow off - Degrease.
Apply chrome phosphate primer to the stripped areas.
Apply corrosion inhibiting surfacer (single or two pot) to both faces.
Spray on anti chipping mastic.
Protect crimped areas and panel joints (Adhesive mastic).
Paint the inside faces (Door apertures, door pillars etc.).
Match the colour on a 200 x 200 mm plate, finished with surfacer.

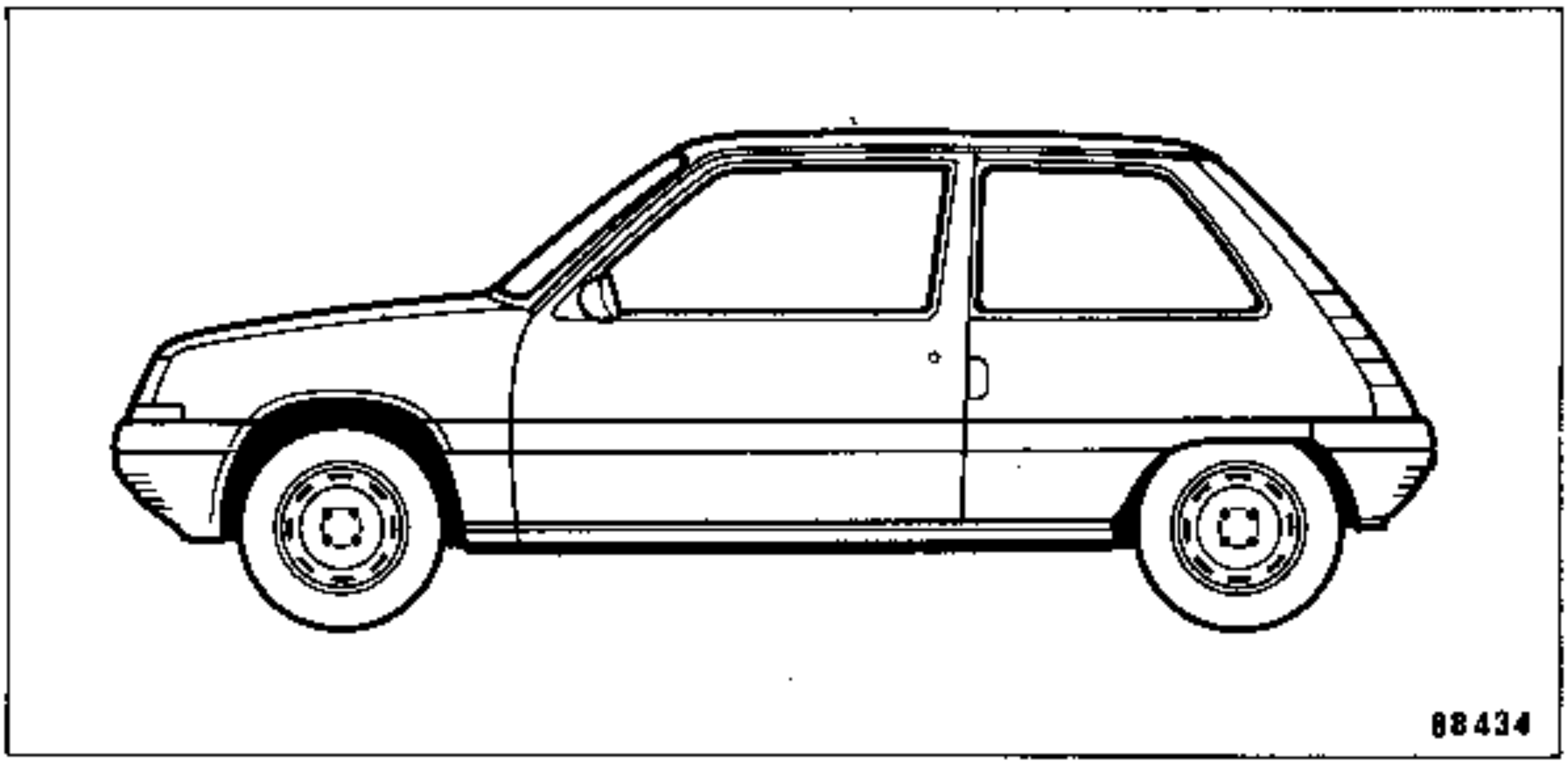


FITTING THE PART TO THE VEHICLE

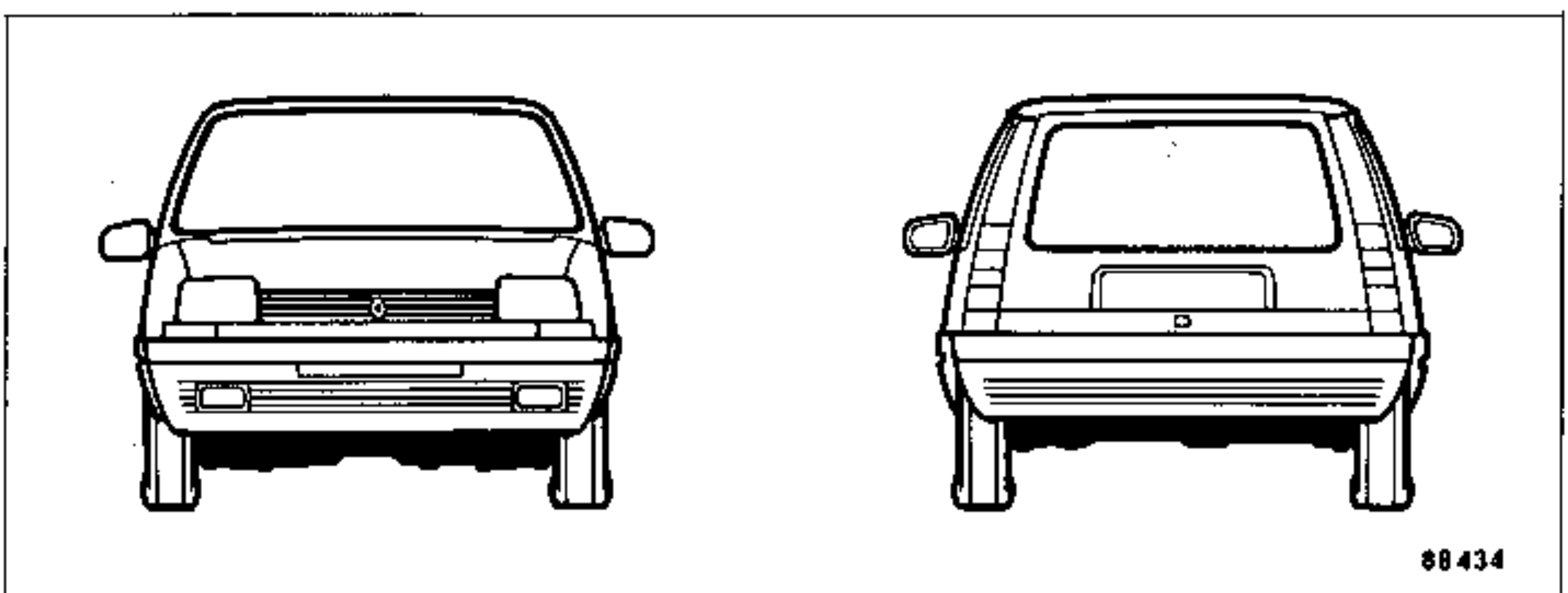
Lightly rub down the surfacer with P800 (400) paper, wet, for opaque paints. P1000 (500) P1200 (600) paper, wet, for super gloss.
Blow off with compressed air.
Mask-off (after checking and determining the colour).
Place the vehicle in the spray booth (fit the cover and the earthing lead).
Degrease - Blow off.
Wipe down with a chemical pad.
Apply two pot paint (Polyrethane).
Apply hollow section protection (Box section components).

After repainting the base colour to original specification simply take an aerosol of the required colour and spray the areas concerned in the usual way.

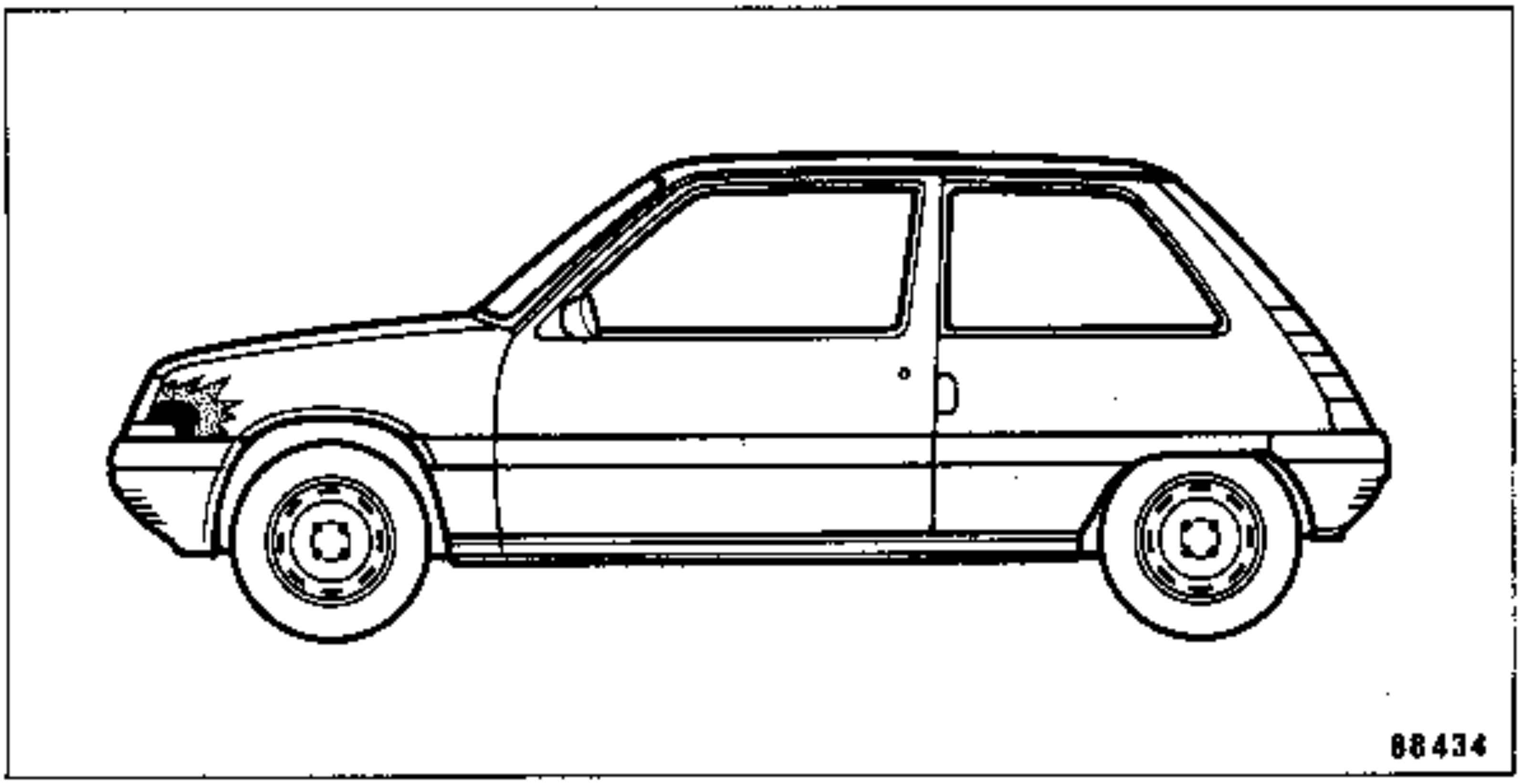
Sills.
Front and rear wheel arches (Inside).



Front and rear lower sections.



Degrease.
Rub down the area to be repaired, dry, with P120.
Blow off - Degrease.
Apply chrome phosphate primer to the bare metal.
Apply surfacing mastic with a palette knife.
Rub down with a block and P800 (400) paper, wet.
Apply corrosion inhibiting surfacer (single or two pot).
Polish the entire area with slightly abrasive polish in the case of opaque paints.
Key the entire part with ultra fine abrasive polish or P1200 (600) paper, wet, in the case of super gloss.
Blow off - Degrease.
Mask-off (after checking and determining the colour).
Place the vehicle in the spray booth (Fit the cover and the earthing lead).
Degrease - Blow off.
Wipe down with a chemical pad.
Apply the two pot paint (Polyurethane).
Stove for 30 minutes at 60°C.
Polish the blended-in area (to hours after stoving) with silicone polish.

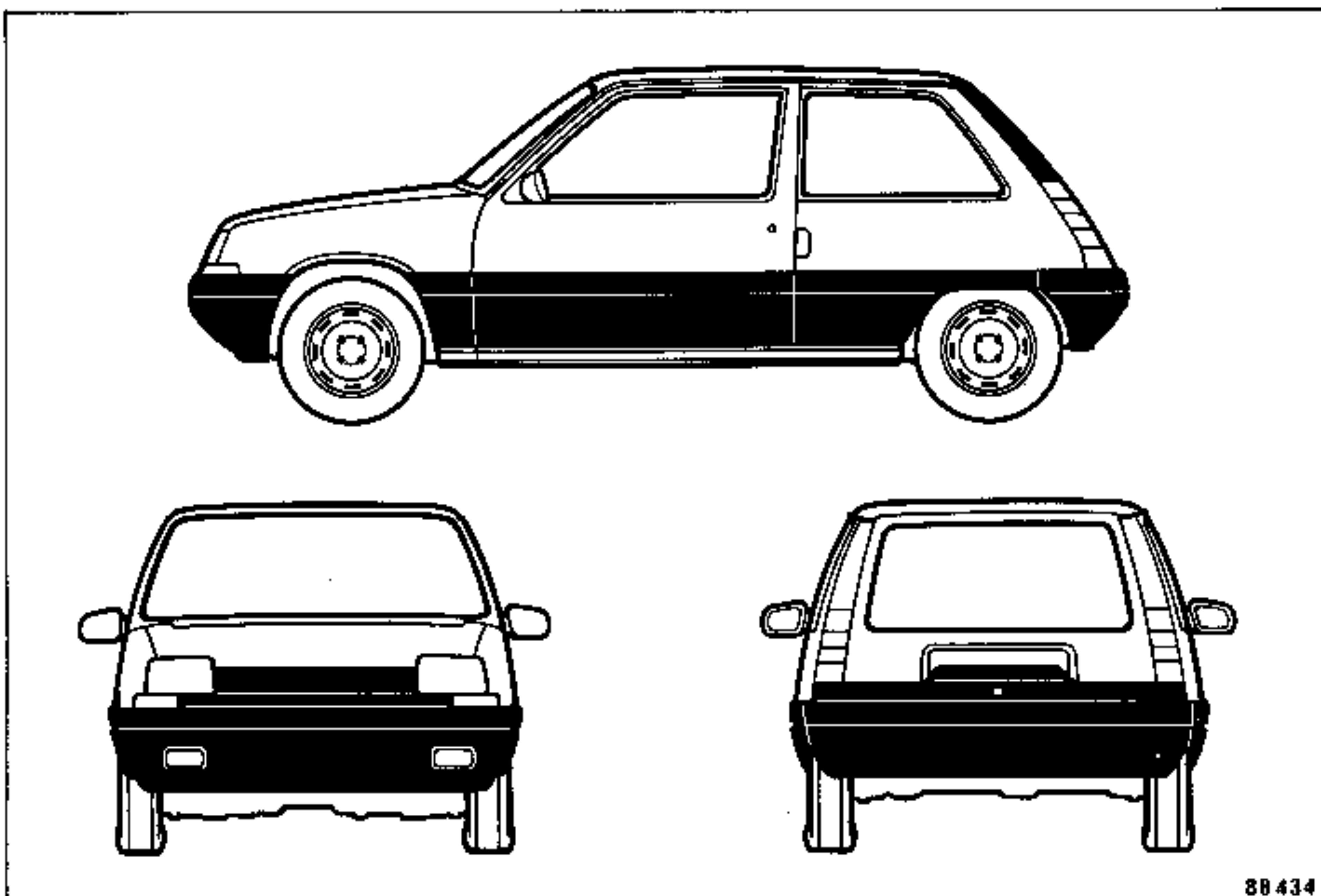


FLEXIBLE PLASTIC PARTS

(Radiator grille, trim, spoilers etc,)

Carefully degrease.
Lightly roughen with a grey rubbing pad.
Blow off - Degrease.
Wipe down with a chemical pad.
Spray on a plastic bonding primer.
Apply two pot paint mixed with a flexible additive.
Do not mix the flexible additive with the matt base but it is essential for the super gloss.

THESE PARTS CANNOT BE REPAIRED



RIGID PLASTIC PARTS

(Example : Bumper shields)

Carefully degrease.
Roughen with a grey or red rubbing pad.
Blow off - Degrease.
Wipe down with a chemical pad.
Apply the two pot paint (Polyurethane).

Preparing welded replacement parts (cataphoresis paint base)

Preparing removable and welded parts (original paint base)

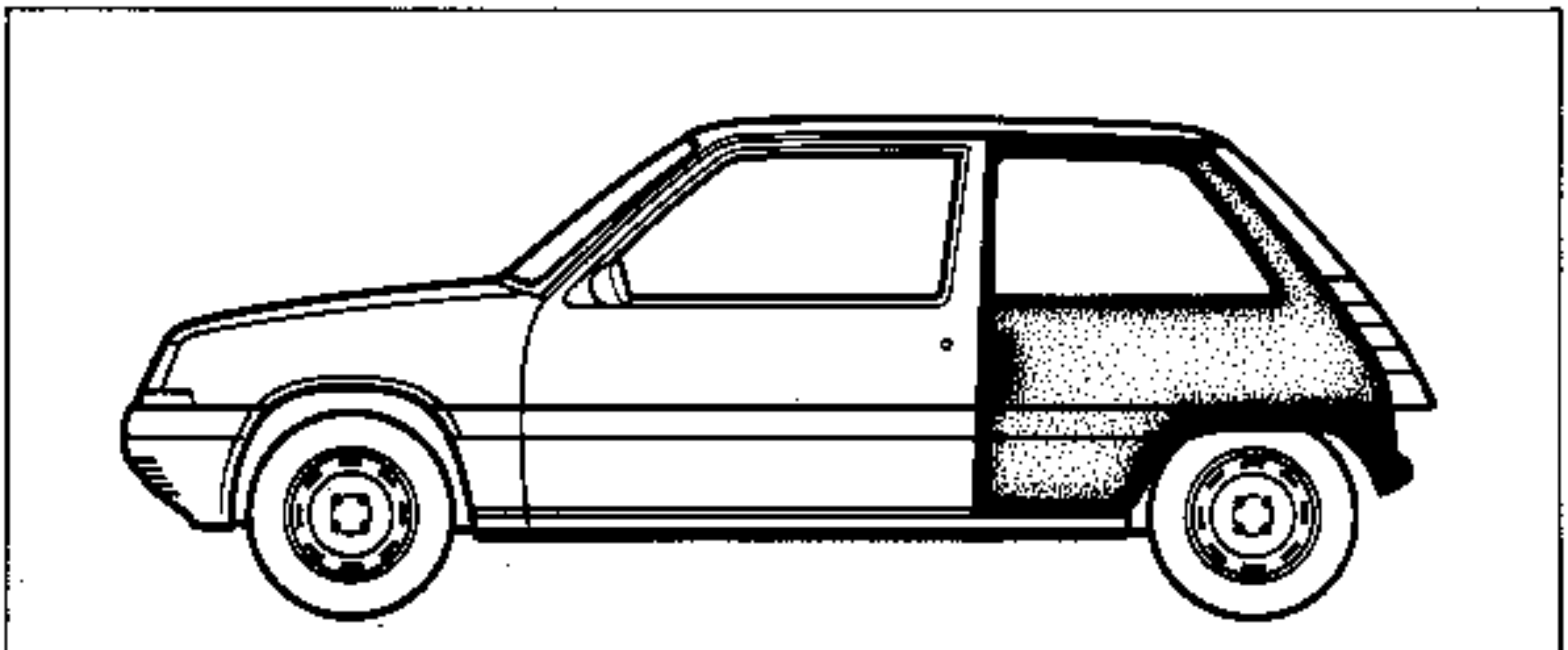
Degrease.
Sand back the areas which have been welded or repaired with P80 paper, dry (Orbital sander, sanding pad).
Rub down both faces with P120, P150 or P 40, dry (Cataphoresis paint base).
Rub down round the sanded area with P120 or P150, dry (Original paint base).
Blow off - Degrease.
Apply chrome phosphate primer to the bare metal (On both faces).
Apply surfacing mastic with a palette knife or a gravity fed gun.

or

Apply two pot filler primer (Eg : Polyurethane).
Rub down with a pad and P150 paper, dry.

or

Rub down with a pad and P400 paper (360), wet.
Roughly mask-off the area, if necessary, before applying the surfacer.
Apply corrosion inhibiting surfacer (single or two pot) to both faces.
Apply the sprayed anti-corrosion finish (Anti-chipping mastic).
Protect the crimped areas and panel joints (Adhesive mastic).
Paint the inside areas (Door frames, door pillars etc.).
Match the paint on a 200 x 200 mm plate to which surfacer has been applied.



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REFITTING ADJACENT PARTS

Key the surfaces with P800 (400) paper, wet, for opaque paints.
P1000 (500) P1200 (600) wet, for super gloss.
Blow off with compressed air.
Mask-off (after checking and determining the colour match).
Place the vehicle in the spray booth (Fit the cover and the earthing lead).
Degrease - Blow-off.
Wipe down with a chemical pad.
Apply the two pot paint (Polyurethane).
Apply the hollow section protection.

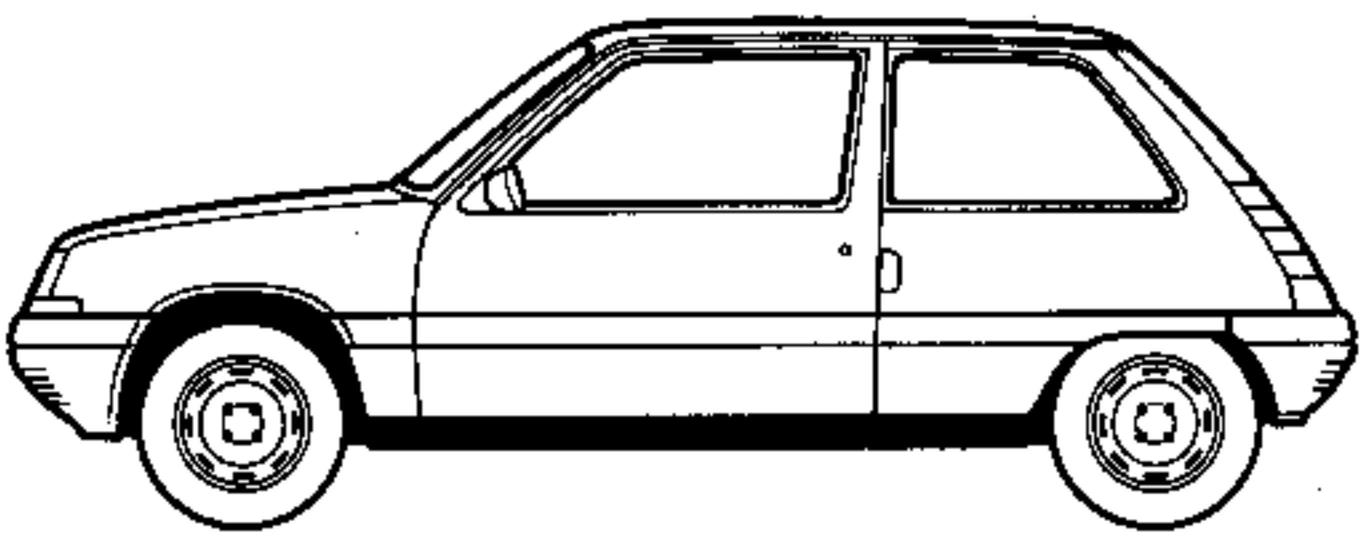
MASTIC 561 (6018)

This mastic is sprayed on to the following sections to provide anti-chipping protection :

- the body sills,
- the insides of the front and rear wings,
- the front and rear lower sections.

It is also used as anti-corrosion protection on the following areas :

- crimped joints,
- panel joints.



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Preparation

Thoroughly mix the two components (parts A and B).

For the products' optimum qualities to be maintained, it is important that the two components should be mixed in the correct proportions, that is to say :
- all part A mixed with all part B,
- half part A mixed with half part B.

Pot life

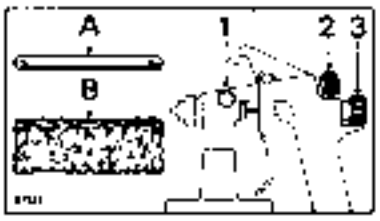
The mix remains usable for 1 hour at ambient temperature.

Application

For the mastic to adhere properly, to bare panelling, it must be preceeded by one coat of chrome phosphate primer and one coat of surfacer.

Apply the mastic in successive coats 1 to 1,5 mm thick using a pressure pot type gun.

Pressure pot mastic gun (type Pipo 2)



Adjusting the mastic gun pressure (type Pipo 2).

The air pressure reducing valve is to be set at 3 bars.

(A) An extruded fillet of mastic is obtained by adjusting the gun as follows :
- unscrew screw (1),
- close the air delivery screw (2),
- unscrew the product delivery screw (3) by three turns.

To spray the mastic on to body sills, rear end panels, radiator grilles, wheel arches, adjust the gun as follows :
- unscrew screw (1),
- unscrew screw (2) by one and a half turns,
- unscrew screw (3) by three turns.

(B) To spray the mastic on to any type of joint, adjust the gun as follows :
- unscrew screw (1),
- unscrew screw (2) by one turn,
- unscrew screw (3) by two and a half turns.

The gun is to be cleaned after application.

Drying time

Stove the product for 15 minutes. at 80°C, using infra-red panels.

After drying, apply the finish paint.

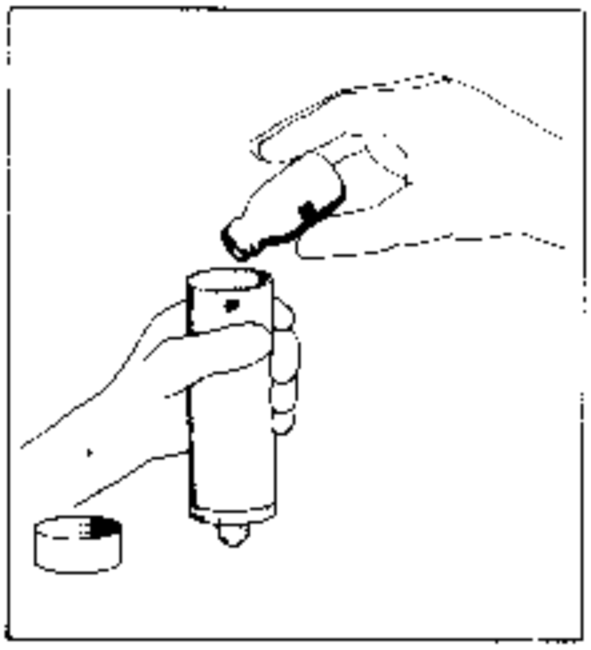
This product takes a very long time to fully cure. It is in no way incorrect to spray paint on to the product whilst it is still slightly flexible.

MASTIC 514 (6015)

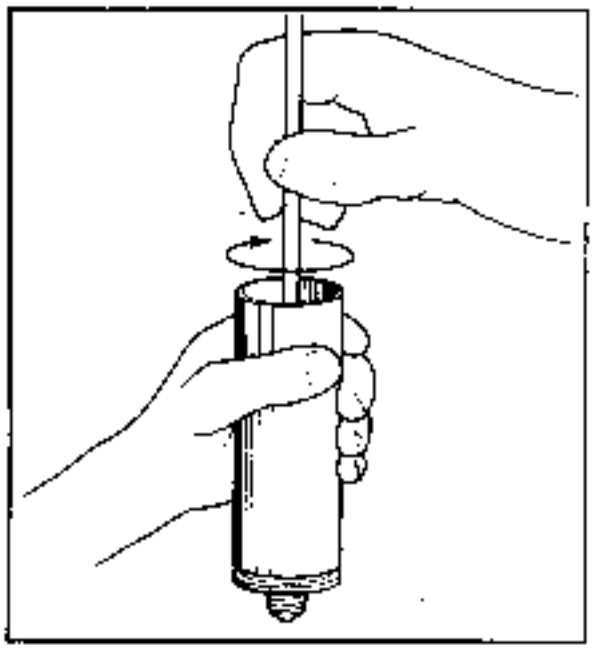
APPLICATION - Structural bonded joints on body components : stiffeners, joints between wings and wheel arches, roofs and bonnet and boot stiffeners.
- Protection of crimped joints on doors and lids.

PACK SIZE 210 gr kit (base + hardener) comprising :
- One 135 mm rigid cartridge containing part A - 90 gr,
- 1 flask containing part B - 20 gr,
- 1 flat nozzle,
- 1 piston,
- 1 set of instructions.

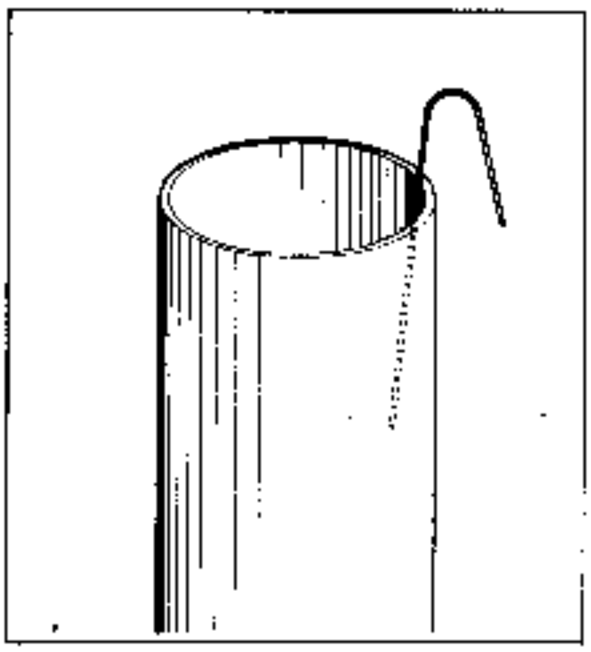
USING THE PRODUCT



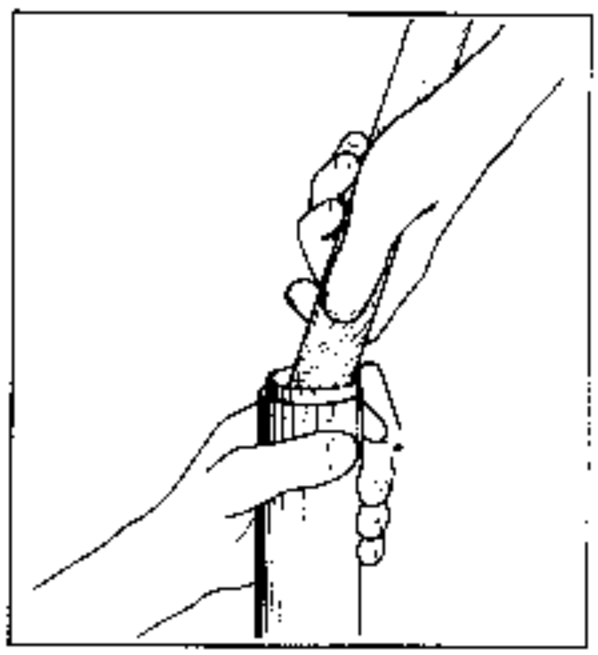
1 - Remove the adhesive tape that secures the plastic cap to the cartridge and pour the contents of the glass flask into it.



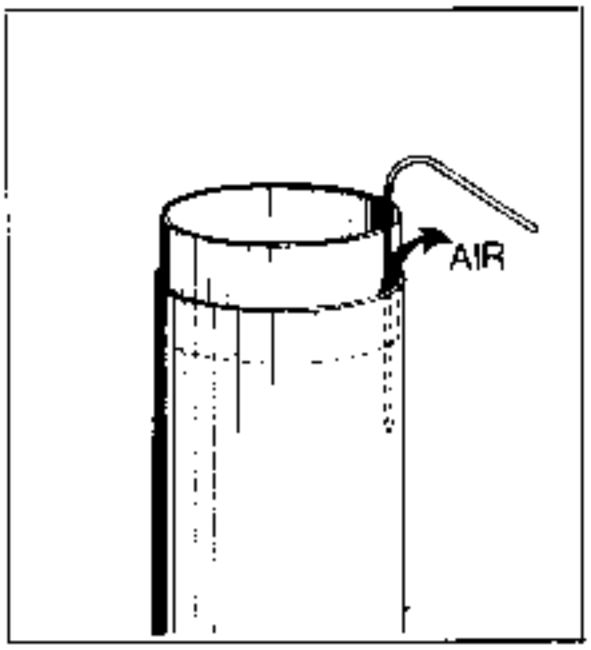
2 - Mix the two components, in the cartridge, using for example a long screwdriver, until a thoroughly mixed paste is obtained.



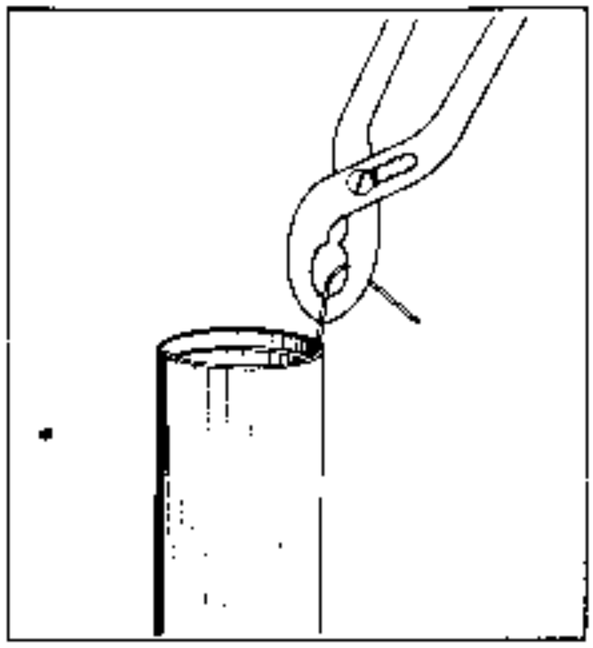
3 - Insert a thin wire, max. Ø 1 mm, for example a welding rod, piece of steel wire or a paper clip, bent at one end as shown here, into the cartridge. It should enter by at least 6 cm.



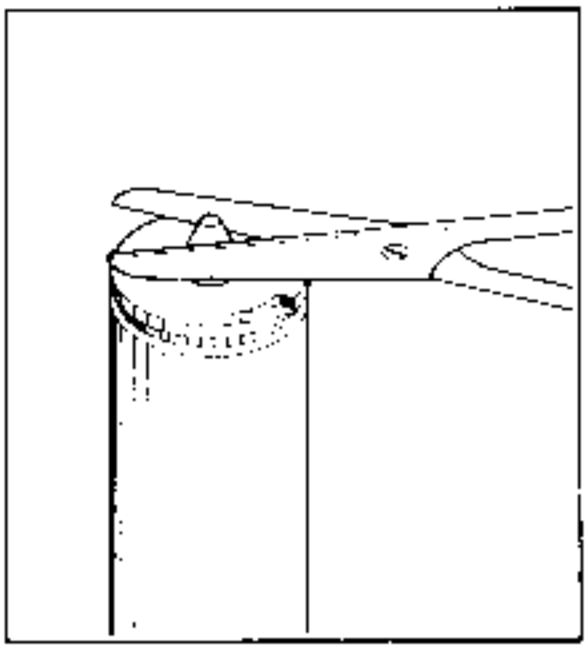
4 - Fit the piston as shown and press it down with a tool handle.



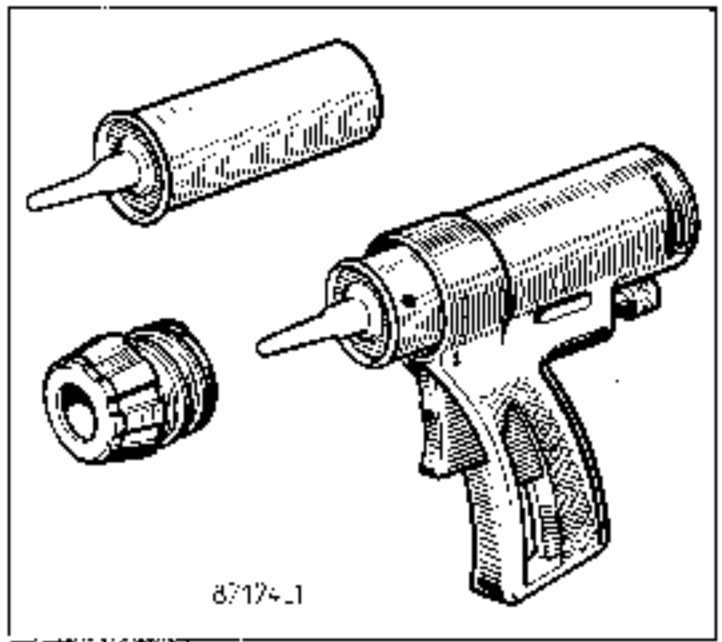
5 - Air will escape from the cartridge past the gap made by the wire.



6 - When no further air is escaping, remove the pressure from the piston and take out the wire with pliers.

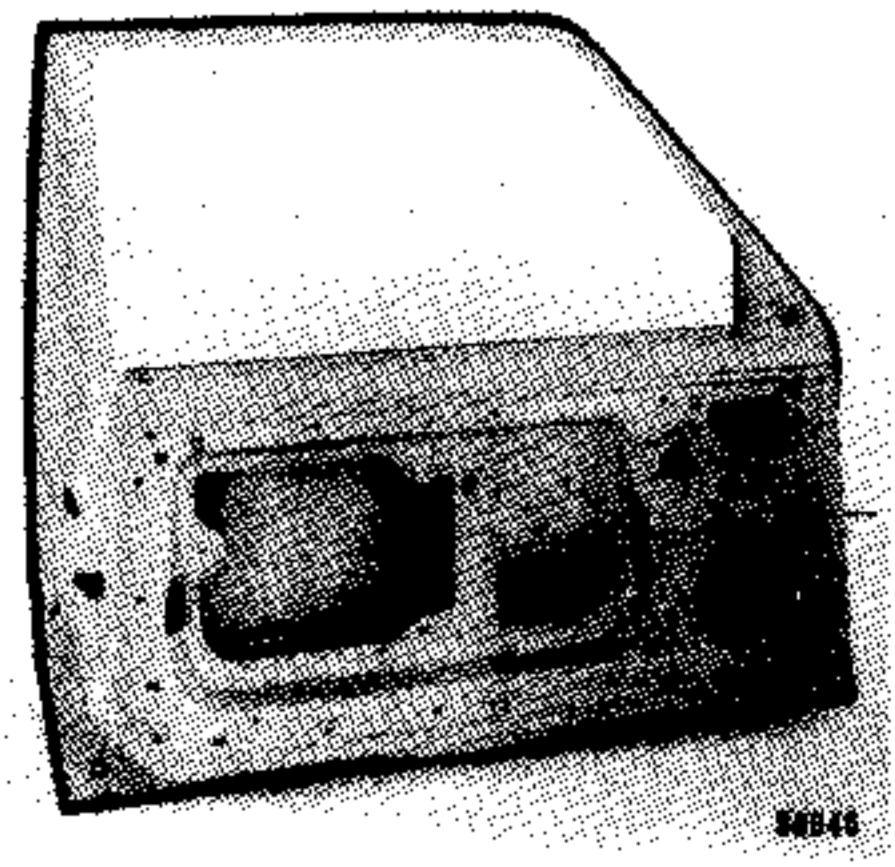


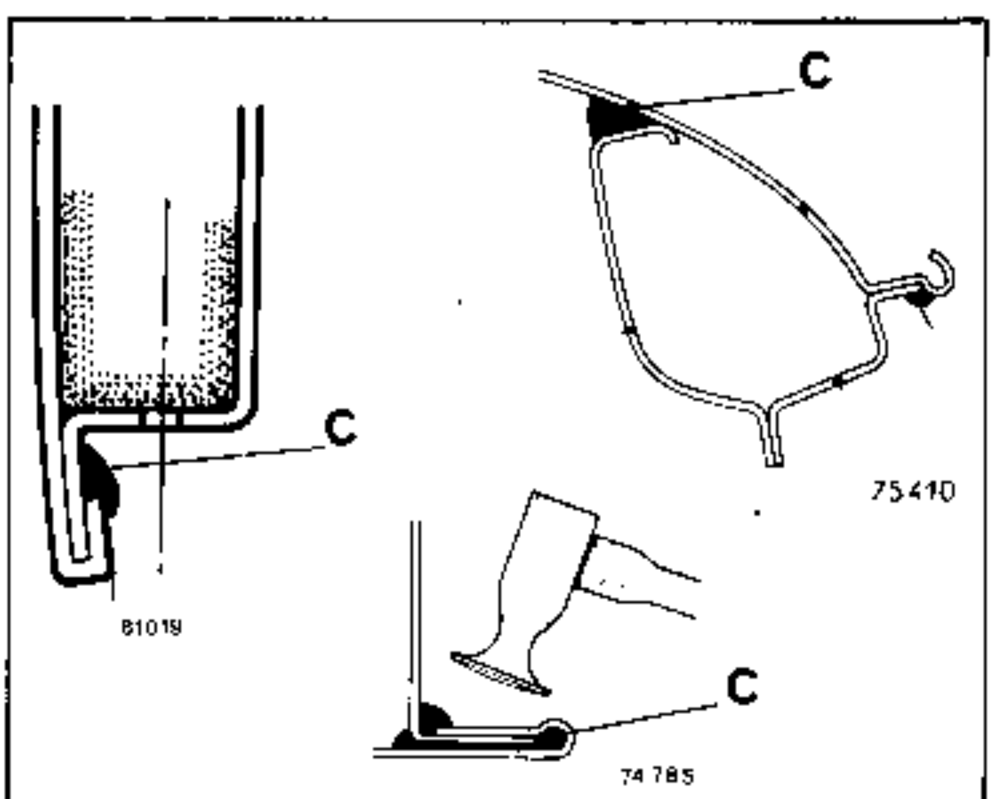
7 - Cut off the end of the cartridge.



8 - Fit the special flat nozzle and apply the mastic using Terosen gun S3-DR + adaptor A 135. The bond, and seal, thus formed will be touch dry in approx. 40 min. It can then be painted and stoved. Any conventional nozzle, that will fit on this type of cartridge, can be used to form other types of joint.

APPLICATION





Protecting hollow sections

This protection usually has to be applied "blind" and therefore great care must be taken to ensure that the protection is effective.

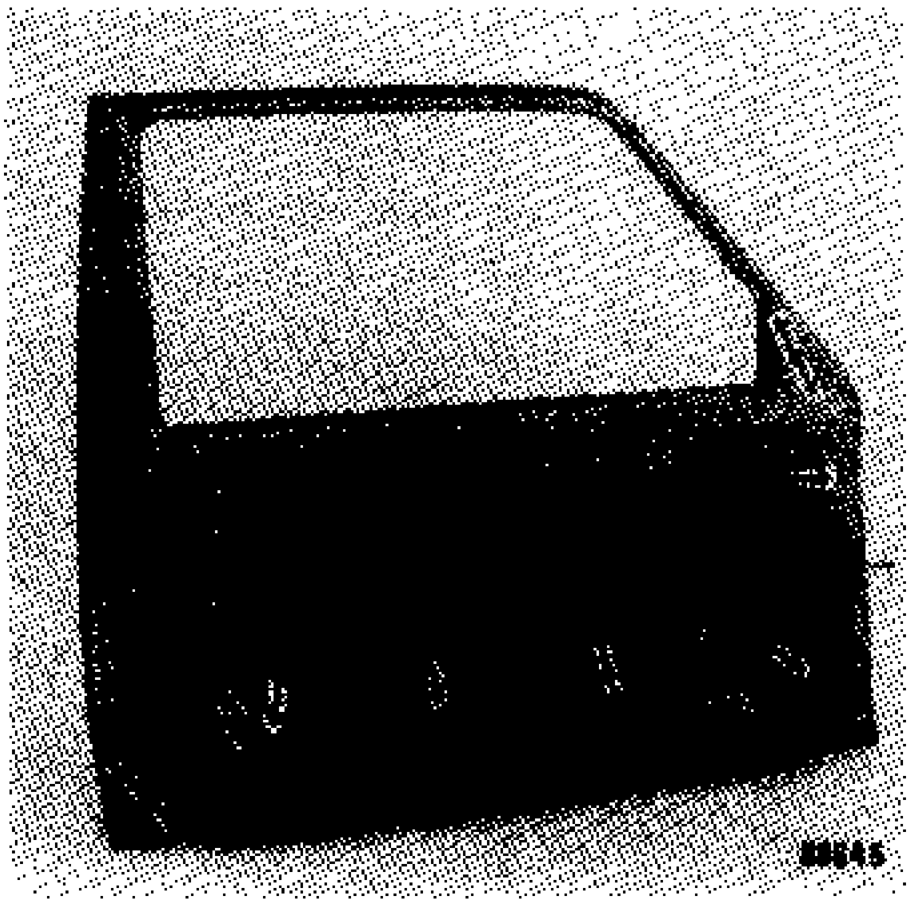
The areas to be protected are, in the main, crimped or welded body joints. The operations to be carried out are as follows, depending on the type of component being protected :

The product is injected into the hollow section after painting but before the interior trim is refitted.

Application

In the case of door, tail gates, bonnet and boot lids, engine compartments or boots, where the areas to be protected can be seen, a cranked nozzle is used to apply it, at a minimum pressure of 5 to 6 bars.

These operations are represented, on the application drawings, by arrows showing the direction in which to point the nozzle.

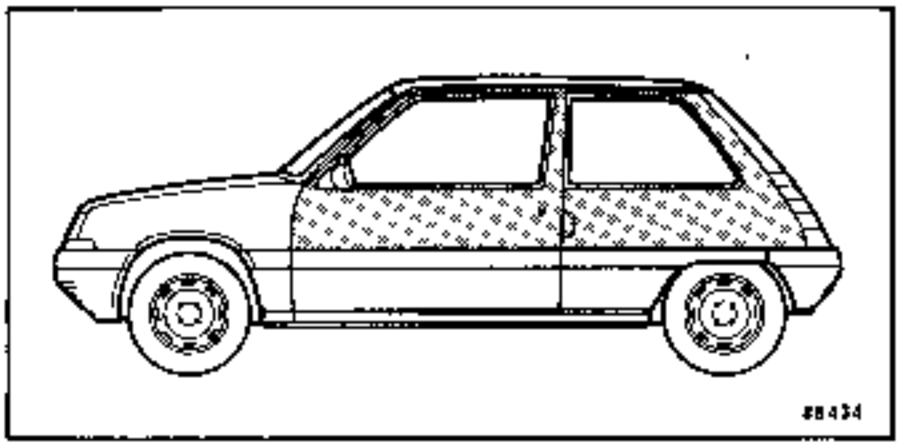


For "long" hollow sections such as side members and cross members, in which the injection operation cannot be seen, directly, it is preferable to use a vertical nozzle which is inserted into each hole so that the protective film is thoroughly distributed.

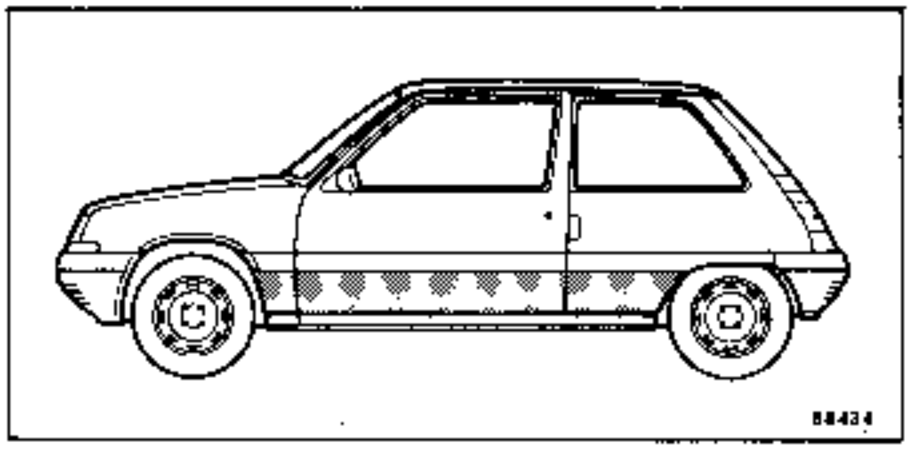
The ridges on the body panels of this vehicle make it possible to repaint part of a panel.

Following small body repairs to scoring etc., just the area concerned can be repainted by masking-off at one of the ribs on the body, thus making repainting the entire component unnecessary. Great care, however, must be paid to correctly matching the colour :

a) Upper part

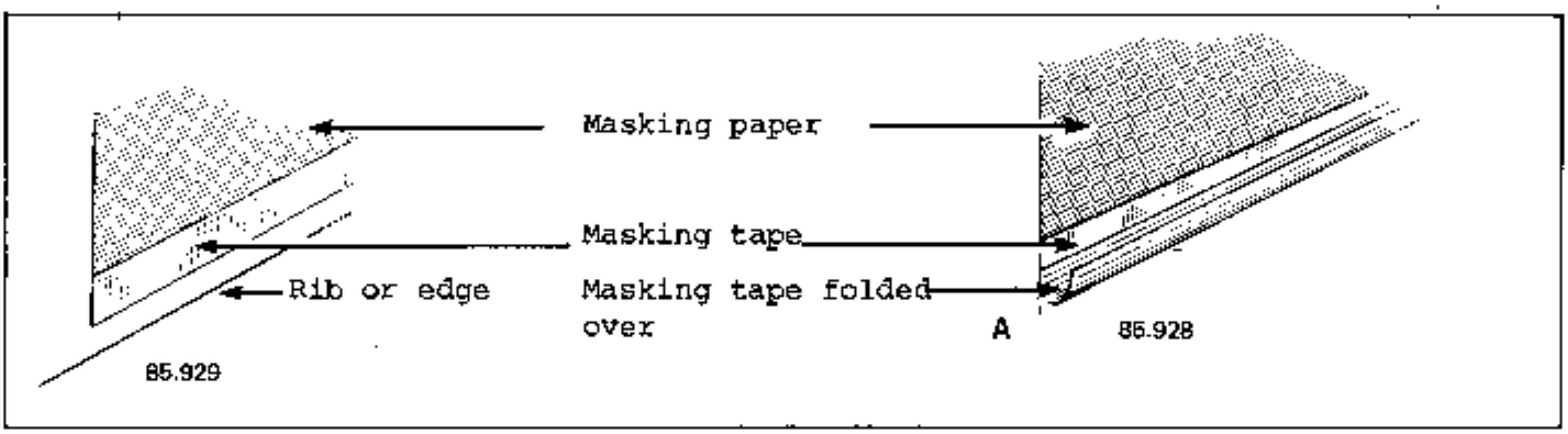


b) Lower part

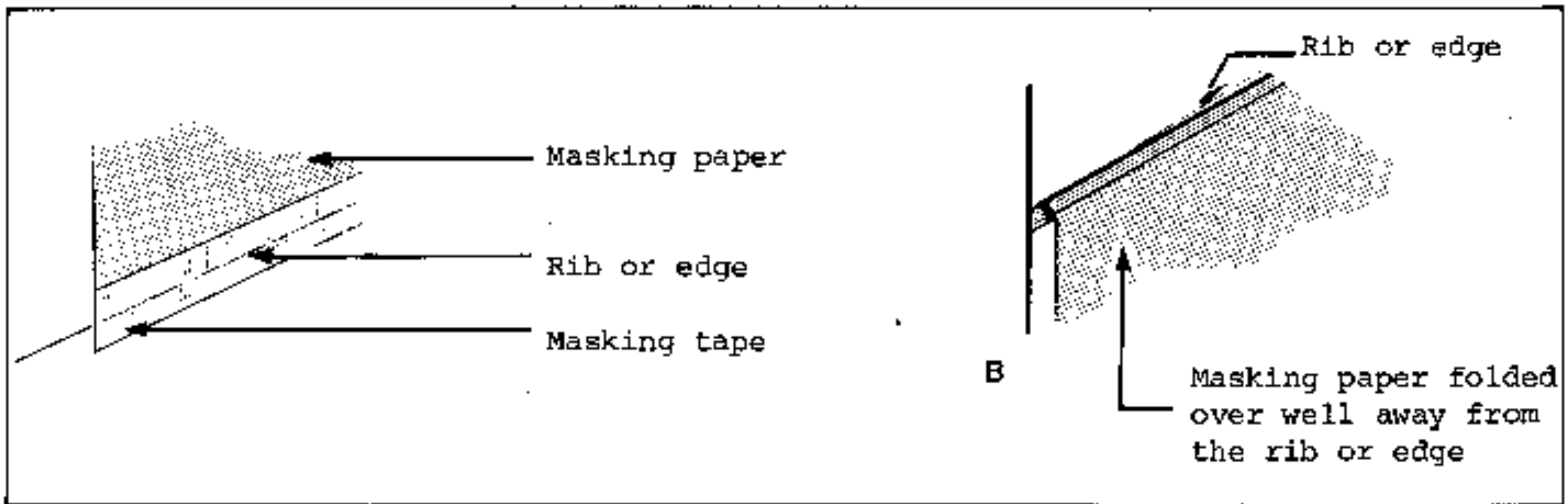


- Prepare the area to be repaired.
- Degrease and polish the rest of the component before masking it off ready for painting.
- Mask-off along the upper or lower edge.

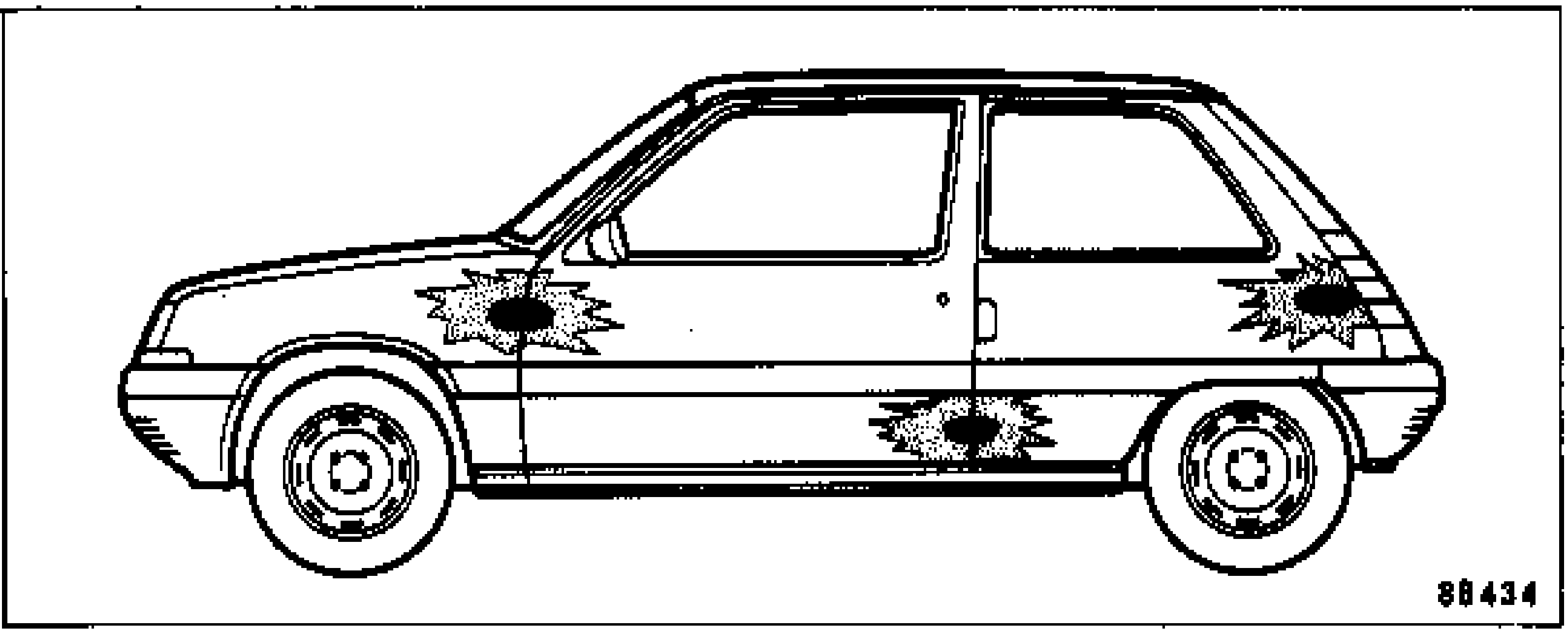
(A) Masking-off folding the masking tape over the edge



(B) Method of masking-off folding both the masking tape and paper over the edge



Local paint damage can be repaired by blending in the area concerned.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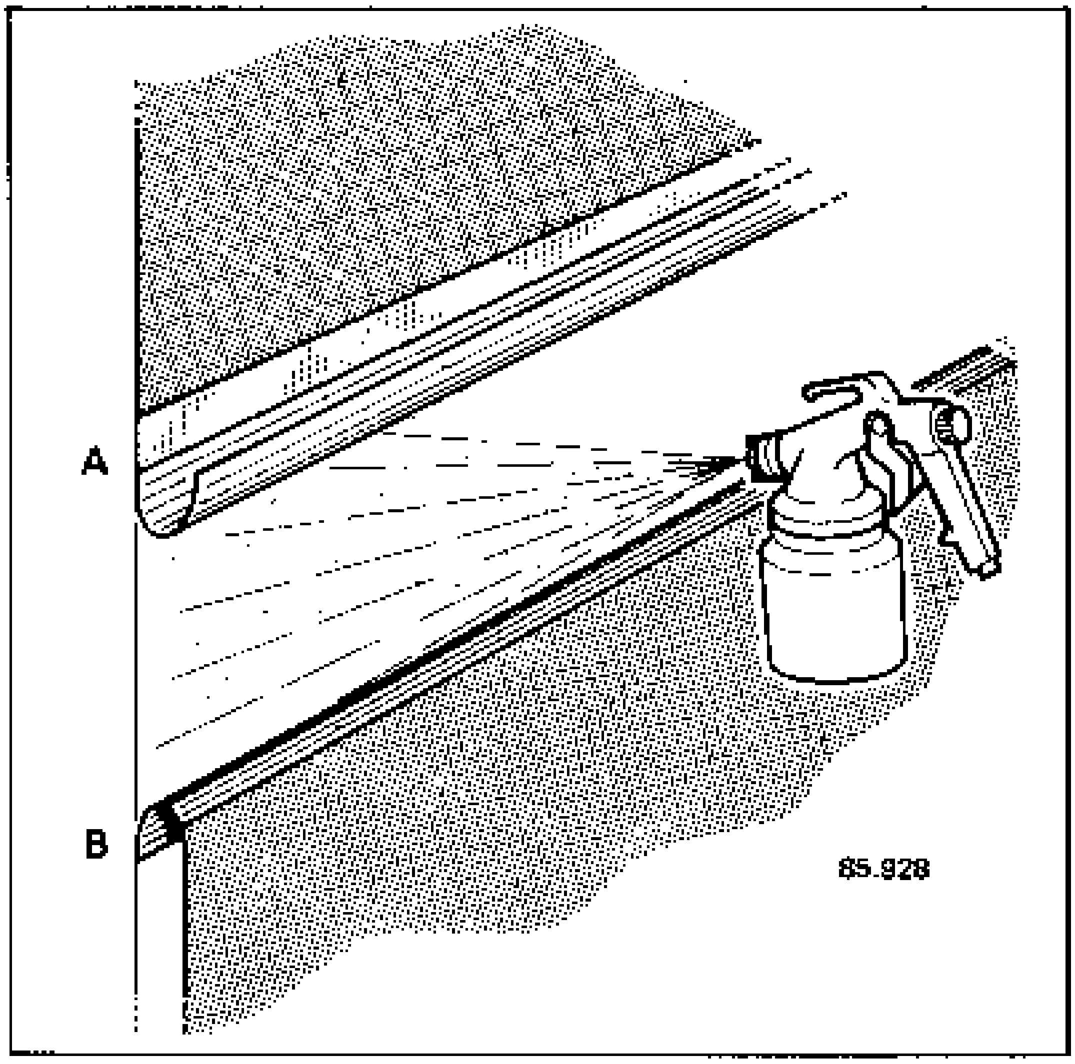
Blending-in an area on a door and a front wing without repainting all these two parts.

Blending-in on a door and a rear wing without repainting all these two parts.

Blending-in just the lower sections of two doors.

Prepare the area to be blended-in (See PAINT APPLICATION SEQUENCE No. 3 and Section T002 of MR501).



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We recommend that the edges of the repair should be masked-off with masking tape, folded over, before stoving the paint.

A/THE COLOUR

- This is the impression that the eye detects when daylight falls on coloured objects around us.
- Daylight consists of the mixture of colours that can be seen in a rainbow (Red - Orange - Yellow - Green - Blue - Violet).

  Example :

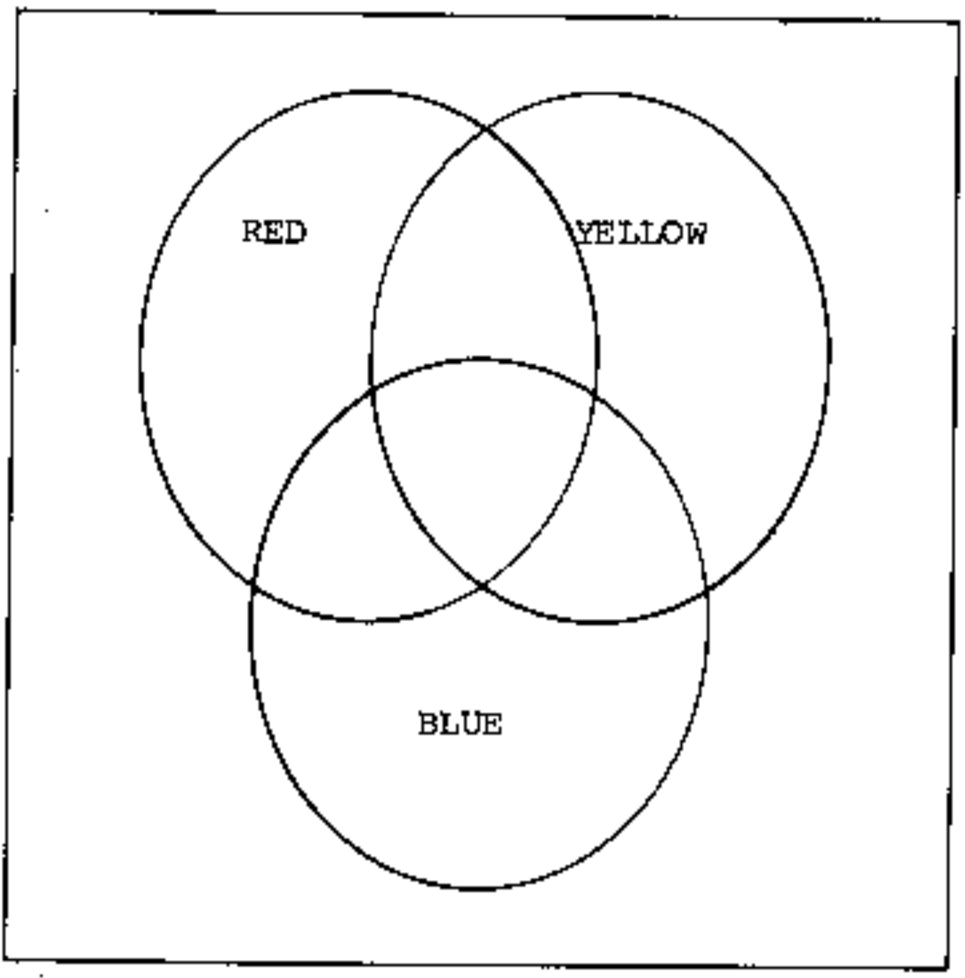
A coloured object (such as an orange) when illuminated by daylight, absorbs all these colours and reflects back just its own (Orange) and this is the one seen by the eye of the observer.

B/THE CHROMATIC CIRCLE

The chromatic circle is a simplified representation of all these colours. The centre of the circle appears as colorimetric black.

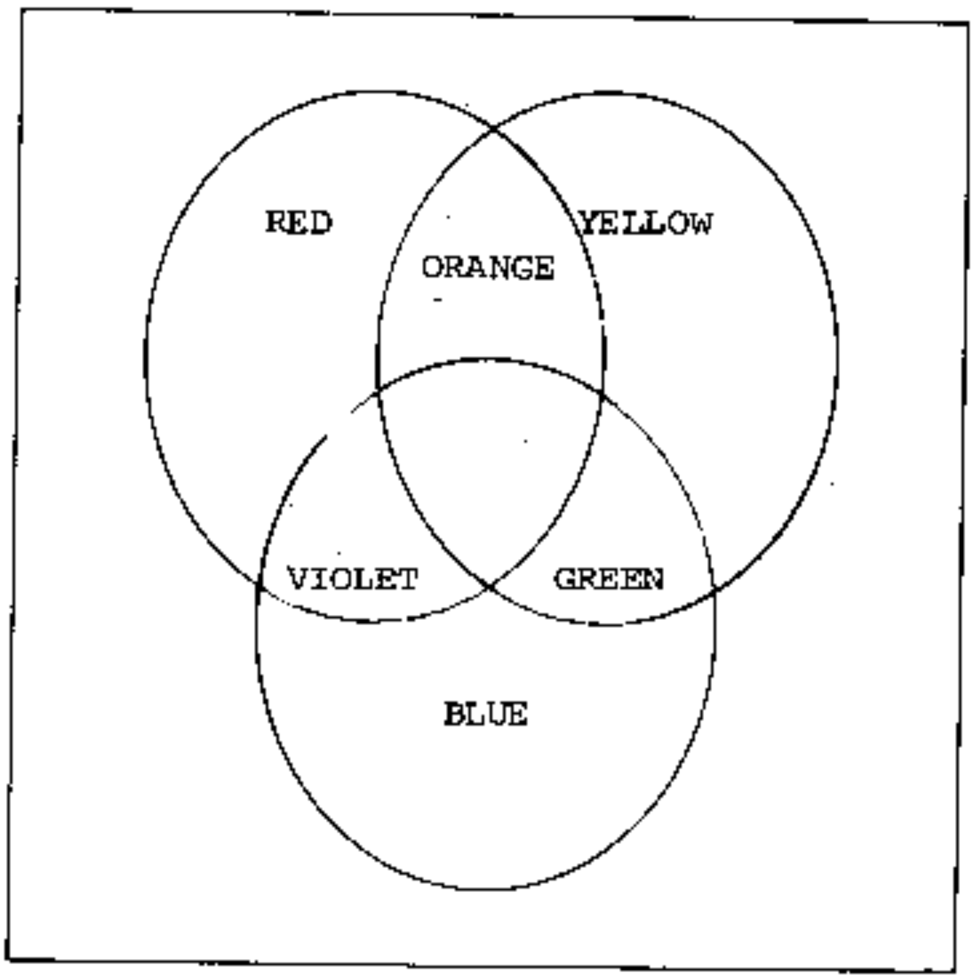
PRIMARY COLOURS

These cannot be obtained by mixing.



SECONDARY COLOURS

These are obtained by mixing two primary colours.



RED + YELLOW = ORANGE

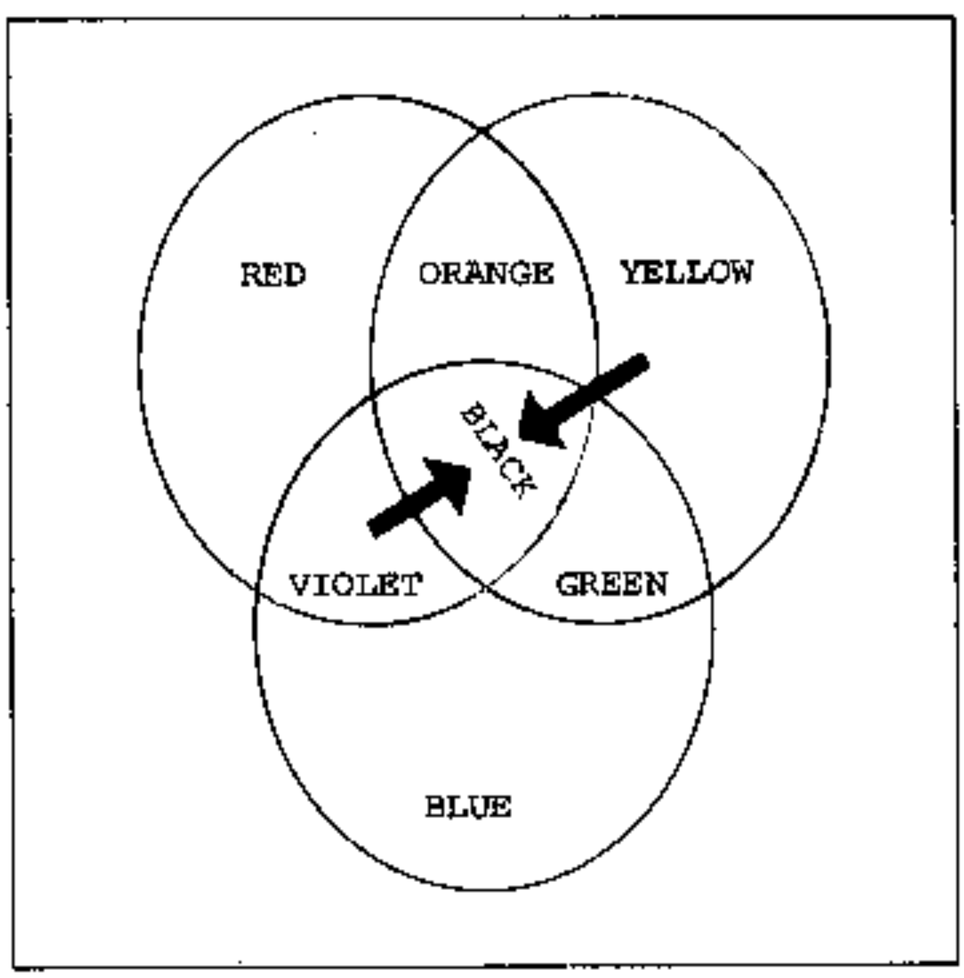
RED + BLUE = VIOLET

BLUE + YELLOW = GREEN

THE ROLE OF THE SECONDARY COLOURS

GREEN - ORANGE and VIOLET are said to be secondary to the primary colours that are diametrically opposite one another on the chromatic circle in that they are made up of two of the PRIMARY colours.

- If we mix three PRIMARY colours we obtain BLACK (colorimetric black).



Example : YELLOW + VIOLET = BLACK

BLUE+RED

BLUE + ORANGE = BLACK

RED+YELLOW

RED + GREEN = BLACK

BLUE+YELLOW

C/COLOUR MATCHING

- Carry out the basic principles of application (see wall chart).
- Spray the paint on to a sample plate, painted with surfacer, 200 x 200 mm.
- Polish an area of the vehicle alongside the repaired area.

D/CORRECTING THE MATCH

- A colour consists of 4 to 5 basic colours.
- Any colour difference is corrected by using the basic components of the formula otherwise there is a risk of metamerism occurring.

E/WHAT IS METAMERISM ?

Visually, metamerism results in any difference between the basic colour and the matching colour being accentuated by a change in the composition of the light under which it is observed.